



Harley Dykstra

PLANNING & SURVEY SOLUTIONS



Development Application

(Proposed Works Depo & Mobile Asphalt Plant)

DWER Works Approval and Licence Application

Lot 104 Rocky Crossing Road, Willyung

Prepared by Harley Dykstra Pty Ltd

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EXECUTIVE SUMMARY

GSS proposes to centralise their vehicle maintenance, administration and asphalt production to one location at the subject site. The Mobile Asphalt Plant MAP is currently operating at Lot 102 Mindijup Road, Albany, and will be relocated to Lot 104 Rocky Crossing Road, Willyung following receipt of all necessary approvals.

This application seeks planning consent from the **City of Albany** for the following:

Land Use:

- Storage of plant and equipment associated with asphalt production
- Office (incidental)
- Mobile Asphalt Plant
- Storage of materials associated with the preparation and production of asphalt

Development:

- Workshop shed (approximately 25m wide x 60m long x 6m high)
- Small office (approx. 12m wide x 25m long x 4m high)
- Mobile asphalt plant
- Earth bund (approx. 4m high x 130m long)
- Washdown bay

This application also seeks Works and Licensing approvals from the **Department of Water and Environmental Regulation** (DWER) for the following:

- Category 35 Asphalt Plant manufacturing

Prior to preparing this application, noise and air quality modelling was completed for the uses and development outlined in this application by two independent specialist consultants to support Amendment No. 4 to the City of Albany Local Planning Scheme No. 1. Through this process, targeted management measures and monitoring actions have been identified to mitigate potential risks to ensure any impacts on the local environment and amenity are negligible.

This application has been prepared in accordance with the conditions and land uses detailed in Amendment No. 4 to remove any complications with approval by the City of Albany.

This application incorporates, and expands upon, the environmental management measures and controls identified to ensure that air quality and noise emissions are able to be managed onsite and mitigate any risks posed on the neighbouring properties.

It is concluded that the operation of the MAP and development proposed for the subject site can be undertaken in an environmentally acceptable manner and in accordance with the relative conditions detailed in the Local Planning Scheme.

1 INTRODUCTION

Great Southern Sands (GSS) group of companies operate under Directorship of Mr Martin Shuttleworth, who is also the owner of Lot 104 Rocky Crossing Road (the 'subject site'). GSS is a well-established Western Australian company servicing land development and civil works throughout Western Australia.

This application seeks planning consent from the **City of Albany** for the following:

Land Use:

- Storage of plant and equipment associated with asphalt production
- Office (incidental)
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- Category 35 Asphalt Plant manufacturing

GSS proposes to centralise their vehicle maintenance, administration and asphalt production to one location at the subject site. The Mobile Asphalt Plant MAP is currently operating at Lot 102 Mindijup Road, Albany, and will be relocated to the subject site following receipt of all necessary approvals.

The workshop will be used to service the GSS fleet of heavy vehicles, which will be stored on site temporarily before being returned to operate offsite. A small office will be installed to provide administrative support.

Three hardstands will be constructed of compacted gravel or road base to accommodate the MAP, overnight parking for around 12 prime movers and temporary parking for heavy machinery being serviced.

Prior to submitting this development application, the City of Albany and WAPC approved Amendment No. 4 to the Local Planning Scheme No. 1. Amendment No. 4 enables Council to approval a number of additional land uses and activities on the subject site, including;

- Mobile asphalt plant
- Storage of plant and equipment associated with asphalt production
- Storage of materials associated with asphalt production
- Office and maintenance workshop.

At the time of preparing this application, Amendment No. 4 has been updated to include modifications requested by the Minister of Planning, and is awaiting gazettal.

As part of the Scheme Amendment process, noise and air quality modelling was completed for the uses and development outlined in this application by two independent specialist consultants. This modelling identifies targeted management measures and monitoring actions to mitigate potential risks to ensure any impacts on the local environment and amenity are negligible.

Approval of this application by the City of Albany and DWER is respectfully requested.

1.1. Approval Requirements

This proposal has been submitted concurrently to DWER (Works Approval and Licensing) and the City of Albany (Development Approval).

1.1.1. DWER Works Approval and Licence

Under Part V of the Environmental Protection Act 1986 (EP Act) a prescribed premises is required to obtain a Works Approval (for construction) and a Licence or Registration (for operation).

The purpose of a Works Approval is to allow the Department of Water and Environment Regulation (DWER) to assess the environmental acceptability of a proposal against relevant standards and policies. A Works Approval also contains conditions to ensure the premises can operate in an environmentally acceptable manner, and that the works themselves do not cause unacceptable environmental impacts. Conditions imposed within the works approval and subsequent operational license ensure that potential impacts are able to be adequately managed.

The works approval and license categories which are part of this application are outlined below:

Category 35 - Asphalt manufacturing: premises on which hot or cold mix asphalt is produced using crushed or ground rock aggregates mixed with bituminous or asphaltic materials for use at places or premises other than those premises.

The proposed Mobile Asphalt Plant (MAP) has an average capacity of 40 tonnes per hour – depending on the grade of aggregate employed, and is forecast to produce up to 10,000 metric tonnes per annum.

A copy of the completed DER Works Approval and Licence application form is provided in **Appendix A**.

This proposal is not considered to have a significant impact on the environment, based on the potential environmental impacts associated with the Mobile Asphalt Plant (MAP) and proposed management procedures, therefore referral to the Office of the Environmental Protection Authority (OEPA) under s.38 of the EP Act is not required.

As demonstrated in this report, the potential environmental impacts associated with the proposed MAP can adequately be addressed through the Works Approval / Licensing process under Part V of the EP Act.

1.1.2. Development Approval

The subject site is zoned 'General Agriculture' under the City of Albany Local Planning Scheme No.1 (LPS 1). In February 2015, the City of Albany resolved to initiate Amendment No. 4 to LPS 1 for the purpose of designating an Additional Use zoning (AU31) over Lot 104 Rocky Crossing Road to incorporate additional land uses and conditions for the development outlined in this application.

In accordance with AU31, the City of Albany has the discretion to approve the following land uses and development proposed in this development application:

- Plant and Equipment Storage and Maintenance
- Office (Incidental)
- Mobile Asphalt Plant
- Storage of materials associated with the preparation and production of asphalt

This application details the proposed development, and seeks planning approval from the City of Albany for the above land uses and development to occur on the subject site in accordance with the relevant conditions related to AU31.

1.2. Proponent Details

1.2.1. Company and Contact Details

The proponent for the application is Great Southern Sands. The primary point of contact in relation to the application is:

Proponent and Operator	Great Southern Sands
Registered Company Address	16 Anthony Road, Albany
Telephone	9845 7688
ABN	97 098 061 226
ACN	098 061 226
Director	Martin Shuttleworth
Mobile	0428 464 212
Fax	9842 6177
Email	mshuttleworth@shuttleworth.com.au
Postal Address	16 Anthony Road, Albany 6330

The primary point of contact from Harley Dykstra for town planning queries is:

David Congdon
Senior Town Planner / Land Development Consultant
Ph: (08) 9844 5100
Email: davidc@harleydykstra.com.au

A copy of the Great Southern Sands ASIC extract, as required by DWER is provided in **Appendix B**.

1.2.2. History with similar works

Great Southern Sands has extensive experience with the installation and operation of mobile asphalt plants, as well as other industrial and extractive industry activities. As previously mentioned, it is intended that the MAP currently located at Mindijup Rd will be relocated to Rocky Crossing Rd.

Examples of works approvals and licenses held by the GSS group of companies include:

- W5913/2015/1 – Mindijup Asphalt Plant
- L8786/2013/1 – John St Solid Waste Depot

1.2.3. Ownership and Location

The registered proprietor of the subject site is Achillies Pty Ltd, which is another company associated with the GSS group of companies under Directorship of Mr Martin Shuttleworth.

A copy of the Certificate of Title is attached at **Appendix C**.

Details of the landholdings and ownership are summarised in **Table 1** below.

Landowner: Achillies Pty Ltd					
Lot No.	Vol/Folio	Plan/Diagram	Area (Ha)	Road Name/No.	Encumbrances / Notifications
Lot 104	2616/525	DP49239	46.83	Rocky Crossing Road	Registered Mortgage

Table 1 – Landholding and ownership details

1.2.4. Surrounding Land Uses

Freehold land adjoining the subject site is zoned *General Agriculture* under the City of Albany Local Planning Scheme No. 1, and includes the Holcim quarry located approximately 250m to the north east. Rural Residential Area 12 (RR12) is located approximately 780m to the south west of the proposed MAP location.

The nearest sensitive land uses are provided in **Table 2** and illustrated in **Figure 1**.

Receptor Address	Distance from proposed Asphalt Plant
Lot 3 Rocky Crossing Road	350m east
Lot 7 Rocky Crossing Road	420m east
Lot 105 Rocky Crossing Road	780m east
Lot 202 Rocky Crossing Road	780m south

Table 2: Closest sensitive receptors



Figure 1 – Closest sensitive receptors

An Air Quality Assessment was completed by Ektimo in 2017 to forecast emission concentrates beyond the boundaries of the subject site. The assessment of the MAP and proposed development established that off-site impacts including odour and dust are predicted to be negligible.

A copy of the Air Quality Assessment is included at **Appendix D**.

Herring Storer have also completed an acoustic assessment, which predicts noise received at the neighbouring premises would comply with the Environmental Protection (Noise) Regulations 1997.

A copy of the Acoustic Assessment is included at **Appendix E**.

2.0 EXISTING ENVIRONMENT

2.1. Site Details

The subject site comprises Lot 104 Rocky Crossing Road, Willyung. The total area of the subject site is 46.8ha. The subject site is 11km from the Albany CBD via Chester Pass Road or 12km via Albany Highway.

Figure 2 shows the location of the site relative to the Albany township and surrounding areas.

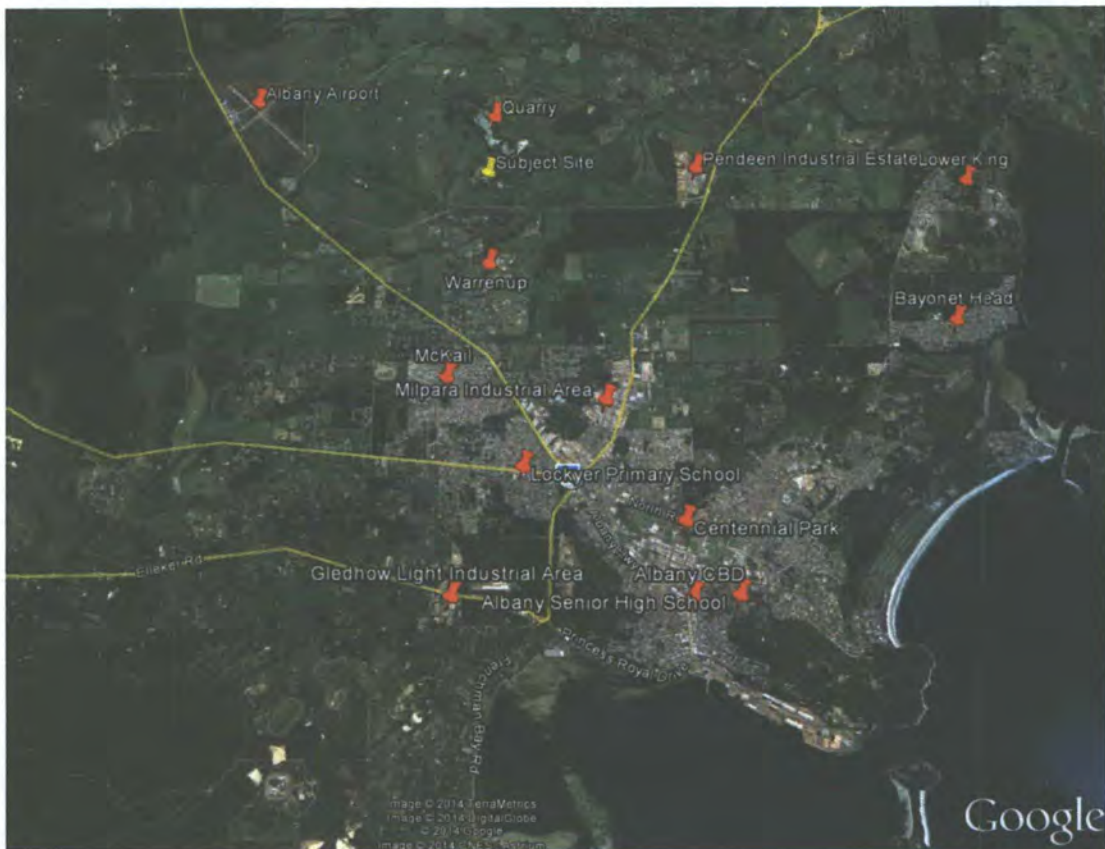


Figure 2: Location Plan

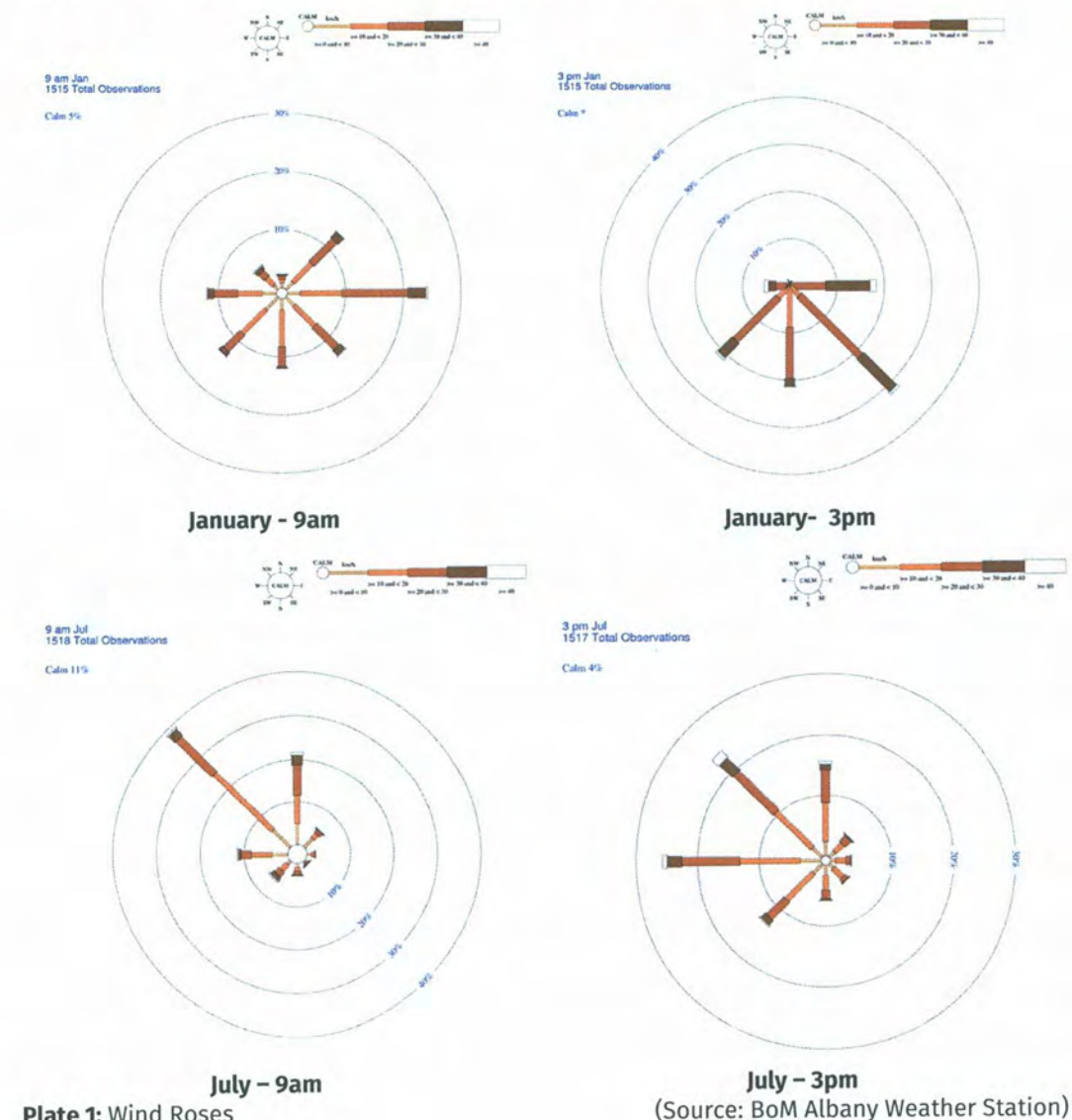
The subject site is largely cleared and has been previously used for approved extractive industry uses (gravel & sand). Limited grazing of cattle is currently undertaken to keep pastures maintained in a low fuel state across the site.

Further details of the site are provided in the following sections.

2.2. Climate

Albany has a Mediterranean climate, characterised by dry summers and wet winters. The average annual precipitation for the Albany Bureau of Meteorology Automatic Weather Station (BoM AWS) is approximately 929mm, with the majority of this falling between May and September (BoM, 2017).

Based on the data from the BoM AWS at Albany Airport, located 3km to the east of the site, winds at the site are broadly distributed with slightly higher frequencies from the south east and from the North West. Less frequent breezes are from the south.



2.3. Topography

The subject site consists of undulating farmland and includes extractive industry activities. Dominant features of the subject site include:

A ridgeline with a small hillock in the central western portion of the subject site, with the northern portions of the ridgeline forming the lower slopes of Mount Willyung;
Mostly eastern facing slopes sloping down to Rocky Crossing Road, with a small portion of the site sloping south (south west corner) and west (north west corner);

Although not depicted by the contours shown on plans supporting this application, Menang Drive has a significant cut adjacent to the southwest corner of the subject site. Existing vegetation within Menang Drive provides some visual screening of the site.

The topography of the subject site is well suited to the proposal, ensuring it can be well screened from surrounding land uses and there is minimal impact on the agricultural landscape in the locality.

2.4. Hydrology

The subject site does not contain any permanent surface water flows, however some surface water flows occur in the west-east valley during the winter months. Shallow groundwater of the subject site is located in two areas, being the northwestern corner (with associated soak/small wet area) and in the west-east valley.

The landowner has advised the following in relation to water on the subject site:

- The northwestern soak has a finite source and is not part of the larger aquifer system (which reduce water flows in summer months); and
- There are some perched groundwater tables throughout the subject site.

2.5. Vegetation and Flora

The majority of the subject site is under pasture, or forms extractive industry, hence being cleared of remnant vegetation. There is a stand of native vegetation located to the south west portion of the subject site.

Further vegetation clearing on the subject site is not required to implement the proposal.

2.6. Fauna and Habitat

Based on the isolated and small area of the site containing native vegetation, there is no significant fauna habitat opportunities present.

2.7. Cultural Heritage

A search of the following databases confirms there are no registered cultural interests on the subject land:

- Aboriginal Heritage Inquiry System (2018)
- State Heritage Office (iNHerit) (2018)
- City of Albany Municipal Heritage Inventory (2018)

3.0 PROPOSED SITE USE AND DEVELOPMENT

3.1. Proposed Site Layout and Uses

The following activities and development are proposed for the subject site:

Workshop – a workshop is proposed to be used exclusively for the servicing and maintenance of the GSS group of company vehicles. Details of the workshop are illustrated on the Site Plan and included in **Appendix H**.

Office – The office will be incidental to the MAP and workshop, and will provide a base for administration tasks associated with the operation of the business. Details of the office are illustrated on the Site Plan and included in **Appendix H**.

Machine Wash-down bay – This area will be used for the cleaning of GSS company vehicles and equipment. The machine wash-down bay will be sealed and fitted with appropriate oil separators to capture contaminants.

Mobile Asphalt Plant (MAP) – to be located in the northwestern corner of the subject site, including; aggregate bins, control room, mixing barrel, baghouse and finished product bins.

Laydown/Hardstand Areas – These areas will be utilized for the MAP, parking of the GSS commercial vehicles, associated attachments, storage of aggregates, fuel and other materials and equipment required for asphalt production. Around 12 prime movers associated with GSS will be parked on the site overnight, and screened from view by vegetation.

Bunding – a 4m high earth bund, approximately 130m long, will be located to the east of the MAP to assist with noise attenuation. Seeding of the bund is proposed to minimise wind erosion.

Vegetation screening – screening of development will be provided by suitable vegetation growing to a minimum mature height of 2m as shown on the site plan, and having regard to the visual amenity of the surrounding landowners.

Vehicles accessing the site will enter and exit from the existing connection onto Rocky Crossing Road. Internal access way will be sealed to minimise dust emissions. The road will be sealed to a width of 4 metres, with a 6m horizontal clearance and appropriate passing bays to comply with bushfire and operational requirements.

At full peak production the site could generate 20 truck movements per day (Note: A truck movement is classified as a one way journey to or from the site). This equates to an average of two truck movements per hour during peak demand.

The proposed site layout is shown on the Site Plan included at **Appendix G**.

3.2. Hours of Operation

The proposed times for operation of the MAP and maintenance of plant and equipment are:

- 7.00 am – 5.00pm
- Monday – Saturday (excluding public holidays)

3.3. Personnel

Fourteen people will be employed on site including four for asphalt production, six subcontractors for vehicle servicing and the remainder being support staff.

3.4. Asphalt Manufacturing Plant

The asphalt plant is semi-mobile and designed to be placed on a firm hard surface such as a stabilised gravel hardstand. When erected, the plant itself takes up approximately 400m², including aggregate bunkers, control room, mixing barrel, baghouse and finished product bins.

3.4.1. Summary

Manufacturing infrastructure includes:

- cold aggregate feeder bins
- rotating heater/dryer drum
- pug-mill for mixing heated aggregate and liquid bitumen
- gob-hopper for loading trucks

Integrated infrastructure includes:

- bag house
- diesel-heated 40,000 litre mobile bitumen tanker

Support infrastructure includes:

- front-end loader
- aggregate stock piles stored in 3-sided aggregate steel bins
- 60,000 litre on-site bunded fuel tank
- diesel generator

Raw materials and fuels required for energy will include

- Four grades of aggregate plus sand
- Bitumen
- Diesel fuel

No fillers other than recovered bag house dust will be included in the manufacturing process.

3.4.2. Asphalt Plant Operation

Asphalt will be manufactured via a batch mix process in which an enclosed conveyor feeds aggregate from a cold feed unit into a sealed, insulated and clad rotary dryer. The aggregates are stockpiled and will be stored in steel bins before being transferred to the feed unit via a loader.

In the diesel-fired dryer, the aggregate is heated to approximately 160 degrees centigrade (°C) before being transferred to the pug mill which is fully insulated and enclosed to retain heat and minimise dust and odour emissions. Bitumen is then injected hot into the pug mill and is mixed with the hot aggregate with any other required material (e.g. colouring agents, etc.) via a twin shaft paddle mixer. Bitumen is stored onsite in a sealed 40,000 litre (L) tank, which is kept heated to prevent the bitumen from solidifying. The mixture is then deposited to an elevated diesel heated storage vessel for discharge to asphalt trucks for transport.

Combusted air is exhausted through a baghouse filter prior to discharge to the atmosphere via a 6.1 metre high stack. The filter contains 224 bags, with a filter area of 240m². The baghouse incorporates an automatic reverse-pulse cleaning system with fine particulate matter returned to the mixer via a screw conveyor. The manufactures specifications for the baghouse states that dust concentration in the filtered air will be less than 20 milligrams per cubic metre (mg/m³).

3.4.3. Bag House

The baghouse consists of a two levels system where course particles in the air stream are removed via a gravity collector and fine particles collected in air-filtration bags. The total capacity of the baghouse filter is 27,000 cubic metres per hour (m³/hr), and incorporates an automatic reverse pulse cleaning system to return accumulated dust in the filtration bags to the pug mill. Filtered air is then discharged via a vertical stack on the bag house.

Filter bags are of American heat-resistant *Nomex* material with a maximum instantaneous temperature of 235°C. Elastic clamps secure bags to the bag frame to facilitate fast and secure installation and replacement. Access to the bag house for periodic inspection and bag replacement is via the bag house top cover. The upper level of the baghouse normally operates below atmospheric pressure where bag cleaning is achieved via a pulsing system that is a reverse flow of normal atmospheric pressure into the upper chamber.

Dust collection bags are periodically pulsed to shake loose collected dust. A screw auger returns both gravity and pulsed dust to the filler elevator where dust is re-incorporated into the manufacturing process.

Aggregate heating and baghouse filtration is an integrated system designed to operate between 80° and 180°C. The integrity of the bag house is insured via air temperature monitoring at the induction fan. A short-term limit of 220°C is allowed with an over-temperature cut-out at 230°C. Also, an alarm is set to alert the operator in the event that the temperature drops to 80°C. The over-temperature stop device consisting of a cold-fan valve on the inlet of the baghouse ensuring that temperatures within the baghouse do not exceed the short-term temperature limit - in the event that temperature exceeds the cut-out value, the control system will cut off fuel to the burner in the dryer/heater drum.

The temperature control system not only protects the integrity of the baghouse, but also ensures that product quality is maintained by ensuring the drum temperature remains within

defined limits - this also prevents blue-smoke emissions arising from over-temperature exceedances. In an older generation of plants, blue-smoke emissions arising from overheating were a major cause of odour emissions.

3.4.4. Diesel Fuel

Diesel fuel will be stored on site in a 60,000 (60m³) litre tank bunded to accommodate 110% of the volume of the storage tank (66,000 litres).

3.4.5. Bitumen

Bitumen will be stored on-site in a mobile 40,000 litre heated/stirred container. The temperature of the stored bitumen will be maintained using an on-site generator.

Integrated Asphalt Manufacturing Plant	Tietuo Machinery QLB-40
Average Capacity of Machinery	40 tonnes per hour
Stack height	6.1 m
Plant Motive Power	Diesel Generator
Heater/Dryer Drum Burner	Diesel Fuel
Bitumen Tank Temperature	Electric, via Diesel Genset
Cold Aggregate Bins	5
Bitumen Storage and Heating Tank	40,000 litres
Installed Diesel Storage	5,000 litres
Water for dust control & safety	20,000 litres
Installed Genset	400 KVa
Asphalt maximum daily production	400 tonnes
Estimated Annual Production if fully utilised	< 10,000 tonnes
Baghouse	
Dust Collection Area	240 m ²
Operating Temperature	80°C to 180°C
Maximum Temperature	230°C
Dust Collection	224 Nomex Bags
Dust Collection Efficiency	Better than 99%

Table 3: Mobile Asphalt Plant data

4.0 POTENTIAL IMPACTS AND PROPOSED MANAGEMENT

4.1. Dust Emissions & Dust Management Plan

All internal access roads will be sealed to minimise dust associated with vehicle movements, however dust may be generated from compacted gravel hardstand areas. To overcome this problem the following mitigation measures are proposed:

Application of dust ameliorants on the surfaces of all hardstands; and

Regular watering with water cart to suppress dust during drier months, or as required.

Given the relative separation of the proposed hardstands from surrounding properties, it is anticipated that any dust generated will be insignificant. The GSS group of companies owns multiple water carts, therefore any situation where dust from gravel surfaces or activities becomes an issue can be resolved quickly.

The main potential sources of dust during the operational phase of the project include:

- Delivery and storage of aggregates and sand;
- Trafficable areas such as the roads and hardstand areas; and
- Stack emissions from the plant.

Table 4 provides a summary of the environmental management actions to be implemented to minimise dust emissions.

Aspect	Environmental Management Action
Delivery and storage of aggregates/sand	<ul style="list-style-type: none"> ▪ Sand and aggregate delivery vehicles will be tarped to prevent windblown dust. ▪ Sand and aggregates will be preconditioned to ensure they are damp upon delivery to site. ▪ Stockpiles to be subject to water mist or sprays to maintain surface moisture to dust extinction levels, particularly during warm and windy weather. ▪ Component aggregate stored onsite in three sided bins and managed in stockpiles no higher than the bin height.
Trafficable areas	<ul style="list-style-type: none"> ▪ The main internal access road shall be sealed to minimise dust associated with vehicle movements. ▪ Vehicle speeds on site will be restricted to 10 km/hr. ▪ A front end loader will be used to manage the stockpiles and load component aggregate into the individual pug mill hoppers as required. Material within the pug mill hoppers will be subject to water mist or sprays to maintain surface moisture to dust extension levels, particularly during warm and windy weather.
Hardstand & Bund	<ul style="list-style-type: none"> ▪ Application of dust ameliorants on the surfaces of all unsealed hardstands and to the bund.

	<ul style="list-style-type: none"> ▪ Regular watering with water cart to suppress dust during drier months, or as required. ▪ Seeding to Bund to minimise long term erosion.
Stack emissions	<ul style="list-style-type: none"> ▪ The plant is serviced by a baghouse which minimises dust emission via the stack. ▪ The plant is fitted with a broken bag detection system which alerts the operator to bag failures. This enables the operator to shutdown the plant to prevent dust emissions. ▪ The baghouse will be inspected and serviced in accordance with manufacturer's specifications. ▪ Periodic monitoring will be undertaken in accordance with the DWER Licence to confirm the effectiveness of the baghouse and confirm emissions are within acceptable limits.

Table 4: Dust Emissions – Environmental Management Actions

The proposed environmental management actions ensure the risk of dust impact on amenity or health to the surrounding areas is low.

Monitoring

Stack monitoring will be undertaken in accordance with the Prescribed Premises Licence. Any breach of licence limits shall be reported to the DWER as soon as practicable in accordance with reporting requirements specified in the Licence. In addition, reports shall be submitted to the DWER summarising stack testing results.

Visual monitoring of dust emissions shall be undertaken by site personnel on an ongoing basis. Continual visual monitoring shall be used to confirm dust control measures are adequate.

Remedial Measures

The monitoring of air emission control measures will be the ultimate responsibility of the Asphalt Operations Manager. Should the management actions outlined in **Table 4** be insufficient, the operator will investigate and develop further strategies to address air emission issues.

4.2. Noise Emissions

Noise emissions are regulated by the Environmental Protection Act 1986 and the Environmental Protection (Noise) Regulations 1997.

The Regulations require that noise emitted from any premises must comply with assigned noise levels when received at any other premises and be free of the intrusive characteristics of tonality, modulation and impulsiveness.

The main sources of potential noise arising from the proposed operation include:

- Workshop;
- Machinery and Vehicle Movement; and
- Mobile Asphalt Plant.

An acoustic assessment was prepared by Herring Storer Acoustics to support the proposed development, a copy of which is included at **Appendix E**. The acoustic assessment identifies that for the proposed operating times, noise received at the nearest neighbouring premises would comply with the requirements of the Environmental Protection (Noise) Regulations 1997, with incorporating the following mitigation measures:

- Plant stack attenuated by 14dB(A) to a sound power level of 98dB(A);
- Boiler to be located within a metal clad shed, with opening to the east;
- A 4 metre bund to be located along the eastern side of the plant; and
- Sound power of the plant (excluding the boiler) to be limited to 102dB(A).

As a precaution the following noise management measures will also be implemented for the construction phase at the site:

- Construction Activities will be undertaken in accordance with the Environmental Protection (Noise) Regulations 1997.
- All mobile equipment will be fitted with appropriate muffler systems.
- Speed limited of vehicles onsite will be restricted to 10 km/hr.
- Immediate neighbours of the site will be notified on the proposed commencement date and duration of construction works prior to works onsite commencing.
- Great Southern Sands complaints register will be used to record any complaints received in relation to construction of the proposed development on the site. Any complaints received will be investigated and management/contingency actions implemented as required.
- A notice will be erected on the site boundary advising of the contact details of the personnel responsible for the construction program.

4.3. Odour Emissions

Hotmix asphalt has a characteristic odour that is present during the manufacture, loading, transportation and application to a roadway.

An air quality assessment has been undertaken for the operation of the MAP on the subject site (Ektimo, 2017). The approved AERMOD dispersion model was used to predict the peak ground level concentrations resulting from the emissions to air of the various pollutants from the 6.1 metre tall asphalt plant vent stack and from the heated bitumen tank, using site representative meteorological data from the nearby BoM AWS at Albany Airport, 3km to the west of the site. A full copy of this report is provided in **Appendix D**.

Emission rate data from the vent stack and heated bitumen tank used in the assessment were based on measurements detailed in the EML Air test report 91872 for a comparable capacity and type of plant using Class 170 low Sulphur bitumen.

Individual Pollutant emissions from the asphalt plant vent stack and heated bitumen tank are presented in **Table 5 and 6**

Classified Indicator Species	Emission Factor (kg/tonne) (USEPA AP42 March 2004, Emission Estimation Tables Hot Mix Asphalt Plant - Batch Mix with No. 2 Fuel Oil)	Source Notes	kg/hr species emission rate for 30 tonnes/hour production	grams/second species emission rate for 30 tonnes/hour production
PM10	0.0135	Table 11.1-1 for Fabric Filter	0.41	0.11
PM2.5	0.00905	67% of PM10, Table 11.1-2	0.27	0.075
CO	0.20	Table 11.1-5	6.0	1.7
NOx as NO2	0.060	Table 11.1-5	1.8	0.50
SO2	0.044	Table 11.1-5	1.3	0.37
Asphalt Fume (as non-methane VOCs)	0.0041	Table 11.1-6 for non-methane VOC	0.12	0.034
Arsenic	0.00000023	Table 11.1-11	0.0000069	0.0000019
Beryllium	0.00000075	Table 11.1-11	0.0000023	0.0000063
Cadmium	0.00000031	Table 11.1-11	0.0000092	0.0000025
Chromium (total)	0.00000029	Table 11.1-11	0.0000086	0.0000024
Hexavalent Chromium	0.00000024	Table 11.1-11	0.0000072	0.0000020
Copper fume and mists	0.00000014	Table 11.1-11	0.000042	0.000012
Lead	0.00000089	Table 11.1-11	0.000027	0.0000074
Manganese	0.00000069	Table 11.1-11	0.00021	0.000058
Mercury (organic)	0.00000021	Table 11.1-11	0.000062	0.0000017
Nickel	0.00000015	Table 11.1-11	0.000045	0.000013
Selenium	0.00000025	Table 11.1-11	0.000074	0.0000020
Zinc	0.00000034	Table 11.1-11	0.00010	0.000028
Acetaldehyde	0.00016	Table 11.1-9	0.0048	0.0013
Benzene	0.00014	Table 11.1-9	0.0042	0.0012
Ethylbenzene	0.0011	Table 11.1-9	0.033	0.0092
Formaldehyde	0.00037	Table 11.1-9	0.011	0.0031
Toluene	0.00050	Table 11.1-9	0.015	0.0042
Xylene	0.0014	Table 11.1-9	0.041	0.011
Total PAHs (assumed as BaP TEQ)	0.000055	Table 11.1-9 for PAH HAP's	0.0017	0.00046
Notes:				
The plant will operate only during daylight hours, nominally from 7am to 5pm, which is <5% of time between 7am-5pm; and <2% overall.				
The plant will typically work with Class 170 bitumen which is low sulphur.				

Table 5: Individual pollutant emissions from the MAP plant vent stack (Source: Ektimo, 2017)

Classified Indicator Species	Emission Factor (kg/L)	kg/hr species emission rate	grams/sec species emission rate	Comments
Particulates as PM10 and as PM2.5	2.4E-04	0.014	0.0039	Specifications from a typical vendor (Astec) for a diesel fired heated bitumen tank based on use of 59.1 L/hour use of No. 2 Fuel Oil. These are based on AP42 Table 11.1-13, 1995. These emissions are assumed constant, 7am to 5pm, 7 days per week. Note specifications provided in Appendix.
SO2	8.9E-03	0.52	0.15	
CO	6.3E-04	0.037	0.010	
NOX as NO2	2.4E-03	0.14	0.039	
Asphalt Fume (as 100% of C5-C20 VOC's)	6.4E-04	0.038	0.011	
Formaldehyde	4.2E-07	0.000025	0.0000069	
Total PAH's (assessed as BaP TEQ)	2.7E-06	0.00016	0.000044	

Table 6: Individual pollutants emissions from the MAP heated bitumen tank (Source: Ektimo, 2017)

The following environmental management actions and controls are proposed to be undertaken in relation to odour management.

Aspect	Environmental Management Action
Stack and Bitumen Tank	<ul style="list-style-type: none"> The bitumen product to be used is a low sulphur bitumen that has been "cut" during production of shorter chain odorous hydrocarbons specifically to reduce odour. This is now widely used in asphalt manufacture around Australia.
	<ul style="list-style-type: none"> The bitumen is stored in heated storage tanks which are fitted with condensers on the head-space vents so that any volatile odorous emissions are condensed to liquid that drops back to the tank.
	<ul style="list-style-type: none"> The plant is fuelled by refined distillate rather than heavier fuel oil, further reducing the emission of partially combusted organics and volatile organic compounds and also combustion gases.
	<ul style="list-style-type: none"> Flue gas from the aggregate drying process and bitumen mixing are recirculated through the burner combustion zone to further reduce volatile organic emissions before being ducted through a baghouse fabric filter system, then to the atmosphere via a 6.1 m stack.
	<ul style="list-style-type: none"> The asphalt product will be produced at temperatures typically less than 175°C which is below the threshold of 180°C for blue smoke emissions that can contain excessive odours and volatile organics.
Loadout	<ul style="list-style-type: none"> The covered load-out conveyor (that transports asphalt upwards into the small storage bucket) will mitigate any residual odours from dispersing into the atmosphere.

	<ul style="list-style-type: none"> The manufactured asphalt will typically be loaded out into trucks direct from the batch process. A small 8 cubic metre elevated bucket may temporarily hold a single produced batch for short periods until a truck arrives for loadout. The duration of the fugitive emissions from the loadout process are reduced by the speed of the loading from the batch process onto tray trucks, which usually takes less than two minutes before the tray is covered and the truck driven from site.
Transport	<ul style="list-style-type: none"> Trucks with asphalt are to leave the site with the trays tarped to reduce residual odour emissions.
Monitoring	<ul style="list-style-type: none"> Odour monitoring will be undertaken in response to significant changes to processes and/or equipment which have the potential to impact odour emissions.
	<ul style="list-style-type: none"> In the event that monitoring indicates the odour emissions are excessive, the operator will immediately investigate and implement appropriate measures to reduce odour to acceptable levels.

Table 7: Odour Emissions – Environmental Management Actions

These environmental management actions and controls will ensure odorous emissions from the asphalt operations satisfy the expected condition for no offensive odours beyond the boundary, and any emissions are unlikely to give rise to complaint at the nearest semi-rural residences.

4.4. Hydrocarbons - Storage and Usage

Mobile Asphalt Plant construction vehicles and equipment have the potential to spill or leak hydrocarbons. The highest risk times are during refuelling, servicing or equipment breakdowns. In order to minimise this risk the following management measures are proposed:

- All operations will be conducted on a hardstand that will prevent loss of hydrocarbons to the underlying soil and facilitate any potential spill clean ups.
- Hydrocarbon spill clean-up kits to be available onsite and used in the event of a spill.
- All vehicles and equipment to be utilised onsite are to be regularly serviced and maintained.
- Diesel fuel will be stored in accordance with DWER bunding requirements, and within a bunding compound that is capable of containing 110% of the volume stored. The integrity of the bunds is to be inspected regularly.
- Where practical, re-fuelling of vehicles and equipment is to be undertaken offsite. In the event of refuelling activities occurring onsite, spill catchment trays shall be deployed to capture any leaks and spills during the process.
- Any spills and associated clean-ups are to be documented.
- Fuel/chemical storage requirements and spill clean-up and reporting procedures are to be made available to all personnel onsite and are to be included within the site induction package.

As associated with most modern workshops, there is a presence of hydrocarbons and other associated chemicals used in vehicles. It is proposed that waste products from the workshop are captured within a purpose-built 'EVAC' system. The waste captured in this system will be removed at regular intervals by a contractor and disposed of accordingly.

4.5. Chemical Management

The storage and use of chemicals onsite has the potential to cause localised soil, groundwater and stormwater contamination if not managed appropriately. Bulk storage of chemicals (i.e. – 1,000m³ or more) requires a works approval and license from DWER. The aggregate volume of chemicals stored on the property is approximately 100m³, and below the DWER threshold.

Chemicals stored and used onsite include:

- Bitumen (40m³)
- Hydrocarbons (e.g. Diesel 60m³)
- Small quantities of miscellaneous chemicals (e.g. solvents, oils and greases).

In order to prevent uncontrolled releases of these products the following management actions will be implemented.

Activity	Environmental Management Plan
Storage	<ul style="list-style-type: none"> ▪ Bulk storage tanks will be stored in bunded areas, or be self bunded, in accordance Australian Standards. ▪ Filling of the bitumen kettles and diesel storage tank will be undertaken by trained professionals. ▪ An inventory, detailing the category, volume and location of chemical will be maintained. ▪ Chemicals stored onsite will be kept in sealed and correctly labelled containers. ▪ Safety Data Sheets (SDS) will be made available for each stored chemical. ▪ Staff will be trained in the correct storage methods for chemical goods. ▪ All drums will be stored on either permanent concrete bunds or portable storage bunds. ▪ The diesel generator and storage tank will be installed in accordance with the requirements of the Dangerous Goods Licence applicable to the site.
Chemical Usage	<ul style="list-style-type: none"> ▪ Staff will be trained to use chemicals in accordance with standards, internal procedures and manufacturers' recommendations. ▪ Bulk transfer of bitumen and diesel is undertaken in hardstand areas.
Incident Response	<ul style="list-style-type: none"> ▪ Training will be provided to staff in regard to spill response equipment and its use. ▪ Spill response equipment will be maintained in good working order. ▪ Any spills will be reported to the Site Manager immediately. ▪ Any chemicals resulting from spills or leaks will be removed and disposed of by licenced contractors.

Table 8: Chemicals storage and use – Environmental Management Actions

Monitoring and Remedial Measures

GSS will undertake regular inspection of chemical storage areas to ensure adequate handling, storage and disposal procedures are followed. Actions arising from inspections shall be recorded, allocated to a responsible person and closed out in a timely manner.

In the event of a significant spill, GSS will implement the emergency response procedures for the site which includes mobilising a specialist spill response contractor to control, contain and clean up the spill.

4.6. Stormwater and Drainage Management

Rainwater from rooftops will be harvested and collected in a 50,000 litre water tank. All other stormwater generated on-site will be directed to existing swales and a clay lined dam situated downslope.

Detailed stormwater designs drawings may be provided to support a subsequent building application.

4.7. Visual Impacts

The subject site can be described as an 'Undulating Rural Landscape' by *Visual Landscape Planning in Western Australia*. It contains natural features such as undulating terrain, a ridgeline and wide valley, with scattered remnant vegetation.

Visual Landscape Planning in Western Australia suggests the following principles and guidelines be applied when planning for development within the 'Undulating Rural Landscape':

Retain remnant vegetation throughout the landscape.

Ensure that structures are not located on the skyline as seen from important viewing locations.

Revegetate cleared ridgelines, to maintain the sense of elevation of these features that becomes diminished when vegetation is lost.

Valued views should be maintained by not siting buildings in locations that are prominent in views, for example, at focal points or from panoramic lookout points.

View corridors should be maintained to important elements in views, such as a vista to a scarp, and not inadvertently screened by buildings, dense roadside planting or plantations.

Development of the subject site seeks to protect the visual elements of the site by:

- Retaining remnant vegetation throughout the site;
- Providing for visual screening fronting Menang Drive and Rocky Crossing Road to screen proposed development; and
- Ensuring development is not located on prominent ridgelines. Where development is proposed to be on the side of ridgelines, it is located lower than the high point of the ridgeline and has vegetation which also provides a visual offset, meaning the development is not the prominent aspect in the landscape;

A Visual Impact Assessment has been prepared to illustrate the likely impacts of the proposed development on the surrounding landscape, a copy of which is attached at **Appendix H**.

5.0 PLANNING CONSIDERATIONS

5.1. City of Albany Local Planning Scheme No. 1

The subject site is zoned General Agriculture under the City of Albany Local Planning Scheme No.1 (LPS 1).

In February 2015, the City of Albany resolved to initiate Amendment No. 4 to LPS 1 for the purpose of designating an Additional Use Site (AU31) over Lot 104 Rocky Crossing Road to incorporate additional land uses and conditions for the development proposed in this application.

Clause 4.5 of LPS 1 states the following in relation to the *Additional Uses* category:

"Despite anything contained in the Zoning Table, the land specified in Schedule 2 may be used for the specific use or uses that are listed in addition to any uses permissible in the zone in which the land is situated subject to the conditions set out in Schedule 2 with respect to that land.

Note: An additional use is a land use that is permitted on a specific portion of land in addition to the uses already permissible in that zone that applies to the land."

AU 31 introduces a number of additional land uses and activities to enable the City of Albany to approve on the subject site, including;

- Mobile Asphalt Plant
- Storage of materials associated with the preparation and production of asphalt
- Plant and equipment storage and maintenance
- Office

This application has been prepared in accordance with the conditions and land uses detailed in Amendment No. 4, and seeks planning consent from the City of Albany for the following:

City of Albany - Land Use:

- Plant and Equipment Storage and Maintenance
- Office (incidental)
- Mobile Asphalt Plant
- Storage of materials associated with the preparation and production of asphalt

City of Albany - Development:

- Workshop shed (approximately 25m wide x 60m long x 6m high)
- Small office (approx. 12m wide x 25m long x 4m high)
- Mobile asphalt plant
- Earth bund (approx. 4m high x 130m long)
- Washdown bay

This application incorporates, and expands upon, the environmental management measures and controls identified to ensure that air quality and noise emissions are able to be managed onsite and mitigate any risks posed on the neighbouring properties.

At the time of preparing this application, Amendment No. 4 has been updated to include modifications requested by the Minister of Planning, and is awaiting gazettal. Once gazetted, the City will be able to issue planning approval.

5.2. SPP 3.7 Planning in Bushfire Prone Areas

The site has been designated bushfire prone under the Department of Fire and Emergency's Bushfire Prone mapping, and requires an assessment of the bushfire risk posed to future development on the site to support a planning application.

A Bushfire Management Plan (BMP) has been prepared for the site, with a copy of the BMP included within **Appendix F**.

The BMP confirms a manageable bushfire risk to the proposed development.

6.0 SUMMARY AND CONCLUSIONS

GSS proposes to centralise their vehicle maintenance, administration and asphalt production to one location at the Lot 104 Rocky Crossing Road, Willyung. The Mobile Asphalt Plant (MAP) is currently operating at Lot 102 Mindijup Road, Albany, and will be relocated to the subject site following receipt of all necessary approvals.

The workshop will be used to service the GSS fleet of heavy vehicles, which will be stored on site temporarily before being returned to operate offsite. A small office will be installed to provide administrative support.

Three hardstands will be constructed of compacted gravel or road base to accommodate the MAP, overnight parking for around 12 prime movers and temporary parking for heavy machinery being serviced.

The activities and potential impacts associated with the site construction, commissioning and operation of the MAP and proposed development are:

- Dust generation
- Odour generation
- Noise generation
- Spills from temporary storage of liquids onsite

The potential risk associated with these impacts has been assessed to be low (see section 4). Noise and Air Quality Modelling has been completed for the proposed development by two independent specialist consultants. Through this process, targeted management measures and monitoring actions have been identified to mitigate potential risks to ensure any impacts on the local amenity are negligible.

Based on the assessments undertaken for this site it is concluded that the proposed development and operation outlined in this application can be undertaken in an environmentally acceptable manner, and in accordance with the planning conditions detailed in LPS1.

APPENDIX TABLE

- APPENDIX A- DWER WORKS APPROVAL AND LICENCE APPLICATION FORM
- APPENDIX B- ASIC COMPANY EXTRACT
- APPENDIX C- CERTIFICATE OF TITLE
- APPENDIX D – AIR QUALITYYY ASSESSMENT
- APPENDIX E – NOISE ASSESSMENT
- APPENDIX F – BUSHFIRE MANAGEMENT PLAN
- APPENDIX G –SITE PLAN
- APPENDIX H –BUILDING PLANS

APPENDIX A

DWER WORKS APPROVAL AND LICENCE APPLICATION FORM

APPENDIX B

ASIC COMPANY EXTRACT

APPENDIX C

CERTIFICATE OF TITLE

WESTERN



AUSTRALIA

RECORD OF CERTIFICATE OF TITLE
UNDER THE TRANSFER OF LAND ACT 1893

REGISTER NUMBER	
104/DP49239	
Duplicate Edition	DATE DUPLICATE ISSUED
2	14/3/2008

VOLUME
2616FOLIO
525

The person described in the first schedule is the registered proprietor of an estate in fee simple in the land described below subject to the reservations, conditions and depth limit contained in the original grant (if a grant issued) and to the limitations, interests, encumbrances and notifications shown in the second schedule.


REGISTRAR OF TITLES**LAND DESCRIPTION:**

LOT 104 ON DEPOSITED PLAN 49239

REGISTERED PROPRIETOR:
(FIRST SCHEDULE)

ACHILLIES PTY LTD OF 61 PEELS PLACE, ALBANY

(T K522899) REGISTERED 29 FEBRUARY 2008

LIMITATIONS, INTERESTS, ENCUMBRANCES AND NOTIFICATIONS:
(SECOND SCHEDULE)

1. K522900 MORTGAGE TO NATIONAL AUSTRALIA BANK LTD REGISTERED 29.2.2008.

Warning: A current search of the sketch of the land should be obtained where detail of position, dimensions or area of the lot is required.

* Any entries preceded by an asterisk may not appear on the current edition of the duplicate certificate of title.

Lot as described in the land description may be a lot or location.

-----END OF CERTIFICATE OF TITLE-----

STATEMENTS:

The statements set out below are not intended to be nor should they be relied on as substitutes for inspection of the land and the relevant documents or for local government, legal, surveying or other professional advice.

SKETCH OF LAND:	DP49239.
PREVIOUS TITLE:	1728-83.
PROPERTY STREET ADDRESS:	LOT 104 ROCKY CROSSING RD, WILLYUNG.
LOCAL GOVERNMENT AREA:	CITY OF ALBANY.

APPENDIX D

AIR QUALITYY ASSESSMENT



Address (Head Office)
427 Canterbury Road
SURREY HILLS VIC 3127

Postal Address
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COCKBURN CENTRAL WA 6164

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Report R003902

**Air Quality Assessment
of Various Emissions to Air
from a Hot Mix Asphalt Plant
near Albany, Western Australia**

Great Southern Sands

REPORT

Document Information

Client Name: Great Southern Sands
Report Number: R003902
Date of Issue: 27 February 2017
Attention: David Congdon (c/o Harvey Dykstra Planning and Survey Solutions)
Address: 19 Anthony Road, Albany, WA 6330

Report Status

Format	Document Number	Report Date	Prepared By	Reviewed By
Draft Report	R003902[DRAFT]	14 February 2017	ALe	
Final Report	R003902	27 February 2017	ALe	DCo
Amend Report				

Amendment Record

Document Number	Initiator	Report Date	Section	Reason
Nil	-	-	-	-

Report Authorisation



Ektime
A. Lewis
Air Quality Environmental Consultant

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1 EXECUTIVE SUMMARY

Great Southern Sands are proposing to operate a small 30 metric tonnes per hour mobile asphalt batch plant on a property at Lot 104 Rocky Crossing Road, Willyung, Albany, Western Australia.

The diesel fuelled plant is proposed to operate during daylight hours only (nominally 7am to 5pm) and is forecast to produce up to 5,000 metric tonnes per annum which would take approximately 170 hours per year at the design production rate. Raw aggregate materials would be sourced from local quarries and standard low sulphur Class 170 bitumen would be periodically delivered by tanker truck and stored in a diesel fuelled heated bitumen storage tank. The proposed plant is new and has been purchased specifically for this forecast production.

Ektimo have been engaged by Harvey Dykstra Planning & Survey Solutions, on behalf of Great Southern Sands, to conduct an air quality assessment of odour, dust and various other constituent emissions to air from the operation of the plant to determine the potential for impact on the health and amenity of sensitive receiver rural residents in the area of the site, as per the requirements of the Western Australian Department of Environment Regulation (DER).

Note Figure 1 for an outline of the region including the site boundary, the proposed location for the plant and the nearest rural residences. The closest rural residents are located 400 metres to east-north-east of the proposed location of the plant, with others further distant to the south and west.

An odour emissions inventory was derived from test data from a mobile asphalt plant of comparable type and size that was also using Class 170 bitumen. The emissions for the various individual constituent pollutants were derived from US EPA Emission Estimation Tables (AP-42). These emissions may be confirmed with direct testing during plant commissioning.

The approved AERMOD dispersion model was used in accordance with EPA guideline methods to predict the peak ground level concentrations resulting from the emissions to air of the various pollutants from a 6.1 m high asphalt plant vent stack and from a short bitumen heater vent; as well as from the odour emissions from the load-out process. The modelling methodology adopted was consistent with DER air quality modelling guidance.

The peak ground level concentrations for all the determined classified indicator pollutant emissions were found to comply at and beyond the site boundary with their corresponding DER assessment criteria. The assessment for inspirable and respirable dust were inclusive of representative background levels based on ambient monitoring conducted by DER at Albany.

General odour is assessed for potential amenity impacts. Typical DER operating conditions require that no offensive odours are to be discharged beyond the boundaries of the premises. DER have rescinded their guidance and assessment criteria for odour assessments and are currently in the process of developing new assessment criteria. In lieu of these being released, assessment criteria has been derived from this previous guidance and adopted here. Peak predicted levels of odour at this assessment criteria are not predicted to extend significantly beyond the site boundary and are predicted to be at approximately one-third of the criteria levels at the nearest rural dwelling receivers.

Levels of odour at concentrations that may be offensive are not predicted to occur beyond the site boundary. A risk assessment that considered a plausible increase over usual emissions of odour indicated that the DER criteria would not be exceeded at these nearest rural residences. The risk of odour dis-amenity at the nearest rural residences to the plant was assessed as **Low**. It may be further noted that the asphalt plant is forecast to operate for less than 2% of all hours in a year, further reducing the risk of dis-amenity.

The emissions of fugitive dust from the site activities that include vehicle movements on unsealed surfaces, stockpiling and loading of raw materials into the hopper, will be subject to management measures. Specific measures are detailed within the separate site Environmental Management Plan and summarised in this assessment. The risk of dis-amenity at the nearest rural residences was assessed as **Low** subject to the consistent and effective application of these management measures.

This report has been prepared for Great Southern Sands and should be read in conjunction with the scope and limitations as detailed in Section 8.

2 CONTEXT

Great Southern Sands are proposing to operate a small 30 metric tonnes per hour mobile asphalt batch plant on a property at Lot 104 Rocky Crossing Road, Willyung, Albany, Western Australia.

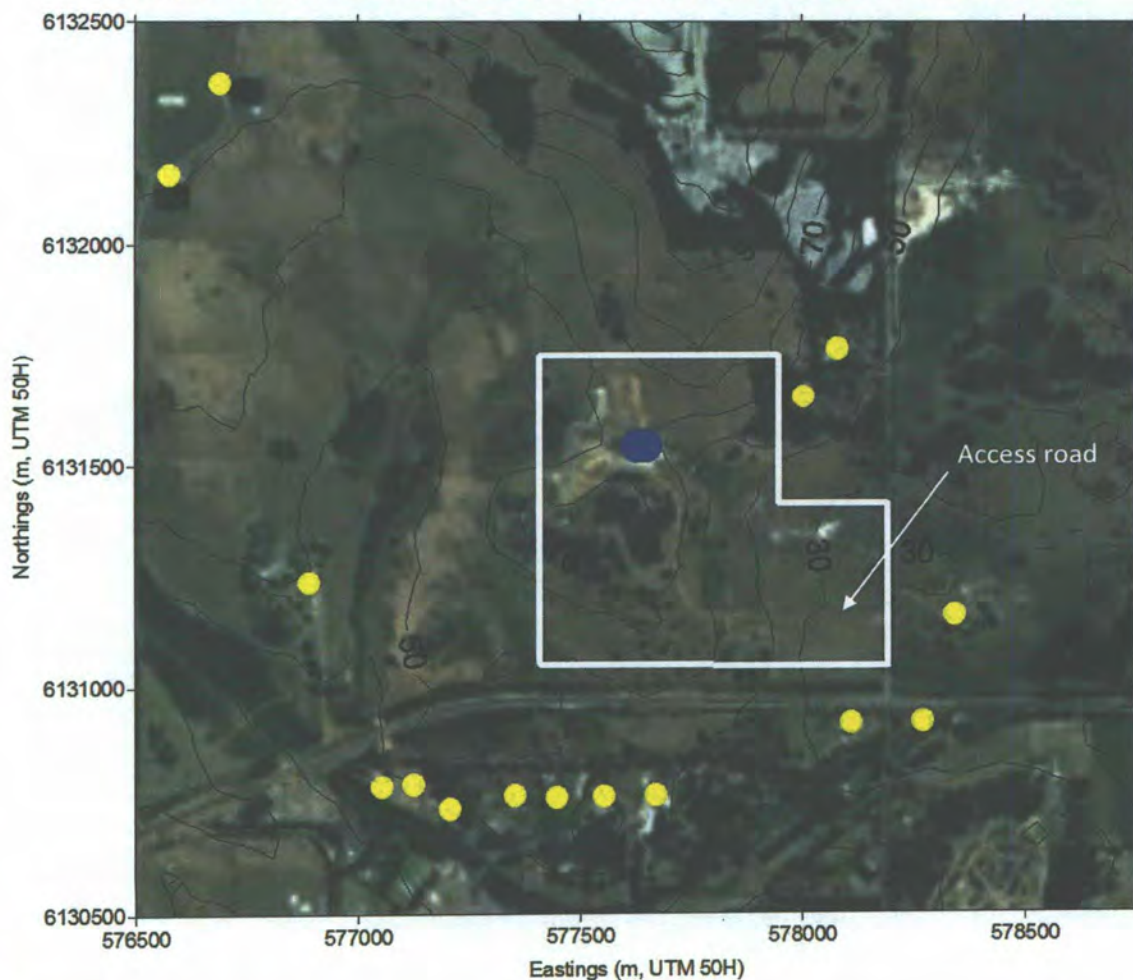
The diesel fuelled mobile plant is proposed to operate during daylight hours only (nominally 7am to 5pm) and is forecast to produce up to 5,000 metric tonnes per annum which would take approximately 170 hours per year at the design production rate. Raw aggregate materials would be sourced from local quarries and standard low sulphur Class 170 bitumen would be periodically delivered by tanker truck and stored in a diesel fuelled heated bitumen storage tank. The proposed plant is new and has been purchased specifically for this forecast production.

Ektime have been engaged by Harvey Dykstra Planning & Survey Solutions, on behalf of Great Southern Sands, to conduct an air quality assessment of odour, dust and various other constituent emissions to air from the operation of the plant to determine the potential for impact on the health and amenity of sensitive receiver rural residents in the area of the site, as per the requirements of the Western Australian Department of Environment Regulation (DER).

Note Figure 1 for an outline of the region including the site boundary, the proposed location for the plant and the nearest rural residences. The closest rural residents are located 400 metres to east-north-east of the proposed location of the plant, with others further distant to the south and west.

Figure 1

Regional layout including the site boundary and plant emission sources (blue) and nearest rural residences (yellow). Terrain elevation contours at 10 m intervals.



The mobile plant is to incorporate a baghouse for particulate removal before the dryer exhaust flue gas is emitted via a single vent stack. It is expected that the main source of emissions including odour will be from this vent stack. A secondary source of odour included in the assessment will be from the load out process when the batch produced asphalt is loaded directly via a conveyor into a tip truck positioned underneath which results in fugitive odour released close to ground level for short periods of less than 2 minutes per load. The asphalt may be held temporarily in an elevated bucket of 8 cubic metres capacity (or a single batch).

An additional minor source of emissions to air will be combustion emissions from a diesel fuelled heated storage tank that will operate simultaneously with the batching plant. This heated tank will contain the Class 170 bitumen that is to be pumped into the plant at up to 180 degrees Celsius during each production batch. Residual odour emissions from this tank are controlled via the use of a condenser on the head space vent.

Section 3 below details the relevant regulatory policy and air quality criteria. Section 4 below details the assessment methodology considering the land use, baseline air quality, meteorological data, the adopted model and configuration, and the emission inventory for all significant classified indicator pollutants, plus odour. The peak predicted ground level concentrations are compared with their corresponding assessment criteria with the results detailed in Section 5. Section 6 details a risk assessment conducted to DER guidelines. Abatement measures to address the identified risk of residual sources of odour and dust are summarised in Section 7.

This report has been prepared for Great Southern Sands and should be read in conjunction with the scope and limitations as detailed in Section 8.

3 POLICY

3.1 Emissions of Individual Pollutants

This assessment is to be conducted using approved modelling methodologies¹, with peak predicted ground level concentrations, inclusive of representative existing background concentrations, assessed against policy within the *Department of Environment Regulation Draft Guidance Statement: Environmental Risk Assessment Framework (2015)*. This document details ground level concentration impact assessment criteria for application at and beyond the site boundary. These criteria are specified to protect the public health and amenity, or other environmental factors if they are more sensitive than human health, such as certain types of vegetation. The adopted criteria for each pollutant significantly emitted from the plant are summarised in Table 1 below. Peak model predictions, at the 99.9th percentile, are predicted for comparison with these criteria.

A risk assessment framework to determine levels of treatment and controls to manage the identified risks is detailed within the *Department of Environment Regulation Guidance Statement: Risk Assessments (Nov. 2016)*.

Table 1: Impact assessment criteria adopted for this assessment based on draft DER policy.

Substance	Criteria 1 hour, ug/m3	Criteria 8 hour, ug/m3	Criteria 24 hour, ug/m3	Criteria Annual, ug/m3	Reason for classification
General Odour (wake free source)	1.3OU, 99.9th %ile 0.6OU, 99.5th %ile				Amenity
PM10			46	27.5	Toxicity
PM2.5			23	7	Toxicity
CO	30000	10000			Toxicity
NOX as NO2	226			56	Toxicity
SO2	524		210	52	Toxicity
Asphalt fume (as 100% of VOC's)	9				Toxicity
Arsenic	0.09		0.027	0.0027	IARC Group 1 carcinogen
Beryllium	0.004			0.00018	IARC Group 1 carcinogen
Cadmium	0.018			1.5	IARC Group 1 carcinogen
Chromium (total) as Cr (III)	9		0.46		Toxicity
Hexavalent Chromium	0.09			0.00018	IARC Group 1 carcinogen
Copper fume	3.7				Toxicity
Lead				0.46	Toxicity
Manganese			0.14		Toxicity
Mercury (as organic)				0.18	Bioaccumulation
Nickel	0.14			0.0027	IARC Group 1 carcinogen
Selenium	0.92				Toxicity
Zinc			46		Toxicity
Acetaldehyde			1830	46	Toxicity
Benzene	29			9.6	IARC Group 1 carcinogen
Ethylbenzene	8000			270	Toxicity
Formaldehyde	20				IARC Group 2A carcinogen
Toluene			3770	377	Toxicity
Xylene			1080	870	Toxicity
Total PAH's (as BaP TEQ)				0.0003	IARC Group 2A carcinogen
Notes:					
Gas volumes at 25 degrees Celsius and at 1 atm:					

3.2 Emissions of General Odour

Odour assessment policy and criterion are currently under review by the DER. The most recent criterion were detailed in the DEC Guideline No. 47: *Guidance for the Assessment of Environmental Factors – Assessment of Odour Impacts from New Proposals (2002)*, although this has been withdrawn pending the development of new policy for the protection of amenity with regard to offensive levels of odour.

Historically, the DER have provided an *Odour Methodology Guideline*² that discusses odour concentration and odour intensity. This guidance may be used in conjunction with the risk assessment framework set out in the draft DER guidance *Environmental Risk Assessment Framework (2015)* to identify factors and corresponding management actions to reduce the risk of the nearest rural residences being exposed to *offensive* odours.

In lieu of definitive guidance, the adoption of the criteria within the Guideline No. 47, followed by a risk assessment are considered appropriate, with the individual controls and management options required to reduce the identified risks of off-site dis-amenity detailed.

Guideline No. 47 details the following odour assessment criteria for surface level fugitive area sources:

- 2 OU expressed as a 3 minute average predicted at the 99.5th percentile; and
- 4 OU expressed as a 3 minute average predicted at the 99.9th percentile.

The asphalt plant emissions are predominantly from a short wake-free vent stack for assessment at receivers in the *far-field*³. A conversion of these *area source* criteria to that specific for *surface wake-free point* sources may be conducted based on NSW DECC modelling guidance⁴ for respective source type peak-to-mean assessment ratios for odour assessment. A factor of 2.3/4 may be applied to provide:

- 1.2 OU expressed as a 3 minute average predicted at the 99.5th percentile; and
- 2.3 OU expressed as a 3 minute average predicted at the 99.9th percentile.

The AERMOD model predicts hourly averages and does not directly predict sub-hour averages. A 1-hour average criteria may be obtained from a 3-minute average criteria by multiplying 0.55, i.e. $C_{60min} = C_{3min} \times (3/60)^{0.2}$, as per guidance⁵. Hence, the assessment criteria considered appropriate for the proposed asphalt plant is as follows:

- 0.6 OU expressed as a 1-hour average predicted at the 99.5th percentile; and
- 1.2 OU expressed as a 1-hour average predicted at the 99.9th percentile.

These criterion levels represent very weak odours that would not usually be detectable within the background ambient palette. In the ambient environment, with an existing background ambient palette, the detection above background (or a distinct level of odour as per the *Odour Methodology Guideline*) has been determined with an evidence based study as being typically in the range of 5 - 10 OU⁶. Hence, an odour concentration of 5 OU may be considered the lower threshold for *offensive* levels of odour. Comparison of peak predications against this threshold, along with frequencies of occurrence and the number of receivers, informs the assessment of the risk of dis-amenity.

² Odour Methodology Guideline, Department of Environmental Protection, WA, 2002

³ Great than 10 times that stack height from the source.

⁴ Approved methods for the modelling and assessment of air pollutants in NSW, DECC, 2005, section 6.6.

⁵ Draft EPA guidance notes for using the regulatory AERMOD air pollution model, publication 1551 revised July 2014.

⁶ Lunney C, and Ormerod R, 1997, "Implications of odour study results for policy guidelines", National Conference of Odour Measurement Standardisation, UNSW Sydney.

4 ASSESSMENT METHODOLOGY

The assessment of the various pollutant emissions to air requires the characterisation of the following key inputs:

1. Land use and background air quality;
2. Model selection and configuration;
3. Meteorological data; and an
4. Emissions inventory.

These are each addressed in the sections below.

4.1 Land Use and Background Air Quality

The proposed asphalt plant site is located in a rural area amongst undulating terrain on a site previously used for sand quarrying. Note Figure 1. There is a large operational quarry located 550 metres to the north-east of the plant location. The closest isolated rural residents are located 400 metres to east-north-east of the proposed location of the plant, with others 700 m to the west. An area of semi-rural residences are located at distances from 650 metres to the south, across Menang Drive. There are no other asphalt plants within 2 km of the proposed plant location.

During 2015, the WA DER conducted continuous ambient air quality monitoring for respirable dust as PM₁₀ at Albany⁷. Background concentrations of respirable and inspirable particulate matter are significant, influenced by crustal dust erosion and transient events such as prescribed burns and bush fire. There were two exceedances of the National Environment Protection Measures for Ambient Air Quality (NEPM-AAQ) objective for PM₁₀ of 50 µg/m³ as a 24-hour average. These were due to prescribed burning activities. The current objective permits 5 exceedances per year. The 6th highest recording was 36.6 µg/m³ and this has been adopted as a conservatively representative background concentration with respect to an assessment criterion of 47 µg/m³ (at 25°C). The annual average was 15.8 µg/m³, with respect to an assessment criterion of 27.5 µg/m³ (at 25°C).

The background concentration for PM_{2.5} as a 24-hour average was assumed as 50% of PM₁₀, at 18.3 µg/m³ with respect to an assessment criterion of 23 µg/m³ (at 25°C). The annual average for monitored levels of PM_{2.5} exceeded the assessment criteria of 7 µg/m³ (at 25°C) at all monitoring locations in WA during 2015. A value of 7.9 µg/m³ may be used for reference.

Background concentrations of other regional air pollutants, such as oxides of nitrogen, carbon monoxide and sulphur dioxide are not expected to be significant with respect to their assessment criteria due to the relatively low population density and lack of significant industry in the area of the proposed plant. These are not monitored locally by the DER.

No background concentration has been assumed for volatile organic compounds, metals or persistent organic compound pollutants emitted from the proposed asphalt plant.

4.2 Model Selection and Configuration

The DER has published generic modelling guidelines⁸ that approve the use of Gaussian plume based dispersion models for areas where the influences of terrain are not significant and for where there is representative meteorological data. The AERMOD dispersion model has been approved as an initial model for assessments subject to these limitations. AERMOD is a steady state plume model that incorporates the latest science and is maintained by the United States Environment Protection Authority.

The discharged emissions from the 6.1 m high asphalt plant vent stack will disperse away from the site near to ground level resulting in peak impacts occurring local to, and decreasing with distance from, the site. The terrain in the region of the site is undulating. These conditions are within the capability of steady state plume models and so the AERMOD model is appropriate for this assessment, in combination with site representative meteorological data from the nearby Bureau of Meteorology (BoM) AWS at Albany Airport, 3 km to the west of the site (note Section 4.3).

In the absence of specific guidance from DER, the AERMOD model has been configured in accordance with the draft EPA Victoria Guidance notes for using the regulatory air pollution model AERMOD in Victoria, publication 1551, October 2013, revised July 2014. Key points are as follows:

- AERMOD ver 15181;
- Default model configuration;
- Pre-processed site representative meteorological data mainly from the Albany Airport AWS was configured to the geophysical conditions typical of the area was obtained from pDs Consultants for the year 2015. Note Section 4.3;
- Hourly meteorological data for the year 2015;
- Terrain influences included with terrain elevation and hill height data prepared using SRTM1 - Shuttle Radar Topography Mission topography data, which was gap filled during processing with the AERMOD terrain pre-processor. Note Figure 1 and Appendix 9.4 input meteorological data summary report;
- Modelling was conducted on a 5 km by 5 km, 40 metre resolution, receptor grid with results contoured and presented over an aerial map of the local region;
- The emission sources were assumed to be continuous between 7am to 5pm, or from Hours 8 to 17, for 365 days per year (see Section 4.4). The plant will only operate during daylight periods;
- Rural dispersion was adopted in accordance with EPA guidance;
- Building wake effects were not considered to be significant for the mobile facility as all surrounding structures are typically raised above ground level (i.e. they are not block form structures) based on schematic drawings provided by Harvey Dykstra.
- Contour plots of both the predicted 99.9th percentile (9th highest) 1 hour average and of the highest 24 hour average ground level concentrations were used where relevant to assess compliance with assessment criteria, respectively;
- Annual average concentrations are presented before and after scaling for expected production time within a year (approximately 170 hours per annum);

- For those pollutant species emitted from both the asphalt plant and from the bitumen heater, the emissions were modelled directly. For those pollutant species only emitted from the asphalt plant vent stack a unit emission rate was initially modelled for the vent stack and peak predicted ground level concentrations were scaled using the individual pollutant emission rates. For those species where a significant proportion of the respective assessment criteria was predicted anywhere on the modelling domain, contour plots were produced for comparison of peak predictions at and beyond the site boundary with the assessment criteria;
- No background concentrations were included directly in the modelling but were discussed in the analysis.

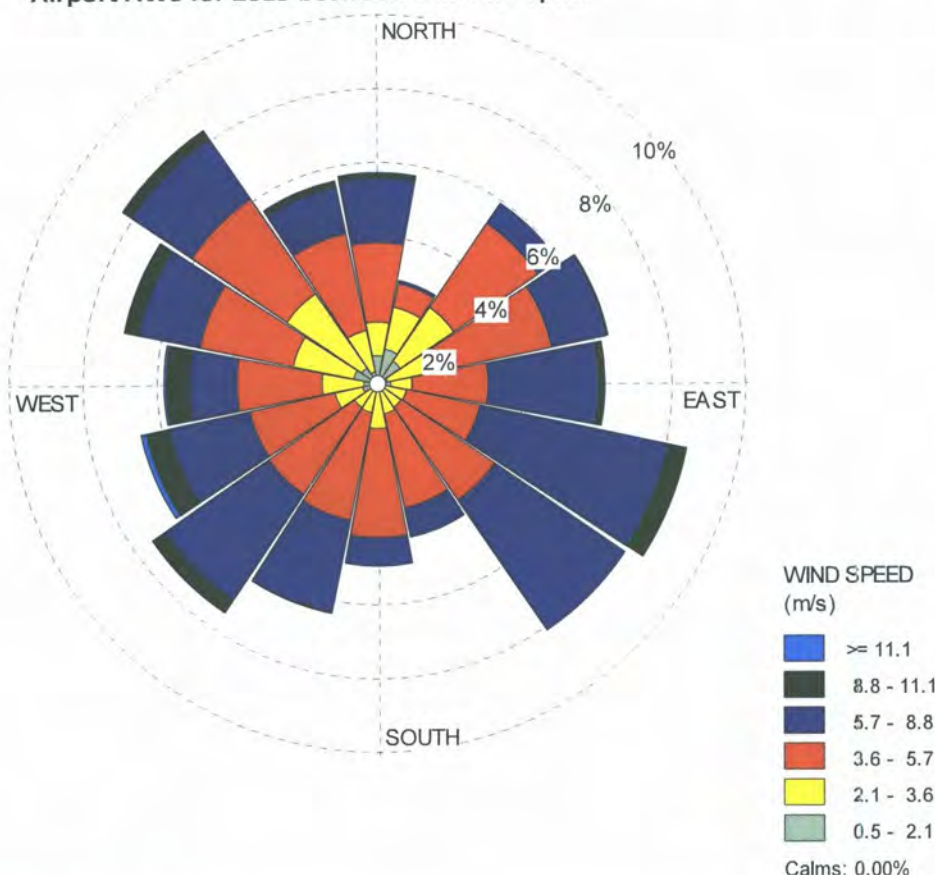
Further information on the AERMOD configuration is provided in the attached input files for each emission constituent including odour in the Appendices. Output files can be provided in electronic form upon request.

4.3 Meteorological Data

A year of hourly varying meteorological data for the year 2015 was synthesised by pDs Consultants based on data from the Bureau of Meteorology Automatic Weather Station (BoM AWS) at Albany Airport, located 3 km to the east of the site. The synthesis was conducted in accordance with the current draft EPA Victoria Guideline *Construction of Input Meteorological Data Files for EPA Victoria's Regulatory Air Pollution Model AERMOD* (Publication 1550). Note the summary report for this data in the Appendices.

It can be seen from Figure 2 that the winds at the site, between 7am to 5pm, are broadly distributed with slightly higher frequencies from the south-east and from the north-west. Least frequent breezes are from the south. However, poor dilution of air emissions from the site will occur with light wind speeds of 2 m/s or less which occur for less than 7% of time during the day. It can be seen from the wind rose that these light winds occur most commonly from the northern quadrants which is predominantly away from the nearest rural residence. The worst case dispersion conditions occur with light winds during night time, however these will be avoided as the plant is not equipped to operate during hours of darkness.

Figure 2: Wind speed and direction distribution of hourly recordings at the BoM Albany Airport AWS for 2015 between 7am and 5pm.



4.4 Emissions Inventory

The small mobile batch mix asphalt plant that is proposed to be located at the site has a design capacity of 30 metric tonnes per hour (tph) of asphalt. Ektime's experience of more typical capacities of asphalt plants that operate throughout Australia are of the drum mix type with capacities ranging from 200 to 350 tonnes per hour.

The proposed diesel fuelled mobile plant will operate between 7am to 5pm only as the plant and works area will not be equipped to normally operate during hours of darkness. The plant is forecast to produce up to 5,000 metric tonnes per annum which would take approximately 170 hours per year of operation at the design production rate.

Emissions to air will include:

- Significant levels of odour, volatile organic compounds, metals, combustion gases and particulates from a single vent stack servicing the flue gas emissions from the diesel fuel fired burner and mixer/dryer. The flue gas emissions within the mixing chamber are recirculated through the burner to abate volatile organic compounds and then discharged via a baghouse to reduce particulate emissions.
- Low levels of odour from the asphalt loadout into tip trucks positioned beneath; and
- Residual volatile organic compounds, combustion gases and particulates from a single small vent for emissions from the diesel fuelled heated bitumen tank that is to provide heated Class 170 low sulfur bitumen at temperatures up to 180 degrees Celsius to the asphalt plant.

Vents Stack Emissions

The emissions from the single vent stack are based on the following:

- Emission rate data from the vent stack for odour was based on measurements detailed in EML Air test report 91872 for a comparable capacity and type of plant using Class 170 low sulfur bitumen. This test report is attached in the Appendices.
- Emissions data for particulates, combustion gases, volatile organic hydrocarbons (VOC's) and other significant classified indicator emissions have been derived from the US EPA emission estimation technique manuals (AP-42) for asphalt plants from 2004. These have been estimated using emission factors specific to batch asphalt plant using a No. 2 fuel oil for a plant design capacity of 30 metric tonnes per hour. *This is conservative as the mobile plant will be actually run on refined diesel fuel which is not as polluting compared to a less refined No. 2 fuel oil;* and
- The vent stack geometry is as per design data provided by Great Southern Sands. The exit conditions adopted were minimum conditions expected for typical asphalt plants. Note Table 2 for these parameters adopted in the modelling.

Ektimo note that the discharge conditions and emission rates for key pollutants may be tested during the plant commissioning phase to confirm the assumptions made in this assessment.

Note Table 3a for the estimated emissions rates adopted with the assessment, with citations, and Figure 1 for source locations.

Asphalt Loadout Odour

Residual odour emissions will occur during the load out process when the batch produced asphalt is loaded directly via a conveyor into a tip truck positioned underneath. A truck may be loaded quickly from the batch process before the tip truck is promptly tarped and driven off-site. Odour will be released close to ground level for short periods of less than 2 minutes per load. The asphalt may be held temporarily in an elevated bucket of 8 cubic metres capacity (or a single batch).

Note Table 3c for adopted odour emission rates which are based on EML Air test report 98172.

These emissions, between 7am and 5pm (Hours 8 to 17) were characterised in the AERMOD model as a volume source, with the following characteristics to represent a loading bay approximately 6 metres long by 4 metres high:

- Initial horizontal spread, $\sigma_y = 2$ m;
- Initial vertical spread, $\sigma_z = 1$ m; and
- Height above ground level = 2 m.

Bitumen Storage and Heating Tank

A diesel fuelled heated storage tank will provide the bitumen for the asphalt plant. The heated tank will operate continuously during the day emitting combustion gases and volatile organic compounds. Note that residual odorous emissions may occur when the bitumen tank is filled from a tanker truck however these are minimised through the use of a condenser fitted over the head space vent on the storage tank. The condensed vapours are returned to the tank. These residual odours that occur transiently during tanker re-fill operations are not included in the assessment.

Based on data from Astec (a typical plant vendor), which is based on emission estimation tables from USEPA AP-42, Table 2 details the discharge conditions assumed in the modelling for the single vent stack.

Note Table 3b for the estimated emissions rates adopted with the assessment, with citations.

Table 2: Stack source release parameters

Discharge characteristics	Asphalt Plant Baghouse vent stack	Heated Bitumen Tank vent stack
Height, metres above ground level	6.1	3.75
Internal Diameter, metres	0.8	0.3
Exit Velocity, metres/second	> 10	5.87
Exit Temperature, degrees Celsius	> 80	316

Table 3a: Individual pollutant emissions from the asphalt plant vent stack

Classified Indicator Species	Emission Factor (kg/tonne) (USEPA AP42 March 2004, Emission Estimation Tables Hot Mix Asphalt Plant - Batch Mix with No. 2 Fuel Oil)	Source Notes	kg/hr species emission rate for 30 tonnes/hour production	grams/second species emission rate for 30 tonnes/hour production
PM10	0.0135	Table 11.1-1 for Fabric Filter	0.41	0.11
PM2.5	0.00905	67% of PM10, Table 11.1-2	0.27	0.075
CO	0.20	Table 11.1-5	6.0	1.7
NOX as NO2	0.060	Table 11.1-5	1.8	0.50
SO2	0.044	Table 11.1-5	1.3	0.37
Asphalt Fume (as non-methane VOC's)	0.0041	Table 11.1-6 for non-methane VOC	0.12	0.034
Arsenic	0.00000023	Table 11.1-11	0.0000069	0.0000019
Beryllium	0.000000075	Table 11.1-11	0.0000023	0.00000063
Cadmium	0.00000031	Table 11.1-11	0.0000092	0.0000025
Chromium (total)	0.00000029	Table 11.1-11	0.0000086	0.0000024
Hexavalent Chromium	0.000000024	Table 11.1-11	0.00000072	0.00000020
Copper fume and mists	0.0000014	Table 11.1-11	0.000042	0.000012
Lead	0.00000089	Table 11.1-11	0.000027	0.0000074
Manganese	0.00000069	Table 11.1-11	0.00021	0.000058
Mercury (organic)	0.00000021	Table 11.1-11	0.0000062	0.0000017
Nickel	0.0000015	Table 11.1-11	0.000045	0.000013
Selenium	0.00000025	Table 11.1-11	0.0000074	0.0000020
Zinc	0.0000034	Table 11.1-11	0.00010	0.000028
Acetaldehyde	0.00016	Table 11.1-9	0.0048	0.0013
Benzene	0.00014	Table 11.1-9	0.0042	0.0012
Ethylbenzene	0.0011	Table 11.1-9	0.033	0.0092
Formaldehyde	0.00037	Table 11.1-9	0.011	0.0031
Toluene	0.00050	Table 11.1-9	0.015	0.0042
Xylene	0.0014	Table 11.1-9	0.041	0.011
Total PAH's (assumed as BaP TEQ)	0.000055	Table 11.1-9 for PAH HAP's	0.0017	0.00046

Notes:

The plant will operate only during daylight hours, nominally from 7am to 5pm, which is <5% of time between 7am-5pm; and <2% overall.

The plant will typically work with Class 170 bitumen which is low sulphur.

Table 3b: Individual pollutant emissions from the heated bitumen tank

Classified Indicator Species	Emission Factor (kg/L)	kg/hr species emission rate	grams/sec species emission rate	Comments
Particulates as PM10 and as PM2.5	2.4E-04	0.014	0.0039	Specifications from a typical vendor (Astec) for a diesel fired heated bitumen tank based on use of 59.1 L/hour use of No. 2 Fuel Oil. These are based on AP42 Table 11.1-13, 1995. These emissions are assumed constant, 7am to 5pm, 7 days per week. Note specifications provided in Appendix.
SO2	8.9E-03	0.52	0.15	
CO	6.3E-04	0.037	0.010	
NOX as NO2	2.4E-03	0.14	0.039	
Asphalt Fume (as 100% of C5-C20 VOC's)	6.4E-04	0.038	0.011	
Formaldehyde	4.2E-07	0.000025	0.0000069	
Total PAH's (assessed as BaP TEQ)	2.7E-06	0.00016	0.000044	

Table 3c: Odour emission from the asphalt plant and from the heated bitumen tank

Odour	OUV/min odour emission rate	OUV/sec odour emission rate	Time	Source
Mobile Asphalt Plant Baghouse Vent Stack	1,300,000	22,000		Emission rate for odour based on EML Air test report 98172 for a comparably sized batch plant (40 tonnes/hour HMA production) using a comparable type of Class 170 bitumen for road use.
Loadout emissions from elevated storage silo.	24,000	400	Day work only. Typically 7am to 5pm	Emission rate for odour based on EML Air test report 98172 for a comparably sized batch plant (40 tonnes/hour HMA production) using a comparable type of Class 170 bitumen for road use. This occurs for approximate 2 minutes per load before the truck departs the site. The maximum truck loads per hour would be 4 or every 15 minutes on average resulting in a maximum of 8 minutes per hour of odour emissions. However, this is assumed constant for the hour within this assessment.

5 RESULTS AND DISCUSSION

5.1 Emissions of General Odour

Figure 4 illustrates contours of the 99.9th percentile peak predicted 1 hour average ground level odour. It can be seen that the assessment criterion level of 1.3 OU is not predicted to extend beyond the site boundary. About one-third of this criterion is predicted at the nearest rural residences indicated.

Figure 5 illustrates contours of the 99.5th percentile peak predicted 1 hour average ground level odour. It can be seen that the assessment criterion level of 0.6 OU is not predicted to extend significantly beyond the site boundary. About one-third of this criterion is also predicted at the nearest rural residences indicated.

Exposure to offensive odours would depend upon both the **frequency** of exposure and the **concentration** at exposure.

Frequency

The prediction of these peak odours assumes that the plant is operating for 365 days per year. However, the asphalt plant is forecast to operate for approximately only 170 hours per year, or for <5% of daylight hours and not at all over-night. From Figure 3 it can be seen that <25% of breezes during the day are towards the nearest rural dwellings.

Concentration

Based on extensive ground truthing of model results to complaint history⁹, ranges of odour concentration may be broadly categorized as follows:

- Very weak odour that would not usually be detectable within the background ambient palette: < 5 OU
- Weak odour that may be distinguishable (or *distinct*) from background: 5 – 10 OU
- Moderate intensity odour that is noticeable and identifiable: 10 - 20 OU
- Strong odour that may be annoying: 20 - 40 OU
- Very strong odour that is likely to be annoying: > 40 OU

Peak predicted levels of odour around the proposed asphalt plant may be compared to these categorised ranges to inform the potential exposure to nuisance odour.

A level of < 1 OU at the nearest residences corresponds to a level of odour that may not be detected in the ambient environment.

Therefore, the odorous emissions from the asphalt operations are predicted to satisfy the expected condition for no offensive odours beyond the boundary, and these emissions are unlikely to give rise to complaint at the nearest semi-rural residences.

The AERMOD output file for this simulation for odour is provided in the Appendices.

Great Southern Sands - Proposed asphalt plant
99.9th percentile, 1 hour average ground level odour
Contour levels: 0.65 and 1.3 OU. Derived criteria is 1.3 OU

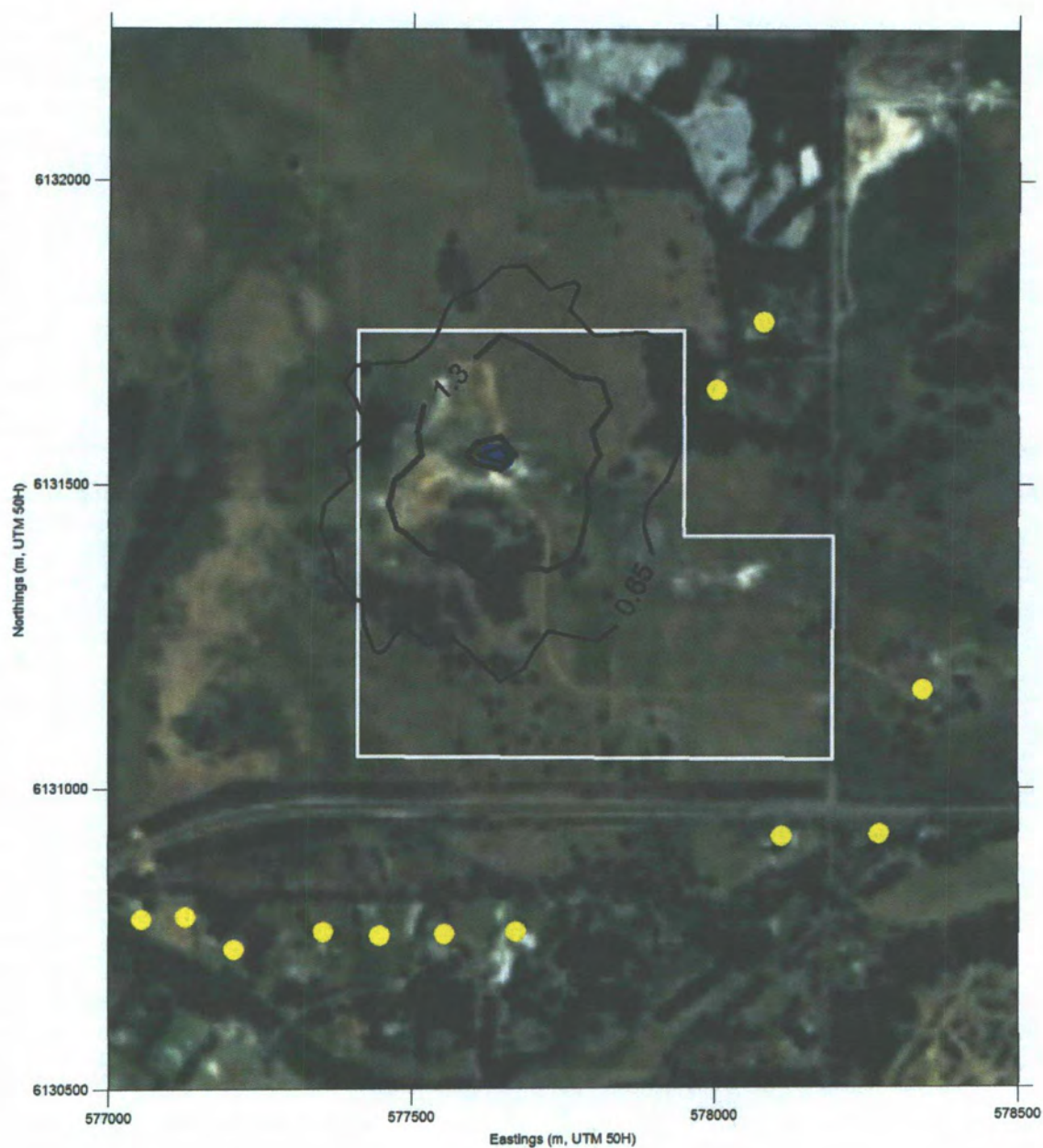
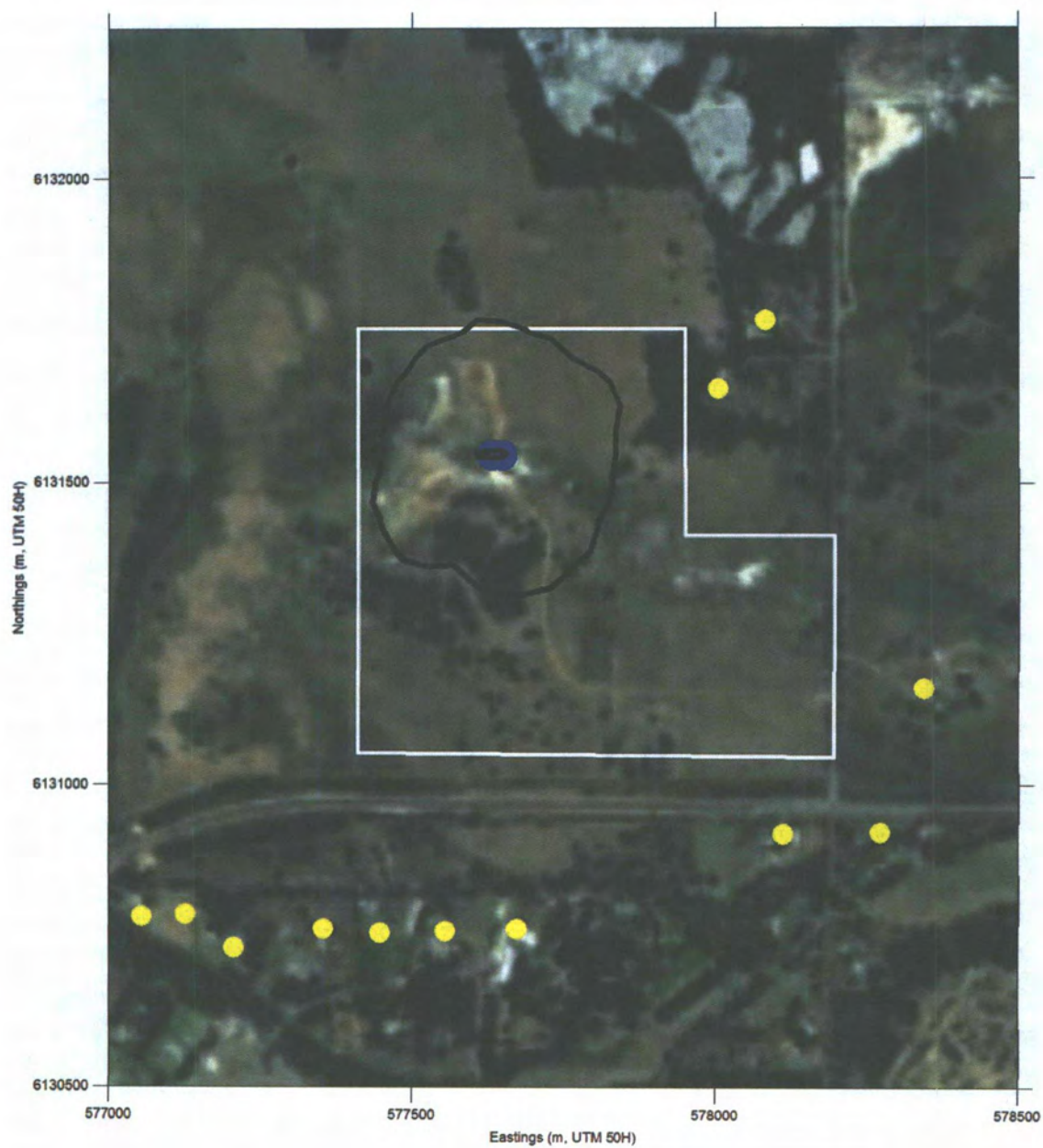


Figure 5

Great Southern Sands - Proposed Asphalt Plant
99.5th percentile, 1 hour average ground level odour
Criteria contour of 0.6 OU



5.2 Classified Indicator Pollutants

Table 4 summarises the peak predicted ground level concentrations *anywhere on the modelling domain* for individual pollutant emissions from the 6.1 m asphalt plant vent stack, and also the lesser emissions from the 3.7 m heated bitumen tank, at relevant averaging times and percentiles for comparison with the assessment criteria. This excludes the contribution of existing background concentrations.

Compliance with each individual design concentration criteria is readily predicted for all pollutants assessed, with the exception of asphalt fume where an exceedance is predicted in the immediate area of the asphalt plant. For particulates, nitrogen dioxide and carbon monoxide, this compliance is not inclusive of conservatively estimated fixed background levels. These individual pollutants are all discussed below.

The AERMOD output file for the simulation for each pollutant is provided in the Appendices.

PM10 and PM2.5

Figure 6 illustrates the peak predicted 24 hour average ground level concentrations of PM10 around the plant, excluding background. It can be seen that the peak at the site boundary is 1.5 µg/m³ compared to a criterion of 46 µg/m³. The inclusion of a conservative background concentration of 36.6 µg/m³ would still indicate ready compliance with the criterion.

Figure 7 illustrates the peak predicted 24 hour average ground level concentrations of PM2.5 around the plant, excluding background. It can be seen that the peak at the site boundary is 1 µg/m³ compared to a criterion of 23 µg/m³. The inclusion of a conservative background concentration of 18.3 µg/m³ would still indicate ready compliance with the criterion.

The annual average predictions for PM10 and for PM2.5, when adjusted for the forecaste hours of operation, are predicted to be <0.1 µg/m³ anywhere on the modelling domain, indicating that there will be no significant increase on annual averages for respirable and inspirable particulates in the area of the plant for the emissions from the asphalt plant vent stack and from the heated bitumen tank.

Fugitive emissions of dust from the handling of bulk materials and from vehicle induced dust are not assessed directly, and are subject to control measures detailed in the site environmental management plan (see section 7).

Oxides of Nitrogen as Nitrogen Dioxide

Figure 8 illustrates the peak predicted 1 hour average ground level concentrations of NOX expressed as NO2 equivalent around the plant, excluding background. It can be seen that the peak at the site boundary is 30 µg/m³ compared to a criterion of 226 µg/m³ indicating ready compliance with the criterion.

Carbon Monoxide

From Table 4 it can be seen that the peak predicted 1 hour average of CO is 316 µg/m³ representing 1% of the 1 hour criterion. The peak predicted 8 hour average is 164 µg/m³ representing 2% of the 8 hour criterion indicating ready compliance with each of the criteria.

Asphalt Fume

Figure 9 illustrates the peak predicted 1 hour average ground level concentrations of asphalt fume (taken as the non-methane emissions of volatile organic compounds from the asphalt plant stack). There is no significant background concentration for this pollutant as there are no other existing asphalt plants within 2 Km of the proposed plant. Whilst the peak predictions within the site boundary

are predicted to exceed the impact assessment criterion of $9 \mu\text{g}/\text{m}^3$, it can be seen that this predicted assessment criterion contour level does not extend significantly beyond the site boundary.

The peak prediction at the nearest receiver is $3 \mu\text{g}/\text{m}^3$, or one-third of the criterion.

The emission rate of asphalt fume (as non-methane VOC) from the asphalt plant vent stack may be confirmed at the commissioning of the asphalt plant.

Table 4: Peak predictions anywhere for Classified Indicator Pollutants and comparison with assessment criteria

Classified Indicator Species	Asphalt Plant Vent Stack Emissions	Heated Bitumen Tank Emissions	Peak 99.9th %ile, 1 hour, ug/m3	Maximum 8 hour, ug/m3	Maximum 24 hour, ug/m3	Annual Average when operating for all time, ug/m3	Annual Average adjusted for 5% of dayshift time	Criteria 1 hour, ug/m3	Criteria 8 hour, ug/m3	Criteria 24 hour, ug/m3	Criteria Annual, ug/m3	Background air quality significant?	Maximum Proportion of Criteria	Proportion of 1 hour criteria	Proportion of 8 hour criteria	Proportion of 24 hour criteria	Proportion of annual average criteria	Notes
unit emission rate of 1 gram/second	✓	×	184		42	4.9	0.24											
PM10	✓	✓			4.9	0.58	0.029			46	27.5	Yes	11%			11%	0.1%	See contour plot Figure 6
PM2.5	✓	✓			3.4	0.41	0.021			23	7	Yes	15%			15%	0.3%	See contour plot Figure 7
CO	✓	✓	316	164				30000	10000			No	2%	1%	2%			
NOX as NO2	✓	✓	103			2.9	0.15				56	No	46%	46%			0.3%	See contour plot Figure 8
SO2	✓	✓	129		39	5.2	0.26	524		210	52	No	25%	25%		18%		
Asphalt Fume (as 100% of C5-C20 VOC's)	✓	✓	10					9				No	112%	112%				See contour plot Figure 9
Arsenic	✓	×	0.00035		0.00008	0.0000093	0.0000047	0.09		0.027	0.0027	No	0.4%	0.4%		0.3%	0.02%	
Beryllium	✓	×	0.00012			0.0000030	0.0000015	0.004			0.00018	No	3%	3%			0.1%	
Cadmium	✓	×	0.00047			0.000012	0.0000062	0.018			1.5	No	3%	3%			0.00004%	
Chromium (total)	✓	×	0.00044		0.00010			9		0.46		No	0.02%	0.005%		0.02%		
Hexavalent Chromium	✓	×	0.000037			0.00000097	0.00000005	0.09			0.00018	No	0.04%	0.04%			0.03%	
Copper fume and mists	✓	×	0.0021					3.7				No	0.06%	0.06%				
Lead	✓	×				0.000036	0.0000018				0.46	No	0.0004%				0.0004%	
Manganese	✓	×			0.0024					0.14		No	2%			2%		
Mercury (organic)	✓	×				0.0000083	0.0000004				0.18	No	0.0002%				0.0002%	
Nickel	✓	×	0.0023			0.000061	0.0000030	0.14			0.0027	No	2%	2%			0.1%	
Selenium	✓	×	0.00038					0.92				No	0.04%	0.04%				
Zinc	✓	×			0.0012							No	0.003%			0.003%		
Acetaldehyde	✓	×			0.057	0.0065	0.00032			46	46	No	0.003%			0.003%		
Benzene	✓	×	0.21			0.0057	0.00028	29			9.6	No	0.7%	0.7%			0.003%	
Ethylbenzene	✓	×	1.7			0.045	0.0022	8000			270	No	0.02%	0.02%			0.001%	
Formaldehyde	✓	✓	0.57					20				No	3%	3%				
Toluene	✓	×	0.77		0.18	0.020	0.0010			3770	377	No	0.005%			0.005%	0.0003%	
Xylene	✓	×	2.1		0.48	0.055	0.0027			1080	870	No	0.04%			0.04%	0.0003%	
Total PAH's (as BaP TEQ)	✓	✓				0.0028	0.00014				0.00030	No	46%				46%	

Figure 6

Great Southern Sands - Proposed Asphalt Plant
Highest predicted 24 hour average PM10 excluding background
Contour intervals in 1 ug/m3 increments. Criteria is 46 ug/m3

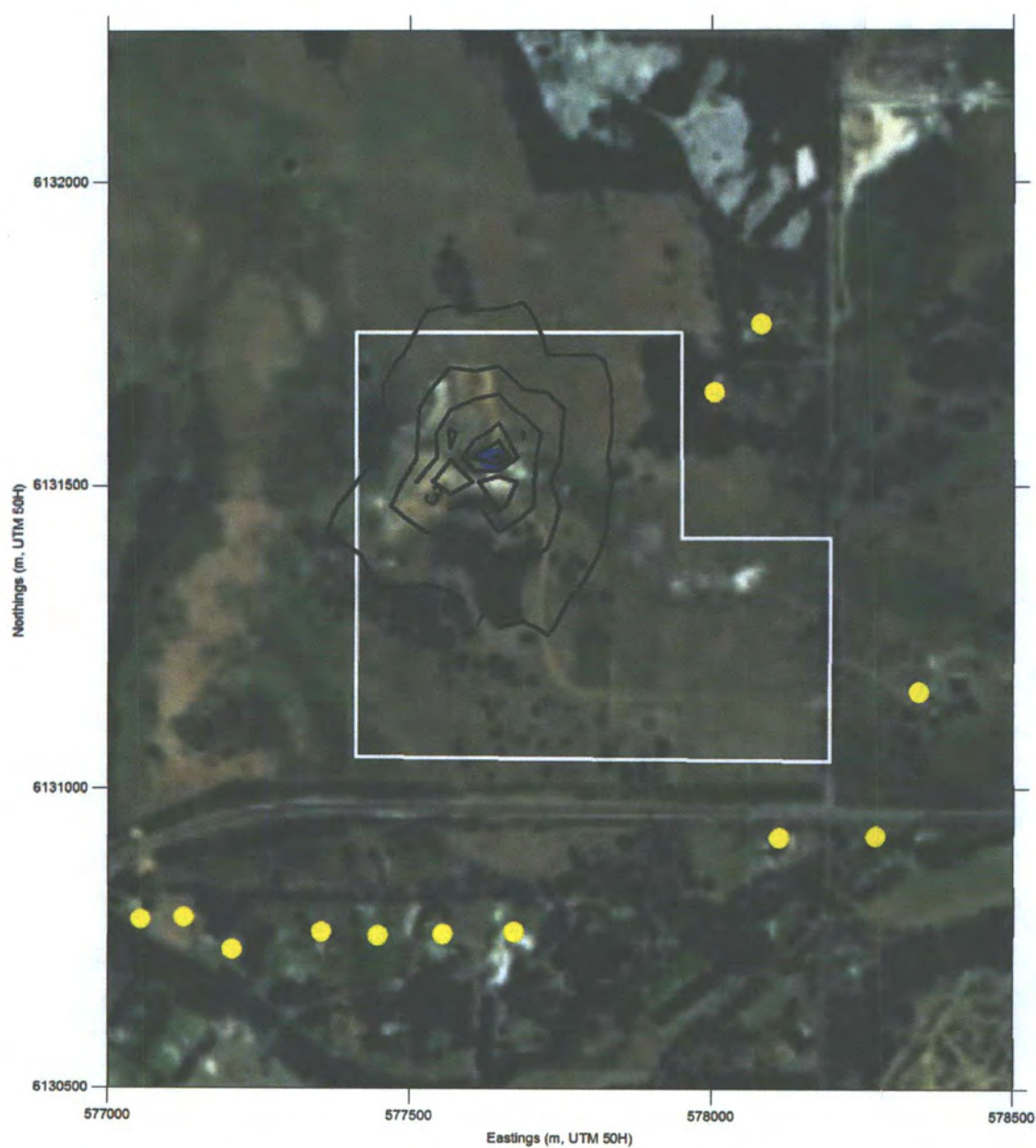


Figure 7

Great Southern Sands - Proposed Asphalt Plant
Highest predicted 24 hour average PM_{2.5} excluding background
Contour intervals in 1 ug/m³ increments. Criteria is 23 ug/m³

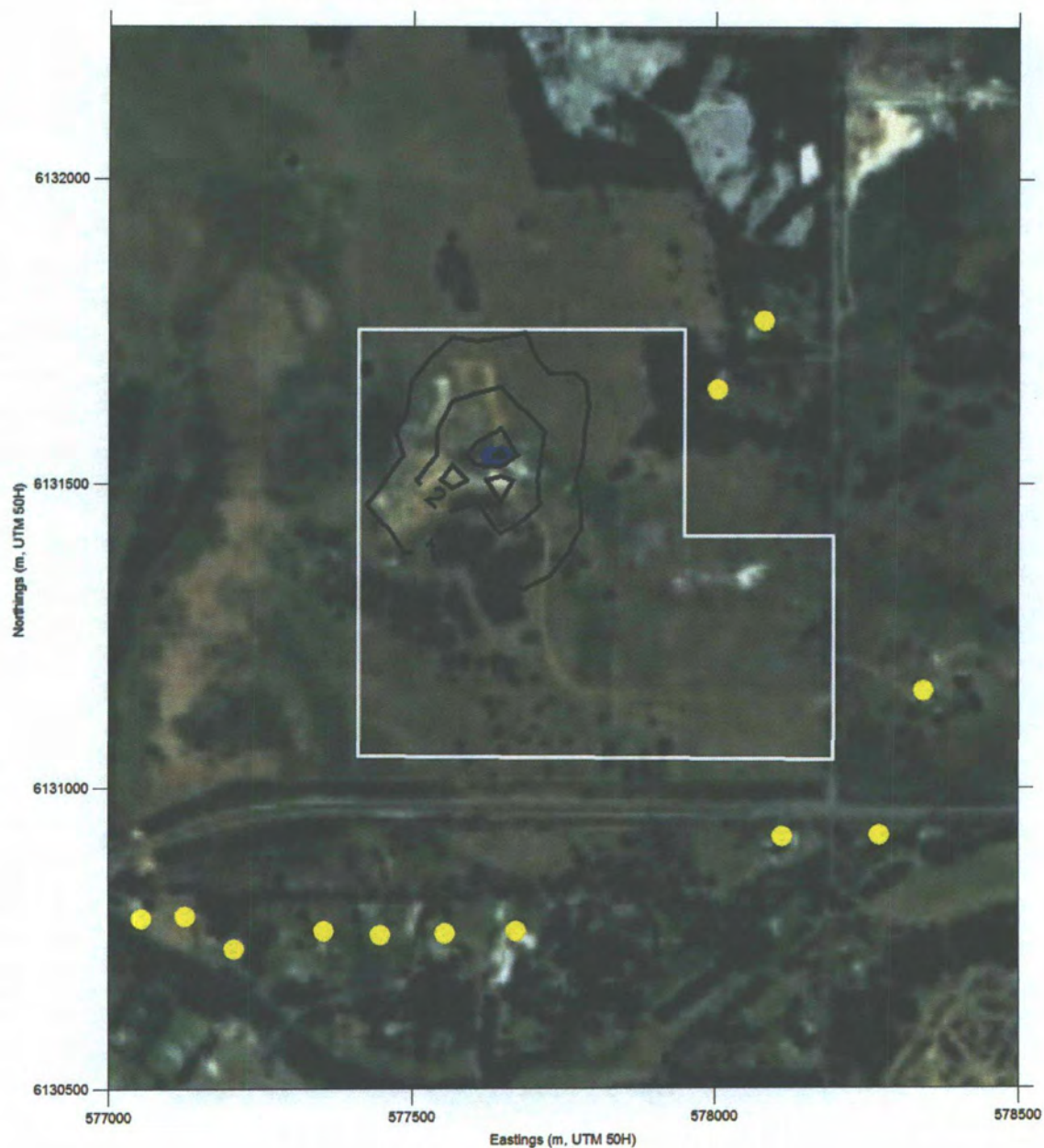


Figure 8

Great Southern Sands - Proposed Asphalt Plant
99.9th percentile predicted 1 hour average NOX as NO2 excluding background
Contour intervals in 10 ug/m3 increments. Criteria is 226 ug/m3

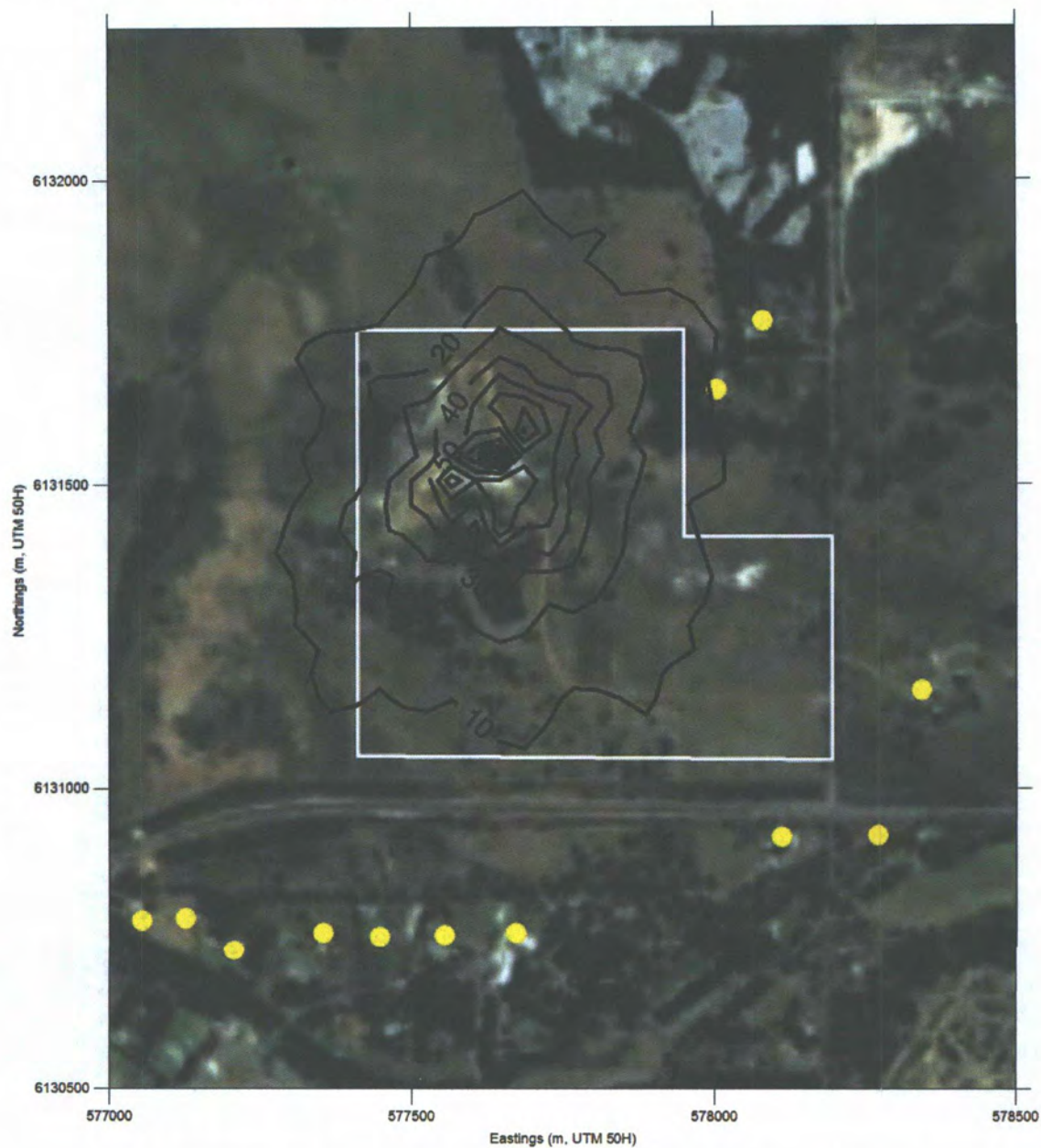
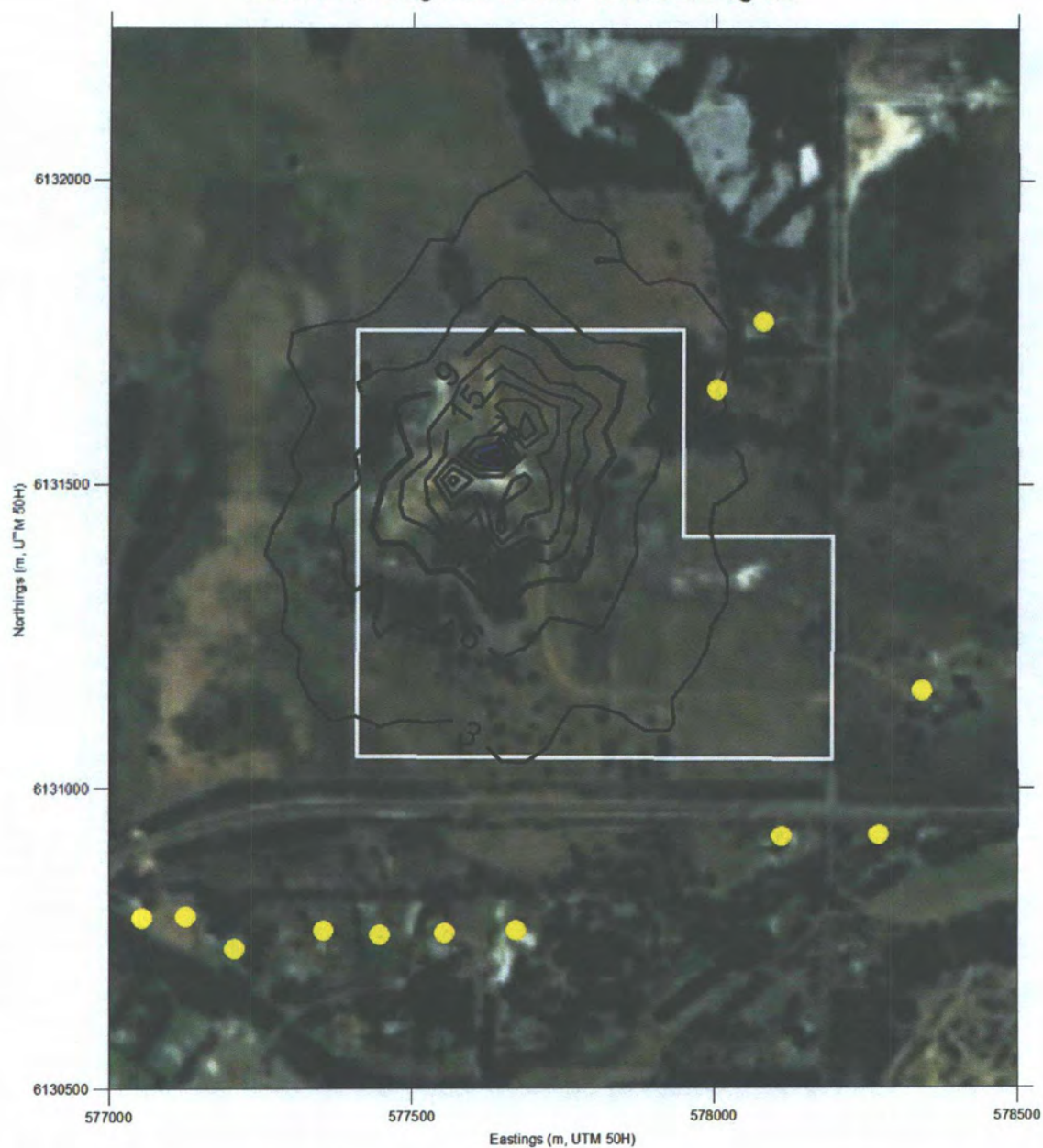


Figure 9

Great Southern Sands Proposed Asphalt Plant
99.9th percentile, 1 hour average ground level concentration of Asphalt Fume
Contours in 3 ug/m³ intervals. Criteria is 9 ug/m³



6 RISK ASSESSMENT

From Section 5.1, it can be seen that the peak predictions of odour at the assessment criteria levels are just contained within the site boundary. From Section 5.2, it can be seen that the most constraining individual pollutant, asphalt fume, has peak predictions that are also just contained within the site boundary. The emission rates for each are recommended to be subject to testing upon commissioning of the plant. About one-third of the respective criteria levels are predicted as peak concentrations at the nearest residences north-east of the plant, i.e. the emission rates would each have to triple before individual exceedances of any criterion would be predicted to occur.

The emissions of asphalt fume may be compared with those predicted for other plants. Batch mix asphalt plants are less common than drum mix plants, which are typically of far greater capacity. Over the course of periodic emissions testing of the vent stack emissions from a drum mix asphalt plant of > 200 tonnes per hour capacity, the peak measured emission rate of C5-C20 volatile organic compounds was 0.011 grams per minute¹⁰. This may be compared to an emission rate of 2.04 grams per minute from the vent stack adopted for this assessment of a 30 tonne per hour plant, which is taken from conservative USEPA emission factor estimations. With this estimate being two orders of magnitude higher than actually measured for larger plants, Ektimo considers that there is a low risk of higher actual measurements.

Ektimo considers that the emissions of general odour are a more significant risk, noting that actual measurements of odour emission rate from a comparable plant that was using a comparable bitumen binder were used in this assessment. Hence, the risk of odour dis-amenity at the nearest receiver residences is subject of this risk assessment.

Fugitive dust emissions have not been directly assessed and the risk of dust dis-amenity from soiled surfaces or visible dust plumes is also considered.

The risk assessment framework is detailed within the Risk Assessments Guidance Statement issued by the DER in November 2016.

Table 6 below details the derived categorised definitions of the Likelihood of dis-amenity and the Consequence of this dis-amenity, based on the framework. The likelihood is based on the potential for the occurrences of causal factors that would lead to any increase in odour or dust emissions. The consequence is based on exceedance of the threshold for offensive levels of odour or dust dis-amenity. Table 7 details the DER risk metric which combines the likelihood and the consequence to derive a risk.

6.1 Odour Risk

Table 8 summarises the assessment of the level of risk for the nearest rural residential receivers as the result of higher odour emissions from the asphalt plant. Causes of higher odour emissions include using polymer modified bitumen, or additives to improve the application of asphalt at lower temperatures, or an unexpectedly high sulfur content. Ektimo have tested odour emissions from an asphalt plant vent stack using polymer modified bitumen (in a drum mix plant). These were approximately **twice as high** when accounting for production rate. Note Table 5 for a summary of these tested odour emission for drum mix plants that were using standard Class 170 bitumen and also a polymer modified bitumen Class 170.

However, a **factor-of-three** increase could be accommodated before non-compliances are predicted at the nearest residences. The risk of amenity impact at the nearest residences was assessed as **Low**, an outcome primarily driven by the relatively small size of the plant and forecast production tonnage, the distance the site boundary and the further distance to the nearest receivers. This determined level of risk is acceptable without the need for further control, although the primary controls of using low sulfur bitumen and

¹⁰ Ektimo emission test report R001988 for Boral Resources at Orange Grove, January 2016.

producing asphalt at a temperature below the threshold for blue smoke emissions are now standard practice.

Table 5: Comparison of odour emission rates from drum mix asphalt plants using different bitumen binders.

Odour when using Class 170 bitumen					
Ektimo Test Report	HMA Production Rate (tons/hour)	Odour concentration in-stack (OU)	Wet.flow rate (Nm3/min)	Odour Emission rate (OUV/min)	Odour Emission rate (OUV/sec)
R001148	240	6800	550	3800000	63000
R001551	240	4900	650	3200000	53000
R001988	200	8600	665	5700000	95000
		average (2 significant figures) ->>			70000
Odour when using Polymer Modified Class 170 bitumen					
EML Air Test Report	HMA Production Rate (tons/hour)	Odour concentration in-stack (OU)	Wet flow rate (Nm3/min)	Odour Emission rate (OUV/min)	Odour Emission rate (OUV/sec)
N87065	200	7900	920	7300000	120000

6.2 Fugitive Dust Risk

Table 9 summarises the assessment of the level of risk for the nearest rural residential receivers as the result of fugitive dust emissions from the works compound and access roads. The primary causes of uncontrolled fugitive dust emissions would be adverse weather (hot, low humidity) conditions that reduce moisture levels within raw materials or surface soil below the threshold required for dust extinction, and higher winds that cause lift off and transport of the dust particles towards receivers within visible plumes. The risk of amenity impact at the nearest residences was assessed as **Low**. This outcome is primarily driven by:

- The relatively small size of the plant, low forecast annual production tonnage and operational time;
- The distance to the site boundary and the further distance to the nearest receivers,
- The site access road oriented to the south of the site away from the nearest receivers to the plant,
- Maintenance of internal roads to reduce surface silt;
- A 10 km/hour site speed limit to eliminate vehicle induced dust; and
- Water mist and sprays as required to reduce visible dust emissions around active stockpiles, storage hoppers, internal roads and activity area surfaces.

This determined level of risk is acceptable, and will require consistent management with the controls and practices as detailed within a separate site environment management plan, and as summarised in Section 7 below.

Table 6: Categorised definition of Likelihood and Consequence of an amenity risk event (based on DER Risk Assessment Framework).

Likelihood		Consequence	
Almost Certain	The risk event is expected to occur in most circumstances.	Severe	Local scale impacts: permanent loss of amenity.
Likely	The risk event will probably occur in most circumstances.	Major	Local scale impacts: high level impact to amenity.
Possible	The risk event could occur at some time.	Moderate	Local scale impacts: mid-level impact to amenity.
Unlikely	The risk event will probably not occur in most circumstances.	Minor	Local scale impacts: low-level impact to amenity.
Rare	The risk event may only occur in exceptional circumstances.	Slight	Local scale impacts: minimal impacts to amenity.

Table 7: Risk Metric (based on DER Risk Assessment Framework).

Likelihood	Consequence				
	Slight	Minor	Moderate	Major	Severe
Almost Certain	Medium	High	High	Extreme	Extreme
Likely	Medium	Medium	High	High	Extreme
Possible	Low	Medium	Medium	High	Extreme
Unlikely	Low	Medium	Medium	Medium	High
Rare	Low	Low	Medium	Medium	High

**Table 8: Derived Risk Assessment for Odour Emissions
(based on DER Risk Assessment Framework).**

Sources			Pathway		Receptors	Potential Impact	Consequence on Receptor	Likelihood of Consequence	Level of Risk / Adverse Impact on Receptor
Emission Point	Proponent Controls	Emission Event							
Asphalt Vent Stack and Load Out Odour	Low sulfur bitumen binder Separation distance to boundary and nearest receivers. Low frequency of proposed operation.	Double odour emission rate due to bitumen having: • Higher sulfur content; • Additives; or • Polymer modification. • Heated excessively >180°C (blue smoke)	Air (inhalation)	→	Nearest rural dwellings to the north-east. Local scale impacts.	Loss of Amenity	Slight (Local scale impacts: Minimal impacts to amenity)	Possible (the risk event could occur at some time)	Low

**Table 9: Derived Risk Assessment for Fugitive Dust Emissions
(based on DER Risk Assessment Framework).**

Sources			Pathway		Receptors	Potential Impact	Consequence on Receptor	Likelihood of Consequence	Level of Risk / Adverse Impact on Receptor
Emission Point	Proponent Controls	Emission Event							
Raw material stockpiles, pug mill loading or internal unsealed roads	Defined stockpile area. Reduce height stockpiles 4 metres. Water mist and sprays to eliminated visible dust. Maintain unsealed roads to reduce surface silt. 10 km/hr speed limit to eliminate vehicle induced dust. Low frequency of proposed operation. Separation distance.	Potential increase in fugitive dust emissions during hot and windy weather conditions.	Air (inhalation) Air (deposited dust) Visibility (amenity)	→	Surrounding rural dwellings. Local scale impacts.	Loss of Amenity (visibility and soiled surfaces)	Minor (Local scale impacts: Low level impact to amenity)	Rare (The risk event may only occur in exceptional circumstances due to proponent controls)	Low

7 ABATEMENT MEASURES

Emissions from the site of fugitive odour and dust will be abated using a range of design and management methods that will include the following:

- Defined unsealed internal access roads will be maintained for vehicle ingress and egress from the site. These will be surfaced with coarse aggregate rock and regularly maintained and watered when necessary to minimise surface silt that may be eroded by winds. Roads constructed like this are less prone to dust emissions;
- Trucks entering the site are to have covered loads and will travel at reduced speeds of 10 km/hr or less to avoid vehicle induced dust emissions;
- Component aggregate will typically be sourced from regional suppliers and stored onsite in managed stockpiles no more than 4 m in height. The stockpiles will be subject to water mist or sprays to maintain surface moisture to dust extinction levels, particularly during warm and windy weather;
- A single front end loader is to be used on site to manage the stockpiles and to load component aggregate into the individual pug mill hoppers as required. The material within the pug mill hoppers will be subject to water mist or sprays to maintain surface moisture to dust extinction levels, particularly during warm and windy weather;
- The bitumen product to be used is a low sulphur bitumen that has been "cut" during production of shorter chain odorous hydrocarbons specifically to reduce odour. This is now widely used in asphalt manufacture around Australia;
- The bitumen is stored in heated storage tanks which are fitted with condensers on the head-space vents so that any volatile odorous emissions are condensed to liquid that drops back to the tank;
- The plant is fuelled by refined distillate rather than heavier fuel oil, further reducing the emission of partially combusted organics and volatile organic compounds; and also combustion gases;
- Flue gas from the aggregate drying process and bitumen mixing are recirculated through the burner combustion zone to further reduce volatile organic emissions, before being ducted through a baghouse fabric filter system, then to atmosphere via a 6.1 m stack;
- The asphalt product will be produced at temperatures typically less than 175°C which is below the threshold of 180°C for blue smoke emissions that can contain excessive odours and volatile organics;
- The covered load-out conveyor (that transports asphalt upwards into the small storage bucket) will mitigate any residual odours from dispersing into the atmosphere;
- The manufactured asphalt will typically be loaded out into trucks direct from the batch process. A small 8 cubic metre elevated bucket may temporarily hold a single produced batch for short periods until a truck arrives for loadout. The duration of the fugitive emissions from the loadout process are reduced by the speed of the loading from the batch process onto tray trucks, which usually takes less than two minutes before the tray is covered and the truck driven from site; and
- Trucks with asphalt are to leave the site with the trays tarped to reduce residual odour emissions.

Further detail of the design and management measures to mitigate fugitive dust and odour emissions from the site are detailed within the site environmental management plan presented separately.

8 LIMITATIONS

This report represents the results of an air dispersion modelling assessment for the purposes of this commission. The data and assessment outcomes provided herein relate only to the project and structures described herein and must be reviewed by a competent engineer/scientist before being used for any other purpose. Ektimo accept no responsibility for other use of the data and assessment outcomes.

Where monitoring results, physical measurements and tests, data collection and similar work have been performed, recorded or provided by others the data is included and used in the form provided by others. The responsibility for the accuracy of such data remains with the issuing authority, not with Ektimo.

An understanding of a site's air quality impact depends on the integration of many pieces of information, some regional, some site specific, some structure specific and some experienced based. Hence this report should not be altered, amended or abbreviated, issued in part or issued incomplete in any way without prior checking and approval by Ektimo. Ektimo accepts no responsibility for any circumstances which arise from the issue of the report which has been modified in any way as outlined above.

9 APPENDICES

9.1 *Test report 91872 for odorous emissions from a comparable batch mix asphalt plant*



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Our reference: **91872**

Page 1 of 5

28 November 2013

Smith & Will Asphaltting
15 Brophy Street
BALLARAT VIC 3350

Attention Mr Damian Sullivan

BALLARAT PLANT

Emission Testing Report - NOVEMBER 2013

Tests were performed at the request of Smith & Will Asphaltting to determine emissions to air as detailed below;

Test Summary		
Location	Test Date	Test Parameters*
Asphalt Plant Scrubber Stack	18/11/13	Odour
Truck Loading	18/11/13	Odour

* Flow rate, velocity, temperature and moisture were determined unless otherwise stated.

Please refer to the following pages for results, plant operating conditions, test methods, quality assurance / quality control information and definitions.

Greg Sceneay
Client Manager

jk doc:91872.doc

Test report prepared for Smith & Will Asphaltting

RESULTS

Date	18/11/2013	Client	Smith & Will Asphaltting Pty Ltd
Report	91872	Stack ID	Asphalt Plant Scrubber Stack
Licence No.	-	Location	Ballarat
EML Staff	GS	State	VIC
Process Conditions	Normal operation producing 14 mm SI asphalt		
Reason for testing:	Air emission testing for Victorian EPA Licence purposes		

Sampling Plane Details			
Sampling plane dimensions (mm) & area	700 x 450	0.315 m ²	
Sampling port size, number & depth	2" BSP (x2) on same traverse		
Access & height of ports	Elevated work platform	9 m	
Duct orientation & shape	Vertical	Rectangular	
Downstream disturbance	Exit	4 D	
Upstream disturbance	Inlet	6 D	
No. traverses & points sampled	1	8	
Traverse method & compliance	AS4323.1	Non-compliant	

Comments

Non-compliant sampling plane; the testing precision will be reduced
The stack or duct does not have the required number of access holes (ports)
The number of traverses sampled is less than the requirement
The discharge is assumed to be composed of dry air and moisture
All results reported on a dry basis at NTP (except odour - wet NTP)

Stack Parameters			
Moisture content, %v/v	5.2		
Gas molecular weight, g/g mole	28.8 (wet)	29.4 (dry)	
Gas density at NTP, kg/m ³	1.29 (wet)	1.31 (dry)	
Test 1			
Gas Flow Parameters			
Temperature, °C	97		
Velocity at sampling plane, m/s	9.2		
Volumetric flow rate, discharge, m ³ /min	170		
Volumetric flow rate (wet NTP), m ³ /min	130		
Volumetric flow rate (dry NTP), m ³ /min	120		
Mass flow rate (wet basis), kg/hour	9900		
Velocity difference, %	1		

Odour		Average		Test 1		Test 2	
Sampling date & Time				18/11/13	1230	18/11/13	1236
Analysis date & Time				19/11/13	1136	19/11/13	1142
Holding time					23 hours		23 hours
Dilution factor & Threshold				6	2400 ou	6	1100 ou
Butanol threshold	50 ppb						
Laboratory temp	20 °C						
Last calibrated	29/01/13	ou	Mass Rate oum ³ /min	Concentration ou	Mass Rate oum ³ /min	Concentration ou	Mass Rate oum ³ /min
No. ITE's used				10		10	
Concentration		10000	1.3 E+06	14000	1.8 E+06	6600	8.4 E+05
Lower Uncertainty Limit		7000		6500		3000	
Upper Uncertainty Limit		15000		31000		14000	

Test report prepared for Smith & Will Asphaltting

Date	18/11/2013	Client	Smith & Will Asphaltting Pty Ltd
Report	91872	Stack ID	Truck Tipper Trailer Loading
Licence No.	-	Location	Ballarat
EML Staff	GS		State VIC
Process Conditions	Normal operation producing 14 mm SI asphalt		
Reason for testing:	Air emission testing for Victorian EPA Licence purposes		

Sampling Plane Details

Sampling plane dimensions (mm) & area	4500 x 2000	9 m ²
Sampling port size, number & depth		
Access & height of ports	Ground level	
Duct orientation & shape		Rectangular
Downstream disturbance		
Upstream disturbance		
No. traverses & points sampled	1	5
Traverse method & compliance	AS4323.1	Non-compliant

Comments

Truck tripper trailer nominal dimensions 4500 mm x 2000 mm
 Non-compliant sampling plane; the testing precision will be reduced
 The gas velocity at some or all sampling points is less than 3 m/s
 The gas temperature of the sampling plane is below the dew point
 The stack or duct does not have the required number of access holes (ports)
 The number of traverses sampled is less than the requirement
 The discharge is assumed to be composed of dry air and moisture
 All results reported on a dry basis at NTP (except odour - wet NTP)

Stack Parameters

Moisture content, %v/v	3.3	
Gas molecular weight, g/g mole	28.6 (wet)	29.0 (dry)
Gas density at NTP, kg/m ³	1.28 (wet)	1.29 (dry)

Test 1**Gas Flow Parameters**

Temperature, °C	26
Velocity at sampling plane, m/s	1.1
Volumetric flow rate, discharge, m ³ /min	590
Volumetric flow rate (wet NTP), m ³ /min	540
Volumetric flow rate (dry NTP), m ³ /min	530
Mass flow rate (wet basis), kg/hour	42000
Velocity difference, %	NA

Odour	Average		Test 1		Test 2	
Sampling date & Time			18/11/13	1255	18/11/13	1255
Analysis date & Time			19/11/13	1122	19/11/13	1129
Holding time				23 hours		23 hours
Dilution factor & Threshold			1	39 ou	1	48 ou
Butanol threshold	50 ppb					
Laboratory temp	20 °C					
Last calibrated	29/01/13					
	ou	Mass Rate	Concentration	Mass Rate	Concentration	Mass Rate
		oum ³ /min	ou	oum ³ /min	ou	oum ³ /min
No. ITE's used			10		10	
Concentration	44	24000	39	21000	48	26000
Lower Uncertainty Limit	29		18		22	
Upper Uncertainty Limit	64		85		100	

PLANT OPERATING CONDITIONS

Unless otherwise stated, the plant operating conditions were normal at the time of testing. See Smith & Will Asphaltting's records for complete process conditions.

TEST METHODS

Unless otherwise stated, the following methods meet the requirements of the Victorian Environment Protection Authority (as specified in *A Guide to Sampling and Analysis of Air Emissions and Air Quality, December 2002*). All sampling and analysis was performed by EML Air unless otherwise specified. Specific details of the methods are available upon request.

Parameter	EML Air Method	Reference Method	Uncertainty*	NATA Accredited	
				Sampling	Analysis
Sample Plane Criteria	-	AS 4323.1	-	✓	NA
Flow rate, temperature and velocity	100	USEPA 2	8%, 2%, 7%	✓	NA
Moisture	105	Vic EPA 3040	6%	✓	✓
Odour	-	AS 4323.3	not specified	✓	✓

* Uncertainty values cited in this table are calculated at the 95% confidence level (coverage factor = 2)

AS – Australian Standard
USEPA – United States Environmental Protection Agency
Vic EPA – Victorian Environment Protection Authority

QUALITY ASSURANCE / QUALITY CONTROL INFORMATION

EML Air is accredited to Australian Standard 17025 – General Requirements for the Competence of Testing and Calibration Laboratories. Australian Standard 17025 requires that a laboratory have a quality system similar to ISO 9002. More importantly it also requires that a laboratory have adequate equipment to perform the testing, as well as laboratory personnel with the competence to perform the testing. This quality assurance system is administered and maintained by the Quality Assurance Manager.

A formal Quality Control program is in place at EML Air to monitor analyses performed in the laboratory and sampling conducted in the field. The program is designed to check where appropriate: the sampling reproducibility, analytical method, accuracy, precision and the performance of the analyst. The Laboratory Manager is responsible for the administration and maintenance of this program.

DEFINITIONS

The following symbols and abbreviations may be used in this test report:

NTP	Normal temperature and pressure. Gas volumes and concentrations are expressed on a dry basis at 0°C, at discharge oxygen concentration and an absolute pressure of 101.325 kPa, unless otherwise specified.
Disturbance	A flow obstruction or instability in the direction of the flow which may impede accurate flow determination. This includes centrifugal fans, axial fans, partially closed or closed dampers, louvres, bends, connections, junctions, direction changes or changes in pipe diameter.
OU	The number of odour units per unit of volume. The numerical value of the odour concentration is equal to the number of dilutions to arrive at the odour threshold (50% panel response).
BSP	British standard pipe
NA	Not applicable
D	Duct diameter or equivalent duct diameter for rectangular ducts
<	Less than
>	Greater than
≥	Greater than or equal to
~	Approximately

9.2 *Vendor specifications for emissions to air from heated bitumen tank*



No. 2 Fuel Oil - Hot Oil Heater Combustion Emissions

03/21/13

Facility Name
Facility Location

Fulton Hogan (WO# 12-137)
Australia

**Heater
Burner**

Heatec HC-120 1.2 mmBtu/hr [1.3 GJ/hr] Hot Oil Heater
Powerflame C2-GO-15 2.2 mmBtu/hr [2.3 GJ/hr] Combination Gas/Oil Burner

(model #s
in bold)

Total Airflow	908	ACFM	25.7	m ³ /min
Standard Airflow	407	DSCFM	11.5	Sm ³ /min
Heat Input	2.2	mmBtu/hr	2.32	GJ/hr
Exhaust Temperature	600	F	316	C
Exhaust Moisture	10.1	%		
Exhaust Height	12.3	ft	3.76	height (m)
Exhaust Diameter	12	in	0.30	dia (m)
Exhaust Area	0.79	sq.ft.	0.073	m ²
Exhaust Velocity	19.3	ft/sec	5.87	m/sec
	1156	ft/min	352.4	m/min

Burner Fuel - Heating Value & Usage Rates *							
	Btu/gal	kJ/liter	Sulfur(%)				
No. 2 Fuel Oil	141000	39299	0.5	15.6	gal/hr	1.37E+05	gal/yr
				59.1	L/hr	5.17E+05	L/yr

* Usage rates based on exclusive use of each fuel annually (8760 hrs)

No. 2 Fuel Oil Combustion							
POLLUTANT	CASRN	MW	FACTOR	ACTUAL			
			lb/mmBtu	lb/hr	kg/hr	ton/yr	tonne/yr
Criteria Pollutants Manufacturer's Data							
Particulates			0.0143	0.031	0.014	0.138	0.125
Sulfur Dioxide	7446-09-5	64.06	1.05*S	1.155	0.524	5.059	4.589
Carbon Monoxide	630-08-0	28.01	0.037	0.081	0.037	0.357	0.323
Oxides of Nitrogen	10102-44-0	46.05	0.14	0.308	0.140	1.349	1.224
Volatile Organics	74-98-6	44.1	0.038	0.084	0.038	0.366	0.332
HAPS (AP-42 Table 11.1-13)							
Formaldehyde	50-00-0	30.03	3.5E-06	5.46E-05	2.48E-05	2.39E-04	2.17E-04
Acenaphthene	83-32-9	154.21	5.3E-07	8.27E-06	3.75E-06	3.62E-05	3.29E-05
Acenaphthylene	208-96-8	152.19	2.0E-07	3.12E-06	1.42E-06	1.37E-05	1.24E-05
Anthracene	120-12-7	178.23	1.8E-07	2.81E-06	1.27E-06	1.23E-05	1.12E-05
Benzo(b)fluoranthene	205-99-2	252.31	1.0E-07	1.56E-06	7.08E-07	6.83E-06	6.20E-06
Fluoranthene	206-44-0	202.26	4.4E-08	6.87E-07	3.11E-07	3.01E-06	2.73E-06
Fluorene	86-73-7	166.22	3.2E-08	4.99E-07	2.26E-07	2.19E-06	1.98E-06
Naphthalene	91-20-3	127.17	1.7E-05	2.65E-04	1.20E-04	1.16E-03	1.05E-03
Phenanthrene	85-01-8	178.23	4.9E-06	7.65E-05	3.47E-05	3.35E-04	3.04E-04
Pyrene	129-00-0	202.25	3.2E-08	4.99E-07	2.26E-07	2.19E-06	1.98E-06

9.3 AERMOD output files for significant pollutants

ODOUR

```
CO STARTING
TITLEONE Great Southern Sands Asphalt Plant at Albany - Odour
TITLETWO Vent stack and loadout odour sources. Terrain included.
MODELOPT CONC NOCHKD
AVERTIME 1
POLLUTID Odour
RUNORNOT RUN
ERRORFIL ERRORS.OUT
CO FINISHED

SO STARTING
ELEVUNIT METERS
LOCATION STACK POINT 577630 6131545 62
** Point Source QS HS TS VS DS
** Parameters:
SRCPARAM STACK 0.022 6.1 353. 10.0 0.8
** QS=0.022 corresponds to an OER of 22,000 OU/sec, with the output normally in ug/m3 now expressed as OU.
** Set hour per day 7am to 5pm or hours 8 to 17
EMISFACT STACK HROFDY 0 0 0 0 0 0 0 1 1 1 1 1 1 1 1 0 0 0 0 0 0 0

LOCATION LOUT VOLUME 577647 6131545 62
** Point Source QS Relht Sig-Y Sig-Z
** Parameters:
SRCPARAM LOUT 0.0004 2 2 1
** QS=0.0004 corresponds to an OER of 400 OU/sec, with the output normally in ug/m3 now expressed as OU.
** Set hour per day 7am to 5pm or hours 8 to 17
EMISFACT LOUT HROFDY 0 0 0 0 0 0 0 1 1 1 1 1 1 1 1 0 0 0 0 0 0 0

SO SRCGROUP ALL
SO FINISHED

RE STARTING
RE INCLUDED "ALBANY_AV2.rel"
RE FINISHED

ME STARTING
SURFFILE "ALBANY2015.sfc"
PROFFILE "ALBANY2015.pfl"
SURFDATA 00011 2015 Albany
UAIRDATA 00099 2015 Esperance
SITEDATA 00022 2015 Albany
PROFBASE 142 METERS
ME FINISHED

OU STARTING
RECTABLE ALLAVE 1ST 9TH
PLOTFILE 1 ALL 1ST GSS-odour-1HR-1ST.PLT
PLOTFILE 1 ALL 9TH GSS-odour-1HR-9TH.PLT
MAXIFILE 1 ALL 0.6 GSS-odour-1HR-0-60U.LST
SUMMFILE GSS-Odour-1HR.SUM
OU FINISHED

*** Message Summary For AERMOD Model Setup ***

----- Summary of Total Messages -----

A Total of 0 Fatal Error Message(s)
A Total of 1 Warning Message(s)
A Total of 0 Informational Message(s)

***** FATAL ERROR MESSAGES *****
*** NONE ***

***** WARNING MESSAGES *****
ME W396 43 MEOPEN: AERMET Version Out-dated or Non-standard; Version: 12345

***** SETUP Finishes Successfully *****
```



*** AERMOT - VERSION 15181 *** *** Great Southern Sands Asphalt Plant at Albany - Odour ***
02/10/17
*** AERMET - VERSION 12345 *** *** Vent stack and loadout odour sources. Terrain included. ***
12:05:57

PAGE

1
**MODELOPTS: NonDEFAULT CONC ELEV NOCHKD RURAL
*** MODEL SETUP OPTIONS SUMMARY ***

**Model Is Setup For Calculation of Average CONCentration Values.

-- DEPOSITION LOGIC --

**NO GAS DEPOSITION Data Provided.

**NO PARTICLE DEPOSITION Data Provided.

**Model Uses NO DRY DEPLETION. DRYDPLT = F

**Model Uses NO WET DEPLETION. WETDPLT = F

**Model Uses RURAL Dispersion Only.

**Model Allows User-Specified Options:

1. Stack-tip Downwash.
2. Model Accounts for ELEVated Terrain Effects.
3. Use Calms Processing Routine.
4. Use Missing Data Processing Routine.
5. No Exponential Decay.

**Other Options Specified:

NOCHKD - Suppresses checking of date sequence in meteorology files

**Model Assumes No FLAGPOLE Receptor Heights.

**The User Specified a Pollutant Type of: ODOUR

**Model Calculates 1 Short Term Average(s) of: 1-HR

**This Run Includes: 2 Source(s); 1 Source Group(s); and 15876 Receptor(s)

with: 1 POINT(s), including
 0 POINTCAP(s) and 0 POINTHOR(s)
and: 1 VOLUME source(s)
and: 0 AREA type source(s)
and: 0 LINE source(s)
and: 0 OPENPIT source(s)

**Model Set To Continue RUNning After the Setup Testing.

**The AERMET Input Meteorological Data Version Date: 12345

**Output Options Selected:

Model Outputs Tables of Highest Short Term Values by Receptor (RECTABLE Keyword)
Model Outputs External File(s) of Threshold Violations (MAXIFILE Keyword)
Model Outputs External File(s) of High Values for Plotting (PLOTFILE Keyword)
Model Outputs Separate Summary File of High Ranked Values (SUMMFILE Keyword)

**NOTE: The Following Flags May Appear Following CONC Values: c for Calm Hours
 m for Missing Hours
 b for Both Calm and Missing Hours

**Misc. Inputs: Base Elev. for Pot. Temp. Profile (m MSL) = 142.00 ; Decay Coef. = 0.000 ; Rot. Angle = 0.0
Emission Units = GRAMS/SEC ; Emission Rate Unit Factor = 0.10000E+07
Output Units = MICROGRAMS/M**3

**Approximate Storage Requirements of Model = 7.0 MB of RAM.

**Detailed Error/Message File: ERRORS.OUT

**File for Summary of Results: GSS-Odour-1HR.SUM



*** AERMOD - VERSION 15181 *** Great Southern Sands Asphalt Plant at Albany - Odour ***
 02/10/17
 *** AERMET - VERSION 12345 *** Vent stack and loadout odour sources. Terrain included. ***
 12:05:57

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**MODELOPTs: NonDEFAULT CONC ELEV NOCHKD RURAL

*** POINT SOURCE DATA ***

RATE	NUMBER	EMISSION	RATE	BASE	STACK	STACK	STACK	STACK	BLDG	URBAN	CAP/	EMIS
SOURCE	PART.	(GRAMS/SEC)	X	Y	ELEV.	HEIGHT	TEMP.	EXIT VEL.	DIAMETER	EXISTS	SOURCE	HOR
ID	CATS.		(METERS)	(METERS)	(METERS)	(METERS)	(DEG.K)	(M/SEC)	(METERS)			SCALAR
BY												VARY
STACK	0	0.22000E-01	577630.0	6131545.0	62.0	6.10	353.00	10.00	0.80	NO	NO	NO HROFDY

*** AERMOD - VERSION 15181 *** Great Southern Sands Asphalt Plant at Albany - Odour ***
 02/10/17
 *** AERMET - VERSION 12345 *** Vent stack and loadout odour sources. Terrain included. ***
 12:05:57

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**MODELOPTs: NonDEFAULT CONC ELEV NOCHKD RURAL

*** VOLUME SOURCE DATA ***

SOURCE	NUMBER	EMISSION	RATE	BASE	RELEASE	INIT.	INIT.	URBAN	EMISSION	RATE
ID	PART.	(GRAMS/SEC)	X	Y	ELEV.	HEIGHT	SY	SZ	SOURCE	SCALAR
	CATS.		(METERS)	(METERS)	(METERS)	(METERS)	(METERS)	(METERS)		VARY
										BY
LOUT	0	0.40000E-03	577647.0	6131545.0	62.0	2.00	2.00	1.00	NO	HROFDY

*** AERMOD - VERSION 15181 *** Great Southern Sands Asphalt Plant at Albany - Odour ***
 02/10/17
 *** AERMET - VERSION 12345 *** Vent stack and loadout odour sources. Terrain included. ***
 12:05:57

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**MODELOPTs: NonDEFAULT CONC ELEV NOCHKD RURAL

*** SOURCE IDs DEFINING SOURCE GROUPS ***

SRCGROUP ID	SOURCE IDs
ALL	STACK, LOUT

*** AERMOD - VERSION 15181 *** Great Southern Sands Asphalt Plant at Albany - Odour ***
 02/10/17
 *** AERMET - VERSION 12345 *** Vent stack and loadout odour sources. Terrain included. ***
 12:05:57

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**MODELOPTs: NonDEFAULT CONC ELEV NOCHKD RURAL

* SOURCE EMISSION RATE SCALARS WHICH VARY FOR EACH HOUR OF THE DAY *

HOURL	SCALAR	HOURL	SCALAR	HOURL	SCALAR	HOURL	SCALAR	HOURL	SCALAR	HOURL	SCALAR
SOURCE ID = STACK	1 .00000E+00	2 .00000E+00	3 .00000E+00	4 .00000E+00	5 .00000E+00	6 .00000E+00	7 .00000E+00	8 .00000E+00	9 .00000E+00	10 .00000E+00	11 .00000E+00
13 .10000E+01	14 .10000E+01	15 .10000E+01	16 .10000E+01	17 .10000E+01	18 .00000E+00	19 .00000E+00	20 .00000E+00	21 .00000E+00	22 .00000E+00	23 .00000E+00	24 .00000E+00
SOURCE ID = LOUT	1 .00000E+00	2 .00000E+00	3 .00000E+00	4 .00000E+00	5 .00000E+00	6 .00000E+00	7 .00000E+00	8 .10000E+01	9 .10000E+01	10 .10000E+01	11 .10000E+01
13 .10000E+01	14 .10000E+01	15 .10000E+01	16 .10000E+01	17 .10000E+01	18 .00000E+00	19 .00000E+00	20 .00000E+00	21 .00000E+00	22 .00000E+00	23 .00000E+00	24 .00000E+00



*** AERMOD - VERSION 15181 *** Great Southern Sands Asphalt Plant at Albany - Odour ***
 02/10/17
 *** AERMET - VERSION 12345 *** Vent stack and loadout odour sources. Terrain included. ***
 12:05:57

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**MODELOPTs: NonDEFAULT CONC ELEV NOCHKD RURAL

*** GRIDDED RECEPTOR NETWORK SUMMARY ***

*** NETWORK ID: UCART1 ; NETWORK TYPE: GRIDCART ***

*** X-COORDINATES OF GRID ***
(METERS)

575086.0	575126.0	575166.0	575206.0	575246.0	575286.0	575326.0	575366.0	575406.0	575446.0
575486.0	575526.0	575566.0	575606.0	575646.0	575686.0	575726.0	575766.0	575806.0	575846.0
575886.0	575926.0	575966.0	576006.0	576046.0	576086.0	576126.0	576166.0	576206.0	576246.0
576286.0	576326.0	576366.0	576406.0	576446.0	576486.0	576526.0	576566.0	576606.0	576646.0
576686.0	576726.0	576766.0	576806.0	576846.0	576886.0	576926.0	576966.0	577006.0	577046.0
577086.0	577126.0	577166.0	577206.0	577246.0	577286.0	577326.0	577366.0	577406.0	577446.0
577486.0	577526.0	577566.0	577606.0	577646.0	577686.0	577726.0	577766.0	577806.0	577846.0
577886.0	577926.0	577966.0	578006.0	578046.0	578086.0	578126.0	578166.0	578206.0	578246.0
578286.0	578326.0	578366.0	578406.0	578446.0	578486.0	578526.0	578566.0	578606.0	578646.0
578686.0	578726.0	578766.0	578806.0	578846.0	578886.0	578926.0	578966.0	579006.0	579046.0
579086.0	579126.0	579166.0	579206.0	579246.0	579286.0	579326.0	579366.0	579406.0	579446.0
579486.0	579526.0	579566.0	579606.0	579646.0	579686.0	579726.0	579766.0	579806.0	579846.0
579886.0	579926.0	579966.0	580006.0	580046.0	580086.0				

*** Y-COORDINATES OF GRID ***
(METERS)

6129107.0	6129147.0	6129187.0	6129227.0	6129267.0	6129307.0	6129347.0	6129387.0	6129427.0	6129467.0
6129507.0	6129547.0	6129587.0	6129627.0	6129667.0	6129707.0	6129747.0	6129787.0	6129827.0	6129867.0
6129907.0	6129947.0	6129987.0	6130027.0	6130067.0	6130107.0	6130147.0	6130187.0	6130227.0	6130267.0
6130307.0	6130347.0	6130387.0	6130427.0	6130467.0	6130507.0	6130547.0	6130587.0	6130627.0	6130667.0
6130707.0	6130747.0	6130787.0	6130827.0	6130867.0	6130907.0	6130947.0	6130987.0	6131027.0	6131067.0
6131107.0	6131147.0	6131187.0	6131227.0	6131267.0	6131307.0	6131347.0	6131387.0	6131427.0	6131467.0
6131507.0	6131547.0	6131587.0	6131627.0	6131667.0	6131707.0	6131747.0	6131787.0	6131827.0	6131867.0
6131907.0	6131947.0	6131987.0	6132027.0	6132067.0	6132107.0	6132147.0	6132187.0	6132227.0	6132267.0
6132307.0	6132347.0	6132387.0	6132427.0	6132467.0	6132507.0	6132547.0	6132587.0	6132627.0	6132667.0
6132707.0	6132747.0	6132787.0	6132827.0	6132867.0	6132907.0	6132947.0	6132987.0	6133027.0	6133067.0
6133107.0	6133147.0	6133187.0	6133227.0	6133267.0	6133307.0	6133347.0	6133387.0	6133427.0	6133467.0
6133507.0	6133547.0	6133587.0	6133627.0	6133667.0	6133707.0	6133747.0	6133787.0	6133827.0	6133867.0
6133907.0	6133947.0	6133987.0	6134027.0	6134067.0	6134107.0				

*** AERMOD - VERSION 15181 *** Great Southern Sands Asphalt Plant at Albany - Odour ***
 02/10/17
 *** AERMET - VERSION 12345 *** Vent stack and loadout odour sources. Terrain included. ***
 12:05:57

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**MODELOPTs: NonDEFAULT CONC ELEV NOCHKD RURAL

*** THE SUMMARY OF HIGHEST 1-HR RESULTS ***

** CONC OF ODOUR IN MICROGRAMS/M**3

**

DATE

NETWORK GROUP ID	AVERAGE CONC	DATE (YYMMDDHH)	RECEPTOR	(XR, YR, ZELEV, ZHILL, ZFLAG)	OF TYPE	
UCART1	HIGH 1ST HIGH VALUE IS	6.37165 ON 15060916: AT (	577606.00,	6131507.00,	67.60, 67.60, 0.00)	GC
UCART1	HIGH 9TH HIGH VALUE IS	3.07477 ON 15071517: AT (	577566.00,	6131507.00,	65.70, 74.00, 0.00)	GC

*** RECEPTOR TYPES: GC = GRIDCART
 GP = GRIDPOLR
 DC = DISCCART
 DP = DISCPOLR



*** AERMOD - VERSION 15181 *** *** Great Southern Sands Asphalt Plant at Albany - Odour ***
02/10/17
*** AERMET - VERSION 12345 *** *** Vent stack and loadout odour sources. Terrain included. ***
12:05:57

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**MODELOPTs: NonDEFAULT CONC ELEV NOCHKD RURAL

*** Message Summary : AERMOD Model Execution ***

----- Summary of Total Messages -----

A Total of 0 Fatal Error Message(s)
A Total of 1 Warning Message(s)
A Total of 0 Informational Message(s)

A Total of 8760 Hours Were Processed

A Total of 0 Calm Hours Identified

A Total of 0 Missing Hours Identified (0.00 Percent)

***** FATAL ERROR MESSAGES *****
*** NONE ***

***** WARNING MESSAGES *****
ME W396 43 MEOPEN: AERMET Version Out-dated or Non-standard; Version: 12345

*** AERMOD Finishes Successfully ***

PM10

```
CO STARTING
TITLEONE Great Southern Sands Asphalt Plant at Albany - PM10
TITLETWO Terrain included. Asphalt Plant vent stack and bitumen heater vent stack
MODELOPT CONC NOCHKD
AVERTIME 24 PERIOD
POLLUTID PM10
RUNORNOT RUN
ERRORFIL ERRORS.OUT
CO FINISHED

SO STARTING
ELEVUNIT METERS
LOCATION STACK POINT 577630 6131545 62
** Point Source QS HS TS VS DS
** Parameters:
SRCPARAM STACK 0.11 6.1 353. 10.0 0.8
** Set hour per day 7am to 5pm or hours 8 to 17
EMISFACT STACK HROFDY 0 0 0 0 0 0 0 1 1 1 1 1 1 1 1 0 0 0 0 0 0 0

LOCATION BHEAT POINT 577630 6131555 62
** Point Source QS HS TS VS DS
** Parameters:
SRCPARAM BHEAT 0.0039 3.73 589. 5.87 0.3
** Set hour per day 7am to 5pm or hours 8 to 17
EMISFACT BHEAT HROFDY 0 0 0 0 0 0 0 1 1 1 1 1 1 1 1 1 0 0 0 0 0 0

SO SRCGROUP ALL
SO FINISHED

RE STARTING
RE INCLUDED "ALBANY_AV2.rel"
RE FINISHED

ME STARTING
SURFFILE "ALBANY2015.sfc"
PROFFILE "ALBANY2015.pfl"
SURFDATA 00011 2015 Albany
UAIRDATA 00099 2015 Esperance
SITEDATA 00022 2015 Albany
PROFBASE 142 METERS
ME FINISHED

OU STARTING
RECTABLE ALLAVE 1ST
MAXTABLE ALLAVE 100
PLOTFILE 24 ALL 1ST GSS-PM10-24HR-1ST.PLT
PLOTFILE PERIOD ALL GSS-PM10-annual.PLT
RANKFILE 24 100 GSS-PM10-24hr.TXT
SUMMFILE GSS-PM10.SUM
OU FINISHED

*** Message Summary For AERMOD Model Setup ***

----- Summary of Total Messages -----
A Total of 0 Fatal Error Message(s)
A Total of 1 Warning Message(s)
A Total of 0 Informational Message(s)

***** FATAL ERROR MESSAGES *****
*** NONE ***

***** WARNING MESSAGES *****
ME W396 41 MEOPEN: AERMET Version Out-dated or Non-standard; Version: 12345

*****
*** SETUP Finishes Successfully ***
*****
```


*** AERMOD - VERSION 15181 *** *** Great Southern Sands Asphalt Plant at Albany - PM10 ***
02/08/17
*** AERMET - VERSION 12345 *** *** Terrain included. Asphalt Plant vent stack and bitumen heater vent ***
15:55:24

PAGE

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**MODELOPTs: NonDEFAULT CONC ELEV NOCHKD RURAL

*** MODEL SETUP OPTIONS SUMMARY ***

**Model Is Setup For Calculation of Average CONCentration Values.

-- DEPOSITION LOGIC --

**NO GAS DEPOSITION Data Provided.

**NO PARTICLE DEPOSITION Data Provided.

**Model Uses NO DRY DEPLETION. DRYDPLT = F

**Model Uses NO WET DEPLETION. WETDPLT = F

**Model Uses RURAL Dispersion Only.

**Model Allows User-Specified Options:

1. Stack-tip Downwash.
2. Model Accounts for ELEVated Terrain Effects.
3. Use Calms Processing Routine.
4. Use Missing Data Processing Routine.
5. No Exponential Decay.

**Other Options Specified:

NOCHKD - Suppresses checking of date sequence in meteorology files

**Model Assumes No FLAGPOLE Receptor Heights.

**The User Specified a Pollutant Type of: PM10

**Model Calculates 1 Short Term Average(s) of: 24-HR
and Calculates PERIOD Averages

**This Run Includes: 2 Source(s); 1 Source Group(s); and 15876 Receptor(s)

with: 2 POINT(s), including
 0 POINTCAP(s) and 0 POINTHOR(s)
and: 0 VOLUME source(s)
and: 0 AREA type source(s)
and: 0 LINE source(s)
and: 0 OPENPIT source(s)

**Model Set To Continue RUNning After the Setup Testing.

**The AERMET Input Meteorological Data Version Date: 12345

**Output Options Selected:

Model Outputs Tables of PERIOD Averages by Receptor
Model Outputs Tables of Highest Short Term Values by Receptor (RECTABLE Keyword)
Model Outputs Tables of Overall Maximum Short Term Values (MAXTABLE Keyword)
Model Outputs External File(s) of High Values for Plotting (PLOTFILE Keyword)
Model Outputs External File(s) of Ranked Values (RANKFILE Keyword)
Model Outputs Separate Summary File of High Ranked Values (SUMMFILE Keyword)

**NOTE: The Following Flags May Appear Following CONC Values: c for Calm Hours
 m for Missing Hours
 b for Both Calm and Missing Hours

**Misc. Inputs: Base Elev. for Pot. Temp. Profile (m MSL) = 142.00 ; Decay Coef. = 0.000 ; Rot. Angle = 0.0
Emission Units = GRAMS/SEC ; Emission Rate Unit Factor = 0.10000E+07
Output Units = MICROGRAMS/M**3

**Approximate Storage Requirements of Model = 5.3 MB of RAM.

**Detailed Error/Message File: ERRORS.OUT

**File for Summary of Results: GSS-PM10.SUM



*** AERMOD - VERSION 15181 *** Great Southern Sands Asphalt Plant at Albany - PM10 ***
02/08/17
*** AERMET - VERSION 12345 *** Terrain included. Asphalt Plant vent stack and bitumen heater vent ***
15:55:24

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**MODELOPTs: NonDEFAULT CONC ELEV NOCHKD RURAL

*** POINT SOURCE DATA ***

RATE	NUMBER	EMISSION	RATE	BASE	STACK	STACK	STACK	STACK	BLDG	URBAN	CAP/	EMIS
SOURCE	PART.	(GRAMS/SEC)	X	Y	ELEV.	HEIGHT	TEMP.	EXIT VEL.	DIAMETER	EXISTS	SOURCE	HOR
ID	CATS.		(METERS)	(METERS)	(METERS)	(METERS)	(DEG.K)	(M/SEC)	(METERS)			SCALAR
BY												VARY
STACK	0	0.11000E+00	577630.0	6131545.0	62.0	6.10	353.00	10.00	0.80	NO	NO	NO
BHEAT	0	0.39000E-02	577630.0	6131555.0	62.0	3.73	589.00	5.87	0.30	NO	NO	NO

*** AERMOD - VERSION 15181 *** Great Southern Sands Asphalt Plant at Albany - PM10 ***
02/08/17
*** AERMET - VERSION 12345 *** Terrain included. Asphalt Plant vent stack and bitumen heater vent ***
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**MODELOPTs: NonDEFAULT CONC ELEV NOCHKD RURAL

*** SOURCE IDs DEFINING SOURCE GROUPS ***

SRCGROUP ID	SOURCE IDs
-------------	------------

ALL STACK , BHEAT ,

*** AERMOD - VERSION 15181 *** Great Southern Sands Asphalt Plant at Albany - PM10 ***
02/08/17
*** AERMET - VERSION 12345 *** Terrain included. Asphalt Plant vent stack and bitumen heater vent ***
15:55:24

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**MODELOPTs: NonDEFAULT CONC ELEV NOCHKD RURAL

* SOURCE EMISSION RATE SCALARS WHICH VARY FOR EACH HOUR OF THE DAY *

HOURL	SCALAR	HOURL	SCALAR	HOURL	SCALAR	HOURL	SCALAR	HOURL	SCALAR	HOURL	SCALAR
SOURCE ID = STACK ; SOURCE TYPE = POINT :											
1	.00000E+00	2	.00000E+00	3	.00000E+00	4	.00000E+00	5	.00000E+00	6	.00000E+00
7	.00000E+00	8	.10000E+01	9	.10000E+01	10	.10000E+01	11	.10000E+01	12	.10000E+01
13	.10000E+01	14	.10000E+01	15	.10000E+01	16	.10000E+01	17	.10000E+01	18	.00000E+00
19	.00000E+00	20	.00000E+00	21	.00000E+00	22	.00000E+00	23	.00000E+00	24	.00000E+00
SOURCE ID = BHEAT ; SOURCE TYPE = POINT :											
1	.00000E+00	2	.00000E+00	3	.00000E+00	4	.00000E+00	5	.00000E+00	6	.00000E+00
7	.00000E+00	8	.10000E+01	9	.10000E+01	10	.10000E+01	11	.10000E+01	12	.10000E+01
13	.10000E+01	14	.10000E+01	15	.10000E+01	16	.10000E+01	17	.10000E+01	18	.00000E+00
19	.00000E+00	20	.00000E+00	21	.00000E+00	22	.00000E+00	23	.00000E+00	24	.00000E+00

*** AERMOD - VERSION 15181 *** Great Southern Sands Asphalt Plant at Albany - PM10 ***
 02/08/17
 *** AERMET - VERSION 12345 *** Terrain included. Asphalt Plant vent stack and bitumen heater vent ***
 15:55:24

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**MODELOPTS: NonDEFAULT CONC ELEV NOCHKD RURAL

*** GRIDDED RECEPTOR NETWORK SUMMARY ***

*** NETWORK ID: UCART1 : NETWORK TYPE: GRIDCART ***

*** X-COORDINATES OF GRID ***
 (METERS)

575086.0, 575126.0, 575166.0, 575206.0, 575246.0, 575286.0, 575326.0, 575366.0, 575406.0, 575446.0,
 575486.0, 575526.0, 575566.0, 575606.0, 575646.0, 575686.0, 575726.0, 575766.0, 575806.0, 575846.0,
 575886.0, 575926.0, 575966.0, 576006.0, 576046.0, 576086.0, 576126.0, 576166.0, 576206.0, 576246.0,
 576286.0, 576326.0, 576366.0, 576406.0, 576446.0, 576486.0, 576526.0, 576566.0, 576606.0, 576646.0,
 576686.0, 576726.0, 576766.0, 576806.0, 576846.0, 576886.0, 576926.0, 576966.0, 577006.0, 577046.0,
 577086.0, 577126.0, 577166.0, 577206.0, 577246.0, 577286.0, 577326.0, 577366.0, 577406.0, 577446.0,
 577486.0, 577526.0, 577566.0, 577606.0, 577646.0, 577686.0, 577726.0, 577766.0, 577806.0, 577846.0,
 577886.0, 577926.0, 577966.0, 578006.0, 578046.0, 578086.0, 578126.0, 578166.0, 578206.0, 578246.0,
 578286.0, 578326.0, 578366.0, 578406.0, 578446.0, 578486.0, 578526.0, 578566.0, 578606.0, 578646.0,
 578686.0, 578726.0, 578766.0, 578806.0, 578846.0, 578886.0, 578926.0, 578966.0, 579006.0, 579046.0,
 579086.0, 579126.0, 579166.0, 579206.0, 579246.0, 579286.0, 579326.0, 579366.0, 579406.0, 579446.0,
 579486.0, 579526.0, 579566.0, 579606.0, 579646.0, 579686.0, 579726.0, 579766.0, 579806.0, 579846.0,
 579886.0, 579926.0, 579966.0, 580006.0, 580046.0, 580086.0,

*** Y-COORDINATES OF GRID ***
 (METERS)

6129107.0, 6129147.0, 6129187.0, 6129227.0, 6129267.0, 6129307.0, 6129347.0, 6129387.0, 6129427.0, 6129467.0,
 6129507.0, 6129547.0, 6129587.0, 6129627.0, 6129667.0, 6129707.0, 6129747.0, 6129787.0, 6129827.0, 6129867.0,
 6129907.0, 6129947.0, 6129987.0, 6130027.0, 6130067.0, 6130107.0, 6130147.0, 6130187.0, 6130227.0, 6130267.0,
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 6130707.0, 6130747.0, 6130787.0, 6130827.0, 6130867.0, 6130907.0, 6130947.0, 6130987.0, 6131027.0, 6131067.0,
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 6131507.0, 6131547.0, 6131587.0, 6131627.0, 6131667.0, 6131707.0, 6131747.0, 6131787.0, 6131827.0, 6131867.0,
 6131907.0, 6131947.0, 6131987.0, 6132027.0, 6132067.0, 6132107.0, 6132147.0, 6132187.0, 6132227.0, 6132267.0,
 6132307.0, 6132347.0, 6132387.0, 6132427.0, 6132467.0, 6132507.0, 6132547.0, 6132587.0, 6132627.0, 6132667.0,
 6132707.0, 6132747.0, 6132787.0, 6132827.0, 6132867.0, 6132907.0, 6132947.0, 6132987.0, 6133027.0, 6133067.0,
 6133107.0, 6133147.0, 6133187.0, 6133227.0, 6133267.0, 6133307.0, 6133347.0, 6133387.0, 6133427.0, 6133467.0,
 6133507.0, 6133547.0, 6133587.0, 6133627.0, 6133667.0, 6133707.0, 6133747.0, 6133787.0, 6133827.0, 6133867.0,
 6133907.0, 6133947.0, 6133987.0, 6134027.0, 6134067.0, 6134107.0,

*** AERMOD - VERSION 15181 *** Great Southern Sands Asphalt Plant at Albany - PM10 ***
 02/08/17
 *** AERMET - VERSION 12345 *** Terrain included. Asphalt Plant vent stack and bitumen heater vent ***
 15:55:24

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**MODELOPTS: NonDEFAULT CONC ELEV NOCHKD RURAL

*** THE SUMMARY OF MAXIMUM PERIOD (8760 HRS) RESULTS ***

** CONC OF PM10 IN MICROGRAMS/M**3 **

GROUP ID	AVERAGE CONC	RECEPTOR (XR, YR, ZELEV, ZHILL, ZFLAG)	OF TYPE	NETWORK GRID-ID
ALL	1ST HIGHEST VALUE IS	0.58017 AT (577566.00, 6131587.00, 61.00, 61.00, 0.00)	GC	UCART1
	2ND HIGHEST VALUE IS	0.51964 AT (577566.00, 6131547.00, 60.80, 76.00, 0.00)	GC	UCART1
	3RD HIGHEST VALUE IS	0.48520 AT (577686.00, 6131587.00, 59.90, 82.00, 0.00)	GC	UCART1
	4TH HIGHEST VALUE IS	0.43187 AT (577686.00, 6131507.00, 61.80, 72.00, 0.00)	GC	UCART1
	5TH HIGHEST VALUE IS	0.42096 AT (577686.00, 6131627.00, 62.80, 82.00, 0.00)	GC	UCART1
	6TH HIGHEST VALUE IS	0.39282 AT (577646.00, 6131627.00, 60.60, 82.00, 0.00)	GC	UCART1
	7TH HIGHEST VALUE IS	0.38788 AT (577566.00, 6131507.00, 65.70, 74.00, 0.00)	GC	UCART1
	8TH HIGHEST VALUE IS	0.38127 AT (577566.00, 6131627.00, 61.10, 61.10, 0.00)	GC	UCART1
	9TH HIGHEST VALUE IS	0.37595 AT (577526.00, 6131587.00, 58.80, 58.80, 0.00)	GC	UCART1
	10TH HIGHEST VALUE IS	0.37360 AT (577606.00, 6131587.00, 61.50, 61.50, 0.00)	GC	UCART1

*** RECEPTOR TYPES: GC = GRIDCART
 GP = GRIDPOLR
 DC = DISCCART
 DP = DISCPOLR



*** AERMOD - VERSION 15181 *** ** Great Southern Sands Asphalt Plant at Albany - PM10 ***
02/08/17
*** AERMET - VERSION 12345 *** ** Terrain included. Asphalt Plant vent stack and bitumen heater vent ***
15:55:24

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**MODELOPTs: NonDEFAULT CONC ELEV NOCHKD RURAL

*** THE SUMMARY OF HIGHEST 24-HR RESULTS ***

** CONC OF PM10 IN MICROGRAMS/M**3 **

DATE

NETWORK GROUP ID GRID-ID	AVERAGE CONC	(YYMMDDHH)	RECEPTOR	(XR, YR, ZELEV, ZHILL, ZFLAG)	OF TYPE
--------------------------------	--------------	------------	----------	-------------------------------	---------

ALL	HIGH	1ST HIGH VALUE IS	4.89476	ON 15061824: AT (577566.00, 6131507.00, 65.70, 74.00, 0.00)	GC
-----	------	-------------------	---------	-------------------	--	----

UCART1

*** RECEPTOR TYPES: GC = GRIDCART
GP = GRIDPOLR
DC = DISCCART
DP = DISCPOLR

*** AERMOD - VERSION 15181 *** ** Great Southern Sands Asphalt Plant at Albany - PM10 ***
02/08/17
*** AERMET - VERSION 12345 *** ** Terrain included. Asphalt Plant vent stack and bitumen heater vent ***
15:55:24

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**MODELOPTs: NonDEFAULT CONC ELEV NOCHKD RURAL

*** Message Summary : AERMOD Model Execution ***

----- Summary of Total Messages -----

A Total of	0 Fatal Error Message(s)
A Total of	1 Warning Message(s)
A Total of	0 Informational Message(s)
A Total of	8760 Hours Were Processed
A Total of	0 Calm Hours Identified
A Total of	0 Missing Hours Identified (0.00 Percent)

***** FATAL ERROR MESSAGES *****
*** NONE ***

***** WARNING MESSAGES *****
ME W396 41 MEOPEN: AERMET Version Out-dated or Non-standard; Version: 12345

*** AERMOD Finishes Successfully ***

PM2.5

```
CO STARTING
  TITLEONE Great Southern Sands Asphalt Plant at Albany - PM2.5
  TITLETWO Terrain included. Asphalt Plant vent stack and bitumen heater vent stack
  MODELOPT CONC NOCHKD
  AVERTIME 24 PERIOD
  POLLUTID PM2-5
  RUNORNOT RUN
  ERRORFIL ERRORS.OUT
CO FINISHED

SO STARTING
  ELEVUNIT METERS
  LOCATION STACK POINT 577630 6131545 62
  ** Point Source QS HS TS VS DS
  ** Parameters:
  SRCPARAM STACK 0.075 6.1 353. 10.0 0.8
  ** Set hour per day 7am to 5pm or hours 8 to 17
  EMISFACT STACK HROFDY 0 0 0 0 0 0 0 1 1 1 1 1 1 1 1 1 0 0 0 0 0 0 0
  LOCATION BHEAT POINT 577630 6131555 62
  ** Point Source QS HS TS VS DS
  ** Parameters:
  SRCPARAM BHEAT 0.0039 3.73 589. 5.87 0.3
  ** Set hour per day 7am to 5pm or hours 8 to 17
  EMISFACT BHEAT HROFDY 0 0 0 0 0 0 0 1 1 1 1 1 1 1 1 1 0 0 0 0 0 0 0

SO SRCGROUP ALL
SO FINISHED

RE STARTING
RE INCLUDED "ALBANY_AV2.rel"
RE FINISHED

ME STARTING
  SURFFILE "ALBANY2015.sfc"
  PROFFILE "ALBANY2015.pfl"
  SURFDATA 00011 2015 Albany
  UAIRDATA 00099 2015 Esperance
  SITEDATA 00022 2015 Albany
  PROFBASE 142 METERS
ME FINISHED

OU STARTING
  RECTABLE ALLAVE 1ST
  MAXTABLE ALLAVE 100
  PLOTFILE 24 ALL 1ST GSS-PM2-5-24HR-1ST.PLT
  PLOTFILE PERIOD ALL GSS-PM2-5-annual.PLT
  RANKFILE 24 100 GSS-PM2-5-24hr.TXT
  SUMMFILE GSS-PM2-5.SUM
OU FINISHED
```

*** Message Summary For AERMOD Model Setup ***

----- Summary of Total Messages -----

```
A Total of 0 Fatal Error Message(s)
A Total of 1 Warning Message(s)
A Total of 0 Informational Message(s)
```

```
***** FATAL ERROR MESSAGES *****
*** NONE ***
```

```
***** WARNING MESSAGES *****
ME W396 41 MEOPEN: AERMET Version Out-dated or Non-standard; Version: 12345
```

```
***** SETUP Finishes Successfully ***
*****
```



*** AERMOD - VERSION 15181 *** *** Great Southern Sands Asphalt Plant at Albany - PM2.5 ***
02/08/17
*** AERMET - VERSION 12345 *** *** Terrain included. Asphalt Plant vent stack and bitumen heater vent ***
15:54:58

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**MODELOPTs: NonDEFAULT CONC ELEV NOCHKD RURAL

*** MODEL SETUP OPTIONS SUMMARY ***

**Model Is Setup For Calculation of Average CONCENTration Values.

-- DEPOSITION LOGIC --

**NO GAS DEPOSITION Data Provided.

**NO PARTICLE DEPOSITION Data Provided.

**Model Uses NO DRY DEPLETION. DRYDPLT = F

**Model Uses NO WET DEPLETION. WETDPLT = F

**Model Uses RURAL Dispersion Only.

**Model Allows User-Specified Options:

1. Stack-tip Downwash.
2. Model Accounts for ELEvated Terrain Effects.
3. Use Calms Processing Routine.
4. Use Missing Data Processing Routine.
5. No Exponential Decay.

**Other Options Specified:

NOCHKD - Suppresses checking of date sequence in meteorology files

**Model Assumes No FLAGPOLE Receptor Heights.

**The User Specified a Pollutant Type of: PM2-5

**Model Calculates 1 Short Term Average(s) of: 24-HR
and Calculates PERIOD Averages

**This Run Includes: 2 Source(s); 1 Source Group(s); and 15876 Receptor(s)

with: 2 POINT(s), including
0 POINTCAP(s) and 0 POINTHOR(s)
and: 0 VOLUME source(s)
and: 0 AREA type source(s)
and: 0 LINE source(s)
and: 0 OPENPIT source(s)

**Model Set To Continue RUNning After the Setup Testing.

**The AERMET Input Meteorological Data Version Date: 12345

**Output Options Selected:

Model Outputs Tables of PERIOD Averages by Receptor
Model Outputs Tables of Highest Short Term Values by Receptor (RECTABLE Keyword)
Model Outputs Tables of Overall Maximum Short Term Values (MAXTABLE Keyword)
Model Outputs External File(s) of High Values for Plotting (PLOTFILE Keyword)
Model Outputs External File(s) of Ranked Values (RANKFILE Keyword)
Model Outputs Separate Summary File of High Ranked Values (SUMMFILE Keyword)

**NOTE: The Following Flags May Appear Following CONC Values: c for Calm Hours
m for Missing Hours
b for Both Calm and Missing Hours

**Misc. Inputs: Base Elev. for Pot. Temp. Profile (m MSL) = 142.00 ; Decay Coef. = 0.000 ; Rot. Angle = 0.0
Emission Units = GRAMS/SEC ; Emission Rate Unit Factor = 0.10000E+07
Output Units = MICROGRAMS/M**3

**Approximate Storage Requirements of Model = 5.3 MB of RAM.

**Detailed Error/Message File: ERRORS.OUT

**File for Summary of Results: GSS-PM2-5.SUM



*** AERMOD - VERSION 15181 *** *** Great Southern Sands Asphalt Plant at Albany - PM2.5 ***
 02/08/17
 *** AERMET - VERSION 12345 *** *** Terrain included. Asphalt Plant vent stack and bitumen heater vent ***
 15:54:58

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**MODELOPTs: NonDEFAULT CONC ELEV NOCHKD RURAL

*** POINT SOURCE DATA ***

RATE	NUMBER	EMISSION	RATE	BASE	STACK	STACK	STACK	STACK	STACK	BLDG	URBAN	CAP/	EMIS
SOURCE	PART.	(GRAMS/SEC)	X	Y	ELEV.	HEIGHT	TEMP.	EXIT VEL.	DIAMETER	EXISTS	SOURCE	HOR	
SCALAR													
ID	CATS.		(METERS)	(METERS)	(METERS)	(METERS)	(DEG.K)	(M/SEC)	(METERS)				VARY
BY													
STACK	0	0.75000E-01	577630.0	6131545.0	62.0	6.10	353.00	10.00	0.80	NO	NO	NO	
HROFDY													
BHEAT	0	0.39000E-02	577630.0	6131555.0	62.0	3.73	589.00	5.87	0.30	NO	NO	NO	
HROFDY													

*** AERMOD - VERSION 15181 *** *** Great Southern Sands Asphalt Plant at Albany - PM2.5 ***
 02/08/17
 *** AERMET - VERSION 12345 *** *** Terrain included. Asphalt Plant vent stack and bitumen heater vent ***
 15:54:58

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**MODELOPTs: NonDEFAULT CONC ELEV NOCHKD RURAL

*** SOURCE IDs DEFINING SOURCE GROUPS ***

SRCGROUP ID	SOURCE IDs
ALL	STACK, BHEAT

*** AERMOD - VERSION 15181 *** *** Great Southern Sands Asphalt Plant at Albany - PM2.5 ***
 02/08/17
 *** AERMET - VERSION 12345 *** *** Terrain included. Asphalt Plant vent stack and bitumen heater vent ***
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**MODELOPTs: NonDEFAULT CONC ELEV NOCHKD RURAL

* SOURCE EMISSION RATE SCALARS WHICH VARY FOR EACH HOUR OF THE DAY *

HOURL	SCALAR	HOURL	SCALAR	HOURL	SCALAR	HOURL	SCALAR	HOURL	SCALAR	HOURL	SCALAR
SOURCE ID = STACK		SOURCE TYPE = POINT									
1	.00000E+00	2	.00000E+00	3	.00000E+00	4	.00000E+00	5	.00000E+00	6	.00000E+00
7	.00000E+00	8	.10000E+01	9	.10000E+01	10	.10000E+01	11	.10000E+01	12	.10000E+01
13	.10000E+01	14	.10000E+01	15	.10000E+01	16	.10000E+01	17	.10000E+01	18	.00000E+00
19	.00000E+00	20	.00000E+00	21	.00000E+00	22	.00000E+00	23	.00000E+00	24	.00000E+00
SOURCE ID = BHEAT		SOURCE TYPE = POINT									
1	.00000E+00	2	.00000E+00	3	.00000E+00	4	.00000E+00	5	.00000E+00	6	.00000E+00
7	.00000E+00	8	.10000E+01	9	.10000E+01	10	.10000E+01	11	.10000E+01	12	.10000E+01
13	.10000E+01	14	.10000E+01	15	.10000E+01	16	.10000E+01	17	.10000E+01	18	.00000E+00
19	.00000E+00	20	.00000E+00	21	.00000E+00	22	.00000E+00	23	.00000E+00	24	.00000E+00

*** AERMOD - VERSION 15181 *** Great Southern Sands Asphalt Plant at Albany - PM2.5 ***
 02/08/17
 *** AERMET - VERSION 12345 *** Terrain included. Asphalt Plant vent stack and bitumen heater vent ***
 15:54:58

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**MODELOPTs: NonDEFAULT CONC ELEV NOCHKD RURAL

*** GRIDDED RECEPTOR NETWORK SUMMARY ***

*** NETWORK ID: UCART1 ; NETWORK TYPE: GRIDCART ***

*** X-COORDINATES OF GRID ***
 (METERS)

575086.0	575126.0	575166.0	575206.0	575246.0	575286.0	575326.0	575366.0	575406.0	575446.0
575486.0	575526.0	575566.0	575606.0	575646.0	575686.0	575726.0	575766.0	575806.0	575846.0
575886.0	575926.0	575966.0	576006.0	576046.0	576086.0	576126.0	576166.0	576206.0	576246.0
576286.0	576326.0	576366.0	576406.0	576446.0	576486.0	576526.0	576566.0	576606.0	576646.0
576686.0	576726.0	576766.0	576806.0	576846.0	576886.0	576926.0	576966.0	577006.0	577046.0
577086.0	577126.0	577166.0	577206.0	577246.0	577286.0	577326.0	577366.0	577406.0	577446.0
577486.0	577526.0	577566.0	577606.0	577646.0	577686.0	577726.0	577766.0	577806.0	577846.0
577886.0	577926.0	577966.0	578006.0	578046.0	578086.0	578126.0	578166.0	578206.0	578246.0
578286.0	578326.0	578366.0	578406.0	578446.0	578486.0	578526.0	578566.0	578606.0	578646.0
578686.0	578726.0	578766.0	578806.0	578846.0	578886.0	578926.0	578966.0	579006.0	579046.0
579086.0	579126.0	579166.0	579206.0	579246.0	579286.0	579326.0	579366.0	579406.0	579446.0
579486.0	579526.0	579566.0	579606.0	579646.0	579686.0	579726.0	579766.0	579806.0	579846.0
579886.0	579926.0	579966.0	580006.0	580046.0	580086.0				

*** Y-COORDINATES OF GRID ***
 (METERS)

6129107.0	6129147.0	6129187.0	6129227.0	6129267.0	6129307.0	6129347.0	6129387.0	6129427.0	6129467.0
6129507.0	6129547.0	6129587.0	6129627.0	6129667.0	6129707.0	6129747.0	6129787.0	6129827.0	6129867.0
6129907.0	6129947.0	6129987.0	6130027.0	6130067.0	6130107.0	6130147.0	6130187.0	6130227.0	6130267.0
6130307.0	6130347.0	6130387.0	6130427.0	6130467.0	6130507.0	6130547.0	6130587.0	6130627.0	6130667.0
6130707.0	6130747.0	6130787.0	6130827.0	6130867.0	6130907.0	6130947.0	6130987.0	6131027.0	6131067.0
6131107.0	6131147.0	6131187.0	6131227.0	6131267.0	6131307.0	6131347.0	6131387.0	6131427.0	6131467.0
6131507.0	6131547.0	6131587.0	6131627.0	6131667.0	6131707.0	6131747.0	6131787.0	6131827.0	6131867.0
6131907.0	6131947.0	6131987.0	6132027.0	6132067.0	6132107.0	6132147.0	6132187.0	6132227.0	6132267.0
6132307.0	6132347.0	6132387.0	6132427.0	6132467.0	6132507.0	6132547.0	6132587.0	6132627.0	6132667.0
6132707.0	6132747.0	6132787.0	6132827.0	6132867.0	6132907.0	6132947.0	6132987.0	6133027.0	6133067.0
6133107.0	6133147.0	6133187.0	6133227.0	6133267.0	6133307.0	6133347.0	6133387.0	6133427.0	6133467.0
6133507.0	6133547.0	6133587.0	6133627.0	6133667.0	6133707.0	6133747.0	6133787.0	6133827.0	6133867.0
6133907.0	6133947.0	6133987.0	6134027.0	6134067.0	6134107.0				

*** AERMOD - VERSION 15181 *** Great Southern Sands Asphalt Plant at Albany - PM2.5 ***
 02/08/17
 *** AERMET - VERSION 12345 *** Terrain included. Asphalt Plant vent stack and bitumen heater vent ***
 15:54:58

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**MODELOPTs: NonDEFAULT CONC ELEV NOCHKD RURAL

*** THE SUMMARY OF MAXIMUM PERIOD (8760 HRS) RESULTS ***

** CONC OF PM2-5 IN MICROGRAMS/M**3 **

GROUP ID		AVERAGE CONC	RECEPTOR (XR, YR, ZELEV, ZHILL, ZFLAG)	OF TYPE	NETWORK GRID-ID
ALL	1ST HIGHEST VALUE IS	0.41009 AT (	577566.00, 6131587.00,	61.00, 61.00,	0.00) GC UCART1
	2ND HIGHEST VALUE IS	0.36981 AT (	577566.00, 6131547.00,	60.80, 76.00,	0.00) GC UCART1
	3RD HIGHEST VALUE IS	0.34755 AT (	577686.00, 6131587.00,	59.90, 82.00,	0.00) GC UCART1
	4TH HIGHEST VALUE IS	0.31196 AT (	577686.00, 6131507.00,	61.80, 72.00,	0.00) GC UCART1
	5TH HIGHEST VALUE IS	0.29669 AT (	577686.00, 6131627.00,	62.80, 82.00,	0.00) GC UCART1
	6TH HIGHEST VALUE IS	0.28555 AT (	577606.00, 6131587.00,	61.50, 61.50,	0.00) GC UCART1
	7TH HIGHEST VALUE IS	0.28025 AT (	577646.00, 6131627.00,	60.60, 82.00,	0.00) GC UCART1
	8TH HIGHEST VALUE IS	0.27489 AT (	577566.00, 6131507.00,	65.70, 74.00,	0.00) GC UCART1
	9TH HIGHEST VALUE IS	0.26862 AT (	577566.00, 6131627.00,	61.10, 61.10,	0.00) GC UCART1
	10TH HIGHEST VALUE IS	0.26307 AT (	577526.00, 6131587.00,	58.80, 58.80,	0.00) GC UCART1

*** RECEPTOR TYPES: GC = GRIDCART
 GP = GRIDPOLR
 DC = DISCCART
 DP = DISCPOLR



*** AERMOD - VERSION 15181 *** *** Great Southern Sands Asphalt Plant at Albany - PM2.5 ***
02/08/17
*** AERMET - VERSION 12345 *** *** Terrain included. Asphalt Plant vent stack and bitumen heater vent ***
15:54:58

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**MODELOPTs: NonDEFAULT CONC ELEV NOCHKD RURAL

*** THE SUMMARY OF HIGHEST 24-HR RESULTS ***

** CONC OF PM2-5 IN MICROGRAMS/M**3 **

DATE

NETWORK GROUP ID GRID-ID	AVERAGE CONC	(YYMMDDHH)	RECEPTOR	(XR, YR, ZELEV, ZHILL, ZFLAG)	OF TYPE
--------------------------------	--------------	------------	----------	-------------------------------	---------

ALL HIGH 1ST HIGH VALUE IS 3.40958 ON 15061824: AT (577566.00, 6131507.00, 65.70, 74.00, 0.00) GC
UCART1

*** RECEPTOR TYPES: GC = GRIDCART
GP = GRIDPOLR
DC = DISCCART
DP = DISCPOLR

*** AERMOD - VERSION 15181 *** *** Great Southern Sands Asphalt Plant at Albany - PM2.5 ***
02/08/17
*** AERMET - VERSION 12345 *** *** Terrain included. Asphalt Plant vent stack and bitumen heater vent ***
15:54:58

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**MODELOPTs: NonDEFAULT CONC ELEV NOCHKD RURAL

*** Message Summary : AERMOD Model Execution ***

----- Summary of Total Messages -----

A Total of 0 Fatal Error Message(s)
A Total of 1 Warning Message(s)
A Total of 0 Informational Message(s)

A Total of 8760 Hours Were Processed

A Total of 0 Calm Hours Identified

A Total of 0 Missing Hours Identified (0.00 Percent)

***** FATAL ERROR MESSAGES *****
*** NONE ***

***** WARNING MESSAGES *****
ME W396 41 MEOPEN: AERMET Version Out-dated or Non-standard; Version: 12345

*** AERMOD Finishes Successfully ***



OXIDES OF NITROGEN AS NITROGEN DIOXIDE

```
CO STARTING
TITLEONE Great Southern Sands Asphalt Plant at Albany - NOX as NO2
TITLETWO Terrain included. Asphalt Plant vent stack and bitumen heater vent stack
MODELOPT CONC NOCHKD
AVERTIME 1 PERIOD
POLLUTID NOX
RUNORNOT RUN
ERRORFIL ERRORS.OUT
CO FINISHED

SO STARTING
ELEVUNIT METERS
LOCATION STACK POINT 577630 6131545 62
** Point Source QS HS TS VS DS
** Parameters:
SRCPARAM STACK 0.50 6.1 353. 10.0 0.8
** Set hour per day 7am to 5pm or hours 8 to 17
EMISFACT STACK HROFDY 0 0 0 0 0 0 0 1 1 1 1 1 1 1 1 0 0 0 0 0 0 0

LOCATION BHEAT POINT 577630 6131555 62
** Point Source QS HS TS VS DS
** Parameters:
SRCPARAM BHEAT 0.039 3.73 589. 5.87 0.3
** Set hour per day 7am to 5pm or hours 8 to 17
EMISFACT BHEAT HROFDY 0 0 0 0 0 0 0 1 1 1 1 1 1 1 1 0 0 0 0 0 0 0

SO SRCGROUP ALL
SO FINISHED

RE STARTING
RE INCLUDED "ALBANY_AV2.rel"
RE FINISHED

ME STARTING
SURFFILE "ALBANY2015.sfc"
PROFFILE "ALBANY2015.pfl"
SURFDATA 00011 2015 Albany
UAIRDATA 00099 2015 Esperance
SITEDATA 00022 2015 Albany
PROFBASE 142 METERS
ME FINISHED

OU STARTING
RECTABLE ALLAVE 1ST 9TH
MAXTABLE ALLAVE 100
PLOTFILE 1 ALL 1ST GSS-NOX-1HR-1ST.PLT
PLOTFILE 1 ALL 9TH GSS-NOX-1HR-9TH.PLT
PLOTFILE PERIOD ALL GSS-NOX-annual.PLT
RANKFILE 1 100 GSS-NOX-1hr.TXT
SUMMFILE GSS-NOX.SUM
OU FINISHED
```

*** Message Summary For AERMOD Model Setup ***

----- Summary of Total Messages -----

```
A Total of 0 Fatal Error Message(s)
A Total of 1 Warning Message(s)
A Total of 0 Informational Message(s)
```

```
***** FATAL ERROR MESSAGES *****
*** NONE ***
```

```
***** WARNING MESSAGES *****
ME W396 41 MEOPEN: AERMET Version Out-dated or Non-standard; Version: 12345
```

```
*****
*** SETUP Finishes Successfully ***
*****
```



PAGE



*** AERMOD - VERSION 15181 *** *** Great Southern Sands Asphalt Plant at Albany - NOX as NO2 ***
02/08/17
*** AERMET - VERSION 12345 *** *** Terrain included. Asphalt Plant vent stack and bitumen heater vent ***
15:53:11

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**MODELOPTs: NonDEFAULT CONC ELEV NOCHKD RURAL

*** POINT SOURCE DATA ***

RATE	NUMBER	EMISSION	RATE		BASE	STACK	STACK	STACK	STACK	BLDG	URBAN	CAP/	EMIS
SOURCE	PART.	(GRAMS/SEC)	X	Y	ELEV.	HEIGHT	TEMP.	EXIT VEL.	DIAMETER	EXISTS	SOURCE	HOR	SCALAR
ID	CATS.		(METERS)	(METERS)	(METERS)	(METERS)	(DEG.K)	(M/SEC)	(METERS)				VARY
BY													
STACK	0	0.50000E+00	577630.0	6131545.0	62.0	6.10	353.00	10.00	0.80	NO	NO	NO	HROFDY
BHEAT	0	0.39000E-01	577630.0	6131555.0	62.0	3.73	589.00	5.87	0.30	NO	NO	NO	HROFDY

*** AERMOD - VERSION 15181 *** *** Great Southern Sands Asphalt Plant at Albany - NOX as NO2 ***
02/08/17
*** AERMET - VERSION 12345 *** *** Terrain included. Asphalt Plant vent stack and bitumen heater vent ***
15:53:11

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**MODELOPTs: NonDEFAULT CONC ELEV NOCHKD RURAL

*** SOURCE IDs DEFINING SOURCE GROUPS ***

SRCGROUP ID	SOURCE IDs
-------------	------------

ALL STACK , BHEAT ,

*** AERMOD - VERSION 15181 *** *** Great Southern Sands Asphalt Plant at Albany - NOX as NO2 ***
02/08/17
*** AERMET - VERSION 12345 *** *** Terrain included. Asphalt Plant vent stack and bitumen heater vent ***
15:53:11

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**MODELOPTs: NonDEFAULT CONC ELEV NOCHKD RURAL

* SOURCE EMISSION RATE SCALARS WHICH VARY FOR EACH HOUR OF THE DAY *

HOURL	SCALAR	HOURL	SCALAR	HOURL	SCALAR	HOURL	SCALAR	HOURL	SCALAR	HOURL	SCALAR
SOURCE ID = STACK ; SOURCE TYPE = POINT :											
1	.00000E+00	2	.00000E+00	3	.00000E+00	4	.00000E+00	5	.00000E+00	6	.00000E+00
7	.00000E+00	8	.10000E+01	9	.10000E+01	10	.10000E+01	11	.10000E+01	12	.10000E+01
13	.10000E+01	14	.10000E+01	15	.10000E+01	16	.10000E+01	17	.10000E+01	18	.00000E+00
19	.00000E+00	20	.00000E+00	21	.00000E+00	22	.00000E+00	23	.00000E+00	24	.00000E+00
SOURCE ID = BHEAT ; SOURCE TYPE = POINT :											
1	.00000E+00	2	.00000E+00	3	.00000E+00	4	.00000E+00	5	.00000E+00	6	.00000E+00
7	.00000E+00	8	.10000E+01	9	.10000E+01	10	.10000E+01	11	.10000E+01	12	.10000E+01
13	.10000E+01	14	.10000E+01	15	.10000E+01	16	.10000E+01	17	.10000E+01	18	.00000E+00
19	.00000E+00	20	.00000E+00	21	.00000E+00	22	.00000E+00	23	.00000E+00	24	.00000E+00



*** AERMOD - VERSION 15181 *** Great Southern Sands Asphalt Plant at Albany - NOX as NO2 ***
 02/08/17
 *** AERMET - VERSION 12345 *** Terrain included. Asphalt Plant vent stack and bitumen heater vent ***
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**MODELOPTs: NonDEFAULT CONC ELEV NOCHKD RURAL

*** GRIDDED RECEPTOR NETWORK SUMMARY ***

*** NETWORK ID: UCART1 ; NETWORK TYPE: GRIDCART ***

*** X-COORDINATES OF GRID ***
 (METERS)

575086.0,	575126.0,	575166.0,	575206.0,	575246.0,	575286.0,	575326.0,	575366.0,	575406.0,	575446.0,
575486.0,	575526.0,	575566.0,	575606.0,	575646.0,	575686.0,	575726.0,	575766.0,	575806.0,	575846.0,
575886.0,	575926.0,	575966.0,	576006.0,	576046.0,	576086.0,	576126.0,	576166.0,	576206.0,	576246.0,
576286.0,	576326.0,	576366.0,	576406.0,	576446.0,	576486.0,	576526.0,	576566.0,	576606.0,	576646.0,
576686.0,	576726.0,	576766.0,	576806.0,	576846.0,	576886.0,	576926.0,	576966.0,	577006.0,	577046.0,
577086.0,	577126.0,	577166.0,	577206.0,	577246.0,	577286.0,	577326.0,	577366.0,	577406.0,	577446.0,
577486.0,	577526.0,	577566.0,	577606.0,	577646.0,	577686.0,	577726.0,	577766.0,	577806.0,	577846.0,
577886.0,	577926.0,	577966.0,	578006.0,	578046.0,	578086.0,	578126.0,	578166.0,	578206.0,	578246.0,
578286.0,	578326.0,	578366.0,	578406.0,	578446.0,	578486.0,	578526.0,	578566.0,	578606.0,	578646.0,
578686.0,	578726.0,	578766.0,	578806.0,	578846.0,	578886.0,	578926.0,	578966.0,	579006.0,	579046.0,
579086.0,	579126.0,	579166.0,	579206.0,	579246.0,	579286.0,	579326.0,	579366.0,	579406.0,	579446.0,
579486.0,	579526.0,	579566.0,	579606.0,	579646.0,	579686.0,	579726.0,	579766.0,	579806.0,	579846.0,
579886.0,	579926.0,	579966.0,	580006.0,	580046.0,	580086.0,				

*** Y-COORDINATES OF GRID ***
 (METERS)

6129107.0,	6129147.0,	6129187.0,	6129227.0,	6129267.0,	6129307.0,	6129347.0,	6129387.0,	6129427.0,	6129467.0,
6129507.0,	6129547.0,	6129587.0,	6129627.0,	6129667.0,	6129707.0,	6129747.0,	6129787.0,	6129827.0,	6129867.0,
6129907.0,	6129947.0,	6129987.0,	6130027.0,	6130067.0,	6130107.0,	6130147.0,	6130187.0,	6130227.0,	6130267.0,
6130307.0,	6130347.0,	6130387.0,	6130427.0,	6130467.0,	6130507.0,	6130547.0,	6130587.0,	6130627.0,	6130667.0,
6130707.0,	6130747.0,	6130787.0,	6130827.0,	6130867.0,	6130907.0,	6130947.0,	6130987.0,	6131027.0,	6131067.0,
6131107.0,	6131147.0,	6131187.0,	6131227.0,	6131267.0,	6131307.0,	6131347.0,	6131387.0,	6131427.0,	6131467.0,
6131507.0,	6131547.0,	6131587.0,	6131627.0,	6131667.0,	6131707.0,	6131747.0,	6131787.0,	6131827.0,	6131867.0,
6131907.0,	6131947.0,	6131987.0,	6132027.0,	6132067.0,	6132107.0,	6132147.0,	6132187.0,	6132227.0,	6132267.0,
6132307.0,	6132347.0,	6132387.0,	6132427.0,	6132467.0,	6132507.0,	6132547.0,	6132587.0,	6132627.0,	6132667.0,
6132707.0,	6132747.0,	6132787.0,	6132827.0,	6132867.0,	6132907.0,	6132947.0,	6132987.0,	6133027.0,	6133067.0,
6133107.0,	6133147.0,	6133187.0,	6133227.0,	6133267.0,	6133307.0,	6133347.0,	6133387.0,	6133427.0,	6133467.0,
6133507.0,	6133547.0,	6133587.0,	6133627.0,	6133667.0,	6133707.0,	6133747.0,	6133787.0,	6133827.0,	6133867.0,
6133907.0,	6133947.0,	6133987.0,	6134027.0,	6134067.0,	6134107.0,				

*** AERMOD - VERSION 15181 *** Great Southern Sands Asphalt Plant at Albany - NOX as NO2 ***
 02/08/17
 *** AERMET - VERSION 12345 *** Terrain included. Asphalt Plant vent stack and bitumen heater vent ***
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**MODELOPTs: NonDEFAULT CONC ELEV NOCHKD RURAL

*** THE SUMMARY OF MAXIMUM PERIOD (8760 HRS) RESULTS ***

** CONC OF NOX IN MICROGRAMS/M**3 **

GROUP ID	AVERAGE CONC	RECEPTOR (XR, YR, ZELEV, ZHILL, ZFLAG)	OF TYPE	NETWORK GRID-ID
ALL	1ST HIGHEST VALUE IS	2.88610 AT (577566.00, 6131587.00,	61.00, 61.00, 0.00)	GC UCART1
	2ND HIGHEST VALUE IS	2.62783 AT (577566.00, 6131547.00,	60.80, 76.00, 0.00)	GC UCART1
	3RD HIGHEST VALUE IS	2.49225 AT (577686.00, 6131587.00,	59.90, 82.00, 0.00)	GC UCART1
	4TH HIGHEST VALUE IS	2.26316 AT (577686.00, 6131507.00,	61.80, 72.00, 0.00)	GC UCART1
	5TH HIGHEST VALUE IS	2.22655 AT (577606.00, 6131587.00,	61.50, 61.50, 0.00)	GC UCART1
	6TH HIGHEST VALUE IS	2.07925 AT (577686.00, 6131627.00,	62.80, 82.00, 0.00)	GC UCART1
	7TH HIGHEST VALUE IS	2.04126 AT (577646.00, 6131587.00,	60.20, 60.20, 0.00)	GC UCART1
	8TH HIGHEST VALUE IS	1.99840 AT (577646.00, 6131627.00,	60.60, 82.00, 0.00)	GC UCART1
	9TH HIGHEST VALUE IS	1.94172 AT (577566.00, 6131507.00,	65.70, 74.00, 0.00)	GC UCART1
	10TH HIGHEST VALUE IS	1.88152 AT (577566.00, 6131627.00,	61.10, 61.10, 0.00)	GC UCART1

*** RECEPTOR TYPES: GC = GRIDCART
 GP = GRIDPOLR
 DC = DISCCART
 DP = DISCPOLR



*** AERMOD - VERSION 15181 *** *** Great Southern Sands Asphalt Plant at Albany - NOX as NO2 ***
02/08/17
*** AERMET - VERSION 12345 *** *** Terrain included. Asphalt Plant vent stack and bitumen heater vent ***
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**MODELOPTs: NonDEFAULT CONC ELEV NOCHKD RURAL

*** THE SUMMARY OF HIGHEST 1-HR RESULTS ***

		** CONC OF NOX		IN MICROGRAMS/M**3		**			
				DATE					
NETWORK	GROUP ID	AVERAGE CONC	(YYMMDDHH)	RECEPTOR	(XR, YR, ZELEV, ZHILL, ZFLAG)	OF TYPE			
GRID-ID									
ALL	HIGH	1ST HIGH VALUE IS	156.79475	ON 15060916: AT (	577606.00, 6131507.00, 67.60, 67.60, 0.00)	GC			
UCART1	HIGH	9TH HIGH VALUE IS	81.24363	ON 15090517: AT (	577686.00, 6131587.00, 59.90, 82.00, 0.00)	GC			
UCART1									

*** RECEPTOR TYPES: GC = GRIDCART
GP = GRIDPOLR
DC = DISCCART
DP = DISCPOLR

*** AERMOD - VERSION 15181 *** *** Great Southern Sands Asphalt Plant at Albany - NOX as NO2 ***
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*** AERMET - VERSION 12345 *** *** Terrain included. Asphalt Plant vent stack and bitumen heater vent ***
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**MODELOPTs: NonDEFAULT CONC ELEV NOCHKD RURAL

*** Message Summary : AERMOD Model Execution ***

----- Summary of Total Messages -----

A Total of 0 Fatal Error Message(s)
A Total of 1 Warning Message(s)
A Total of 0 Informational Message(s)

A Total of 8760 Hours Were Processed

A Total of 0 Calm Hours Identified

A Total of 0 Missing Hours Identified (0.00 Percent)

***** FATAL ERROR MESSAGES *****
*** NONE ***

***** WARNING MESSAGES *****
ME W396 41 MEOPEN: AERMET Version Out-dated or Non-standard; Version: 12345

*** AERMOD Finishes Successfully ***



ASPHALT FUME

```
CO STARTING
TITLEONE Great Southern Sands Asphalt Plant at Albany - Asphalt fume
TITLETWO Terrain included. Asphalt Plant vent stack and bitumen heater vent stack
MODELOPT CONC NOCHKD
AVERTIME 1
POLLUTID AF
RUNORNOT RUN
ERRORFIL ERRORS.OUT
CO FINISHED

SO STARTING
ELEVUNIT METERS
LOCATION STACK POINT 577630 6131545 62
** Point Source QS HS TS VS DS
** Parameters:
SRCPARAM STACK 0.034 6.1 353. 10.0 0.8
** Set hour per day 7am to 5pm or hours 8 to 17
EMISFACT STACK HROFDY 0 0 0 0 0 0 0 1 1 1 1 1 1 1 1 0 0 0 0 0 0 0

LOCATION BHEAT POINT 577630 6131555 62
** Point Source QS HS TS VS DS
** Parameters:
SRCPARAM BHEAT 0.011 3.73 589. 5.87 0.3
** Set hour per day 7am to 5pm or hours 8 to 17
EMISFACT BHEAT HROFDY 0 0 0 0 0 0 0 1 1 1 1 1 1 1 1 0 0 0 0 0 0 0

SO SRCGROUP ALL
SO FINISHED

RE STARTING
RE INCLUDED "ALBANY_AV2.rel"
RE FINISHED

ME STARTING
SURFFILE "ALBANY2015.sfc"
PROFFILE "ALBANY2015.pfl"
SURFDATA 00011 2015 Albany
UAIRDATA 00099 2015 Esperance
SITEDATA 00022 2015 Albany
PROFBASE 142 METERS
ME FINISHED

OU STARTING
RECTABLE ALLAVE 1ST 9TH
MAXTABLE ALLAVE 100
PLOTFILE 1 ALL 1ST GSS-ap42-asphalt-fume-1HR-1ST.PLT
PLOTFILE 1 ALL 9TH GSS-ap42-asphalt-fume-1HR-9TH.PLT
SUMMFILE GSS-ap42-asphalt-fume.SUM
RANKFILE 1 100 GSS-ap42-asphalt-fume-1hr.TXT
OU FINISHED

*** Message Summary For AERMOD Model Setup ***

----- Summary of Total Messages -----

A Total of 0 Fatal Error Message(s)
A Total of 1 Warning Message(s)
A Total of 0 Informational Message(s)

***** FATAL ERROR MESSAGES *****
*** NONE ***

***** WARNING MESSAGES *****
ME W396 41 MEOPEN: AERMET Version Out-dated or Non-standard; Version: 12345

***** SETUP Finishes Successfully *****
```



*** AERMOD - VERSION 15181 *** *** Great Southern Sands Asphalt Plant at Albany - Asphalt fume ***
02/06/17
*** AERMET - VERSION 12345 *** *** Terrain included. Asphalt Plant vent stack and bitumen heater vent ***
13:18:36

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**MODELOPTs: NonDEFAULT CONC ELEV NOCHKD RURAL
*** MODEL SETUP OPTIONS SUMMARY ***

**Model Is Setup For Calculation of Average CONCentration Values.
-- DEPOSITION LOGIC --
**NO GAS DEPOSITION Data Provided.
**NO PARTICLE DEPOSITION Data Provided.
**Model Uses NO DRY DEPLETION. DRYDPLT = F
**Model Uses NO WET DEPLETION. WETDPLT = F

**Model Uses RURAL Dispersion Only.

**Model Allows User-Specified Options:
1. Stack-tip Downwash.
2. Model Accounts for ELEVated Terrain Effects.
3. Use Calms Processing Routine.
4. Use Missing Data Processing Routine.
5. No Exponential Decay.

**Other Options Specified:
NOCHKD - Suppresses checking of date sequence in meteorology files

**Model Assumes No FLAGPOLE Receptor Heights.

**The User Specified a Pollutant Type of: AF

**Model Calculates 1 Short Term Average(s) of: 1-HR

**This Run Includes: 2 Source(s); 1 Source Group(s); and 15876 Receptor(s)

with: 2 POINT(s), including
0 POINTCAP(s) and 0 POINTHOR(s)
and: 0 VOLUME source(s)
and: 0 AREA type source(s)
and: 0 LINE source(s)
and: 0 OPENPIT source(s)

**Model Set To Continue RUNning After the Setup Testing.

**The AERMET Input Meteorological Data Version Date: 12345

**Output Options Selected:
Model Outputs Tables of Highest Short Term Values by Receptor (RECTABLE Keyword)
Model Outputs Tables of Overall Maximum Short Term Values (MAXTABLE Keyword)
Model Outputs External File(s) of High Values for Plotting (PLOTFILE Keyword)
Model Outputs External File(s) of Ranked Values (RANKFILE Keyword)
Model Outputs Separate Summary File of High Ranked Values (SUMMFILE Keyword)

**NOTE: The Following Flags May Appear Following CONC Values: c for Calm Hours
m for Missing Hours
b for Both Calm and Missing Hours

**Misc. Inputs: Base Elev. for Pot. Temp. Profile (m MSL) = 142.00 ; Decay Coef. = 0.000 ; Rot. Angle =
0.0
Emission Units = GRAMS/SEC ; Emission Rate Unit Factor = 0.10000E+07
Output Units = MICROGRAMS/M**3

**Approximate Storage Requirements of Model = 7.0 MB of RAM.

**Detailed Error/Message File: ERRORS.OUT
**File for Summary of Results: GSS-ap42-asphalt-fume.SUM



*** AERMOD - VERSION 15181 *** *** Great Southern Sands Asphalt Plant at Albany - Asphalt fume ***
02/06/17
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**MODELOPTS: NonDEFAULT CONC ELEV NOCHKD RURAL

*** POINT SOURCE DATA ***

EMIS RATE	NUMBER	EMISSION RATE			BASE	STACK	STACK	STACK	STACK	BLOG	URBAN	CAP/
SOURCE	PART.	(GRAMS/SEC)	X	Y	ELEV.	HEIGHT	TEMP.	EXIT VEL.	DIAMETER	EXISTS	SOURCE	HOR
SCALAR	CATS.		(METERS)	(METERS)	(METERS)	(METERS)	(DEG.K)	(M/SEC)	(METERS)			
STACK	0	0.34000E-01	577630.0	6131545.0	62.0	6.10	353.00	10.00	0.80	NO	NO	NO
HROFDY												
BHEAT	0	0.11000E-01	577630.0	6131555.0	62.0	3.73	589.00	5.87	0.30	NO	NO	NO
HROFDY												

*** AERMOD - VERSION 15181 *** *** Great Southern Sands Asphalt Plant at Albany - Asphalt fume ***
02/06/17
*** AERMET - VERSION 12345 *** *** Terrain included. Asphalt Plant vent stack and bitumen heater vent ***
13:18:36

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**MODELOPTS: NonDEFAULT CONC ELEV NOCHKD RURAL

*** SOURCE IDs DEFINING SOURCE GROUPS ***

SRCGROUP ID	SOURCE IDs
-------------	------------

ALL STACK , BHEAT ,

*** AERMOD - VERSION 15181 *** *** Great Southern Sands Asphalt Plant at Albany - Asphalt fume ***
02/06/17
*** AERMET - VERSION 12345 *** *** Terrain included. Asphalt Plant vent stack and bitumen heater vent ***
13:18:36

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**MODELOPTS: NonDEFAULT CONC ELEV NOCHKD RURAL

* SOURCE EMISSION RATE SCALARS WHICH VARY FOR EACH HOUR OF THE DAY *

HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR
SOURCE ID = STACK ; SOURCE TYPE = POINT :											
1	.00000E+00	2	.00000E+00	3	.00000E+00	4	.00000E+00	5	.00000E+00	6	.00000E+00
7	.00000E+00	8	.10000E+01	9	.10000E+01	10	.10000E+01	11	.10000E+01	12	.10000E+01
13	.10000E+01	14	.10000E+01	15	.10000E+01	16	.10000E+01	17	.10000E+01	18	.00000E+00
19	.00000E+00	20	.00000E+00	21	.00000E+00	22	.00000E+00	23	.00000E+00	24	.00000E+00
SOURCE ID = BHEAT ; SOURCE TYPE = POINT :											
1	.00000E+00	2	.00000E+00	3	.00000E+00	4	.00000E+00	5	.00000E+00	6	.00000E+00
7	.00000E+00	8	.10000E+01	9	.10000E+01	10	.10000E+01	11	.10000E+01	12	.10000E+01
13	.10000E+01	14	.10000E+01	15	.10000E+01	16	.10000E+01	17	.10000E+01	18	.00000E+00
19	.00000E+00	20	.00000E+00	21	.00000E+00	22	.00000E+00	23	.00000E+00	24	.00000E+00



*** AERMOD - VERSION 15181 *** Great Southern Sands Asphalt Plant at Albany - Asphalt fume ***
 02/06/17
 *** AERMET - VERSION 12345 *** Terrain included. Asphalt Plant vent stack and bitumen heater vent ***
 13:18:36

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**MODELOPTS: NonDEFAULT CONC ELEV NOCHKD RURAL

*** GRIDDED RECEPTOR NETWORK SUMMARY ***

*** NETWORK ID: UCART1 ; NETWORK TYPE: GRIDCART ***

*** X-COORDINATES OF GRID ***
 (METERS)

575086.0	575126.0	575166.0	575206.0	575246.0	575286.0	575326.0	575366.0	575406.0	575446.0
575486.0	575526.0	575566.0	575606.0	575646.0	575686.0	575726.0	575766.0	575806.0	575846.0
575886.0	575926.0	575966.0	576006.0	576046.0	576086.0	576126.0	576166.0	576206.0	576246.0
576286.0	576326.0	576366.0	576406.0	576446.0	576486.0	576526.0	576566.0	576606.0	576646.0
576686.0	576726.0	576766.0	576806.0	576846.0	576886.0	576926.0	576966.0	577006.0	577046.0
577086.0	577126.0	577166.0	577206.0	577246.0	577286.0	577326.0	577366.0	577406.0	577446.0
577486.0	577526.0	577566.0	577606.0	577646.0	577686.0	577726.0	577766.0	577806.0	577846.0
577886.0	577926.0	577966.0	578006.0	578046.0	578086.0	578126.0	578166.0	578206.0	578246.0
578286.0	578326.0	578366.0	578406.0	578446.0	578486.0	578526.0	578566.0	578606.0	578646.0
578686.0	578726.0	578766.0	578806.0	578846.0	578886.0	578926.0	578966.0	579006.0	579046.0
579086.0	579126.0	579166.0	579206.0	579246.0	579286.0	579326.0	579366.0	579406.0	579446.0
579486.0	579526.0	579566.0	579606.0	579646.0	579686.0	579726.0	579766.0	579806.0	579846.0
579886.0	579926.0	579966.0	580006.0	580046.0	580086.0				

*** Y-COORDINATES OF GRID ***
 (METERS)

6129107.0	6129147.0	6129187.0	6129227.0	6129267.0	6129307.0	6129347.0	6129387.0	6129427.0	6129467.0
6129507.0	6129547.0	6129587.0	6129627.0	6129667.0	6129707.0	6129747.0	6129787.0	6129827.0	6129867.0
6129907.0	6129947.0	6129987.0	6130027.0	6130067.0	6130107.0	6130147.0	6130187.0	6130227.0	6130267.0
6130307.0	6130347.0	6130387.0	6130427.0	6130467.0	6130507.0	6130547.0	6130587.0	6130627.0	6130667.0
6130707.0	6130747.0	6130787.0	6130827.0	6130867.0	6130907.0	6130947.0	6130987.0	6131027.0	6131067.0
6131107.0	6131147.0	6131187.0	6131227.0	6131267.0	6131307.0	6131347.0	6131387.0	6131427.0	6131467.0
6131507.0	6131547.0	6131587.0	6131627.0	6131667.0	6131707.0	6131747.0	6131787.0	6131827.0	6131867.0
6131907.0	6131947.0	6131987.0	6132027.0	6132067.0	6132107.0	6132147.0	6132187.0	6132227.0	6132267.0
6132307.0	6132347.0	6132387.0	6132427.0	6132467.0	6132507.0	6132547.0	6132587.0	6132627.0	6132667.0
6132707.0	6132747.0	6132787.0	6132827.0	6132867.0	6132907.0	6132947.0	6132987.0	6133027.0	6133067.0
6133107.0	6133147.0	6133187.0	6133227.0	6133267.0	6133307.0	6133347.0	6133387.0	6133427.0	6133467.0
6133507.0	6133547.0	6133587.0	6133627.0	6133667.0	6133707.0	6133747.0	6133787.0	6133827.0	6133867.0
6133907.0	6133947.0	6133987.0	6134027.0	6134067.0	6134107.0				

*** AERMOD - VERSION 15181 *** Great Southern Sands Asphalt Plant at Albany - Asphalt fume ***
 02/06/17
 *** AERMET - VERSION 12345 *** Terrain included. Asphalt Plant vent stack and bitumen heater vent ***
 13:18:36

PAGE

330

**MODELOPTS: NonDEFAULT CONC ELEV NOCHKD RURAL

*** THE SUMMARY OF HIGHEST 1-HR RESULTS ***

** CONC OF AF IN MICROGRAMS/M**3 **

DATE

NETWORK GROUP ID TYPE	GRID-ID	AVERAGE CONC	(YYMMDDHH)	RECEPTOR (XR, YR, ZELEV, ZHILL, ZFLAG)	OF	
ALL	HIGH	1ST HIGH VALUE IS	13.90971	ON 15060916: AT (577606.00, 6131507.00, 67.60, 67.60, 0.00)		
GC	UCART1	HIGH	9TH HIGH VALUE IS	8.62418	ON 15052117: AT (577606.00, 6131547.00, 62.50, 72.00, 0.00)	
GC	UCART1					

*** RECEPTOR TYPES: GC = GRIDCART
 GP = GRIDPOLR
 DC = DISCCART
 DP = DISCPOLR



*** AERMOD - VERSION 15181 *** *** Great Southern Sands Asphalt Plant at Albany - Asphalt fume ***
02/06/17
*** AERMET - VERSION 12345 *** *** Terrain included. Asphalt Plant vent stack and bitumen heater vent ***
13:18:36

PAGE

331

**MODELOPTs: NonDEFAULT CONC ELEV NOCHKD RURAL

*** Message Summary : AERMOD Model Execution ***

----- Summary of Total Messages -----

A Total of 0 Fatal Error Message(s)
A Total of 1 Warning Message(s)
A Total of 0 Informational Message(s)

A Total of 8760 Hours Were Processed

A Total of 0 Calm Hours Identified



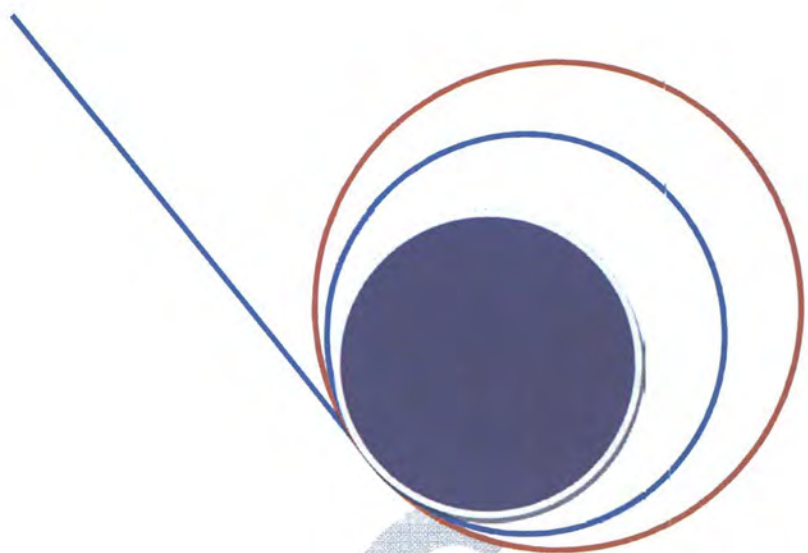
A Total of 0 Missing Hours Identified (0.00 Percent)

***** FATAL ERROR MESSAGES *****
*** NONE ***

***** WARNING MESSAGES *****
ME W396 41 MEOPEN: AERMET Version Out-dated or Non-standard; Version: 12345

*** AERMOD Finishes Successfully ***

9.4 *Appendix: Summary report for the synthesis of the meteorological data.*



Input Meteorological data files for AERMOD

Albany- WA

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INTRODUCTION

New generation regulatory model AERMOD requires hourly averaged meteorological data from a single site that is preferably within the model domain ('on-site' or site-specific data). However, data from the nearest 'off-site' meteorological station can be used when on-site data are not available, and the off-site data are representative of the area of concern (i.e. the meteorological parameters as well as surface characteristics characterise the transport and dispersion conditions of the location in question).

It is also preferable that:

- The compilation of the input meteorological data file is done in accordance with 'best practice', with procedures and algorithms recommended or set by environment regulators/US & VIC EPA.

pDs Consultancy has been engaged by EKTIMO to compile an 'AERMOD-ready' meteorological files for an application site which is about 3 KM east of **Albany Airport** weather station in Western Australia.

This input meteorological data files have been compiled basically following the EPA, Victoria's draft guidelines: "Construction of input meteorological data files for EPA Victoria's regulatory air pollution model (AERMOD) (Publication No.1550)".



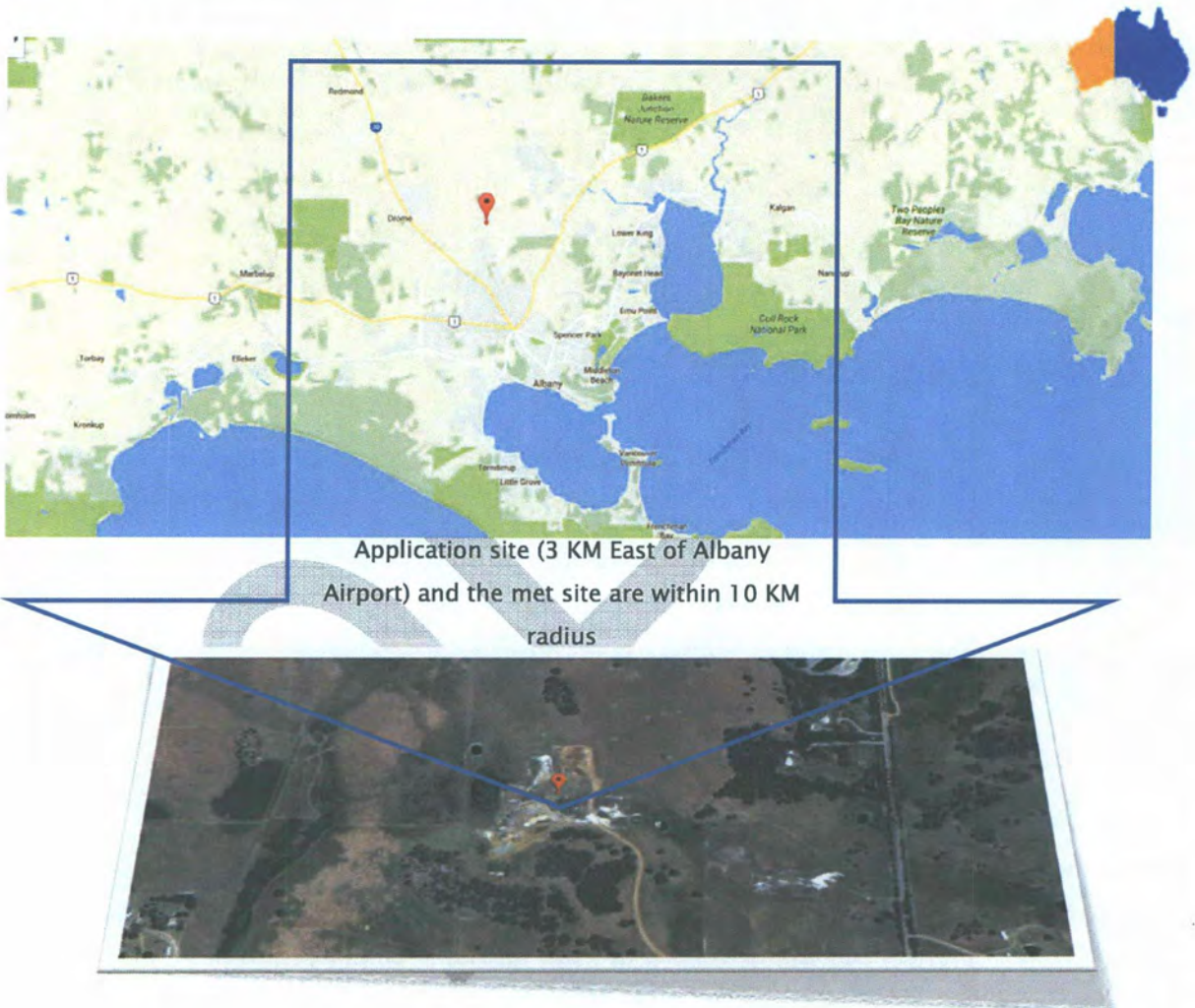


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LOCATION OF THE APPLICATION SITE & MET DATA SOURCE:
PLACE MARK SHOWING THE APPLICATION SITE, ALBANY AIRPORT, WA



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Data Processing

Input Information

Data Used for the compilation

Meteorological Data

1. Mandatory Data (Albany Airport)
 - i. 10m Wind Direction and Speed
 - ii. Ambient Temperature (Screen Level)
2. Supplementary data (Albany Airport)
 - I. Surface Pressure
 - II. 3 Hourly Cloud observations
 - III. Relative Humidity
 - IV. Rainfall Rate
3. Upper air Data (Esperance)
 - I. Pressure Levels
 - II. Geopotential Heights
 - III. Temperature
 - IV. Dew Point





DATA SOURCE

- National Climate Centre, Bureau of Meteorology, Melbourne for all 3 types of data
- Data Source :Albany Airport/ Esperance, WA
 - Note Esperance is about 380 KM, northeast of Albany, upper air observations are representing the south coast of WA.
- Period :1 Jan 2015 to 31 Dec 2015

QA/QC ON RAW DATA

- I. Hourly averaged winds both direction and speed and temperature examined for gaps and wind stalls
 - Suspected wind stalls (both wind direction and speed) removed and filled appropriately preserving the temporal consistency.
 - Note that BoM Syncrotec Anemometer's lowest detection limit of wind speed is 2 KM/Hour (Wind Speed Threshold)
- II. Small gaps filled with previous or following hour records
- III. Days with big gaps removed maintaining 90% data recovery
- IV. Parameters QA/QCed based on extreme values
- V. Gaps in vertical temperature profiles were filled with previous or following day data for the completeness.



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METSITE INFORMATION

Site IDs

UA ID: 0099 UA Station: Esperance

SF ID: 0011 SF Station: Albany

OS ID: 0022 OS Station: Albany

Ref Heights

Wind: 10 Temperature: 2

Auxiliary Parameters

PCode: 11 VPTG: 0.005 Wind Threshold: 0.6

Maximum CBL: 3000 Minimum CBL: 50

Daylight Savings

☐ Apply Daylight Savings Offset to Sunset and Sunrise

Beta options

☐ Apply u* Adjustment

Station Info

BoM ST data

DATA COVERAGE:

Season	Data Coverage %				
Year	2017	2012	2013	2014	2015
Summer					100
Autumn					100
Winter					100
Spring					100
Annual					100



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Annual and Seasonal data coverage are meeting regulatory requirement (90% or better).

DETERMINATION OF SURFACE CHARACTERISTICS

All available surface maps including google maps examined to determine correct land use categories within 10 Km by 10 KM area centring the application site.

Albedo and Bowen ratio were determined using land use categories shown below.

The screenshot displays the pDs AUSMET software interface. The 'Surface Met Site' tab is active, showing site information and a map. The 'Met Sites' Info. sub-tab is selected, displaying the following data:

Address:	-34.955069, 117.84977							
Latitude:	-34.955	Longitude:	117.850	Time Zone:	8	108 Rainy Days		
Northing:	6131609.825	Easting:	577586.267	UTM Zone:	50	Average Rainy Days:	103	Normal

The map shows a 10km x 10km area centered on the site. The 'Land Use' tab is selected, showing the following data:

Land Use	Summer	Autumn	Winter	Spring
Open Water	0.1000	0.1000	0.1000	0.1000
Low Intensity Residential	0.8000	1.0000	1.0000	0.8000
Quantum/Strip Mines/Gr	1.5000	1.5000	1.5000	1.5000
Deciduous Forest	0.3000	1.0000	1.0000	0.7000
Mixed Forest	0.3000	0.9000	0.9000	0.7000
Shrub land (Non-Arid R)	1.0000	1.5000	1.5000	1.0000

The 'Land Use Categories in a Sector' dialog box is open, showing the following data:

Land Use Category	Summer	Autumn	Winter	Spring
<input checked="" type="checkbox"/> Open Water	0.1000	0.1000	0.1000	0.1000
<input checked="" type="checkbox"/> Low Intensity Residential	0.8000	1.0000	1.0000	0.8000
<input checked="" type="checkbox"/> Quantum/Strip Mines/Gr	1.5000	1.5000	1.5000	1.5000
<input checked="" type="checkbox"/> Deciduous Forest	0.3000	1.0000	1.0000	0.7000
<input checked="" type="checkbox"/> Mixed Forest	0.3000	0.9000	0.9000	0.7000
<input checked="" type="checkbox"/> Shrub land (Non-Arid R)	1.0000	1.5000	1.5000	1.0000

The 'Wetness' is set to 'Normal'. The 'All sectors same' and 'All seasons same' buttons are visible at the bottom.



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Sector dependent surface roughness was determined considering 6 sectors. Roughness of each sector with 4 segments (250m) was assigned carefully examining land use distribution.

The screenshot displays the pDsAUSMET software interface. The 'Site Info' tab is active, showing the following details:

- Address: -34.955069, 117.84977
- Latitude: -34.955, Longitude: 117.850, Time Zone: 8, 108 Rainy Days
- Northing: 6131609.825, Easting: 577586.267, UTM Zone: 50, Average Rainy Days: 103, Normal

A map view shows the site location with a red pin and a 1km x 1km scale bar. The 'Roughness' tab is selected, showing a table of land use data for 6 sectors across four seasons (Summer, Autumn, Winter, Spring).

	Summer	Autumn	Winter	Spring
Land Use	0.3780	0.3780	0.3234	0.3546
Land Use	0.5537	0.5537	0.3761	0.4776
Land Use	0.4756	0.4756	0.3527	0.4229
Land Use	0.4756	0.4756	0.3527	0.4229
Land Use	0.3000	0.3000	0.3000	0.3000
Land Use	0.3000	0.3000	0.3000	0.3000





The following parameters were determined/computed following EPA, VIC and US EPA guidelines.

Sensible Heat flux –Calculated based on cloud observations

- I. Friction Velocity (U^*)
- II. Monin–Obukhov Length (L)
- III. Height of the Stable Boundary Layer(SBL)
- IV. Vertical Velocity Scale (W^*)
- V. Height of the Convective Boundary Layer (CBL)

Mixing height (Convective)–CBL

DEFINITION:

The convective mixing height, the depth of the surface mixed layer is the height of the atmosphere above the ground, which is well mixed due either to mechanical turbulence or convective turbulence. This height was determined by using the methodology of Benkley and Schulman (Journal of Applied Meteorology, Volume 18, 1979, pp 772–780). Esperance Airport upper air observation containing temperature and moisture profiles and surface temperature, pressure and relative humidity at Albany were used to determine daytime mixing height.



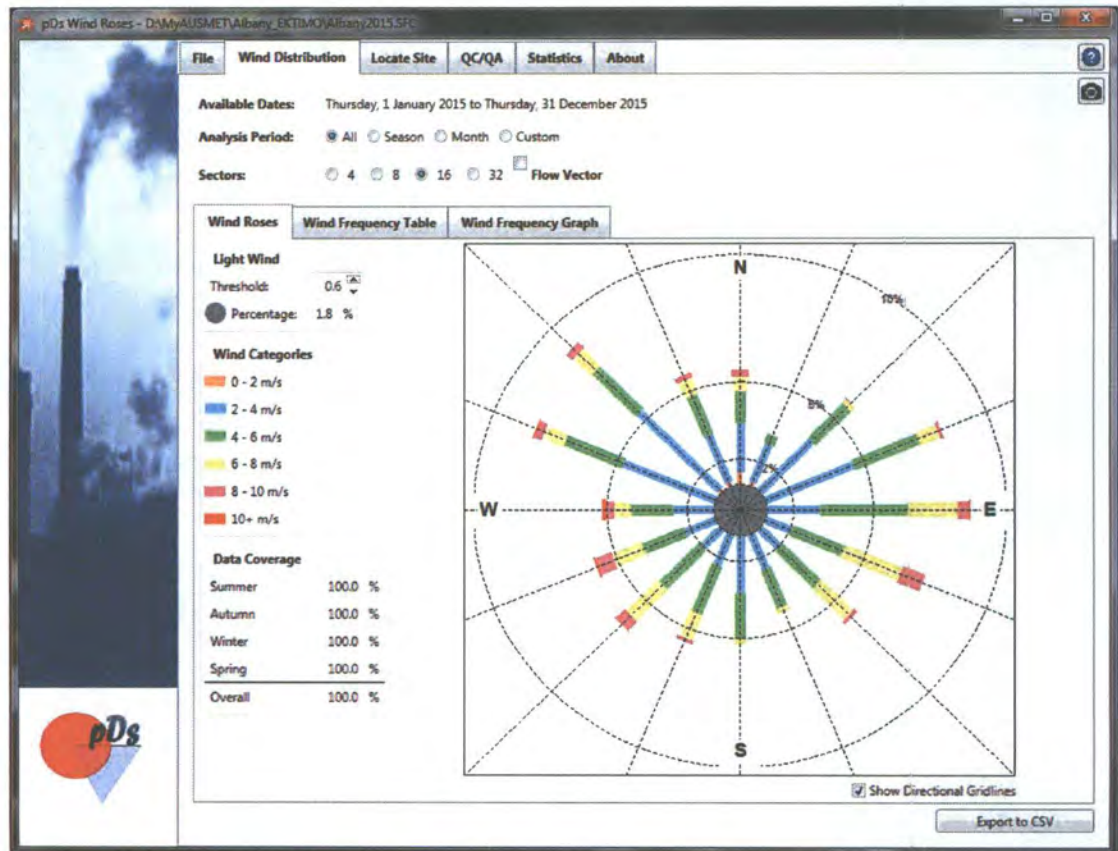
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DATA ANALYSIS

ANNUAL WINDROSES FOR ALBANY-2015



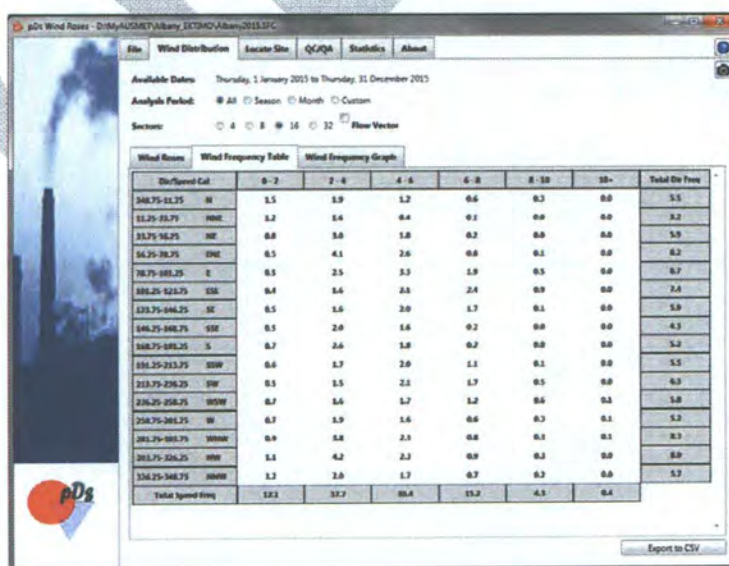
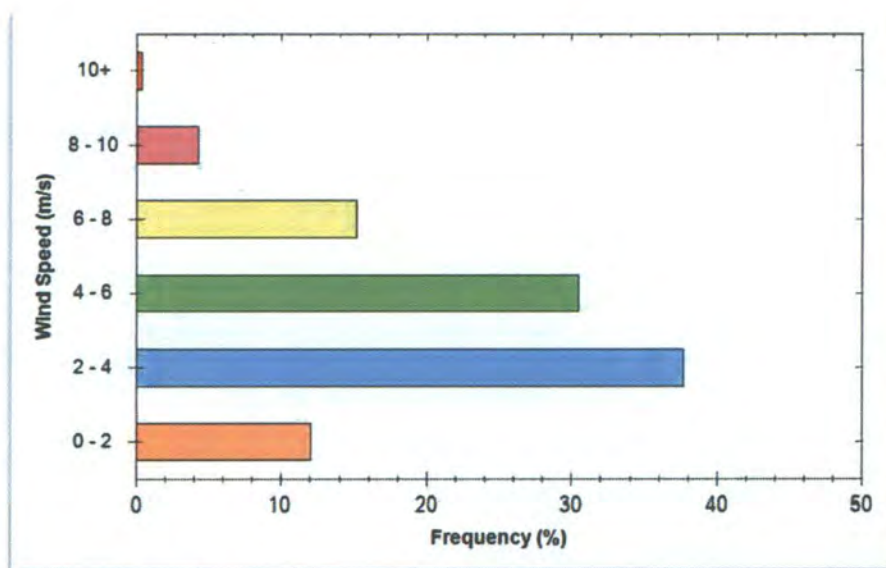


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FREQUENCY OF WIND SPEED



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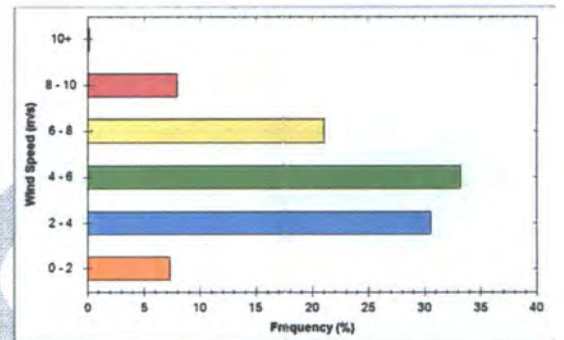
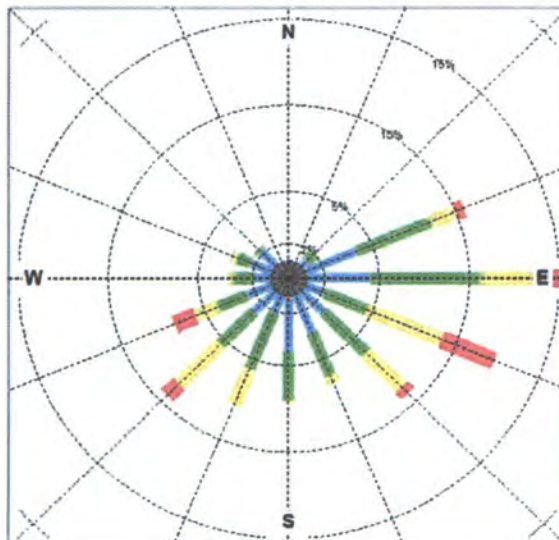
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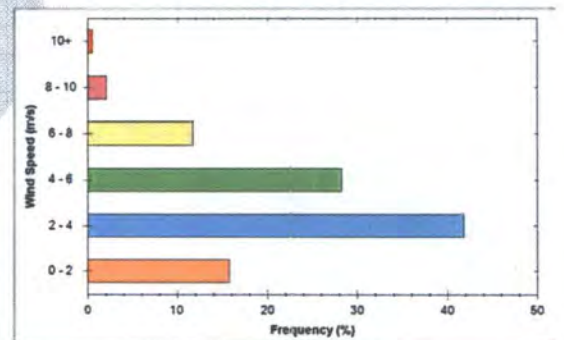
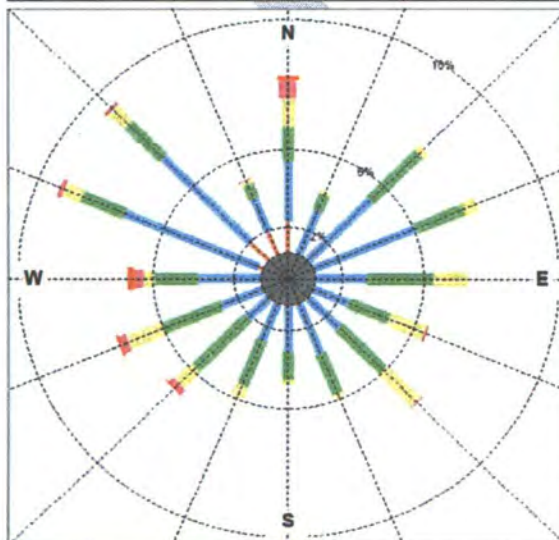
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SEASONAL WINDROSES

Summer



Autumn



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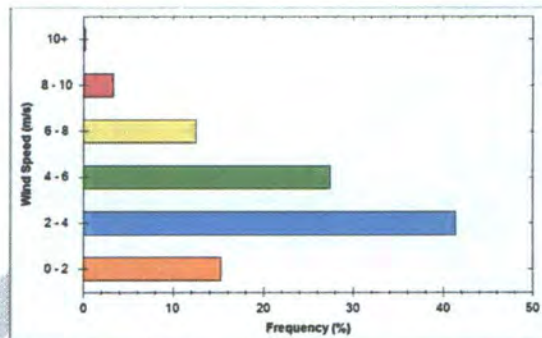
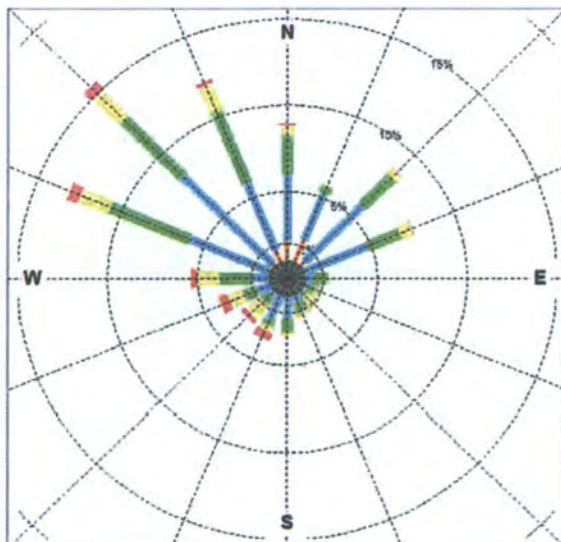


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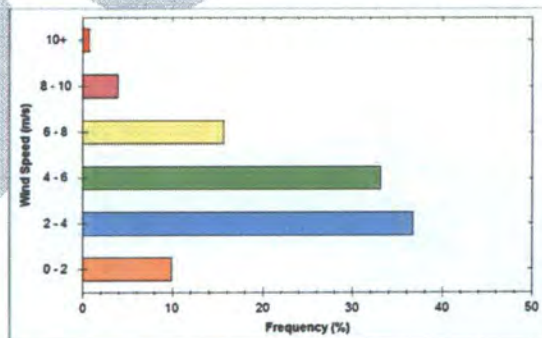
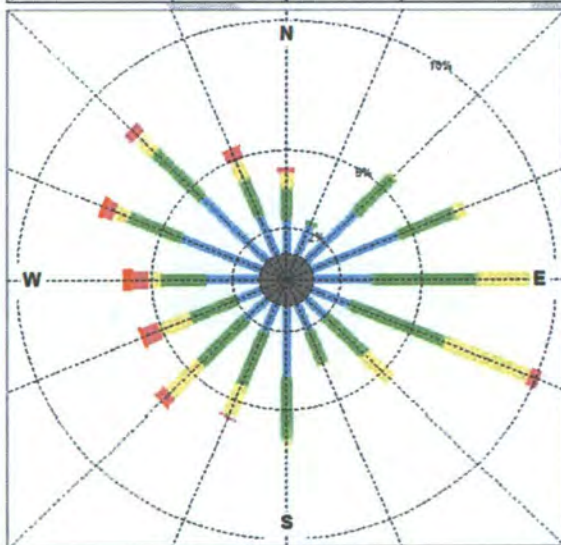
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Winter



Spring



Seasonal variations are clearly depicted.

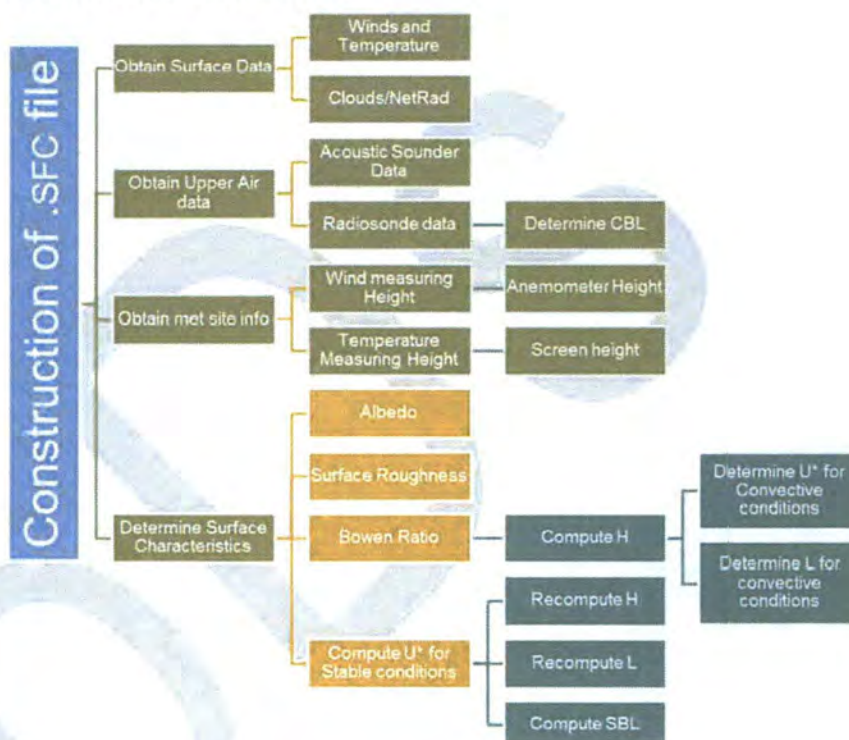


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Appendix A

FLOW CHARTS - CONSTRUCTION PROCEDURE

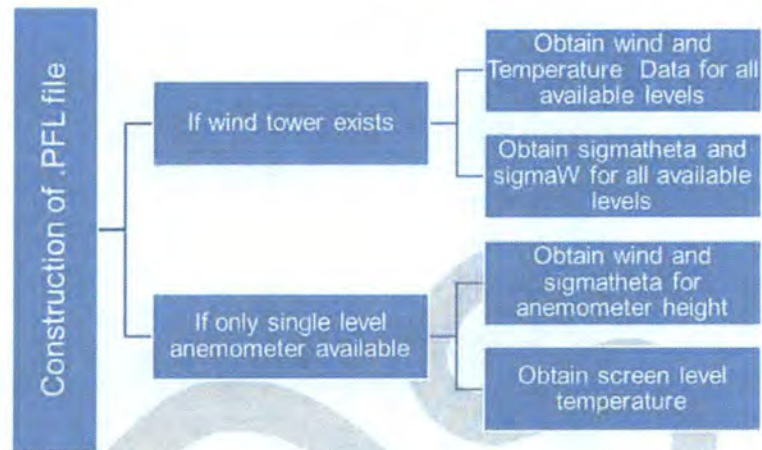




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Appendix B

RECEPTOR ELEVATION AND HILL HEIGHT FILE (.REL)

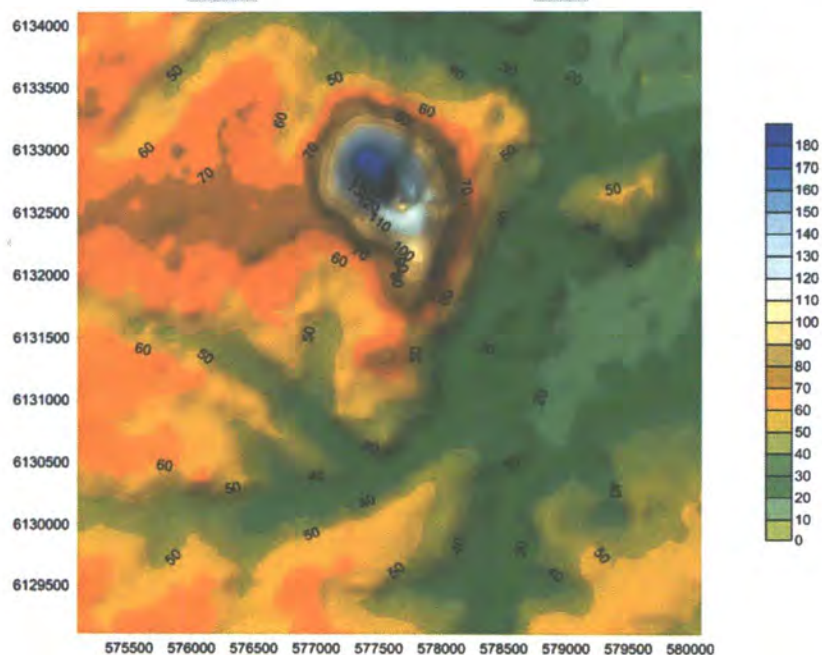
This file was prepared using SRTM1 – Shuttle Radar Topography Mission topography data. Gap filled through AERMAP processing.

CHARACTERISTICS OF THE DOMAIN SPECIFIED BY THE CLIENT:

Centre: -34.955069, 117.84977, (577586, 6131607) m UTM zone 50H

Extent: 5 KM by 5 KM

Resolution: 40 m





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Bibliography

Australian Standard 2923-1987: Standards Association of Australia

Benkley, C.W. & Schulman L.L. 1979 :Estimating Hourly Mixing Depths from Historical Meteorological Data :Jl of Applied Meteorology Vol 1 page 772-780

USEPA 2004, AERMOD :Description of Model Formulation, EPA-454/R-03-00. United States Environmental Protection Agency, Washington DC, USA.

USEPA 2012, User Guide for the AERMOD Meteorological Processor-AERMET; Addendum, United States Environmental Protection Agency, Washington DC, USA.

USEPA, 2000, Meteorological Monitoring Guidance for Regulatory Modelling Applications, EPA-450/R-99-005. United States Environmental Protection Agency, Washington DC, USA.

USEPA, Office of Air Quality Planning and Standards, AERSURFACE User's Guide, Research Triangle Park, North Carolina, EPA 454/B-08-001

USEPA, Office of Air Quality Planning and Standards, User's Guide for the AERMOD Meteorological Processor (AERMET) and Addendum, Research Triangle Park, North Carolina, EPA 454/B-03-002.



DISCLAIMER

Compilation of input meteorological data files for AERMOD was done under the supervision of qualified and experienced meteorologists. Although all due care has been taken, we cannot give any warranty, nor accept any liability (except that required by law) in relation to the information given, its completeness or its applicability to a particular problem. These data and other material are supplied on the condition that you agree to indemnify us and hold us harmless from and against all liability, losses, claims, proceedings, damages, costs and expenses, directly or indirectly relating to, or arising from the use of or reliance on the data and material which we have supplied.

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APPENDIX E

NOISE ASSESSMENT

Rochdale Holdings Pty Ltd A.B.N. 85 009 949 067 trading as:

HERRING STORER ACOUSTICS

Suite 34, 11 Preston Street, Como, W.A. 6152

P.O. Box 219, Como, W.A. 6952

Telephone: (08) 9367 6200

Facsimile: (08) 9474 2579

Email: hsa@hsacoustics.com.au



HARLEY DYKSTRA

PROPOSED ASPHALT PLANT
LOT 104 ROCKY CROSSING ROAD
WILLYUNG, ALBANY

NOISE ASSESSMENT

FEBRUARY 2017

OUR REF: 21354-1-17005



DOCUMENT CONTROL PAGE

NOISE ASSESSMENT
PROPOSED ASPHALT PLANT, ALBANY

Job No: 17005

Document Reference : 21354-1-17005

FOR

GREAT SOUTHERN SANDS

DOCUMENT INFORMATION				
Author:	Tim Reynolds	Checked By:	George Watts	
Date of Issue :	14 February 2017			

REVISION HISTORY				
Revision	Description	Date	Author	Checked

DOCUMENT DISTRIBUTION				
Copy No.	Version No.	Destination	Hard Copy	Electronic Copy
1	1	Harley Dykstra Attn : David Congdon (davidc@harleydykstra.com.au)		✓

CONTENTS

1.	INTRODUCTION	1
2.	SUMMARY	1
3.	CRITERIA	1
4.	PROPOSED OPERATIONS	4
5.	MODELLING	5
6.	DISCUSSION	10

APPENDICIES

A	Locality Plan/ Neighbouring Residence
B	Noise Bund

1. INTRODUCTION

Herring Storer Acoustics was commissioned by Harley Dykstra on behalf of Great Southern Sands to carry out an acoustical assessment of emissions from a proposed Asphalt Plant to be located at Lot 104 Rocky Crossing Road, Willyung Albany. The objectives of the study were to:

- Determine, by modelling, noise propagation from the proposed plant.
- Assess the predicted noise levels received at the closest noise sensitive premises, for compliance with the *Environmental Protection (Noise) Regulations 1997*.
- If exceedances are predicted, investigate possible noise control options that will reduce noise emissions to achieve compliance with the regulations.

Site location is shown on the figure attached in Appendix A.

2. SUMMARY

At the closest neighbouring premises, the assigned L_{A10} day period noise level would range from 45 to 50 dB(A). During the night period, the assigned L_{A10} would range from 35 to 40 dB(A).

To comply with the requirements of the *Environmental Protection (Noise) Regulation 1997* during the day and evening periods; including during the day on a Sunday or Public Holiday, the following noise mitigations are required :

- Plant stack attenuated by 14dB(A) to a sound power level of 98 dB(A);
- Boiler to be located within a metal clad shed, with the opening to the east;
- A 4 metre bund located along the eastern side of the plant; and
- Sound power of the plant (excluding boiler) be limited to 102 dB(A).

It is noted, that even with the inclusion of the mitigations as outlined above, noise received at the neighbouring residences would only comply with the assigned noise levels for the day, evening and Sunday / Public Holidays, but would not achieve compliance during the night period. To comply during the night period, the following additional noise mitigations would be required :

- NO truck movements allowed during the night period; and
- The operation of the front end loader would need to be limited to less than 10% of the time or less than 6 minutes per hour, thus that noise received at the neighbouring residence would be assessable under the L_{A1} criteria.

3. CRITERIA

The *Environmental Protection (Noise) Regulations 1997* stipulate the allowable noise levels that can be received at a premise from another premises. The allowable noise level when received at a residence is determined by the calculations of an influencing factor, which is then added to base noise levels. The influencing factor is calculated for the usage of land within two circles, having radii of 100m and 450m from the premises of concern.

TABLE 1 - BASELINE ASSIGNED OUTDOOR NOISE LEVEL

Premises Receiving Noise	Time of Day	Assigned Level (dB)		
		L _{A10}	L _{A1}	L _{Amax}
Noise sensitive premises	0700 - 1900 hours Monday to Saturday	45 + IF	55 + IF	65 + IF
	0900 - 1900 hours Sunday and Public Holidays	40 + IF	50 + IF	65 + IF
	1900 - 2200 hours all days	40 + IF	50 + IF	55 + IF
	2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and Public Holidays	35 + IF	45 + IF	55 + IF

Note: L_{A10} is the noise level exceeded for 10% of the time.
L_{A1} is the noise level exceeded for 1% of the time.
L_{Amax} is the maximum noise level.
IF is the influencing factor.

It is a requirement that received noise be free of annoying characteristics (tonality, modulation and impulsiveness), defined below as per Regulation 9.

“impulsiveness” means a variation in the emission of a noise where the difference between L_{Apeak} and L_{Amax Slow} is more than 15 dB when determined for a single representative event;

“modulation” means a variation in the emission of noise that –

- (a) is more than 3dB L_{A Fast} or is more than 3 dB L_{A Fast} in any one-third octave band;
- (b) is present for more at least 10% of the representative assessment period; and
- (c) is regular, cyclic and audible;

“tonality” means 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 3dB 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 8dB at any time when the sound pressure levels are determined as L_{ASlow} levels.

The assigned noise levels are also conditional on no annoying characteristics existing such as tonal components etc. If such characteristics exist, then any measured level is adjusted accordingly. The adjustments that apply are shown in Table 2.

TABLE 2 - ADJUSTMENTS TO MEASURED LEVELS

Where tonality is present	Where modulation is present	Where impulsiveness is present
+5 dB(A)	+5 dB(A)	+10 dB(A)

Note: these adjustments are cumulative to a maximum of 15 dB.

We note that the Influencing Factor for the highly sensitive area of the neighbouring noise sensitive premises (i.e. residence) surrounding the proposed plant would range between 0 and 5 dB depending on their location. Thus, the influencing factors would be as listed in Table 3.

TABLE 3 – CALCULATION OF NOISE INFLUENCING FACTOR

Location	Influencing Factor (dB)
Lot 3 Rocky Crossing	+5
Lot 7 Rocky Crossing	+2
Lot 5 Rocky Crossing	+3
Lot 61 - 66 Menang Drive	0 - 2
Lot 202 Menang Drive	+2 dB
Lot 5318 Menang Drive	+2 dB
Lot 5319 Menang Drive	+2 dB
Lot 105 Rocky Crossing Road	+2 dB

The range of assigned level are listed in Table 4.

TABLE 4 - ASSIGNED OUTDOOR NOISE LEVELS

Premises Receiving Noise	Time of Day	Assigned Level (dB)		
		L _A 10	L _A 1	L _A max
Noise sensitive premises: highly sensitive area	0700 - 1900 hours Monday to Saturday	45 - 50	55 - 60	65 - 70
	0900 - 1900 hours Sunday and Public Holidays	40 - 45	50 - 55	65 - 70
	1900 - 2200 hours all days	40 - 45	50 - 55	55 - 60
	2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and Public Holidays	35 - 40	45 - 50	55 - 60
Noise sensitive premises: any area other than highly sensitive area	All Hours	60	76	80

Note: L_{A10} is the noise level exceeded for 10% of the time.
L_{A1} is the noise level exceeded for 1% of the time.
L_{Amax} is the maximum noise level.
IF is the influencing factor.

The neighbouring residences are shown on the attached locality plan attached as Figure 1 in Appendix A.



FIGURE 1 – LOCATION PLAN

4. PROPOSED OPERATIONS

From information supplied, we understand that the plant would be located in the north west portion of the site, as shown on Figure 1.

The main noise sources associated with the plant are as listed in Table 5.

TABLE 5 - SOUND POWER LEVELS dB(A)

Item	Sound Power Level dB(A)
Front End Loader	109
Burner	101
Stack	112
Plant	106
Trucks	94

Note : Stack height is 22.5 metres above ground.

5. MODELLING

Modelling of the noise received at the neighbouring residence was carried out using "SoundPlan".

SoundPlan uses the theoretical sound power levels determined from measured sound pressure levels to calculate the noise level received at a specific location. Additionally, the calculations used the following input data:

- a) Ground contours, as obtained from Google Earth; and
- b) Standard weather conditions.

Weather conditions for the modelling were as stipulated within the Environmental Protection Authority's "*Draft Guidance for Assessment of Environmental Factors No. 8 - Environmental Noise*" for the night periods were as listed in Table 6.

TABLE 6 - WEATHER CONDITIONS

Condition	Day Period
Temperature	15 °C
Relative Humidity	50%
Pasquill Stability Class	F
Wind Speed	3m/s*

* From sources, towards receivers.

Preliminary modelling indicated that based on the sound power levels listed in Table 5, noise received at the neighbouring residence would exceed the requirements of the *Environmental protection (Noise) Regulations 1997*. Thus, the results of the noise modelling includes the following noise mitigations :

- Plant stack attenuated by 14dB(A) to a sound power level of 98 dB(A);
- Boiler to be located within a metal clad shed, with the opening to the east;
- A 4 metre bund located along the eastern side of the plant; and
- Sound power of the plant (excluding boiler) be limited to 102 dB(A).

6. RESULTS

Noise received at the neighbouring residence, with the inclusion of the noise mitigation, as outlined above in Section 5 – Modelling, are shown on Table 7.

TABLE 7 – CALCULATED NOISE LEVELS dB(A)

Location	Calculated Noise Level dB(A)
Lot 3 Rocky Crossing	38
Lot 7 Rocky Crossing	36
Lot 105 Rocky Crossing	35
Lot 61 Menang Drive	34
Lot 62 Menang Drive	32
Lot 63 Menang Drive	32
Lot 64 Menang Drive	32
Lot 65 Menang Drive	33
Lot 66 Menang Drive	34
Lot 202 Menang Drive	38
Lot 5318 Menang Drive	37
Lot 5319 Menang Drive	35

It is noted that even with the inclusion of the mitigations as outlined above, noise received at the neighbouring residences would only comply with the assigned noise levels for the day, evening and Sunday / Public Holidays, but would not achieve compliance during the night period.

To comply during the night period, the following additional noise mitigations would be required :

- NO truck movements allowed during the night period; and
- The operation of the front end loader would need to be limited to less than 10% of the time or less than 6 minutes per hour, thus that noise received at the neighbouring residence would be assessable under the L_{A1} criteria.

With the inclusion of the above additional noise mitigation, additional noise modelling was undertaken for :

- 1 Night operation of plant without Front End Loader Operating and NO truck movements; and
- 2 Front End Loader only operating.

The results are listed in Table 8.

TABLE 8 – CALCULATED NOISE LEVELS dB(A)

Location	Calculated Noise Level dB(A)	
	Plant Only (Night Period)	FEL Only
Lot 3 Rocky Crossing	35	30
Lot 7 Rocky Crossing	33	28
Lot 105 Rocky Crossing	29	28
Lot 61 Menang Drive	28	30
Lot 62 Menang Drive	27	26
Lot 63 Menang Drive	28	27
Lot 64 Menang Drive	28	27
Lot 65 Menang Drive	29	28
Lot 66 Menang Drive	29	28
Lot 202 Menang Drive	30	35
Lot 5318 Menang Drive	30	33
Lot 5319 Menang Drive	29	30

7. ASSESSMENT

At the calculated noise level, noise received at the neighbouring premises is unlikely to be considered tonal. However, to be conservative, a +5 dB(A) penalty for a tonal component has been included in the assessment

Tables 9 to 11 lists the calculated noise level, the applicable penalties for annoying characteristic and the assessable noise level.

TABLE 9 – APPLICABLE ADJUSTMENTS AND ASSESSABLE NOISE LEVELS FOR FULL OPERATIONS

Item	Calculated Noise Level, dB(A)	Applicable Adjustments to Measured Noise Levels, dB(A)			Assessable Noise Level, dB(A)
		Where Noise Emission is NOT music			
		Tonality	Modulation	Impulsiveness	
Lot 3 Rocky Crossing	38	+5	-	-	43
Lot 7 Rocky Crossing	36	+5	-	-	41
Lot 105 Rocky Crossing	35	+5	-	-	40
Lot 61 Menang Drive	34	+5	-	-	39
Lot 62 Menang Drive	32	+5	-	-	37
Lot 63 Menang Drive	32	+5	-	-	37
Lot 64 Menang Drive	32	+5	-	-	37
Lot 65 Menang Drive	33	+5	-	-	38
Lot 66 Menang Drive	34	+5	-	-	39
Lot 202 Menang Drive	38	+5	-	-	43
Lot 5318 Menang Drive	37	+5	-	-	42
Lot 5319 Menang Drive	35	+5	-	-	40

TABLE 10 – APPLICABLE ADJUSTMENTS AND ASSESSABLE NOISE LEVELS FOR PLANT ONLY

Item	Calculated Noise Level, dB(A)	Applicable Adjustments to Measured Noise Levels, dB(A)			Assessable Noise Level, dB(A)
		Where Noise Emission is NOT music			
		Tonality	Modulation	Impulsiveness	
Lot 3 Rocky Crossing	35	+5	-	-	40
Lot 7 Rocky Crossing	33	+5	-	-	38
Lot 105 Rocky Crossing	29	+5	-	-	34
Lot 61 Menang Drive	28	+5	-	-	33
Lot 62 Menang Drive	27	+5	-	-	32
Lot 63 Menang Drive	28	+5	-	-	33
Lot 64 Menang Drive	28	+5	-	-	33
Lot 65 Menang Drive	29	+5	-	-	34
Lot 66 Menang Drive	29	+5	-	-	34
Lot 202 Menang Drive	30	+5	-	-	35
Lot 5318 Menang Drive	30	+5	-	-	35
Lot 5319 Menang Drive	29	+5	-	-	34

TABLE 11 – APPLICABLE ADJUSTMENTS AND ASSESSABLE NOISE LEVELS FOR FEL

Item	Calculated Noise Level, dB(A)	Applicable Adjustments to Measured Noise Levels, dB(A)			Assessable Noise Level, dB(A)
		Where Noise Emission is NOT music			
		Tonality	Modulation	Impulsiveness	
Lot 3 Rocky Crossing	30	+5	-	-	35
Lot 7 Rocky Crossing	28	+5	-	-	33
Lot 105 Rocky Crossing	28	+5	-	-	33
Lot 61 Menang Drive	30	+5	-	-	35
Lot 62 Menang Drive	26	+5	-	-	31
Lot 63 Menang Drive	27	+5	-	-	32
Lot 64 Menang Drive	27	+5	-	-	32
Lot 65 Menang Drive	28	+5	-	-	33
Lot 66 Menang Drive	28	+5	-	-	33
Lot 202 Menang Drive	35	+5	-	-	40
Lot 5318 Menang Drive	33	+5	-	-	38
Lot 5319 Menang Drive	30	+5	-	-	35

Table 11 summarises the applicable Assigned Noise Levels, and assessable noise level emissions for noise associated with the entire operation, including plant, Front End Loader and Truck movement.

Table 12 summarises the applicable Assigned Noise Levels, and assessable noise level emissions for noise associated with the plant only for compliance with the assigned night period L_{A10} noise level. Table 13 assesses noise received at the neighbouring residences from only the Front End Loader for compliance with the assigned night period L_{A1} noise level.

TABLE 12 – ASSESSMENT OF L_{A10} NOISE LEVEL EMISSIONS (WITH TONALITY)

Location	Assessable Noise Level, dB(A)	Applicable Times of Day	Applicable Assigned L _{A10} Noise Level (dB)	Exceedance to Assigned Noise Level (dB)
Lot 3 Rocky Crossing	43	Day Period	50	Complies
		Evening Period Sunday / Public Holiday	45	Complies
		Night Period	40	+3
Lot 7 Rocky Crossing	41	Day Period	47	Complies
		Evening Period Sunday / Public Holiday	42	Complies
		Night Period	37	+4
Lot 105 Rocky Crossing	40	Day Period	48	Complies
		Evening Period Sunday / Public Holiday	43	Complies
		Night Period	38	+2
Lot 61 Menang Drive	39	Day Period	45	Complies
		Evening Period Sunday / Public Holiday	40	Complies
		Night Period	35	+4
Lot 62 Menang Drive	37	Day Period	45	Complies
		Evening Period Sunday / Public Holiday	40	Complies
		Night Period	35	+2
Lot 63 Menang Drive	37	Day Period	46	Complies
		Evening Period Sunday / Public Holiday	41	Complies
		Night Period	36	+1
Lot 64 Menang Drive	37	Day Period	46	Complies
		Evening Period Sunday / Public Holiday	41	Complies
		Night Period	36	+1
Lot 65 Menang Drive	38	Day Period	47	Complies
		Evening Period Sunday / Public Holiday	42	Complies
		Night Period	37	+1
Lot 66 Menang Drive	39	Day Period	47	Complies
		Evening Period Sunday / Public Holiday	42	Complies
		Night Period	37	+2
Lot 202 Menang Drive	43	Day Period	47	Complies
		Evening Period Sunday / Public Holiday	42	Complies
		Night Period	37	+6
Lot 5318 Menang Drive	42	Day Period	47	Complies
		Evening Period Sunday / Public Holiday	42	Complies
		Night Period	37	+5
Lot 5319 Menang Drive	40	Day Period	47	Complies
		Evening Period Sunday / Public Holiday	42	Complies
		Night Period	37	+3

**TABLE 13 – ASSESSMENT OF NIGHT PERIOD L_{A10} NOISE LEVEL EMISSIONS
PLANT ONLY**

Location	Assessable Noise Level, dB(A)	Applicable Times of Day	Applicable Assigned L_{A10} Noise Level (dB)	Exceedance to Assigned Noise Level (dB)
Lot 3 Rocky Crossing	40	Night Period	40	Complies
Lot 7 Rocky Crossing	38	Night Period	37	Complies
Lot 105 Rocky Crossing	34	Night Period	38	Complies
Lot 61 Menang Drive	33	Night Period	35	Complies
Lot 62 Menang Drive	32	Night Period	35	Complies
Lot 63 Menang Drive	33	Night Period	36	Complies
Lot 64 Menang Drive	33	Night Period	36	Complies
Lot 65 Menang Drive	34	Night Period	37	Complies
Lot 66 Menang Drive	34	Night Period	37	Complies
Lot 202 Menang Drive	35	Night Period	37	Complies
Lot 5318 Menang Drive	35	Night Period	37	Complies
Lot 5319 Menang Drive	34	Night Period	37	Complies

**TABLE 14 – ASSESSMENT OF NIGHT PERIOD L_{A1} NOISE LEVEL EMISSIONS
FRONT END LOADER ONLY**

Location	Assessable Noise Level, dB(A)	Applicable Times of Day	Applicable Assigned L_{A1} Noise Level (dB)	Exceedance to Assigned Noise Level (dB)
Lot 3 Rocky Crossing	35	Night Period	50	Complies
Lot 7 Rocky Crossing	33	Night Period	47	Complies
Lot 105 Rocky Crossing	33	Night Period	48	Complies
Lot 61 Menang Drive	35	Night Period	45	Complies
Lot 62 Menang Drive	31	Night Period	45	Complies
Lot 63 Menang Drive	32	Night Period	46	Complies
Lot 64 Menang Drive	32	Night Period	46	Complies
Lot 65 Menang Drive	33	Night Period	47	Complies
Lot 66 Menang Drive	33	Night Period	47	Complies
Lot 202 Menang Drive	40	Night Period	47	Complies
Lot 5318 Menang Drive	38	Night Period	47	Complies
Lot 5319 Menang Drive	35	Night Period	47	Complies

8. DISCUSSION

Preliminary modelling indicated that based on the above sound power levels, noise received at the neighbouring residence would exceed the requirements of the *Environmental protection (Noise) Regulations 1997*. Thus, the results of the noise modelling includes the following noise mitigations :

- Plant stack attenuated by 14dB(A) to a sound power level of 98 dB(A);
- Boiler to be located within a metal clad shed, with the opening to the east;
- A 4 metre bund located along the eastern side of the plant; and
- Sound power of the plant (excluding boiler) be limited to 103 dB(A).

It is noted that even with the inclusion of the mitigations as outlined above, noise received at the neighbouring residences would comply with the assigned noise levels for the day, evening and Sunday / Public Holidays, but would not achieve compliance during the night period.

To comply during the night period, the following additional noise mitigations would be required :

- NO truck movements allowed during the night period; and
- The operation of the front end loader would need to be limited to less than 10% of the time or less than 6 minutes per hour, thus that noise received at the neighbouring residence would be assessable under the L_{A1} criteria.

APPENDIX A

LOCATION PLAN /
NEIGHBOURING RESIDENCE



DEVELOPMENT GUIDE PLAN

Additional Use Site No.31
Lot 104 Rocky Crossing Road,
Willyung,
Albany



Harley Dykstra

PLANNING & SURVEY SOLUTIONS

SCALE AT A3 1:5000

0 50 100 150 200 250
ALL DISTANCES ARE IN METRES



DRAWN	CHECKED	DRAWING No
SDP 14/10/2014	SDP 14/10/2014	20112-04C.dgn
REV	DESCRIPTION	DATE
B	Client Modifications	05/08/2014
C	Modification for the City of Albany	14/10/2014

LEGEND

- Buildings & Concrete Apron
- Laydown or Hardstand
- Proposed Crushing Area/Mobile Asphalt Plant
- Sand Extraction Area
- Washdown Bay
- Stormwater Retention
- Vegetation Screening
- Unsealed/Sealed Access Roads

This Development Guide Plan has been adopted by Council and signed by the Chief Executive Officer for the City of Albany

Chief Executive Officer.....Date.....

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NOTE:

This plan has been prepared for planning purposes. Areas, Contours and Dimensions shown are subject to survey.



Appendix C

A vertical dashed line runs down the left side of the page, consisting of a series of short, thick black horizontal bars separated by gaps.

APPENDIX B

NOISE BUND

**EASTERN BUND
(TOP OF OLD PIT)**

Lot 7 on D87537
No. 361 Rocky Crossing Road
420m from crushing area

Lot 3 on D60779
No. 359 Rocky Crossing Road
350m from crushing area

Decommissioned
Sandpit

Workshop

Office

Current
Working
Sandpit

NOISE BUND TO EAST OF PLANT

Appendix B

Lot 105 on DP49240

APPENDIX F

BUSHFIRE MANAGEMENT PLAN



Harley Dykstra

PLANNING & SURVEY SOLUTIONS



BUSHFIRE MANAGEMENT PLAN

Lot 104 Rocky Crossing Road, Willyung

Prepared by Harley Dykstra Pty Ltd for Great Southern Sands

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DOCUMENT CONTROL

Report Version	Purpose	Author	Date
A	Final	David Congdon	12.1.2018

Prepared for: Great Southern Sands

Prepared by: DC

Reviewed by: LB

Date: 12.1.2018

Job No & Name: 20112 Lot 102 Rocky Crossing Road, Willyung

Version: A

DISCLAIMER

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This document has been exclusively drafted. No express or implied warranties are made by the Consultant regarding the research findings and data contained in this report. All of the information details included in this report are based upon the existent land area conditions and research provided and obtained at the time the Consultant conducted its analysis.

Regardless of the outcomes required by this report it is very important to note that the risk of ignition always remains. Bushfires, by nature, can burn in a variety of different manners and are unpredictable. As noted within AS 3959-2009, the purpose of constructing dwellings to the standard prescribed in this document is to *reduce* the risk of ignition whilst a bushfire front passes. The reader must understand that there will always remain an element of risk.

The findings of this report are valid for a period of 3 years after its issue. If there is a possibility that vegetation structure and location has changed significantly since the date of the site inspection, a new Bushfire Management Plan should be prepared.

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1 INTRODUCTION

1.1 Summary of Report

This Bushfire Management Plan has been prepared to support a development application for Lot 104 Rocky Crossing Road, Willyung (the 'subject site'). The Bushfire Management Plan confirms the proposed development is able to comply with State Planning Policy 3.7 – Planning in Bushfire Prone Areas, and all buildings and land uses are able to be located in areas identified as BAL 29 or lower.

The development application seeks planning consent from the **City of Albany** for the following:

Land Use:

- Storage of plant and equipment associated with asphalt production
- Office (incidental)
- Mobile Asphalt Plant
- Storage of materials associated with the preparation and production of asphalt

Development:

- Workshop shed (approximately 25m wide x 60m long x 6m high)
- Small office (approx. 12m wide x 25m long x 4m high)
- Mobile asphalt plant
- Earth bund (approx. 4m high x 130m long)
- Washdown bay

Fourteen people will be employed on site including four for asphalt production, six subcontractors for vehicle servicing and the remainder being support staff.

1.2 Subject Site

The subject site is located at Lot 104 Rocky Crossing Road, Willyung, approximately 14 km North West of the Albany town centre, via Chester Pass Road. The site is approximately 46.8 Ha in area and contains no dwellings or buildings.

The site located in a rural area, with a 367m frontage onto Rocky Crossing Road, and 779m frontage onto Menang Drive.

1.3 Proposed Development

The development application seeks planning consent from the **City of Albany** for the following:

Land Use:

- Storage of plant and equipment associated with asphalt production
- Office (incidental)
- Mobile Asphalt Plant

- Storage of materials associated with the preparation and production of asphalt



Development:



- Workshop shed (approximately 25m wide x 60m long x 6m high)
- Small office (approx. 12m wide x 25m long x 4m high)
- Mobile asphalt plant
- Earth bund (approx. 4m high x 130m long)
- Washdown bay



Fourteen people will be employed on site including four for asphalt production, six subcontractors for vehicle servicing and the remainder being support staff.

2 VEGETATION CLASSIFICATION

A Bushfire Attack Level Assessment was completed at the site, classifying all vegetation within 100m of the proposed development. This was assessed in accordance with Method 1 of Australian Standards 3959-2009 (Clause 2.2). The classification of each vegetation plot identified at the site visit are provided below.

Plot 1	
Type: Woodland Type B	
Effective Slope: Downslope 2.8 degrees	
	
Photo ID: 1	Photo ID: 22
<ul style="list-style-type: none"> - Located in the southern portion of the site and adjacent road reserve - Open Jarrah/Marri woodland, with grassy understorey. Not multi layered - Rehabilitated road reserve consisting of Juvenile Jarrah and Marri trees, shrubs and grasses - Future state anticipated to be a Woodland Type B. Not multi layered - Average vegetation height 10-15m - <10-30% foliage cover 	

Plot 2	
Type: Excluded Clause 2.2.3.2 (f)	
Effective Slope: n/a	
	
Photo ID: 2	Photo ID: 13
<ul style="list-style-type: none"> - Grasses actively grazed and maintained no higher than 100mm. - Paddocks under pasture including rye grass, clovers and Kikuyu - <10% foliage cover 	

Plot 3	
Type: Excluded Clause 2.2.3.2 (e)	
Effective Slope: n/a	
	
Photo ID: 6	Photo ID: 12
Non vegetated areas including roads, gravel pit, hardstand and dam.	

Plot 4

Type: **Woodland Type B**

Effective Slope: Flat/upslope



Photo ID: 4



Photo ID: 5

- Located in the mid-western area of the site
- Open Jarrah/Marri woodland with a grassy understory. Not multi layered
- Average vegetation height 10 – 15m
- <10-30% vegetation cover

Plot 5

Type: **Shrubland Type C**

Effective Slope: Downslope 1.6 degrees



Photo ID: 9

- Located in the north and west portions of the site
- Sedges and grasses to 1.5m in a wet damp area adjacent to the property

Plot 6

Type: **Shrub Type D**

Effective Slope: Flat/Upslope



Photo ID: 10

- Located to the north west portion of the site
- Scrub including Melaleuca and Taylorina scrub
- Scrubs to 4m, with occasional tree to 5m
- Sedges and grass understory
- >30% foliage cover

Plot 7

Type: **Woodland Type B**

Effective Slope: Flat/upslope



Photo ID: 11

- Located in the property to the north, small area of grazed Eucalyptus trees
- Jarrah and Marri Trees with grassy understory. Not multi layered
- Average vegetation height 10-15m
- <10-30% foliage cover

Plot 8

Type: **Woodland Type B**

Effective Slope: Downslope 6.8 to 8.2 degrees



Photo ID: 14

- Located in north eastern portion of the site
- Jarrah and Marri Trees, with grassy understory. Not multi layered
- Average vegetation height 10-15m
- <10-30% foliage cover

Plot 9

Type: **Forrest Type A**

Effective Slope: Downslope 8.3 degrees



Photo ID: 15

- Located in the north east portion of the property
- Jarrah and Marri low forest
- Multi layered
- Average vegetation height 10-15m
- <30-70% foliage cover

Plot 10

Type: **Forrest Type A**

Effective Slope: Downslope 1.4 degrees



Photo ID: 16



Photo ID: 17

- Located along Rocky Crossing Road within the road reserve
- Jarrah/Marri low forest
- Multilayered
- Average vegetation height 10-15m
- <30-70% foliage cover

Plot 11

Type: **Excluded Clause 2.2.3.2(e)**

Effective Slope: n/a



Photo ID: 26

- Constructed public road(s)

Plot 12

Type: **Excluded Clause 2.2.3.2(f)**

Effective Slope: n/a



Photo ID: 19

- Grasses actively grazed and maintained no higher than 100mm.
- Paddocks under pasture including rye grass, clovers and Kikuyu
- <10% foliage cover

Plot 13

Type: **Scrub Type D**

Effective Slope: Downslope 2.1 degrees



Photo ID: 18

- Located along the northern side of Menang Drive road reserve
- Tea Tree scrub, with sedges and grassy understory
- Average vegetation height 3.5m
- >30 foliage cover

Plot 14

Type: **Scrub Type D**

Effective Slope: Downslope 1.2 degrees



Photo ID: 27

- Located along the northern side of Menang Drive road reserve
- Tea Tree scrub, with sedges and grassy understory
- Average vegetation height 3.5m
- >30 foliage cover

Plot 15

Type: **Woodland Class B**

Effective Slope: 1.2 to 2.8 degrees downslope



Photo ID: 28



Photo ID: 25

- Located on the southern side of the Menang Drive road reserve
- Open Jarrah/Marri woodland with a grassy understory. Not multi layered
- Average vegetation height 10 – 15m
- <10-30% foliage cover

Plot 16

Type: **Grassland Type G**

Effective Slope: Downslope 1.4 to 3.5 degrees



Photo ID: 23



Photo ID: 24

- Located to the south of the subject site in adjacent paddocks
- Grasses consisting of Rye, clovers and Kikuyu
- <10% foliage cover

Plot 17

Type: **Woodland Class B**

Effective Slope: 2.7 degrees downslope



Photo ID: 21

- Located on the southern side of Menang Drive in adjacent paddocks
- Open Jarrah/Marri woodland with a grassy understory. Not multi layered
- Average vegetation height 10 – 15m
- <10-30% foliage cover

Plot 18
Type: Excluded Clause 2.2.3.2 (e & f)
Effective Slope: n/a
<div>  </div> <div>Photo ID: 20</div>
- Buildings and managed garden

2.1 Results

A Bushfire Attack Level (BAL) Contour Map was produced using the Fire Danger index that has been determined using method 1 in accordance with the applicable standard for Western Australian Municipalities (FDI 80), which is the standard found in Table 2.1 of AS 3959-2009.

The BAL Contour Map (overleaf) demonstrates the potential radiant heat impact to the proposed development, and that there is sufficient area on the subject site to locate a workshop and asphalt plant in an area identified as BAL 29 or less.

Because the site is subject to a potential radiant heat level greater than BAL-Low, the following sections address the criteria listed in Appendix 4 of the Guidelines associated with SPP 3.7 – Planning in Bushfire Prone Areas.






BAL Contour Map



Legend:

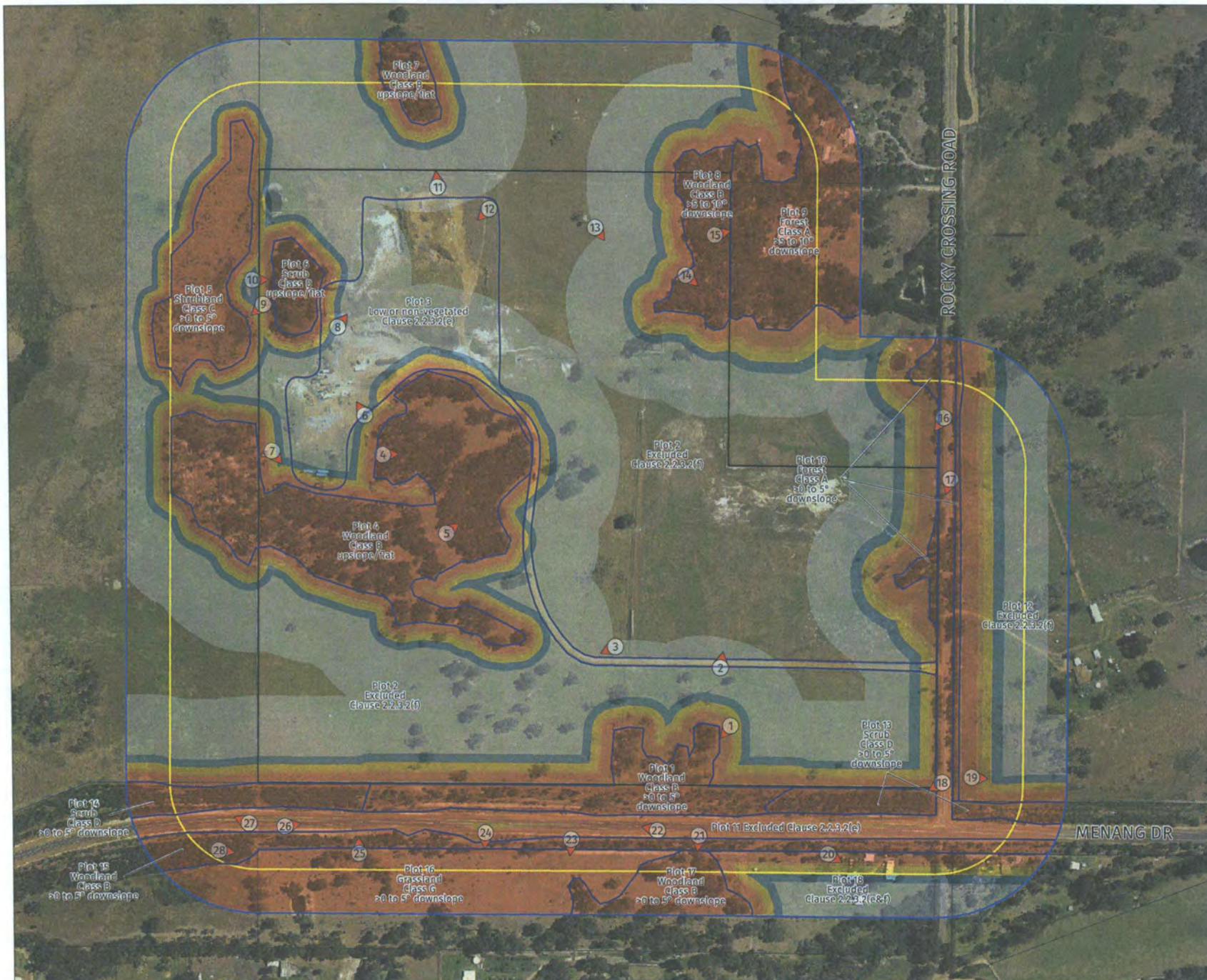
-  Subject land
-  Cadastre
-  Vegetation Boundary
-  100m Buffer
-  150m Buffer
-  Photo Location/
Orientation

Bushfire Attack Levels:

-  BAL 12.5
-  BAL 19
-  BAL 29
-  BAL 40
-  BAL Flame Zone

Lot 104
 Location details: Rocky Crossing Rd,
 Wilyung
 Assessment date: 12/01/18
 Prepared by: David Congdon

Date aerial photo: Feb 2016



3 ASSESSMENT AGAINST THE BUSHFIRE PROTECTION CRITERIA

3.1 Compliance

State Planning Policy 3.7 (SPP 3.7) provides a number of objectives, with its primary purpose being to *“implement effective, risk based land use planning and development to preserve life and reduce the impact of bushfire on property and infrastructure”*. This primary objective is manifested in a number of policy objectives that seek to implement the purpose of the policy. These objectives provide general statements of intent, and their practical rationalisation is developed through four different elements in Appendix 4 of the guidelines underpinning SPP 3.7 under the heading of *Bushfire Protection Criteria*.

The following section demonstrates that the proposed development is able to comply with the bushfire protection criteria.

Element	Acceptable solutions	Compliance	Proposed bushfire management strategies
Element 1: Location	A1.1 Development location	Yes	There is sufficient area, as demonstrated on the BAL Contour Map, to locate a workshop and asphalt plant in an area with a BAL rating of BAL 29 or less.
Element 2: Siting and design	A2.1 Asset Protection Zone	N/A	The BAL Contour Plan concludes that sufficient area is available on the subject site to ensure that development can occur in areas that can experience a potential radiant heat level of BAL 29 or less. Therefore, an APZ is not required.
Element 3: Vehicular access	A3.1 Two access routes.	Yes	The site has frontage to Rocky Crossing Road which provides access to two different destinations via Menang Drive to the south, and Wilyung Road to the north.
	A3.2 Public road	Yes	Rocky Crossing Road and connecting roads are public roads, and are able to comply with Section 3.2 of SPP 3.7.
	A3.3 Cul-de-sac	N/A	No Cul-de-sacs are proposed as part of this development application.
	A3.4 Battle-axe	N/A	No battle-axes are proposed as part of this development application.
	A3.5 Private driveway longer than 50m	Yes	The existing driveway is greater than 50m, and will be upgraded to comply with element E3.5 and Table 4 of SPP 3.7.
	A3.6 Emergency access way	N/A	No new emergency access ways are required for the proposed development.
	A3.7 Fire service access routes (perimeter roads)	N/A	No fire service access routes are required for the proposed development.
	A3.8 Firebreak width	N/A	The proposed development will need to ensure compliance with the annual fire management notice issued by the Local Government. The City of Albany require 3m wide firebreaks, with 4m vertical clearance, and pastures to be maintained no higher than 50mm.

Element 4: Water	A4.1 Reticulated areas	N/A	Not Applicable
	A4.2 Non-reticulated areas	Yes	The subject site is not connected to a reticulated water supply. The proposed development will utilise rainwater catchment with a minimum dedicated supply of 10,000L for firefighting purposes.
	A4.3 Individual lots within non-reticulated areas (Only for use if creating 1 additional lot and cannot be applied cumulatively)	N/A	Not Applicable

4 RESPONSIBILITIES FOR IMPLEMENTATION AND MANAGEMENT OF THE BUSHFIRE MEASURES

This section sets out the responsibilities of the developer/s, landowner/s and local government with regards to the initial implementation and ongoing maintenance of the required actions.

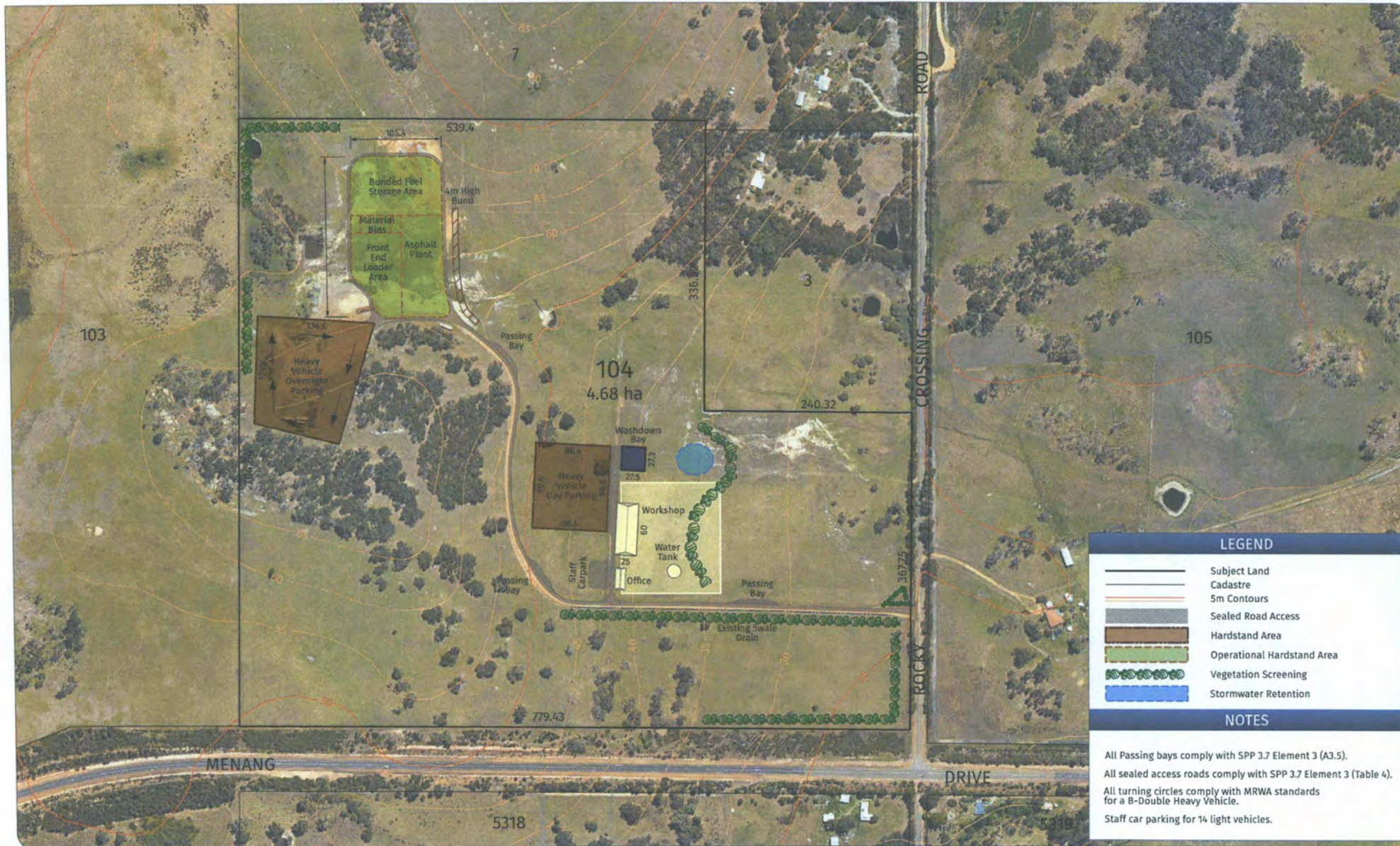
LANDOWNER/DEVELOPER – PRIOR TO SALE OR OCCUPANCY	
No.	Implementation Action
1	Ensure water supply is available to the proposed development, including a dedicated 10,000L for firefighting purposes.
2	Upgrade internal driveway to comply with element E3.5 and Table 4 of SPP 3.5.

LANDOWNER/OCCUPIER - ONGOING	
No.	Management Action
1	Maintain dedicated 10,000L water supply for firefighting purposes.
2	Maintain pastures and fire breaks in accordance with the City of Albany fire management notice.

LOCAL GOVERNMENT – ONGOING MANAGEMENT	
No.	Management Action
1	Rocky Crossing Road and the connecting road network are public roads and are able to comply with Section 3.2 of SPP 3.7 in their current state. These roads will require ongoing maintenance by the City of Albany and State of Western Australia to ensure the road surface is maintained, to allow a conventional two wheel drive vehicle to travel safely on them in either direction.

APPENDIX G

SITE PLAN



LEGEND

- Subject Land
- Cadastre
- 5m Contours
- Sealed Road Access
- Hardstand Area
- Operational Hardstand Area
- Vegetation Screening
- Stormwater Retention

NOTES

- All Passing bays comply with SPP 3.7 Element 3 (A3.5).
- All sealed access roads comply with SPP 3.7 Element 3 (Table 4).
- All turning circles comply with MRWA standards for a B-Double Heavy Vehicle.
- Staff car parking for 14 light vehicles.

DEVELOPMENT SITE PLAN

Lot 104 Rocky Crossing Road,
WILLYUNG

Plan No. | 20112-07A
Date | 13/03/18
Drawn | JW
Checked | DC
Revision | A

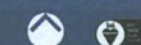
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W: www.harleydykstra.com.au

ALBANY | BUNBURY | BUSSETON | FORRESTDALE | PERTH

Scale | 1:4000@A3

0 50m 100m

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NOTE: This plan has been prepared for planning purposes. Allens, Contours and Topographic should use subject to survey



Harley Dykstra

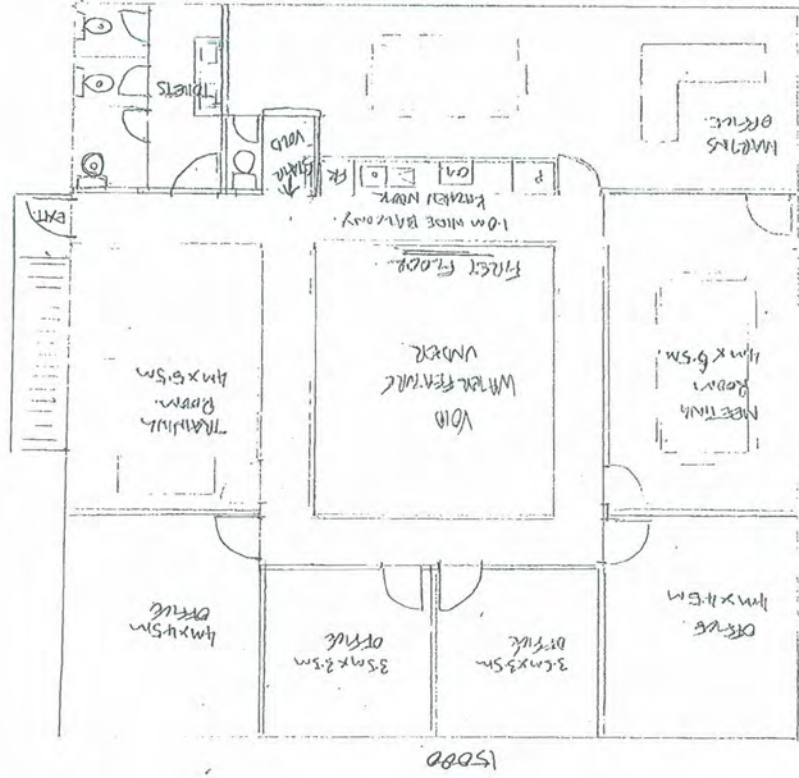
PLANNING & SURVEY SOLUTIONS

APPENDIX H

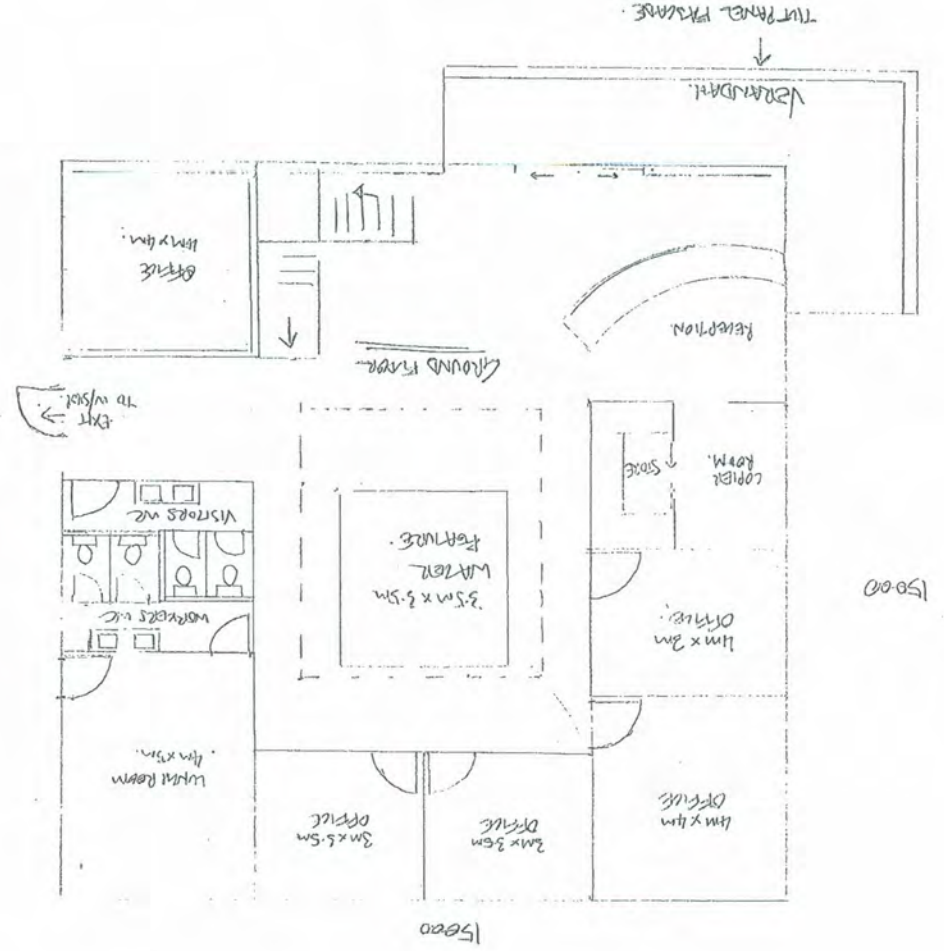
Building Plans

APPENDIX I

Visual Impact Assessment

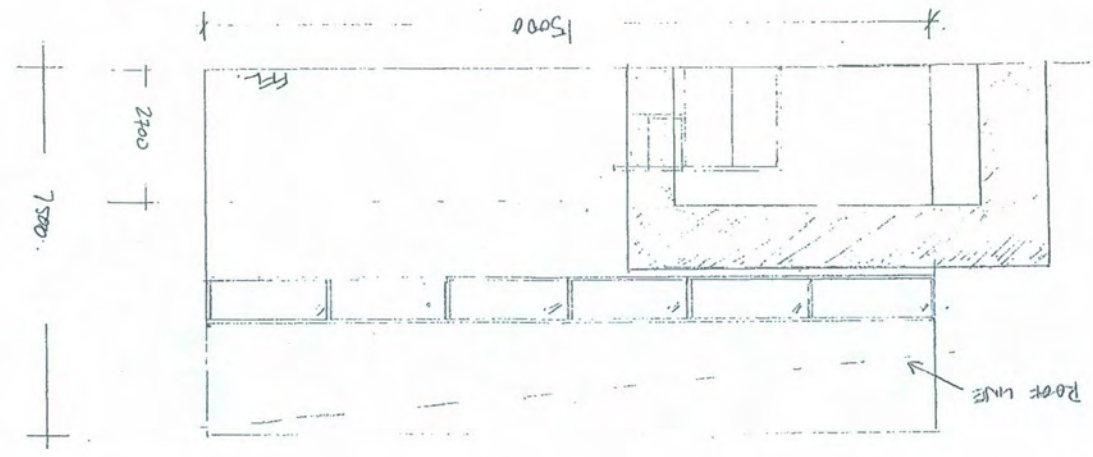


MARKING OFFICE
 OFFICES x 9
 LUNCH ROOM x 1
 MEETING ROOM x 1
 TRASH ROOM x 1
 TOILETS x 2

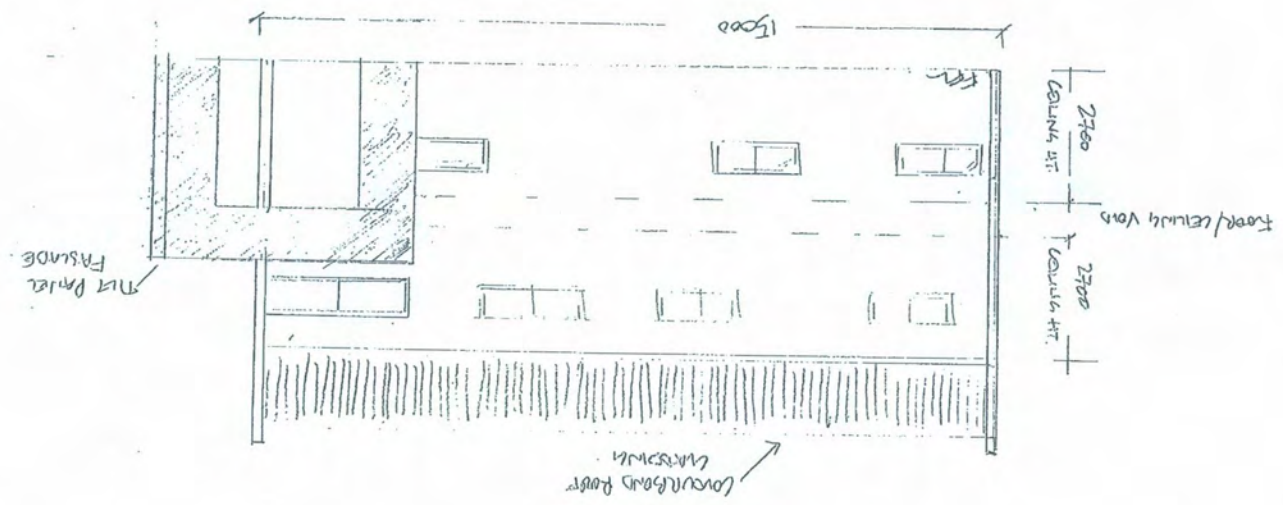


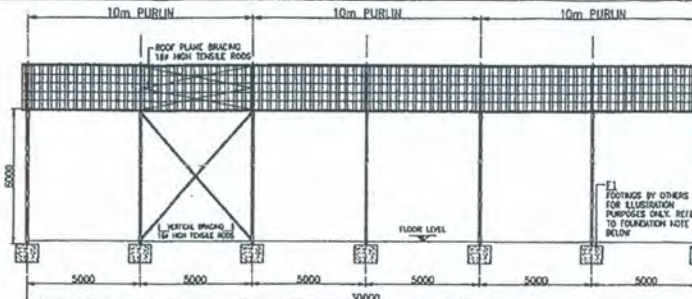
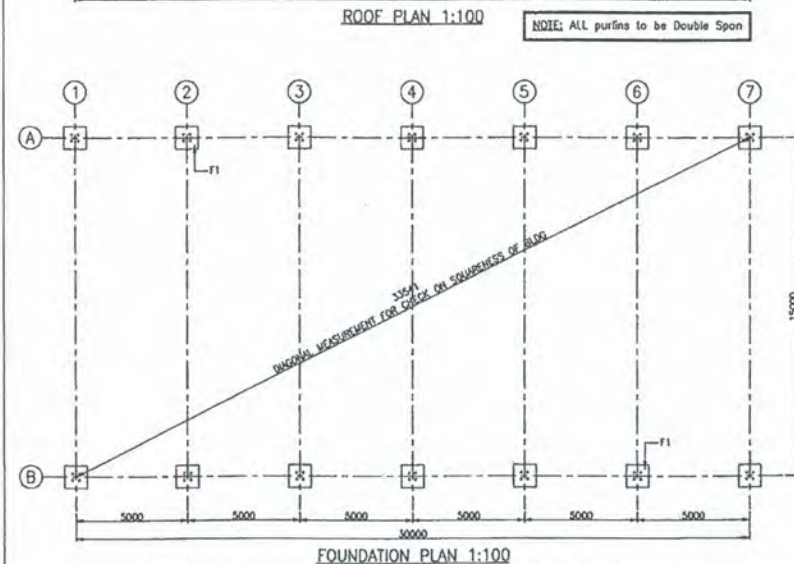
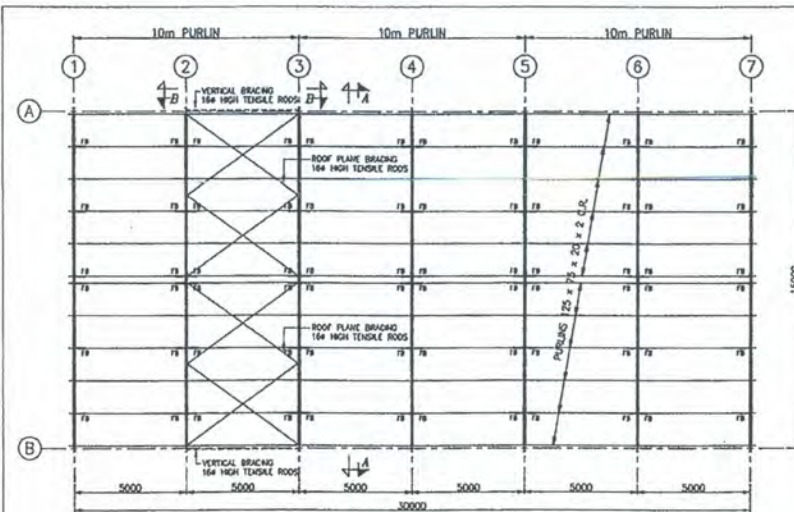
15000

FRONT ELEVATION

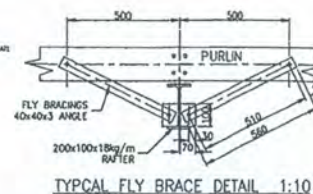
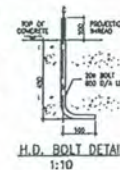
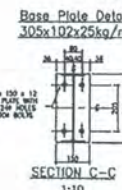
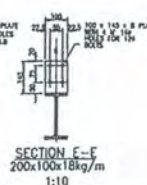
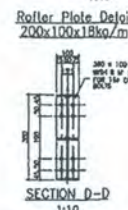
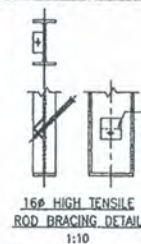
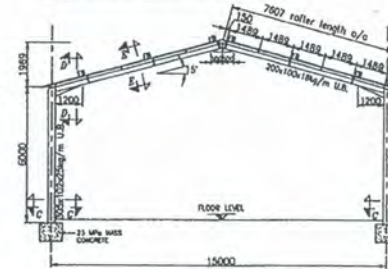
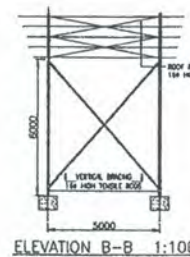


SIDE ELEVATION





PRE-GALVANISED PURLINS
Fly Bracing 3 per rafter



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2. ALL PROPOSED PRODUCTS ARE TO BE INSTALLED STRICTLY IN ACCORDANCE WITH THE MANUFACTURER'S WRITTEN SPECIFICATIONS & DETAILS.

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5. IT REMAINS THE CLIENT'S / OWNER'S / ARCHITECT'S OR THEIR AUTHORIZED REPRESENTATIVE'S RESPONSIBILITY TO ENSURE THAT ALL RELEVANT AND APPLICABLE DOCUMENTATION FOR BUILDING APPLICATIONS HAVE BEEN LOCATED AND APPROVED WITH THE LOCAL AUTHORITY PRIOR TO CONSTRUCTION COMMENCING. SEE CLARIFICATION AND/OR CONFIRMATION FROM LOCAL AUTHORITY IF REQUIRED.

6. THE DESIGN CERTIFICATE (FORM 13), DRAWINGS OR ANY OTHER SUPPORTING DOCUMENTATION ISSUED BY THIS OFFICE DOES NOT CONSTITUTE BUILDING DEVELOPMENT APPROVAL. NOR AUTHORIZES THE COMMENCEMENT OF WORK. THIS OFFICE ACCEPTS NO RESPONSIBILITY IF IT IS FOUND THAT NO APPROVAL FROM THE RELEVANT LOCAL AUTHORITY HAS BEEN OBTAINED, COMPLETED OR OBTAINED PRIOR TO CONSTRUCTION COMMENCING OR THAT ANY WORK UNDERTAKEN DOES NOT COMPLY WITH THE BUILDING DEVELOPMENT APPROVAL. THIS OFFICE MUST BE PROVIDED A COPY OF THE FORM 8 - DEVELOPMENT APPLICATION DECISION NOTICE UNDER THE SUSTAINABLE PLANNING ACT 2000 PRIOR TO THIS OFFICE UNDERTAKING ANY STRUCTURAL WORKS OR INSTRUCTIONS TO ASPECTS OF THE BUILDING WORK (E.G. FOOTINGS, SLAB, FRAMES) AND THE ISSUING OF FORM 13 INSPECTION CERTIFICATE FOR THE PURPOSES OF COMPLIANCE WITH THE BUILDING DEVELOPMENT APPROVAL.

STRUCTURAL STEELWORK

1. ALL STEELWORK SHALL COMPLY WITH AS4100 AND AS4680 AS APPROPRIATE. ALL WELDS AND UNPAINTED STEEL SHALL BE PAINTED WITH ONE COAT OF EPOXY-PRIMER PRIOR TO ERECTION. WELDS SHALL BE 10mm MIN.

2. ALL STEELWORK SHALL BE GRADE S275.

3. ALL STEELWORK IN EXTERNAL EXPOSED CONDITIONS SHALL BE HOT DIPPED GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH THE REQUIREMENTS OF AS4680. REFER ARCHITECTURAL/CONSTRUCTION SPECIFICATIONS FOR SELECTED FINISHED SURFACE TREATMENTS.

4. ALL STEELWORK SHALL BE GRADE S275, UNLESS OTHERWISE SPECIFIED WITHIN SOUTH AFRICAN STANDARDS.

5. THE STRUCTURE HAS BEEN DESIGNED AS EITHER/TOR WITH AN ENCLOSED STRUCTURE/ROOF ONLY.

6. EXTENSIVE CLADDING CAN BE INSTALLED IN ACCORDANCE WITH MANUFACTURERS REQUIREMENTS AND AUSTRALIAN STANDARDS SUBJECT TO CHECKED APPROVAL & REVIEW. THIS OFFICE CAN BE CONTACTED AS REQUIRED.

7. WALL FINISHES/CLADDING ETC SHALL BE INSTALLED IN ACCORDANCE WITH AUSTRALIAN STANDARDS AND ARE BEYOND THE SCOPE OF THIS DOCUMENT AND CERTIFICATE.

8. FOOTINGS, SLABS, ETC BY OTHERS.

DESIGN LOADS

1. THE STRUCTURAL COMPONENTS DETAILED WITHIN THESE DRAWINGS HAVE BEEN DESIGNED IN ACCORDANCE WITH THE RELEVANT S.A. CODES AND RULES FOR THE FOLLOWING LOADINGS UNLESS NOTED OTHERWISE WITHIN THE DRAWINGS.

2. ROOF LOADS: SHEETING & PURLINS 0.13kPa
LIVE LOAD 0.25kPa

3. WIND LOADS TO AS4055: $V_w = 40m/s$ (ultimate)
 $V_w = 35m/s$ (service)
 $C_d = 1.0$
 $C_{pe} = 1.0$

BOOTH ENGINEERS & ASSOCIATES PTY LTD
CONSULTING ENGINEERS

2/6/17

0 20/2/17 100 ISSUED FOR CONSTRUCTION
REV DATE INT DESCRIPTION

Premier Steel Structures (Pty) Ltd
Unit 27, Dawb, 107 Esplanade
Bayside, QLD
4010
Tel: 081 455 508 072
Email: pty@premiersteel.com.au

Proposed Steel Structure FOR:

DRG. No: 160849-03 SHEET 1 OF 1
TYPE 15x30x6 (N2)
5m Bays

DATE 20/02/17
DRAWN TSB
CHECKED KH

STEELWORK & FOUNDATION LAYOUT AND DETAILS FOR STEEL STRUCTURE - 15m SPAN x 30m LONG x 6m HIGH [DO NOT SCALE THIS DRAWING]

APPENDIX I

Visual Impact Assessment





Harley Dykstra

PLANNING & SURVEY SOLUTIONS

Visual Impact Assessment

Lot 104 Rocky Crossing Road, Willyung

Prepared by Harley Dykstra Pty Ltd for Great Southern Sands

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FS 536019

DOCUMENT CONTROL

Control Version	DATE	Status	Distribution	Comment
A	2.3.2017	Draft	Internal	Draft for Comment and Review
B				
C				
D				
E				

Prepared for: Great Southern Sands
Prepared by: DC
Reviewed by: HD
Date: 2.3.2017
Job No & Name: 20112 Great Southern Sands
Version: A

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1 BACKGROUND

Great Southern Sands are proposing to operate a mobile asphalt plant and civil works depot at Lot 104 Rocky Crossing Road, Willyung (the “*subject site*”). The subject site is located at the corner of Menang Drive and Rocky Crossing Road approximately 12km north west of the Albany CBD.

Harley Dykstra has been commissioned to prepare and progress Amendment 4 to the City of Albany Local Planning Scheme 1, to permit additional land uses and associated development to be considered on the subject site.

The framework for the visual assessment of Lot 104 Rocky Crossing Road, Willyung, is based on the accepted visual assessment techniques outlined in *WAPC Visual Landscape Planning in Western Australia (2007)*.

The purpose of this assessment is to determine the visual impact of the proposed additional land use and associated development in terms of the wider landscape when viewed from public vantage points.

2 VISUAL IMPACT ASSESSMENT METHODOLOGY

This visual impact assessment has been prepared in accordance with the techniques outlined in the *WAPC Visual Landscape Planning in Western Australia (2007)*.

The following steps outline the method undertaken in preparing the visual impact assessment for the subject site:

1. Determine the visual management objectives
2. Describe the proposed development
3. Describe the potential visual impacts
4. Develop visual management measures
5. Prepare final recommendations

3 VISUAL MANAGEMENT OBJECTIVES

The key visual management objective is to protect the rural landscape of this locality from conflicting development and incorporate mitigation measures where necessary to achieve this objective.

The subject site can be described as an ‘Undulating Rural Landscape’ by *Visual Landscape Planning in Western Australia*. It contains natural features such as undulating terrain, a ridgeline and wide valley with scattered remnant vegetation.

Visual Landscape Planning in Western Australia suggests the following principles and guidelines be applied when planning for development within the 'Undulating Rural Landscape':

- *"Retain remnant vegetation throughout the landscape.*
- *Ensure that structures are not located on the skyline as seen from important viewing locations.*
- *Revegetate cleared ridgelines, to maintain the sense of elevation of these features that becomes diminished when vegetation is lost.*
- *Valued views should be maintained by not siting buildings in locations that are prominent in views, for example, at focal points or from panoramic lookout points.*
- *View corridors should be maintained for important elements in views, such as a vista to a scarp, and not inadvertently screened by buildings, dense roadside planting or plantations."*

Future development of the subject site seeks to protect the visual elements of the site by:

- Retaining remnant vegetation throughout the site;
- Providing for visual screening fronting Menang Drive and Rocky Crossing Road to screen proposed development;
- Ensuring development is not located on prominent ridgelines. Where development is proposed to be on the side of ridgelines, it is located lower than the high point of the ridgeline and has vegetation which also provides a visual offset, meaning the development is not the prominent aspect in the landscape; and
- Incorporating building materials and colours that are appropriate to the rural landscape.

These measures ensure future development will be sensitive to the landscape and respond with appropriate visual form.

4 PROPOSED DEVELOPMENT

The Scheme Amendment seeks the following additional uses to be considered to for approval on the subject site:

- Civil works depot, including:
 - Plant and Equipment Storage and Maintenance
 - Office (incidental)
 - Mobile Asphalt Plant
 - Storage of building/construction materials/products

The **workshop** and **office** will be located away from the ridgeline, approximately half way up the hill and setback approximately 160m from Menang Drive. The floor areas to these buildings is anticipated to be approximately 400m² and 50m² respectively, and constructed of colourbond materials.

A Machine **Washdown Bay** is co-located adjacent the warehouse and office, and will consist of an asphalt hardstand of approximately 750m².

The Proposed **Mobile Asphalt Plant** will be located in the northwestern corner of the subject site. The plant has a vent stack 7.8m high.

The **laydown/hardstand areas** will consist of compacted gravel, as shown on the Development Guide Plan at **Appendix A**.

Vegetation screening is proposed in strategic locations to assist with softening the impacts of the proposed development. Native vegetation species will be selected with a minimum mature height of 2m.

5 POTENTIAL VISUAL IMPACTS

Views to the subject site are predominately from Menang Drive east of the subject site. The key components of the development that will be visible from surrounding locations will be the warehouse and mobile asphalt plant vent stack.

Along Kinjarling Road, approximately 1km to the north east, there would likely be a limited glimpse of the plant stack. This is due to the open paddocks with minimal remnant vegetation and little fenceline plantings. **Photos 1.0** and **1.1** (in **Appendix B**) show the view from this location pre and post development.

Along Rocky Crossing Road in front of the subject site, there is a line of sight towards the warehouse and plant stack from the existing crossover. This is where the vegetation has been cleared for access. Further along the remainder of Rocky Crossing Road and Menang Drive, both dense roadside vegetation and remnant vegetation within the subject site almost completely obscure lines of sight towards the proposed location of development. **Photos 2.0, 2.1, 3.0** and **3.1** show the view from these locations pre and post development.

Along Menang Drive there are limited points where someone within the public realm will catch glimpses of the upper section of the plant stack vent and warehouse. These particular locations are along a stretch of road approximately 1.5km from the site, where the speed limit is set at 90km/h, as such these glimpses would be fleeting when viewed from a moving vehicle. **Photos 4.0** and **4.1** show the view from this location pre and post development.

5.1 Anticipated Short Term Effects

The site will have very little change. Construction of the proposed development requires very little vegetation clearing. This means that the dense screen of vegetation on the site will not be reduced.

5.2 Anticipated Mid-Term Effects

Little to no foreseeable midterm effects.

5.3 Anticipated Long Term Effects

Little to no foreseeable long term effects within the broader landscape. As the vegetation surrounding the proposed development continues to grow, it will continue to further screen the development.

The use of non-reflective materials, within a landscape of mature trees and rolling topography, will widely be considered as just another manmade component of the character of the area.

6 VISUAL MANAGEMENT MEASURES

Impacts from the proposal are unlikely to be visible due to the location of the proposed development, topography and screening provided by existing and proposed vegetation.

The hardstand and mobile asphalt plant are to be located in the saddle of Mount Willyung which provides visual screening to the north, south and east. Vegetation screening will be located along the western and northern boundary to screen the development from these directions. No structures will be located on ridgelines.

The workshop and office will be co-located on the eastern facing slope approximately half way up the hill. The higher aspects of the hill forms a backdrop and will prevent any development on the site from being silhouetted against the skyline. Vegetation screening will be planted down slope to assist with managing any visual impacts.. White or reflective colours are not recommended as these colours do not tend to blend in with the natural landscape.

7 CONCLUSION AND RECOMMENDATIONS

The proposed additional uses and associated development are able occur within the Rural landscape with very little visual impact on the surrounding public domain.

The following measures are recommended to be included in the planning framework to assist with minimising any visual impacts:

- All buildings to be co-located in sympathy to the existing landscape, and to constructed of suitable materials and/or colours to blend in with the landscape;
- Cream, white or bright colours should be avoided as these colours draw attention in rural landscapes, by producing strong visual contrast;
- All buildings to be single level and clustered as illustrated on the Development Guide Plan;
- Steep pitched rooflines should be avoided to ensure they reflect the angle of slope of the skyline;
- No development at focal points or on prominent hillside;
- All fences to be of a rural character, and preferably post and wire;
- The proposed development be serviced with underground power;
- The clearing of remnant vegetation to be kept to a minimum;
- Vegetation screening to be planted, as illustrated on the Development Guide Plan, with native species that grow to a minimum mature height of 2m;
- Additional plantings, in accordance with the fire management plan, if screening around structures is required.

APPENDIX A – DEVELOPMENT GUIDE PLAN

DEVELOPMENT GUIDE PLAN

Additional Use Site No.31
Lot 104 Rocky Crossing Road,
Willyung,
Albany



Harley Dykstra

PLANNING & SURVEY SOLUTIONS

SCALE AT A3 1:5000



DRAWN	CHECKED	DRAWING No
SDP 14/10/2014	SDP 14/10/2014	20112-04C.dgn
REV	DESCRIPTION	DATE
B	Client Modifications	05/08/2014
C	Modification for the City of Albany	14/10/2014

LEGEND

- Buildings & Concrete Apron
- Laydown or Hardstand
- Proposed Crushing Area/Mobile Asphalt Plant
- Sand Extraction Area
- Washdown Bay
- Stormwater Retention
- Vegetation Screening
- Unsealed/Sealed Access Roads

This Development Guide Plan has been adopted by Council and signed by the Chief Executive Officer for the City of Albany

Chief Executive Officer:.....Date.....

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Appendix C

Offices also at Bunbury, Busselton, Kelmscott and Perth

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NOTE:

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APPENDIX B – LOCATION AND DIRECTION OF KEY SITE LINES



1 → Photo Location & Direction

LOCATION PLAN

Lot 104 Rocky Crossing Road,
WILLYUNG

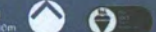
Plan No. | 20112-05A
Date | 16/03/17
Drawn | BdR
Checked | HD
Revision | A

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Scale | 1:10,000@A3

0 100m 200m 300m

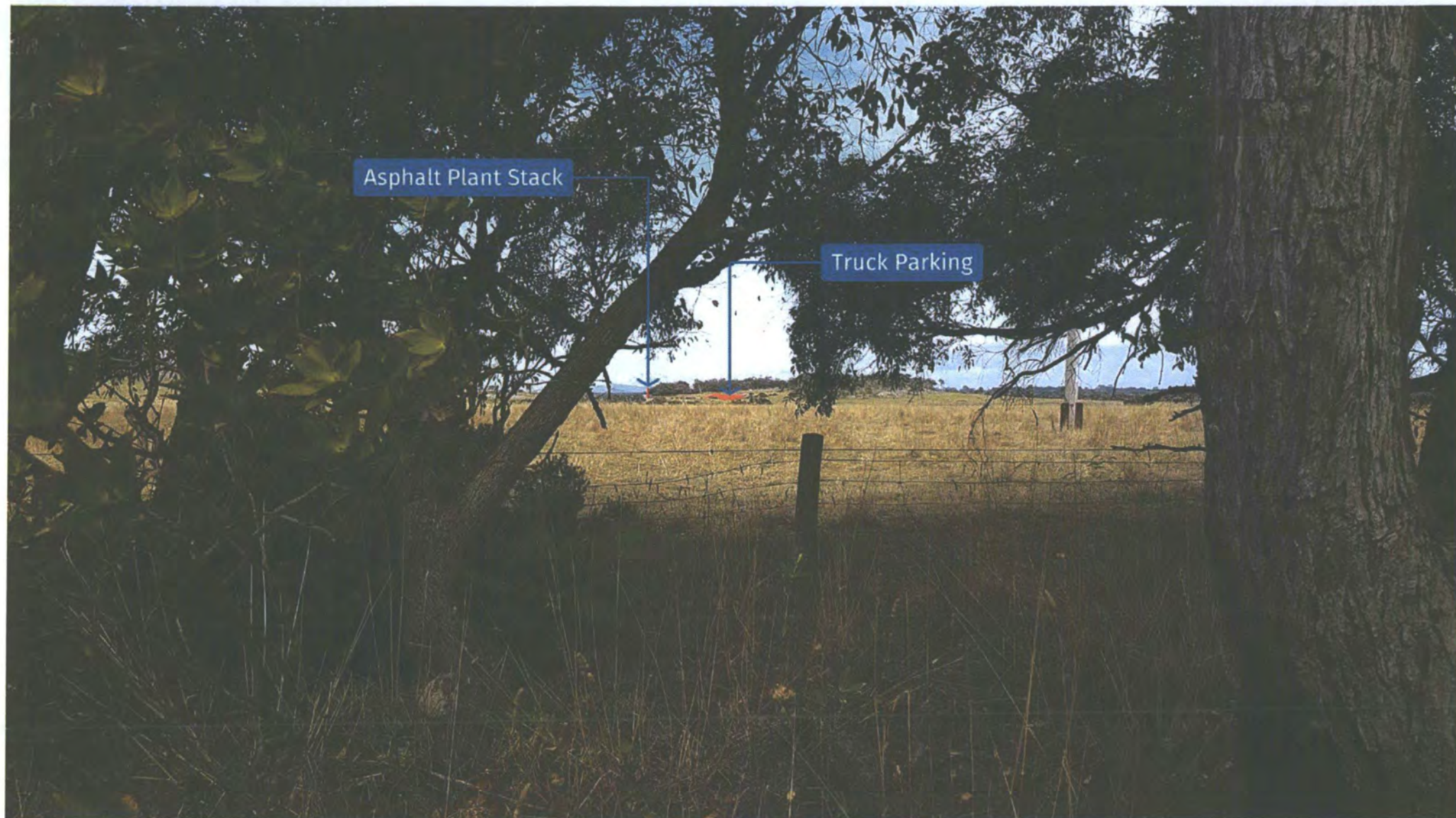


NOTES: This plan has been prepared for planning purposes. Areas, boundaries and dimensions shown are subject to survey.



Harley Dykstra

PLANNING & SURVEY SOLUTIONS



Asphalt Plant Stack

Truck Parking



