STATEMENT OF ENVIRONMENTAL EFFECTS FOR THE OPERATION OF AN ANIMAL FEED BUSINESS, INSTALLATION OF INTERNAL ROADS, HARDSTAND AND ASSOCIATED LANDSCAPING WORKS AT 901 MAMRE ROAD, KEMPS CREEK NSW

Prepared for: Penrith City Council
J M Produce
Olathree Pty Ltd

Prepared by: Linda Zanotto, Senior Environmental Engineer
Daniele Albanese, Senior Acoustical Engineer
Katie Trahair, Environmental Scientist
R T Benbow, Principal Consultant

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Benbow ENVIRONMENTAL

Engineering a Sustainable Future for Our Environment

Head Office: 13 Daking Street North Parramatta NSW 2151 AUSTRALIA
Tel: 61 2 9890 5099 Fax: 61 2 9890 5399
Email: admin@benbowenviro.com.au
Visit our website: www.benbowenviro.com.au

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DOCUMENT CONTROL

Prepared by:	Position:	Signature:	Date:
Linda Zanotto	Senior Environmental Engineer		17 February 2016
Daniele Albanese	Senior Acoustical Engineer		17 February 2016
Katie Trahair	Environmental Scientist		17 February 2016

Reviewed by:	Position:	Signature:	Date:
R T Benbow	Principal Consultant		17 February 2016

Approved by:	Position:	Signature:	Date:
R T Benbow	Principal Consultant		17 February 2016

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Benbow ENVIRONMENTAL

Head Office:
13 Daking Street North Parramatta NSW 2151 Australia
P.O. Box 687 Parramatta NSW 2124 Australia
Telephone: +61 2 9890 5099 Facsimile: +61 2 9890 5399
E-mail: admin@benbowenviro.com.au
Visit our Website at www.benbowenviro.com.au

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ABBREVIATIONS

AS	Australian Standard
BE	Benbow Environmental
LEP	Local Environmental Plan
NPI	National Pollutant Inventory
NSW EPA	New South Wales Environment Protection Authority
POEO	Protection of the Environment Operations Act 1997
QA	Quality Assurance
QC	Quality Control

UNITS OF MEASUREMENT

°C	degree centigrade	(unit of temperature)
dB(A)	A-weighted decibels	(unit of noise)
m	metre	(unit of length)
m^3	cubic meter	(unit of volume)
T	Tonnes	(measurement of weight)

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EXECUTIVE SUMMARY

The Merceica Family have operated a very successful animal food production business for in excess of 30 years within the Penrith City Council area.

Growth of residential areas has meant that this business needs to be relocated in fairness to their residential neighbours.

Land at 901 Mamre Road was purchased for this purpose and various basic activities have been undertaken to ready this land for the purpose of an animal food business.

As this landholding is reasonably large, other uses of the land closer to Mamre Road have been considered and are included in this all-encompassing development application (DA).

The landholding was specifically purchased by two members of the Merceica Family for the purpose of relocating the animal food business onto land which permits this type of operation.

The landholding has unique aspects that have been considered in designing this development.

To ensure the site is suited for the agricultural related activity a number of structural changes have needed to be made, one of the most critical being to resolve the drainage through the site of run-off water from Mamre Road. This has been resolved and would enable vehicles to access the rear of the site where the animal feed business is best located.

The front of the site is unused and the owners desire to enhance the appearance of the site, provide a traffic noise and visual barrier for the residence on site and provide a new access roadway so that the shared road to residences at the rear but adjoining land, would not be affected by animal feed truck movements.

The far rear area of the site becomes Environmental Conservation where the land slopes down a steep batter to a natural water body. The land between an existing shed and the batter had, prior to the Merceica purchase, been used to dump waste building materials. These were removed and the land form stabilised.

An independent environmental site assessment was undertaken and has been submitted to Council. It is also included in the Attachments to this Statement of Environmental Effects. The soil analyses found there to be no presence of contaminants of concern.

During the interim period between previous development applications submitted around February–March 2015 and now, an exempt waste material consisting of glass fines was temporarily stored in this area awaiting the preparation of this DA report and the future development of the residentially zoned land where the animal feed business is currently located. Due to time difficulties this material has since been removed from this area and used to raise the roadway levels and form a working platform for the proposed truck manoeuvring for the animal feed business.

A future development application will be submitted to request permission to produce concrete based rural products using part of the glass fines in the production process.

The relocation of the animal feed business is not a designated or integrated development. The business is related to agriculture and is permitted with consent.

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A number of potential environmental impacts have been assessed in detail.

Noise

Background noise logging has been undertaken at nearest potential receptors and a detailed noise impact assessment undertaken.

Noise control safeguards have been designed into the development and satisfactory noise levels would be met.

An examination of the current site of the animal feed business will show that it is immediately adjacent – along a shared boundary – with several residences. Noise levels exceed what would usually be expected, however the two groups – the animal feed business and residents – are in harmony.

There are zero complaints on noise or dust.

High noise levels are not generated in the processes. Careful consideration has been given to ensuring noise controls are included in the proposed new site.

Air

An air quality impact assessment has been prepared by applying NSW EPA guidelines for preparing these assessments.

The existing operation was studied and a detailed air quality assessment which included air dispersion modelling prepared.

The operations of the animal feed business have dust controls built into the processes. There were no odorous emissions found at the site which would be detected at the existing operation's site boundaries. These are immediately adjacent to residences at the existing site. There is no history of odour complaints.

Surface Water Run-off

A detailed assessment of surface water run-off and the potential for impacts to occur on the water body has been undertaken.

This assessment has recommended the addition of sedimentation basins and heavy landscaping cover on the batter at the far rear of the site.

Traffic

A detailed traffic impact assessment has been undertaken. It is proposed that a new driveway to access Mamre Road be installed in the future.

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Risk Hazard Assessment

A detailed risk hazard assessment has been prepared for the proposed operations. A number of safeguards had already been built into the proposed operations and a set of further controls were found to be necessary.

As a consequence of the risk hazard approach in considering potential adverse consequences, a surface water run-off assessment was prepared and sedimentation ponds added to the far rear of the site. In addition the level of the land was raised to ensure limited to negligible contact between the animal feed business and the on-site drainage.

The development as proposed has been found suitable for this site and approval is requested.

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1. INTRODUCTION

The document provides a Statement of Environmental Effects for the proposed operation of an animal feed production and storage business on land described as 901-915 Mamre Road, Kemps Creek.

The landholding is owned by Olathree Pty Ltd. Bill and Tony Merceica commissioned Benbow Environmental to prepare this detailed Statement of Environmental Effects for the proposed activities as discussed below. The business trades as J M Produce.

The following proposed activities are all related to agricultural products and are permitted with consent:

- Establish an animal feed production and storage business in the rear half of the site. This will require construction of roadways, drainage, hardstand areas, silos weighbridge and various buildings (agricultural sheds).
- Provide all weather roadway access from the existing and proposed longer term new driveway.
- Behind the existing barn at the front of the site, erect an earth berm that would be used to shield the existing residence for noise reduction from the increased traffic that will occur along Mamre Road with the changes that are already planned to occur (Airport and Employment Zones). Privacy for the Merceica Family would also be ensured if an earth berm is erected and vegetated.
- At the front of the site, further landscaping is proposed with reduced height of earth berms to what was originally proposed in the March 2015 Statement of Environmental Effects also prepared by Benbow Environmental (Reference 151039_SEE_Rev1).

Council has desired a reduced change to the appearance of the site and this has been agreed to.

1.1 INTRODUCTION TO THE PROPONENT

The proponent for the development is J M Produce on behalf of Bill and Tony Merceica. The owners of the land grant permission for the lodging of the development application. The development would be operated by the Merceica Family as nominated above.

1.2 ENVIRONMENTAL ASPECTS

The Statement of Environmental Effects has therefore considered the following aspects:

- Noise emissions;
- Air emissions;
- Surface water run-off;
- Hazards and risks;
- Visual Impacts;
- Waste generation;
- Traffic; and
- Previous site contamination issues.

Certain of these aspects are very minor.

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The proposed development would have ancillary activities such as use of a weighbridge. Wholesale sales is the main focus of the business. Future operation of a retail sales outlet in the area of the barn may be appropriate in the future and would be the subject of a separate development application.

Similarly the operations of a rural supplies business may be the subject of a future development application to Council. At present the focus is on the animal feed business.

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2. SITE DESCRIPTION

The subject site is known as Lot 33 – DP 258414, with street address 901 Mamre Rd, Kemps Creek. The site area is 13.66 hectares. The location of the site is shown in Figure 2-1.

Figure 2-1: Site Location



Source: NSW Dept of Lands SIX maps

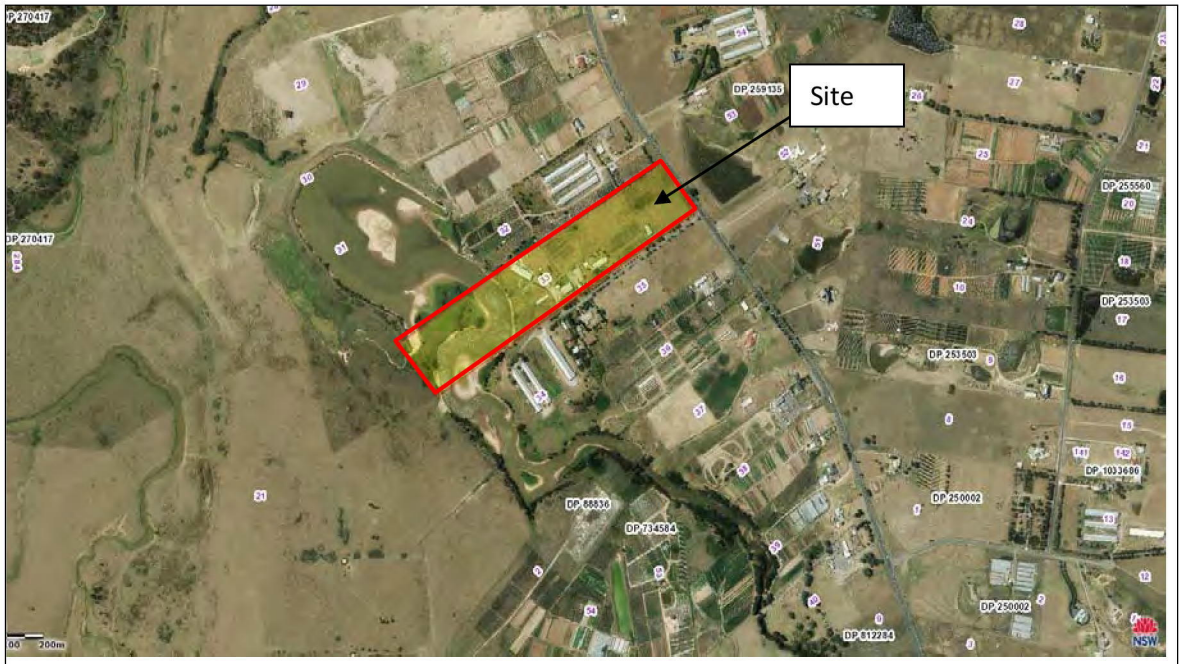
↑N Not to scale	LEGEND: Site border	Benbow Environmental 13 Daking Street, North Parramatta NSW 2151

The land is generally described as cleared and flat rural land but with internal roads and drainage installed. The internal roadways have been extended for private usage and currently do not have access to Mamre Road. The natural contours of the site and an overland flow path directs surface water from the north-east towards the south-west. The land adjoins existing rural lands.

The land holding includes an existing residence and several rural sheds. An aerial photograph of the site is shown in Figure 2-2.

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Figure 2-2: Aerial Photo



Source: NSW Dept of Lands SIX maps

N Not to scale	LEGEND: Site border	Benbow Environmental 13 Daking Street, North Parramatta NSW 2151

Figure 2-3 shows a survey plan of the site. This shows the presence of the residence and sheds. It shows the overland flow path that services the spillway of a farm dam on the far side of Mamre Road and directs flow across the subject, eventually dispersing to Kemps Creek at the south-west of the subject site. This existing flow pattern will not be affected by the proposed works.

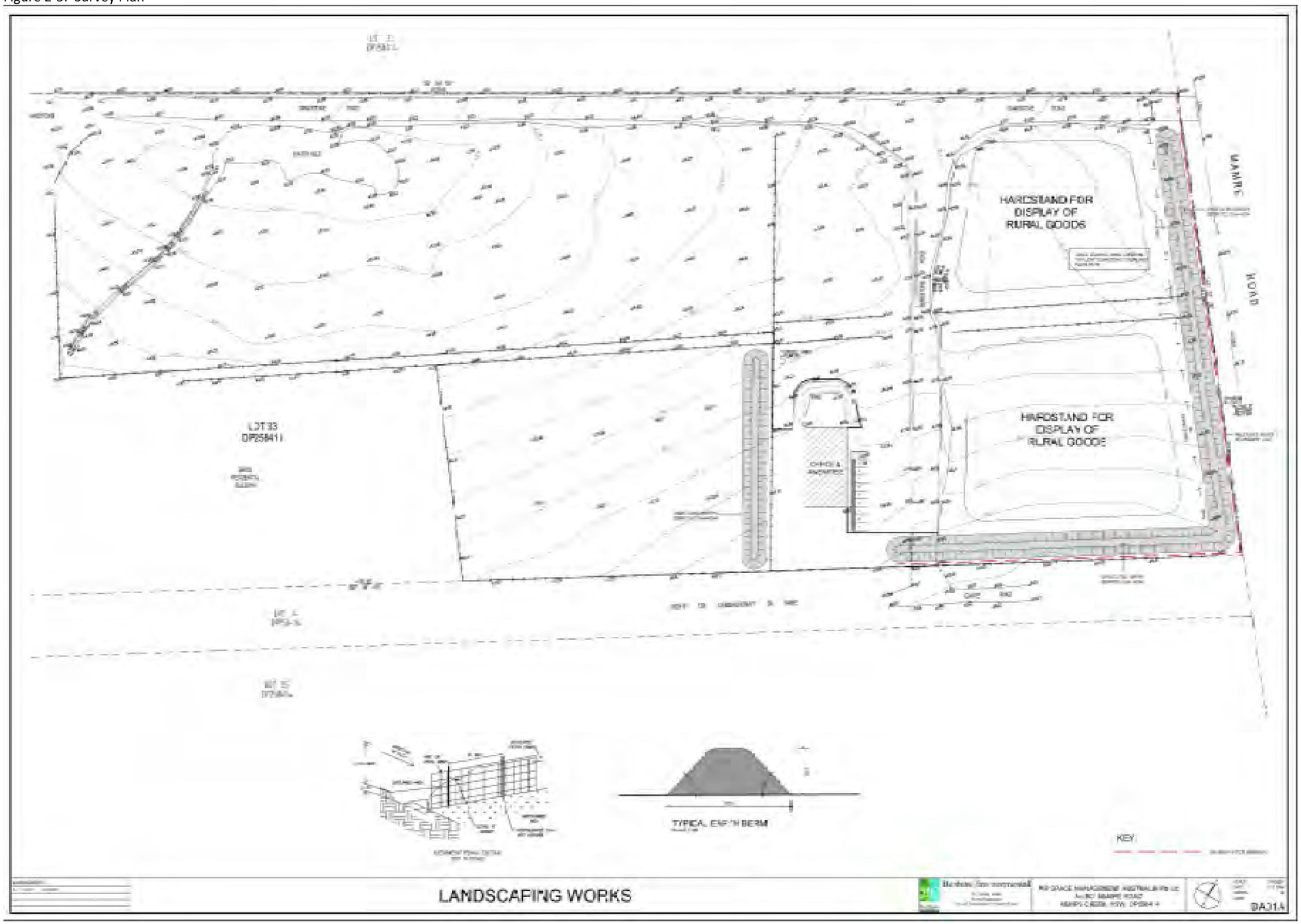
The plan shows the proposed location of the vegetated earth berm. Existing water flow through the berm would be engineered. The plan also shows the individual private roadways that have been constructed due to the restriction on use of the site due to the site being partly used to facilitate the passage of water from Mamre Road across the site.

A hardstand area is proposed to be constructed for the future use of the site for farm-related machinery. This area would also be used for a future rural supplies business. This business would initially specialise in road-making materials and general farm construction materials eg. sand, composts, land enhancement materials, lines suited for use in road making or drainage. Quantity stored would vary significantly from time to time but may reach 5000 tonne on the hardstand area.

Figure 2-4 shows the proposed sheds on the site plan.

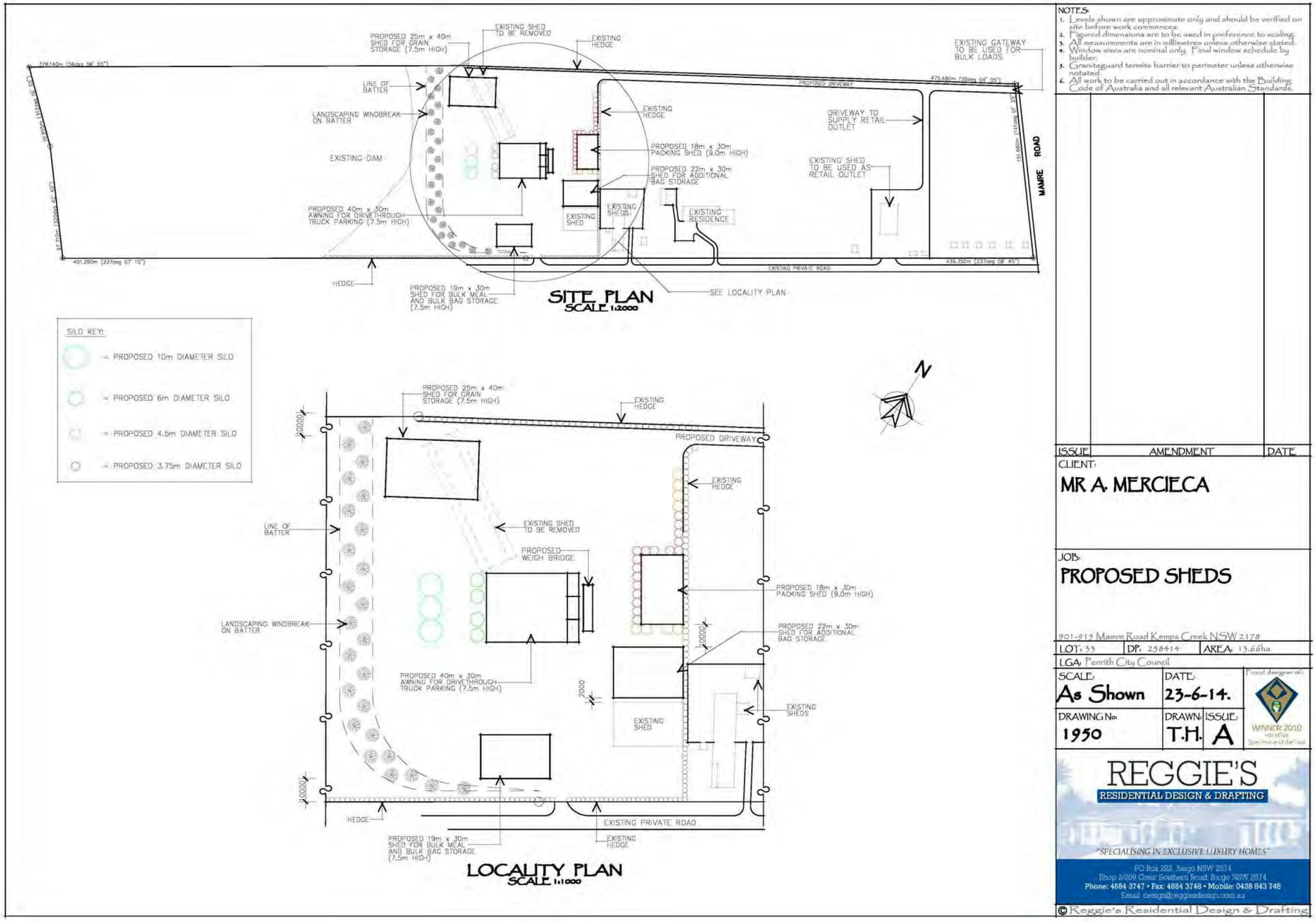
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Figure 2-3: Survey Plan



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Figure 2-4: Site Plan



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3. STATUTORY PLANNING REQUIREMENTS

This section assesses the relevant planning requirements of the subject land.

3.1 PENRITH CITY COUNCIL

The relevant Penrith City Council planning documents are described hereunder.

3.1.1 Penrith City Council LEP 2010

The land is zoned part RU2 Rural Landscape and part E2 Environmental Conservation in **Penrith Local Environment Plan 2010 (PLEP2010)**. The section of the land where the proposed activity is to occur is entirely within the RU2 zone. The zone allows for the following activities:

Zone RU2 Rural Landscape

1 Objectives of zone

- *To encourage sustainable primary industry production by maintaining and enhancing the natural resource base.*
- *To maintain the rural landscape character of the land.*
- *To provide for a range of compatible land uses, including extensive agriculture.*
- *To minimise conflict between land uses within the zone and land uses within adjoining zones.*
- *To preserve and improve natural resources through appropriate land management practices.*
- *To ensure development is compatible with the environmental capabilities of the land and does not unreasonably increase the demand for public services or public facilities.*

2 Permitted without consent

Extensive agriculture; Home occupations

3 Permitted with consent

Agricultural produce industries; Agriculture; Animal boarding or training establishments; Building identification signs; Business identification signs; Cellar door premises; Cemeteries; Community facilities; Crematoria; Dual occupancies; Dwelling houses; Environmental facilities; Environmental protection works; Farm buildings; Flood mitigation works; Forestry; Funeral homes; Helipads; Home-based child care; Home businesses; Home industries; Information and education facilities; Places of public worship; Public administration buildings; Recreation areas; Recreation facilities (outdoor); Roads; Roadside stalls; Rural supplies; Schools; Secondary dwellings; Stock and sale yards; Tourist and visitor accommodation; Veterinary hospitals

4 Prohibited

Hotel or motel accommodation; Serviced apartments; Any other development not specified in item 2 or 3

The proposal is for the installation of hardstand to rural land, and the erection of earth berms as landscaping. The proposal is an allowable activity and thus permissible with Consent. The following definition is relevant:

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> ***agricultural produce industry*** *means a building or place used for the handling, treating, processing or packing, for commercial purposes, of produce from agriculture (including dairy products, seeds, fruit, vegetables or other plant material), and includes wineries, flour mills, cotton seed oil plants, cotton gins, feed mills, cheese and butter factories, and juicing or canning plants, but does not include a livestock processing industry.*

The land is rural land; the application does not include any activity to be conducted upon the land except for that as described in this document.

The land is also mapped for *Scenic Character and Landscape Values*. This is in the following terms:

> ***6.5 Protection of scenic character and landscape values***
>
> *(1) The objectives of this clause are as follows:*
>
> *(a) to identify areas that have particular scenic value either from major roads, identified heritage items or other public places,*
> *(b) to ensure development in these areas is located and designed to minimise its visual impact.*
> *(2) This clause applies to land identified as "Land with scenic and landscape values" on the Scenic and Landscape Values Map.*
> *(3) Development consent must not be granted for any development on land to which this clause applies unless the consent authority is satisfied that measures will be taken, including in relation to the location and design of the proposed development, to minimise the visual impact of the development from major roads, identified heritage items and other public places.*

A land zoning map is provided as Figure 3-1 showing the land zonings on the subject site.

The site has previously been used for primary production and activities related to agriculture.

The land along both sides of Mamre Road is varying in use as there are structural changes to the type of land use that the community requires.

Immediately adjacent to the site the land use remains predominantly agricultural in nature with poultry and shed farms nearest to the site and also bordering the natural water body.

Further along Mamre Road and predominantly on the western side, there are numerous activities which now the communities needs and the proposed development is considered to be in harmony with these uses which are not rural in nature but are related to the agricultural industries of this area.

The proposed uses as defined in this Statement of Environmental Effects are therefore in keeping with the other forms of land uses as related to agriculture and the accompanying visual changes that result.

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Figure 3-1: Land Zoning Map



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3.1.2 Penrith Development Control Plan (2014)

The subject site is affected by the provisions of Penrith Development Control Plan (DCP) 2014. The DCP is made up of six (6) parts, A – F:

- Part A – Introduction;
- Part B – Principles;
- Part C – City Wide Controls;
- Part D – Land Use Controls;
- Part E – Key Precincts; and
- Part F – Other Relevant Information.

The DCP principles are:

> *Principle 1: Provide a long term vision for cities, based on sustainability; intergenerational, social, economic and political equity; and their individuality.*
>
> *Principle 2: Achieve long term economic and social security.*
>
> *Principle 3: Recognise the intrinsic value of biodiversity and natural ecosystems, and protect and restore them.*
>
> *Principle 4: Enable communities to minimise their ecological footprint.*
>
> *Principle 5: Build on the characteristics of ecosystems in the development and nurturing of healthy and sustainable cities.*
>
> *Principle 6: Recognise and build on the distinctive characteristics of cities, including their human and cultural values, history and natural systems.*
>
> *Principle 7: Empower people and foster participation.*
>
> *Principle 8: Expand and enable cooperative networks to work towards a common, sustainable future.*
>
> *Principle 9: Promote sustainable production and consumption, through appropriate use of environmentally sound technologies and effective demand management.*
>
> *Principle 10: Enable continual improvement, based on accountability, transparency and good governance.*

The proposed development supports the above principles.

The following table addresses applicable items from Part C – City wide controls and Part D1 – Rural Land Uses.

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Table 3-1: Requirements of the Penrith DCP

Requirement	Comments
C1 Site Planning and Design Principles	
1.1.1 Site Analysis	Site plans and drawings have been provided as part of the Development Application.
1.1.2 Key Areas with Scenic and Landscape Values	The land is within an area with scenic and landscape values. Visual amenity is addressed in Section 5.6.
1.2.1 Application of certification system	Not applicable.
1.2.2 Built form – energy efficiency and conservation	Not applicable – the building already exists on site.
1.2.3 Building form – height, bulk and scale	The proposed buildings are of a size comparable to rural sheds.
1.2.4 Responding to the Site's Topography and Landform	The site is already developed and ready for use.
1.2.5 Safety and Security	The proponent would ensure that appropriate external lighting and fencing is provided.
1.2.6 Maximising Access and Adaptability	Refer to Traffic report.
C2 Vegetation Management	
2.1 Preservation of Trees and Vegetation	Shown on the site plan.
2.2 Biodiversity Corridors and Areas of Remnant Indigenous Vegetation in Non-Urban Areas	The land is not natural resources sensitive land.
2.3 Bushfire Management	The land is shown as Vegetation Category 2 on the Penrith bushfire prone land map. There is no immediate bushland adjacent to the developed area of the site.

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Table 3-1: Requirements of the Penrith DCP

Requirement	Comments
C3 Water Management 3.1 The Water Cycle/Water Conservation 3.2 Catchment Management and Water Quality 3.3 Watercourses, Wetlands and Riparian Corridors 3.4 Groundwater 3.5 Flood Planning 3.6 Stormwater management and drainage 3.7 Water retention basins and dams 3.8 Rainwater storage tanks	Water management including water use, conservation, quality, nearest waterways, groundwater, flood planning, stormwater management and drainage and rainwater tanks are addressed in the SWMP in Section 5.4.
C4 Land Management 4.1 Site Stability and Earthworks 4.2 Landfill 4.3 Erosion and Sedimentation 4.4 Contaminated Lands 4.5 Salinity	Minor earthworks may be required.
C5 Waste Management 5.1 Waste Management Plans 5.2 General Controls 5.3 Development Specific Controls 5.4 Hazardous Waste Management 5.5 On-site Sewage Management	Refer to Section 4.2 The majority of waste generated from the operations would be recyclable.
C6 Landscape Design	Proposed landscaping is identified on the Site Plans.

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Table 3-1: Requirements of the Penrith DCP

Requirement	Comments
C7 Culture and Heritage 7.1 European Heritage 7.2 Aboriginal Culture and Heritage 7.3 Significant Trees and Gardens	There are no items of culture or heritage at the site.
C8 Public Domain 8.1 Pedestrian Amenity 8.2 Street Furniture 8.3 Lighting 8.4 Outdoor Dining and Trading Areas 8.5 Public Art	 A high level of pedestrian activity is not expected. Not applicable. Lighting would be provided for security purposes. Not applicable. Not applicable.
C9 Advertising and Signage	Future application.
C10 Transport, Access and Parking 10.1 Transport and Land Use 10.2 Traffic Management and Safety 10.3 Key Transport Corridors 10.4 Roads 10.5 Parking, Access and Driveways 10.6 Pedestrian Connections 10.7 Bicycle Facilities	Details are provided in the Traffic Report.
C11 Subdivision	Not applicable.
C12 Noise and Vibration 12.1 Road Traffic Noise 12.2 Rail Traffic Noise and Vibration 12.3 Air craft Noise 12.4 Industrial and Commercial Development 12.5 Rural Development 12.6 Open Air Entertainment 12.7 Vibration and Blasting	 Clauses 12.1 and 12.5 apply. Requirements are addressed in Section 5.1 and the attached Noise Impact Assessment.

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Table 3-1: Requirements of the Penrith DCP

Requirement	Comments
C13 Infrastructure and Services	Addressed in Section 4.
D1 Rural Land Uses	
1.1 Rural Character	Visual amenity is addressed in Section 5.6.
1.2 Rural Dwellings and Outbuildings	Buildings associated with the proposal are in line with the rural character of the area.
1.3 Farm Buildings	Not applicable.
1.4 Agricultural Development	Not applicable.
1.5 Non-agricultural development	Not applicable.

The proposed development complies with the listed requirements in Penrith DCP.

3.2 STATE AND REGIONAL ENVIRONMENTAL PLANNING POLICIES

The following State Environmental Planning Policies (SEPP) have been examined:

- SEPP (Infrastructure) 2007;
- SEPP no. 33 – Hazardous and Offensive Development;
- SEPP no. 55 – Remediation of Land;
- SREP No. 20 – Sydney Regional Environmental Plan No. 20 Hawkesbury Nepean River; and
- North West Subregion Draft Subregional Strategy.

3.2.1 State Environmental Planning Policy (Infrastructure) 2007

The facility is permissible under the provisions of SEPP (Infrastructure) 2007, however, there are no specific planning provisions for the proposed development.

3.2.2 State Environmental Planning Policy No. 33 – Hazardous and Offensive Development

Pursuant to Clause 3 of State Environmental Planning Policy No. 33 (SEPP 33) 'potentially hazardous industry' is defined as follows:

> *"potentially hazardous industry" means a development for the purposes of any industry which, if the development were to operate without employing any measures (including, for example, isolation from existing or likely future development on other land) to reduce or minimise its impact in the locality or on the existing or likely future development on other land, would pose a significant risk in relation to the locality:*
>
> *(a) to human health, life or property; or*
> *(b) to the biophysical environment,*

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and includes a hazardous industry and a hazardous storage establishment."

Hazardous storage establishment is defined at Clause 4 of SEPP 33 as follows:

"hazardous storage establishment" means any establishment where goods, materials or products are stored which, when in operation and when all measures proposed to reduce or minimise its impact on the locality have been employed (including, for example, measures to isolate the establishment from existing or likely future development on the other land in the locality), would pose a significant risk in relation to the locality.

(a) to human health, life or property; or
(b) to the biophysical environment."

The proposed operation involves an animal feed business. Minor quantities of dangerous goods would be required including diesel and LPG cylinders. The proposal therefore does not fit the definition of "potentially hazardous industry" or "hazardous storage establishment" and SEPP 33 does not apply.

3.2.3 State Environmental Planning Policy No. 55 – Remediation of Land

The proposed development would involve construction or excavation works for two sediment control dams.

An environmental site assessment was previously conducted and is presented in Attachment 1.

3.2.4 Sydney Regional Environmental Plan No. 20 – Hawkesbury-Nepean River

The Sydney Regional Environmental Plan No. 20 (SREP 20) applies to the subject land. The following provides an assessment of the proposed development in accordance with SREP 20.

The aim of this plan is to protect the environment of the Hawkesbury-Nepean River system by ensuring that the impacts of future land uses are considered in a regional context.

Matters relating to surface water run-off and stormwater management have been considered in the assessment of the proposal as set out in the SEE.

3.3 PROTECTION OF THE ENVIRONMENT OPERATIONS ACT, 1997

Under the Protection of the Environment Operations Act, 1997, the proposed development would fall under the definition of:

(2) Agricultural processing, "general agricultural processing", meaning the processing of agricultural produce (otherwise than as part of the manufacture of beer, wine, spirits, vinegar, acetic acid or similar products), but excluding:

a) dairy processing and grape processing; and
b) the processing of agricultural produce by means of mobile processing operations

***'Agricultural produce'** includes seeds, fruit, vegetables and other plant material, but excludes dairy produce and grapes.*

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'Process' *includes crush, juice, grind, gin, mill, separate, wash, sort, coat, roll, press, steam, flake, comb, homogenise and pasteurise.*

In this case, the proposed activities would **not** exceed the thresholds of Schedule 1 of the POEO Act for the capacity to process more than 30,000 tonnes of agricultural produce per year.

Therefore based on the estimated maximum tonnage processed per year, the facility does not require an Environment Protection Licence from the NSW EPA.

3.4 ENVIRONMENT PROTECTION AUTHORITY

Since the material used for the berms is to meet the Classification Guidelines as Virgin Excavated Natural Material (VENM) and/or Excavated Natural Material (ENM), there are no other relevant EPA statutory requirements.

A site layout and drawings of the sheds follow.

3.5 ENVIRONMENTAL PLANNING AND ASSESSMENT ACT, 1979

The proposed development does not trigger any definitions to be considered as designated development in any relevant planning instruments pursuant to Section 77A of the Act. Nor does the proposed development trigger integrated development pursuant to Section 91 under the Environmental Planning and Assessment Act, 1979.

The following section provides an assessment of the proposed development in accordance with the provisions of Section 79C of the Environmental Planning and Assessment (Amendment) Act, 1979.

3.5.1 Section 79C (1) – Matters for Consideration

In determining a development application a consent authority is to take into consideration such of the following matters as are relevant to the development, the subject of the development application.

(a) The provisions of:

(i) Any environmental planning instrument

The Penrith Local Environmental Plan (PLEP) 2010 applies to the subject land. The subject land is zoned part RU2 Rural Landscape and part E2 Environmental Conservation. The section of the land where the proposed activity is to occur is entirely within the RU2 zone. Under the provisions of this zone the proposed use is permissible with the consent of Council.

(ii) Any draft environmental planning instruments that have been placed on public exhibition.

None at this stage.

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(iii) Any Development Control Plans

The proposed use has been assessed in accordance with the Penrith DCP 2014, however this DCP has limited application to rural land uses.

(iv) Any matters prescribed by the regulations.

None at this stage.

(b) The likely impact of the development including environmental impacts in both the natural and built environment and social and economic impacts in the locality.

- Context and Setting.
  The proposed use will complement the development and strengthen the overall economic development of the area.

- Potential Impact on Adjoining Properties.
  There will be no negative impact on the adjoining or surrounding industrial developments.

- Access, Transport and Traffic.
  The development will be a low traffic generator and will have an acceptable traffic impact. A BAR right turn treatment at the new heavy vehicle access point and its separation from light vehicle traffic will ensure safe and efficient operation. The internal traffic design and parking is well designed and fully in accordance with standard requirements.

- Public Domain.
  The proposed use will have a positive contribution to the public domain.

- Utilities.
  The existing utilities have been or are being provided to service the proposed development.

- Heritage.
  There are no heritage issues.

- Other Land Resources.
  The proposed development will utilise the valuable rural land.

- Critical Habitat.
  The land does not include or comprise critical habitat.

- Air and Microclimate.
  There are no air or microclimate issues.

- Waste.
  Minor waste would be generated.

- Energy.
  The proposed operation would not involve energy intensive activities therefore there are no energy issues.

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- Noise.
  Noise has been addressed in Section 5. No adverse degradation to the existing acoustic environment would be likely. No significant increase to the existing ambient noise levels at the considered nearest residential receivers is expected.

- Natural Hazards.
  There are no acknowledged natural hazards.

- Social Impact in the Locality.
  There are no negative social impacts.

- Economic Impact in the Locality.
  The proposed use will contribute to the economic development of Kemps Creek.

- Site Design and Building Form.
  The existing building design and form will not be altered.

- Construction.
  Construction works are proposed as part of this development application. The works are described in summary in Section 4

- Cumulative Impacts.
  There are no cumulative impact issues.

(c) The suitability of the site for the development.

The proposed development is appropriate for this site. The objectives of the zone RU2 have been satisfied.

(d) Any submissions made in accordance with the Act.

No submissions at this stage.

(e) The public interest.

There are no aspects of the proposed use that would be contrary to the public interest.

3.6 CONCLUDING SUMMARY

The planning report and supporting documents for the proposed use of 901 Mamre Road, Kemps Creek as an animal food production business is a permissible use subject to Council's approval.

In summary:

- The proposed development has been assessed in accordance with the matters for consideration within Section 79C of the Environmental Planning and Assessment Act 1979.
- The proposed use is permissible with consent pursuant to the provisions of RU2 – Rural Landscape Zoning and is consistent with the zone objectives in the Penrith Local Environmental Plan 2010.

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- The detailed site plans and supporting documents and reports justify Council approval of the proposed development.
- A number of environmental safeguards would be implemented at the site to prevent cumulative effects especially on the quality of our waterways. These safeguards are best practice and are recommended for this site.

Having regard to the contents of the report and the conclusions reached, the proposed use is recommended for approval subject to conditions by Council.

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4. DESCRIPTION OF PROPOSED OPERATIONS

This section of the Statement of Environmental Effects details the nature of the proposed operations.

The following provides a Summary and then further detail is discussed.

4.1 SITE OPERATIONS IN SUMMARY

The site would retain its agricultural appearance in the front half with the proposed changes being very minor.

The rear half would provide the most suitable location for the animal feed business which is currently in a residential zoned area only a few kilometres from the proposed site. The current site has suburban residential development nearby and it is time for the animal feed business to be relocated.

4.1.1 Nature of the Activities

The operation of an animal feed production, storage and sales business consists of activities that are not in conflict with adjoining landholders or the environment protection zone that exists at the far western end of the site.

Animal feed consist of bringing to the site seed products. These may consist of a range of seeds such as wheat, barley, sorghum, corn and others.

The seeds are brought into the site in a range of truck types from rigid axle to semi-articulated types. The trucks would pass over a weighbridge and park, waiting for instruction to empty their load.

The seed are emptied from the trucks into hoppers which in turn auger the seed up into a series of silos.

Each silo is sealed against entry of weather, vermin and spillage of product as seeds are a valuable resource.

As the silos are being filled, any dust generated from the surfaces of the seeds is drawn into a reverse pulse dust collector and removed from the air.

The seeds are able to be unloaded from the silos using augers such that a variety of seed are able to be blended. The mixture of various combinations of seeds is augered into the processing shed onto mechanical screens. This ensures husks are removed off the seeds. A hammer mill and roller mills then size reduce the seed essentially cracking it into smaller pieces.

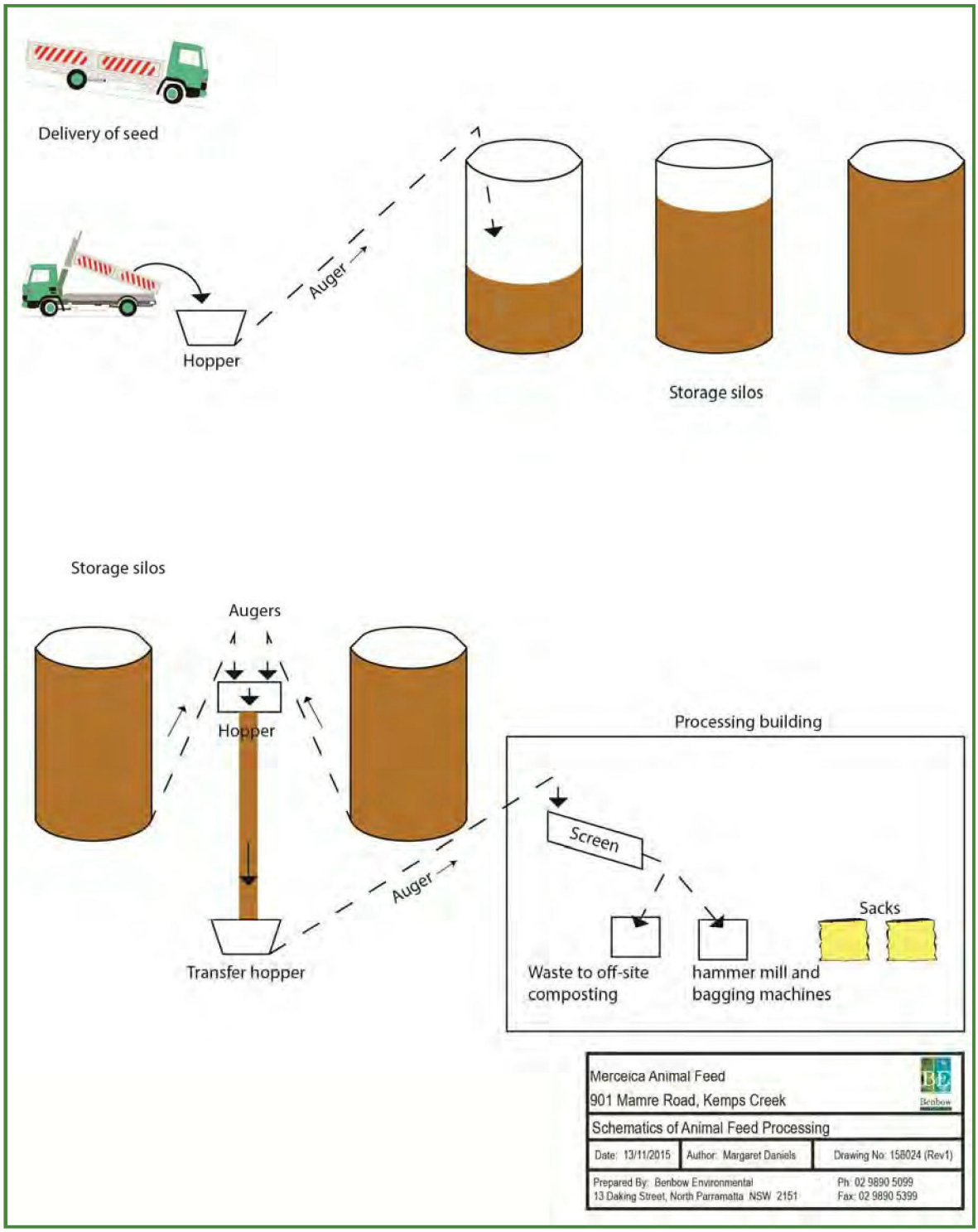
The flow of seeds pass down into a packing bagging machine. These are pre-printed and the finished product are then placed onto pallets and transferred by forklift to a storage area within the processing shed.

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An alternative to the produce coming from the bagging machine is the transfer of seeds to bulka bags which can then be loaded onto track bodies for delivery in bulk. Bulk material is also unloaded directly from stockpiles in sheds into truck bodies using a small front end loader. The trucks delivering bulk materials are reweighted over the weighbridge and use the internal roadway system to depart the site.

The following schematic illustrates how the plant operates.

Figure 4-1: Schematic plant operation



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A site layout and drawings of the sheds follow.

Annual production varies between 20,000–29,000 tonnes depending on conditions within the agricultural industries that purchase the produce.

Besides sacks (bags of 20–25 kg) being filled, bulka bags that can hold 1000 kg are also used. Bulk material that is sold to wholesalers in bulk would most often be stored in stockpiles within the shed shown rather than being loaded out using an auger unless it is a specialty seed product.

The silos are of 100 tonne capacity. Corn may be stored in 1800 T stockpiles; wheat in 500 T stockpiles.

Hours of operation are typically:

Monday–Friday:	7.00 am–5.00 pm
Saturday	7.00 am–3.00 pm

The dust extractor would usually operate to 4.30 pm during the week and til 1.00 pm on Saturdays. There would be no production on Sundays or public holidays.

The auger conveyors need to transfer seed are called floveyors. These run full time during working hours and noise levels have been measured on the existing site. There are several screening machines. There would be three TQL2 200 X 100 separators and two TQL2 150 X 100 grain separators. Above the bagging bin is a cyclone that removes unwanted material that is sent to an offsite composter. No water is needed in the process.

4.2 WASTE GENERATION

As would be expected there is minimal wastage. There is organic material such as husks removed during the hammer or roller milling process and the screening process.

These materials are light in weight and are easily captured in a cyclone and able to be transferred into a bag fitted to the bottom of the cyclone. This bag is sealed so it is not a source of dust release. The dust collector external to the building also operates with a sealed bag. The collected material is used by composters.

Truck servicing in a workshop on site would generate ~1000L of sump oil a year. This is stored in 205L steel drums sitting on a bunded pallet. This oil is removed by an oil recycler on a needs basis e.g. six monthly.

Office paper and cardboard is separated for offsite recycling – approximately 5 tonne maximum over a year and removed monthly.

Minimal domestic type waste is generated.

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4.3 SERVICES

Power and mains water are on site. Toilet facilities and washroom will need to be installed.

A rainwater tank would be installed to provide the water that is needed.

4.4 WORKSHOP FACILITIES

The existing site of the animal feed business has workshop facilities for truck maintenance. It is proposed that this type of facility also be established at the proposed site.

The workshop would have concrete floors and drain to a sump (s) within the workshop.

Any truck cleaning would take place within the workshop and wash water would be recaptured and be recycled. An oil-water separator would be needed to remove surface oil and sludge from the wash water. This separator and the cleaned water tank would be located within the workshop and within a bunded area.

Waste oil would be stored in 205L steel drums held on a bunded pallet.

There would be no materials relating to the workshop and truck cleaning located outside the workshop building.

4.5 SITE PLANS

A set of site plans are provided.

An overall site layout Drawing No. 1950 Issue A dated 23.6.14 (Figure 2-4) shows the following:

- The location of the existing barn near the front of the site. The barn has a note "existing shed to be used as retail outlet". This would have limited usage for retail customers, the majority would be wholesalers picking up smaller quantities in bags and sacks.

- The proposed driveway along the northern site boundary and a driveway across to the existing shed (barn) discussed above.

  These driveways have been constructed using glass fines that are exempted from waste regulations. This has occurred as the site was inoperable with water entering off Mamre Road.

- The existing residence and existing sheds associated with the residence are shown.

  The existing private road along the southern boundary is shown. This would not be used for the proposed business.

  The rear half of the site would be used for the animal feed business.

  On this plan is a larger plan view of this rear half – refer to locality plan.

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The locality plan shows the following:

- Shed 1.
  - This would be used to store bulk bags and sacks of finished product;

- Shed 2 alongside an existing shed.
  - This would also be used for this same purpose.

- Shed 3.
  - This shed is called the "packing shed" on this plan
  - In this report it is described as the processing shed.
  - There are storage silos shown around this shed.

- Shed 4.
  - This would be used for stock piles of grain.
  - Near to where this shed would be, an old existing shed is located which would be demolished.
  - There is no asbestos cement in this shed, wall and roof materials are steel cladding.
  - The materials that make up the shed would all be recycled off site.

- Shed 5.
  - This is more an awning for truck parking.
  - Maintenance of trucks would occur in the middle of this shed.
  - The eastern end of this shed would house the following ancillary facilities:
    - Reception, offices and tea room;
    - Product laboratory;
    - Storage associated with the office and laboratory;
    - Lunch room; and
    - Further amenities.
  - Adjacent to this shed, eastern side, would be the weighbridge.

For visual enhancement of the site extensive planting of hedges would occur as shown:

- Along the northern and southern boundaries;
- Across the eastern boundary of the animal feed business near sheds 2 and 3;
- Across the rear of the barn, an earth berm 2.5m high would be formed and this would be vegetated; and
- Clumping vegetation would be placed near the front of the site - adjoining Mamre Road – to provide beautification of the site.

This is in keeping with the proprietors' objective of enhancing the presentation of the site.

This accords with Council's desires and follows the same approach adopted by many other local Council's in Western Sydney so that commercial/agricultural activities enhance rather than detract from the appearance of their Council areas. This is strongly supported.

Construction activities would consist of the following:

- Preparation of hardstand areas;
- Preparation of the floors of the sheds;
- Install footings for the sheds and silos (if needed);

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- Erect the sheds; and install the silos, augers, floveyors and seed processing equipment and bagging plant; and
- Construction of sedimentation ponds (dams). There are two such dams required and these are discussed in Section 5 of the report where details of their function, design and need is explained. Construction of these will require excavation and formation of the walls for the eastern and western sedimentation dams.

The size of the two dams are also shown. Construction would firstly involve having designs of the dam walls prepared at construction certificate stage.

The construction would involve excavation and using the excavated material, if suitable, for the walls.

A construction environmental management plan would be prepared to ensure during construction that no environmental damage was caused.

4.5.1 Description of Shed Plans

Plans of each shed and elevation are provided.

Shed 1	Drawings	1950-1	Plan
		1950-2a	Elevations
		1950-2b	Elevations
Shed 2	Drawings	1950-3	Plan
		1950-4a	Elevations
		1950-4b	Elevations
Shed 3	Drawings	1950-5	Plan
		1950-6a	Elevations
		1950-6b	Elevations
Shed 4	Drawings	1950-7	Plan
		1950-8a	Elevations
		1950-8b	Elevations
Shed 5	Drawings	1950-9	Plan
		1950-10	Elevations

4.6 CHEMICAL USAGE

An animal feed business has very limited use of chemicals.

There would be lubricating oils and grease on site. There would be no fuel storage for trucks. Up to 4 X 205L steel drums of diesel and a 5,000L aboveground bunded and roofed steel tank may be on site for fuel usage for the front end loader.

The forklift would be LPG fuelled hence 4 forklift truck size LPG cylinders, 45kg, may be on site in the large awning shed in a cage.

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There is use of tablets of a pesticide added to the silos. This is Phostoxin. It is locked in a storeroom until needed. It is only used to fumigate grain that has weevil infestation so it is not in routine use.

It is used by placing 1 to 2 tablets per cubic metre in the top of the silo where the weevil infestation is known to exist. The lid of the silo is put in place after the tablets are added and the silo remains undisturbed for a minimum of 5 days.

This activity has been assessed in the Air Quality Impact Assessment.

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5. ENVIRONMENTAL ASPECTS

The following environmental aspects of the proposed development have been assessed:

- Noise emissions;
- Air emissions;
- Traffic;
- Surface water run-off;
- Hazards and risks;
- Visual Impacts; and
- Previous site contamination issues.

Chemical usage and waste generation were addressed in the previous section.

An assessment of these aspects are provided in the sub-sections that follow and in detailed reports provided in the Attachments.

5.1 NOISE EMISSIONS

A noise impact assessment was undertaken by Benbow Environmental to determine the predicted noise impacts of the proposed site operations on nearest sensitive receptors and provide recommended noise control measures where deemed necessary. The noise impact assessment was prepared in accordance with the NSW *Environmental Protection Authority, Industrial Noise Policy (EPA 2000)*.

The main sources of noise from the proposed operations includes the delivery trucks delivering feed. Use of the roller mill, hammer mill and screening operations would also generate noise. Noise from these operations would be significantly shielded as they would be located within the proposed packing shed.

Predictive Noise Modelling was undertaken by using the predictive noise software SoundPLAN v7.3. A worst case scenario was modelled under neutral, high wind and temperature inversion weather conditions. Non-compliance with the noise criteria was predicted at 3 nearest sensitive receptors.

With the following noise control measures in place, compliance with noise criteria would be achieved at all the nearest residential receptors except at location R8, a poultry farm at 885-869 Mamre Rd, Kemps Creek:

- Construction of 4m high walls to the south-east and north-east of the truck unloading area. This would be adjacent to the proposed awning;
- Construction of an acoustic screen around the dust collector; and
- Construction of an acoustic enclosure around the blower area in order to reduce noise contribution from blower and pipeline by 15dB.

At this location the main noise contribution is from trucks accessing and leaving the site. It has to be noted that at location R8 currently a poultry farm is present. At this location truck movements associated with feed delivery and bird pickup would occur.

In the absence of trucks driving along the access road over a 15 minute period the noise level associated with the proposed operations was predicted to be equal to 36 dB(A) under adverse

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weather conditions and 34dB(A) under neutral weather conditions. This would comply with the noise criteria.

No increase in existing road traffic noise levels is expected as a result of the proposed operations.

The full report is provided in Attachment 2.

5.2 AIR EMISSIONS

An air quality impact assessment provided in Attachment 3 was undertaken by Benbow Environmental to assess the air emissions from the proposed operation of the animal food production facility. The assessment was undertaken in accordance with the NSW EPA guidelines "Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales". Air emission impacts were quantified using the NSW EPA approved dispersion model AERMOD to determine whether or not exceedances to health-impact derived assessment criteria would occur at potentially sensitive receivers, being residential premises, neighbouring facilities and Kemps Creek waterway. Conservative assumptions were utilised in the dispersion modelling inputs to ensure that worst-case impacts were simulated and evaluated.

The dispersion modelling undertaken has shown that no exceedances to the air quality criteria were predicted. The assessment concludes that the proposal meets the most relevant and applicable air assessment criteria in accordance with the NSW EPA guidelines and the Safe Work Australia exposure standards and is expected to not cause any impact or harm to any of the nearest potentially affected land uses, including waterways.

5.3 TRANSPORT ASSESSMENT

A traffic and parking impact assessment was undertaken by Transport and Urban Planning Pty Ltd in July 2015.

This is a summary of the report findings.

"*This report has examined a proposed wholesale and retail stock feed supply development on 901-915 Mamre Road, Kemps Creek, and has assessed the traffic and parking impacts, access arrangements and internal traffic design.*

In terms of overall traffic generation, the proposal is assessed as a low traffic generator. During peak hour of a typical busy day only two truck tips (1 in, 1 out) and 10 light vehicle trips (5 in, 5 out) will be generated.

The assessment of the traffic impact on Mamre Road is that a BAR right turn treatment should be provided for the heavy vehicle access driveway, and if so there will be a negligible impact on traffic flow on Mamre Road. It should also be noted that the traffic generated by the development is simply being relocated within the regional road network, as this is a business relocation rather than a new business.

The proposal includes a new separate heavy vehicle access to the site from Mamre Road, so that all heavy vehicle movements will be separated from public light vehicle movements. This will be a significant site safety benefit.

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The amount of on-site parking for retail sales, staff vehicles and trucks exceeds the peak business needs. Truck manoeuvring areas are generous and all vehicles using the site will be able to enter and leave in a forward direction. The proposed access and internal design will be fully in accordance with AS2890.1 and AS2890.2.

In conclusion, the development will be a low traffic generator and will have an acceptable traffic impact. A BAR right turn treatment at the new heavy vehicle access point and its separation from light vehicle traffic will ensure safe and efficient operation. The internal traffic design and parking is well designed and fully in accordance with standard requirements."

The full report is available in Attachment 4.

5.4 SITE WATER MANAGEMENT PLAN

A Stormwater Management Plan (SWMP)was prepared by National Integrated Creative Solutions and is provided below. The SWMP deals with Surface Water Runoff and is specifically focussed on ensuring adequate protection of the waterbody is achieved. There are no activities within 100m of the waterbody.

5.4.1 Introduction

This document and the accompanying drawings constitute a Site Water Management Plan for the site located at 901-915 Mamre Road, Kemps Creek, NSW and prepared in accordance with Landcom, 2004 (The "Blue Book") and DECC (2008).

This plan includes recommendations and strategies that should be implemented within the site to address the issues relating to site water management during both the establishment and operation phases. These include:

- Surface water management plan;
- Preliminary landscaping and vegetation plan;
- Erosion and Sediment Control Plan; and
- The following drawings:
  - NICS_1518002_FIG01;
  - NICS_1518002_FIG02; and
  - NICS_1518002_FIG03.

Based on inspections of the site under both dry and wet weather conditions, and the review of the site's topographical survey, it is clearly evident that the site could be divided into two (2) sub-catchments which will be called the **Eastern catchment** and the **Western catchment** for easier review of the information contained in this document.

The site has an existing natural water hole that receives water from most of the eastern catchment area of the site. This water hole does not have sufficient capacity to contain all the water flowing from the catchment that drains into it and as a result, it naturally overflows into the neighbouring property located north of the subject site.

Due to the fact that Olathree Pty Ltd (the site owners) are developing the site and as part of the Company's proactive initiatives in relation to achieving good environmental management outcomes on the site, it was considered appropriate to prepare a comprehensive site water management plan to ensure that the activities undertaken on site have minimal to nil impact on

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the receiving environment from a water perspective. Subsequently, it was determined that the best approach is to contain, divert and direct all stormwater runoff to the existing water hole (sedimentation pond) following refurbishment to meet current NSW related policies and guidelines as well as the need to construct a second sedimentation pond near the western end of the site (east of Kemps Creek) to capture stormwater runoff from the western catchment.

Based on the information available to NICS so far, it is anticipated that the eastern catchment would be considered as the clean area of the site since no processing or storage associated with the main activities would be undertaken within this catchment as it will mainly have roadways, landscaping and vegetation areas as well as display of samples of finished products. None of these activities is likely to cause stormwater runoff to be contaminated. Hence, it is anticipated that the quality of water in this catchment to be excellent and suitable for use in many areas on site in addition to the fact that, if for any reason, the water quality was compromised, the water could be easily treated within the sedimentation pond prior to being re-used.

However, the quality of the water in the western sedimentation pond would be unknown and depending on the activities undertaken outside the processing and storage buildings. The quality of this water would be determined following 2-4 rounds of water testing at the western sedimentation pond. This is one of the main reasons for designing and constructing the 2 sedimentation ponds so the quality of water could be easily monitored and, if necessary treated appropriately prior to being re-used on site or discharged off-site, if severe adverse weather conditions were present for extended periods of time which are outside the design criteria.

Under current conditions, this happens now since that is what naturally occurs and has been occurring naturally for thousands of years on this site and all other sites near waterways. Another reason for constructing the western sedimentation pond is to utilise some of the captured water on site for dust suppression, landscaping and vegetation purposes to reduce dependance on our very valuable potable water as it is promoted by all Government Departments in Australia whether they are at local, State or Federal level. Another reason is to reduce the flow and velocity of the stormwater runoff near the steep embankment at that section of the site to prevent or minimise potential erosion.

Both sedimentation ponds will be designed and constructed with a **“nil water discharge”** policy in mind.

As part of this SWMP, it was considered appropriate to include a section on erosion and sediment controls to ensure that the operators of the facility on that site are fully aware of their obligations to minimise their activities’ impact on the receiving environment under a wide range of meteorological conditions.

It was considered that this site will be used to demonstrate that activities could be undertaken with positive rather than negative impacts on the receiving environment by implementing simple principles as outlined in this document.

As an example, the roadway is not made of impervious materials such as concrete or asphalt but rather from mainly recovered glass sand and similar compatible materials. This will assist the stormwater runoff to filter through the materials and to reduce the velocity of stormwater runoff before either leaving the area and draining into the sedimentation ponds or being drained naturally. As a result, we will have a better quality of water to be re-used on site or being discharged naturally.

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A similar approach will be implemented for the carparks, the hardstands, diversion drains and dish-drains. Some of the same materials will also be considered for use in the construction of the sedimentation ponds as well.

In addition, we would implement the **"water sensitive urban design"** principle which seeks to imitate the natural water balance on site before the land is developed for its intended use. It slows stormwater runoff to gain natural filtration, on-site detention and infiltration as well as longer time for evapotranspiration. The final runoff water will eventually reach the waterways but only after it has been cleaned and filtered by the soil (and recovered glass sand) and used by plants before it gets there.

One of the main objectives is to minimise impervious surfaces so that the least water flows off-site into the stormwater system or waterways. At the scale of this site, options such as permeable roads, driveways and hardstands must be optimised. Garden beds can be designed for infiltration. Lawns, swales and soak wells can detain stormwater and increase percolation into the soil.

Some of the environmental benefits as a result of implementing these measures include:

- Cleaner Kemps Creek and other downstream waterways;
- Reduced flooding on the site;
- Councils spending less money emptying stormwater traps/gross pollutant traps; and
- Much healthier environment for plants, birds and animals.

Other options that were considered are the use of mulching which has been proven to be one of the essential elements of water efficient outdoor areas. Mulching around plants saves water by preventing evaporation and reducing runoff. Mulching also limits weed growth and can improve soil conditions (depending of the type of mulch).

5.4.2 Project Information

5.4.2.1 Site description

A summary of site details are provided in Table 5-1

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Table 5-1 **-** Summary Site Details

Location	Lot 33 DP 258414 901-915 Mamre Road, Kemps Creek
Total Area	Approximately 13.5 hectares
Grid Reference (GDA – MGA56)	Mid site Easting: 294660 Northing: 6252164 Elevation: 45 m Zone: 56 At Mamre Road Easting: 294999 Northing: 6252383 Elevation: 50 m Zone: 56
Local Government Area	Penrith City Council
Existing Land Use	The environment of the site and surrounding properties is modified rural, consisting of grazing, poultry/duck farms, crops in hot house environments and some rural dwellings
Current Zoning	RU2 – Rural Landscape
Proposed Development	Rural Supplies activities
Total Site Dimensions	Eastern side = 152 m Western side – 169 m Northern side = 854 m Southern side = 841 Total area = 13.53 ha or 135300 m^2 Total perimeter = 2016 m
Site dimensions East of Kemps Creek	Eastern side = 152 m Western side = 198 m (Waterfront line) Northern side = 551 m Southern side = 622 m Area = 8.769 ha or 87690 m^2 Perimeter = 1523
Western Catchment Approximate Dimensions	Eastern side = 160 m Southern side = 237 m Western side = 198 m Northern side = 189 Approximate total Western catchment area = 29420 m^2 or 2.942 ha
Eastern Catchment Approximate Dimensions	Eastern side = 152 m Southern side = 385 m Western side = 160 m Northern side = 362 m Approximate total Eastern catchment area = 58266 m2 or 5.827 ha

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5.4.3 Objectives

The objectives for water management within the site are:

- to minimise the erosion and sedimentation of undisturbed areas, watercourses and water bodies;
- to protect Kemps Creek;
- to minimise the loss of topsoil from areas disturbed by site preparation activities and normal operations, where applicable; and
- to protect surface (and groundwater) quality and comply with statutory requirements and conditions.

5.4.4 Management Criteria and Guidelines

5.4.4.1 Surface Water

Baseline water samples should be collected at two locations (eastern and western sedimentation ponds) and water samples sent to a registered laboratory for analysis. Table 4.1 outlines the parameters/analytes that should be considered for testing the samples, which will be used as a benchmark for comparison for future water testing.

Table 5-2: Baseline Surface Water Quality Testing Parameters

Parameter
Oil & Grease
pH
EC
TSS
N
P

5.4.4.2 Erosion and Sediment Control

All sediment and erosion control devices have been designed and constructed in accordance with the guidelines *Managing Urban Stormwater: Soil and Construction* (NSW Department of Housing 1998, Landcom 2004 and DECC 2008) for a 90th percentile five-day rainfall interval as a conservative approach.

The Erosion and Sediment Control Plan prepared specifically for this site sets out the erosion and sediment control measures to be implemented across the site and their design specifications.

5.4.5 Management Safeguards and Ameliorative Actions

5.4.5.1 Surface Water

- Impervious bund(s) will be installed around areas in which fuels, oils and chemicals are stored;
- Maintenance on mobile plant and equipment will be conducted within a bunded area, unless it is undertaken within the building;

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- A wastewater treatment facility will be installed with oil separator and sediment trap to treat the drainage from any hardstand, vehicle servicing and workshop areas); and
- Stormwater will be diverted away from disturbed land surfaces. All diversion banks, channels and points of discharge will be constructed or stabilised so as to minimise erosion and scouring.

5.4.5.2 Erosion and Sediment Control

The following management safeguards and ameliorative actions will be implemented across the various stages of the development:

- Sedimentation Ponds (also called Sediment Basins);
- Diversion Structures;
- Barrier Fencing and Restricted Areas;
- Sediment Fences;
- Stockpiles;
- Containment Bunds;
- Dust Suppression;
- Stable site access points are to be provided wherever construction vehicles enter and leave the work site from public roads. They should be constructed in accordance with Standard Drawing SD 6-14 or alternatively 'rumble grids' can be used;
- Safe parking areas for staff and visitor vehicles should be delineated at the discretion of the site manager;
- The site manager is to delineate an appropriate location for the site office or compound/s;
- Safe storage areas for wastes, fuels and other hazardous materials are to be delineated at the discretion of the site manager;
- Storage locations for erosion control materials are to be delineated at the discretion of the site manager; and
- Any waste materials must be removed away from any publically trafficked road surface as soon as possible.

Detailed requirements for each of the safeguards and ameliorative actions above are outlined in the SWMP, the associated drawings listed above and the Erosion and Sediment Control Plan.

5.4.6 Monitoring and Maintenance

5.4.6.1 Surface Water

Water sampling and testing is to be undertaken at the same locations as would initially be tested (at the sedimentation ponds once every year). The results are to be compared against the baseline results obtained in accordance with table 4.1. Any decline in water quality is to be investigated and appropriate remedial action taken if the cause is deemed to be a consequence of the normal operations on site.

5.4.6.2 Erosion and Sediment Control

Following the details provided in the SWMP, site monitoring and maintenance will be undertaken during and after all construction works are completed.

5.4.6.2.1 General

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- Any sediment accumulated in trapping devices is to be removed and deposited in a secure location where there is a low risk that it will be re-entrained in runoff; and
- Waste receptacles will be emptied as necessary. Disposal of waste will be in a manner approved by the site superintendent/manager and consistent with NSW regulatory requirements.

5.4.6.2.2 Sedimentation ponds (Sediment Basins)

- The sedimentation pond must be inspected weekly and any damaged or eroded areas repaired;
- Water from the sedimentation pond to be used for dust suppression and irrigation must not be used within riparian areas adjacent to the existing natural watercourse/creek. Note, that if this water is pumped into a tanker truck for later use, it cannot be discharged from the tanker into a creek without first being flocculated. However, it can be applied as a dust suppressant without flocculation;
- If water from the sedimentation pond is to be emptied into the natural water (creek/dam), flocculation of the water must first take place before directing it into the waterways (Section 7.12 provides detailed requirements for the flocculation of sedimentation ponds);
- When ponds are flocculated and the remaining water contains 50mg/L (i.e.50g per 1,000L) or less of suspended sediment, water can be pumped out into the existing creek/dam; and
- Water must be drained out of the sedimentation pond once every 12 months in order to inspect the level of remaining sediment. If sediment is above the design capacity (i.e. above the marked/pegged level), remove accumulated sediment and dispose of it in a secure location where there is a low risk that it will be re-entrained in runoff.

5.4.6.2.3 Self-Auditing Program

- A self-auditing program must be initiated for the site. The site manager is to inspect the site at least fortnightly and maintain a log of inspections, paying particular attention to:
- Removal of spilled materials from near riparian areas.
- Ensuring the stability of the sedimentation ponds.
- Ensuring barrier fencing is maintained and exclusion zones are being observed by all workers and contractors.
- Constructing additional erosion and/or sediment control works as might become necessary to ensure the desired water control is achieved.
- Maintaining erosion and sediment control measures in an efficiently functioning condition for the duration of the construction works and normal operations.
- Removal of trapped sediment and disposal to safe areas.
-
- Areas of localised soil erosion are to be identified and appropriate preventative measures implemented. These will include:
-
- Planting additional stabilising vegetation or wind breaks.
- Stabilising soils with mulches or alternative soil binders.
- Taking steps to minimise any concentrated stormwater flows.
-
- Any areas of localised poor drainage are to be identified and appropriate remedial action taken. This will include:

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- Installing formalised drainage channels or pipes.
- Improving soil permeability by cultivating the soil surface.
- Improving soil permeability by installing infiltration trenches.

5.4.7 Erosion and Sediment Control Plan

5.4.7.1 Erosion Hazard Assessment and RUSLE

5.4.7.1.1 Introduction

A major water quality issue from this development will be the risk of erosion on:
- The embankment;
- stockpiles; and
- road/hardstand surfaces.

Proper erosion and sediment control management must occur to minimise the risk of sediments and their associated nutrients entering receiving waters.

5.4.7.1.2 Area of Disturbance and Staging

Construction work stages are broken down into two separate stages. The first stage is the construction of the access road, car parking area and hardstand (Stage 1) and the second stage is the construction of the plant which includes sheds, amenities, etc… (Stage 2).

The topsoil has already been removed over the entire area where construction activities are likely to be undertaken, therefore for erosion and sediment control purposes the disturbed areas will be considered throughout the duration of the whole site preparation and operation.

It must also be noted that during the normal operation stage, disturbances will still occur on the unsealed access road due to vehicle movements. These disturbance however, will only result in minimal amounts of sediment laden runoff and, providing the erosion and sediment control measures and structures specified for the access road construction stage (Stage 1), in conjunction with road dust suppression are still implemented and maintained for the duration of the plant operations, the risk of sediments entering waterways will be kept to a minimum.

5.4.7.1.3 Revised Universal Soil Loss Equation (RUSLE)

The Revised Universal Soil Loss Equation (RUSLE) in Landcom (2004) is used to predict the long term, average soil loss and the soil loss class from sheet and rill flow over the development site.

The RUSLE formula is: A = R x K x LS x P x C (Tonnes /ha/year), where

A = computed soil loss
R = rainfall erosivity factor
K = soil erodibility factor
LS = slope length/gradient factor
P = erosion control practice factor
C = ground cover and management factor

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Rainfall erosivity obtained from Map 10 for Sydney provides R-factor = 2500 for Kemps Creek area. For the eastern catchment where the slope is only about 5% and based on Figure 4.6 – assessment of potential erosion hazards, we have low erosion hazard.

Hence, the following input parameters are used:

- Rainfall erosivity factor (R) = 2500
- Soil erodibility factor (K) = 0.0185 (Bannerman and Hazelton, 1990)
- Slope length/gradient factor (LS) = 0.58 1.6 % for a length 300 m;
- Erosion control practice factor (P) = 1.3
- Ground cover and management factor (C) = 0.3

The average soil loss for the site is estimated to be:

A = 2500 x 0.0185 x 0.58 x 1.3 x 0.3 = 10.5 Tonnes /ha/year

For the **Eastern catchment** the total is 10.5 x 5.827 = 61.1 tonnes/year
For this material the specific density is likely to be about1.4 tonnes/m^3
Hence, the volume of sediments is 61.1/1.4 = 43.7 m^3/year therefore for the required capacity to be included in the sizing of the sedimentation pond, only volume of sediments for 2 months is required and this will be 43.7/6 = 7.28 m^3/ 2 months which will be added to the size of the sedimentation pond as shown below.

Similarly for the **Western catchment** the total is 10.5 x 2.942 = 31 tonnes/year
For this material the specific density is likely to be about1.4 tonnes/m^3
Hence, the volume of sediments is 31/1.4 = 22.14 m^3/year therefore for the required capacity to be included in the sizing of the sedimentation pond, only volume of sediments for 2 months is required and this will be 22.14/6 = 3.69 m^3/ 2 months which will be added to the size of the sedimentation pond as shown in Section 7.4.

5.4.7.2 Water Management for the Access Road

Water management for the construction phase of the access road is to be in accordance with the Erosion and Sediment Control Plan and on the accompanying drawings. All water management practices (i.e. erosion and sediment control structures, table drains and pipes) are to remain in place for the duration of the plant operations. Where:

- 'Clean' water from the upstream side of the road will flow into a dish drain and be diverted via road culverts under the road.
- Flows from the culverts will pass through a series of sediment traps before entering the sedimentation pond or it may naturally drain as it occurs now.
- Surface flows from the road will drain to both sides, either into the dish drain or onto the vegetated area on the downstream side of the road.

5.4.7.3 Water Management for the Remaining Areas

Water management for the other areas is to be in accordance with the plan on the drawings listed above and the guidelines for relevant component details within this report.

- Before normal operations begin, most areas including car parks, hardstands and truck turning area will drain naturally into the sedimentation ponds.

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- The western sedimentation pond will be used as a holding area for all stormwater flows from the western catchment.
- Stormwater from the eastern catchment is to be diverted to the eastern sedimentation pond.
- The sedimentation ponds are to be drained via irrigation and dust suppression.
- If there is excess water it can be either:

I. Flocculated and then released into the natural waterway/creek; or
II. Re-pumped back into the eastern (or western) sedimentation pond depending which one is near full. This means that the two (2) sedimentation ponds should be used to their maximum capacity prior to any discharge off-site is considered.

- The car parking areas and truck turning area must drain via surface flows and appropriate diversion drains into the relevant sedimentation pond.
- All 'clean' surface water flows should be diverted around the disturbed areas, where practical, by using bunds positioned on the upslope boundaries of the disturbed areas.

5.4.7.4 Sedimentation Ponds

5.4.7.4.1 Requirements

Sedimentation ponds are used to intercept sediment-laden runoff and retain most sediment and other materials to protect downstream waterways from pollution.

Sedimentation ponds are necessary for most large construction developments, but are only required for other developments where the soil loss is >200 tonnes/year. However, as stated previously in this case due to the sensitive nature of the area and the potential for pollution of Kemps Creek and flooding, it was considered appropriate that two (2) sedimentation ponds be installed on site.

5.4.7.4.2 Operations and Details

For the normal operations the stormwater runoff will drain to the relevant sedimentation pond. From here the water can be reused for:

- Pasture/bund irrigation; or
- Dust suppression; or
- Flocculated and redirected back into the natural water way.

Alternatively, water can be pumped between the sedimentation ponds, if required.

Diversion drains and bunds will be used in conjunction with the sedimentation ponds to direct upslope "clean" water away from the disturbed areas and to direct "dirty" water runoff from disturbed areas into the relevant sedimentation pond. The sedimentation ponds, diversion drain locations and plan details are shown on the drawings listed above.

Sedimentation ponds storage volumes are sized according to Landcom 2004 (Blue Book) and DECC 2008 to have sufficient capacity to contain the 5-day, 90th percentile rainfall event using rainfall data for Liverpool (43.8 mm) which is considered to be the closest location to the site as included in the Blue Book. In this case, the volumetric runoff coefficient (C_v) was considered to be 0.70 (Landcom, 2004) as a conservative approach.

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In addition to containing this volume of water, ponds are designed to also retain 2 months of anticipated soil loss. This volume (called sediment storage volume) is calculated by considering the average soil loss, determined by RUSLE in Section7.1.3. The sedimentation pond storage volumes for the two sedimentation ponds will be as outlined below.

For the **Eastern sedimentation pond** we have:
The settling Zone Volume is 43.8 x 5.827 x 0.70 x 10 = 1786.5 m^3
Total size of the eastern sedimentation pond = 1786.5 + 7.28 = 1794 m^3 (rounded up)

To provide confidence to all stakeholders involved, it is recommended that an additional 5% safety factor be applied to the total capacity of the sedimentation pond. Therefore, the eastern sedimentation pond should be constructed to have a capacity of 1884 m^3 (rounded up).

The dimensions that can be used varies depending of the accurate location of the sedimentation pond however, it is preferable that the ratio of length to width be 3:1 with a minimum depth of 0.6 m. An example of complying sedimentation pond could be Length = 30m, width = 10 m and depth = 6.3 m.

For the **Western sedimentation pond** we have:
The settling Zone Volume is 43.8 x 2.942 x 0.70 x 10 = 902 m^3
Total size of the eastern sedimentation pond = 902 + 3.69 = 905.7 m^3

To provide confidence to all stakeholders involved, it is recommended that an additional 5% safety factor be applied to the total capacity of the sedimentation pond. Therefore, the eastern sedimentation pond should be constructed to have a capacity of 951 m^3 (rounded up).

The dimensions that can be used varies depending of the accurate location of the sedimentation pond however, it is preferable that the ratio of length to width be 3:1 with a minimum depth of 0.6 m. An example of complying sedimentation pond could be Length = 25m, width = 8 m and depth = 4.75 m.

The eastern and western sedimentation ponds will provide the storage volume capturing all stormwater runoff from the whole site during rainfall events. The suggested sedimentation ponds locations are shown on the drawings listed above and will mainly be used as storage/diversion ponds for irrigation and dust suppression purposes. However, they could also be used as a sedimentation pond for flocculation during circumstances where they are near full and, requiring excess water to be treated and emptied into the existing watercourse. Excess water from the sedimentation pond can also be re-pumped between each other when emptying the sedimentation ponds is required. (Note: Water does not require flocculation or treatment when used for irrigation or dust suppression purposes or if it is pumped from the one sedimentation pond back into the other).

The sedimentation pond is to be constructed according to Standard Drawing SD 6-4 and the following details:

- The sedimentation pond should be built to incorporate a primary outlet (weir overflow) sized to have a capacity to pass the 100 year peak flow. This should be 3m in base width by 1m in depth with side slopes of 1:4.

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- Internal batters should be graded to a maximum of 6:1. If batters exceed this gradient complete water safety control measures must be implemented.
- A 'Full of Sediment' marker must be placed in the sedimentation pond to show the design capacity depth of the sediment storage volume, and hence to determine when sediment removal is required. The sediment storage volume equates to approximately 6% of the total pond volume, therefore the 'Full of Sediment' marker is to be placed at a level within the sedimentation pond to indicate the bottom 6% of the volume.

Note that any water released into the creek (whether from the sedimentation ponds or from a water cart) will require flocculation to achieve adequate settling of dispersible fine material – i.e. 50mg/L of suspended sediment (Refer to Site Monitoring and Maintenance Section for further details).

5.4.7.5 Diversion Structures

Diversion drains, banks or bunds are used to direct runoff into the various storages and to divert upslope "clean" water around the disturbed areas. The diversion drain locations and plan details are shown on the drawings listed above.

Eastern Catchment

Construction of 0.45 m wide dish-drains with depth at the middle of them being 0.15 – 0.20 m. These dish-drains should be constructed along the Northern, Eastern and Southern sides of the site. These dish-drains should be supported with a geofabric sediment fence as shown in the drawings. These dish-drains and sediment fences should also be constructed along both sides of the roadways.

Western Catchment

Landscaping and vegetation of a garden bed about 1.2 m wide along the Northern, Southern and Western sides of this catchment area. For the Western side of this catchment, it is also recommended that in addition to the landscaping area, two (2) rows of sediment fences be constructed at 20 m and 25 m from the water line to assist in slowing down the velocity of the water and capturing sediments before reaching Kemps Creek under severe adverse weather conditions. The western catchment should be re-contoured to ensure that stormwater runoff is diverted and directed to the sedimentation pond to be constructed near the western end of this catchment. Dish-drains and silt fences should also be installed adjacent to the landscaping areas.

In relation to the potential of activities encroaching on Kemps Creek, we understand that in accordance with the NSW Department of Primary Industries' (Office of Water) document titled "*Guidelines for Riparian Corridors on Waterfront Land*" dated June 2012; it is unclear whether this section of Kemps Creek is 1st or 2nd order watercourse based on the Strahler System. Hence, the width of the *Vegetated Riparian Zone* (VRZ) would be either 10 or 20 m wide. Based on discussions with the Office of Water, there are no specific requirements under the Water Management Act 2000, if the activities are undertaken outside the defined buffer zone which in this case it is a maximum of 20 m. This 20 m wide zone along Kemps Creek should be measured from the high point of the base.

These structures were sized as follows:

- Where they direct sediment-laden runoff: designed for stability in all storms up to and including the 20-year ARI storm event.

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- Where they divert “clean” water from external lands around the site: designed for stability in all storm events up to and including the 100- year ARI storm event.

The size and lining characteristics for all of the diversion drains provided for the all areas are detailed in the drawings.

Energy dissipaters are not considered mandatory but it could be considered by the operators of the site, if all other structures are proven to be insufficient to control and contain stormwater runoff. These structures minimise erosion of drains and their outlets through reduction of water velocity. They are to be constructed using riprap, grouted riprap, gabions, recycled concrete or fresh concrete.

5.4.7.5.1 The Access Road

Diversion drains (i.e. dish-drains) and culvert pipe crossings are to be provided for the access road in accordance with the Erosion and Sediment Control Plan. The following are recommended:

- Check dams could also be installed in the dish-drains at maximum of 80m intervals.
- The dish-drains must be completely lined with kikuyu turf or equivalent to provide a permanent ground cover. (Note: Jute mesh can be used during grass establishment but is a temporary measure only, therefore cannot be used alone).

5.4.7.6 Sediment Fences

Install all sediment fencing in accordance with Standard Drawing SD 6-8. Sediment fence locations are shown on the drawings. Ensure that:

- Sediment fences are firmly trenched into the ground for their entire length;
- Sediment fences include small ‘returns’ (see Standard Drawing 6-8) to minimise the risk of water flowing along them rather than through them.
- Sediment fences are installed around the toe of all stockpiles (Refer to Standard Drawing SD 4-1).

5.4.7.7 Barrier Fencing and Restricted Areas

Barrier fences are used to delineate access areas and to minimise unnecessary disturbance of vegetated lands. They are used to restrict access to any areas that are well vegetated and do not need to be disturbed. A good cover of vegetation is the best defence against erosion so should be maintained wherever possible.

- Barrier fencing is to be installed in the locations shown on the drawings.
- Barrier fencing can simply be made from tape wound around star pickets or stakes. Alternatively, sediment fence or chain wire fences can be used for this purpose if so desired.
- Barrier and sediment fencing is to be used to ensure that all vehicles entering and leaving the site pass over a stable access point to minimise bogginess in these areas and minimise sediment tracking onto public roads.
- Barrier fencing is to be used to delineate the areas adjacent to Kemps Creek as ‘no go’ zones.
- Barrier fencing is to be used at the discretion of the site manager to delineate other ‘no go’ areas.
- The soil erosion hazard on the site will be kept as low as practicable by minimising land disturbance.

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5.4.7.8 Stockpiles

Due to the fact that the stockpiles are of temporary nature on this site and most likely will only occur during the site preparation and construction stages, there should be limited requirements to manage these stockpiles as outlined below. The site manager is to designate safe stockpile sites in these locations. All stockpiles are to be constructed and maintained in accordance with Standard Drawing SD 4-1 and the following regulations:

I. All stockpiles must have sediment fencing installed around their bases as per Standard Drawing SD 4-1.
II. Stockpiles are not to be positioned within 20m of a riparian zone (creek and other watercourses).
III. Mulched vegetation, topsoil and subsoil (if applicable) are to be stockpiled separately.
IV. Stockpiles should be trimmed, deep ripped to 300mm, immediately sown with permanent pasture species and fertilised.
V. Stockpiles should be stabilised to achieve a C-factor of 0.1 within 10 days of formation.
VI. Stockpiles can be constructed to a maximum of 5m in height, however where there is sufficient area, they should be less than 3 m in height.
VII. The working face of the stockpile should be battered down at a maximum slope of 3:1.

5.4.7.9 Containment Bunds

Containment bunds for fuel, oil and chemical storage and vehicle maintenance are to be positioned in locations determined by the site manager, however a minimum 40m buffer between these structures and the riparian zone (creek and other watercourses) must be maintained.

- Bunds are to be provided around the fuel, oil and chemical storage areas. These bunds should:

I. Have walls and floors constructed of impervious materials;
II. Have floors graded to a collection sump;
III. Not have a drain valve incorporated into the bund structure;
IV. Have walls not less than 250mm high;
V. Be of sufficient capacity to contain 110% of the volume of the largest tank that is installed/operated.

- Maintenance on mobile plant and equipment must also be conducted within a hardstand bunded area or alternatively within an enclosed and bunded structure such as a shed.
- Drainage from any hardstand, vehicle servicing and workshop areas must be treated by a wastewater treatment facility with an oil separator and sediment trap.

5.4.7.10 Dust Suppression

The access road, the parking areas and the truck turning areas will require dust suppression. This water should be sourced from the sedimentation pond. Application rates will be dependent on weather, temperature, vehicle movements and surface infiltration rates. The application rate for the access road and truck turning area is estimated at 2mm per non-rainy day.

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5.4.7.11 General Site Measures

5.4.7.11.1 Stable Access Points and Parking

I. Stable site access points are to be provided wherever construction vehicles enter and leave the work site from public roads. They should be constructed as 'rumble grids'.
II. Safe parking areas for non-essential vehicles should be delineated at the discretion of the site manager.

5.4.7.11.2 Site Compound, Safe Storage and Waste Materials

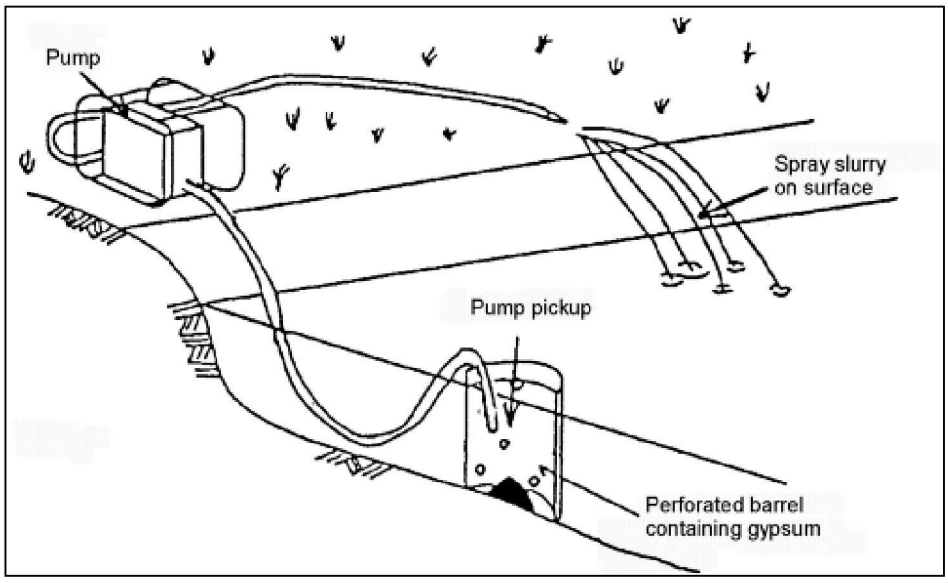
I. The site manager is to delineate an appropriate location for the site office or compound/s.
II. Safe storage areas for wastes, fuels and other hazardous materials are to be delineated at the discretion of the site manager (Refer to Section 7.9 for storage and management details).
III. Storage locations for erosion control materials are to be delineated at the discretion of the site manager.
IV. Any waste materials (such as rocks and debris) must be removed from any publicly trafficked road surface as soon as possible.

5.4.7.12 Flocculation of Sedimentation Ponds

Flocculation can be achieved by using gypsum (or equivalent) at a rate of approximately 40kg/100 m_3 of stormwater. Note that other flocculants are available, many of which are aluminium based. Care is required when using aluminium as a dosing agent, particularly where runoff or receiving waters could be highly acidic (pH less than 6.0).

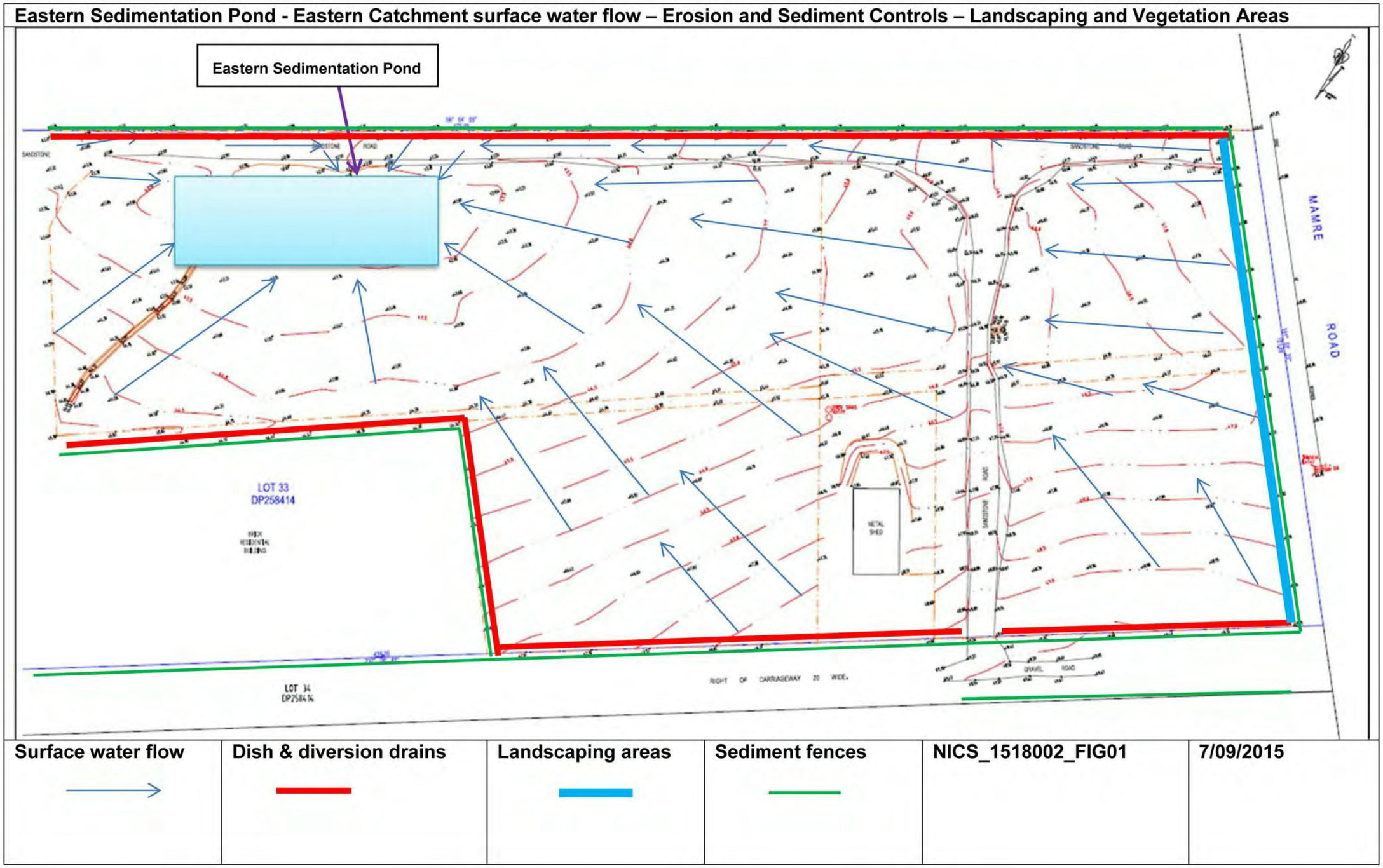
It is essential that the flocculating agent is spread evenly over the entire pond surface for proper treatment of water. See Figure 5-1 below.

Figure 5-1: Flocculation of sedimentation ponds



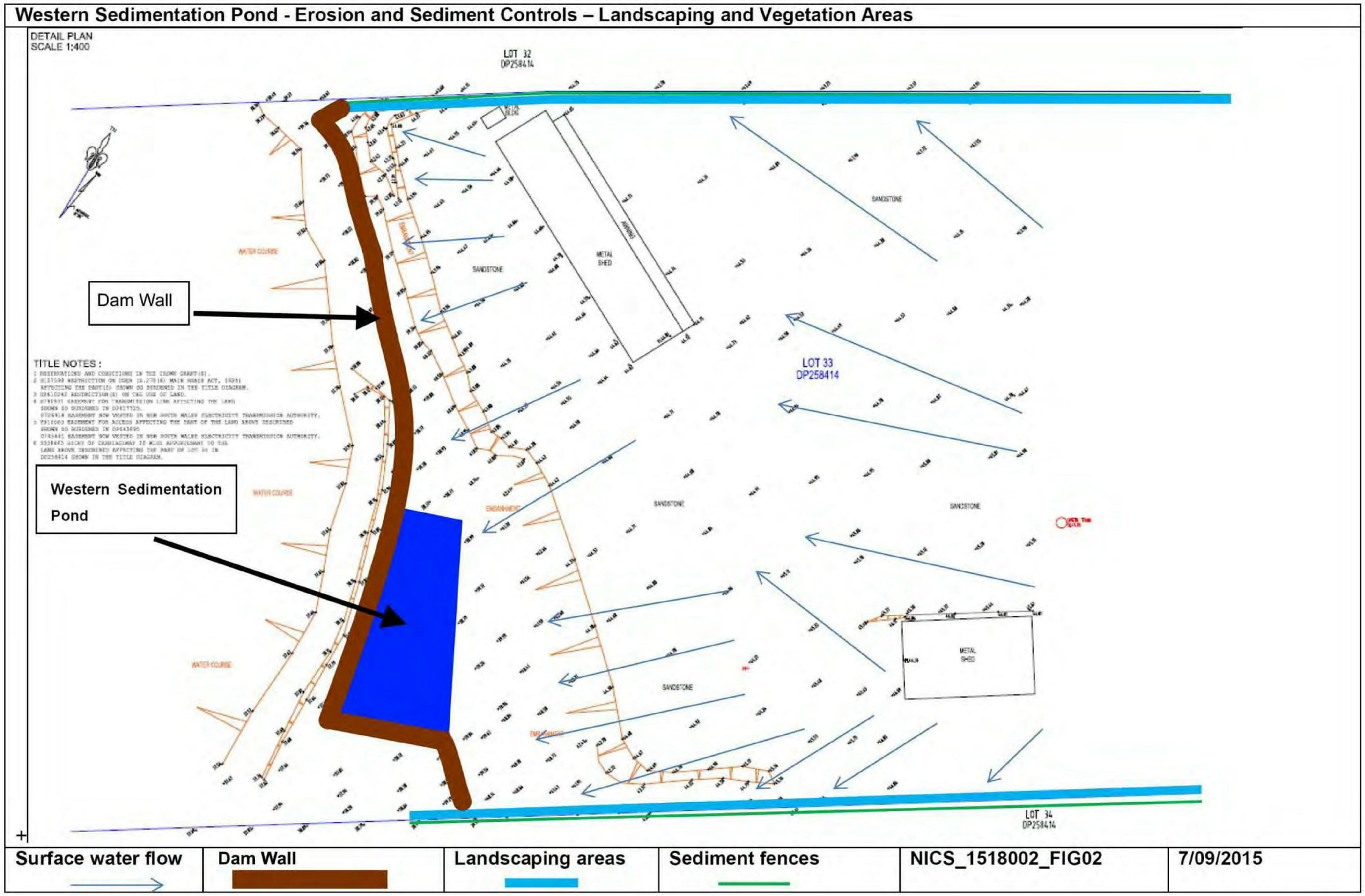
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Figure 5-2: Easter Sedimentation Pond



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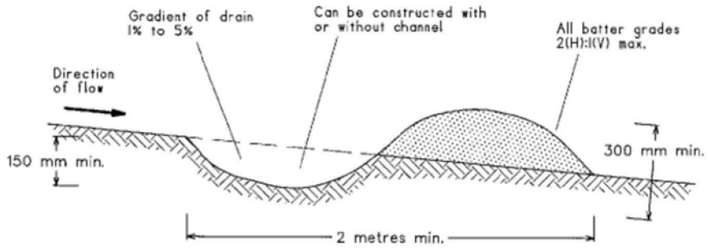
Figure 5-3: Western Sedimentation Pond



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Figure 5-4: Design of generic erosion and sediment control structures

Design of generic erosion and sediment control structures

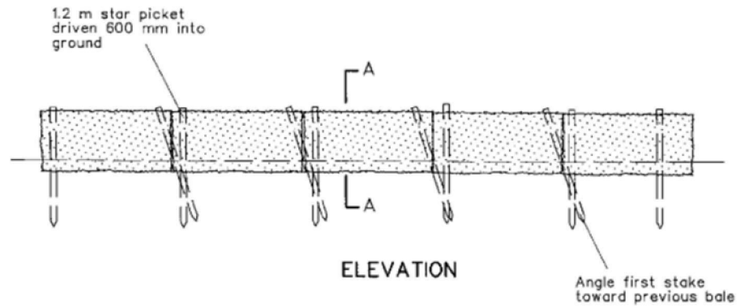


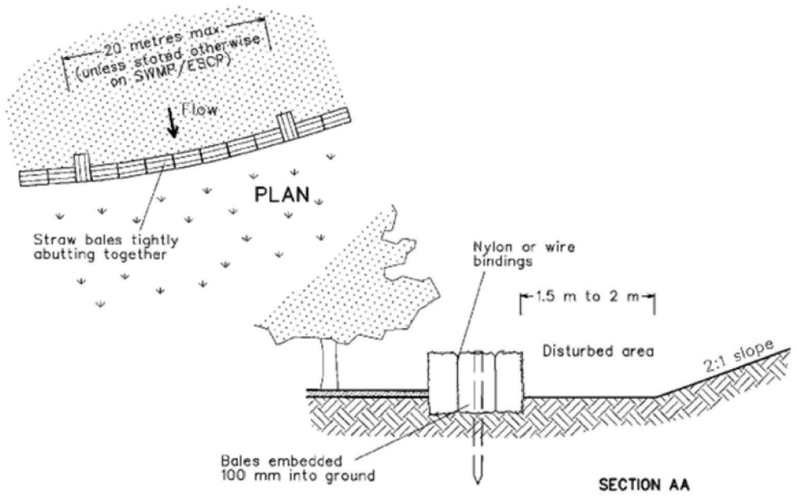
NOTE: Only to be used as temporary bank where maximum upslope length is 80 metres.

Construction Notes

1. Build with gradients between 1 percent and 5 percent.
2. Avoid removing trees and shrubs if possible - work around them.
3. Ensure the structures are free of projections or other irregularities that could impede water flow.
4. Build the drains with circular, parabolic or trapezoidal cross sections, not V shaped.
5. Ensure the banks are properly compacted to prevent failure.
6. Complete permanent or temporary stabilisation within 10 days of construction.

EARTH BANK (LOW FLOW) **SD 5-5**





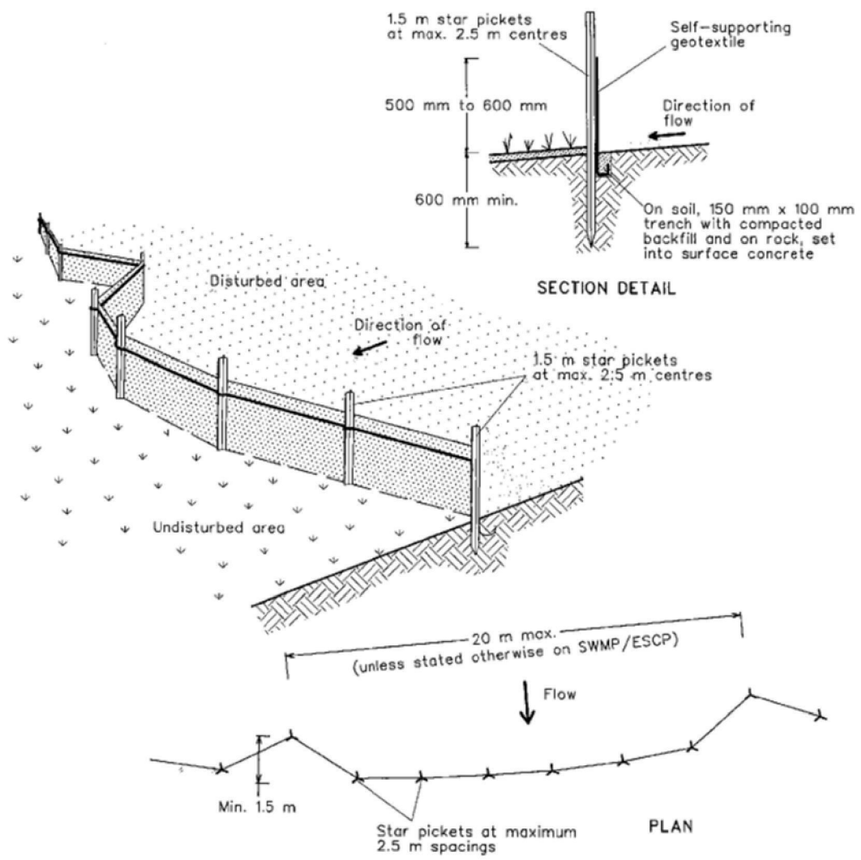
Construction Notes

1. Construct the straw bale filter as close as possible to being parallel to the contours of the site.
2. Place bales lengthwise in a row with ends tightly abutting. Use straw to fill any gaps between bales. Straws are to be placed parallel to ground.
3. Ensure that the maximum height of the filter is one bale.
4. Embed each bale in the ground 75 mm to 100 mm and anchor with two 1.2 metre star pickets or stakes. Angle the first star picket or stake in each bale towards the previously laid bale. Drive them 600 mm into the ground and, if possible, flush with the top of the bales. Where star pickets are used and they protrude above the bales, ensure they are fitted with safety caps.
5. Where a straw bale filter is constructed downslope from a disturbed batter, ensure the bales are placed 1 to 2 metres downslope from the toe.
6. Establish a maintenance program that ensures the integrity of the bales is retained - they could require replacement each two to four months.

STRAW BALE FILTER **SD 6-7**

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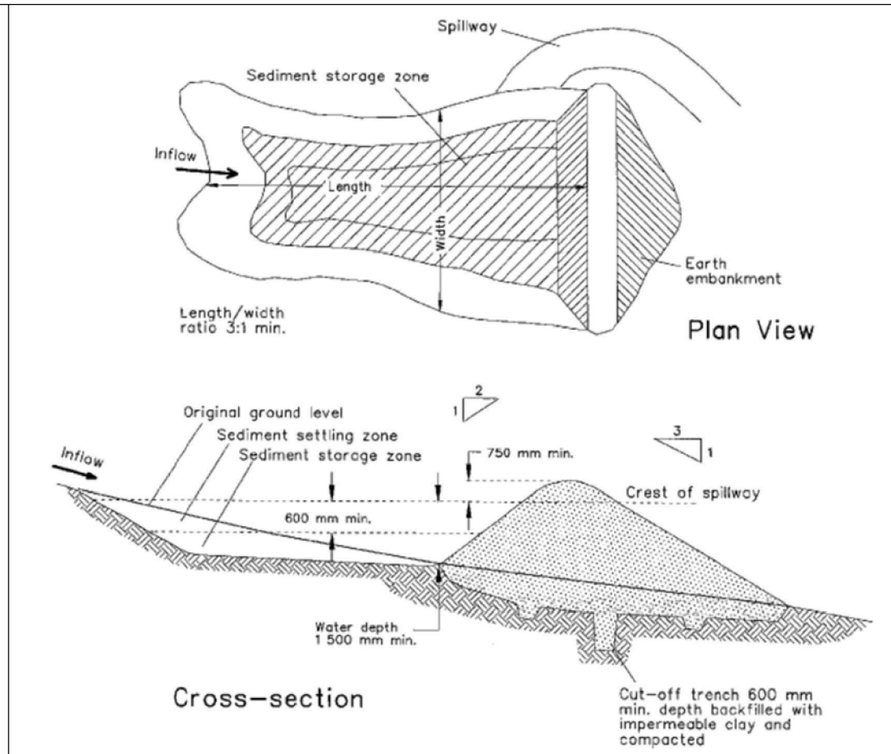
Design of generic erosion and sediment control structures



Construction Notes

1. Construct sediment fences as close as possible to being parallel to the contours of the site, but with small returns as shown in the drawing to limit the catchment area of any one section. The catchment area should be small enough to limit water flow if concentrated at one point to 50 litres per second in the design storm event, usually the 10-year event.
2. Cut a 150-mm deep trench along the upslope line of the fence for the bottom of the fabric to be entrenched.
3. Drive 1.5 metre long star pickets into ground at 2.5 metre intervals (max) at the downslope edge of the trench. Ensure any star pickets are fitted with safety caps.
4. Fix self-supporting geotextile to the upslope side of the posts ensuring it goes to the base of the trench. Fix the geotextile with wire ties or as recommended by the manufacturer. Only use geotextile specifically produced for sediment fencing. The use of shade cloth for this purpose is not satisfactory.
5. Join sections of fabric at a support post with a 150-mm overlap.
6. Backfill the trench over the base of the fabric and compact it thoroughly over the geotextile.

SEDIMENT FENCE **SD 6-8**



Construction Notes

1. Remove all vegetation and topsoil from under the dam wall and from within the storage area.
2. Construct a cut-off trench 500 mm deep and 1,200 mm wide along the centreline of the embankment extending to a point on the gully wall level with the riser crest.
3. Maintain the trench free of water and recompact the materials with equipment as specified in the SWMP to 95 per cent Standard Proctor Density.
4. Select fill following the SWMP that is free of roots, wood, rock, large stone or foreign material.
5. Prepare the site under the embankment by ripping to at least 100 mm to help bond compacted fill to the existing substrate.
6. Spread the fill in 100 mm to 150 mm layers and compact it at optimum moisture content following the SWMP.
7. Construct the emergency spillway.
8. Rehabilitate the structure following the SWMP.

EARTH BASIN - WET **SD 6-4**
(APPLIES TO 'TYPE D' AND 'TYPE F' SOILS ONLY)

NICS_151802_FIG03 ***7/09/2015***

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5.5 ENVIRONMENTAL RISK ASSESSMENT

Benbow Environmental prepared an Environmental Risk Assessment (ERA) Report for the proposed animal feed processing operations to be located at 901-915 Mamre Rd Kemps Creek. The purpose of the assessment was to determine the level of risk that the existing operations pose on the surrounding businesses.

From the risk analysis undertaken in the previous section, the main environmental site hazards include:

- Generation and release of dust emissions;
- Potential diesel leaks and spills;
- Release of phosphine gas from use of fumigants;
- Excessive noise from on-site operations and activities; and
- External Fire.

The above hazards were analysed considering all safeguards for the proposed development as designed. Additional safeguards were recommended if required to minimise risk. These included:

- Provide spill kits in high risk areas;
- Develop a Preventative maintenance schedule;
- Develop a spill procedure;
- Erect a sign adjacent to the diesel storage area with simple instructions on how to avoid spillages; and
- If applicable, use an alternative for reversing beepers on onsite vehicles.

All risks were found to be Class III (except for fire as discussed in Table 5-1) indicating an overall low level of risk. No high level risks of Class I were found to be present at the site.

With all safeguards and control measures in place, the proposed facility presents a low risk to adjoining premises or residents within the vicinity.

The full Environmental Risk Assessment is presented as Attachment 5

5.6 VISUAL AMENITY

Council Officers have specifically requested that visual aspects be considered.

Two earlier DA's have both been withdrawn and the emphasis on the site development is now the animal feed business.

The earth berms across the very front of the site with Mamre Road have been removed.

The earth berms adjacent to the front of the site and along the north and south boundaries would be reduced to landscaping mounds of up to 0.5m high to provide a base for shrubs. Shrub heights would vary between 1m and 3m in height.

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An earth berm 2.5m in height would be placed on the west (rear) of the existing barn (shed at front of site). This would be vegetated and would provide a noise and privacy screen for the residence on the site.

In the rear half of the site and along the northern boundary for the length of the internal roadway, shrubs/hedges would be planted.

The western surface of the batter leading down to the waterway would be vegetated with natural grasses and native species of shrubs.

The visual appearance of the site as proposed would be enhanced.

The following section of the SEE summarises the past contamination issues on site that occurred prior to the purchase of the site by Olathree Pty Limited.

5.7 PAST CONTAMINATION ISSUES

During previous ownership of the site, building rubble has been placed on site in two areas.

- A dam area to the NW of the existing sheds associated with the residence. Brick and broken pieces of concrete, steel pipe were typical materials used to fill this low lying area of the site that was waterlogged.
- Behind the long shed adjacent to the batter down to the waterbody, similar materials were found.

These were removed and the surface of the hardstand backing to the batter made into a hardstand area to improve the site and reduce sediment runoff.

Concerns raised by Council led to Douglas Partners undertaking an Environmental Site Assessment.

This report had previously been provided to Council and is provided in Attachment 1.

A summary of the findings is presented.

“Based on the field and analytical results presented in this report, it is concluded that the fill at the site, within the area shown on Drawing 1, is suitable to be retained under the proposed commercial land use, which is understood to include the storage and distribution of stock feed and grains.

The processed aggregate complies with the Recovered Aggregate Exemption and Recovered Aggregate Order and is therefore suitable for land application in road making activities, building, landscaping and construction works.”

Subsequent to the DA’s that were submitted to Council in February – March 2015 and withdrawn so that Council could consider first the one DA for the animal feed business, glass fines were brought to the site in accordance with an exemption that applied to the glass fines.

These have since been removed from the temporary storage area adjacent to the batter and used in accordance with the exemption for road building and turning areas for trucks.

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Additional safeguards have been added to the design of the site to ensure any organic materials from the processing of seed and grains are unable to reach the waterway.

There are no known ongoing contamination issues with the site.

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6. ENVIRONMENTAL MITIGATION MEASURES

This section provides a summary of the mitigation measures recommended in this Statement of Environmental Effects and supporting technical studies. For full details, please refer to the individual reports.

The following safeguards and control measures would be provided to minimise impacts on the environment from the operation of the facility.

Noise

- Construction of a 4 metre high solid fence is proposed to the southern side of the site.
- Construction of 4m high walls to the south-east and north-east of the truck unloading area. This would be adjacent to the proposed awning.
- Construction of an acoustic screen around the dust collector;
- Construction of an acoustic enclosure around the blower area in order to reduce noise contribution from blower and pipeline by 15dB.

Air

- Mikropul baghouse dust extractor connected to:
  - External floveyors;
  - Internal floveyors;
  - 3xTQLZ 200x150 grain separators;
  - 2xTQLZ 150x100 grain separators;
  - Hammer mill;
  - Roller mill;
  - Mixer;
  - Bagging bin; and
  - Bag filling and weighing machine.
- Spray sealing of onsite roads.
- Use of water sprays or dust suppression agent applied to reduce dust emissions when needed.
- Auger transfer points fully enclosed.
- Storage of raw materials in Silo
- Fumitoxin tablets supplied in gas-tight containers which can be tightly resealed and stored for future use.
- Storage and use of aluminium phosphide in accordance with Work Cover NSW Code of Practice (2006) 'Safe use of bulk solids containers and flatbed storage including silos, field bins and chaser bins' & 'Safe use and storage of chemicals (including pesticides and herbicides) in agriculture'.

Water

- Impervious bund(s) will be installed around areas in which fuels, oils and chemicals are stored;
- Maintenance on mobile plant and equipment will be conducted within a bunded area, unless it is undertaken within the building;
- A wastewater treatment facility will be installed with oil separator and sediment trap to treat the drainage from any hardstand, vehicle servicing and workshop areas); and

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- Stormwater will be diverted away from disturbed land surfaces. All diversion banks, channels and points of discharge will be constructed or stabilised so as to minimise erosion and scouring.
- Erosion and sediment controls such as sedimentation Ponds, diversion Structures, barrier Fencing and Restricted Areas, Sediment Fences
- Water monitoring program.

Chemicals

- Bunded and roofed steel tank for the storage of diesel;
- Spill kits;
- Develop a spill procedure; and
- Erect a sign with simple instructions on how to avoid spillages.

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7. CONCLUDING REMARKS

The development of the site has been reduced to a focus on the animal feed business currently at another area within Penrith City Council.

The site with the safeguards in place is considered to be suitable for the intended use.

This concludes the report.



Linda Zanotto
Senior Environmental Engineer



Daniele Albanese
Senior Acoustical Engineer



Katie Trahair
Environmental Scientist



R T Benbow
Principal Consultant

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8. LIMITATIONS

Our services for this project are carried out in accordance with our current professional standards for site assessment investigations. No guarantees are either expressed or implied.

This report has been prepared solely for the use of J M Produce, as per our agreement for providing environmental services. Only J M Produce is entitled to rely upon the findings in the report within the scope of work described in this report. Otherwise, no responsibility is accepted for the use of any part of the report by another in any other context or for any other purpose.

Although all due care has been taken in the preparation of this study, no warranty is given, nor liability accepted (except that otherwise required by law) in relation to any of the information contained within this document. We accept no responsibility for the accuracy of any data or information provided to us by J M Produce for the purposes of preparing this report.

Any opinions and judgements expressed herein, which are based on our understanding and interpretation of current regulatory standards, should not be construed as legal advice.

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ATTACHMENTS

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Attachment 1: Environmental Site Assessment

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Douglas Partners
Geotechnics / Environment / Groundwater

Integrated Practical Solutions

Report on Contamination Investigation

915 Mamre Road
Kemps Creek

Prepared for
Olathree Pty Ltd

Project 84601.00
December 2014



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Douglas Partners
Geotechnics / Environment / Groundwater

Document History

Document details

Project No.	84601.00	Document No.	1
Document title	Contamination Investigation		
Site address	915 Mamre Road, Kemps Kreek		
Report prepared for	Olathree Pty Ltd		
File name	P:\84601 KEMPS CREEK, Fill Assessment PG\Docs\REPORT		

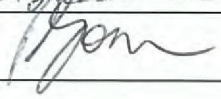
Document status and review

Revision	Prepared by	Reviewed by	Date issued
0	Richard Lamont	Paul Gorman	12 December 2014

Distribution of copies

Revision	Electronic	Paper	Issued to
0	1	0	Olathree Pty Ltd

The undersigned, on behalf of Douglas Partners Pty Ltd, confirm that this document and all attached drawings, logs and test results have been checked and reviewed for errors, omissions and inaccuracies.

	Signature	Date
Author		12 December 2014
Reviewer		12 December 2014

NCS INTERNATIONAL CERTIFIED QUALITY MANAGEMENT SYSTEM

Douglas Partners Pty Ltd
ABN 75 053 980 117
www.douglaspartners.com.au
96 Hermitage Road
West Ryde NSW 2114
PO Box 472
West Ryde NSW 1685
Phone (02) 9809 0666
Fax (02) 9809 4095

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Abbreviations

ABC	ambient background concentration
ACL	added contaminant limits
AEC	area of environmental concern
ANZECC	Australian and New Zealand Environmental & Conservation
ARCP	asbestos removal control plan
AS	Australian Standard
As	arsenic
B(a)P	benzo(a)pyrene
BaP TEQ	benzo(a)pyrene toxic equivalent
bgl	below ground level
BH	borehole
BTEX	benzene, toluene, ethyl benzene, xylenes
C10-C36	heavy fraction TPH molecules, 10 to 36 carbon atoms
C6-C9	volatile fraction TPH molecules, 6 to 9 carbon atoms
Cd	cadmium
CLM Act	Contaminated Land Management Act
COC	chain of custody
Cr	chromium
Cr(III)	chromium with oxidation state III (stable in normal environments)
Cr(VI)	chromium with oxidation state VI (typically not stable in normal environments)
CRC Care	Co-operative Research Centre for Contamination Assessment and Remediation of the Environment
CSM	conceptual site model
Cu	copper
DA	development application
DCE	dichlororethene
DDD	dichlorodiphenyldichloroethane
DDE	dichlorodiphenyldichloroethylene
DDT	dichlorodiphenyltrichloroethane
DECCW	NSW Department of Environment, Climate Change and Water (now superceded)
DP	Douglas Partners
D.P.	Deposited Plan
DQI	data quality indicator
DQO	data quality objective
DSI	detailed site (contamination) investigation
EIL	ecological investigation levels
ELS	Envirolab Services Pty Ltd
EPA	Environment Protection Authority
ESL	ecological screening level
F1	TPH fraction C6-C10
F2	TPH fraction >C10-C16
F3	TPH fraction >C16-C34
F4	TPH fraction >C34-C40
FA	friable asbestos
Fe	iron
ha	hectares

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Hg	mercury
HHRA	human health risk assessment
HIL	heath investigation level
HMTV	hardness modified trigger value
HSL	health screening level
ISO	International Standards Organisation
LOR	limit of reporting
m	metre
mg/kg	milligrams per kilogram
N/A	not applicable
NATA	National Association of Testing Authorities
ND(nd)	not detected above the practical quantitation limit
NHMRC	National Health and Medical Research Council
NEPC	National Environment Protection Council
NEPM	National Environmental Protection (Assessment of Site Contamination) Measure
Ni	nickel
NL	not limiting
NRMMC	National Resource Management Ministerial Council
OCP	organochlorine pesticides
OEH	Office of Environment and Heritage
PAH	polycyclic aromatic hydrocarbons
Pb	Lead
PCB	polychloride biphenyls
pH	unit measure of acidity/ alkalinity
PID	photoionisation detector
POEO Act	Protection of the Environment Operations Act
PSI	preliminary site investigation
PQL	practical quantitation limit
QA	quality assurance
QA/QC	quality assurance/ quality control
QC	quality control
RPD	relative percentage difference
SAC	site assessment criteria
SAQP	sampling and analysis quality plan
SAQP	sampling, analysis and quality plan
TEQ	toxicity equivalency quotient
TPH	total petroleum hydrocarbons
TRH	total recoverable hydrocarbons
US EPA	United States Environmental Protection Agency
VOC	volatile organic compounds
WA DoH	Western Australia Department of Health
Zn	zinc
%	percent
<	less than
≤	equal to or less than
>	greater than
≥	equal to or greater than

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Appendices

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Appendix B: Data Quality Objectives

Appendix C: Data Quality Indicators

Appendix D: Field and Laboratory QA/QC

Appendix E: Laboratory Certificates and Chain of Custody Documentation

Appendix F: Test Pit Results and Notes about this Report

Appendix G: Laboratory Summary Tables

Appendix H: Witt 2014 Report

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Report on Contamination Investigation
915 Mamre Road, Kemps Creek

1. Introduction

This report details the methodology and results of a contamination investigation undertaken by Douglas Partners Pty Ltd (DP) at 915 Mamre Road, Kemps Creek. The contamination investigation was commissioned by Olathree Pty Ltd and carried out in general accordance with DP's email proposal dated 7 November 2014.

It is understood that the site has been recently inspected by Penrith City Council (PCC) and the NSW EPA and that PCC has risen concerns over what they claim is the importing and spreading of a substantial volume of fill.

The objectives of the contamination investigation are to:

- Assess the suitability of fill at the site to be retained under the current land use, which is understood to include the storage and distribution of stock feed and grains; and
- Assess the suitability of crushed and processed demolition rubble to be used as surface cover / fill at the site.

The investigation was conducted and reported with reference to the National Environment Protection Council (NEPC) *National Environment Protection (Assessment of Site Contamination) Measure 1999 as* amended 2013 (NEPC, 2013), the NSW EPA *Guidelines for Consultants Reporting on Contaminated Sites* (reprinted 2011), The NSW EPA *Resource Recovery Exemption under Part 9, Clauses 91 and 92 of the Protection of the Environment Operations (Waste) Regulation 2014 The recovered aggregate exemption 2014 (Recovered Aggregate Exemption),* and the NSW EPA *Resource Recovery Order under Part 9, Clause 93 of the Protection of the Environment Operations (Waste) Regulation 2014 The recovered aggregate order 2014 (Recovered Aggregate Order)*.

2. Background

The following relevant imported fill assessment was previously conducted on part of the site, and was reviewed by DP as part of this contamination investigation:

- DP Report on *Assessment of Imported Fill*, *901 - 915 Mamre Road, Kemps Creek* prepared for Henry Davis York, Project 73509, 3 July 2010 (DP, 2010).

DP (2010) included an inspection of an area containing imported fill along with sampling from the imported fill that was spread across the surface of part of the site, and sampling from stockpiles within the investigation area, which covered about 40m by 40m to the south of the existing shed.

The stockpiles consisted of varying material types, including silty clay, sandy clay and clayey sand along with brick pieces, concrete, gravel, plastic and plant material. The spread material consisted of

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sandy clay with sandstone fragments, brick pieces, clay pipe pieces, gravel, cement and plant material.

The analytical results showed that all concentrations of heavy metals apart from lead, polycyclic aromatic hydrocarbon (PAH), total recoverable hydrocarbon (TRH), bBenzene, toluene, ethylbenzene and xylene (BTEX), organochlorine pesticides (OCP), organophosphorus pesticides (OPP), polychlorinated biphenyl (PCB), and phenols were below the adopted site assessment criteria (SAC). Toxicity Characteristic Leaching Procedure (TCLP) testing was performed on samples with exceedances. The analyte concentrations were then assessed against the leachable (TCLP1) and specific contamination concentrations (SSC1) for general solid waste.

Based on the results of the assessment it was considered that the imported materials within the investigation area could be classed as General Solid Waste (non-putrescible) for the purpose of off-site disposal.

Subsequent to the DP (2010) report it is understood that the site was purchased by Olathree Pty Ltd for the purpose of relocating their stock feed and grain distribution centre in Erskine Park. The site was cleared of vegetation and clean sandstone was imported to assist in forming a trafficable surface cover.
The sandstone material was apparently imported from 233 Johnston Street, Annandale. A letter report by Witt Consulting Pty Ltd (Witt, 2014) stating that this material is virgin excavated natural material (VENM) is included in Appendix I.

3. Scope of Works

The scope of works for the contamination investigation was as follows:

- Review of DP (2013);
- A walkover of the site to identify current features, any areas of environmental concern and accessible areas for intrusive investigations;
- Positioning of 36 test pits (TP1 to TP36) across the site to provide a general coverage. The pits were positioned primarily to assess ground conditions where fill material is believed to have been placed;
- Collection of soil samples from the test bores and submission of selected samples to a NATA accredited laboratory for a general suite of contaminants comprising the following:-
  - The priority heavy metals arsenic (As), cadmium (Cd), chromium (Cr), copper (Cu), lead (Pb), mercury (Hg), nickel (Ni) and zinc (Zn);
  - PAH;
  - TRH;
  - BTEX;
  - OCP;
  - OPP;
  - PCB;
  - Phenols;

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  - Asbestos; and
  - QA/QC samples.
- Analysis of a selected number of samples for general physical properties including pH, conductivity and cation exchange capacity (CEC) content;
- Collection of samples from within stockpiles of processed aggregate located within the site;
- Analysis of processed aggregate samples for the following:
  - Heavy metals – arsenic, cadmium chromium, copper, lead, manganese, mercury, nickel, zinc;
  - Foreign material; and
  - Conductivity
- Assessment of soil analytical data against appropriate health and ecologically based investigation and screening levels;
- Assessment of the processed aggregate data against the threshold levels listed in the Recovered Aggregate Order; and
- Preparation of this report.

4. Site Identification and Description

4.1 Site Identification

The property 915 Mamre Road, Kemps Creek is currently registered as Lot 33 in Deposited Plan 258414 and occupies a total area in the order of 13.8 hectares (ha). For the purposes of this contamination investigation "the site" is defined by the area that has recently been cleared and filled, as outlined on Drawing 1 in Appendix A. The site is of irregular shape and has a total area of approximately 2.6 ha.

4.2 Site Description

At the time of preparing this report the site was being prepared for use as a stock feed and grain distribution centre.

The site was cleared of all vegetation at the time of undertaking the fieldwork. There were several large sheds observed on the site at the time of conducting the fieldwork for this contamination investigation. The buildings were being utilised for several different businesses including truck trailer manufacture and coloured rubber granule manufacture.

The area to the north of the site is occupied by agricultural land. To the west is Kemps Creek and rural land. To the east is Mamre Road then rural land. To the south is agricultural land then Kemps Creek.

Three stockpiles of processed aggregate were observed within the site, as shown on Drawing 1, Appendix A. The stockpiles were estimated to be in the order of 120 m^3 in combined volume and comprised crushed concrete and brick from sheds demolished at the site. A visual inspection of the stockpiles did not identify any potential asbestos containing material.

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The site layout is shown in the aerial photograph base to Drawing 1, Appendix A.

5. Topography, Geology, Soils and Water

The site was observed to be generally flat to slightly undulating, with a depression in the centre, and south-western facing slopes toward the south-western boundary.

Reference to the Penrith 1: 100 000 Geological Series Sheet indicates that the site is of underlain by Bringelly Shale which typically comprises shale, carbonaceous claystone, laminite, and fine to medium grained lithic sandstone. Quaternary fluvial sediments which typically comprise fined-gained sand, silt and clay are expected in the northern portion of the site. Subsurface conditions are likely to include lenses of alluvial deposits (sand, gravel, clay) overlying shale at depth.

Reference to the Penrith 1:100,000 Soils Landscape Map indicates that the majority of the site is situated within the residual soil group in the Blacktown landscape, and is typified by gently undulating rise on Wianamatta Group shales and Hawkesbury shale. Limitations encountered in this landscape are moderately reactive highly plastic subsoil, low soil fertility, poor soil drainage.

Groundwater flow direction across the site is likely to be heavily influenced by Kemps Creek, which is located immediately adjacent to the south-west of the site. Flow directions will therefore most likely flow towards the south-west. The depth of groundwater will also be influenced by the creek level.

Reference to digital data of Acid Sulphate Soil Risk (supplied by NSW Department of Environment and Climate Change in 2008 based on published 1:25,000 Acid Sulfate Soils Risk Mapping, 1994-1998) indicates that the eastern portion of the site is located within an area known to have high probability of containing acid sulphate soils.

A groundwater bore search of the NSW Office of Water website database was conducted. One groundwater bore was located within a 1 km radius of the site.

6. Preliminary Conceptual Site Model

A conceptual site model (CSM) is a representation of site-related information regarding contamination sources, receptors and exposure pathways between those sources and receptors. The CSM provides the framework for identifying how the site became contaminated (or potentially contaminated) and how potential receptors may be exposed to contamination either in the present or the future i.e. it enables an assessment of the potential source – pathway – receptor linkages.

A ‘source–pathway–receptor’ approach has been used to assess the potential risks of harm being caused to human, water or environmental receptors from target potential contamination source (fill) via exposure pathways. The possible pathways between the fill and identified receptors are provided in Table 1 below.

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Table 1: Preliminary Conceptual Site Model

Source	Transport Pathway	Receptor	Comments
S1: Filling	**P1**: Direct contact with soil (ingestion and dermal) **P2**: Inhalation of dust and/or vapours **P3**: Leaching of contaminants and vertical mitigation into groundwater **P4**: Surface water run-off	**R1**: Site users and visitors **R2**: Construction and Maintenance workers **R3**: Groundwater and surface water **R4**: General Ecology	The soil investigations undertaken are aimed at assessing the fill on the site as a potential source of contamination risk.

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7. Fieldwork and Analysis

7.1 Data Quality Objectives and Project Quality Procedures

The contamination investigation has been devised broadly in accordance with the seven step data quality objective (DQO) process which is provided in Appendix B, Schedule B2 of NEPC (2013). The DQO process is outlined as follows:

- Stating the Problem;
- Identifying the Decision;
- Identifying Inputs to the Decision;
- Defining the Boundary of the Assessment;
- Developing a Decision Rule;
- Specifying Acceptable Limits on Decision Errors; and
- Optimising the Design for Obtaining Data.

An evaluation of the DQO is presented in Appendix B.

7.2 Data Quality Indicators

The performance of the assessment in achieving the DQO was assessed through the application of Data Quality Indicators (DQI), defined as follows:

Precision:	A quantitative measure of the variability (or reproducibility) of data;
Accuracy:	A quantitative measure of the closeness of reported data to the "true" value;
Representativeness:	The confidence (expressed qualitatively) that data are representative of each media present on the site;
Completeness:	A measure of the amount of useable data from a data collection activity;
Comparability:	The confidence (expressed qualitatively) that data can be considered equivalent for each sampling and analytical event.

An evaluation of the DQI is presented in Appendix C.

7.3 Sample Location and Rationale

The total site area is approximately 2.6 ha. The recommended minimum sampling density as stipulated in the NSW EPA's *Contaminated Sites: Sampling Design Guideline, 1995* for a 2.6 ha site is 36 sampling points. As such, 36 test pits were positioned as shown on Drawing 1. The pit positions were governed by the areas that appeared to have been filled or regraded.

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The test pits were labelled as TP1 to TP36. The test pits were designed to enable sampling of the media considered to be most likely impacted by contaminants, in this case, imported filling.

Representative samples of the filling and natural soil were recovered from the test pits in order to assess the contamination status of the soils within the subject site.

The total estimated volume of processed aggregate in the stockpiles is 120 m^3. Based on the Recovered Aggregate Order, nine (9) samples were recovered (three from each stockpile).

7.4 Sampling Methods

The test pits were excavated under the instruction and supervision of an environmental scientist from DP on 12 and 13 November 2014.

The test pits were excavated using a 25 tonne excavator. The pits were extended to depths of between 0.2 m and 3.5 m below ground level (bgl), with each test pit excavated into natural soils or to bedrock refusal. Test pits were also excavated as slots into the stockpiles of aggregate. Given the absence of indicators of volatile contaminants (i.e. no observed staining or odours), soil samples were recovered directly from the excavator bucket.

All sampling data was recorded on DP's test pit logs with essential information included in the chain-of-custody sheets. The general sample handling procedure adopted is summarised below:

- collect soil samples directly from excavator bucket;
- transfer samples into laboratory-prepared glass jars, filled to the top to minimise the headspace within the sample jar, and capping immediately to minimise loss of volatiles;
- transfer bulk aggregate samples to bulk plastic bags;
- label sample containers with individual and unique identification, including project number, sample location and sample depth; and
- place the glass jars, with Teflon lined lid, into an ice cooled, insulated and sealed container for transport to the laboratory.

7.5 Field Quality Assurance and Quality Control

The field quality assurance (QA) and quality control (QC) procedures for sampling were as prescribed in Douglas Partners' *Field Procedures Manual*. Field replicate samples were recovered and analysed for a limited suite of contaminants by means of intra-laboratory and inter-laboratory analysis. Trip blank and trip spike samples were also included as part of the QA/QC process. This is in accordance with standard industry practice and guidelines.

No field rinsate samples were collected or analysed as part of the assessment. Given that soil samples were taken from excavator bucket, contaminant concentrations were considered likely to be low, rinsate sample test results were not considered to be critical to the outcomes of the investigation.

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A complete discussion of the field QA/QC is presented in Appendix D. In summary, it is considered that on the basis of the field and laboratory QA/QC the analytical data reported by the laboratory is reliable and useable for this investigation.

7.6 Analytical Rationale

The analytical scheme was designed to obtain an indication of the potential presence and possible distribution of contaminants that may be attributable to the potential sources informed by the CSM and discussed in Section 6.

As such, the analysis was undertaken on fill and aggregate samples only. Samples were selected for analysis on the basis of the testing budget and in order to include analysis of all fill types encountered in the field.

7.7 Laboratory QA/QC

The analytical laboratory, accredited by NATA, is required to conduct in-house QA/QC procedures. These are normally incorporated into every analytical run and include reagent blanks, spike recovery, control samples, surrogate recovery and duplicate samples. These results are included in the laboratory reports in Appendix E.

The results of the DP assessment of laboratory QA/QC are presented in Appendix D. In summary, it is considered that on the basis of the field and laboratory QA/QC the analytical data reported by the laboratory is reliable and useable for this investigation.

8. Site Assessment Criteria

The proposed development at the site will include warehouses, ground level parking and landscaping associated with the stock feed and grain distribution business.

The Site Assessment Criteria (SAC) applied in the current investigation is informed by the CSM which identified *human and ecological* receptors to potential contamination on the site (refer to Section 6). Analytical results were assessed (as a Tier 1 assessment) against the SAC comprising the investigation and screening levels of Schedule B1, NEPC (2013). The NEPC guidelines are endorsed by the NSW EPA under the CLM Act 1997. Petroleum based health screening levels for direct contact have been adopted from the *Cooperative Research Centre for Contamination Assessment and Remediation of the Environment (CRC CARE) Technical Report no.10 Health screening levels for petroleum hydrocarbons in soil and groundwater* (2011) as referenced by NEPC (2013).

The investigation and screening levels are applicable to generic land use settings and include consideration of, where relevant, the soil type and the depth of contamination. The investigation and screening levels are not intended to be used as clean up levels. Rather, they establish concentrations above which further appropriate investigation (e.g. Tier 2 assessment) should be

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undertaken. They are intentionally conservative and are based on a reasonable worst-case scenario.

The investigation and screening levels applied in the current investigation comprise levels adopted for a generic commercial/industrial land use scenario, and intrusive maintenance workers (also representing construction workers).

8.1 Soils

8.1.1 Health Investigation Levels

The Health Investigation Levels (HIL) and Health Screening Levels (HSL) are scientifically-based, generic assessment criteria designed to be used in the first stage (Tier 1) of an assessment of potential human health risk from chronic exposure to contaminants.

HILs are applicable to assessing health risk arising *via* all relevant pathways of exposure for a range of metals and organic substances. The HIL are generic to all soil types and apply generally to a depth of 3 m below the surface for commercial/industrial use. Site-specific conditions may determine the depth to which HILs apply for other land uses.

HSLs are applicable to selected petroleum compounds and fractions to assess the risk to human health via inhalation and direct contact pathways. HSL have been developed for different land uses, soil types and depths to contamination.

The generic HIL and HSL are considered to be appropriate for the assessment of contamination at the site. Given the proposed land use the adopted HIL and HSL are:

- **HIL-D** – commercial/industrial;
- **HSL-D** – commercial/industrial;
- **HSL-** Intrusive Maintenance Worker (shallow trench).

In addition, the HSL adopted are predicated on the inputs summarised in Table 2.

Table 2: Inputs to the Derivation of HSLs

Variable	Input	Rationale
Potential exposure pathway	Soil vapour intrusion (inhalation) / Direct contact *	There is a potential for vapour intrusion into buildings and service trenches, and direct contact with soil during construction and maintenance works.
Soil Type	Sand	In the absence of laboratory particle analysis sand HSLs have been adopted as an initial conservative screen); sand being logged as a component of the sub-surface profile.
Depth to contamination	0 m to <1 m or 0 m to <2 m	Fill and near surface soils are identified as the most likely impacted media.

*Developed by CRC CARE (2011)

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The adopted soil HIL and HSL for the potential contaminants of concern are presented in Tables 3 and 4.

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Table 3: Health Investigation and Screening Levels (HIL and HSL) in mg/kg unless otherwise indicated – Commercial/Industrial

Contaminants		HIL-D, HSL-D, Direct Contact	HSL-D Vapour Intrusion
Metals	Arsenic	3000	-
	Cadmium	900	-
	Chromium (VI)	3,600	-
	Copper	240,000	-
	Lead	1,500	-
	Mercury (inorganic)	120	-
	Nickel	730	-
	Zinc	400,000	-
PAH	Benzo(a)pyrene TEQ[1]	40	-
	Naphthalene	2,200	-
	Total PAH	4000	-
TRH	C6 – C10 (less BTEX) [F1]	26,000	260
	>C10-C16 (less Naphthalene) [F2]	20,000	NL
	>C16-C34 [F3]	27,000	-
	>C34-C40 [F4]	8,100	-
BTEX	Benzene	430	3
	Toluene	99,000	NL
	Ethylbenzene	27,000	NL
	Xylenes	81,000	230
Phenol	Phenol	240,000	-
OCP	Aldrin + Dieldrin	45	-
	Chlordane	530	-
	DDT+DDE+DDD	3,600	-
	Endosulfan	2,000	-
	Endrin	100	-
	Heptachlor	50	-
	HCB	80	-
	Methoxychlor	2,500	-
PCB [2]		7	-

Notes: 1. sum of carcinogenic PAH
2. non dioxin-like PCBs only.
3. NL – Not limiting

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Table 4: Health Investigation and Screening Levels (HIL and HSL) in mg/kg unless otherwise indicated – Intrusive Maintenance Worker

Contaminants		HSL-Intrusive Maintenance Worker, Direct Contact	HSL-Intrusive Maintenance Worker, Vapour Intrusion
Metals	Arsenic	-	-
	Cadmium	-	-
	Chromium (VI)	-	-
	Copper	-	-
	Lead	-	-
	Mercury (inorganic)	-	-
	Nickel	-	-
	Zinc	-	-
PAH	Benzo(a)pyrene TEQ[1]	-	-
	Naphthalene	-	-
	Total PAH	-	-
TRH	C6 – C10 (less BTEX) [F1]	82,000	NL
	>C10-C16 (less Naphthalene) [F2]	62,000	NL
	>C16-C34 [F3]	85,000	-
	>C34-C40 [F4]	120,000	-
BTEX	Benzene	1,100	77
	Toluene	120,000	NL
	Ethylbenzene	85,000	NL
	Xylenes	130,000	NL
Phenol	Phenol	-	-
OCP	Aldrin + Dieldrin	-	-
	Chlordane	-	-
	DDT+DDE+DDD	-	-
	Endosulfan	-	-
	Endrin	-	-
	Heptachlor	-	-
	HCB	-	-
	Methoxychlor	-	-

Notes: NL – Not limiting

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8.1.2 Ecological Investigation Levels

Ecological Investigation Levels (EIL) have been derived for selected metals and organic compounds and are applicable for assessing risk to terrestrial ecosystems (NEPC, 2013). EIL depend on specific soil physiochemical properties and land use scenarios and generally apply to the top 2 m of soil, which corresponds to the root zone and habitation zone of many species. The EIL is determined for a contaminant based on the sum of the ambient background concentration (ABC) and an added contaminant limit (ACL). The ABC of a contaminant is the soil concentration in a specific locality that is the sum of naturally occurring background levels and the contaminants levels that have been introduced from diffuse or non-point sources (e.g. motor vehicle emissions). The ACL is the added concentration (above the ABC) of a contaminant above which further appropriate investigation and evaluation of the impact on ecological values is required.

The EIL is calculated using the following formula:

EIL = ABC + ACL,

The ABC is determined through direct measurement at an appropriate reference site (preferred, but not available for the current project) or through the use of methods defined by Olszowy et al *Trace element concentrations in soils from rural and urban areas of Australia*, Contaminated Sites monograph no. 4, South Australian Health Commission, Adelaide, Australia 1995 (Olszowy, 1995) or Hamon et al, *Geochemical indices allow estimation of heavy metal background concentrations in soils*, Global Biogeochemical Cycles, vol. 18, GB1014, (Hamon, 2004). ACL is based on the soil characteristics of pH, CEC and clay content.

EILs (and ACLs where appropriate) have been derived in NEPC (2013) for only a short list of contaminants comprising As, Cu, Cr (III), DDT, naphthalene, Ni, Pb and Zn. An *Interactive (Excel) Calculation Spreadsheet* may be used for calculating site-specific EIL for these contaminants, and has been provided in the ASC NEPM Toolbox available on the SCEW (Standing Council on Environment and Water) website (http://www.scew.gov.au/node/941).

The adopted EIL, derived from Tables 1B(1) to 1B(5), Schedule B1 of NEPC (2013) are shown in the following Table 6. The following site specific data and assumptions have been used to determine the EILs:

- a protection level of 80% has been adopted;
- the EILs will apply to the top 2 m;
- given the likely source of soil contaminants (i.e. historical filling) the contamination is considered as “aged” (>2 years);
- ABCs have been taken as the approximate average EPA background concentrations for NSW as published in Olszowy (1995); and
- Site specific pH and CEC have been tested, and as such these values have been used in the determination of EILs, where appropriate.

The adopted EILs are listed in the following Table 5.

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Table 5: Ecological Investigation Levels (EIL) in mg/kg

Analyte		ABC[1]	ACL	EIL[2]	Comments
Metals	Arsenic	NA	NA	160	Adopted parameters: pH of 7.8 (average tested); CEC of 18 $cmol_c/kg$ (average tested); organic carbon 1% (assumed); sand content (based on logs)
	Copper	-	330	330	
	Nickel	-	430	430	
	Chromium III	20	530	550	
	Lead	NA	NA	1,800	
	Zinc	140	1100	1240	
OCP	DDT	-	NA	640	
PAH	Naphthalene	-	NA	370	

Notes: 1. Taken from Olszowy (1995)
2. Commercial/industrial

8.1.3 Ecological Screening Levels – Petroleum Hydrocarbons

Ecological Screening Levels (ESL) are used to assess the risk of selected petroleum hydrocarbon compounds, BTEX and benzo(a)pyrene to terrestrial ecosystems. ESL apply to the top 2 m of the soil profile as for EIL.

ESL have been derived in NEPC (2013) for petroleum fractions F1 to F4 as well as BTEX and benzo(a)pyrene. Site specific data and assumptions as summarised in Table 6 have been used to determine the ESL. The adopted ESL, from Table 1B(6), Schedule B1 of NEPC (2013) are shown in Table 7.

Table 6: Inputs to the Derivation of ESL

Variable	Input	Rationale
Depth of ESL application	Top 2 m of the soil profile	The top 2 m depth below ground level corresponds to the root zone and habitation zone of many species.
Land use	Commercial	Proposed feed and grain production site
Soil Texture	Coarse	Sandy filling was identified as the most conservative soil type in the test pits.

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Table 7: Ecological Screening Levels (ESL) in mg/kg

Analyte		ESL	Comments
TPH	C6 – C10 (less BTEX) [F1]	215*	
	>C10-C16 (less Naphthalene) [F2]	170*	All ESLs are low reliability apart from those marked with * which are moderate reliability
	>C16-C34 [F3]	1,700	
	>C34-C40 [F4]	3,300	
BTEX	Benzene	75	
	Toluene	135	
	Ethylbenzene	165	
	Xylenes	180	
PAH	Benzo(a)pyrene	1.4	

8.1.4 Management Limits – Petroleum Hydrocarbons

In addition to appropriate consideration and application of the HSLs, there are additional considerations which reflect the nature and properties of petroleum hydrocarbons, including:

- Formation of observable light non-aqueous phase liquids (LNAPL);
- Fire and explosion hazards;
- Effects on buried infrastructure e.g. penetration of, or damage to, in-ground services.

Management Limits to avoid or minimise these potential effects have been adopted in NEPC (2013) as interim Tier 1 guidance. Management Limits have been derived in NEPC (2013) for the same four petroleum fractions as the HSL (F1 to F4). The adopted Management Limits, from Table 1B(7), Schedule B1 of NEPC (2013) are shown in the following Table 8. The following site specific data and assumptions have been used to determine the Management Limits:

- the Management Limits will apply to any depth within the soil profile;
- the Management Limits for commercial land use apply;
- A “coarse” soil texture has been adopted, due to the high clay content observed during the investigation and to take a conservative approach.

Table 8: Management Limits in mg/kg

Analyte		Management Limit
TRH	$C_6 – C_{10}$ (F1) #	700
	$>C_{10}-C_{16}$ (F2) #	1,000
	$>C_{16}-C_{34}$ (F3)	3,500
	$>C_{34}-C_{40}$ (F4)	10,000

Separate management limits for BTEX and naphthalene are not available hence these have not been subtracted from the relevant fractions to obtain F1 and F2

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8.1.5 Asbestos in Soil

Bonded asbestos-containing material (ACM) is the most common form of asbestos contamination across Australia, generally arising from:

- Inadequate removal and disposal practices during demolition of buildings containing asbestos products;
- Widespread dumping of asbestos products and asbestos containing fill on vacant land and development sites; and
- Commonly occurring in historical fill containing unsorted demolition materials.

Mining, manufacturing or distribution of asbestos products may result in sites being contaminated by friable asbestos including free fibres. Severe weathering or damage to bonded ACM may also result in the formation of friable asbestos comprising fibrous asbestos (FA) and/or asbestos fines (AF).

Asbestos only poses a risk to human health when asbestos fibres are made airborne and inhaled. If asbestos is bound in a matrix such as cement or resin, it is not readily made airborne except through substantial physical damage. Bonded ACM in sound condition represents a low human health risk, whilst both FA and AF materials have the potential to generate, or be associated with, free asbestos fibres. Consequently, FA and AF must be carefully managed to prevent the release of asbestos fibres into the air.

A detailed asbestos assessment as outlined in NEPC (2013) was not undertaken as part of the DSI as the propensity for asbestos contamination had not yet been identified. Therefore the presence or absence of asbestos at a limit of reporting of 0.1 g/kg (and no respirable fibres) has been adopted for this investigation as an initial screen.

8.2 Aggregate

The assessment of the processed aggregate was conducted with the reference to the Recovered Aggregate Exemption and the Recovered Aggregate Order. The Recovered Aggregate Exemption applies as follows:

- This exemption applies to recovered aggregate that is, or is intended to be, applied to land for road making activities, building, landscaping and construction works;
- Recovered aggregate is a material comprising of concrete, brick, ceramics, natural rock and asphalt processed into an engineered material. This does not include refractory bricks or associated refractory materials, or asphalt that contains coal tar;
- The material must meet all chemical and other material requirements for recovered aggregate which are required on or before the supply of recovered aggregate under ‘the recovered aggregate order 2014’; and
- The recovered aggregate can only be applied to land in road making activities, building, landscaping and construction works.

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The chemical and other material requirements for recovered aggregate are listed in Table 1 of the Recovered Aggregate Order, and repeated in the following Table 9.

Table 9: Recovered Aggregate Order Chemical Requirements

Column 1	Column 2	Column 3	Column 4
Chemicals and other attributes	**Maximum average concentration for characterisation** (mg/kg 'dry weight' unless otherwise specified)	**Maximum average concentration for routine testing** (mg/kg 'dry weight' unless otherwise specified)	**Absolute maximum concentration** (mg/kg 'dry weight' unless otherwise specified)
1. Mercury	0.5	Not required	1
2. Cadmium	0.5	0.5	1.5
3. Lead	75	75	150
4. Arsenic	20	Not required	40
5. Chromium (total)	60	60	120
6. Copper	60	60	150
7. Nickel	40	Not required	80
8. Zinc	200	200	350
9. Electrical Conductivity	1.5 dS/m	1.5dS/m	3 dS/m
10. Metal	1%	1%	2%
11. Plaster	0.25%	0.25%	0.5%
12. Rubber, plastic, paper, cloth, paint, wood and other vegetable matter	0.2%	0.2%	0.3%

9. Fieldwork Results

The subsurface conditions encountered in the test pits are presented in the test pit logs in Appendix F. Notes defining descriptive terms and classification methods are also included in Appendix F.

The principal strata sequentially encountered in the test pits across the site comprised:

- Top soil – Grassed dark brown clayey sand, variable to depths up to 0.1 m;
- Filling – generally sand filling (predominantly a crushed sandstone consistent with Witt, 2014), some with traces of gravel, brick, plastic, concrete, metal, and PVC pipe to depths of up to 3.3 m (average 0.7 m);
- Silty clay / clay – Stiff to hard clay, variable depths from 0.05 m to 3.5 m;

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- Shale – Extremely weathered to highly weathered shale, variable top of rock depths from 0.45 m and 0.8 m;
- Sandstone – Extremely weathered to highly weathered sandstone, variable top of rock depths from about 0.05 m to 1.36 m.

The sampled aggregate in the stockpiles comprised crushed and processed concrete and brick.

No potential asbestos containing materials (ACM) were observed in the test pits.

All PID screening results were low, suggesting an absence of volatile contaminants in the soil samples.

10. Laboratory Testing

The results of the laboratory analysis undertaken are presented in Tables 10 and 11, Appendix G.

The full laboratory reports together with the chain of custody and sample receipt information are presented in Appendix E.

11. Discussion of Results

11.1 Soil

The field results suggest that the subject site is underlain by a variable (but generally shallow) depth of filling, then silty clay and clay and sandstone or shale bedrock. There was nothing observed during the fieldwork to suggest that there is a high potential for contamination of the soils encountered.

The analytical results for the soil samples indicated that the concentrations of BTEX, PCB, OCP, OPP and phenols in all soil samples analysed were below the laboratory's limit of reporting and within the adopted SAC.

Low concentrations of TRH and heavy metals were recorded which were all within the adopted SAC.

Asbestos was not observed in any of the soil samples and was not detected at the reporting limit in any samples analysed for asbestos.

11.2 Aggregate

An assessment of the results in respect to the Recovered Aggregate Order criteria follows:

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- Recorded concentrations of arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc were within the average allowable and absolute maximum allowable concentrations;
- Values for electrical conductivity were within the average allowable and absolute maximum allowable concentrations for all samples; and
- The percentages of foreign materials were within the average allowable and absolute maximum allowable concentrations for all samples.

12. Conclusion and Recommendations

Based on the field and analytical results presented in this report, it is concluded that the fill at the site, within the area shown on Drawing 1, is suitable to be retained under the proposed commercial land use, which is understood to include the storage and distribution of stock feed and grains.

The processed aggregate complies with the Recovered Aggregate Exemption and Recovered Aggregate Order and is therefore suitable for land application in road making activities, building, landscaping and construction works.

13. Limitations

Douglas Partners Pty Ltd (DP) has prepared this report for 915 Mamre Road, Kemps Creek, in general accordance with the email proposal dated 6 November2014. This report is provided for the exclusive use of Olathree Pty Ltd for the specific project and purpose as described in the report. It should not be used by or relied upon for other projects or purposes on the same or other site or by a third party.

Any party so relying upon this report beyond its exclusive use and purpose as stated above, and without the express written consent of DP, does so entirely at its own risk and without recourse to DP for any loss or damage. In preparing this report DP has necessarily relied upon information provided by the client and/or their agents.

The results provided in the report are indicative of the sub-surface conditions on the site only at the specific testing locations, and then only to the depths investigated and at the time the work was carried out. Sub-surface conditions can change abruptly due to variable geological processes and also as a result of human influences. Such changes may occur after DP's field testing has been completed.

DP's advice is based upon the conditions encountered during this investigation. The accuracy of the advice provided by DP in this report may be affected by undetected variations in ground conditions across the site between and beyond the testing locations. The advice may also be limited by budget constraints imposed by others or by site accessibility.

Asbestos-based materials have not been detected by observation or by laboratory analysis either on the surface of the site or in fill at the locations sampled and analysed. A secondary indicator of

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the possible presence of asbestos-based materials is the presence of demolition materials including concrete, brick, tile and/or other miscellaneous waste materials. Such materials were not detected on the surface of the site at the locations sampled and analysed. The sampling plan adopted for this investigation is appropriate to achieve the stated project objectives, however, there are necessarily parts of the site that have not been sampled and analysed or visually assessed. It is therefore possible that asbestos-based materials may be present in unobserved areas of the site or between sample points and no warranty can be given that asbestos is not present.

This report must be read in conjunction with all of the attached notes and should be kept in its entirety without separation of individual pages or sections. DP cannot be held responsible for interpretations or conclusions made by others unless they are supported by an expressed statement, interpretation, outcome or conclusion stated in this report.

This report, or sections from this report, should not be used as part of a specification for a project, without review and agreement by DP. This is because this report has been written as advice and opinion rather than instructions for construction.

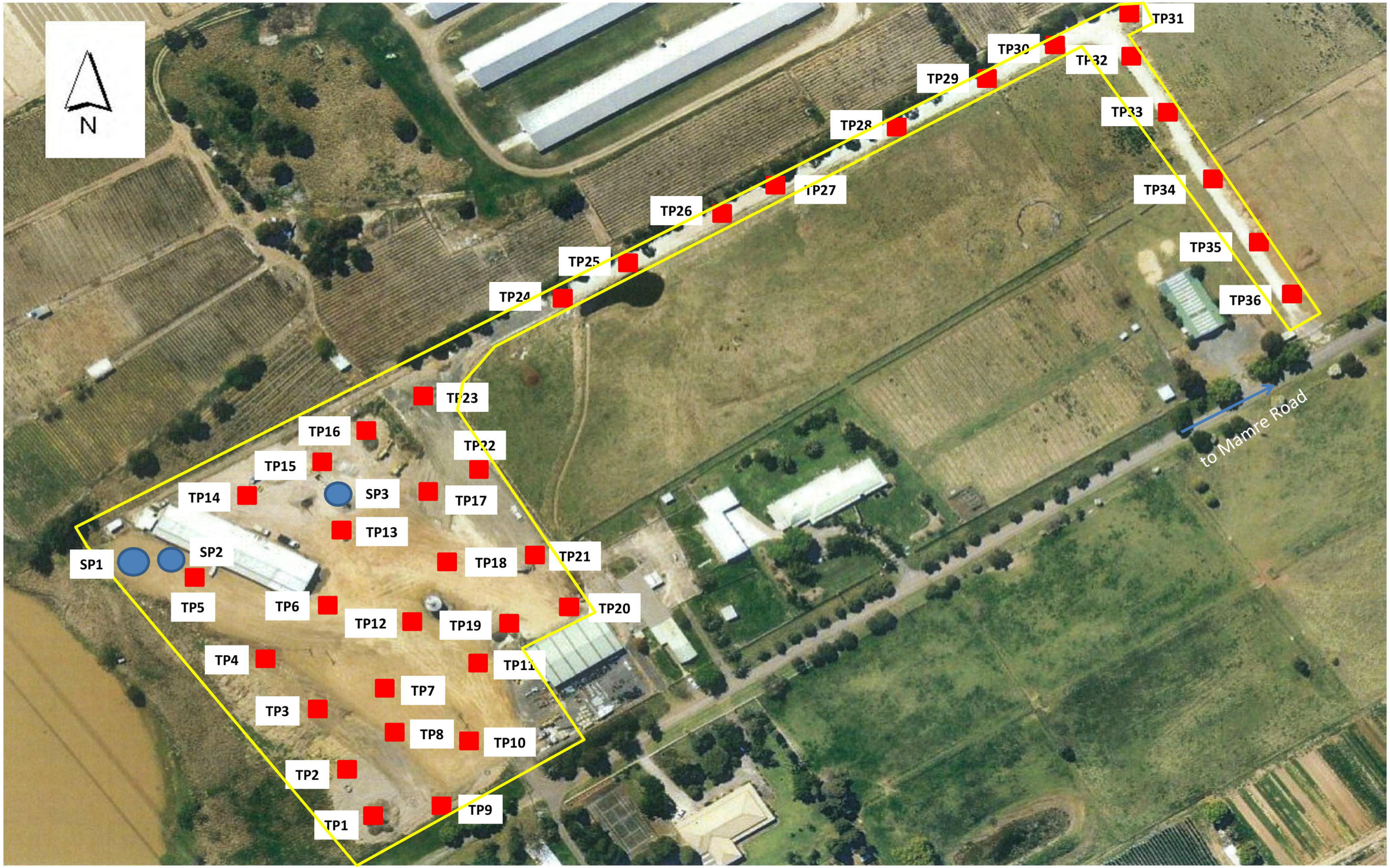
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Appendix A

Drawing

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Douglas Partners Geotechnics / Environment / Groundwater	CLIENT: Olathree Pty Ltd		TITLE: **Site Layout and Sampling Locations** **915 Mamre Road, Kemps Creek**	PROJECT No:	84601
	OFFICE: Sydney	DRAWN BY: RJL		DRAWING No:	1
	SCALE: NTS	DATE: ##########		REVISION:	A

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Appendix B

Data Quality Objectives

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Data Quality Objectives

The Contamination Investigation has been devised broadly in accordance with the seven step data quality objective (DQO) process, also provided in this appendix, Schedule B2 of the *National Environment Protection (Assessment of Site Contamination) Measure* 1999 as amended 2013 (NEPC 2013). The DQO process is outlined as follows:

(1) State the Problem

Olathree Pty Ltd plan to utilise the site for commercial purposes. Filling of the site has been identified by Penrith City Council and NSW EPA. The "problem" to be addressed is the suitability of the fill and processed aggregate to remain on the site.

(2) Identify the Decision/Objectives of the Study

The contamination investigation is aimed at assessing the suitability of fill and processed aggregate to remain on the site.

The analytical data were compared to health investigation levels (HIL), health screening levels (HSL), ecological investigation levels (EIL), ecological screening levels (ESL) and management limits referenced from NEPC (2013). The assessment of the suitability of the subject site for the proposed development was based on the comparison of the analytical results for all contaminants of potential concern (COPC) to the adopted site assessment criteria (SAC).

The following specific decisions were made, as appropriate:

- What is the conceptual site model (i.e. sources, receptors, migration pathways, exposure)?
- Do the existing soils pose a potential risk to identified receptors?
- Is the data sufficient to make a decision regarding the abovementioned risks, and the compatibility of the subject material for retention on the site?

(3) Identify Information Inputs

Inputs into the decisions are as follows:

- Regional geology, topography and hydrogeology*;*
- Soil samples collected from a total of 36 test pits along with three stockpile locations were positioned across the accessible areas of the subject site, and analysed for the COPC*;*
- The lithology of the site as described in the test pit logs;
- Field and laboratory QA/QC data to assess the suitability of the environmental data for the assessment;
- All analysis undertaken at a NATA accredited laboratory; and
- The comparison of analytical test results with NEPC (2013) criteria discussed in Section 7 of the report.

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(4) Define the Study Boundaries

The study boundaries are defined in Section 3.1 of the report and the site drawing, Appendix A.

(5) Develop the Analytical Approach (or decision rule)

The information obtained during the assessment was used to characterise the fill and aggregate in terms of contamination issues and risk to human health and/or the environment. The decision rules used in characterising the subject site were as follows:

- Selected soil samples were analysed for the COPC;
- Laboratory test results for the systematic soil samples (i.e. non-targeted soil samples) were assessed individually;
- The adopted SAC were those published and/or endorsed by the NSW EPA.

Field and laboratory test results were considered useable for the assessment after evaluation against the following data quality indicators (DQIs), which are also evaluated in this appendix.

- Precision – a measure of variability or reproducibility of data;
- Accuracy – a measure of closeness of the data to the 'true' value;
- Representativeness – the confidence (qualitative) of data representativeness of media present on site;
- Completeness – a measure of the amount of usable data from a data collection activity; and
- Comparability – the confidence (qualitative) that data may be considered to be equivalent for each sampling and analytical event.

(6) Specify the Performance or Acceptable Criteria

Decision errors for the analysis and evaluation of the respective COPC in soil are:

1. Deciding that the site requires remediation /management when it truly does not
2. Deciding that the site does not require remediation /management when it truly does

Decision errors for the proposed assessment were minimised and measured by the following:

- The sampling regime targeted the fill and aggregate;
- Sample collection and handling techniques were in accordance with industry practice as outlined in DP's Field Procedures Manual;
- Samples were prepared and analysed by NATA-accredited laboratories with the acceptance limits for laboratory QA/QC parameters based on the laboratory reported acceptance limits and those stated in NEPC (2013);
- The analyte selection is based on the available site history, past site activities, site features and the findings reported in DP (2010). The potential for contaminants other than those analysed is considered to be low;

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- The SAC were adopted from established and NSW EPA endorsed guidelines. Where not available, recognised national and international guidelines were used. The SAC have risk probabilities already incorporated;
- Only NATA accredited laboratories using NATA endorsed methods are used to perform laboratory analysis. Where NATA endorsed methods are not used, the reasons are stated. The effect of using non-NATA methods on the decision making process are explained.

(7) Optimise the design for obtaining data

Sampling design and procedures that were implemented to optimise data collection for achieving the DQOs included the following:

- Only NATA accredited laboratories using NATA endorsed methods were used to perform laboratory analysis; and
- An adequately experienced environmental scientist conducted the field work and sample analysis interpretation.

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Appendix C

Data Quality Indicators

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Data Quality Indicators

Field and laboratory procedures were assessed against the following data quality indicators (DQIs):

- Completeness – a measure of the amount of usable data from a data collection activity;
- Comparability – the confidence (qualitative) that data may be considered to be equivalent for each sampling and analytical event;
- Representativeness – the confidence (qualitative) of data representativeness of media present on-site;
- Precision – a measure of variability or reproducibility of data; and
- Accuracy – a measure of closeness of the data to the 'true' value.

The DQIs were assessed as outlined in the following table.

DQI	Considerations as specified in NEPM Schedule B2	Comment
Completeness		
Field Considerations	All critical locations sampled	Fill and processed aggregate were sampled.
	All samples collected (from grid and at depth)	Test pits were located on a general grid basis over accessible portions of the site. Soils from the depths of concern were collected and analysed.
	Standard operating practices (SOPs) appropriate and complied with	Field staff followed SOPs as defined in the DP *Field Procedures Manual.* Samples were recovered from the excavator bucket. The procedure was considered adequate given the low potential for volatile contaminants.
	Experienced sampler	A DP environmental scientist with 3 years' experience led the field team.
	Documentation correct	The documentation included the fieldwork instruction sheet, test pit logs, and chains of custody, all of which were reviewed by the Project Manager (Senior Associate).
Laboratory Considerations	All critical samples analysed according to the proposal and Waste Classification report (DP, 2013)	The DP proposal was followed. Any variation to the proposal has been recorded in the report.

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DQI	Considerations as specified in NEPM Schedule B2	Comment
	All analytes analysed according to the proposal	Contaminants of potential concern identified in DP (2013) have been assessed.
	Appropriate methods and PQLs/LOR	NATA approved methods have been adopted. Limits of reporting (LORs) and practical quantitation limits (PQLs) in accordance with the method have been used by the contract laboratory.
	Sample Documentation complete	Chain-of-custody (CoC) maintained and appended to the Certificates of Analysis(s). All Certificates of Analysis are complete and appended to the report.
	Sample holding times complied with	Sample holding times complied with by the NATA accredited laboratory.
Comparability		
Field Considerations	Same SOPs used on each occasion	Field staff followed SOPs for the day of sampling as defined in the DP Field Procedures Manual
	Experienced sampler	As above
	Climatic conditions	Fine conditions were experienced on the days of sampling.
	Same types of samples collected	Field staff followed SOPs as defined in the DP Field Procedures Manual. All samples were essentially undisturbed and collected from the middle of the excavator bucket.
Laboratory Considerations	Sample analytical methods used	The laboratory used is accredited by NATA for the analyses undertaken. Laboratory methods are as stated on the Certificates of Analysis
	Sample PQLs / LORs	PQL or LOR set by the laboratories are below the adopted site criteria or indicate across-the-board lack of detection.
	Same laboratories	Envirolab Services was used for primary sample analysis.

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DQI	Considerations as specified in NEPM Schedule B2	Comment
	Same units	All laboratory results are expressed in consistent units for each analyte/ media type.
Representativeness		
Field Considerations	Appropriate media sampled according to the CSM	Yes
	Appropriate media identified in CSM sampled	Yes
Laboratory Considerations	Appropriate samples analysed to address the issues identified in the CSM	Yes
Precision		
Field Considerations	SOPs appropriate and complied with	Field staff followed SOPs as defined in the DP Field procedures Manual.
Laboratory Considerations	Analysis of: 1) laboratory and inter-laboratory duplicates 2) field duplicates 3) laboratory-prepared volatile trip spikes	The DSI included the analysis of duplicates, trip spike and trip blank samples. The laboratory acceptance limits are: [1) Average relative percentage difference (RPD) result <10 times PQL/LOR, no limit; results >10 times PQL/LOR, 0% -50% 2) Average relative percentage difference (RPD) result <10 times PQL/LOR, no limit; results >10 times PQL/LOR, 0% -50% 3) Recovery of 70-130%]
Accuracy (bias)		
Field Considerations	SOPs appropriate and complied with	Field staff followed the SOPs as defined in the DP Field procedures Manual.
Laboratory Considerations	Analysis of: 1) field blanks	Envirolab Services included as part of their QC blanks, duplicates, spikes and control samples. The laboratory acceptance limits are: 1) Concentrations of analytes are <PQL/LOR 2) Concentrations of analytes

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DQI	Considerations as specified in NEPM Schedule B2	Comment
	2) rinsate blank	are <PQL/LOR
	3) reagent blank/method blank	3) Recoveries are within 60-140%.
	4) matrix spike	4) Recoveries within 70-130% for inorganics and 60-140% for organics.
	5) surrogate spike	5) Recoveries are within 70-130% for inorganics and 60-140% for organics.
	6) reference material	6) Analysis within the acceptable limits of the Certificate of Analysis for the reference material. These results are generally not contained in the Certificate of Analysis.
	7) laboratory control sample	7) Recoveries are within 70-130% for inorganics and 60-140% for organics.
	8) laboratory-prepared spikes	8) Recoveries are within 60-140%.

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Appendix D

Field and Laboratory QA/QC

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QA/QC PROCEDURES AND RESULTS

Q1 FIELD QUALITY ASSURANCE AND QUALITY CONTROL

The field quality control (QC) procedures for sampling as prescribed in Douglas Partners *Field Procedures Manual* were followed at all times during the assessment.

Q1.1 Sampling Team

Field sampling was undertaken by DP Environmental Scientist Richard Lamont on 12 and 13 November 2014. Sampling was undertaken during fine weather conditions.

Q1.2 Sample Collection and Dispatch

Sample collection procedures and dispatch for soil are reported in Section 6 of the report.

Q1.3 Logs

Logs for each sampling location were recorded in the field. The location of individual samples were recorded on the field logs along with location, depth, initials of sampler, replicate locations and replicate type. Logs are presented in Appendix C.

Q1.4 Chain-of-Custody (COC)

Analysis to be performed on each sample was recorded on the COC which accompanied samples to the analytical laboratory. Signed copies of COCs are presented in Appendix E, following the laboratory reports.

Q1.5 Sample Splitting Techniques

Replicate samples were collected in the field as a measure of accuracy, precision and repeatability of the results. Field replicate samples for soil were collected from the same location and at an identical depth to the primary sample. Equal portions of the recovered sample were placed into the sampling jars and sealed. The sample was not homogenised in a bowl and then split, as this process can lead to loss of volatiles from the soil should they be present. Replicate samples were labelled with a DP identification number, recorded on DP bore logs, so as to conceal their relationship to their primary sample from the analysing laboratory.

Q1.6 Decontamination Procedures

Soil samples were recovered directly from the centre of the excavator bucket by the Environmental Scientist using disposable latex gloves. No additional sampling equipment was utilised therefore negating the need for decontamination.

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Q1.7 Trip Spikes

According to the NSW EPA *Guidelines for Consultants Reporting on Contaminated Sites* (2011), laboratory prepared trip spikes are to be taken into the field, subjected to the same preservation methods as the field samples, then analysed, for the purposes of determining the losses in volatile organics incurred prior to reaching the laboratory.

The laboratory prepared a soil trip spike which were preserved in the standard manner and taken into the field unopened. The volatile organic recovery rates are shown below. At this stage, the laboratory has no standard acceptance limits in recovery rates as results from in-house laboratory controls often vary. Results (Table Q1) indicate that the percentage loss for BTEX during the sample transport was minimal and therefore it is considered that appropriate preservation techniques were employed. The results also indicate that any potential loss of volatiles from the recovered samples that might have occurred would only be minimal and would therefore not affect the outcome/conclusions of the assessment.

Table Q1 – Trip Spike Results

Sample ID	Matrix	Recovery (%)				
		Benzene	Toluene	Ethyl Benzene	m+p xylene	o xylene
TS	soil	91	91	91	90	90

Q1.8 Trip Blanks

Laboratory prepared soil and water trip blanks were taken out to the field unopened, subjected to the same preservation methods as the field samples, then analysed for the purposes of determining the transfer of contaminants into the blank sample prior to analysis. The result of the laboratory analysis for the trip blanks is shown in Table Q2.

Table Q2 -Trip Blank Results

Sample ID	Matrix	BTEX				
		Benzene	Toluene	Ethyl Benzene	m+p xylene	o xylene
TB	soil	<0.2	<0.5	<1	<2	<1

The concentrations of analytes were all below practical quantitation limits indicating that cross contamination had not occurred during the course of the round trip from the site to the laboratory.

Q1.9 Relative Percentage Difference

A measure of the consistency of results for field samples is derived by the calculation of relative percentage differences (RPDs) for duplicate samples. A RPD of ± 30% is generally considered acceptable for inorganic analytes by the EPA, although in general a wider RPD range may be acceptable for organic analytes (up to 50%).

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Intra-laboratory replicates were conducted as an internal check of the reproductively within the primary laboratory (Envirolab Services Pty Ltd) and as a measure of consistency of sampling techniques. Replicate samples were collected at a rate of approximately one replicate sample for every ten original samples collected and also analysed at a rate of 10% of primary samples analysed. Chemicals of concern were analysed at a higher frequency to other chemicals of secondary concern. One sample and its replicate pair was analysed for heavy metals, TRH, BTEX and PAH.

The comparative results of analysis between original and replicate samples are summarised in the tables below.

Table Q3 – Intra-laboratory Results TRH, BTEX, PAH

Sample ID	TRH		BTEX				PAH	
	C6-C9	C10-C36	Benzene	Toluene	Ethyl-benzene	m + p-Xylene	BaP	Total PAH
TP4/0.3-0.4	<25	<250	<0.5	<0.5	<1	<2	<0.05	<2
BD1/121114	<25	<250	<0.5	<0.5	<1	<2	<0.05	<2
Difference	0	0	0	0	0	0	0	0
RPD%	0	0	0	0	0	0	0	0
TP19/0.1-0.2	<25	290	<0.5	<0.5	<1	<2	<0.05	<2
BD1/131114	<25	410	<0.5	<0.5	<1	<2	<0.05	2.5
Difference	0	120	0	0	0	0	0	0.5
RPD%	**0**	**34**	**0**	**0**	**0**	**0**	**0**	22

Table Q4 – Intra-laboratory Results – Heavy Metals

Sample ID	Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc
TP4/0.3-0.4	7	0.4	16	32	28	<0.1	21	140
BD1/121114	8	0.4	34	33	27	<0.1	19	120
Difference	1	0	18	1	1	0	2	20
RPD%	**13**	**0**	**72**	**3**	**4**	**0**	**10**	**15**
TP19/0.1-0.2	<4	<0.4	9	19	21	<0.1	41	110
BD1/131114	<4	<0.4	13	27	22	<0.1	42	120
Difference	0	0	4	8	1	0	1	10
RPD%	**0**	**0**	**36**	**35**	**5**	**0**	**2**	**9**

The calculated RPD values were all within the acceptable range of ± 50% for the samples and their replicates with the exception of those shaded. However, these results are not considered to be of concern due to:

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- The low actual difference between the concentrations; and/or
- The concentrations being at or close to the practical quantitation limit.

It is considered that the results, overall, indicate an acceptable consistency between the samples and their replicates and indicate that suitable field sampling methodology was adopted and laboratory precision was achieved.

Q2 LABORATORY QUALITY ASSURANCE AND QUALITY CONTROL

Q2.1 Laboratory Accreditation

Only laboratories accredited by the National Association of Testing Authorities (NATA) for the chemical analyses undertaken were used for analysis of samples recovered as part of this assessment. Samples were submitted to Envirolab Services Pty Ltd (Chatswood) for analysis:

Envirolab Services are NATA accredited for the analyses undertaken. Envirolab's accreditation number is 2901 and they are accredited for compliance with ISO/IEC 17025. In-house procedures are employed by Envirolab in the absence of documented standards. This is performed yearly and is reviewed by NATA.

Envirolab participate in all common Proficiency Rounds including NARL (NMI) for organics and metals, PTA (NATA for organics, inorganics, asbestos and metals, QLD Govt for SPOCAS and National Residue Survey for metals). Envirolab also participate in non-accredited rounds conducted by the University of Wollongong.

Q2.2 Chain-of-Custody

Chain-of-custody information was recorded on the DP standard chain-of-custody (COC) sheets, which accompanied samples to the analytical laboratories. COCs contained sampling date, receipt date and time and the identity of samples. Copies of COCs, signed by the analytical laboratories, are presented in Appendix E, following the laboratory reports.

Q2.3 Batch Numbers and Holding Times

The following table lists the laboratory batch numbers applicable to this assessment, together with the corresponding sampling, sample receipt and COC receipt dates.

Table Q5 – Batch Details

Laboratory	Batch No.	Sampling Date	COC Receipt
Envirolab	119345	12/11/2014 and 13/11/2014	14/11/2014

Schedule B(3) of the *National Environment Protection (Assessment of Site Contamination) Measure* 2013 (NEPM) prepared by the National Environment Protection Council (NEPC), details recommended maximum holding times for samples for various analytes.

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A review of the laboratory report sheets and chain-of-custody documentation indicated that holding times were met by both laboratories, as summarised in the table below.

Table Q6 - Holding Times

Matrix	Analyte	Recommended maximum holding time	Holding time met
Soil	Heavy Metals: As, Cd, Cr, Cu, Pb, Hg, Ni, Zn	6 months	yes
	TPH C_6-C_9	14 days	yes
	TPH C_{10}-C_{36}	14 days	yes
	BTEX	14 days	yes
	PAH	14 days	yes
	OCP	14 days	yes
	PCB	14 days	yes
	Phenols	14 days	yes
	Asbestos	Nil	Not applicable

Q2.4 Analytical Methods

The laboratory analytical methods are provided on the laboratory certificates in Appendix E and summarised below in Tables Q7.

The test methods used by the laboratories generally comply with those listed in the NEPM and the Australian and New Zealand Environment and Conservation Council (ANZECC)-1996 "*Guidelines for the Laboratory Analysis of Contaminated Soils*". Alternate methods used by Envirolab (i.e. not identified in the NEPM and ANZECC guidelines) have been validated by Envirolab, as recommended in the NEPM and ANZECC guidelines, and endorsed by NATA.

Table Q7 - Soil Analysis

Analyte	PQL / LOR [1] (mg/kg) Envirolab	Envirolab Reference Method
Heavy Metals Cd, Cr, Cu, Pb, Ni, Zn	1.0	ICP-AES (Metals.20)
Arsenic (As)	4.0	ICP-AES (Metals.20)
Mercury (Hg)	0.10	CV-AAS (Metals.21)
VOC	0.5-10	P&T/GC/MS (GC.14)
TPH C_6-C_9	25	P&T/GC/MS (GC.16)
TPH C_{10}-C_{36}	250	GC/FID (GC.3)

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Analyte	PQL / LOR [1] (mg/kg) Envirolab	Envirolab Reference Method
BTEX	0.5-2	P&T/GC/MS (GC.14)
OCP	0.1	GC/ECD (GC.5)
PCB	0.1	GC/ECD (GC.6)
PAH	0.05-0.1	GC/MS (GC.12 subset)
Phenols	1-10	GC/MS (GC.12)
Asbestos	qualitative identification	AS4964-2004, qualitative identification using Polarised Light Microscopy and Dispersion Staining Techniques.

1: Practical Quantitation Limit / Limit of Reporting

Q2.5 Asbestos Sub-Sampling

Asbestos analysis was undertaken on a portion of sample sub-sampled by the laboratory. This is considered to be an appropriate method to characterise the samples given that no asbestos containing materials or fibres were observed in the field.

Q2.6 Practical Quantitation Limits - PQLs

The PQL (also referred to by some laboratories as the limit of reporting) is the lowest quantity of an analyte which can be detected by the adopted analysis. PQLs at different analytical laboratories can differ depending on the analytical techniques.

The PQLs were all less than the SAC.

Q2.7 Surrogate Spike

This sample is prepared by adding a known amount of surrogate, which behaves similarly to the analyte, prior to analysis of each sample. The recovery result indicates the proportion of the known concentration of the surrogate that is detected during analysis. The following Table Q8 summarises the reported recoveries and the acceptance criteria adopted by each of the laboratories.

Table Q8 – Surrogate Spike Recoveries

Laboratory/ Report	Reported Recoveries	Acceptance Limits
Envirolab / 119345	77-123%	60-140% organics 10-140% SVOC and speciated phenols

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The reported recoveries are within acceptance limits, indicating that the extraction technique was effective.

Q2.8 Laboratory Control Sample (LCS)

This sample comprises spiking either a standard reference material or a control matrix (such as a blank of sand or water) with a known concentration of specific analytes. The control sample is analysed with the sample batch and the recorded concentrations reported as a percentage recovery of the known or expected concentration, in order to determine how the laboratory has performed with regard to sample preparation and analytical procedure. LCS are analysed at a frequency of 1 in 20, with a minimum of one analysed per batch.

The following Table Q9 summarises the reported recoveries and the acceptance criteria adopted by Envirolab.

Table Q9 – Laboratory Control Samples

Laboratory	Reported Recoveries	Acceptance Limits
Envirolab / 119345	76-125%	70-130% inorganics / metals 60-140% organics 10-140% SVOC and speciated phenols

The results are within acceptance limits as specified by lab Envirolab, indicating that the extraction and analytical techniques were effective.

Q2.9 Laboratory Duplicate Results

The laboratory prepares duplicate samples from the supplied samples (original samples) and/or laboratory spiked samples, and carries out preparation and testing in the same manner as the original sample. The duplicate sample provides an indication of laboratory precision and reproducibility. The comparisons between the laboratory duplicates and original samples are reported on the laboratory test results certificates as Relative Percentage Difference (RPD).

The following Table Q10 summarises the reported RPD and the acceptance criteria adopted by each of the laboratories.

Table Q10 – Laboratory Duplicate Samples

Laboratory	Reported Recoveries	Acceptance Limits
Envirolab / 119345	0-67%	>5xPQL : 0-50% RPD <5xPQL : any RPD

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The reported RPD for both laboratories were generally within the acceptance criteria adopted. The metals comparisons outside the acceptable limits were few and considered to be due to the non-homogeneous nature of the fill materials.

Q2.10 Laboratory Blank Results

The laboratory blank, sometimes referred to as the method blank or reagent blank is the sample prepared and analysed at the beginning of every analytical run, following calibration of the analytical apparatus. This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, it can be determined by processing solvents and reagents in exactly the same manner as for samples. Laboratory blanks are analysed at a frequency of 1 in 20, with a minimum of one per batch.

The laboratory results for blanks indicated concentrations of all analytes to be below PQL and therefore the results were considered to be acceptable.

Q2.11 Matrix Spike

The purpose of matrix spikes is to monitor the performance of the analytical methods used and to determine whether matrix interferences exist. Samples and replicates are spiked with identical concentrations of the target analyte before extraction or digestion. The results are reported as percentage recoveries of the known spike concentration.

The following Table Q11 summarises the reported RPD and the acceptance criteria adopted by each of the laboratories.

Table Q11 – Matrix Spike Samples

Laboratory	Reported Recoveries	Acceptance Limits
Envirolab / 119345	75-139%	70-130% inorganics / metals 60-140% organics 10-140% SVOC and speciated phenols

The matrix spike data presented fall within the acceptance limits of the laboratories.

Q3 - SUMMARY

Based on the QA/QC methods and results discussed above it is considered that the dataset obtained is suitable for use in assessment of contamination at the site.

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Appendix E

Laboratory Certificates

and Chain of Custody Documentation

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Envirolab Services Pty Ltd
ABN 37 112 535 645
12 Ashley St Chatswood NSW 2067
ph 02 9910 6200 fax 02 9910 6201
enquiries@envirolabservices.com.au
www.envirolabservices.com.au

CERTIFICATE OF ANALYSIS 119345

Client:
Douglas Partners Pty Ltd
96 Hermitage Rd
West Ryde
NSW 2114

Attention: Richard Lamont

Sample log in details:

Your Reference:	**84601, Site Regrading Kemps Creek**
No. of samples:	44 soils
Date samples received / completed instructions received	14/11/14 / 14/11/14

Analysis Details:
Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.
Please refer to the last page of this report for any comments relating to the results.

Report Details:

Date results requested by: / Issue Date:	21/11/14 / 21/11/14
Date of Preliminary Report:	Not Issued

NATA accreditation number 2901. This document shall not be reproduced except in full.
Accredited for compliance with ISO/IEC 17025. **Tests not covered by NATA are denoted with *.**

Results Approved By:

Jacinta Hurst
Laboratory Manager

ACCREDITED FOR TECHNICAL COMPETENCE

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vTRH(C6-C10)/BTEXN in Soil						
Our Reference:	UNITS	119345-1	119345-2	119345-3	119345-4	119345-5
Your Reference	----------	TP2	TP3	TP4	BD1/121114	TP5
Depth	----------	0-0.1	0.3-0.4	0.3-0.4	-	1.3-1.4
Date Sampled		12/11/2014	12/11/2014	12/11/2014	12/11/2014	12/11/2014
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	17/11/2014	17/11/2014	17/11/2014	17/11/2014	17/11/2014
Date analysed	-	18/11/2014	18/11/2014	18/11/2014	18/11/2014	18/11/2014
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	92	97	97	94	89

vTRH(C6-C10)/BTEXN in Soil						
Our Reference:	UNITS	119345-6	119345-7	119345-8	119345-9	119345-10
Your Reference	----------	TP6	TP7	TP8	TP9	TP10
Depth	----------	2.9-3.0	0.2-0.3	0.3-0.4	0-0.1	0-0.1
Date Sampled		12/11/2014	12/11/2014	12/11/2014	12/11/2014	12/11/2014
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	17/11/2014	17/11/2014	17/11/2014	17/11/2014	17/11/2014
Date analysed	-	18/11/2014	18/11/2014	18/11/2014	18/11/2014	18/11/2014
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	96	100	93	99	85

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vTRH(C6-C10)/BTEXN in Soil						
Our Reference:	UNITS	119345-11	119345-12	119345-13	119345-14	119345-15
Your Reference	----------	TP12	TP14	TP15	TP17	TP18
Depth	----------	0-0.05	0-0.05	0.1-0.2	0.1-0.2	0-0.05
Date Sampled		13/11/2014	13/11/2014	13/11/2014	13/11/2014	13/11/2014
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	17/11/2014	17/11/2014	17/11/2014	17/11/2014	17/11/2014
Date analysed	-	18/11/2014	18/11/2014	18/11/2014	18/11/2014	18/11/2014
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	92	97	100	102	97

vTRH(C6-C10)/BTEXN in Soil						
Our Reference:	UNITS	119345-16	119345-17	119345-18	119345-19	119345-20
Your Reference	----------	TP19	BD1/131114	TP20	TP21	TP22
Depth	----------	0.1-0.2	-	0.1-0.2	0.1-0.2	0.1-0.2
Date Sampled		13/11/2014	13/11/2014	13/11/2014	13/11/2014	13/11/2014
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	17/11/2014	17/11/2014	17/11/2014	17/11/2014	17/11/2014
Date analysed	-	18/11/2014	18/11/2014	18/11/2014	18/11/2014	18/11/2014
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	97	97	92	95	96

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vTRH(C6-C10)/BTEXN in Soil						
Our Reference:	UNITS	119345-21	119345-22	119345-23	119345-24	119345-25
Your Reference	----------	TP23	TP24	TP25	TP26	TP27
Depth	----------	0.1-0.2	0.2-0.3	0.2-0.3	0.1-0.2	0.1-0.2
Date Sampled		13/11/2014	12/11/2014	12/11/2014	12/11/2014	12/11/2014
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	17/11/2014	17/11/2014	17/11/2014	17/11/2014	17/11/2014
Date analysed	-	19/11/2014	19/11/2014	19/11/2014	19/11/2014	19/11/2014
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	84	87	81	85	94

vTRH(C6-C10)/BTEXN in Soil						
Our Reference:	UNITS	119345-26	119345-27	119345-28	119345-29	119345-30
Your Reference	----------	TP28	TP29	TP31	TP33	TP34
Depth	----------	0.1-0.2	0.1-0.2	0.1-0.2	0.2-0.3	0.7-0.8
Date Sampled		12/11/2014	12/11/2014	12/11/2014	12/11/2014	12/11/2014
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	17/11/2014	17/11/2014	17/11/2014	17/11/2014	17/11/2014
Date analysed	-	19/11/2014	19/11/2014	19/11/2014	19/11/2014	19/11/2014
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	94	92	91	91	86

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vTRH(C6-C10)/BTEXN in Soil					
Our Reference:	UNITS	119345-31	119345-32	119345-43	119345-44
Your Reference	----------	TP35	TP36	Trip Spike	Trip Blank
Depth	----------	0-0.1	0-0.1	-	-
Date Sampled		12/11/2014	12/11/2014	12/11/2014	12/11/2014
Type of sample		soil	soil	soil	soil
Date extracted	-	17/11/2014	17/11/2014	17/11/2014	17/11/2014
Date analysed	-	19/11/2014	19/11/2014	19/11/2014	19/11/2014
TRH C_6 - C_9	mg/kg	<25	<25	[NA]	[NA]
TRH C_6 - C_{10}	mg/kg	<25	<25	[NA]	[NA]
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	[NA]	[NA]
Benzene	mg/kg	<0.2	<0.2	91%	<0.2
Toluene	mg/kg	<0.5	<0.5	91%	<0.5
Ethylbenzene	mg/kg	<1	<1	91%	<1
m+p-xylene	mg/kg	<2	<2	90%	<2
o-Xylene	mg/kg	<1	<1	90%	<1
naphthalene	mg/kg	<1	<1	[NA]	[NA]
Surrogate aaa-Trifluorotoluene	%	88	89	103	92

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svTRH (C10-C40) in Soil						
Our Reference:	UNITS	119345-1	119345-2	119345-3	119345-4	119345-5
Your Reference	----------	TP2	TP3	TP4	BD1/121114	TP5
Depth	----------	0-0.1	0.3-0.4	0.3-0.4	-	1.3-1.4
Date Sampled		12/11/2014	12/11/2014	12/11/2014	12/11/2014	12/11/2014
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	17/11/2014	17/11/2014	17/11/2014	17/11/2014	17/11/2014
Date analysed	-	17/11/2014	17/11/2014	17/11/2014	17/11/2014	17/11/2014
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100	<100	<100	<100
TRH >C_{10}-C_{16}	mg/kg	<50	<50	<50	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH >C_{16}-C_{34}	mg/kg	<100	<100	<100	<100	<100
TRH >C_{34}-C_{40}	mg/kg	<100	<100	<100	<100	<100
Surrogate o-Terphenyl	%	123	101	101	92	100

svTRH (C10-C40) in Soil						
Our Reference:	UNITS	119345-6	119345-7	119345-8	119345-9	119345-10
Your Reference	----------	TP6	TP7	TP8	TP9	TP10
Depth	----------	2.9-3.0	0.2-0.3	0.3-0.4	0-0.1	0-0.1
Date Sampled		12/11/2014	12/11/2014	12/11/2014	12/11/2014	12/11/2014
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	17/11/2014	17/11/2014	17/11/2014	17/11/2014	17/11/2014
Date analysed	-	17/11/2014	17/11/2014	17/11/2014	17/11/2014	17/11/2014
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	150	<100	<100	<100
TRH >C_{10}-C_{16}	mg/kg	<50	<50	<50	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH >C_{16}-C_{34}	mg/kg	<100	140	<100	<100	<100
TRH >C_{34}-C_{40}	mg/kg	<100	160	<100	<100	<100
Surrogate o-Terphenyl	%	104	105	87	89	98

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svTRH (C10-C40) in Soil						
Our Reference:	UNITS	119345-11	119345-12	119345-13	119345-14	119345-15
Your Reference	----------	TP12	TP14	TP15	TP17	TP18
Depth	----------	0-0.05	0-0.05	0.1-0.2	0.1-0.2	0-0.05
Date Sampled		13/11/2014	13/11/2014	13/11/2014	13/11/2014	13/11/2014
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	17/11/2014	17/11/2014	17/11/2014	17/11/2014	17/11/2014
Date analysed	-	18/11/2014	18/11/2014	18/11/2014	18/11/2014	18/11/2014
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100	<100	<100	<100
TRH >C_{10}-C_{16}	mg/kg	<50	<50	<50	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH >C_{16}-C_{34}	mg/kg	<100	<100	<100	<100	<100
TRH >C_{34}-C_{40}	mg/kg	<100	<100	<100	<100	<100
Surrogate o-Terphenyl	%	99	98	101	100	102

svTRH (C10-C40) in Soil						
Our Reference:	UNITS	119345-16	119345-17	119345-18	119345-19	119345-20
Your Reference	----------	TP19	BD1/131114	TP20	TP21	TP22
Depth	----------	0.1-0.2	-	0.1-0.2	0.1-0.2	0.1-0.2
Date Sampled		13/11/2014	13/11/2014	13/11/2014	13/11/2014	13/11/2014
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	17/11/2014	17/11/2014	17/11/2014	17/11/2014	17/11/2014
Date analysed	-	18/11/2014	18/11/2014	18/11/2014	18/11/2014	18/11/2014
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	140	260	<100	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100	<100	<100	<100
TRH >C_{10}-C_{16}	mg/kg	<50	52	<50	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50	52	<50	<50	<50
TRH >C_{16}-C_{34}	mg/kg	120	230	<100	<100	<100
TRH >C_{34}-C_{40}	mg/kg	<100	<100	<100	<100	<100
Surrogate o-Terphenyl	%	95	97	84	95	97

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svTRH (C10-C40) in Soil						
Our Reference:	UNITS	119345-21	119345-22	119345-23	119345-24	119345-25
Your Reference	----------	TP23	TP24	TP25	TP26	TP27
Depth	----------	0.1-0.2	0.2-0.3	0.2-0.3	0.1-0.2	0.1-0.2
Date Sampled		13/11/2014	12/11/2014	12/11/2014	12/11/2014	12/11/2014
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	17/11/2014	17/11/2014	17/11/2014	17/11/2014	17/11/2014
Date analysed	-	18/11/2014	18/11/2014	18/11/2014	18/11/2014	18/11/2014
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100	<100	<100	<100
TRH >C_{10}-C_{16}	mg/kg	<50	<50	<50	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH >C_{16}-C_{34}	mg/kg	<100	<100	<100	<100	<100
TRH >C_{34}-C_{40}	mg/kg	<100	<100	<100	<100	<100
Surrogate o-Terphenyl	%	91	98	98	100	102

svTRH (C10-C40) in Soil						
Our Reference:	UNITS	119345-26	119345-27	119345-28	119345-29	119345-30
Your Reference	----------	TP28	TP29	TP31	TP33	TP34
Depth	----------	0.1-0.2	0.1-0.2	0.1-0.2	0.2-0.3	0.7-0.8
Date Sampled		12/11/2014	12/11/2014	12/11/2014	12/11/2014	12/11/2014
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	17/11/2014	17/11/2014	17/11/2014	17/11/2014	17/11/2014
Date analysed	-	18/11/2014	18/11/2014	18/11/2014	18/11/2014	18/11/2014
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100	<100	<100	<100
TRH >C_{10}-C_{16}	mg/kg	<50	<50	<50	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH >C_{16}-C_{34}	mg/kg	<100	<100	<100	<100	<100
TRH >C_{34}-C_{40}	mg/kg	<100	<100	<100	<100	<100
Surrogate o-Terphenyl	%	95	84	88	88	83

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svTRH (C10-C40) in Soil			
Our Reference:	UNITS	119345-31	119345-32
Your Reference	----------	TP35	TP36
Depth	----------	0-0.1	0-0.1
Date Sampled		12/11/2014	12/11/2014
Type of sample		soil	soil
Date extracted	-	17/11/2014	17/11/2014
Date analysed	-	18/11/2014	18/11/2014
TRH C_{10} - C_{14}	mg/kg	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100
TRH >C_{10}-C_{16}	mg/kg	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50	<50
TRH >C_{16}-C_{34}	mg/kg	<100	<100
TRH >C_{34}-C_{40}	mg/kg	<100	<100
Surrogate o-Terphenyl	%	89	86

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PAHs in Soil						
Our Reference:	UNITS	119345-1	119345-2	119345-3	119345-4	119345-5
Your Reference	----------	TP2	TP3	TP4	BD1/121114	TP5
Depth	----------	0-0.1	0.3-0.4	0.3-0.4	-	1.3-1.4
Date Sampled		12/11/2014	12/11/2014	12/11/2014	12/11/2014	12/11/2014
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	17/11/2014	17/11/2014	17/11/2014	17/11/2014	17/11/2014
Date analysed	-	18/11/2014	18/11/2014	18/11/2014	18/11/2014	18/11/2014
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	0.1	<0.1	0.1	0.1
Pyrene	mg/kg	<0.1	0.1	<0.1	0.1	0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	<0.1	0.1	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	0.06	<0.05	0.1	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)pyrene TEQ NEPM B1	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Total Positive PAHs	mg/kg	NIL (+)VE	0.45	NIL (+)VE	0.46	0.30
Surrogate p-Terphenyl-d14	%	124	98	102	100	97

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PAHs in Soil						
Our Reference:	UNITS	119345-6	119345-7	119345-8	119345-9	119345-10
Your Reference	----------	TP6	TP7	TP8	TP9	TP10
Depth	----------	2.9-3.0	0.2-0.3	0.3-0.4	0-0.1	0-0.1
Date Sampled		12/11/2014	12/11/2014	12/11/2014	12/11/2014	12/11/2014
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	17/11/2014	17/11/2014	17/11/2014	17/11/2014	17/11/2014
Date analysed	-	18/11/2014	18/11/2014	18/11/2014	18/11/2014	18/11/2014
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	0.5	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	0.3	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	1.5	<0.1	<0.1	<0.1
Pyrene	mg/kg	<0.1	1.4	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	<0.1	0.7	<0.1	<0.1	<0.1
Chrysene	mg/kg	<0.1	0.8	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	2	<0.2	0.3	<0.2
Benzo(a)pyrene	mg/kg	<0.05	1.2	<0.05	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	0.9	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	0.6	<0.1	<0.1	<0.1
Benzo(a)pyrene TEQ NEPM B1	mg/kg	<0.5	1.5	<0.5	<0.5	<0.5
Total Positive PAHs	mg/kg	NIL (+)VE	9.6	NIL (+)VE	0.31	NIL (+)VE
Surrogate p-Terphenyl-d14	%	114	101	101	98	102

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PAHs in Soil Our Reference: Your Reference Depth Date Sampled Type of sample	UNITS ---------- ----------	119345-11 TP12 0-0.05 13/11/2014 soil	119345-12 TP14 0-0.05 13/11/2014 soil	119345-13 TP15 0.1-0.2 13/11/2014 soil	119345-14 TP17 0.1-0.2 13/11/2014 soil	119345-15 TP18 0-0.05 13/11/2014 soil
Date extracted	-	17/11/2014	17/11/2014	17/11/2014	17/11/2014	17/11/2014
Date analysed	-	18/11/2014	18/11/2014	18/11/2014	18/11/2014	18/11/2014
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	0.05	<0.05	<0.05	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)pyrene TEQ NEPM B1	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Total Positive PAHs	mg/kg	0.27	NIL (+)VE	NIL (+)VE	NIL (+)VE	NIL (+)VE
Surrogate p-Terphenyl-d14	%	103	95	101	100	102

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PAHs in Soil Our Reference: Your Reference Depth Date Sampled Type of sample	UNITS ---------- ----------	119345-16 TP19 0.1-0.2 13/11/2014 soil	119345-17 BD1/131114 - 13/11/2014 soil	119345-18 TP20 0.1-0.2 13/11/2014 soil	119345-19 TP21 0.1-0.2 13/11/2014 soil	119345-20 TP22 0.1-0.2 13/11/2014 soil
Date extracted	-	17/11/2014	17/11/2014	17/11/2014	17/11/2014	17/11/2014
Date analysed	-	18/11/2014	18/11/2014	18/11/2014	18/11/2014	18/11/2014
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	0.2	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	0.6	<0.1	<0.1	<0.1
Pyrene	mg/kg	<0.1	0.4	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	<0.1	0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	<0.1	0.2	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)pyrene TEQ NEPM B1	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Total Positive PAHs	mg/kg	NIL (+)VE	1.5	NIL (+)VE	NIL (+)VE	NIL (+)VE
Surrogate p-Terphenyl-d14	%	99	98	93	100	107

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PAHs in Soil						
Our Reference:	UNITS	119345-21	119345-22	119345-23	119345-24	119345-25
Your Reference	----------	TP23	TP24	TP25	TP26	TP27
Depth	----------	0.1-0.2	0.2-0.3	0.2-0.3	0.1-0.2	0.1-0.2
Date Sampled		13/11/2014	12/11/2014	12/11/2014	12/11/2014	12/11/2014
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	17/11/2014	17/11/2014	17/11/2014	17/11/2014	17/11/2014
Date analysed	-	18/11/2014	18/11/2014	18/11/2014	18/11/2014	18/11/2014
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)pyrene TEQ NEPM B1	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Total Positive PAHs	mg/kg	NIL (+)VE	NIL (+)VE	NIL (+)VE	NIL (+)VE	NIL (+)VE
Surrogate p-Terphenyl-d14	%	95	98	99	100	101

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PAHs in Soil						
Our Reference:	UNITS	119345-26	119345-27	119345-28	119345-29	119345-30
Your Reference	----------	TP28	TP29	TP31	TP33	TP34
Depth	----------	0.1-0.2	0.1-0.2	0.1-0.2	0.2-0.3	0.7-0.8
Date Sampled		12/11/2014	12/11/2014	12/11/2014	12/11/2014	12/11/2014
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	17/11/2014	17/11/2014	17/11/2014	17/11/2014	17/11/2014
Date analysed	-	18/11/2014	18/11/2014	18/11/2014	18/11/2014	18/11/2014
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	0.2	<0.1	<0.1
Pyrene	mg/kg	<0.1	<0.1	0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	<0.05	0.09	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)pyrene TEQ NEPM B1	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Total Positive PAHs	mg/kg	NIL (+)VE	NIL (+)VE	0.40	NIL (+)VE	NIL (+)VE
Surrogate p-Terphenyl-d14	%	96	94	97	99	94

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PAHs in Soil Our Reference: Your Reference Depth Date Sampled Type of sample	UNITS ---------- ----------	119345-31 TP35 0-0.1 12/11/2014 soil	119345-32 TP36 0-0.1 12/11/2014 soil
Date extracted	-	17/11/2014	17/11/2014
Date analysed	-	18/11/2014	18/11/2014
Naphthalene	mg/kg	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1
Pyrene	mg/kg	<0.1	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1
Benzo(a)pyrene TEQ NEPM B1	mg/kg	<0.5	<0.5
Total Positive PAHs	mg/kg	NIL (+)VE	NIL (+)VE
Surrogate p-Terphenyl-d14	%	102	100

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Organochlorine Pesticides in soil						
Our Reference:	UNITS	119345-1	119345-2	119345-3	119345-4	119345-5
Your Reference	----------	TP2	TP3	TP4	BD1/121114	TP5
Depth	----------	0-0.1	0.3-0.4	0.3-0.4	-	1.3-1.4
Date Sampled		12/11/2014	12/11/2014	12/11/2014	12/11/2014	12/11/2014
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	17/11/2014	17/11/2014	17/11/2014	17/11/2014	17/11/2014
Date analysed	-	17/11/2014	17/11/2014	17/11/2014	17/11/2014	17/11/2014
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	100	83	84	80	79

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Organochlorine Pesticides in soil						
Our Reference:	UNITS	119345-6	119345-7	119345-8	119345-9	119345-10
Your Reference	----------	TP6	TP7	TP8	TP9	TP10
Depth	----------	2.9-3.0	0.2-0.3	0.3-0.4	0-0.1	0-0.1
Date Sampled		12/11/2014	12/11/2014	12/11/2014	12/11/2014	12/11/2014
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	17/11/2014	17/11/2014	17/11/2014	17/11/2014	17/11/2014
Date analysed	-	17/11/2014	17/11/2014	17/11/2014	17/11/2014	17/11/2014
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	91	83	81	82	94

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Organochlorine Pesticides in soil						
Our Reference:	UNITS	119345-11	119345-12	119345-13	119345-14	119345-15
Your Reference	----------	TP12	TP14	TP15	TP17	TP18
Depth	----------	0-0.05	0-0.05	0.1-0.2	0.1-0.2	0-0.05
Date Sampled		13/11/2014	13/11/2014	13/11/2014	13/11/2014	13/11/2014
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	17/11/2014	17/11/2014	17/11/2014	17/11/2014	17/11/2014
Date analysed	-	17/11/2014	17/11/2014	17/11/2014	17/11/2014	17/11/2014
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	108	81	83	83	84

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Organochlorine Pesticides in soil						
Our Reference:	UNITS	119345-16	119345-17	119345-18	119345-19	119345-20
Your Reference	----------	TP19	BD1/131114	TP20	TP21	TP22
Depth	----------	0.1-0.2	-	0.1-0.2	0.1-0.2	0.1-0.2
Date Sampled		13/11/2014	13/11/2014	13/11/2014	13/11/2014	13/11/2014
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	17/11/2014	17/11/2014	17/11/2014	17/11/2014	17/11/2014
Date analysed	-	17/11/2014	17/11/2014	17/11/2014	17/11/2014	17/11/2014
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	79	81	92	85	88

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Organochlorine Pesticides in soil						
Our Reference:	UNITS	119345-21	119345-22	119345-23	119345-24	119345-25
Your Reference	----------	TP23	TP24	TP25	TP26	TP27
Depth	----------	0.1-0.2	0.2-0.3	0.2-0.3	0.1-0.2	0.1-0.2
Date Sampled		13/11/2014	12/11/2014	12/11/2014	12/11/2014	12/11/2014
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	17/11/2014	17/11/2014	17/11/2014	17/11/2014	17/11/2014
Date analysed	-	17/11/2014	17/11/2014	17/11/2014	17/11/2014	17/11/2014
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	86	86	83	83	85

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Organochlorine Pesticides in soil						
Our Reference:	UNITS	119345-26	119345-27	119345-28	119345-29	119345-30
Your Reference	----------	TP28	TP29	TP31	TP33	TP34
Depth	----------	0.1-0.2	0.1-0.2	0.1-0.2	0.2-0.3	0.7-0.8
Date Sampled		12/11/2014	12/11/2014	12/11/2014	12/11/2014	12/11/2014
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	17/11/2014	17/11/2014	17/11/2014	17/11/2014	17/11/2014
Date analysed	-	17/11/2014	17/11/2014	17/11/2014	17/11/2014	17/11/2014
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	0.7	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	0.5	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	84	95	85	80	77

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Organochlorine Pesticides in soil			
Our Reference:	UNITS	119345-31	119345-32
Your Reference	----------	TP35	TP36
Depth	----------	0-0.1	0-0.1
Date Sampled		12/11/2014	12/11/2014
Type of sample		soil	soil
Date extracted	-	17/11/2014	17/11/2014
Date analysed	-	17/11/2014	17/11/2014
HCB	mg/kg	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1
Surrogate TCMX	%	87	88

Organophosphorus Pesticides						
Our Reference:	UNITS	119345-1	119345-2	119345-3	119345-4	119345-5
Your Reference	----------	TP2	TP3	TP4	BD1/121114	TP5
Depth	----------	0-0.1	0.3-0.4	0.3-0.4	-	1.3-1.4
Date Sampled		12/11/2014	12/11/2014	12/11/2014	12/11/2014	12/11/2014
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	17/11/2014	17/11/2014	17/11/2014	17/11/2014	17/11/2014
Date analysed	-	17/11/2014	17/11/2014	17/11/2014	17/11/2014	17/11/2014
Diazinon	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	100	83	84	80	79

Organophosphorus Pesticides						
Our Reference:	UNITS	119345-6	119345-7	119345-8	119345-9	119345-10
Your Reference	----------	TP6	TP7	TP8	TP9	TP10
Depth	----------	2.9-3.0	0.2-0.3	0.3-0.4	0-0.1	0-0.1
Date Sampled		12/11/2014	12/11/2014	12/11/2014	12/11/2014	12/11/2014
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	17/11/2014	17/11/2014	17/11/2014	17/11/2014	17/11/2014
Date analysed	-	17/11/2014	17/11/2014	17/11/2014	17/11/2014	17/11/2014
Diazinon	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	91	83	81	82	94

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Organophosphorus Pesticides						
Our Reference:	UNITS	119345-11	119345-12	119345-13	119345-14	119345-15
Your Reference	----------	TP12	TP14	TP15	TP17	TP18
Depth	----------	0-0.05	0-0.05	0.1-0.2	0.1-0.2	0-0.05
Date Sampled		13/11/2014	13/11/2014	13/11/2014	13/11/2014	13/11/2014
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	17/11/2014	17/11/2014	17/11/2014	17/11/2014	17/11/2014
Date analysed	-	17/11/2014	17/11/2014	17/11/2014	17/11/2014	17/11/2014
Diazinon	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	108	81	83	83	84

Organophosphorus Pesticides						
Our Reference:	UNITS	119345-16	119345-17	119345-18	119345-19	119345-20
Your Reference	----------	TP19	BD1/131114	TP20	TP21	TP22
Depth	----------	0.1-0.2	-	0.1-0.2	0.1-0.2	0.1-0.2
Date Sampled		13/11/2014	13/11/2014	13/11/2014	13/11/2014	13/11/2014
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	17/11/2014	17/11/2014	17/11/2014	17/11/2014	17/11/2014
Date analysed	-	17/11/2014	17/11/2014	17/11/2014	17/11/2014	17/11/2014
Diazinon	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	79	81	92	85	88

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Organophosphorus Pesticides						
Our Reference:	UNITS	119345-21	119345-22	119345-23	119345-24	119345-25
Your Reference	----------	TP23	TP24	TP25	TP26	TP27
Depth	----------	0.1-0.2	0.2-0.3	0.2-0.3	0.1-0.2	0.1-0.2
Date Sampled		13/11/2014	12/11/2014	12/11/2014	12/11/2014	12/11/2014
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	17/11/2014	17/11/2014	17/11/2014	17/11/2014	17/11/2014
Date analysed	-	17/11/2014	17/11/2014	17/11/2014	17/11/2014	17/11/2014
Diazinon	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	86	86	83	83	85

Organophosphorus Pesticides						
Our Reference:	UNITS	119345-26	119345-27	119345-28	119345-29	119345-30
Your Reference	----------	TP28	TP29	TP31	TP33	TP34
Depth	----------	0.1-0.2	0.1-0.2	0.1-0.2	0.2-0.3	0.7-0.8
Date Sampled		12/11/2014	12/11/2014	12/11/2014	12/11/2014	12/11/2014
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	17/11/2014	17/11/2014	17/11/2014	17/11/2014	17/11/2014
Date analysed	-	17/11/2014	17/11/2014	17/11/2014	17/11/2014	17/11/2014
Diazinon	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	84	95	85	80	77

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Organophosphorus Pesticides			
Our Reference:	UNITS	119345-31	119345-32
Your Reference	----------	TP35	TP36
Depth	----------	0-0.1	0-0.1
Date Sampled		12/11/2014	12/11/2014
Type of sample		soil	soil
Date extracted	-	17/11/2014	17/11/2014
Date analysed	-	17/11/2014	17/11/2014
Diazinon	mg/kg	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1
Surrogate TCMX	%	87	88

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PCBs in Soil						
Our Reference:	UNITS	119345-1	119345-2	119345-3	119345-4	119345-5
Your Reference	----------	TP2	TP3	TP4	BD1/121114	TP5
Depth	----------	0-0.1	0.3-0.4	0.3-0.4	-	1.3-1.4
Date Sampled		12/11/2014	12/11/2014	12/11/2014	12/11/2014	12/11/2014
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	17/11/2014	17/11/2014	17/11/2014	17/11/2014	17/11/2014
Date analysed	-	17/11/2014	17/11/2014	17/11/2014	17/11/2014	17/11/2014
Arochlor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1221	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1254	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCLMX	%	100	83	84	80	79

PCBs in Soil						
Our Reference:	UNITS	119345-6	119345-7	119345-8	119345-9	119345-10
Your Reference	----------	TP6	TP7	TP8	TP9	TP10
Depth	----------	2.9-3.0	0.2-0.3	0.3-0.4	0-0.1	0-0.1
Date Sampled		12/11/2014	12/11/2014	12/11/2014	12/11/2014	12/11/2014
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	17/11/2014	17/11/2014	17/11/2014	17/11/2014	17/11/2014
Date analysed	-	17/11/2014	17/11/2014	17/11/2014	17/11/2014	17/11/2014
Arochlor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1221	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1254	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCLMX	%	91	83	81	82	94

PCBs in Soil						
Our Reference:	UNITS	119345-11	119345-12	119345-13	119345-14	119345-15
Your Reference	----------	TP12	TP14	TP15	TP17	TP18
Depth	----------	0-0.05	0-0.05	0.1-0.2	0.1-0.2	0-0.05
Date Sampled		13/11/2014	13/11/2014	13/11/2014	13/11/2014	13/11/2014
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	17/11/2014	17/11/2014	17/11/2014	17/11/2014	17/11/2014
Date analysed	-	17/11/2014	17/11/2014	17/11/2014	17/11/2014	17/11/2014
Arochlor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1221	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1254	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCLMX	%	108	81	83	83	84

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PCBs in Soil						
Our Reference:	UNITS	119345-16	119345-17	119345-18	119345-19	119345-20
Your Reference	----------	TP19	BD1/131114	TP20	TP21	TP22
Depth	----------	0.1-0.2	-	0.1-0.2	0.1-0.2	0.1-0.2
Date Sampled		13/11/2014	13/11/2014	13/11/2014	13/11/2014	13/11/2014
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	17/11/2014	17/11/2014	17/11/2014	17/11/2014	17/11/2014
Date analysed	-	17/11/2014	17/11/2014	17/11/2014	17/11/2014	17/11/2014
Arochlor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1221	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1254	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCLMX	%	79	81	92	85	88

PCBs in Soil						
Our Reference:	UNITS	119345-21	119345-22	119345-23	119345-24	119345-25
Your Reference	----------	TP23	TP24	TP25	TP26	TP27
Depth	----------	0.1-0.2	0.2-0.3	0.2-0.3	0.1-0.2	0.1-0.2
Date Sampled		13/11/2014	12/11/2014	12/11/2014	12/11/2014	12/11/2014
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	17/11/2014	17/11/2014	17/11/2014	17/11/2014	17/11/2014
Date analysed	-	17/11/2014	17/11/2014	17/11/2014	17/11/2014	17/11/2014
Arochlor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1221	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1254	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCLMX	%	86	86	83	83	85

PCBs in Soil						
Our Reference:	UNITS	119345-26	119345-27	119345-28	119345-29	119345-30
Your Reference	----------	TP28	TP29	TP31	TP33	TP34
Depth	----------	0.1-0.2	0.1-0.2	0.1-0.2	0.2-0.3	0.7-0.8
Date Sampled		12/11/2014	12/11/2014	12/11/2014	12/11/2014	12/11/2014
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	17/11/2014	17/11/2014	17/11/2014	17/11/2014	17/11/2014
Date analysed	-	17/11/2014	17/11/2014	17/11/2014	17/11/2014	17/11/2014
Arochlor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1221	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1254	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCLMX	%	84	95	85	80	77

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PCBs in Soil			
Our Reference:	UNITS	119345-31	119345-32
Your Reference	----------	TP35	TP36
Depth	----------	0-0.1	0-0.1
Date Sampled		12/11/2014	12/11/2014
Type of sample		soil	soil
Date extracted	-	17/11/2014	17/11/2014
Date analysed	-	17/11/2014	17/11/2014
Arochlor 1016	mg/kg	<0.1	<0.1
Arochlor 1221	mg/kg	<0.1	<0.1
Arochlor 1232	mg/kg	<0.1	<0.1
Arochlor 1242	mg/kg	<0.1	<0.1
Arochlor 1248	mg/kg	<0.1	<0.1
Arochlor 1254	mg/kg	<0.1	<0.1
Arochlor 1260	mg/kg	<0.1	<0.1
Surrogate TCLMX	%	87	88

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Total Phenolics in Soil						
Our Reference:	UNITS	119345-1	119345-2	119345-3	119345-4	119345-5
Your Reference	----------	TP2	TP3	TP4	BD1/121114	TP5
Depth	----------	0-0.1	0.3-0.4	0.3-0.4	-	1.3-1.4
Date Sampled		12/11/2014	12/11/2014	12/11/2014	12/11/2014	12/11/2014
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	17/11/2014	17/11/2014	17/11/2014	17/11/2014	17/11/2014
Date analysed	-	17/11/2014	17/11/2014	17/11/2014	17/11/2014	17/11/2014
Total Phenolics (as Phenol)	mg/kg	<5	<5	<5	<5	<5

Total Phenolics in Soil						
Our Reference:	UNITS	119345-6	119345-7	119345-8	119345-9	119345-10
Your Reference	----------	TP6	TP7	TP8	TP9	TP10
Depth	----------	2.9-3.0	0.2-0.3	0.3-0.4	0-0.1	0-0.1
Date Sampled		12/11/2014	12/11/2014	12/11/2014	12/11/2014	12/11/2014
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	17/11/2014	17/11/2014	17/11/2014	17/11/2014	17/11/2014
Date analysed	-	17/11/2014	17/11/2014	17/11/2014	17/11/2014	17/11/2014
Total Phenolics (as Phenol)	mg/kg	<5	<5	<5	<5	<5

Total Phenolics in Soil						
Our Reference:	UNITS	119345-11	119345-12	119345-13	119345-14	119345-15
Your Reference	----------	TP12	TP14	TP15	TP17	TP18
Depth	----------	0-0.05	0-0.05	0.1-0.2	0.1-0.2	0-0.05
Date Sampled		13/11/2014	13/11/2014	13/11/2014	13/11/2014	13/11/2014
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	17/11/2014	17/11/2014	17/11/2014	17/11/2014	17/11/2014
Date analysed	-	17/11/2014	17/11/2014	17/11/2014	17/11/2014	17/11/2014
Total Phenolics (as Phenol)	mg/kg	<5	<5	<5	<5	<5

Total Phenolics in Soil						
Our Reference:	UNITS	119345-16	119345-17	119345-18	119345-19	119345-20
Your Reference	----------	TP19	BD1/131114	TP20	TP21	TP22
Depth	----------	0.1-0.2	-	0.1-0.2	0.1-0.2	0.1-0.2
Date Sampled		13/11/2014	13/11/2014	13/11/2014	13/11/2014	13/11/2014
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	17/11/2014	17/11/2014	17/11/2014	17/11/2014	17/11/2014
Date analysed	-	17/11/2014	17/11/2014	17/11/2014	17/11/2014	17/11/2014
Total Phenolics (as Phenol)	mg/kg	<5	<5	<5	<5	<5

Total Phenolics in Soil						
Our Reference:	UNITS	119345-21	119345-22	119345-23	119345-24	119345-25
Your Reference	----------	TP23	TP24	TP25	TP26	TP27
Depth	----------	0.1-0.2	0.2-0.3	0.2-0.3	0.1-0.2	0.1-0.2
Date Sampled		13/11/2014	12/11/2014	12/11/2014	12/11/2014	12/11/2014
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	17/11/2014	17/11/2014	17/11/2014	17/11/2014	17/11/2014
Date analysed	-	17/11/2014	17/11/2014	17/11/2014	17/11/2014	17/11/2014
Total Phenolics (as Phenol)	mg/kg	<5	<5	<5	<5	<5

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Total Phenolics in Soil						
Our Reference:	UNITS	119345-26	119345-27	119345-28	119345-29	119345-30
Your Reference	----------	TP28	TP29	TP31	TP33	TP34
Depth	----------	0.1-0.2	0.1-0.2	0.1-0.2	0.2-0.3	0.7-0.8
Date Sampled		12/11/2014	12/11/2014	12/11/2014	12/11/2014	12/11/2014
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	17/11/2014	17/11/2014	17/11/2014	17/11/2014	17/11/2014
Date analysed	-	17/11/2014	17/11/2014	17/11/2014	17/11/2014	17/11/2014
Total Phenolics (as Phenol)	mg/kg	<5	<5	<5	<5	<5

Total Phenolics in Soil			
Our Reference:	UNITS	119345-31	119345-32
Your Reference	----------	TP35	TP36
Depth	----------	0-0.1	0-0.1
Date Sampled		12/11/2014	12/11/2014
Type of sample		soil	soil
Date extracted	-	17/11/2014	17/11/2014
Date analysed	-	17/11/2014	17/11/2014
Total Phenolics (as Phenol)	mg/kg	<5	<5

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Acid Extractable metals in soil						
Our Reference:	UNITS	119345-1	119345-2	119345-3	119345-4	119345-5
Your Reference	----------	TP2	TP3	TP4	BD1/121114	TP5
Depth	----------	0-0.1	0.3-0.4	0.3-0.4	-	1.3-1.4
Date Sampled		12/11/2014	12/11/2014	12/11/2014	12/11/2014	12/11/2014
Type of sample		soil	soil	soil	soil	soil
Date digested	-	17/11/2014	17/11/2014	17/11/2014	17/11/2014	17/11/2014
Date analysed	-	17/11/2014	17/11/2014	17/11/2014	17/11/2014	17/11/2014
Arsenic	mg/kg	11	7	7	8	9
Cadmium	mg/kg	0.4	<0.4	0.4	0.4	0.5
Chromium	mg/kg	12	11	16	34	15
Copper	mg/kg	33	31	32	33	33
Lead	mg/kg	17	20	28	27	26
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	14	15	21	19	21
Zinc	mg/kg	54	70	140	120	100

Acid Extractable metals in soil						
Our Reference:	UNITS	119345-6	119345-7	119345-8	119345-9	119345-10
Your Reference	----------	TP6	TP7	TP8	TP9	TP10
Depth	----------	2.9-3.0	0.2-0.3	0.3-0.4	0-0.1	0-0.1
Date Sampled		12/11/2014	12/11/2014	12/11/2014	12/11/2014	12/11/2014
Type of sample		soil	soil	soil	soil	soil
Date digested	-	17/11/2014	17/11/2014	17/11/2014	17/11/2014	17/11/2014
Date analysed	-	17/11/2014	17/11/2014	17/11/2014	17/11/2014	17/11/2014
Arsenic	mg/kg	7	6	7	8	8
Cadmium	mg/kg	<0.4	<0.4	0.4	0.5	0.5
Chromium	mg/kg	9	13	11	16	16
Copper	mg/kg	34	31	32	32	27
Lead	mg/kg	15	23	18	23	23
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	19	15	17	26	17
Zinc	mg/kg	72	58	67	85	66

Acid Extractable metals in soil						
Our Reference:	UNITS	119345-11	119345-12	119345-13	119345-14	119345-15
Your Reference	----------	TP12	TP14	TP15	TP17	TP18
Depth	----------	0-0.05	0-0.05	0.1-0.2	0.1-0.2	0-0.05
Date Sampled		13/11/2014	13/11/2014	13/11/2014	13/11/2014	13/11/2014
Type of sample		soil	soil	soil	soil	soil
Date digested	-	17/11/2014	17/11/2014	17/11/2014	17/11/2014	17/11/2014
Date analysed	-	17/11/2014	17/11/2014	17/11/2014	17/11/2014	17/11/2014
Arsenic	mg/kg	<4	10	5	<4	6
Cadmium	mg/kg	<0.4	0.5	0.5	0.5	<0.4
Chromium	mg/kg	3	21	15	21	15
Copper	mg/kg	11	27	35	41	30
Lead	mg/kg	13	21	17	15	18
Mercury	mg/kg	<0.1	<0.1	<0.1	0.2	<0.1
Nickel	mg/kg	4	14	31	79	22
Zinc	mg/kg	51	72	77	53	65

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Acid Extractable metals in soil						
Our Reference:	UNITS	119345-16	119345-17	119345-18	119345-19	119345-20
Your Reference	----------	TP19	BD1/131114	TP20	TP21	TP22
Depth	----------	0.1-0.2	-	0.1-0.2	0.1-0.2	0.1-0.2
Date Sampled		13/11/2014	13/11/2014	13/11/2014	13/11/2014	13/11/2014
Type of sample		soil	soil	soil	soil	soil
Date digested	-	17/11/2014	17/11/2014	17/11/2014	17/11/2014	17/11/2014
Date analysed	-	17/11/2014	17/11/2014	17/11/2014	17/11/2014	17/11/2014
Arsenic	mg/kg	<4	<4	5	6	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4	0.4	<0.4
Chromium	mg/kg	9	13	14	19	5
Copper	mg/kg	19	27	36	21	20
Lead	mg/kg	21	22	13	22	12
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	41	42	40	14	9
Zinc	mg/kg	110	120	64	39	43

Acid Extractable metals in soil						
Our Reference:	UNITS	119345-21	119345-22	119345-23	119345-24	119345-25
Your Reference	----------	TP23	TP24	TP25	TP26	TP27
Depth	----------	0.1-0.2	0.2-0.3	0.2-0.3	0.1-0.2	0.1-0.2
Date Sampled		13/11/2014	12/11/2014	12/11/2014	12/11/2014	12/11/2014
Type of sample		soil	soil	soil	soil	soil
Date digested	-	17/11/2014	17/11/2014	17/11/2014	17/11/2014	17/11/2014
Date analysed	-	17/11/2014	17/11/2014	17/11/2014	17/11/2014	17/11/2014
Arsenic	mg/kg	4	6	5	4	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	0.5
Chromium	mg/kg	9	7	12	19	20
Copper	mg/kg	20	11	18	24	38
Lead	mg/kg	9	12	18	17	12
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	18	2	10	35	82
Zinc	mg/kg	39	13	29	37	42

Acid Extractable metals in soil						
Our Reference:	UNITS	119345-26	119345-27	119345-28	119345-29	119345-30
Your Reference	----------	TP28	TP29	TP31	TP33	TP34
Depth	----------	0.1-0.2	0.1-0.2	0.1-0.2	0.2-0.3	0.7-0.8
Date Sampled		12/11/2014	12/11/2014	12/11/2014	12/11/2014	12/11/2014
Type of sample		soil	soil	soil	soil	soil
Date digested	-	17/11/2014	17/11/2014	17/11/2014	17/11/2014	17/11/2014
Date analysed	-	17/11/2014	17/11/2014	17/11/2014	17/11/2014	17/11/2014
Arsenic	mg/kg	6	10	<4	<4	11
Cadmium	mg/kg	<0.4	<0.4	<0.4	0.5	0.4
Chromium	mg/kg	22	6	7	19	16
Copper	mg/kg	26	17	5	43	17
Lead	mg/kg	10	10	91	11	16
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	33	3	<1	76	10
Zinc	mg/kg	31	19	34	55	25

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Acid Extractable metals in soil						
Our Reference:	UNITS	119345-31	119345-32	119345-33	119345-34	119345-35
Your Reference	----------	TP35	TP36	SP1/S1	SP1/S2	SP1/S3
Depth	----------	0-0.1	0-0.1	-	-	-
Date Sampled		12/11/2014	12/11/2014	12/11/2014	12/11/2014	12/11/2014
Type of sample		soil	soil	soil	soil	soil
Date digested	-	17/11/2014	17/11/2014	17/11/2014	17/11/2014	17/11/2014
Date analysed	-	17/11/2014	17/11/2014	17/11/2014	17/11/2014	17/11/2014
Arsenic	mg/kg	11	11	4	4	4
Cadmium	mg/kg	0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	15	18	11	11	11
Copper	mg/kg	20	20	24	70	33
Lead	mg/kg	20	20	30	30	25
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	10	11	8	8	6
Zinc	mg/kg	48	51	77	99	81

Acid Extractable metals in soil						
Our Reference:	UNITS	119345-36	119345-37	119345-38	119345-39	119345-40
Your Reference	----------	SP2/S1	SP2/S2	SP2/S3	SP2/S4	SP3/S1
Depth	----------	-	-	-	-	-
Date Sampled		12/11/2014	12/11/2014	12/11/2014	12/11/2014	12/11/2014
Type of sample		soil	soil	soil	soil	soil
Date digested	-	17/11/2014	17/11/2014	17/11/2014	17/11/2014	17/11/2014
Date analysed	-	17/11/2014	17/11/2014	17/11/2014	17/11/2014	17/11/2014
Arsenic	mg/kg	<4	4	4	4	5
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	12	15	17	20	19
Copper	mg/kg	22	31	48	32	110
Lead	mg/kg	33	31	36	42	28
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	9	10	12	12	16
Zinc	mg/kg	260	91	100	100	71

Acid Extractable metals in soil				
Our Reference:	UNITS	119345-41	119345-42	119345-45
Your Reference	----------	SP3/S2	SP3/S3	TP23-TRIPLICATE
Depth	----------	-	-	0.1-0.2
Date Sampled		12/11/2014	12/11/2014	13/11/2014
Type of sample		soil	soil	soil
Date digested	-	17/11/2014	17/11/2014	17/11/2014
Date analysed	-	17/11/2014	17/11/2014	17/11/2014
Arsenic	mg/kg	4	4	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4
Chromium	mg/kg	19	21	8
Copper	mg/kg	46	43	19
Lead	mg/kg	18	37	9
Mercury	mg/kg	<0.1	<0.1	<0.1
Nickel	mg/kg	21	12	16

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Acid Extractable metals in soil				
Our Reference:	UNITS	119345-41	119345-42	119345-45
Your Reference	----------	SP3/S2	SP3/S3	TP23-TRIPLICATE
Depth	----------	-	-	0.1-0.2
Date Sampled		12/11/2014	12/11/2014	13/11/2014
Type of sample		soil	soil	soil
Zinc	mg/kg	53	110	26

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Moisture						
Our Reference:	UNITS	119345-1	119345-2	119345-3	119345-4	119345-5
Your Reference	----------	TP2	TP3	TP4	BD1/121114	TP5
Depth	----------	0-0.1	0.3-0.4	0.3-0.4	-	1.3-1.4
Date Sampled		12/11/2014	12/11/2014	12/11/2014	12/11/2014	12/11/2014
Type of sample		soil	soil	soil	soil	soil
Date prepared	-	17/11/2014	17/11/2014	17/11/2014	17/11/2014	17/11/2014
Date analysed	-	18/11/2014	18/11/2014	18/11/2014	18/11/2014	18/11/2014
Moisture	%	8.9	9.0	13	13	12

Moisture						
Our Reference:	UNITS	119345-6	119345-7	119345-8	119345-9	119345-10
Your Reference	----------	TP6	TP7	TP8	TP9	TP10
Depth	----------	2.9-3.0	0.2-0.3	0.3-0.4	0-0.1	0-0.1
Date Sampled		12/11/2014	12/11/2014	12/11/2014	12/11/2014	12/11/2014
Type of sample		soil	soil	soil	soil	soil
Date prepared	-	17/11/2014	17/11/2014	17/11/2014	17/11/2014	17/11/2014
Date analysed	-	18/11/2014	18/11/2014	18/11/2014	18/11/2014	18/11/2014
Moisture	%	9.4	12	13	8.2	3.8

Moisture						
Our Reference:	UNITS	119345-11	119345-12	119345-13	119345-14	119345-15
Your Reference	----------	TP12	TP14	TP15	TP17	TP18
Depth	----------	0-0.05	0-0.05	0.1-0.2	0.1-0.2	0-0.05
Date Sampled		13/11/2014	13/11/2014	13/11/2014	13/11/2014	13/11/2014
Type of sample		soil	soil	soil	soil	soil
Date prepared	-	17/11/2014	17/11/2014	17/11/2014	17/11/2014	17/11/2014
Date analysed	-	18/11/2014	18/11/2014	18/11/2014	18/11/2014	18/11/2014
Moisture	%	2.4	17	7.4	9.1	6.8

Moisture						
Our Reference:	UNITS	119345-16	119345-17	119345-18	119345-19	119345-20
Your Reference	----------	TP19	BD1/131114	TP20	TP21	TP22
Depth	----------	0.1-0.2	-	0.1-0.2	0.1-0.2	0.1-0.2
Date Sampled		13/11/2014	13/11/2014	13/11/2014	13/11/2014	13/11/2014
Type of sample		soil	soil	soil	soil	soil
Date prepared	-	17/11/2014	17/11/2014	17/11/2014	17/11/2014	17/11/2014
Date analysed	-	18/11/2014	18/11/2014	18/11/2014	18/11/2014	18/11/2014
Moisture	%	14	17	7.2	15	9.7

Moisture						
Our Reference:	UNITS	119345-21	119345-22	119345-23	119345-24	119345-25
Your Reference	----------	TP23	TP24	TP25	TP26	TP27
Depth	----------	0.1-0.2	0.2-0.3	0.2-0.3	0.1-0.2	0.1-0.2
Date Sampled		13/11/2014	12/11/2014	12/11/2014	12/11/2014	12/11/2014
Type of sample		soil	soil	soil	soil	soil
Date prepared	-	17/11/2014	17/11/2014	17/11/2014	17/11/2014	17/11/2014
Date analysed	-	18/11/2014	18/11/2014	18/11/2014	18/11/2014	18/11/2014
Moisture	%	14	15	20	13	4.8

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Moisture						
Our Reference:	UNITS	119345-26	119345-27	119345-28	119345-29	119345-30
Your Reference	----------	TP28	TP29	TP31	TP33	TP34
Depth	----------	0.1-0.2	0.1-0.2	0.1-0.2	0.2-0.3	0.7-0.8
Date Sampled		12/11/2014	12/11/2014	12/11/2014	12/11/2014	12/11/2014
Type of sample		soil	soil	soil	soil	soil
Date prepared	-	17/11/2014	17/11/2014	17/11/2014	17/11/2014	17/11/2014
Date analysed	-	18/11/2014	18/11/2014	18/11/2014	18/11/2014	18/11/2014
Moisture	%	6.6	12	5.7	9.5	18

Moisture						
Our Reference:	UNITS	119345-31	119345-32	119345-33	119345-34	119345-35
Your Reference	----------	TP35	TP36	SP1/S1	SP1/S2	SP1/S3
Depth	----------	0-0.1	0-0.1	-	-	-
Date Sampled		12/11/2014	12/11/2014	12/11/2014	12/11/2014	12/11/2014
Type of sample		soil	soil	soil	soil	soil
Date prepared	-	17/11/2014	17/11/2014	17/11/2014	17/11/2014	17/11/2014
Date analysed	-	18/11/2014	18/11/2014	18/11/2014	18/11/2014	18/11/2014
Moisture	%	13	10	7.8	8.4	8.5

Moisture						
Our Reference:	UNITS	119345-36	119345-37	119345-38	119345-39	119345-40
Your Reference	----------	SP2/S1	SP2/S2	SP2/S3	SP2/S4	SP3/S1
Depth	----------	-	-	-	-	-
Date Sampled		12/11/2014	12/11/2014	12/11/2014	12/11/2014	12/11/2014
Type of sample		soil	soil	soil	soil	soil
Date prepared	-	17/11/2014	17/11/2014	17/11/2014	17/11/2014	17/11/2014
Date analysed	-	18/11/2014	18/11/2014	18/11/2014	18/11/2014	18/11/2014
Moisture	%	6.3	6.6	3.0	4.4	11

Moisture			
Our Reference:	UNITS	119345-41	119345-42
Your Reference	----------	SP3/S2	SP3/S3
Depth	----------	-	-
Date Sampled		12/11/2014	12/11/2014
Type of sample		soil	soil
Date prepared	-	17/11/2014	17/11/2014
Date analysed	-	18/11/2014	18/11/2014
Moisture	%	7.5	7.9

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Asbestos ID - soils						
Our Reference:	UNITS	119345-1	119345-2	119345-3	119345-4	119345-5
Your Reference	----------	TP2	TP3	TP4	BD1/121114	TP5
Depth	----------	0-0.1	0.3-0.4	0.3-0.4	-	1.3-1.4
Date Sampled		12/11/2014	12/11/2014	12/11/2014	12/11/2014	12/11/2014
Type of sample		soil	soil	soil	soil	soil
Date analysed	-	18/11/2014	18/11/2014	18/11/2014	18/11/2014	18/11/2014
Sample mass tested	g	Approx. 40g	Approx. 40g	Approx. 40g	Approx. 40g	Approx. 40g
Sample Description	-	Brown coarse-grain soil	Dark brown coarse-grain soil & rocks	Dark brown coarse-grain soil & rocks	Dark brown coarse-grain soil	Grey coarse-grain soil & rocks
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg
Trace Analysis	-	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected

Asbestos ID - soils						
Our Reference:	UNITS	119345-6	119345-7	119345-8	119345-9	119345-10
Your Reference	----------	TP6	TP7	TP8	TP9	TP10
Depth	----------	2.9-3.0	0.2-0.3	0.3-0.4	0-0.1	0-0.1
Date Sampled		12/11/2014	12/11/2014	12/11/2014	12/11/2014	12/11/2014
Type of sample		soil	soil	soil	soil	soil
Date analysed	-	18/11/2014	18/11/2014	18/11/2014	18/11/2014	18/11/2014
Sample mass tested	g	Approx. 40g	Approx. 40g	Approx. 40g	Approx. 40g	Approx. 40g
Sample Description	-	Grey coarse-grain soil & rocks	Brown coarse-grain soil & rocks	Brown coarse-grain soil & rocks	Brown coarse-grain soil & rocks	Brown fine-grain soil & rocks
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg
Trace Analysis	-	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected

Asbestos ID - soils						
Our Reference:	UNITS	119345-11	119345-12	119345-13	119345-14	119345-15
Your Reference	----------	TP12	TP14	TP15	TP17	TP18
Depth	----------	0-0.05	0-0.05	0.1-0.2	0.1-0.2	0-0.05
Date Sampled		13/11/2014	13/11/2014	13/11/2014	13/11/2014	13/11/2014
Type of sample		soil	soil	soil	soil	soil
Date analysed	-	18/11/2014	18/11/2014	18/11/2014	18/11/2014	18/11/2014
Sample mass tested	g	Approx. 40g	Approx. 40g	Approx. 40g	Approx. 40g	Approx. 40g
Sample Description	-	Dark brown sandy soil	Brown coarse-grain soil & rocks	Brown coarse-grain soil & rocks	Brown coarse-grain soil & rocks	Brown coarse-grain soil & rocks
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg
Trace Analysis	-	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected

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Asbestos ID - soils						
Our Reference:	UNITS	119345-16	119345-17	119345-18	119345-19	119345-20
Your Reference	----------	TP19	BD1/131114	TP20	TP21	TP22
Depth	----------	0.1-0.2	-	0.1-0.2	0.1-0.2	0.1-0.2
Date Sampled		13/11/2014	13/11/2014	13/11/2014	13/11/2014	13/11/2014
Type of sample		soil	soil	soil	soil	soil
Date analysed	-	18/11/2014	18/11/2014	18/11/2014	18/11/2014	18/11/2014
Sample mass tested	g	Approx. 40g	Approx. 40g	Approx. 40g	Approx. 40g	Approx. 40g
Sample Description	-	Brown grey coarse-grain soil & rocks	Brown coarse-grain soil & rocks	Brown grey coarse-grain soil & rocks	Brown coarse-grain soil & rocks	Grey coarse-grain soil & rocks
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg
Trace Analysis	-	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected

Asbestos ID - soils						
Our Reference:	UNITS	119345-21	119345-22	119345-23	119345-24	119345-25
Your Reference	----------	TP23	TP24	TP25	TP26	TP27
Depth	----------	0.1-0.2	0.2-0.3	0.2-0.3	0.1-0.2	0.1-0.2
Date Sampled		13/11/2014	12/11/2014	12/11/2014	12/11/2014	12/11/2014
Type of sample		soil	soil	soil	soil	soil
Date analysed	-	18/11/2014	18/11/2014	18/11/2014	18/11/2014	18/11/2014
Sample mass tested	g	Approx. 40g	Approx. 40g	Approx. 40g	Approx. 40g	Approx. 40g
Sample Description	-	Grey coarse-grain soil & rocks	Grey coarse-grain soil & rocks	Brown coarse-grain soil & rocks	Grey coarse-grain soil & rocks	Brown coarse-grain soil & rocks
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg
Trace Analysis	-	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected

Asbestos ID - soils						
Our Reference:	UNITS	119345-26	119345-27	119345-28	119345-29	119345-30
Your Reference	----------	TP28	TP29	TP31	TP33	TP34
Depth	----------	0.1-0.2	0.1-0.2	0.1-0.2	0.2-0.3	0.7-0.8
Date Sampled		12/11/2014	12/11/2014	12/11/2014	12/11/2014	12/11/2014
Type of sample		soil	soil	soil	soil	soil
Date analysed	-	18/11/2014	18/11/2014	18/11/2014	18/11/2014	18/11/2014
Sample mass tested	g	Approx. 40g	Approx. 40g	Approx. 40g	Approx. 40g	Approx. 40g
Sample Description	-	Grey coarse-grain soil & rocks	Grey coarse-grain soil & rocks	Brown coarse-grain soil	Grey coarse-grain soil & rocks	Brown coarse-grain soil
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg
Trace Analysis	-	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected

Asbestos ID - soils						
Our Reference:	UNITS	119345-31	119345-32	119345-33	119345-34	119345-35
Your Reference	----------	TP35	TP36	SP1/S1	SP1/S2	SP1/S3
Depth	----------	0-0.1	0-0.1	-	-	-
Date Sampled		12/11/2014	12/11/2014	12/11/2014	12/11/2014	12/11/2014
Type of sample		soil	soil	soil	soil	soil
Date analysed	-	18/11/2014	18/11/2014	18/11/2014	18/11/2014	18/11/2014
Sample mass tested	g	Approx. 40g	Approx. 40g	Approx. 40g	Approx. 40g	41.40g
Sample Description	-	Brown coarse-grain soil	Brown coarse-grain soil & rocks	Grey coarse-grain soil & rocks	Brown grey coarse-grain soil & rocks	Brown coarse-grain soil & rocks
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg
Trace Analysis	-	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected

Asbestos ID - soils						
Our Reference:	UNITS	119345-36	119345-37	119345-38	119345-39	119345-40
Your Reference	----------	SP2/S1	SP2/S2	SP2/S3	SP2/S4	SP3/S1
Depth	----------	-	-	-	-	-
Date Sampled		12/11/2014	12/11/2014	12/11/2014	12/11/2014	12/11/2014
Type of sample		soil	soil	soil	soil	soil
Date analysed	-	18/11/2014	18/11/2014	18/11/2014	18/11/2014	18/11/2014
Sample mass tested	g	Approx. 40g	Approx. 40g	Approx. 40g	Approx. 40g	Approx. 40g
Sample Description	-	Brown coarse-grain soil & rocks	Brown coarse-grain soil & rocks	Grey sandy soil & rocks	Grey sandy soil & rocks	Grey coarse-grain soil & rocks
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg
Trace Analysis	-	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected

Asbestos ID - soils			
Our Reference:	UNITS	119345-41	119345-42
Your Reference	----------	SP3/S2	SP3/S3
Depth	----------	-	-
Date Sampled		12/11/2014	12/11/2014
Type of sample		soil	soil
Date analysed	-	18/11/2014	18/11/2014
Sample mass tested	g	Approx. 40g	Approx. 40g
Sample Description	-	Brown coarse-grain soil & rocks	Grey coarse-grain soil & rocks
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg
Trace Analysis	-	No asbestos detected	No asbestos detected

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Miscellaneous Inorg - soil						
Our Reference:	UNITS	119345-1	119345-5	119345-8	119345-11	119345-14
Your Reference	----------	TP2	TP5	TP8	TP12	TP17
Depth	----------	0-0.1	1.3-1.4	0.3-0.4	0-0.05	0.1-0.2
Date Sampled		12/11/2014	12/11/2014	12/11/2014	13/11/2014	13/11/2014
Type of sample		soil	soil	soil	soil	soil
Date prepared	-	17/11/2014	17/11/2014	17/11/2014	17/11/2014	17/11/2014
Date analysed	-	18/11/2014	18/11/2014	18/11/2014	18/11/2014	18/11/2014
pH 1:5 soil:water	pH Units	7.8	8.2	7.7	8.3	9.1
Electrical Conductivity 1:5 soil:water	µS/cm	800	200	270	94	300

Miscellaneous Inorg - soil						
Our Reference:	UNITS	119345-16	119345-20	119345-23	119345-26	119345-30
Your Reference	----------	TP19	TP22	TP25	TP28	TP34
Depth	----------	0.1-0.2	0.1-0.2	0.2-0.3	0.1-0.2	0.7-0.8
Date Sampled		13/11/2014	13/11/2014	12/11/2014	12/11/2014	12/11/2014
Type of sample		soil	soil	soil	soil	soil
Date prepared	-	17/11/2014	17/11/2014	17/11/2014	17/11/2014	17/11/2014
Date analysed	-	18/11/2014	18/11/2014	18/11/2014	18/11/2014	18/11/2014
pH 1:5 soil:water	pH Units	8.2	6.9	7.9	7.0	7.2
Electrical Conductivity 1:5 soil:water	µS/cm	350	190	120	300	220

Miscellaneous Inorg - soil						
Our Reference:	UNITS	119345-33	119345-34	119345-35	119345-36	119345-37
Your Reference	----------	SP1/S1	SP1/S2	SP1/S3	SP2/S1	SP2/S2
Depth	----------	-	-	-	-	-
Date Sampled		12/11/2014	12/11/2014	12/11/2014	12/11/2014	12/11/2014
Type of sample		soil	soil	soil	soil	soil
Date prepared	-	17/11/2014	17/11/2014	17/11/2014	17/11/2014	17/11/2014
Date analysed	-	18/11/2014	18/11/2014	18/11/2014	18/11/2014	18/11/2014
Electrical Conductivity 1:5 soil:water	µS/cm	620	570	750	930	840

Miscellaneous Inorg - soil						
Our Reference:	UNITS	119345-38	119345-39	119345-40	119345-41	119345-42
Your Reference	----------	SP2/S3	SP2/S4	SP3/S1	SP3/S2	SP3/S3
Depth	----------	-	-	-	-	-
Date Sampled		12/11/2014	12/11/2014	12/11/2014	12/11/2014	12/11/2014
Type of sample		soil	soil	soil	soil	soil
Date prepared	-	17/11/2014	17/11/2014	17/11/2014	17/11/2014	17/11/2014
Date analysed	-	18/11/2014	18/11/2014	18/11/2014	18/11/2014	18/11/2014
Electrical Conductivity 1:5 soil:water	µS/cm	930	810	700	670	1,000

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CEC						
Our Reference:	UNITS	119345-1	119345-5	119345-8	119345-11	119345-14
Your Reference	----------	TP2	TP5	TP8	TP12	TP17
Depth	----------	0-0.1	1.3-1.4	0.3-0.4	0-0.05	0.1-0.2
Date Sampled		12/11/2014	12/11/2014	12/11/2014	13/11/2014	13/11/2014
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	21/11/2014	21/11/2014	21/11/2014	21/11/2014	21/11/2014
Date analysed	-	21/11/2014	21/11/2014	21/11/2014	21/11/2014	21/11/2014
Exchangeable Ca	meq/100g	17	16	18	5.5	19
Exchangeable K	meq/100g	0.3	0.7	0.5	0.1	0.4
Exchangeable Mg	meq/100g	4.8	3.7	4.9	0.22	4.9
Exchangeable Na	meq/100g	3.8	0.26	0.34	<0.1	1.2
Cation Exchange Capacity	meq/100g	26	21	24	5.9	26

CEC						
Our Reference:	UNITS	119345-16	119345-20	119345-23	119345-26	119345-30
Your Reference	----------	TP19	TP22	TP25	TP28	TP34
Depth	----------	0.1-0.2	0.1-0.2	0.2-0.3	0.1-0.2	0.7-0.8
Date Sampled		13/11/2014	13/11/2014	12/11/2014	12/11/2014	12/11/2014
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	21/11/2014	21/11/2014	21/11/2014	21/11/2014	21/11/2014
Date analysed	-	21/11/2014	21/11/2014	21/11/2014	21/11/2014	21/11/2014
Exchangeable Ca	meq/100g	7.6	2.0	8.1	5.9	8.4
Exchangeable K	meq/100g	0.4	0.3	0.7	0.4	0.2
Exchangeable Mg	meq/100g	9.9	4.8	5.5	5.6	10
Exchangeable Na	meq/100g	0.86	2.5	0.50	2.2	0.90
Cation Exchange Capacity	meq/100g	19	9.5	15	14	20

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Method ID	Methodology Summary
Org-016	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater.
Org-014	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS.
Org-003	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis.
Org-012 subset	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013.
Org-005	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.
Org-008	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.
Org-006	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD.
Inorg-031	Total Phenolics by segmented flow analyser (in line distillation with colourimetric finish). Solids are extracted in a caustic media prior to analysis.
Metals-020 ICP-AES	Determination of various metals by ICP-AES.
Metals-021 CV-AAS	Determination of Mercury by Cold Vapour AAS.
Inorg-008	Moisture content determined by heating at 105+/-5 deg C for a minimum of 12 hours.
ASB-001	Asbestos ID - Qualitative identification of asbestos in bulk samples using Polarised Light Microscopy and Dispersion Staining Techniques including Synthetic Mineral Fibre and Organic Fibre as per Australian Standard 4964-2004.
Inorg-001	pH - Measured using pH meter and electrode in accordance with APHA latest edition, 4500-H+. Please note that the results for water analyses are indicative only, as analysis outside of the APHA storage times.
Inorg-002	Conductivity and Salinity - measured using a conductivity cell at 25oC in accordance with APHA latest edition 2510 and Rayment & Lyons.
Metals-009	Determination of exchangeable cations and cation exchange capacity in soil based on Rayment and Lyons 2011.

QUALITY CONTROL vTRH(C6-C10)/BTEXN in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			17/11/2014	119345-1	17/11/2014 || 17/11/2014	LCS-4	17/11/2014
Date analysed	-			19/11/2014	119345-1	18/11/2014 || 18/11/2014	LCS-4	18/11/2014
TRH C_6 - C_9	mg/kg	25	Org-016	<25	119345-1	<25 || <25	LCS-4	94%
TRH C_6 - C_{10}	mg/kg	25	Org-016	<25	119345-1	<25 || <25	LCS-4	94%
Benzene	mg/kg	0.2	Org-016	<0.2	119345-1	<0.2 || <0.2	LCS-4	96%
Toluene	mg/kg	0.5	Org-016	<0.5	119345-1	<0.5 || <0.5	LCS-4	97%
Ethylbenzene	mg/kg	1	Org-016	<1	119345-1	<1 || <1	LCS-4	93%
m+p-xylene	mg/kg	2	Org-016	<2	119345-1	<2 || <2	LCS-4	93%
o-Xylene	mg/kg	1	Org-016	<1	119345-1	<1 || <1	LCS-4	92%
naphthalene	mg/kg	1	Org-014	<1	119345-1	<1 || <1	[NR]	[NR]
Surrogate aaa-Trifluorotoluene	%		Org-016	89	119345-1	92 || 100 || RPD: 8	LCS-4	84%

QUALITY CONTROL svTRH (C10-C40) in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			17/11/2014	119345-1	17/11/2014 || 17/11/2014	LCS-4	17/11/2014
Date analysed	-			18/11/2014	119345-1	17/11/2014 || 17/11/2014	LCS-4	17/11/2014
TRH C_{10} - C_{14}	mg/kg	50	Org-003	<50	119345-1	<50 || <50	LCS-4	113%
TRH C_{15} - C_{28}	mg/kg	100	Org-003	<100	119345-1	<100 || <100	LCS-4	117%
TRH C_{29} - C_{36}	mg/kg	100	Org-003	<100	119345-1	<100 || <100	LCS-4	106%
TRH >C_{10}-C_{16}	mg/kg	50	Org-003	<50	119345-1	<50 || <50	LCS-4	113%
TRH >C_{16}-C_{34}	mg/kg	100	Org-003	<100	119345-1	<100 || <100	LCS-4	117%
TRH >C_{34}-C_{40}	mg/kg	100	Org-003	<100	119345-1	<100 || <100	LCS-4	106%
Surrogate o-Terphenyl	%		Org-003	88	119345-1	123 || 103 || RPD: 18	LCS-4	105%

QUALITY CONTROL PAHs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			17/11/2014	119345-1	17/11/2014 || 17/11/2014	LCS-4	17/11/2014
Date analysed	-			17/11/2014	119345-1	18/11/2014 || 18/11/2014	LCS-4	17/11/2014
Naphthalene	mg/kg	0.1	Org-012 subset	<0.1	119345-1	<0.1 || <0.1	LCS-4	117%
Acenaphthylene	mg/kg	0.1	Org-012 subset	<0.1	119345-1	<0.1 || <0.1	[NR]	[NR]
Acenaphthene	mg/kg	0.1	Org-012 subset	<0.1	119345-1	<0.1 || <0.1	[NR]	[NR]
Fluorene	mg/kg	0.1	Org-012 subset	<0.1	119345-1	<0.1 || <0.1	LCS-4	107%
Phenanthrene	mg/kg	0.1	Org-012 subset	<0.1	119345-1	<0.1 || <0.1	LCS-4	109%
Anthracene	mg/kg	0.1	Org-012 subset	<0.1	119345-1	<0.1 || <0.1	[NR]	[NR]
Fluoranthene	mg/kg	0.1	Org-012 subset	<0.1	119345-1	<0.1 || <0.1	LCS-4	103%

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QUALITY CONTROL PAHs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Pyrene	mg/kg	0.1	Org-012 subset	<0.1	119345-1	<0.1 || <0.1	LCS-4	105%
Benzo(a)anthracene	mg/kg	0.1	Org-012 subset	<0.1	119345-1	<0.1 || <0.1	[NR]	[NR]
Chrysene	mg/kg	0.1	Org-012 subset	<0.1	119345-1	<0.1 || <0.1	LCS-4	98%
Benzo(b,j+k) fluoranthene	mg/kg	0.2	Org-012 subset	<0.2	119345-1	<0.2 || <0.2	[NR]	[NR]
Benzo(a)pyrene	mg/kg	0.05	Org-012 subset	<0.05	119345-1	<0.05 || <0.05	LCS-4	125%
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012 subset	<0.1	119345-1	<0.1 || <0.1	[NR]	[NR]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012 subset	<0.1	119345-1	<0.1 || <0.1	[NR]	[NR]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012 subset	<0.1	119345-1	<0.1 || <0.1	[NR]	[NR]
Surrogate p-Terphenyl-d14	%		Org-012 subset	101	119345-1	124 || 100 || RPD: 21	LCS-4	108%

QUALITY CONTROL Organochlorine Pesticides in soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			17/11/2014	119345-1	17/11/2014 || 17/11/2014	LCS-4	17/11/2014
Date analysed	-			17/11/2014	119345-1	17/11/2014 || 17/11/2014	LCS-4	17/11/2014
HCB	mg/kg	0.1	Org-005	<0.1	119345-1	<0.1 || <0.1	[NR]	[NR]
alpha-BHC	mg/kg	0.1	Org-005	<0.1	119345-1	<0.1 || <0.1	LCS-4	108%
gamma-BHC	mg/kg	0.1	Org-005	<0.1	119345-1	<0.1 || <0.1	[NR]	[NR]
beta-BHC	mg/kg	0.1	Org-005	<0.1	119345-1	<0.1 || <0.1	LCS-4	104%
Heptachlor	mg/kg	0.1	Org-005	<0.1	119345-1	<0.1 || <0.1	LCS-4	96%
delta-BHC	mg/kg	0.1	Org-005	<0.1	119345-1	<0.1 || <0.1	[NR]	[NR]
Aldrin	mg/kg	0.1	Org-005	<0.1	119345-1	<0.1 || <0.1	LCS-4	99%
Heptachlor Epoxide	mg/kg	0.1	Org-005	<0.1	119345-1	<0.1 || <0.1	LCS-4	94%
gamma-Chlordane	mg/kg	0.1	Org-005	<0.1	119345-1	<0.1 || <0.1	[NR]	[NR]
alpha-chlordane	mg/kg	0.1	Org-005	<0.1	119345-1	<0.1 || <0.1	[NR]	[NR]
Endosulfan I	mg/kg	0.1	Org-005	<0.1	119345-1	<0.1 || <0.1	[NR]	[NR]
pp-DDE	mg/kg	0.1	Org-005	<0.1	119345-1	<0.1 || <0.1	LCS-4	95%
Dieldrin	mg/kg	0.1	Org-005	<0.1	119345-1	<0.1 || <0.1	LCS-4	95%
Endrin	mg/kg	0.1	Org-005	<0.1	119345-1	<0.1 || <0.1	LCS-4	96%
pp-DDD	mg/kg	0.1	Org-005	<0.1	119345-1	<0.1 || <0.1	LCS-4	112%
Endosulfan II	mg/kg	0.1	Org-005	<0.1	119345-1	<0.1 || <0.1	[NR]	[NR]
pp-DDT	mg/kg	0.1	Org-005	<0.1	119345-1	<0.1 || <0.1	[NR]	[NR]
Endrin Aldehyde	mg/kg	0.1	Org-005	<0.1	119345-1	<0.1 || <0.1	[NR]	[NR]
Endosulfan Sulphate	mg/kg	0.1	Org-005	<0.1	119345-1	<0.1 || <0.1	LCS-4	103%
Methoxychlor	mg/kg	0.1	Org-005	<0.1	119345-1	<0.1 || <0.1	[NR]	[NR]
Surrogate TCMX	%		Org-005	78	119345-1	100 || 83 || RPD: 19	LCS-4	81%

QUALITY CONTROL Organophosphorus Pesticides	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			17/11/2014	119345-1	17/11/2014 || 17/11/2014	LCS-4	17/11/2014
Date analysed	-			17/11/2014	119345-1	17/11/2014 || 17/11/2014	LCS-4	17/11/2014
Diazinon	mg/kg	0.1	Org-008	<0.1	119345-1	<0.1 || <0.1	[NR]	[NR]
Dimethoate	mg/kg	0.1	Org-008	<0.1	119345-1	<0.1 || <0.1	[NR]	[NR]
Chlorpyriphos-methyl	mg/kg	0.1	Org-008	<0.1	119345-1	<0.1 || <0.1	[NR]	[NR]
Ronnel	mg/kg	0.1	Org-008	<0.1	119345-1	<0.1 || <0.1	[NR]	[NR]
Chlorpyriphos	mg/kg	0.1	Org-008	<0.1	119345-1	<0.1 || <0.1	LCS-4	102%
Fenitrothion	mg/kg	0.1	Org-008	<0.1	119345-1	<0.1 || <0.1	LCS-4	99%
Bromophos-ethyl	mg/kg	0.1	Org-008	<0.1	119345-1	<0.1 || <0.1	[NR]	[NR]
Ethion	mg/kg	0.1	Org-008	<0.1	119345-1	<0.1 || <0.1	LCS-4	105%
Surrogate TCMX	%		Org-008	78	119345-1	100 || 83 || RPD: 19	LCS-4	81%
QUALITY CONTROL PCBs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			17/11/2014	119345-1	17/11/2014 || 17/11/2014	LCS-4	17/11/2014
Date analysed	-			17/11/2014	119345-1	17/11/2014 || 17/11/2014	LCS-4	17/11/2014
Arochlor 1016	mg/kg	0.1	Org-006	<0.1	119345-1	<0.1 || <0.1	[NR]	[NR]
Arochlor 1221	mg/kg	0.1	Org-006	<0.1	119345-1	<0.1 || <0.1	[NR]	[NR]
Arochlor 1232	mg/kg	0.1	Org-006	<0.1	119345-1	<0.1 || <0.1	[NR]	[NR]
Arochlor 1242	mg/kg	0.1	Org-006	<0.1	119345-1	<0.1 || <0.1	[NR]	[NR]
Arochlor 1248	mg/kg	0.1	Org-006	<0.1	119345-1	<0.1 || <0.1	[NR]	[NR]
Arochlor 1254	mg/kg	0.1	Org-006	<0.1	119345-1	<0.1 || <0.1	LCS-4	97%
Arochlor 1260	mg/kg	0.1	Org-006	<0.1	119345-1	<0.1 || <0.1	[NR]	[NR]
Surrogate TCLMX	%		Org-006	78	119345-1	100 || 83 || RPD: 19	LCS-4	96%
QUALITY CONTROL Total Phenolics in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			17/11/2014	119345-1	17/11/2014 || 17/11/2014	LCS-1	17/11/2014
Date analysed	-			17/11/2014	119345-1	17/11/2014 || 17/11/2014	LCS-1	17/11/2014
Total Phenolics (as Phenol)	mg/kg	5	Inorg-031	<5	119345-1	<5 || <5	LCS-1	103%
QUALITY CONTROL Acid Extractable metals in soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date digested	-			17/11/2014	119345-1	17/11/2014 || 17/11/2014	LCS-2	17/11/2014
Date analysed	-			17/11/2014	119345-1	17/11/2014 || 17/11/2014	LCS-2	17/11/2014
Arsenic	mg/kg	4	Metals-020 ICP-AES	<4	119345-1	11 || 10 || RPD: 10	LCS-2	112%
Cadmium	mg/kg	0.4	Metals-020 ICP-AES	<0.4	119345-1	0.4 || 0.4 || RPD: 0	LCS-2	105%

QUALITY CONTROL Acid Extractable metals in soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Chromium	mg/kg	1	Metals-020 ICP-AES	<1	119345-1	12 || 11 || RPD: 9	LCS-2	108%
Copper	mg/kg	1	Metals-020 ICP-AES	<1	119345-1	33 || 34 || RPD: 3	LCS-2	106%
Lead	mg/kg	1	Metals-020 ICP-AES	<1	119345-1	17 || 16 || RPD: 6	LCS-2	103%
Mercury	mg/kg	0.1	Metals-021 CV-AAS	<0.1	119345-1	<0.1 || <0.1	LCS-2	100%
Nickel	mg/kg	1	Metals-020 ICP-AES	<1	119345-1	14 || 14 || RPD: 0	LCS-2	103%
Zinc	mg/kg	1	Metals-020 ICP-AES	<1	119345-1	54 || 53 || RPD: 2	LCS-2	105%

QUALITY CONTROL Miscellaneous Inorg - soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date prepared	-			17/11/2014	119345-1	17/11/2014 || 17/11/2014	LCS-1	17/11/2014
Date analysed	-			18/11/2014	119345-1	18/11/2014 || 18/11/2014	LCS-1	18/11/2014
pH 1:5 soil:water	pH Units		Inorg-001	[NT]	119345-1	7.8 || 7.5 || RPD: 4	LCS-1	102%
Electrical Conductivity 1:5 soil:water	µS/cm	1	Inorg-002	<1	119345-1	800 || 800 || RPD: 0	LCS-1	107%

QUALITY CONTROL CEC	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			[NT]	119345-26	21/11/2014 || 21/11/2014	LCS-2	21/11/2014
Date analysed	-			[NT]	119345-26	21/11/2014 || 21/11/2014	LCS-2	21/11/2014
Exchangeable Ca	meq/100g	0.1	Metals-009	<0.1	119345-26	5.9 || 6.3 || RPD: 7	LCS-2	104%
Exchangeable K	meq/100g	0.1	Metals-009	<0.1	119345-26	0.4 || 0.4 || RPD: 0	LCS-2	114%
Exchangeable Mg	meq/100g	0.1	Metals-009	<0.1	119345-26	5.6 || 5.5 || RPD: 2	LCS-2	104%
Exchangeable Na	meq/100g	0.1	Metals-009	<0.1	119345-26	2.2 || 2.0 || RPD: 10	LCS-2	99%
Cation Exchange Capacity	meq/100g	1	Metals-009	<1.0	119345-26	14 || 14 || RPD: 0	[NR]	[NR]

QUALITY CONTROL vTRH(C6-C10)/BTEXN in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	119345-11	17/11/2014 || 17/11/2014	LCS-5	17/11/2014
Date analysed	-	119345-11	18/11/2014 || 18/11/2014	LCS-5	19/11/2014
TRH C_6 - C_9	mg/kg	119345-11	<25 || <25	LCS-5	101%
TRH C_6 - C_{10}	mg/kg	119345-11	<25 || <25	LCS-5	101%
Benzene	mg/kg	119345-11	<0.2 || <0.2	LCS-5	104%
Toluene	mg/kg	119345-11	<0.5 || <0.5	LCS-5	106%
Ethylbenzene	mg/kg	119345-11	<1 || <1	LCS-5	99%
m+p-xylene	mg/kg	119345-11	<2 || <2	LCS-5	98%

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QUALITY CONTROL vTRH(C6-C10)/BTEXN in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
o-Xylene	mg/kg	119345-11	<1 || <1	LCS-5	98%
naphthalene	mg/kg	119345-11	<1 || <1	[NR]	[NR]
Surrogate aaa-Trifluorotoluene	%	119345-11	92 || 98 || RPD: 6	LCS-5	91%
QUALITY CONTROL svTRH (C10-C40) in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	119345-11	17/11/2014 || 17/11/2014	LCS-5	17/11/2014
Date analysed	-	119345-11	18/11/2014 || 18/11/2014	LCS-5	18/11/2014
TRH C_{10} - C_{14}	mg/kg	119345-11	<50 || <50	LCS-5	113%
TRH C_{15} - C_{28}	mg/kg	119345-11	<100 || <100	LCS-5	123%
TRH C_{29} - C_{36}	mg/kg	119345-11	<100 || <100	LCS-5	125%
TRH >C_{10}-C_{16}	mg/kg	119345-11	<50 || <50	LCS-5	113%
TRH >C_{16}-C_{34}	mg/kg	119345-11	<100 || <100	LCS-5	123%
TRH >C_{34}-C_{40}	mg/kg	119345-11	<100 || <100	LCS-5	125%
Surrogate o-Terphenyl	%	119345-11	99 || 101 || RPD: 2	LCS-5	103%
QUALITY CONTROL PAHs in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	119345-11	17/11/2014 || 17/11/2014	LCS-5	17/11/2014
Date analysed	-	119345-11	18/11/2014 || 18/11/2014	LCS-5	17/11/2014
Naphthalene	mg/kg	119345-11	<0.1 || <0.1	LCS-5	91%
Acenaphthylene	mg/kg	119345-11	<0.1 || <0.1	[NR]	[NR]
Acenaphthene	mg/kg	119345-11	<0.1 || <0.1	[NR]	[NR]
Fluorene	mg/kg	119345-11	<0.1 || <0.1	LCS-5	89%
Phenanthrene	mg/kg	119345-11	<0.1 || <0.1	LCS-5	94%
Anthracene	mg/kg	119345-11	<0.1 || <0.1	[NR]	[NR]
Fluoranthene	mg/kg	119345-11	0.1 || <0.1	LCS-5	95%
Pyrene	mg/kg	119345-11	0.1 || 0.1 || RPD: 0	LCS-5	97%
Benzo(a)anthracene	mg/kg	119345-11	<0.1 || <0.1	[NR]	[NR]
Chrysene	mg/kg	119345-11	<0.1 || <0.1	LCS-5	90%
Benzo(b,j+k)fluoranthene	mg/kg	119345-11	<0.2 || <0.2	[NR]	[NR]
Benzo(a)pyrene	mg/kg	119345-11	0.05 || 0.09 || RPD: 57	LCS-5	106%
Indeno(1,2,3-c,d)pyrene	mg/kg	119345-11	<0.1 || <0.1	[NR]	[NR]
Dibenzo(a,h)anthracene	mg/kg	119345-11	<0.1 || <0.1	[NR]	[NR]
Benzo(g,h,i)perylene	mg/kg	119345-11	<0.1 || <0.1	[NR]	[NR]
Surrogate p-Terphenyl-d14	%	119345-11	103 || 104 || RPD: 1	LCS-5	99%

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QUALITY CONTROL Organochlorine Pesticides in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	119345-11	17/11/2014 || 17/11/2014	LCS-5	17/11/2014
Date analysed	-	119345-11	17/11/2014 || 17/11/2014	LCS-5	17/11/2014
HCB	mg/kg	119345-11	<0.1 || <0.1	[NR]	[NR]
alpha-BHC	mg/kg	119345-11	<0.1 || <0.1	LCS-5	77%
gamma-BHC	mg/kg	119345-11	<0.1 || <0.1	[NR]	[NR]
beta-BHC	mg/kg	119345-11	<0.1 || <0.1	LCS-5	86%
Heptachlor	mg/kg	119345-11	<0.1 || <0.1	LCS-5	79%
delta-BHC	mg/kg	119345-11	<0.1 || <0.1	[NR]	[NR]
Aldrin	mg/kg	119345-11	<0.1 || <0.1	LCS-5	87%
Heptachlor Epoxide	mg/kg	119345-11	<0.1 || <0.1	LCS-5	78%
gamma-Chlordane	mg/kg	119345-11	<0.1 || <0.1	[NR]	[NR]
alpha-chlordane	mg/kg	119345-11	<0.1 || <0.1	[NR]	[NR]
Endosulfan I	mg/kg	119345-11	<0.1 || <0.1	[NR]	[NR]
pp-DDE	mg/kg	119345-11	<0.1 || <0.1	LCS-5	87%
Dieldrin	mg/kg	119345-11	<0.1 || <0.1	LCS-5	77%
Endrin	mg/kg	119345-11	<0.1 || <0.1	LCS-5	76%
pp-DDD	mg/kg	119345-11	<0.1 || <0.1	LCS-5	93%
Endosulfan II	mg/kg	119345-11	<0.1 || <0.1	[NR]	[NR]
pp-DDT	mg/kg	119345-11	<0.1 || <0.1	[NR]	[NR]
Endrin Aldehyde	mg/kg	119345-11	<0.1 || <0.1	[NR]	[NR]
Endosulfan Sulphate	mg/kg	119345-11	<0.1 || <0.1	LCS-5	80%
Methoxychlor	mg/kg	119345-11	<0.1 || <0.1	[NR]	[NR]
Surrogate TCMX	%	119345-11	108 || 100 || RPD: 8	LCS-5	82%

QUALITY CONTROL Organophosphorus Pesticides	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	119345-11	17/11/2014 || 17/11/2014	LCS-5	17/11/2014
Date analysed	-	119345-11	17/11/2014 || 17/11/2014	LCS-5	17/11/2014
Diazinon	mg/kg	119345-11	<0.1 || <0.1	[NR]	[NR]
Dimethoate	mg/kg	119345-11	<0.1 || <0.1	[NR]	[NR]
Chlorpyriphos-methyl	mg/kg	119345-11	<0.1 || <0.1	[NR]	[NR]
Ronnel	mg/kg	119345-11	<0.1 || <0.1	[NR]	[NR]
Chlorpyriphos	mg/kg	119345-11	<0.1 || <0.1	LCS-5	104%
Fenitrothion	mg/kg	119345-11	<0.1 || <0.1	LCS-5	103%
Bromophos-ethyl	mg/kg	119345-11	<0.1 || <0.1	[NR]	[NR]
Ethion	mg/kg	119345-11	<0.1 || <0.1	LCS-5	86%
Surrogate TCMX	%	119345-11	108 || 100 || RPD: 8	LCS-5	80%
QUALITY CONTROL PCBs in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	119345-11	17/11/2014 || 17/11/2014	LCS-5	17/11/2014
Date analysed	-	119345-11	17/11/2014 || 17/11/2014	LCS-5	17/11/2014
Arochlor 1016	mg/kg	119345-11	<0.1 || <0.1	[NR]	[NR]
Arochlor 1221	mg/kg	119345-11	<0.1 || <0.1	[NR]	[NR]
Arochlor 1232	mg/kg	119345-11	<0.1 || <0.1	[NR]	[NR]
Arochlor 1242	mg/kg	119345-11	<0.1 || <0.1	[NR]	[NR]
Arochlor 1248	mg/kg	119345-11	<0.1 || <0.1	[NR]	[NR]
Arochlor 1254	mg/kg	119345-11	<0.1 || <0.1	LCS-5	93%
Arochlor 1260	mg/kg	119345-11	<0.1 || <0.1	[NR]	[NR]
Surrogate TCLMX	%	119345-11	108 || 100 || RPD: 8	LCS-5	90%
QUALITY CONTROL Total Phenolics in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	119345-11	17/11/2014 || 17/11/2014	LCS-2	17/11/2014
Date analysed	-	119345-11	17/11/2014 || 17/11/2014	LCS-2	17/11/2014
Total Phenolics (as Phenol)	mg/kg	119345-11	<5 || <5	LCS-2	101%
QUALITY CONTROL Acid Extractable metals in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date digested	-	119345-11	17/11/2014 || 17/11/2014	LCS-3	17/11/2014
Date analysed	-	119345-11	17/11/2014 || 17/11/2014	LCS-3	17/11/2014
Arsenic	mg/kg	119345-11	<4 || <4	LCS-3	112%
Cadmium	mg/kg	119345-11	<0.4 || <0.4	LCS-3	106%
Chromium	mg/kg	119345-11	3 || 3 || RPD: 0	LCS-3	109%
Copper	mg/kg	119345-11	11 || 8 || RPD: 32	LCS-3	107%
Lead	mg/kg	119345-11	13 || 10 || RPD: 26	LCS-3	102%
Mercury	mg/kg	119345-11	<0.1 || <0.1	LCS-3	102%
Nickel	mg/kg	119345-11	4 || 3 || RPD: 29	LCS-3	104%
Zinc	mg/kg	119345-11	51 || 50 || RPD: 2	LCS-3	105%

QUALITY CONTROL Miscellaneous Inorg - soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date prepared	-	119345-33	17/11/2014 || 17/11/2014	LCS-2	17/11/2014
Date analysed	-	119345-33	18/11/2014 || 18/11/2014	LCS-2	18/11/2014
pH 1:5 soil:water	pH Units	[NT]	[NT]	[NR]	[NR]
Electrical Conductivity 1:5 soil:water	µS/cm	119345-33	620 || 590 || RPD: 5	LCS-2	110%
QUALITY CONTROL vTRH(C6-C10)/BTEXN in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	119345-21	17/11/2014 || 17/11/2014	119345-2	17/11/2014
Date analysed	-	119345-21	19/11/2014 || 19/11/2014	119345-2	18/11/2014
TRH C_6 - C_9	mg/kg	119345-21	<25 || <25	119345-2	106%
TRH C_6 - C_{10}	mg/kg	119345-21	<25 || <25	119345-2	106%
Benzene	mg/kg	119345-21	<0.2 || <0.2	119345-2	106%
Toluene	mg/kg	119345-21	<0.5 || <0.5	119345-2	106%
Ethylbenzene	mg/kg	119345-21	<1 || <1	119345-2	103%
m+p-xylene	mg/kg	119345-21	<2 || <2	119345-2	107%
o-Xylene	mg/kg	119345-21	<1 || <1	119345-2	104%
naphthalene	mg/kg	119345-21	<1 || <1	[NR]	[NR]
Surrogate aaa-Trifluorotoluene	%	119345-21	84 || 88 || RPD: 5	119345-2	97%
QUALITY CONTROL svTRH (C10-C40) in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	119345-21	17/11/2014 || 17/11/2014	119345-2	17/11/2014
Date analysed	-	119345-21	18/11/2014 || 18/11/2014	119345-2	17/11/2014
TRH C_{10} - C_{14}	mg/kg	119345-21	<50 || <50	119345-2	123%
TRH C_{15} - C_{28}	mg/kg	119345-21	<100 || <100	119345-2	139%
TRH C_{29} - C_{36}	mg/kg	119345-21	<100 || <100	119345-2	#
TRH >C_{10}-C_{16}	mg/kg	119345-21	<50 || <50	119345-2	123%
TRH >C_{16}-C_{34}	mg/kg	119345-21	<100 || <100	119345-2	139%
TRH >C_{34}-C_{40}	mg/kg	119345-21	<100 || <100	119345-2	#
Surrogate o-Terphenyl	%	119345-21	91 || 95 || RPD: 4	119345-2	113%
QUALITY CONTROL PAHs in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	119345-21	17/11/2014 || 17/11/2014	119345-2	17/11/2014
Date analysed	-	119345-21	18/11/2014 || 18/11/2014	119345-2	18/11/2014
Naphthalene	mg/kg	119345-21	<0.1 || <0.1	119345-2	99%
Acenaphthylene	mg/kg	119345-21	<0.1 || <0.1	[NR]	[NR]
Acenaphthene	mg/kg	119345-21	<0.1 || <0.1	[NR]	[NR]
Fluorene	mg/kg	119345-21	<0.1 || <0.1	119345-2	93%
Phenanthrene	mg/kg	119345-21	<0.1 || <0.1	119345-2	97%
Anthracene	mg/kg	119345-21	<0.1 || <0.1	[NR]	[NR]
Fluoranthene	mg/kg	119345-21	<0.1 || <0.1	119345-2	91%
Pyrene	mg/kg	119345-21	<0.1 || <0.1	119345-2	94%

QUALITY CONTROL PAHs in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Benzo(a)anthracene	mg/kg	119345-21	<0.1 || <0.1	[NR]	[NR]
Chrysene	mg/kg	119345-21	<0.1 || <0.1	119345-2	88%
Benzo(b,j+k)fluoranthene	mg/kg	119345-21	<0.2 || <0.2	[NR]	[NR]
Benzo(a)pyrene	mg/kg	119345-21	<0.05 || <0.05	119345-2	111%
Indeno(1,2,3-c,d)pyrene	mg/kg	119345-21	<0.1 || <0.1	[NR]	[NR]
Dibenzo(a,h)anthracene	mg/kg	119345-21	<0.1 || <0.1	[NR]	[NR]
Benzo(g,h,i)perylene	mg/kg	119345-21	<0.1 || <0.1	[NR]	[NR]
Surrogate p-Terphenyl-d14	%	119345-21	95 || 101 || RPD: 6	119345-2	96%
QUALITY CONTROL Organochlorine Pesticides in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	119345-21	17/11/2014 || 17/11/2014	119345-2	17/11/2014
Date analysed	-	119345-21	17/11/2014 || 17/11/2014	119345-2	17/11/2014
HCB	mg/kg	119345-21	<0.1 || <0.1	[NR]	[NR]
alpha-BHC	mg/kg	119345-21	<0.1 || <0.1	119345-2	113%
gamma-BHC	mg/kg	119345-21	<0.1 || <0.1	[NR]	[NR]
beta-BHC	mg/kg	119345-21	<0.1 || <0.1	119345-2	109%
Heptachlor	mg/kg	119345-21	<0.1 || <0.1	119345-2	101%
delta-BHC	mg/kg	119345-21	<0.1 || <0.1	[NR]	[NR]
Aldrin	mg/kg	119345-21	<0.1 || <0.1	119345-2	103%
Heptachlor Epoxide	mg/kg	119345-21	<0.1 || <0.1	119345-2	98%
gamma-Chlordane	mg/kg	119345-21	<0.1 || <0.1	[NR]	[NR]
alpha-chlordane	mg/kg	119345-21	<0.1 || <0.1	[NR]	[NR]
Endosulfan I	mg/kg	119345-21	<0.1 || <0.1	[NR]	[NR]
pp-DDE	mg/kg	119345-21	<0.1 || <0.1	119345-2	98%
Dieldrin	mg/kg	119345-21	<0.1 || <0.1	119345-2	99%
Endrin	mg/kg	119345-21	<0.1 || <0.1	119345-2	99%
pp-DDD	mg/kg	119345-21	<0.1 || <0.1	119345-2	117%
Endosulfan II	mg/kg	119345-21	<0.1 || <0.1	[NR]	[NR]
pp-DDT	mg/kg	119345-21	<0.1 || <0.1	[NR]	[NR]
Endrin Aldehyde	mg/kg	119345-21	<0.1 || <0.1	[NR]	[NR]
Endosulfan Sulphate	mg/kg	119345-21	<0.1 || <0.1	119345-2	108%
Methoxychlor	mg/kg	119345-21	<0.1 || <0.1	[NR]	[NR]
Surrogate TCMX	%	119345-21	86 || 93 || RPD: 8	119345-2	82%

QUALITY CONTROL Organophosphorus Pesticides	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	119345-21	17/11/2014 || 17/11/2014	119345-2	17/11/2014
Date analysed	-	119345-21	17/11/2014 || 17/11/2014	119345-2	17/11/2014
Diazinon	mg/kg	119345-21	<0.1 || <0.1	[NR]	[NR]
Dimethoate	mg/kg	119345-21	<0.1 || <0.1	[NR]	[NR]
Chlorpyriphos-methyl	mg/kg	119345-21	<0.1 || <0.1	[NR]	[NR]
Ronnel	mg/kg	119345-21	<0.1 || <0.1	[NR]	[NR]
Chlorpyriphos	mg/kg	119345-21	<0.1 || <0.1	119345-2	111%
Fenitrothion	mg/kg	119345-21	<0.1 || <0.1	119345-2	113%
Bromophos-ethyl	mg/kg	119345-21	<0.1 || <0.1	[NR]	[NR]
Ethion	mg/kg	119345-21	<0.1 || <0.1	119345-2	103%
Surrogate TCMX	%	119345-21	86 || 93 || RPD: 8	119345-2	82%
QUALITY CONTROL PCBs in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	119345-21	17/11/2014 || 17/11/2014	119345-2	17/11/2014
Date analysed	-	119345-21	17/11/2014 || 17/11/2014	119345-2	17/11/2014
Arochlor 1016	mg/kg	119345-21	<0.1 || <0.1	[NR]	[NR]
Arochlor 1221	mg/kg	119345-21	<0.1 || <0.1	[NR]	[NR]
Arochlor 1232	mg/kg	119345-21	<0.1 || <0.1	[NR]	[NR]
Arochlor 1242	mg/kg	119345-21	<0.1 || <0.1	[NR]	[NR]
Arochlor 1248	mg/kg	119345-21	<0.1 || <0.1	[NR]	[NR]
Arochlor 1254	mg/kg	119345-21	<0.1 || <0.1	119345-2	102%
Arochlor 1260	mg/kg	119345-21	<0.1 || <0.1	[NR]	[NR]
Surrogate TCLMX	%	119345-21	86 || 93 || RPD: 8	119345-2	98%
QUALITY CONTROL Total Phenolics in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	119345-21	17/11/2014 || 17/11/2014	119345-2	17/11/2014
Date analysed	-	119345-21	17/11/2014 || 17/11/2014	119345-2	17/11/2014
Total Phenolics (as Phenol)	mg/kg	119345-21	<5 || <5	119345-2	99%
QUALITY CONTROL Acid Extractable metals in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date digested	-	119345-21	17/11/2014 || 17/11/2014	LCS-4	17/11/2014
Date analysed	-	119345-21	17/11/2014 || 17/11/2014	LCS-4	17/11/2014
Arsenic	mg/kg	119345-21	4 || 6 || RPD: 40	LCS-4	109%
Cadmium	mg/kg	119345-21	<0.4 || <0.4	LCS-4	105%
Chromium	mg/kg	119345-21	9 || 8 || RPD: 12	LCS-4	108%
Copper	mg/kg	119345-21	20 || 16 || RPD: 22	LCS-4	107%
Lead	mg/kg	119345-21	9 || 10 || RPD: 11	LCS-4	101%
Mercury	mg/kg	119345-21	<0.1 || <0.1	LCS-4	93%
Nickel	mg/kg	119345-21	18 || 9 || RPD: 67	LCS-4	102%
Zinc	mg/kg	119345-21	39 || 22 || RPD: 56	LCS-4	104%

QUALITY CONTROL vTRH(C6-C10)/BTEXN in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	119345-31	17/11/2014 || 17/11/2014	119345-22	17/11/2014
Date analysed	-	119345-31	19/11/2014 || 19/11/2014	119345-22	19/11/2014
TRH C_6 - C_9	mg/kg	119345-31	<25 || <25	119345-22	97%
TRH C_6 - C_{10}	mg/kg	119345-31	<25 || <25	119345-22	97%
Benzene	mg/kg	119345-31	<0.2 || <0.2	119345-22	98%
Toluene	mg/kg	119345-31	<0.5 || <0.5	119345-22	99%
Ethylbenzene	mg/kg	119345-31	<1 || <1	119345-22	96%
m+p-xylene	mg/kg	119345-31	<2 || <2	119345-22	97%
o-Xylene	mg/kg	119345-31	<1 || <1	119345-22	96%
naphthalene	mg/kg	119345-31	<1 || <1	[NR]	[NR]
Surrogate aaa-Trifluorotoluene	%	119345-31	88 || 90 || RPD: 2	119345-22	87%

QUALITY CONTROL svTRH (C10-C40) in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	119345-31	17/11/2014 || 17/11/2014	119345-22	17/11/2014
Date analysed	-	119345-31	18/11/2014 || 18/11/2014	119345-22	18/11/2014
TRH C_{10} - C_{14}	mg/kg	119345-31	<50 || <50	119345-22	128%
TRH C_{15} - C_{28}	mg/kg	119345-31	<100 || <100	119345-22	139%
TRH C_{29} - C_{36}	mg/kg	119345-31	<100 || <100	119345-22	94%
TRH >C_{10}-C_{16}	mg/kg	119345-31	<50 || <50	119345-22	128%
TRH >C_{16}-C_{34}	mg/kg	119345-31	<100 || <100	119345-22	139%
TRH >C_{34}-C_{40}	mg/kg	119345-31	<100 || <100	119345-22	94%
Surrogate o-Terphenyl	%	119345-31	89 || 87 || RPD: 2	119345-22	110%

QUALITY CONTROL PAHs in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	119345-31	17/11/2014 || 17/11/2014	119345-22	17/11/2014
Date analysed	-	119345-31	18/11/2014 || 18/11/2014	119345-22	18/11/2014
Naphthalene	mg/kg	119345-31	<0.1 || <0.1	119345-22	90%
Acenaphthylene	mg/kg	119345-31	<0.1 || <0.1	[NR]	[NR]
Acenaphthene	mg/kg	119345-31	<0.1 || <0.1	[NR]	[NR]
Fluorene	mg/kg	119345-31	<0.1 || <0.1	119345-22	87%
Phenanthrene	mg/kg	119345-31	<0.1 || <0.1	119345-22	92%
Anthracene	mg/kg	119345-31	<0.1 || <0.1	[NR]	[NR]
Fluoranthene	mg/kg	119345-31	<0.1 || <0.1	119345-22	94%
Pyrene	mg/kg	119345-31	<0.1 || <0.1	119345-22	95%
Benzo(a)anthracene	mg/kg	119345-31	<0.1 || <0.1	[NR]	[NR]
Chrysene	mg/kg	119345-31	<0.1 || <0.1	119345-22	88%
Benzo(b,j+k)fluoranthene	mg/kg	119345-31	<0.2 || <0.2	[NR]	[NR]
Benzo(a)pyrene	mg/kg	119345-31	<0.05 || <0.05	119345-22	104%
Indeno(1,2,3-c,d)pyrene	mg/kg	119345-31	<0.1 || <0.1	[NR]	[NR]
Dibenzo(a,h)anthracene	mg/kg	119345-31	<0.1 || <0.1	[NR]	[NR]

QUALITY CONTROL PAHs in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Benzo(g,h,i)perylene	mg/kg	119345-31	<0.1 || <0.1	[NR]	[NR]
Surrogate p-Terphenyl-d14	%	119345-31	102 || 100 || RPD: 2	119345-22	95%
QUALITY CONTROL Organochlorine Pesticides in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	119345-31	17/11/2014 || 17/11/2014	119345-22	17/11/2014
Date analysed	-	119345-31	17/11/2014 || 17/11/2014	119345-22	17/11/2014
HCB	mg/kg	119345-31	<0.1 || <0.1	[NR]	[NR]
alpha-BHC	mg/kg	119345-31	<0.1 || <0.1	119345-22	75%
gamma-BHC	mg/kg	119345-31	<0.1 || <0.1	[NR]	[NR]
beta-BHC	mg/kg	119345-31	<0.1 || <0.1	119345-22	84%
Heptachlor	mg/kg	119345-31	<0.1 || <0.1	119345-22	77%
delta-BHC	mg/kg	119345-31	<0.1 || <0.1	[NR]	[NR]
Aldrin	mg/kg	119345-31	<0.1 || <0.1	119345-22	85%
Heptachlor Epoxide	mg/kg	119345-31	<0.1 || <0.1	119345-22	76%
gamma-Chlordane	mg/kg	119345-31	<0.1 || <0.1	[NR]	[NR]
alpha-chlordane	mg/kg	119345-31	<0.1 || <0.1	[NR]	[NR]
Endosulfan I	mg/kg	119345-31	<0.1 || <0.1	[NR]	[NR]
pp-DDE	mg/kg	119345-31	<0.1 || <0.1	119345-22	85%
Dieldrin	mg/kg	119345-31	<0.1 || <0.1	119345-22	76%
Endrin	mg/kg	119345-31	<0.1 || <0.1	119345-22	75%
pp-DDD	mg/kg	119345-31	<0.1 || <0.1	119345-22	92%
Endosulfan II	mg/kg	119345-31	<0.1 || <0.1	[NR]	[NR]
pp-DDT	mg/kg	119345-31	<0.1 || <0.1	[NR]	[NR]
Endrin Aldehyde	mg/kg	119345-31	<0.1 || <0.1	[NR]	[NR]
Endosulfan Sulphate	mg/kg	119345-31	<0.1 || <0.1	119345-22	79%
Methoxychlor	mg/kg	119345-31	<0.1 || <0.1	[NR]	[NR]
Surrogate TCMX	%	119345-31	87 || 80 || RPD: 8	119345-22	78%

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QUALITY CONTROL Organophosphorus Pesticides	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	119345-31	17/11/2014 || 17/11/2014	119345-22	17/11/2014
Date analysed	-	119345-31	17/11/2014 || 17/11/2014	119345-22	17/11/2014
Diazinon	mg/kg	119345-31	<0.1 || <0.1	[NR]	[NR]
Dimethoate	mg/kg	119345-31	<0.1 || <0.1	[NR]	[NR]
Chlorpyriphos-methyl	mg/kg	119345-31	<0.1 || <0.1	[NR]	[NR]
Ronnel	mg/kg	119345-31	<0.1 || <0.1	[NR]	[NR]
Chlorpyriphos	mg/kg	119345-31	<0.1 || <0.1	119345-22	97%
Fenitrothion	mg/kg	119345-31	<0.1 || <0.1	119345-22	95%
Bromophos-ethyl	mg/kg	119345-31	<0.1 || <0.1	[NR]	[NR]
Ethion	mg/kg	119345-31	<0.1 || <0.1	119345-22	80%
Surrogate TCMX	%	119345-31	87 || 80 || RPD: 8	119345-22	83%
QUALITY CONTROL PCBs in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	119345-31	17/11/2014 || 17/11/2014	119345-22	17/11/2014
Date analysed	-	119345-31	17/11/2014 || 17/11/2014	119345-22	17/11/2014
Arochlor 1016	mg/kg	119345-31	<0.1 || <0.1	[NR]	[NR]
Arochlor 1221	mg/kg	119345-31	<0.1 || <0.1	[NR]	[NR]
Arochlor 1232	mg/kg	119345-31	<0.1 || <0.1	[NR]	[NR]
Arochlor 1242	mg/kg	119345-31	<0.1 || <0.1	[NR]	[NR]
Arochlor 1248	mg/kg	119345-31	<0.1 || <0.1	[NR]	[NR]
Arochlor 1254	mg/kg	119345-31	<0.1 || <0.1	119345-22	78%
Arochlor 1260	mg/kg	119345-31	<0.1 || <0.1	[NR]	[NR]
Surrogate TCLMX	%	119345-31	87 || 80 || RPD: 8	119345-22	92%
QUALITY CONTROL Total Phenolics in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	119345-31	17/11/2014 || 17/11/2014	119345-22	17/11/2014
Date analysed	-	119345-31	17/11/2014 || 17/11/2014	119345-22	17/11/2014
Total Phenolics (as Phenol)	mg/kg	119345-31	<5 || <5	119345-22	96%
QUALITY CONTROL Acid Extractable metals in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date digested	-	119345-31	17/11/2014 || 17/11/2014	119345-2	17/11/2014
Date analysed	-	119345-31	17/11/2014 || 17/11/2014	119345-2	17/11/2014
Arsenic	mg/kg	119345-31	11 || 11 || RPD: 0	119345-2	96%
Cadmium	mg/kg	119345-31	0.4 || 0.5 || RPD: 22	119345-2	95%
Chromium	mg/kg	119345-31	15 || 15 || RPD: 0	119345-2	98%
Copper	mg/kg	119345-31	20 || 21 || RPD: 5	119345-2	99%
Lead	mg/kg	119345-31	20 || 19 || RPD: 5	119345-2	96%
Mercury	mg/kg	119345-31	<0.1 || <0.1	119345-2	100%
Nickel	mg/kg	119345-31	10 || 10 || RPD: 0	119345-2	90%
Zinc	mg/kg	119345-31	48 || 48 || RPD: 0	119345-2	90%

QUALITY CONTROL Acid Extractable metals in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date digested	-	[NT]	[NT]	119345-22	17/11/2014
Date analysed	-	[NT]	[NT]	119345-22	17/11/2014
Arsenic	mg/kg	[NT]	[NT]	119345-22	91%
Cadmium	mg/kg	[NT]	[NT]	119345-22	98%
Chromium	mg/kg	[NT]	[NT]	119345-22	100%
Copper	mg/kg	[NT]	[NT]	119345-22	105%
Lead	mg/kg	[NT]	[NT]	119345-22	93%
Mercury	mg/kg	[NT]	[NT]	119345-22	100%
Nickel	mg/kg	[NT]	[NT]	119345-22	94%
Zinc	mg/kg	[NT]	[NT]	119345-22	101%

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Report Comments:

TRH in soil (semi-vol):
Percent recovery is not possible to report as the high concentration of analytes in the sample/s have caused interference.

Asbestos-ID in soil: A portion of the supplied samples were sub-sampled for asbestos analysis according to Envirolab procedures.
We cannot guarantee that these sub-samples are indicative of the entire samples. Envirolab recommends supplying 40-50g of sample in its own container.

Sample 119345-35; Chrysotile asbestos identified embedded in al fragment of fibre cement (total weight 0.0048g). Which in 41.40g of soil is 0.01g/kg (i.e. < reporting limit for the method of 0.1g/kg).

Acid Extractable Metals in Soil: The laboratory RPD acceptance criteriae has been exceeded for 119345-21 for Ni and Zn. Therefore a triplicate result has been issued as laboratory sample number 119345-45.

Asbestos ID was analysed by Approved Identifier: Paul Ching
Asbestos ID was authorised by Approved Signatory: Paul Ching

INS: Insufficient sample for this test
NA: Test not required
<: Less than

PQL: Practical Quantitation Limit
RPD: Relative Percent Difference
>: Greater than

NT: Not tested
NA: Test not required
LCS: Laboratory Control Sample

Quality Control Definitions

Blank: This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.

Duplicate: This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.

Matrix Spike : A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.

LCS (Laboratory Control Sample) : This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.

Surrogate Spike: Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.
Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.
Spikes for Physical and Aggregate Tests are not applicable.
For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.
Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics and 10-140% for SVOC and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

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CHAIN OF CUSTODY

Project Name: Site Regrading Kemps Creek.....
Project No:84601 ..... Sampler: RJL.....
Project Mgr: PG .....Mob. Phone: 0434561888 .....
Email: Richard.lamont@douglaspartners.com.au; paul.gorman@douglaspartners.com.au

To: Envirolab Services
12 Ashley Street, Chatswood NSW 2068
Attn: Aileen Hie

Phone: 02 9910 6200 Fax: 02 9910 6201

Date Required: standard turn around..... Lab Quote No. .....Email: tnotaras@envirolabservices.com.au

Sample ID	Sample Depth	Lab ID	Sampling Date	S - soil W – water	Container type	HEAVY METAL	TRH	BTEX	PAH	ASBESTOS	PCB/OCP/OPP	PHENOLS	pH	CEC	Conductivity		Notes
TP2	0-0.1	1	12/11	S	G	X	X	X	X	X	X	X	X	X	X		
TP3	0.3-0.4	2	12/11	S	G	X	X	X	X	X	X	X					
TP4	0.3-0.4	3	12/11	S	G	X	X	X	X	X	X	X					
BD1/121114		4		S	G	X	X	X	X	X	X	X					
TP5	1.3-1.4	5	12/11	S	G	X	X	X	X	X	X	X	X	X	X		
TP6	2.9-3.0	6	12/11	S	G	X	X	X	X	X	X	X					
TP7	0.2-0.3	7	12/11	S	G	X	X	X	X	X	X	X					
TP8	0.3-0.4	8	12/11	S	G	X	X	X	X	X	X	X	X	X	X		
TP9	0-0.1	9	12/11	S	G	X	X	X	X	X	X	X					
TP10	0-0.1	10	12/11	S	G	X	X	X	X	X	X	X					
TP12	0-0.05	11	13/11	S	G	X	X	X	X	X	X	X	X	X	X		

ENVIROLAB
Envirolab Services
12 Ashley St
Chatswood NSW 2067
Ph: (02) 9910 6200

Job No: 119347
Date Received: 14.11.14
Time Received: 1200
Received by: DF
Temp: Cool/Ambient
~~Cooling: Ice/Icepack~~
Security: Intact/Broken/None

Lab Report No. .....
Send Results to: Douglas Partners Address: 96 Hermitage Road, West Ryde 2114
Phone: (02) 9809 0666
Fax: (02) 9809 4095

Relinquished by: R.Lamont Signed: Date & Time: 14/11/14 Received By: Daniel Ford Date & Time: 14.11.14 12:00
Relinquished by: Signed: Date & Time: Received By: Date & Time:

Document Set ID: 7088845
Version: 1, Version Date: 23/03/2016

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CHAIN OF CUSTODY

Project Name: Site Regrading Kemps Creek.....
Project No:84601 ..... Sampler: RJL.....
Project Mgr: PG .....Mob. Phone: 0434561888 .....
Email: Richard.lamont@douglaspartners.com.au; paul.gorman@douglaspartners.com.au

To: Envirolab Services
12 Ashley Street, Chatswood NSW 2068
Attn: Tania Notaras
Phone: 02 9910 6200 Fax: 02 9910 6201
Email: tnotaras@envirolabservices.com.au

Date Required: Standard turn around..... Lab Quote No. .....

Sample ID 119345	Sample Depth	Lab ID	Sampling Date	S - soil W – water	Container type	HEAVY METAL	TRH	BTEX	PAH	PHENOLS	PCB/OCP/OPP	ASBESTOS	pH	Conductivity	CEC		Notes
TP14	0-0.05	12	13/11	S	G	X	X	X	X	X	X	X					
TP15	0.1-0.2	13	13/11	S	G	X	X	X	X	X	X	X					
TP17	0.1-0.2	14	13/11	S	G	X	X	X	X	X	X	X	X	X	X		
TP18	0-0.05	15	13/11	S	G	X	X	X	X	X	X	X					
TP19	0.1-0.2	16	13/11	S	G	X	X	X	X	X	X	X	X	X	X		
BD1/131114		17		S	G	X	X	X	X	X	X	X					
TP20	0.1-0.2	18	13/11	S	G	X	X	X	X	X	X	X					
TP21	0.1-0.2	19	13/11	S	G	X	X	X	X	X	X	X					
TP22	0.1-0.2	20	13/11	S	G	X	X	X	X	X	X	X	X	X	X		
TP23	0.1-0.2	21	13/11	S	G	X	X	X	X	X	X	X					
TP24	0.2-0.3	22	12/11	S	G	X	X	X	X	X	X	X					

Lab Report No. .....
Send Results to: Douglas Partners Address: 96 Hermitage Road, West Ryde 2114
Phone: (02) 9809 0666
Fax: (02) 9809 4095

Relinquished by: R.Lamont	Signed:	Date & Time: 14/11/14	Received By:	Date & Time:	14.11.14 12:00
Relinquished by:	Signed:	Date & Time:	Received By:	Date & Time:	

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Version: 1, Version Date: 23/03/2016

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Project Name: Site Regarding Kemps Creek.....
Project No:84601 ..... Sampler: RJL.....
Project Mgr: PG .....Mob. Phone: 0434561888 .....
Email: Richard.lamont@douglaspartners.com.au; paul.gorman@douglaspartners.com.au

To: Envirolab Services
12 Ashley Street, Chatswood NSW 2068
Attn: Tania Notaras
Phone: 02 9910 6200 Fax: 02 9910 6201
Email: tnotaras@envirolabservices.com.au

Date Required: Standard turn around..... Lab Quote No. .....

Sample ID 11934F	Sample Depth	Lab ID	Sampling Date	S - soil W – water	Container type	HEAVY METAL	TRH	BTEX	PAH	PHENOLS	PCB/OCP/OPP	ASBESTOS	CEC	pH	Conductivity		Notes
TP25	0.2-0.3	23.	12/11	S	G	X	X	X	X	X	X	X	X	X	X		
TP26	0.1-0.2	24.	12/11	S	G	X	X	X	X	X	X	X					
TP27	0.1-0.2	25.	12/11	S	G	X	X	X	X	X	X	X					
TP28	0.1-0.2	26.	12/11	S	G	X	X	X	X	X	X	X	X	X	X		
TP29	0.1-0.2	27.	12/11	S	G	X	X	X	X	X	X	X					
TP31	0.1-0.2	28.	12/11	S	G	X	X	X	X	X	X	X					
TP33	0.2-0.3	29.	12/11	S	G	X	X	X	X	X	X	X					
TP34	0.7-0.8	30.	12/11	S	G	X	X	X	X	X	X	X	X	X	X		
TP35	0-0.1	31.	12/11	S	G	X	X	X	X	X	X	X					
TP36	0-0.1	32.	12/11	S	G	X	X	X	X	X	X	X					
SP1/S1		33.	12/11	S	G	X						X			X		

Lab Report No. .....
Send Results to: Douglas Partners Address: 96 Hermitage Road, West Ryde 2114
Phone: (02) 9809 0666
Fax: (02) 9809 4095

Relinquished by: R.Lamont	Signed:	Date & Time: 14/11/14	Received By: Daniel Farel	Date & Time: 14.11.14 12:00
Relinquished by:	Signed:	Date & Time:	Received By:	Date & Time:

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Version: 1, Version Date: 23/03/2016

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CHAIN OF CUSTODY

Project Name: Site Regrading Kemps Creek.....
Project No:84601 ..... Sampler: RJL.....
Project Mgr: PG .....Mob. Phone: 0434561888 .....
Email: Richard.lamont@douglaspartners.com.au; paul.gorman@douglaspartners.com.au

To: Envirolab Services
12 Ashley Street, Chatswood NSW 2068
Attn: Aileen Hie

Phone: 02 9910 6200 Fax: 02 9910 6201

Date Required: standard turn around..... Lab Quote No. .....Email: tnotaras@envirolabservices.com.au

Sample ID 119345.	Sample Depth	Lab ID	Sampling Date	S - soil W – water	Container type	HEAVY METAL	TRH	BTEX	PAH	ASBESTOS	PCB/OCP/OPP	PHENOLS	pH	CEC	Conductivity		Notes
SP1/S2		34	12/11	S	G	X				X					X		
SP1/S3		35	12/11	S	G	X				X					X		
SP2/S1		36	12/11	S	G	X				X					X		
SP2/S2		37	12/11	S	G	X				X					X		
SP2/S3		38	12/11	S	G	X				X					X		
SP2/S4		39	12/11	S	G	X				X					X		
SP3/S1		40	12/11	S	G	X				X					X		
SP3/S2		41	12/11	S	G	X				X					X		
SP3/S3		42	12/11	S	G	X				X					X		
TRIP SPIKE		43		S				X									
TRIP BLANK		44		S				X									

Lab Report No. .....
Send Results to: Douglas Partners Address: 96 Hermitage Road, West Ryde 2114
Phone: (02) 9809 0666
Fax: (02) 9809 4095

Relinquished by: R.Lamont Signed: Date & Time: 14/11/14 Received By: Daniel Ford Date & Time: 14.11.14 12:00

Relinquished by: Signed: Date & Time: Received By: Date & Time:

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PO Box 472
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Fax (02) 9809 4095

Results of Foreign Materials Content of Recycled Crushed Concrete T276

Client:	**Olathree Pty Ltd**	**Project No:**	84601
		Report No:	1
Project:	Fill assessment	**Report Date:**	25/11/2014
		Date Sampled:	12/11/2014
Location:	Kemps Creek	**Date of Test:**	18/11/2014
		Page:	1 of 1

SAMPLE NO	DEPTH (m)	DESCRIPTION	FOREIGN MATERIAL TYPE (% Retained on 4.75mm Sieve)		
			TYPE I	TYPE II	TYPE III
SP1/S1	-	Brick, concrete, tiles and fines	0.0	0.1	0.3

Legend:
Type I = Metal
Type II = Plaster, Clay Lumps and other Friable Material
Type III = Rubber, Plastic, Bitumen, Paper, Cloth, Paint, Wood and other Vegetable Matter

Sampling Method(s): Sampled by Enviro Department

Remarks: Sample contains 0.1% glass and 33% brick/tiles

Tested: AH
Checked: MM

Mark Matthews
Laboratory Manager

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PO Box 472
West Ryde NSW 1685
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Results of Foreign Materials Content of Recycled Crushed Concrete T276

Client:	**Olathree Pty Ltd**	**Project No:**	84601
		Report No:	2
Project:	Fill assessment	**Report Date:**	25/11/2014
		Date Sampled:	12/11/2014
Location:	Kemps Creek	**Date of Test:**	18/11/2014
		Page:	1 of 1

SAMPLE NO	DEPTH (m)	DESCRIPTION	FOREIGN MATERIAL TYPE (% Retained on 4.75mm Sieve)		
			TYPE I	TYPE II	TYPE III
SP1/S2	-	Brick, concrete, tiles and fines	0.2	0.5	0.2

Legend:
Type I = Metal
Type II = Plaster, Clay Lumps and other Friable Material
Type III = Rubber, Plastic, Bitumen, Paper, Cloth, Paint, Wood and other Vegetable Matter

Sampling Method(s): Sampled by Enviro Department

Remarks: Sample contains 0.2% glass and 11% brick/tiles

Tested: AH
Checked: MM

Mark Matthews
Laboratory Manager

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West Ryde NSW 2114
PO Box 472
West Ryde NSW 1685
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Results of Foreign Materials Content of Recycled Crushed Concrete T276

Client:	**Olathree Pty Ltd**	**Project No:**	84601
		Report No:	3
Project:	Fill assessment	**Report Date:**	25/11/2014
		Date Sampled:	12/11/2014
Location:	Kemps Creek	**Date of Test:**	18/11/2014
		Page:	1 of 1

SAMPLE NO	DEPTH (m)	DESCRIPTION	FOREIGN MATERIAL TYPE (% Retained on 4.75mm Sieve)		
			TYPE I	TYPE II	TYPE III
SP1/S3	-	Brick, concrete, tiles and fines	0.0	0.0	0.0

Legend:
Type I = Metal
Type II = Plaster, Clay Lumps and other Friable Material
Type III = Rubber, Plastic, Bitumen, Paper, Cloth, Paint, Wood and other Vegetable Matter

Sampling Method(s): Sampled by Enviro Department

Remarks: Sample contains 10% brick/tiles

Tested: AH
Checked: MM

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Laboratory Manager

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West Ryde NSW 2114
PO Box 472
West Ryde NSW 1685
Phone (02) 9809 0666
Fax (02) 9809 4095

Results of Foreign Materials Content of Recycled Crushed Concrete T276

Client:	**Olathree Pty Ltd**	**Project No:**	84601
		Report No:	4
Project:	Fill assessment	**Report Date:**	25/11/2014
		Date Sampled:	12/11/2014
Location:	Kemps Creek	**Date of Test:**	18/11/2014
		Page:	1 of 1

SAMPLE NO	DEPTH (m)	DESCRIPTION	FOREIGN MATERIAL TYPE (% Retained on 4.75mm Sieve)		
			TYPE I	TYPE II	TYPE III
SP2/S1	-	Brick, concrete, tiles and fines	0.0	0.0	0.1

Legend:
Type I = Metal
Type II = Plaster, Clay Lumps and other Friable Material
Type III = Rubber, Plastic, Bitumen, Paper, Cloth, Paint, Wood and other Vegetable Matter

Sampling Method(s): Sampled by Enviro Department

Remarks: Sample contains 0.1% glass and 23% brick/tiles

Tested: AH
Checked: MM

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West Ryde NSW 2114
PO Box 472
West Ryde NSW 1685
Phone (02) 9809 0666
Fax (02) 9809 4095

Results of Foreign Materials Content of Recycled Crushed Concrete T276

Client:	**Olathree Pty Ltd**	**Project No:**	84601
		Report No:	5
Project:	Fill assessment	**Report Date:**	25/11/2014
		Date Sampled:	12/11/2014
Location:	Kemps Creek	**Date of Test:**	18/11/2014
		Page:	1 of 1

SAMPLE NO	DEPTH (m)	DESCRIPTION	FOREIGN MATERIAL TYPE (% Retained on 4.75mm Sieve)		
			TYPE I	TYPE II	TYPE III
SP2/S2	-	Brick, concrete, tiles and fines	0.1	0.0	0.0

Legend:
Type I = Metal
Type II = Plaster, Clay Lumps and other Friable Material
Type III = Rubber, Plastic, Bitumen, Paper, Cloth, Paint, Wood and other Vegetable Matter

Sampling Method(s): Sampled by Enviro Department

Remarks: Sample contains 0.1% glass and 19% brick/tiles

Tested: AH
Checked: MM

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Laboratory Manager

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West Ryde NSW 2114
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Results of Foreign Materials Content of Recycled Crushed Concrete T276

Client:	**Olathree Pty Ltd**	**Project No:**	84601
		Report No:	6
Project:	Fill assessment	**Report Date:**	25/11/2014
		Date Sampled:	12/11/2014
Location:	Kemps Creek	**Date of Test:**	18/11/2014
		Page:	1 of 1

SAMPLE NO	DEPTH (m)	DESCRIPTION	FOREIGN MATERIAL TYPE (% Retained on 4.75mm Sieve)		
			TYPE I	TYPE II	TYPE III
SP2/S3	-	Brick, concrete, tiles and fines	0.0	0.0	0.3

Legend:
Type I = Metal
Type II = Plaster, Clay Lumps and other Friable Material
Type III = Rubber, Plastic, Bitumen, Paper, Cloth, Paint, Wood and other Vegetable Matter

Sampling Method(s): Sampled by Enviro Department

Remarks: Sample contains 0.1% glass and 25% brick/tiles

Tested: AH
Checked: MM

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Laboratory Manager

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Results of Foreign Materials Content of Recycled Crushed Concrete T276

Client:	**Olathree Pty Ltd**	**Project No:**	84601
		Report No:	7
Project:	Fill assessment	**Report Date:**	25/11/2014
		Date Sampled:	12/11/2014
Location:	Kemps Creek	**Date of Test:**	18/11/2014
		Page:	1 of 1

SAMPLE NO	DEPTH (m)	DESCRIPTION	FOREIGN MATERIAL TYPE (% Retained on 4.75mm Sieve)		
			TYPE I	TYPE II	TYPE III
SP2/S4	-	Brick, concrete, tiles and fines	0.0	0.1	0.1

Legend:
Type I = Metal
Type II = Plaster, Clay Lumps and other Friable Material
Type III = Rubber, Plastic, Bitumen, Paper, Cloth, Paint, Wood and other Vegetable Matter

Sampling Method(s): Sampled by Enviro Department

Remarks: Sample contains 0.1% glass and 12% brick/tiles

Tested: AH
Checked: MM

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West Ryde NSW 2114
PO Box 472
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Fax (02) 9809 4095

Results of Foreign Materials Content of Recycled Crushed Concrete T276

Client:	Olathree Pty Ltd	**Project No:**	84601
		Report No:	8
Project:	Fill assessment	**Report Date:**	25/11/2014
		Date Sampled:	12/11/2014
Location:	Kemps Creek	**Date of Test:**	18/11/2014
		Page:	1 of 1

SAMPLE NO	DEPTH (m)	DESCRIPTION	FOREIGN MATERIAL TYPE (% Retained on 4.75mm Sieve)		
			TYPE I	TYPE II	TYPE III
SP3/S1	-	Brick, concrete, tiles and fines	0.1	0.1	0.1

Legend:
Type I = Metal
Type II = Plaster, Clay Lumps and other Friable Material
Type III = Rubber, Plastic, Bitumen, Paper, Cloth, Paint, Wood and other Vegetable Matter

Sampling Method(s): Sampled by Enviro Department

Remarks: Sample contains 11% brick/tiles

Tested: AH
Checked: MM

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Results of Foreign Materials Content of Recycled Crushed Concrete T276

Client:	**Olathree Pty Ltd**	**Project No:**	84601
		Report No:	9
Project:	Fill assessment	**Report Date:**	25/11/2014
		Date Sampled:	12/11/2014
Location:	Kemps Creek	**Date of Test:**	18/11/2014
		Page:	1 of 1

SAMPLE NO	DEPTH (m)	DESCRIPTION	FOREIGN MATERIAL TYPE (% Retained on 4.75mm Sieve)		
			TYPE I	TYPE II	TYPE III
SP3/S2	-	Brick, concrete, tiles and fines	1.7	0.1	0.3

Legend:
Type I = Metal
Type II = Plaster, Clay Lumps and other Friable Material
Type III = Rubber, Plastic, Bitumen, Paper, Cloth, Paint, Wood and other Vegetable Matter

Sampling Method(s): Sampled by Enviro Department

Remarks: Sample contains 0.1% glass and 18% brick/tiles

Tested: AH
Checked: MM

Mark Matthews
Laboratory Manager

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PO Box 472
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Results of Foreign Materials Content of Recycled Crushed Concrete T276

Client:	**Olathree Pty Ltd**	**Project No:**	84601
		Report No:	10
Project:	Fill assessment	**Report Date:**	25/11/2014
		Date Sampled:	12/11/2014
Location:	Kemps Creek	**Date of Test:**	18/11/2014
		Page:	1 of 1

SAMPLE NO	DEPTH (m)	DESCRIPTION	FOREIGN MATERIAL TYPE (% Retained on 4.75mm Sieve)		
			TYPE I	TYPE II	TYPE III
SP3/S2	-	Brick, concrete, tiles and fines	0.0	0.1	0.2

Legend:
Type I = Metal
Type II = Plaster, Clay Lumps and other Friable Material
Type III = Rubber, Plastic, Bitumen, Paper, Cloth, Paint, Wood and other Vegetable Matter

Sampling Method(s): Sampled by Enviro Department

Remarks: Sample contains 0.0% glass and 15% brick/tiles

Tested: AH
Checked: MM

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Laboratory Manager

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Version: 1, Version Date: 23/03/2016

Appendix F

Test Bore Results

and Notes About this Report

Document Set ID: 7088845
Version: 1, Version Date: 23/03/2016

TEST PIT LOG

CLIENT: Olathree Pty Ltd
PROJECT: Site Regrading
LOCATION: 915 Mamre Road, Kemps Creek

SURFACE LEVEL: --
EASTING: 294620
NORTHING: 6252058

PIT No: 1
PROJECT No: 84601
DATE: 12/11/2014
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
	0.1	FILLING - light brown, fine to medium sand filling with some subangular small to medium gravel and traces of glass, humid		D	0.0 0.1				
	0.35	CLAY - red-orange, clay with traces of sand, humid							
		Pit discontinued at 0.35m - target depth reached							

RIG: Komatsu PC 220LC

LOGGED: RJL

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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Document Set ID: 7088845
Version: 1, Version Date: 23/03/2016

TEST PIT LOG

CLIENT: Olathree Pty Ltd
PROJECT: Site Regrading
LOCATION: 915 Mamre Road, Kemps Creek

SURFACE LEVEL: --
EASTING: 294607
NORTHING: 6252045

PIT No: 2
PROJECT No: 84601
DATE: 12/11/2014
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
	0.1	FILLING - light brown and orange, fine to medium sand filling, humid		D	0.0				
		CLAY - orange and red, clay with some sand, humid			0.1				
	0.43	Pit discontinued at 0.43m - target depth reached							
	1								1
	2								2
	3								3
	4								4

RIG: Komatsu PC 220LC

LOGGED: RJL

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

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TEST PIT LOG

CLIENT: Olathree Pty Ltd
PROJECT: Site Regrading
LOCATION: 915 Mamre Road, Kemps Creek

SURFACE LEVEL: --
EASTING: 294601
NORTHING: 6252100

PIT No: 3
PROJECT No: 84601
DATE: 12/11/2014
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
		FILLING - dark brown, fine to medium sand filling with some medium to large gravel and concrete boulders with trace of brick and plastic, humid		D	0.3 0.4				
	1			D	1.5 1.6				1
	1.8	CLAY - red, clay with some sand, humid							
	2								2
	2.3	Pit discontinued at 2.3m - target depth reached							
	3								3
	4								4

RIG: Komatsu PC 220LC
LOGGED: RJL
SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

Document Set ID: 7088845
Version: 1, Version Date: 23/03/2016

TEST PIT LOG

CLIENT: Olathree Pty Ltd
PROJECT: Site Regrading
LOCATION: 915 Mamre Road, Kemps Creek

SURFACE LEVEL: --
EASTING: 294582
NORTHING: 6252119

PIT No: 4
PROJECT No: 84601
DATE: 12/11/2014
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
	0.0	FILLING - dark brown, fine to medium sand filling with some medium to large gravel, concrete boulders and some brick, plastic and wood, humid							
		- metal bar at 0.1m		D*	0.3				
					0.4				
		- metal wire at 0.4m							
	1								1
				D	1.4				
		- metal wire at 1.42m			1.5				
	2								2
	3								3
	3.3	CLAY - red clay with some sand, humid		D	3.3				
		- metal bar at 3.4m			3.4				
	3.5	Pit discontinued at 3.5m - target depth reached							
	4								4

RIG: Komatsu PC 220LC

LOGGED: RJL

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS: *BD1/121114 collected at 0.3m to 0.4m

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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Document Set ID: 7088845
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TEST PIT LOG

CLIENT: Olathree Pty Ltd
PROJECT: Site Regrading
LOCATION: 915 Mamre Road, Kemps Creek

SURFACE LEVEL: --
EASTING: 294561
NORTHING: 6252149

PIT No: 5
PROJECT No: 84601
DATE: 12/11/2014
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
		FILLING - dark brown, fine to medium sand filling with some small to medium gravel and some brick and tile, humid							
		- plastic at 0.3m		D	0.3 0.4				
	1								1
				D	1.3 1.4				
	1.8	CLAY - red-yellow, clay with some sand, humid							
	2								2
	2.25	Pit discontinued at 2.25m - target depth reached							
	3								3
	4								4

RIG: Komatsu PC 220LC

LOGGED: RJL

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Olathree Pty Ltd
PROJECT: Site Regrading
LOCATION: 915 Mamre Road, Kemps Creek

SURFACE LEVEL: --
EASTING: 294607
NORTHING: 6252146

PIT No: 6
PROJECT No: 84601
DATE: 12/11/2014
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
		FILLING - dark brown, fine to medium sand filling with medium to large gravel, some concrete boulders and traces of brick, humid							
		- PVC pipe at 0.3m		D	0.3 0.4				
	1								1
		- concrete slab at 1.5m							
		- grey sandstone boulders at 1.7m							
	2								2
				D	2.9 3.0				
	3								3
	3.1	Pit discontinued at 3.1m - refusal							
	4								4

RIG: Komatsu PC 220LC **LOGGED:** RJL **SURVEY DATUM:** MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Olathree Pty Ltd
PROJECT: Site Regrading
LOCATION: 915 Mamre Road, Kemps Creek

SURFACE LEVEL: --
EASTING: 294626
NORTHING: 6252114

PIT No: 7
PROJECT No: 84601
DATE: 12/11/2014
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
	0.0	FILLING - dark brown, fine to medium sand filling with some small to medium gravel and small to medium concrete and traces of glass, brick and tile, humid		D	0.2 0.3				
	1.2	SANDSTONE - dark grey-orange, highly weathered sandstone		◆	1.5				
	2.0	Pit discontinued at 2.0m - target depth reached							

RIG: Komatsu PC 220LC
LOGGED: RJL
SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS: ◆Weathered sandstone found. Unsure if fill or natural (sample taken for identification)

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Olathree Pty Ltd
PROJECT: Site Regrading
LOCATION: 915 Mamre Road, Kemps Creek

SURFACE LEVEL: --
EASTING: 294626
NORTHING: 6252088

PIT No: 8
PROJECT No: 84601
DATE: 12/11/2014
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
		FILLING - dark brown, fine to medium sand filling with some small to medium gravel, concrete boulder and traces of brick, tile and wood, humid		D	0.3 0.4				
	1.4	CLAY - red clay with some sand, humid							
	1.9	Pit discontinued at 1.9m - target depth reached							

RIG: Komatsu PC 220LC

LOGGED: RJL

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Olathree Pty Ltd
PROJECT: Site Regrading
LOCATION: 915 Mamre Road, Kemps Creek

SURFACE LEVEL: --
EASTING: 294661
NORTHING: 6252064

PIT No: 9
PROJECT No: 84601
DATE: 12/11/2014
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
	0.1	FILLING - dark brown, fine to medium sand filling with some small to medium gravel, humid		D	0.0				
	0.3	CLAY - red-orange, clay with some sand, humid			0.1				
		Pit discontinued at 0.3m - target depth reached							

RIG: Komatsu PC 220LC

LOGGED: RJL

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Olathree Pty Ltd
PROJECT: Site Regrading
LOCATION: 915 Mamre Road, Kemps Creek

SURFACE LEVEL: --
EASTING: 294666
NORTHING: 6252086

PIT No: 10
PROJECT No: 84601
DATE: 12/11/2014
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
	0.0								5 10 15 20
	0.1	FILLING - dark brown, fine to medium sand filling with some small to medium gravel and trace of brick, humid		D	0.0 - 0.1				
	0.2	CLAY - red-orange, clay with some sand, humid							
		Pit discontinued at 0.2m - target depth reached							
	1								1
	2								2
	3								3
	4								4

RIG: Komatsu PC 220LC

LOGGED: RJL

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Olathree Pty Ltd
PROJECT: Site Regrading
LOCATION: 915 Mamre Road, Kemps Creek

SURFACE LEVEL: --
EASTING: 294657
NORTHING: 6252121

PIT No: 11
PROJECT No: 84601
DATE: 13/11/2014
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
	0.05	FILLING - dark brown, fine to medium sand filling with some small to medium brick, tile and gravel, humid		D	0.0 0.05				
		SANDSTONE - highly weathered, light brown sandstone							
	0.5	Pit discontinued at 0.5m - target depth reached							
	1								
	2								
	3								
	4								

Dynamic Penetrometer Test (blows per mm): 5, 10, 15, 20

RIG: Komatsu PC 220LC
LOGGED: RJL
SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Olathree Pty Ltd
PROJECT: Site Regrading
LOCATION: 915 Mamre Road, Kemps Creek

SURFACE LEVEL: --
EASTING: 294634
NORTHING: 6252141

PIT No: 12
PROJECT No: 84601
DATE: 13/11/2014
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
	0.1	FILLING - dark brown, fine to medium sand filling with medium brick, concrete and tile, damp		D	0.0 0.05				
	0.16 0.21	FILLING - light brown and grey, clay filling with small to medium brick and concrete, damp							
		SANDSTONE - highly weathered, light brown sandstone							
		Pit discontinued at 0.21m - target depth reached							
	1								
	2								
	3								
	4								

Dynamic Penetrometer Test (blows per mm): 5, 10, 15, 20

RIG: Komatsu PC 220LC

LOGGED: RJL

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Olathree Pty Ltd
PROJECT: Site Regrading
LOCATION: 915 Mamre Road, Kemps Creek

SURFACE LEVEL: --
EASTING: 294608
NORTHING: 6252178

PIT No: 13
PROJECT No: 84601
DATE: 13/11/2014
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
	0.1	FILLING - dark brown, fine to medium sand filling with trace clay with some small to medium brick, concrete, tile and gravel		D	0.0 0.05				
		CLAY - orange-red and light grey, clay with some sand							
	0.92	Pit discontinued at 0.92m - target depth reached							
	1								1
	2								2
	3								3
	4								4

RIG: Komatsu PC 220LC

LOGGED: RJL

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Olathree Pty Ltd
PROJECT: Site Regrading
LOCATION: 915 Mamre Road, Kemps Creek

SURFACE LEVEL: --
EASTING: 294580
NORTHING: 6252186

PIT No: 14
PROJECT No: 84601
DATE: 13/11/2014
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
	0.05	FILLING - light brown, fine to medium sand filling with some small to medium brick, tile, concrete and gravel, humid		D	0.0 0.05				
		CLAY - orange-red and light grey, clay with some sand, humid							
	0.89	Pit discontinued at 0.89m - target depth reached							
	1								1
	2								2
	3								3
	4								4

RIG: Komatsu PC 220LC

LOGGED: RJL

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Olathree Pty Ltd
PROJECT: Site Regrading
LOCATION: 915 Mamre Road, Kemps Creek

SURFACE LEVEL: --
EASTING: 294600
NORTHING: 6252208

PIT No: 15
PROJECT No: 84601
DATE: 13/11/2014
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
		FILLING - light brown, fine to medium sand filling with some clay and medium and small to medium gravel, concrete, brick and compacted clay, humid		D	0.1 0.2				
	0.3	CLAY - red-orange, clay with some sand, humid							
	1.04 1.09	SHALY CLAY - light grey and brown, shaly clay, humid							
		Pit discontinued at 1.09m - target depth reached							

RIG: Komatsu PC 220LC

LOGGED: RJL

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Olathree Pty Ltd
PROJECT: Site Regrading
LOCATION: 915 Mamre Road, Kemps Creek

SURFACE LEVEL: --
EASTING: 294622
NORTHING: 6252225

PIT No: 16
PROJECT No: 84601
DATE: 13/11/2014
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
		FILLING - light brown, fine to medium sand filling with some small to medium brick, concrete and gravel, humid		D	0.1 0.2				
	0.3	CLAY - red, clay with some sand, damp							
	1								1
	1.14	Pit discontinued at 1.14m - target depth reached							
	2								2
	3								3
	4								4

RIG: Komatsu PC 220LC

LOGGED: RJL

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

Document Set ID: 7088845
Version: 1, Version Date: 23/03/2016

TEST PIT LOG

CLIENT: Olathree Pty Ltd
PROJECT: Site Regrading
LOCATION: 915 Mamre Road, Kemps Creek

SURFACE LEVEL: --
EASTING: 294639
NORTHING: 6252203

PIT No: 17
PROJECT No: 84601
DATE: 13/11/2014
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
		FILLING - dark brown, fine to medium sand filling with some clay and shale and small to medium gravel, concrete, brick and tile, humid		D	0.1 0.2				
	0.5	CLAY - red and light grey, clay with some sand, humid							
	0.77	Pit discontinued at 0.77m - target depth reached							
	1								1
	2								2
	3								3
	4								4

RIG: Komatsu PC 220LC

LOGGED: RJL

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Olathree Pty Ltd
PROJECT: Site Regrading
LOCATION: 915 Mamre Road, Kemps Creek

SURFACE LEVEL: --
EASTING: 294651
NORTHING: 6252159

PIT No: 18
PROJECT No: 84601
DATE: 13/11/2014
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
	0.05	FILLING - light brown, fine to medium sand filling with some small to medium gravel, brick and concrete, humid		D	0.0 0.05				
		CLAY - orange-yellow and light grey, clay with some sand, humid							
	0.45 0.49	SHALE - highly weathered, black and grey shale							
		Pit discontinued at 0.49m - target depth reached							
	1								
	2								
	3								
	4								

RIG: Komatsu PC 220LC

LOGGED: RJL

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Olathree Pty Ltd
PROJECT: Site Regrading
LOCATION: 915 Mamre Road, Kemps Creek

SURFACE LEVEL: --
EASTING: 294670
NORTHING: 6252138

PIT No: 19
PROJECT No: 84601
DATE: 13/11/2014
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
	0.1	FILLING - dark brown, fine to medium sand filling with trace clay and some small to medium brick, tile and concrete, humid		D*	0.1 0.2				
	0.3	FILLING - dark brown-orange, clay filling with some sand and some small gravel, brick and trace ironstone, humid							
	0.44	SANDSTONE - highly weathered, light brown sandstone							
		Pit discontinued at 0.44m - target depth reached							

RIG: Komatsu PC 220LC

LOGGED: RJL

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS: *BD1/131114 collected at 0.1m to 0.2m

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Olathree Pty Ltd
PROJECT: Site Regrading
LOCATION: 915 Mamre Road, Kemps Creek

SURFACE LEVEL: --
EASTING: 294693
NORTHING: 6252146

PIT No: 20
PROJECT No: 84601
DATE: 13/11/2014
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
	0.1	FILLING - light brown, fine to medium sand filling with small to medium gravel, brick, tile and concrete, humid - cloth rag at 0.05m		D	0.1 0.2				
		FILLING - light brown-orange, clay filling with some sand and some small to medium gravel, brick and concrete, humid							
	0.95	SANDSTONE - highly weathered, light brown sandstone							
	1.36	Pit discontinued at 1.36m - target depth reached							

RIG: Komatsu PC 220LC

LOGGED: RJL

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Olathree Pty Ltd
PROJECT: Site Regrading
LOCATION: 915 Mamre Road, Kemps Creek

SURFACE LEVEL: --
EASTING: 294680
NORTHING: 6252168

PIT No: 21
PROJECT No: 84601
DATE: 13/11/2014
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
	0.05	FILLING - light brown, fine to medium sand filling with some small to medium brick, concrete and gravel		D	0.1				
	0.24	FILLING - red-orange, clay filling with some sand, humid - old water pipe at 0.17m			0.2				
		CLAY - orange and light grey, clay with some sand, humid							
	0.8	SHALE - highly weathered, grey and black shale							
	1.0	Pit discontinued at 1.0m - target depth reached							

Dynamic Penetrometer Test (blows per mm): 5, 10, 15, 20

RIG: Komatsu PC 220LC

LOGGED: RJL

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Olathree Pty Ltd
PROJECT: Site Regrading
LOCATION: 915 Mamre Road, Kemps Creek

SURFACE LEVEL: --
EASTING: 294657
NORTHING: 6252208

PIT No: 22
PROJECT No: 84601
DATE: 13/11/2014
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
	0.4	FILLING - light brown, clay filling with some sand and some small to medium concrete, brick and gravel, humid		D	0.1 0.2				
	0.9	CLAY - red-orange, clay with some sand, humid							
	1	Pit discontinued at 0.9m - target depth reached							

RIG: Komatsu PC 220LC

LOGGED: RJL

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Olathree Pty Ltd
PROJECT: Site Regrading
LOCATION: 915 Mamre Road, Kemps Creek

SURFACE LEVEL: --
EASTING: 294631
NORTHING: 6252234

PIT No: 23
PROJECT No: 84601
DATE: 13/11/2014
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
	0.1	FILLING - light brown, fine to medium sand filling with some concrete, gravel and brick, humid		D	0.1				
		FILLING - mottled light grey and dark brown, sandy clay filling with small gravel, humid			0.2				
	0.7	CLAY - orange-red and light grey, clay with some sand, humid							
	1.0	Pit discontinued at 1.0m - target depth reached							

Dynamic Penetrometer Test (blows per mm): 5, 10, 15, 20

RIG: Komatsu PC 220LC

LOGGED: RJL

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Olathree Pty Ltd
PROJECT: Site Regrading
LOCATION: 915 Mamre Road, Kemps Creek

SURFACE LEVEL: --
EASTING: 294684
NORTHING: 6252273

PIT No: 24
PROJECT No: 84601
DATE: 12/11/2014
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
		FILLING - light brown-grey, fine to medium sand filling with some clay with some small gravel, damp		D	0.2 0.3				
	0.85	CLAY - orange-yellow, clay with some sand, damp							
	1.55	Pit discontinued at 1.55m - target depth reached							

RIG: Komatsu PC 220LC

LOGGED: RJL

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Olathree Pty Ltd
PROJECT: Site Regrading
LOCATION: 915 Mamre Road, Kemps Creek

SURFACE LEVEL: --
EASTING: 294710
NORTHING: 6252291

PIT No: 25
PROJECT No: 84601
DATE: 12/11/2014
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
		FILLING - dark brown, clay filling with some sand and some small to medium gravel, damp		D	0.2 0.3				
	0.9	CLAY - red-orange-light grey, clay with some sand, damp							
	1.5	Pit discontinued at 1.5m - target depth reached							

RIG: Komatsu PC 220LC

LOGGED: RJL

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Olathree Pty Ltd
PROJECT: Site Regrading
LOCATION: 915 Mamre Road, Kemps Creek

SURFACE LEVEL: --
EASTING: 294744
NORTHING: 6252310

PIT No: 26
PROJECT No: 84601
DATE: 12/11/2014
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
		FILLING - dark brown, fine to medium sand filling with some clay and small to medium gravel		D	0.1 0.2				
	0.7	CLAY - red-orange, clay with some sand, damp							
	1								1
	1.15	Pit discontinued at 1.15m - target depth reached							
	2								2
	3								3
	4								4

RIG: Komatsu PC 220LC

LOGGED: RJL

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▽	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Olathree Pty Ltd
PROJECT: Site Regrading
LOCATION: 915 Mamre Road, Kemps Creek

SURFACE LEVEL: --
EASTING: 294771
NORTHING: 6252327

PIT No: 27
PROJECT No: 84601
DATE: 12/11/2014
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
		FILLING - dark brown, fine to medium sand filling with trace clay and some small to medium gravel, humid		D	0.1 0.2				
	0.5	CLAY - red-orange, clay with some sand, damp							
	1.1	Pit discontinued at 1.1m - target depth reached							

RIG: Komatsu PC 220LC

LOGGED: RJL

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Olathree Pty Ltd
PROJECT: Site Regrading
LOCATION: 915 Mamre Road, Kemps Creek

SURFACE LEVEL: --
EASTING: 294809
NORTHING: 6252351

PIT No: 28
PROJECT No: 84601
DATE: 12/11/2014
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
		FILLING - dark brown-light grey, fine to medium sand filling with traces of clay and small gravel, humid		D	0.1 0.2				
	0.6	CLAY - red-orange-light grey, clay with some sand, damp							
	1.0	Pit discontinued at 1.0m - target depth reached							

RIG: Komatsu PC 220LC

LOGGED: RJL

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Olathree Pty Ltd
PROJECT: Site Regrading
LOCATION: 915 Mamre Road, Kemps Creek

SURFACE LEVEL: --
EASTING: 294837
NORTHING: 6252368

PIT No: 29
PROJECT No: 84601
DATE: 12/11/2014
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
		FILLING - light brown-grey, fine to medium sand filling with some clay and small gravel, humid		D	0.1 0.2				
	0.4	CLAY - red-orange, clay with some sand, humid							
	0.7	Pit discontinued at 0.7m - target depth reached							
	1								1
	2								2
	3								3
	4								4

RIG: Komatsu PC 220LC

LOGGED: RJL

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Olathree Pty Ltd
PROJECT: Site Regrading
LOCATION: 915 Mamre Road, Kemps Creek

SURFACE LEVEL: --
EASTING: 294858
NORTHING: 6252380

PIT No: 30
PROJECT No: 84601
DATE: 12/11/2014
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
		FILLING - light brown, fine to medium sand filling with trace of clay and small gravel, damp		D	0.1 0.2				
	0.3	CLAY - red-orange, clay with some sand, damp							
	0.74	Pit discontinued at 0.74m - target depth reached							
	1								1
	2								2
	3								3
	4								4

RIG: Komatsu PC 220LC

LOGGED: RJL

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

Document Set ID: 7088845
Version: 1, Version Date: 23/03/2016

TEST PIT LOG

CLIENT: Olathree Pty Ltd
PROJECT: Site Regrading
LOCATION: 915 Mamre Road, Kemps Creek

SURFACE LEVEL: --
EASTING: 294886
NORTHING: 6252395

PIT No: 31
PROJECT No: 84601
DATE: 12/11/2014
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
		FILLING - light brown-orange, fine to medium sand filling with small to medium sandstone gravel, damp		D	0.1 0.2				
	0.65	CLAY - red-orange, clay with some sand, humid							
	0.9	Pit discontinued at 0.9m - target depth reached							

Dynamic Penetrometer Test (blows per mm): 5, 10, 15, 20; 1, 2, 3, 4

RIG: Komatsu PC 220LC

LOGGED: RJL

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

Document Set ID: 7088845
Version: 1, Version Date: 23/03/2016

TEST PIT LOG

CLIENT: Olathree Pty Ltd
PROJECT: Site Regrading
LOCATION: 915 Mamre Road, Kemps Creek

SURFACE LEVEL: --
EASTING: 294887
NORTHING: 6252382

PIT No: 32
PROJECT No: 84601
DATE: 12/11/2014
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
		FILLING - dark brown-grey, fine to medium sand filling with small to medium gravel and small concrete, humid		D	0.1 0.2				
	0.3	FILLING - yellow-grey, fine to medium sand filling with small to medium gravel and small concrete, humid							
	0.6	CLAY - red-orange, clay with some sand, humid							
	1								1
	1.3	Pit discontinued at 1.3m - target depth reached							
	2								2
	3								3
	4								4

RIG: Komatsu PC 220LC

LOGGED: RJL

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
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Version: 1, Version Date: 23/03/2016

TEST PIT LOG

CLIENT: Olathree Pty Ltd
PROJECT: Site Regrading
LOCATION: 915 Mamre Road, Kemps Creek

SURFACE LEVEL: --
EASTING: 294903
NORTHING: 6252360

PIT No: 33
PROJECT No: 84601
DATE: 12/11/2014
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
		FILLING - light to dark brown, clay filling with some sand and small to medium gravel, humid		D	0.2 0.3				
	0.5	CLAY - red and light grey, clay with some sand, damp							
	1.1	Pit discontinued at 1.1m - target depth reached							

RIG: Komatsu PC 220LC

LOGGED: RJL

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

Document Set ID: 7088845
Version: 1, Version Date: 23/03/2016

TEST PIT LOG

CLIENT: Olathree Pty Ltd
PROJECT: Site Regrading
LOCATION: 915 Mamre Road, Kemps Creek

SURFACE LEVEL: --
EASTING: 294923
NORTHING: 6252330

PIT No: 34
PROJECT No: 84601
DATE: 12/11/2014
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
	0.01	TOPSOIL - dark brown, fine to medium sand with some rootlets, humid		D	0.1				
		FILLING - dark brown, fine to medium sand filling with small to medium gravel, humid			0.2				
	0.7	FILLING - dark brown-black, clay filling with some sand and small to medium asphalt gravel, humid		D	0.7				
	1				0.8				1
	1.2	CLAY - light grey, clay with trace of silt, humid							
	1.5	Pit discontinued at 1.5m - target depth reached							
	2								2
	3								3
	4								4

Dynamic Penetrometer Test (blows per mm): 5, 10, 15, 20

RIG: Komatsu PC 220LC
LOGGED: RJL
SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▽	Water level	V	Shear vane (kPa)

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Document Set ID: 7088845
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TEST PIT LOG

CLIENT: Olathree Pty Ltd
PROJECT: Site Regrading
LOCATION: 915 Mamre Road, Kemps Creek

SURFACE LEVEL: --
EASTING: 294940
NORTHING: 6252306

PIT No: 35
PROJECT No: 84601
DATE: 12/11/2014
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
	0.0	FILLING - dark brown, fine to medium sand filling with trace of clay and some small gravel, humid		D	0.0				
	0.1				0.1				
	0.3	CLAY - red-orange-yellow, clay with some sand, humid							
	0.8	Pit discontinued at 0.8m - target depth reached							
	1								
	2								
	3								
	4								

Dynamic Penetrometer Test (blows per mm): 5, 10, 15, 20

RIG: Komatsu PC 220LC

LOGGED: RJL

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Olathree Pty Ltd
PROJECT: Site Regrading
LOCATION: 915 Mamre Road, Kemps Creek

SURFACE LEVEL: --
EASTING: 294955
NORTHING: 6252281

PIT No: 36
PROJECT No: 84601
DATE: 12/11/2014
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
	0.0			D	0.0				
	0.1	TOPSOIL - dark brown, fine to medium sand with some rootlets, humid			0.1				
	0.2	FILLING - dark brown, fine to medium sand filling with some small to medium gravel, humid							
		CLAY - red-orange-yellow, clay with some sand, humid							
	0.6	Pit discontinued at 0.6m - target depth reached							
	1								
	2								
	3								
	4								

Dynamic Penetrometer Test (blows per mm): 5, 10, 15, 20

RIG: Komatsu PC 220LC

LOGGED: RJL

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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About this Report

Introduction

These notes have been provided to amplify DP's report in regard to classification methods, field procedures and the comments section. Not all are necessarily relevant to all reports.

DP's reports are based on information gained from limited subsurface excavations and sampling, supplemented by knowledge of local geology and experience. For this reason, they must be regarded as interpretive rather than factual documents, limited to some extent by the scope of information on which they rely.

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This report is the property of Douglas Partners Pty Ltd. The report may only be used for the purpose for which it was commissioned and in accordance with the Conditions of Engagement for the commission supplied at the time of proposal. Unauthorised use of this report in any form whatsoever is prohibited.

Borehole and Test Pit Logs

The borehole and test pit logs presented in this report are an engineering and/or geological interpretation of the subsurface conditions, and their reliability will depend to some extent on frequency of sampling and the method of drilling or excavation. Ideally, continuous undisturbed sampling or core drilling will provide the most reliable assessment, but this is not always practicable or possible to justify on economic grounds. In any case the boreholes and test pits represent only a very small sample of the total subsurface profile.

Interpretation of the information and its application to design and construction should therefore take into account the spacing of boreholes or pits, the frequency of sampling, and the possibility of other than 'straight line' variations between the test locations.

Groundwater

Where groundwater levels are measured in boreholes there are several potential problems, namely:

- In low permeability soils groundwater may enter the hole very slowly or perhaps not at all during the time the hole is left open;
- A localised, perched water table may lead to an erroneous indication of the true water table;
- Water table levels will vary from time to time with seasons or recent weather changes. They may not be the same at the time of construction as are indicated in the report; and
- The use of water or mud as a drilling fluid will mask any groundwater inflow. Water has to be blown out of the hole and drilling mud must first be washed out of the hole if water measurements are to be made.

More reliable measurements can be made by installing standpipes which are read at intervals over several days, or perhaps weeks for low permeability soils. Piezometers, sealed in a particular stratum, may be advisable in low permeability soils or where there may be interference from a perched water table.

Reports

The report has been prepared by qualified personnel, is based on the information obtained from field and laboratory testing, and has been undertaken to current engineering standards of interpretation and analysis. Where the report has been prepared for a specific design proposal, the information and interpretation may not be relevant if the design proposal is changed. If this happens, DP will be pleased to review the report and the sufficiency of the investigation work.

Every care is taken with the report as it relates to interpretation of subsurface conditions, discussion of geotechnical and environmental aspects, and recommendations or suggestions for design and construction. However, DP cannot always anticipate or assume responsibility for:

- Unexpected variations in ground conditions. The potential for this will depend partly on borehole or pit spacing and sampling frequency;
- Changes in policy or interpretations of policy by statutory authorities; or
- The actions of contractors responding to commercial pressures.

If these occur, DP will be pleased to assist with investigations or advice to resolve the matter.

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About this Report

Site Anomalies

In the event that conditions encountered on site during construction appear to vary from those which were expected from the information contained in the report, DP requests that it be immediately notified. Most problems are much more readily resolved when conditions are exposed rather than at some later stage, well after the event.

Information for Contractual Purposes

Where information obtained from this report is provided for tendering purposes, it is recommended that all information, including the written report and discussion, be made available. In circumstances where the discussion or comments section is not relevant to the contractual situation, it may be appropriate to prepare a specially edited document. DP would be pleased to assist in this regard and/or to make additional report copies available for contract purposes at a nominal charge.

Site Inspection

The company will always be pleased to provide engineering inspection services for geotechnical and environmental aspects of work to which this report is related. This could range from a site visit to confirm that conditions exposed are as expected, to full time engineering presence on site.

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Appendix G

Laboratory Summary Tables

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		BTEX							Halogenated Benzenes	Inorganics		Lead	Metals						
	B(a)P TEQ	Benzene	Ethylbenzene	Toluene	Xylene (m & p)	Xylene (o)	Xylene Total	C6-C10 less BTEX (F1)	Hexachlorobenzene	Moisture	pH (aqueous extract)	Lead	Arsenic	Cadmium	Chromium (III+VI)	Copper	Mercury	Nickel	Zinc
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	%	pH_Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL	0.5	0.2	1	0.5	2	1		25	0.1	0.1		1	4	0.4	1	1	0.1	1	1
NEPM (2013) HILs Comm/Ind D Soil	40								80			1500	3000	900	3600	240,000	730	6000	400,000
NEPM (2013) Comm/Ind D Soil HSL for Vapour Intrusion, Sand, 0-1m		3	NL	NL			230	260											
NEPM (2013) Management Limits Comm / Ind, Coarse Soil																			
NEPM (2013) EILs - Commercial/Industrial (Aged)												1800	160		310	300		460	1100
NEPM (2013) ESLs for Comm/Ind, Coarse Soil		75	165	135			180	215											
ENM (2014) Table 2 Absolute Maximum		0.5	25	65			15				4.5-10	100	40	1	150	200	1	60	300
ENM (2014) Table 2 Maximum Average		NA	NA	NA			NA				5-9	50	20	0.5	75	100	0.5	30	150

| | | Organochlorine Pesticides | | | | | | | | | | | | | | | | | | |

				Polychlorinated Biphenyls								TPH										Asbestos	
				Indeno(1,2,3-c,d)pyrene	Naphthalene	PAHs (Sum of total)	Phenanthrene	Phenolics Total	Pyrene	Arochlor 1016	Arochlor 1221	Arochlor 1232	Arochlor 1242	Arochlor 1248	Arochlor 1254	Arochlor 1260	C10-C16	C16-C34	C34-C40	F2-NAPHTHALENE	C6 - C9	C10 - C14	C15 - C28	C29-C36	+C10 - C36 (Sum of total)	C6-C10	Asbestos ID in Soil	Trace Analysis
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg		
EQL				0.1	0.1		0.1	5	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	50	100	100	50	25	50	100	100		25		
NEPM (2013) HILs Comm/Ind D Soil						4000		240,000					7 (total PCB)														NAD	NAD
NEPM (2013) Comm/Ind D Soil HSL for Vapour Intrusion, Sand, 0-1m																				NL								
NEPM (2013) Management Limits Comm / Ind, Coarse Soil																	1000	3500	10,000							700		
NEPM (2013) EILs - Commercial/Industrial (Aged)					370																							
NEPM (2013) ESLs for Comm/Ind, Coarse Soil																		1700	3300	170								
ENM (2014) Table 2 Absolute Maximum						40																		500				
ENM (2014) Table 2 Maximum Average						20																		250				
Field_ID	**Sample_Depth_Range**	**Sampled_Date-Time**	**Matrix_Description**																									
TP2	0-0.1	11/12/2014		<0.1	<0.1	0	<0.1	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<50	<100	<100	<50	<25	<50	<100	<100	<250	<25	NAD	NAD
TP3	0.3-0.4	11/12/2014		<0.1	<0.1	0.45	<0.1	<5	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<50	<100	<100	<50	<25	<50	<100	<100	<250	<25	NAD	NAD
TP4	0.3-0.4	11/12/2014		<0.1	<0.1	0	<0.1	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<50	<100	<100	<50	<25	<50	<100	<100	<250	<25	NAD	NAD
BD1/121114	0.3-0.4	11/12/2014		0.1	<0.1	0.46	<0.1	<5	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<50	<100	<100	<50	<25	<50	<100	<100	<250	<25	NAD	NAD
TP5	1.3-1.4	11/12/2014		<0.1	<0.1	0.3	0.1	<5	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<50	<100	<100	<50	<25	<50	<100	<100	<250	<25	NAD	NAD
TP6	2.9-3	11/12/2014		<0.1	<0.1	0	<0.1	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<50	<100	<100	<50	<25	<50	<100	<100	<250	<25	NAD	NAD
TP7	0.2-0.3	11/12/2014		0.9	<0.1	9.6	0.5	<5	1.4	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<50	140	160	<50	<25	<50	<100	150	225	<25	NAD	NAD
TP8	0.3-0.4	11/12/2014		<0.1	<0.1	0	<0.1	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<50	<100	<100	<50	<25	<50	<100	<100	<250	<25	NAD	NAD
TP9	0-0.1	11/12/2014		<0.1	<0.1	0.31	<0.1	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<50	<100	<100	<50	<25	<50	<100	<100	<250	<25	NAD	NAD
TP10	0-0.1	11/12/2014		<0.1	<0.1	0	<0.1	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<50	<100	<100	<50	<25	<50	<100	<100	<250	<25	NAD	NAD
TP12	0-0.05	13/11/2014		<0.1	<0.1	0.27	<0.1	<5	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<50	<100	<100	<50	<25	<50	<100	<100	<250	<25	NAD	NAD
TP14	0-0.05	13/11/2014		<0.1	<0.1	0	<0.1	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<50	<100	<100	<50	<25	<50	<100	<100	<250	<25	NAD	NAD
TP15	0.1-0.2	13/11/2014		<0.1	<0.1	0	<0.1	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<50	<100	<100	<50	<25	<50	<100	<100	<250	<25	NAD	NAD
TP17	0.1-0.2	13/11/2014		<0.1	<0.1	0	<0.1	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<50	<100	<100	<50	<25	<50	<100	<100	<250	<25	NAD	NAD
TP18	0-0.05	13/11/2014		<0.1	<0.1	0	<0.1	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<50	<100	<100	<50	<25	<50	<100	<100	<250	<25	NAD	NAD
TP19	0.1-0.2	13/11/2014		<0.1	<0.1	0	<0.1	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<50	120	<100	<50	<25	<50	140	<100	215	<25	NAD	NAD
BD1/131114	0.1-0.2	13/11/2014		<0.1	<0.1	1.5	0.2	<5	0.4	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	52	230	<100	52	<25	<50	260	<100	335	<25	NAD	NAD
TP20	0.1-0.2	13/11/2014		<0.1	<0.1	0	<0.1	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<50	<100	<100	<50	<25	<50	<100	<100	<250	<25	NAD	NAD
TP21	0.1-0.2	13/11/2014		<0.1	<0.1	0	<0.1	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<50	<100	<100	<50	<25	<50	<100	<100	<250	<25	NAD	NAD
TP22	0.1-0.2	13/11/2014		<0.1	<0.1	0	<0.1	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<50	<100	<100	<50	<25	<50	<100	<100	<250	<25	NAD	NAD
TP23	0.1-0.2	13/11/2014		<0.1	<0.1	0	<0.1	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<50	<100	<100	<50	<25	<50	<100	<100	<250	<25	NAD	NAD
TP23 - TRIPLICATE	0.1-0.2	13/11/2014		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
TP24	0.2-0.3	11/12/2014		<0.1	<0.1	0	<0.1	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<50	<100	<100	<50	<25	<50	<100	<100	<250	<25	NAD	NAD
TP25	0.2-0.3	11/12/2014		<0.1	<0.1	0	<0.1	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<50	<100	<100	<50	<25	<50	<100	<100	<250	<25	NAD	NAD
TP26	0.1-0.2	11/12/2014		<0.1	<0.1	0	<0.1	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<50	<100	<100	<50	<25	<50	<100	<100	<250	<25	NAD	NAD
TP27	0.1-0.2	11/12/2014		<0.1	<0.1	0	<0.1	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<50	<100	<100	<50	<25	<50	<100	<100	<250	<25	NAD	NAD
TP28	0.1-0.2	11/12/2014		<0.1	<0.1	0	<0.1	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<50	<100	<100	<50	<25	<50	<100	<100	<250	<25	NAD	NAD
TP29	0.1-0.2	11/12/2014		<0.1	<0.1	0	<0.1	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<50	<100	<100	<50	<25	<50	<100	<100	<250	<25	NAD	NAD
TP31	0.1-0.2	11/12/2014		<0.1	<0.1	0.4	<0.1	<5	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<50	<100	<100	<50	<25	<50	<100	<100	<250	<25	NAD	NAD
TP33	0.2-0.3	11/12/2014		<0.1	<0.1	0	<0.1	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<50	<100	<100	<50	<25	<50	<100	<100	<250	<25	NAD	NAD
TP34	0.7-0.8	11/12/2014		<0.1	<0.1	0	<0.1	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<50	<100	<100	<50	<25	<50	<100	<100	<250	<25	NAD	NAD
TP35	0-0.1	11/12/2014		<0.1	<0.1	0	<0.1	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<50	<100	<100	<50	<25	<50	<100	<100	<250	<25	NAD	NAD
TP36	0-0.1	11/12/2014		<0.1	<0.1	0	<0.1	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<50	<100	<100	<50	<25	<50	<100	<100	<250	<25	NAD	NAD
Statistical Summary																												
Number of Results				23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23
Number of Detects				0	0	23	1	0	3	0	0	0	0	0	0	0	1	2	0	1	0	0	2	0	2	0	0	0
Minimum Concentration				<0.1	<0.1	0	<0.1	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<50	<100	<100	<50	<25	<50	<100	<100	215	<25	-	-
Minimum Detect				ND	ND	0.27	0.2	ND	0.1	ND	ND	ND	ND	ND	ND	ND	52	120	ND	52	ND	ND	140	ND	215	ND	-	-
Maximum Concentration				<0.1	<0.1	1.5	0.2	<5	0.4	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	52	230	<100	52	<25	<50	260	<100	335	<25	-	-
Maximum Detect				ND	ND	1.5	0.2	ND	0.4	ND	ND	ND	ND	ND	ND	ND	52	230	ND	52	ND	ND	260	ND	335	ND	-	-
Average Concentration				0.05	0.05	0.094	0.057	2.5	0.07	0.05	0.05	0.05	0.05	0.05	0.05	0.05	26	61	50	26	13	25	63	50	138	13	-	-
Median Concentration				0.05	0.05	0	0.05	2.5	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	25	50	50	25	12.5	25	50	50	125	12.5	-	-
Standard Deviation				0	0	0.32	0.031	0	0.073	0	0	0	0	0	0	0	5.6	40	0	5.6	0	0	47	0	47	0	-	-

Notes

NL	Not Limiting
NAD	No asbestos detected at the laboratory reporting limit
BD1/121114	Field Duplicate of TP4/0.3-0.4
BD1/131114	Field Duplicate of TP19/0.1-0.2

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			Foreign Materials			Asbestos	Inorganics		Lead	Metals						
			Foreign Materials	Metal	Plaster	Asbestos fibres	Conductivity	Moisture	Lead	Arsenic	Cadmium	Chromium (III+VI)	Copper	Mercury	Nickel	Zinc
			%	%	%	-	µS/cm	%	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL							1	0.1	1	4	0.4	1	1	0.1	1	1
Recovered Aggregate Order 2014 - Absolute Maximum			0.3	2	0.5	0	1500		150	40	1.5	120	150	1	80	350
Recovered Aggregate Order 2014 - Maximum Average			0.2	1	0.25	0	3000		75	20	0.5	60	60	0.5	40	200
Field_ID	**LocCode**	**Sampled_Date-Time**														
SP1/S1	SP1	12/11/2014	0.3	0	0.1	0	620	7.8	30	4	<0.4	11	24	<0.1	8	77
SP1/S2	SP1	12/11/2014	0.2	0.2	0.5	0	570	8.4	30	4	<0.4	11	70	<0.1	8	99
SP1/S3	SP1	12/11/2014	0	0	0	0	750	8.5	25	4	<0.4	11	33	<0.1	6	81
SP2/S1	SP2	12/11/2014	0.1	0	0	0	930	6.3	33	<4	<0.4	12	22	<0.1	9	260
SP2/S2	SP2	12/11/2014	0	0.1	0	0	840	6.6	31	4	<0.4	15	31	<0.1	10	91
SP2/S3	SP2	12/11/2014	0.3	0	0	0	930	3	36	4	<0.4	17	48	<0.1	12	100
SP2/S4	SP2	12/11/2014	0.1	0	0.1	0	810	4.4	42	4	<0.4	20	32	<0.1	12	100
SP3/S1	SP3	12/11/2014	0.1	0.1	0.1	0	700	11	28	5	<0.4	19	110	<0.1	16	71
SP3/S2	SP3	12/11/2014	0.3	1.7	0.1	0	670	7.5	18	4	<0.4	19	46	<0.1	21	53
SP3/S3	SP3	12/11/2014	0.2	0	0.1	0	1000	7.9	37	4	<0.4	21	43	<0.1	12	110
Average Concentration			0.2	0.2	0.1	0	782	7.1	31	4	0.4	16	46	0.1	11	104

Foreign Materials: Rubber, plastic, paper, cloth, paint, wood and other vegetable matter (Type III)

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Appendix H

Witt Report

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Witt Consulting Pty Ltd
ABN: 76 102 953 515
mail@witt.com.au
witt.com.au
19 Bella Vista St, Heathcote NSW 2233

Ref: WittC-Evergreen-L-A

14 October 2014

Travis
Evergreen Earth Works
Po Box 595
Richmond NSW 2753

Re: Virgin Excavated Natural Material, Development, 233 Johnston Street Annandale

Attention **Travis** office@evergreenearthworks.com.au

1 Introduction

At the request of Travis of Evergreen Earth Works, Rahsn Witt made a site inspection at the above address. The purpose of the inspection was to determine if the sandstone material being excavated from the site is virgin natural material.

2 Geological Setting

The site is rectangular, approximately 45 m long on the western boundary fronting Johnston Street and approximately 25 m wide on the northern Boundary fronting Rose Street. We understand that the site has been used as a warehouse all concrete and soil had been stripped at the time of our inspection.

The 1:100,000 Sydney geological map shown below in Figure 1 indicates the geology at the site location to be Ashfield shale overlying Hawkesbury Sandstone. At the time of our inspection Hawkesbury Sandstone was exposed over the entire site.

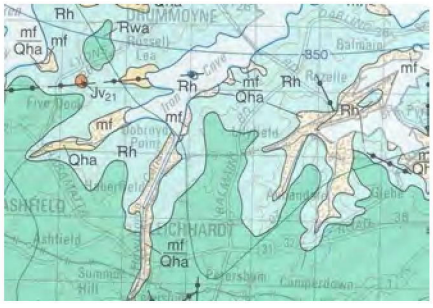


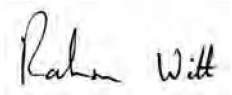
Figure 1 Extract from Sydney 1:100,000 geological map.

3 Recommendations

Based on our site inspection and the geological maps it is our opinion that material proposed to be removed from the site will be virgin excavated natural material VENM. We understand that approximately of 1000 m^3 of VENM is proposed to be removed from the site.

Should you have any questions regarding this matter please do not hesitate to contact the undersigned.

Regards,



Rahsn Witt
Principal Engineer
Chartered Professional Engineer
National Professional Engineers Register

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Attachment 2: Noise Impact Assessment (Benbow Environmental)

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NOISE IMPACT ASSESSMENT
PREPARED FOR
J M PRODUCE
901-915 MAMRE RD KEMPS CREEK

Prepared for: J M Produce
Olathree Pty Ltd

Prepared by: Daniele Albanese, Senior Acoustic Consultant
R T Benbow, Principal Consultant

Report No: 158024_NIA_Rev1
January 2016
(Released: 18 January 2016)

Benbow ENVIRONMENTAL

Engineering a Sustainable Future for Our Environment

Head Office: 13 Daking Street North Parramatta NSW 2151 AUSTRALIA
Tel: 61 2 9890 5099 Fax: 61 2 9890 5399
Email: admin@benbowenviro.com.au
Visit our website: www.benbowenviro.com.au

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DOCUMENT CONTROL

Prepared by:	Position:	Signature:	Date:
Daniele Albanese	Senior Acoustic Engineer		18 January 2016

Reviewed by:	Position:	Signature:	Date:
R T Benbow	Principal Consultant		18 January 2016

Approved by:	Position:	Signature:	Date:
R T Benbow	Principal Consultant		18 January 2016

DOCUMENT REVISION RECORD

Revision	Date	Description	Checked	Approved
1	18-01-2016	Rev1 / Draft	R T Benbow	R T Benbow

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Revision	Issue Date	Issued To	Issued By
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Benbow ENVIRONMENTAL

Head Office:
13 Daking Street North Parramatta NSW 2151 Australia
P.O. Box 687 Parramatta NSW 2124 Australia
Telephone: +61 2 9890 5099 Facsimile: +61 2 9890 5399
E-mail: admin@benbowenviro.com.au
Visit our Website at www.benbowenviro.com.au

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Attachments

Attachment 1: Noise Terminology
Attachment 2: QA/QC Procedures
Attachment 3: Calibration Certificates
Attachment 4: Daily Noise Logger Charts

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1. INTRODUCTION

Benbow Environmental has been engaged by J M Produce on behalf of Olathree Pty Ltd to prepare a noise impact assessment for the proposed development at 901-915 Mamre Rd Kemps Creek. The proposal is for the relocation of an animal feed production business to the site at Kemps Creek from a facility at 100 Erskine Park Road, Erskine Park 2759. This assessment determines the predicted noise impacts of the proposed site operations on nearest sensitive receptors and provides recommended noise control measures where deemed necessary.

This noise impact assessment has been prepared in accordance with the NSW *Environmental Protection Authority, Industrial Noise Policy (EPA 2000)*. Predictive Noise Modelling was undertaken by using the predictive noise software SoundPLAN v7.3.

1.1 SCOPE OF WORKS

This noise impact assessment has been limited to the following scope of works:

a) Undertake long-term unattended and short-term attended background noise monitoring;
b) Establish project specific noise levels for the site in accordance with NSW EPA Industrial Noise Policy (EPA 2000);
c) Determine all potential noise sources associated with the existing and proposed development;
d) Collect required noise source data;
e) Predict potential noise impacts at the nearest potentially affected receptors to the site;
f) Assess potential noise impacts against relevant legislation and guidelines;
g) Recommend general ameliorative measures/control solutions (where required); and
h) Compile this report with concise statements of potential noise impact.

To aid in the review of this report, supporting documentation has been included within the Attachments.

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2. SITE IDENTIFICATION

2.1 SITE LOCATION

The subject site is located within Lot 33 DP 258414, 901-915 Mamre Rd Kemps Creek. The site location is shown in Figure 2-1.

An aerial view of the current site is shown in Figure 2-2 and a site plan is shown in Figure 2-3.

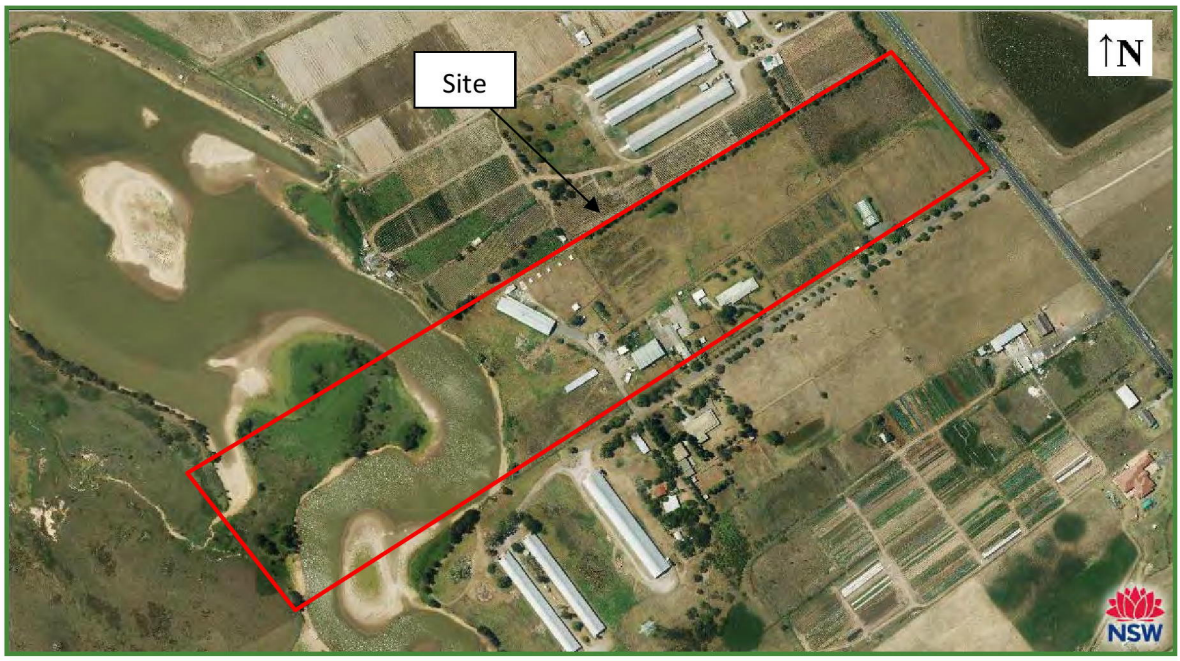
Figure 2-1: Site Location



Source: SIX Maps

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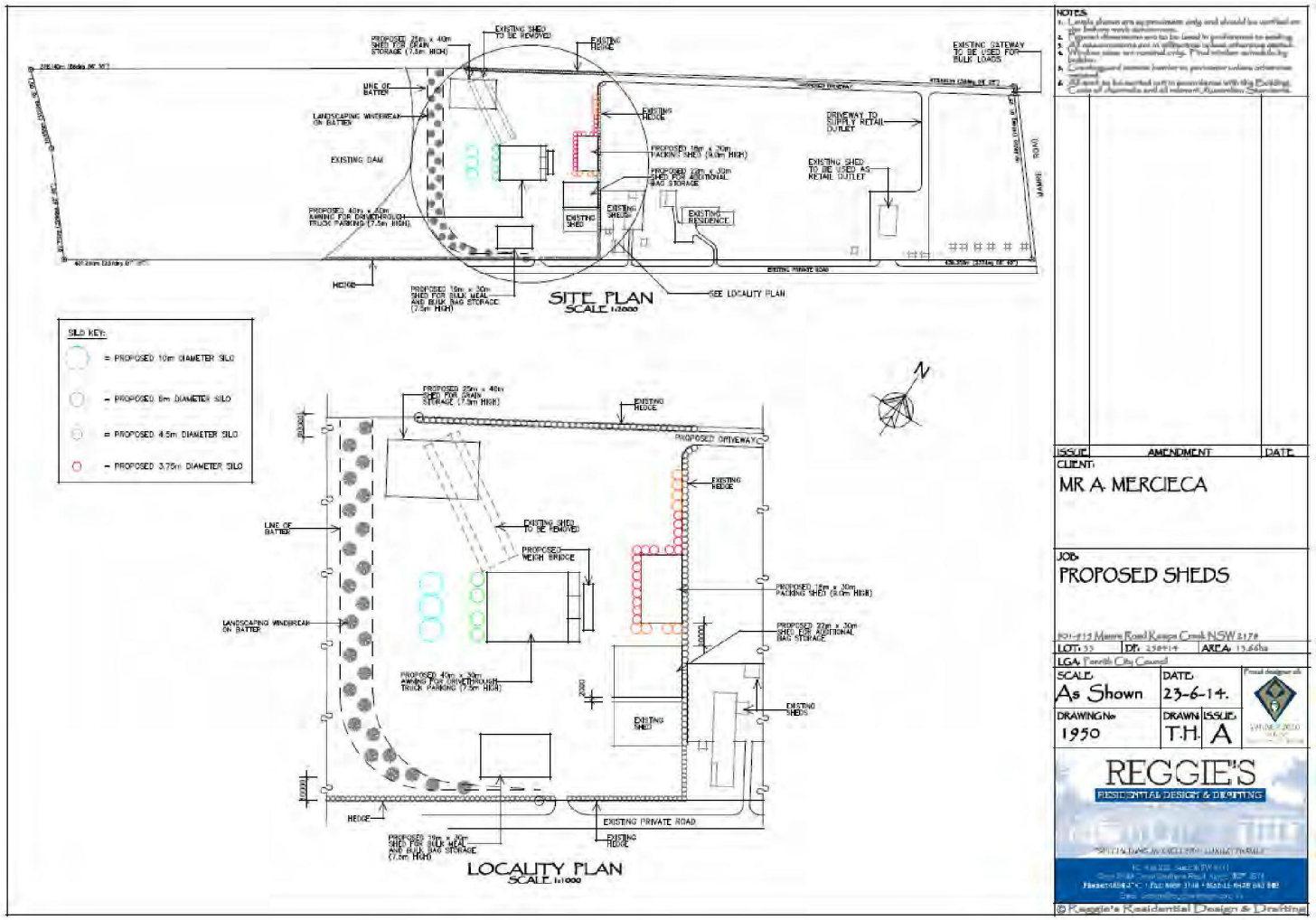
Figure 2-2: Site Aerial



Source: SIX Maps

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Figure 2-3: Site Plan



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3. NEAREST SENSITIVE RECEPTORS

Table 3-1 provides the list of the nearest identified sensitive residential and industrial receptors that could be affected by noise impacts from the site's activities. These receptors were selected based on their proximity and directional bearing from the subject site.

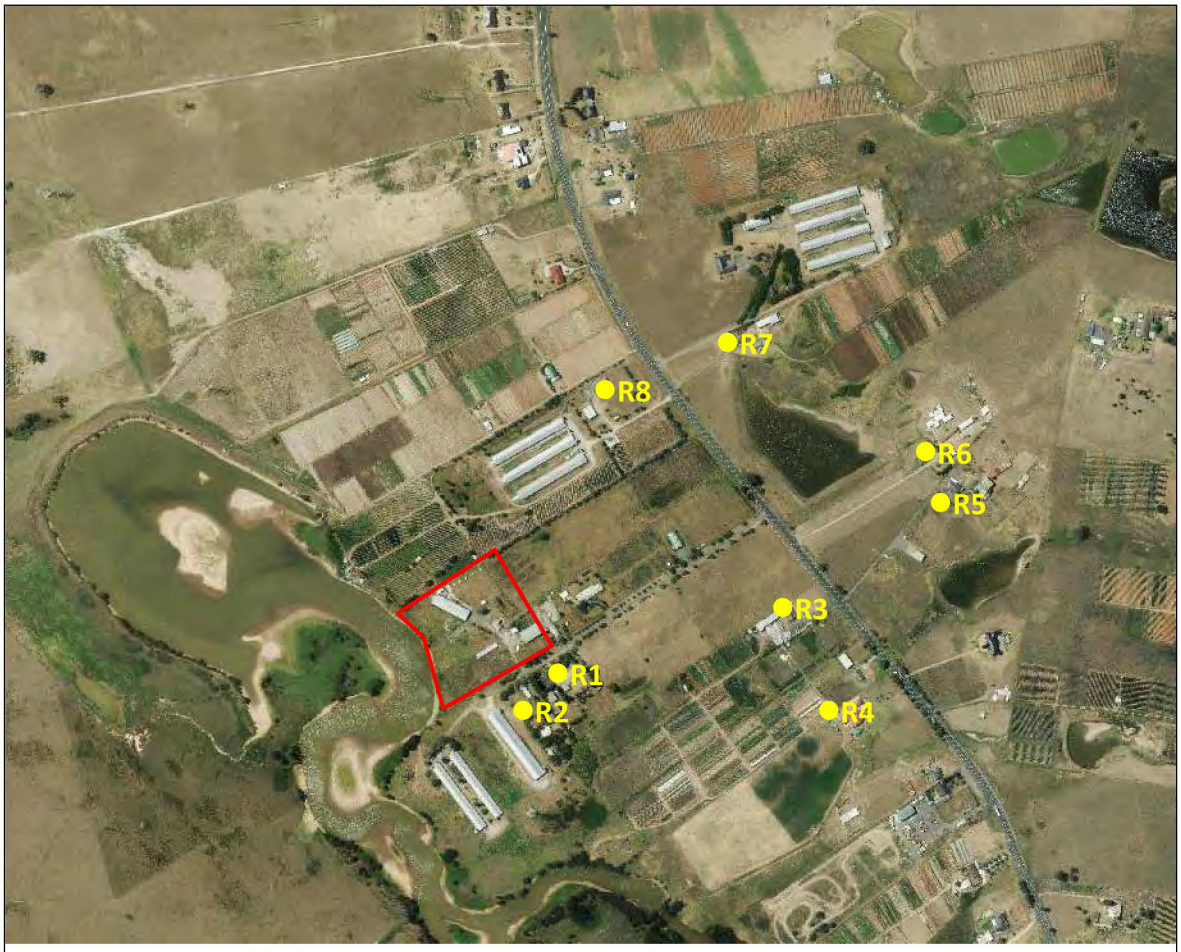
The location of the receptors is shown in Table 3-1.

Table 3-1: Nearest Identified Sensitive Residential Receptors

Receptor ID	Address	Direction from proposed site	Approx. Distance from Proposed Development
R1	919-929 Mamre Rd, Kemps Creek	SE	50
R2	917 Mamre Rd, Kemps Creek	S	96
R3	931 Mamre Rd, Kemps Creek	E	373
R4	949-965 Mamre Rd, Kemps Creek	E	463
R5	930-966 Mamre Rd, Kemps Creek	ENE	691
R6	904-928 Mamre Rd, Kemps Creek	ENE	698
R7	884-902 Mamre Rd, Kemps Creek	NE	525
R8	885-869 Mamre Rd, Kemps Creek	NE	325

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Figure 3-1: Location of Receptors



Source: SIX Maps

↑N Not to scale	LEGEND: Site ▭ Receptor ●	Benbow Environmental 13 Daking Street, North Parramatta NSW 2151

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4. EXISTING ACOUSTIC ENVIRONMENT

The level of background noise varies over the course of any 24 hour period, typically from a minimum at 3.00am to a maximum during morning and afternoon traffic peak hours. Therefore the NSW EPA Industrial Noise Policy (INP) requires that the level of background and ambient noise be assessed separately for the daytime, evening and night time periods. The INP defines these periods as follows:

- **Day** is defined as 7.00am to 6.00pm, Monday to Saturday and 8.00am to 6.00pm Sundays and Public Holidays;
- **Evening** is defined as 6.00pm to 10.00pm, Monday to Sunday and Public Holidays; and
- **Night** is defined as 10.00pm to 7.00am, Monday to Saturday and 10.00pm to 8.00am Sundays and Public Holidays.

4.1 NOISE MONITORING EQUIPMENT AND METHODOLOGY

Background noise level measurements were carried out using a Svantek SVAN 957 Precision Sound Level Meter (attended noise monitoring) and two (2) Acoustic Research Laboratories statistical Environmental Noise Loggers, type EL-215 (unattended noise monitoring). The instrument sets were calibrated by a NATA accredited laboratory within two years of the measurement period. Calibration certificates have been included in Attachment 3.

To ensure accuracy and reliability in the results, field reference checks were applied both before and after the measurement period with an acoustic calibrator. There were no excessive variances observed in the reference signal between the pre-measurement and post-measurement calibration. The instruments were set on A-weighted Fast response and noise levels were measured over 15-minute statistical intervals. QA/QC procedures applied for the measurement and analysis of noise levels have been presented in Attachment 2. The microphones were fitted with windsocks and were positioned at 1.5 meters above ground level.

In assessing the background noise levels, any data affected by adverse weather conditions has been discarded according to the requirements of the NSW EPA Industrial Noise Policy (INP). The weather data was sourced from the Bureau of Meteorology from the Automatic Weather Station (AWS) located at Camden (ID 068192).

4.2 MEASUREMENT LOCATION

Unattended long-term noise monitoring was undertaken from 20th July 2015 to 28th July 2015 at two (2) residential locations. One additional noise logger was located at the subject site along Mamre Road in order to monitor the existing road traffic noise levels.

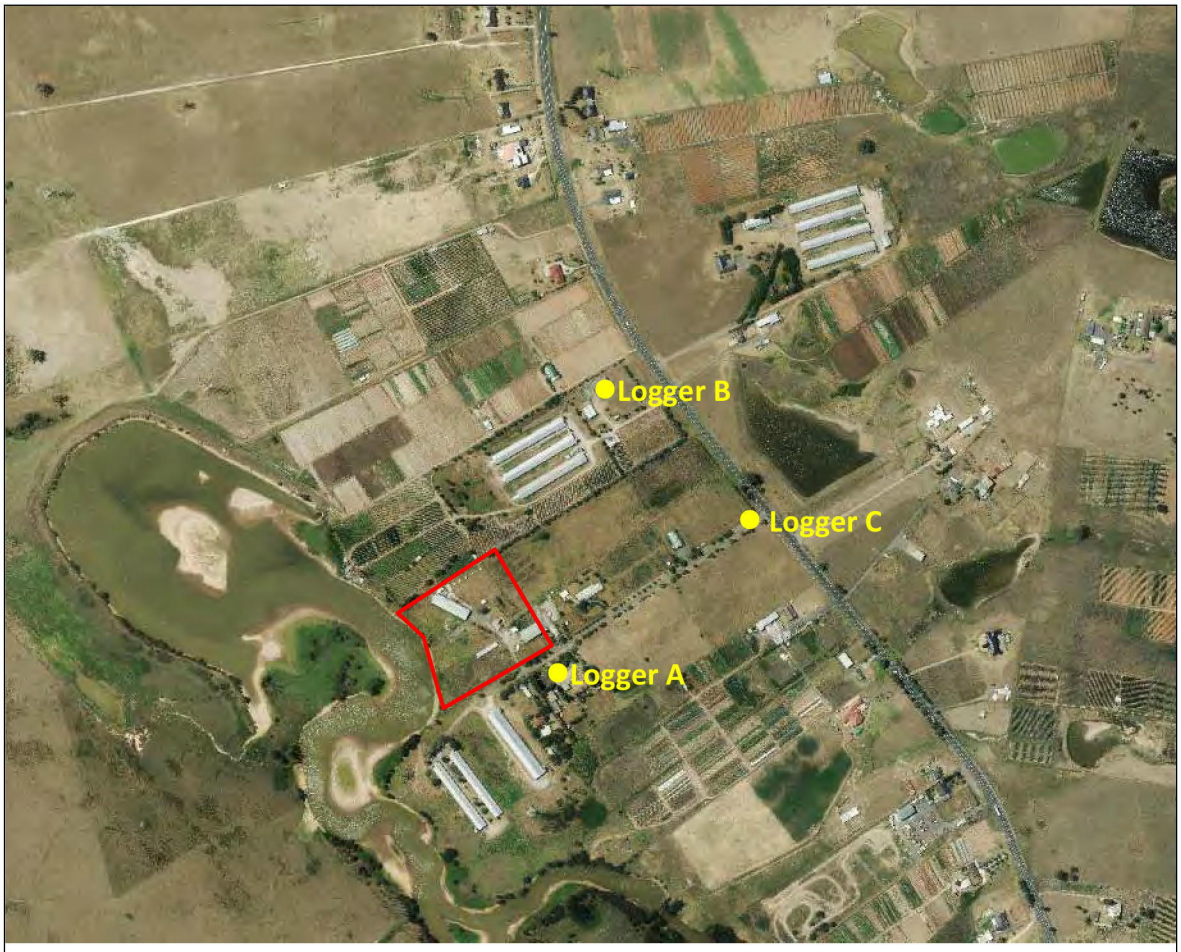
Additional detailed attended noise monitoring was undertaken on 28th July 2015. The noise logger locations are listed in Table 4-1 and shown in Figure 4-1. The measured noise levels have been considered as being representative of the existing ambient noise environment of the area. Noise Logger Charts are presented in Attachment 4.

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Table 4-1: Noise Monitoring Locations

Monitoring Location	Address
A (R1)	919-929 Mamre Rd, Kemps Creek
B (R8)	885-869 Mamre Rd, Kemps Creek
C	901-915 Mamre Rd, Kemps Creek

Figure 4-1: Noise Monitoring Locations



Source: SIX Maps

N
Not to scale

LEGEND:
Site
Receptor

Benbow Environmental
13 Daking Street,
North Parramatta NSW 2151

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In accordance with the NSW EPA INP, measured noise data obtained from the above monitored locations has been considered representative of the various potentially affected areas surrounding the project site. The relevant information, found in Section 3.1.2 on page 24 of the NSW INP has been reproduced below.

> ***"Most affected location(s)**—locations that are most affected (or that will be most affected) by noise from the source under consideration as per Note 2 in Section 2.2.1. In determining these locations, the following need to be considered: existing background levels, noise source location/s, distance from source/s (or proposed source/s) to receiver, and any shielding (for example, building, barrier) between source and receiver. Often several locations will be affected by noise from the development. In these cases, locations that can be considered representative of the various affected areas should be monitored."*

Table 4-2 identifies the various considered receptor locations that have been associated with the two (2) noise logger locations and will therefore utilise the noise criteria derived from the measurement data obtained from the respective noise logger.

Table 4-2: Associated Residential Receptors

Monitoring Location	Associated Residential Receptor Locations
A	R1, R2, R3, R4
B	R5, R6, R7, R8
C	Road Traffic Noise Monitoring

4.3 Measured Noise Levels

4.3.1 Long-Term Unattended Noise Monitoring Results

The data was analysed to determine a single assessment background level (ABL) for each day, evening and night time period, in accordance with the NSW EPA INP. That is, the ABL is best established by determining the lowest tenth-percentile level of the L_{A90} noise data over each period of interest. The background noise level or rating background level (RBL) representing the day, evening and night assessment periods is based on the median of individual ABL's determined over the entire monitoring period. The results of the long-term unattended noise monitoring are displayed in Table 4-3, Table 4-4 and Table 4-5 for the respective locations A, B and C.

The resultant data is considered representative of the background and equivalent sound pressure levels for the area, and is therefore suitable for use in this noise impact assessment. Daily noise logger graphs have been included in Attachment 4.

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Table 4-3: Unattended Noise Monitoring Results at Location A, dB(A)

Date	Average L_1			Average L_{10}			ABL (L_{90})			L_{eq}		
	Day	Evening	Night	Day	Evening	Night	Day	Evening	Night	Day	Evening	Night
20/07/2015	57	50	49	50	46	44	37	38	37	54	44	42
21/07/2015	60	53	52	53	50	46	43	41	36	52	48	55
22/07/2015	58	50	51	53	47	46	43	39	35	52	45	57
23/07/2015	62	47	-	55	44	-	43	37	-	54	42	-
24/07/2015	63	56	49	56	49	44	41	39	35	65	49	49
25/07/2015	59	50	51	50	45	44	37	35	33	52	44	56
26/07/2015	-	49	47	-	44	41	-	32	31	-	44	43
27/07/2015	57	46	46	50	40	42	38	33	31	50	41	44
28/07/2015	59	50	53	50	46	47	38	38	31	51	44	58
Average	**59**	**50**	**50**	**52**	**46**	**44**	*	*	*	*	*	*
Median	*	*	*	*	*	*	**40**	**38**	**34**	*	*	*
Logarithmic Average	*	*	*	*	*	*	*	*	*	**57**	**45**	**54**

Note: - indicates values that has not been considered due to adverse weather conditions
# indicates noise measurements were not undertaken during this period
* Indicates values that are not relevant to that noise descriptor
Value in bold indicates most relevant noise descriptor

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Table 4-4: Unattended Noise Monitoring Results at Location B, dB(A)

Date	Average L_1			Average L_{10}			ABL (L_{90})			L_{eq}		
	Day	Evening	Night	Day	Evening	Night	Day	Evening	Night	Day	Evening	Night
20/07/2015	53	51	52	48	47	46	32	32	29	47	44	43
21/07/2015	54	54	52	49	50	46	32	33	25	47	48	44
22/07/2015	54	51	51	49	47	44	33	32	26	47	44	43
23/07/2015	53	50	-	48	46	-	32	32	-	48	43	-
24/07/2015	53	53	51	48	48	45	34	29	27	46	45	43
25/07/2015	52	53	51	45	47	44	30	27	24	45	46	42
26/07/2015	-	47	49	-	41	40	-	25	23	-	39	39
27/07/2015	50	49	50	45	44	43	31	28	21	44	41	43
28/07/2015	52	53	52	46	48	46	29	31	21	45	45	45
Average	**53**	**51**	**51**	**47**	**46**	**44**	*	*	*	*	*	*
Median	*	*	*	*	*	*	**32**	**31**	**24**	*	*	*
Logarithmic Average	*	*	*	*	*	*	*	*	*	**46**	**44**	**43**

Note: - indicates values that has not been considered due to adverse weather conditions
# indicates noise measurements were not undertaken during this period
* Indicates values that are not relevant to that noise descriptor
Value in bold indicates most relevant noise descriptor

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Table 4-5: Unattended Noise Monitoring Results at Location C, dB(A)

Date	Average L_1			Average L_{10}			ABL (L_{90})			L_{eq}		
	Day	Evening	Night	Day	Evening	Night	Day	Evening	Night	Day	Evening	Night
20/07/2015	77	74	74	71	68	66	46	44	39	69	64	63
21/07/2015	77	74	74	71	68	65	47	48	37	68	65	64
22/07/2015	77	75	74	71	68	65	50	45	38	68	65	65
23/07/2015	78	74	-	72	68	-	46	45	-	69	65	-
24/07/2015	77	73	74	71	67	65	48	44	38	68	64	64
25/07/2015	75	71	70	68	65	61	46	40	35	64	61	60
26/07/2015	-	70	69	-	65	58	-	38	34	-	61	58
27/07/2015	76	72	72	70	67	63	47	40	32	67	63	63
28/07/2015	77	74	74	71	68	65	45	45	32	67	64	64
Average	**77**	**73**	**73**	**71**	**67**	**63**	*	*	*	*	*	*
Median	*	*	*	*	*	*	**47**	**44**	**36**	*	*	*
Logarithmic Average	*	*	*	*	*	*	*	*	*	**68**	**64**	**63**

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4.3.2 Short-Term Attended Noise Monitoring Results

Given that the results of the unattended noise monitoring are affected by all ambient noise sources such as local fauna, road traffic and industrial sources, it is not possible to determine with precision the exact existing industrial noise contribution based on unattended monitoring alone. Therefore, the attended noise monitoring allows for a more detailed understanding of the existing ambient noise characteristics and a more meaningful final analysis to be undertaken. The results of the short-term attended noise monitoring are displayed in Table 4-6.

Table 4-6: Attended Noise Monitoring Results, dB(A)

Location / Time Period	Noise Descriptor				Comments
	L_1	L_{10}	L_{90}	L_{eq}	
Location A (R1) 29/07/2015 9:19am	58	52	45	49	• Birds ≤ 62 dB(A) • Aeroplane ≤ 61 dB(A) • Reversing Beeper from industry < 45 dB(A) • Dogs Barking ≤ 54 dB(A) • Traffic on Mamre Rd ≤ 45 dB(A) • Industrial Noise = 44 dB(A)
Location B (R8) 29/07/2015 10:05am	59	54	42	51	• Birds ≤ 50 dB(A) • Aeroplane ≤ 59 dB(A) • Truck on Mamre Rd ≤ 60 dB(A) • Industrial Noise < 42 dB(A)
Location C (Traffic) 29/07/2015 9:40am	79	71	50	68	• Trucks on Mamre Rd ≤ 83 dB(A) • Cars on Mamre Rd ≤ 70 dB(A) • Birds ≤ 51 dB(A) • Aeroplane ≤ 55 dB(A)

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4.4 PHOTOGRAPHS

Figure 4-2, Figure 4-3 and
Figure 4-4 show the locations of the noise monitoring instrumentation at location A and B respectively.

Figure 4-2: Noise Logger Location A - 919-929 Mamre Rd, Kemps Creek

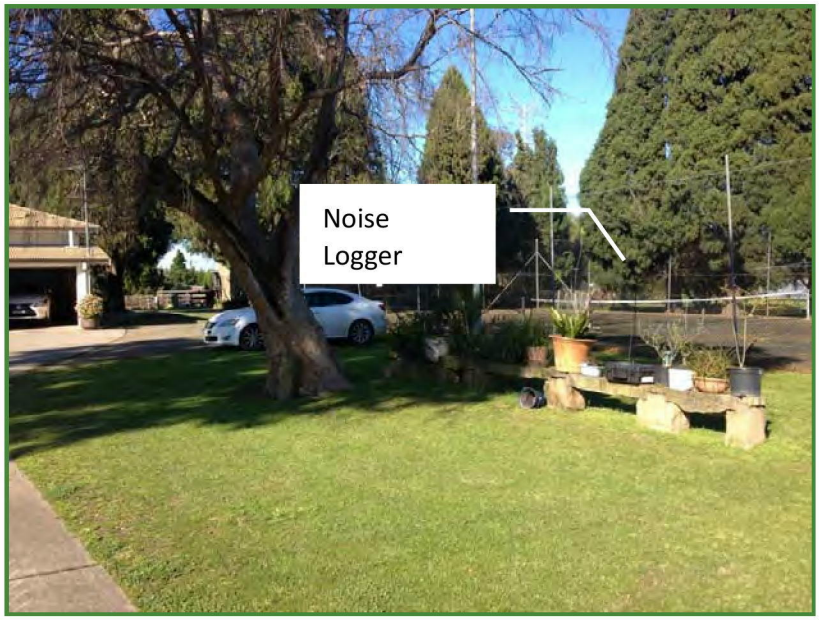
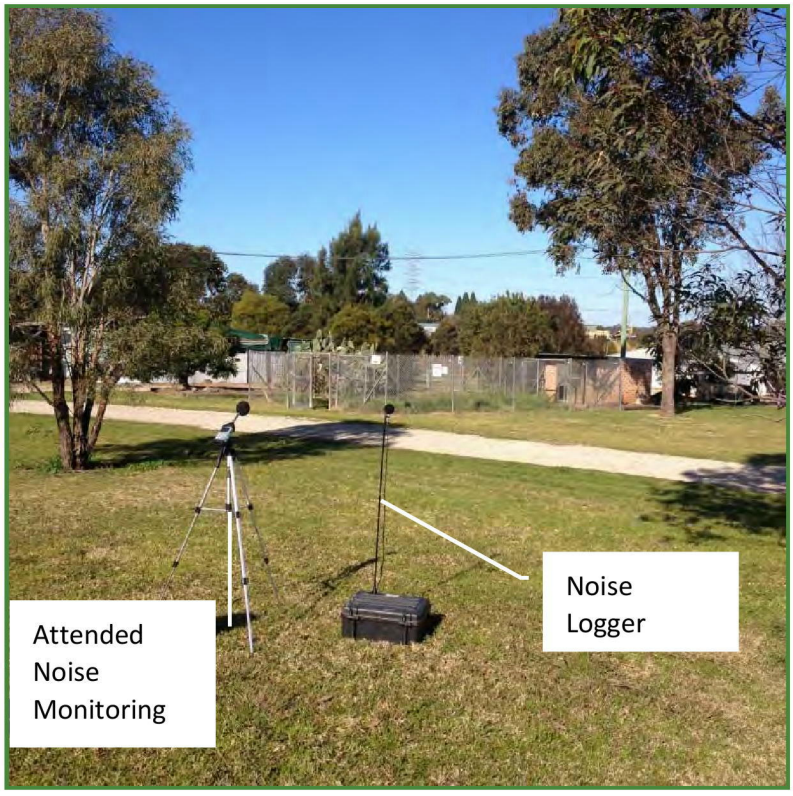
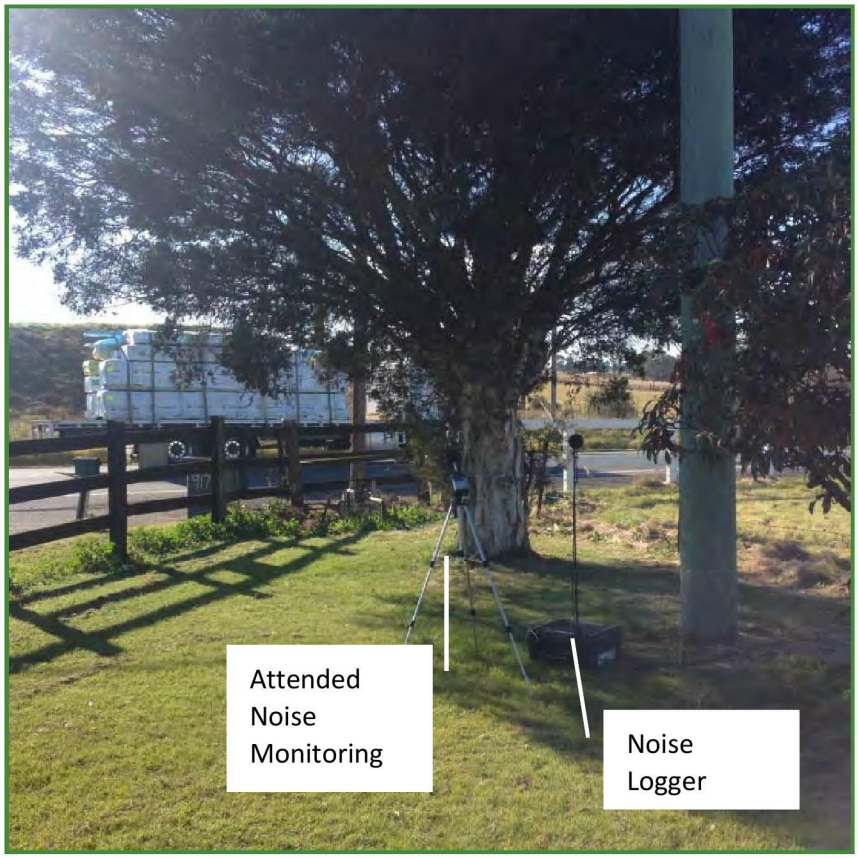


Figure 4-3: Noise Logger Location B - 885-869 Mamre Rd, Kemps Creek



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Figure 4-4: Noise Logger Location C – 901-915 Mamre Rd, Kemps Creek



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5. CURRENT LEGISLATION AND GUIDELINES

5.1 NSW EPA INDUSTRIAL NOISE POLICY

5.1.1 Introduction

The NSW Industrial Noise Policy was developed by the NSW EPA primarily for the assessment of noise emissions from industrial sites regulated by the NSW EPA. However, the policy can also be used by NSW Planning and Infrastructure and local government to assist in their assessment of potential noise issues.

An important point to note in the policy is presented in Section 1.4.1. This section states:

> "*The industrial noise source criteria set down in Section 2 are best regarded as planning tools. They are not mandatory, and an application for a noise-producing development is not determined purely on the basis of compliance or otherwise with the noise criteria. Numerous other factors need to be taken into account in the determination. These factors include economic consequences, other environmental effects and the social worth of the development.*"

The policy sets out two criteria that are used to assess potential site-related noise impacts. The first criterion aims at controlling intrusive noise impacts in the short-term for residences. This criterion is therefore called the intrusiveness criterion.

The second criterion aims at maintaining a suitable amenity for particular land uses including residences in the long-term. This criterion is called the amenity criterion.

5.1.2 Intrusiveness Criterion

The intrusiveness criterion can be summarised as:

$L_{Aeq,(15minute)} \leq$ rating background level + 5 dB(A)

Where the $L_{Aeq,(15minute)}$ is the predicted or measured L_{Aeq} from noise generated within the project site over a fifteen minute interval at the receptor.

This is to be assessed at the most affected point on or within the residential property boundary or if that is more than 30 m from the residence, at the most affected point within 30 m of the residence.

5.1.3 Amenity Criterion

To limit continuing increases in noise levels, the maximum ambient noise level within an area from industrial noise sources should not normally exceed the acceptable noise levels specified in Table 2.1 of the NSW INP, the applicable parts of which are reproduced in Table 5-1.

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Table 5-1: NSW EPA Amenity Criteria – Recommended L_{Aeq} noise levels from industrial noise sources

Type of Receptor	Indicative Noise Amenity Area	Period	Recommended L_{Aeq} noise level (dB(A))	
			Acceptable	Recommended Maximum
Residence	Rural	Day	50	55
		Evening	45	50
		Night	40	45
Industrial	All	When in use	70	75

The existing industrial noise levels are compared to the acceptable level and Table 5-2 is then used to derive the applicable amenity criteria.

Table 5-2: Modification to Acceptable Noise Level (ANL[1]) to Account for Existing Levels of Stationary Noise

Total Existing L_{Aeq} Noise Level From Industrial Sources	Maximum L_{Aeq} Noise Level for Noise from New Sources Alone
≥ ANL + 2	If existing noise level is likely to decrease in future: ANL – 10 If existing noise level is unlikely to decrease in the future: Existing level – 10
ANL + 1	ANL – 8
ANL	ANL – 8
ANL –1	ANL – 6
ANL – 2	ANL – 4
ANL – 3	ANL – 3
ANL – 4	ANL – 2
ANL – 5	ANL –2
ANL – 6	ANL – 1
< ANL - 6	ANL

Source: Table 2.2 NSW EPA INP
Note: [1]ANL is the recommended acceptable L_{Aeq} noise level for the specific receptor, area and time of day.

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5.2 PROJECT SPECIFIC NOISE LEVELS

Noise limits for the project site can be established in accordance with the principles and methodologies of the NSW EPA INP, the measured background noise levels and the existing industrial operational noise levels of the area.

According to the NSW EPA INP, it is recommended that the more stringent noise limits be applied to protect the existing acoustic amenity from deteriorating.

The selected project specific noise levels applicable to the operational noise are presented in Table 5-3.

It should be noted that different time periods apply for the noise criteria as the intrusive criterion considers a 15 minute assessment period while the amenity criterion requires assessment over the total length of time that a site is operational within each day, evening or night period. In order to ensure compliance under all circumstances, a 15 minute period assessment has been considered for all receptors.

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Table 5-3: Project Specific Noise Levels, dB(A)

Receptor	Time Period	Measured RBL L90	Existing Industrial Noise L_{eq}	Acceptable Noise Level $L_{eq,\ period}$	Intrusive Criterion $L_{eq,15minute}$	Amenity Criterion $L_{eq,\ period}$	PSNL $L_{eq,15\ minute}$
Logger A –Residential R1, R2, R3, R4	Day	40	44	50	45	49	**45**
Logger B – Residential R5, R6, R7, R8	Day	32	<42	50	37	50	**37**
R8 (as industrial)	When in use	-	-	70	-	70	**70**

Note: - indicates not applicable
Bold values indicate the applicable Project Specific Noise Levels

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5.3 NSW EPA Road Noise Policy

5.3.1 Introduction

The RNP has been adopted by the EPA to establish the off-site road traffic noise criteria for the potential noise impact associated with the facility. The RNP was developed by the NSW EPA primarily to identify the strategies that address the issue of road traffic noise from:

- Existing roads;
- New road projects;
- Road redevelopment projects; and
- New traffic-generating developments.

The RNP also defines criteria to be used in assessing the impacts of such noise.

5.3.2 Road Category

The RNP states the following:

> *"Roads are functionally classified by a range of factors, including their role in facilitating traffic movement; their relationship to other road categories; and whether they support through or local traffic, access to adjacent land uses and applicable traffic management options".*

Mamre Road has been considered as the road most affected by site road traffic noise. This road is classified as 'Sub-arterial roads' as defined in the RNP.

The functional role of a 'Sub-arterial road' is explained as follows:

- Provide connection between arterial roads and local roads;
- May support arterial roads during peak periods; and
- May have been designed as local streets but can serve major traffic-generating developments or support non-local traffic.

5.3.3 Noise Assessment Criteria

Section 2.3 of the RNP outlines the criteria for assessing road traffic noise. The relevant sections of Table 3 of the RNP are shown in Table 5-4.

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Table 5-4: Road Traffic Noise Assessment Criteria For Residential Land Uses, dB(A)

Road Category	Type of Project/Land Use	Assessment Criteria, dB(A)	
		Day (7am-10pm)	Night (10pm-7am)
Sub-arterial roads	3. Existing residences affected by additional traffic on existing freeways/arterial/sub-arterial roads generated by land use developments	$L_{Aeq\ (15\ hour)}$ 60 dB (external)	$L_{Aeq\ (9\ hour)}$ 55 dB (external)

The noise level descriptor that has been adopted by the RNP for use with the above criteria is the L_{Aeq}.

5.3.4 Relative Increase Criteria

In addition to the assessment criteria outlined above, any increase in the total traffic noise level at a location due to a proposed project or traffic-generating development, must be considered. Residences experiencing increases in total traffic noise levels above the relative criteria should also be considered for mitigation as described in Section 3.4 of the RNP. For road projects where the main subject road is a local road, the relative increase criterion does not apply.

Table 6 of the RNP outlines the relative increase criteria for residential land uses and is shown in Table 5-5.

Table 5-5: Relative Increase Criteria For Residential Land Uses, dB(A)

Road Category	Type of Project/Land Use	Total Traffic Noise Level Increase, dB(A)	
		Day (7 am-10 pm)	Night (10 pm-7 am)
Freeway/arterial/sub-arterial roads and transit ways	New road corridor/redevelopment of existing road/land use development with potential to generate additional traffic on existing road	Existing traffic $L_{Aeq\ (15\ hour)}$ + 12 dB (external)	Existing traffic $L_{Aeq\ (9\ hour)}$ + 12 dB (external)

The assessment criteria provided in Table 5-4 and the relative increase criteria provided in Table 5-5 should both be considered when designing project specific noise levels, and the lower of the two should be adopted. For example, if the assessment criteria is 60 dB(A) and the relative increase criteria is 42 dB(A), then a project specific noise level of 42 dB(A) should be adopted. Similarly, if the assessment criteria is 60 dB(A) and the relative increase criteria is 65 dB(A), a project specific noise level of 60 dB(A) should be adopted.

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5.3.5 Exceedance of Criteria

If the criteria shown in both Table 5-4 and Table 5-5 cannot be achieved, justification should be provided that all feasible and reasonable mitigation measures have been applied.

For existing residences and other sensitive land uses affected by additional traffic on existing roads generated by land use developments, any increase in the total traffic noise level should be limited to 2 dB above that of the corresponding 'no build option'.

5.3.6 Assessment Locations for Existing Land Uses

Table 5-6: Assessment Locations for Existing Land Uses

Assessment Type	Assessment Location
External noise levels at residences	The noise level should be assessed 1 metre from the façade and at a height of 1.5 metres from the floor. Separate noise criteria should be set and assessment carried out for each façade of a residence, except in straightforward situations where the residential façade most affected by road traffic noise can be readily identified. The residential noise level criterion includes an allowance for noise reflected from the façade ('façade correction'). Therefore, when taking a measurement in the free field where reflection during measurement is unlikely (as, for instance, when measuring open land before a residence is built), an appropriate correction – generally 2.5 dB – should be added to the measured value. The 'façade correction' should not be added to measurements taken 1 metre from the façade of an existing building. Free measurements should be taken at least 15 metres from any wall, building or other reflecting pavement surface on the opposite side of the roadway, and at least 3.5 metres from any wall, building or other pavement surface, behind or at the sides of the measurement point which would reflect the sound.
Noise levels at multi-level residential buildings	The external points of reference for measurement are the two floors of the building that are most exposed to traffic noise. On other floors, the internal noise level should be at least 10 dB less than the relevant external noise level on the basis of openable windows being opened sufficiently to provide adequate ventilation. (Refer to the Building Code of Australia (Australian Building Codes Board 2010) for additional information.)
Internal noise levels	Internal noise levels refer to the noise level at the centre of the habitable room that is most exposed to the traffic noise with openable windows being opened sufficiently to provide adequate ventilation. (Refer to the Building Code of Australia (Australian Building Codes Board 2010) for additional information.)
Open space – passive or active use	The noise level is to be assessed at the time(s) and location(s) regularly attended by people using the space. In this regard, 'regular' attendance at a location means at least once a week.

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5.3.7 Road Traffic Project Specific Noise Levels

Based on the traffic noise monitoring data obtained from the logger at location C and the long term road traffic noise measurement results, the current existing road traffic noise levels readily exceed the assessment criteria. As a conservative approach, the assessment criteria has been considered to assess the additional road traffic noise associated with the proposed operations.

Measured road traffic noise levels have been utilised to calculate the road traffic noise levels expected at the residences nearest to Mamre road. The nearest residence identified is located approximately 40 m from Mamre road.

The selected project specific noise levels associated with road traffic noise are presented in Table 5-7.

Where existing traffic noise levels are above the noise assessment criteria, any increase in the total traffic noise level should be limited to 2 dB above that of the corresponding 'no build option'.

Table 5-7: Project Specific Noise Levels Associated with Road Traffic, dB(A)

Receptor along	Period	Existing Road Traffic Noise L_{eq}	Assessment Criteria $L_{eq,15 \text{ or } 9 \text{ hour}}$	Relative Increase Criteria $L_{eq,15 \text{ or } 9 \text{ hour}}$	PSNL $L_{eq,15 \text{ or } 9 \text{ hour}}$
Logger C Measured road traffic noise levels	Day	69	-	-	**-**
	Night	61	-	-	**-**
Nearest Residence 40m from Mamre Road	Day	64	60	66	**66**
	Night	56	55	58	**58**

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6. NOISE IMPACT ASSESSMENT

An outline of the predictive noise modelling methodology and operating scenarios is provided below.

6.1 NOISE MODELLING

Predictive Noise Modelling was implemented by using the predictive noise software SoundPLAN v7.3. This model has been extensively utilised by Benbow Environmental for assessing noise emissions for existing and proposed developments, and it is recognised by regulatory authorities throughout Australia. The model allows for the prediction of noise from a site, at the specified receptor, by calculating the individual contribution of each noise source.

Calculations were undertaken by using the Concawe algorithm within SoundPLAN v.7.3.

The noise sources as well as the topographical features of the subject area and receptor locations, were all input into the noise model to determine the noise emissions of the proposed development at the nearest potentially affected residences. Based on previous site inspections, the local topography for the area appears to be consistent with levels as printed on the topographic map.

A site survey plan was obtained from the client and on-site elevation lines were included in the noise model.

Off-site topographical information have been obtained from Land and Property Information database and implemented in SoundPLAN v.7.3.

The modelling scenario has been carried out using the $L_{Aeq(15\ minute)}$ and L_{Amax} descriptors. The worst case scenarios have been considered in the noise model.

Using these descriptors, noise emission levels were predicted at the nearest potentially affected sensitive receptors to determine the noise impact against the project specific noise levels and other relevant noise criteria in accordance with the NSW EPA Industrial Noise Policy.

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6.1.1 Noise Sources

The major noise source likely to occur during the day time period would be the periodic delivery of feed to the site. The primary noise sources here are the movement of the delivery truck around the site and the feed silo auger (blower).

Use of roller mill and hammer mill as well as screening operations generate also elevated noise levels, however these would be located inside the proposed packing shed and their contribution to the overall noise emissions from the site would be reduced.

The sound power levels for the identified noise sources associated with the operational activities have either been calculated from measurements of sound pressure levels undertaken by an acoustic engineer from BE during current operations at the subject site or calculated at a similar facility.

Approximate A-weighted octave and third octave band centre frequency sound power levels have been used and are presented in Table 6-1.

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Table 6-1: Noise Sources – Sound Power Levels dB(A)

Area	Height	Lmax	Overall	Third Octave Band Centre Frequency (Hz)									
				25	31	40	50	63	80	100	125	160	200
				250	315	400	500	630	800	1k	1.25k	1.6k	2k
				2.5k	3.15k	4k	5k	6.3k	8k	10k	12.5k	16k	20k
1 – Truck Unloading	1 m	**101**	**100**	34	39	45	44	49	54	59	64	70	75
				79	80	83	87	86	89	90	91	92	94
				89	86	84	82	80	77	73	70	65	-
2 – Silo Auger	Line 0 to 5 m	**93**	**93**	30	36	39	42	40	45	51	57	63	68
				72	74	76	80	80	82	84	85	85	84
				82	81	78	75	73	70	66	62	56	49
3 – Truck Idling	1.5m	**103**	**100**	-	42	-	-	61	-	-	81	-	-
				89	-	-	87	-	-	96	-	-	95
				-	-	89	-	-	87	-	-	-	-
4 – Forklift	1.5 m	**94**	**90**	-	57	-	-	81	-	-	82	-	-
				78	-	-	85	-	-	84	-	-	81
				-	-	75	-	-	67	-	-	-	-
5 – Truck Maneuvering	1.5m engine 3m exhaust	**105**	**102**	37	55	51	61	65	59	68	75	76	73
				77	76	99	89	81	94	85	87	84	86
				83	86	82	85	79	89	87	-	-	-
6 – Feed Blower	1m	**104**	**102**	37	39	51	49	57	56	63	71	69	77
				76	85	81	82	83	84	84	85	86	86
				88	91	92	93	94	94	93	89	85	79
7 – Grain Cleaner Sieve	4 m	**103**	**101**	37	42	48	58	56	62	68	68	75	81
				80	85	84	85	85	82	82	86	85	87
				89	91	91	92	92	91	90	87	81	75
8 – Hammer Mill	1.5 m	**99**	**96**	23	39	39	55	42	44	61	62	72	65

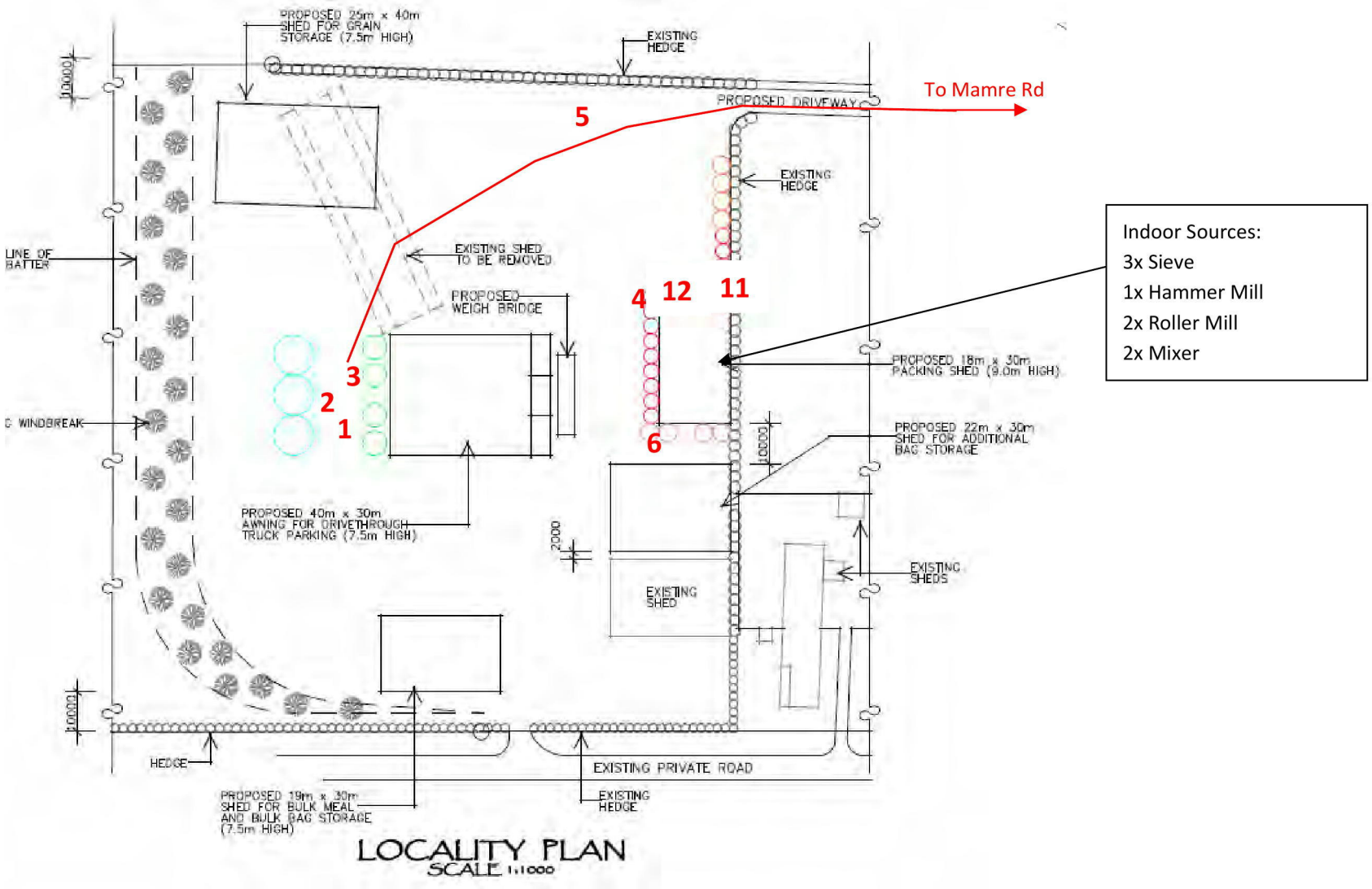
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Table 6-1: Noise Sources – Sound Power Levels dB(A)

Area	Height	Lmax	Overall	Third Octave Band Centre Frequency (Hz)									
				25	31	40	50	63	80	100	125	160	200
				250	315	400	500	630	800	1k	1.25k	1.6k	2k
				2.5k	3.15k	4k	5k	6.3k	8k	10k	12.5k	16k	20k
				73	81	81	77	80	81	80	83	84	85
				86	86	87	87	85	83	79	76	70	64
9 – Roller Mill	1.5 m	**110**	**105**	33	40	48	53	56	59	66	70	80	83
				85	89	96	92	93	89	88	89	87	88
				89	91	93	93	94	95	94	91	85	78
10 – Mixer	1.5 m	**90**	**87**	30	42	43	44	54	51	51	57	62	68
				67	77	76	76	76	76	75	75	75	73
				73	72	72	72	73	72	69	65	59	52
11 – Dust Collector	4 m	**104**	**103**	44	48	62	60	66	70	75	82	79	90
				88	91	91	96	93	91	94	93	91	87
				87	86	84	82	81	80	76	71	67	60
12 – Air Compressor	1 m	**100**	**96**	36	38	44	49	51	52	60	70	69	73
				73	73	85	82	84	90	83	87	85	82
				81	79	77	75	76	78	76	73	70	65

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Figure 6-1: Noise Sources Location



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6.1.2 Meteorological Factors

Wind and temperature inversions may affect the noise emission from the site and these need to be assessed when they are considered to be a feature of the area.

Wind is considered to be a feature where source-to-receptor wind speeds (at 10 m above ground) of 3 m/s or below occur for 30% or more of the time in any assessment period in any season.

Temperature inversion is considered a feature where this occurs more than 30% of the nights in winter.

Temperature inversion conditions would be best associated with F-class stability conditions – generally associated with still/light winds and clear skies during the night time or early morning period (these are referred to as stable atmospheric conditions).

A detailed analysis of the weather conditions of the area was not undertaken. Default values for wind speed and temperature inversion conditions have been utilised in accordance with the NSW EPA Industrial Noise Policy.

6.1.2.1 Weather Conditions Considered in the Assessment

The following conditions were considered:

- Condition A: neutral weather conditions;
- Condition B: wind speed 3m/s source to receiver; and
- Condition C: temperature inversion.

The meteorological condition considered in the noise model has been displayed in detail in Table 6-2.

Table 6-2: Meteorological Conditions Assessed in Noise Propagation Modelling

Condition	Classification	Ambient Temp.	Ambient Humidity	Wind Speed	Wind Direction (blowing from)	Temperature Inversion	Affected Receptors	Applicability
A	Neutral	10 °C	70%	–	–	No	All	All periods
B	Wind	10 °C	70%	3m/s	Source to receiver	No	All	All periods
C	Temperature Inversion	10 °C	70%	2m/s	Source to receiver	Yes	All	Night Time

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6.2 OPERATIONAL SCENARIO

The operational scenario was configured to provide an assessment of maximum operations for the proposed facility. The scenario was established for the model to provide an accurate estimate of potential noise impacts at the aforementioned residential, industrial and other noise sensitive receptors under the proposed maximum operating conditions.

6.2.1 Assumptions Made for Noise Modelling

The modelling scenario was implemented based on the assumption listed as follows:

- On-site topographical information was obtained from combining topographical maps from the Department of Lands, Six Maps, and a survey plan provided by the client;
- Off-site topographical information have been obtained from Department of Lands, Six Maps database and imported in SoundPLAN v.7.3;
- On-site structures such as the proposed sheds and the existing sheds have been included in the model;
- All residential receptors were modelled at 1.5 m above ground level at the most noise-affected point within 30 m of the residence;
- All ground areas surrounding the subject site and the nearest nominated occupancies have been modelled considering a ground factors of 1 (grass);
- The ground on-site has been modelled considering a conservative ground factor of 0 (totally reflective surfaces);
- No more than two (2) trucks are expected throughout a 15 minute period.
- Trucks have been modelled considering two moving point sources at heights of 1.5 m and 3 m above ground level in order to account for the engine (1.5 m) and the exhaust outlet (3 m);
- One (1) forklift has been modelled considering one point source at a height of 1.5 m above ground. The forklift has been modelled as being operational for 100% of the assessment period outside. This provides a conservative approach.
- The feed blower will be operational for 100% of the assessment period and has been modelled as a point source at a height of 1 m above ground.
- All the noise sources located indoors (hammer mill, sieves, roller mill and mixers) have been modelled as point sources and have been considered to be operating for 100% of the time over the 15 minute assessment period.
- One dust collector has been modelled as operating constantly over the 15 minute assessment period.
- An air compressor has been modelled as a point source operating for 15 seconds over a 15 minute period. This was based on on-site observations.

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- A 4 metre high solid fence is proposed to the southern side of the site. This has been included in the noise model.

6.3 MODELLING RESULTS

Noise emissions from the proposed facility have been predicted utilising a conservative approach, assuming all equipment and machinery operate simultaneously over the 15 minute assessment period.

The predicted noise levels at the considered residential locations for the above operational scenarios are displayed in the following Tables.

6.3.1 Operational Scenario

Table 6-3: Noise Modelling Results – Operational Scenario

Receptors	Predicted Noise Levels			Applicable Noise Criteria
	Daytime $L_{Aeq\ (15\ minute)}$			
	Condition A Neutral	Condition B Wind	Condition B Temp Inversion	Daytime $L_{Aeq\ (15\ minute)}$
R1	43 ✓	45 ✓	45 ✓	45
R2	49 ×	52 ×	52 ×	45
R3	35 ✓	39 ✓	39 ✓	45
R4	33 ✓	38 ✓	38 ✓	45
R5	29 ✓	34 ✓	34 ✓	37
R6	28 ✓	32 ✓	32 ✓	37
R7	39 ×	42 ×	42 ×	37
R8	45 ×	48 ×	48 ×	37

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6.3.2 Road Traffic Noise

The road traffic noise generated by the proposed activities would be minimal. A total number of 12 truck movements per day has been considered.

The estimated road traffic noise level has been calculated at the nearest residence to Mamre Road located approximately 40 metres from Mamre Road.

Table 6-4: Predicted Road Traffic Noise Levels, dB(A)

Receptor along	Period	Existing Road Traffic Noise L_{eq}	Assessment Criteria $L_{eq,15\ hours}$	Predicted Road Traffic Noise $L_{eq,15}$	Cumulative Impact $L_{eq,15\ hours}$
Nearest Residence 40m from Mamre Road	Day	64	66	43	**66**

The proposed operations would not generate a significant additional road traffic noise. No increase in existing road traffic noise levels is expected.

6.4 Noise Control Measures

Non compliance with the noise criteria was predicted at 3 nearest sensitive receptors.

The following noise control measures have been implemented in order to significantly reduce the noise emissions associated with the proposed operations:

- Construction of 4m high walls to the south-east and north-east of the truck unloading area. This would be adjacent to the proposed awning.
- Construction of an acoustic screen around the dust collector;
- Construction of an acoustic enclosure around the blower area in order to reduce noise contribution from blower and pipeline by 15dB.

The predicted noise levels with all noise control measures are shown in Table 6-5.

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Table 6-5: Noise Modelling Results – Operational Scenario

Receptors	Predicted Noise Levels			Applicable Noise Criteria
	Daytime $L_{Aeq\ (15\ minute)}$			
	Condition A Neutral	Condition B Wind	Condition B Temp Inversion	Daytime $L_{Aeq\ (15\ minute)}$
R1	40 ✓	41 ✓	41 ✓	45
R2	40 ✓	41 ✓	41 ✓	45
R3	33 ✓	36 ✓	36 ✓	45
R4	28 ✓	32 ✓	32 ✓	45
R5	25 ✓	29 ✓	29 ✓	37
R6	27 ✓	31 ✓	31 ✓	37
R7	35 ✓	37 ✓	37 ✓	37
R8	41 ✗	43 ✗	43 ✗	37

Compliance with noise criteria would be achieved at all the nearest residential receptors except at location R8.

At this location the main noise contribution is given by the trucks accessing and leaving the site.

It has to be noted that at location R8 currently a poultry farm is present. At this location truck movements associated with feed delivery and bird pickup would occur.

The proposed operation would generate only minimal traffic movements (up to 12 per day) and this would occur during daytime only.

In the absence of trucks driving along the access road over a 15 minute period the noise level associated with the proposed operations was predicted to be equal to 36 dB(A) under adverse weather conditions and 34dB(A) under neutral weather conditions. This would comply with the noise criteria.

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7. CONCLUSIONS

Benbow Environmental has been engaged by Olathree Pty Ltd to prepare a noise impact assessment for the proposed development at 901-915 Mamre Rd Kemps Creek.

No increase in existing road traffic noise levels is expected as a result of the proposed operations.

With the following noise control measures in place, compliance with noise criteria under worst case conditions would be achieved at all the nearest residential receptors except at location R8, a poultry farm at 885-869 Mamre Rd, Kemps Creek:

- Construction of 4m high walls to the south-east and north-east of the truck unloading area. This would be adjacent to the proposed awning.
- Construction of an acoustic screen around the dust collector;
- Construction of an acoustic enclosure around the blower area in order to reduce noise contribution from blower and pipeline by 15dB.

This exceedance would be 4 dB(A) under neutral weather conditions and up to 6 dB(A) under high wind speed and temperature inversions from trucks accessing and leaving the site.

In the absence of trucks driving along the access road over a 15 minute period the noise level associated with the proposed operations was predicted to be equal to 36 dB(A) under adverse weather conditions and 34dB(A) under neutral weather conditions. This would comply with the noise criteria.

Based on the predictive noise model results the noise emissions associated with the proposed development's operation are expected to comply with the project specific noise levels at all the considered receptors with the exception of R8, a poultry farm located at 885-869 Mamre Road, Kemps Creek where under worst case conditions, noise criteria may exceed as a result of trucks accessing and leaving the site.

This concludes the report.

Prepared by:





Daniele Albanese
Senior Acoustic Engineer

R T Benbow
Principal Consultant

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8. LIMITATIONS

Our services for this project are carried out in accordance with our current professional standards for site assessment investigations. No guarantees are either expressed or implied.

This report has been prepared solely for the use of J M Produce, as per our agreement for providing environmental services. Only J M Produce is entitled to rely upon the findings in the report within the scope of work described in this report. Otherwise, no responsibility is accepted for the use of any part of the report by another in any other context or for any other purpose.

Although all due care has been taken in the preparation of this study, no warranty is given, nor liability accepted (except that otherwise required by law) in relation to any of the information contained within this document. We accept no responsibility for the accuracy of any data or information provided to us by J M Produce for the purposes of preparing this report.

Any opinions and judgements expressed herein, which are based on our understanding and interpretation of current regulatory standards, should not be construed as legal advice.

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ATTACHMENTS

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Attachment 1: Noise Terminology

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'A' FREQUENCY WEIGHTING

The 'A' frequency weighting roughly approximates to the Fletcher-Munson 40 phon equal loudness contour. The human loudness perception at various frequencies and sound pressure levels is equated to the level of 40 dB at 1 kHz. The human ear is less sensitive to low frequency sound and very high frequency sound than midrange frequency sound (i.e. 500 Hz to 6 kHz). Humans are most sensitive to midrange frequency sounds, such as a child's scream. Sound level meters have inbuilt frequency weighting networks that very roughly approximates the human loudness response at low sound levels. It should be noted that the human loudness response is not the same as the human annoyance response to sound. Here low frequency sounds can be more annoying than midrange frequency sounds even at very low loudness levels. The 'A' weighting is the most commonly used frequency weighting for occupational and environmental noise assessments. However, for environmental noise assessments, adjustments for the character of the sound will often be required.

AMBIENT NOISE

The ambient noise level at a particular location is the overall environmental noise level caused by all noise sources in the area, both near and far, including all forms of traffic, industry, lawnmowers, wind in foliage, insects, animals, etc. Usually assessed as an energy average over a set time period 'T' (L_{Aeq},T).

AUDIBLE

Audible refers to a sound that can be heard. There are a range of audibility grades, varying from "barely audible", "just audible" to "clearly audible" and "prominent".

BACKGROUND NOISE LEVEL

Total silence does not exist in the natural or built-environments, only varying degrees of noise. The Background Noise Level is the minimum repeatable level of noise measured in the absence of the noise under investigation and any other short-term noises such as those caused by all forms of traffic, industry, lawnmowers, wind in foliage, insects, animals, etc.. It is quantified by the noise level that is exceeded for 90 % of the measurement period 'T' (L_{A90}, T). Background Noise Levels are often determined for the day, evening and night time periods where relevant. This is done by statistically analysing the range of time period (typically 15 minute) measurements over multiple days (often 7 days). For a 15 minute measurement period the Background Noise Level is set at the quietest level that occurs at 1.5 minutes.

'C' FREQUENCY WEIGHTING

The 'C' frequency weighting approximates the 100 phon equal loudness contour. The human ear frequency response is more linear at high sound levels and the 100 phon equal loudness contour attempts to represent this at various frequencies at sound levels of approximately 100 dB.

DECIBEL

The decibel (dB) is a logarithmic scale that allows a wide range of values to be compressed into a more comprehensible range, typically 0 dB to 120 dB. The decibel is ten times the logarithm of the ratio of any two quantities that relate to the flow of energy (i.e. power). When used in acoustics it is the ratio of square of the sound pressure level to a reference sound pressure level, the ratio of the sound power level to a reference sound power level, or the ratio of the sound intensity level to a reference sound intensity level. See also Sound Pressure Level and Sound Power Level. Noise levels in decibels cannot be added arithmetically since they are logarithmic numbers. If one machine is generating a noise level of 50 dB, and another similar machine is placed beside it, the level will increase to 53 dB (from $10 \log_{10} (10^{(50/10)} + 10^{(50/10)})$ and not 100 dB. In theory, ten similar machines placed side by side will increase the sound level by 10 dB, and one hundred machines increase the sound level by 20 dB. The human ear has a vast sound-sensitivity range of over a thousand billion to one so the logarithmic decibel scale is useful for acoustical assessments.

dBA – See 'A' frequency weighting

dBC – See 'C' frequency weighting

EQUIVALENT CONTINUOUS SOUND LEVEL, LAeq

Many sounds, such as road traffic noise or construction noise, vary repeatedly in level over a period of time. More sophisticated sound level meters have an integrating/averaging electronic device inbuilt, which will display the energy time-average (equivalent continuous sound level - L_{Aeq}) of the 'A' frequency weighted sound pressure level. Because the decibel scale is a logarithmic ratio, the higher noise levels have far more sound energy, and therefore the LAeq level tends to indicate an average which is strongly influenced by short term, high level noise events. Many studies show that human reaction to level-varying sounds tends to relate closer to the L_{Aeq} noise level than any other descriptor.

'F'(FAST) TIME WEIGHTING

Sound level meter design-goal time constant which is 0.125 seconds.

FLETCHER–MUNSON EQUAL LOUDNESS CONTOUR CURVES

The Fletcher–Munson curves are one of many sets of equal loudness contours for the human ear, determined experimentally by Harvey Fletcher and Wilden A. Munson, and reported in a 1933 paper entitled "Loudness, its definition, measurement and calculation" in the Journal of the Acoustic Society of America.

FREE FIELD

In acoustics a free field is a measurement area not subject to significant reflection of acoustical energy. A free field measurement is typically not closer than 3.5 metres to any large flat object (other than the ground) such as a fence or wall or inside an anechoic chamber.

FREQUENCY

The number of oscillations or cycles of a wave motion per unit time, the SI unit is the hertz (Hz). 1 Hz is equivalent to one cycle per second. 1000 Hz is 1 kHz.

IMPACT ISOLATION CLASS (IIC)

The American Society for Testing and Materials (ASTM) has specified that the IIC of a floor/ceiling system shall be determined by operating an ISO 140 Standard Tapping Machine on the floor and measuring the noise generated in the room below. The IIC is a number found by fitting a reference curve to the measured octave band levels and then deducting the sound pressure level at 500 Hz from 110 decibels. Thus the higher the IIC, the better the impact sound isolation. Not commonly used in Australia.

'I' (IMPULSE) TIME WEIGHTING

Sound level meter time constant now not in general use. The 'I' (impulse) time weighting is not suitable for rating impulsive sounds with respect to their loudness. It is also not suitable for assessing the risk of hearing impairment or for determining the 'impulsiveness' of a sound.

IMPACT SOUND INSULATION ($L_{nT,w}$)

Australian Standard AS ISO 717.2 – 2004 has specified that the Impact Sound Insulation of a floor/ceiling system be quantified by operating an ISO 140 Standard Tapping Machine on the floor and measuring the noise generated in the room below. The Weighted Standardised Impact Sound Pressure Level ($L_{nT,w}$) is the sound pressure level at 500 Hz for a reference curve fitted to the measured 1/3 octave band levels. Thus the lower $L_{nT,w}$ the better the impact sound insulation.

IMPULSE NOISE

An impulse noise is typified by a sudden rise time and a rapid sound decay, such as a hammer blow, rifle shot or balloon burst.

LOUDNESS

The volume to which a sound is audible to a listener is a subjective term referred to as loudness. Humans generally perceive an approximate doubling of loudness when the sound level increases by about 10 dB and an approximate halving of loudness when the sound level decreases by about 10 dB.

MAXIMUM NOISE LEVEL, LAFmax

The root-mean-square (rms) maximum sound pressure level measured with sound level meter using the 'A' frequency weighting and the 'F' (Fast) time weighting. Often used for noise assessments other than aircraft.

MAXIMUM NOISE LEVEL, LASmax

The root-mean-square (rms) maximum sound pressure level measured with sound level meter using the 'A' frequency weighting and the 'S' (Slow) time weighting. Often used for aircraft noise assessments.

NOISE RATING NUMBERS

A set of empirically developed equal loudness curves has been adopted as Australian Standard AS1469-1983. These curves allow the loudness of a noise to be described with a single NR number. The Noise Rating number is that curve which touches the highest level on the measured spectrum of the subject noise. For broadband noise such as fans and engines, the NR number often equals the 'A' frequency weighted dB level minus five.

NOISE

Noise is unwanted, harmful or inharmonious (discordant) sound. Sound is wave motion within matter, be it gaseous, liquid or solid. Noise usually includes vibration as well as sound.

NOISE REDUCTION COEFFICIENT – See: "Sound Absorption Coefficient"

OFFENSIVE NOISE

Reference: Dictionary of the NSW Protection of the Environment Operations Act 1997). "Offensive Noise means noise:
(a) that, by reason of its level, nature, character or quality, or the time at which it is made, or any other circumstances:
(i) is harmful to (or likely to be harmful to) a person who is outside the premise from which it is emitted, or
(ii) interferes unreasonably with (or is likely to interfere unreasonably with) the comfort or repose of a person who is outside the premises from which it is emitted, or
(b) that is of a level, nature, character or quality prescribed by the regulations or that is made at a time, or in other circumstances prescribed by the regulations."

PINK NOISE

Pink noise is a broadband noise with an equal amount of energy in each octave or third octave band width. Because of this, Pink Noise has more energy at the lower frequencies than White Noise and is used widely for Sound Transmission Loss testing.

REVERBERATION TIME, T60

The time in seconds, after a sound signal has ceased, for the sound level inside a room to decay by 60 dB. The first 5 dB decay is often ignored, because of fluctuations that occur while reverberant sound conditions are being established in the room. The decay time for the next 30 dB is measured and the result doubled to determine the T_{60}. The Early Decay Time (EDT) is the slope of the decay curve in the first 10 dB normalised to 60 dB.

SOUND ABSORPTION COEFFICIENT, α

Sound is absorbed in porous materials by the viscous conversion of sound energy to a small amount of heat energy as the sound waves pass through it. Sound is similarly absorbed by the flexural bending of internally damped panels. The fraction of incident energy that is absorbed is termed the Sound Absorption Coefficient, α. An absorption coefficient of 0.9 indicates that 90 % of the incident sound energy is absorbed. The average α from 250 to 2 kHz is termed the Noise Reduction Coefficient (NRC).

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'S' (SLOW) TIME WEIGHTING

Sound level meter design-goal time constant which is 1 second.

SOUND ATTENUATION

A reduction of sound due to distance, enclosure or some other devise. If an enclosure is placed around a machine, or an attenuator (muffler or silencer) is fitted to a duct, the noise emission is reduced or attenuated. An enclosure that attenuates the noise level by 20 dB reduces the sound energy by one hundred times.

SOUND EXPOSURE LEVEL (LAE)

Integration (summation) rather than an average of the sound energy over a set time period. Use to assess single noise events such as truck or train pass by or aircraft flyovers. The sound exposure level is related to the energy average (L_{Aeq}, T) by the formula L_{Aeq}, T = L_{AE} – 10 $\log_{10}$ T. The abbreviation (SEL) is sometimes inconsistently used in place of the symbol (L_{AE}).

SOUND PRESSURE

The rms sound pressure measured in pascals (Pa). A pascal is a unit equivalent to a newton per square metre (N/m^2).

SOUND PRESSURE LEVEL, Lp

The level of sound measured on a sound level meter and expressed in decibels (dB). Where L_P = 10 $\log_{10}$ $(Pa/Po)^2$ dB (or 20 log10 (Pa/ Po) dB) where Pa is the rms sound pressure in Pascal and Po is a reference sound pressure conventionally chosen is 20 µPa (20 x 10^{-6} Pa) for airborne sound. L_p varies with distance from a noise source.

SOUND POWER

The rms sound power measured in watts (W). The watt is a unit defined as one joule per second. A measures the rate of energy flow, conversion or transfer.

SOUND POWER LEVEL, Lw

The sound power level of a noise source is the inherent noise of the device. Therefore sound power level does not vary with distance from the noise source or with a different acoustic environment. Lw = Lp + 10 $\log_{10}$ 'a' dB, re: 1pW, (10^{-12} watts) where 'a' is the measurement noise-emission area (m^2) in a free field.

SOUND TRANSMISSION CLASS (STC)

An internationally standardised method of rating the sound transmission loss of partition walls to indicate the sound reduction from one side of a partition to the other in the frequency range of 125 Hz to 4000 kHz. (Refer: Australian Standard AS 1276 – 1979). Now not in general use in Australia see: weighted sound reduction index.

SOUND TRANSMISSION LOSS

The amount in decibels by which a random sound is reduced as it passes through a sound barrier. A method for the measurement of airborne Sound Transmission Loss of a building partition is given in Australian Standard AS 1191 - 2002.

STATISTICAL NOISE LEVELS, Ln.

Noise which varies in level over a specific period of time 'T' (standard measurement times are 15 minute periods) may be quantified in terms of various statistical descriptors for example:-

- The noise level, in decibels, exceeded for 1 % of the measurement time period, when 'A' frequency weighted and 'F' time weighted is reference to as L_{AF1}, T. This may be used for describing short-term noise levels such as could cause sleep arousal during the night.

- The noise level, in decibels, exceeded for 10 % of the measurement time period, when 'A' frequency weighted and 'F' time weighted is reference to as L_{AF10}, T. In most countries the LAF10, T is measured over periods of 15 minutes, and is used to describe the average maximum noise level.

- The noise level, in decibels, exceeded for 90 % of the measurement time period, when 'A' frequency weighted and 'F' time weighted is reference to as L_{AF90}, T. In most countries the LAF90, T is measured over periods of 15 minutes, and is used to describe the average minim um or background noise level.

STEADY NOISE

Noise, which varies in level by 6 dB or less, over the period of interest with the time-weighting set to "Fast", is considered to be "steady". (Refer AS 1055.1 1997).

WEIGHTED SOUND REDUCTION INDEX, Rw

This is a single number rating of the airborne sound insulation of a wall, partition or ceiling. The sound reduction is normally measured over a frequency range of 100 Hz to 3.150 kHz and averaged in accordance with ISO standard weighting curves (Refer AS/NZS 1276.1:1999). Internal partition wall Rw + C ratings are frequency weighted to simulate insulation from human voice noise. The R_w + C is similar in value to the STC rating value. External walls, doors and windows may be $R_w + C_{tr}$ rated to simulate insulation from road traffic noise. The spectrum adaptation term Ctr adjustment factor takes account of low frequency noise. The weighted sound reduction index is normally similar or slightly lower number than the STC rating value.

WHITE NOISE

White noise is broadband random noise whose spectral density is constant across its entire frequency range. The sound power is the same for equal bandwidths from low to high frequencies. Because the higher frequency octave bands cover a wider spectrum, white noise has more energy at the higher frequencies and sounds like a hiss.

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'Z' FREQUENCY WEIGHTING

The 'Z' (Zero) frequency weighting is 0 dB within the nominal 1/3 octave band frequency range centred on 10 Hz to 20 kHz. This is within the tolerance limits given in AS IEC 61672.1-2004: 'Electroacoustics - Sound level meters – Specifications'.

Attachment 2: QA/QC Procedures

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Calibration of Sound Level Meters

A sound level meter requires regular calibration to ensure its measurement performance remains within specification. Benbow Environmental sound level meters are calibrated by a National Association of Testing Authority (NATA) registered laboratory or a laboratory approved by the NSW Environment Protection Authority (EPA) every two years and after each major repair, in accordance with AS 1259-1990.

The calibration of the sound level meter was checked immediately before and after each series of measurements using an acoustic calibrator. The acoustic calibrator provides a known sound pressure level, which the meter indicates when the calibrator is activated while positioned on the meter microphone.

The sound level meters also incorporate an internal calibrator for use in setting up. This provides a check of the electrical calibration of the meter, but does not check the performance of the microphone. Acoustical calibration checks the entire instrument including the microphone. Calibration certificates for the instrument sets used have been included as Attachment 3.

Care and Maintenance of Sound Level Meters

Noise measuring equipment contains delicate components and therefore must be handled accordingly. The equipment is manufactured to comply with international and national standards and is checked periodically for compliance. The technical specifications for sound level meters used in Australia are defined in Australian Standard AS 1259 – 1990 *"Sound Level Meters"*.

The sound level meters and associated accessories are protected during storage, measurement and transportation against dirt, corrosion, rapid changes of temperature, humidity, rain, wind, vibration, electric and magnetic fields. Microphone cables and adaptors are always connected and disconnected with the power turned off. Batteries are removed (with the instrument turned off) if the instrument is not to be used for some time.

Investigation Procedures

All investigative procedures were conducted in accordance with AS 1055.1-1997 *Acoustics – "Description and Measurement of Environmental Noise (Part 1: General Procedures)"*.

The following information was recorded and kept for reference purposes:

- type of instrumentation used and measurement procedure conducted;
- description of the time aspect of the measurements, ie. measurement time intervals; and
- positions of measurements and the time and date were noted.

As per AS 1055.1-1997, all measurements were carried out at least 3.5 m from any reflecting structure other than the ground. The preferred measurement height of 1.2 m above the ground was utilised. A sketch of the area was made identifying positions of measurement and the approximate location of the noise source and distances in meters (approx.).

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Unattended Noise Monitoring

NOISE MONITORING EQUIPMENT

ARL noise loggers type Ngara and EL-215 were used to conduct the long-term unattended noise monitoring. This equipment complies with Australian Standard 1259.2–1990 "Acoustics – Sound Level Meters" and is designated as a Type 1 and Type 2 instrument suitable for field use.

The measured data is processed statistically and stored in memory every 15 minutes. The equipment was calibrated prior and subsequent to the measurement period using a Rion NC-73 sound level calibrator. There were no significant variances observed in the reference signal between the pre-measurement and post-measurement calibrations. Instrument calibration certificates have also been included in Attachment 3.

METEOROLOGICAL CONSIDERATION DURING MONITORING

For the long-term attended monitoring, meteorological data for the relevant period were provided by the Bureau of Meteorology, which was considered representative of the site for throughout the monitoring period.

DESCRIPTORS & FILTERS USED FOR MONITORING

Noise levels are commonly measured using A-weighted filters and are usually described as dB(A). The "A-weighting" refers to standardised amplitude versus frequency curve used to "weight" sound measurements to represent the response of the human ear. The human ear is less sensitive to low frequency sound than it is to high frequency sound. Overall A-weighted measurements quantify sound with a single number to represent how people subjectively hear different frequencies at different levels.

Noise environments can be described using various descriptors depending on characteristics of noise or purpose of assessments. For this survey the L_{A90} was used to analyse the monitoring results. The statistical descriptors L_{A90} measures the noise level exceeded for 90% of the sample measurement time, and is used to describe the “Background noise”. Background noise is the underlying level of noise present in the ambient noise, excluding extraneous noise or the noise source under investigation.

Measurement sample periods were fifteen minutes. The Noise -vs- Time graphs representing measured noise levels at the noise monitoring location are presented in Attachment 4.

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ATTENDED NOISE MONITORING

NOISE MONITORING EQUIPMENT

The attended short-term noise monitoring was carried out using a SVANTEK SVAN957 Class 1 Precision Sound Level Meter. The instrument was calibrated by a NATA accredited laboratory within two years of the measurement period. The instrument sets comply with AS 1259 and was set on A-weighted, fast response.

The microphone was positioned at 1.5 metres above ground level and was fitted with a windsock. The instrument was calibrated using a Rion NC-73 sound level calibrator prior and subsequent to the measurement period to ensure the reliability and accuracy of the instrument sets. There were no significant variances observed in the reference signal between the pre-measurement and post-measurement calibrations. Instrument calibration certificates have also been included in Attachment 3.

WEATHER CONDITIONS

It was partially cloudy, find without significant breeze.

METHODOLOGY

The attended noise measurements were carried out generally in accordance with Australian Standard AS 1055-1997 - "Acoustics – Description and Measurement of Environmental Noise".

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Attachment 3: Calibration Certificates

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Version: 1, Version Date: 23/03/2016

Acoustic Research Labs Pty Ltd
Level 7 Building 2 423 Pennant Hills Rd
Pennant Hills NSW AUSTRALIA 2120
Ph: +61 2 9484 0800 A.B.N. 65 160 399 119
www.acousticresearch.com.au

Calibration Certificate

Number : C13669

Client Details : Benbow Environmental
13 Daking Street
North Parramatta NSW 2151

Equipment Tested/ Model Number : ARL Ngara

Instrument Serial Number : 8780AC

Microphone Serial Number : 317859

Preamplifier Serial Number : 27984

Ambient Temperature : 23°C

Relative Humidity : 50%

Barometric Pressure : 100.4 kPa

Calibration Technician : Jeff Yu

Calibration Date : 04-December-2013

Secondary Check by : Sandra Minto

Report Issue Date : 09-December-2013

Approved Signatory :

Tested To : AS1259.1:1990
AS1259.2:1990

Comments : All tests passed for type 1

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
10.2.2: Absolute sensitivity	Pass	10.4.5: R.M.S performance	Pass
10.2.3: Frequency weighting	Pass	9.3.2: Time averaging	Pass
10.3.2: Overload indications	Pass	9.3.5: Overload indication	Pass
8.9: Detector-indicator linearity	Pass		
8.10: Differential level linearity	Pass		
10.3.4: Inherent weighted system noise level	Pass		
10.4.2: Time weighting characteristics F and S	Pass		

NATA
WORLD RECOGNISED ACCREDITATION

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www.acousticresearch.com.au

Calibration Certificate

Number : C13670

Client Details : Benbow Environmental
13 Daking Street
North Parramatta NSW 2151

Equipment Tested/ Model Number : ARL Ngara
Instrument Serial Number : 8780AD
Microphone Serial Number : 317856
Preamplifier Serial Number : 27983

Ambient Temperature : 23°C
Relative Humidity : 47%
Barometric Pressure : 100 kPa

Calibration Technician : Adrian Walker
Calibration Date : 04-December-2013
Secondary Check by : Sandra Minto
Report Issue Date : 09-December-2013
Approved Signatory :

Tested To : AS1259.1:1990
AS1259.2:1990

Comments : All tests passed for type 1

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
10.2.2: Absolute sensitivity	Pass	10.4.5: R.M.S performance	Pass
10.2.3: Frequency weighting	Pass	9.3.2: Time averaging	Pass
10.3.2: Overload indications	Pass	9.3.5: Overload indication	Pass
8.9: Detector-indicator linearity	Pass		
8.10: Differential level linearity	Pass		
10.3.4: Inherent weighted system noise level	Pass		
10.4.2: Time weighting characteristics F and S	Pass		

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www.acousticresearch.com.au

Calibration Certificate

Number : C13671

Client Details : Benbow Environmental
13 Daking Street
North Parramatta NSW 2151

Equipment Tested/ Model Number : ARL Ngara
Instrument Serial Number : 8780AE
Microphone Serial Number : 13743
Preamplifier Serial Number : 27982

Ambient Temperature : 22°C
Relative Humidity : 48%
Barometric Pressure : 100.62 kPa

Calibration Technician : Adrian Walker
Calibration Date : 09-December-2013
Secondary Check by : Sandra Minto
Report Issue Date : 09-December-2013
Approved Signatory :

Tested To : AS1259.1:1990
AS1259.2:1990

Comments : All tests passed for type 1

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
10.2.2: Absolute sensitivity	Pass	10.4.5: R.M.S performance	Pass
10.2.3: Frequency weighting	Pass	9.3.2: Time averaging	Pass
10.3.2: Overload indications	Pass	9.3.5: Overload indication	Pass
8.9: Detector-indicator linearity	Pass		
8.10: Differential level linearity	Pass		
10.3.4: Inherent weighted system noise level	Pass		
10.4.2: Time weighting characteristics F and S	Pass		

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CERTIFICATE OF CALIBRATION

CERTIFICATE NO.: **SLM 41048 & FILT 0932**

Equipment Description:	Sound & Vibration Analyser		
Manufacturer:	Svantek		
Model No:	Svan-957	**Serial No:**	15336
Microphone Type:	7052E	**Serial No:**	47869
Filter Type:	1/3 Octave	**Serial No:**	15336
Comments:	All tests passed for type 1. (See over for details)		
Owner:	Benbow Environmental 13 Daking Street North Parramatta 2151		
Ambient Pressure:	1018 hPa ±1.5 hPa		
Temperature:	24 °C ±2° C	**Relative Humidity:**	42% ±5%
Date of Calibration:	21/07/2015	**Issue Date:**	23/07/2015

Acu-Vib Test Procedure: AVP05 (SLM) & AVP06 (Filters)

CHECKED BY: ..DW.. **AUTHORISED SIGNATURE:** .....

Jack Kiett

Accredited for compliance with ISO/IEC 17025
The results of the tests, calibration and/or measurements included in this document are traceable to Australian/national standards.

NATA
WORLD RECOGNISED ACCREDITATION

Accredited Lab. No. 9262
Acoustic and Vibration Measurements

ACU-VIB
ELECTRONICS

HEAD OFFICE
Unit 14, 22 Hudson Ave. Castle Hill NSW 2154
Tel: (02) 96808133 Fax: (02)96808233
Mobile: 0413 809806
web site: www.acu-vib.com.au

Document Set ID: 7088845
Version: 1, Version Date: 23/03/2016

CERTIFICATE OF CALIBRATION

CERTIFICATE NO: 16962

EQUIPMENT TESTED: Sound Level Calibrator

Manufacturer: Rion
Type No: NC-73 **Serial No:** 10186522
Owner: Benbow Environmental
13 Daking Street
North Parramatta NSW 2151

Tests Performed: Measured output pressure level was found to be:

Parameter	Pre-Adj	Adj Y/N	Output: (db re 20 µPa)	Frequency: (Hz)	THD&N (%)
Level 1:	NA	N	94.03	993.70	0.40
Level 2:	NA	N	NA	NA	NA
Uncertainty:			±0.11 dB	±0.05 Hz	±0.2 %
Uncertainty (at 95% c.l.) k=2					

CONDITION OF TEST:
Ambient Pressure: 1001 hPa ±1.5 hPa **Relative Humidity:** 57% ±5%
Temperature: 23 °C ±2° C
Date of Calibration: 23/02/2015 **Issue Date:** 23/02/2015
Acu-Vib Test Procedure: AVP02 (Calibrators)
Test Method: AS IEC 60942 - 2004
CHECKED BY: ... **AUTHORISED SIGNATURE:** .....
Jack Riolt

Accredited for compliance with ISO/IEC 17025
The results of the tests, calibration and/or measurements included in this document are traceable to Australian/national standards.

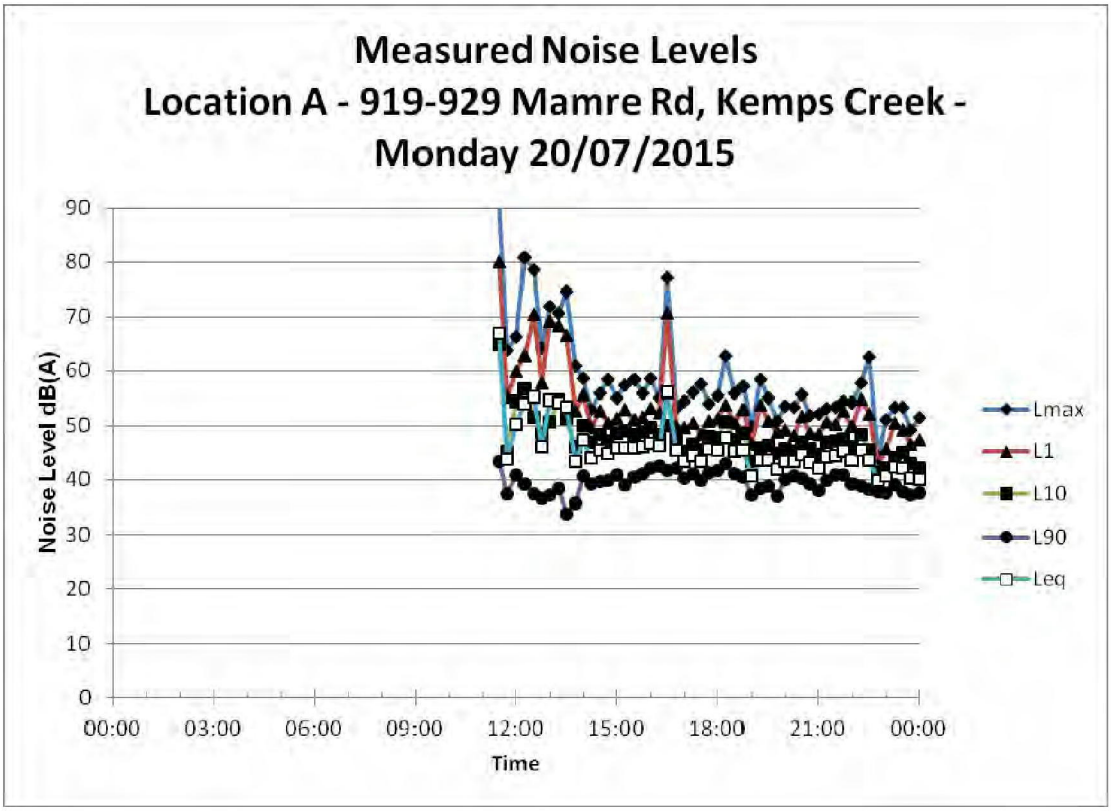
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ACCREDITATION
Accredited Lab. 9262
Acoustic and Vibration Measurements

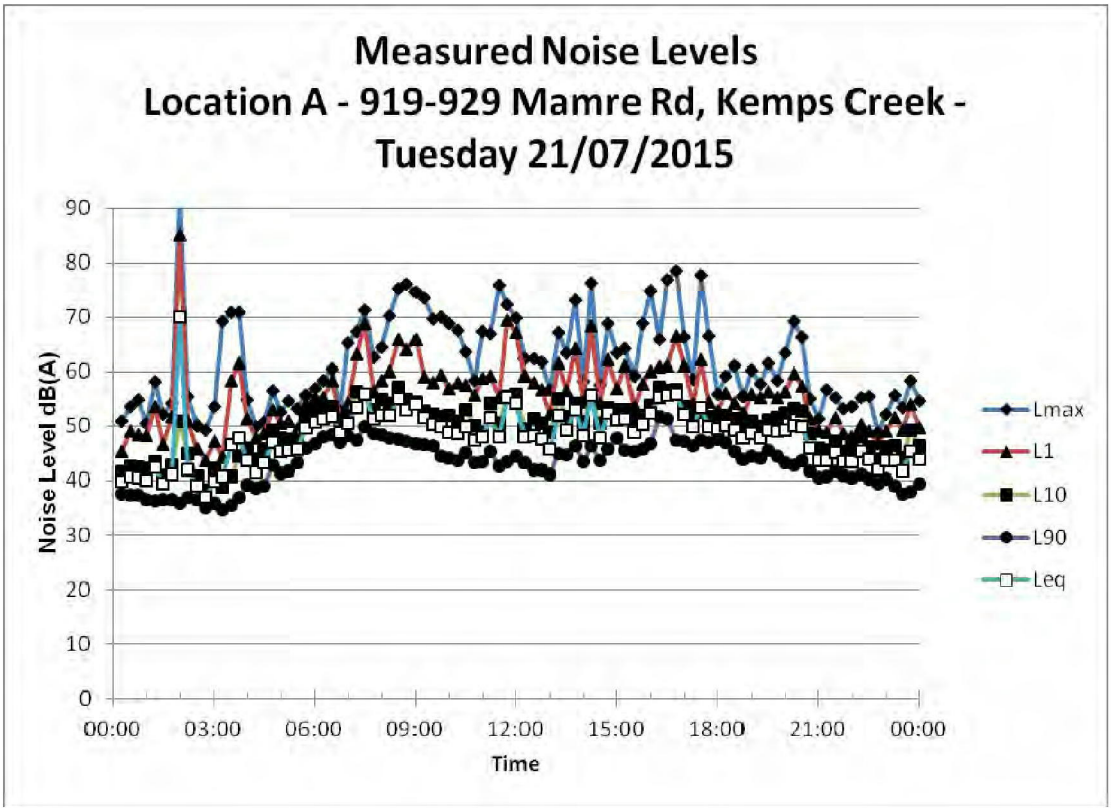
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ELECTRONICS
HEAD OFFICE
Unit 14, 22 Hudson Ave. Castle Hill NSW 2154
Tel: (02) 96808133 Fax: (02)96808233
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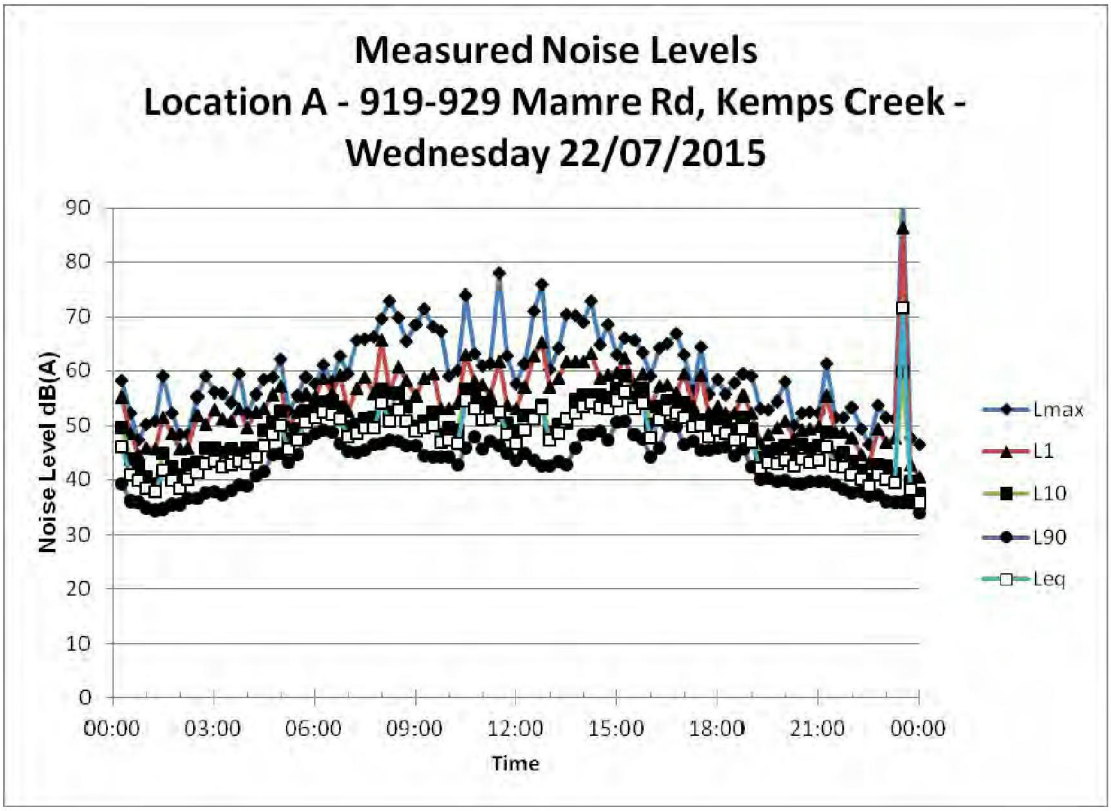
Attachment 4: Daily Noise Logger Charts

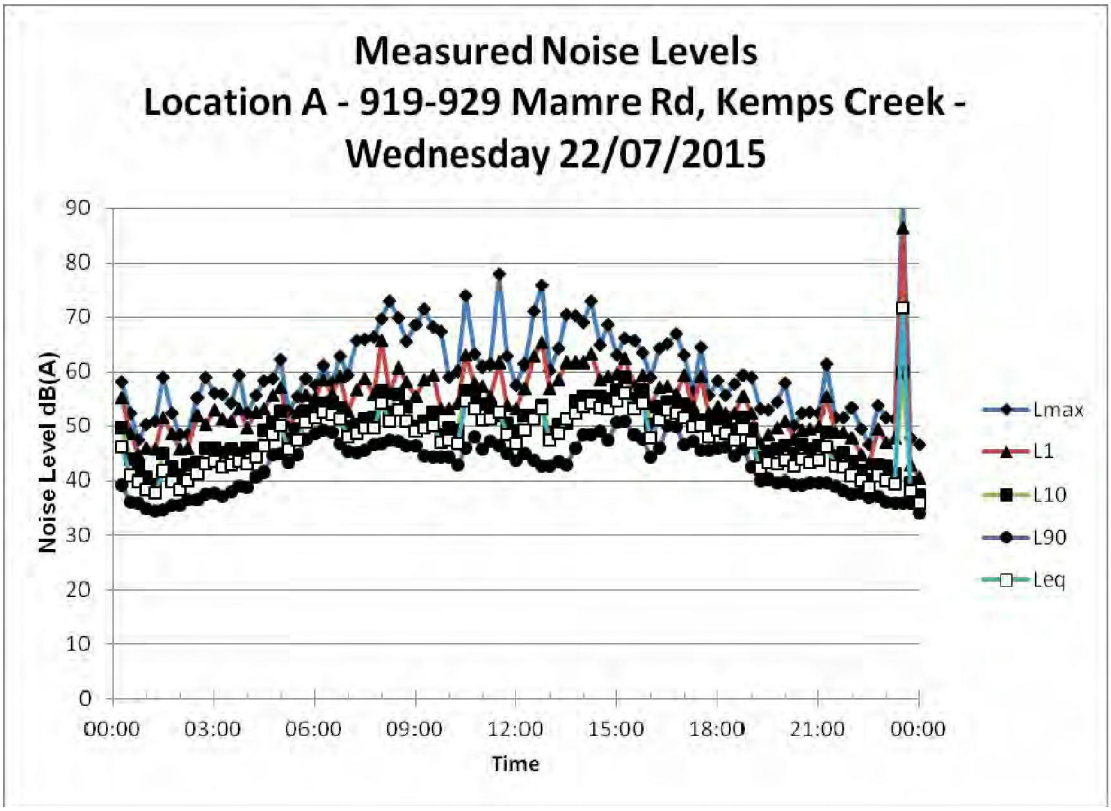
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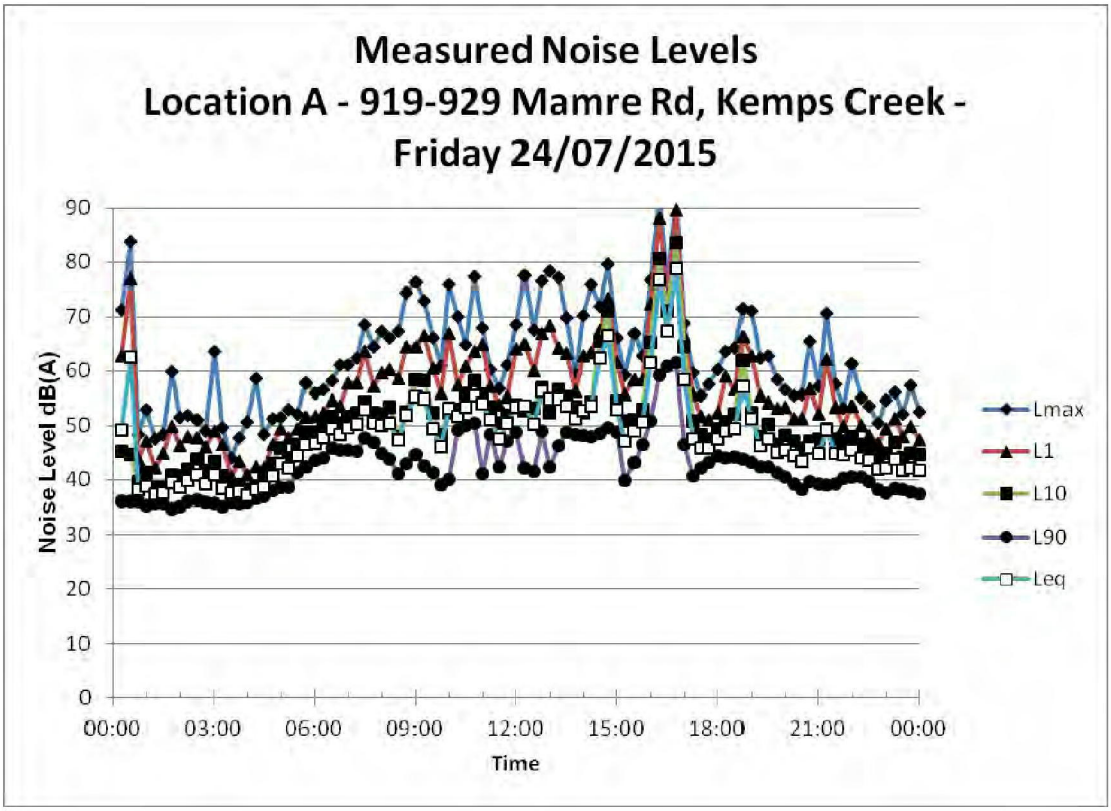


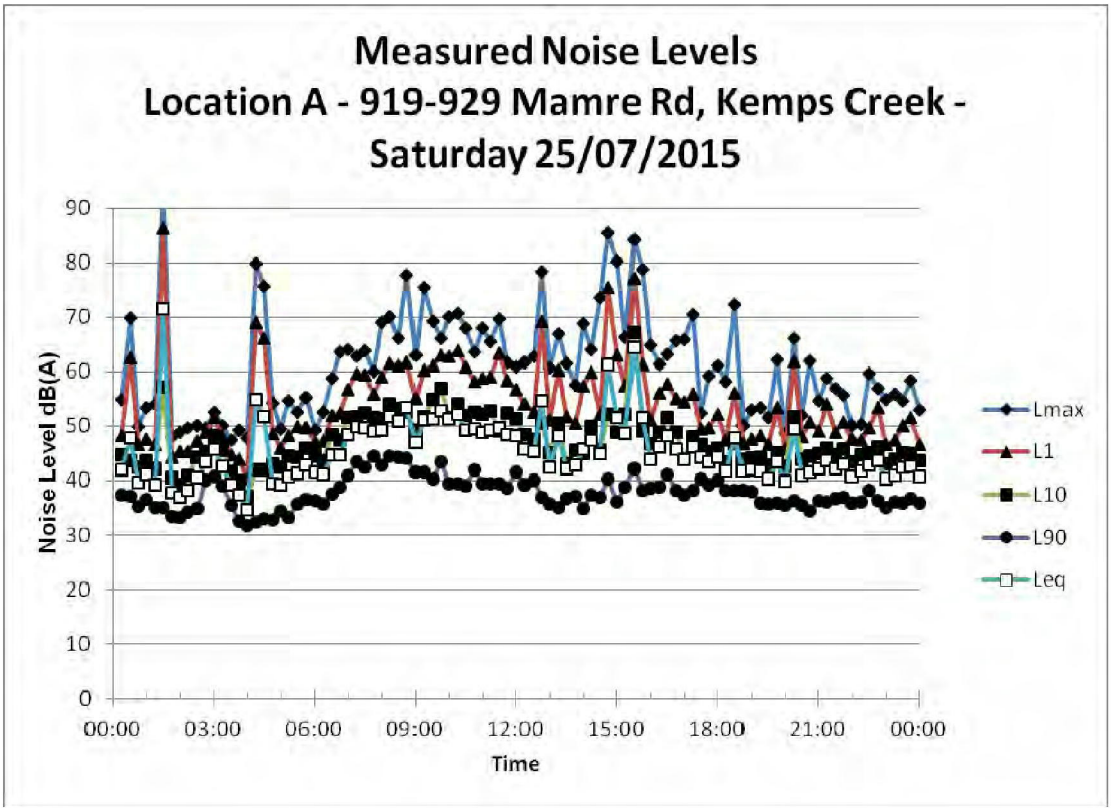
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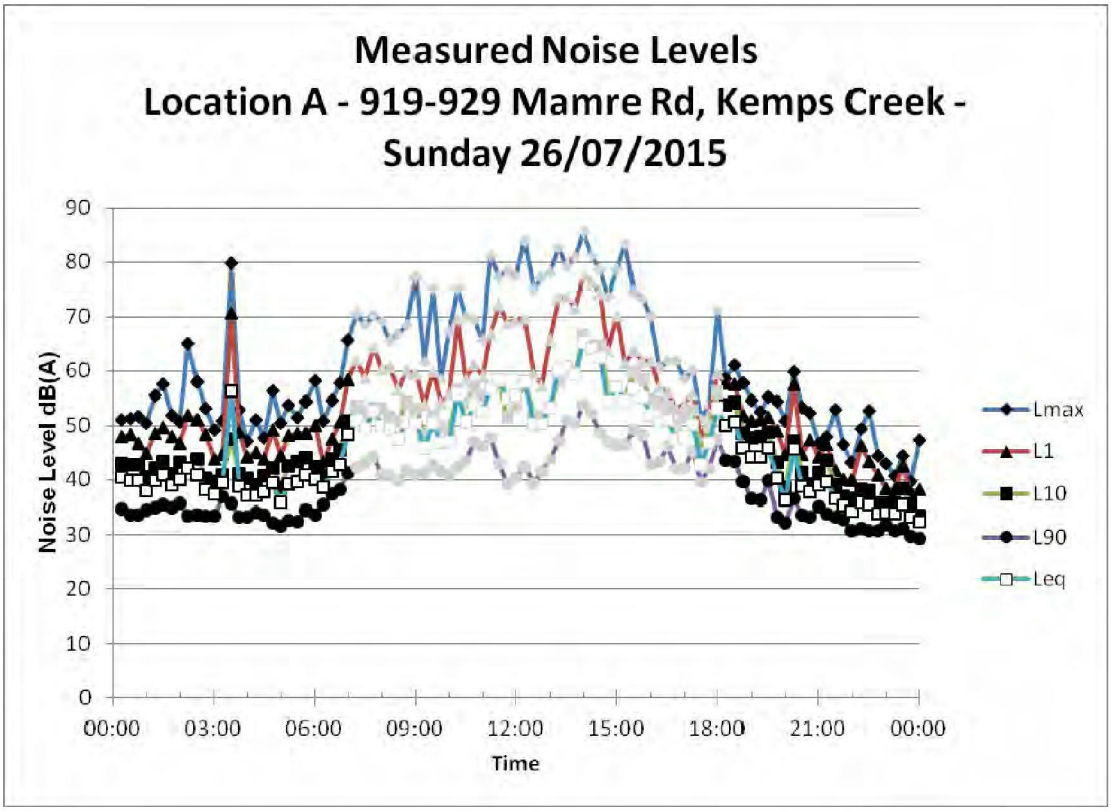


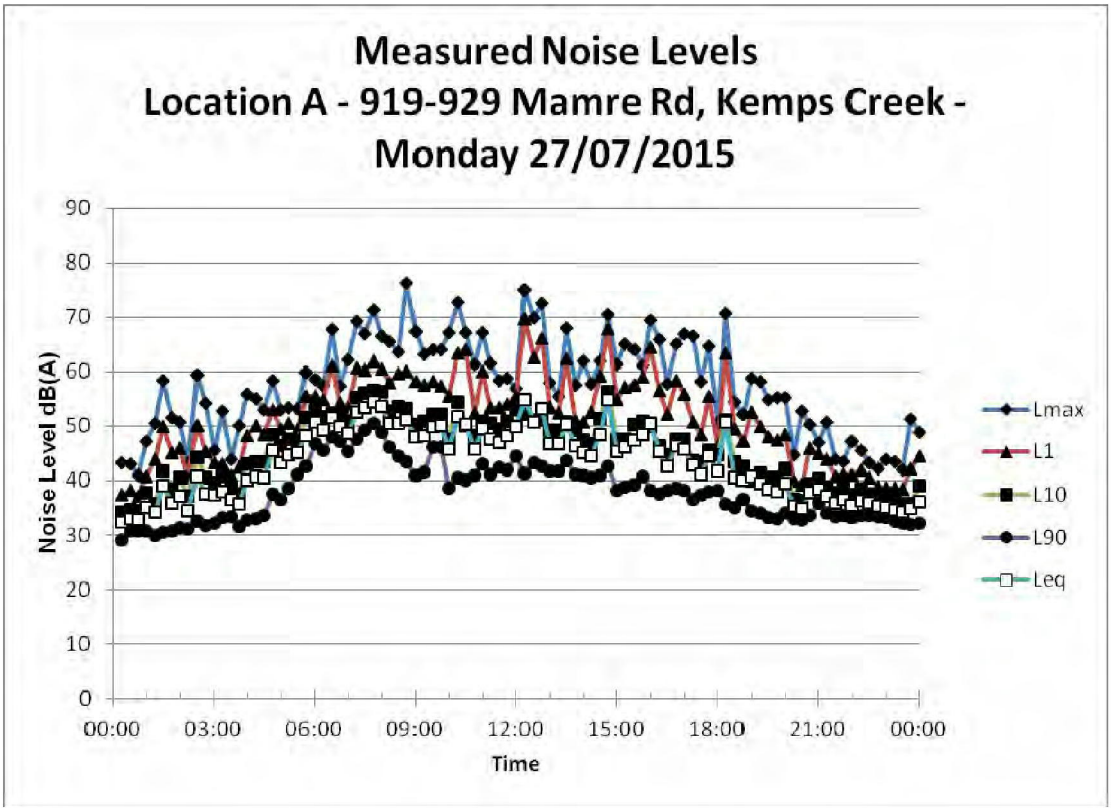
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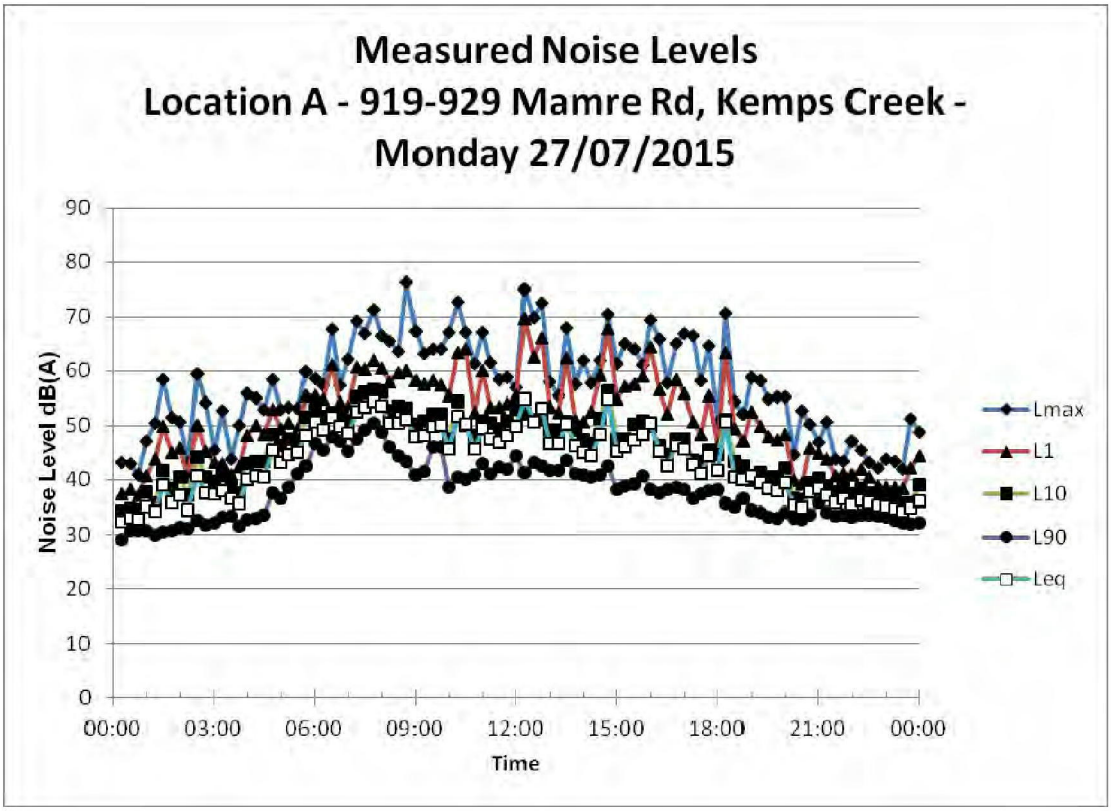


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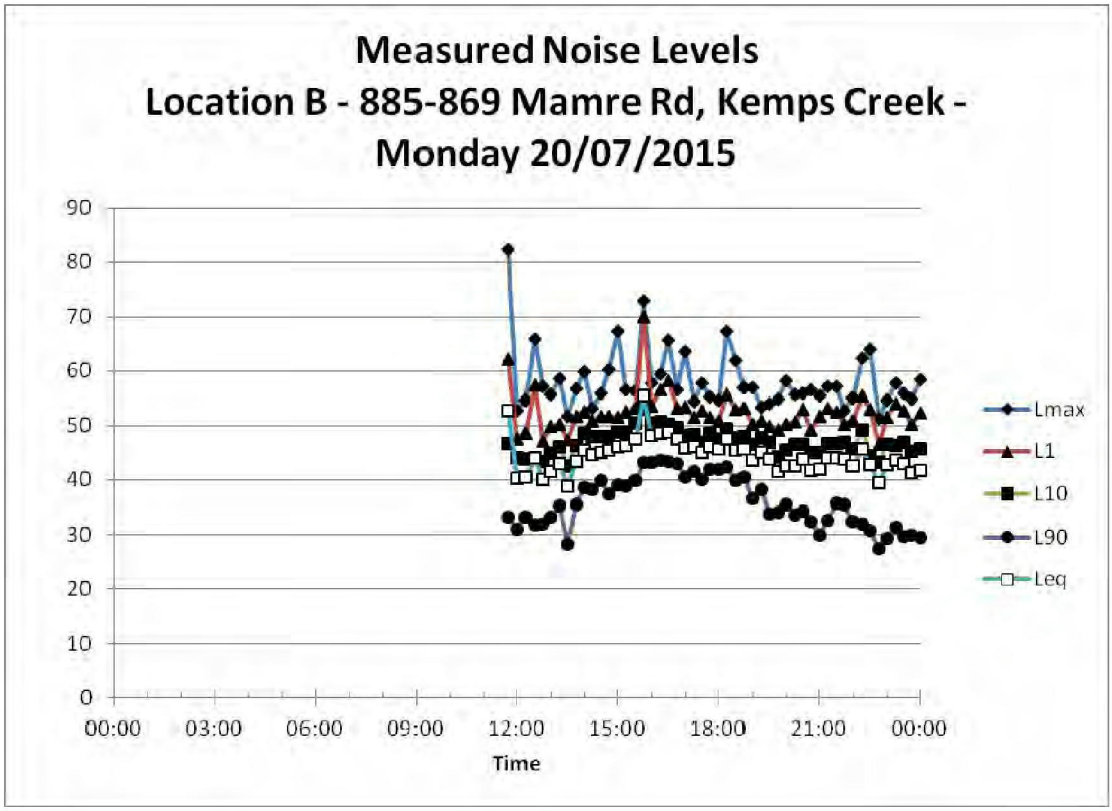


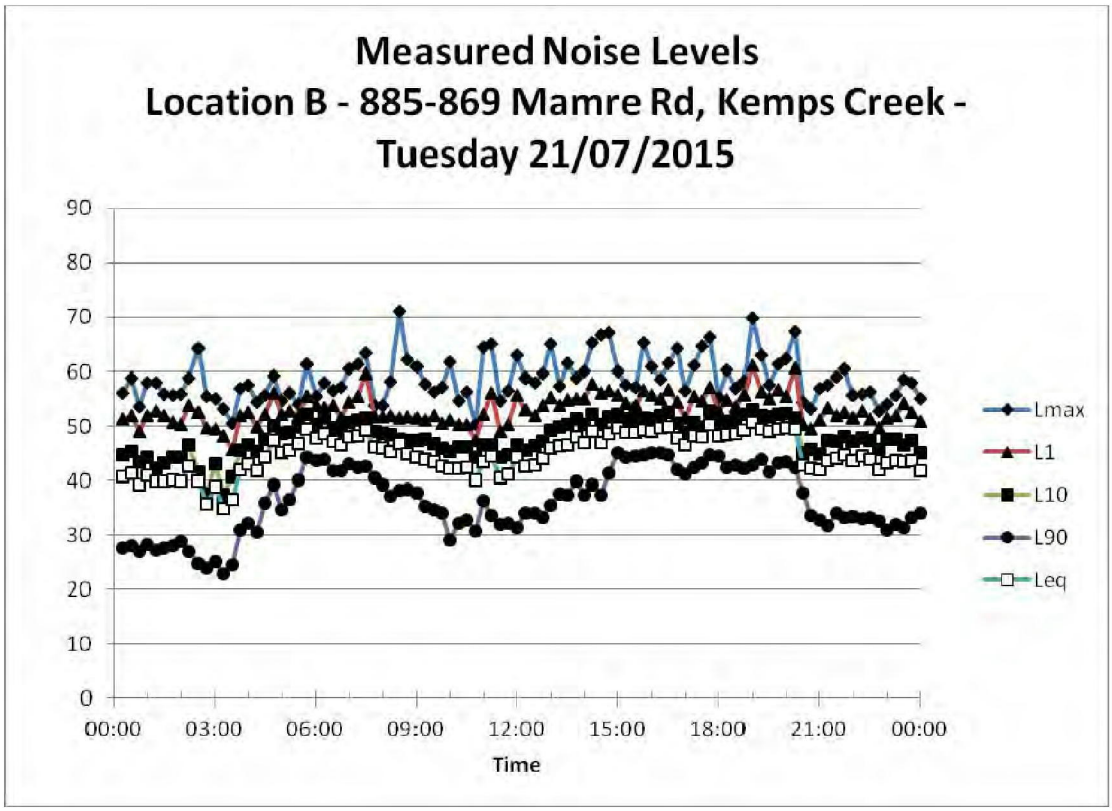


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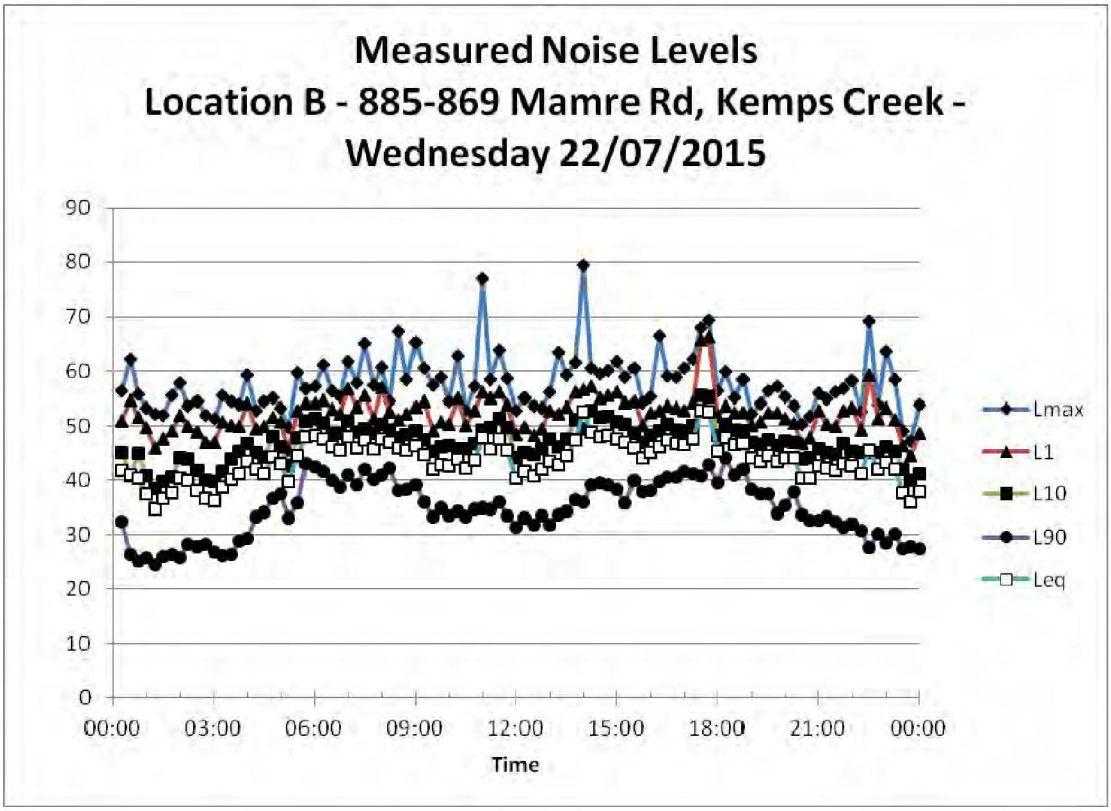


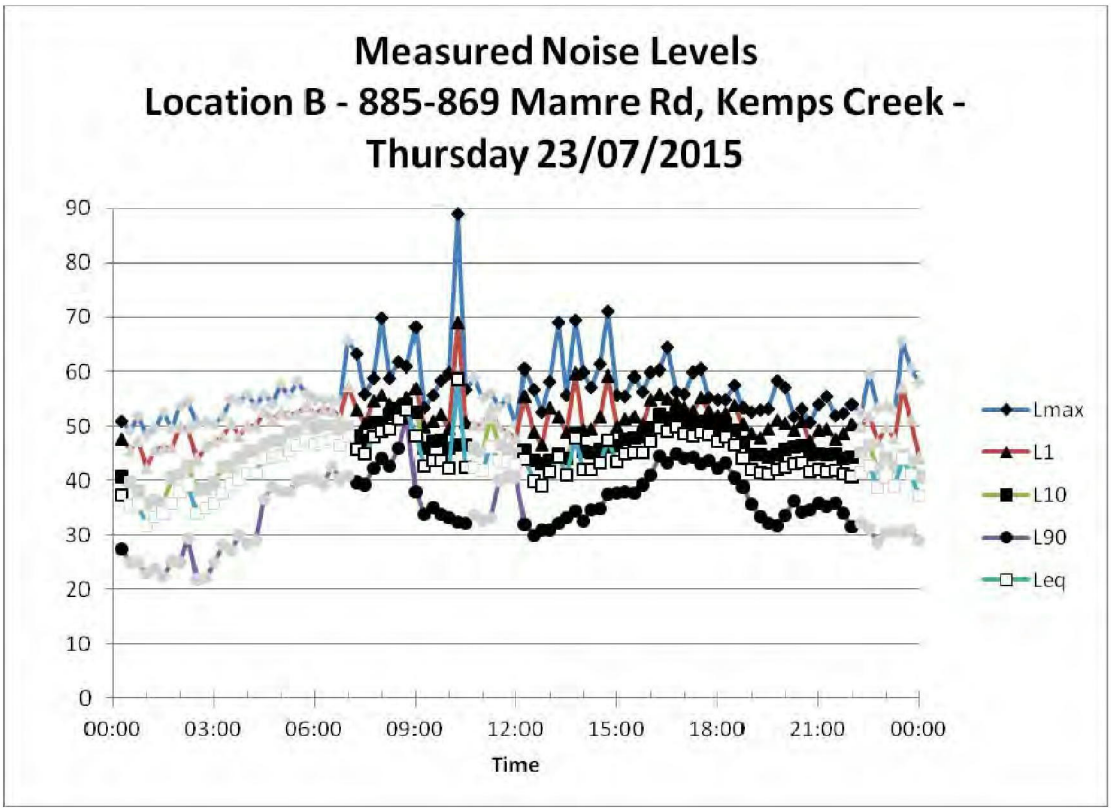
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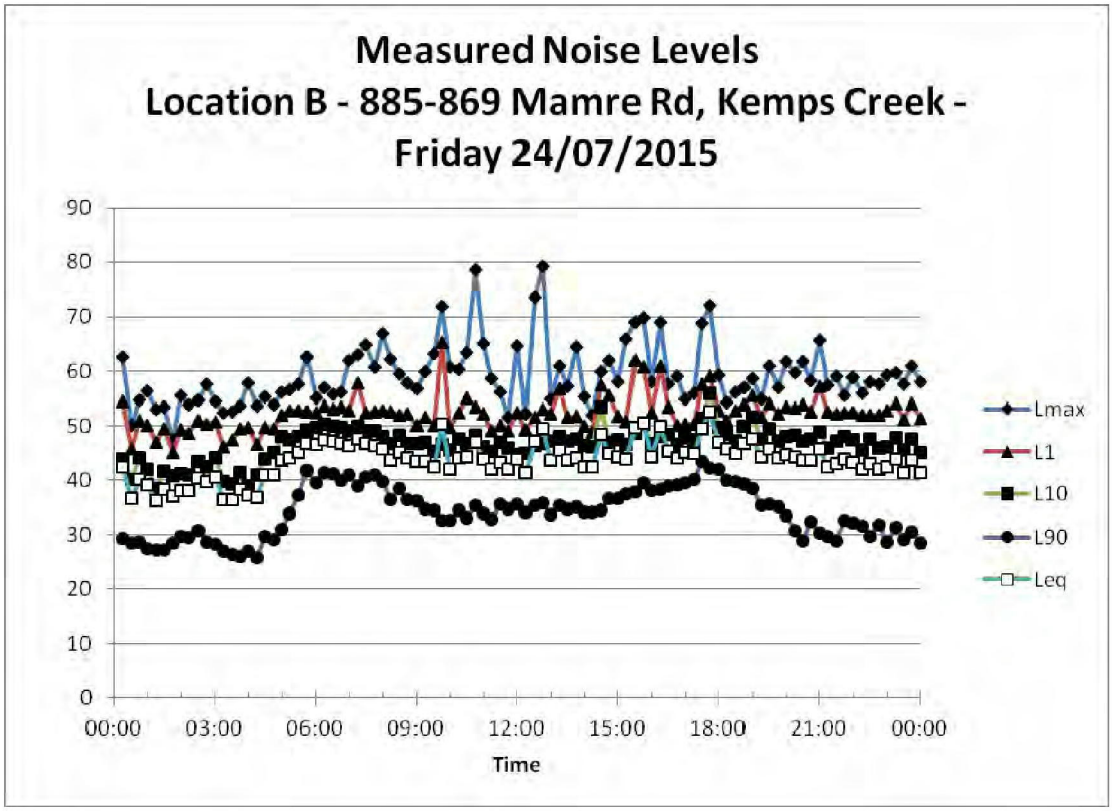


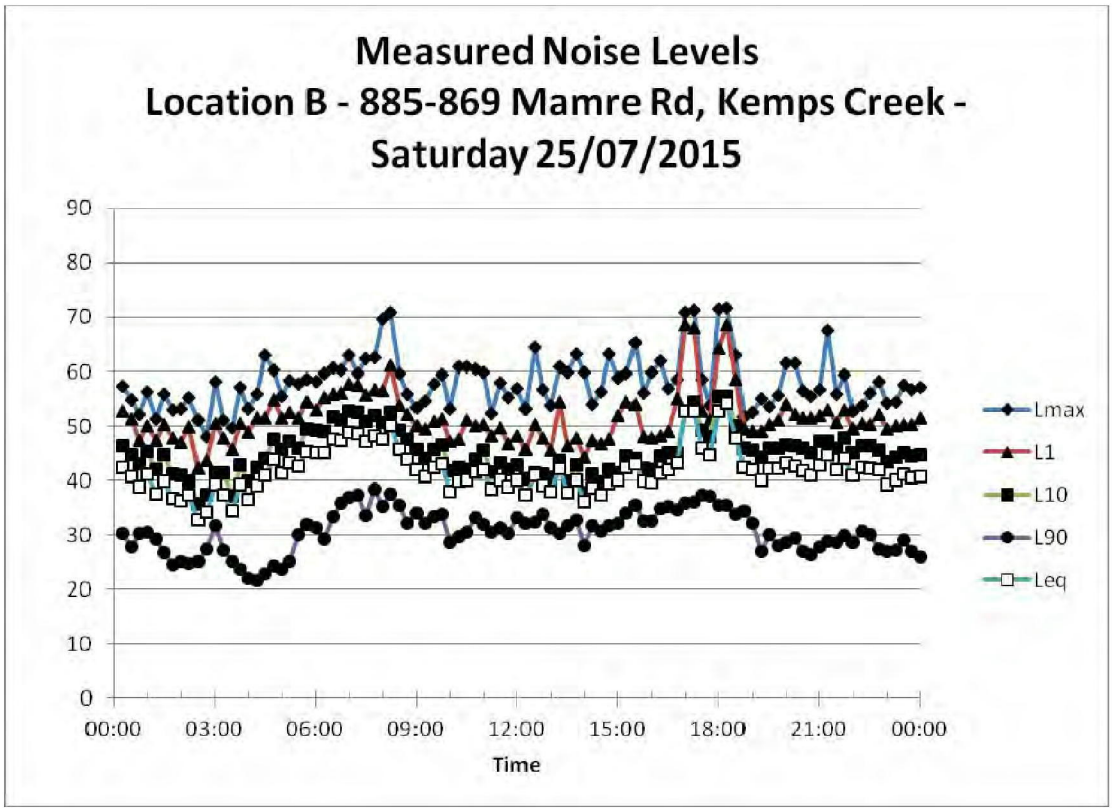
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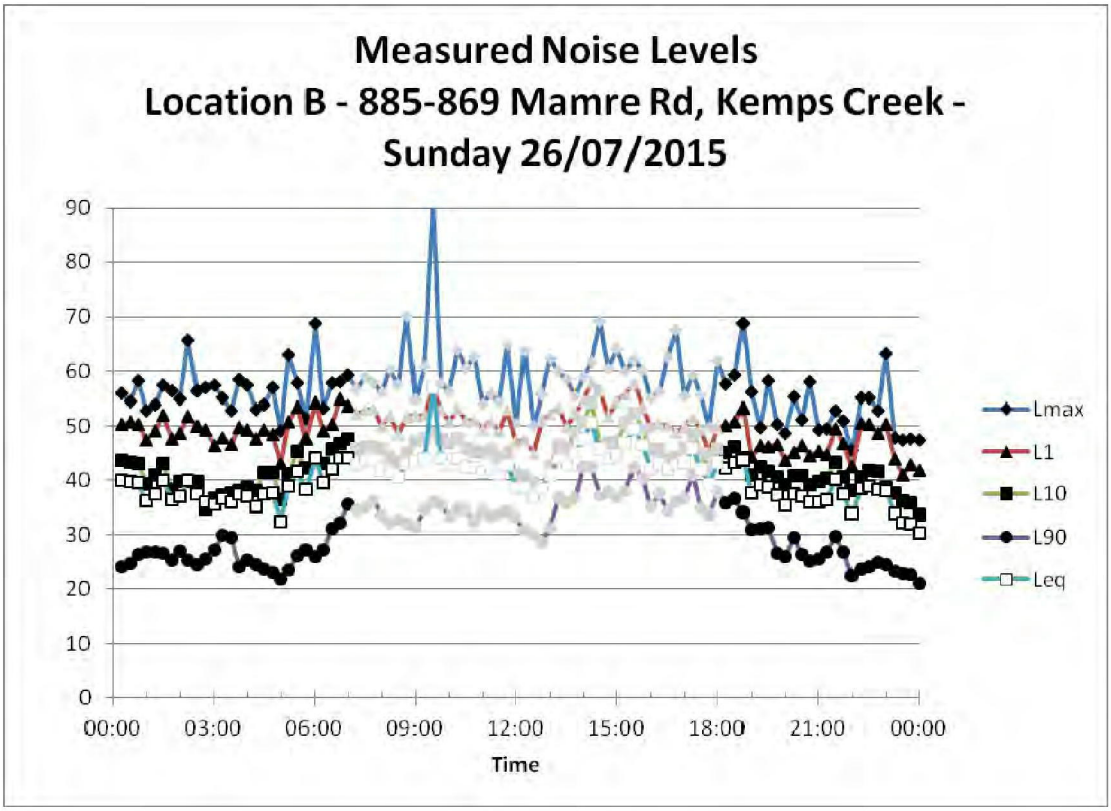


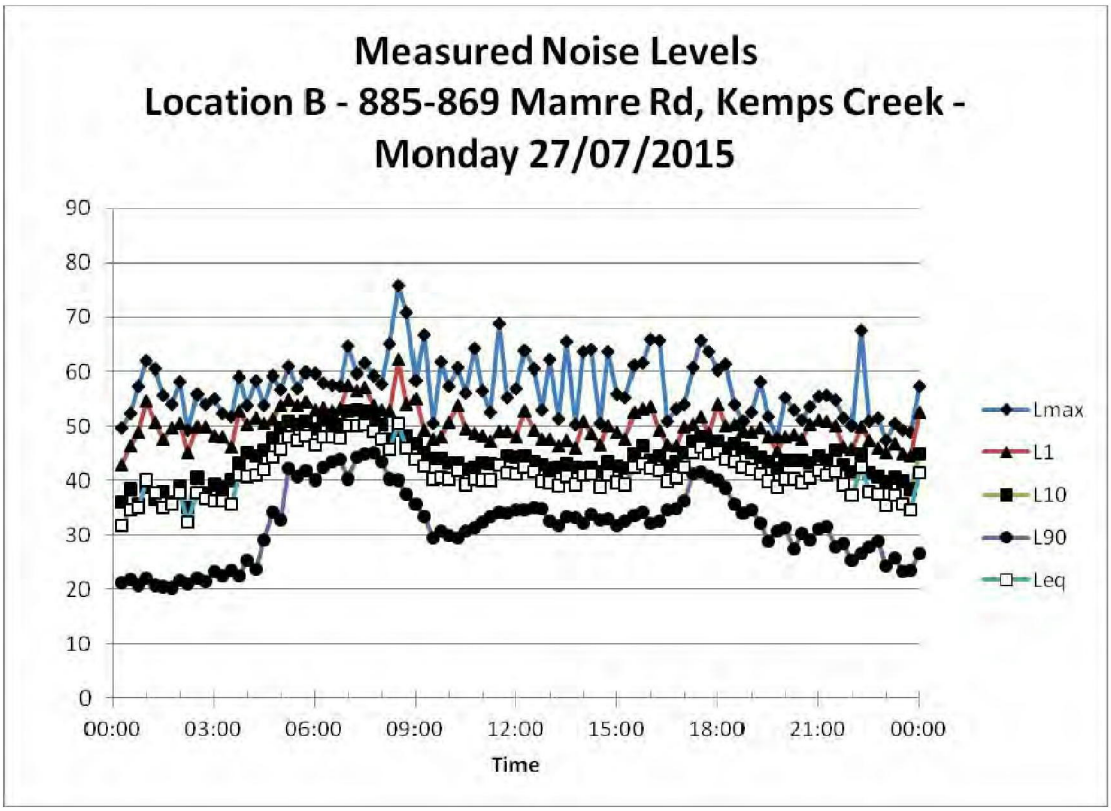
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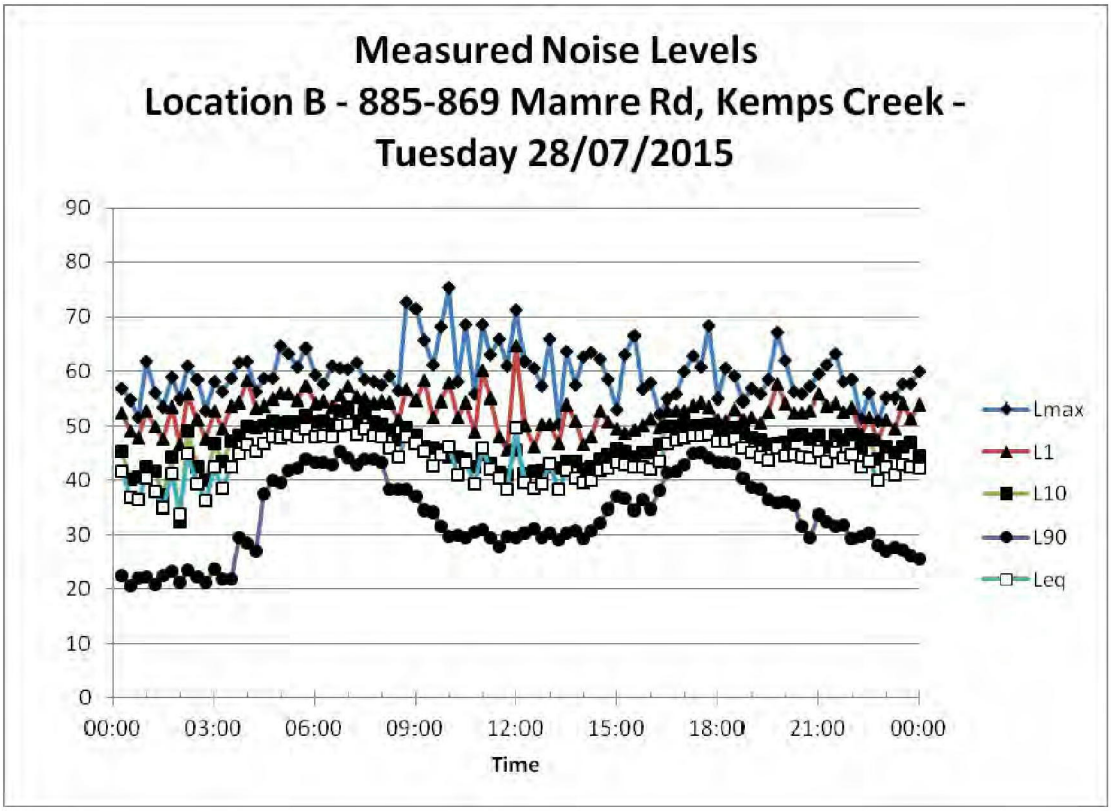


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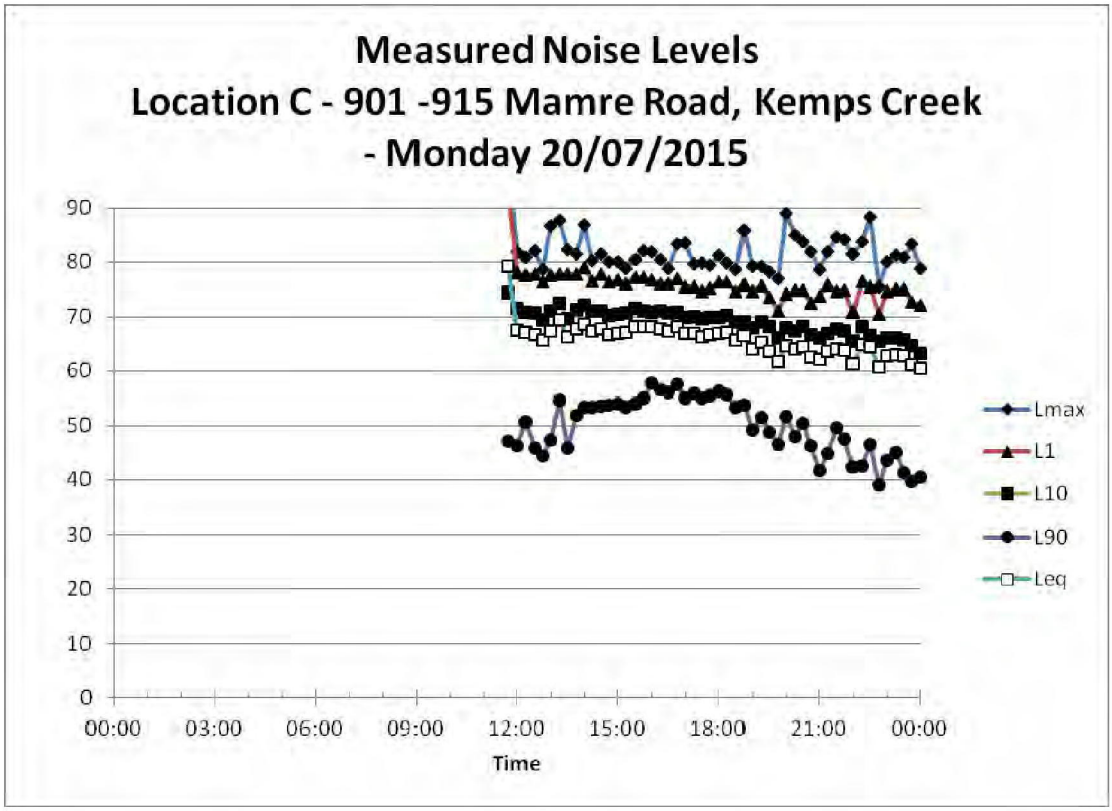


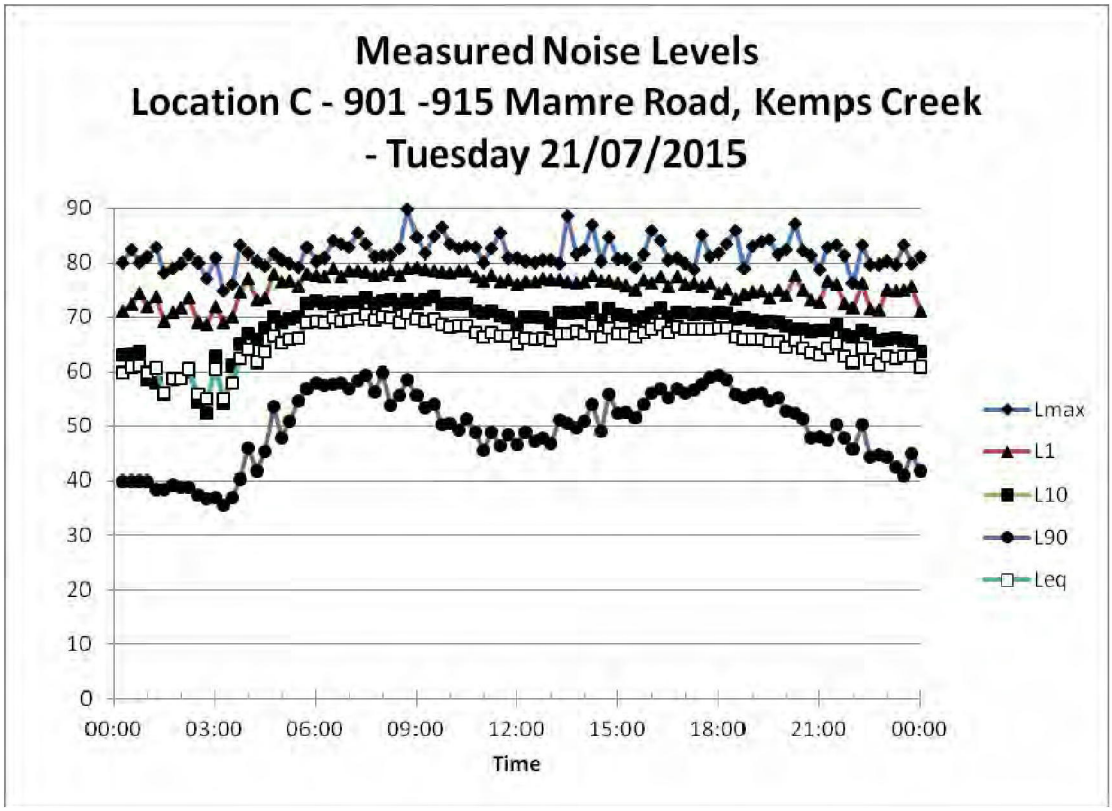


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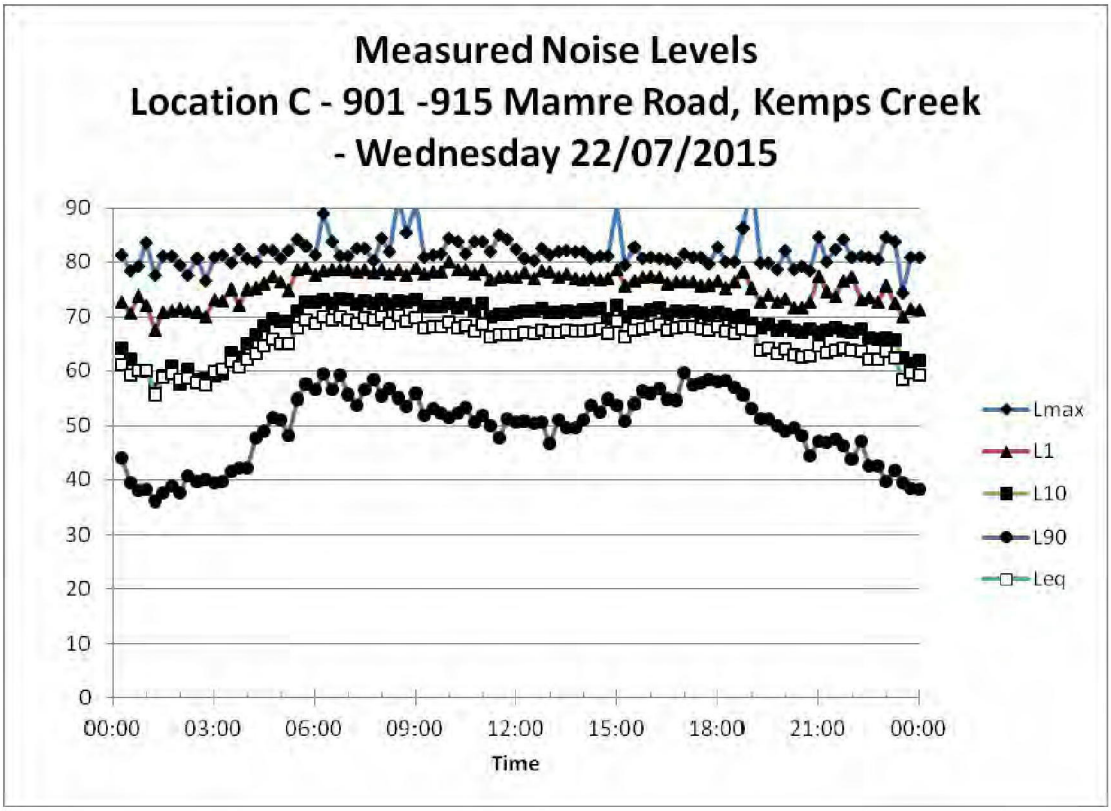


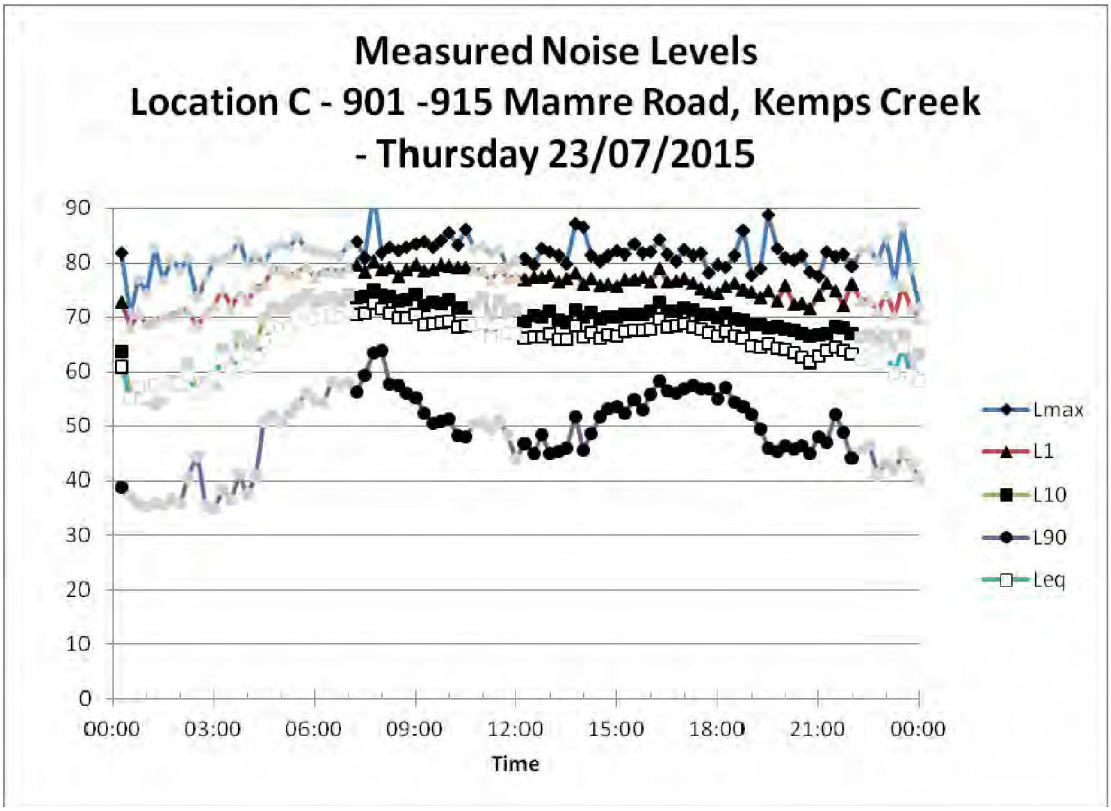
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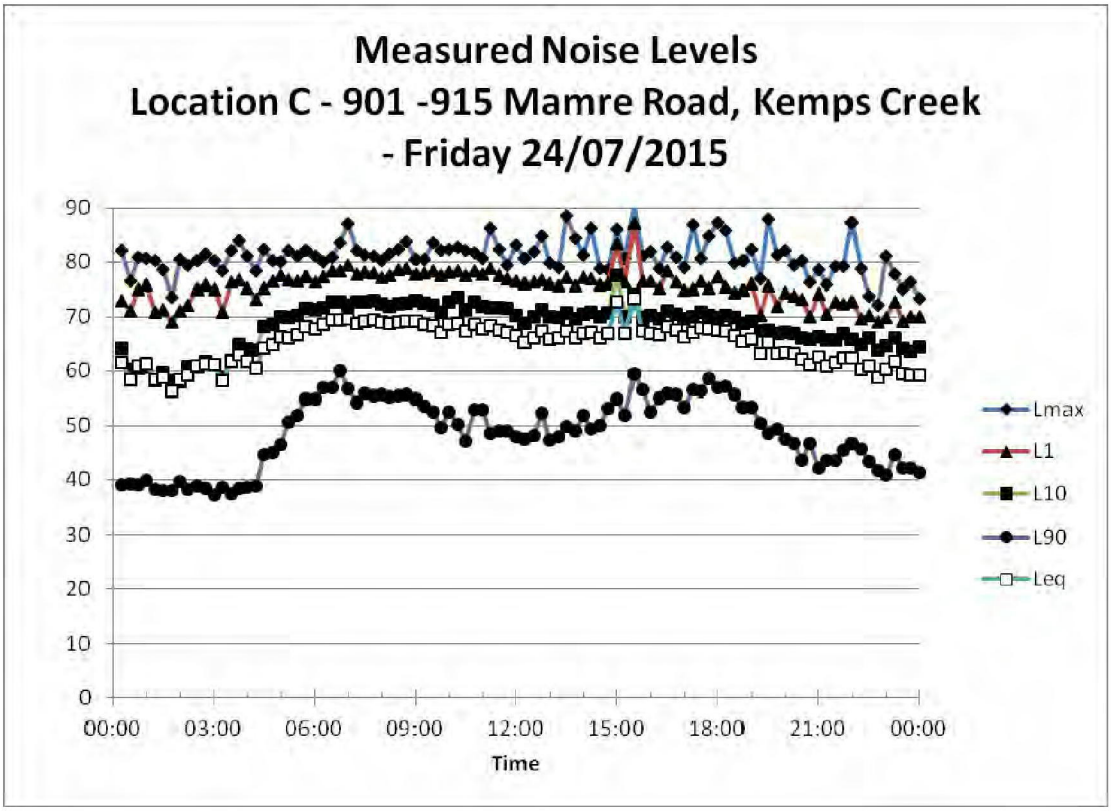


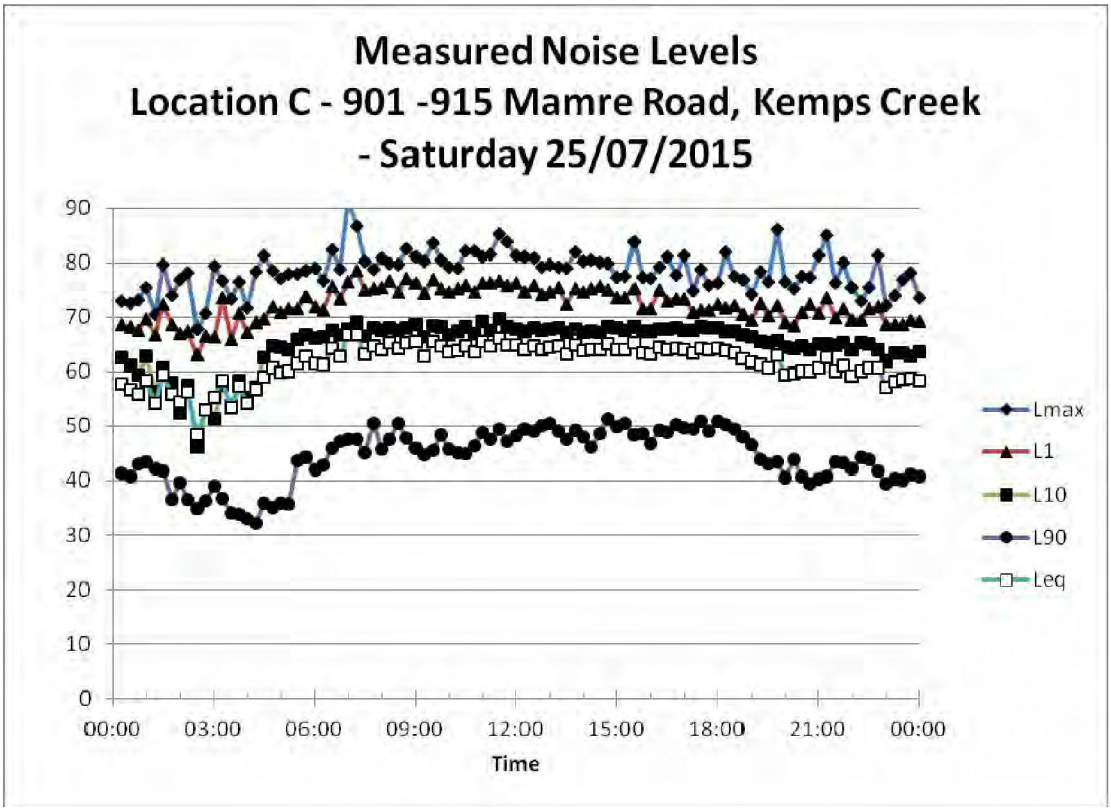
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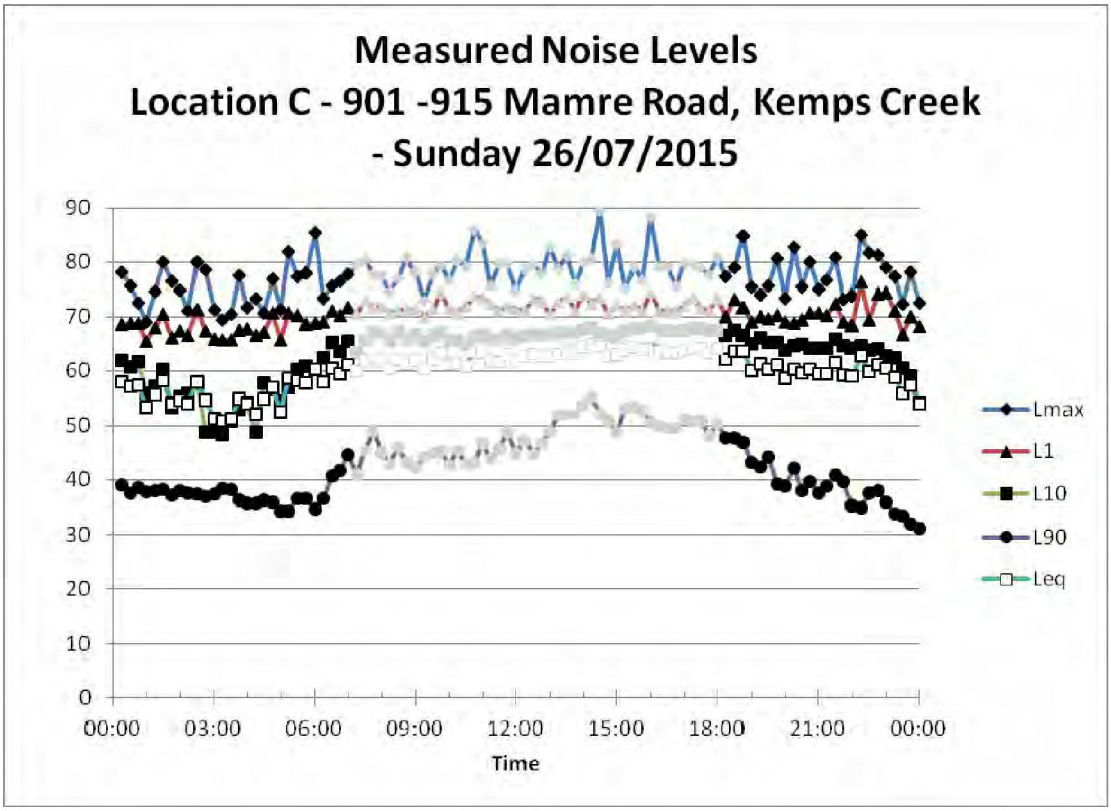


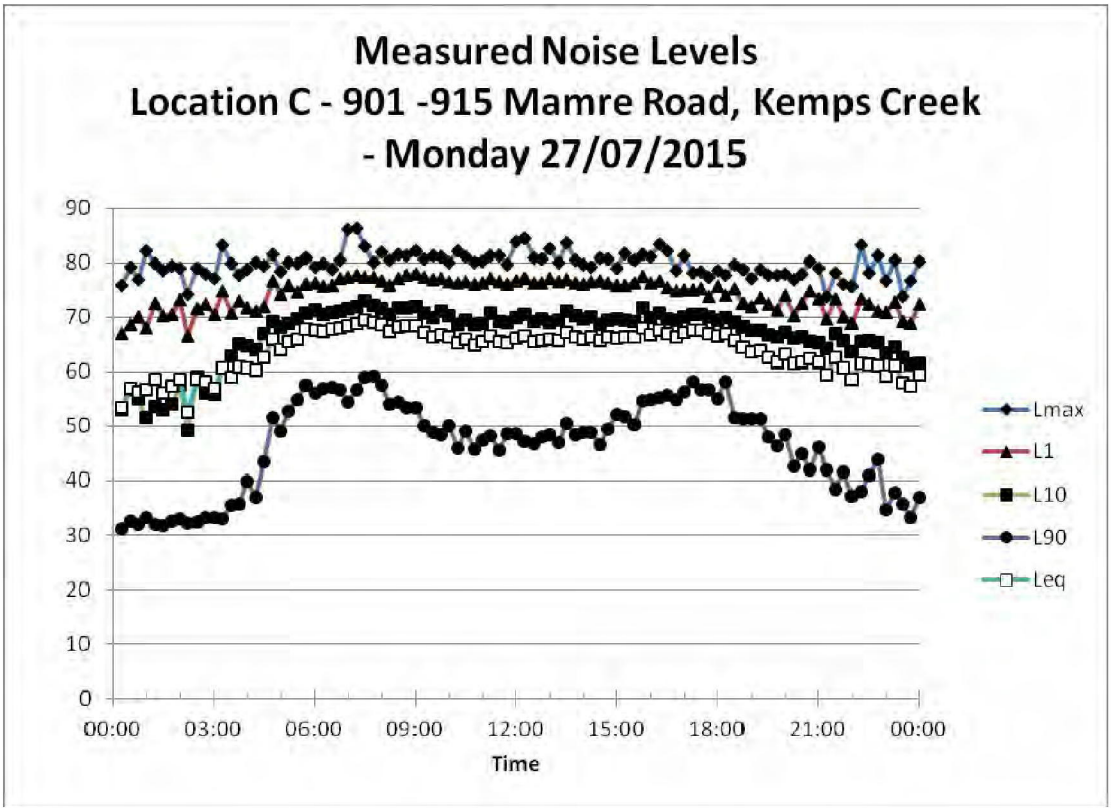
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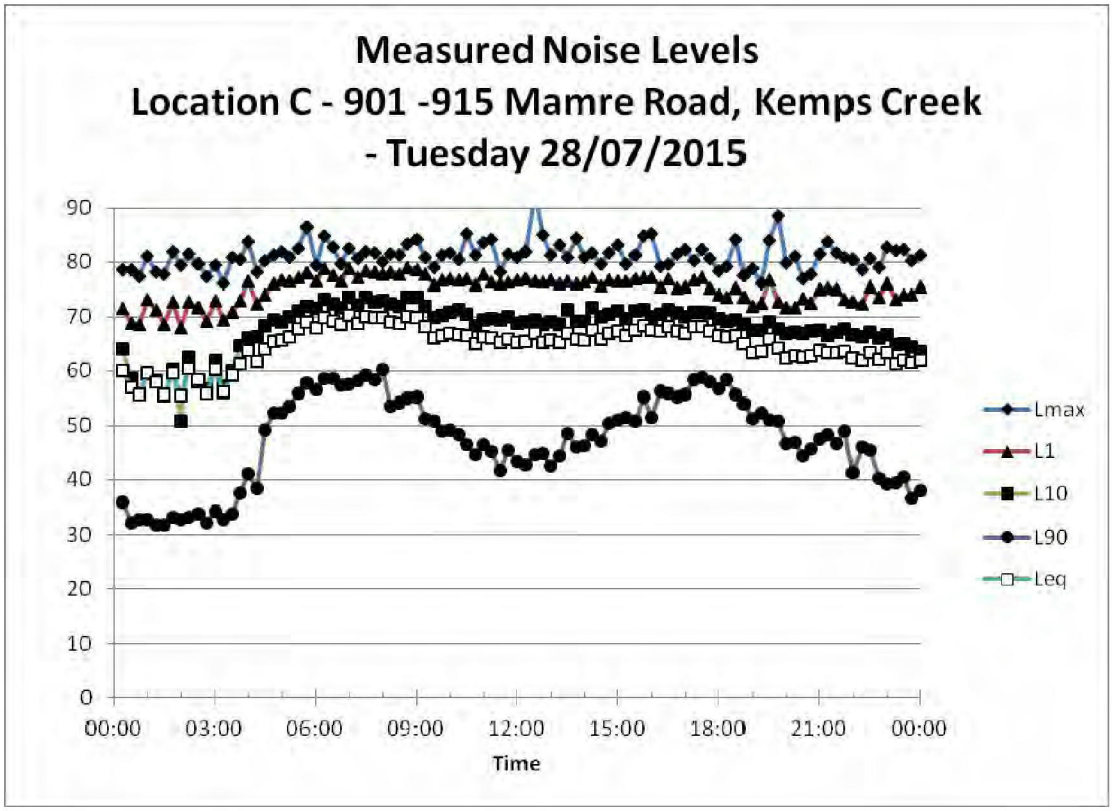


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Attachment 3: Air Quality Impact Assessment

Document Set ID: 7088845
Version: 1, Version Date: 23/03/2016

AIR QUALITY IMPACT ASSESSMENT
FOR
J M PRODUCE
901-915 MAMRE ROAD, KEMPS CREEK

Prepared for: J M Produce
Olathree Pty Ltd

Prepared by: Katie Trahair, Environmental Scientist
R T Benbow, Principal Consultant

Report No: 158024_Air_Rev2
January 2016
(Released: 18 January 2016)

Benbow
ENVIRONMENTAL

Engineering a Sustainable Future for Our Environment

Head Office: 13 Daking Street North Parramatta NSW 2151 AUSTRALIA
Tel: 61 2 9890 5099 Fax: 61 2 9890 5399
Email: admin@benbowenviro.com.au
Visit our website: www.benbowenviro.com.au

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Version: 1, Version Date: 23/03/2016

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Version: 1, Version Date: 23/03/2016

DOCUMENT CONTROL

Prepared by:	Position:	Signature:	Date:
Katie Trahair	Environmental Scientist		18 January 2016

Reviewed by:	Position:	Signature:	Date:
R T Benbow	Principal Consultant		18 January 2016

Approved by:	Position:	Signature:	Date:
R T Benbow	Principal Consultant		18 January 2016

DOCUMENT REVISION RECORD

Revision	Date	Description	Checked	Approved
1	8-07-2015	Draft / Rev 1	R T Benbow	R T Benbow
2	18-01-2016	Final / Rev 2	R T Benbow	R T Benbow

DOCUMENT DISTRIBUTION

Revision	Issue Date	Issued To	Issued By
1	8-07-2015	J M Produce	Benbow Environmental
2	18-01-2016	J M Produce	Benbow Environmental

Benbow ENVIRONMENTAL

Head Office:
13 Daking Street North Parramatta NSW 2151 Australia
P.O. Box 687 Parramatta NSW 2124 Australia
Telephone: +61 2 9890 5099 Facsimile: +61 2 9890 5399
E-mail: admin@benbowenviro.com.au
Visit our Website at www.benbowenviro.com.au

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EXECUTIVE SUMMARY

Benbow Environmental has been engaged by Tony Mercieca to undertake an air quality impact assessment (AQIA) for the proposed relocation of animal food production at 901-915 Mamre Road, Kemps Creek NSW. The purpose of this assessment is to determine the proposed developments contribution to dust and particulate emission levels at the nearest sensitive receptors. Emissions of phosphine gas associated with onsite fumigation activities have also been assessed. It also allows for identification of environmental safeguards that may be required.

This AQIA has been prepared in accordance with the NSW EPA guidelines, *"Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales"* (August 2005).

These guidelines provide the methodology in conducting the assessment, including the selection of meteorological data, the appropriate calculation of emission rates, dispersion modelling, and the assessment criteria for use in identifying unacceptable dust impacts.

Dust, particulate and phosphine gas emissions were determined to be the potential sources of air emissions to be released on site.

Diesel engine emissions are very limited and do not require assessment.

The new generation air dispersion model, AERMOD was used for the prediction of off-site impacts associated with the air emissions from the proposed operations. Using this software program, it has been determined that the predicted impacts are well below the criteria derived from the EPA guidelines.

A summary of the findings of the air quality impact prediction results and recommendations are provided as follows:

- With the majority of processing operations occurring within a building, will have industry best practice controls in place to prevent dust and particulate emissions from causing interference to adjoining properties and residential receptors.

- Handling and application of fumigants will have industry best practice controls in place to prevent phosphine gas emissions from causing harm to human health at residential receptors.

This assessment has demonstrated that the site as proposed will have adequate safeguards in place to achieve satisfactory compliance with air quality guidelines.

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1. INTRODUCTION

Benbow Environmental has been engaged by Tony Mercieca of JM Produce to undertake an air quality impact assessment for the relocation of an animal feed production business to be located at 901-915 Mamre Road, Kemps Creek NSW 2178, pictured in Figure 1-1. The proponent currently operates the facility at 100 Erskine Park Road, Erskine Park 2759. This assessment determines the predicted dust and particulate matter contribution from the proposed site operations and potential exposure concentrations of phosphine gas.

This AQIA has been prepared in accordance with the NSW EPA guidelines *"Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales"* (August 2005).

The AQIA uses the existing air quality data to establish the background levels of dust and particulates.

This data is used to combine with the predicted levels from the proposed operations of the animal feed production. In this manner, a cumulative air quality impact assessment is made.

The proposed animal feed production facility would install a number of best practice air emission controls that are discussed in this report and in the Environmental Hazard Analysis report.

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Figure 1-1: Site Location



Source:

↑N Not to scale	LEGEND: Site	Benbow Environmental 13 Daking Street, North Parramatta NSW 2151

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2. SITE DETAILS & EXISTING ACTIVITIES

This section presents the site location, description of the site and surrounds and a description of the existing development on the site.

2.1 SITE LOCATION

The site is situated in the south-western end of the property located at 901-915 Mamre Road, Kemps Creek NSW, also known as Lot 33, DP 258414. The site location is visually indicated in Figure 1-1 and Figure 2-1. Figure 2-3 indicates the proposed site layout.

Figure 2-1: Site Location, Lot 33, DP 258414



Source: SIX Maps

↑N Not to scale	LEGEND: Site	Benbow Environmental 13 Daking Street, North Parramatta NSW 2151

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Figure 2-2: Aerial View of Site Indicating Proposed Location of Animal Food Production Facility

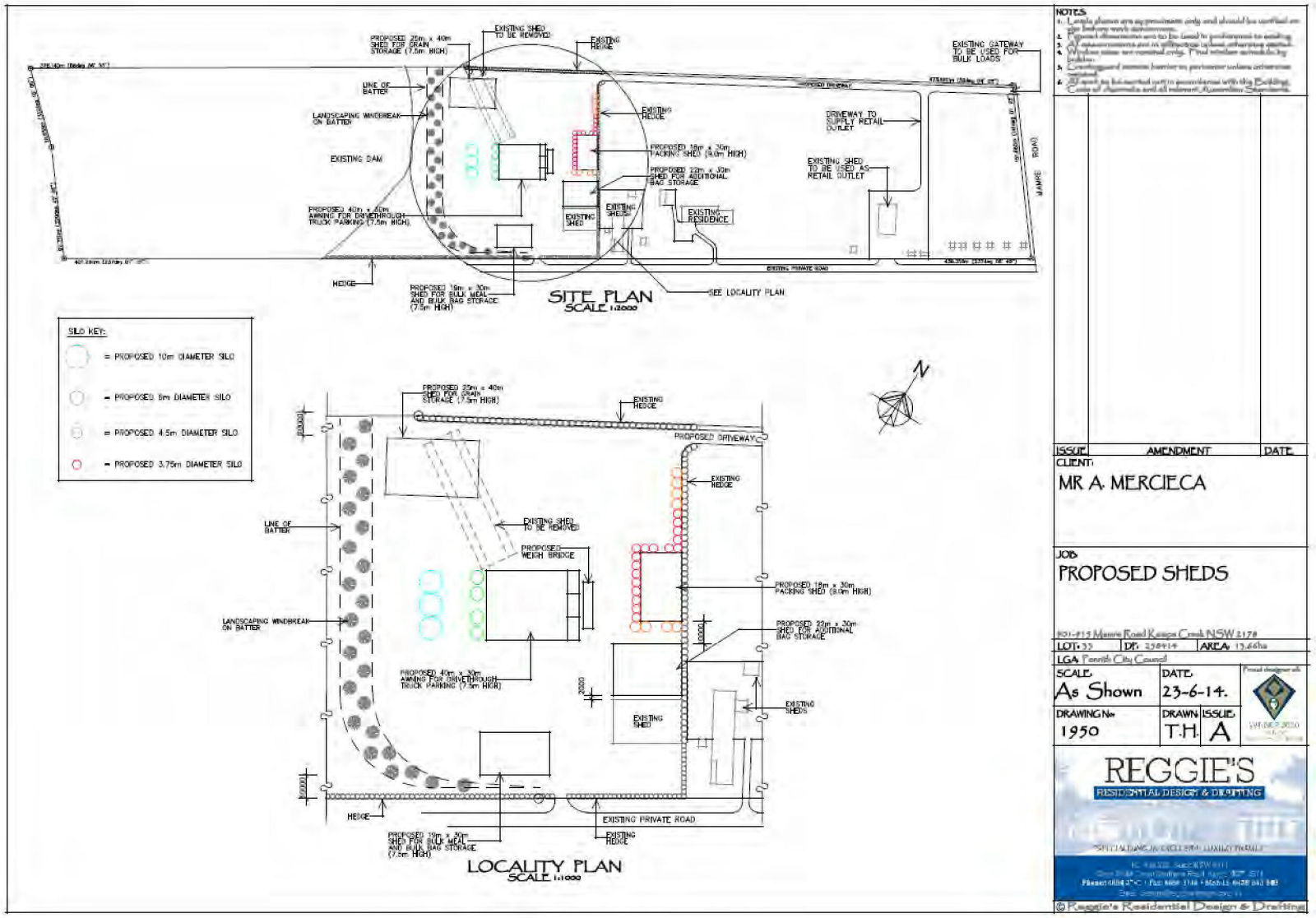


Source: SIX Maps

↑N Not to scale	LEGEND: Site	Benbow Environmental 13 Daking Street, North Parramatta NSW 2151

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Figure 2-3: Site Plan



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2.2 DESCRIPTION OF THE SURROUNDING AREA

Majority of the surrounding land use of the site is residential and farmlands. The DP 258414 Lot 33 encompasses part of Kemps Creek to the south-west. Only the south-western end of the property is proposed to be used for the animal feed production facility. The existing residential property is to remain in its current location. The north-eastern portion of DP 258414 Lot 33 is currently seeking approval as use for a demolition and construction waste recovery facility.

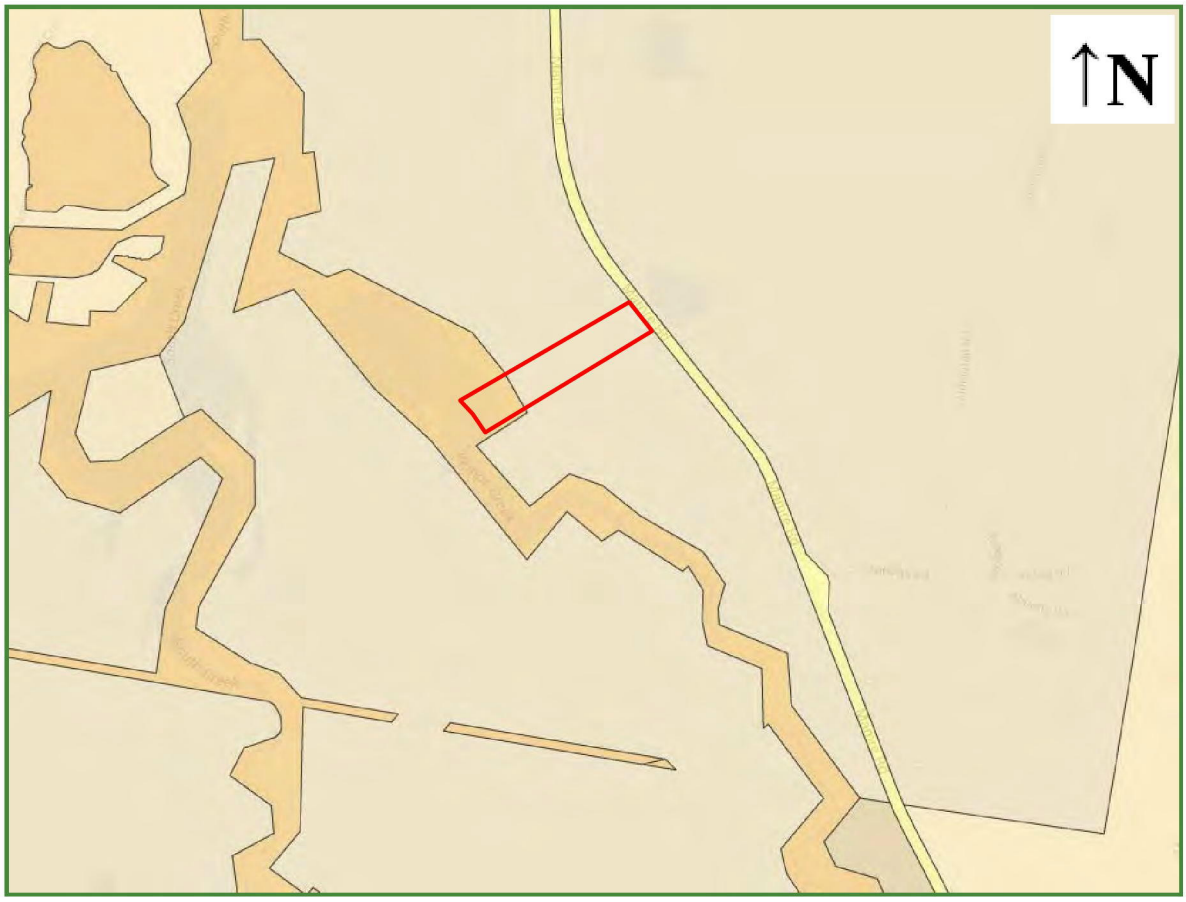
2.3 LAND USE OF THE PROPOSED SITE LOCATION

The land is located at 901-915 Mamre Road, Kemps Creek NSW, also known as Lot 33, DP 258414. The site is located in the Penrith City Council Local Government Area.

The site is located within land zoned "RU2 – Rural Landscape" as shown in Figure 2-4. A portion of the western end of the site is zoned *E2 Environmental Conservation*.

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Figure 2-4: Penrith City Council Planning Information



LEGEND:

B1 Neighbourhood Centre	R4 High Density Residential
B2 Local Centre	R5 Large Lot Residential
B3 Commercial Core	RE1 Public Recreation
B4 Mixed Use	RE2 Private Recreation
B5 Business Development	RU1 Primary Production
B6 Enterprise Corridor	RU2 Rural Landscape
B7 Business Park	RU3 Forestry
B8 Metropolitan Centre	RU4 Primary Production Small Lots
E1 National Parks and Nature Reserves	RU5 Village
E2 Environmental Conservation	RU6 Transition
E3 Environmental Management	SP1 Special Activities
E4 Environmental Living	SP2 Infrastructure
IN1 General Industrial	SP3 Tourist
IN2 Light Industrial	W1 Natural Waterways
IN3 Heavy Industrial	W2 Recreational Waterways
IN4 Working Waterfront	W3 Working Waterways
R1 General Residential	UL Unzoned Land
R2 Low Density Residential	DM Deferred Matter
R3 Medium Density Residential	

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2.4 NEAREST SENSITIVE RECEPTORS

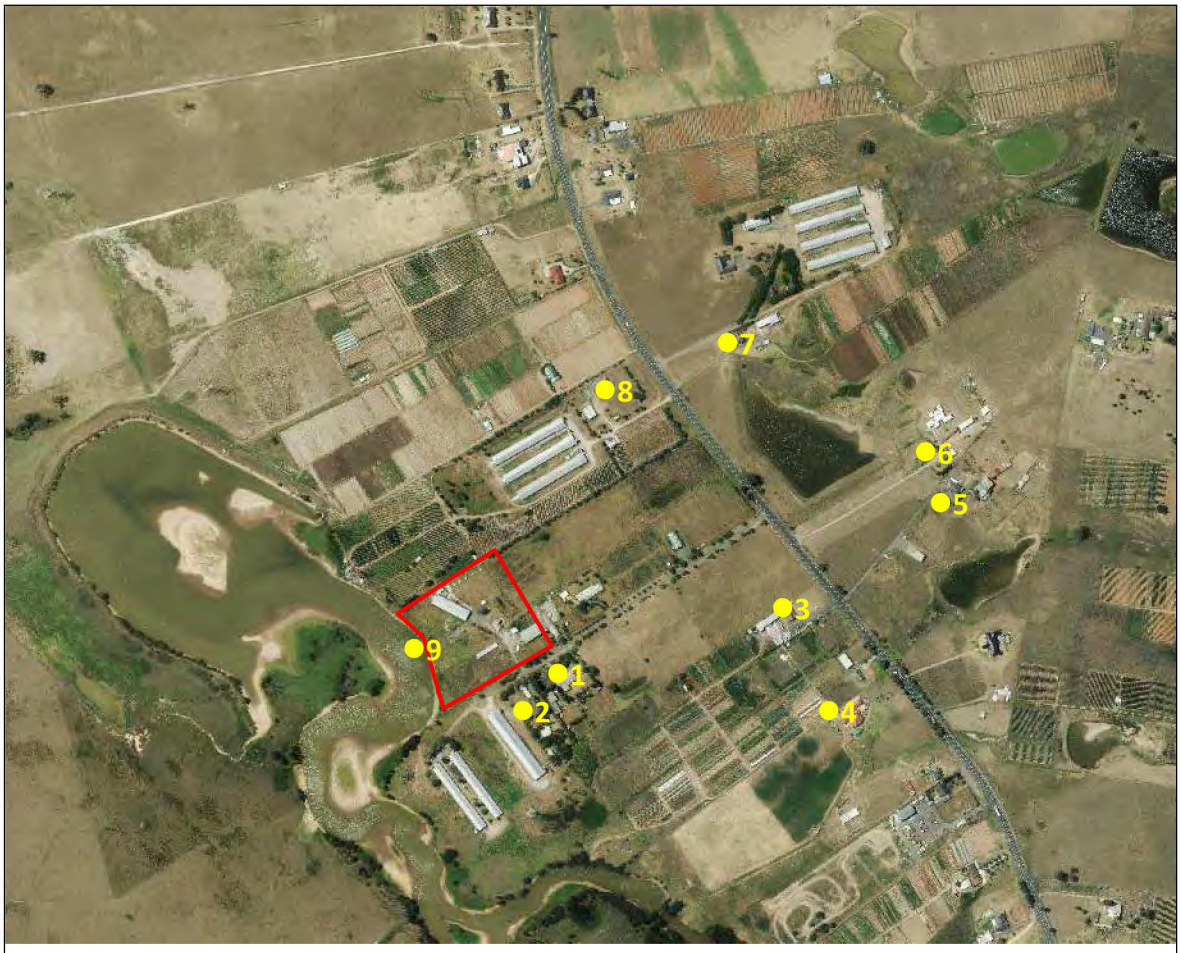
The following table presents the details of the nearest sensitive receptors considered in the assessment. Location of receptors is shown in Figure 2-5.

Table 2-1: Nearest Sensitive Receptor Details

Receptor ID	Address	Direction from Site	Approximate distance to site boundary (m)	Type of Receptor
1	919-929 Mamre Rd, Kemps Creek	SE	50	Residential
2	917 Mamre Rd, Kemps Creek	S	96	Commercial
3	931 Mamre Rd, Kemps Creek	E	373	Residential
4	949-965 Mamre Rd, Kemps Creek	E	463	Residential
5	930-966 Mamre Rd, Kemps Creek	ENE	691	Residential
6	904-928 Mamre Rd, Kemps Creek	ENE	698	Residential
7	884-902 Mamre Rd, Kemps Creek	NE	525	Residential
8	885-869 Mamre Rd, Kemps Creek	NE	325	Residential
9	901-915 Mamre Rd, Kemps Creek	W	Within Lot Boundary	Waterway

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Figure 2-5: Location of Receptors



Source: SIX Maps

N Not to scale	LEGEND: Site Receptor	Benbow Environmental 13 Daking Street, North Parramatta NSW 2151

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3. METEOROLOGY AND LOCAL AIR QUALITY

3.1 PROJECT SITE REPRESENTATIVE METEOROLOGICAL DATA

The nearest weather monitoring station within proximity to the subject site is the Horsley Park AWS operated by the Bureau of Meteorology. This monitoring station is located approximately 7 kilometres away to the east of the subject site and was considered to be the most appropriate due to the vicinity, completeness and data available to carry out dispersion modelling.

Weather data for the year 2013 was obtained. For the purpose of inclusion in the air dispersion model a meteorological file using 2013 as the base year was generated by Air Quality Professionals Pty Ltd as a site-representative meteorological file for use in the assessment.

3.2 WIND ROSE PLOTS

Wind rose plots show the direction from which the wind is coming with triangles known as "petals". The petals of the plots in Table 3-1 summarise wind direction data into 8 compass directions ie. north, north-east, east, south-east, etc.

The length of the triangles, or "petals", indicates the frequency that the wind blows from the direction presented. Longer petals for a given direction indicate a higher frequency of wind from that direction. Each petal is divided into segments, with each segment representing one of the six wind speed classes. Thus, the segments of a petal show what proportion of wind for a given direction falls into each class.

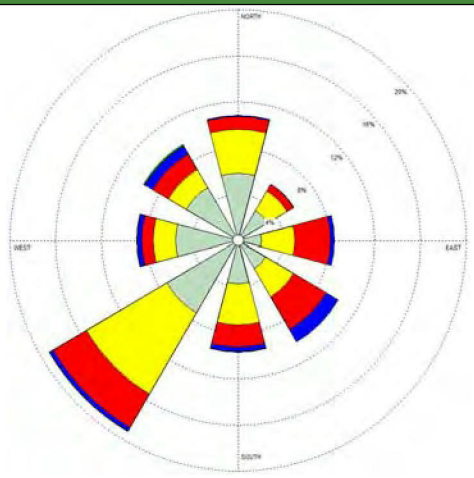
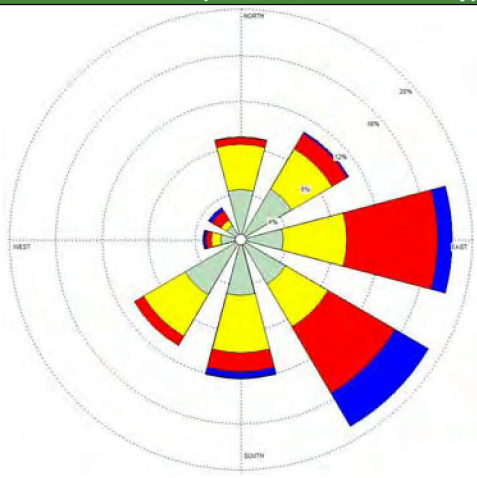
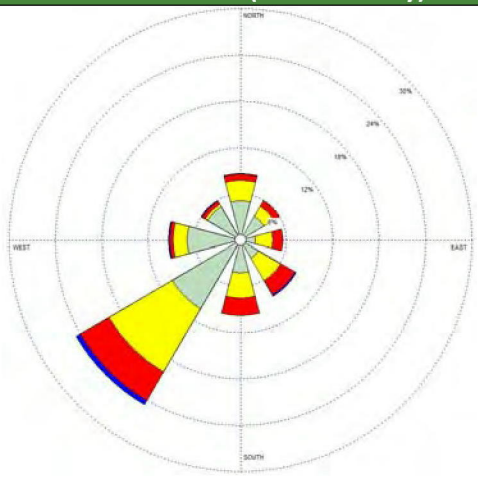
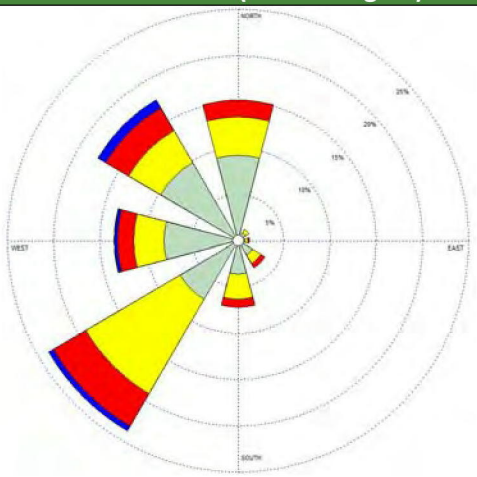
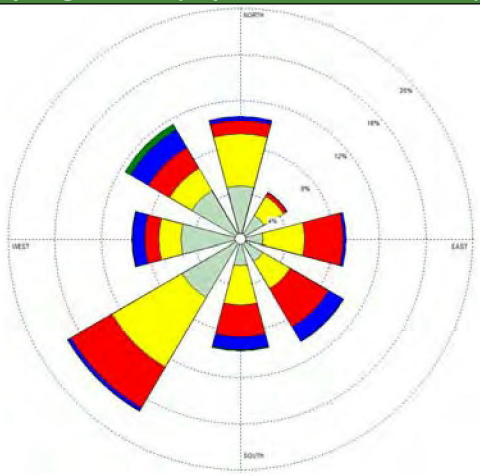
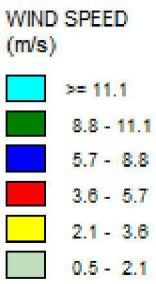
The proportion of time for which wind speed is equal to or less than 0.5 m/s, when speed is negligible, is referred to as calm hours or "calms". Calms are not shown on a wind rose as they have no direction, but the proportion of time that they make up for the period under consideration is noted under each wind rose.

The concentric circles in each wind rose are the axes that denote wind frequencies. In comparing the plots it should be noted that the axis varies between wind roses, although all wind roses are the same size. The frequencies shown in the first quadrant (top-left quarter) of each wind rose are stated beneath the wind rose.

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3.3 LOCAL WIND TRENDS

Table 3-1: Wind Rose Plots for Horsley Park Meteorological File (2013)

All Seasons	Summer Season (December – February)
	
Average Wind Speed: 2.16 m/s Calms Frequency: 17.63%	Average Wind Speed: 2.48 m/s Calms Frequency: 14.06%
Autumn Season (March – May)	**Winter Season (June – August)**
	
Average Wind Speed: 1.79 m/s Calms Frequency: 21.87 %	Average Wind Speed: 1.93 m/s Calms Frequency: 16.86%
Spring Season (September – November)	**Legend**
	
Average Wind Speed: 2.46 m/s Calms Frequency: 17.54 %	

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3.4 TERRAIN AND STRUCTURAL EFFECTS ON DISPERSION

The meteorological condition known as katabatic flow (or katabatic drift) is often identified as the condition under which maximum environmental impacts from primarily ground-based sources are likely to occur. Katabatic flow is simply the movement of cold air down a slope, generally under stable atmospheric conditions. Under such circumstances, dispersion of airborne pollutants is generally slow and the associated impacts can reach their peak.

Katabatic flow is unlikely to affect any emissions from the subject site because katabatic flow only affects receptors that are located at a lower terrain elevation compared to the site's elevation. As such, no wind direction-specific katabatic flow would be expected to occur.

3.5 LOCAL AIR QUALITY

Background air quality parameters were obtained from the NSW EPA ambient air monitoring station located at Bringelly, NSW. The relevant assessable pollutant parameters available from the monitoring station are PM_{10} 24-hour and monthly average values for 2014, which have been provided in Table 3-2 below.

Table 3-2: Referenced Background PM_{10} Data – NSW EPA Monitoring Station at Bringelly

PM_{10}	Value Recorded Within Each Month ($\mu g/m^3$)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Av.
Bringelly, NSW													
24-Hour Maximum	50.4	39.1	28.8	34.7	59.1	34.8	36.0	24.7	25.0	45.4	38.4	33.4	**37.5**
Monthly Average	17.8	20.3	13.6	15.1	20.3	12.4	15.8	12.5	12.4	20.1	21.4	17.9	**16.6**

Given the data provided above, the most applicable PM_{10} background concentrations are 37.5 $\mu g/m^3$ under a 24-hour averaging period and 16.6 $\mu g/m^3$ under an annual averaging period.

Using the worst-case particle size distribution data provided by the U.S. Environmental Protection Agency (USEPA) AP 42 Emissions Database, a PM_{10}-to-TSP ratio of 0.51 was used to estimate the TSP background concentration level of 32.5 $\mu g/m^3$ for an annual averaging period.

There is no background data available at the above weather station for dust deposition. Dust deposition background levels have therefore been conservatively assumed to be 2 g/m^2/month.

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4. AIR QUALITY CRITERIA AND GUIDELINES

4.1 PROTECTION OF THE ENVIRONMENT OPERATIONS ACT 1997

The *Protection of the Environment Operations Act 1997* (POEO Act) applies the following definitions relating to air pollution:

> ***"Air pollution"*** *means the emission into the air of any air impurity.*
>
> *While "air impurity" includes smoke, dust (including fly ash), cinders, solid particles of any kind, gases, fumes, mists odours, and radioactive substances*

The following sections of this Act have most relevance to the site:

- *Section 124 Operation of Plant - other than domestic plant*

  The occupier of any premises who operates any plant in or on those premises in such a manner as to cause air pollution from those premises is guilty of an offence if the air pollution so caused, or any part of the air pollution so caused, is caused by the occupier's failure:

  (a) to maintain the plant in an efficient condition, or

  (b) to operate the plant in a proper and efficient manner.

- *Section126 Dealing with Materials*

  (1) The occupier of any premises who deals with materials in or on those premises in such a manner as to cause air pollution from those premises is guilty of an offence if the air pollution so caused, or any part of the air pollution so caused, is caused by the occupiers failure to deal with those materials in a proper and efficient manner.

  (2) In this section:

  deal *with materials means process, handle, move, store or dispose of the materials.*

  Materials *includes raw materials, materials in the process of manufacture, manufactured materials, by-products or waste materials.*

- *Section 127 Proof of causing pollution*

  To prove that air pollution was caused from premises within the meaning of Sections 124 – 126, it is sufficient to prove that air pollution was caused on the premises, unless the defendant satisfies the court that the air pollution did not cause air pollution outside the premises.

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- *Section 128 Standards of air impurities not to be exceeded*

  (1) The occupier of any premises must not carry on any activity, or operate any plant, in or on the premises in such a manner as to cause or permit the emission at any point specified in or determined in accordance with the regulations of air impurities in excess of:

  (a) The standard of concentration and the rate, or

  (b) The standard of concentration or the rate.

  Prescribed by the regulations in respect of any such activity or any such plant.

  (2) Where neither such a standard nor rate has been so prescribed, the occupier of any premises must carry on any activity, or operate any plant, in or on the premises by such practicable means as may be necessary to prevent or minimise air pollution.

The proposed development is required to comply with this Act.

4.2 PROTECTION OF ENVIRONMENT OPERATIONS (CLEAN AIR) REGULATION 2010

In accordance with Part 5 of the *Protection of the Environment Operations (Clean Air) Regulation 2010* (herein referred to as the Clean Air Regulation 2010), the activities and facility would belong to Group C (Standards for non-scheduled premises) as it is to be *commenced to be carried on, or to operate, on or after 1 September 2005 as a result of development consent granted pursuant to a development application made on or after 1 September 2005*.

Schedule 6 of the Clean Air Regulation 2010 provides standards of concentration for non-scheduled premises for general activities and facilities.

Solid Particles (Group C) Concentration: 100 mg/m^3

The proposed development is required to comply with this Regulation.

4.3 NSW ENVIRONMENT PROTECTION AUTHORITY GUIDELINES

The document, "*Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales*" (AMMAAP) published by the NSW Environment Protection Authority (NSW EPA) provides guidance on methodology and thresholds that are to be used for the air impact assessment of a proposed development. This air impact assessment has been conducted in accordance with this guideline, and assessable pollutants (along with their corresponding limits) are summarised in Table 4-1.

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Table 4-1: Relevant Limits from the Approved Methods for Modelling and Assessment of Air Pollutants in New South Wales (2005)

Pollutant	Averaging Period	Concentration		Source
		pphm	µg/m^3	
PM_{10}	24 hours	-	50	NEPC (1998)
	Annual	-	30	EPA (1998)
Total Suspended Particulates (TSP)	Annual	-	90	NHMRC (1996)
		g/m^2/month[a]	**g/m^2/month[b]**	
Deposited Dust	Annual	2	4	NERDDC (1988)

[a] Maximum increase in deposited dust level.

[b] Maximum total deposited dust level.

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5. DESCRIPTION OF THE PROPOSAL

5.1 PROCESS DESCRIPTION

Animal feed is to be manufactured at the site, similar to the existing activities at the Erskine Park site. This is undertaken through the following activities:

- Receipt of grain and other raw materials;
- Cleaning and grading;
- Milling;
- Mixing;
- Bagging and weighing;
- Storage; and
- Dispatch of finished products.

A variety of raw materials including grains and pulses are received and stored in silos and bulka bags in sheds. Augers are used to unload bulk deliveries received.

Materials are transported around site via floveyors.

TQLZ grain separators are used for cleaning and grading materials.

Grain and pulses are crushed using a hammer mill and roller mill.

Finished products are stored in 20kg bags, 25kg bags and bulka bags within sheds, until received by customers and freight companies. Vehicles collecting packaged products can include utes, light rigid, medium rigid, heavy rigid and semi-trailers. Based on existing customer demand, the proposed retail outlet at the front of the site would expect to receive around twenty cars per day.

Vehicle movement is variable. During busy periods up to half a dozen unload/loads of grain meal from bulk semi or b double trucks is expected while other days may have no bulk movements. The site has a maximum capacity for 2 trucks to unload at any given time. Unloading takes approximately 1hr.

5.1.1 Raw Materials & Storage

A range of grains and pulses are processed on site including:

- Wheat;
- Corn;
- Peas; and
- Barley.

Raw materials are stored in silos and in bulka bags in sheds. Quantities of each individual grain/pulse stored vary based on demand. At any given time approximately 1,800 tonnes of corn, 500 tonnes of wheat and 100 tonnes of each other grain/pulse are stored on site.

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Silo dimensions are given below in Table 5-1, while the location of silos is shown in Figure 2-3.

Table 5-1: Silo Dimensions

Diameter (m)	Height (m)	Approximate Volume (m^3)	Diameter of silo opening (mm)	Number of silos on site
10.6	12.78	1127.80	600	3
6.4	12.29	395.37	600	4
4.5	8.5	135.19	600	8
3.7	8.5	91.39	600	17

5.1.2 Finished Goods

Finished products are stored in 20kg bags, 25kg bags and bulka bags within the sheds. Approximately 20,000 – 29,000 tonnes of finished product are produced annually.

5.1.3 Hours of Operation

The facility operates during the following hours:

Operating Hours: Monday to Friday: 7:00 am to 5:00 pm
Saturday: 7:00am to 3:00pm
Sunday: Closed

5.2 Air Quality Impact Mitigation and Monitoring Measures

The air quality impact mitigation measures are summarised below.

- Mikropul baghouse dust extractor connected to:
  - External floveyors;
  - Internal floveyors;
  - 3xTQLZ 200x150 grain separators;
  - 2xTQLZ 150x100 grain separators;
  - Hammer mill;
  - Roller mill;
  - Mixer;
  - Bagging bin; and
  - Bag filling and weighing machine.
- Spray sealing of onsite roads.
- Use of water sprays or dust suppression agent applied to reduce dust emissions when needed.
- Auger transfer points fully enclosed.
- Storage of raw materials in Silo

5.2.1 Emissions from Construction

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5.2.1.1 Construction Emission Sources

There are several sources of dust emission associated with the construction phase of the proposal.

Table 5-2: Construction phase emission sources and emission factors

Source	PM10 emission factors	TSP emission factors
Land clearing with bulldozer	0.2132 kg/hr	1.0439 kg/hr
Break up of existing shed concrete slab	0.0012 kg/t	0.0027 kg/t
Excavation works	0.012 kg/t	0.025 kg/t
Excavator wheel generated	1.0364 kg/vkt	3.3855 kg/vkt
Truck transport of excavated material	1.0977 kg/vkt	3.5859 kg/vkt
Front End Loader	0.012 kg/t	0.025 kg/t
Grader	0.085 kg/vkt	0.1901 kg/vkt
Concrete Mixer Trucks	1.0977 kg/vkt	3.5859 kg/vkt
Tipper Trucks	1.0977 kg/vkt	3.5859 kg/vkt

5.2.1.2 Construction Modelling Assumptions

Assumptions used in construction phase modelling:

- Silt content of the soil is 12%;
- Moisture content of soil 20%;
- Land clearing takes 3 days;
- Volume of existing concrete slab to be removed is 324m^3, takes 5 days;
- Total distance travelled by grader is 9.3km at an average speed of 5km/hr for 7 days;
- Total distance travelled by 22ton excavator is 1.5km, excavation takes 5 days;
- Earth works with the front end loader takes 7 days;
- Total distance travelled by 25ton cement mixer is 1.5km over 25 days;
- Total distance travelled by 25ton trucks for the transport of excavated materials is 1.5km, over 5 days;
- Total distance travelled by 25ton tipper trucks is 1.5km, over 25 days;
- A reduction factor of 0.26 is applied for the use of water sprays 'at various intervals to disturbed areas within construction site'.

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5.2.1.3 Construction Emission Inventory

Table 5-3: Construction phase emission inventory

Source	PM10 emission rate (g/s)	TSP emission rate (g/s)
Land clearing with bulldozer	0.00247	0.01208
Break up of existing shed concrete slab	0.00270	0.00608
Excavation works	0.02700	0.05625
Excavator wheel generated	0.00281	0.00917
Truck transport of excavated material	0.00297	0.00971
Front End Loader	0.00501	0.01045
Grader	0.00102	0.00228
Concrete Mixer Trucks	0.00059	0.00194
Tipper Trucks	0.00059	0.00194

5.2.1.4 Construction Modelling Approach

The above construction dust sources have been grouped into 4 phases:

- Land Clearing with bulldozer – 3 days.
- Excavation (break up of concrete, excavation works, excavator wheel generated emissions and truck transport of excavated materials) – 5 days.
- Earth works (grading and use of front end loader) – 7 days.
- Shed construction (concrete mixer trucks and tipper trucks) – 25 days.

Meteorological data of high wind and dry conditions was selected to stimulate worst-case scenario conditions for dust emissions.

5.2.1.5 Results of Construction Emission Modelling

The following tables give the maximum concentrations of dust at receptors using a 24 hour averaging period over the corresponding number of days associated with the various construction phases.

Table 5-4: Estimated Impact Results for Land clearing – 3 days (24 Hour averaging period)

Receptors	PM10 Impact (µg/m^3)	TSP Impact (µg/m^3)
R1	0.34359	1.68040
R2	0.38919	1.90342
R3	0.16799	0.82157
R4	0.06497	0.31775
R5	0.08043	0.39338
R6	0.09974	0.48781
R7	0.27163	1.32847
R8	0.30402	1.48687
R9	1.26512	6.18729

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Table 5-5: Estimated Impact Results for Excavation – 5 days (24 Hour averaging period)

Receptors	PM10 Impact (µg/m^3)	TSP Impact (µg/m^3)
R1	0.64997	10.09644
R2	1.26274	12.50328
R3	1.16854	7.39737
R4	0.46746	2.90663
R5	0.73992	4.18152
R6	1.01144	5.47376
R7	2.55182	14.09620
R8	2.53560	14.77950
R9	4.30993	41.12355

Table 5-6: Estimated Impact Results for Earth Works – 7 days (24 Hour averaging period)

Receptors	PM10 Impact (µg/m^3)	TSP Impact (µg/m^3)
R1	0.79600	1.66599
R2	0.94821	2.00001
R3	0.51142	1.09227
R4	0.23499	0.50282
R5	0.28249	0.60628
R6	0.35798	0.76975
R7	0.92965	1.99688
R8	0.98520	2.11109
R9	3.12917	6.59934

Table 5-7: Estimated Impact Results for Shed Construction – 25 days (24 Hour averaging period)

Receptors	PM10 Impact (µg/m^3)	TSP Impact (µg/m^3)
R1	0.04682	0.15395
R2	0.15648	0.51454
R3	0.24914	0.81921
R4	0.09950	0.32715
R5	0.18395	0.60485
R6	0.19468	0.64015
R7	0.49747	1.63576
R8	0.45162	1.48500
R9	0.48807	1.60483

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5.2.1.6 Discussion of Construction Modelling Results

While considering the time frame for each phase, the modelled impact of PM10 and TSP emissions from the various phases associated with construction show compliance with the air quality guidelines at all receivers. However during the 'excavation' stage, greater use of water sprays is recommended to minimise potentially impact at receivers.

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6. EMISSIONS TO AIR

6.1 AIR EMISSION SOURCES

Air emission sources typical of an animal feed production business would exist at the site. These include dust and particulates (PM_{10}, total suspended particulates and deposited dust) and aluminium phosphide (used as a fumigant). However, controls would be put in place to ensure that industry best practice is upheld. These controls are considered in this assessment.

Dust emission sources associated with animal feed production are listed below.

- Wheel-generated dust emission from traffic movements on spray-sealed surfaces.
- Delivery of raw materials / grain.
- Transfer of grain from truck to silo via auger.
- Internal transfer and handling of grain.
- Grain cleaner / grading sieve.
- Grain processing with hammer mill.
- Grain processing with roller mill.
- Mixer.
- Feed shipping.

The dust collector outlet, of diameter 600mm, would be located along the north-west wall of shed 3, at a height of 8.5m above ground level.

6.2 AIR EMISSION FACTORS

The National Pollutant Inventory (NPI) Emission Estimation Technique Manual for Animal and Bird Feed Manufacture (1999) Table 4 uses emission factors from the USEPA AP42 (1998). The latest edition, USEPA AP 42, 5th Edition, Volume I, Chapter 9: Food and Agricultural Industries, Section 9.9.1 Grain Elevators & Processes Table 9.9.1-1 Particulate emission factors for grain elevators and Table 9.9.1-2 Particulate emission factors for grain processing facilities 'Animal Feed Mills' (2003) has been used to derive the emission factors below in Table 6-1. Convert Lb/tonne to kg/Tonne.

Table 6-1: Emission Factors for Animal Feed Mills

Emission Source	PM10 Emission Factor (kg/tonne of grain handled or processed)	TSP Emission Factor (kg/tonne of grain handled or processed)
Hammer Mill (Cyclone)	0.015*	0.030
Roller Mill (Flacker)	0.034*	0.68
Mixer	ND	ND
Grain Cleaner / Grading Sieve	0.009	0.034
Handling / Auger/ Conveyor / Distributor /Floveyors	0.015	0.028
Grain Receiving	0.001	0.008
Feed Shipping	0.0004	0.0015

ND – No Data Available, while identified as a potential source of emissions, mixing operations were not considered in this assessment.
*In accordance with USEPA (2003) where PM10 test data was not available, PM10 emission factors estimated by taking 50% of TSP emission factors.

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The generalised particle size distribution for grain processing from USEPA's AP 42 database (Table 6-2) was used to determine the mass fraction per particle size. This ratio was used as an input for the modelling of dust deposition.

Table 6-2: USEPA AP-42 Generalised Particle Size Distribution for Grain Processing

Particle Size (µm)	Cumulative % ≤ Stated Size (Uncontrolled)	Minimum Value	Maximum Value	Standard Deviation
1.0	8	-	-	-
2.0	18	-	-	-
2.5	23	17	34	9
3.0	27	-	-	-
4.0	34	-	-	-
5.0	40	-	-	-
6.0	43	35	48	7
10.0	61	56	65	5

Note: Only values of 2.5 µm, 6.0 µm, and 10 µm were observed. The others were calculated, and thus no statistical parameters are given.

6.3 REDUCTION FACTORS

The following reduction factors were utilised in this assessment.

Table 6-3: Dust Controls and Associated Reduction Factors

Control	Efficiency	Reduction Factor
Dust Extractor[1]	99%	0.01
Spray Sealing of Ground Surface[2]	84%	0.16

[1]Mikropul (equipment manufacturer)
[2]WRAP Fugitive Dust Handbook, 2006

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6.4 EMISSION RATES

The emission rates were estimated by multiplying the emission factors previously discussed by the quantity of grain handled at the relevant activities for the corresponding activity period of time. Appropriate reduction factors were then applied.

Emission factors for wheel generated emissions on unpaved roads were calculated using the following formula.

$$EF_{(kg/VKT)} = \frac{0.4536}{1.6093} \times k \times \left(\frac{s_{(\%)}}{12}\right)^{a} \times \left(\frac{W_{(t)}}{3}\right)^{b}$$

Where:

k_{TSP}	= 4.9 for total suspended particles
$k_{PM_{10}}$	= 1.5 for PM_{10}
$s_{(\%)}$	= silt content of material (%)
$W_{(t)}$	= vehicle mass (t)
a_{TSP}	= 0.7 (empirical constant)
$a_{PM_{10}}$	= 0.9 (empirical constant)
b	= 0.45 (empirical constant)

The emission factors for wheel generated emissions on unpaved roads in Table 6-4 were calculated using assumptions listed in Section 6.5.

Table 6-4: Calculated Emission Factors for Wheel Generated Emissions on Unpaved Roads

Emission Source	PM10 Emission Factor (kg/vkt)	TSP Emission Factor (kg/vkt)
Wheel Generated on Unpaved Roads	1.32533	4.32942

*VKT – Vehicle kilometres travelled

The wheel generated emission rates were estimated by multiplying the above emission factors by the projected number of vehicles and distance travelled by each of these on unpaved roads on site. Appropriate reduction factors were then applied.

6.5 SUMMARY OF ASSUMPTIONS UTILISED

The following assumptions were used in the air dispersion modelling phase of the assessment:

- The total annual raw material usage of 29,000 tonnes was used to estimate emissions from the subject site;
- The emission rates were conservatively estimated for 6 full operational days per week;
- The roller mill and hammer mill each operate for 30hrs a week, an average of 5hrs per day;

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- There are always three TQLZ separators running during the working day, ie 3 each running for 10 hours per day;
- Floveyors run constantly throughout the 10hr working day;
- Emissions from the delivery of grain were calculated for 4 hours per day;
- Emission from the loading of trucks were calculated based on 4 hours per day;
- Assumed movement of 4 trucks in and out per day;
- Estimated distanced travelled per truck on site is 0.2km ;
- Using a worst-case scenario approach, all trucks entering site assumed to have a mass of 38tonnes;
- Silt content of ground surface calculated for sand i.e. 12%;
- A reduction factor of 0.01 was applied to the emissions of equipment connected to the dust extractor; and
- A reduction factor of 0.16 was applied to wheel generated emissions due to spray sealing of the sites ground surface.

The following conditions were also utilised as inputs into the model using the AERMOD modelling program:

- Emissions from equipment connected to the dust extractor was cumulatively modelled as a single point source from the dust extractor exhaust;
- Dust extractor exhaust being of 0.6m diameter and height 8.5m, with an exit velocity of 17m/s;
- A constant emission rate was assumed;
- Grain receiving and finished product shipping sources were modelled as volume sources within shed 5;
- Wheel generated emissions were modelled as an area source using a thin polygon as recommended by the US EPA 'User's Guide for the EPA Regulatory Model- Aermod' (2004) for line sources close to ground level; and
- Ambient air conditions were assumed for the modelling.

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6.6 AIR EMISSIONS INVENTORY

The air emission inventory is provided in the following tables; Table 6-5 for point sources, Table 6-6 for volumes sources and Table 6-7 for area sources.

Table 6-5: Air Emission Inventory for Point Source

Activities Modelled	Release Type	Height (m)	Diameter (m)	MGA 56 Coordinates		Emission Rate	
				X	Y	PM_{10} (g/s)	TSP (g/s)
Dust Extractor Exhaust	Point	8.50	0.60	294666.35	6252200.58	0.00015	0.00035

Table 6-6: Air Emission Inventory for Volume Sources

Activities Modelled	Release Type	Release Height (m)	Width (m)	MGA 56 Coordinates (SW Corner)		Emission Rate	
				X	Y	PM_{10} (g/s)	TSP (g/s)
Grain Receiving	Volume	3.75	30	294624.68	6252126.31	0.00027	0.00215
Feed Shipping	Volume					0.00011	0.00040

Table 6-7: Air Emission Inventory for Area Sources

Activities Modelled	Release Type	Release Height (m)	MGA 56 Coordinates		Emission Rate	
			X	Y	PM_{10} (g/s)	TSP (g/s)
Wheel Generated Emissions	Area	0	294608.51	6252223.89	0.00022	0.00072
			294608.56	6252223.97		
			294663.15	6252140.61		
			294663.16	6252140.68		

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7. AIR IMPACT MODELLING

7.1 DISPERSION MODEL

The new generation air dispersion model, AERMOD was used for the prediction of off-site impacts associated with the air emissions from the proposed operations. AERMOD uses air dispersion based on planetary boundary layer turbulence structure and scaling concepts. The AERMOD model replaced AUSPLUME as the air dispersion model accepted by the Victorian EPA in January 2014 and is a suitable model to use for this air assessment.

The model was used to estimate the concentration impacts on receptors for each hour of input meteorology. Within the AERMOD dispersion model technical options are available to simulate plume behaviour affected by the presence of buildings. Buildings on site and immediately surrounding the site were included in the modelling. Terrain was assumed to be flat.

Air emissions from the proposed development can be considered to have been adequately represented using the modelling program.

7.1.1 Meteorological Input Data

A year of meteorological data based on the year 2013, as described in Section 3, was obtained as input into AERMOD. Input Meteorological files were constructed by Air Quality Professionals Pty Ltd. AERMOD requires two types of input files: Surface Data File and Vertical Profile Data File. This ensured that sufficient meteorological data was available so as to guarantee that worst-case conditions were adequately included in the model predictions.

7.1.2 Building-Wake Effects

Building-wake effects occur when emissions from a source are hindered as they move from winds "washing" the emissions down to the nearest building structure. This phenomenon can enhance off-site dust impacts (depending on the location of the building structure, wind direction and the source).

Building-wake effects are considered in the air dispersion modelling phase of the assessment by representing all buildings and structures on site in the model.

7.1.3 Terrain Effects on Air Impacts through Katabatic Air Drainage

As previously mentioned, given the generally flat nature of the terrain elevation surrounding the site, minimal local katabatic air drainage effects are anticipated and would not be expected to significantly affect the air impact results at the surrounding residences or public recreation areas.

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7.2 MODELLING RESULTS

Table 7-1 to Table 7-4 provide the results of the air modelling for each identified receptor.

Table 7-1: Estimated Impact Results for PM_{10}, 24 hour Averaging Period

Receptors	Incremental Impact ($\mu g/m^3$)	Background Air Quality ($\mu g/m^3$)	Cumulative Impact ($\mu g/m^3$)	Limit ($\mu m/m^3$)	Pass (Yes/No)
R1	0.24953	37.5	37.74953	50	Yes
R2	0.36030		37.86030		Yes
R3	0.19769		37.69769		Yes
R4	0.09225		37.59225		Yes
R5	0.10722		37.60722		Yes
R6	0.09965		37.59965		Yes
R7	0.14265		37.64265		Yes
R8	0.19180		37.69180		Yes
R9	0.30911		37.80911		Yes

Table 7-2: Estimated Impact Results for PM_{10}, Annual Averaging Period

Receptors	Incremental Impact ($\mu g/m^3$)	Background Air Quality ($\mu g/m^3$)	Cumulative Impact ($\mu g/m^3$)	Limit ($\mu m/m^3$)	Pass (Yes/No)
R1	0.06277	16.6	16.66277	30	Yes
R2	0.06100		16.66100		Yes
R3	0.03080		16.63080		Yes
R4	0.01749		16.61749		Yes
R5	0.02150		16.62150		Yes
R6	0.02313		16.62313		Yes
R7	0.03765		16.63765		Yes
R8	0.03903		16.63903		Yes
R9	0.08087		16.68087		Yes

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Table 7-3: Estimated Impact Results for TSP, Annual Averaging Period

Receptors	Incremental Impact ($\mu g/m^3$)	Background Air Quality ($\mu g/m^3$)	Cumulative Impact ($\mu g/m^3$)	Limit ($\mu m/m^3$)	Pass (Yes/No)
R1	0.39477	32.5	32.89477	90	Yes
R2	0.37514		32.87514		Yes
R3	0.17007		32.67007		Yes
R4	0.09997		32.59997		Yes
R5	0.11728		32.61728		Yes
R6	0.12495		32.62495		Yes
R7	0.18680		32.68680		Yes
R8	0.19488		32.69488		Yes
R9	0.46968		32.96968		Yes

Table 7-4: Estimated Impact Results for Dust Deposition, 1 Year Averaging Period

Receptors	Incremental Impact (g/m^2/month)	Background Air Quality (g/m^2/month)	Cumulative Impact (g/m^2/month)	Limit (g/m^2/month)	Pass (Yes/No)
R1	0.00007	2	2.00007	4	Yes
R2	0.00009		2.00009		Yes
R3	0.00007		2.00007		Yes
R4	0.00003		2.00003		Yes
R5	0.00004		2.00004		Yes
R6	0.00005		2.00005		Yes
R7	0.00016		2.00016		Yes
R8	0.00020		2.00020		Yes
R9	0.00030		2.00030		Yes

7.3 Discussion of Modelling Results

The results show compliance with the air quality guidelines at all receivers. The modelled results show that there would be negligible contribution to the PM10 and total suspended particulates at these receivers.

Dust deposition which is indicative of nuisance dust also shows an insignificant contribution.

$PM_{2.5}$ results are not included as there is currently no requirement in the air quality guidelines.

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8. CHEMICALS & DANGEROUS GOODS

8.1 PHOSPHINE GAS

Fumitoxin tablets containing aluminium phosphide are used on site as a silo fumigant. It is listed as a class 6.1 'toxic substance' dangerous good, packing group II or III, UN3048.

Phosphine gas is liberated via the following reaction when in contact with atmospheric moisture:

$$AlP + 3H_2O \text{ ---> } Al(OH)_3 + PH_3$$

The molecular mass of phosphine gas is 33.99758 g/mol.

In addition to its toxic properties, the gas will corrode certain metals and may ignite spontaneously in air at concentrations above its lower flammable limit of 1.8% v/v (18,000 ppm).

8.2 CRITERIA

Phosphine gas is highly toxic not only to insects and burrowing pests but to humans, and other forms of animal life. The inhalation of phosphine gas presents a risk to human health. The American Conference of Governmental Industrial Hygienists (ACGIH) 'Threshold Limit Values for chemical substances and physical agents & Biological Exposure Indices' (2014) describes phosphine as causing upper respiratory tract irritation, gastrointestinal irritation, headache and central nervous system impair.

Safe Work Australia (2011) 'Workplace exposure standards for atmospheric contaminants' and ACGIH (2014) give the following exposure criteria:

Substance	TWA		STEL	
	ppm	mg/m^3	ppm	mg/m^3
Phosphine	0.3	0.42	1	1.4

Note: TWA - Time Weighted Average (exposure for 8 hours per day per 5 day period)
STEL - Short Term Exposure Limit (exposure over 15 minute period)

The TWA and STEL limits are concentrations to which persons may be exposed repeatedly without adverse health effects.

Note: Ppm and mg/m^3 can be converted using the following formula where 24.4 is the molar volume in litres at 25° Celcius and 101.3 kPa.

$$\text{Concentration in mg/m}^3 = \frac{\text{molecular weight x concentration in ppm}}{24.4}$$

In accordance with 'Guidance on the Interpretation of Workplace Exposure Standards for Airborne Contaminants' (2012) published by Safe Work Australia and 'Adjustment of Workplace Exposure Standards for Extended Work Shifts' (2013), Australian Institute of Occupational Hygienists, the TWA can be adjusted to better reflect the exposure time of an individual. While

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the 'Brief and Scala Model' is regarded as the most conservative adjustment method it cannot be applied to exposure periods of 24 hours per day. If an exposure period of 23 hours is then assumed, using the following formula, a TWA of 0.00913 is produced.

$$Adjusted\ Exposure\ standard\ (TWA) = \frac{8 \times (24 - h) \times Exposure\ standard\ (8hr\ TWA)}{16 \times h}$$

The 'OSHA Model' method is based on the assumption that the magnitude of the toxic response of an agent is a function of the concentration that reaches the site of action for that agent. For an exposure period of 24 hours per day, using the following formula, a TWA of 0.14 is calculated.

$$Adjusted\ Exposure\ Standard\ (TWA) = \frac{8 \times Exposure\ standard\ (8hr\ TWA)}{h}$$

Given the above, the most conservative TWA criteria of 0.00913 will be use for the purpose of assessing the risk to human health.

8.3 USE ON SITE

Fumigation is a typical procedure associated with the storage of grain products and is to be carried out on site where insect infestation of grain has occurred. As indicated by the proponent, fumigation only occurs in the silos of diameter measuring 4.5m and 6.4m. For the purpose of this assessment, fumigation of a single silo is assumed to be carried out approximately once every 3 months.

1.5 Fumitoxin tablets are used by the proponent per cubic meter of silo and are left in the purpose built silo over a fortnight period in order to ensure full decomposition occurs. The manufacturer (Nufarm) states that a single 3g tablet liberates 1g of phosphine gas during complete decomposition. After this time the silo lid is opened to allow natural ventilation with the external air. 'Fumigation with phosphine, other fumigants and controlled atmospheres – A Grains Industry Guide', Grains Research & Development Corporation (2011) gives a minimum period of 5 days aeration for naturally ventilated silos.

8.4 BEST PRACTICE

When a silo is first opened after a successful fumigation the gas concentration levels are extremely high and so appropriate PPE must be worn. Fumitoxin tablets are supplied in gas-tight containers which can be tightly resealed and stored for future use. Tablet containers are only to be opened outdoors.

The onsite storage and use of aluminium phosphide is to be in accordance with Work Cover NSW Code of Practice (2006) 'Safe use of bulk solids containers and flatbed storage including silos, field bins and chaser bins' & 'Safe use and storage of chemicals (including pesticides and herbicides) in agriculture'.

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8.5 MODELLING APPROACH

The release of phosphine gas was modelled as a 5 day event rather than over an annual period, as fumigation only occurs sporadically and aeration of the silos post fumigation takes a relatively small period of time.

The meteorological period selected for modelling was used to simulate 'worst-case' dilution conditions i.e. where there wind is predominantly 'calm' (wind speed is equal to or less than 0.5 m/s). The period from the 11/4–15/4 from the meteorological files were selected in accordance with the above.

The emission rates were calculated by multiplying the volume of each silo by the tablet application rate (1.5 tablets per m^3) and the corresponding 1g of phosphine gas liberated per tablet divided by the 5 day aeration period.

The dispersion of phosphine gas was modelled individually for 5 silos locations (detailed below in Table 8-1) to determine potential impacts on their various closest sensitive receptors.

The model is conservative in assuming a constant emission rate. Dependant on atmospheric conditions phosphine gas has a half-life ranging between 5- 28 hours.

Table 8-1: Details of Silos used in modelling

Silo ID	Eastings	Northings	Height (m)	Diameter of Silo Opening (mm)	Exit Velocity (m/s)	Emission Rate (g/s)
1	294606.23	6252146.49	12.29	600	0.01	0.00137
2	294619.66	6252126.51	12.29	600	0.01	0.00137
3	294653.04	6252232.62	8.5	600	0.01	0.00047
4	294675.26	6252167.05	8.5	600	0.01	0.00047
5	294690.38	6252177.22	8.5	600	0.01	0.00047

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8.6 MODELLING RESULTS

The following tables provide the estimated concentration of phosphine gas for each of the silos at the receptors for both the maximum for a 1 hour averaging period and maximum for a 24 hour averaging period.

Table 8-2: Estimated Impact Results for Phosphine Gas - Silo 1, 1 hour Averaging Period

Receptors	Impact (mg/m^3)	Adjusted TWA Limit (mg/m^3)	Pass (Yes/No)
R1	0.00189	0.00913	Yes
R2	0.00001		Yes
R3	0.00110		Yes
R4	0.00001		Yes
R5	0.00005		Yes
R6	0.00012		Yes
R7	0.00043		Yes
R8	0.00027		Yes
R9	0.00165		Yes

Table 8-3: Estimated Impact Results for Phosphine Gas - Silo 2, 1 hour Averaging Period

Receptors	Impact (mg/m^3)	Adjusted TWA Limit (mg/m^3)	Pass (Yes/No)
R1	0.00182	0.00913	Yes
R2	0.00001		Yes
R3	0.00097		Yes
R4	0.00001		Yes
R5	0.00009		Yes
R6	0.00020		Yes
R7	0.00042		Yes
R8	0.00011		Yes
R9	0.00125		Yes

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Table 8-4: Estimated Impact Results for Phosphine Gas - Silo 3, 1 hour Averaging Period

Receptors	Impact (mg/m^3)	Adjusted TWA Limit (mg/m^3)	Pass (Yes/No)
R1	0.00004	0.00913	Yes
R2	0.00005		Yes
R3	0.00004		Yes
R4	0.00003		Yes
R5	0.00022		Yes
R6	0.00012		Yes
R7	0.00032		Yes
R8	0.00028		Yes
R9	0.00043		Yes

Table 8-5: Estimated Impact Results for Phosphine Gas - Silo 4, 1 hour Averaging Period

Receptors	Impact (mg/m^3)	Adjusted TWA Limit (mg/m^3)	Pass (Yes/No)
R1	0.00004	0.00913	Yes
R2	0.00003		Yes
R3	0.00042		Yes
R4	0.00004		Yes
R5	0.00006		Yes
R6	0000011		Yes
R7	0.00018		Yes
R8	0.00006		Yes
R9	0.00064		Yes

Table 8-6: Estimated Impact Results for Phosphine Gas - Silo 5, 1 hour Averaging Period

Receptors	Impact (mg/m^3)	Adjusted TWA Limit (mg/m^3)	Pass (Yes/No)
R1	0.00004	0.00913	Yes
R2	0.00004		Yes
R3	0.00050		Yes
R4	0.00004		Yes
R5	0.00006		Yes
R6	0.00009		Yes
R7	0.00017		Yes
R8	0.00005		Yes
R9	0.00050		Yes

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Table 8-7: Estimated Impact Results for Phosphine Gas – Silo 1, 24 hour Averaging Period

Receptors	Impact (mg/m^3)	Adjusted TWA Limit (mg/m^3)	Pass (Yes/No)
R1	0.00010	0.00913	Yes
R2	0.00000		Yes
R3	0.00008		Yes
R4	0.00000		Yes
R5	0.00000		Yes
R6	0.00001		Yes
R7	0.00003		Yes
R8	0.00002		Yes
R9	0.00018		Yes

Table 8-8: Estimated Impact Results for Phosphine Gas – Silo 2, 24 hour Averaging Period

Receptors	Impact (mg/m^3)	Adjusted TWA Limit (mg/m^3)	Pass (Yes/No)
R1	0.00010	0.00913	Yes
R2	0.00000		Yes
R3	0.00008		Yes
R4	0.00000		Yes
R5	0.00001		Yes
R6	0.00001		Yes
R7	0.00003		Yes
R8	0.00001		Yes
R9	0.00007		Yes

Table 8-9: Estimated Impact Results for Phosphine Gas – Silo 3, 24 hour Averaging Period

Receptors	Impact (mg/m^3)	Adjusted TWA Limit (mg/m^3)	Pass (Yes/No)
R1	0.00000	0.00913	Yes
R2	0.00000		Yes
R3	0.00000		Yes
R4	0.00000		Yes
R5	0.00001		Yes
R6	0.00001		Yes
R7	0.00003		Yes
R8	0.00002		Yes
R9	0.00002		Yes

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Table 8-10: Estimated Impact Results for Phosphine Gas – Silo 4, 24 hour Averaging Period

Receptors	Impact (mg/m^3)	Adjusted TWA Limit (mg/m^3)	Pass (Yes/No)
R1	0.00000	0.00913	Yes
R2	0.00000		Yes
R3	0.00003		Yes
R4	0.00000		Yes
R5	0.00001		Yes
R6	0.00001		Yes
R7	0.00001		Yes
R8	0.00000		Yes
R9	0.00004		Yes

Table 8-11: Estimated Impact Results for Phosphine Gas – Silo 5, 24 hour Averaging Period

Receptors	Impact (mg/m^3)	Adjusted TWA Limit (mg/m^3)	Pass (Yes/No)
R1	0.00000	0.00913	Yes
R2	0.00000		Yes
R3	0.00003		Yes
R4	0.00000		Yes
R5	0.00001		Yes
R6	0.00001		Yes
R7	0.00001		Yes
R8	0.00000		Yes
R9	0.00003		Yes

8.7 Discussion of Modelling Results

The above results show compliance with the adjusted TWA human health criteria at all receivers for phosphine gas.

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9. STATEMENT OF POTENTIAL AIR IMPACT

An air quality impact assessment was undertaken to assess the air emissions from the proposed operation of the animal food production facility. The assessment was undertaken in accordance with the NSW EPA guidelines "Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales". Air emission impacts were quantified using the NSW EPA approved dispersion model AERMOD to determine whether or not exceedances to health-impact derived assessment criteria would occur at potentially sensitive receivers, being residential premises, neighbouring facilities and Kemps Creek waterway. Conservative assumptions were utilised in the dispersion modelling inputs to ensure that worst-case impacts were simulated and evaluated.

The dispersion modelling undertaken has shown that no exceedances to the air quality criteria were predicted. The assessment concludes that the proposal meets the most relevant and applicable air assessment criteria in accordance with the NSW EPA guidelines and the Safe Work Australia exposure standards and is expected to not cause any impact or harm to any of the nearest potentially affected land uses, including waterways.

This concludes the report.



K Trahair
Environmental Scientist



R T Benbow
Principal Consultant

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10. LIMITATIONS

Our services for this project are carried out in accordance with our current professional standards for site assessment investigations. No guarantees are either expressed or implied.

This report has been prepared solely for the use of J M Produce, as per our agreement for providing environmental services. Only J M Produce is entitled to rely upon the findings in the report within the scope of work described in this report. Otherwise, no responsibility is accepted for the use of any part of the report by another in any other context or for any other purpose.

Although all due care has been taken in the preparation of this study, no warranty is given, nor liability accepted (except that otherwise required by law) in relation to any of the information contained within this document. We accept no responsibility for the accuracy of any data or information provided to us by J M Produce for the purposes of preparing this report.

Any opinions and judgements expressed herein, which are based on our understanding and interpretation of current regulatory standards, should not be construed as legal advice.

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Attachment 4: Traffic and Parking Assessment Report (Transport & Urban Planning)

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TRAFFIC AND PARKING IMPACT ASSESSMENT REPORT FOR A PROPOSED BULK STOCK FEED SUPPLY DEVELOPMENT AT 901-915 MAMRE ROAD, KEMPS CREEK

Ref. 15074r

July 2015

Prepared By

TRANSPORT & URBAN PLANNING PTY LTD
Traffic Engineering, Transport Planning
Road Safety & Project Management Consultants
5/90 Toronto Parade
P.O. Box 533
SUTHERLAND NSW 2232
Tel: (02) 9545 1411
Fax: (02) 9545 1556
Email: geoff@transurbanplan.com.au

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APPENDICES

Appendix 1 Traffic Count Data

Appendix 2 Existing Site Traffic Data

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1.0 INTRODUCTION

Transport and Urban Planning Pty Ltd has been engaged by Benbow Environmental to prepare this traffic impact assessment report for the development of a wholesale and retail stock feed supply business at 901-915 Mamre Road, Kemps Creek.

The business will be operated by JM Produce Pty Ltd, and it will replace their existing stock feed supply operation at Lot 1 Erskine Park Road, Erskine Park.

The proposed development will be on a large parcel of rural land on the western side of Mamre Road, about 4km north of Elizabeth Drive. The land is currently zoned as mainly RU2 Rural Landscape and partly E2 Environmental Conservation under the Penrith LEP 2010. **Figures 1** and **2** show the site location.

This report will be structured as follows:

- Section 2 will outline the development proposal;
- Section 3 will describe the site and its surrounds;
- Section 4 will identify the existing traffic conditions on the nearby roads;
- Section 5 will assess the traffic generation of the proposal, the access routes and the impact on the surrounding road network;
- Section 6 will assess the site access requirements and internal traffic and parking arrangements;
- Section 7 will present conclusions.

This assessment has been prepared in accordance with the provision of State Environmental Planning Policy Infrastructure, the RMS Guide to Traffic Generating Development and with regard to the relevant planning instruments of Penrith City Council.

This report should be read in conjunction with the architectural drawings prepared by Reggie's Design and Drafting.

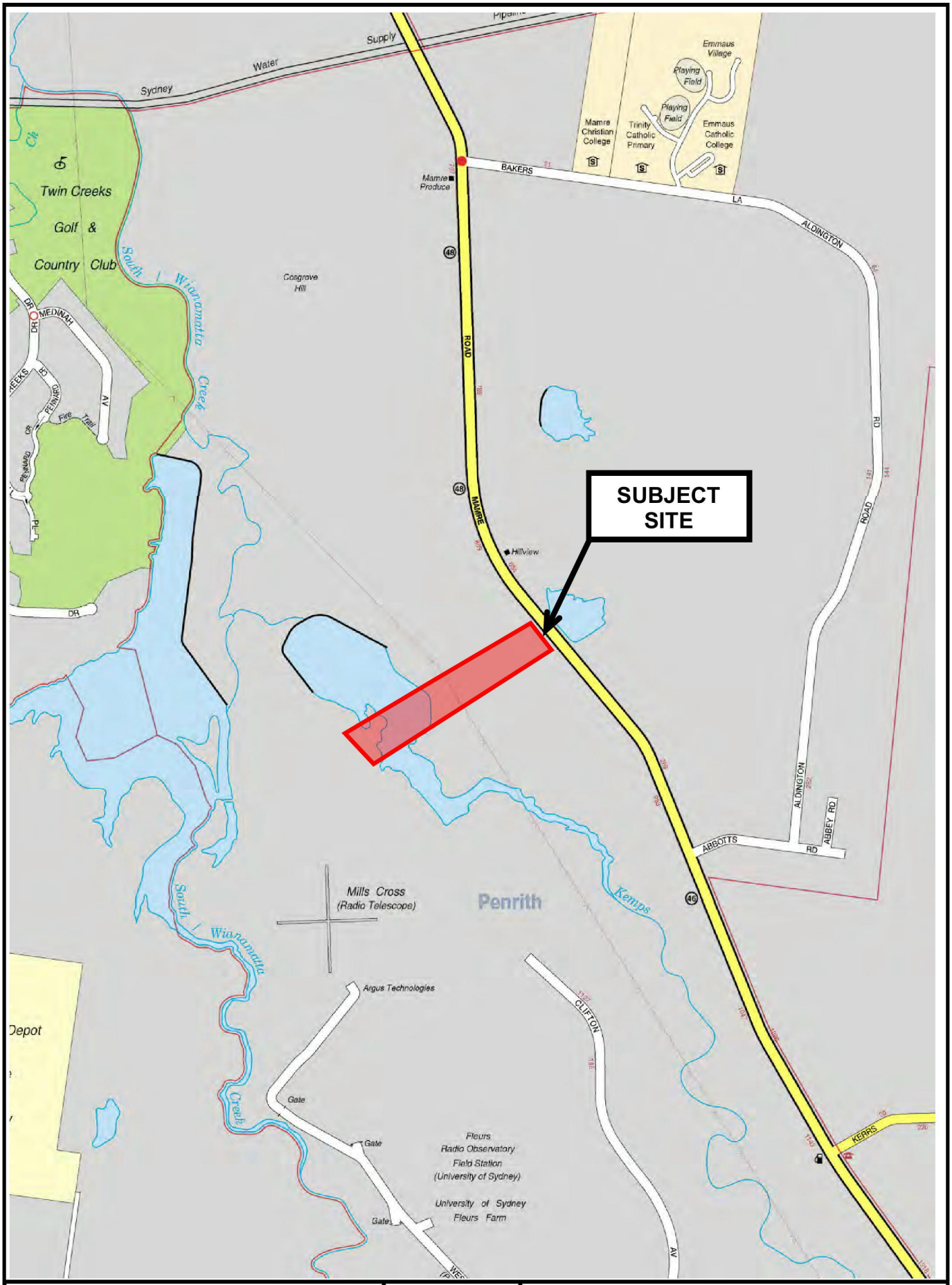
2.0 DEVELOPMENT PROPOSAL

2.1 Background

The proposal involves the relocation of an existing bulk stock feed business which has been located on Lot 1 Erskine Park Road, Erskine Park, for several decades. The existing business operation is now surrounded by more recent residential housing subdivisions, and is considered to be more suitably located in a more rural oriented neighbourhood.

The new location is about 5km south of the existing site, at 901-915 Mamre Road, Kemps Creek, in a mainly rural area.

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TRAFFIC, TRANSPORT & PROJECT MANAGEMENT CONSULTANTS

5/90 Toronto Parade, Sutherland NSW 2232
Phone 02 9545 1411 Fax 02 9545 1556

admin@transurbanplan.com.au

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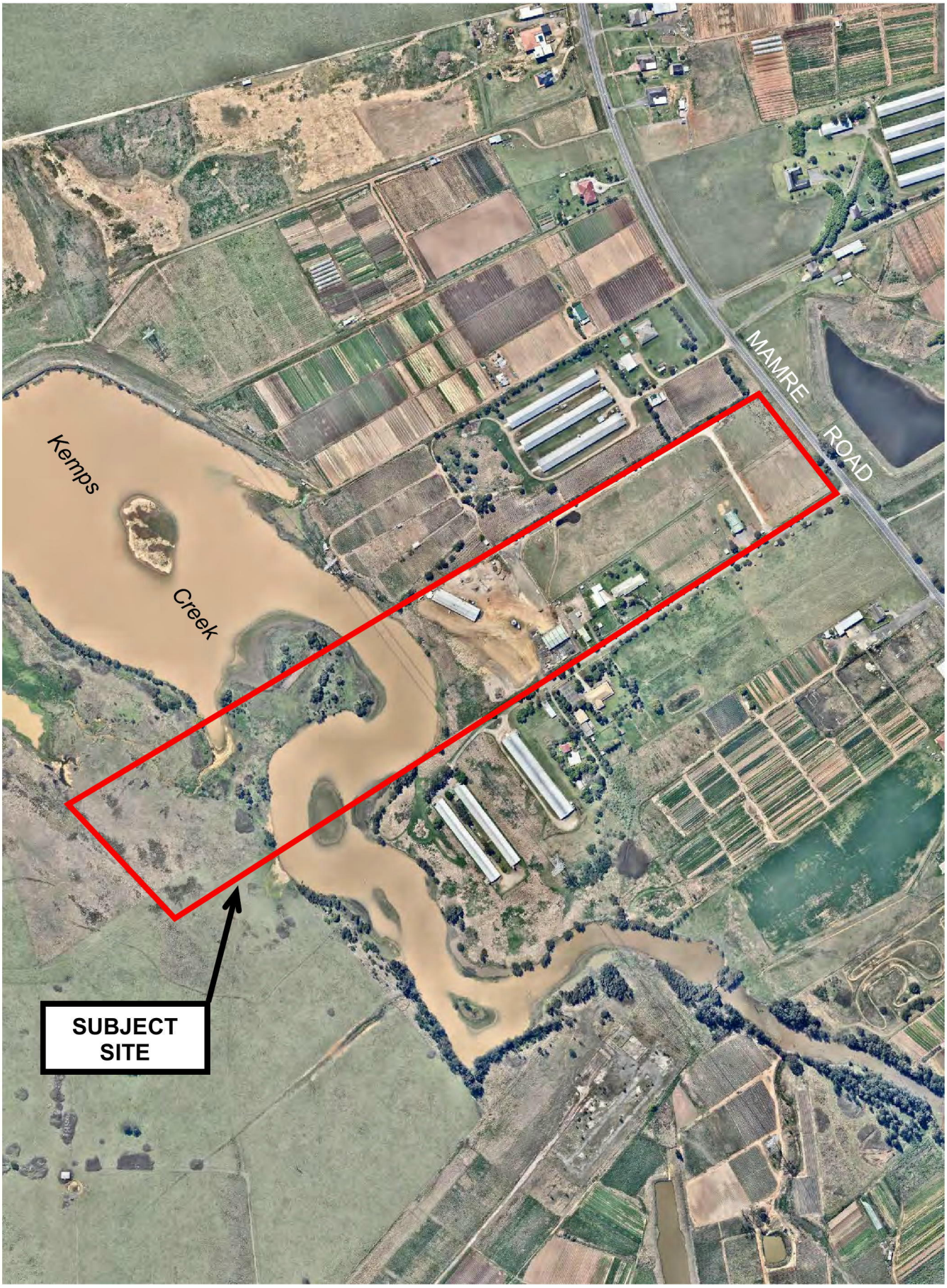
FIGURE 1

PROPOSED BULK STOCK FEED BUSINESS
901-915 MAMRE ROAD, KEMPS CREEK

SITE LOCATION

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FIGURE 2

PROPOSED BULK STOCK FEED BUSINESS
901-915 MAMRE ROAD, KEMPS CREEK

SUBJECT SITE

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2.2 Proposed Development

The bulk stock feed development proposed will be about the same size as the existing business in Erskine Park, and is expected to have the same capacity and wholesale/retail sales volumes.

JM Produce receives bulk deliveries of various stock feed products. It loads the products into silos or into individual bags for sale to both the public and other businesses in bulk and large domestic quantities.

The development will involve demolition of one large existing site shed, retention of one other existing shed, and construction of five new sheds for storage, bagging processes and loading/unloading of trucks. These sheds are all to be located on the western end of the property, with truck access for bulk deliveries and collections along the northern boundary of the site to Mamre Road. Public sales will take place from another existing site shed located nearer to Mamre Road, on the eastern end of the property. The Mamre Road accesses for trucks to the bulk storage area and for the public retail sales will be separate.

A number of silos will also be installed on the western end of the property comprising;

- 3 x 10m diameter silos
- 4 x 6m diameter silos
- 8 x 4.5m diameter silos
- 17 x 3.75m diameter silos

A weighbridge is proposed in the western area to measure quantities of bulk deliveries and purchases. The site operation involves several different pieces of plant and equipment, including hopper/elevators which load grain into silos.

2.3 Operating Hours

The proposed business operation is planned to have similar operating hours as the existing business, 7.00am to 5.00pm Monday to Friday, 8.00am to 11.00am Saturday.

3.0 THE SITE

3.1 Location and Access

The proposed development will be on 901-915 Mamre Road, Kemps Creek (Lot 33 in DP 258414). The property is about 13.6Ha in size, however only about 20% of the site will be used for the bulk stock feed operation. About one third of the site is part of an existing dam on Kemps Creek, while the remainder of the site will be used for other purposes.

The site is on the west side of Mamre Road about 4km north of Elizabeth Drive and 1km north of Abbotts Road. It is 3.6km south of Erskine Park Road and 7.5km south of the M4 Motorway.

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3.2 Existing Use and Surrounding Development

The property has one residence and several sheds, and has previously been used for routine rural and agricultural purposes.

The site is bounded to the north and south by other large rural properties which have mixed agricultural uses. The rear of the property includes a dam which is part of Kemps Creek, and other undeveloped rural properties exist further west.

The site's eastern boundary fronts Mamre Road, which is a classified State Road. Rural properties also exist on the eastern side of Mamre Road.

4.0 ROAD NETWORK

Figure 3 shows the surrounding road network and identifies the classified roads.

4.1 Key Access Roads

Mamre Road is a classified State Road running north / south between Elizabeth Drive in the south to the M4 Motorway and Great Western Highway in the north. It has a total length of about 13km. The road is designed as a rural road and most of its length for several kilometres either side of the site consists of a 2 lane undivided road, with 1 wide traffic lane in each direction, edgelines, sealed road shoulders of varying widths, no kerbs or gutters and grassed table drains. It has an undulating profile and its alignment consists of long straight sections linked by large radius curves. It has an 80km/h speed limit.

At the site frontage, Mamre Road consists of 2 x 3.4 metre wide lanes and sealed shoulders of about 1.2 metre width on both sides, providing a total sealed road width of about 9.2 metres.

Development along Mamre Road is rural between Elizabeth Drive to the Erskine Park Industrial area about 3km north of the subject site.

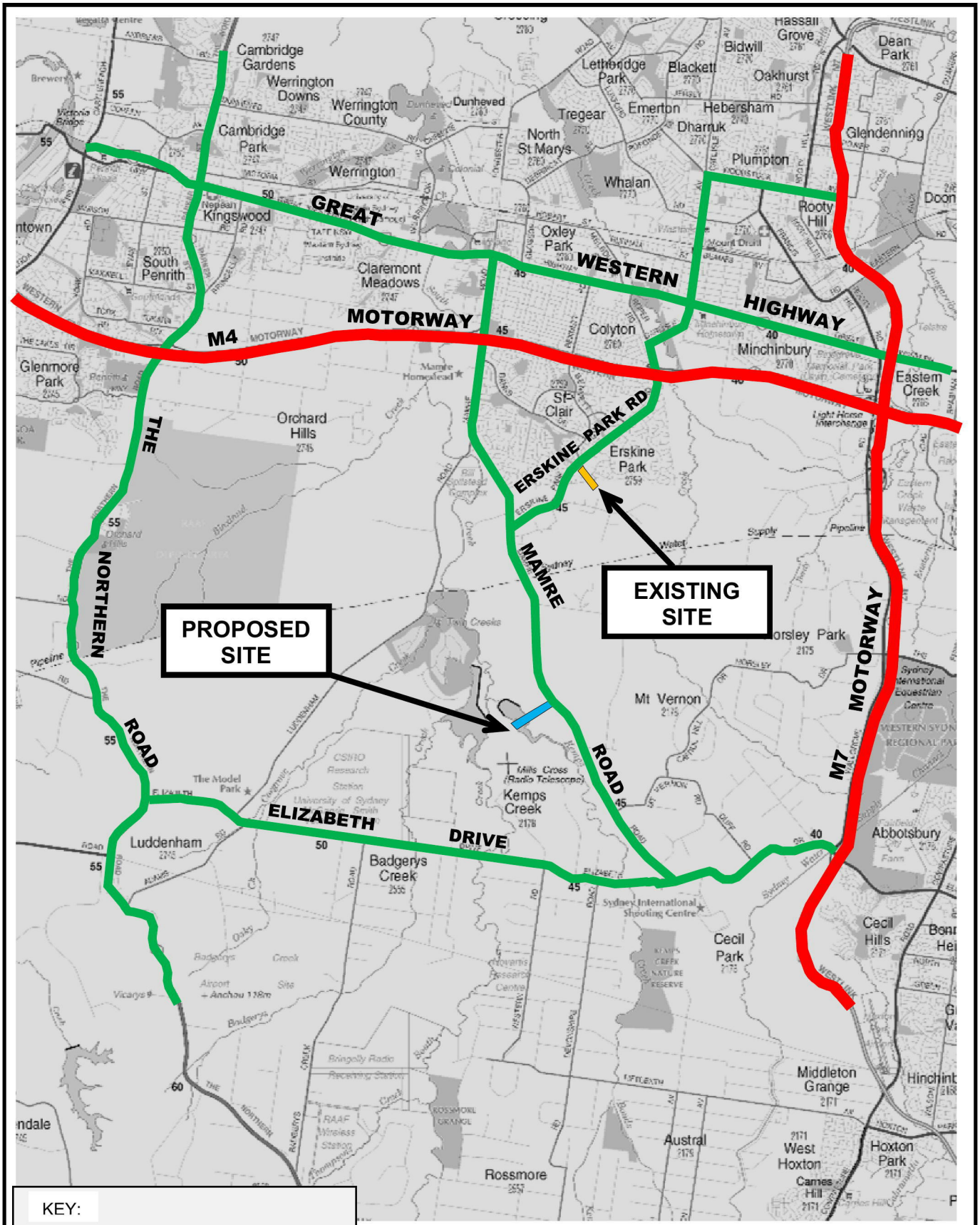
Elizabeth Drive is a classified State Road running east / west between the M7 Motorway and The Northern Road, a total length of about 14km. The road is mostly a 2-lane rural road. The proposed development of Badgerys Creek Airport near the western end of Elizabeth Drive is expected to significantly increase traffic along the road, and a 10 year Federally funded road development program (Western Sydney Infrastructure Plan) includes the planned construction of an airport motorway between the M7 and The Northern Road along the Elizabeth Drive alignment.

The intersection of Mamre Road and Elizabeth Drive is currently a large diameter multi lane roundabout, which is well designed for large articulated vehicles and can accommodate higher volumes of traffic than currently use the intersection.

Erskine Park Road is a classified State Road running in a north easterly direction from Mamre Road to the M4 Motorway, a total length of about 4.3km.

The southern section of Erskine Park Road runs through the large Erskine Park industrial estate. The intersection with Mamre Road is signalised and both roads have been widened near the intersection, with additional through and turning lanes to provide substantial capacity. Erskine Park Road has 4 lanes of traffic plus additional turning lanes at access points into the industrial estate. About 1.5km from Mamre

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TRAFFIC, TRANSPORT & PROJECT MANAGEMENT CONSULTANTS

5/90 Toronto Parade, Sutherland NSW 2232
Phone 02 9545 1411 Fax 02 9545 1556

admin@transurbanplan.com.au

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FIGURE 3

PROPOSED BULK STOCK FEED BUSINESS
901-915 MAMRE ROAD, KEMPS CREEK

CLASSIFIED ROAD NETWORK

JOB NO. 15074

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Road, near the boundary of the industrial estate and the residential housing development of Erskine Park to the north, the road becomes a 2 lane road for about 1.1km. It then widens to a 4 lane divided road until it reaches the M4 interchange. The existing JM Produce bulk stock feed business is located in the 2 lane section of Erskine Park Road, as shown on **Figure 3**.

4.2 Traffic Volumes

Historical Annual Average Daily Traffic (AADT) volumes for Mamre Road have been obtained from RMS. These are listed below:

Mamre Road, at Water Supply Pipeline (2.5km north of site).

1999 : 12,153veh/day

2002 : 12,446veh/day

2005 : 13,793veh/day

Since 2005 the RMS has reduced its regular traffic counting program and they provide no further AADT at this location. This assessment has therefore carried out a one week tube traffic count during May 2015 to identify current traffic volumes, speeds and percentages of heavy vehicles near the subject site. A copy of the count summary report is included in Appendix 1. The results are shown in the following table.

TABLE 4.1

MAY 2015 TRAFFIC COUNT ON MAMRE ROAD

Period	Northbound	Southbound	Combined
AM Peak Hour 7am-8am	614	679	1,293
PM Peak Hour 4pm-5pm	701	689	1,390
AWT (5 day)	7,350	7,796	15,146
ADT (7 day)	6,454	6,823	13,277

The above ADT data indicates that traffic volumes on this section of Mamre Road have remained relatively stable over the past decade, in keeping with the unchanged rural development in the locality.

The survey also showed the 7 day average percentage of heavy vehicles was about 15% and the 85th percentile speed was 88km/h.

4.3 Traffic Conditions on Mamre Road

The RMS Guide to Traffic Generating Developments includes Level of Service (LOS) tables for various types of road and environments. Table 4.5 provides LOS for rural roads. For a level road with 15% heavy vehicles, a two way peak hour volume of up to 1,410 vehicles indicates LOS D. As the recent count indicates the current peak hour volume is 1,390 vehicles, Mamre Road is assessed as operating at LOS D near the site. While this indicates satisfactory operation, current traffic conditions would include frequent platoons of traffic travelling closely together with little or no opportunity for overtaking.

However, due to there being no constraints along this section of Mamre Road, traffic flows are generally continuous and smooth.

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The current LoS D may lead to a need for basic right turn access treatment (BAR) to the site, to prevent delayed right turning trucks from blocking southbound traffic on Mamre Road.

5.0 TRAFFIC GENERATION AND IMPACT

5.1 Trip Generation

As detailed in Section 2.2, the proposed development is planned to be of similar size, capacity and throughput as the existing JM Produce operation on Erskine Park Road. As it is expected that similar traffic movements will be generated, a daily log of vehicle trips for both wholesale and public retail sales was recorded for the week commencing Tuesday 7 April 2015. The survey data is provided in Appendix 2. This data was supplemented by information from the manager of JM Produce, which provided typical incoming delivery truck volumes.

No data was recorded for Saturday morning operating hours, however it is understood that weekend public retail sales are similar to a busy weekday, while there are usually no bulk deliveries or pick ups.

The survey data and management information was used to produce the following 'busy day' trip generation of wholesale and retail sales:

Public Retail Sales

Busy day daily sales	=	44 cars
	=	88 light vehicle trips per day

Wholesale Sales

Light Vehicles

Busy day sales	=	2 cars / vans
	=	4 light vehicle trips per day

Rigid Trucks

Busy day daily sales	=	2
	=	4 rigid truck trips per day

Articulated Trucks

Busy day daily sales	=	1
	=	2 articulated truck trips per day

Bulk Deliveries In

Rigid Trucks

Busy day daily trucks	=	1
	=	2 rigid truck trips per day

Articulated Trucks

Busy day daily trucks	=	2
	=	4 articulated truck trips per day

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Totals

Car trips	=	92 trips per day
Rigid truck trips	=	6 trips per day
Articulated truck trips	=	6 trips per day

These vehicle trips are spread evenly throughout the operating hours of the business. The hourly trip generation of the proposed development will be up to:

Car:	9.2, say 10 trips per hour
Rigid Truck:	0.6, say 1 trip per hour
Articulated truck:	0.6, say 1 trip per hour

It is also noted that the proposal is a relocation of an existing business and will not be a generator of "new" traffic. The same amount of traffic currently uses Erskine Park Road to and from the site, and a significant proportion would also use Mamre Road, and so the traffic impact of the proposal will be lower than if it were a new business operation.

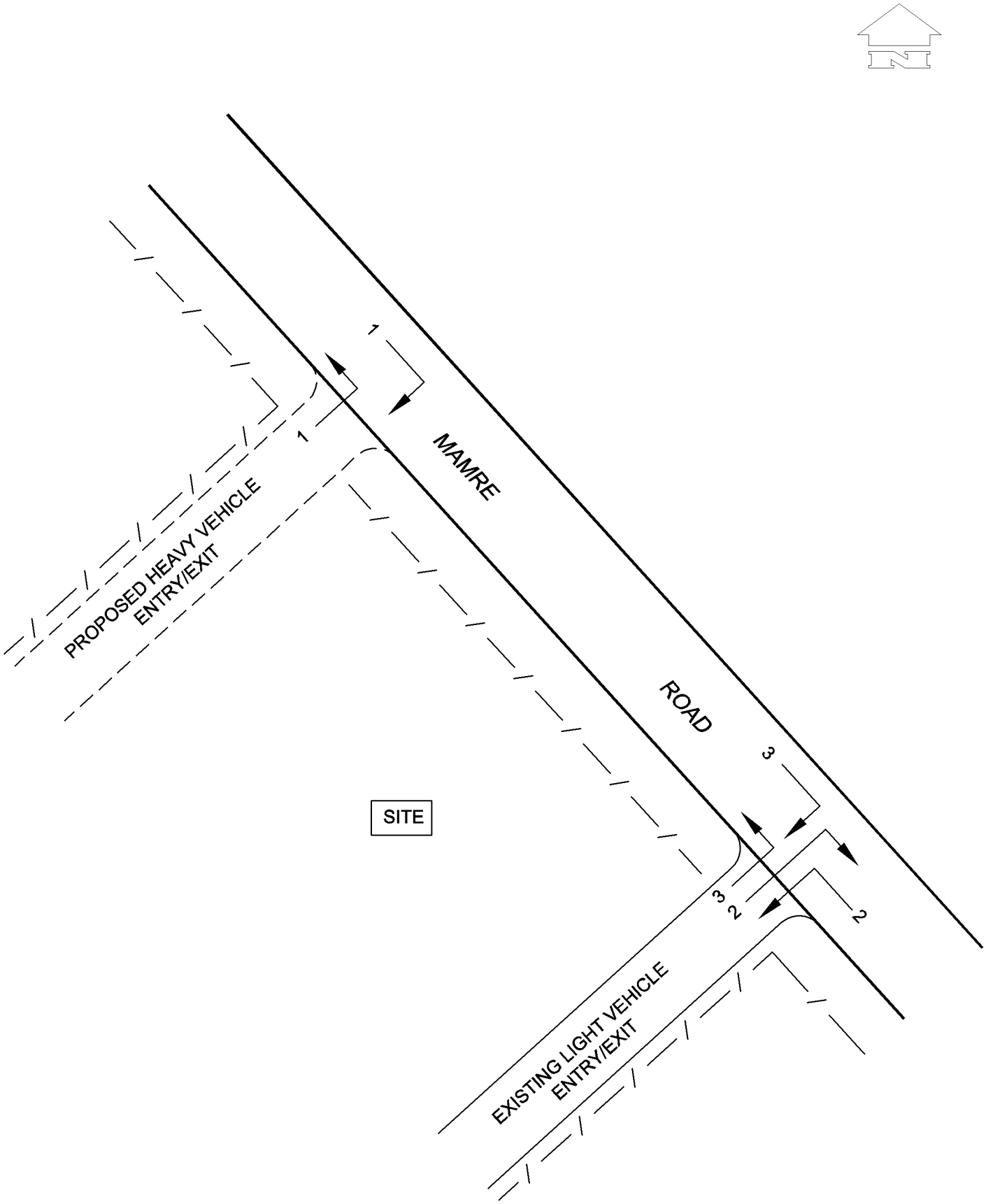
5.2 Trip Distribution

The above maximum hourly trips will be evenly spread between north and south along Mamre Road. The trip distribution of traffic generated by the proposed development is shown on **Figure 4**.

5.3 Traffic Impact

The trips shown in **Figure 4** are assessed as a low traffic generation and impact, which can easily be absorbed onto Mamre Road with no impact on the road capacity or operation.

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Phone 02 9545 1411 Fax 02 9545 1556
admin@transurbanplan.com.au

FIGURE 4

PROPOSED BULK STOCK FEED BUSINESS
901-915 MAMRE ROAD, KEMPS CREEK

BUSY DAY PEAK HOUR TRIP DISTRIBUTION

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6.0 SITE ACCESS AND INTERNAL LAYOUT

6.1 Site Access

The proposed development is planned to separate heavy vehicle movements from public car movements by construction of a new heavy vehicle access driveway on the northern boundary of the site. While detailed design of this new access is not yet available, the design will be required to meet AS2890.2-2002 (Off-street Commercial Vehicle Facilities). The site access gate will be set back from the property boundary to allow an articulated vehicle to completely clear the road prior to stopping. Further, due to the current vehicle volumes using Mamre Road and its current road width, a BAR (basic right turn) road widening treatment is planned.

Use of a BAR treatment is supported by the Austroads Guide to Road Design Part 4A, Section 4.8 and Figure 4.9(b). Note that a BAR treatment in this case will be superior to a CHR (channelised right turn), because it will not require the substantial volumes of through traffic on Mamre Road to deviate around a little used right turn bay.

The existing driveway and site access on the southern side of the site will be used for all light vehicle access to the site, but will not be used by trucks. This driveway will therefore remain unaltered.

6.2 Internal Traffic Layout

The proposed development will have a 9 metre wide two way truck access road along the northern boundary of the site, between Mamre Road and the main manoeuvring area at the stock feed storage area. The manoeuvring area is a very large open, level space with sufficient room to allow vehicles up to B-doubles to manoeuvre, load and unload. All trucks will be able to enter and leave the site in a forward direction. Road widths, grades and manoeuvring areas will be fully in accordance with AS2890.2.

Light vehicle traffic will be separated from truck movements, with retail sales to be carried out in a separate building adjacent to the light vehicle access road, about 130 metres from Mamre Road. The main stock feed storage and truck manoeuvring area is a further 260 metres west, and the only car access to that area is planned to be for staff cars.

6.3 Parking

The retail sales building includes an informal parking area for about 6 cars which will adequately cater for the maximum number of public sales. The car park will allow cars to turn around within it, so that all cars will enter and leave the site in a forward direction.

Staff car parking will be available on the south side of the main stock feed storage area. The site generally will have up to 5 staff on site and a delivery driver. There is more than adequate space in this area for these staff cars.

Parking on site for heavy vehicles will be limited to plant and equipment plus up to 2 delivery trucks operated by the business. These vehicles will be parked within the manoeuvring area. Delivery trucks operated by suppliers and clients of the business will not park on-site.

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7.0 CONCLUSIONS

This report has examined a proposed wholesale and retail stock feed supply development on 901-915 Mamre Road, Kemps Creek, and has assessed the traffic and parking impacts, access arrangements and internal traffic design.

In terms of overall traffic generation, the proposal is assessed as a low traffic generator. During a peak hour of a typical busy day only two truck trips (1 in, 1 out) and 10 light vehicle trips (5 in, 5 out) will be generated.

The assessment of the traffic impact on Mamre Road is that a BAR right turn treatment should be provided for the heavy vehicle access driveway, and if so, there will be a negligible impact on traffic flow on Mamre Road. It should also be noted that the traffic generated by the development is simply being relocated within the regional road network, as this is a business relocation rather than a new business operation.

The proposal includes a new separate heavy vehicle access to the site from Mamre Road, so that all heavy vehicle movements will be separated from public light vehicle movements. This will be a significant site safety benefit.

The amount of on-site parking for retail sales, staff vehicles and trucks exceeds the peak business needs. Truck manoeuvring areas are generous and all vehicles using the site will be able to enter and leave in a forward direction. The proposed access and internal traffic design will be fully in accordance with AS2890.1 and AS2890.2.

In conclusion, the development will be a low traffic generator and will have an acceptable traffic impact. A BAR right turn treatment at the new heavy vehicle acces point and its separation from light vehicle traffic will ensure safe and efficient operation. The internal traffic design and parking is well designed and fully in accordance with standard requirements.

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APPENDIX 1

TRAFFIC COUNT DATA

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CfeIT bob.white@cfeit.com (02) 9740 8600

Traffic Count Summary Report

Count Number	**1996**	Ref : **TUP**	**UBD 225 P-7**
Street	**MAMRE ROAD, KEMPS CREEK : From ELIZABETH DRIVE to GREAT WESTERN HIGHWAY : NORTH BOUND**		
Location	About 1KM north of Abbotts Road, on guardrail.		*Carriageway*

TOTAL COUNT MATRIX

Start Date	08-MAY-15
Start Time	100
Duration	7 DAYS
Interval	1 HOUR

Weekly 50th Percentile Speed	79
Weekly 85th Percentile Speed	88
Five Day AADT	7351
Seven Day AADT	6455

	MON *11TH*	TUE *12TH*	WED *13TH*	THU *14TH*	FRI *8TH*	SAT *9TH*	SUN *10TH*	5 Day Total	5 Day Average	7 Day Total	7 Day Average
Midnight - 1am	37	39	44	41	44	58	85	**205**	**41**	**348**	**50**
1am - 2am	18	28	20	30	27	38	38	**123**	**25**	**199**	**28**
2am - 3am	19	21	20	23	22	25	19	**105**	**21**	**149**	**21**
3am - 4am	53	49	71	58	60	28	11	**291**	**58**	**330**	**47**
4am - 5am	200	199	187	195	196	78	25	**977**	**195**	**1080**	**154**
5am - 6am	414	444	467	430	398	120	45	**2153**	**431**	**2318**	**331**
6am - 7am	536	536	552	526	530	183	54	**2680**	**536**	**2917**	**417**
7am - 8am	**603**	**675**	616	577	**599**	167	106	**3070**	**614**	**3343**	**478**
8am - 9am	598	650	**653**	**622**	567	299	124	**3090**	**618**	**3513**	**502**
9am - 10am	368	402	377	390	330	**303**	217	**1867**	**373**	**2387**	**341**
10am - 11am	242	323	281	295	305	290	236	**1446**	**289**	**1972**	**282**
11am - Midday	282	265	224	263	282	288	**326**	**1316**	**263**	**1930**	**276**
Midday - 1pm	294	259	135	309	315	318	262	**1312**	**262**	**1892**	**270**
1pm - 2pm	348	345	366	348	387	**342**	268	**1794**	**359**	**2404**	**343**
2pm - 3pm	397	389	411	447	433	308	275	**2077**	**415**	**2660**	**380**
3pm - 4pm	497	551	507	516	520	299	307	**2591**	**518**	**3197**	**457**
4pm - 5pm	**649**	679	**776**	**707**	**692**	337	**337**	**3503**	**701**	**4177**	**597**
5pm - 6pm	**649**	**694**	642	636	652	326	288	**3273**	**655**	**3887**	**555**
6pm - 7pm	339	389	398	381	386	231	221	**1893**	**379**	**2345**	**335**
7pm - 8pm	156	189	153	202	223	127	147	**923**	**185**	**1197**	**171**
8pm - 9pm	102	135	139	141	140	109	154	**657**	**131**	**920**	**131**
9pm - 10pm	108	116	126	138	124	127	133	**612**	**122**	**872**	**125**
10pm - 11pm	93	86	99	97	108	121	88	**483**	**97**	**692**	**99**
11pm - Midnight	58	62	53	55	85	95	47	**313**	**63**	**455**	**65**
Total	**7060**	**7525**	**7317**	**7427**	**7425**	**4617**	**3813**	**36754**	**7350**	**45184**	**6454**

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Traffic Count Summary Report

Count Number	**1996**	Ref : **TUP**	**UBD 225 P-7**
Street	**MAMRE ROAD, KEMPS CREEK : From GREAT WESTERN HIGHWAY to ELIZABETH DRIVE : SOUTH BOUND**		
Location	About 1KM north of Abbotts Road, on guardrail.		*Carriageway*

TOTAL COUNT MATRIX

Start Date	08-MAY-15
Start Time	100
Duration	7 DAYS
Interval	1 HOUR

Weekly 50th Percentile Speed	78
Weekly 85th Percentile Speed	88
Five Day AADT	7797
Seven Day AADT	6823

	MON *11TH*	TUE *12TH*	WED *13TH*	THU *14TH*	FRI *8TH*	SAT *9TH*	SUN *10TH*	5 Day Total	5 Day Average	7 Day Total	7 Day Average
Midnight - 1am	27	41	52	38	48	60	55	**206**	**41**	**321**	**46**
1am - 2am	12	40	35	39	31	39	38	**157**	**31**	**234**	**33**
2am - 3am	22	35	33	31	35	21	21	**156**	**31**	**198**	**28**
3am - 4am	49	55	68	53	63	35	25	**288**	**58**	**348**	**50**
4am - 5am	126	153	141	159	132	61	30	**711**	**142**	**802**	**115**
5am - 6am	361	391	354	399	373	156	40	**1878**	**376**	**2074**	**296**
6am - 7am	584	641	631	641	593	228	73	**3090**	**618**	**3391**	**484**
7am - 8am	**663**	**682**	**757**	**664**	**630**	212	114	**3396**	**679**	**3722**	**532**
8am - 9am	442	520	571	441	508	271	168	**2482**	**496**	**2921**	**417**
9am - 10am	324	366	389	341	369	285	254	**1789**	**358**	**2328**	**333**
10am - 11am	275	313	296	277	275	319	312	**1436**	**287**	**2067**	**295**
11am - Midday	297	322	208	327	317	**344**	**319**	**1471**	**294**	**2134**	**305**
Midday - 1pm	314	335	122	335	350	327	**336**	**1456**	**291**	**2119**	**303**
1pm - 2pm	409	423	416	405	460	**370**	289	**2113**	**423**	**2772**	**396**
2pm - 3pm	563	533	541	505	561	341	242	**2703**	**541**	**3286**	**469**
3pm - 4pm	610	634	675	636	**710**	332	316	**3265**	**653**	**3913**	**559**
4pm - 5pm	**675**	**705**	703	**687**	675	327	335	**3445**	**689**	**4107**	**587**
5pm - 6pm	655	638	**705**	649	626	365	260	**3273**	**655**	**3898**	**557**
6pm - 7pm	384	403	459	396	447	243	186	**2089**	**418**	**2518**	**360**
7pm - 8pm	189	228	209	203	224	141	135	**1053**	**211**	**1329**	**190**
8pm - 9pm	154	161	133	152	136	120	119	**736**	**147**	**975**	**139**
9pm - 10pm	141	145	128	194	160	124	108	**768**	**154**	**1000**	**143**
10pm - 11pm	97	122	119	139	173	102	75	**650**	**130**	**827**	**118**
11pm - Midnight	74	69	70	69	91	76	30	**373**	**75**	**479**	**68**
Total	**7447**	**7955**	**7815**	**7780**	**7987**	**4899**	**3880**	**38984**	**7796**	**47763**	**6823**

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Traffic Count Summary Report

Count Number	**1996**	Ref : **TUP**	**UBD 225 P-7**
Street	**MAMRE ROAD, KEMPS CREEK : Between ELIZABETH DRIVE & GREAT WESTERN HIGHWAY (bidirectional) :**		
Location	About 1KM north of Abbotts Road, on guardrail.		*Carriageway*

TOTAL COUNT MATRIX

Start Date	08-MAY-15
Start Time	100
Duration	7 DAYS
Interval	1 HOUR

Weekly 50th Percentile Speed	78
Weekly 85th Percentile Speed	88
Five Day AADT	15148
Seven Day AADT	13278

	MON *11TH*	TUE *12TH*	WED *13TH*	THU *14TH*	FRI *8TH*	SAT *9TH*	SUN *10TH*	5 Day Total	5 Day Average	7 Day Total	7 Day Average
Midnight - 1am	64	80	96	79	92	118	140	**411**	**82**	**669**	**96**
1am - 2am	30	68	55	69	58	77	76	**280**	**56**	**433**	**62**
2am - 3am	41	56	53	54	57	46	40	**261**	**52**	**347**	**50**
3am - 4am	102	104	139	111	123	63	36	**579**	**116**	**678**	**97**
4am - 5am	326	352	328	354	328	139	55	**1688**	**338**	**1882**	**269**
5am - 6am	775	835	821	829	771	276	85	**4031**	**806**	**4392**	**627**
6am - 7am	1120	1177	1183	1167	1123	411	127	**5770**	**1154**	**6308**	**901**
7am - 8am	**1266**	**1357**	**1373**	**1241**	**1229**	379	220	**6466**	**1293**	**7065**	**1009**
8am - 9am	1040	1170	1224	1063	1075	570	292	**5572**	**1114**	**6434**	**919**
9am - 10am	692	768	766	731	699	588	471	**3656**	**731**	**4715**	**674**
10am - 11am	517	636	577	572	580	609	548	**2882**	**576**	**4039**	**577**
11am - Midday	579	587	432	590	599	**632**	**645**	**2787**	**557**	**4064**	**581**
Midday - 1pm	608	594	257	644	665	645	598	**2768**	**554**	**4011**	**573**
1pm - 2pm	757	768	782	753	847	**712**	557	**3907**	**781**	**5176**	**739**
2pm - 3pm	960	922	952	952	994	649	517	**4780**	**956**	**5946**	**849**
3pm - 4pm	1107	1185	1182	1152	1230	631	623	**5856**	**1171**	**7110**	**1016**
4pm - 5pm	**1324**	**1384**	**1479**	**1394**	**1367**	664	**672**	**6948**	**1390**	**8284**	**1183**
5pm - 6pm	1304	1332	1347	1285	1278	691	548	**6546**	**1309**	**7785**	**1112**
6pm - 7pm	723	792	857	777	833	474	407	**3982**	**796**	**4863**	**695**
7pm - 8pm	345	417	362	405	447	268	282	**1976**	**395**	**2526**	**361**
8pm - 9pm	256	296	272	293	276	229	273	**1393**	**279**	**1895**	**271**
9pm - 10pm	249	261	254	332	284	251	241	**1380**	**276**	**1872**	**267**
10pm - 11pm	190	208	218	236	281	223	163	**1133**	**227**	**1519**	**217**
11pm - Midnight	132	131	123	124	176	171	77	**686**	**137**	**934**	**133**
Total	**14507**	**15480**	**15132**	**15207**	**15412**	**9516**	**7693**	**75738**	**15147**	**92947**	**13278**

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APPENDIX 2

WHOLESALE PICK UPS

Type of Vehicle	Date	Time In	Time Out	Details
Small truck	7/4/15	10.03	10.23	B/Bags x 4
Van	7/4/15	10.00	10.05	Box
Semi (small)	7/4/15	10.15	10.26	1 pallet bagged
Semi	7/4/15	11.02	11.20	Bags
Large rigid	7/4/15	11.04	11.30	2 x bulkabags
Van	7/4/15	12.51	1.00	Bags
Med rigid	7/4/15	1.29	1.57	252 bags out
Semi	8/4/15	8.43		Bulk out
Ute	8/4/15	11.03		Bags
Semi	8/4/15	12.37	2.15	Bulk out
Large rigid	8/4/15	2.58	3.30	Bags out
Van	8/4/15	3.00	3.10	Bags out
Large rigid	8/4/15	3.10	3.20	Bags out
Small rigid	9/4/15	2.30		Bags out
Ute	9/4/15	1.30	1.45	Bags out
Med rigid	9/4/15	3.40	3.51	Bags out
Ute	10/4/15	11.30	11.40	Bags out
Large semi	13/4/15	8.23	10.00	Bulk out corn
Car / trailer	13/4/15	7.45	8.00	Bulkabag out (corn)
Car / trailer	13/4/15	8.30	8.40	Bulkabag out millmix
Small tipper	13/4/15	8.23	8.50	Bulk out (oats)
Semi large	13/4/15	9.50	10.55	Bulk out (corn)
Semi large	14/4/15	6.58	10.09	Bulk out
Semi med	14/4/15	10.00	10.21	Bulk out
Rigid med	14/4/15	9.30	9.45	Bags out
Ute	14/4/15	1.00	1.15	Bags out
Small rigid	14/4/15	10.30	10.47	Bags out

RETAIL SALES (by Car)

Tuesday	38 cars
Wednesday	19 cars
Thursday	37 cars
Friday	39 cars
Monday	44 cars

BULK INCOMING DELIVERIES

Large rigid	9/4/15	9.49	9.57	Boxes in
Small rigid	13/4/15	9.05	9.28	Bulkabags in
B-double	13/4/15	10.05	11.00	Bulk in (DDG)

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Attachment 5: Environmental Risk Assessment

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ENVIRONMENTAL RISK ASSESSMENT
REPORT FOR
J M PRODUCE
901-915 MAMRE RD KEMPS CREEK

Prepared for: J M Produce
Olathree Pty Ltd

Prepared by: Linda Zanotto, Senior Environmental Engineer
R T Benbow, Principal Consultant

Report No: 158024_ERA_Rev1
January 2016
(Released: 18 January 2016)

Benbow
ENVIRONMENTAL

Engineering a Sustainable Future for Our Environment

Head Office: 13 Daking Street North Parramatta NSW 2151 AUSTRALIA
Tel: 61 2 9890 5099 Fax: 61 2 9890 5399
Email: admin@benbowenviro.com.au
Visit our website: www.benbowenviro.com.au

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Prepared by:	Position:	Signature:	Date:
Linda Zanotto	Senior Environmental Engineer		18 January 2016

Reviewed by:	Position:	Signature:	Date:
R T Benbow	Principal Consultant		18 January 2016

Approved by:	Position:	Signature:	Date:
R T Benbow	Principal Consultant		18 January 2016

DOCUMENT REVISION RECORD

Revision	Date	Description	Checked	Approved
1	18-01-2016	Final / Rev 1	R T Benbow	R T Benbow

DOCUMENT DISTRIBUTION

Revision	Issue Date	Issued To	Issued By
1	18-01-2016	J M Produce	Benbow Environmental

Benbow ENVIRONMENTAL

Head Office:
13 Daking Street North Parramatta NSW 2151 Australia
P.O. Box 687 Parramatta NSW 2124 Australia
Telephone: +61 2 9890 5099 Facsimile: +61 2 9890 5399
E-mail: admin@benbowenviro.com.au
Visit our Website at www.benbowenviro.com.au

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EXECUTIVE SUMMARY

Benbow Environmental was commissioned by J M Produce on behalf of Olathree Pty Ltd to prepare an Environmental Risk Assessment (ERA) Report for the proposed animal feed processing operations to be located at 901-915 Mamre Rd Kemps Creek. The purpose of the assessment is to determine the level of risk that the proposed operations pose on the surrounding area.

This is of particular importance as the western portion of the site is an environment protection zone due to the presence of a large water body.

The site is located within land zoned part RU2 Rural Landscape and part E2 Environmental Conservation under the Penrith Local Environment Plan 2010 (PLEP2010). The section of the land where the proposed activity is to occur is entirely within the RU2 zone. The proposed development involves relocation of an animal feed business is not a designated or integrated development. The business is related to agriculture and is permitted with consent.

Animal feed consist of bringing to the site seed products. These may consist of a range of seeds such as wheat, barley, sorghum, corn and others. The main activities would include:

- Receipt of raw materials (seed) in a range of truck types from rigid axle to semi-articulated types. The trucks would pass over a weighbridge and park, waiting for instruction to empty their load.
- The seed is emptied from the trucks into hoppers which in turn auger the seed up into a series of silos. As the silos are being filled, any dust generated from the surfaces of the seeds is drawn into a reverse pulse dust collector and removed from the air.
- Unloading of seed using augers to enable a variety of seed to be blended. The mixture of various combinations of seeds is augered into the processing shed onto mechanical screens.
- A hammer mill and roller mills then size reduce the seed essentially cracking it into smaller pieces.
- Seeds pass down into a packing-bagging machine and finished product is placed on pallets and stored in the processing shed.

This ERA Report has been prepared to identify all potential hazards and risks from the proposed operations (as designed) and ensure that these are adequately managed and controlled. This report considers the health effects to workers on-site, and assesses the risks to the health of persons and receptors surrounding the site. The following risk areas were analysed:

- Air;
- Noise;
- Water;
- Land;
- Chemicals; and
- Human Health.

Hazards within these areas of risk were assigned a “risk rating”, with Class I being a high level of risk, Class II posing a moderate level of risk and Class III low risk. The major risks with risk ratings of higher than Class III are summarised in the following table. With the implementation of minor additional safeguards, most of these risks were re-assessed to be low (Class III). There were no high level risks identified. The full risk assessment is included as Table 5-1.

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In addition to the safeguards designed into the proposed facility, the following additional safeguards were recommended:

- Undertake the sediment control system outlined in the statement of environmental effects;
- Provide spill kits in high risk areas;
- Develop a Preventative maintenance schedule;
- Develop a spill procedure;
- Erect a sign adjacent to the diesel storage area with simple instructions on how to avoid spillages; and
- If applicable, use an alternative for reversing beepers on onsite vehicles.

With the recommended current controls in place, the site operations would not pose a significant risk to the health of those living in the surrounding area.





Linda Zanotto
Senior Environmental Engineer

R T Benbow
Principal Consultant

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1. INTRODUCTION

This report presents the results of an Environmental Risk Assessment (ERA) for the proposed animal feed processing activities to be located at the Olathree Pty Ltd site at 901-915 Mamre Rd, Kemps Creek.

The ERA assesses the potential hazards to the environment from activities occurring on-site. The ERA follows the principles established in the following standards and guidelines:

- AS/NZS ISO 31000:2009 - Risk management - Principles and guidelines;
- SA/SNZ HB 436:2013 - Risk management guidelines - Companion to AS/NZS ISO 31000:2009; and
- HB 203:2012 - Managing Environment-Related Risk.

The purpose of the ERA is to identify major risks associated with the site's activities and ensure that adequate safeguards are in place to protect the health and safety of workers, surrounding land uses and the environment. Impacts on organisations and communities from environment related matters are also considered.

1.1 SCOPE OF WORKS

The scope of this report extends to the following:

- Present details of the site, site activities and surrounding area;
- Examine the details and properties of the raw materials and finished goods of the animal feed production process;
- Determine the potential effects of the site's activities on the environment;
- Undertake a qualitative risk assessment. This is done by assessing existing controls in place at the site, identifying additional controls and assessing any residual risks. Present the findings of this as a Hazard and Risk Register; and
- Prepare a report which presents the above, the risk assessment methodology, hazard and risk register, major risk issues and any additional recommendations as found necessary.

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2. SITE DETAILS & EXISTING ACTIVITIES

This section presents the site location, description of the site and surrounds and a description of the existing concrete batching activities undertaken at the site.

2.1 SITE LOCATION

The land is located at 901-915 Mamre Rd Kemps Creek in Sydney NSW, also known as Lot 33 in DP258414 . The site is located within the City of Penrith Local Government Area.

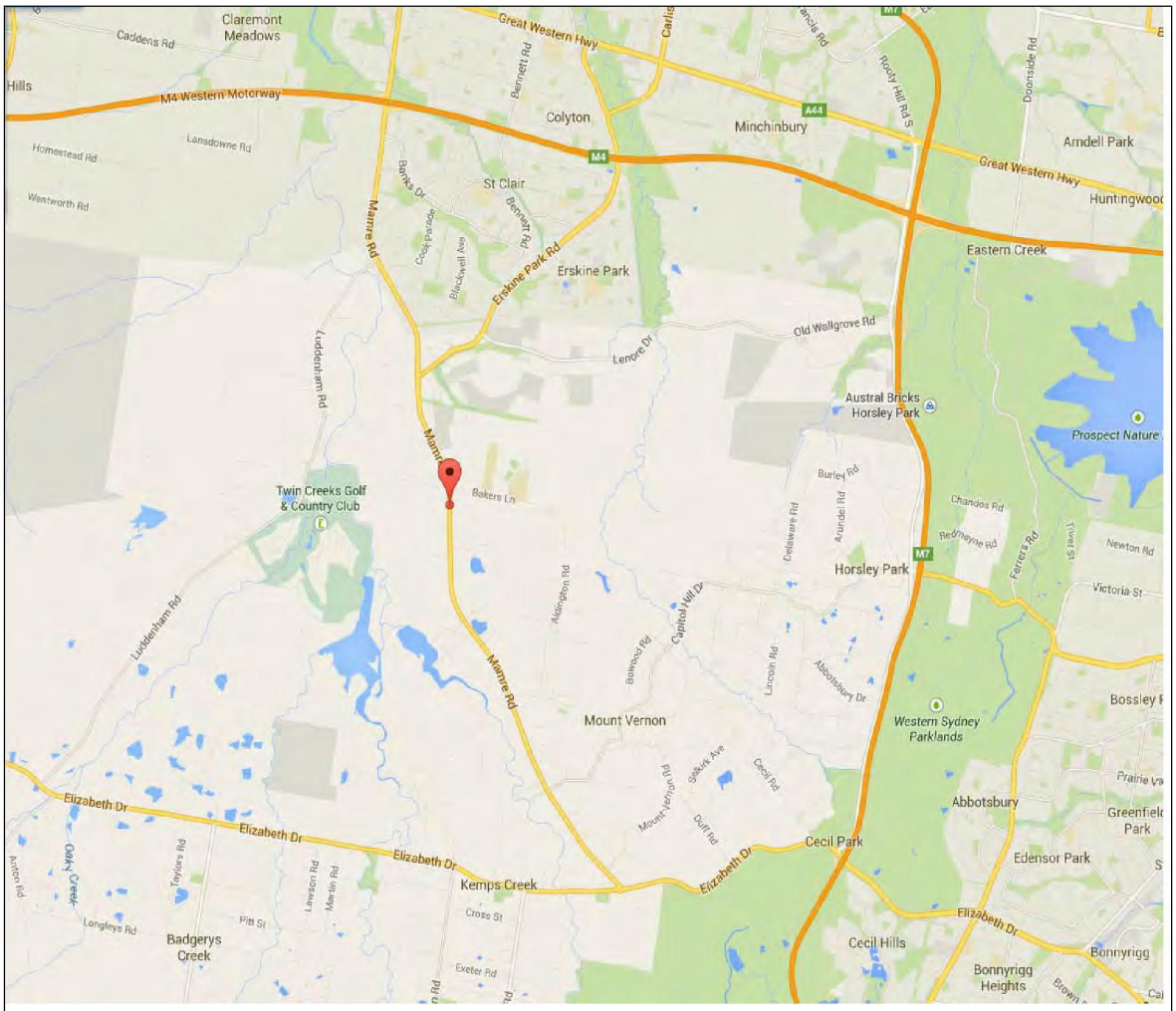
Figure 2-1 shows the location of the site in a regional context.

Figure 2-2 shows an aerial photograph of the local area.

Figure 2-3 shows an aerial photograph of the site. The red line on Figure 2-3 indicates the approximate boundary of the site.

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Figure 2-1: Site Location in a Regional Context



Source: Google Maps, 2015

↑N Not to scale		Benbow Environmental 13 Daking Street, North Parramatta NSW 2151

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Figure 2-2: Aerial Photograph of the Local area



Source: SIX Maps, 2015

↑N Not to scale	LEGEND: Site border	Benbow Environmental 13 Daking Street, North Parramatta NSW 2151

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Figure 2-3: Aerial View of the Site



Source: SIX Maps, 2015

↑N Not to scale	LEGEND: Site border	Benbow Environmental 13 Daking Street, North Parramatta NSW 2151

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2.2 DESCRIPTION OF THE SITE AND SURROUNDS

The site is located in the Penrith City Council Local Government Area.

The site is located within land zoned "RU2 – Rural Landscape". A portion of the western end of the site is zoned *E2 Environmental Conservation*. Figure 2-4 shows the portion of the site that is the proposed location of the animal food production facility.

Majority of the surrounding land use of the site is residential and farmlands. The DP 258414 Lot 33 encompasses part of Kemps Creek to the south-west. Only the south-western end of the property is proposed to be used for the animal feed production facility. The existing residential property is to remain in its current location. The north-eastern portion of DP 258414 Lot 33 is currently seeking approval as use for a demolition and construction waste recovery facility.

Figure 2-4: Aerial View of Site Indicating Proposed Location of Animal Food Production Facility



Source: SIX Maps

↑N Not to scale	LEGEND: Site	Benbow Environmental 13 Daking Street, North Parramatta NSW 2151

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2.2.1 Nearest Sensitive Receptors

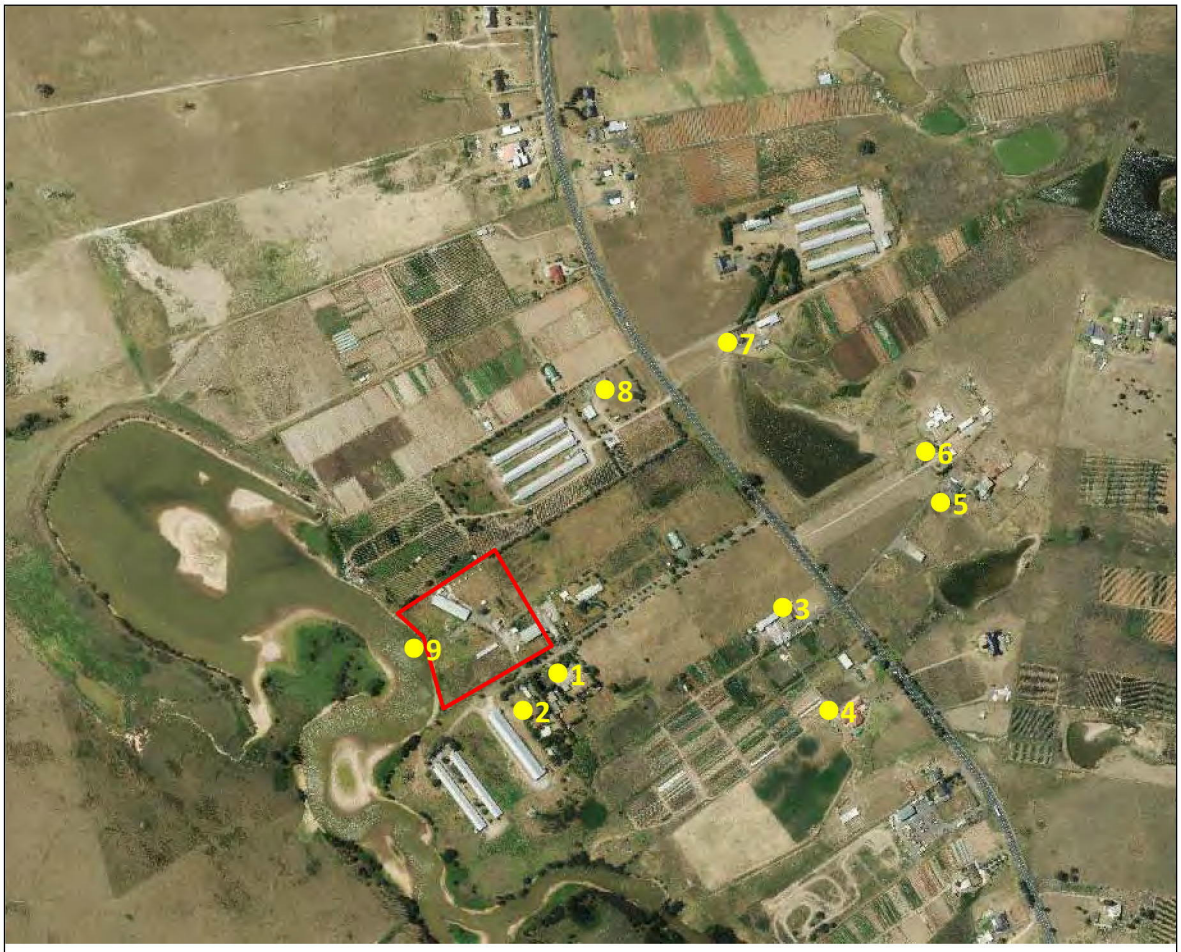
Table 2-1 lists the nearest sensitive receptors to the site. These are shown in Figure 2-5.

Table 2-1: Nearest Sensitive Receptors

Receptor ID	Address	Direction from Site	Approximate distance to site boundary (m)	Type of Receptor
1	919-929 Mamre Rd, Kemps Creek	SE	50	Residential
2	917 Mamre Rd, Kemps Creek	S	96	Commercial
3	931 Mamre Rd, Kemps Creek	E	373	Residential
4	949-965 Mamre Rd, Kemps Creek	E	463	Residential
5	930-966 Mamre Rd, Kemps Creek	ENE	691	Residential
6	904-928 Mamre Rd, Kemps Creek	ENE	698	Residential
7	884-902 Mamre Rd, Kemps Creek	NE	525	Residential
8	885-869 Mamre Rd, Kemps Creek	NE	325	Residential
9	901-915 Mamre Rd, Kemps Creek	W	Within Lot Boundary	Waterway

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Figure 2-5: Nearest Sensitive Receptors



Source: SIX Maps

↑N Not to scale	LEGEND: Site ▭ Receptor ●	Benbow Environmental 13 Daking Street, North Parramatta NSW 2151

2.3 SITE ACTIVITIES

Site activities are proposed to involve production of animal feed. Annual production varies between 20,000–29,000 tonnes depending on conditions within the agricultural industries that purchase the produce.

A description of the process steps is provided below and a process flow is provided as Figure 2-6.

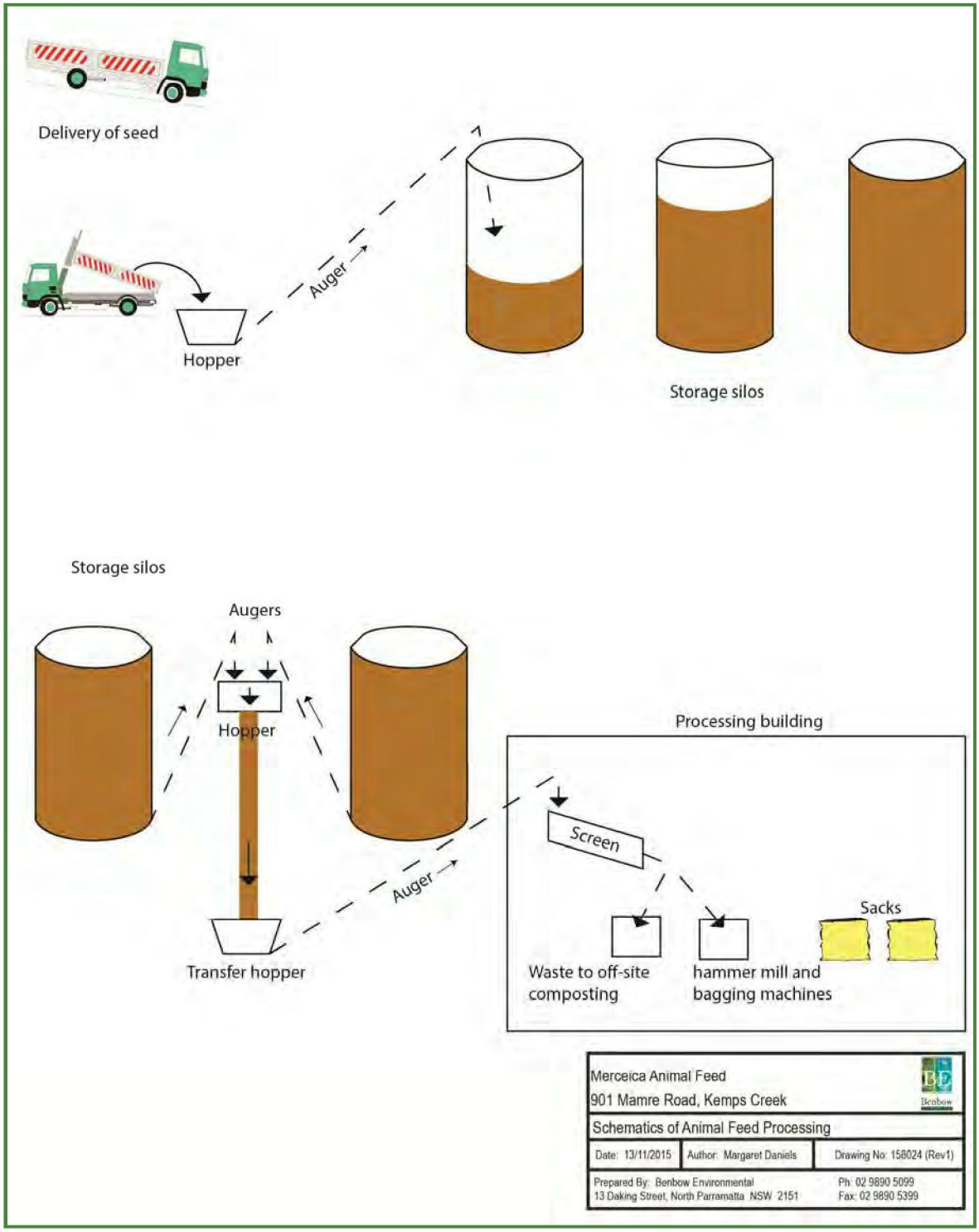
The main activities would include:

- Receipt of raw materials (seed) in a range of truck types from rigid axle to semi-articulated types. The trucks would pass over a weighbridge and park, waiting for instruction to empty their load.
- The seed is emptied from the trucks into hoppers which in turn auger the seed up into a series of silos. As the silos are being filled, any dust generated from the surfaces of the seeds is drawn into a reverse pulse dust collector and removed from the air.

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- Unloading of seed using augers to enable a variety of seed to be blended. The mixture of various combinations of seeds is augered into the processing shed onto mechanical screens.
- A hammer mill and roller mills then size reduce the seed essentially cracking it into smaller pieces.
- Seeds pass down into a packing-bagging machine and finished product is placed on pallets and stored in the processing shed.

Figure 2-6: Process Flow



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Besides sacks (bags of 20–25 kg) being filled, bulka bags that can hold 1000 kg are also used. Bulk material that is sold to wholesalers in bulk would most often be stored in stockpiles within the shed shown rather than being loaded out using an auger unless it is a specialty seed product.

The silos are of 100 tonne capacity. Corn may be stored in 1800 T stockpiles; wheat in 500 T stockpiles.

The dust extractor would usually operate to 4.30 pm during the week and til 1.00 pm on Saturdays. There would be no production on Sundays or public holidays.

The auger conveyors need to transfer seed are called floveyors. These run full time during working hours and noise levels have been measured on the existing site. There are several screening machines. There would be three TQL2 200 X 100 separators and two TQL2 150 X 100 grain separators. Above the bagging bin is a cyclone that removes unwanted material that is sent to an offsite composter. No water is needed in the process.

2.3.1 Raw Materials

Animal feed consist of bringing to the site seed products. These may consist of a range of seeds such as wheat, barley, sorghum, corn and others.

2.3.2 Chemicals & Dangerous Goods

An animal feed business has very limited use of chemicals.

There would be lubricating oils and grease on site. There would be no fuel storage for trucks. Up to 4 X 205L steel drums of diesel and a 5,000L aboveground bunded and roofed steel tank may be on site for fuel usage for the front end loader.

The forklift would be LPG fuelled hence 4 forklift truck size LPG cylinders, 45kg, may be on site in the large awning shed in a cage.

There is use of tablets of a pesticide added to the silos. This is Phoxtoxin. It is locked in a storeroom until needed. It is only used to fumigate grain that has weevil infestation so it is not in routine use.

It is used by placing 1 to 2 tablets per cubic metre in the top of the silo where the weevil infestation is known to exist. The lid of the silo is put in place after the tablets are added and the silo remains undisturbed for a minimum of 5 days.

This activity has been assessed in the Air Quality Impact Assessment of the Statement of Environmental Effects.

2.3.3 Finished Goods

Finished goods consist of various animal feed in 20-25kg bags or bulka bags.

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2.3.4 Hours of Operation

Hours of operation are typically:

Monday–Friday:	7.00 am–5.00 pm
Saturday	7.00 am–3.00 pm

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3. METHODOLOGY

The following methodology was used in assessing risks associated with the site's activities. A qualitative method was used and a review conducted of whether a quantitative assessment was required.

For the purposes of this assessment, "environment" is defined as: *the surroundings in which an organisation operates, including air, water, land, natural resources, flora, fauna, humans and their interrelations*. (ISO 14050:2004 – Environment Management – Vocabulary)

3.1 HAZARD IDENTIFICATION

This is the first step in the risk assessment. It involves the identification of all theoretically possible hazardous events as the basis for further quantification and analysis. This does not in any way imply that the hazard identified or its theoretically possible impact will occur in practice. Essentially, it identifies the particular characteristics and nature of hazards to be further evaluated in order to quantify potential risks.

To identify hazards, a survey of operations was carried out to isolate the events which are outside normal operating conditions and which have the potential to impact outside the boundaries of the site. In accordance with the NSW Department of Planning's Hazardous Industry Planning Advisory Paper (HIPAP) No. 6 – *Guidelines for Hazard Analysis*, these events do not include occurrences that are a normal part of the operational cycles of the site but rather the atypical and abnormal, such as the occurrence of a significant liquid spill during product transfer operations.

3.2 RISK CRITERIA

The following sub-section defines the risk criteria used in this assessment.

3.2.1 Consequence Estimation

This aspect involves the analysis of events carried forward from the hazard identification process in order to quantify their potential on-site and off-site impacts. In this case, these events typically include fire and the potential effects on people, the environment, damage to property and the financial loss as a result of this damage.

Categories of consequences have been defined in terms of environmental, health and financial impacts and include the following:

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WHAT ARE THE WORST CASE SCENARIO CONSEQUENCES?

CONSEQUENCES OR IMPACT

Level	Descriptor	Description
1	Insignificant	Confined on-site environmental impacts able to be promptly rectified. No injuries. Financial loss less than $2,000
2	Minor	Confined environmental impacts requiring short term recovery with potentially little or no off-site impacts. First Aid treatment. Financial loss $2,000 to $20,000
3	Moderate	Confined environmental impacts requiring medium term recovery both on-site and off-site. Medical treatment required. Financial loss $20,000 to $200,000
4	Severe	Unconfined environmental impacts requiring long term recovery and leaving residual damage both on-site and off-site. Extensive injuries, loss of product capability. Financial loss $200,000 to $1M
5	Catastrophic	Widespread environmental impact requiring long term recovery and leaving major damage both on-site and off-site. Death. Financial loss more than $1M

3.2.2 Likelihood Estimation

This aspect involves determining how likely an event is to occur. Likelihood is the chance that something might happen and is defined for the purposes of this assessment in the following table.

HOW LIKELY IS AN EVENT TO OCCUR?

LIKELIHOOD

Level	Descriptor	Description
A	Almost Certain	Very likely. The event is expected to occur in most circumstances.
B	Likely	Strong possibility. The event will probably occur in most circumstances.
C	Possible	The event might occur at some time.
D	Unlikely	Not expected. There is a slight possibility the event could occur at some time.
E	Rare	Highly unlikely. The event may occur only in exceptional circumstances.

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3.2.3 Level of Risk

The level of risk is defined by the following table.

Likelihood	LEVEL OF RISK Consequence				
	Insignificant 1	**Minor 2**	**Moderate 3**	**Severe 4**	**Catastrophic 5**
A (almost certain)	III	II	I	I	I
B (likely)	III	II	I	I	I
C (possible)	III	II	II	I	I
D (unlikely)	III	III	II	II	II
E (rare)	III	III	III	II	II

The Class I area shown in red indicates a high level of risk which is intolerable and where risk reduction is required. This requires the reduction of frequency and/or consequence.

The Class II area shown in yellow indicates a moderate level of risk. Whilst the risk is not unacceptable, there should be practical measures taken to lower the risk if economically viable. For risks where further mitigation is not economically viable, judgment needs to be exercised as to whether the level of risk is acceptable or not. This area is the beginning of the "As Low as Reasonably Practicable" (ALARP) region which means that while risk of an accident may be tolerable, steps still need to be taken to reduce the risk level to as low as reasonably practicable. A risk that satisfies ALARP would be considered acceptable.

The Class III area shown in green indicates a low level of risk and is broadly considered to be acceptable. Further risk mitigation may not be required / appropriate. However, low and accepted risks should be monitored and routinely reviewed to ensure that they remain acceptable. Few risks remain static. This area includes ALARP as well as what are known as trivial or negligible risks.

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4. RISK CHARACTERISATION & IDENTIFICATION

4.1 IDENTIFICATION OF HAZARDS

HB 203-2012: Managing Environment-Related Risk defines a **risk source** as:

> *a tangible or intangible element that alone or in combination has the intrinsic potential to give rise to risk. It is thus an encompassing term that includes the terms 'hazard' (a source of potential harm) and 'environmental aspect'*

An **environmental aspect** could be *a "licensed discharge or emission, waste, or the consumption or reuse of a material. They could also involve noise, odour, light or vibration."*

The process of identifying hazards associated with the proposed activities to be undertaken at the site was to firstly carry out a review of the proposed process steps. The next step was a brainstorming session with a team of consultants to systematically break down each step in the process and identify environmental aspects and therefore potential hazards associated with each activity. These hazards were then divided into environmental risk areas of air, water, land, noise, chemicals and human health.

The results of this process are presented in Table 4-1.

Table 4-1: Identification of Hazards

Risk Source / Activity	Hazards	Risk Area
PROCESS: Receipt and unloading of raw materials		
Unloading of seed into hoppers and transfer via auger to silos	Generation of dust emissions	AIR, HUMAN HEALTH
On-site traffic movements	Noise from reversing beepers, engines	NOISE
	Tracking of sediment in yard area and off site into stormwater drains.	WATER
	Wheel generated dust emissions.	AIR, HUMAN HEALTH
	Vehicle leakages of oil and fuel causing staining of surface	LAND, WATER
	Diesel consumption adding to air pollution load	AIR
Storage of seed and other raw materials in silos Silo failure	Release of dust and particulates	AIR, WATER

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Table 4-1: Identification of Hazards

Risk Source / Activity	Hazards	Risk Area
Dust Collection	Release of clean air from dust collectors. This is noted as an emission to air. Polluted air enters the dust collector where dust is captured and cleaned air is then discharged. Failure of dust collection system resulting in release of dust and particulates Noise from Dust Collector Outlet	AIR AIR, WATER NOISE
PROCESS: Internal Transfer of raw materials		
Internal transfer via auger conveyors	Generation of dust Sediment build up due to spillage of material over edge of conveyor Noise	AIR, HUMAN HEALTH AIR, WATER, HUMAN HEALTH NOISE
PROCESS: Blending and Screening		
Mixing of raw materials and mechanical screening	Release of dust emissions adding to air pollution load and sedimentation of local waterways Noise from mechanical screens	AIR, WATER, HUMAN HEALTH NOISE
PROCESS: Milling		
Size reduction through hammer mill and roller mill	Generation of dust Noise	AIR, HUMAN HEALTH NOISE
PROCESS: Packing and Storage		
Use of bagging machine to package finished goods into bags	Generation of dust Noise	AIR, HUMAN HEALTH NOISE
Bulk storage of finished goods in shed	Release of dust and particulates	AIR, WATER
PROCESS: Chemical Use and Storage		
Use of fumigant (aluminium phosphide) where insect infestation has occurred Storage of fumigant.	Release of phosphine gas	CHEMICALS, AIR, HUMAN HEALTH
lubricating oils and grease	Risk of spills and leaks	WATER, LAND
Diesel fuel – storage Refilling / Fueling of on-site vehicles	Spillages of diesel fuel causing staining and potential for land and water contamination Spillages of diesel fuel causing staining and potential for land and water contamination Odour	CHEMICALS, LAND, WATER CHEMICALS, LAND, WATER AIR

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Table 4-1: Identification of Hazards

Risk Source / Activity	Hazards	Risk Area
PROCESS: General Plant Activities		
Car parking and yard areas	Leakages of oil and fuel causing staining, leading to land and water contamination	LAND, WATER
	Wheel generated dust	AIR
	Engine noise	NOISE

Analysis of the risks associated with the hazards identified above is presented in Section 5.

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5. RISK ANALYSIS

The risk analysis was undertaken using the hazard identification table in Section 4.1 and the risk criteria established in Section 3.2. Risk assessment was undertaken firstly based on the existing site activities and safeguards to determine the Existing Risk Rating. Additional safeguards were recommended to hazards that presented a high or medium risk (Risk Level Classes II and III) and an assessment of these hazards was undertaken to determine the residual risk.

The results are presented as a Hazard and Risk Register in Table 5-1.

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Table 5-1: Hazard and Risk Register

Event Number	Hazard	Consequences	Causes	Prevention & Mitigation Safeguards	Consequences	Likelihood	Existing Risk Rating	Is the risk ALARP?	Recommended Additional Safeguards	Consequence	Likelihood	Residual Risk Rating	Meet ALARP?
1. AIR													
1	Generation and release of dust emissions	- Reduction in the local air quality and visibility; - Potential health effects on respiratory, cardiovascular systems, asthma and other health related issues - Ecological effects including impacts on plants, changes to soil chemistry and impacts on aquatic life if dust settles on nearby waterways. - Dust deposition on cars, buildings, within waterways and on other surfaces - Damage to vehicle surfaces and other equipment - Complaints from neighbouring properties and the public	Unloading of seed into hoppers and transfer via auger to silos	Loads covered whilst unloading Fully enclosed auger points Dust collection system	Insignificant	Almost Certain	III	YES	None required	Insignificant	Almost Certain	III	YES
			Wheel generated dust emissions from on-site vehicle movements	Spray sealing of onsite roads. Use of water sprays or dust suppression agent applied to reduce dust emissions when needed	Insignificant	Possible	III	YES	None required	Insignificant	Possible	III	YES
			Bulk storage of finished goods in stockpiles	Storage within enclosed building.	Insignificant	Likely	III	YES	None required	Insignificant	Likely	III	YES
			Overfill of storage silos / Silo failure	Pressure release valve and ducted to ground High level probes to detect levels in silos Dust collection system	Moderate	Rare	III	YES	None required	Moderate	Rare	III	YES
			Internal transfer of raw materials via auger conveyors	Fully enclosed building Fully enclosed auger points Dust collection system	Insignificant	Unlikely	III	YES	None required	Insignificant	Unlikely	III	YES

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Table 5-1: Hazard and Risk Register

Event Number	Hazard	Consequences	Causes	Prevention & Mitigation Safeguards	Consequences	Likelihood	Existing Risk Rating	Is the risk ALARP?	Recommended Additional Safeguards	Consequence	Likelihood	Residual Risk Rating	Meet ALARP?
			Failure of dust collection system	Regular maintenance Alarm system	Minor	Unlikely	III	YES	None required	Minor	Unlikely	III	YES
			Mixing/blending and mechanical screening	Processing undertaken within enclosed building Auger conveyor points fully enclosed. Dust collection system	Minor	Unlikely	III	YES	None required	Minor	Unlikely	III	YES
			Use of hammer mill and roller mill	Undertaken within enclosed building Auger conveyor points fully enclosed Dust collection system	Minor	Unlikely	III	YES	None required	Minor	Unlikely	III	YES
2	Odour	- Irritating nuisance to workers and others close by - Complaints from neighbouring properties and the public	Use and storage of chemicals	Enclosed chemical containers	Insignificant	Unlikely	III	YES	Provide Spill kits	Insignificant	Unlikely	III	YES
			On-site refuelling of vehicles and refilling of diesel tank	Roofed and bunded diesel tank	Insignificant	Possible	III	YES	None required	Insignificant	Possible	III	YES

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Table 5-1: Hazard and Risk Register

Event Number	Hazard	Consequences	Causes	Prevention & Mitigation Safeguards	Consequences	Likelihood	Existing Risk Rating	Is the risk ALARP?	Recommended Additional Safeguards	Consequence	Likelihood	Residual Risk Rating	Meet ALARP?
3	Release of phosphine gas	- Phosphine gas is highly toxic not only to insects and burrowing pests but to humans, and other forms of animal life - The inhalation of phosphine gas presents a risk to human health - upper respiratory tract irritation, gastrointestinal irritation, headache and central nervous system impair	Use and storage of fumigant	Fumitoxin tablets supplied in gas-tight containers which can be tightly resealed and stored for future use. Tablet containers are only opened outdoors. Storage and use of aluminium phosphide in accordance with Work Cover NSW Code of Practice (2006) '*Safe use of bulk solids containers and flatbed storage including silos, field bins and chaser bins*' & '*Safe use and storage of chemicals (including pesticides and herbicides) in agriculture*'. PPE Gear to be worn	Minor	Unlikely	III	YES	None required	Minor	Unlikely	III	YES
4	Release of products of combustion adding to air pollution load	- Reduction in local air quality and release of gases including carbon monoxide, a known greenhouse gas	Diesel consumption of on-site vehicles and trucks / tankers	Well maintained vehicles, regularly serviced	Insignificant	Likely	III	YES	None required	Insignificant	Likely	III	YES

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Table 5-1: Hazard and Risk Register

Event Number	Hazard	Consequences	Causes	Prevention & Mitigation Safeguards	Consequences	Likelihood	Existing Risk Rating	Is the risk ALARP?	Recommended Additional Safeguards	Consequence	Likelihood	Residual Risk Rating	Meet ALARP?
2. LAND													
5	Staining of surfaces due to release of materials, spills, leakages	- Rainwater runoff over the staining could result in contamination of stormwater and nearby creeks - Staining could enter cracks in surfaces and enter the sub-soil contaminating land - Potential health related impacts of exposure to contaminants within the land - Ecological effects including changes to soil chemistry, effects on plant growth and effects on aquatic life if contamination enters waterways	Leakages of fuel or oil from on-site vehicles, during refuelling and refilling of diesel tank.	Covered and bunded diesel tank storage area that conforms to AS 1940-2004	Minor	Possible	II	NO	Provide spill kits Develop a Preventative maintenance schedule Erect a sign with simple instructions on how to avoid spillages.	Minor	Unlikely	III	YES
			Leakages from the storage and use of lubricating oils and grease.	Covered and bunded Chemical storage area that conforms to AS 1940-2004	Moderate	Rare	III	YES	Provide spill kits	Moderate	Rare	III	YES

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Table 5-1: Hazard and Risk Register

Event Number	Hazard	Consequences	Causes	Prevention & Mitigation Safeguards	Consequences	Likelihood	Existing Risk Rating	Is the risk ALARP?	Recommended Additional Safeguards	Consequence	Likelihood	Residual Risk Rating	Meet ALARP?
6	Release of sediment resulting in pollution of land	- Sedimentation of nearby creeks - Contamination of land including changes to soil, effects on plants and aquatic life.	Heavy rainfall	Sediment containment and drainage system	Minor	Possible	II	No	Vegetate the batter into a landscaped buffer zone	Insignificant	Possible	III	
			Tracking of sediment into yard from on-site traffic movements	Spray sealing of onsite roads Use of water sprays or dust suppression agent applied to reduce dust emissions when needed.	Insignificant	Possible	III	YES	None required	Insignificant	Possible	III	YES
7	Chemical spill	- Chemical harm to personnel - Contamination of stormwater and nearby creeks - Chemicals could enter cracks in surfaces and enter the sub-soil contaminating land - Potential health related impacts of exposure to chemicals - Ecological effects including changes to soil chemistry and effects on plant growth	Release of diesel due to failure of diesel tank and cracks in bunding	None	Severe	Rare	III	YES	Provide spill kits Develop a Preventative maintenance schedule Develop a spill procedure Erect a sign with simple instructions on how to avoid spillages.	Severe	Rare	III	YES
			Release of diesel due to spillages whilst refilling tank and during refuelling of vehicles XXX	None	Minor	Possible	II	NO	Provide spill kits Develop a Preventative maintenance schedule Develop a spill procedure Erect a sign with simple instructions on how to avoid spillages.	Minor	Unlikely	III	YES
3. WATER													

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Table 5-1: Hazard and Risk Register

Event Number	Hazard	Consequences	Causes	Prevention & Mitigation Safeguards	Consequences	Likelihood	Existing Risk Rating	Is the risk ALARP?	Recommended Additional Safeguards	Consequence	Likelihood	Residual Risk Rating	Meet ALARP?
8	Sediment accumulation in yard area resulting in pollution of water	- Poor housekeeping standards - Generation of dust resulting in reduced air quality - Complaints from neighbouring properties	Tracking of sediment in yard by on-site traffic	Spray sealing of onsite roads Use of water sprays or dust suppression agent applied to reduce dust emissions when needed.	Minor	Likely	III	YES	None required	Minor	Likely	III	YES
			Release of sediment from stockpiles, conveyors and raw material storage	Diversion of sediment laden runoff to sedimentation ponds. A nil discharge from site. Water monitoring program	Minor	Almost Certain	III	YES	None required	Minor	Almost Certain	III	YES
9	Deposition of dust on waterways	- Impacts on aquatic life - Reduction in water quality of local waterways - Sedimentation of local waterways	Generation of dust emissions from bulk storage of materials and unloading activities	Diversion of sediment laden runoff to sedimentation ponds. A nil discharge from site. Water monitoring program	Minor	Almost Certain	III	YES	None required	Minor	Almost Certain	III	YES
			Dust collection system failure	Regular maintenance Alarm system	Minor	Unlikely	III	YES	None required	Minor	Unlikely	III	YES

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Table 5-1: Hazard and Risk Register

Event Number	Hazard	Consequences	Causes	Prevention & Mitigation Safeguards	Consequences	Likelihood	Existing Risk Rating	Is the risk ALARP?	Recommended Additional Safeguards	Consequence	Likelihood	Residual Risk Rating	Meet ALARP?
10	Chemical leaks and spills	- Chemical harm to personnel - Contamination of stormwater and nearby creeks - Potential health related impacts of exposure to chemicals - Effects on aquatic life if chemicals enter waterways	Failure of diesel tank, cracks in bunding, spillages whilst refilling tank and during refuelling of vehicles	Covered and bunded Diesel storage area that conforms to AS 3780–2008	Moderate	Unlikely	II	YES	Provide spill kits Develop a Preventative maintenance schedule Develop a spill procedure Erect a sign with simple instructions on how to avoid spillages.	Minor	Unlikely	III	YES
4. NOISE													
11	Excessive noise	- Disturbance to neighbouring properties and the public using Coward Street - Excessive noise levels exceeding criteria resulting in fines and/or complaints - In extreme cases, health effects related to excessive noise	Use of reversing beepers by on-site traffic	4m high walls to the south-east and north-east of the truck unloading area, adjacent to the proposed awning.	Minor	Unlikely	III	NO	Use alternative for reversing beepers	Insignificant	Unlikely	III	YES
			Unloading of materials	4m high walls to the south-east and north-east of the truck unloading area, adjacent to the proposed awning.	Insignificant	Possible	III	YES	None required	Insignificant	Possible	III	YES
			Dust collector outlet	Acoustic screen around the dust collector	Insignificant	Possible	III	YES	None required	Insignificant	Possible	III	YES

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Table 5-1: Hazard and Risk Register

Event Number	Hazard	Consequences	Causes	Prevention & Mitigation Safeguards	Consequences	Likelihood	Existing Risk Rating	Is the risk ALARP?	Recommended Additional Safeguards	Consequence	Likelihood	Residual Risk Rating	Meet ALARP?
			Process noise including conveying, mixing, mechanical screening and milling	Activities undertaken within enclosed building, fully enclosed auger points, 4m high walls to the south-east and north-east of the truck unloading area, adjacent to the proposed awning, Acoustic enclosure around the blower area.	Insignificant	Possible	III	YES	None required	Insignificant	Possible	III	YES

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Table 5-1: Hazard and Risk Register

Event Number	Hazard	Consequences	Causes	Prevention & Mitigation Safeguards	Consequences	Likelihood	Existing Risk Rating	Is the risk ALARP?	Recommended Additional Safeguards	Consequence	Likelihood	Residual Risk Rating	Meet ALARP?
5. CHEMICALS													
12	Chemical Spills and leaks	- Chemical harm to personnel - Contamination of stormwater and nearby creeks - Chemicals could enter cracks in surfaces and enter the sub-soil contaminating land - Potential health related impacts of exposure to chemicals - Ecological effects including changes to soil chemistry, effects on plant growth and aquatic life	Use and storage of fumigant	Fumitoxin tablets supplied in gas-tight containers which can be tightly resealed and stored for future use. Tablet containers are only opened outdoors. Storage and use of aluminium phosphide in accordance with Work Cover NSW Code of Practice (2006) '*Safe use of bulk solids containers and flatbed storage including silos, field bins and chaser bins*' & '*Safe use and storage of chemicals (including pesticides and herbicides) in agriculture*'. PPE Gear to be worn	Minor	Unlikely	III	YES	None required	Minor	Unlikely	III	YES
			Leakages or spills from diesel tank / storage	Bunded and roofed steel tank	Minor	Unlikely	III	YES	Provide spill kits	Minor	Unlikely	III	YES

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Table 5-1: Hazard and Risk Register

Event Number	Hazard	Consequences	Causes	Prevention & Mitigation Safeguards	Consequences	Likelihood	Existing Risk Rating	Is the risk ALARP?	Recommended Additional Safeguards	Consequence	Likelihood	Residual Risk Rating	Meet ALARP?
6. HUMAN HEALTH													
13	Exposure to chemicals	- irritation of the eyes, nose, throat and lungs - Other health related effects associated with long term exposure	Fumigation of pests	Fumitoxin tablets supplied in gas-tight containers which can be tightly resealed and stored for future use. Tablet containers are only opened outdoors. Storage and use of aluminium phosphide in accordance with Work Cover NSW Code of Practice (2006) '*Safe use of bulk solids containers and flatbed storage including silos, field bins and chaser bins*' & '*Safe use and storage of chemicals (including pesticides and herbicides) in agriculture*'. PPE Gear to be worn	Minor	Unlikely	III	YES	None required	Minor	Unlikely	III	YES

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Table 5-1: Hazard and Risk Register

Event Number	Hazard	Consequences	Causes	Prevention & Mitigation Safeguards	Consequences	Likelihood	Existing Risk Rating	Is the risk ALARP?	Recommended Additional Safeguards	Consequence	Likelihood	Residual Risk Rating	Meet ALARP?
14	Exposure to excessive dust	- Health effects of excessive dust exposure such as irritation of the eyes, nose, throat and lungs - Other health related effects associated with long term exposure	Generation of dust emissions from processing operations.	• Mikropul baghouse dust extractor connected to: ► External floveyors; ► Internal floveyors; ► 3xTQLZ 200x150 grain separators; ► 2xTQLZ 150x100 grain separators; ► Hammer mill; ► Roller mill; ► Mixer; ► Bagging bin; and ► Bag filling and weighing machine	Moderate	Possible	III	YES	None required.	Minor	Unlikely	III	YES
			Failure of silo or dust collection system.	Pressure release valve Auger transfer points fully enclosed	Minor	Rare	III	YES	None required	Minor	Rare	III	YES

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Table 5-1: Hazard and Risk Register

Event Number	Hazard	Consequences	Causes	Prevention & Mitigation Safeguards	Consequences	Likelihood	Existing Risk Rating	Is the risk ALARP?	Recommended Additional Safeguards	Consequence	Likelihood	Residual Risk Rating	Meet ALARP?
7. GENERAL SITE RISKS													
15	External Fire / Explosion – Under worst case conditions	- Damage to vehicle and/or property - Release of toxic products of combustion - Missiles (eg LPG cylinders) - Rupturing of containers and contaminated fire water runoff	Brake fire Tyre fire Fuel leak (eg: forklift use LPG) Smoking Lightning strike Adjacent property fires Arson Appliance fire Broken fluorescent light	Maintenance of vehicles No smoking on site Fire extinguishers Fire water available from hydrants and hand-held hoses Emergency response plan includes actions to take if a fire occurs Inert raw materials present on site	Severe	Unlikely	II	YES	No further controls available. Fires are considered to be a relatively rare event at similar facilities but are possible, hence the Risk Rating remains at II.	Severe	Unlikely	II	YES
16	External Fire / Explosion – General conditions	- Damage to vehicle and/or property - Release of toxic products of combustion - Rupturing of containers and contaminated fire water runoff	Brake fire Tyre fire Fuel leak (eg: forklift use LPG) Smoking Lightning strike Adjacent property fires Arson Appliance fire Broken fluorescent light	Maintenance of vehicles No smoking on site Fire extinguishers Fire water available from hydrants and hand-held hoses Emergency response plan includes actions to take if a fire occurs Inert materials on-site	Minor	Unlikely	III	YES	None required	Minor	Unlikely	III	YES

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6. RECOMMENDATIONS & CONCLUDING REMARKS

From the risk analysis undertaken in the previous section, the main environmental site hazards include:

- Generation and release of dust emissions;
- Potential diesel leaks and spills;
- Release of phosphine gas from use of fumigants;
- Excessive noise from on-site operations and activities; and
- External Fire.

The above hazards were analysed considering all safeguards for the proposed development as designed. Additional safeguards were recommended if required to minimise risk. These included:

- Provide spill kits in high risk areas;
- Develop a Preventative maintenance schedule;
- Develop a spill procedure;
- Erect a sign adjacent to the diesel storage area with simple instructions on how to avoid spillages; and
- If applicable, use an alternative for reversing beepers on onsite vehicles.

All risks were found to be Class III (except for fire as discussed in Table 5-1) indicating an overall low level of risk. No high level risks of Class I were found to be present at the site.

With all safeguards and control measures in place, the proposed facility presents a low risk to adjoining premises or residents within the vicinity.

This concludes the report.





Linda Zanotto
Senior Environmental Engineer

R T Benbow
Principal Consultant

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7. LIMITATIONS

Our services for this project are carried out in accordance with our current professional standards for site assessment investigations. No guarantees are either expressed or implied.

This report has been prepared solely for the use of J M Produce, as per our agreement for providing environmental services. Only J M Produce is entitled to rely upon the findings in the report within the scope of work described in this report. Otherwise, no responsibility is accepted for the use of any part of the report by another in any other context or for any other purpose.

Although all due care has been taken in the preparation of this study, no warranty is given, nor liability accepted (except that otherwise required by law) in relation to any of the information contained within this document. We accept no responsibility for the accuracy of any data or information provided to us by J M Produce for the purposes of preparing this report.

Any opinions and judgements expressed herein, which are based on our understanding and interpretation of current regulatory standards, should not be construed as legal advice.

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8. REFERENCES

Industrial Accident Prevention Association, “Silica in the Workplace” Guide, 2008

Standards Australia, AS/NZS ISO 31000:2009 - Risk management - Principles and guidelines

Standards Australia, SA/SNZ HB 436:2013 - Risk management guidelines - Companion to AS/NZS ISO 31000:2009

Standards Australia, HB 203:2012 - Managing Environment-Related Risk

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