

EPL Variation (EPL 21389)
13 Bellfrog St, Greenacre

Statement of Environmental Effects

July 2020



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Acknowledgement of Country

4Pillars acknowledges the Traditional Owners of the land on which this site is located, the people of the Eora and Dharug nations. We pay our respects to their Elders past and present.

Disclosure statement

Mr James Hammond, Director of 4Pillars is engaged, via an EnviroNow services agreement, to provide environmental consulting services to Aussie Skips Recycling Pty Ltd. Mr Hammond fulfills the role and position of Environmental Manager for Aussie Skips Recycling Pty Ltd.

This document has been prepared by 4Pillars and Mr Hammond in their capacity as independent environmental professionals. The statements and conclusions of this document are based on an objective evaluation of the available facts and data.

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1 Introduction

This Statement of Environmental Effects (SOEE) has been prepared to support the accompanying licence variation, submitted via EPA eConnect. The licence variation form has been lodged with the intent of modifying Environment Protection Licence (EPL) No. 21389 for the Waste Storage facility at 13 Bellfrog St, Greenacre (the Premises).

The proposed changes to the EPL are an increase in the authorised amount of waste permitted on the Premises at any one time from 4,000 tonnes to 8,000 tonnes, as well as an increase in the permitted annual quantity of material to be received at the Premises, from 160,000 tonnes in any 12 month period, to 199,000 tonnes in any 12 month period. The applicable Conditions in the EPL to be modified are L3.2 and L3.3, respectively.

We welcome the opportunity to discuss this proposal further with the NSW Environment Protection Authority (the EPA) and can provide further information on any aspect of the proposal, on request. We thank the EPA in advance for their timely assessment and decision on this proposal.

2 Site details

Street Address	13 Bellfrog Street, Greenacre, 2190, NSW
Lots	LOT 15 DP1133214
Local Government Area	Strathfield Council
Zoning	IN1 – General Industrial (LEP 2012)
Development consent	DA2012/175
Environment Protection Licence	21389
Site operator	Aussie Skips Recycling Pty Ltd (ABN 23 614 855 506)
Scale of activities (current)	Waste Storage: 160,000 tonnes in any 12-month period. 4,000 tonnes at any one time.
Scale of activities (proposed)	Waste Storage: 199,000 tonnes in any 12-month period 8,000 tonnes at any one time.
Infrastructure on Site	Warehouse, workshop, awning, waste storage bays.

Table 1: Summary of site details.

2.1 The applicant

The Site operator and applicant is Aussie Skips Recycling Pty Ltd (Aussie Recycling). Aussie Recycling is a waste management company, and their business activities include the operation of a resource recovery facility in Strathfield South, NSW (EPL 20885), and this Site located at 13 Bellfrog St, Greenacre, NSW. Site operations were first approved by Strathfield City Council in February 2013, under the Development Application Number 2012/175, for “construction of an industrial warehouse building with an associated workshop and use as a materials handling yard”. On 4 March 2020, Aussie Recycling obtained Environment Protection Licence (EPL) 21389 for the Site.

2.2 Site context

The subject site is 13 Bellfrog Street, Greenacre – Lot 15 DP 1133214 (the Site). The Site is located in an area of industrial activity, and is bounded on all sides by industrial sites, including warehouses (to the west and east), a 24-hour concrete batching plant (to the north), and factory units (currently under construction and imminently completed by the same owner as our site) to the south (see Figure 1). The nearest residential receivers are to the south and west, approximately 80 m and 105 m distance from the site, respectively. The nearest arterial road (dual carriageway) is Punchbowl Road, approximately 130 m to the east. The nearest main road is Juno Parade, approximately 120 m to the south.

The Site is located within land zoned under the Strathfield Local Environment Plan 2012 as IN1: General Industrial. There are four licensed monitoring points in total, three of which (for noise) are located at three residential receivers to the south, south-west, and west of the Site, and one (for water) which is located on the Site.

2.3 Overview of current operations

The site operates as a waste handling and transfer facility, with a current capacity to receive and handle 160,000 tonnes of waste material each year. Earthworks materials and certain other permitted wastes are brought to the site from various construction and infrastructure project sites around Sydney. Materials are handled and segregated into different

streams, which are either assessed against Resource Recovery Orders or otherwise waste classified. Materials are exported for direct re-use, or sent on to other facilities for further processing (see Figure 2 for a site layout diagram).

The flow of material through the site under the proposed operation is shown in Diagram 1. Further detail regarding site operations is contained in the Plan of Management (POM) for the site, which the EPA has been provided recently and can be provided again on request.

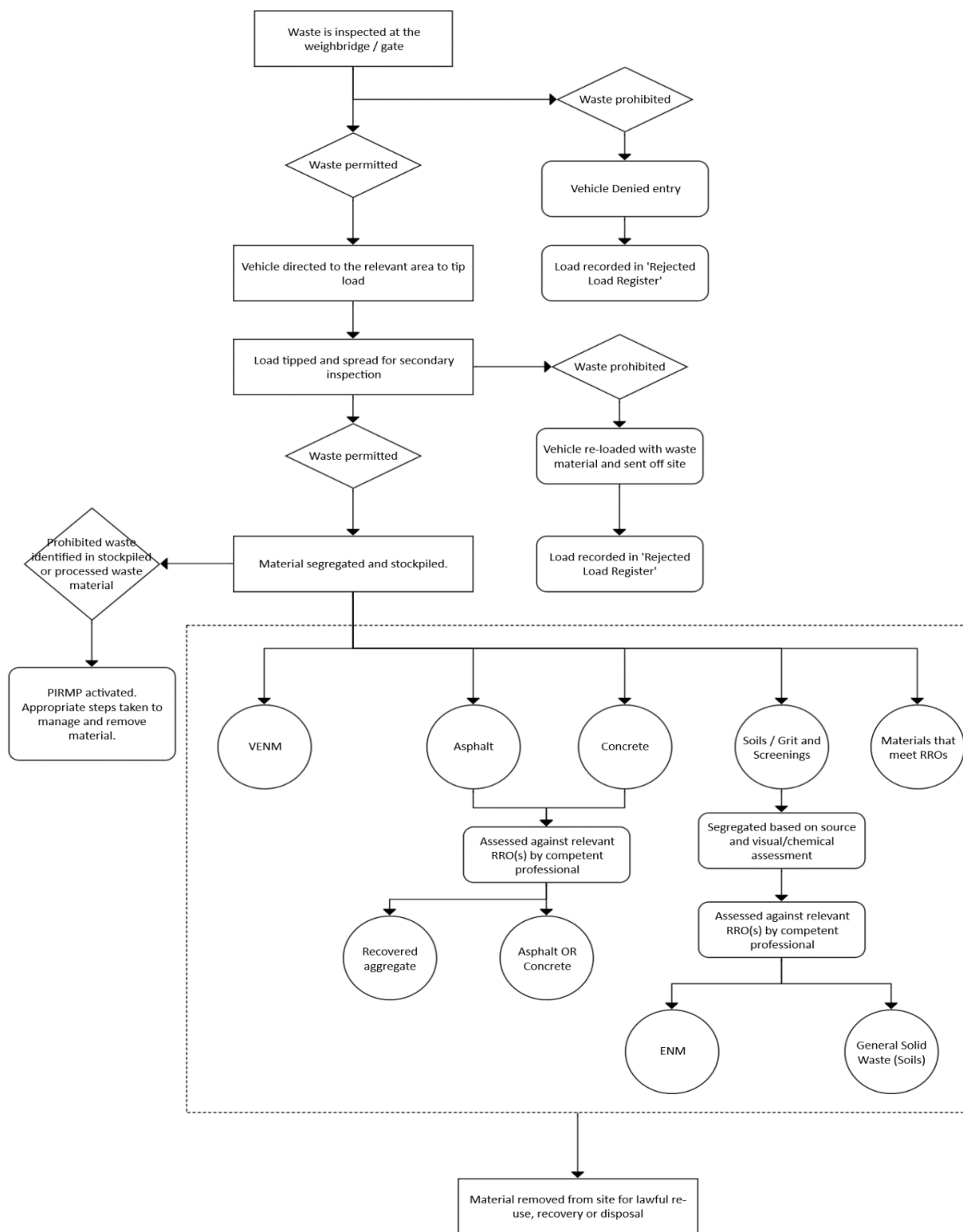


Diagram 1: Material receipt, storage and export procedure.

3 The proposal

3.1 Proposed modifications

This proposal involves the following changes to the EPL:

1. Increase in authorised amount

Increase the authorised amount of waste permitted on the Premises at any one time from 4,000 tonnes to 8,000 tonnes (Condition L3.2 of the EPL).

2. Increase in capacity

Increase the permitted annual quantity of material to be received at the Premises, from 160,000 tonnes in any 12-month period, to 199,000 tonnes in any 12-month period (Condition L3.3 of the EPL).

3.2 Overview of proposed operations

The proposed operations will not differ in any way from the current operations, other than occurring at a slightly larger scale. The increased scale of operation will not require any changes to the site layout or the mobile plant used at the site.

4 Regulatory context

4.1 Permissibility of the activity under the existing development Consent

As part of the development application process in 2012, a Statement of Environmental Effects was prepared by Borg Architects (the 2012 SOEE). The determination of the application was made by Strathfield Council on the 19th of February 2013, with the approved Consent (2012/175) operating from the 2nd of May 2013. The Consent allows for the "construction of an industrial warehouse building with an associated workshop and use as a materials handling yard". Details about the specifics of the operations to be carried out on the Site were provided in the 2012 SOEE.

In February 2019, Aussie Recycling applied for an EPL for the Premises. At that time, Strathfield Council argued that the activities to be carried out on Site by Aussie Recycling were not permitted by the Consent, and that (therefore) an EPL could not be approved. Despite robust and logical arguments put forward by Aussie Recycling, their consultants and legal representatives, Council refused to alter their position. The EPL application was refused on 5 July 2019 and Aussie Recycling subsequently commenced Class 1 appeal proceedings in the Land and Environment Court of NSW.

A Section 34 negotiated agreement was able to be reached between Aussie Recycling and the NSW EPA on 20 February 2020. Clause 1 of the 'Parties Agreement on Matters of Jurisdiction' dated 20 February 2020 states that "*The Parties note that DA 2012/175 has been issued by Strathfield Council on 19 February 2013 for the Controlled Development*". Therefore, this confirms the EPA's view that Consent exists for the type of scheduled activity for which the licence was granted.

Scale of activity

The Consent as issued authorises a scale of activity that is defined by truck movements, rather than by an annual mass or volume limit. Aussie Recycling and their agents have argued the consent as written theoretically permits more than 500,000 tonnes per annum of waste materials to be received and handled-this is NOT the volume being proposed.

4Pillars was not directly involved in the Class 1 proceedings in late 2019 and early 2020. However, we understand that the matter of scale was discussed at length. We are advised the EPA's view was that 200,000 tonnes was seen as a 'trigger' above which it was not reasonable to carry on the activity without a consent issued via a State Significant Development approval pathway.

Aussie Recycling does not wish to exceed this limit at this time. We also note the modelling studies carried out for the purposes of the Class 1 appeal all used 200,000 as the throughput limit.

These factors are the reason for the proponent has limited the proposed increase in annual throughput to 199,000 tonnes at this time. We trust this approach will extinguish any question regarding permissibility of the proposed activity (both in relation to the nature of the activity and the scale at which it is carried out).

4.2 Existing Environmental Protection Licence

EPL 21389 was issued in March 2020 to Aussie Skips Recycling Pty Ltd (the Licensee) to undertake the Scheduled Activity of Waste Storage at the Site. Condition L3.2 of the EPL restricts the amount of waste permitted on the Premises at any one time to 4,000 tonnes, and Condition L3.3 limits the permitted annual quantity of material to be received at the Site to 160,000 tonnes in any 12 month period.

The definition of Waste Storage under Clause 42 of Schedule 1 of the *Protection of the Environment Operations Act 1997* (POEO Act) is as follows (note that only relevant parts of the definition have been reproduced):

Waste storage, meaning the receiving from off site and storing (including storage for transfer) of waste.

The activity to which this clause applies is declared to be a scheduled activity if—

(c) more than the following amounts of waste (other than waste referred to in paragraph (a) or (b)) are stored on the premises at any time—

(i) in the case of premises in the regulated area—more than 1,000 tonnes or 1,000 cubic metres,

(d) more than the following amounts of waste (other than waste referred to in paragraph (a) or (b)) is received per year from off site—

(i) in the case of premises in the regulated area—6,000 tonnes,

Considering that no change to the type of activities undertaken on Site is proposed, we confirm that Waste Storage is still the appropriate Scheduled Activity, and no addition of further Scheduled Activities is required to allow the proposed change.

4.3 Statement addressing Section 58 of the POEO Act

Section 58 of the POEO Act provides for the variation of licences, by application of the licence holder, or the initiative of the appropriate regulatory authority. Section 58(6) states the regulatory authority must invite and consider public submissions before it varies the licence, if the following conditions are met:

a. The variation of a licence will authorise a significant increase in the environmental impact of the activity authorised or controlled by the licence; and

b. The proposed variation has not, for any reason, been the subject of environmental assessment and public consultation under the EP&A Act 1979.

The proposed changes to the licence will not authorise a significant increase in the environmental impact of the activity, as shown in impact assessment section of this SOEE. Therefore, we do not expect this variation to be subject to public exhibition. However, we welcome the EPA's views on this matter and will work constructively with the EPA and stakeholders, if exhibition is considered necessary.

4.4 Existing environmental management framework

To ensure ongoing compliance with the requirements of site approvals and other applicable requirements held in legislation, procedures have been developed and are contained within the Site's Plan of Environmental Management (POM). Site staff receive training in relevant sections of the POM. External environmental consultants and experts are consulted when necessary, to ensure that approaches remain up to date. Monitoring requirements contained within the EPL include monthly surface water sampling and quarterly noise monitoring, for which the resulting data is uploaded to the Aussie Recycling website, and reports provided to the EPA as required.

Waste tracking is performed using the weighbridge on Site and recorded in AussieWatch, which is proprietary, cloud-based software. Every month, Waste Contribution Monthly Reports (WCMRs) are submitted to the EPA via the Waste and Resource Reporting Portal (WARRP). At the end of every reporting period, an Annual Return is prepared and submitted to the EPA, which details compliance with the requirements in the EPL, and all monitoring undertaken.

Aussie Recycling operates under an accredited Integrated Management System (IMS), which integrates WHS, Quality and Environmental Management systems, to the relevant ISO standards.

The above plans, procedures, and reports are all referred to in further detail in later sections of this document.

5 Market conditions, demand and justification

Reuse and recycling are the focus of the Australian Government and NSW EPA's policies on waste management. Improved recycling rates and diversion of waste from landfill is essential to achieve the targets specified in the NSW *Waste Avoidance and Resource Recovery Strategy 2014-21*. The applicant shares this view and has therefore invested heavily into their operations, both at the subject Site and across NSW. The strengths of this variation are primarily related to the role of the Site for import and export of a large amount of material that is regularly produced from infrastructure projects across Sydney. The Site's excellent, centralised location makes it desirable and efficient for waste generators, reducing the distance required for transporting material from the various projects which in turn ensures short turn-around times for delivery vehicles. Greenhouse gas and air quality benefits are also expected from reduced transport requirements.

The variation is a relatively small increase to the amount of material already permitted at the Site, and current control measures combined with regular reviews and improvements, are expected to adequately manage this additional scale. The alternative would be to construct and develop an entirely new facility, which would take time, be costly, and pose new challenges or issues to environmental management, whereas this facility is already in place. We believe there is a strong justification to increase the Site's storage capacity, in order to allow for additional residence time should there be any delays in obtaining laboratory results for RRO classifications. The changes will ensure that the Site can continue to facilitate local infrastructure projects, provide local jobs, create efficiencies and cost-savings that are passed on to proponents and do so in a manner that has minimal impact on the community.

6 Impact scoping

6.1 Sensitive receivers

Current receivers

The Site is located in an area of industrial activity, and is bounded on all sides by industrial sites, including warehouses (to the west and east), a 24-hour concrete batching plant (to the north), and factory units (currently under construction and nearly completed) to the south. The nearest residential receivers are to the south and west, approximately 80 m and 105 m distance from the site, respectively (see Figure 1).

In the current EPL, three nearby residential receivers are identified, which are located roughly to the south, south-west, and west of the Site. Between the Site and the southern receivers are two large industrial units. The nearest residences to the South are located on Juno Parade, which is a relatively busy thoroughfare for vehicles.

Future receivers

Following the imminent completion of the industrial units currently under construction to the south of the Site, there will be little scope for change in developments, and it is therefore not expected that there will be any significant increase in residential receivers in the immediate area in the future.

Therefore, the assessment of impacts focuses mainly on the current residential receivers.

Complaints

The Site has not received any complaints regarding noise, dust or any other environmental matters. No complaints have been received directly and we are not aware of any complaints being made to the EPA or Council. NSW EPA recently stated they had received complaints related to dust emissions from the Greenacre industrial area in general; however, considering the other contributors in the industrial estate (i.e. unsealed container yards, Hanson concrete batching plant, etc.) we have not been able to draw this complaint back to the operation of Aussie Recycling's facility.

6.2 Scoping potential environmental impacts

As this proposal is a modification in scale of current activities, rather than a new development or change of use, many of the environmental impacts expected from activities undertaken following the variation are already present, and are thus actively mitigated and monitored under current approvals and internal frameworks.

However, for the purposes of determining all potential impacts, a precautionary approach was taken and it was assumed that no current controls were in place. Once potential impacts were identified, the current controls were assessed, and

any necessary improvements were identified. Where external reports and assessments relating to the various impacts were available, these were reviewed and their conclusions discussed.

The following section provides detailed information on each potential impact. Where those impacts are adequately addressed through existing controls, those controls are re-affirmed. Where potential impacts are new or different, commitments are given to additional avoidance/mitigation measures, to ensure they are effectively controlled.

7 Impact assessment

7.1 *Relevance of existing environmental impact assessments*

The existing SOEE (the 2012 SOEE) was prepared by Borg Architects as part of the original development application process in 2012 for the use of the Site as a materials handling yard, as well as the construction of an industrial warehouse building with an associated workshop.

However, in addition to the 2012 SOEE, several additional studies and assessments have since been undertaken to ensure that potential environmental impacts are managed effectively.

The Class 1 EPL appeal process in 2019-2020 resulted in a number of detailed environmental assessments being completed for the Site. These assessments were all done on the basis of an annual throughput of 200,000 tonnes per annum. As such, they remain relevant for assessing the potential impacts of the proposed activity. These assessments are referenced in this document as appropriate.

Future mitigation measures

Aussie Recycling will soon be carrying out works at the site to improve the environmental management infrastructure on Site even further (pending Council approvals where necessary). These improvements include:

1. Installation of an additional 146,000 L of runoff water storage capacity, via a set of four above ground tanks;
2. Re-using water on Site, with a view to preventing discharge in all but the most extreme of circumstances;
3. Extending the existing awnings over waste storage bays by approximately 14 m; and
4. Installation of dual, in-ground weighbridges.

For the purposes of this impact assessment, we will assume these additional mitigation measures are not built. Therefore, the assessment is conservative.

7.2 *Surface water quality*

The potential impacts of the operations on Site on surface water quality are managed via several existing controls,. The proposed variation is not expected to pose any additional risks to surface water quality, as no additional waste types are to be accepted, and the current and proposed measures are expected to continue to be sufficient. A number of reports and assessments have either been prepared or are currently underway, which ensure that surface water on the Site is managed to a high standard, and that risks to off-Site are reduced. These assessments are detailed below in chronological order of development.

A runoff water quality management (WQM) report for the Site was prepared in September 2019 by Tooker & Associates (provided as Appendix 1). This report was prepared based on an expected throughput at the Site of 200,000 tonnes per annum of waste soil material. When the WQM report was prepared, it was expected that all handling of waste material would occur under cover, and that there would therefore be no runoff generated from the waste. Additionally, no runoff would enter or emanate from the workshop. Based on this, it was determined that the risk profile in terms of runoff water quality was solely normal pollutants generated from an industrial hardstand and building roofs, for which the pollutants of concern are gross pollutants, total suspended solids (TSS), total phosphorus, and total nitrogen. Water quality mitigation measures existing during the preparation of the WQM report included detention storage ponding over part of the hardstand, rainwater reuse tanks for the warehouse roof runoff, sawtooth grading of the hardstand to prevent surface water entering the materials handling area, an underground sedimentation basin along the front edge of the workshop building, a grass swale treatment system prior to off-Site discharge, and separate collection and treatment for any workshop waste. All of these measures have remained in place and are ongoing.

During the negotiation of the s34 Agreement, we understand the EPA disagreed that all waste would be stored under cover. We note that our observations on Site supports this view. The EPA required additional studies and controls, which are discussed below.

As required by Condition U1.4 of the Site's EPL, a Contingency Plan was prepared to address possible future failures of the site water management system to achieve a best practice environmental outcome, and was provided to the EPA via email on the 25th of March. This Plan was included in the Site's Plan of Environmental Management (POM), and provides a number of options to be considered if water monitoring indicates recurring exceedances of the limits in the EPL. The potential contingency measures include engineering, elimination, procedural, isolation, and administrative measures. At this stage, the implementation of any of these measures has not been considered necessary, as Aussie Recycling is still building a dataset of water monitoring results.

A Surface Water Discharge Characterisation Assessment (SWDCA) as required by Condition U1.2 of the Site's EPL, is being implemented. This assessment will identify – among other things – all potential pollutants which may be present in a discharge from the Site and provide suggestions for possible actions and mitigation measures to avoid or minimise pollution and manage non-trivial impacts.

As required by Condition U1.1 of the Site's EPL, Tooker & Associates was engaged by Aussie Recycling to design a stormwater management system consistent with the principles and practices of the Managing Urban Stormwater – Mines and Quarries Volume 2E, which was provided to the EPA via email on the 17th of June (provided as Appendix 2). The proposed water management system will greatly exceed the volume of on-site runoff storage required and ensure that the runoff water quality from the site readily conforms to the requirements of the Volume 2E guidelines. Aussie Recycling are currently awaiting feedback from the EPA on the proposed design, but expects to commence construction of the system before the end of the year.

As required by the Site's EPL, monthly grab samples are taken from the licensed water discharge point (EPL Point 4), and analysed for pH and TSS. Since the commencement of this monitoring, only one exceedance of TSS has been recorded, with TSS and pH values compliant during all other monitoring events.

It must also be noted that on several occasions, there has been no water available to sample, as the water is retained and re-used on Site where possible, rather than being permitted to discharge. Aussie Recycling intends to design and run the water management system in a manner that avoids water leaving the site, with a focus on water reuse, rather than treatment and controlled discharge.

The catchment area will not be increased due to this proposal, nor will the nature of the material accepted and stored at the site. Therefore, the water quality controls which are already in place (and those which the EPA require but which have not yet been implemented) are adequate to manage the risk associated with the proposed increase in throughput and storage.

7.3 Air quality (incl. odour)

An air quality impact assessment of the operations was undertaken in October 2019 by EMM (provided as Appendix 3). This assessment was carried out based on an expected throughput at the Site of 200,000 tonnes per annum of material, which is slightly higher than the quantity applied for with this variation. Site-generated emissions of TSP, PM₁₀ and PM_{2.5} were calculated during the assessment for both peak day and average day operations of the Site and were quantified using publicly available emission estimation techniques. Particulate matter mitigation measures – which are now in place on Site – were incorporated into the emission calculations.

Mitigation measures that were existing at the time of the 2019 assessment included carrying out operations on a solid concrete slab surface, three water cannons along the southern fence of the main yard, a wheel wash system at the site entrance, storage of material within bays consisting of concrete block side walls, a rear shed wall and an overhead steel awning, as well as further water misting sprays built into the awning. All of these mitigation measures remain in use on the Site and will continue to be operational following this variation. A mitigation measure that was proposed at the time of the assessment, which has since been implemented, was the use of a bobcat-mounted vacuum broom to routinely sweep the paved surface of the yard, and remove silt particles that could otherwise become airborne or escape the Site via tracking onto the public road. Water cannons have also been installed on Site, which are used to wet down stockpiles, tipping and loading trucks and concrete surfaces. The water sprays and water cannons help ensure the material being received and handled at the Site has the same (or higher) moisture content than the moisture content used in the modelling study.

The assessment concluded that the predicted air quality impacts from Site operations at the scale of 200,000 tonnes per annum were well below the applicable assessment criteria at the residential receivers closest to the Site boundary, that

they would not result in cumulative exceedances of NSW EPA impact assessment criteria at any residential receivers, and that emissions from Site activities were not anticipated to adversely impact upon the surrounding environment.

Based on the EMM air quality impact assessment and the fact that the proposal does not exceed the modelled throughput, we do not expect the variation to cause any significant impact on air quality.

7.4 Soil contamination and groundwater

The area of the Site which is used for materials storage and handling is sealed with a thick concrete slab, and the materials handling bays are covered by a large metal awning, to reduce the exposure of waste stockpiles to rainfall. Furthermore, the materials received and stored on the Site are restricted to those with low contaminant profiles, as per the table in Condition L3.1 of the EPL. Therefore, there is little risk of contamination of land or groundwater due to leaching through the hardstand into underlying soils and aquifer(s). Although an increase in the authorised amount is proposed, which would permit a larger quantity of material to be on Site at any one time, this is not expected to increase the potential for the contamination of soil and groundwater, particularly as the residence time of material at the site is in the order of days, following which bays are emptied and cleaned. The proposed increase in annual throughput will also not increase the potential for contamination.

7.5 Noise

A detailed acoustic assessment of the operations carried out by Aussie Recycling at the Site was undertaken in December 2019 by EMM (provided as Appendix 4). The noise impact assessment was based on 200,000 tonnes per annum of waste throughput and the same operational equipment and Site layout that will be maintained under the proposed operation (i.e. no additional machinery or extended operating hours are required).

The noise assessment was carried out in accordance with the Noise Policy for Industry (2017). The analysis and measurements were incorporated into a noise model, which was used to predict the Site contribution to noise levels at surrounding residential receivers. The assessment concluded that operational noise levels from the Site were predicted to satisfy the relevant levels for all receiver locations and periods, following construction of the industrial building to the south of the Site. The potential for sleep disturbance impacts from the operations was also assessed, and relevant criteria was expected to be satisfied at all assessment locations.

Since the assessment was undertaken, construction of the large industrial building to the south of the Site has been completed. This building is a significant barrier for the transmission of sound and will result in further reduction of noise (originating from the Site) at the nearest residential receiver on Juno Parade.

The machinery used on Site at present (and during the assessment) will be sufficient for the management of both the increased amount of material on site at any one time, as well as the total annual throughput of material. Therefore, noise levels from the Site are not expected to be increased significantly following the variation, and the conclusions from EMM's assessment remain valid. We reiterate that there have been no complaints of noise as a result of Aussie Recycling's operation since operations at the Site commenced.

In March 2020, as per Condition L4.12 of the Site's EPL, a Traffic Noise Management Strategy (TNMS) for the Site was prepared by EMM (provided as Appendix 5). The TNMS ensures that feasible and reasonable noise management strategies for vehicle movements associated with the premises are identified and applied. A number of mitigation measures that are implemented at the Site to control and minimise the generation of noise are contained within the Site's Plan of Environmental Management (POM). These include limiting the hours and types of operations carried out, restricting machinery used to that which will meet noise generation guidelines, ensuring that all machinery is operated correctly and maintained appropriately, and that noise reduction technology is used on fleet vehicles (e.g. skip bin trucks) where possible. Some of these measures are also required by Conditions in the Site's EPL. As well as the above, additional measures implemented include driver training to reduce noisy practices (minimising the use of compression braking etc.), parking vehicles to allow morning exiting without the need to reverse, avoiding using Juno Parade (a close-by residential street) as a thoroughfare where possible, induction of contractors in regard to specific noise management strategies, and taking disciplinary action against employees in breach of noise minimisation procedures.

Condition M6.1 of the Site's EPL requires that attended noise monitoring be undertaken quarterly for the first reporting period, and twice yearly thereafter, to determine compliance with the noise limits in Condition L4.1 of the EPL. The first quarterly noise monitoring event was undertaken in May 2020, with the subsequent report provided to the EPA via email on the 25th of June (provided as Appendix 6). Site operations during the monitoring were believed to be reflective of regular operations, and all EPL monitoring locations were accessible, ensuring that the monitoring was compliant with the requirements of the EPL. The assessment concluded that the Site contribution to both the LAeq and LAFmax values

determined at all three EPL monitoring points throughout all sessions were compliant with the limits set in the EPL. As mentioned above, it is not anticipated that a change in the machinery used on Site or the activities undertaken will be required to manage the increase in the authorised amount and the annual throughput following the variation. Therefore, we do not expect any corresponding change in noise levels from the Site following the variation, and no non-compliances with the Site noise limits are predicted. Noise monitoring will continue to be carried out as required by the EPL.

7.6 Contaminated and non-permitted material

Since the EPL for the Site was obtained in early 2020, no contaminated or non-permitted material has been accepted onto the Site, due to the thorough pre-assessment and inspection procedures implemented prior to and during the receipt of material, which are detailed in the Site's Plan Of Management (POM). These procedures will continue to be implemented following the variation.

The proposed change is solely an increase to the *amount* of material that is currently permitted and received on the Site. As no additional waste types are proposed, this causes no foreseeable increase in the potential risk of the acceptance to the Site of contaminated and non-permitted material.

7.7 Pollution incidents

The main hazards on the Site which have been identified as likely to cause a pollution incident are contaminated water storages, hydrocarbons, chemicals and illegal wastes. Management of these incidents is covered by the Site's Pollution Incident Response Management Plan (PIRMP) and accompanying Pollution Incident Response Procedure (PIRP). Potential impacts to water are covered by the various management plans outlined in the Surface Water Quality section, above. The proposed variation is an increase to the amount of material received and stored on the Site and no change is proposed to the waste types accepted or chemicals/hydrocarbons stored. As such, the likelihood of pollution incidents is not expected to increase due to the variation.

7.8 Traffic

In December 2019, traffic engineering advice for the Site was provided by McLaren Traffic Engineering (MTE). The advice was provided in letter format and has been attached as Appendix 7 to this SOEE. In the preparation of the advice, MTE reviewed and considered the Development Consent for the Site (DA2012/175), as well as the 2012 SOEE by Borg Architects that accompanied the Development Application. The advice confirmed the capacity of the Site to receive and dispose of materials based on both the physical constraints of the site and the on the approved number of truck movements under DA2012/175. MTE concluded that the Site has the physical capacity to receive the maximum number of vehicles as outlined within DA2012/175, even during the "worst-case scenario" of all hourly truck movements occurring simultaneously. Based on the restrictions on operating hours and hourly truck movements detailed in the 2012 SOEE, MTE calculated that the Site has an annual capacity in accordance with DA2012/175 of 539,274 tonnes per annum. This amount is over twice the proposed increase to 199,000 tonnes per annum, exceeding this by 340,274 tonnes per annum. Therefore, there is significantly fewer truck movements related to the Site in comparison to that which is permitted by the Site's consent.

Nevertheless, the proposed change is expected to cause an increase in truck movements related to the Site, compared to current permitted operations, as the increase in material received on the Site from 160,000 to 199,000 tonnes per annum will require a corresponding increase in trucks. The increase in trucks equals to an additional 4 trucks a day or 8 heavy vehicle movements per day.

7.9 Visual amenity

Activities on Site are obscured from outside view by the high walls around the Site, as well as the warehouse in the south-east of the Site. The majority of activities carried out on the Site are related to the management and handling of material, with other activities including truck parking, and storage of empty (only) skip bins. Material handling is carried out close to or within handling/storage bays or bunkers, which are open at the front and have sides constructed of large concrete blocks. These bays are located handled along the northern and north-western boundary of the Site, which is quite a distance from the entrance gate. A large metal wall and awning covers the bays to the rear and from above, further obscuring them from outside view. Following the variation, material will continue to be handled within the storage bays, which have adequate capacity to accommodate for the increase in material. Therefore, the change will not change the external visual appearance of the Site, or its impacts on the visual amenity of the area.

8 Additional commitments

The licensee remains committed to monitoring water and noise impacts at the site, as required by the EPL. Results of monitoring will be uploaded to Aussie Recycling's website regularly, as required, and provided to the EPA via statutory reporting mechanisms (i.e. annual return).

All vehicles transporting waste into or from the facility will continue to be weighed using the weighbridge on Site, which is operated in accordance with the requirements of the POEO (Waste) Regulation 2014. Reporting on waste movements occurs monthly via the waste and resource reporting portal (WARRP). Internal mechanisms to ensure that the authorised amount is not exceeded include regular reviews of the weighbridge software, which can provide an accurate "stock on hand" value on demand, and to allow for better management of material if high stock numbers are anticipated. Regular internal reviews of the software are also carried out to ensure that the annual throughput limit is not exceeded.

9 Closing statement

The proposal detailed in this SOEE is the result of careful consideration of the environmental assessments prepared by various experts, a review of current and previous Site operations, and ongoing discussions with the NSW EPA. We have worked closely with the applicant to develop a balanced proposal, which allows for positive economic outcomes for the business, while ensuring that the potential for an increase in environmental risk is minimised. Outlined in this proposal are the various environmental controls that are in place on Site, as well as proposed commitments, which we believe will be adequate to manage the increase in scale proposed.

We thank the EPA in advance for their thorough consideration of the proposal and we welcome the opportunity to discuss it further.

10 List of appendices

- Appendix 1. Water Quality Management Report, September 2019.
- Appendix 2. Stormwater Management System Plans, June 2020.
- Appendix 3. Air Quality Impact Assessment, October 2019.
- Appendix 4. Noise impact assessment, December 2019.
- Appendix 5. Traffic Noise Management Strategy, March 2020.
- Appendix 6. Noise Monitoring Report, May 2020.
- Appendix 7. Traffic engineering advice, December 2019.

11 Figures and photos

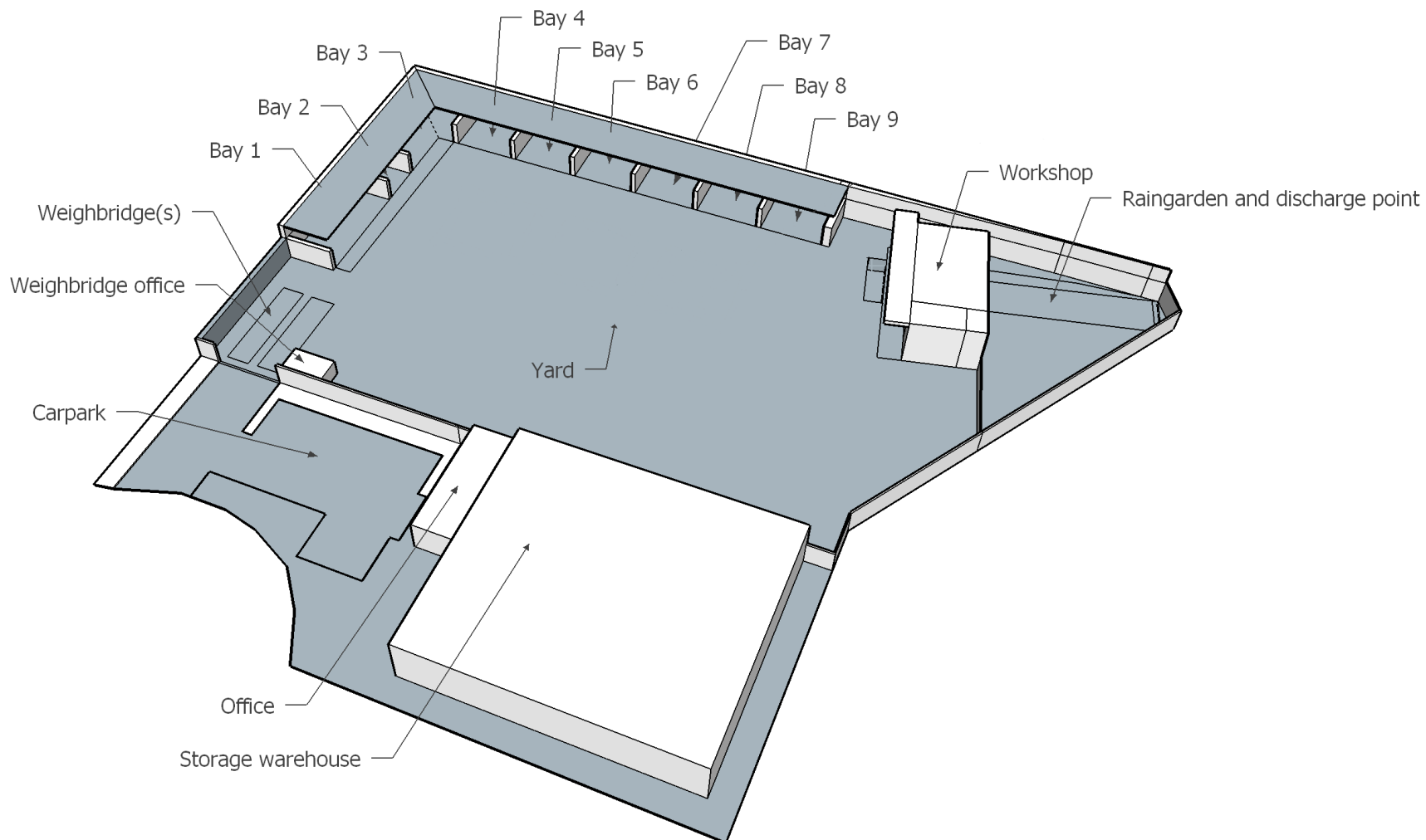
Locality plan



Drawn by:	JH	Report reference: 20181207AUS-BFS-SOEE-2020-07	Key:	Orange polygon: site
Date:	01/02/2019	Image source: Google Earth Pro (28 December 2018 imagery)		Blue tracks: Railway lines Roads as marked

Figure 1: Locality plan for the site.

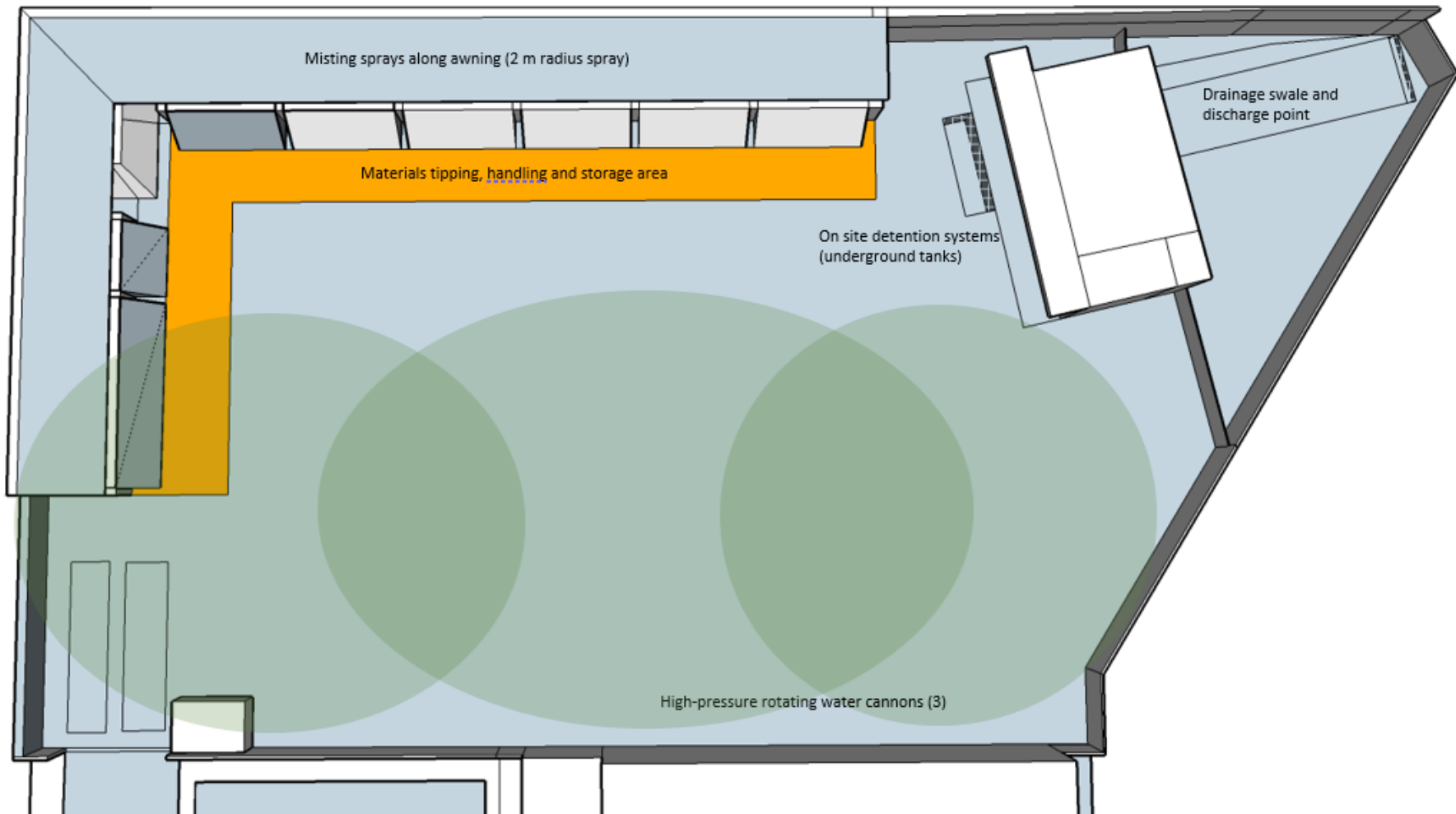
Conceptual site model



Drawn by:	JH	Report reference 20181207AUS-BFS-SOEE-2020-07	Key:	Features: As labelled
Date:	30/09/2019	Image source: 4Pillars		

Figure 2: Key site features.

On Site environmental management infrastructure



Drawn by:	JH	Report reference	20181207AUS-BFS-SOEE-2020-07	Key:	Green circles: approximate coverage of water cannons.
Date:	10/10/2019	Image source:	4Pillars		

Figure 3: On site environmental management infrastructure.

AUSSIE SKIPS RECYCLING PTY LTD
13 BELLFROG ST GREENACRE

ENVIRONMENTAL PROTECTION LICENCE APPLICATION
RUNOFF WATER QUALITY MANAGEMENT REPORT

September 2019

Prepared by

Mark Tooker

Director

Tooker and Associates

1. Introduction

Aussie Skips Recycling Pty Ltd have applied to the Environment Protection Authority (EPA) for an Environment Protection Licence (EPL) to receive 200,000 tonnes per annum of general solid waste (non-putrescible) at its existing facility at Lot 15 DP 1133214 known as 13 Bellfrog St Greenacre.

The EPA issued a notice of refusal on the 5 July 2019 in respect of the application which identified that one of the merit issues on which it had based its decision to refuse the application was that, in its view, the applicant had provided insufficient information regarding runoff water management in its application.

Aussie Skips has appealed the EPA's decision to refuse to grant a licence to the Land and Environment Court. It is expected that the EPA will continue to argue in those proceedings that in its opinion the EPA, as decision maker, does not have sufficient information on runoff water management to allow it to be satisfied that this issue can be managed if a licence is granted.

The purpose of this report is to provide explanatory information regarding the runoff water management including the runoff water quality mitigation measures. It is understood that an application may be made to the Land and Environment Court to amend the class 1 application before the Court so that this report forms part of that application.

This report was prepared by Mark Tooker from Tooker and Associates who has over 35 years experience in runoff management and water quality assessments. A copy of Mark's CV is attached as Appendix B.

2. Site Description

The site is located in an existing industrial area at the eastern end of Bellfrog St. Greenacre (refer Figure 1) and consists of an existing industrial facility with a concrete hardstand area, warehouse building, workshop building and covered material storage bays (refer Figure 2). The site has a total area of approximately 6480m².

Aussie Skips are seeking an EPL to receive up to 200,000 tonnes per annum of general solid waste consisting of VENM, grit sediments and screenings, fully cured concrete waste, asphalt, soil that meet the CT1 threshold and other materials that meet the requirements of resource recovery orders. It is not proposed to receive mixed demolition wastes but only wastes that are largely excavated spoil in nature. It is proposed that this waste will be delivered, sorted, mixed and stored, at all times, under the covered awning area along the northern and western boundaries. This area has concrete solid walls along these boundaries and as required, the existing storage bay dividers will be removed to provide for the material handling and storage areas. There will be no runoff from this covered materials handling area.

The hardstand in the open area of the site will be used for truck manoeuvring and parking similar to all other industrial sites.

The site boundary in the north eastern corner adjoins a concrete lined stormwater channel. The site drainage discharges into a Council trunk drainage line which ultimately discharges into the stormwater channel. Flows in the stormwater channel, which has a large urban catchment, flows in a north eastern direction.

3. Risk profile

All the waste material handling will occur under cover and will not generate any runoff from the waste. No runoff will enter or emanate from the Workshop building. Any liquid spilt from the internal mechanical operations in the workshop will be drained via the work sumps and treated in an oil separator prior to discharge to the sewer along the northern boundary. There will be no runoff or leachate emanating from the interior of the warehouse building.

As such, the only risk profile in terms of runoff water quality is just the normal pollutants generated from an industrial hardstand and building roofs. The NSW government urban stormwater management guidelines (Managing Urban Stormwater: Council Handbook) have been adopted by NSW Councils for management of runoff water quality from hardstand areas and industrial roofs. These guidelines specify requirements for reductions in the mean annual runoff pollutant loads.

4. Pollutants of Concern

The pollutants of concern, as specified in the NSW government and Council guidelines for industrial areas are gross pollutants, total suspended solids, total phosphorus and total nitrogen. The reductions required in mean annual pollutant loads in runoff are:

- Gross pollutants 90%
- Total suspended solids 85%
- Total phosphorus 60%
- Total nitrogen 45%

5. Proposed Runoff Water Quality Mitigation Measures

The existing built runoff water quality mitigation measures on site include (refer Figure 3):

- Detention storage ponding over part of the hardstand;
- Rainwater reuse tanks for reuse of the warehouse roof runoff;
- Sawtooth grading of the hardstand to prevent runoff entering the materials handling area;
- Sedimentation basin located underground along the front edge of the workshop building;
- Grass swale treatment system prior to discharge to Council drainage pipe;

- Separate collection and treatment for the Workshop for any waste collected in the sumps with treatment in an oil separator prior to discharge to the sewer along the northern boundary.

The truck exit shaker grid is approximately 3m x 4m in plan located just inside the exit gate to the site (refer Figure 3). It assists in the removal of loose sediment or other debris from the under carriage and tyres of the trucks as they enter and leave the site. The ongoing condition of the site's Bellfrog Road exit driveway demonstrates that the measures employed are effective in controlling the migration of sediment onto the public road. Nevertheless, the applicant, Aussie Skips, has committed to the timely installation of an exit wheelwash once the EPL is issued for the site.

The central area of the hardstand has a sawtooth surface profile to encourage storage of runoff above ground on the hardstand so that the peak flows leaving the site match those of the pre development conditions (refer Figure 5). This storage of 300m³ ensures low runoff velocities and promotes settling of suspended solids and gross pollutants out of the runoff. This ponding level is below the level of the materials handling area.

Roof runoff from the warehouse building is collected in two underground rainwater tanks which have volumes of 6,100 L and 11,500 L (refer Figure 4). This water is reused for toilet flushing, irrigation and dust suppression. This reduces the volume of runoff which in turn reduces the volume of pollutants discharged from the site.

The hardstand area fronting the covered materials handling area has a V surface profile with the lowest part in the centre of this area inline with the stormwater drainage line and inlet pits (refer Figure 5). The hardstand slopes down away from the edge of the covered materials handling area to the low point in line with the drainage line. This is an additional measure to prevent the hardstand runoff from flowing into the materials handling area.

The underground sedimentation basin is approximately 18m long, 2.5m wide and has an average water storage depth of 2.68m (refer Figure 3). Runoff is stored in this basin to promote settling of solids and pollutants. Water is drawn from the surface of the basin and directed to the bio retention grass swale filter which has plan dimensions of 18.4m x 5.8m providing 106.7m² of treatment area. The swale has a 200mm deep filter zone. Surface runoff from the swale is collected in a 300mm wide grated drain across the width of the swale and flow is directed to a Council drainage pit just outside the site's northern boundary.

6. Runoff Water Quality Management Performance

The performance of the runoff water quality mitigation measures was determined by use of the NSW government and Council recommended methodology using the MUSIC model with parameters selected from the Council recommended values (refer Appendix A).

The reductions in mean annual pollutant loads achieved with the existing mitigation measures readily exceeds the NSW government and Council guidelines as follows:

Pollutant	Required reduction	Reduction achieved
1. Gross pollutants	90%	99%
2. Total suspended solids	85%	95%
3. Total phosphorus	60%	85%
4. Total nitrogen	45%	64%

7. EPA Letter dated 5 July 2019

Aussie Skips concedes that the original application to the EPA for the EPL did not explain that there would be no runoff from the waste or from within any buildings onto the hardstand or discharged into receiving waters.

Notwithstanding this, the content of this report confirms that the waste materials handling/storage area will be covered and any spillages in the workshop will be discharged to the sewer after treatment in an oil separator. The hardstand surface has been especially given a saw tooth surface profile to prevent surface runoff entering the waste handling/storage area. Aussie Skips will accept conditions on the EPL to this effect.

Given this fact, the runoff water quality from the hardstand and building roofs can be managed according to the NSW government and Council guidelines (Managing Urban Stormwater: Council Handbook) which has been adopted by Councils for general application to urban areas. The water quality assessment has been undertaken using the MUSIC model which is the model preferred by most government authorities for urban developments.

Given that there is no runoff from the waste materials handling area, there will be no potential increase in the pollutant loads in runoff beyond the typical industrial site which is not subjected to the requirements in the EPA letter paragraphs 10a. to 10d. The typical industrial site is subjected to the same runoff water quality analysis as undertaken in this report and the runoff water quality criteria as adopted in this report. There are no special polluting activities proposed on this site (which will be exposed to rainfall and generate runoff) to warrant other than the application of the State and local government guidelines as applied to runoff water quality management on all industrial developments.

8. Conclusions

The waste material handling will be undertaken under cover and will not generate any runoff. The site hardstand has been designed to exclude runoff from the hardstand entering the covered waste materials handling area. As such, the runoff water quality management for the site falls under the NSW government and Council guidelines for an industrial site with a hardstand area. These guidelines require specified rates of reduction in the mean annual pollutant load in runoff from the site.

The existing runoff water quality mitigation measures on site provide significant improvements beyond the standard reductions required by the guidelines and thereby readily comply with the government requirements for runoff water quality management for an industrial development.

FIGURES

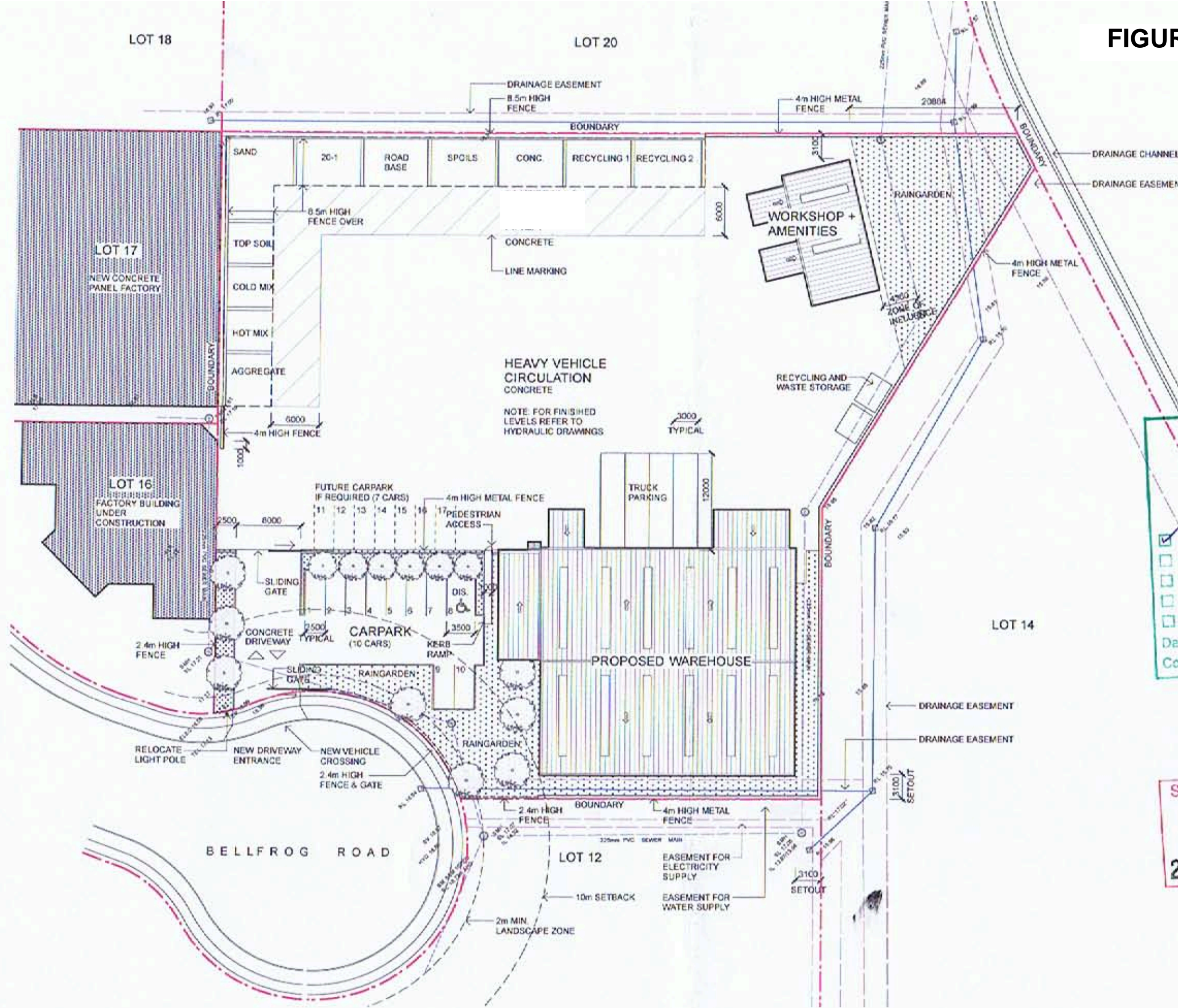
FIGURE 1



LOCALITY PLAN

FIGURE 2

- LEGEND:**
- HARDSTAND
 - LANDSCAPING
 - ADJACENT SITE BUILDING
 - MANHOLE COVER
 - STORMWATER DRAIN (REFER TO HYDRAULIC ENGINEERS DWG'S)
 - EXISTING EASEMENT
 - EXISTING SEWER PIPE
 - BOUNDARY
 - EXISTING STORMWATER PIPE



STRATHFIELD COUNCIL APPROVED

DA No.: 2012/175
 SDA No.:
 SSI No.:
 CDC No.:
 CC No.:
 Date determined: 19/12/13
 Council Officer: [Signature]

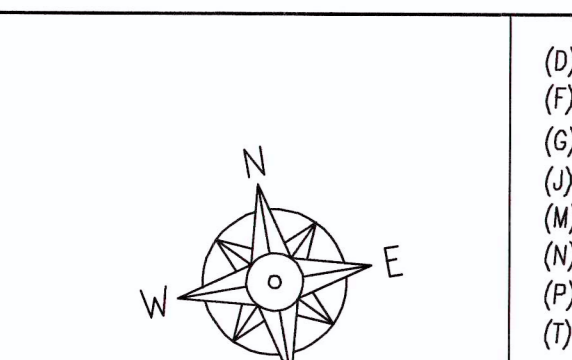
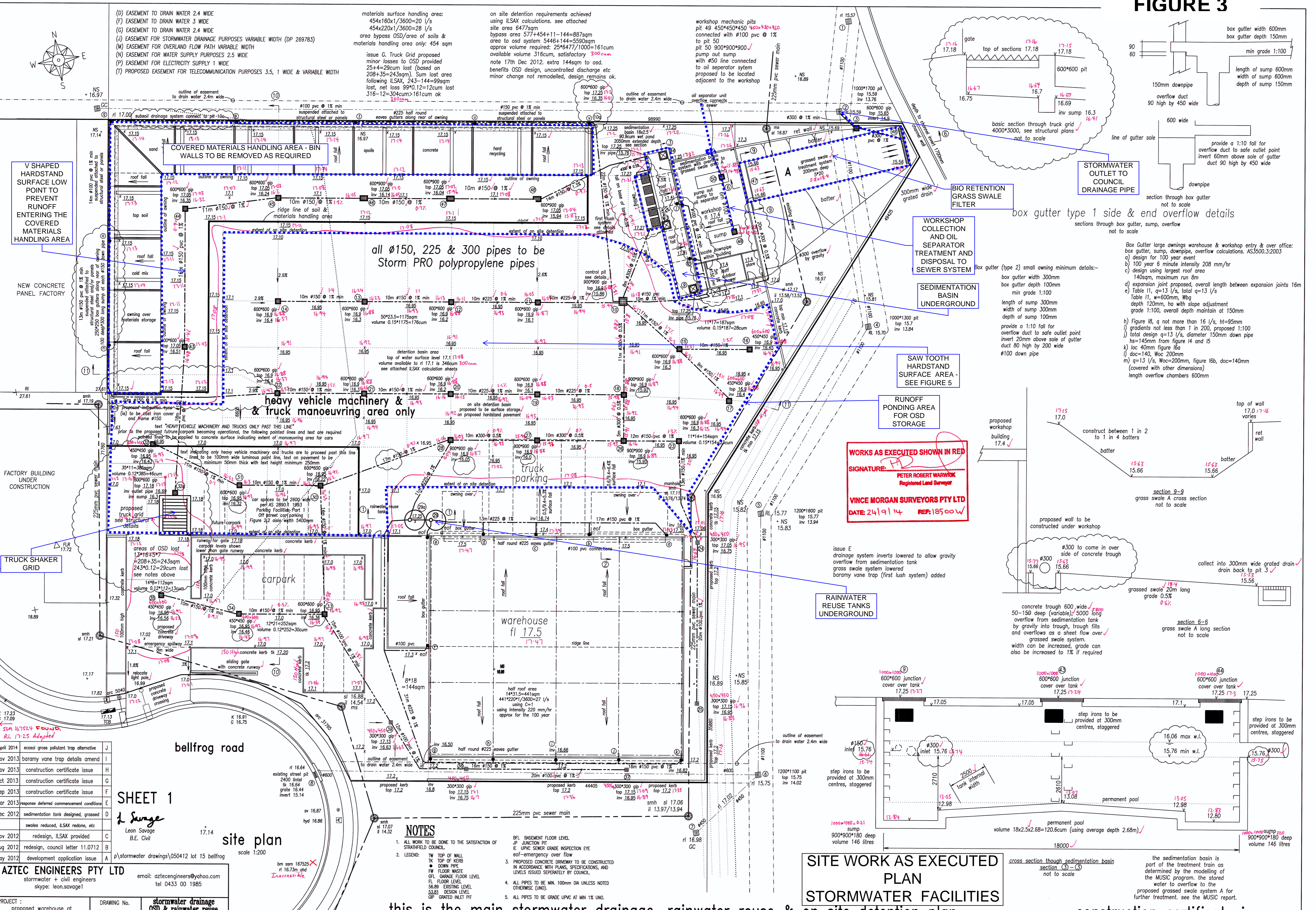
APPLICANT'S COPY

Strathfield Municipal Council
 19 DEC 2012
 2012/075



Notes All dimensions must be taken from site and / or verified before commencement of work - DO NOT SCALE DRAWINGS. Any discrepancy shall be referred to Borg Architects before proceeding with the work. Approval by the architect of this drawing for project use is for the design concept only and does not relieve the contractor or builder of any of his / her responsibilities under contract. Copyright © Borg Architects Pty Ltd. All rights reserved. This work is covered by copyright & is not to be reproduced or copied in any form by any means (graphic, electronic or mechanical including photocopying) without the written permission of Borg Architects. Any licence, express or implied, to use this document for any purpose whatsoever is restricted to the terms of the written agreement between Borg Architects and the instructing party.				architecture interiors urban design 	project DUNMAIN	sheet title SITE PLAN	drawn MB	
	C	14/12/12	Issue For Development Application	Studio 3, 61 Marlborough Street Surry Hills NSW 2010 p.02 9280 4223 f.02 9280 4226 arch@borgarchitects.com.au new arb 5783 abn 65 111 755 312 www.borgarchitects.com.au	address	date	project no.	issue
	B	4/12/12	Issue For Client Approval		LOT 15 BELLFROG ROAD GREENACRE NSW 2190	MARCH 2012	1110	MB
	A	5/0/12	Issue for PRE DA meeting			scale	sheet	C
issue	date	amendment			1:500 @ A3	DA01		

FIGURE 3



(D) EASEMENT TO DRAIN WATER 2.4 WIDE
 (F) EASEMENT TO DRAIN WATER 3 WIDE
 (G) EASEMENT TO DRAIN WATER 2.4 WIDE
 (J) EASEMENT FOR STORMWATER DRAINAGE PURPOSES VARIABLE WIDTH (DP 269783)
 (M) EASEMENT FOR OVERLAND FLOW PATH VARIABLE WIDTH
 (N) EASEMENT FOR WATER SUPPLY PURPOSES 2.5 WIDE
 (P) EASEMENT FOR ELECTRICITY SUPPLY 1 WIDE
 (T) PROPOSED EASEMENT FOR TELECOMMUNICATION PURPOSES 3.5, 1 WIDE & VARIABLE WIDTH

V SHAPED HARDSTAND SURFACE LOW POINT TO PREVENT RUNOFF ENTERING THE COVERED MATERIALS HANDLING AREA

NEW CONCRETE PANEL FACTORY

FACTORY BUILDING UNDER CONSTRUCTION

TRUCK SHAKER GRID

bellfrog road

SHEET 1
 L. Savage
 Leon Savage
 B.E. Civil
 17.14
 site plan
 scale 1:200

AZTEC ENGINEERS PTY LTD
 stormwater + civil engineers
 skype: leon.savage1
 email: aztecengineers@yahoo.com
 tel 0433 00 1885

COVERED MATERIALS HANDLING AREA - BIN WALLS TO BE REMOVED AS REQUIRED

all Ø150, 225 & 300 pipes to be Storm PRO polypropylene pipes

heavy vehicle machinery & truck manoeuvring area only

truck parking

warehouse fl 17.5

carpark

bellfrog road

SHEET 1
 L. Savage
 Leon Savage
 B.E. Civil
 17.14
 site plan
 scale 1:200

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stormwater drainage OSD & rainwater reuse water quality treatment
 DRAWING No. 050412

materials surface handling area:
 45x160x1/3600=20 l/s
 45x220x1/3600=28 l/s
 area bypass OSD/area of soils & materials handling area only: 454 sqm
 issue G. Truck Grid proposed minor losses to OSD provided 25+4=29cum lost (based on 208+35=243sqm). Sum lost area following ILSAX, 243-144=99sqm lost, net loss 99-12=87cum lost 316-12=304cum=161cum ok

on site detention requirements achieved using ILSAX calculations. see attached site area 6477sqm
 bypass area 577+454+11-144=887sqm
 area to OSD system 5446+144=5590sqm
 approx volume required: 25*6477/1000=161cum
 available volume 316cum, satisfactory 300cum
 note 17th Dec 2012, extra 144sqm to OSD. benefits OSD design, uncontrolled discharge etc minor change not remodelled, design remains ok.

workshop mechanic pits pit 49 450*450*450 450*450*450 connected with #100 pvc @ 1% to pit 50 pit 50 900*900*900 pump out sump with #50 line connected to oil separator system proposed to be located adjacent to the workshop

detention basin area top of water surface level 17.17.18 volume available to it 17.17 is 346cum 300cum see attached ILSAX calculation sheets

issue E drainage system inverts lowered to allow gravity overflow from sedimentation tank grass swale system lowered barmy vane trap (first flush system) added

rainwater reuse tanks

warehouse fl 17.5

bellfrog road

NOTES
 1. ALL WORK TO BE DONE TO THE SATISFACTION OF STRATHFIELD COUNCIL.
 2. LEGEND:
 TW TOP OF WALL
 TK TOP OF KERB
 DP DOWN PIPE
 FW FLOOR WASTE
 GEL GARAGE FLOOR LEVEL
 FL FLOOR LEVEL
 EX EXISTING LEVEL
 S.D. DESIGN LEVEL
 GP GRATED INLET PIT
 BFL BASEMENT FLOOR LEVEL
 JP JOINTION PIT
 E UPVC SEWER GRASS INSPECTION EYE
 eoF-emergency over flow
 3. PROPOSED CONCRETE DRIVEWAY TO BE CONSTRUCTED IN ACCORDANCE WITH PLANS, SPECIFICATIONS, AND LEVELS ISSUED SEPARATELY BY COUNCIL.
 4. ALL PIPES TO BE MIN. 100mm DIA UNLESS NOTED OTHERWISE (UNO).
 5. ALL PIPES TO BE GRADE UPVC AT MIN 1% UNO.

this is the main stormwater drainage, rainwater reuse & on site detention plan

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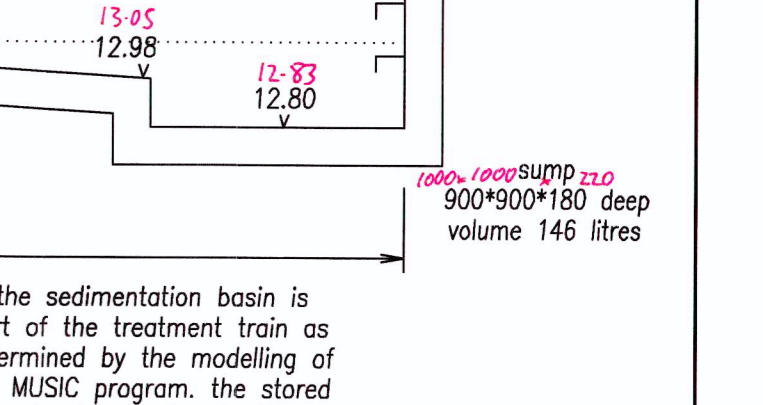
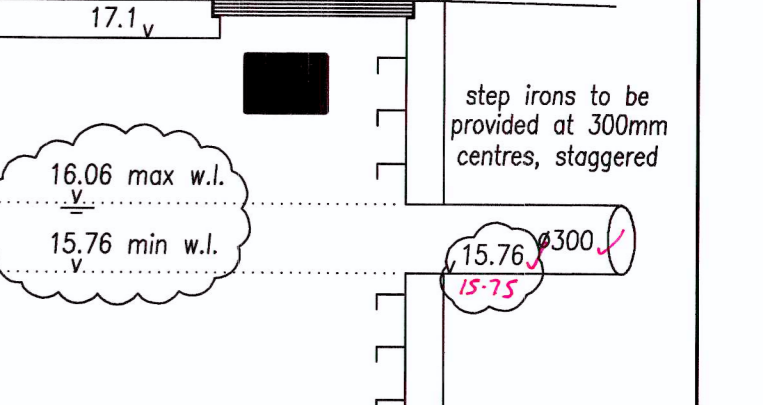
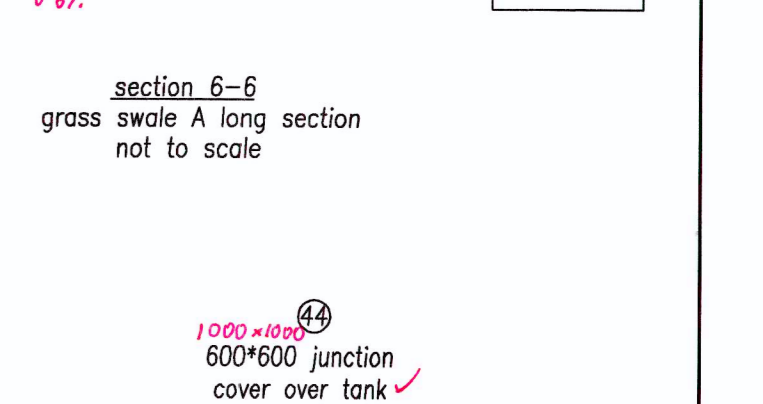
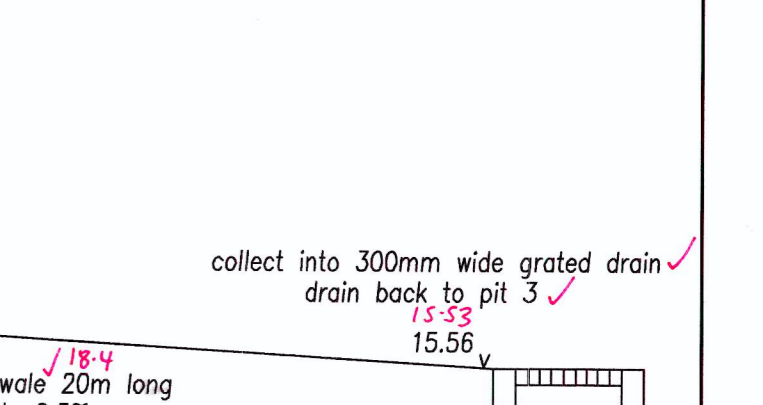
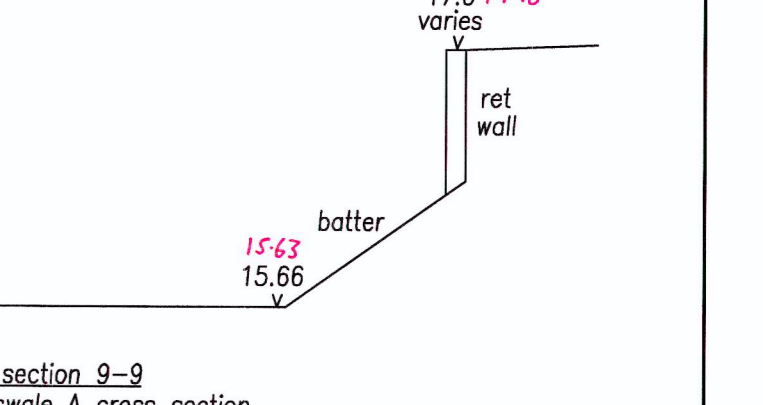
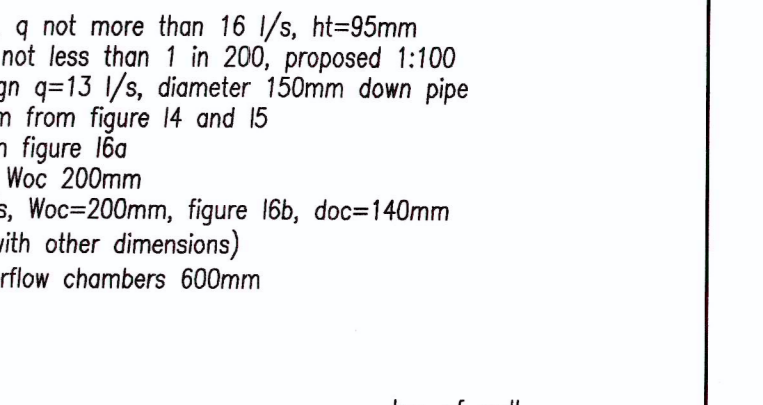
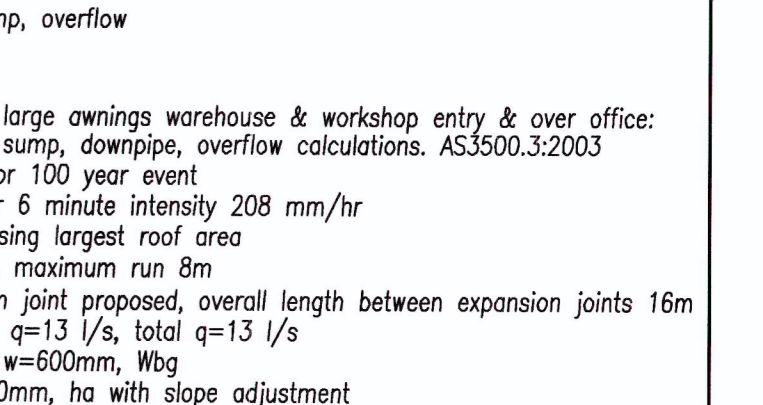
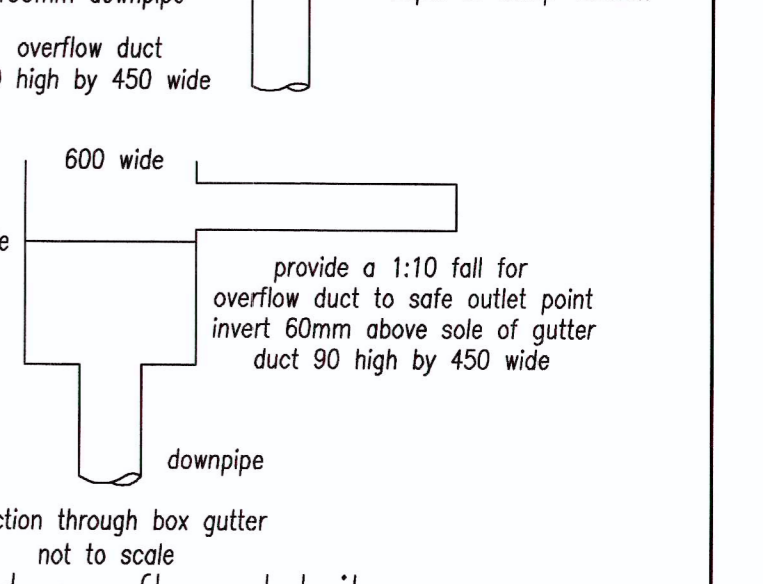
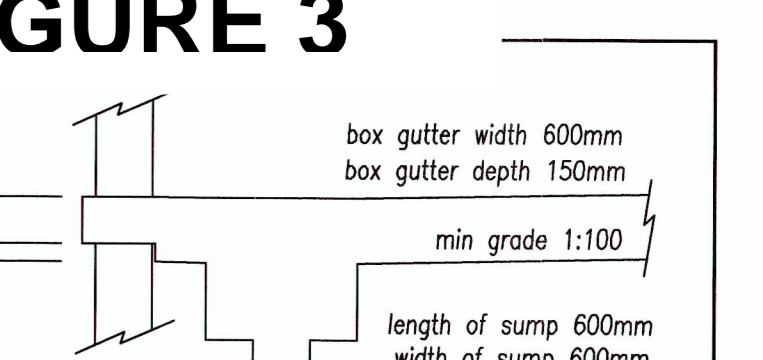
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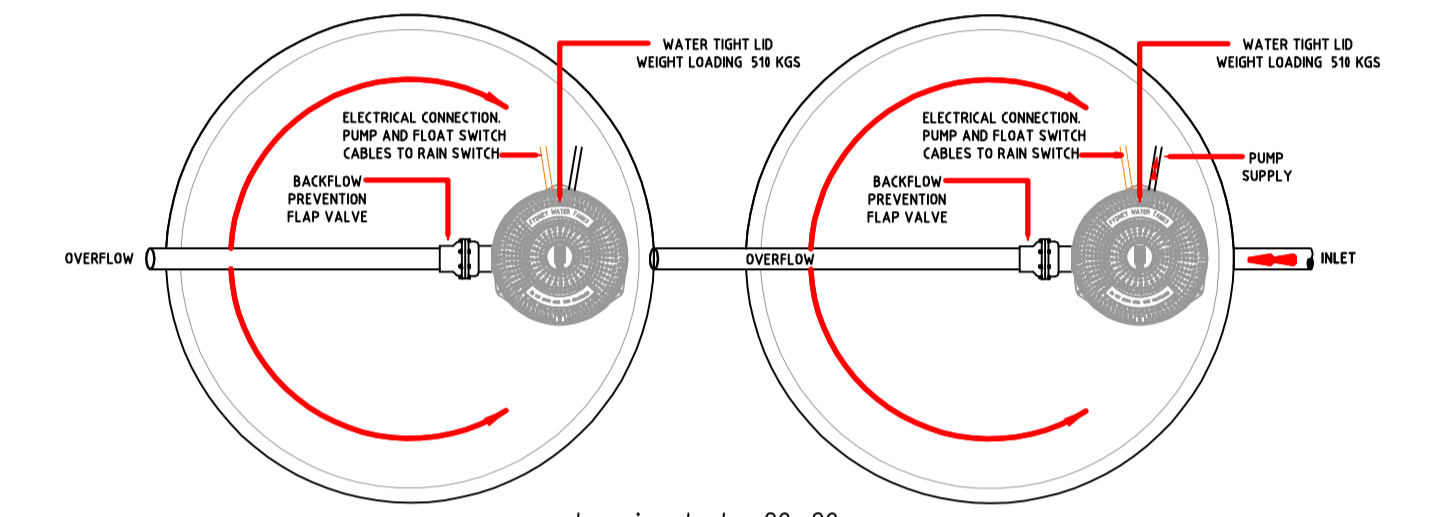
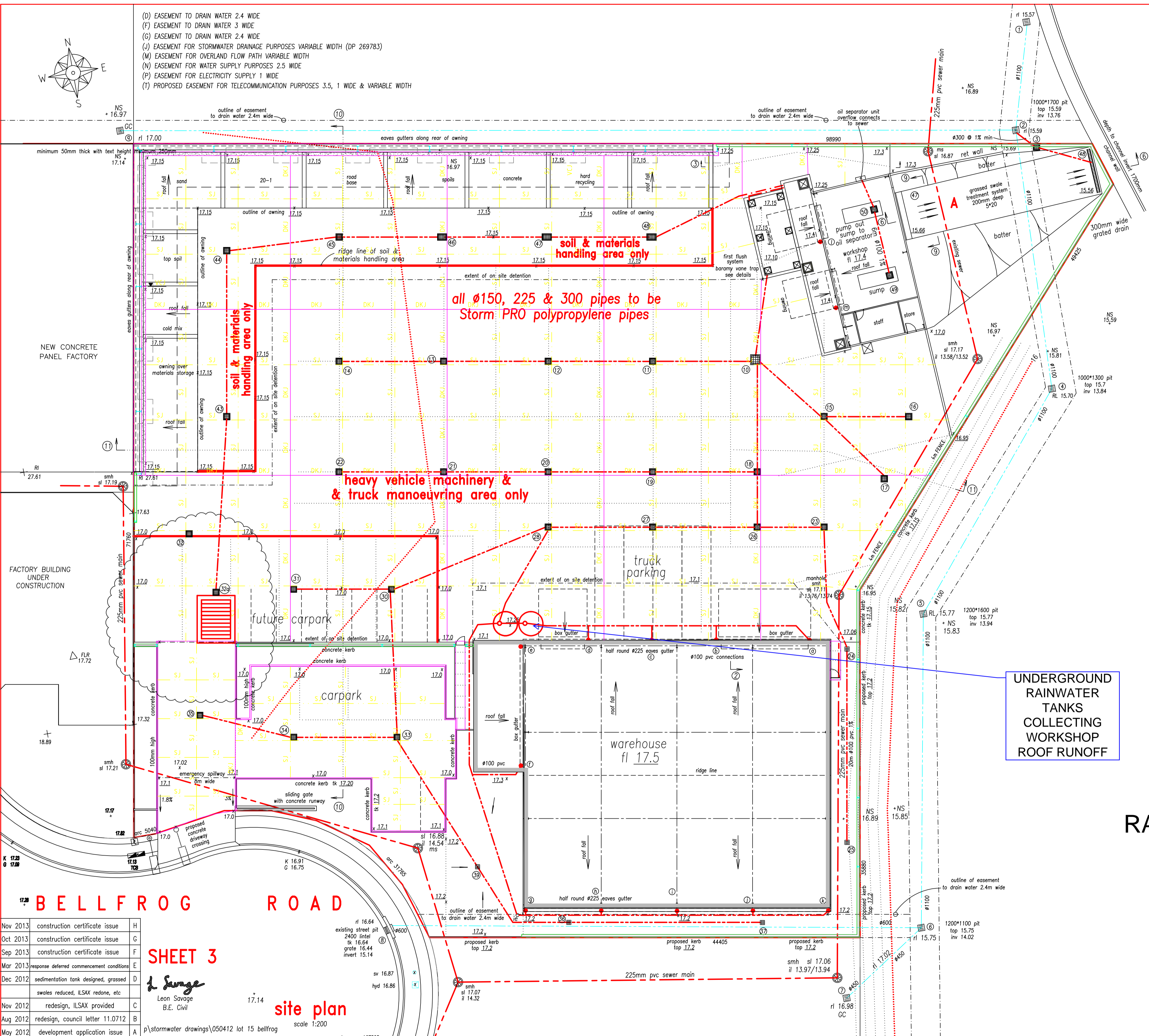
construction certificate issue

WORKS AS EXECUTED SHOWN IN RED
 SIGNATURE: PETER ROBERT WARWICK
 Registered Land Surveyor
 VINCE MORGAN SURVEYORS PTY LTD
 DATE: 24/9/14 REF: 18500W

SITE WORK AS EXECUTED PLAN
STORMWATER FACILITIES

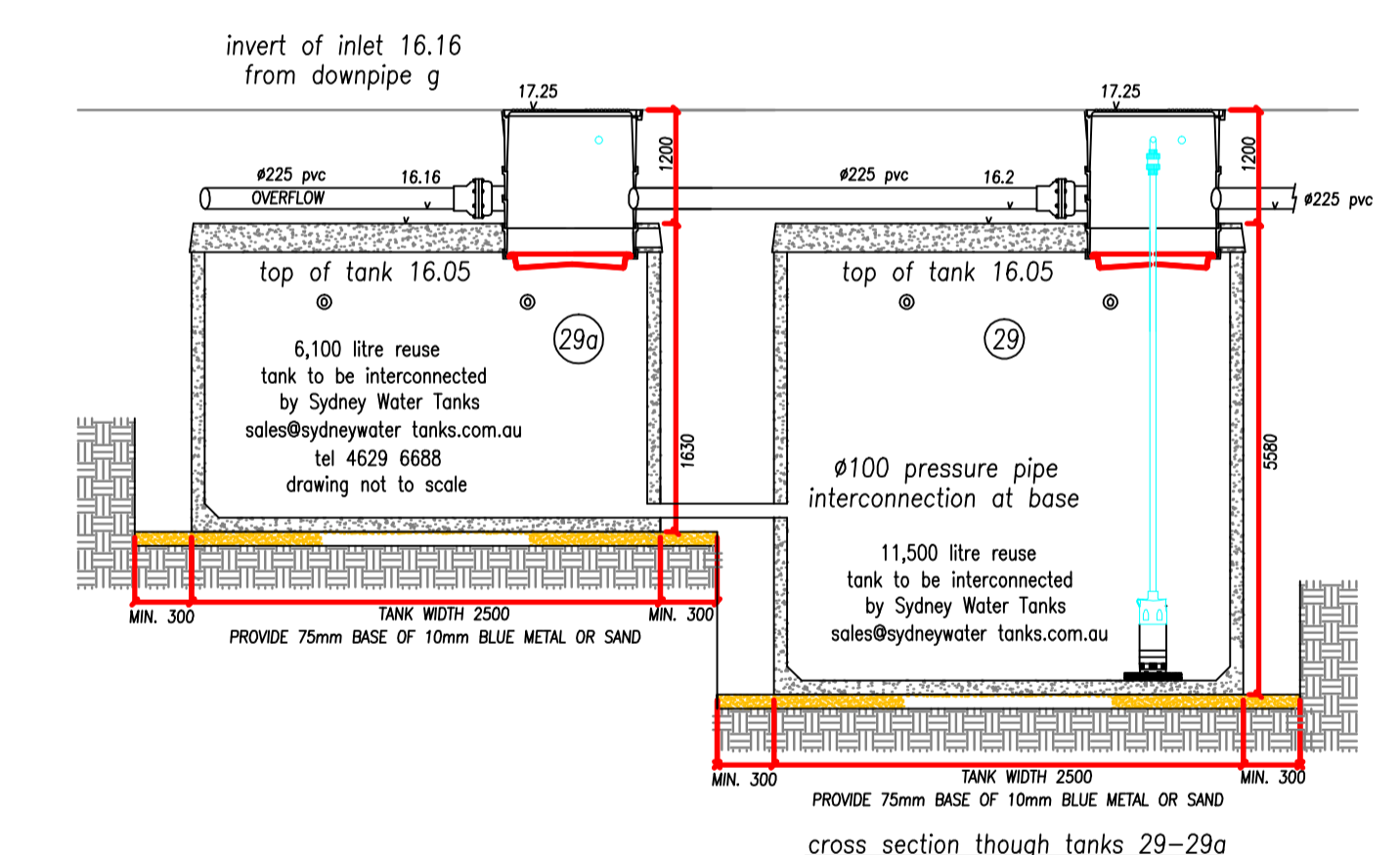
the sedimentation basin is part of the treatment train as determined by the modelling of the MUSIC program. the stored water to overflow to the proposed grassed swale system A for further treatment. see the MUSIC report.

FIGURE 4



plan view tank 29-29a
not to scale

this tank used for reuse applications such as cisterns, dust suppression & outdoor taps. see MUSIC report.



RAINWATER REUSE TANK DETAILS

- issue D
1. separate plan on sheet 2 showing extent of On Site Detention (OSD)
 2. separate plan on sheet 2 showing extent of catchment draining to the OSD system
 3. plans reconfigured to excise area "soil & materials handling area only" from draining to the OSD this area drains to the sedimentation basin, bypassing the OSD system. ILSAX calculations revised accordingly.
 4. all pipes #150mm and greater in diameter changed to Storm PRO product.
 5. the sedimentation basin adjacent to the workshop is part of the treatment train. Please see the MUSIC model in this regard.
 6. the distribution line from the sedimentation basin adjacent to the workshop is directed to the grassed swale treatment system A only behind the proposed workshop.
 7. sheets 1 of 2 shows the site plan at scale 1:200. The sedimentation basin is drawn to scale. there is adequate clearance around the basin to be constructed in the position shown. The workshop will be structurally designed to allow for the adjacent basin.
 8. a long section and a cross section of the grass swale are provided, the runoff from the grassed swale A at the rear of the site behind the workshop is collected and drained to the final pit number 3 & then to the interallotment drainage system.
 9. See updated MUSIC modelling and report which have been prepared in association with this submission.
 10. ENVIROPOD treatment systems within pits no longer required as part of this latest analysis & design. Leon Savage.

Nov 2013	construction certificate issue	H
Oct 2013	construction certificate issue	G
Sep 2013	construction certificate issue	F
Mar 2013	response deferred commencement conditions	E
Dec 2012	sedimentation tank designed, grassed swales reduced, ILSAX redone, etc.	D
Nov 2012	redesign, ILSAX provided	C
Aug 2012	redesign, council letter 11.07.12	B
May 2012	development application issue	A

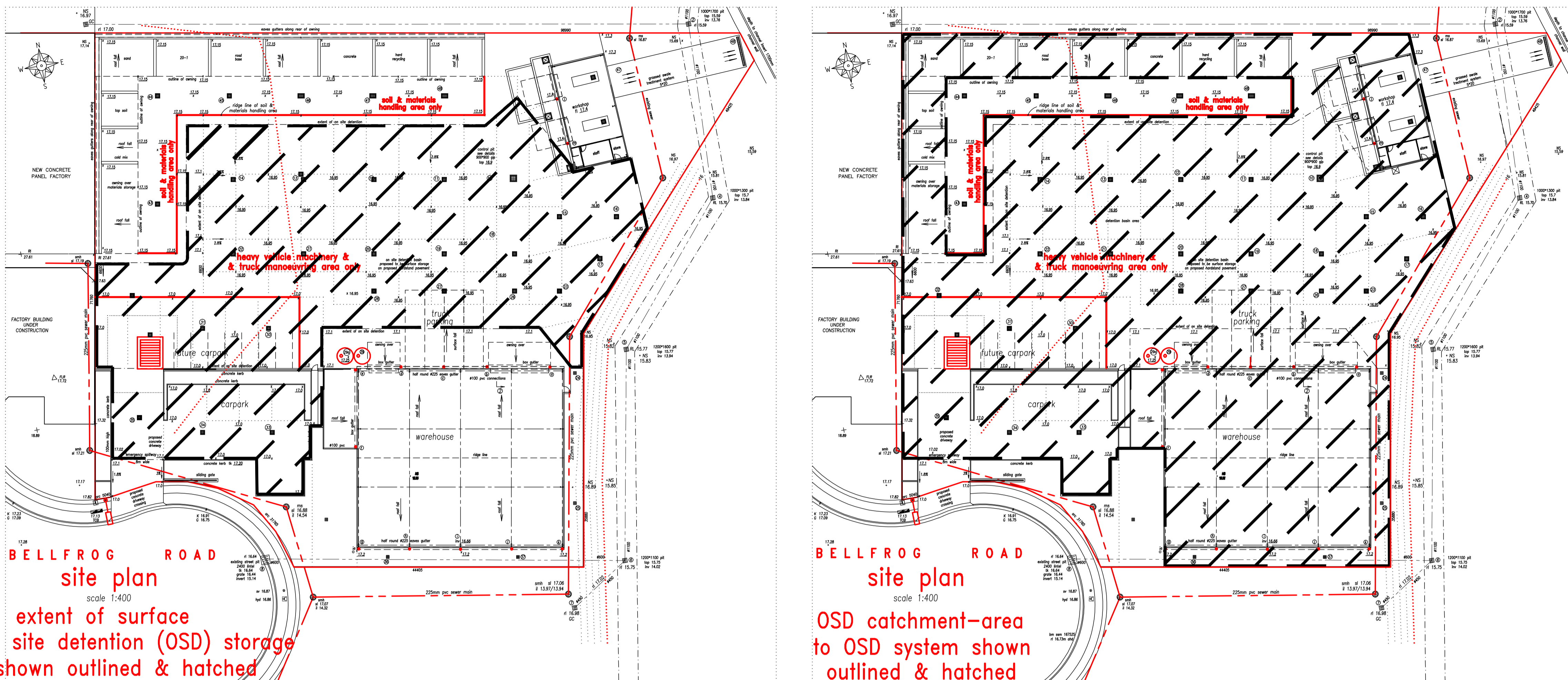
AZTEC ENGINEERS PTY LTD
stormwater + civil engineers
skype: leon.savage1
email: aztecengineers@yahoo.com
tel 0433 00 1985

PROJECT : proposed warehouse at lot 15 bellfrog road, greenacre
DRAWING No. 050412
stormwater drainage OSD & rainwater reuse water quality treatment

this plan shows layout of pits in relation to SJs & DKJs and sections for reuse tanks

construction certificate issue

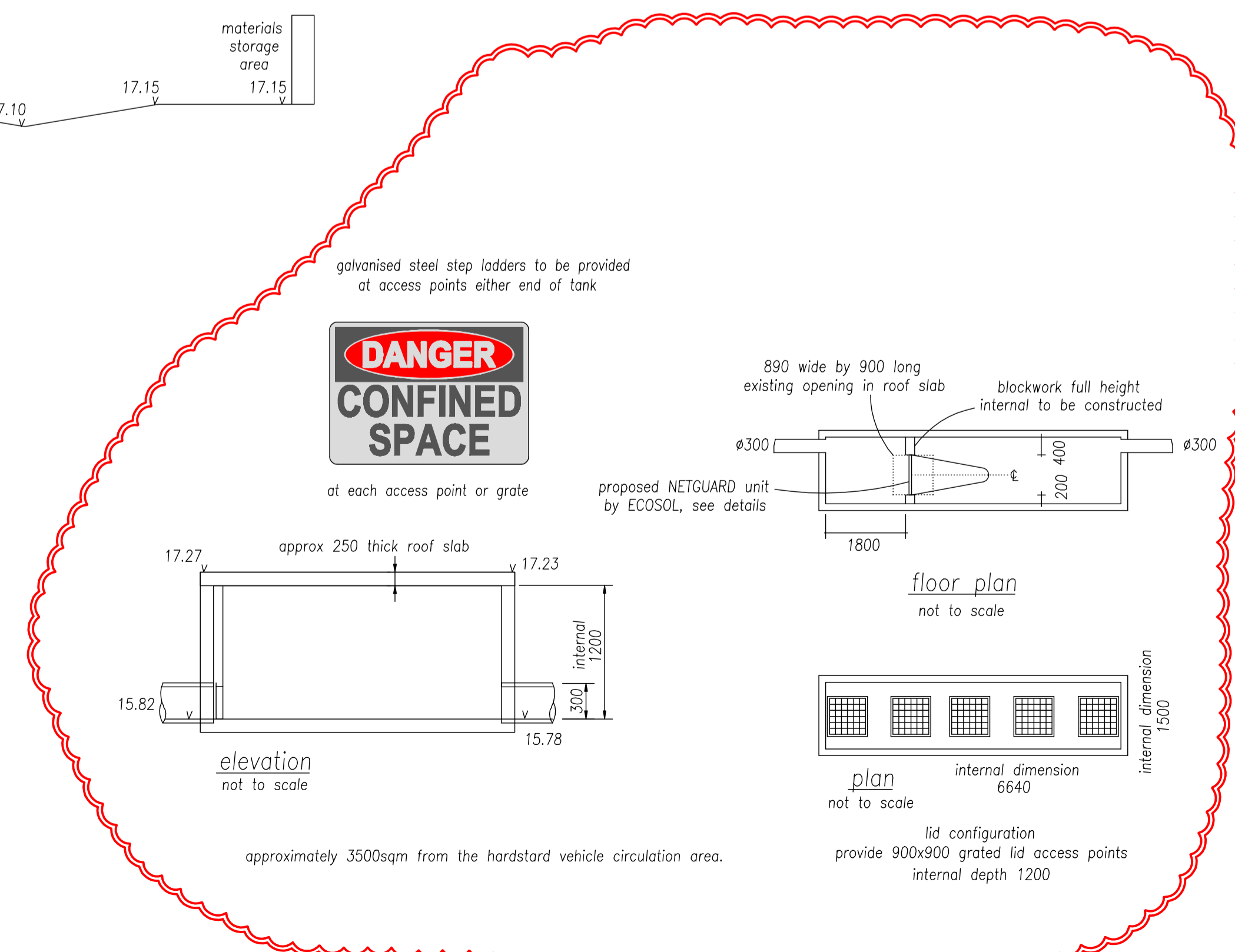
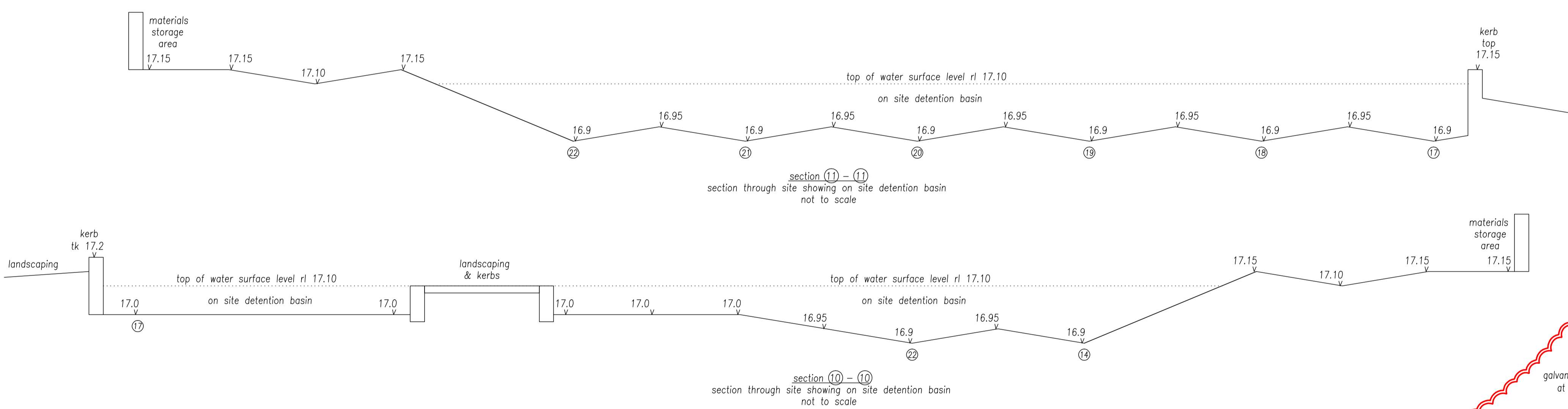
FIGURE 5



- Box Gutter behind soil bins, downpipes n, o & q, north west corner of site: box gutter, sump, downpipe, overflow calculations. AS3500.3:2003
- a) design for 100 year event
- b) 100 year 6 minute intensity 208 mm/hr
- c) design using largest roof area
- 70sqm wall & 230sqm roof, maximum run 8m
- d) expansion joint proposed, overall length between expansion joints 16m
- e) Table 11, q=13 l/s, total q=13 l/s
- depth 250mm, no with slope adjustment
- grade 1:100, overall depth maintain at 250mm
- h) Figure 18, q not more than 16 l/s, h=250mm
- i) gradients not less than 1 in 200, proposed 1:100
- j) total design q=10 l/s, diameter 150mm down pipes
- hs=100mm from figure 14 and 15
- k) loc 50mm figure 16a
- l) doc=200, Woc 250mm
- m) q=10 l/s total, Woc=250mm, figure 16b, doc=150mm (covered with other dimensions)
- length overflow weir 100mm

box gutter width 250mm
 box gutter depth 250mm
 min grade 1:100
 length of sump 300mm
 width of sump 250mm
 depth of sump 100mm
 provide a 1:10 fall for overflow duct to safe outlet point
 invert 50mm above sole of gutter
 duct 200 high by 250 wide
 Ø150 down pipes n, o & q.

SAW TOOTH SURFACE PROFILE FOR THE HARDSTAND FOR PONDING OF RUNOFF AND PROTECTION OF COVERED MATERIALS HANDLING AREA



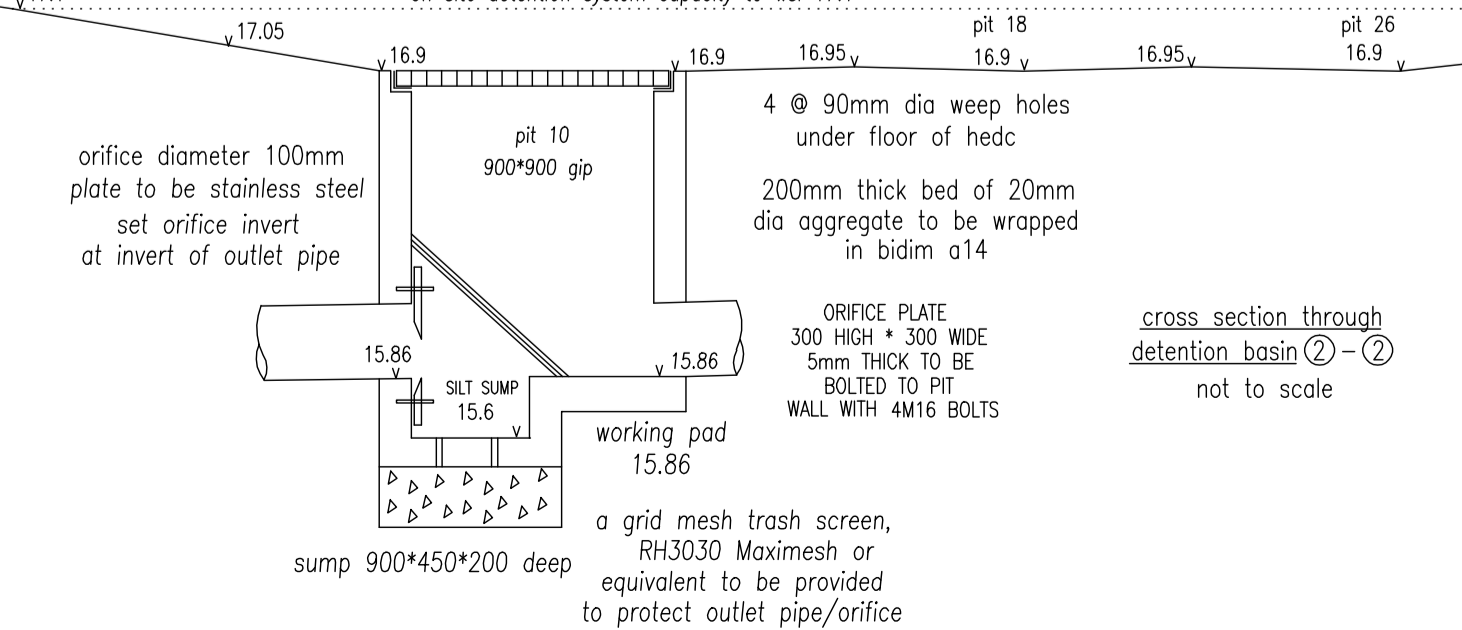
SHEET 2
 p:\stormwater drawings\050412 lot 15 bellfrog

April 2014	ecosol gross pollutant trap alternative	J
Nov 2013	baramy vane trap details amend	I
Nov 2013	construction certificate issue	H
Oct 2013	construction certificate issue	G
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	swales reduced, ILSAX redone, etc	
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Aug 2012	redesign, council letter 11.0712	B
May 2012	development application issue	A

Leon Savage
 Leon Savage
 B.E. Civil

AZTEC ENGINEERS PTY LTD
 stormwater + civil engineers
 skype: leon.savage1
 email: aztecengineers@yahoo.com
 tel 0433 00 1985

PROJECT : proposed warehouse at lot 15 bellfrog road, greenacre
 DRAWING No. **050412**
stormwater drainage OSD & rainwater reuse water quality treatment



APPENDIX A

MUSIC MODELLING REPORT

Kozarovski and Partners
 6/6-8 Garfield Street
 Carlton NSW 2218
 Ph: (02) 8964 9242
 Mobile: 0412 997767
 e-mail: pavelk@optusnet.com.au
 Date: 1 June 2012
 Amended: 17 December 2012
 Amended2: 1 April 2013

Water Quality Control Report for No. 15 Bellfrog Street, Greenacre

1 Introduction

The total site area is some 6480 m². The site falls towards the back and a drainage easement is available to drain all the runoff by gravity.

It is proposed to construct a warehouse, a workshop, storage sheds and driveways/car parking on this site. Council's OSD policy applies to this land. An above ground OSD is proposed with a storage of 346 m³. The description of proposed area types is given in the table below:

Description	Area (m ²)
Site Area	6480
Roof Warehouse	960
Roof awnings	576
Roof workshop	142
Soil & material handling area	444
Driveways/car parking	3450
Driveway by passing OSD	44
Landscaped area by passing OSD	863

2 General

The water quality modelling software program MUSIC has been used to establish the effectiveness of the water quality treatment proposal. MUSIC has been developed by the Cooperative Research Centre for Catchment Hydrology, and is designed as a planning tool for water quality treatment trains for catchment runoff. The model provided for submission and approval is:

- *Bellfrog_grassed_swale3.sqz*

The program MUSIC is able to model pollutant loads present in stormwater runoff from a catchment and assess the effectiveness of different treatment devices in terms of pollutant load reduction.

3 Pollutant Loading

Strathfield City Council (SCC) has provided pollutant concentration levels for Total Suspended Solids (TSS), Total Phosphorous (TP), and Total Nitrogen (TN) from testing by others of pollutant levels of various land types including industrial hardstand, roofs, and roads. These levels will produce a good representation of the above expressed catchments.

The post developed condition of the lots will be medium density residential. MUSIC nodes for Roof, Driveway and landscaped areas as required by the Council were used in this study.

	Roof Areas	Road Areas	General Urban	Forest/Natural
Impervious Area Properties				
Rainfall Threshold (mm)	1.4	1.4	1.4	1.4
Pervious Area Properties				
Soil Storage Capacity (mm)	170	170	170	170
Initial Storage (% of Capacity)	30	30	30	30
Field Capacity (mm)	70	70	70	70
Infiltration Capacity Coefficient a	210	210	210	210
Infiltration Capacity Coefficient b	4.7	4.7	4.7	4.7
Groundwater properties				
Initial Depth (mm)	10	10	10	10
Daily Recharge Rate (%)	50	50	50	50
Daily Baseflow Rate (%)	4	4	4	4
Daily Seepage Rate (%)	0	0	0	0
Total Suspended Solids Baseflow Concentrations				
Mean (log mg/L)	-	-	1.2	0.78
Std Dev (log mg/L)	-	-	0.17	0.17
Serial Correlation (R squared)	-	-	0	0
Stormflow Concentration Parameters				
Mean (log mg/L)	1.3	2.43	2.15	1.6
Std Dev (log mg/L)	0.32	0.32	0.32	0.32
Serial Correlation (R squared)	0	0	0	0
Total Phosphorus Baseflow Concentrations				
Mean (log mg/L)	-	-	-0.85	-1.52

Std Dev (log mg/L)	0.25	0.25	0.19	0.19
Serial Correlation (R squared)	0	0	0	0
Stormflow Concentration Parameters				
Mean (log mg/L)	-0.89	-0.30	-0.60	-1.10
Std Dev (log mg/L)	0.25	0.25	0.25	0.25
Serial Correlation (R squared)	0	0	0	0
Total Nitrogen Baseflow Concentrations				
Mean (log mg/L)	-	-	0.11	-0.52
Std Dev (log mg/L)	-	-	0.12	0.12
Serial Correlation (R squared)	0	0	0	0
Stormflow Concentration Parameters				
Mean (log mg/L)	0.30	0.34	0.3	-0.05
Std Dev (log mg/L)	0.19	0.19	0.19	0.19
Serial Correlation (R squared)	0	0	0	0

4 Water Quality Treatment Proposal

Stormwater carries pollutants that it has picked up from the surfaces it has come into contact with. This creates a risk of contamination to downstream habitats. A treatment train can be implemented to protect against this risk of contamination. A treatment train consists of more than one mechanism that removes pollution; in our case a series of treatment devices are used. The treatment train is effective because the different treatment devices in series overlap in the pollutants they remove thus providing a more thorough treatment with redundancies along the treatment train.

The water quality treatment train has been designed to ensure that pollutant removal rates satisfy the requirements in the Strathfield City Council Stormwater Quality Control Policy.

Pollution Retention Criteria	
Pollutant	Retention Criteria for Development Sites
Total Suspended Solids	85% reduction in post development mean annual load
Gross Pollutants	90% reduction in post development mean annual load
Total Phosphorus	60% reduction in post development mean annual load
Total Nitrogen	45% reduction in post development mean annual load

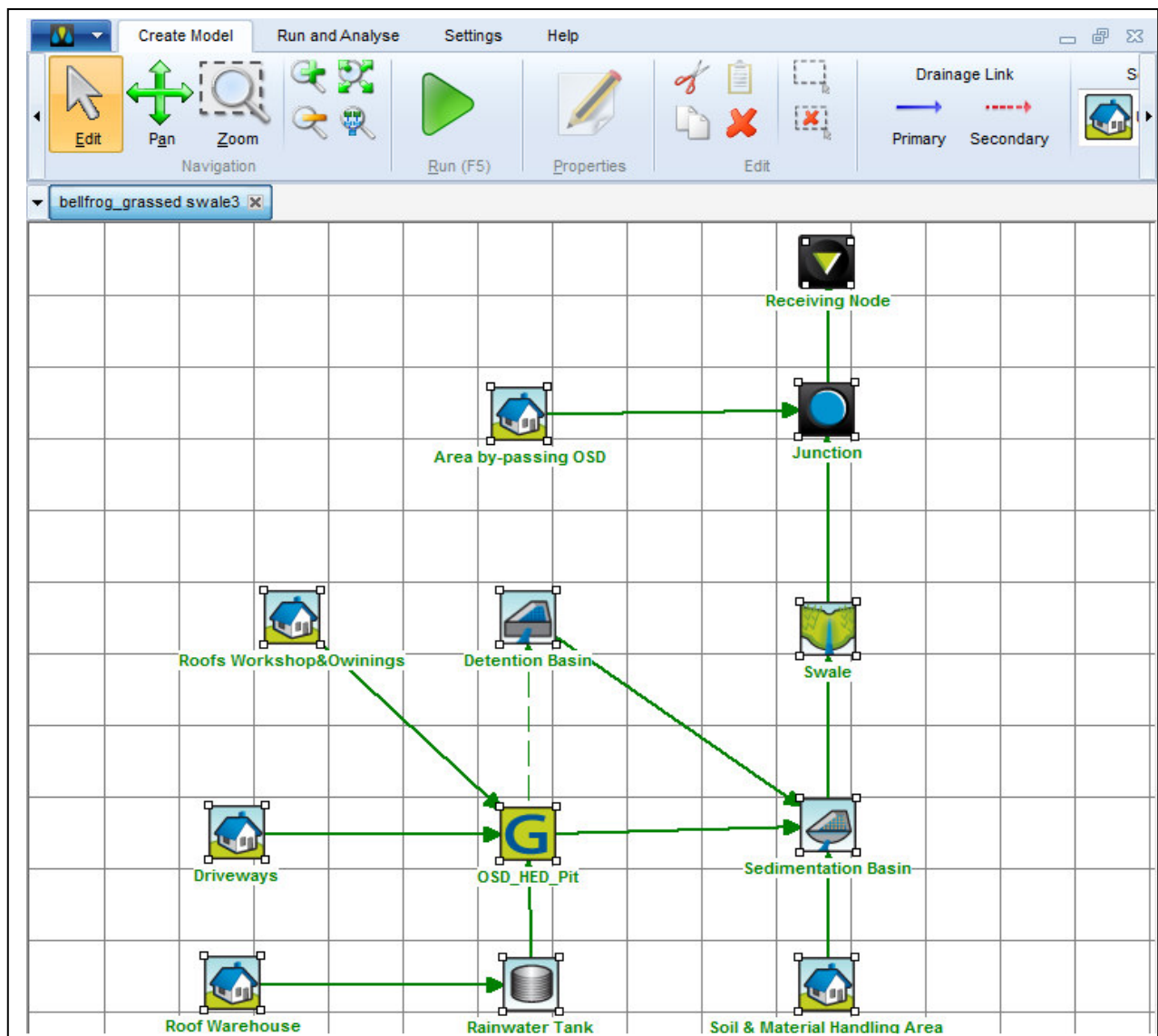
The following treatment train is proposed:

Use a 10 KL rainwater tank to collect and store warehouse roof runoff and re-use it for toilet flushing. It was assumed that 15 people would be using the toilets with a total of 300 l/day.

Incorporate the OSD into the treatment train with the 23 l/s as a low flow by-pass. Only the excess volume of water would be directed to the OSD storage.

Use a sedimentation basin to remove sediments and also to provide water for irrigation of the landscaped areas with an average of 300 KL/a. The overflow from the sediment basin is directed to a grassed swale. The grassed swale is 20 m long, 5 m wide with a 1% fall.

The schematic model layout is shown below:



5 Modelling Results

The modelling has been completed with the intention to model the post developed water quality runoff condition and ensure that pollutant removal rates satisfy the requirements in the Strathfield City Council Stormwater Quality Control Policy.

The results for the treatment train effectiveness can be seen below.:

Flow (ML/yr)	4.28	1.94	54.7
Peak Flow (m3/s)	0.139	5.58E-02	59.9
Total Suspended Solids (kg/yr)	1.05E+03	56.7	94.6
Total Phosphorus (kg/yr)	1.91	0.293	84.6
Total Nitrogen (kg/yr)	9.96	3.57	64.2
Gross Pollutants (kg/yr)	107	0.946	99.1

As can be seen from the above table the treatment train has been successful in achieving the Council pollution retention criteria.

6 Conclusion

The modelling results above have been determined using pollutant loads obtained from Strathfield City Council (SCC) in the MUSIC program. A treatment train consisting of numerous pollution removal devices has been implemented to provide pollution removal for the developed site.

The treatment train operates as a complete system removing the target pollutants to the required level.

The results of modelling have confirmed the effectiveness of the proposed treatment train which satisfies the BCC Stormwater Quality Control Policy.

7 Operation and Maintenance

The two main parts of the treatment train are rainwater tank, the OSD, the sedimentation basin and the grassed swale.

The operation and maintenance of the rainwater tank can be organised by the management or by an independent contractor. It is preferable that a contractor is engaged who would inspect the rainwater tank systems once a year and undertake repairs and or cleaning as necessary. The maintenance of the sedimentation tank will have to be done by the same contractor as required or a minimum once a year. The contractor will have to check if the pumps/diverters and automatic irrigation systems are operational and the sediment level in the tanks and the PH of the rainwater. RWTs would have to be cleaned once the water becomes acidic.

The maintenance of the OSD system is described in a separate document.

The maintenance of the grassed swale would consist of regular mowing, leaving at least 50 mm of grass. Once a year the maintenance contractor would have to check that the swale surface is uniform, fill in with a top soil any holes or depressions, ensuring that the overflow from the sedimentation tank is spread equally across the entire width of the swale.



Pavel Kozarovski, MIEAust, CPEng, NPER-3

APPENDIX B

CURRICULUM VITAE

CURRICULUM VITAE

MARK TOOKER

Project Director/Strategic Infrastructure Adviser



Qualifications and Affiliations

Bachelor of Engineering Science, Civil
Engineering, UNSW

Masters of Engineering Science, UNSW

Fellow Institution of Engineers Australia

Professional Expertise

Mark's professional expertise over 35 years lies in strategic assessment of urban infrastructure and formulating infrastructure solutions related to urban development. He also has extensive experience in water management and flood management particular for brownfield sites. He has worked in the government and private sector and has significant executive experience in business, development management and project management.

Mark has fulfilled long-duration Project Director level roles and provided strategic advice to governments. His expertise has been recognised in his selection to provide expert advice to Commissions of Enquiry and Land and Environment Court appeals.

He was a Director of a 150-person multi-disciplinary engineering consultancy for 20 years.

Mark worked in state government agencies for 15 years.

Project Experience – a representative selection

Project Director/ Manager/ Advisor: on water management and flooding issues on the following projects:

- Parramatta Government Lands Precinct;
- Penrith Lakes;
- Lords Rd Leichhardt;
- Summer Hill Flour Mill redevelopment;
- Cooks Cove redevelopment;
- Warriewood Valley;
- Penrith Army Lands;
- ADI Site, Eastern Precinct;
- Nelsons Ridge, Greystanes;
- West Dapto;
- Myall River Downs, Tea Gardens;
- Rosedale, Batemans Bay;
- Docklands, Vic;
- Channel 7 redevelopment, Epping;
- East Leppington;
- Dept of Defence sites
 - Moorebank
 - Ermington
 - Leppington
 - Dundas

Project Director on water management for recycling facilities and quarries:

- Chipping Norton Recycling facility;
- Belrose Quarry;
- Smeaton Grange Recycling Facility;
- Newcastle Recycling Facility;
- Penrith Recycling Facility;
- Menangle Quarry;
- Silverwater Recycling Facility;
- Sandy Point Quarry.

Project Leader: urban renewal at Green Square and Balmain Shore – urban infrastructure and flooding investigations and concept design solutions.

Project Leader: provision of urban infrastructure strategy advice for a large residential development in Hurstville and commercial development at Miranda.

Expert Advisor: expert evidence in numerous Land and Environment Court appeals and Commissions of Inquiry.

Prior Experience

Tooker and Associates

(Project Director)

(2017 – present); project director role in formulating solutions to water management and flooding issues in urban development.

NPC (National Project Consultants)

(Project Director)

(2012-2017); strategic role in assessment of infrastructure, project and development management for urban development.

APP Corporation Pty Limited

(Project Director)

(2010 – 2012); strategic role in assessment of infrastructure, project and development management for urban development.

Worley Parsons (Manager, Environment, NSW, VIC, SA)

(2007 – 2010); established Worley Parsons in the urban development consultancy field. Strengthened this offering by establishing new business units of planning and approvals, and sustainability and climate change as well as maintaining a strong role in strategic infrastructure reviews.

Patterson Britton and Partners

(Director)

(1988 – 2007); Director (owner and partner) of a 150-personnel consultancy responsible for managing, business development and strategic direction of the urban development/water management/environment practice as well as Project Director/Manager on strategic infrastructure review projects.

NSW Public Works Department (Project

Manager)

(1978 – 1988); project manager in an increasing role of responsibility on engineering infrastructure projects and on the formulation of government policy. Led a group of five engineers in 1986 to 1988 with responsibility for delivery of projects, managing budgets, liaising with senior government officials and formulating government policy.

Sydney Water Corporation

(1972 – 1978); gained experience in construction, managing contractors, design of water/ sewer systems, deep water ocean outfall designs and the formulation of government policy.

Aussie Skips Recycling Pty Ltd

Po Box 156

Bellfield, NSW, 2191

17 June 2020

Dear Sir,

Re: Environment Protection Licence (EPL) 21389 Section U1.1

The EPL 21389 for the Aussie Skips recycling facility at 13 Bellfrog Street Greenacre in Section U1.1 entitled Water Management and Treatment requires a design of a runoff management system which is consistent with the principles and practices of the Managing Urban Stormwater – Mines and Quarries Volume 2E (Volume 2E).

This letter formulates the design details for the runoff water management system which conforms to the Volume 2E guideline and has been prepared by Mark Tooker who is a professional engineer with over 35 years experience in the management of runoff quantity and quality.

The EPL also has further specifications requiring adoption of a volumetric runoff co-efficient for impervious surfaces of 0.9 and a standard receiving environment for operations longer than 3 years which requires selection of a 90 percentile 5 day rainfall for estimation of the water storage requirement. This also results in an indicative average annual uncontrolled overflow from the storage system of 2 – 4 spills per year (refer Volume 2E Table 6.2).

The Volume 2E storage required on the site to manage the quality of runoff for the 90 percentile 5 day rainfall of 42.6mm (Bankstown – closest area to site) with a runoff co-efficient of 0.9 for the hardstand (3938m²) and 0.3 for the landscaped areas (757m²) is 161KL. This storage would be provided in four 46.4KL above ground tanks with a total storage of 186 KL located on a 50mm steel plate over a 75mm blue metal media treatment zone 300-400mm thick with ag pipes draining to the existing stormwater drainage outlet as generally shown on Figure 1. The media treatment zone would replace the existing grass swale.

The existing runoff water management system on the site consists of a first flush tank (12KL) and sedimentation tank (120KL). These elements would be retained to provide further treatment to runoff on the site.

Runoff from the hardstand would firstly be treated in the first flush tank and then the sedimentation tank. During a storm and as the sedimentation tank is filling with water, the water reuse pump (10 L/s capacity) would activate to deliver water to fill the reuse tanks (10 KL capacity). Once the reuse water tanks are full, the pump would turn off and a second pump in the sedimentation tank (20 L/s) would deliver water to the Volume 2E tanks until they were full. Any excess water in the sedimentation tank would overflow via the existing gravity drainage line to the head of the proposed media treatment zone (replacing the grass swale) and then discharge to the existing stormwater outlet.

The reuse water would be used for dust suppression on the hardstand. The reuse water tanks will be topped up from water in the sedimentation tank and if not available from this source, then they will be topped up with potable water.

The water from each storm in the Volume 2E tanks would be dosed with flocculant as it flows into the tanks and be retained for treatment for a maximum of five days or until the total suspended solids concentration is less than 50mg/L. During this period, if there is no water available in the sedimentation tank, then water will be pumped from the Volume 2E tanks to the sedimentation tank. When water reached the desired quality in the Volume 2E tanks, it will be pumped back to the sedimentation tank for reuse purposes or discharged to the existing stormwater outlet. The Volume 2E tanks then would be empty awaiting the next storm.

The EPL requires that the runoff water reuse be maximised in order to reduce the discharge volume and frequency. The reuse of water for dust suppression onsite would account for approximately 68% of the average annual runoff water entering the Volume 2E storage. The average annual runoff from the site with an annual average rainfall of 868mm would be approximately 3675KL while the reuse for dust suppression would be 2mm deep water over the site hardstand for the 318 average annual dry days would be 2505KL. This amount of reuse would significantly reduce the volume and frequency of controlled discharges from the Volume 2E storages.

Further measures which would be incorporated on site to manage the runoff water quality would be:

1. The runoff would pass firstly through the existing first flush tank (12KL) and then the sedimentation tank (120KL) in which significant removal of solids would occur prior to entering the Volume 2E storage tanks;
2. The existing grates on the drainage inlet pits in the soil and materials handling area would be covered by geotextile to remove solids prior to the entry to the stormwater drainage system;
3. All stormwater pits and tanks would be cleaned regularly and as required;
4. Preventing prohibited material, if found, from contacting stormwater;
5. Preventing uncovered temporary storage of higher risk materials; and
6. Providing covers or containers for sorting and handling of higher risk materials.

In summary, the volume of storage required onsite to satisfy the Volume 2E guidelines is 161KL. The water management proposal for the site will greatly exceed these requirements with:

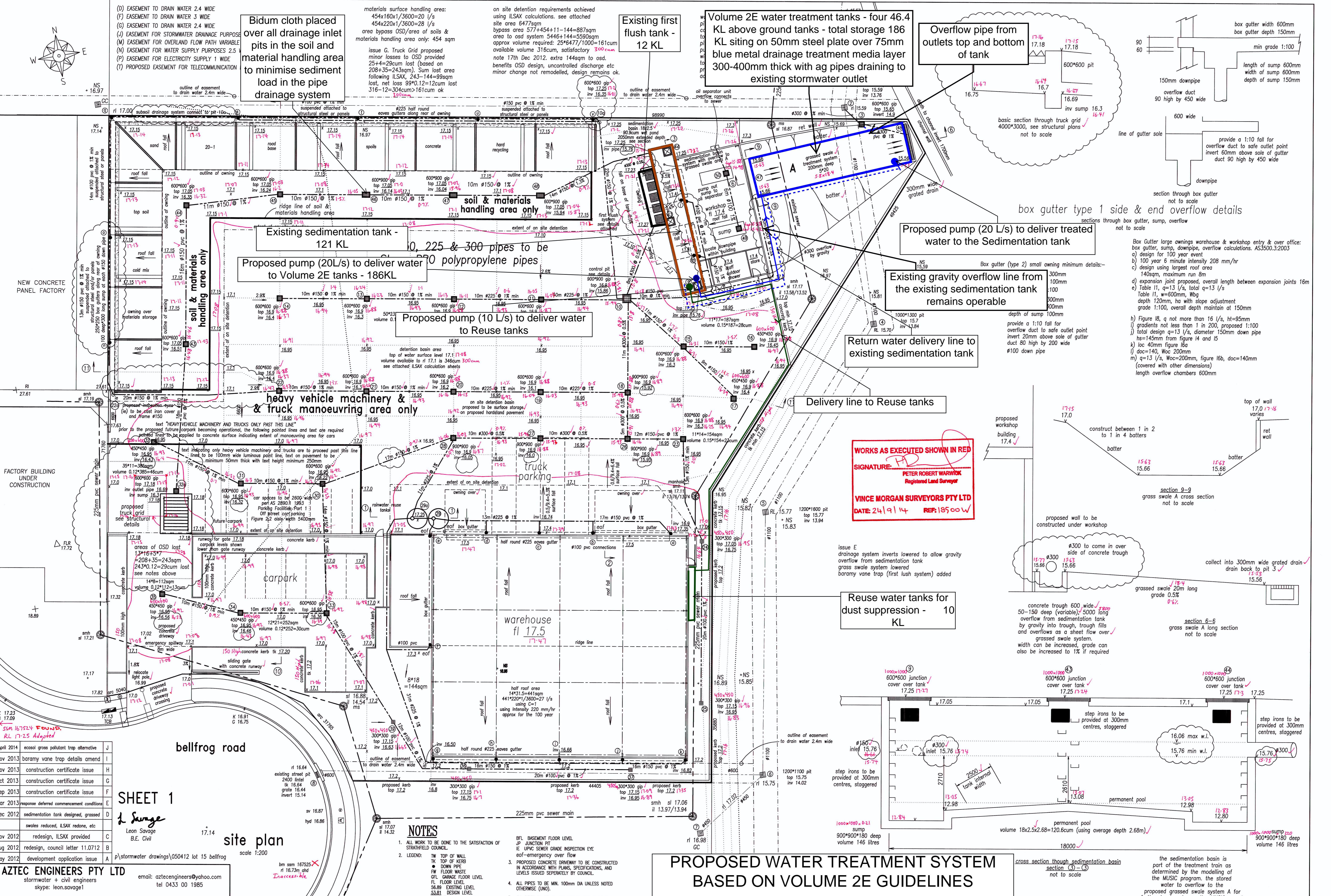
- a. 185.6KL of new Volume 2E above ground storages;
- b. 132KL of existing treatment storages as well as further treatment in a media treatment area;
- c. An average annual reuse of 68% of the site runoff which will significantly reduce the controlled discharges from the site;
- d. Further improvements in runoff water quality achieved by the six additional measures as proposed in the list above.

The combination of all these measures will ensure that the runoff water quality from the site will readily conform to the requirements of the Volume 2E guidelines.



Mark Tooker Director

FIGURE 1



Bidum cloth placed over all drainage inlet pits in the soil and material handling area to minimise sediment load in the pipe drainage system

materials surface handling area: 454x160x1/3600=20 l/s
454x220x1/3600=28 l/s
area bypass OSD/area of soils & materials handling area only: 454 sqm
issue G. Truck Grid proposed minor losses to OSD provided 25+4=29cum lost (based on 208+35=243sqm). Sum lost area following ILSAX, 243-144=99sqm lost, net loss 99+12=111cum lost 316-12=304cum=161cum ok

Existing first flush tank - 12 KL

Volume 2E water treatment tanks - four 46.4 KL above ground tanks - total storage 186 KL sitting on 50mm steel plate over 75mm blue metal drainage treatment media layer 300-400mm thick with ag pipes draining to existing stormwater outlet

Overflow pipe from outlets top and bottom of tank

Existing sedimentation tank - 121 KL
Proposed pump (20L/s) to deliver water to Volume 2E tanks - 186KL

Proposed pump (10 L/s) to deliver water to Reuse tanks

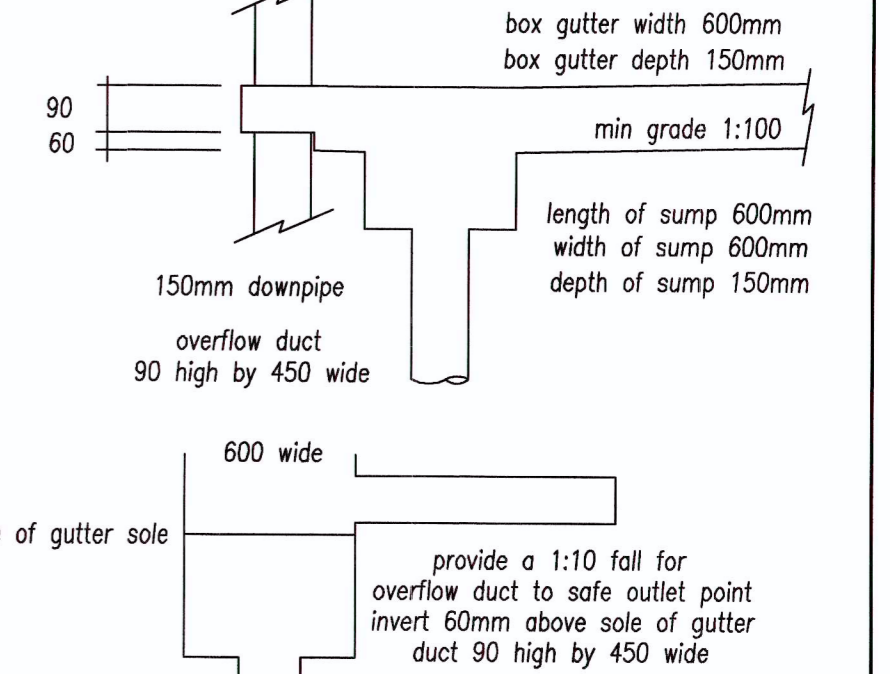
Existing gravity overflow line from the existing sedimentation tank remains operable

Return water delivery line to existing sedimentation tank

Delivery line to Reuse tanks

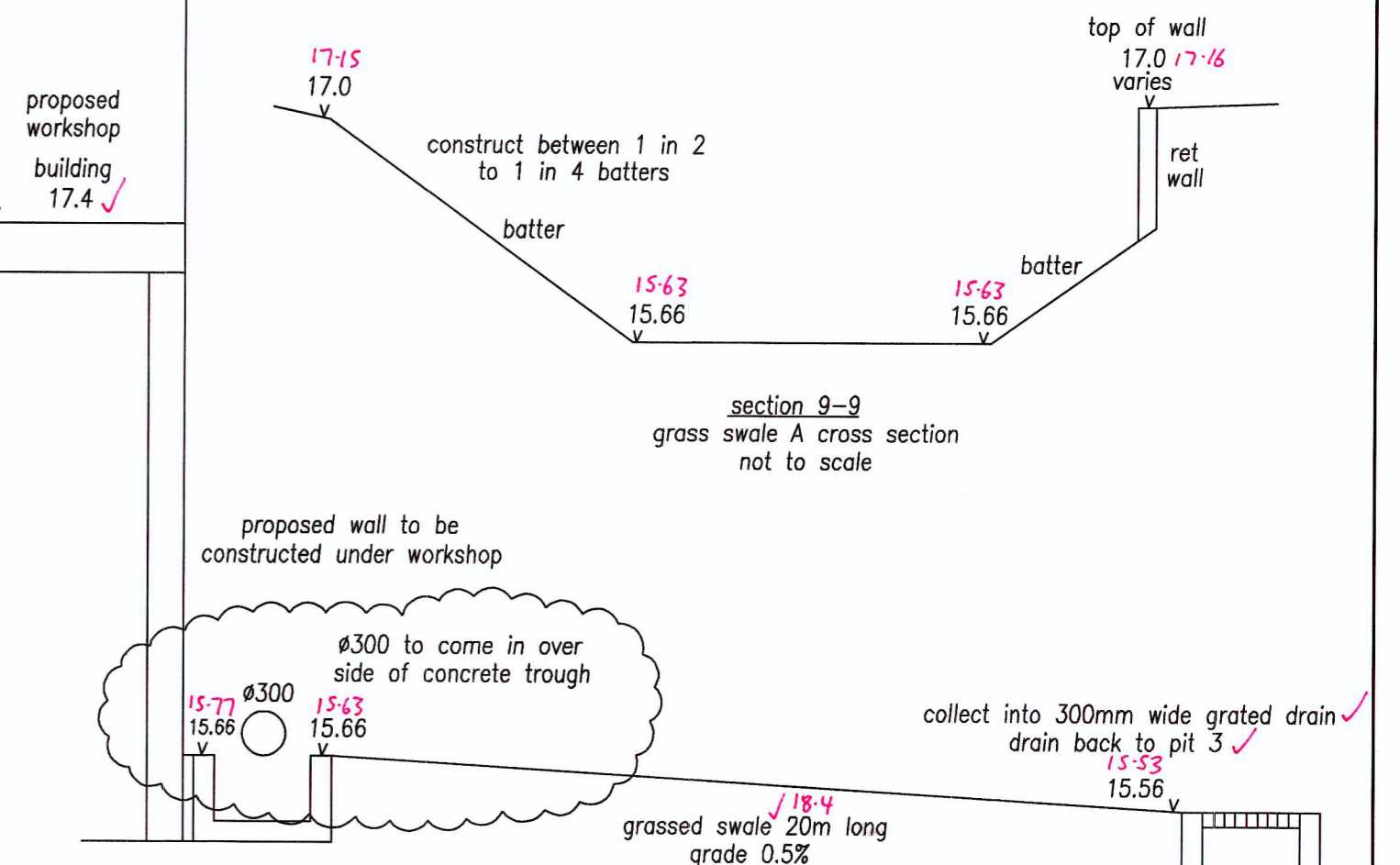
WORKS AS EXECUTED SHOWN IN RED
SIGNATURE: PETER ROBERT WARWICK
Registered Land Surveyor
VINCE MORGAN SURVEYORS PTY LTD
DATE: 24/1/14 REF: 18500W

Reuse water tanks for dust suppression - 10 KL

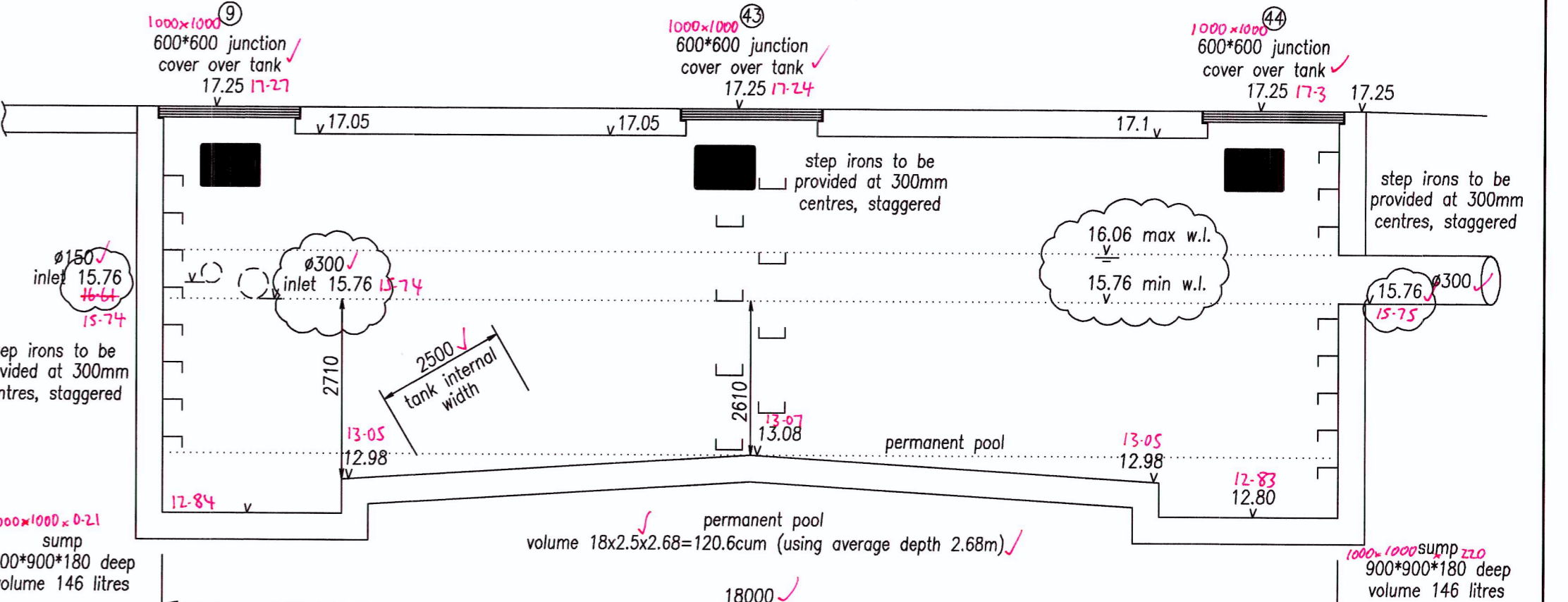


box gutter type 1 side & end overflow details

- Box Gutter large awnings warehouse & workshop entry & over office: box gutter, sump, downpipe, overflow calculations. AS3500.3:2003
- design for 100 year event
 - 100 year 6 minute intensity 208 mm/hr
 - design using largest roof area
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 - Figure 18, q not more than 16 l/s, ht=95mm
 - total design q=13 l/s, diameter 150mm down pipe hs=145mm from figure 14 and 15
 - loc 40mm figure 16a
 - doc=140, Woc=200mm
 - q=13 l/s, Woc=200mm, figure 16b, doc=140mm (covered with other dimensions)
 - length overflow chambers 600mm



concrete trough 600 wide / 50-150 deep (variable); 5000 long overflow from sedimentation tank by gravity into trough, trough fills and overflows as a sheet flow over grassed swale system. width can be increased, grade can also be increased to 1% if required



the sedimentation basin is part of the treatment train as determined by the modelling of the MUSIC program. the stored water to overflow to the proposed grassed swale system A for further treatment. see the MUSIC report.

SHEET 1
2. Surge
Leon Savage
B.E. Civil
17.14
scale 1:200

April 2014	ecoloss gross pollutant trap alternative	J
Nov 2013	barany vane trap details amend	I
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May 2012	development application issue	A

stormwater drawings\050412 lot 15 bellfrog

- NOTES**
- ALL WORK TO BE DONE TO THE SATISFACTION OF STRATHFIELD COUNCIL.
 - LEGEND:
 - TW TOP OF WALL
 - TK TOP OF KERB
 - DN DOWN PIPE
 - FW FLOOR WASTE
 - GFL GARAGE FLOOR LEVEL
 - FL FLOOR LEVEL
 - SL EXISTING LEVEL
 - SD DESIGN LEVEL
 - GP GRATED INLET PIT
 - PROPOSED CONCRETE DRIVEWAY TO BE CONSTRUCTED IN ACCORDANCE WITH PLANS, SPECIFICATIONS, AND LEVELS ISSUED SEPARATELY BY COUNCIL.
 - ALL PIPES TO BE MIN. 100mm DIA UNLESS NOTED OTHERWISE (UNO).
 - ALL PIPES TO BE GRADE UPVC AT MIN 1% UNO.

PROPOSED WATER TREATMENT SYSTEM BASED ON VOLUME 2E GUIDELINES

this is the main stormwater drainage, rainwater reuse & on site detention plan

construction certificate issue

13 Bellfrog Street, Greenacre

Air quality impact assessment

Prepared for Aussie Skips Recycling Pty Ltd
October 2019

EMM Sydney
Ground floor, 20 Chandos Street
St Leonards NSW 2065

T 02 9493 9500

E info@emmconsulting.com.au

www.emmconsulting.com.au

13 Bellfrog Street, Greenacre

Air quality impact assessment

Report Number

J190513 RP1

Client

Aussie Skips Recycling Pty Ltd

Date

16 October 2019

Version

v1 Final

Prepared by

Reviewed by



Scott Fishwick

Associate – National Technical Leader, Air Quality

16 October 2019

Francine Manansala

Associate – Air Quality

16 October 2019

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Executive Summary

EMM Consulting Pty Ltd (EMM) has been engaged to complete an air quality impact assessment (AQIA) of the Aussie Recycling facility located at 13 Bellfrog Street Greenacre (the site) on behalf of Aussie Skips Recycling Pty Ltd (Aussie Skips).

In undertaking this AQIA, existing environment conditions were quantified primarily using the Bureau of Meteorology monitoring station at Canterbury Racecourse and the NSW Department of Industry, Planning and Environment air quality monitoring station at Chullora. Emissions from the Hanson Greenacre concrete batching plant were explicitly modelled to represent local cumulative impacts.

Emissions of total suspended particulates (TSP), particulate matter less than 10 microns in aerodynamic equivalent diameter (PM₁₀) and particulate matter less than 2.5 microns in aerodynamic equivalent diameter (PM_{2.5}) were calculated for proposed 200,000 tpa throughput operations.

Emissions were calculated for both peak day and average day operations of the site. Emissions were quantified using publicly available emission estimation techniques. Existing and proposed particulate matter mitigation measures were incorporated into the emission calculations.

Atmospheric dispersion modelling predictions of air pollution emissions for site activities were undertaken using the AERMOD dispersion model. The results of the dispersion modelling show that:

- the predicted air quality impacts from proposed 200,000 tpa operations are well below the applicable assessment criteria at the closest residential receptors to site boundary, and would not result in additional cumulative (accounting for background) exceedances of NSW EPA impact assessment criteria at any surrounding residential receptor;
- the predicted air quality impacts at neighbouring industrial receptors are low and are generally predicted to comply with NSW EPA impact assessment criteria; and
- where exceedances were predicted (24-hour average PM₁₀ and annual average PM_{2.5}), the exceedance was demonstrated to be dominated by background (ie influenced by regional emission source) rather than any contribution from site or local industrial emissions sources and therefore not considered significant.

On the basis of the results of the dispersion modelling conducted, emissions from the proposed 200,000 tpa operations at the site are not anticipated to adversely impact the surrounding environment.

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1 Introduction

1.1 Overview

EMM Consulting Pty Ltd (EMM) has been engaged to complete an air quality impact assessment (AQIA) of the Aussie Recycling facility located at 13 Bellfrog Street Greenacre (the site) on behalf of Aussie Skips Recycling Pty Ltd (Aussie Skips). The regional setting of the site is illustrated in Figure 1.1.

A development application (DA) for the construction of an industrial warehouse building with an associated workshop and use as a materials storage yard at the site was lodged by Dunmain Pty Ltd in September 2012 and approved by Strathfield Council in February 2013. The site is leased by Aussie Skips from Dunmain and is currently used for the receipt, storage and export of soils, aggregates, virgin excavated natural material (VENM) and other similar waste materials. The DA approved site layout is presented in Figure 1.2.

Aussie Skips applied for an environment protection licence (EPL) from the NSW Environment Protection Authority (NSW EPA) in February 2019 to receive up to 200,000 tonnes per annum (tpa) of general solid waste (non-putrescible).

The EPL application was refused by NSW EPA in a letter dated 5 July 2019. One reason for EPL refusal provided by the NSW EPA in the letter related to the absence of an air assessment for the site. Specifically, the NSW EPA had the following comments relating to air quality:

13. The EPA notes that the EPL application did not address the possibility of air quality impacts from proposed activities. The Applicant has not provided any rigorous assessment relating to air pollution at the Premises. Therefore, the EPA is unable to adequately assess the potential for air emissions and impacts from the proposed activities.

14. The Applicant did not complete an air quality impact assessment that assessed the potential impacts in accordance with the NSW EPA's guidelines, including the *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW* (DEC, 2016); *Approved Methods for the Sampling and Analysis of Air Pollutants in NSW* (DEC, 2007); *Assessment and Management of Odour from Stationary Sources in NSW* (DEC, 2006); *Technical Notes: Assessment and Management of Odour from Stationary Sources in NSW* (DEC, 2006); *Load Calculation Protocol for use by holders of NSW Environment Protection Licences when calculating Assessable Pollutant Loads* (DECC, 2009).

15. The Applicant also did not describe management and mitigation measures including specifications of pollution control equipment (including manufacturer's performance guarantees where available) and management protocols for both point and fugitive emissions.

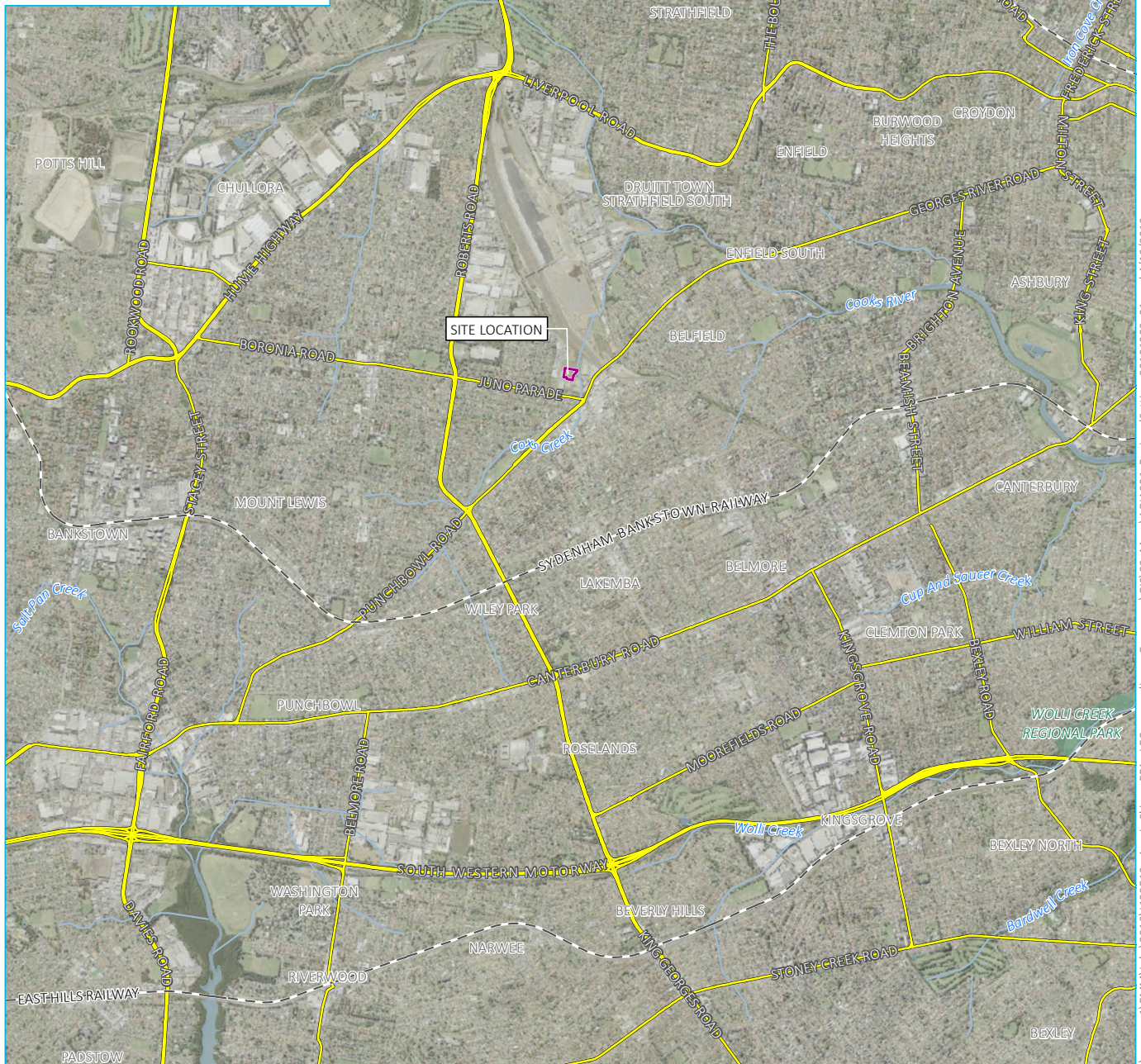
1.2 Assessment approach and requirements

This AQIA has been prepared generally in accordance with the guidelines specified by the NSW EPA in the *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (EPA 2016), hereafter 'the Approved Methods for Modelling'. Consistent with Section 2.1 of the Approved Methods for Modelling, this AQIA is classed as a Level 2 assessment and implements a refined dispersion modelling approach using site-specific/representative input data.

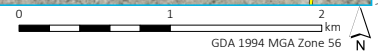
The AQIA is comprised of the following sections:

- a description of the local setting and surrounds of the site;
- relevant pollutants for assessment and applicable impact assessment criteria;

- a description of baseline inputs, specifically:
 - meteorology and climate; and
 - existing air quality environment;
- a detailed air pollution emissions inventory for the site (proposed 200,000 tpa operations); and
- results of atmospheric dispersion modelling conducted for the site, including an analysis of site-only and cumulative impacts accounting for baseline air quality.



Source: EMM (2019); DFSI (2017); GA (2011)



- KEY**
- Site boundary
 - Rail line
 - Main road
 - Watercourse/drainage line
 - Waterbody
 - NPWS reserve

Regional setting

Aussie Recycling Greenacre
Air quality impact assessment
Figure 1.1



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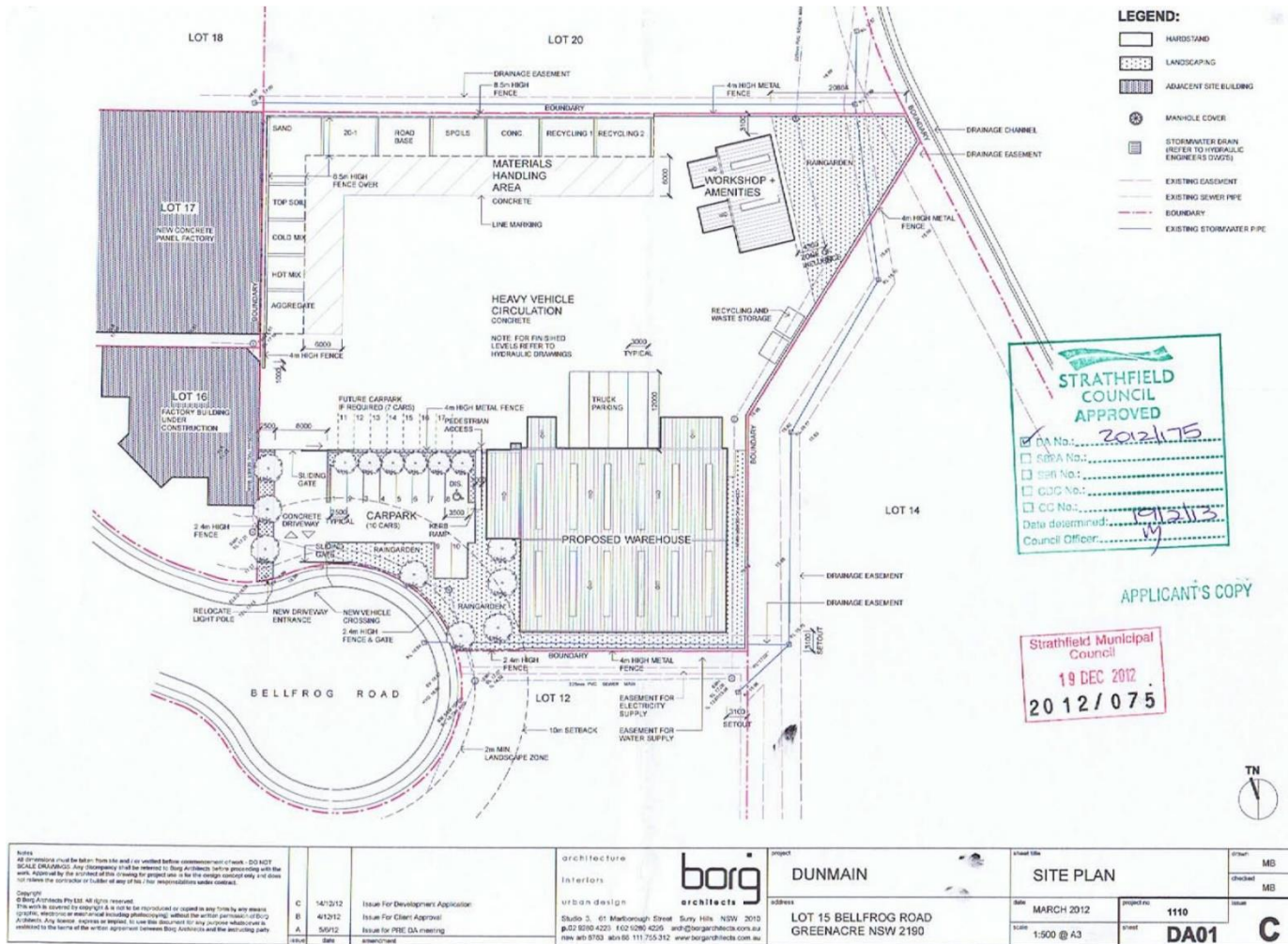


Figure 1.2 DA approved site plan – February 2013

2 Site description and setting

2.1 Site description and existing operations

The site is located within an existing industrial area in Greenacre, NSW. The surrounding lots along Bellfrog Street are a mixture of warehouses and industrial operations, including the Hanson Greenacre concrete batching plant (CBP) immediately to the north of the site. Further afield from Bellfrog Street is the Sydney Ports Enfield Intermodal site to the north, an additional industrial site to the east and residential dwellings to the south and west.

As stated, the site is currently used for the receipt, storage and export of loads made up of predominately soils, aggregates, concrete, asphalt, VENM and other similar waste materials.

The site features a site entrance and car parking area, concrete hardstand yard, material storage bunkers along the western and northern boundaries of the yard, workshop and amenity structures in the northeast corner and a warehouse structure at the southern boundary. The site is entirely sealed with concrete except for the grassed raingarden and landscaped areas.

Material is delivered to site by road truck, typically in loads of approximately 30 t. Trucks are weighed and unloaded adjacent to the material storage bunkers. Material is handled at the storage bunkers by a front end loader (FEL) and excavator. Sifting and sorting of material is conducted by excavator fitted with a sieve bucket. Stored material is loaded to trucks by FEL for export from site. There is no crushing, screening or processing of material at the site.

The site operates between 6.00 am and 5.00 pm, Monday to Saturday and 7.00 am to 5.00 pm on Sundays.

A site visit was conducted by EMM in September 2019 to observe existing operations. The following photos provide a visualisation of site operations:

- Photograph 2.1 – site entrance with an incoming truck shown;
- Photograph 2.2 - active wheel wash system at the site entrance to clean the wheels of exiting trucks;
- Photograph 2.3 – an example of one of the three water cannons installed on the awnings as per the attached plan of the main yard;
- Photograph 2.4 – active water cannon at the site entrance;
- Photograph 2.5 – stored material within a bunker;
- Photograph 2.6 – the awning over the material storage bunkers and installed water misting spray heads; and
- Photograph 2.7 – FEL loading material to a truck for export from site.



Photograph 2.1 Truck delivering material to site



Photograph 2.2 Active wheel wash at site entrance



Photograph 2.3 **Example of installed water cannon at southern boundary**



Photograph 2.4 Active water cannon at site entrance



Photograph 2.5 **Stored material in bunker at site (concrete block side walls and awning roof visible)**



Photograph 2.6 Awning over storage bunkers – installed misting sprays circled



Photograph 2.7 FEL loading material to truck for export from site

2.2 Receptor locations

As stated, the site is in an industrial estate, with the closest residential dwellings located 100 m to the west and south of the site. In order to assess potential impacts from the site, a mixture of residential and industrial receptors have been selected as representative of the surrounding environment. Representative receptor locations are presented in Table 2.1 and are illustrated in shown in Figure 2.1. These locations are used as points for detailed model analysis of air quality impacts from the site.

It is noted that several of these receptor locations, including the Hanson Greenacre CBP, are themselves potential sources of air pollution emissions (further discussion in Section 5.1). Nevertheless, these locations are included within this AQIA. Adherence with applicable air quality impact assessment criteria at these locations would indicate that air quality criteria will be met at other surrounding receptors.

Table 2.1 **Representative sensitive receptor locations**

ID	Location (m, MGA56S)		Receptor type
	Easting	Northing	
R1	321932	6246346	Industrial
R2	321891	6246341	Industrial
R3	321847	6246361	Industrial
R4	321846	6246439	Industrial
R5	321894	6246394	Industrial
R6	321885	6246446	Industrial
R7	322004	6246385	Industrial
R8	321898	6246509	Industrial
R9	321845	6246472	Industrial
R10	321851	6246506	Industrial
R11	321855	6246564	Industrial
R12	321861	6246595	Industrial
R13	321908	6246638	Industrial
R14	321875	6246661	Industrial
R15	322072	6246418	Industrial
R16	321940	6246276	Residential
R17	321821	6246287	Residential
R18	321791	6246372	Residential
R19	321808	6246508	Residential
R20	321817	6246588	Residential



Source: EMM (2019); DFSI (2017); GA (2011)

0 50 100
m
GDA 1994 MGA Zone 56

KEY

- Site boundary
- Watercourse/drainage line
- Cadastral boundary
- Receptor location types
- Industrial (15)
- Residential (5)

Representative receptor locations

Aussie Recycling Greenacre
Air quality impact assessment
Figure 2.1



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3 Pollutants and assessment criteria

3.1 Potential air pollutants

The operation of the site has the potential to generate emissions of various air pollutants to the ambient atmosphere. Emission sources will comprise of a mixture of fugitive (material handling and transfer, movement of mobile plant and equipment, wind erosion of exposed surfaces) and mobile combustion sources (diesel combustion by site equipment fleet and trucks). Air pollutants will comprise of:

- particulate matter, specifically:
 - total suspended particulate matter (TSP);
 - particulate matter less than 10 microns in aerodynamic diameter (PM₁₀);
 - particulate matter less than 2.5 microns in aerodynamic diameter (PM_{2.5}).
- oxides of nitrogen (NO_x);
- sulphur dioxide (SO₂);
- carbon monoxide (CO); and
- volatile organic compounds (VOCs).

Particulate matter pollutants (TSP, PM₁₀ and PM_{2.5}) are anticipated to be the critical pollutants with regards to both magnitude of emissions generated by the site and the associated compliance with impact assessment criteria at surrounding receptors. This assessment will therefore focus on the quantification of particulate matter emissions and impacts (fugitive releases and diesel combustion related particulate matter). Emissions and impacts from other pollutants associated with diesel combustion (NO_x, SO₂, CO and VOCs) are expected to be minor and have not been addressed further in this assessment.

The site would not receive or store any potentially odorous materials. Consequently, no further consideration to odour is given in this assessment.

The assessment of the site's compliance with the relevant criteria applicable to particulate matter, under proposed operations at 200,000 tpa, is presented in the following sections. The site should demonstrate compliance with the impact assessment criteria outlined in the Approved Methods for Modelling (EPA 2016). The impact assessment criteria are designed to maintain ambient air quality that allows for the adequate protection of human health and well-being.

3.2 Applicable air quality assessment criteria

The NSW EPA's impact assessment criteria for particulate matter pollutants, as documented in Section 7 of the Approved Methods for Modelling, are presented in Table 3.1. The NSW EPA assessment criteria for PM₁₀ and PM_{2.5} are consistent with revised National Environment Protection (Ambient Air Quality) Measure (AAQ NEPM) national reporting standards (National Environment Protection Council [NEPC] 1998; NEPC 2015).

TSP, which relates to air borne particles less than 50 micrometres (µm) in diameter, is used as a metric for assessing amenity impacts (reduction in visibility, dust deposition and soiling of buildings and surfaces) rather than health

impacts (EPA 2013). Particles less than 10 µm and 2.5 µm in diameter, a subset of TSP, are fine enough to enter the human respiratory system and can lead to adverse human health impacts. The NSW EPA impact assessment criteria for PM₁₀ and PM_{2.5} are therefore used to assess the potential impact to human health from particulate matter concentrations.

The Approved Methods for Modelling classifies TSP, PM₁₀, PM_{2.5} and dust deposition as criteria pollutants. Assessment criteria for ‘criteria pollutants’ are applied at the nearest existing or likely future off-site sensitive receptor and compared against the 100th percentile (ie the highest) dispersion modelling prediction. Both the incremental and cumulative impacts need to be presented, requiring consideration of existing ambient background concentrations for the criteria pollutants assessed.

For dust deposition, the NSW EPA (2016) specify criteria for project-only increment and cumulative dust deposition levels. Dust deposition impacts are derived from TSP emission rates and particle deposition calculations in the dispersion modelling process.

Table 3.1 Impact assessment criteria for particulate matter

PM metric	Averaging period	Assessment criteria
TSP	Annual	90 µg/m ³
PM ₁₀	24-hour	50 µg/m ³
	Annual	25 µg/m ³
PM _{2.5}	24-hour	25 µg/m ³
	Annual	8 µg/m ³
Dust deposition	Annual	2 g/m ² /month (project increment only)
		4 g/m ² /month (cumulative)

Notes: µg/m³: micrograms per cubic meter; g/m²/month: gram per square meter per month

4 Meteorology and climate

4.1 Monitoring data resources

The site is not required to and does not measure meteorological parameters. In reviewing the meteorological and climate environments of the project area, the following data were used:

- 1-hour average meteorological data and historical climate data from the Bureau of Meteorology (BoM) Automatic Weather Station (AWS) at Canterbury Racecourse (Station Number 066194) and Bankstown Airport (Station Number 061078) located 3.5 km east and 8 km west-southwest of the site, respectively.

4.2 Meteorological modelling

Section 4.1 of the Approved Methods for Modelling specifies that meteorological data representative of a site can be used in the absence of suitable on-site observations. Data should cover a period of at least one year with a percentage completeness of at least 90%. Site representative data can be obtained from either a nearby meteorological monitoring station or synthetically generated using the CSIRO prognostic meteorological model The Air Pollution Model (TAPM).

As stated, hourly average meteorological data from the BoM Canterbury Racecourse and Bankstown Airport monitoring stations were obtained in the absence of on-site monitoring at the site. Data from the Canterbury Racecourse AWS was used as the primary resource, with observations from the Bankstown Airport AWS adopted for cloud cover observations.

To supplement these meteorological observation datasets, the CSIRO meteorological model TAPM was used to generate parameters not routinely measured, specifically the vertical temperature profile.

TAPM was configured and run in accordance with the methodology provided in Section 4.5 of the Approved Methods for Modelling (NSW EPA, 2016), with the following refinements:

- modelling to 300 m grid cell resolution (beyond 1 km resolution specified); and
- inclusion of high resolution (90 m) regional topography (improvement over default 250 m resolution data).

The TAPM vertical temperature profile for every hour was adjusted by first substituting the predicted 10 m above ground temperature with hourly recorded temperature at 10 m (sourced from the Canterbury Racecourse AWS). The difference between the TAPM predicted temperature and the measured 10 m temperature was applied to the entire predicted vertical temperature profile.

On the basis of similarities in inter-annual trends in wind speed and direction (Section 4.3) for the years between 2014 and 2018, 2017 was considered suitably representative of the Canterbury Racecourse AWS for use in the assessment to meet the requirements of the Approved Methods for Modelling.

4.3 Prevailing winds

A wind rose showing wind speed and direction data recorded at the Canterbury Racecourse AWS by year between 2014 and 2018 is presented in Figure 4.1. Across all years of analysed data, the annual recorded wind pattern is dominated by a general northwest and southeast alignment or air flow, with an additional northeast element evident. Highest wind speeds recorded are most frequently experienced from the southeast and northeast. The average recorded wind speed across all years was between 2.9 m/s and 3.1 m/s, with a frequency of calm conditions (wind speeds less than 0.5 m/s) between 18.4% and 19.4% of the time across all analysed years.

Seasonal and diurnal wind roses for the Canterbury Racecourse AWS data recorded between 2014 and 2018 are provided in Appendix A.

Seasonal and diurnal (dividing each 24-hour period into night and day) wind roses for the Canterbury Racecourse AWS meteorological dataset are presented in Appendix A. Pronounced seasonal variation is evident in the data recorded at the Canterbury Racecourse AWS. The southeast and northeast components are most defined in summer and spring. Air flow from the west to northwest are most prevalent in winter. Wind speed is greatest during summer and spring, while the incidence of calms is greatest during the autumn months.

Diurnal variation is also evident at the Canterbury Racecourse AWS. While the directional pattern between night and day hours is similar, the wind speeds are notably lower during the night and early morning hours. Calm conditions are notably higher during the night hours.

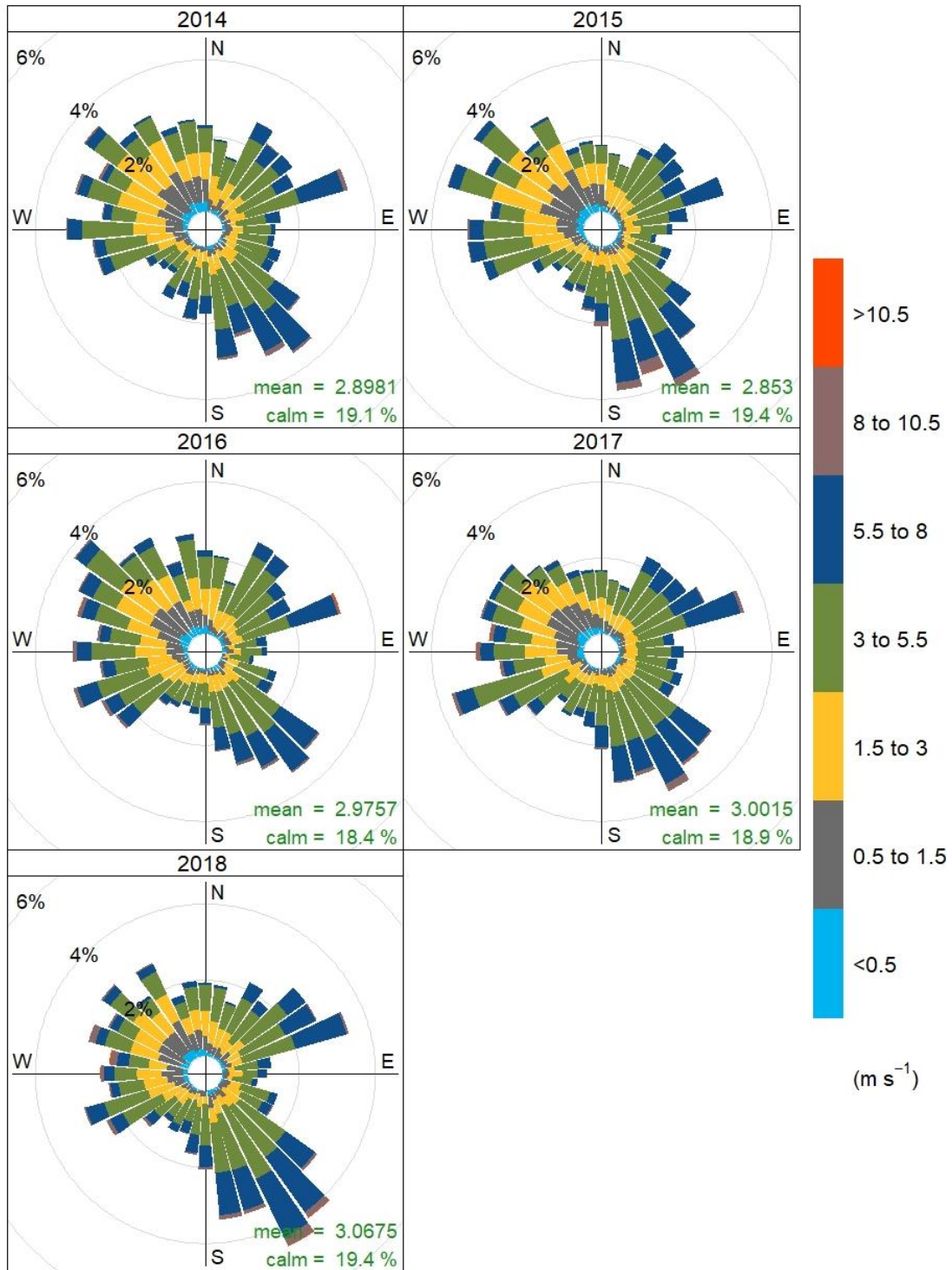
4.4 Atmospheric stability and mixing depth

Atmospheric stability refers to the degree of turbulence or mixing that occurs within the atmosphere and is a controlling factor in the rate of atmospheric dispersion of pollutants.

The Monin-Obukhov length (L) provides a measure of the stability of the surface layer (ie the layer above the ground in which vertical variation of heat and momentum flux is negligible; typically about 10 % of the mixing height). Negative L values correspond to unstable atmospheric conditions, while positive L values correspond to stable atmospheric conditions. Very large positive or negative L values correspond to neutral atmospheric conditions.

Figure 4.2 illustrates the seasonal variation of atmospheric stability derived from the Monin-Obukhov length calculated by AERMET based on the Canterbury Racecourse AWS dataset. The diurnal profile presented illustrates that atmospheric instability increases during daylight hours as convective energy increases, whereas stable atmospheric conditions prevail during the night-time. This profile indicates that the potential for atmospheric dispersion of emissions would be greatest during daytime hours and lowest during evening through to early morning hours.

Hourly-varying atmospheric boundary layer depths were generated by AERMET, the meteorological processor for the AERMOD dispersion model. The variation in average boundary layer depth by hour of the day is illustrated in Figure 4.3. Greater boundary layer depths are experienced during the daytime hours, peaking in the mid to late afternoon. Higher daytime wind velocities and the onset of incoming solar radiation increases the amount of mechanical and convective turbulence in the atmosphere. As turbulence increases so too does the depth of the boundary layer, generally contributing to higher mixing depths and greater potential for atmospheric dispersion of pollutants.



Frequency of counts by wind direction (%)

Figure 4.1 Inter-annual comparison of recorded wind speed and direction – Canterbury Racecourse AWS – 2014 to 2018

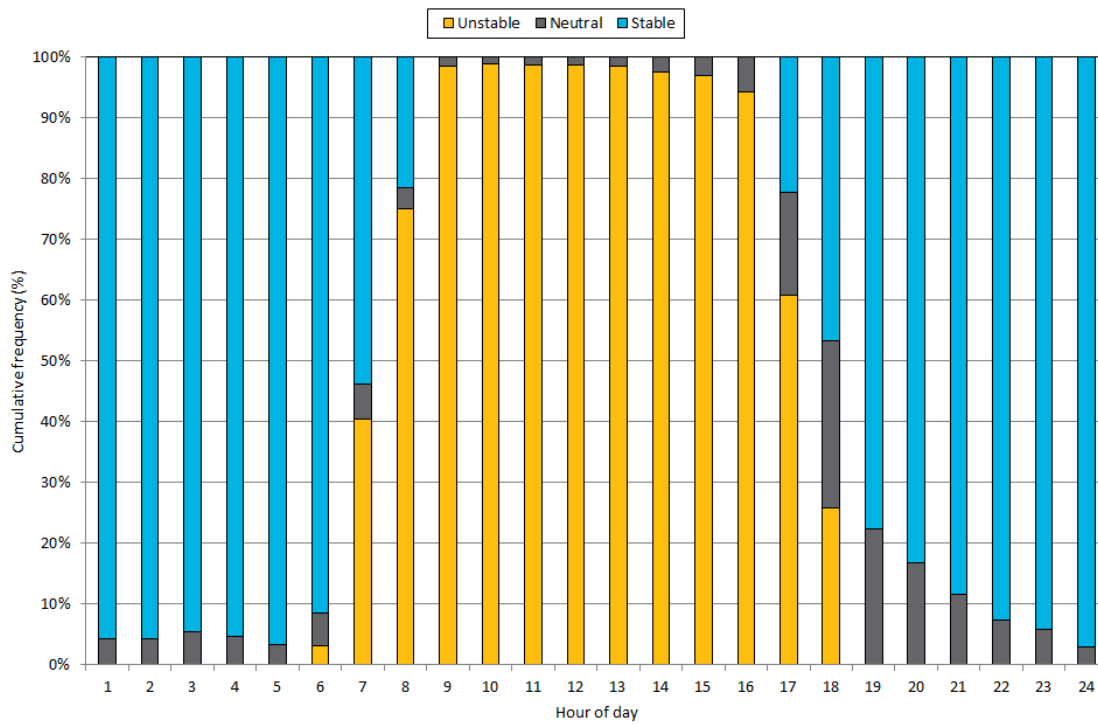


Figure 4.2 AERMET-calculated diurnal variation in atmospheric stability– Canterbury Racecourse AWS 2017

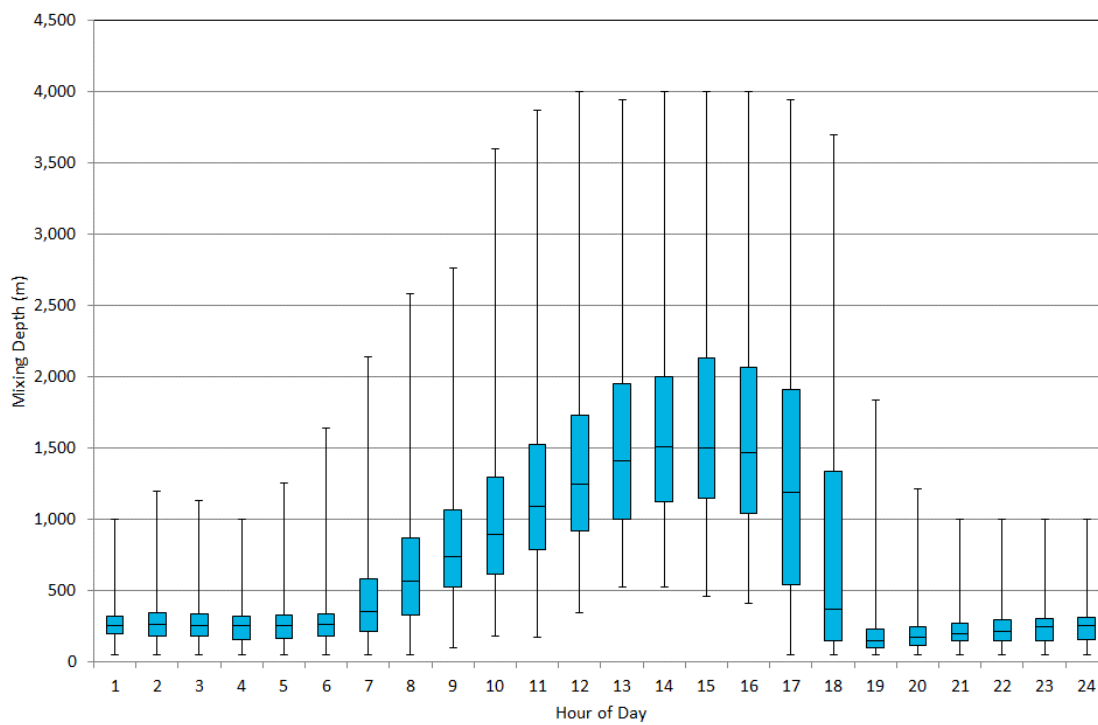


Figure 4.3 AERMET-calculated diurnal variation in atmospheric mixing depth – Canterbury Racecourse 2017

5 Baseline air quality

5.1 Existing sources of emissions

The site is located within an existing industrial estate with several potential emission sources in the immediate surrounding area, including:

- Hanson Greenacre CBP – located immediately to the north of the site;
- D & M Excavations and Asphalt yard – 100 m to the north of the site;
- Sadliers Logistics Centre – 100 m to the north-east of the site;
- Sydney Ports Enfield Intermodal Terminal – 500 m to the north of the site; and
- Bingo Greenacre recycling facility – 700 m to the north of the site.

With the exception of the Hanson Greenacre CBP, the above operations are likely to be minor in emissions or sufficiently distant from the site to avoid direct cumulative impacts at the surrounding receptor locations. Consequently, the emissions from these industrial operations in the surrounding area are assumed to be accounted for in the baseline air quality described in Section 5.3. Emissions and impacts from the Hanson Greenacre CBP are presented in Section 5.1.1.

5.1.1 Hanson Greenacre CBP emissions and impacts

In order to account for emissions from the Hanson Greenacre CBP, relevant emission estimates in the public domain were referenced. The Hanson Greenacre CBP was approved in 2010 and no relevant air quality impact assessment for that operation could be sourced from the public domain. However, it is noted that the traffic assessment for the Hanson Eastern Creek CBP (Transport and Traffic Planning Associates 2019) used traffic count data from the Hanson Greenacre CBP on the basis that the production capacity was very similar between the two operations. Consequently, the particulate matter emissions inventory presented in the air quality impact assessment completed for the Hanson Eastern Creek CBP (Pacific Environment 2018) has been adopted to represent emissions from the Hanson Greenacre CBP.

Annual emission totals based on average day and peak day activity rates from the Hanson Eastern Creek CBP (Pacific Environment 2018) and adopted for the Hanson Greenacre CBP are presented in Table 5.1.

Table 5.1 Adopted annual particulate matter emissions for Hanson Greenacre CBP

Pollutant	Annual emissions (kg/annum)	
	Average day	Peak day
TSP	530	1,364
PM ₁₀	211	488
PM _{2.5}	29	73

Source: Table 6-1 of Pacific Environment 2018

In order to account for the local impact from the Hanson Greenacre CBP at the selected sensitive receptor locations, emissions presented in Table 5.1 were modelled as volume sources configured following the observed on-site truck transport route at the Hanson Greenacre CBP site. Peak day emissions were used to predict maximum 24-hour average concentrations of PM₁₀ and PM_{2.5}, while average day emissions were used to predict annual average TSP, PM₁₀ and PM_{2.5} concentration and annual average dust deposition rates. Further discussion relating to atmospheric dispersion modelling conducted is presented in Section 7.

The results from the indicative dispersion modelling completed for the Hanson Greenacre CBP are summarised in Table 5.2

Table 5.2 Incremental concentration and deposition results for Hanson Greenacre CBP

Receptor ID	Predicted incremental concentration (µg/m ³) or deposition rate (g/m ² /month)						
	TSP		PM ₁₀		PM _{2.5}		Dust deposition
	Annual	Maximum 24-hour	Annual	Maximum 24-hour	Annual	Annual	
Criterion	90	50	25	25	8	2	
R1	0.2	2.3	0.2	0.3	<0.1	<0.1	
R2	0.2	1.8	0.1	0.2	<0.1	<0.1	
R3	0.2	1.7	0.1	0.2	<0.1	<0.1	
R4	0.4	2.6	0.3	0.4	<0.1	0.1	
R5	0.4	3.5	0.3	0.5	<0.1	0.1	
R6	1.5	7.2	0.9	1.0	0.1	0.3	
R7	0.4	4.3	0.3	0.6	<0.1	0.1	
R8	2.0	8.2	1.1	1.1	0.2	0.3	
R9	0.6	3.0	0.4	0.4	0.1	0.1	
R10	0.7	3.0	0.4	0.4	0.1	0.1	
R11	0.6	2.5	0.3	0.3	<0.1	0.1	
R12	0.4	1.9	0.2	0.3	<0.1	0.1	
R13	0.2	1.5	0.1	0.2	<0.1	<0.1	
R14	0.2	1.1	0.1	0.1	<0.1	<0.1	
R15	0.3	3.3	0.2	0.5	<0.1	<0.1	
R16	0.1	1.2	0.1	0.2	<0.1	<0.1	
R17	0.1	1.0	0.1	0.1	<0.1	<0.1	
R18	0.1	1.1	0.1	0.2	<0.1	<0.1	
R19	0.3	1.9	0.2	0.3	<0.1	<0.1	
R20	0.3	1.5	0.2	0.2	<0.1	<0.1	

In addition to local area industrial operations, it is considered that the following sources contribute to air pollution emissions in the vicinity of the site:

- dust entrainment and tyre and break wear due to vehicle movements along public roads;
- petrol and diesel emission from vehicle movements along public roads;
- diesel combustion and fugitive dust emissions from the nearby rail corridor;
- wind generated dust from exposed areas within the surrounding region;
- seasonal emissions from household wood burning fires; and
- sea salts contained in sea breezes.

More remote sources which contribute episodically to suspended air quality levels in the region include dust storms and bushfires.

5.2 Air quality monitoring data resources

There are no air quality measurements available for the site. The NSW Department of Industry, Planning and Environment (DPIE) maintains air quality station (AQS) locations at Chullora, approximately 3 km north-west of the site. Daily average concentrations of PM₁₀ and PM_{2.5} from the AQS were collated for the period between 2014 and 2018. Analysis of the data collected at the Chullora AQS is provided in the following sections.

5.3 Baseline air quality environment

5.3.1 PM₁₀

A time series of recorded 24-hour average PM₁₀ concentrations at the Chullora AQS for the period between January 2014 and December 2018 is presented in Figure 5.1. Recorded 24-hour average PM₁₀ concentrations fluctuate throughout the presented period. Concentrations of 24-hour average PM₁₀ at the Chullora AQS are typically below the applicable NSW EPA impact assessment criterion of 50 µg/m³. The 24-hour average criterion was exceeded once in 2015 and 2016, four times in 2017 and seven times in 2018, the majority of which were attributed to regional scale bushfire or dust storm events.

Key statistics for the five years of analysed data from the Chullora AQS are presented in Table 5.3. Additionally, the frequency of recorded PM₁₀ concentrations at the Chullora AQS by year for the period 2014 to 2018 is illustrated in Figure 5.2. The increasing trend in annual average PM₁₀ concentrations and 24-hour average criteria exceedances from 2014 to 2018 is reflective of the increasing duration of drought conditions across NSW and potential for widespread dust storm events.

Annual average PM₁₀ concentrations are below the applicable criterion of 25 µg/m³ for all analysed years.

Consistent with the 2017 calendar year meteorological dataset adopted for the modelling period (see Section 4), the 2017 calendar year PM₁₀ dataset from the Chullora AQS has been adopted to represent baseline conditions.

Table 5.3 Statistics for PM₁₀ concentrations – DPIE Chullora AQS – 2014 to 2018

Year	Maximum	95th percentile	90th percentile	75th percentile	Median	Average	Days > 50 µg/m ³
24-hour average PM₁₀ concentration (µg/m³)							
2014	40.0	30.2	26.5	21.2	17.0	17.9	0
2015	64.6	29.4	26.1	21.6	16.1	17.2	1
2016	63.5	30.5	27.8	22.2	17.0	18.0	1
2017	63.0	33.9	29.9	24.0	18.2	20.1	4
2018	90.7	40.1	32.4	25.9	20.0	21.4	7

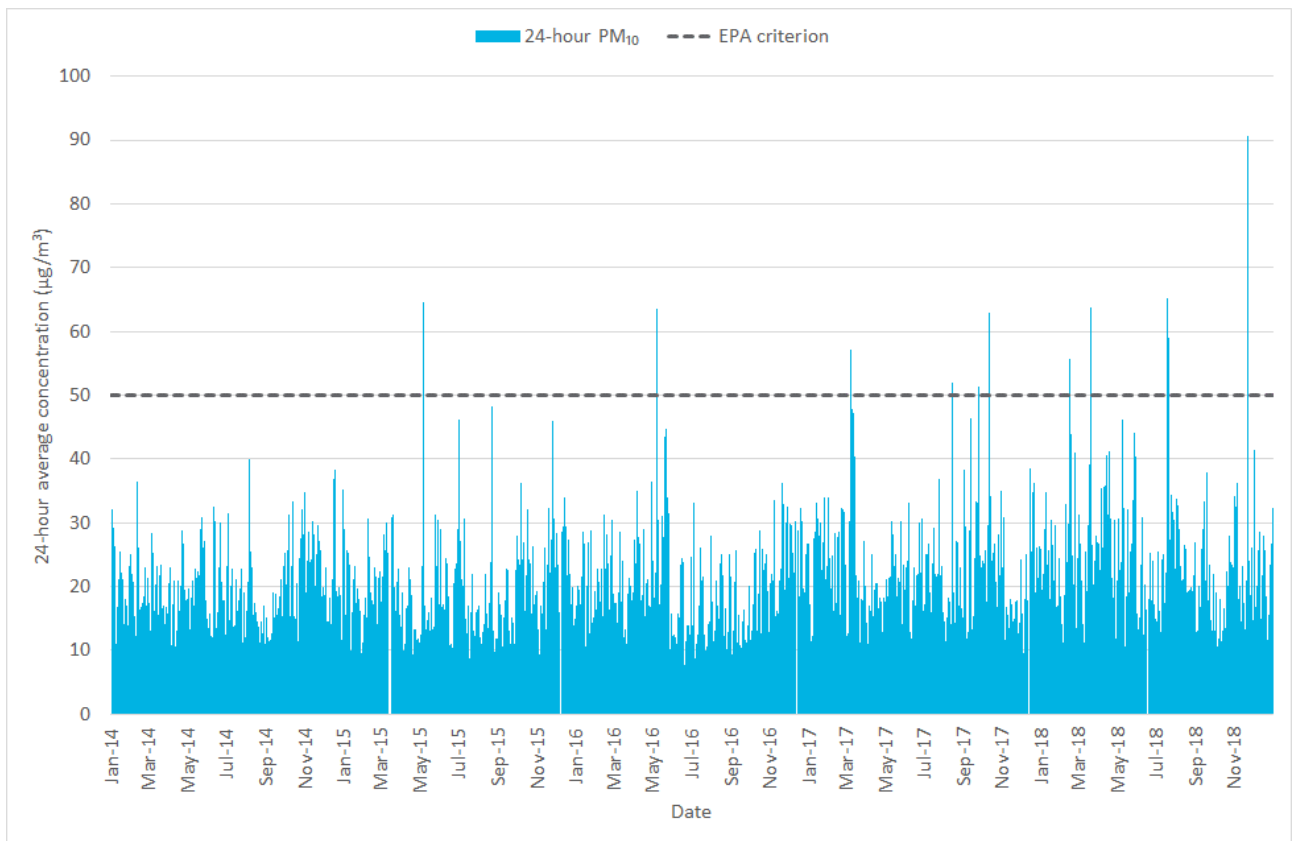


Figure 5.1 Time series of 24-hour average PM₁₀ concentrations – DPIE Chullora AQS – 2014 to 2018

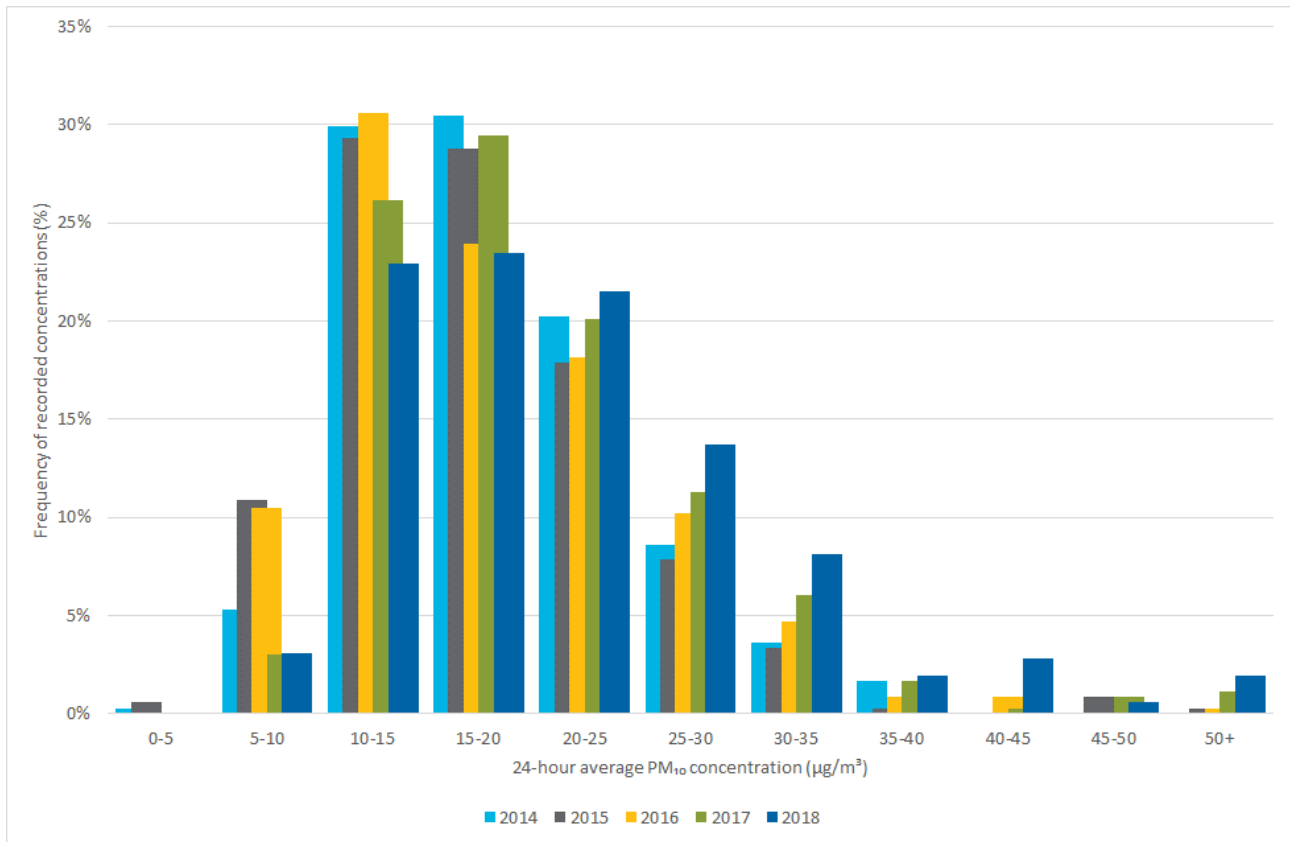


Figure 5.2 Frequency distribution of PM₁₀ monitoring data – DPIE Chullora AQS – 2014 to 2018

5.3.2 PM_{2.5}

A time series of recorded 24-hour average PM_{2.5} concentrations at the Chullora AQS is presented in Figure 5.3. Similar to PM₁₀ concentrations, the recorded 24-hour average PM_{2.5} concentrations fluctuate throughout the presented period. Recorded 24-hour average PM_{2.5} concentrations were generally below the NSW EPA impact assessment criterion of 25 µg/m³. The 24-hour average criterion was exceeded once in 2015, five times in 2016, seven times in 2017 and three times in 2018. Exceedances of the 24-hour average criteria are linked with regional-scale vegetation burning (bush fires, hazard reduction burns) and dust storms. During 2017, the NSW DPIE identifies that four exceedance days in March were directly attributable to a localised fire at a nearby industrial facility (NSW OEH 2018).

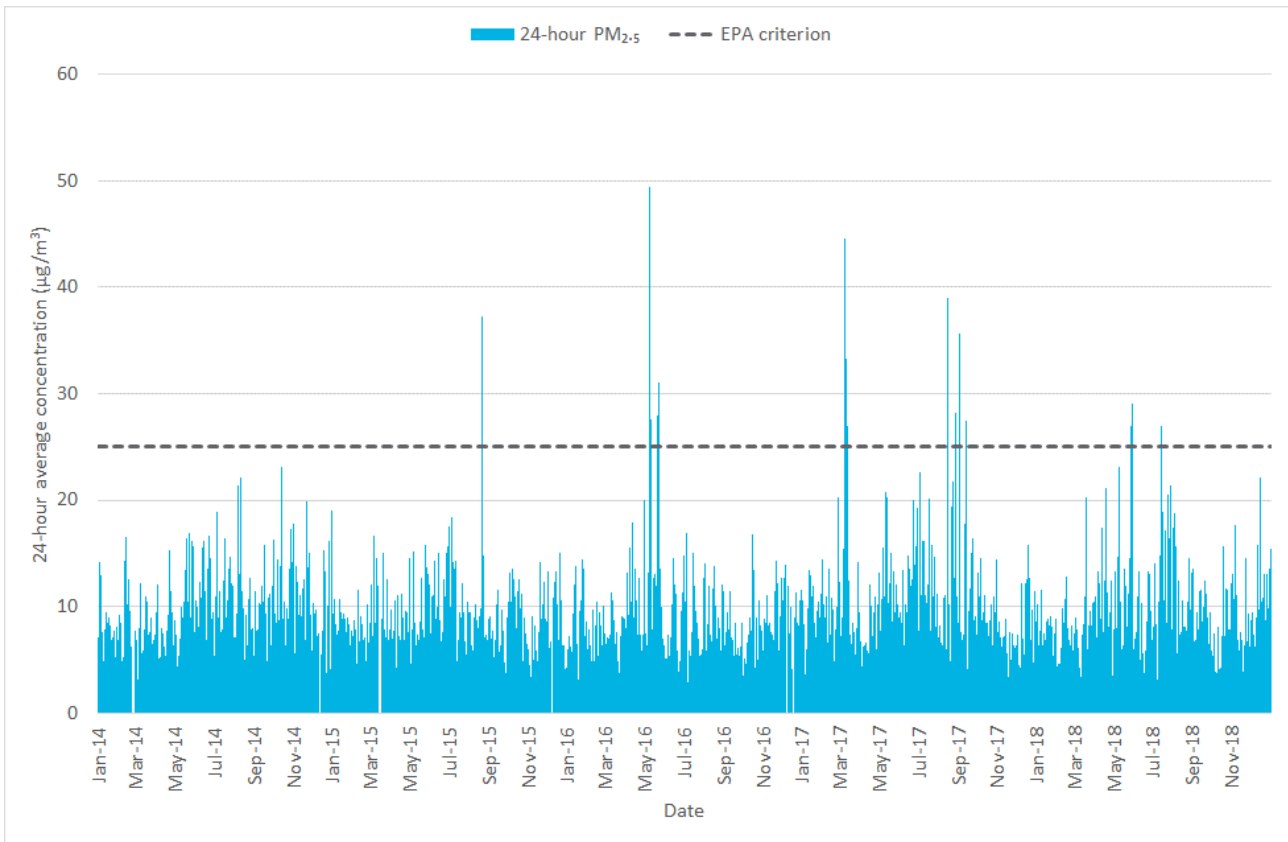


Figure 5.3 Time series of 24-hour average PM_{2.5} concentrations – OEH Chullora AQS – 2014 to 2018

Key statistics for the five years of analysed PM_{2.5} monitoring data from the Chullora AQS are presented in Table 5.4. and the inter-annual frequency histogram of recorded PM_{2.5} concentrations illustrated in Figure 5.4. From the five-year period analysed, it is considered that the 2017 year provides a conservatively high estimate of baseline PM_{2.5} concentrations for the local area.

The annual average PM_{2.5} concentrations for 2014, 2017 and 2018 were at or above the applicable criterion of 8 µg/m³, and below for 2015 and 2016.

Table 5.4 Statistics for PM_{2.5} concentrations – DPIE Chullora AQS – 2014 to 2018

Year	Maximum	95th percentile	90th percentile	75th percentile	Median	Average	Days > 25 µg/m ³
24-hour average PM_{2.5} concentration (µg/m³)							
2014	23.1	16.1	13.7	10.4	7.7	8.0	0
2015	37.2	14.3	12.3	9.6	7.2	7.7	1
2016	49.4	14.0	12.5	9.5	7.0	7.7	5
2017	44.6	19.9	14.5	10.9	8.2	9.3	9
2018	29.1	16.3	13.5	10.5	7.7	8.4	3

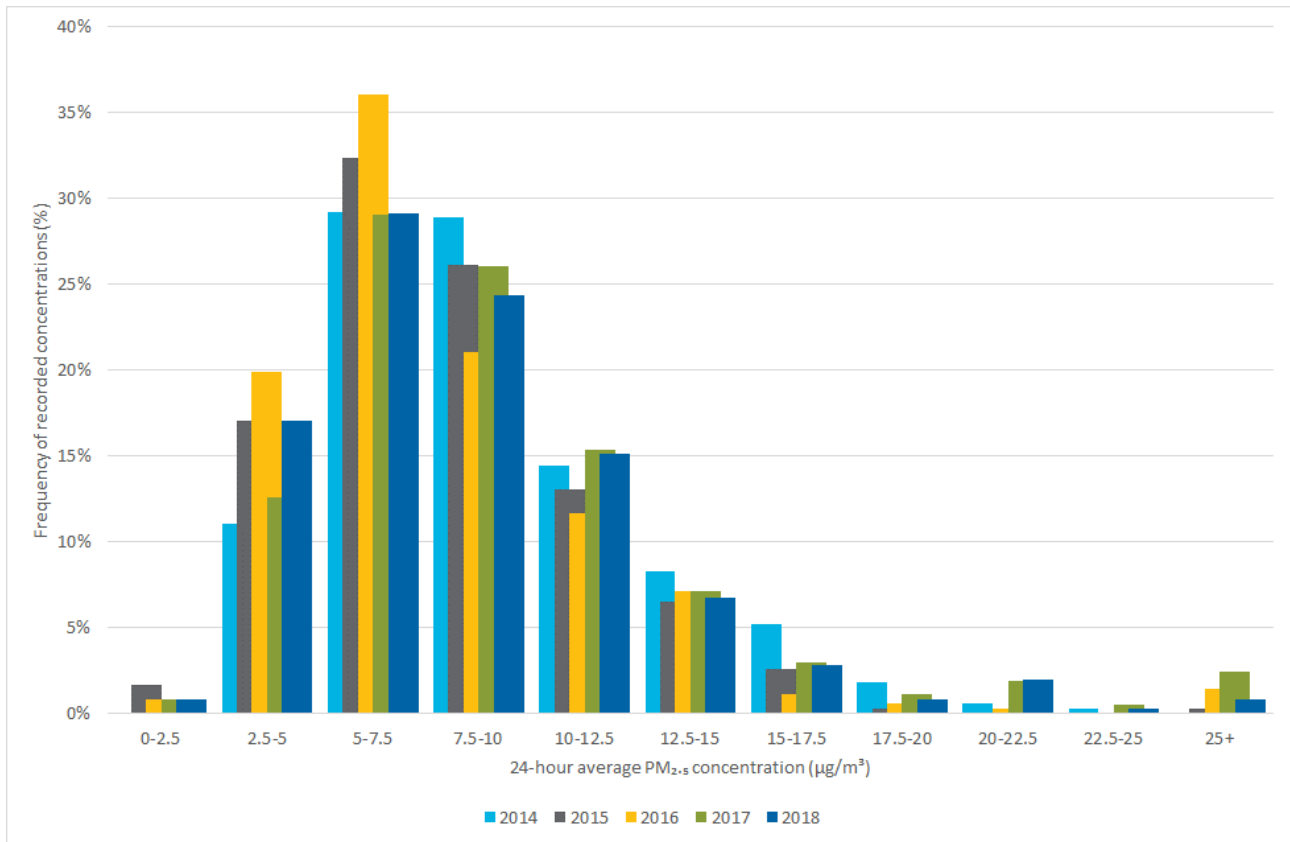


Figure 5.4 Frequency distribution of PM_{2.5} monitoring data – DPIE Chullora AQS – 2014 to 2018

5.3.3 TSP

There are no measurements of TSP at the site. In the absence of locally sourced TSP monitoring data, a PM₁₀ to TSP ratio of 0.4 has been adopted. When applied to the annual average PM₁₀ concentration for 2017 from the Chullora AQS (see Section 5.3.1), an annual average TSP background concentration of 50.3 µg/m³ is derived.

5.3.4 Dust deposition

Dust deposition monitoring has been conducted at five locations in the vicinity of another Aussie Skips facility at Strathfield South, approximately 1.2 km to the north-east of the site. Monitoring has been conducted for a period of five months. The period average monitoring results from the dust deposition gauge located closest to the site is 1.4 g/m²/month.

While a full 12-month period of monitoring has not been completed at the time of reporting, this dust deposition level is considered appropriate for representing existing baseline dust deposition levels.

5.4 Adopted background summary

The adopted background air quality conditions for the site, based on the analysis presented in the preceding sections, are summarised in Table 5.5.

Table 5.5 Summary of adopted background air quality concentrations

Pollutant	Averaging period	Value	Unit
TSP	Annual	50.3	
PM ₁₀	24-hour	Daily varying 2017 dataset	
	Annual	20.1	µg/m ³
PM _{2.5}	24-hour	Daily varying 2017 dataset	
	Annual	9.3	
Dust deposition	Month	1.3	g/m ² /month

In order to assess cumulative impacts for the site, these values have been combined with the corresponding model predictions from site and from the Hanson Greenacre CBP. Further discussion on model results and compliance with impact assessment criteria is presented in Section 7.3.

It is noted that the pairing of the daily-varying PM₁₀ model predictions from the Hanson Greenacre CBP with the corresponding concentrations from the 2017 DPIE Chullora AQS dataset increases the number of existing exceedance days from four to six at industrial receptors R6 and R8. These additional exceedance days occur when the background at Chullora was 47.6 µg/m³ and 46.3 µg/m³ respectively and under the influence of a regional-scale event (ie bushfire or dust storm).

6 Emissions inventory

Fugitive dust sources associated with the operation of the site were quantified through the application of National Pollution Inventory (NPI) emission estimation techniques and United States Environmental Protection Agency (US-EPA) AP-42 emission factor equations. Particulate matter emissions were quantified for various particle size fractions, with the TSP fraction being estimated to provide an indication of dust deposition rates. Coarse particles (PM₁₀) and fine particle (PM_{2.5}) were estimated using ratios for the different particle size fractions available within the literature (principally the US-EPA AP-42).

Emissions of non-particulate matter pollutants (including oxides of nitrogen, carbon monoxide and sulphur dioxide) associated with diesel fuel combustion are likely to be minor in nature relative to particulate matter emissions. Such emissions were not included in this assessment.

It is noted that the approach to quantify emissions from the site is consistent with Section 3 of *Load Calculation Protocol for use by holders of NSW Environment Protection Licences when calculating Assessable Pollutant Loads* (DECC 2009).

6.1 Emission scenario

To assess the potential air quality impacts associated with the site, a single emissions scenario was developed based on the following assumptions:

- A site annual throughput of material delivered to site of 200,000 tpa. Emissions were calculated for annualised emissions, assuming operations occurring Monday to Sunday. In order to predict peak day impacts (24-hour average PM₁₀ and PM_{2.5}) a scaling factor of 1.75 was applied based on advice from Aussie Skips on the indicative relationship between busy and normal operating conditions at site.
- It has been assumed that 100% of the site 200,000 tpa throughput applies to all components of the site (ie material delivery, material unloading, material handling and transfers, loading to trucks and export from site).
- Operational emission sources associated with site activities comprise of:
 - vehicle entrainment of particulate matter from trucks moving on paved surfaces at site;
 - unloading of imported material to the yard;
 - transfer of material to storage bunkers by FEL;
 - handling of material by excavator;
 - loading of material to truck by FEL for export;
 - diesel fuel combustion by on-site plant and equipment; and
 - wind erosion associated with material storage bunkers.
- The majority (approximately 90%) of material to be received at the site is soils and VENM. Consequently, a moisture content of 14% was adopted, which is the default value for clay/soil mix at municipal solid waste landfills (US-EPA 2006).

- During the site visit completed by EMM, a paved road silt loading sample was collected from the truck access route. To collect the sample, a 1 m² area was marked out and then swept with a dust-pan and broom. The collected sample was then weighed, returning a value of 20 g/m². This value was used in the emission equation for paved roads (US-EPA 2011a) adopted in the emissions inventory.



Photograph 6.1 Paved road sample location (left) and weighed sample (right)

- Diesel combustion emissions from on-site plant was quantified in the following way:
 - Two excavators (Komatsu PC138US) and one FEL (Hyundai HL757-9) were assumed to be operating in the yard. Using manufacture engine loads and likely annual operating hours, the annual energy consumption rates in kilo-watt hour were quantified. Particulate matter emissions were calculated by adopting engine size specific US-EPA Tier 2 emission factors (US-EPA 2016) for non-road diesel equipment.
 - Emissions from trucks associated with the import and export of material using calculated annual on-site travel distances and a published NSW EPA (2012) emission factor for road trucks.
- A diurnal profile has been developed based on current site records for incoming and outgoing truck movements by hour of the day. The profile is illustrated in Figure 6.1 and shows operations peaking during the middle of the day. This profile was applied to emissions from truck movements and material handling to vary operations throughout the day in the modelling (Section 7).

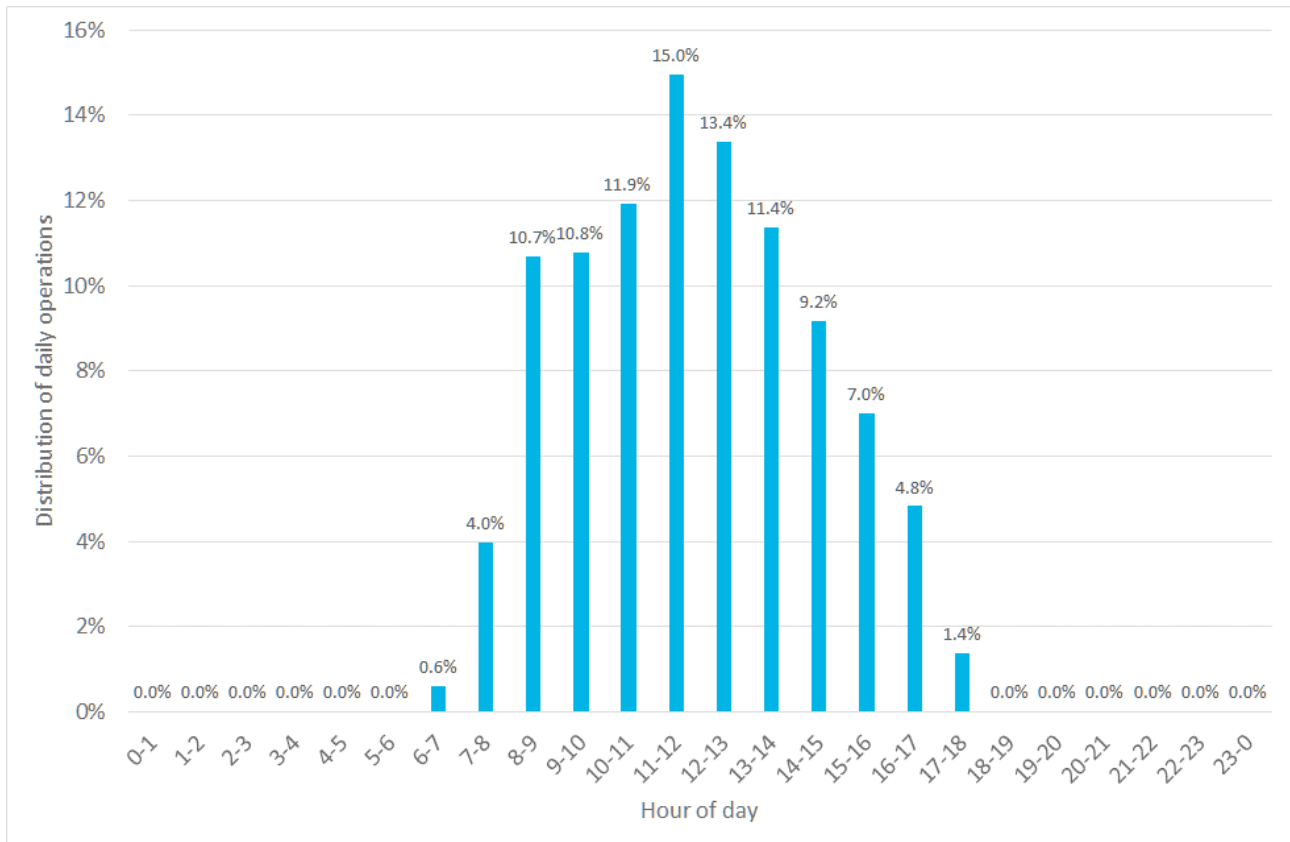


Figure 6.1 Distribution profile for daily operations at the site

6.2 Emission reduction factors

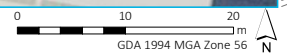
The site features the following dust mitigation measures:

- entire site is paved;
- three water canons, each with a spray radius of 30 m, are installed along the southern fence of the main yard providing wet suppression coverage to the site;
- a wheel wash system is installed at the site entrance to remove the silt load of wheels on trucks exiting the site;
- material is stored within bunkers featuring concrete block side walls, rear shed wall and an overhead awning; and
- the awning features misting sprays to add and increase the moisture content of stored materials in the bunkers.

The layout of the water spray network, including awning mister sprays and site entrance wheel wash, and the associated spray coverage are marked in Figure 6.2. It can be seen that the majority of the site is covered by the water spray network.



Source: EMM (2019); DFSI (2017)



KEY

- | | |
|---------------------------|--------------|
| Site boundary | Spray radius |
| Watercourse/drainage line | 2 m |
| Cadastral boundary | 8 m |
| Spray network type | 30 m |
| Mist spray | |
| Wheel wash | |
| Water spray | |

Water spray network coverage

Aussie Recycling Greenacre
Air quality impact assessment
Figure 6.2

\\lemmsvr1\EMM\Jobs\2019\190513 - Aussie Skips v EPA - LEC proceedings - Greenacre\GIS\02_Maps\QAQA009_WaterSprayNetwork_20191014_01.mxd 15/10/2019

In addition to these measures, Aussie Skips will introduce a bobcat-mounted vacuum broom to routinely sweep the paved surface of the yard.

To account for these mitigation measures in the emissions inventory developed for the site, the following emission reduction factors were applied:

- 53% reduction for paved road traffic-generated emissions for the use of vacuum sweeping (US-EPA 2011b);
- 70% reduction for three sided walls with roof (Katestone 2011) for wind erosion from materials storage bunkers; and
- 50% reduction for water sprays (NPI 2012) for the awning mounted misting sprays and water spray network applied to all activities occurring in the yard.

6.3 Particulate matter emissions

A summary of calculated annual emissions by source type for 200,000 tpa operations is presented in Table 6.1. Particulate matter control measures, as documented in Section 6.2 are accounted for in these calculated emission totals. The relative contribution of source types to annual emissions by particle size is illustrated in Figure 6.3.

Based on the information presented most significant source of emissions for coarser particles is associated with the movement of vehicles across paved surfaces. The significance of diesel combustion emissions increases with decreasing particle size. Further details regarding emission estimation factors and assumptions are provided in Appendix B.

Table 6.1 Calculated annual average TSP, PM₁₀ and PM_{2.5} emissions – 200,000 tpa

Emissions source	Calculated annual average emissions (kg/annum) by source		
	TSP	PM ₁₀	PM _{2.5}
Delivery of materials - site entrance to yard	548.2	105.2	25.5
Material unloading from trucks	10.8	5.1	0.8
Material handling at bunkers by FEL	10.8	5.1	0.8
Material handling at bunkers by excavator	10.8	5.1	0.8
Loading to trucks from bunkers by FEL	10.8	5.1	0.8
Dispatch of product to market - yard to site entrance	548.2	105.2	25.5
Wind erosion - stockpiled material	8.3	4.1	0.6
Diesel combustion – on-site plant	181.9	181.9	166.7
Diesel combustion - trucks	1.6	1.6	1.6
Total peak day emissions	1,331.4	418.5	222.9

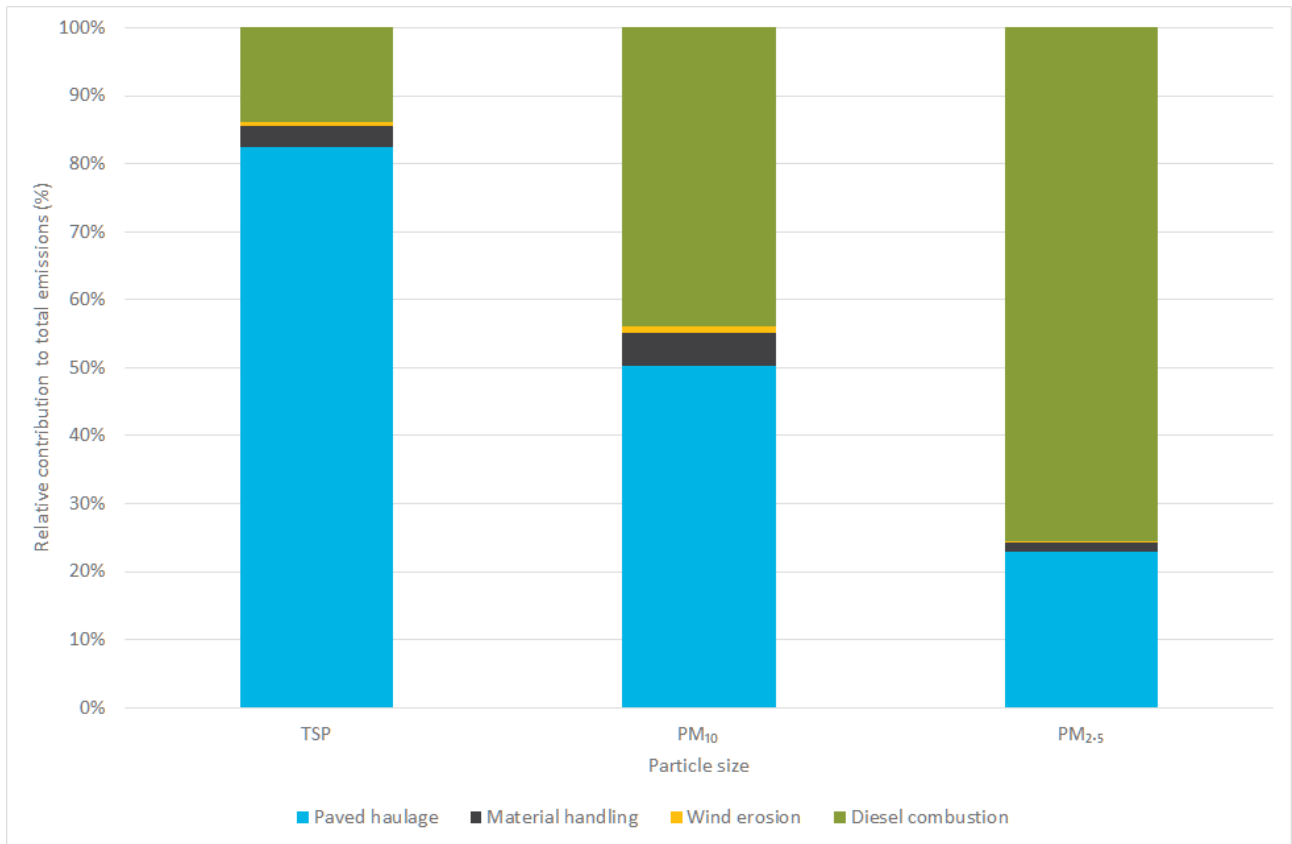


Figure 6.3 Relative source contribution to total site emissions by particle size – 200,000 tpa operations

7 Air dispersion modelling

7.1 Dispersion model selection and configuration

The atmospheric dispersion modelling completed within this assessment used the AMS/US-EPA regulatory model (AERMOD) (US-EPA 2004). AERMOD is designed to handle a variety of pollutant source types, including surface and buoyant elevated sources, in a wide variety of settings such as rural and urban as well as flat and complex terrain.

In addition to the 20 individual receptor locations (documented in Section 2.2), particulate matter concentrations were predicted over a two tier nested 1 km by 1 km grid domain (inner 0.5 km by 0.5 km domain with a 50 m grid cell resolution, outer 1 km by 1 km domain with a 100 m grid cell resolution).

Simulations were undertaken for the 12 month period of 2017 using the AERMET-generated file based largely on the BoM Canterbury Racecourse AWS meteorological monitoring dataset as input (see Section 4 for description of input meteorology).

Emission sources in AERMOD were configured using line-volume (roads), volume sources (material handling and processing) and area sources (wind erosion) in accordance with the site layout in Figure 1.2.

The methodology and results of the emissions inventory developed for this study are presented in Section 6 and Appendix B.

7.2 Incremental (site-only) results

Predicted incremental TSP, PM₁₀, PM_{2.5} concentrations and dust deposition rates from site operations at 200,000 tpa are presented in Table 7.1 for each of the selected receptor locations.

The predicted concentrations and deposition rates for all pollutants and averaging periods are below the applicable NSW EPA assessment criterion at all neighbouring receptors.

With the exception of dust deposition, the assessment criteria listed are applicable to cumulative concentrations. Analysis of cumulative impact compliance is presented in Section 7.3.

Isopleth plots, illustrating spatial variations in site-related incremental TSP, PM₁₀ and PM_{2.5} concentrations and dust deposition rates are provided in Appendix C. Isopleth plots of the maximum 24-hour average concentrations presented in Appendix C do not represent the dispersion pattern on any individual day, but rather illustrate the maximum daily concentration that was predicted to occur at each model calculation point given the range of meteorological conditions occurring over the 2017 modelling period.

7.3 Cumulative (site + baseline) results

Cumulative impacts at each of the sensitive receptor assessment locations surrounding the Site have been assessed in the following way:

- For 24-hour average concentrations, the predicted 24-hour average model predictions for PM₁₀ and PM_{2.5} from the site for each day of the modelling period has been combined with the corresponding predicted 24-hour average model predictions from the Hanson CBP site and the corresponding 24-hour average PM₁₀ and PM_{2.5} concentration from the NSW DPIE Chullora 2017 monitoring dataset (as presented in Section 5.4).
- Due to the number of existing exceedances in the baseline dataset for 2017 (four for PM₁₀ and nine for PM_{2.5}), the fifth highest cumulative PM₁₀ concentration and tenth highest cumulative PM_{2.5} concentration are

presented for comparison with the applicable NSW EPA impact assessment criteria. This is consistent with the NSW EPA Approved Methods for Modelling.

- For annual average concentrations, the predicted annual average concentrations (site and Hanson CBP) have been paired with the corresponding baseline annual average concentration (Section 5.4).

Predicted cumulative TSP, PM₁₀ and PM_{2.5} concentrations associated with site operations at 200,000 tpa are presented in Table 7.2 for each of the selected receptor locations.

The predicted cumulative concentrations for all pollutants and averaging periods satisfy the applicable NSW EPA assessment criterion at all neighbouring receptors, with the following exceptions:

- 24-hour average PM₁₀ – aside from the four existing criteria exceedance days in the DPIE Chullora AQS background dataset, the inclusion of site emissions returns additional exceedance of the 24-hour average PM₁₀ impact assessment criterion at receptors R5, R6 and R8 under peak day operations.
- Annual average PM_{2.5} – cumulative concentrations at all receptor locations are above the NSW EPA impact assessment criterion. However, the 2017 baseline concentration for annual average PM_{2.5} is already in exceedance of the criterion due to the influence of dust storms and hazard reduction burn events.

As stated in Section 5.4, the combination of predictions from the Hanson Greenacre CBP and the DPIE Chullora AQS dataset (not accounting for concentrations from the site) results in two additional exceedance days at the neighbouring industrial receptors R6 and R8 (it is noted that receptor R8 is the Hanson operation). The inclusion of site concentrations for peak day operations with concentrations predicted from the Hanson Greenacre CBP and DPIE Chullora AQS dataset results in two additional exceedance days at receptor R5 and one additional exceedance day at receptors R6 and R8. For all predicted additional exceedance days the corresponding background concentrations are between 46.3 µg/m³ and 47.9 µg/m³ and contribute more than 90% of the total cumulative concentration. These predicted cumulative exceedances are therefore driven by regional background rather than emissions from the site.

Regarding the exceedance of the annual average PM_{2.5}, as stated the 2017 baseline concentration is already in exceedance of the NSW EPA criterion due to the influence of dust storms and hazard reduction burn events during that year (Section 5.3.2). Across all receptors, the baseline concentration contributes more than 97% to the predicted cumulative concentrations. Clearly, the incremental contribution to cumulative annual average PM_{2.5} concentrations from the site is negligible relative to baseline.

From this analysis, the cumulative impacts predicted at all surrounding receptor locations are dominated by the baseline concentrations rather than impacts generated by the site. In order to further illustrate the dominance of adopted baseline concentrations to cumulative concentrations, the following figures are presented:

- Figure 7.1 - daily-varying cumulative 24-hour average PM₁₀ concentrations for peak day operations at the residential receptor with highest site-only contribution (receptor R16);
- Figure 7.2 - daily-varying cumulative 24-hour average PM₁₀ concentrations for peak day operations at the industrial receptor with highest site-only contribution (receptor R6);
- Figure 7.3 - cumulative annual average PM₁₀ concentrations at all receptor locations;
- Figure 7.4 - daily-varying cumulative 24-hour average PM_{2.5} concentrations for peak day operations at the residential receptor with highest site-only contribution (receptor R16);
- Figure 7.5 - daily-varying cumulative 24-hour average PM₁₀ concentrations for peak day operations at the industrial receptor with highest site-only contribution (receptor R6);

- Figure 7.6 - cumulative annual average PM_{2.5} concentrations at all receptor locations;
- Figure 7.7 - cumulative annual average TSP concentrations at all receptor locations; and
- Figure 7.8 - cumulative annual average dust deposition levels at all receptor locations.

Table 7.1 Incremental (site-only) concentration and deposition results

Receptor ID	Predicted incremental concentration (µg/m ³) or deposition rate (g/m ² /month)					
	TSP	PM ₁₀		PM _{2.5}		Dust deposition
	Annual	Maximum 24-hour	Annual	Maximum 24-hour	Annual	Annual
Criterion	90	50	25	25	8	2
R1	1.4	4.6	0.5	1.8	0.2	0.5
R2	0.9	4.6	0.3	1.3	0.2	0.3
R3	0.6	1.9	0.2	0.7	0.1	0.2
R4	0.9	3.7	0.4	1.9	0.2	0.3
R5	5.3	7.4	1.4	2.2	0.6	1.9
R6	2.1	7.5	0.9	4.8	0.5	0.7
R7	1.4	8.2	0.7	4.7	0.4	0.4
R8	0.7	4.0	0.4	2.6	0.3	0.2
R9	0.7	2.6	0.3	1.4	0.2	0.2
R10	0.5	2.7	0.3	1.2	0.1	0.2
R11	0.3	1.9	0.1	1.1	0.1	0.1
R12	0.2	0.9	0.1	0.6	0.1	0.1
R13	0.1	0.8	0.1	0.5	<0.1	<0.1
R14	0.1	0.7	0.1	0.4	<0.1	<0.1
R15	0.3	2.1	0.2	1.2	0.1	0.1
R16	0.2	1.6	0.1	0.7	0.1	0.1
R17	0.2	1.7	0.1	0.4	<0.1	0.1
R18	0.3	0.8	0.1	0.4	0.1	0.1
R19	0.3	1.5	0.1	0.6	0.1	0.1
R20	0.2	1.6	0.1	0.9	0.1	0.1

Notes: Criteria for TSP, PM₁₀ and PM_{2.5} is applicable to cumulative (increment + baseline). Criteria is provided for comparison purposes only.

Table 7.2 Cumulative (site + Hanson Greenacre CBP + background) concentration and deposition results

Receptor ID	Predicted incremental concentration ($\mu\text{g}/\text{m}^3$) or deposition rate ($\text{g}/\text{m}^2/\text{month}$)					
	TSP	PM ₁₀		PM _{2.5}		Dust deposition
	Annual	5 th highest 24-hour	Annual	10 th highest 24-hour	Annual	Annual
Criterion	90	50	25	25	8	4
R1	51.7	49.0	20.7	24.2	9.6	1.8
R2	51.2	48.6	20.5	23.3	9.5	1.6
R3	50.9	48.4	20.4	23.0	9.5	1.5
R4	51.4	49.1	20.7	23.1	9.5	1.6
R5	55.9	51.8	21.6	24.2	9.9	3.3
R6	53.8	52.7	21.8	24.0	9.9	2.3
R7	52.0	49.7	21.0	24.8	9.8	1.8
R8	52.8	52.7	21.6	23.7	9.7	1.9
R9	51.4	49.3	20.7	23.1	9.5	1.6
R10	51.3	49.7	20.7	23.0	9.5	1.6
R11	50.9	49.3	20.5	22.9	9.5	1.5
R12	50.7	49.0	20.4	22.9	9.4	1.4
R13	50.5	48.8	20.3	22.8	9.4	1.4
R14	50.4	48.6	20.2	22.8	9.4	1.4
R15	50.8	48.5	20.5	23.3	9.5	1.4
R16	50.5	48.2	20.2	23.3	9.4	1.4
R17	50.4	48.1	20.2	22.9	9.4	1.4
R18	50.5	48.2	20.3	22.8	9.4	1.4
R19	50.7	48.6	20.4	22.8	9.4	1.4
R20	50.6	48.7	20.3	22.8	9.4	1.4

Note: due to existing exceedances in the background dataset due to natural events (four for PM₁₀ and nine for PM_{2.5}), the 5th highest 24-hour average cumulative PM₁₀ concentration and 10th highest 24-hour average cumulative PM_{2.5} concentration are presented.

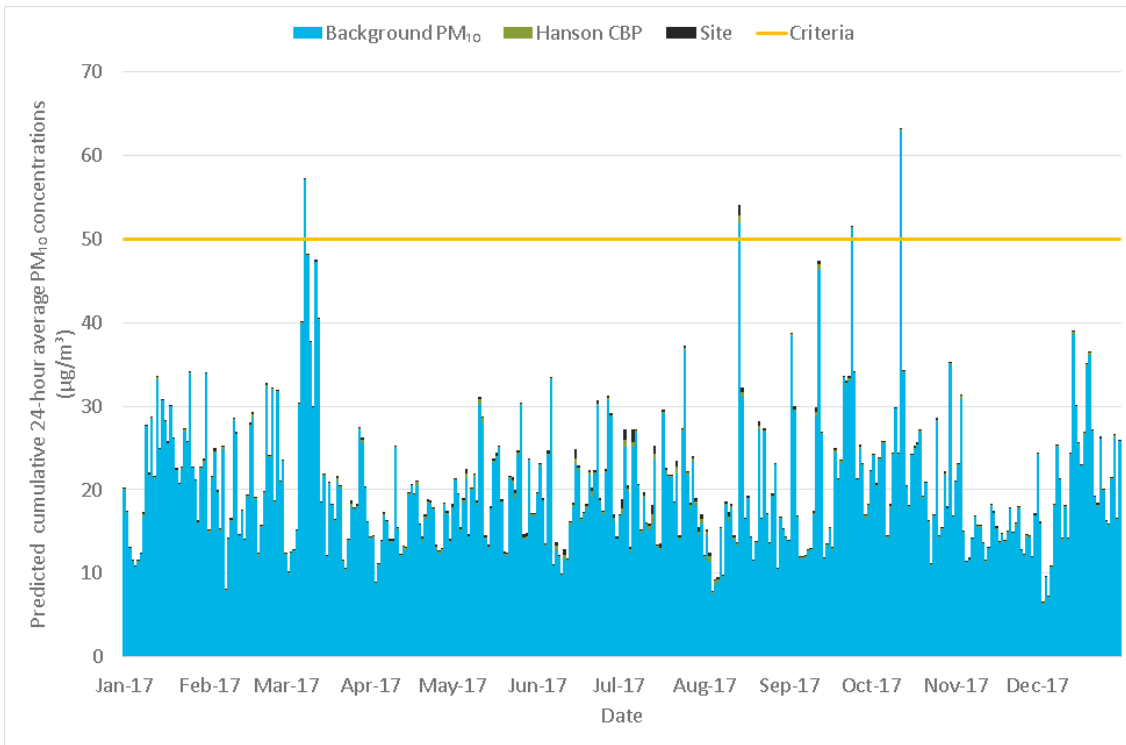


Figure 7.1 Daily-varying cumulative PM₁₀ concentrations at residential receptor R16 – peak day operations

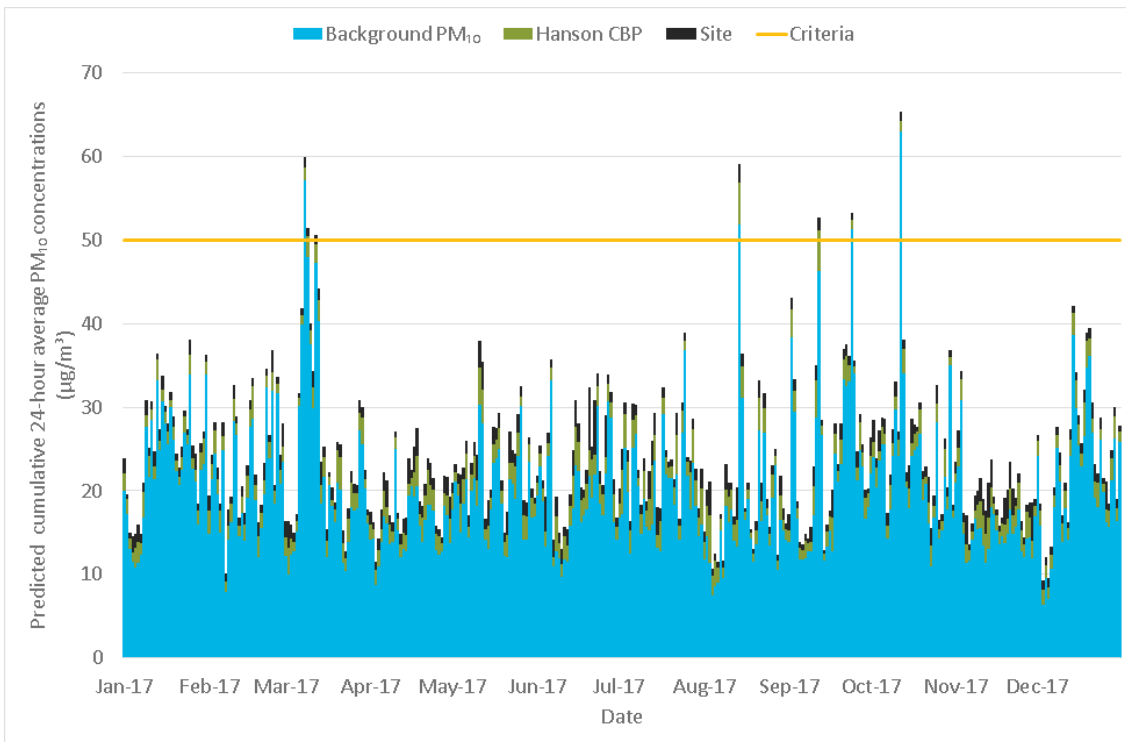


Figure 7.2 Daily-varying cumulative PM₁₀ concentrations at industrial receptor R6 – peak day operations

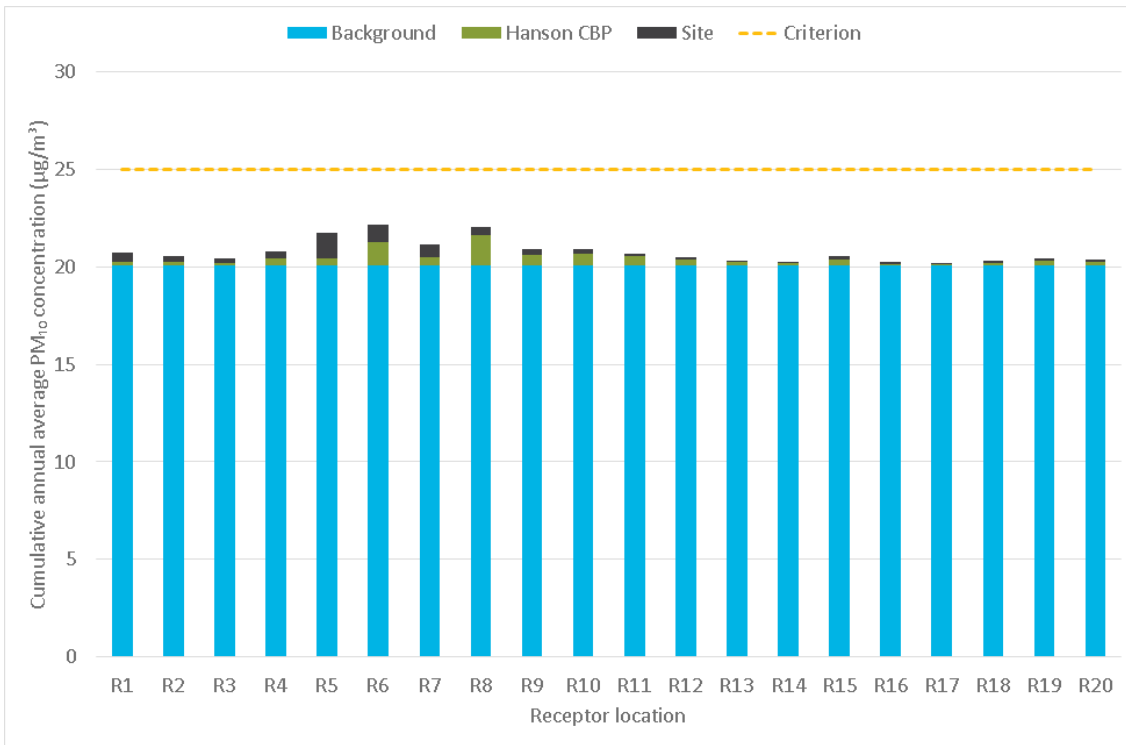


Figure 7.3 Cumulative annual average PM₁₀ concentrations by receptor– average day operations

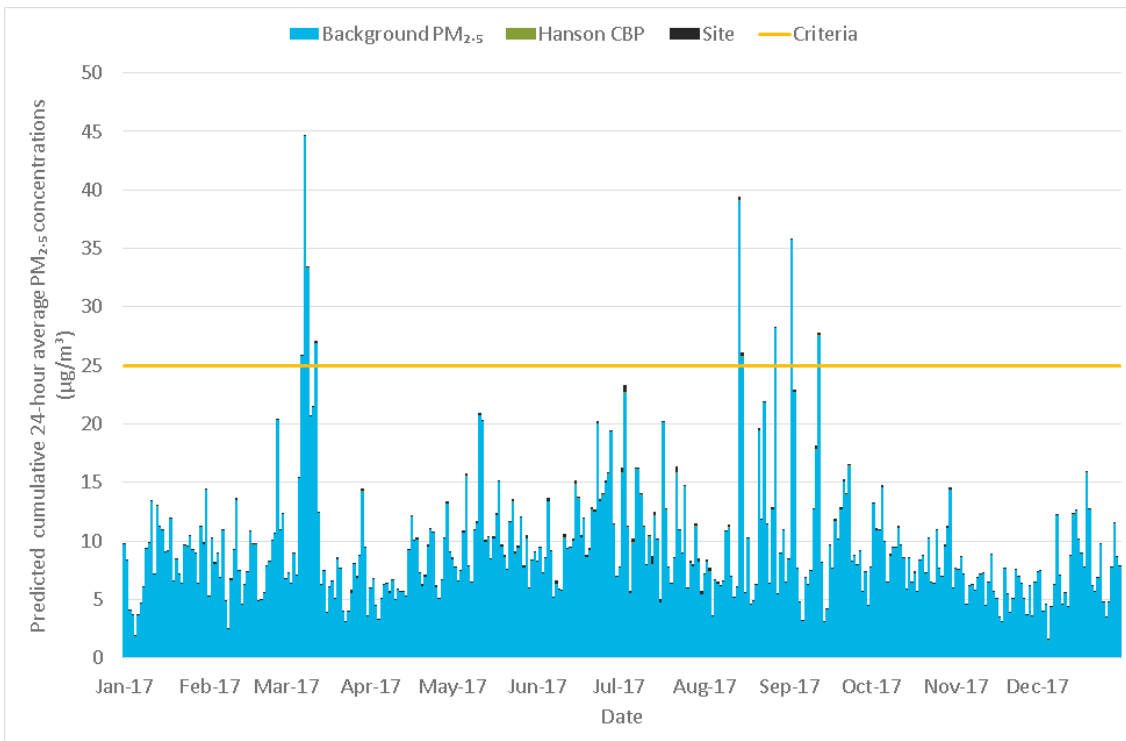


Figure 7.4 Daily-varying cumulative PM_{2.5} concentrations at residential receptor R16 – peak day operations

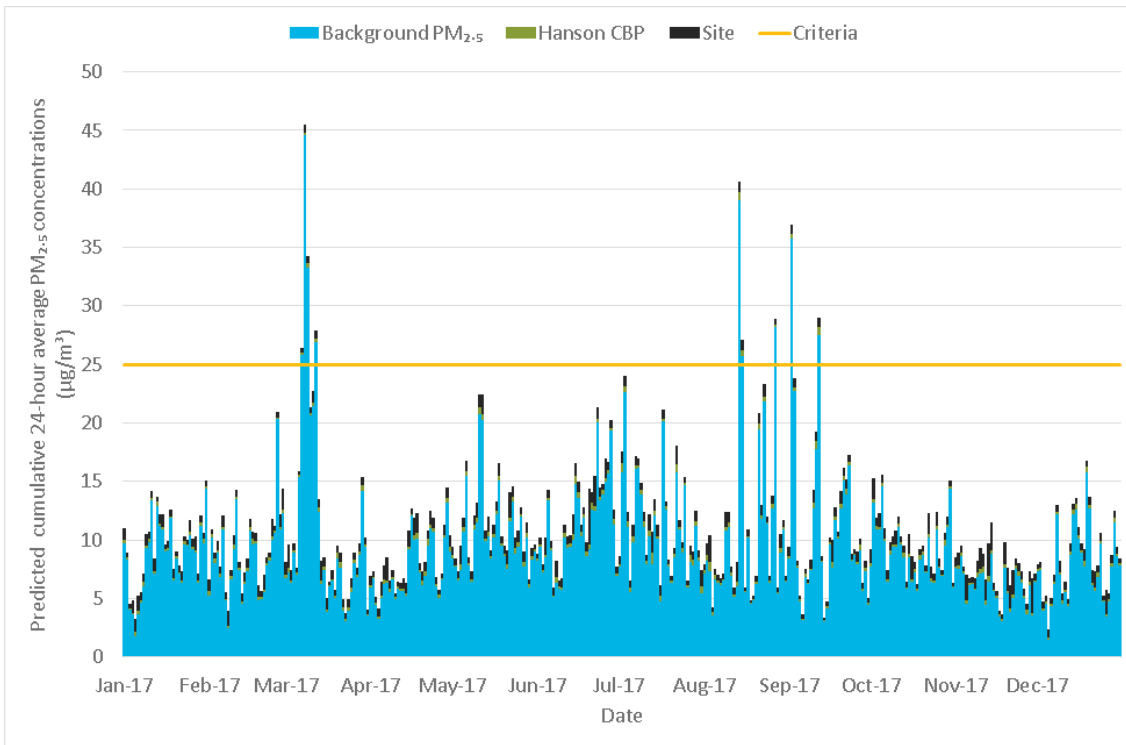


Figure 7.5 Daily-varying cumulative PM_{2.5} concentrations at industrial receptor R6 – average day operations

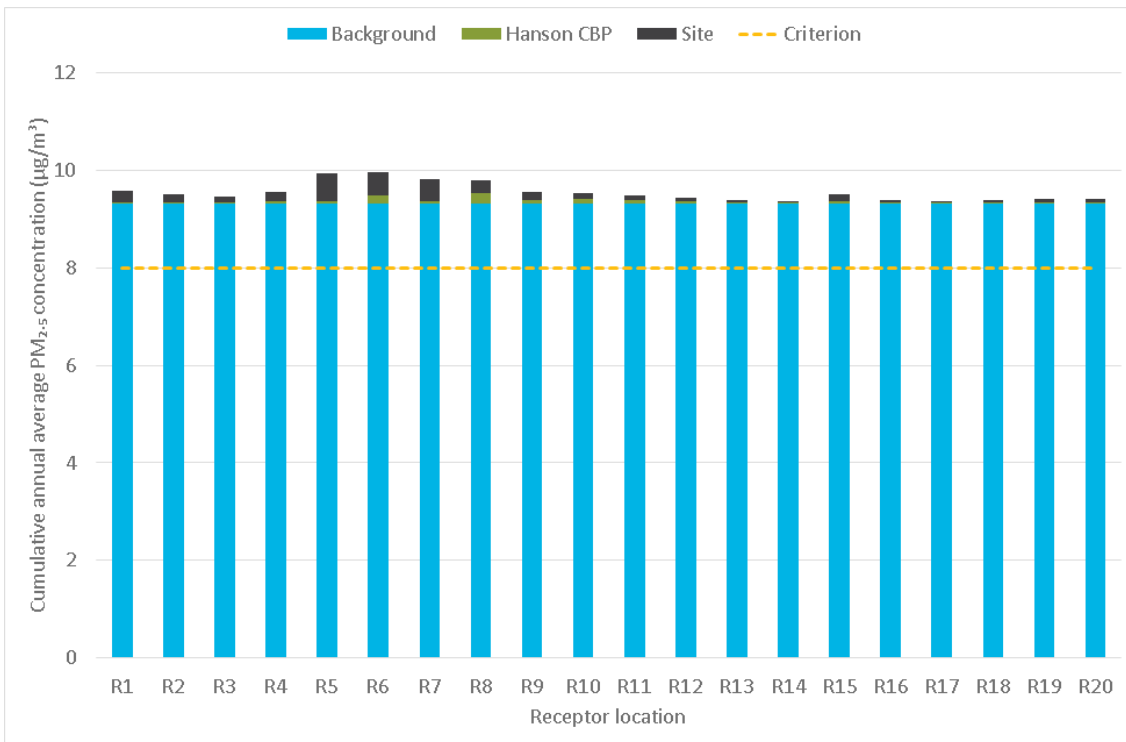


Figure 7.6 Cumulative annual average PM_{2.5} concentrations by receptor– average day operations

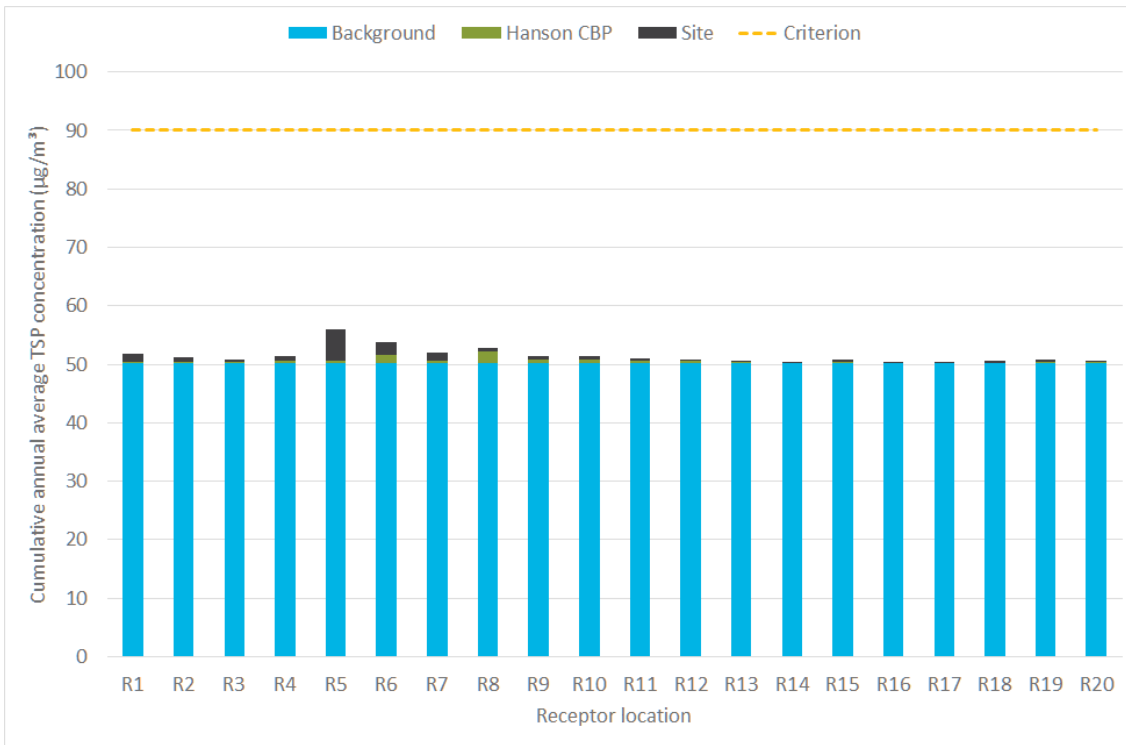


Figure 7.7 Cumulative annual average TSP concentrations by receptor– average day operations

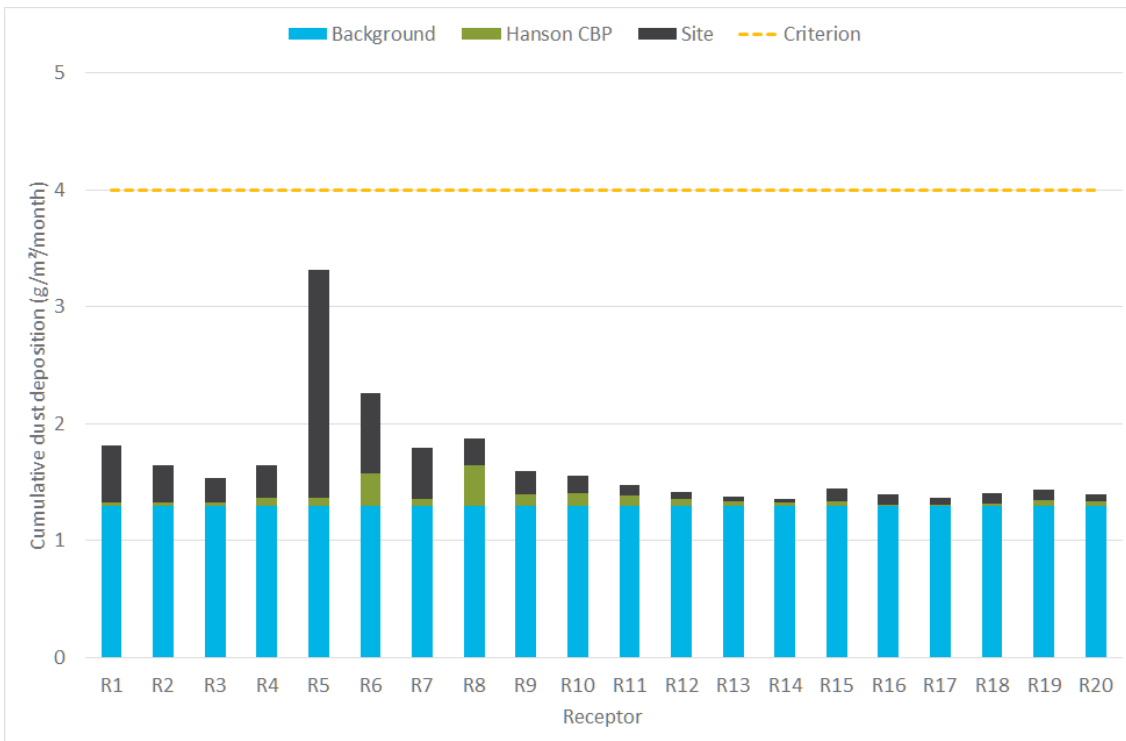


Figure 7.8 Cumulative annual average dust deposition levels by receptor– average day operations

8 Conclusions

An AQIA focusing on the quantification of emissions and resultant air quality impacts from the site has been conducted by EMM.

Site-generated emissions of TSP, PM₁₀ and PM_{2.5} were calculated for proposed 200,000 tpa throughput at the site. Emissions were quantified for peak day and average day activities using publicly available emission estimation techniques.

In order to mitigate emissions, Aussie Skips has implemented the following dust mitigation measures:

- the entire site is paved;
- three water cannons, each with a spray radius of 30 m, are installed along the southern fence of the main yard providing wet suppression coverage to the site;
- a wheel wash system is installed at the site entrance to remove the silt load of wheels on trucks exiting the site;
- material is stored within bunkers featuring concrete block side walls, rear shed wall and an overhead awning; and
- the awning features misting sprays to add and increase the moisture content of stored materials in the bunkers.

In addition to these measures, Aussie Skips will introduce a bobcat-mounted vacuum broom to routinely sweep the paved surface of the yard.

Atmospheric dispersion modelling was undertaken using AERMOD, and the results are summarised as follows:

- the predicted air quality impacts from proposed 200,000 tpa operations are well below the applicable assessment criteria at the closest residential receptors to site boundary, and would not result in additional cumulative (accounting for background) exceedances of NSW EPA impact assessment criteria at any residential receptors;
- the predicted air quality impacts at neighbouring industrial receptors are low and are generally predicted to comply with NSW EPA impact assessment criteria; and
- where exceedances were predicted (24-hour average PM₁₀ and annual average PM_{2.5}), the exceedance was demonstrated to be dominated by background (ie influenced by regional emission source) rather than any contribution from site or local industrial emissions sources and therefore not considered significant.

On the basis of the results of the dispersion modelling conducted, emissions from the proposed 200,000 tpa operations at the site are not anticipated to adversely impact upon the surrounding environment.

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Abbreviations

AHD	Australian height datum
Approved Methods for Modelling	<i>Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales</i>
AQIA	Air quality impact assessment
AQS	Air quality station
Aussie Skips	Aussie Skips Recycling Pty Limited
AWS	Automatic weather station
BoM	Bureau of Meteorology
CO	Carbon monoxide
Council	Strathfield Council
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DPIE	Department of Planning, Industry and Environment
EPA	Environment Protection Authority
NOx	Oxides of nitrogen
NSW EPA	NSW Environment Protection Authority
PM ₁₀	Particulate matter less than 10 microns in aerodynamic diameter
PM _{2.5}	Particulate matter less than 2.5 microns in aerodynamic diameter
SEARs	Secretary's Environmental Assessment Requirements
SO ₂	Sulphur dioxide
TAPM	The Air Pollution Model
TSP	Total suspended particulates
US-EPA	United States Environmental Protection Agency
VENM	Virgin excavated natural material
VOC	Volatile organic compounds

Appendix A

Wind roses from Canterbury Racecourse AWS

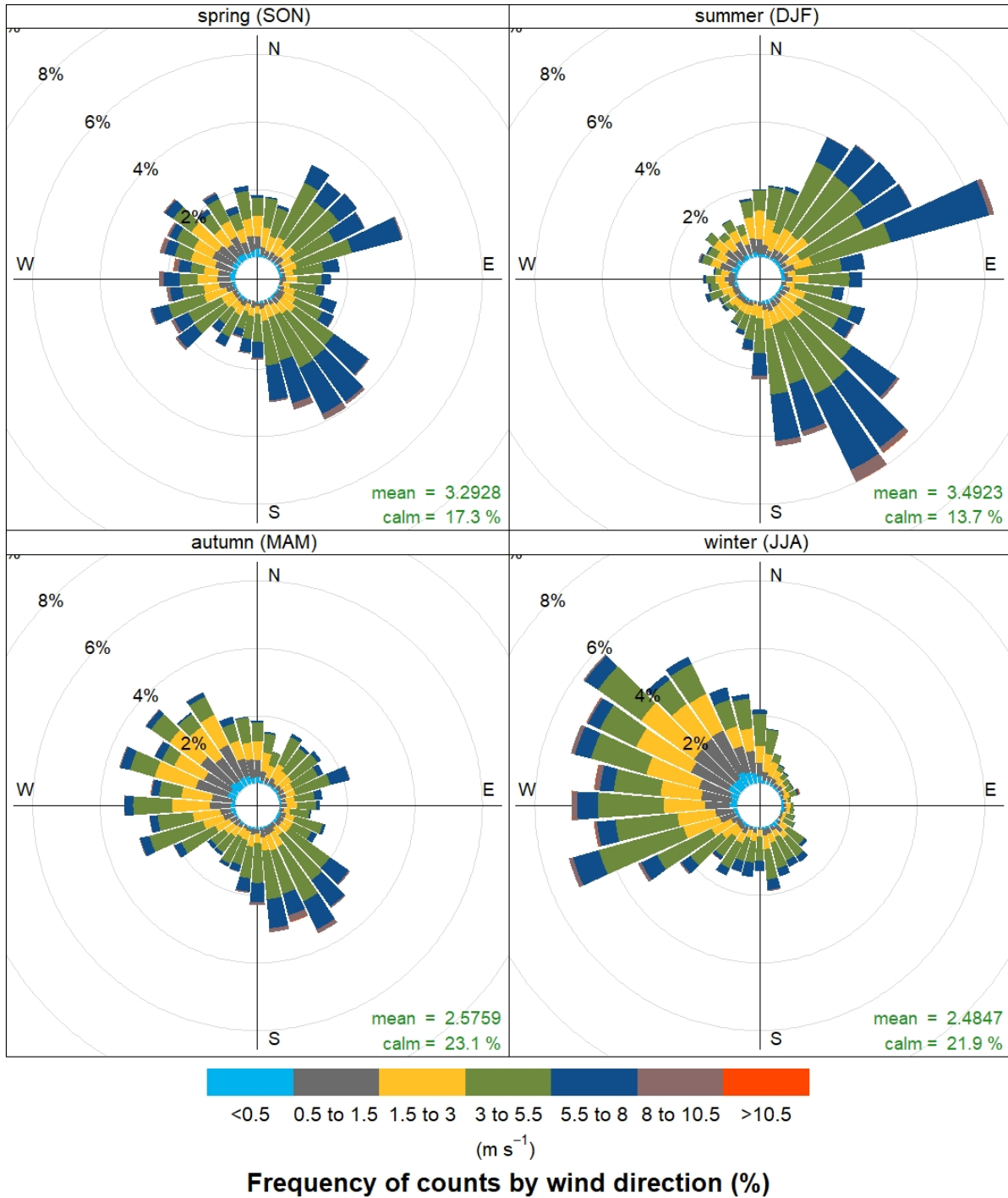


Figure A.1 Seasonal wind roses – Canterbury Racecourse AWS – 2014 to 2018

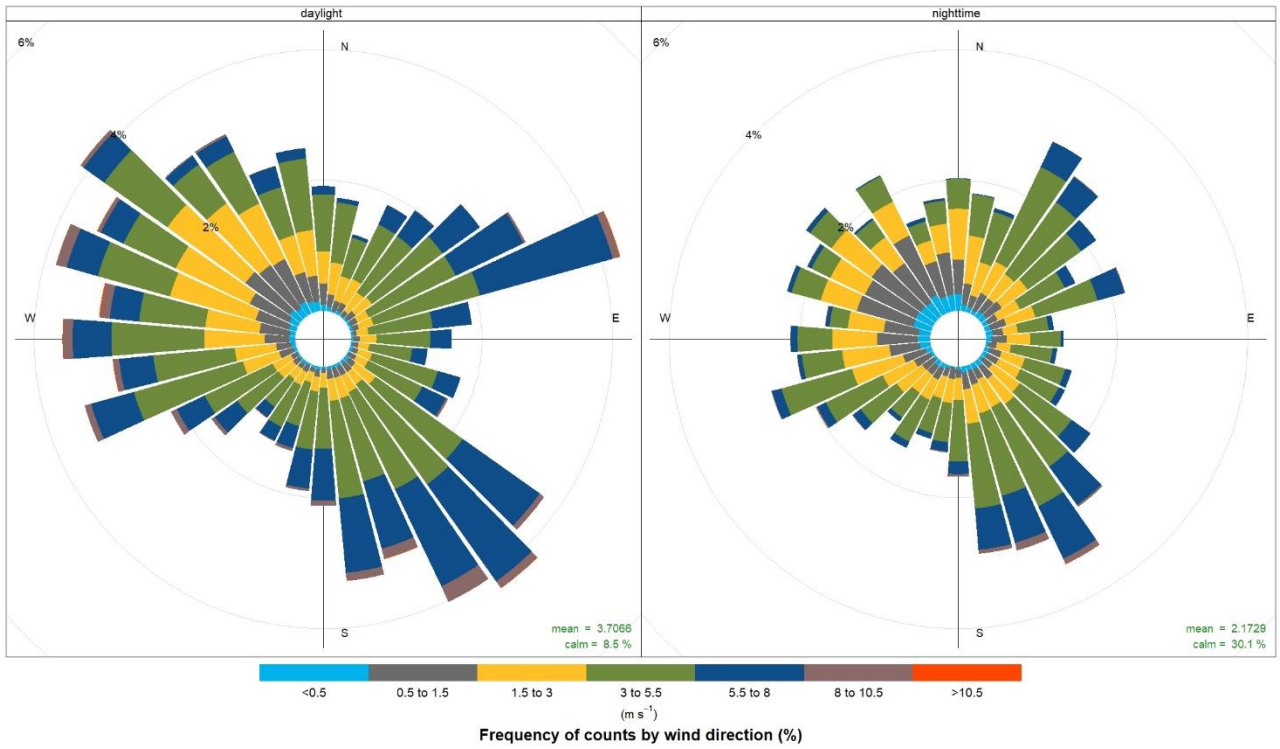


Figure A.2 Diurnal wind roses – Canterbury Racecourse AWS – 2014 to 2018

Appendix B

Emissions inventory background

B.1 Introduction

Particulate matter emissions from the site were quantified through the application of accepted published emission estimation factors, collated from a combination of United States Environmental Protection Agency (US-EPA) AP-42 Air Pollutant Emission Factors and NPI emission estimation manuals, including the following:

- NPI Emission Estimation Technique Manual for Mining (NPI 2012);
- NPI Emission Estimation Technique Manual for Combustion Engines (NPI 2008);
- AP-42 Chapter 11.19.2 – Crushed Stone Processing and Pulverized Mineral Processing (US-EPA 2004);
- AP-42 Chapter 13.2.1 – Paved Roads (US-EPA 2011);
- AP-42 Chapter 13.2.4 – Aggregate Handling and Storage Piles (US-EPA 2006b); and
- AP-42 Chapter 11.9 - Western Surface Coal Mining (US-EPA 1998).

Particulate releases were quantified for TSP, PM₁₀ and PM_{2.5} as documented in subsequent sections.

B.2 Particulate matter emissions inventory

The emissions inventory developed for the existing operations at the site is presented in Table B.1.

Table B.1 Emissions inventory – Scenario 1 operations – 200,000 tpa activities

Source Name	Emission factor source	Activity Rate	Unit	Parameter 1	Value	Parameter 2	Value	Parameter 3	Value	Parameter 4	Value	TSP EF	PM ₁₀ EF	PM _{2.5} EF	EF Unit	Emission Controls	Reduction factor
Delivery of materials - site entrance to yard	AP-42 13.2.1 - Paved Road Equation	VKT per year	1,333	Road silt loading (g/m ²)	20	Haul distance (km)	0.2	Loads per year	6,666.67	Ave Truck Weight (t)	30	1.74966	0.33585	0.08125	kg/VKT	Vacum sweeping + water sprays	77%
Material unloading from trucks	AP-42 13.2.4 - Materials Handling Equation / NPI Mining Equation 10	Tonnes per year	200,000	Average wind speed (m/s)	2.835	Moisture content (%)	14					0.00011	0.00005	0.00001	kg/tonne	Water sprays	50%
Material handling at bunkers by FEL	AP-42 13.2.4 - Materials Handling Equation / NPI Mining Equation 10	Tonnes per year	200,000	Average wind speed (m/s)	2.835	Moisture content (%)	14					0.00011	0.00005	0.00001	kg/tonne	Water sprays	50%
Material handling at bunkers by excavator	AP-42 13.2.4 - Materials Handling Equation / NPI Mining Equation 10	Tonnes per year	200,000	Average wind speed (m/s)	2.835	Moisture content (%)	14					0.00011	0.00005	0.00001	kg/tonne	Water sprays	50%
Loading to trucks from bunkers by FEL	AP-42 13.2.4 - Materials Handling Equation / NPI Mining Equation 10	Tonnes per year	200,000	Average wind speed (m/s)	2.835	Moisture content (%)	14					0.00011	0.00005	0.00001	kg/tonne	Water sprays	50%
Dispatch of product to market - yard to site entrance	AP-42 13.2.1 - Paved Road Equation	VKT per year	1,333	Road silt loading (g/m ²)	20	Haul distance (km)	0.2	Loads per year	6,666.67	Ave Truck Weight (t)	30	1.74966	0.33585	0.08125	kg/VKT	Vacum sweeping + water sprays	77%

Table B.1 Emissions inventory – Scenario 1 operations – 200,000 tpa activities

Source Name	Emission factor source	Activity Rate	Unit	Parameter 1	Value	Parameter 2	Value	Parameter 3	Value	Parameter 4	Value	TSP EF	PM ₁₀ EF	PM _{2.5} EF	EF Unit	Emission Controls	Reduction factor
Wind erosion - stockpiled material	AP-42 11.9 - Wind erosion of exposed areas factor	Area (ha)	0.07									850	425	63.75	kg/ha/year	Three-sided walls with roof + water sprays	85%

Appendix C

Incremental (site-only) isopleth plots



Source: EMM (2019); DFSI (2017); GA (2011)

KEY

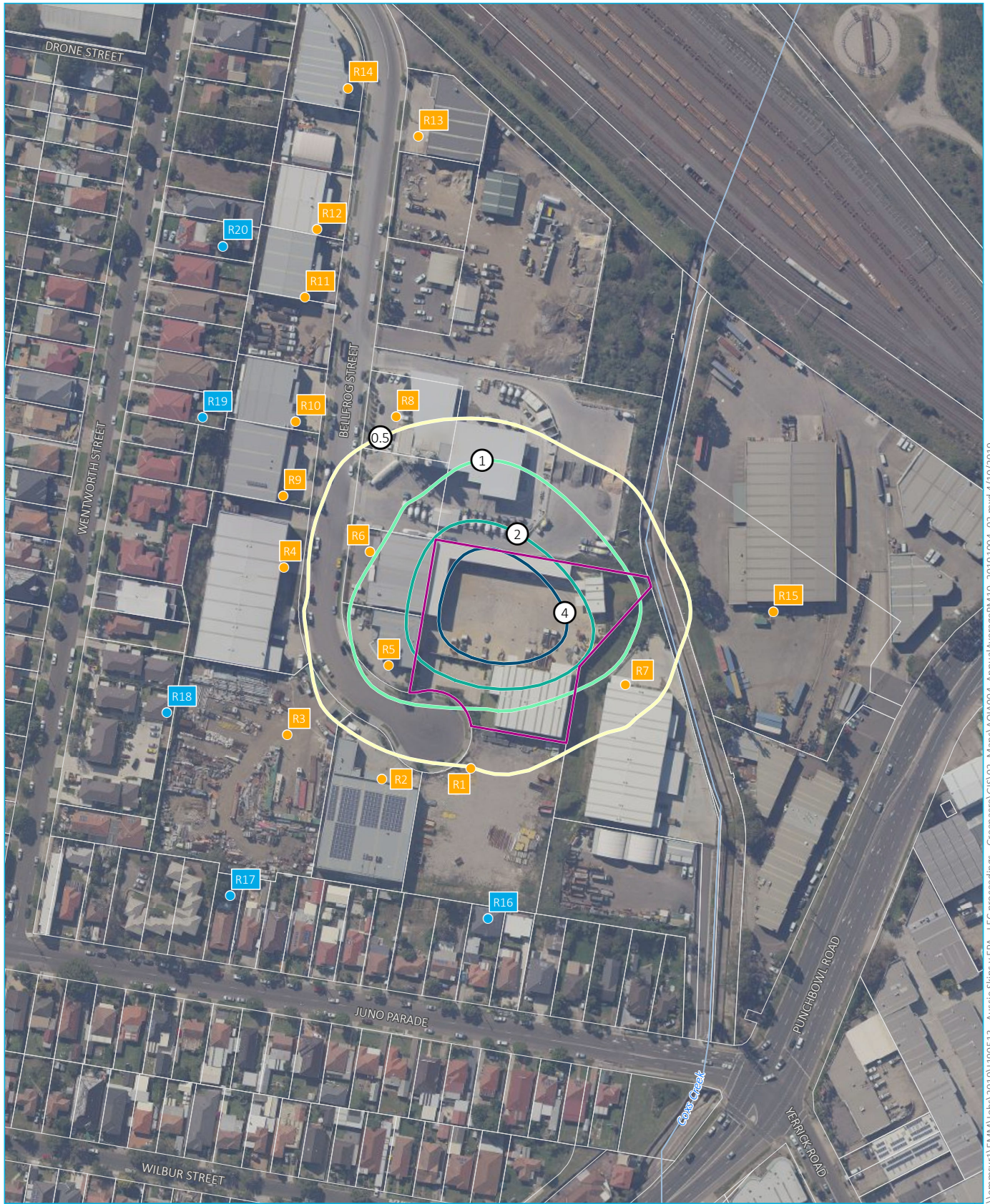
- Site boundary
- Watercourse/drainage line
- Cadastral boundary
- Receptor location types
- Industrial
- Residential
- PM₁₀ concentrations (µg/m³)
- 2.5
- 5
- 10
- 20

Maximum predicted 24-hour average
PM₁₀ concentrations (µg/m³) – site only –
peak day operations

Aussie Recycling Greenacre
Air quality impact assessment
Figure C.1



\\emmsvr1\EMM\Jobs\2019\190513 - Aussie Skips v EPA - LEC proceedings - Greenacre\GIS\02_Maps\AQAO003_Max24HourAverage_20191004_02.mxd 4/10/2019



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Source: EMM (2019); DFSI (2017); GA (2011)



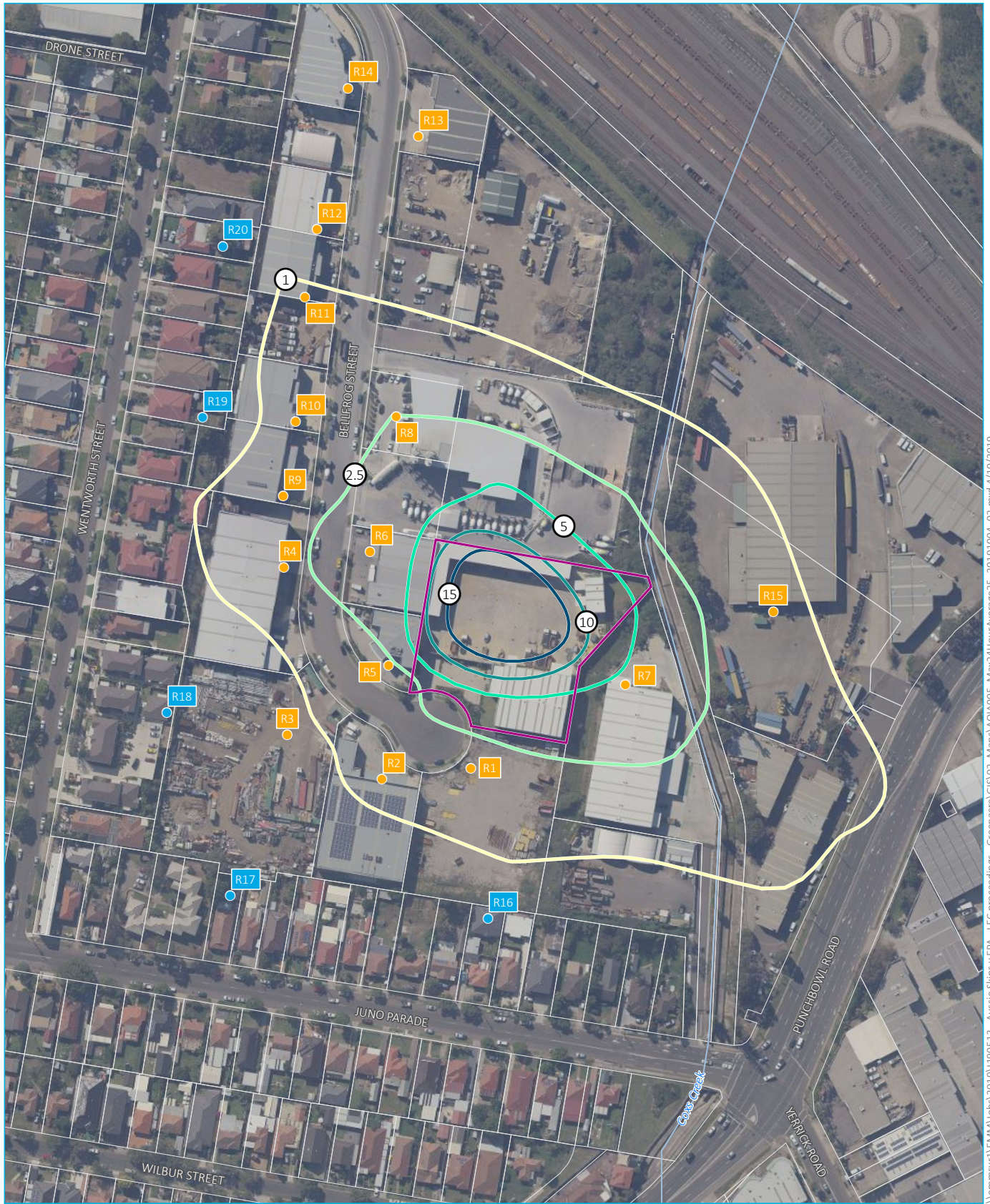
KEY

- | | |
|---|---|
| Site boundary | PM ₁₀ concentrations (µg/m ³) |
| Watercourse/drainage line | 0.5 |
| Cadastral boundary | 1 |
| Receptor location types | 2 |
| ● Industrial | 4 |
| ● Residential | |

Predicted annual average PM₁₀ concentrations (µg/m³) – site only – average day operations

Aussie Recycling Greenacre
Air quality impact assessment
Figure C.2





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Source: EMM (2019); DFSI (2017); GA (2011)

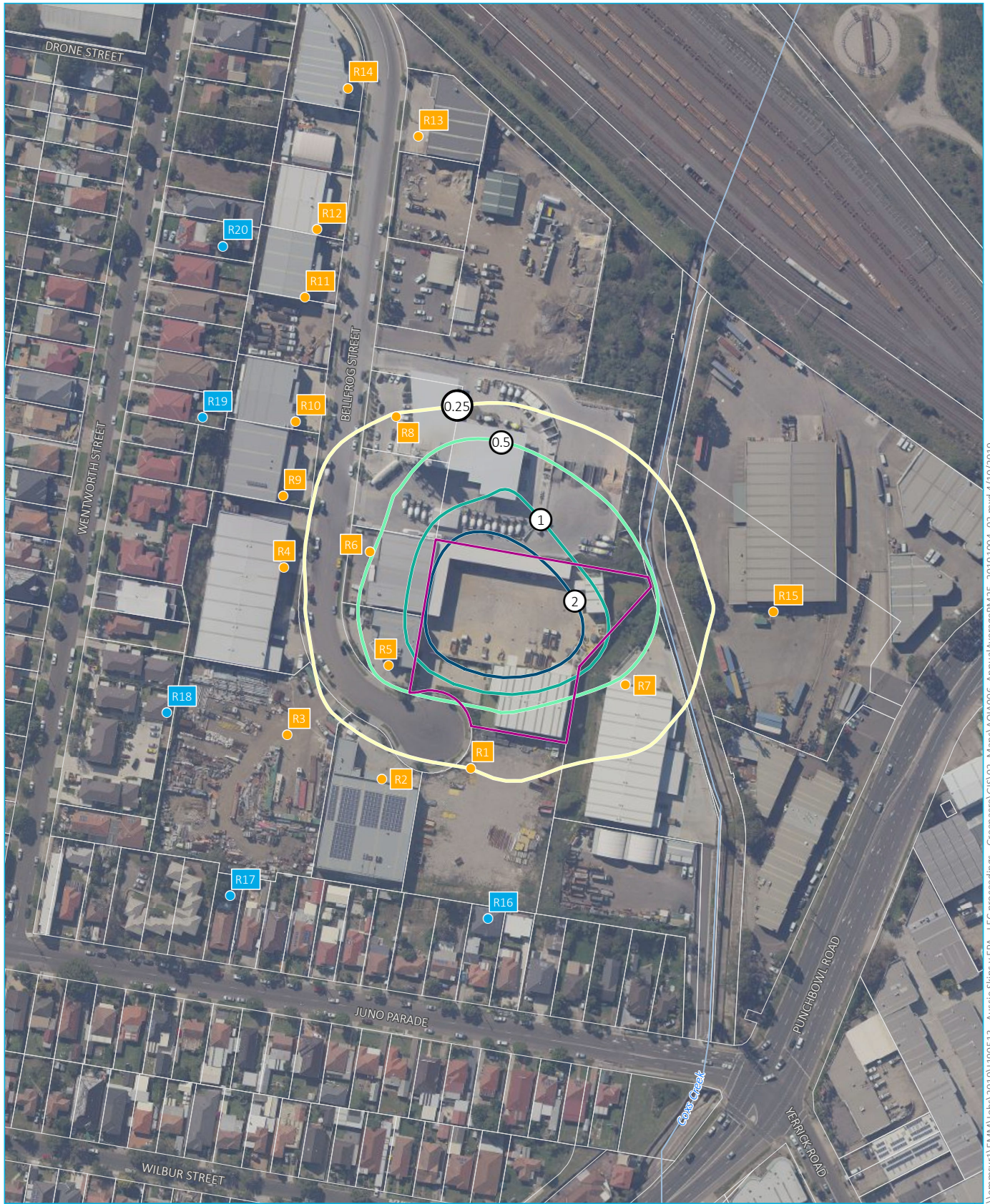
KEY

- | | |
|--|---|
| Site boundary | PM _{2.5} concentrations (µg/m ³) |
| Watercourse/drainage line | 1 |
| Cadastral boundary | 2.5 |
| Receptor location types | 5 |
| ● Industrial | 10 |
| ● Residential | 15 |

Maximum predicted 24-hour average
PM_{2.5} concentrations (µg/m³) – site only –
peak day operations

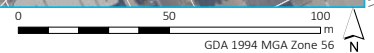
Aussie Recycling Greenacre
Air quality impact assessment
Figure C.3





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Source: EMM (2019); DFSI (2017); GA (2011)

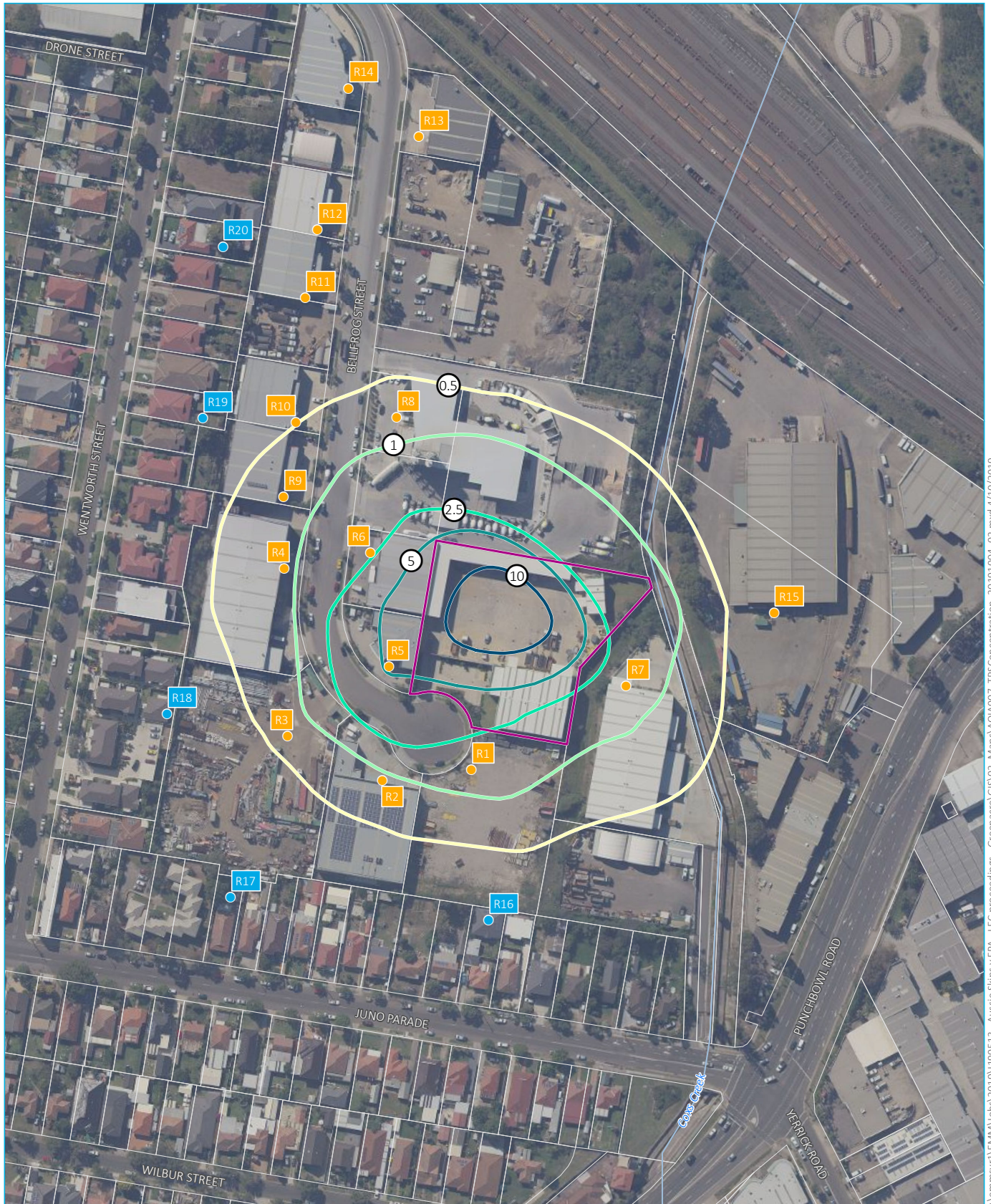


KEY

- | | |
|--|---|
| Site boundary | PM _{2.5} concentrations (µg/m ³) |
| Watercourse/drainage line | 0.25 |
| Cadastral boundary | 0.5 |
| Receptor location types | 1 |
| ● Industrial | 2 |
| ● Residential | |

Predicted annual average PM_{2.5} concentrations (µg/m³) – site only – average day operations

Aussie Recycling Greenacre
Air quality impact assessment
Figure C.4



\\emmsvr1\EMM\Jobs\2019\190513 - Aussie Skips v EPA - LEC proceedings - Greenacre\GIS\02_Maps\AQIA007_TPSConcentration_20191004_02.mxd 4/10/2019

Source: EMM (2019); DFSI (2017); GA (2011)

KEY

- | | |
|--|---|
| Site boundary | TSP concentrations ($\mu\text{g}/\text{m}^3$) |
| Watercourse/drainage line | 0.5 |
| Cadastral boundary | 1 |
| Receptor location types | 2.5 |
| ● Industrial | 5 |
| ● Residential | 10 |

Predicted annual average TSP concentrations ($\mu\text{g}/\text{m}^3$) – site only – average day operations

Aussie Recycling Greenacre
Air quality impact assessment
Figure C.5



\\emmsvr1\EMM\Jobs\2019\190513 - Aussie Skips v EPA - LEC proceedings - Greenacre\GIS\02_Maps\AQIA008_DustDepositionLevels_20191004_02.mxd 4/10/2019

Source: EMM (2019); DFSI (2017); GA (2011)

KEY

- Site boundary
- Watercourse/drainage line
- Cadastral boundary
- Receptor location types
- Industrial
- Residential
- Dust deposition levels (g/m²/month)
- 0.1
- 0.25
- 0.5
- 1
- 2
- 4

Predicted annual average dust deposition levels (g/m²/month) – site only – average day operations

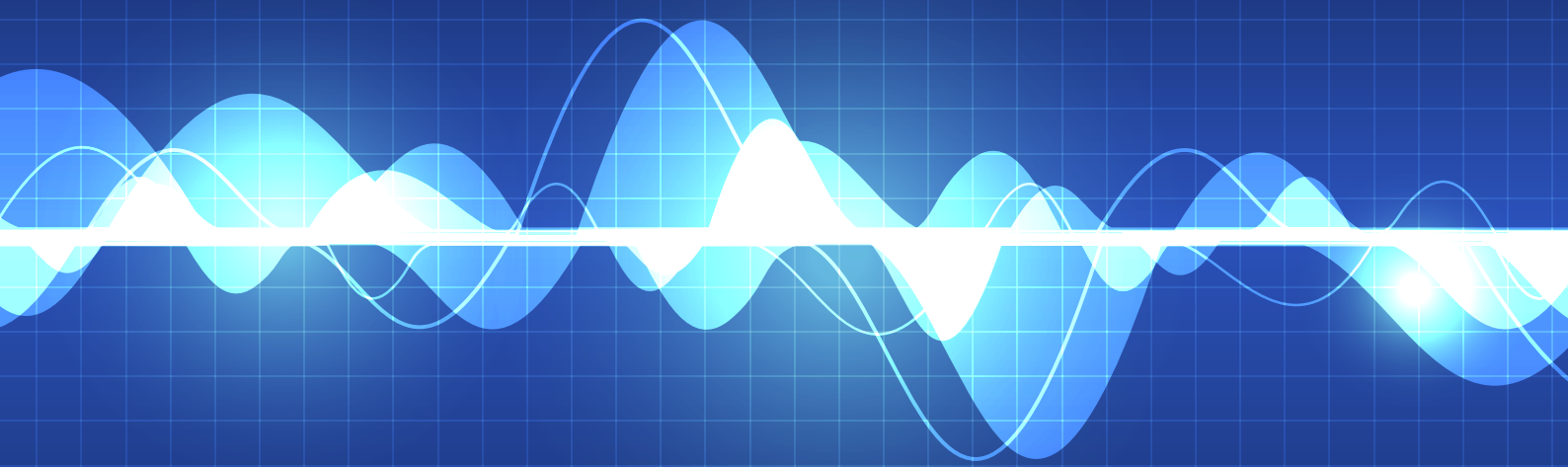
Aussie Recycling Greenacre
Air quality impact assessment
Figure C.6



Aussie Skips Recycling - Greenacre

Noise Impact Assessment

Prepared for Aussie Skips Recycling Pty Ltd
December 2019





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Aussie Skips Recycling - Greenacre

Noise Impact Assessment

Report Number

J190513 RP1

Client

Aussie Skips Recycling Pty Ltd

Date

20 December 2019

Version

Final

Prepared by



Rick Scully

Acoustic Consultant

20 December 2019

Reviewed by



Najah Ishac

National Technical Leader, Acoustics

20 December 2019

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1 Introduction

EMM Consulting Pty Ltd (EMM) has been engaged to prepare a detailed acoustic assessment of operations conducted by Aussie Skips Recycling Pty Ltd (Aussie Skips), located at Lot 15 Bellfrog Street, Greenacre (the Site).

A development application (DA) for the construction of an industrial warehouse building with an associated workshop and use as a materials storage yard at the site was lodged by Dunmain Pty Ltd in September 2012 and approved by Strathfield Council in February 2013. The site is leased by Aussie Skips from Dunmain and is currently used for the receipt, storage and dispatch of soils, aggregates, virgin excavated natural material (VENM) and other similar materials. The DA approved site layout is presented in Figure 1.1.

Aussie Skips applied for an environment protection licence (EPL) from the NSW Environment Protection Authority (NSW EPA) in February 2019 to receive up to 200,000 tonnes per annum (tpa) of general solid waste (non-putrescible).

The site is located within an existing industrial area in Greenacre, NSW. The surrounding lots along Bellfrog Street are a mixture of warehouses and industrial operations, including the Hanson Greenacre concrete batching plant (CBP) immediately to the north of the site. Further afield from Bellfrog Street is the Sydney Ports Enfield Intermodal site to the north, industrial sites to the east, south and west, with residential dwellings to the south and west beyond industrial properties.

The site is currently used for the receipt, storage and dispatch of loads made up of predominately soils, aggregates, concrete, asphalt, VENM and other similar materials.

The site features an entrance and car parking area off Bellfrog Street, concrete hardstand yard, material storage bunkers, workshop and amenity structures in the northeast corner and a warehouse structure at the south east corner of the site. The site is entirely sealed with concrete except for the grassed raingarden and landscaped areas.

Material is delivered to site by road trucks of various sizes, with typical loads of approximately 30 t. Trucks are weighed and unloaded adjacent to the material storage bunkers. Material is handled at the storage bunkers by a front end loader (FEL) and excavator. Sifting and sorting of material is conducted by excavator fitted with a sieve bucket. Stored material is loaded into trucks by the FEL for dispatch from site. There is no crushing, screening or processing of material at the site.

The site operates between 6.00 am and 5.00 pm, Monday to Saturday. The site does not operate on Sundays.

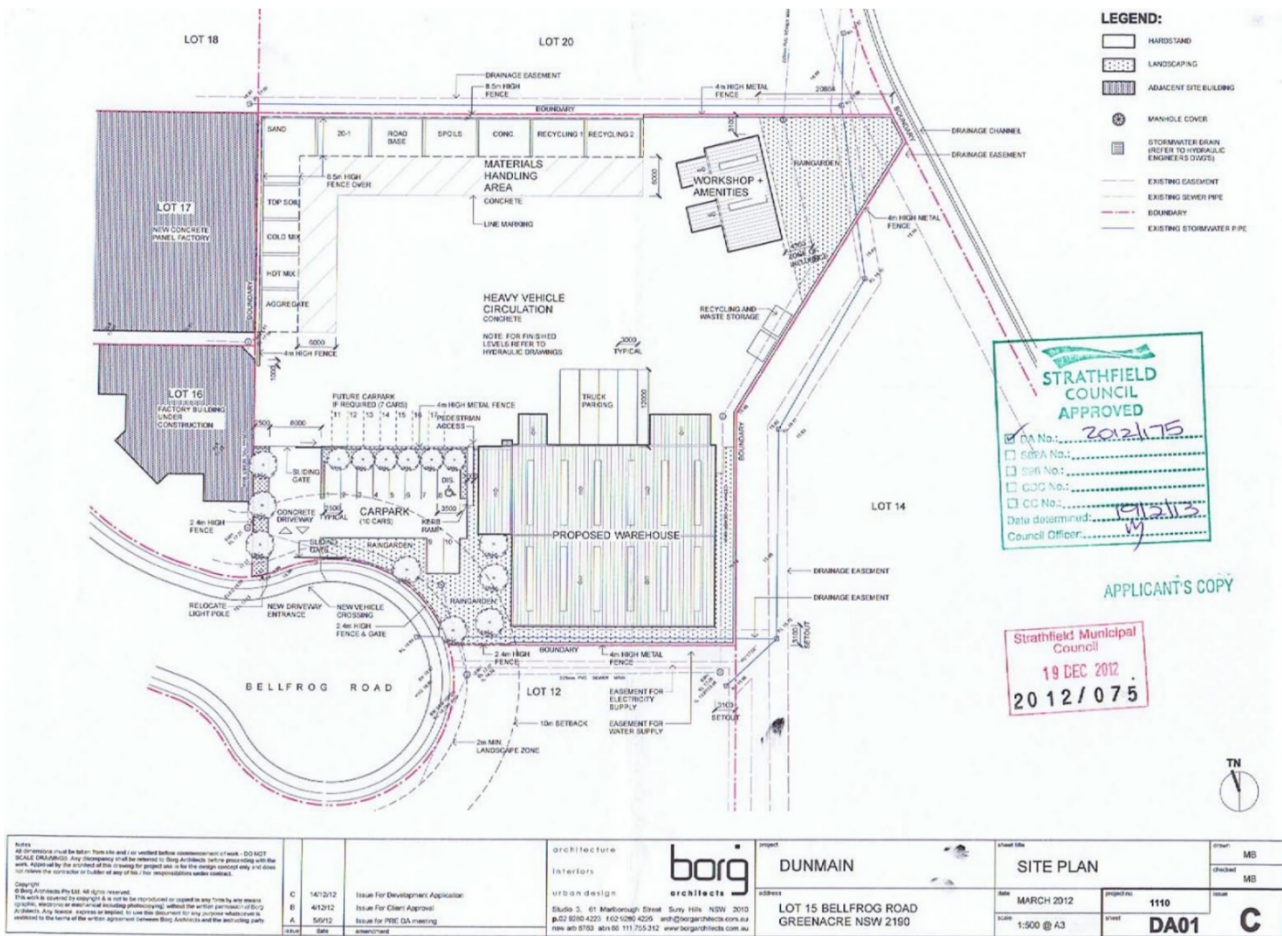


Figure 1.1 Approved DA site plan – February 2013

2 Existing environment

2.1 Noise sensitive assessment locations

The nearest residential assessment locations to site are located 110 m to the south and west of the yard at Juno Parade and Wentworth Street, Greenacre. Noise impacts have been predicted to these locations and a number of other residential properties to the south and west of the Site. These assessment locations are considered to represent the most exposed residences based on our observations, noise monitoring and modelling.

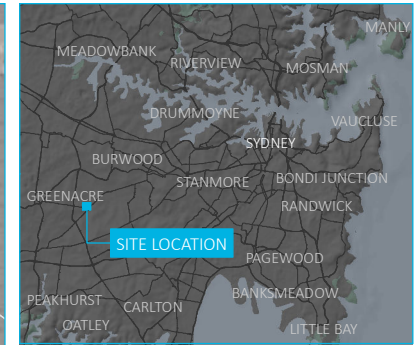
A warehouse is currently under construction on Lot 12 Bellfrog Street, Greenacre, to the south of the Site. We understand that this will be of similar construction to the existing warehouse on Lot 11 to its west.

An extensive list of residential assessment locations, along with a figure showing their location is provided in Appendix A. A representative list of assessment locations are shown in Table 2.1 and are identified in Figure 2.1. The assessment locations in Table 2.1 are considered representative of surrounding residences and are the most exposed to site noise based on our modelling.

Table 2.1 Residential assessment locations

Receiver ID	Address
R9	25 Juno Parade, Greenacre
R17	41 Juno Parade, Greenacre
R19	54 Wentworth Street, Greenacre

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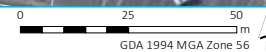
- KEY**
- Site boundary
 - Future warehouse site boundary
 - Attended measurement calibration point
 - ▲ Unattended Noise monitoring location
 - Noise sensitive assessment location
 - Watercourse/drainage line
 - Cadastral boundary

Site location, noise sensitive assessment locations and noise monitoring locations

Aussie Skips - Greenacre
Noise impact assessment
Figure 2.1



Source: EMM (2019); DFSI (2017); GA (2011); ASGC (2006)



2.2 Background noise levels

To establish the existing ambient noise environment of the area, unattended noise monitoring was conducted in December 2019 at two representative residential assessment locations on Juno Parade (R9 and R16) as shown in Figure 2.1.

The long term noise monitoring location at R16 (L1) is close (within 10m) to the location as used in a previous noise assessment for former proponents of the Site, prepared by SLR Consulting (Report Number 610.11930-R1, dated 10 October 2012). This SLR report relied upon baseline noise monitoring from 2010, and is now dated and precedes many of the current industrial sites present today. Hence, the need to update the baseline data.

The location of noise monitoring is representative of the nearest noise sensitive residences and was selected after a detailed inspection of the area, giving consideration to other noise sources which may influence the data recorded, the proximity of noise sensitive residences and security issues of the noise monitoring devices.

Noise monitoring was conducted in general accordance with the procedures described in Australian Standard AS 1055-1997 *Acoustics - Description and Measurement of Environmental Noise* and the Noise Policy for Industry (NPfI) (EPA, 2017).

The long-term unattended measurements were carried out using one Svantek 979 environmental noise monitor (s/n 21095) from 2 to 16 December 2019 and one Svantek 977 environmental noise monitor (s/n 59682) from 4 to 16 December 2019.

Calibration of instrumentation was checked prior to and following measurements. All equipment carried appropriate and current NATA (or manufacturer) calibration certificates. No calibration drift was recorded.

Data affected by adverse meteorological conditions and by spurious and uncharacteristic events has been excluded from the results in accordance with methodologies provided in the NPfI. Meteorological data was obtained from the NSW Office of Environment and Heritage automated weather station in Chullora, approximately 3.2 km northwest from site. The results of long-term unattended noise monitoring are summarised in Table 4.1. Daily statistical data and charts are provided in Appendix B.

Table 2.2 Unattended long-term noise monitoring results

ID	Location	Measured background noise level, RBL dB				Measured L_{Aeq} dB			
		Morning shoulder	Day	Evening	Night	Morning shoulder	Day	Evening	Night
L1	R16 – 39 Juno Parade, Greenacre	46	47	45	39	53	54	53	49

Notes: Day: 7am to 6pm Monday to Saturday; 8am to 6pm Sundays and public holidays; Evening: 6pm to 10pm; Night: 10pm to 6am; Morning shoulder: 6am to 7am.

Observations made during operator-attended noise monitoring confirm that the Site was mostly inaudible at NM2 apart from a few occasional vehicle movements or infrequent sounds of excavators sifting soil. Hence, the L_{90} noise metric used to establish RBLs is not affected by site operations.

Operator attended noise surveys of 15-minute duration were conducted at the unattended noise logger location on Wednesday 4 December 2019. Conditions during the measurements comprised dry weather with a light south-easterly breeze.

The unattended measurements were taken using a Brüel & Kjær 2250 Type 1 hand-held sound analyser (S/N 3008201). Calibration of the sound analyser was verified in-field using a Brüel & Kjær 4230 calibrator (S/N 1441415). All instrumentation was within their relevant NATA calibration period.

The results of the attended noise monitoring are provided in Table 2.3.

Table 2.3 Attended short-term noise monitoring results – 4 December 2019

Location	Start time	Measured sound pressure levels, dB, 15 min				Comments
		L _{Amax}	L _{Amin}	L _{A90}	L _{Aeq}	
L1	10:00 am	44	77	50	56	Noise from Site mostly inaudible except for a few instances where an excavator sifting was audible. Other audible noise sources include: insects, birdsong, activities in adjacent industrial land (franna crane, hammering occasionally, manitou and people talking) and traffic on Juno Parade.

2.3 Current operations

2.3.1 On-site unattended monitoring

An additional unattended noise monitor was installed on site, on top of the weighbridge office. The data from this unit provided confirmation of typical noise emissions from site across an extended period. This assisted in the calibration of the noise predictions. A Svantek 977 environmental noise monitor (s/n 59681) was installed from 2 to 16 December 2019. The Calibration of instrumentation was checked prior to and following measurements. All equipment carried appropriate and current NATA (or manufacturer) calibration certificates. No calibration drift was recorded.

Results from this monitor indicated that noise levels on-site during busy periods typically ranged from 70 to 78 dB L_{Aeq,15min}. The upper limits of this range have been used to calibrate the noise predictions of the model.

2.3.2 Attended monitoring

Operator attended noise monitoring was conducted at the noise logger location during the day on 4 December and at the attended measurement calibration point (A1, see Figure 2.1) during the morning shoulder and day periods on 11 December 2019. Results from these attended measurements have been used to assist with calibrating the noise predictions in the model.

Table 2.4 presents results and observations from attended monitoring. It is important to note that on-site skip bin activities were virtually non-existent over the time all the attended noise monitoring was undertaken and attendance at site to install unattended devices (ie several hours of observations). One skip bin was observed being loaded onto a truck (roller bed version) however that operation was not measurable above other site activities. The on-site unattended noise monitor present during the time this skip bin was loaded onto a truck, and possibly others throughout the unattended monitoring period, captures all such site emissions. As noted earlier, the on-site monitor was used to calibrate the modelling and hence skip bin activities are accounted for in the assessment. Further discussion regarding skip bin noise is provided in Section 4.

Table 2.4 Operator attended noise monitoring results

Location	Date and start time	Weather conditions	Total noise levels, dB				Estimated site contribution		Notes
			L _{Amin}	L _{Amax}	L _{A90}	L _{Aeq,15min}	L _{Aeq,15min}	L _{Amax}	
Morning shoulder									
A1	11 Dec 2019 6:00am	Light winds, 1.7 m/s SW, Thinly overcast	49	81	51	60	53	58	Noise audible from site included trucks exiting site, reverse quackers and engine noise (trucks idling). Other audible noise sources include truck and light vehicle movements (not site related), activity at Hanson CBP (agi load alarm, constant hum), noise from adjacent construction site (vehicle movements), noise from neighbouring warehouse (truck movements, reverse alarms, bangs of loading trucks).
A1	11 Dec 2019 6:15am	Light winds, 1.7 m/s SW, Thinly overcast	48	75	50	56	50	60	Noise audible from site included trucks exiting site and engine noise (trucks idling). Other audible noise sources include truck and light vehicle movements (not site related), activity at Hanson CBP (agi load alarm, constant hum), noise from adjacent construction site (hammering).
Daytime									
L1	4 Dec 2019 10:00am	Light winds, 1.2 m/s SW, Smoke haze	44	77	50	56	<40	46	Site mostly inaudible except for a few instances where the excavator sifting was audible. Other audible noise sources include adjacent industrial yard activity (franna crane, metal clangs, talking, hammering), birdsong, insects, aircraft and traffic on Juno Parade.
A1	11 Dec 2019 11:45am	Light winds, 2.2 m/s S, Thinly overcast	50	84	54	59	56	70	Noise audible from site included sprinklers (constantly operating), reverse quackers, engine revs, trucks idling, excavator sifting occasionally, bobcat cleaning, road truck unloading (with bucket door bangs) and trucks entering/exiting site. Other audible noise sources include activities at adjacent construction site (hand tools, saw, loading skip bin), activities at adjacent industrial warehouse (loading trucks, bangs, reverse alarms) and vehicle movements on Bellfrog Street.

Table 2.4 Operator attended noise monitoring results

Location	Date and start time	Weather conditions	Total noise levels, dB				Estimated site contribution		Notes
			L _{Amin}	L _{Amax}	L _{A90}	L _{Aeq,15min}	L _{Aeq,15min}	L _{Amax}	
A1	11 Dec 2019 12:00am	Light winds, 2 m/s S, Thinly overcast	51	77	55	62	56	58	Noise audible from site included trucks entering/exiting site, excavator sifting, sprinklers (constantly operating) and trucks idling. Other noise sources include activity at adjacent construction site (electric blower, bangs from loading skip bin), aircraft and vehicle movements on Bellfrog Street.
A1	11 Dec 2019 12:15am	Light winds, 2 m/s S, Thinly overcast	51	74	54	60	57	65	Noise audible from site included engine revs, trucks idling, trucks entering/exiting site, excavator sifting and haul trucks unloading. Other audible noise sources included adjacent construction site activity (truck movements, electric blower, small excavator loading skip bin, sweeping), neighbouring industrial warehouse activities (truck movements and vehicle movements on Bellfrog Street).
A1	11 Dec 2019 12:30am	Light winds, 2 m/s S, Thinly overcast	52	80	56	65	57	65	Noise audible from site included haul trucks unloading, trucks entering/exiting site, FEL loading haul truck and engine revs. Other audible noise sources included activity in adjacent construction site (electric blower, small excavator loading skip bin, vehicle movements), activity at neighbouring industrial warehouse (truck movements, truck loading bands/clangs) and vehicle movements on Bellfrog Street.

3 Noise criteria

3.1 Noise policy for Industry

Noise from industrial sites or processes in NSW are regulated by the local council, Department of Planning and Environment (DPE) and/or the EPA and usually have a licence and/or development consent conditions stipulating noise limits. These limits are normally derived from operational noise levels applied at assessment locations. They are based on EPA guidelines, ie Noise Policy for Industry (EPA 2017) (NPfI) or noise levels that can be achieved at a specific site following the application of all reasonable and feasible noise mitigation.

The objectives of project noise trigger levels (PNTL) for industry are to protect the community from excessive intrusive noise and preserve amenity for specific land uses. It should be noted that the audibility of a noise source does not necessarily equate to disturbance at an assessment location.

To ensure these objectives are met, the EPA provides two separate noise trigger levels: intrusiveness and amenity. The fundamental difference being intrusiveness noise levels apply over 15 minutes in any period (day, evening or night), whereas the amenity noise levels apply to the entire assessment period (day, evening or night).

3.2 Intrusive noise levels

The intrusive noise trigger levels require that $L_{Aeq,15\text{ minute}}$ noise levels from the Site during the relevant operational periods (i.e. morning shoulder and day in this instance) do not exceed the RBL by more than 5 dB. Table 3.1 presents the intrusive noise level determined for the site based on the adopted RBLs.

Table 3.1 Project intrusiveness noise level – all residential assessment locations

Period ¹	Adopted RBL, dB	Project intrusiveness noise level, dB, $L_{Aeq,15\text{ minute}}$
Morning shoulder	46	51
Day	47	52

Notes: Day: 7am to 6pm Monday to Saturday; 8am to 6pm Sundays and public holidays; Evening: 6pm to 10pm; Night: 10pm to 6am; Morning shoulder: 6am to 7am.

3.3 Amenity noise levels

The assessment of amenity is based on noise levels specific to the land use. The noise levels relate only to industrial noise and exclude road or rail noise. Where the measured existing industrial noise approaches the recommended amenity noise level, it needs to be demonstrated that noise levels from new industry will not contribute to existing industrial noise such that amenity noise levels are exceeded.

To ensure that industrial noise levels (existing plus new) remain within the recommended amenity noise levels for an area, the project amenity noise level for new industrial developments is the recommended amenity noise level (outlined in Table 2.2 of the NPfI) minus 5 dB.

The residential locations most exposed to noise from the site share a common boundary with other industrial land uses, and hence in that context can be classed under the NPfI industrial interface amenity category for existing situations. However, we have adopted a conservative approach and have categorised all receivers in the NPfI “urban” amenity category without applying an industrial interface adjustment. The urban category as per the NPfI is “an area with an acoustical environment that:

- is dominated by ‘urban hum’ or industrial noise source, where urban hum means the aggregate sound of many unidentifiable, mostly traffic and/or industrial related sound sources;
- has through-traffic with characteristically heavy and continuous traffic flows during peak periods;
- is near commercial districts or industrial districts; and
- has any combination of the above.

The corresponding project amenity noise levels for the site are given in Table 3.2.

Table 3.2 Project amenity noise levels

Indicative area	Time period ¹	Recommended amenity noise level, $L_{Aeq, period}$	Project amenity noise level dB, $L_{Aeq, period}^3$
Urban residential	Day	60	55
	Night ¹	45	40

Notes: Day: 7am to 6pm Monday to Saturday; 8am to 6pm Sundays and public holidays; Evening: 6pm to 10pm; Night: 10pm to 6am; Morning shoulder: 6am to 7am.

1. The Site will not be in operation during the night period, apart from the morning shoulder. Night amenity criteria has been adopted for the morning shoulder period.

3.4 Project noise trigger levels

The project noise trigger level (PNTL) is the lower of the calculated intrusive or amenity noise level and is provided in Table 3.3 for all assessment locations. This is the level that will be used to assess noise impact and drive the process of assessing all feasible and reasonable control measures.

In accordance with the NPfI, +3 dB has been added to the $L_{Aeq, period}$ amenity criteria for the day period (Table 3.2) so that it can be directly compared with the $L_{Aeq, 15minute}$ intrusive criteria (Table 3.1).

As the site does not operate for the entire night period, amenity criteria for the night period (morning shoulder) has been kept as a $L_{Aeq, 9hour}$.

Table 3.3 Project noise trigger levels – residential assessment locations

Period ¹	Intrusive noise level dB, $L_{Aeq, 15 min}$	Amenity noise level dB	Project noise trigger level (PNTL), dB(A)
Day	52	58 $L_{Aeq, 15min}^1$	52 $L_{Aeq, 15min}$
Night (morning shoulder)	51	40 $L_{Aeq, 9hour}$	51 $L_{Aeq, 15min}$ and 40 $L_{Aeq, 9hour}$

Notes: Day: 7am to 6pm Monday to Saturday; 8am to 6pm Sundays and public holidays; Evening: 6pm to 10pm; Night: 10pm to 6am; Morning shoulder: 6am to 7am.

3.5 Sleep disturbance

As the Site operates during the morning shoulder period, an assessment of sleep disturbance has been completed.

The NPfI suggests that a detailed maximum noise level event assessment should be undertaken where night-time noise levels at a residential location exceed:

- $L_{Aeq,15\text{ minute}}$ 40 dB or the prevailing RBL plus 5 dB (whichever is the greater); and/or
- L_{Amax} 52 dB or the prevailing RBL plus 15 dB (whichever is the greater).

Guidance regarding potential for sleep disturbance is also provided in the NSW EPA's Road Noise Policy (RNP). The RNP calls upon a number of studies that have been conducted into the effect of maximum noise levels on sleep. The RNP provides the following conclusions from the research on sleep disturbance:

- maximum internal noise levels (L_{Amax}) below 50 to 55 dB are unlikely to awaken people from sleep; and
- one or two noise events per night, with maximum internal noise levels (L_{Amax}) of 65 to 70 dB, are not likely to affect health and wellbeing significantly.

It is commonly accepted by acoustic practitioners and regulatory bodies that a facade including a partially open window will reduce external noise levels by 10 dB. Therefore, external noise levels in the order of 60 to 65 dB calculated at the facade of a residence is unlikely to awaken people according to the RNP.

If noise levels over the screening criteria are identified, then additional analysis would consider factors such as:

- how often the events would occur;
- the time the events would occur;
- whether there are times of day when there is a clear change in the noise environment (such as during early morning shoulder periods); and
- current scientific literature available regarding the impact of maximum noise level events at night.

Table 3.4 provides the noise level event screening criteria for the residential assessment locations.

Table 3.4 Sleep disturbance screening criteria at all residences

Adopted morning shoulder RBL, dB	Sleep disturbance screening criteria, dB	
	$L_{Aeq,15\text{ minute}}$	L_{Amax}
46	51	61

4 Operational noise assessment

4.1 Overview

This section presents the methods and assumptions used to model noise emissions from the approved and proposed operations.

Noise predictions were carried out using the DGMR software 'iNoise', developed by the same developers for Bruel & Kjaer's Predictor software. The iNoise software adopts the ISO9613 algorithm and calculates total noise levels at assessment locations from concurrent operation of multiple noise sources. The model considers factors such as the lateral and vertical location of plant, source-to-receptor distances, ground effects, atmospheric absorption, topography of the site and surrounding area and applicable meteorological conditions.

For all scenarios, it has been assumed that all plant and equipment operated simultaneously. This is considered a conservative representation of a typical worst-case scenario.

4.2 Equipment

Table 4.1 presents a list of modelled plant, noise emission data and proposed operation periods of the equipment based on site data and measurements conducted by EMM on 2 May and 11 December 2019.

Table 4.1 Equipment sound power levels and operating times

Equipment/activity	Sound power level, $L_{Aeq,15min}$	Number per 15 minutes, (utilisation percentage per 15 minutes) ¹		Activity/notes
		Morning shoulder	Day	
Excavator ²	107	-	2	Sifting dirt and sorting material
Front end loader ²	106 (stockpile management) 101 (loading haul truck)	-	1	Managing stockpiles or loading road truck with dirt
Storage or changing over of skip bins ²	102	-	1	Trucks storing, picking up or changing over skip bins
Trucks unloading material ²	108	-	4	Trucks unloading material into excavator stockpile. SWL based on worst case B-double road trucks.
Bobcat	104	-	1 (50%)	Cleaning site
Heavy vehicles	103	10	6	Heavy vehicles entering/exiting site
Trucks idling	90	3	3	Trucks idling on site waiting to load/unload or enter/exit site.

Notes: 1. Utilisation percentage shown only if less than 100%
2. Measured by EMM at the site.

4.3 Sleep disturbance

During the morning shoulder the only activity that occurs is the movement of trucks. All trucks are parked on site at the end of the previous day in a manner allowing them to start and leave the site without the need to reverse or apply air brakes. A sound power level of 103 dBA attributed to a heavy vehicle traversing has been used to predict L_{Amax} noise levels at sensitive receivers.

4.4 Southern warehouse

A scenario wherein the warehouse currently under construction on Lot 12 to the south of site is completed has also been modelled. The completed warehouse is likely to provide significant noise reductions for receivers to the south. As access to the plans for this site were not available, a highly conservative building height of 6m has been applied in the model. The footprint of the building has been assumed to be the extents of the current foundation slab that was observed during our site inspections.

4.5 Calibration

Sound power levels from the on-site measurements (provided in Table 4.1) were assigned to noise sources within the model. Noise level predictions to the on-site noise logger (L2) location and the attended measurement calibration point (A1) are consistent with the results presented in Section 2.3. Hence the model is deemed calibrated and reflects measured noise contributions from site.

5 Results

The predicted noise levels at receivers for each period outlined above are presented in Table 5.1. Predictions to all assessment locations (R1-R23) are provided in Appendix A. Noise contour maps are provided in Appendix C.

Predictions have been assessed against the PNTLs established in Section 3.4

Table 5.1 Predicted noise levels

Assessment location	Morning shoulder			Day, $L_{Aeq,15min}$			Sleep disturbance, L_{Amax}		
	PNTL	Predicted noise levels	Predicted noise levels with southern warehouse	PNTL	Predicted noise levels	Predicted noise levels with southern warehouse	Screening criteria	Predicted noise levels	Predicted noise levels with southern warehouse
R9	51 $L_{Aeq,15min}$	45 $L_{Aeq,15min}$	<35 $L_{Aeq,15min}$	52	54	<40	61	54	<45
	40 $L_{Aeq,9hour}$	36 $L_{Aeq,9hour}$	<35 $L_{Aeq,9hour}$		47	47			
R17	51 $L_{Aeq,15min}$	<35 $L_{Aeq,15min}$	<35 $L_{Aeq,15min}$	52	47	47	61	<45	<45
	40 $L_{Aeq,9hour}$	<35 $L_{Aeq,9hour}$	<35 $L_{Aeq,9hour}$		48	48			
R19	51 $L_{Aeq,15min}$	39 $L_{Aeq,15min}$	39 $L_{Aeq,15min}$	52	48	48	61	49	49
	40 $L_{Aeq,9hour}$	<35 $L_{Aeq,9hour}$	<35 $L_{Aeq,9hour}$		48	48			

Notes: Light grey shading indicates a 1-2dB exceedance.

Noise predictions at all residential assessment locations are predicted to satisfy the relevant PNTL for all periods except for during the day at R8 and R9. At these assessment locations, noise levels are predicted to exceed daytime PNTLs by 1 to 2 dB. A 1 to 2 dB exceedance or change in noise level is generally classified by the EPA and DPE as negligible after all feasible and reasonable noise mitigation and management has been applied (refer to the NPfI). This is because a change in noise level of 1 to 2 dB in an environmental noise context would not be discernible to the human ear.

Further, once the industrial building currently under construction to the south is completed, noise levels are predicted to drop significantly at southern assessment locations as shown in Table 5.1. Once this construction is complete, noise predictions at all residential assessment locations are predicted to satisfy the relevant PNTL for all periods. Hence, there will be no residual noise levels that will require any further feasible and reasonable noise mitigation measures.

Maximum noise level predictions are below the sleep disturbance screening criteria at all residential assessment locations. Further, predicted maximum noise levels are below levels expected to cause awakenings of 60 to 65 dB L_{Amax} as referenced in the Road Noise Policy (RNP) (EPA 2011).

6 Conclusion

EMM has prepared a detailed acoustic assessment of operations conducted by Aussie Skips, at their operations on Lot 15, 13 Bellfrog Street, Greenacre (the Site).

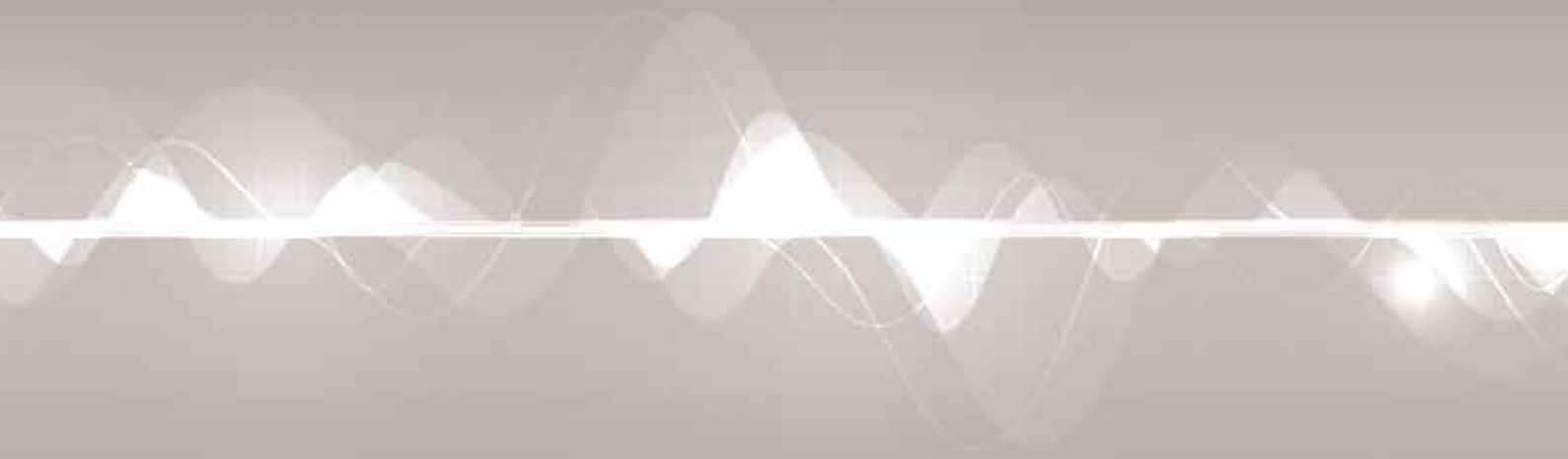
Existing background noise levels and PNTLs were established in accordance with NPfl (EPA 2017). Site operations were analysed extensively and noise emissions from site were measured using both attended and unattended measurement practices. This analysis and measurements were incorporated into a noise model, calibrated to predict noise levels from site at surrounding residential noise sensitive assessment locations.

Operational noise levels from the site are predicted to satisfy the relevant PNTL for all periods once the industrial building currently under construction to the south is completed. Prior to that, predicted noise is marginally (1 to 2 dB) above PNTLs at two locations (R8 and R9). A 1 to 2 dB exceedance or change in noise level is generally classified by the EPA and DPE as negligible after all feasible and reasonable noise mitigation and management has been applied (refer to the NPfl).

Potential sleep disturbance impacts from operations during the morning shoulder have also been assessed and predictions demonstrate that relevant criteria will be satisfied at all assessment locations.

Appendix A

Detailed noise predictions

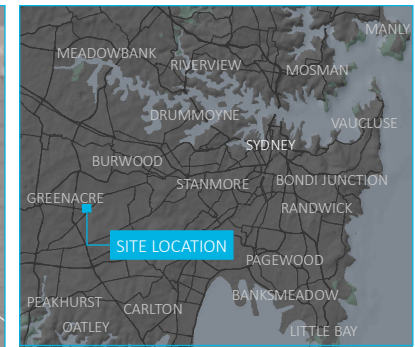
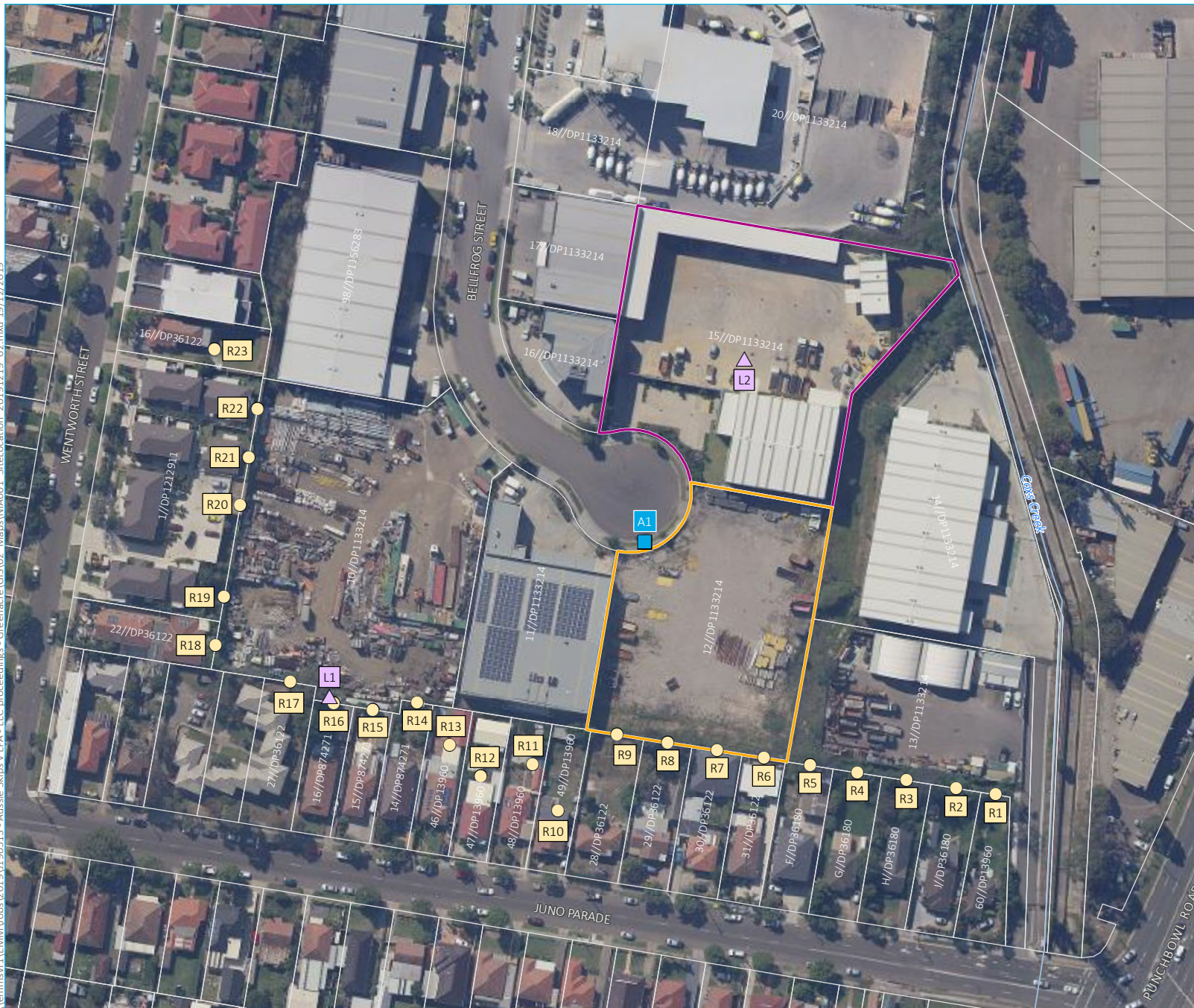


A.1 Noise sensitive assessment locations

Table A.1 Residential assessment locations

Receiver ID	Address
R1	9 Juno Parade, Greenacre
R2	11 Juno Parade, Greenacre
R3	13 Juno Parade, Greenacre
R4	15 Juno Parade, Greenacre
R5	17 Juno Parade, Greenacre
R6	19 Juno Parade, Greenacre
R7	21 Juno Parade, Greenacre
R8	23 Juno Parade, Greenacre
R9	25 Juno Parade, Greenacre
R10	27 Juno Parade, Greenacre
R11	29 Juno Parade, Greenacre
R12	31 Juno Parade, Greenacre
R13	33 Juno Parade, Greenacre
R14	35 Juno Parade, Greenacre
R15	37 Juno Parade, Greenacre
R16	39 Juno Parade, Greenacre
R17	41 Juno Parade, Greenacre
R18	56 Wentworth Street, Greenacre
R19	54 Wentworth Street, Greenacre
R20	50-52 Wentworth Street, Greenacre
R21	48 Wentworth Street, Greenacre
R22	46 Wentworth Street, Greenacre
R23	44 Wentworth Street, Greenacre

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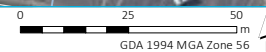
- KEY**
- Site boundary
 - Future warehouse site boundary
 - Attended measurement calibration point
 - ▲ Unattended Noise monitoring location
 - Noise sensitive assessment location
 - Watercourse/drainage line
 - Cadastral boundary

Site location, noise sensitive assessment locations and noise monitoring locations

Aussie Skips - Greenacre
Noise impact assessment
Figure A.1



Source: EMM (2019); DFSI (2017); GA (2011); ASGC (2006)



A.2 Noise predictions

Table A.2 Predicted noise levels

Assessment location	Morning shoulder			Day, $L_{Aeq,15min}$			Sleep disturbance, L_{Amax}		
	PNTL	Predicted noise levels	Predicted noise levels with southern warehouse	PNTL	Predicted noise levels	Predicted noise levels with southern warehouse	PNTL	Predicted noise levels	Predicted noise levels with southern warehouse
R1	51 $L_{Aeq,15min}$	<35 $L_{Aeq,15min}$	<35 $L_{Aeq,15min}$	52	47	47	61	42	42
	40 $L_{Aeq,9hour}$	<35 $L_{Aeq,9hour}$	<35 $L_{Aeq,9hour}$						
R2	51 $L_{Aeq,15min}$	41 $L_{Aeq,15min}$	41 $L_{Aeq,15min}$	52	51	51	61	48	48
	40 $L_{Aeq,9hour}$	<35 $L_{Aeq,9hour}$	<35 $L_{Aeq,9hour}$						
R3	51 $L_{Aeq,15min}$	42 $L_{Aeq,15min}$	<35 $L_{Aeq,15min}$	52	51	44	61	49	37
	40 $L_{Aeq,9hour}$	<35 $L_{Aeq,9hour}$	<35 $L_{Aeq,9hour}$						
R4	51 $L_{Aeq,15min}$	43 $L_{Aeq,15min}$	<35 $L_{Aeq,15min}$	52	47	43	61	50	36
	40 $L_{Aeq,9hour}$	<35 $L_{Aeq,9hour}$	<35 $L_{Aeq,9hour}$						
R5	51 $L_{Aeq,15min}$	43 $L_{Aeq,15min}$	<35 $L_{Aeq,15min}$	52	46	42	61	50	35
	40 $L_{Aeq,9hour}$	<35 $L_{Aeq,9hour}$	<35 $L_{Aeq,9hour}$						
R6	51 $L_{Aeq,15min}$	43 $L_{Aeq,15min}$	<35 $L_{Aeq,15min}$	52	47	41	61	51	32
	40 $L_{Aeq,9hour}$	<35 $L_{Aeq,9hour}$	<35 $L_{Aeq,9hour}$						
R7	51 $L_{Aeq,15min}$	43 $L_{Aeq,15min}$	<35 $L_{Aeq,15min}$	52	48	<40	61	52	32
	40 $L_{Aeq,9hour}$	<35 $L_{Aeq,9hour}$	<35 $L_{Aeq,9hour}$						
R8	51 $L_{Aeq,15min}$	43 $L_{Aeq,15min}$	<35 $L_{Aeq,15min}$	52	53	<40	61	52	31
	40 $L_{Aeq,9hour}$	<35 $L_{Aeq,9hour}$	<35 $L_{Aeq,9hour}$						
R9	51 $L_{Aeq,15min}$	45 $L_{Aeq,15min}$	<35 $L_{Aeq,15min}$	52	54	<40	61	54	35
	40 $L_{Aeq,9hour}$	36 $L_{Aeq,9hour}$	<35 $L_{Aeq,9hour}$						
R10	51 $L_{Aeq,15min}$	<35 $L_{Aeq,15min}$	<35 $L_{Aeq,15min}$	52	50	46	61	33	33
	40 $L_{Aeq,9hour}$	<35 $L_{Aeq,9hour}$	<35 $L_{Aeq,9hour}$						
R11	51 $L_{Aeq,15min}$	<35 $L_{Aeq,15min}$	<35 $L_{Aeq,15min}$	52	40	40	61	32	32
	40 $L_{Aeq,9hour}$	<35 $L_{Aeq,9hour}$	<35 $L_{Aeq,9hour}$						

Table A.2 Predicted noise levels

Assessment location	Morning shoulder			Day, $L_{Aeq,15min}$			Sleep disturbance, L_{Amax}		
	PNTL	Predicted noise levels	Predicted noise levels with southern warehouse	PNTL	Predicted noise levels	Predicted noise levels with southern warehouse	PNTL	Predicted noise levels	Predicted noise levels with southern warehouse
R12	51 $L_{Aeq,15min}$	<35 $L_{Aeq,15min}$	<35 $L_{Aeq,15min}$	52	42	42	61	33	33
	40 $L_{Aeq,9hour}$	<35 $L_{Aeq,9hour}$	<35 $L_{Aeq,9hour}$						
R13	51 $L_{Aeq,15min}$	<35 $L_{Aeq,15min}$	<35 $L_{Aeq,15min}$	52	41	41	61	31	31
	40 $L_{Aeq,9hour}$	<35 $L_{Aeq,9hour}$	<35 $L_{Aeq,9hour}$						
R14	51 $L_{Aeq,15min}$	<35 $L_{Aeq,15min}$	<35 $L_{Aeq,15min}$	52	44	44	61	34	34
	40 $L_{Aeq,9hour}$	<35 $L_{Aeq,9hour}$	<35 $L_{Aeq,9hour}$						
R15	51 $L_{Aeq,15min}$	<35 $L_{Aeq,15min}$	<35 $L_{Aeq,15min}$	52	46	46	61	34	34
	40 $L_{Aeq,9hour}$	<35 $L_{Aeq,9hour}$	<35 $L_{Aeq,9hour}$						
R16	51 $L_{Aeq,15min}$	<35 $L_{Aeq,15min}$	<35 $L_{Aeq,15min}$	52	46	46	61	34	34
	40 $L_{Aeq,9hour}$	<35 $L_{Aeq,9hour}$	<35 $L_{Aeq,9hour}$						
R17	51 $L_{Aeq,15min}$	<35 $L_{Aeq,15min}$	<35 $L_{Aeq,15min}$	52	47	47	61	34	34
	40 $L_{Aeq,9hour}$	<35 $L_{Aeq,9hour}$	<35 $L_{Aeq,9hour}$						
R18	51 $L_{Aeq,15min}$	38 $L_{Aeq,15min}$	38 $L_{Aeq,15min}$	52	47	47	61	48	48
	40 $L_{Aeq,9hour}$	<35 $L_{Aeq,9hour}$	<35 $L_{Aeq,9hour}$						
R19	51 $L_{Aeq,15min}$	39 $L_{Aeq,15min}$	39 $L_{Aeq,15min}$	52	48	48	61	49	49
	40 $L_{Aeq,9hour}$	<35 $L_{Aeq,9hour}$	<35 $L_{Aeq,9hour}$						
R20	51 $L_{Aeq,15min}$	40 $L_{Aeq,15min}$	40 $L_{Aeq,15min}$	52	47	47	61	53	53
	40 $L_{Aeq,9hour}$	<35 $L_{Aeq,9hour}$	<35 $L_{Aeq,9hour}$						
R21	51 $L_{Aeq,15min}$	40 $L_{Aeq,15min}$	40 $L_{Aeq,15min}$	52	44	44	61	52	52
	40 $L_{Aeq,9hour}$	<35 $L_{Aeq,9hour}$	<35 $L_{Aeq,9hour}$						
R22	51 $L_{Aeq,15min}$	40 $L_{Aeq,15min}$	40 $L_{Aeq,15min}$	52	42	42	61	52	52
	40 $L_{Aeq,9hour}$	<35 $L_{Aeq,9hour}$	<35 $L_{Aeq,9hour}$						
R23	51 $L_{Aeq,15min}$	<35 $L_{Aeq,15min}$	<35 $L_{Aeq,15min}$	52	40	40	61	31	31
	40 $L_{Aeq,9hour}$	<35 $L_{Aeq,9hour}$	<35 $L_{Aeq,9hour}$						

Notes: Light grey shading indicates a 1-2dB exceedance.

Appendix B

Daily logger charts

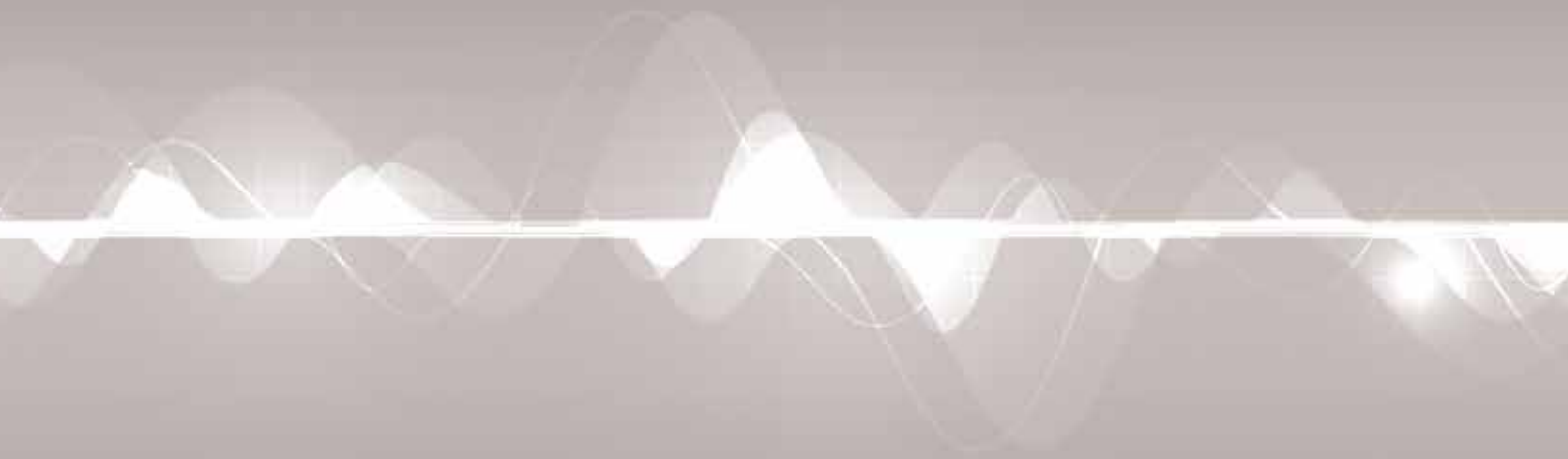
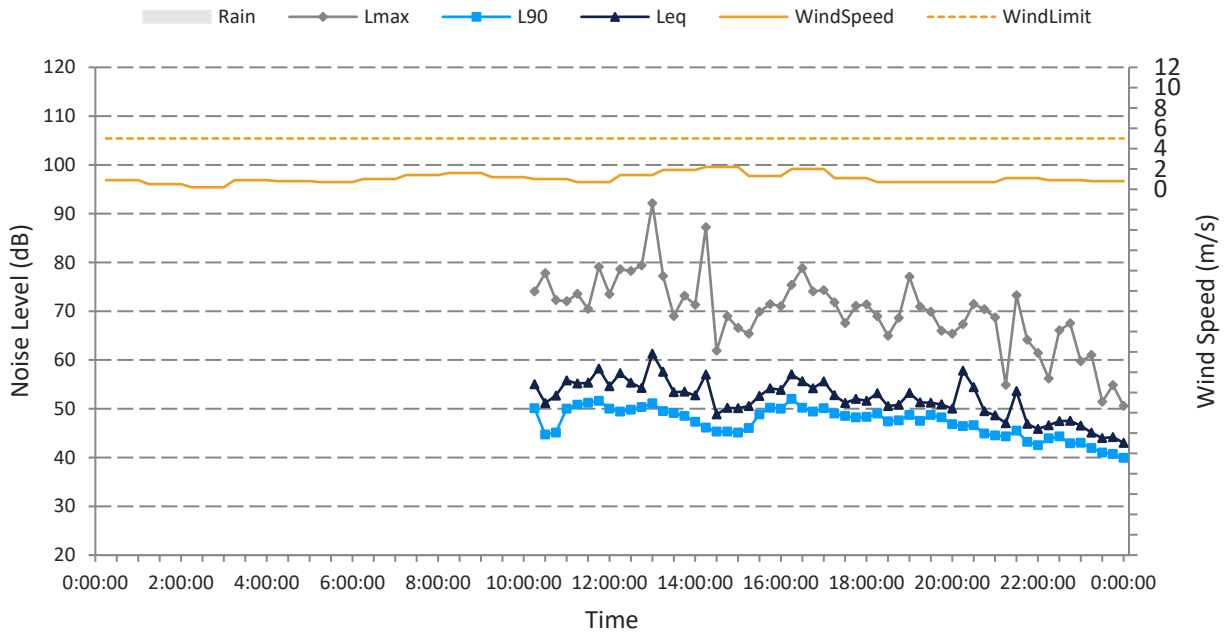


Table B.1 **Logger summary results – L1**

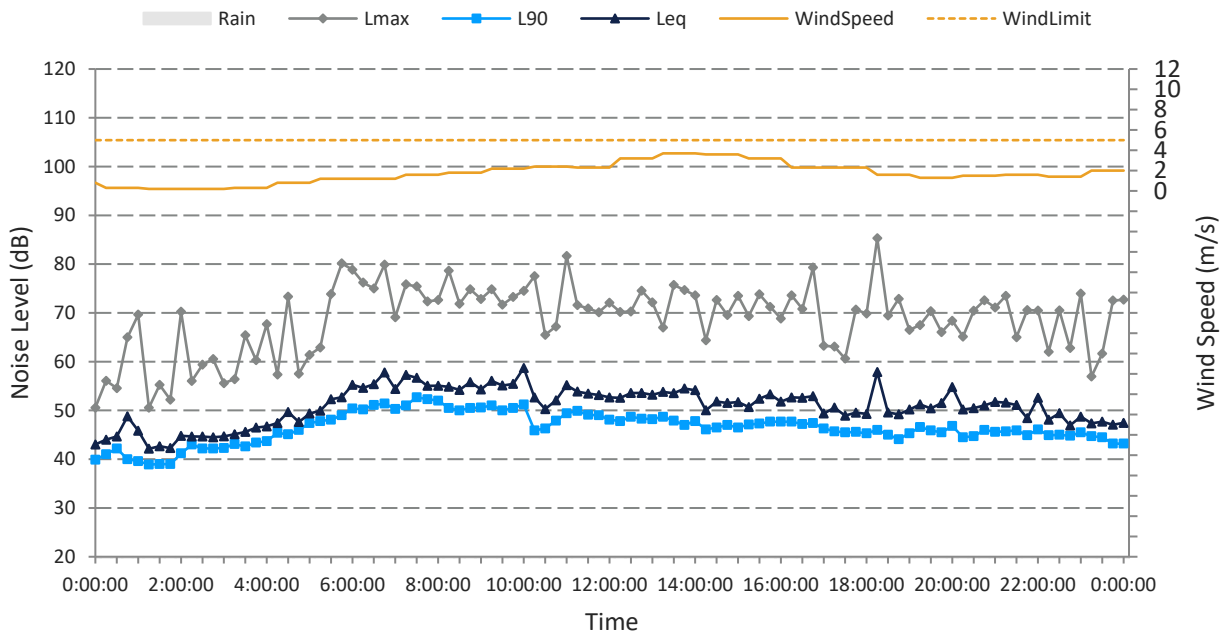
Date	ABL			ABL	L _{Aeq,11 hour} Day	L _{Aeq,4 hour} Evening	L _{Aeq,9 hour} Night	L _{Aeq,15 hour} Day	L _{Aeq,24 hour} Day	L _{Aeq,8 hour} Night
	ABL Day	Evening	Night	Morning shoulder (6-7am)						
Wednesday, 04-12-19	0	43	40	0	0	52	50	0	53	48
Thursday, 05-12-19	46	45	39	50	54	52	49	53	52	48
Friday, 06-12-19	48	47	39	45	54	54	48	54	52	46
Saturday, 07-12-19	46	45	38	46	54	52	48	53	52	47
Sunday, 08-12-19*	-	-	-	-	-	-	-	-	-	-
Monday, 09-12-19	49	47	40	47	55	52	49	55	53	47
Tuesday, 10-12-19	47	0	38	47	54	0	48	54	52	46
Wednesday, 11-12-19	46	45	36	45	53	51	47	53	51	46
Thursday, 12-12-19	47	45	36	45	55	51	46	54	53	44
Friday, 13-12-19	47	45	40	44	56	51	49	55	54	49
Saturday, 14-12-19	46	48	39	44	56	60	49	57	56	49
Sunday, 15-12-19*	-	-	-	-	-	-	-	-	-	-
Monday, 16-12-19	0	0	0	48	0	0	0	0	0	0
Summary Values	47	45	39	46	54	53	49	54	53	48

*Excluded as site does not operate on Sundays

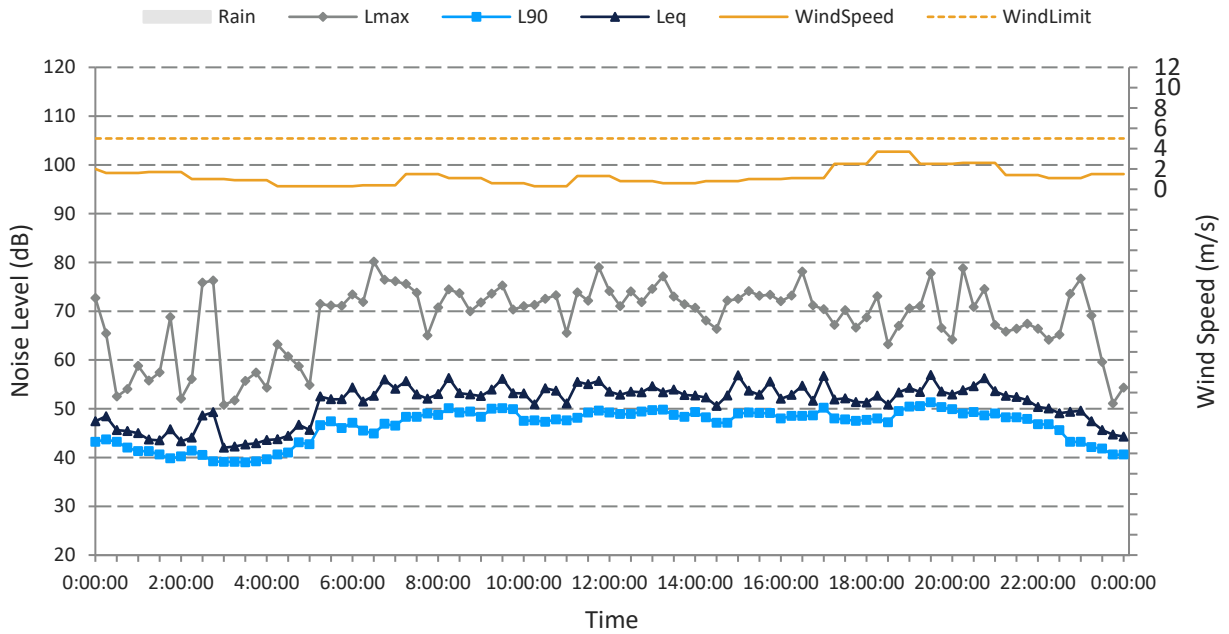
**Measured ambient noise levels
39 Juno Parade Greenacre
Wednesday, 04-12-19**



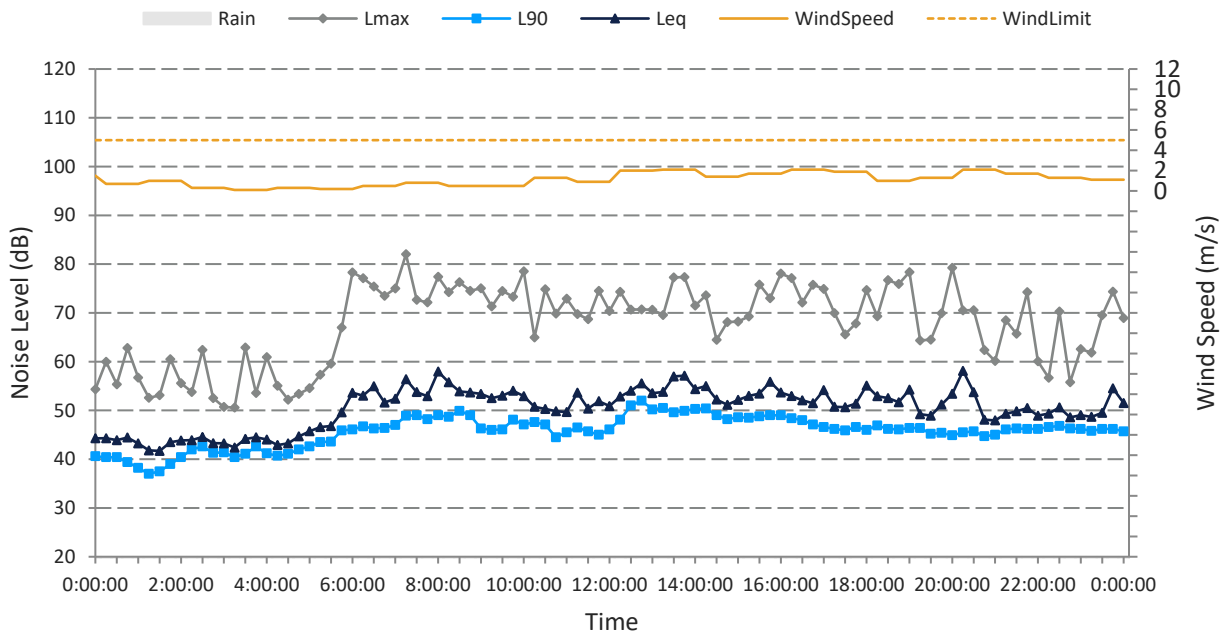
**Measured ambient noise levels
39 Juno Parade Greenacre
Thursday, 05-12-19**



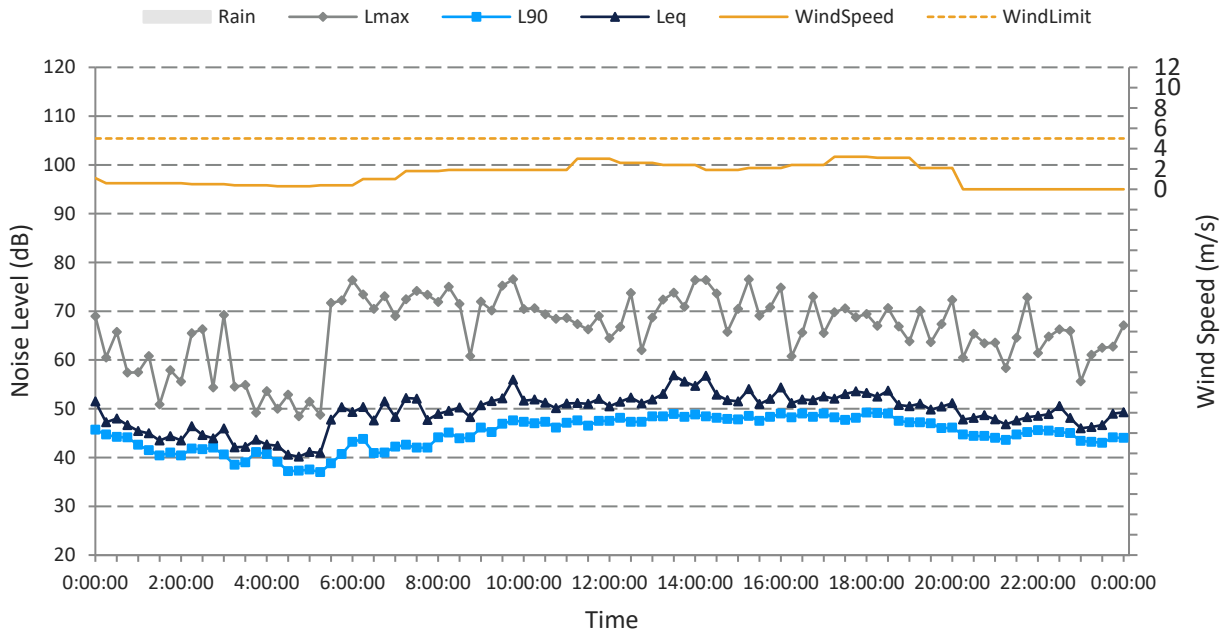
**Measured ambient noise levels
39 Juno Parade Greenacre
Friday, 06-12-19**



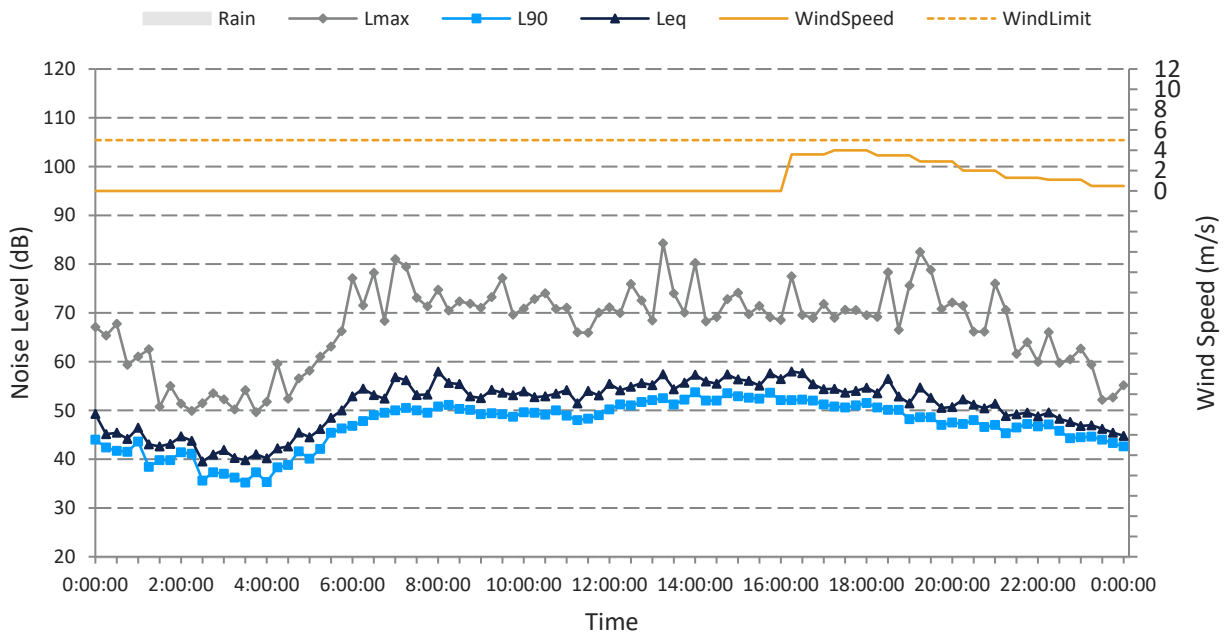
**Measured ambient noise levels
39 Juno Parade Greenacre
Saturday, 07-12-19**



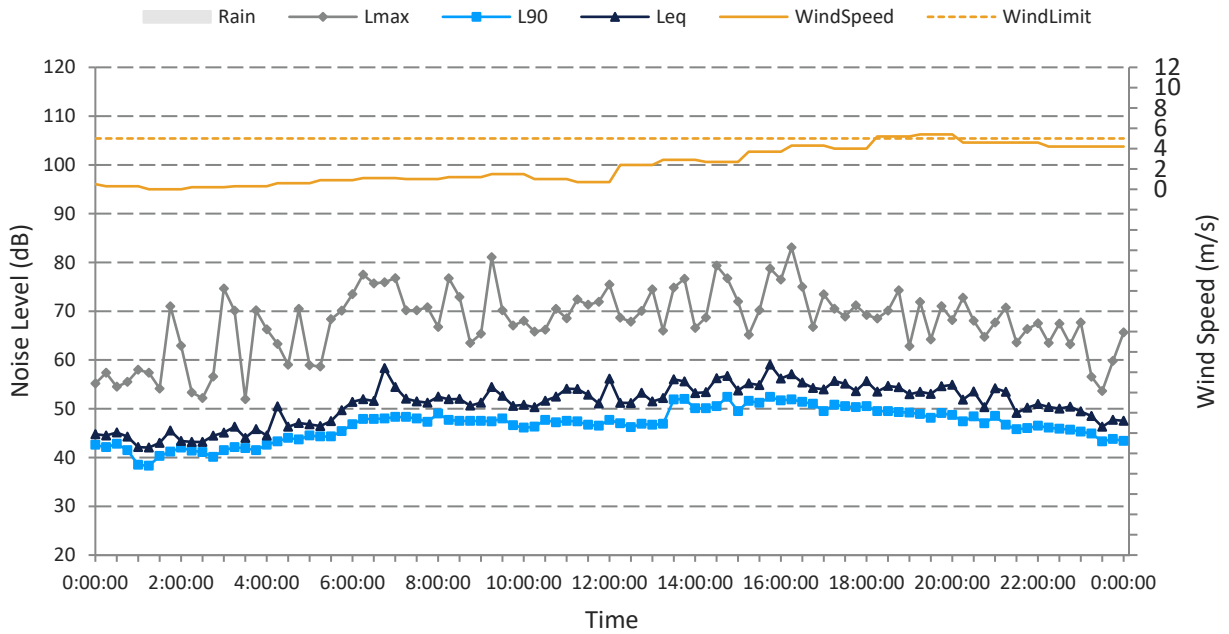
**Measured ambient noise levels
39 Juno Parade Greenacre
Sunday, 08-12-19**



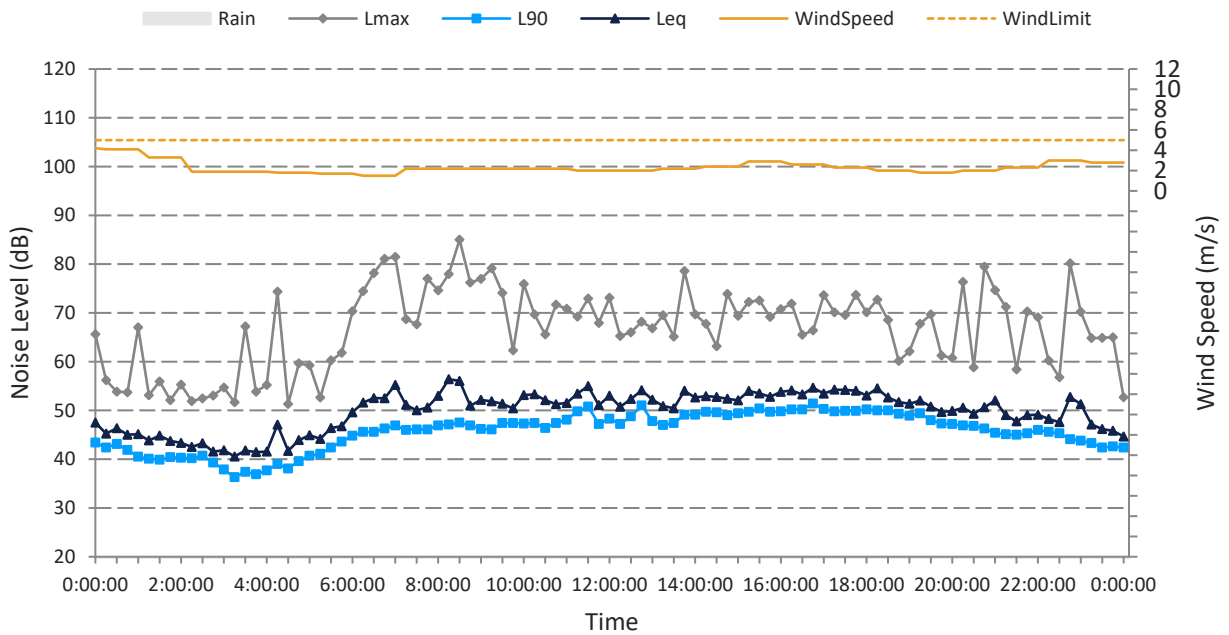
**Measured ambient noise levels
39 Juno Parade Greenacre
Monday, 09-12-19**



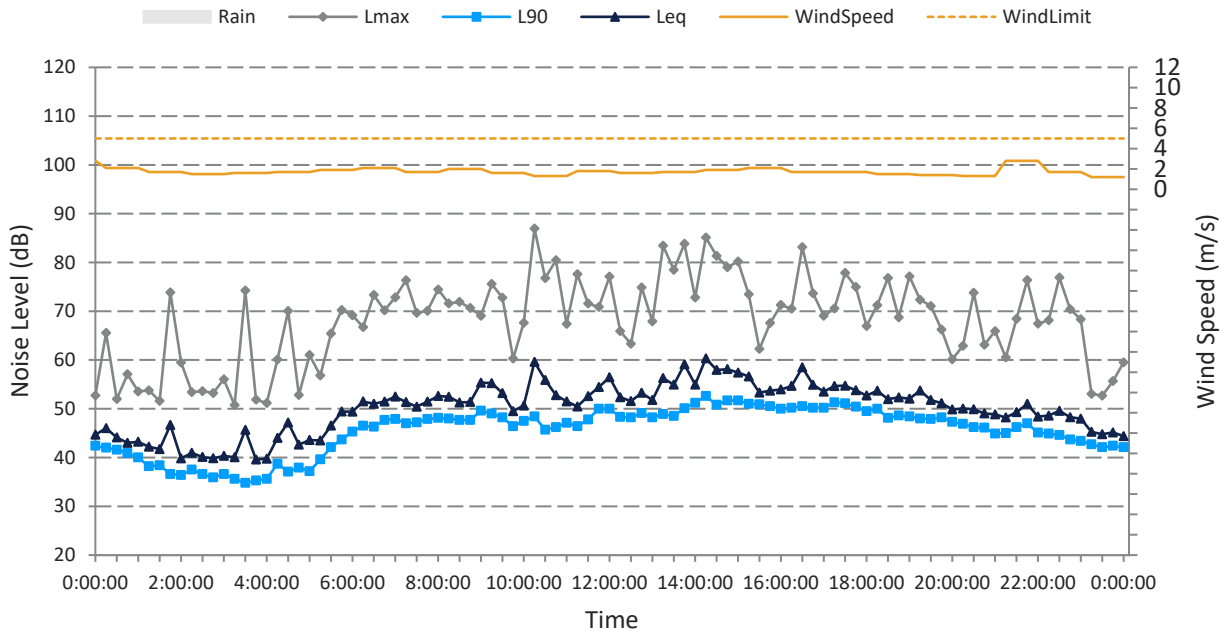
**Measured ambient noise levels
39 Juno Parade Greenacre
Tuesday, 10-12-19**



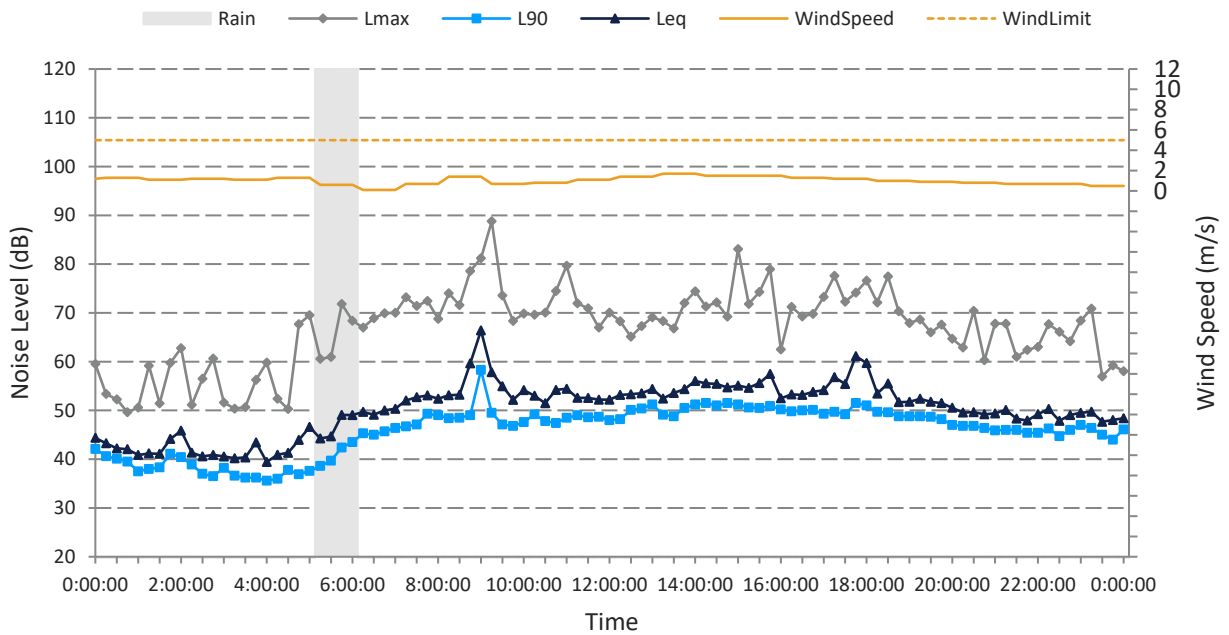
**Measured ambient noise levels
39 Juno Parade Greenacre
Wednesday, 11-12-19**



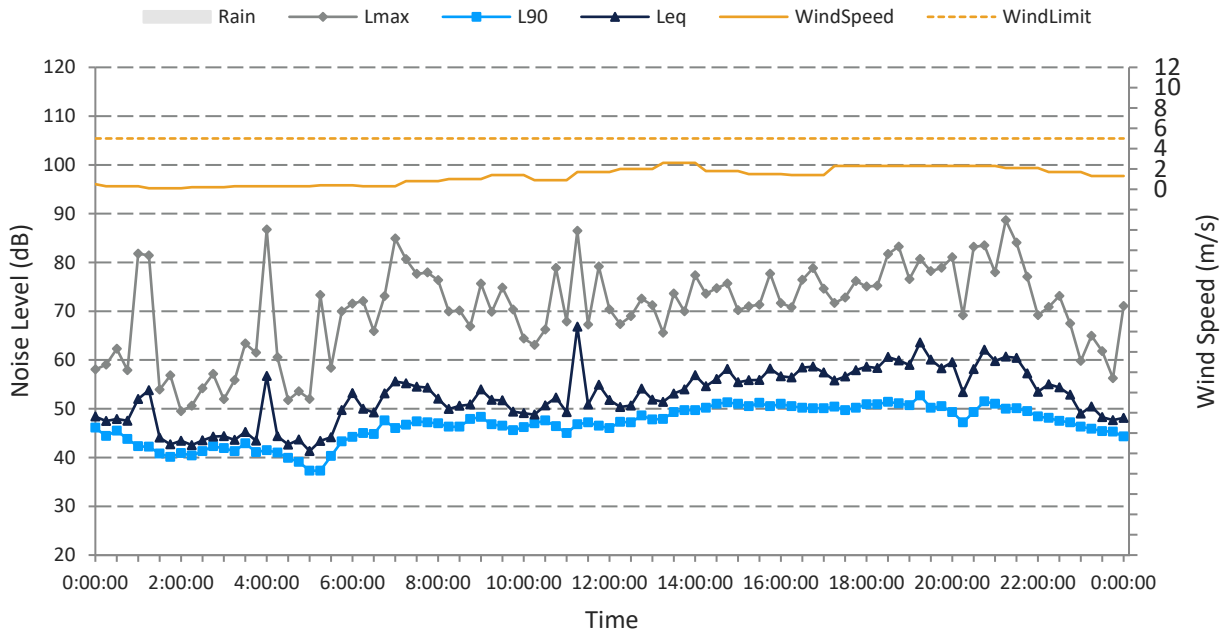
**Measured ambient noise levels
39 Juno Parade Greenacre
Thursday, 12-12-19**



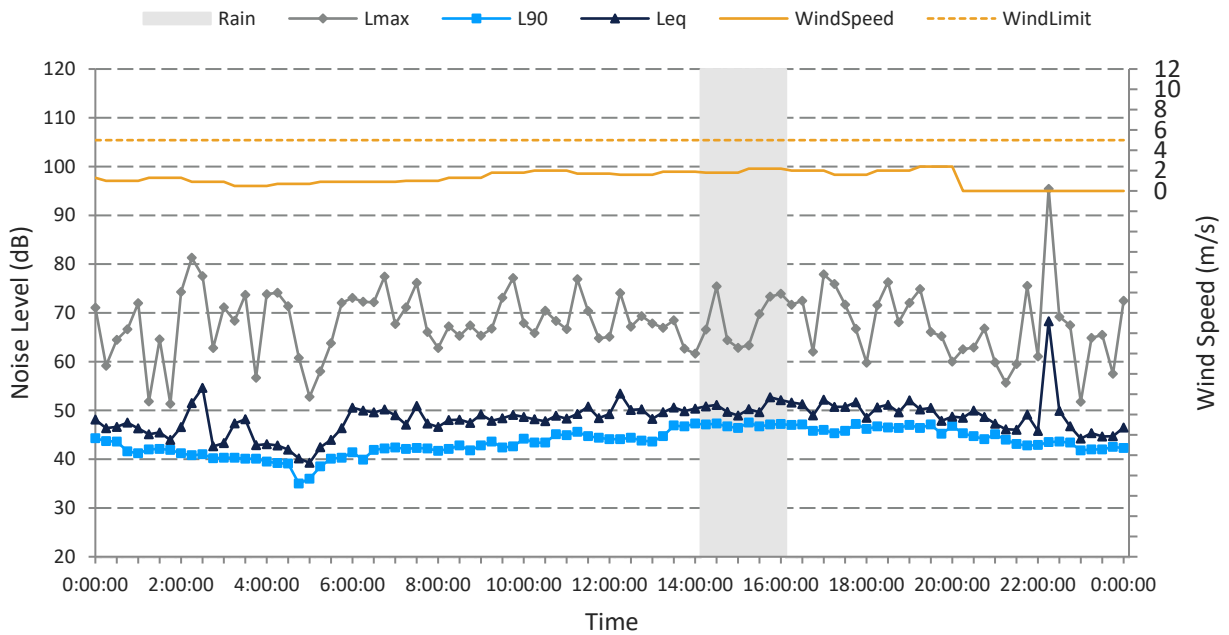
**Measured ambient noise levels
39 Juno Parade Greenacre
Friday, 13-12-19**



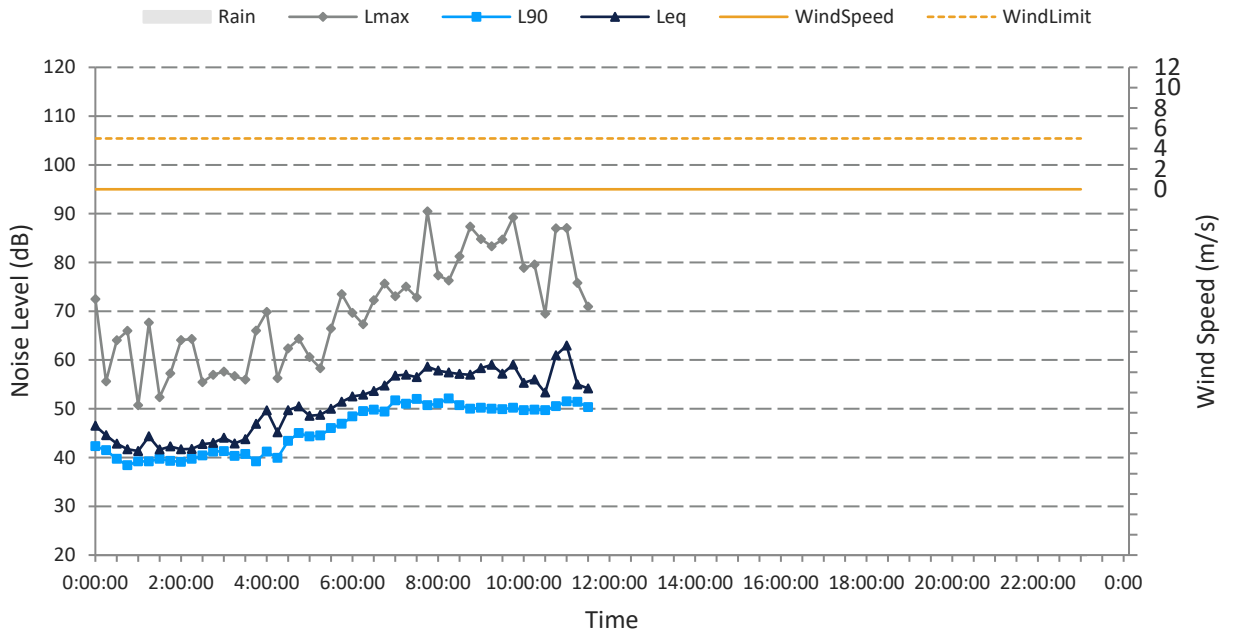
**Measured ambient noise levels
39 Juno Parade Greenacre
Saturday, 14-12-19**



**Measured ambient noise levels
39 Juno Parade Greenacre
Sunday, 15-12-19**

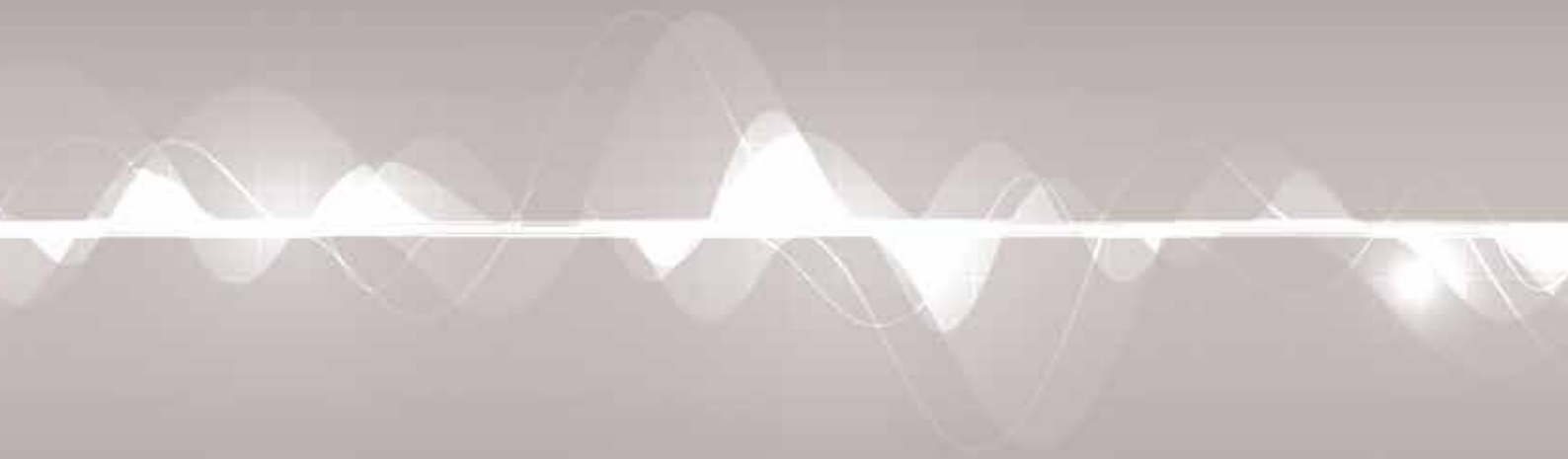


Measured ambient noise levels
39 Juno Parade Greenacre
Monday, 16-12-19

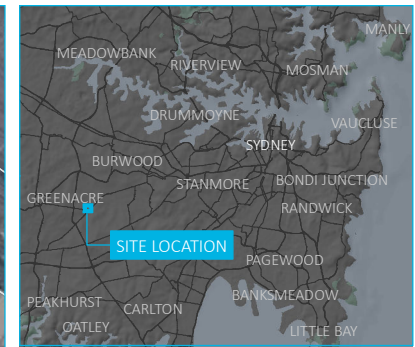


Appendix C

Noise contours



\\lemssvr1\EMM\Jobs\2019\190513 - Aussie Skips v EPA - LEC proceedings - Greenacre\GIS\02_Maps\NIA003_DayContours_20191219_01.mxd 19/12/2019



KEY

- Site boundary
- Future warehouse site boundary
- Attended measurement calibration point
- Unattended Noise monitoring location
- Noise sensitive assessment location
- Watercourse/drainage line
- Cadastral boundary

Noise contour (dB LAeq, 15 min)

- 52
- 54
- 56
- 58
- 60

Noise contour range (dB LAeq, 15 min)

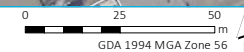
- 52 - 54
- 54 - 56
- 56 - 58
- 58 - 60
- 60 +

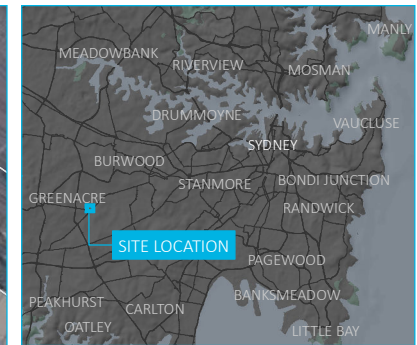
Noise contours – day

Aussie Skips - Greenacre
Noise impact assessment
Figure C.1



Source: EMM (2019); DFSI (2017); GA (2011); ASGC (2006)





- KEY**
- Site boundary
 - Future warehouse site boundary
 - Indicative warehouse location
 - Attended measurement calibration point
 - Unattended Noise monitoring location
 - Noise sensitive assessment location
 - Watercourse/drainage line
 - Cadastral boundary
- Noise contour (dB $L_{Aeq, 15 \text{ min}}$)**
- 52
 - 54
 - 56
 - 58
 - 60
- Noise contour range (dB $L_{Aeq, 15 \text{ min}}$)**
- 52 - 54
 - 54 - 56
 - 56 - 58
 - 58 - 60
 - 60 +

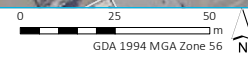
Noise contours – day with southern warehouse

Aussie Skips - Greenacre
Noise impact assessment
Figure C.2

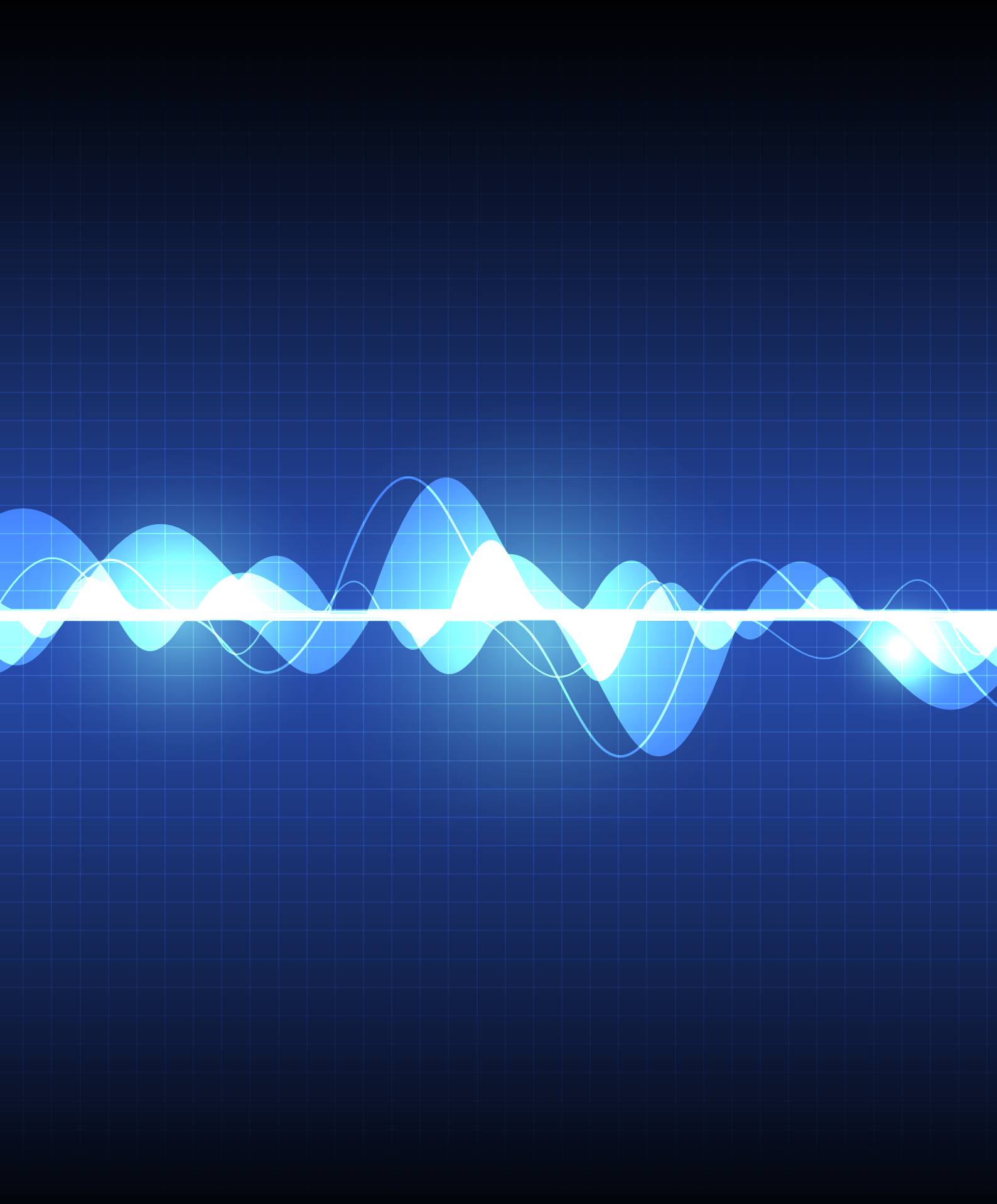


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Source: EMM (2019); DFSI (2017); GA (2011); ASGC (2006)







Traffic Noise Management Strategy

Aussie Industries - 13 Bellfrog Street, Greenacre NSW

Prepared for Aussie Industries
March 2020

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Traffic Noise Management Strategy

Aussie Industries - 13 Bellfrog Street, Greenacre NSW

Report Number

J190219 TNMS1

Client

Aussie Industries

Date

25 March 2020

Version

Final

Prepared by



Katie Teyhan

Associate

25 March 2020

Approved by



Najah Ishac

Director

25 March 2020

This report has been prepared in accordance with the brief provided by the client and has relied upon the information collected at the time and under the conditions specified in the report. All findings, conclusions or recommendations contained in the report are based on the aforementioned circumstances. The report is for the use of the client and no responsibility will be taken for its use by other parties. The client may, at its discretion, use the report to inform regulators and the public.

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1 Introduction

1.1 Overview

Aussie Skips Recycling Pty Ltd (Aussie Skips) are the operators of the materials handling facility located at 13 Bellfrog Street, Greenacre, NSW (the Site).

The current operation was first approved by Strathfield City Council under development application number DA2012/175 in February 2013. The approved development was 'Construction of an industrial warehouse building with an associated workshop and use as a materials handling yard'. The development pathway for this site was local (non-designated) development. The development was not carried out as integrated development and no EPA licence was sought by the previous Site owners following development approval.

Aussie Skips recently applied for and were granted Environment Protection Licence (EPL) 21389 which was issued on 4 March 2020. EMM Consulting Pty Limited (EMM) has been engaged by Aussie Skips to prepare this Traffic Noise Management Strategy (TNMS) as required by Condition L4.12 of EPL 21389.

1.2 EPL Requirements

The requirements of Condition L4.12 of EPL 21389 are reproduced in Table 1.1 together with a summary of where each component has been addressed within this report.

Table 1.1 EPL 21389 Condition L4.12 – Traffic Noise Management Strategy requirements

EPL Requirement	Relevant section of TNMS
L4.12 A Traffic Noise Management Strategy (TNMS) must be developed by the Licensee and provided to the EPA within 21 days of the issuing of this Licence, to ensure that feasible and reasonable noise management strategies for vehicle movements associated with the premises are identified and applied, that include (but are not necessarily limited to) the following:	
<ul style="list-style-type: none">• driver training to ensure that noisy practices such as the use of compression engine brakes are not unnecessarily used near sensitive receivers;	Section 3.1
<ul style="list-style-type: none">• best noise practice in the selection and maintenance of vehicle fleets;	Section 3.1
<ul style="list-style-type: none">• movement scheduling where practicable to reduce impacts during sensitive times of the day;	Section 3.1
<ul style="list-style-type: none">• communication and management strategies for non-licensee owned and operated vehicles to ensure the provision of the TNMS are implemented;	Section 3.1
<ul style="list-style-type: none">• system of audited management practices that identifies non-conformances, initiates and monitors corrective and preventative action (including disciplinary action for breaches of noise minimisation procedures) and assesses the implementation and improvement of the TNMS;	Section 4
<ul style="list-style-type: none">• specific procedures for drivers to minimise impacts at identified sensitive receivers;	Section 3.1
<ul style="list-style-type: none">• clauses in conditions of employment, or in contracts, of drivers that require adherence to the noise minimisation procedures and facilitate effective implementation of the disciplinary actions for breaches of the procedures.	Section 3.1

2 Noise limits

Condition L4 of EPL 21389 contains the noise limits relevant to operations at the Site. Noise generated at the premises must not exceed the noise levels provided in Table 2.1 during the corresponding time periods.

Table 2.1 Aussie Skips Greenacre – noise limits as per EPL 21389

Location	Period	Noise parameter, dB	
		L _{Aeq,15minute}	L _{Amax}
1. 25 Juno Parade, Greenacre	Morning shoulder	51	61
	Day	54	70
2. 41 Juno Parade, Greenacre	Morning shoulder	51	61
	Day	52	70
3. 54 Wentworth Street, Greenacre	Morning shoulder	51	61
	Day	52	70

Notes:

Morning Shoulder: the period from 6am to 7am Monday to Saturday and the period from 6am to 8am Sunday and public holidays.

Day: the period from 7am to 6pm Monday to Saturday and the period from 8am to 6pm Sunday and public holidays.

Condition L4.4 of EPL 21389 contains the meteorological conditions under which these noise limits apply. These noise limits apply under Stability Categories A, B, C and D with wind speeds up to and including 0.5 m/s at 10m above ground level. For meteorological conditions outside of those described here, the noise limits that apply are 5 dB higher than those provided in Table 2.1.

The meteorological conditions are to be determined from meteorological data obtained from the NSW Office of Environment and Heritage automated weather station in Chullora. Stability Categories are to be determined using the sigma-theta method as outlined in Section D1.4 of the Noise Policy for Industry (NSW EPA, 2017).

3 Noise management and mitigation

3.1 General noise management measures

Section 16 of the Aussie Industries Plan of Environmental Management (POM) dated 11 November 2019 outlines the following environmental goals for the site in relation to noise:

- Noise generated by the facility shall not adversely affect the site or its surrounds;
- Assure quality of operations;
- Prevent degradation of local amenity;
- Adequate staffing and training; and
- Provide and maintain a safe working environment.

The POM also contains the following measures that are implemented, as required, to control noise from the site:

- limiting the hours and types of operations to that which is approved;
- limiting machinery used to that which meets noise generation guidelines for this type of operation;
- correct operation and maintenance of machinery; and
- fleet vehicles are selected and maintained based on consideration and use of noise reduction technology wherever feasible (e.g. squawkers rather than reversing beepers).

The following additional measures are implemented at the Site:

- drivers will be trained to ensure that noisy practices such as the use of engine compression brakes are not unnecessarily used near sensitive receivers;
- all trucks are parked on site at the end of the previous day in a manner allowing them to start and leave the site without the need to reverse or apply air brakes during the morning shoulder period;
- heavy vehicles travelling to/from the site will not use Juno Parade as a thoroughfare, unless they are attending to a job which is located on Juno Parade.
- all contractors are required to be inducted to site prior to arriving to ensure they are aware of and implement the provisions outlined in this TNMS; and
- appropriate disciplinary action will be taken against employees that are found to be in breach of the required noise minimisation procedures. In accordance with information provided in the *Traffic engineering advice for the materials handling yard at 13 Bellfrog Street, Greenacre* prepared by McLaren Traffic Engineering dated 13 December 2019 the maximum hourly truck volumes and types as well as operating hours are outlined in Table 3.1.

Table 3.1 **Operational hours and truck volumes**

Days	Hours of operation	Number of truck movements
Monday to Friday	6am to 5pm	Large trucks: 2 per hour Medium trucks: 3 per hour Small trucks / vans: 3 per hour
Saturday and Sunday	7am to 4pm	Large trucks: 2 per hour Medium trucks: 1 per hour Small trucks / vans: 3 per hour
Night shift (weekdays only) / Emergency call outs (7 days)	5pm to 6am	Large trucks: 0-1 per hour Medium trucks: 0-1 per hour Small trucks / vans: 1-2 per hour

1. Large truck: up to 30 tonnes maximum payload
2. Medium truck: up to 25 tonnes maximum payload
3. Small truck / van: up to 8 tonnes maximum payload

3.2 Noise monitoring

Noise monitoring will be undertaken in accordance with Condition M6 of EPL 21389.

In addition, noise performance of the site is monitored qualitatively by relevant personnel at the site and by monitoring the number and nature of noise complaints received.

3.3 Complaint response procedure

If a noise complaint is received the following actions are taken by the site's Environment Compliance Officer:

- completion of a complaint form;
- coordination with the CEO to ensure the complaint is investigated;
- results of the investigation and actions taken are documented;
- records of noise complaints are maintained; and
- liaison with the complainant regarding the steps taken to minimise further noise disturbance.

4 Review and improvement

The site is regularly audited to ensure compliance with the POM and nominated officers are appropriately trained in the area of noise management at the site.

Aussie Industries will undertake an internal audit on a regular basis to identify non-conformances, initiate and monitor corrective and preventative action and assess the implementation and improvement of the TNMS. Relevant audit information will be provided to the regulator upon request.

Aussie Industries will review and where necessary revise this TNMS within 3 months of the submission of an audit, Annual Review, an incident report, or any modification to the EPL. The TNMS will further be subject to a 3 year periodic review. The review of the TNMS will reflect any relevant changes in environmental requirements, technology and operational procedures.

5 Conclusion

EMM has prepared this TNMS as required by Condition L4.12 of EPL 21389. This TNMS aims to ensure that feasible and reasonable noise management strategies for vehicle movements associated with the premises are identified and applied.

Noise monitoring report

Aussie Recycling

EPL 21389: 2020-21 Licence Year, Quarter 1, May

June 2020

Report Reference: 2020-21 Noise Monitoring Report, Quarter 1, May

Version: V1.0 (Final)

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Acknowledgement of Country

4Pillars acknowledges the Traditional Owners of the land on which this site is located, the people of the Eora and Dharug nations. We pay our respects to their Elders past and present.

Executive summary

4Pillars Environmental Consulting was engaged by Aussie Skips Recycling Pty Ltd to conduct attended noise monitoring for the Aussie Recycling Greenacre facility located at 13 Bellfrog Street, Greenacre, NSW, 2190.

The objective of the attended monitoring was to assess compliance of the Site operations with the relevant noise emission limits stated in the Environment Protection Licence (EPL 21389) (LAeq and LAFmax limits apply). The assessment was to include one attended monitoring session in the 'morning shoulder' period (6am to 7am) and two sessions during the 'day' period (7am to 6pm) at each of the three receiver locations identified on the licence. In total, 27 sessions were to be obtained.

Attended noise monitoring was carried out by trained and experienced environmental scientists, using a Class 1 Precision sound level meter, over three consecutive operating days (12-14 May). Site operations during this period were reflective of normal operation, both in relation to the nature of the operation and the scale of activity.

In addition to the noise logger used to obtain measurements at the licensed monitoring points, a 'comparison logger' was established at the southern boundary of the Site. The comparison logger collected data over the same time periods as the primary logger and provides a point of reference for site activity and noise emissions, to facilitate analysis of noise data from the primary logger and assist in determining the site contribution to measured noise levels.

Although the meteorological conditions experienced during monitoring were appropriate for noise measurement to occur (i.e. no rain, no discernible wind), the data obtained from the OEH automated weather station at Chullora confirms that the atmospheric stability category and wind speeds were such that modified noise limits (+ 5 dB to standard limits) applied during the time measurements were taken (refer Condition L4.5 of EPL 21389). Notwithstanding this, a conservative approach was taken; in that the raw data was first compared to the unmodified EPL limits. If there were exceedances of the unmodified limits, a three-stage analysis process was followed, which involved:

- Stage 1. Sessions with raw LAeq exceedances were processed to remove peaks in measured sound pressure levels which were attributable to extraneous sources. Compliant results were not assessed further;
- Stage 2. Data within sessions with continued LAeq exceedances was inspected to determine whether there was supporting evidence from the comparison logger to suggest a causal link between the site and the exceedance (a combination of simple distance attenuation, noise propagation modelling and regression analysis was used). Compliant results were not assessed further;
- Stage 3. Data for sessions with remaining exceedances of LAFmax values was inspected, with peak associated with extraneous noise sources removed. Remaining LAFmax exceedances were assessed in the context of the comparison logger, to identify whether a causal link between the site and the exceedance (a combination of simple distance attenuation, noise propagation modelling and regression analysis was used). Compliant results were not assessed further.

After the above stages of data analysis were implemented, any results for the estimated site noise contribution at the EPL monitoring points which were non-compliant with the unmodified EPL limits were then compared to the modified EPL limits. This was the final compliance check and only those values which exceeded the modified EPL limits were reported as being non-compliant with the site's noise emission criteria.

The noise environment at the EPL monitoring points is complex and there are a number of extraneous noise sources which influence measured noise levels. These include traffic on Juno parade, other nearby industrial sites, construction sites, animals (birds, dogs etc.) and other anthropogenic noise (i.e. residents talking, children playing). The staged data analysis approach (detailed above) removed the influence of extraneous noise to the extent possible. After removing extraneous data, the majority of sessions were compliant with the unmodified EPL limits.

Simple distance attenuation calculation and noise propagation modelling (based on measurements from the comparison logger) suggests that the contribution of the site to measured noise levels at the EPL monitoring points was relatively minor (and well within the unmodified EPL limits). A regression analysis of the data obtained from the primary logger and the comparison logger confirmed that there was no significant correlation between the datasets. In fact, the data suggest a slight negative correlation between noise emissions at the site and measured noise at receiver locations – suggesting that the site is only a minor contributor to the observed noise environment at those locations.

We conclude that the Site contribution to noise levels at all three EPL monitoring points was compliant with the LAeq limits set in Condition L4.1 of the EPL for both the Morning Shoulder and Day periods, during all sessions. The Site contributions to LAFmax values determined at all three EPL monitoring points was compliant with the LAFmax limits set in Condition L4.1 and L4.5 of the EPL during all sessions.

Introduction and background

4Pillars Environmental Consulting Pty Ltd (4Pillars) was engaged by Aussie Skips Recycling Pty Ltd to conduct noise monitoring for the Aussie Recycling Greenacre facility located at 13 Bellfrog Street, Greenacre, NSW, 2190 (the Site).

Objectives

The objective of this assessment was to carry out noise monitoring in a manner that assesses compliance with the noise limits detailed in Environment Protection Licence (EPL) 21389.

Scope of work

4Pillars' scope of work was as follows:

- Conduct attended noise monitoring for three consecutive operating days during the first quarter of the 2020-21 licence year, during the Morning Shoulder and Day time periods (and under representative operating conditions) at the three monitoring points specified in the licence;
 - Morning Shoulder means the period from 6am to 7am Monday to Saturday and the period from 6am to 8am Sunday and public holidays.
 - Day means the period from 7am to 6pm Monday to Saturday and the period from 8am to 6pm Sunday and public holidays.
- Analyse the gathered data against EPL 21389 noise criteria; and
- Prepare a noise monitoring report and draw conclusions regarding compliance.

Site details

The subject site is 13 Bellfrog Street, Greenacre – Lot 15 DP 1133214. The Site is located in an area of industrial activity, and is bounded on all sides by industrial sites, including warehouses (to the west and east), a 24-hour concrete batching plant (to the north), and factory units (currently under construction and nearly completed) to the south. The nearest residential receivers are to the south and west, approximately 80 m and 105 m distance from the site, respectively. The nearest arterial road (dual carriageway) is Punchbowl Road, approximately 130 m to the east. The nearest main road is Juno Parade, approximately 120 m to the south.

The Site is located within land zoned under the Strathfield Local Environment Plan 2012 as IN: General Industrial. The licensed monitoring points are located at three residential receivers to the south, south-west, and west of the Site (see Figure 8).

Noise limits and monitoring method

As noted above, the site is subject to EPL 21389. The licence states:

"L4 Noise Limits

L4.1 – Noise generated at the premises that is measured at each monitoring point established under this licence must not exceed the noise levels specified in Column 4 of the table below for that point during the corresponding time periods specified in Column 1 when measured using the corresponding measurement parameters listed in Column 2.

Point 1

<i>Time period</i>	<i>Measurement parameter</i>	<i>Measurement frequency</i>	<i>Noise level dB(A)</i>
<i>Day</i>	<i>Day-LAeq (15 minute)</i>	<i>Quarterly</i>	<i>54</i>

Point 1,2,3

<i>Time period</i>	<i>Measurement parameter</i>	<i>Measurement frequency</i>	<i>Noise level dB(A)</i>
<i>Morning-Shoulder</i>	<i>Day-LAeq (15 minute)</i>	<i>Quarterly</i>	<i>51</i>
<i>Morning-Shoulder</i>	<i>LAFmax</i>	<i>Quarterly</i>	<i>61</i>
<i>Day</i>	<i>LAFmax</i>	<i>Quarterly</i>	<i>70</i>

Point 2,3

<i>Time period</i>	<i>Measurement parameter</i>	<i>Measurement frequency</i>	<i>Noise level dB(A)</i>
Day	Day-LAeq (15 minute)	Quarterly	52

M6 Noise Monitoring

M6.1 – Attended noise monitoring must be undertaken in accordance with Condition L4.7 and must:

- a) occur quarterly for a period of one year in the first reporting period and every six months in each reporting period thereafter;
- b) occur during each day and morning shoulder period as defined in the Noise Policy for Industry for a minimum of:
 - 30 minutes during the day; and
 - 15 minutes during the morning shoulder period.
 - occur for three consecutive operating days.

Monitoring was undertaken in the manner required by the licence, in accordance with the Noise Policy for Industry (2017).

Method

Sound level meter

Attended noise monitoring was carried out for three consecutive operating days, on:

- Tuesday 12 May 2020;
- Wednesday 13 May 2020; and
- Thursday 14 May 2020.

Noise monitoring was carried out by qualified and experienced environmental scientists (R Thompson, J Hammond, and T Nguyen), using an Acoustic Research Laboratories Pty Ltd Ngara Class 1 precision sound level meter. The same meter was used for all monitoring sessions at licensed monitoring points (Serial number: 8780FB). A comparison logger (Serial number: 878012) was set up at the entrance to the Site and recorded throughout all monitoring sessions.

The meters were calibrated at a NATA-accredited laboratory within two years of the measurement period. Calibration certificates were inspected prior to any measurements being taken and are available on request.

Sampling locations

The Site EPL identifies three locations where noise monitoring must be conducted each quarter (EPL points 1, 2 and 3) (see Figure 8). Sample data were collected at each of these locations, as required, and no issues with access were encountered.

All measurements were taken in locations that were at least 3.5 m from any reflecting structure (other than the ground), and were taken as close as possible to the boundary closest to the Site.

Sampling procedures

During each sampling event, the meter was operated in accordance with the manufacturer's specifications and other relevant reference documents (i.e. AS 2659.1988). During recording, the meter was set to 'fast' time weighting and 'A' frequency weighting. The microphone was fitted with a foam windscreen and positioned 1.5 m above ground level during recording. Calibration checks were carried out before and after each measurement period, to ensure reliability and accuracy of the instruments.

Prior to and during recording, detailed notes were taken, which covered parameters including weather, time interval, location, meter settings, activities undertaken on the Site, and extraneous noise sources not related to the Site. The equipment was handled with care, packaged and transported in accordance with the manufacturer's specifications.

NGARA Logger

Once the microphone was set up, checked and ready to log data, recording was started by the operator. Samples were obtained over a period of time that allowed a 15-minute sample to be extracted for each location. The selected noise logger takes sound pressure level (SPL) and instantaneous LAeq readings every 100 ms. Statistical analyses were performed upon the data by 4Pillars using Microsoft Excel.

Sessions

As per Condition M6.1 of the Site's EPL, monitoring was required for a minimum of 15 minutes during the Morning Shoulder period, and 30 minutes during the Day period. Therefore, a single 15 minute session was recorded at each of the monitoring locations during the Morning Shoulder period, and two 15 minute sessions were recorded at each of the monitoring locations during the Day period. To ensure that monitoring would be representative of Site operations throughout an entire day during the Day period, one 15 minute session was recorded prior to 12:00 at each monitoring location, and one 15 minute session was recorded after 12:00 at each monitoring location.

A total of nine 15 minute monitoring sessions were obtained for each of the three days of monitoring, which gave a total of 27 sessions.

Site operations

The Site was in normal operation during all sampling events. The location and scale of Site operations on the days selected for sampling are believed to be representative of activities carried out on a normal operating day.

Equipment that was operational on Site during sampling included:

- 1 x Hyundai 20 tonne excavator;
- 1 x Hyundai front end loader;
- 1 x Bobcat sweeper;

Vehicles related to Site activities that entered and exited the Site during sampling included:

- Skip bin trucks, dropping off and picking up empty skip bins; and
- Truck and dog trailers bringing and removing approved materials.

Site operations generally involve the receiving, light sorting, and export of excavated materials (soils, clays, aggregates entrained with minor amounts of approved building and demolition wastes such as concrete), as well as the parking and storage of trucks. No loads of mixed demolition wastes are accepted on the site.

Each sampling entry in Table 6 includes further, specific information regarding site activities occurring at the time of sampling.

Extraneous noise sources

Extraneous noise sources (not associated with the Site) were a significant contributor to measured noise levels during sampling. These sources including steady traffic noise (e.g. Juno Parade, and Punchbowl Road), which were especially prevalent during the Day period, as well as industrial noise from surrounding sites. During the Day period, times without noticeable traffic noise are very uncommon. Additional extraneous noise sources that had a noticeable impact on measured noise levels included animals (especially nearby birds and dogs), residents, and children.

Noise levels from birds in proximity to the monitoring loggers (tweeting, screeching, warbling, crowing) varied in intensity but were repeatedly measured as high as 65-82 dB(A), and although generally very brief had the largest measured impact on LAFmax and LAeq measurements, due to the high values recorded.

Due to the regularity of extraneous noise sources, as well as the short time available for the Morning Shoulder sessions, it was not possible to exclude these sources from the recordings in the field by pausing the logger. However, where extraneous noise sources were short and distinct, it was possible to exclude these from the post-sampling analyses. The impact of extraneous noise sources have been taken into account when calculating the site's estimated contribution to noise levels.

Comparison logger

To determine the noise levels emitted directly from the Site, a "comparison logger" was set up at the entrance to the Site. Recordings were taken with this logger concurrently with the sample logger. This allowed comparison of the results for both loggers, to further assist with determining the site contribution to the measured noise level.

The internal clock of the comparison logger was coordinated with the clock on the primary logger, to ensure that the chronology of noise measurements was aligned.

Results and discussion

Meteorological conditions

During all sampling sessions, the weather was clear, with no rainfall. Humidity was generally moderate (based on online real-time weather data accessed during the sessions). Noise limits set in the EPL under Condition L4.1 apply under the meteorological conditions detailed in Condition L4.4 of the EPL, as shown in the below Table.

Table 1: Meteorological conditions detailed in Condition L4.4 of the EPL.

Assessment Period	Meteorological Conditions
Day	Stability Categories A, B, C and D with wind speeds up to and including 0.5m/s at 10m above ground level
Morning Shoulder	Stability Categories A, B, C and D with wind speeds up to and including 0.5m/s at 10m above ground level

As required by Condition L4.6 of the EPL, the meteorological conditions experienced during each monitoring session were determined from meteorological data obtained from the meteorological weather station identified as NSW Office of Environment and Heritage automated weather station in Chullora (accessed from: <https://www.dpie.nsw.gov.au/air-quality/search-for-and-download-air-quality-data>). Data for three sessions were not available. The stability category for each monitoring session was then determined using the sigma-theta method detailed in Fact Sheet D of the NSW EPA *Noise Policy for Industry* (2017), as required by Condition L4.6 (b) of the EPL. Raw sigma theta values obtained from the weather monitoring station were modified as per the procedure in Section D1.4 of the *Noise Policy for Industry*, as the Site is located in a “City” surface (Table D8 of the Policy). The average of the provided roughness figure was used, a modification factor of 1.3 m. The determined meteorological conditions are provided in Table 2, below.

As can be seen in Table 2, the Pasquill-Gifford Stability Category for all sessions were estimated as Category A. As the Morning Shoulder sessions occurred prior to 07:00, Night-time Pasquill-Gifford Stability Categories were determined based on Table D7 of the *Noise Policy for Industry*, and were estimated as Category F. During each session, the average hourly wind speed (obtained from the Chullora data) ranged from 0.6-4.6 m/s. Although the Stability Categories for each session during the Day period (excepting the three sessions for which no data was available) were determined to be Category A, wind speeds greater than 0.5 m/s meant that the conditions experienced were not equivalent to those detailed in Condition L4.4 of the EPL (Table 1, above). Therefore, as per Condition L4.5 of the EPL, the noise limits that applied during the session are those limits detailed in Condition L4.1 plus 5 dB. The revised limits for each session are presented in Table 2.

Table 2: Meteorological conditions during each sampling sessions, based on hourly average data collected at the NSW OEH automated weather station in Chullora for wind speed and sigma theta. MS = Morning Shoulder period, D (m) = Day (morning) period, D (a) = Day (afternoon) period, SD = raw sigma theta value, SD corrected = Site specific sigma theta value corrected with an aerodynamic roughness of 1.3 (estimated average for “city” surfaces), NA = Not Available.

Date	Period	Session Start	EPL Point	Wind speed (m/s)	SD (°)	SD corrected (°)	Stability Category (day, night)	Met. conditions in L4.4 satisfied?	Required change to noise limits in L4.1	Revised limit (dB) (LAeq, LAFmax)
12/05/2020	MS	6:05:30	3	0.7	30.78	47.41	A	No	+5dB	56, 66
	MS	6:27:10	2	0.7	30.78	47.41	A	No	+5dB	56, 66
	MS	6:47:00	1	0.7	30.78	47.41	A	No	+5dB	56, 66
	D (m)	7:35:00	1	0.8	36.56	56.31	A	No	+5dB	59, 75
	D (m)	8:00:00	2	0.9	36.14	55.66	A	No	+5dB	57, 75
	D (m)	8:25:00	3	0.9	36.14	55.66	A	No	+5dB	57, 75
	D (a)	14:30:30	3	1.8	33.97	52.32	A	No	+5dB	57, 75
	D (a)	14:54:30	2	1.9	34.58	53.26	A	No	+5dB	57, 75
	D (a)	15:17:10	1	1.9	34.58	53.26	A	No	+5dB	59, 75
13/05/2020	MS	6:08:00	3	0.6	45.56	70.17	A, F	No	+5dB	56, 66
	MS	6:29:30	2	0.6	45.56	70.17	A, F	No	+5dB	56, 66

Date	Period	Session Start	EPL Point	Wind speed (m/s)	SD (°)	SD corrected (°)	Stability Category (day, night)	Met. conditions in L4.4 satisfied?	Required change to noise limits in L4.1	Revised limit (dB) (LAeq, LAFmax)
	MS	6:47:45	1	0.6	45.56	70.17	A, F	No	+5dB	56, 66
	D (m)	7:31:30	1	0.6	47.81	73.64	A	No	+5dB	59, 75
	D (m)	7:53:00	2	0.6	47.81	73.64	A	No	+5dB	57, 75
	D (m)	8:13:30	3	0.9	41.51	63.93	A	No	+5dB	57, 75
	D (a)	15:23:10	3	NA	NA	NA	Not determined	Unknown	None	No change, No change
	D (a)	15:45:30	2	NA	NA	NA	Not determined	Unknown	None	No change, No change
	D (a)	16:09:30	1	NA	NA	NA	Not determined	Unknown	None	No change, No change
14/05/2020	MS	6:10:22	3	1.3	28.22	43.46	A, F	No	+5dB	56, 66
	MS	6:32:25	2	1.3	28.22	43.46	A, F	No	+5dB	56, 66
	MS	6:55:00	1	1.6	23.64	36.41	A	No	+5dB	56, 66
	D (m)	7:40:00	1	1.6	23.64	36.41	A	No	+5dB	59, 75
	D (m)	8:03:00	2	1.2	27.29	42.03	A	No	+5dB	57, 75
	D (m)	8:27:00	3	1.2	27.29	42.03	A	No	+5dB	57, 75
	D (a)	13:49:00	3	4.6	18.07	27.83	A	No	+5dB	57, 75
	D (a)	14:14:00	2	4.5	17.37	26.75	A	No	+5dB	57, 75
	D (a)	14:39:00	1	4.5	17.37	26.75	A	No	+5dB	59, 75

Data analysis

The data obtained during each 15-minute monitoring session was analysed using Microsoft Excel, and raw values for LAeq (15 minutes) and LAFmax were determined for each session. These raw values were then compared to the relevant noise level limits for each EPL Point and Period, as shown in Table 3.

In order to conduct a conservative assessment, **the comparison and assessment was first undertaken against the original (unmodified) limits in Condition L4.1 of the EPL**, rather than the revised limits detailed in Table 2, based on the meteorological conditions experienced. The results from this initial comparison are shown in Table 4.

Assessment process

Where the raw values exceeded the permitted limits, the data was subjected to a thorough three-stage assessment process, to determine if the exceedances could be attributed to the Site. These stages were based on which parameter was exceeded in each session and are summarised below. Further detail about each stage is provided in the following sections.

Stage 1 – Exceedance of permitted limit by raw LAeq: The full data set was inspected, and peaks that exceeded the LAFmax limits and could be directly attributed to extraneous noise sources were removed. Maximum potential values for LAeq and LAFmax were recalculated based on the reduced data set.

Stage 2 – Continued exceedance of permitted limit by LAeq, following Stage 1: Residual data was inspected to determine whether the exceedance could be attributed to the Site. A combination of modelling, distance attenuation calculations, and correlation between the monitoring location and site comparison loggers was then used to estimate the potential site contribution

Stage 3 – Exceedance of raw LAFmax values: The full data set was inspected, and peaks that exceeded the LAFmax limits and could be directly attributed to extraneous noise sources were identified. Maximum potential values for LAFmax were estimated, assuming these peaks were removed from the data set.

Where the raw results obtained were below the permitted limits, no further assessment was undertaken to determine more accurate levels. However, we expect that the results obtained are substantially higher than the Site's contribution to measured noise levels, considering the complex noise environment, which includes multiple industrial sources, busy roads, and natural sources (e.g. birds and other animals).

As well as the three-stage assessment process for individual sessions, a general comparison between the noise levels recorded at each monitoring location and with the Site comparison logger was made.

Table 3: Unmodified noise level limits detailed in Condition L4.1 of the EPL.

		Noise level limits (dB(A))		
		EPL Point		
Period	Parameter	1 (25 Juno Pde)	2 (41 Juno Pde)	3 (54 Wentworth St)
Morning Shoulder	L _{Aeq} (15 mins)	51	51	51
	L _{AFmax}	61	61	61
Day	L _{Aeq} (15 mins)	54	52	52
	L _{AFmax}	70	70	70

Table 4: Raw values for L_{Aeq} and L_{AFmax} obtained for each session, prior to the three-stage assessment (to the nearest whole number). Colours have been used to show compliance (green) and non-compliance (red) with the relevant limits. Note these are raw values and are not necessarily reflective of the Site contribution to the recorded noise levels.

Date	Period	Session Start	EPL Point	L _{Aeq} (15 mins)	L _{AFmax}	
12/05/2020	Morning Shoulder	6:05:30	3	49	59	
12/05/2020	Morning Shoulder	6:27:10	2	55	76	
12/05/2020	Morning Shoulder	6:47:00	1	51	65	
12/05/2020	Day (morning)	7:35:00	1	51	77	
12/05/2020	Day (morning)	8:00:00	2	54	78	
12/05/2020	Day (morning)	8:25:00	3	50	71	
12/05/2020	Day (afternoon)	14:30:30	3	49	63	
12/05/2020	Day (afternoon)	14:54:30	2	51	70	
12/05/2020	Day (afternoon)	15:17:10	1	51	74	
13/05/2020	Morning Shoulder	6:08:00	3	48	71	
13/05/2020	Morning Shoulder	6:29:30	2	52	67	
13/05/2020	Morning Shoulder	6:47:45	1	51	66	
13/05/2020	Day (morning)	7:31:30	1	50	63	
13/05/2020	Day (morning)	7:53:00	2	52	78	
13/05/2020	Day (morning)	8:13:30	3	46	68	
13/05/2020	Day (afternoon)	15:23:10	3	48	73	
13/05/2020	Day (afternoon)	15:45:30	2	49	77	
13/05/2020	Day (afternoon)	16:09:30	1	54	79	
14/05/2020	Morning Shoulder	6:10:22	3	51	64	
14/05/2020	Morning Shoulder	6:32:25	2	50	70	
14/05/2020	Morning Shoulder	6:55:00	1	52	80	
14/05/2020	Day (morning)	7:40:00	1	52	65	
14/05/2020	Day (morning)	8:03:00	2	52	69	
14/05/2020	Day (morning)	8:27:00	3	49	65	
14/05/2020	Day (afternoon)	13:49:00	3	52	68	
14/05/2020	Day (afternoon)	14:14:00	2	52	81	
14/05/2020	Day (afternoon)	14:39:00	1	56	76	
				# Compliant	20	9
				# Non-compliant	7	18

Stage 1 – Exceedance of permitted limit by raw L_{Aeq}

In this initial stage, the full data set was inspected for each session where the raw L_{Aeq} value exceeded the permitted limits. As shown in Table 4, this was a total of seven sessions. Peaks that exceeded the relevant L_{AFmax} limits were identified, as shown in the example presented in Figure 1, of the Morning Shoulder session at EPL 2 on 12 May 2020 (“Session 2”). The detailed field sheets for each session, from records taken at both the monitoring location and at the Site were then inspected to determine whether these peaks had been noted by field personnel during the monitoring events. Additionally, the audio files for each session were listened to, where field notes did not identify the peaks. Where

the noise sources that caused these exceedances were determined to be directly attributed to extraneous noise sources (i.e. not from the Site), the data points were removed, and a revised data set of a reduced number of values was obtained. Where exceedances could not be directly attributed to extraneous noise, or a combination of noise sources (potentially including the Site) were identified, the data points were not removed. In the example using Session 2 (refer Figure 1) all data points greater than the permitted LAFmax limit of 61 dB(A) could be directly attributable to extraneous noise sources, specifically overhead birds and a dog barking in proximity to the monitoring location. We note that an alternative technique to remove certain extraneous noise sources (i.e. bird noise) would be the use of specific band filters, such as a third octave frequency cut-off filter. For this assessment, we opted not to use such filters, as the extraneous noise sources generally occurred in discrete peaks and were distinguishable from other potentially relevant noise sources via a manual process.

Following the removal of the relevant data points, the maximum potential Site contribution values for LAeq and LAFmax were recalculated based on the reduced data set. It must be noted that, due to the removal of the data points, a full 15 minutes of data (9000 samples) was no longer available for the calculations. Therefore, the values obtained are estimates only. However, due to the thorough assessment implemented, we are confident that all data points chosen to be removed were attributable to extraneous noise sources and that the raw values obtained initially were therefore not reflective of the potential Site contribution to the noise levels.

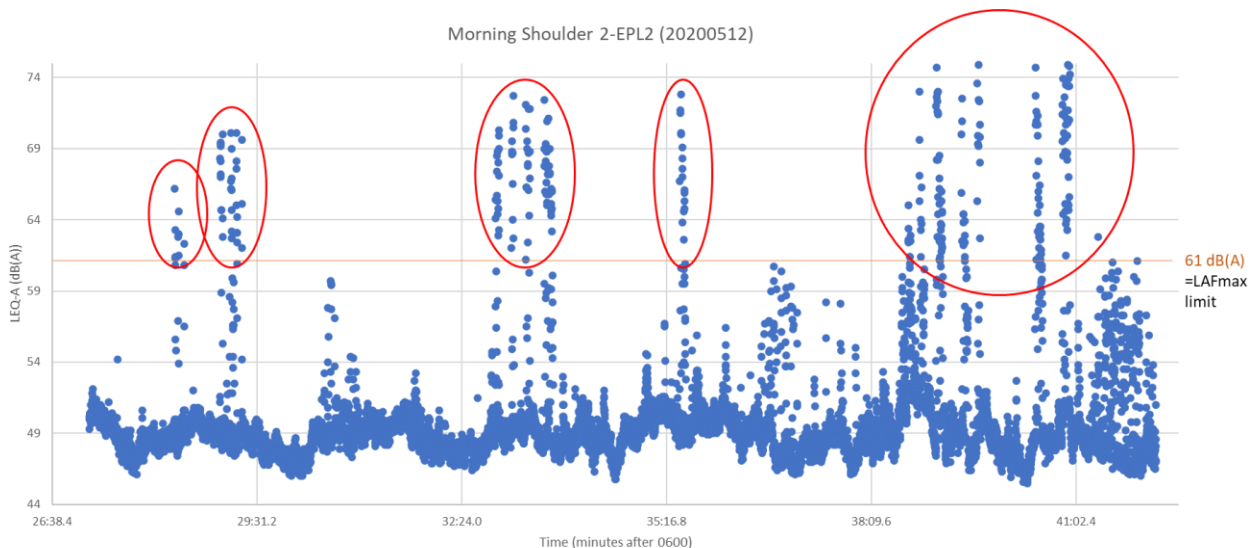


Figure 1: Raw LEQ-A data obtained for Session 2 (12/05/2020, Morning Shoulder, EPL Point 2, Session Start: 6:27:10), showing the permitted LAFmax limit (orange line), and peaks above this limit (red circles). In this example, all peaks greater than the permitted LAFmax limit of 61 dB(A) could be directly attributable to birds and dogs.

Stage 2 – Continued exceedance of permitted limit by LAeq, following Stage 1

Following the removal of data points directly attributable to extraneous noise sources in Stage 1, there remained one session (Session 27) in which the LAeq value exceeded the relevant permitted limit. In this session, a value of 55 dB(A) was obtained, which was a 4 dB(A) exceedance of the unmodified limit.

The residual data for this session was then inspected to determine whether the exceedance could be attributed to the Site. Following this, simple noise attenuation calculations and modelling was carried out upon the data and used to estimate the potential site contribution.

Inspection of data and audio

Session 27: During this session, field notes show that there was consistently high noise from children playing next door to the monitoring location, including banging on the fence, using air pressure equipment, and crying. Field notes also show that industrial noise was only faintly audible during this session.

Distance attenuation calculations

Assuming the noise source was directly adjacent to the location of the comparison monitoring logger, we are able to calculate the expected noise levels at EPL Point 1 using the Inverse Square Law for simple distance attenuation. The formula for this calculation is $L_p(R2) = L_p(R1) - 20 \cdot \log_{10}(R2/R1)$, where:

$R1$ = Distance from the noise source to initial location (estimated as 10 m, from site entry to comparison logger).

$R2$ = Distance from the noise source to the new location (EPL Point 1 located 89.1 m away from site entry).

$Lp(R1)$ = Sound Pressure Level at initial location (recorded during each session).

$Lp(R2)$ = Calculated Sound Pressure Level at the new location (EPL Point 1).

Table 5: Simple distance attenuation calculations for the two sessions that exceeded permitted limits for LAeq following the Stage 1 assessment.

EPL Point 1						
Session (date, start time)	Lp(R1)(dBA)	R1 (m)	R2 (m)	Calculated levels		Recorded levels
				Lp(R2) (dBA)	Predicted degree of attenuation (dBA)	Recorded LAeq (dBA)
Session 27 (14/05/20, 14:39)	63	10	89.1	44	19	55

The above calculation was carried out upon using the LAeq (15 minutes) values obtained from the comparison monitor during Session 27, which is a reasonably accurate estimate of the noise produced from the Site (note, this monitor would also have been influenced by other industrial noise in proximity to the Site). The calculation shows that the distance between the Site and the receiver (EPL Point 1) is expected to cause a decrease of 19 dB(A), and that the sound level contribution of the Site is therefore expected to be 44 dB(A) at EPL Point 1 during the session. Our recorded data shows an LAeq value of 55 dB(A) at EPL Point 1 during the session. While the calculation is very simplified, it is useful to note that the distance between the Site and the EPL Point is expected to cause a significant reduction in sound level, to a level that is far below the actual recorded values.

Point source modelling

Data obtained from the comparison logger was used to create a simple noise propagation model, to estimate the noise levels at each of the EPL Points¹. The model allows the input of substantial additional information and variables, including multiple noise sources and source types, objects (such as buildings and walls), altitudes, and ground types. Relevant buildings (i.e. those between the Site and receivers) were included in the model. Figure 2, below, shows the output of this model using the LAeq (15 minutes) value from the comparison logger during Session 12 (68.5 dB(A)). This output shows a much greater reduction in noise level, compared to the distance attenuation calculation, with a value of 9.9 dB(A) estimated for EPL Point 1. The further reduction is likely to be caused by the presence of buildings between the Site and the monitoring points, and the difference in location between the on-site noise sources, compared to the comparison noise logger, which is not taken into account in the model. It should be noted that while the model allows for a large amount of customisation, our approach was to develop a simple model that estimated noise propagation based on a single noise source at the southern boundary of the Site that matched the measured SPL at that location, (determined using the comparison logger). Our model focused on a simple estimate of the Site noise output only and did not account for the multiple noise sources at the site, or the many other extraneous noise sources in the surrounding area. A more accurate model for the Site was prepared by EMM for their December 2019 *Noise Impact Assessment*², and we did not foresee any benefits from repeating this modelling. We note the results of this attended noise assessment broadly support the predicted noise levels in EMM’s December 2019 modelling study.

Although this modelling exercise should be viewed as a qualitative exercise only – like the distance attenuation calculation, the model is useful as it shows a significant reduction in sound pressure levels between the Site and the EPL Points.

Summary of Stage 2

Based on the above, we can be confident that the LAeq (15 minutes) values obtained for each of the sessions are overestimations of the actual noise contribution from the Site. Due to the complex noise environment, it is difficult to calculate the actual Site noise contribution during each session. However, as each exceedance was only minor, and the calculations and model show significant reductions in noise pressure level between the Site and the monitoring points, we can be confident that the unmodified LAeq (15 minutes) limits were not exceeded due to the Site noise contribution. Therefore, we will estimate the contributions as “less than the relevant limit”.

Stage 3 – Exceedance of raw LAFmax values

In this final stage, we focused on the sessions for which the raw values exceeded LAFmax limits, to determine whether these exceedances could be attributed to the Site.

¹ Model available via <http://noisetools.net>.

² Aussie Skips Recycling – Greenacre *Noise Impact Assessment* December 2019, EMM. Report ref: “J190513 RP1”

A similar procedure as Stage 1 was implemented, with the full data set for each session inspected and peaks that exceeded the LAFmax limits identified. A combination of the field notes, audio, and data from the comparison logger were then utilised to determine whether these peaks could be directly attributed to extraneous noise sources or from Site activities. As the LAeq value obtained for each of these sessions was below the relevant limits, the calculation of a revised LAeq following the removal of extraneous sources was determined to not be necessary. Therefore, data that could be directly attributed to extraneous noise sources was identified but not removed from the data set. Where the only exceedances of the LAFmax value could be directly attributed to extraneous noise sources, the LAFmax for the session was determined to be less than the relevant limit, and was not calculated. Where values could be directly attributed to Site activities, a more accurate value was determined.

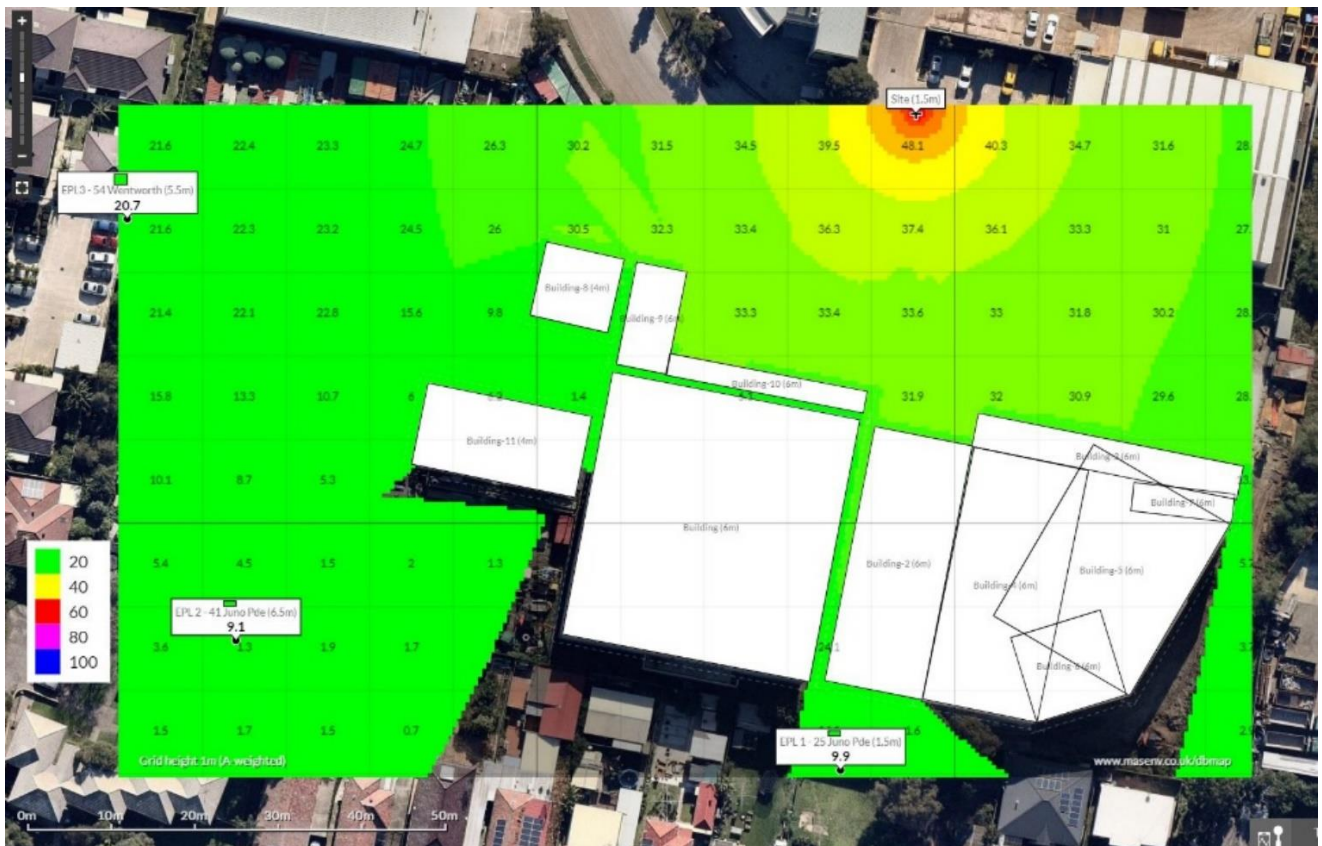


Figure 2: Noise modelling showing the Site (black cross at top of image), EPL Points (black points), and buildings expected to be relevant (white polygons). Modelled noise is shown as the coloured overlay, with noise levels in the scale on the left of the image (in dB(A)). Model created using noisetools.net.

Comparison of monitoring location logger and Site logger

To determine whether there was a clear correlation between the values obtained for each monitoring location and the Site noise source, the results obtained were compared to those from the comparison logger, following identical statistical analyses as the monitoring location results. Simple correlation plots were prepared for the LAeq (15 minutes) values and the LAFmax values, and are shown below in Figure 3 and Figure 4, respectively. Note, both plots have been prepared based on the values obtained following the three-stage assessment process, and therefore do not account for all data points.

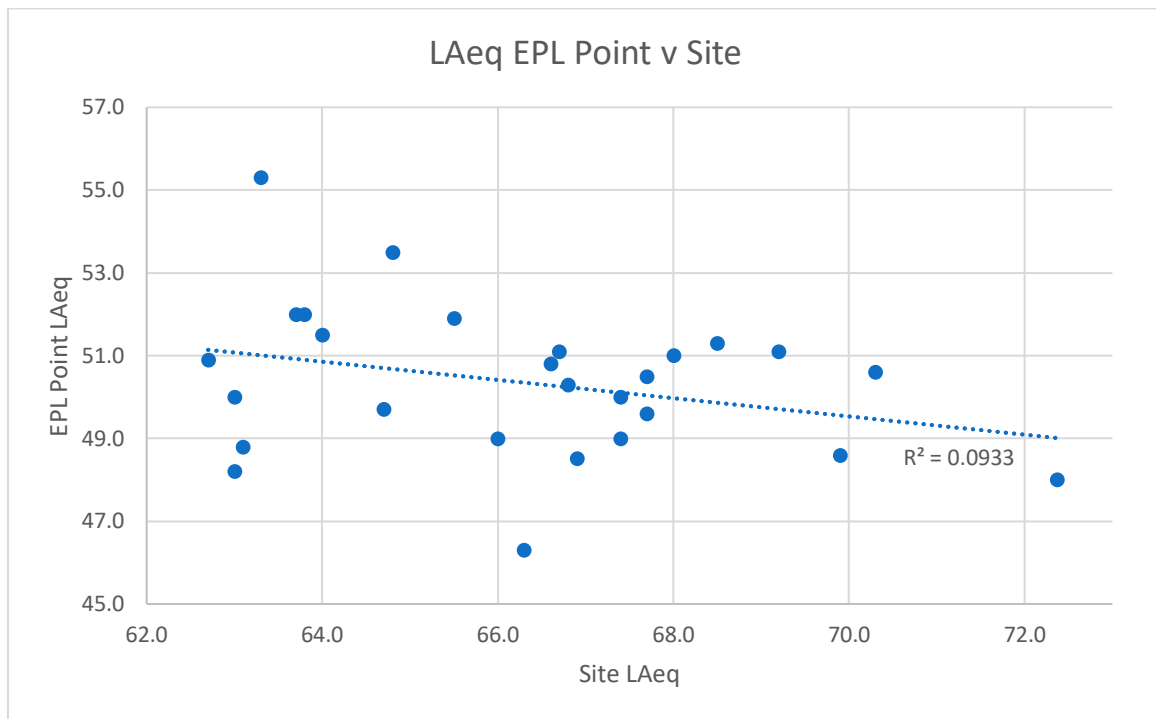


Figure 3: Comparison of LAeq (15 minutes) values during each monitoring session at each EPL Point and the comparison logger (i.e. Site noise source). A linear trendline has been included.

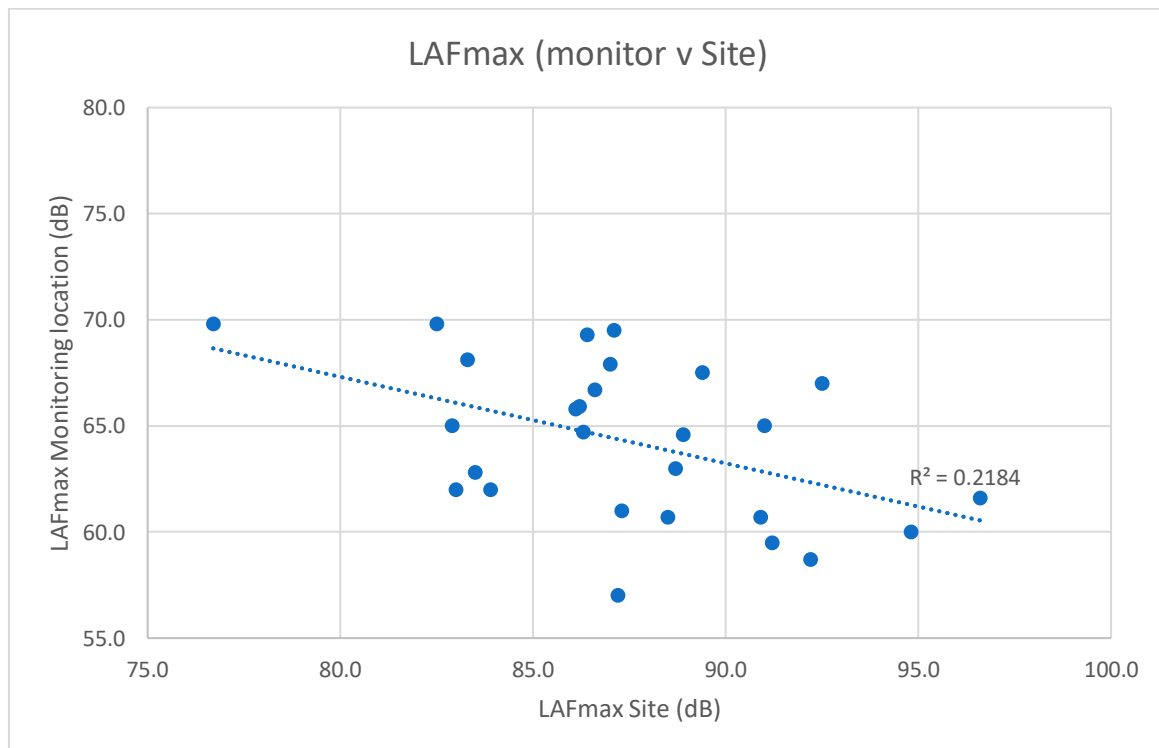


Figure 4: Comparison of LAFmax values during each monitoring session at each EPL Point and the comparison logger (i.e. Site noise source). A linear trendline has been included.

The two plots above show that there is little to no correlation between the noise levels at the Site and each monitoring location.

The full data set obtained from the monitoring location logger and comparison logger during each of the 12 May 2020 Morning Shoulder sessions were also compared, and were plotted as shown in the following Figures.

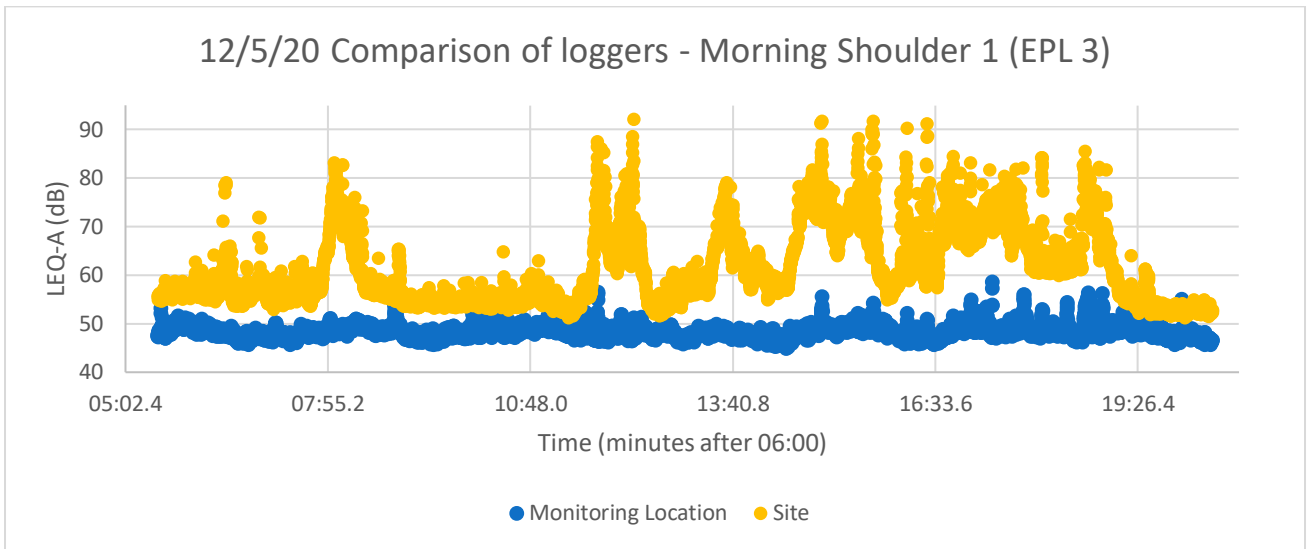


Figure 5: All data points obtained during the 12 May 2020 Morning Shoulder Session 1 from the monitoring logger at EPL 3, and the comparison logger at the Site.

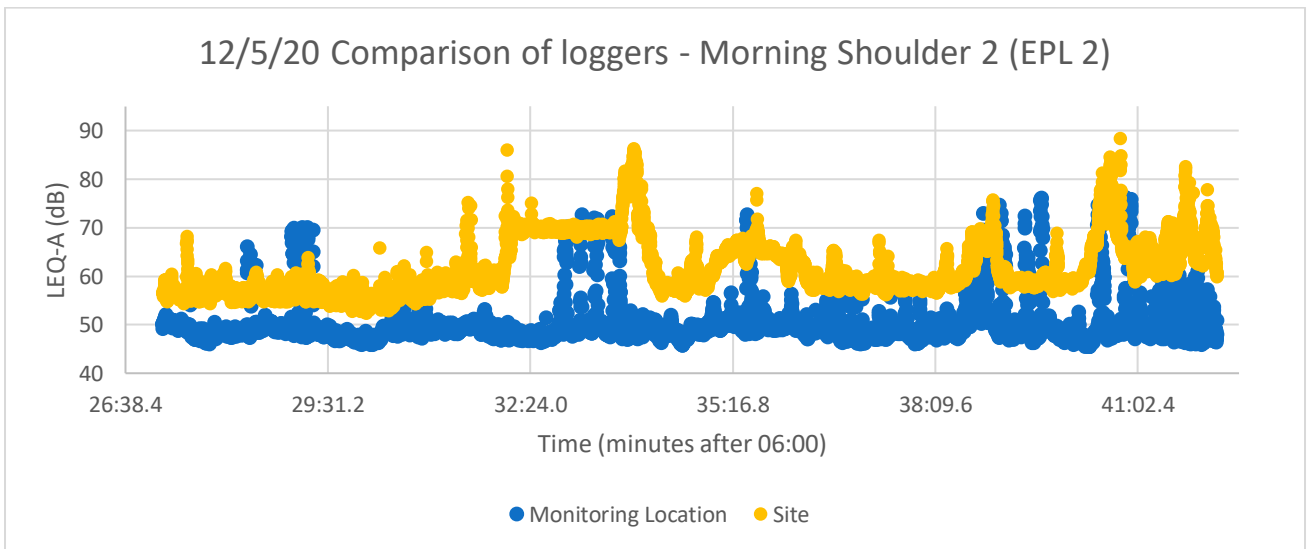


Figure 6: All data points obtained during the 12 May 2020 Morning Shoulder Session 2 from the monitoring logger at EPL 2, and the comparison logger at the Site.

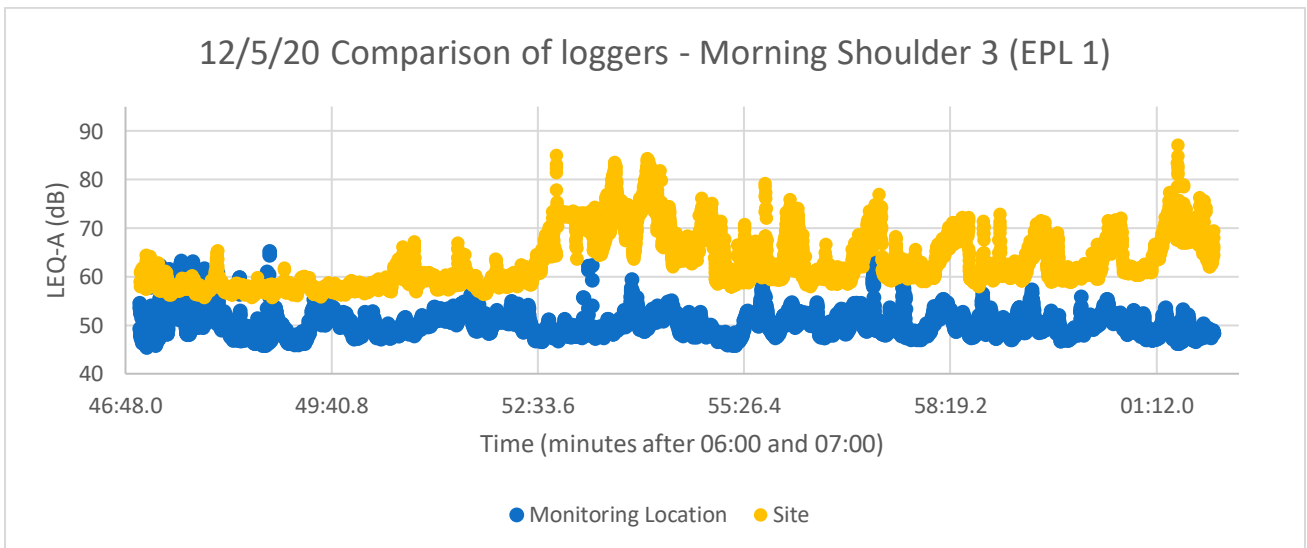


Figure 7: All data points obtained during the 12 May 2020 Morning Shoulder Session 3 from the monitoring logger at EPL 1, and the comparison logger at the Site.

The above Figures show very few periods where the noise levels on Site are clearly impacted upon the levels recorded at each monitoring location.

Calibration results

Calibration checks were generally within 0.5 dB(A) of the reference signal between the pre-measurement and post-measurement calibrations. There was occasional minor variance of up to 1.0 dB(A); however, we note this was likely due to the need to shorten the calibrator stabilisation timeframe, in order to retain enough time to conduct three 15-minute monitoring sessions within the morning shoulder period (6 am to 7am). The average variance across each time period was 0.35 dB (A), which is acceptable and we do not expect that this has resulted in any adverse effects on the validity of the measurements obtained.

Noise results

The results for each monitoring session following the three-stage assessment process are provided below in Table 6. This table includes the estimated maximum site contribution to the LAeq (15 minutes), the estimated maximum potential Site contribution to the LAFmax, and details about the Site activities and dominant noise sources during each of the sessions. From these results, we can see that the estimated maximum Site contribution to the LAeq (15 minutes) values at the three monitoring points was determined to vary between 46 dB(A) and 54 dB(A). Taking into account the results from the distance attenuation calculations, the modelling, and the complex surrounding noise environment, we expect the actual Site contribution to be lower in each case. The estimated maximum potential Site contribution to the LAFmax varied between 59 dB(A) and 70 dB(A) across the three monitoring points. Again, it is expected that the actual Site contribution to the LAFmax is likely to be lower in most cases.

The attended noise monitoring results indicate noise levels at the monitoring points are more heavily influenced by surrounding noise sources than Site activities, in particular traffic, animals, and other industrial sites.

In addition, 4Pillars is advised that the site has had no noise complaints, nor is it aware of any complaints made to Council or the NSW EPA.

Table 6: Results of attended noise monitoring, following the three-stage assessment procedure implemented to estimate the maximum potential Site contribution to LAeq (15 minutes) and LAFmax values (to the nearest whole number). MS = Morning Shoulder, D (m) = Day (morning) period, D (a) = Day (afternoon) period. Non-compliant results have been highlighted (if any have been identified).

Date	Session	Period	Start time	EPL Point	Estimated maximum site contribution LAeq (15 min) (dB(A))	Estimated maximum potential site contribution LAFmax (dB(A))	Confidence in estimate	Site activities/noises during monitoring	Reference noise sources (roughly in order of dominance)
12/05/2020	1	MS	6:05:30	3	49	59	High	Staff arriving, skip trucks exiting site, movement of vehicles on site	Traffic, birds, industrial noise
	2	MS	6:27:10	2	50	61	High	Vehicles exiting site, front end loader, movement of bins	Traffic, birds, dog, industrial noise
	3	MS	6:47:00	1	51	<57	Medium	Vehicles entering and exiting site, front end loader, movement of bins, unloading and sorting of material	Traffic, birds, industrial noise, site audible but faint
	4	D (m)	7:35:00	1	51	<62	Medium	Vehicles exiting site, movement of material	Traffic, birds, industrial noise, site audible
	5	D (m)	8:00:00	2	49	66	High	Vehicles entering and exiting site, movement of material	Surrounding industrial sites dominant, some banging from site, traffic, birds, roadworks
	6	D (m)	8:25:00	3	50	<62	Medium	Handling/shaking of material with mobile plant, movement of bins, food truck horn (brief)	Traffic, consistent industrial noise from surrounding sites
	7	D (a)	14:30:30	3	49	63	High	Vehicles entering and exiting site, unloading and sorting of material	Distant traffic, industrial hum, trucks on Bellfrog Street, birds, residents
	8	D (a)	14:54:30	2	51	70	High	Vehicles entering and exiting site, reversing beepers, unloading and sorting of material and skips	Mobile plant from site, traffic, birds, reversing alarms from surrounding sites, shouting and alarms from adjacent site
	9	D (a)	15:17:10	1	51	<67	Medium	Vehicles entering site, unloading and sorting of material, dropping of bins	Traffic, industrial noise (potentially from site), birds, alarms/beepers
13/05/2020	10	MS	6:08:00	3	48	<60	Medium	Vehicles entering and exiting site, operation of machinery	Traffic, industrial noise from vicinity of site, birds
	11	MS	6:29:30	2	50	61	High	Vehicles entering and exiting site, operation of machinery	Industrial noise (fans, trucks, alarms from cement works), birds, traffic

13/05/2020	12	MS	6:47:45	1	51	66	Low	Vehicles entering and exiting site, operation of machinery	Traffic, industrial noise (fans, trucks, alarms from cement works), birds
	13	D (m)	7:31:30	1	50	63	High	Vehicles entering and exiting site, operation of machinery	Traffic, construction site, industrial noise, birds
	14	D (m)	7:53:00	2	52	68	High	Vehicles entering and exiting site, operation of machinery	Industrial noise, birds, traffic, plane, residents
	15	D (m)	8:13:30	3	46	68	High	Vehicles entering and exiting site, operation of machinery	Industrial noise, birds, traffic, plane
	16	D (a)	15:23:10	3	48	<67	Medium	Vehicles entering and exiting site, operation of machinery	Birds, traffic, site audible but generally faint
	17	D (a)	15:45:30	2	49	<65	Medium	Sorting and movement of material, dropping of bins	Traffic, birds, construction site, site audible but not dominant
	18	D (a)	16:09:30	1	54	<65	Medium	Sorting and movement of material, dropping of bins	Traffic, residents playing in yard, construction site, site audible but not dominant
14/05/2020	19	MS	6:10:22	3	51	62	Low	Vehicles exiting site	Birds, traffic, reversing beepers, site audible but not dominant
	20	MS	6:32:25	2	50	<60	Medium	Trucks idling, vehicles exiting site, dropping of bins	Traffic, birds, industrial noise, residents
	21	MS	6:55:00	1	<51	61	High	Sorting and movement of material, dropping of bins	Traffic, industrial noise
	22	D (m)	7:40:00	1	52	65	High	Sorting and movement of material	Traffic, excavator at adjacent site, site noises
	23	D (m)	8:03:00	2	52	69	High	Sorting and movement of material	Birds, traffic, excavator at adjacent site, residents
	24	D (m)	8:27:00	3	49	65	High	Little-no activity	Birds, traffic, residents
	25	D (a)	13:49:00	3	52	68	High	Little activity - some vehicles entering and exiting site, sorting and movement of material	Birds, traffic, excavator at adjacent site, industrial noise, residents
	26	D (a)	14:14:00	2	51	70	High	Sorting and movement of material, dropping of bins	Wind, traffic, reverse beeper, residents, birds, industrial noise
	27	D (a)	14:39:00	1	<51	70	High	Sorting and movement of material, dropping of bins	Children playing, traffic, industrial noise

Deviations from monitoring requirements

Due to the time pressures imposed by the short Morning Shoulder period (1 hour), and the requirement to monitor at three separate locations during this period, it was not possible to complete all sessions prior to 07:00. During each monitoring day, the final Morning Shoulder session recordings were completed at 07:02, 07:02:45, and 07:10, respectively. We do not believe this had a significant impact on the outcome of the results, and the data was assessed against the stricter limits imposed upon the Morning Shoulder period.

Conclusion

As shown in the preceding sections, a thorough assessment process was implemented to determine whether exceedances of set limits were attributable to Site activities, or were rather caused by extraneous noise sources.

Although some raw values exceeded the relevant limits, we determined that these were generally due to extraneous noise sources, and that the Site contribution to noise levels at all three EPL monitoring points were compliant with the LAeq limits set in Condition L4.1 of the EPL for both the Morning Shoulder and Day periods, throughout all sessions.

In Sessions 12 and 19, the LAFmax values following the three-stage assessment process exceeded the LAFmax limits set in Condition L4.1 of the EPL. In Session 12, the LAFmax value was estimated (with Low confidence) to be 66 dB(A), due to a scraping that was noted to have occurred from the Site at the time of this noise level. This scraping was barely audible in the audio file recording and occurred simultaneously with the tweeting of close-by birds, and it is expected that the noise level is rather attributable to these birds, as bird noise experienced throughout the three monitoring days was consistently recorded at such high levels. Nevertheless, it was not possible to confidently distinguish between noise values attributable to the birds and those attributable from the Site. If we assume the high exceedance was caused by the birds, then the next highest maximum value observed during the session was a single measurement of 61.3 dB(A), which could be attributed to a scraping noise on Site. This is a very minor exceedance of the LAFmax limit set in Condition L4.1 of the EPL. In Session 19, the LAFmax value was estimated (with Low confidence) to be 62 dB(A), due to a single measurement which was believed to be due to a clanging sound related to a skip truck leaving the Site. This value was also a very minor exceedance of the LAFmax limit set in Condition L4.1 of the EPL. No other noises from the Site exceeded the limit during either of these two Sessions.

Site operations during monitoring were believed to be reflective of regular operations, and all EPL monitoring locations were accessible. The monitoring undertaken was therefore compliant with the requirements detailed in the EPL.

Statement of compliance

As discussed above, the LAeq values determined for the Site contribution to noise levels at all three EPL monitoring points were compliant with the LAeq limits set in Condition L4.1 of the EPL throughout all sessions.

Although values in two sessions (Sessions 12 and 19) were shown to have exceeded the original LAFmax limits set in Condition L4.1 of the EPL, the meteorological conditions (determined as per Condition L4.6 of the EPL) outlined in Table 2 must be taken into account. The meteorological conditions experienced during the monitoring require the noise limits that applied during Sessions 12 and 19 to be modified by an addition of 5 dB, which gives a revised LAFmax limit in both sessions of 66 dB(A). The LAFmax values that could be attributed to the Site during these sessions was below this revised limit, and therefore, no exceedance occurred.

The Site contribution to LAFmax values determined for all three EPL monitoring points were compliant with the LAFmax limits set in Condition L4.1 and L4.5 of the EPL throughout all sessions.

Limitations of this assessment

To the best of our knowledge and based on information provided to us by the client or their representatives, the information contained in this report is accurate at the date of issue. 4Pillars has used a degree of care and skill ordinarily exercised in similar investigations by reputable members of the environmental sector in Australia. No other warranty, expressed or implied, is made or intended. The opinions and judgements expressed in this report should not be construed as legal opinions or advice. 4Pillars is also not responsible or liable for any third-Party use or reliance on this report.

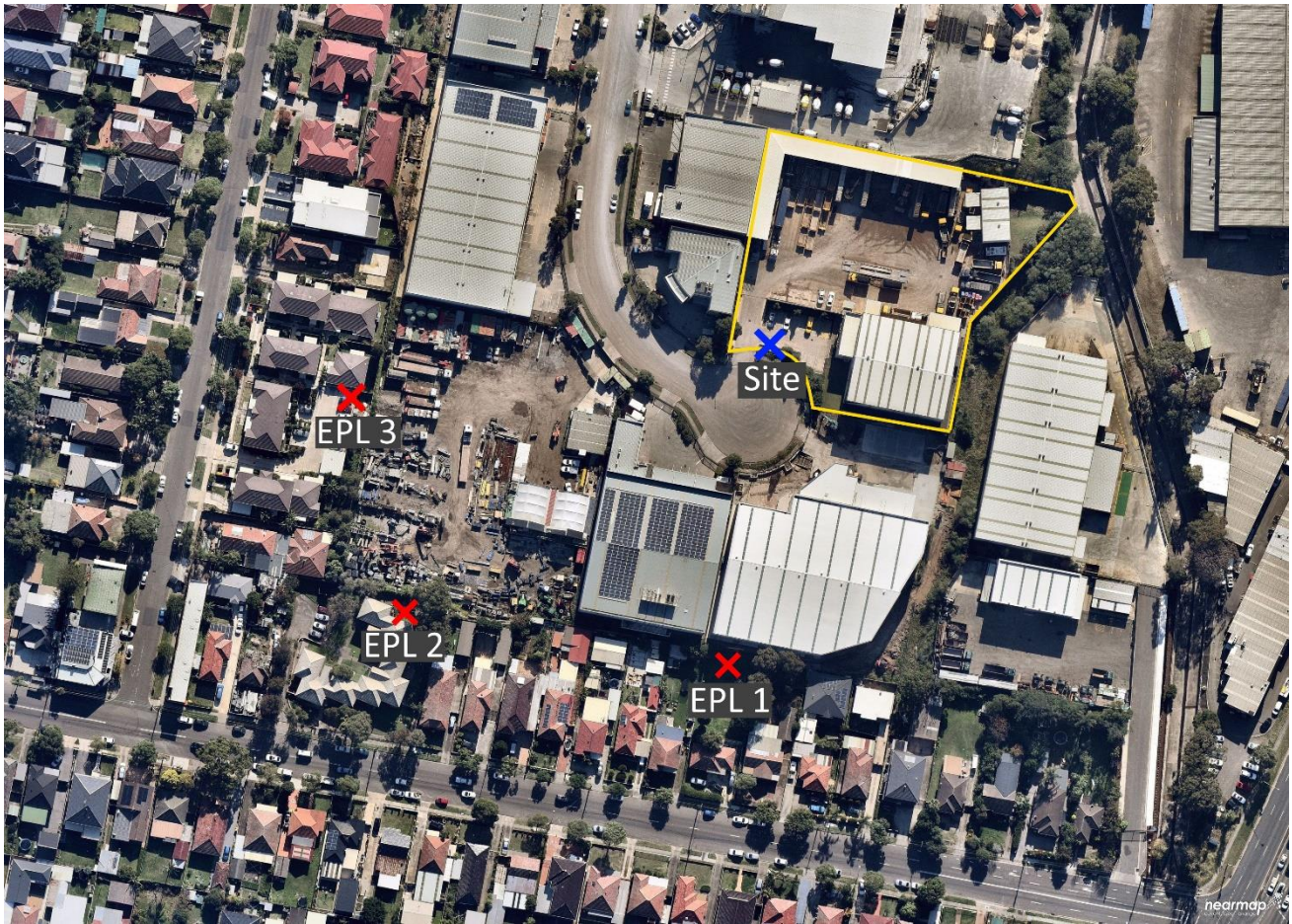


Figure 8: Location of Site (yellow polygon), EPL Point monitoring locations (red crosses), and the location of the comparison logger (blue cross).

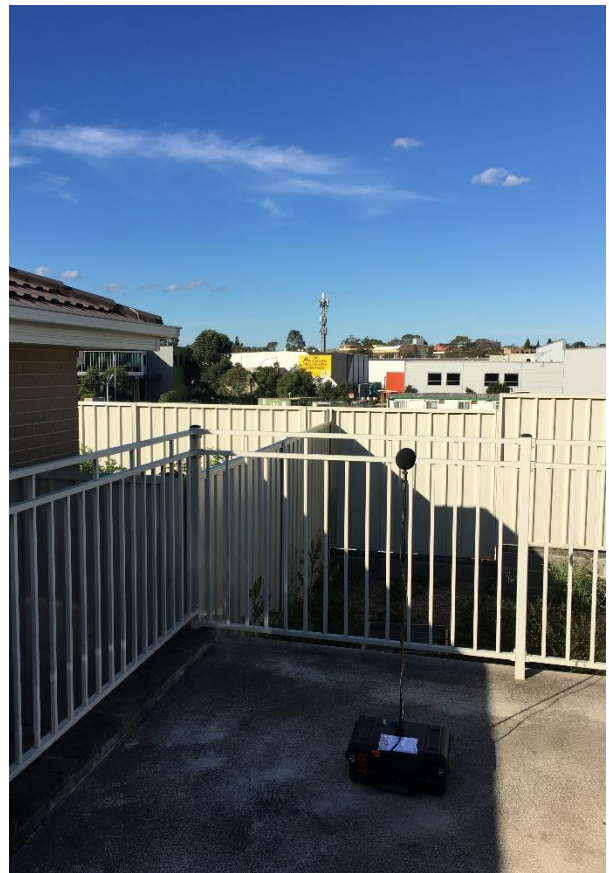
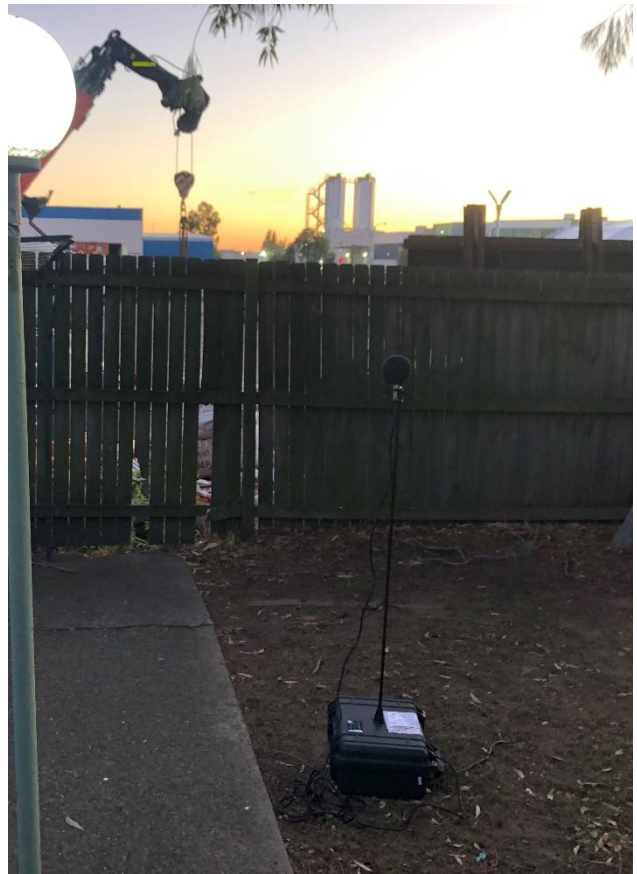


Figure 9: Noise loggers in place at each monitoring location, clockwise from top left: EPL 1, EPL 2, EPL 3, comparison logger. All photos are taken in the direction of the Site.

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Division of RAMTRANS Australia ABN: 45067491678 RPEQ: 19457

Transport Planning, Traffic Impact Assessments, Road Safety Audits, Expert Witness

13 December 2019

Reference: 190855.01FA

Aussie Skips Recycling Pty Ltd
C-/ MinterEllison
84-108 Madeline Street
Strathfield South NSW2136
Attention: Matthew Barker

TRAFFIC ENGINEERING ADVICE FOR THE MATERIALS HANDLING YARD AT 13 BELLFROG STREET, GREENACRE

Dear Matthew,

Reference is made to your request to provide traffic engineering advice for the materials handling yard at 13 Bellfrog Street, Greenacre (Site plan in **Annexure A**). This letter addresses the request for a confirmation of the capacity of the site to receive and dispose of materials based on both the physical constraints of the site and the on the approved number of truck movements under development consent DA2012/175.

It is requested that this assessment is undertaken with the understanding that the EPL Application, which relates to the carrying out of materials storage activities on the site, includes the receipt 200,000 tonnes per annum of general materials that would be sorted in a materials handling yard on-site.

1 Documents Reviewed

In completing this assessment, the following documentation has been reviewed and considered:

- Strathfield Council Development Consent DA2012/175;
- DA2012/175 – Stamped Drawings dated 19th December 2012 (Page 1 in **Annexure A**);
- Statement of Environmental Effects by Borg Architects, Issue B dated September 2012.

2 Site Capacity

2.1 Physical Constraints

Consideration is given to the physical constraints of the site layout and hardstand area. A swept path assessment has been conducted on aerial imagery taken of the site, reproduced in **Annexure B**, with the results demonstrating that the site has ample capacity to accommodate multiple large vehicles for loading and unloading in accordance with the limits stated within the *Borg Architects Statement of Environmental Effects* dated September 2012.

Our assessment has identified that in the worst-case scenario whereby all hourly truck movements to the site occur at the same time, the site can comfortably accommodate the storage and loading of at least:

- Two (2) large trucks;
- Three (3) medium truck;
- Three (3) small trucks.

Under such circumstances, the site has the physical capacity to accommodate the maximum number of vehicles arrivals on-site during any one hour, though a more realistic scenario, is that these vehicles would arrive throughout the hour and as such it is unlikely that all vehicles will be on the site simultaneously.

Reference is made to consent condition 19 of DA2012/175, which states.

19. Four (4) truck loading/unloading bays must be provided on the northern side of the proposed warehouse and must be marked, labelled and drained in accordance with the approved plans.

Based on this condition it can be assumed that the site has the capacity for 4 vehicles to unload at any one time. The estimated residence time per vehicle on site is 8-15 minutes, depending on vehicle size and loading time as provided by Aussie Skips. Based on this information, MTE has completed queuing analysis of the site assuming a worst-case unloading time of 15 minutes, with a maximum of 8 vehicles arriving within one hour as per the Statement of Environmental Effects.

MTE has found that the 98th percentile queue is one (1) vehicle based on the conservative assumptions made. This single queued vehicle can be easily accommodated on the site with extensive handstand area available beyond what is required for unloading/loading purposes. Refer to **Annexure C** for the detailed queuing analysis results.

In view of the above and based on a combination of swept path testing and queuing analysis conducted for the site, it is clear that the site has the physical capacity to receive the maximum number of vehicles as outlined within the development consent DA2012/175.

2.2 Constraints as set by Development Consent

Reference is made to multiple consent conditions of the Strathfield Council Development Consent DA2012/175, with relevance to determining the sites compacity constraint. An extract of those conditions can be found below;

Parking / Traffic Matters

20. Four (4) truck loading/unloading bays must be provided on the northern side of the proposed warehouse and must be marked, labelled and drained in accordance with the approved plans.

Site Operation

47. The hours of operation shall be restricted to 6:00 am to 5:00pm Monday to Saturday and 7:00am to 5:00pm Sunday.

Access to the site between the hours of 5pm to 6am is permitted for emergency purposes only, during which time the materials handling yard is not to be operational.

The hours of operation and the number of truck movements per hour of the site are outlined within Section 5.5.4 of the *Borg Architects Statement of Environmental Effects* dated September 2012, and an extract of the relevant table from Section 5.5.3 can be found below in **Table 1** for reference.

TABLE 1: 2012 SEE: OPERATION – HOURS AND TRUCKS EXTRACT

Days	Hours of operation	Number of truck movements
<i>Monday – Friday</i>	<i>6am – 5pm</i>	<i>Large trucks = 2 / hour Medium trucks = 3 / hour Small trucks / vans = 3 / hour</i>
<i>Saturday & Sunday</i>	<i>7am – 4pm</i>	<i>Large trucks = 2 / hour Medium trucks = 1 / hour Small trucks / vans = 3 / hour</i>
<i>Night shift (weekdays only) / Emergency call outs (7 days)</i>	<i>5pm – 6am</i>	<i>Large trucks = 0-1 / hour Medium trucks = 0-1 / hour Small trucks / vans = 1-2 / hour</i>

In addition to this, it has been advised that the expected truck sizes for servicing the property and their maximum tonnage are as summarised below in **Table 2**.

TABLE 2: EXPECTED TRUCK CHARACTERISTICS

Vehicle Type	Maximum Payload
Large Truck	30 tonnes
Medium Truck	25 tonnes
Small Truck	8 tonnes

Considering all of the above, in order to calculate the maximum site capacity as determined by the development consent, we can make the following assumptions:

- The truck movements occur at their maximum during every hour of operation, such that the site operates for a total of 11 hours on a weekday, and 9 hours on a Saturday and Sunday;
- Night shift & Emergency call outs are additional and not considered within this assessment.

Under the above assumptions and restrictions, the daily site capacity can be determined as demonstrated below in **Table 3**.

TABLE 3: DAILY MAXIMUM SITE CAPACITY

Vehicle Type	Weekdays	Saturday or Sunday
Large Truck	660 tonnes	540 tonnes
Medium Truck	825 tonnes	225 tonnes
Small Truck	264 tonnes	216 tonnes
Total	1,749 tonnes	981 tonnes

Based on **Table 3** above, the total weekday maximum capacity of the site is **1,749** tonnes per weekday and **981** tonnes per Saturday and Sunday.

For the process of estimating annual site capacity, the following conservative assumptions regarding the operating days per year have been made:

- 250 working weekdays per year (this excludes typical public holidays);
- 104 Saturdays and Sundays per year.

Under the above assumptions and restrictions, the site has an annual capacity in accordance with the development consent DA2012/175 of **539,274** tonnes per year. This exceeds the EPL application figure of 200,000 tonnes per annum by some **339,274** tonnes per annum.

Please contact the undersigned should you require further information or assistance.

Yours faithfully

McLaren Traffic Engineering



Tom Steal

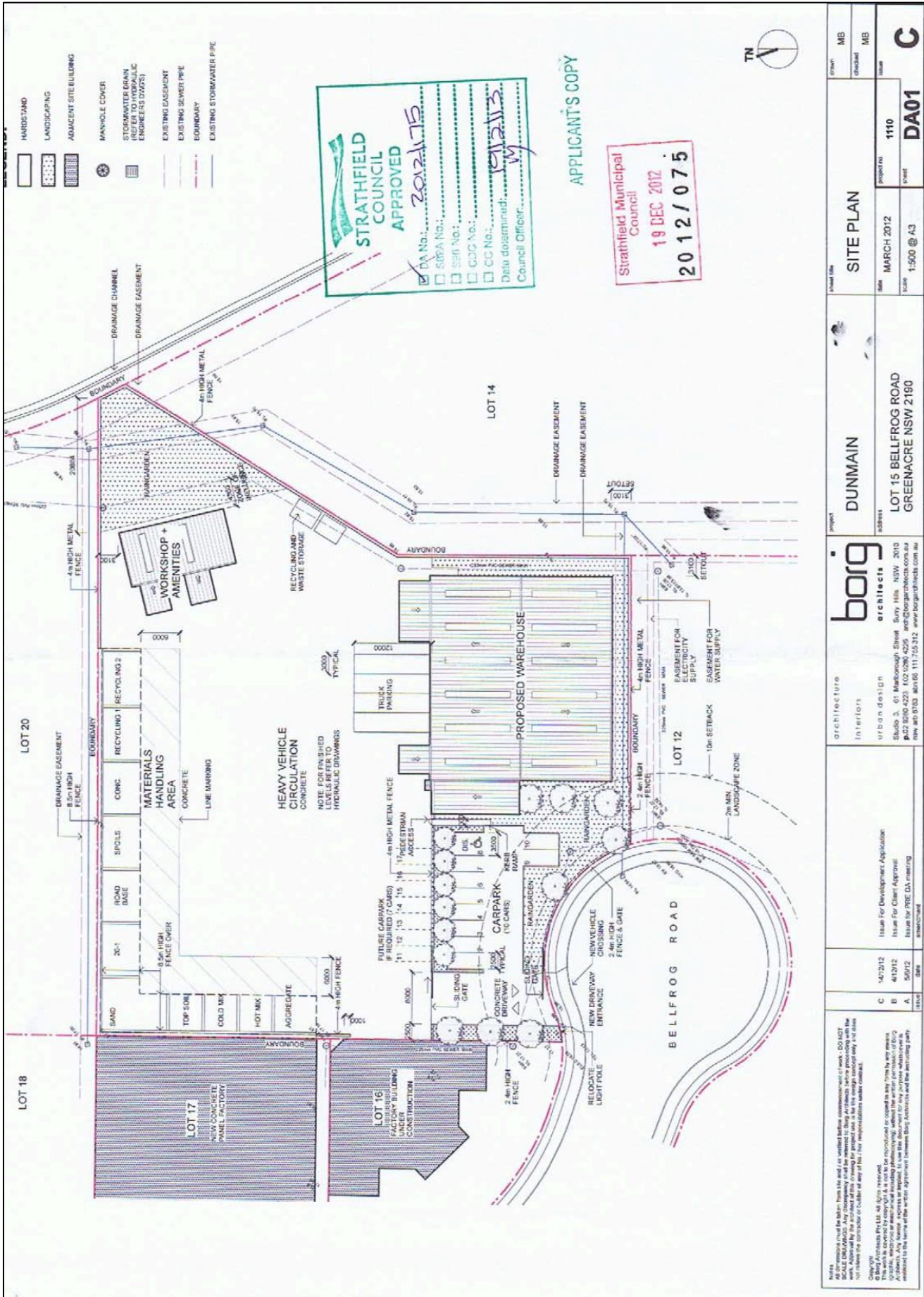
Senior Traffic Engineer

BE Civil AMAITPM MIEAust

RMS Accredited Level 1 Road Safety Auditor

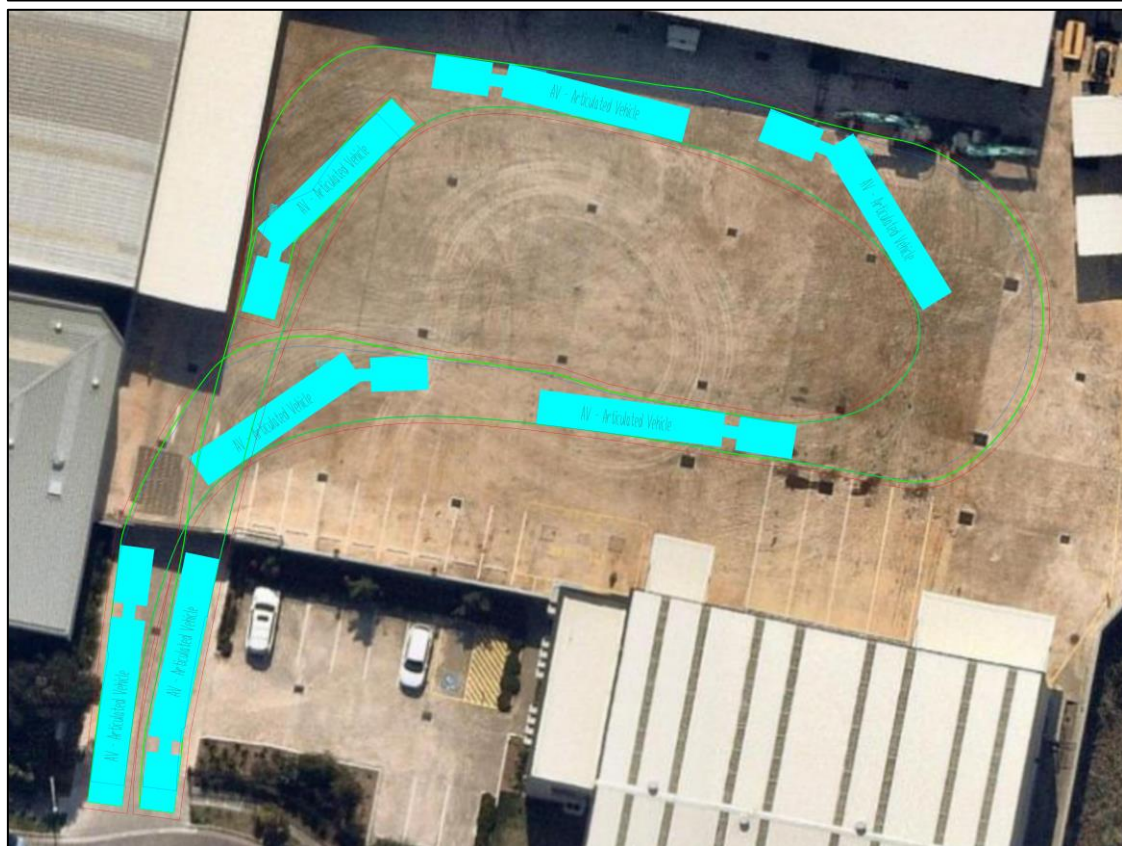
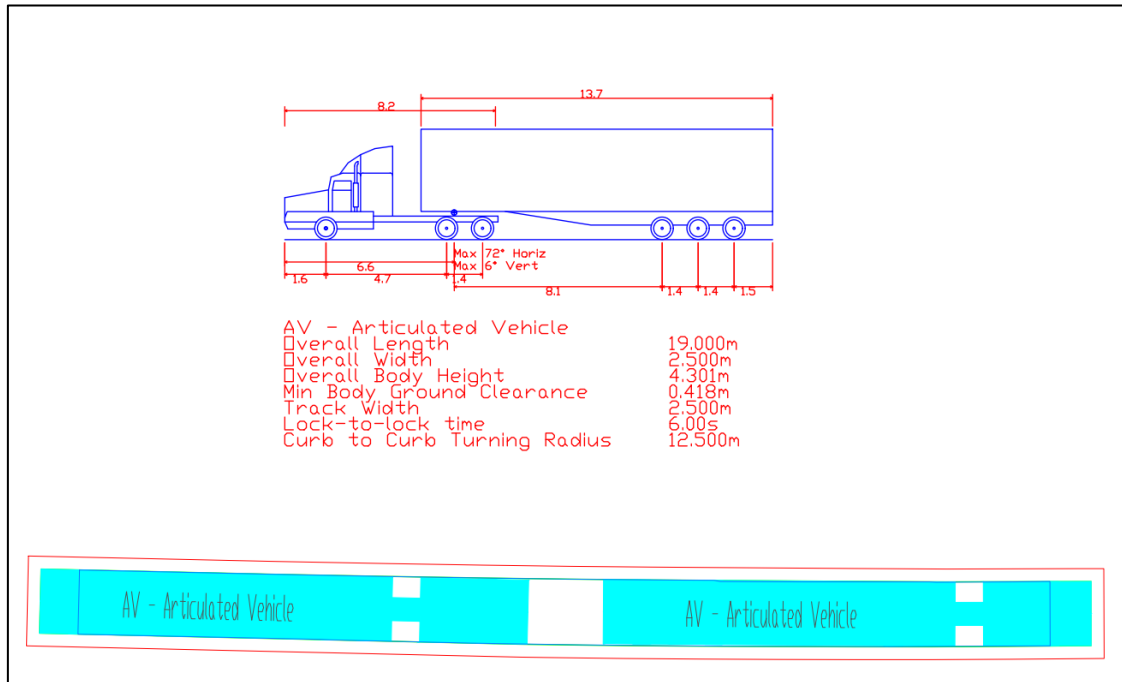
RMS Accredited Work Zone Traffic Management Plan Designer and Inspector

ANNEXURE A: CONCEPT SITE PLAN



Project DUNMAIN LOT 15 BELLFROG ROAD GREENACRE NSW 2160		Site Plan MARCH 2012 1:500 @ A3		MB MB C
Architecture Interiors urban design Studio 3, 61 Macdonough Street, Bury Hills NSW 2010 P 02 9594 4223 F 02 9596 4225 web@borgarchitects.com.au nsw and 0703 and 03 111 55 332 www.borgarchitects.com.au		Issue For Development Application Issue For Client Approval Issue For PPE DA meeting		Scale 1:500 @ A3
C 14/2012 B 412012 A 505012	Issue For Development Application Issue For Client Approval Issue For PPE DA meeting	Date 19 DEC 2012	DA No. 2012/075	Council Officer [Signature]

ANNEXURE B: SWEEP PATH TESTING



**19m AV Circulation
Tested @ 5km/h
SUCCESSFUL**

Blue – Wheels
Green – Vehicle body
Red – 500mm clearance

ANNEXURE C: QUEUING ANALYSIS

Based on AUSTRROADS the detailed queuing analysis for the site is outlined below:

Site Queuing Assumptions

- Adopted worst case dwelling time onsite = 15 minutes.
- Number of tucks able to unload at once = 4
- Inbound traffic flow = 8 trucks per hour

Based on *Austrroads Guide to Traffic Management: Part 3: Traffic Studies and Analysis, Section 5.1.2*, the resulting queuing results are shown below.

TABLE 4: QUEUING RESULTS

Number of units in system	Number of vehicles in queue	Probability of this many units in system (%)	Probability of this many units in system or less (%)	Probability of this many units in system or more (%)
0	0	50.00	50.00	100.00
1	0	25.00	75.00	50.00
2	0	12.50	87.50	25.00
3	0	6.25	93.75	12.50
4	0	3.13	96.88	6.25
5	1	1.56	98.44	3.13

Based upon the queue theory, the site has the capacity to cater for the worst-case unloading scenario with one (1) vehicle queuing in the 98th percentile queue demand. This single queuing vehicle can utilise the onsite weighbridge or somewhere else on site.