GREENSPOT HUNTER VALLEY

Nutrient Recycling Facility

Response to Submissions – SSD 9418

20/06/2022

Document Control

REV NO.	REVISION DATE	AUTHOR	REVIEWER	DETAILS
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Please note: In preparing this report Space Urban Pty Ltd have assumed that all information and documents provided to us as a result of a specific request or enquiry were complete, accurate and up-to-date. Where we have obtained information from a government register or database, we have assumed that the information is accurate. Where an assumption has been made, we have not made any independent investigations with respect to the matters the subject of that assumption. As such we would not be aware of any reason if any of the assumptions were incorrect.

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This report is relevant to the current conditions, project design and statutory framework at the time of publication. Any modifications to project design may require an update of this report as determined appropriate by Space Urban Pty Ltd.

Approval for Issue

NAME	SIGNATURE	DATE
Shaun Smith		20/06/2022

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1 INTRODUCTION

The following document has been prepared to provide details of a revised project description and address submissions received for State Significant Development (SSD) 9418 as a result of the exhibition period between 6 December 2019 to 31 January 2020 inclusive.

1.1 BACKGROUND

Bettergrow Pty Ltd (Bettergrow), trading as 'Greenspot Hunter Valley' (the Proponent), is proposing to undertake the expansion and operation of an existing nutrient recycling facility (the Proposal) on Lot 10 DP1204457, 74 Lemington Road, Ravensworth, NSW (the site).

Current composting operations at the site are approved by DA140/2016 and allow the receival of up to 76,000 tonnes per annum (tpa) of biosolids and garden organics. The Proponent for DA140/2016 was Bettergrow who are contracted by AGL Macquarie (the Landowner) to supply manufactured soil ameliorant and rehabilitation products for use, in part, for approved rehabilitation works at the Ravensworth No. 2 mine and Ravensworth South mine.

The current Proposal seeks to authorise the receipt of up to 200,000tpa of organic materials, including new feed sources of garden waste, to facilitate the sale of a portion of the composted material to third parties. The recovered resources would be transferred either directly to end use markets or to other facilities or processors for value adding to achieve maximum value for the beneficial use.

The proposal as described in the Project EIS 2019 includes the following key components:

- Receive a total of up to 200,000 tpa of organics.
- Transfer of the composted material to other AGL Macquarie sites such as the Liddell Ash Dam, Liddell Power Station and Bayswater Power Station for use in rehabilitation as per existing approval.
- Sale of a portion of the finished 'compost' to third parties as per DA140/2016 as modified.
- Upgrading of a proportion of the hardstand area and installation of an aerated composting system such as the Mobile Aerated Floor (MAF) (or equivalent) suitable for the management and composting of other organics.
- Completion of the capping of the hardstand area and expansion of leachate dam as approved as part of the Stage 2 development application to facilitate the management and storage of the increase in organic inputs.
- Installation of a single lane weigh bridge approximately 27.5m long.
- Installation of covered hard stand areas for the receival and blending, if required, of incoming organics.
- Installation of a dedicated trailer wash bay.
- Installation of two 25,000 litre recycled drill water storage tanks.
- Installation of a machinery shelter that will allow storage of tools and machinery for servicing.

The Proposal is located within an area that is dominated by coal mining and heavy industrial activities, including power generation and related activities. As such the Proposal is within a highly altered environment and is generally compatible with surrounding land use.

Bettergrow currently operates a range of recycling facilities across NSW and Queensland (QLD). The expansion of this operation will benefit the existing rehabilitation activities across AGL Macquarie lands, and also assist the NSW Government in achieving an increased diversion of waste from landfill through the provision of strategic infrastructure and processing capacity.

1.2 DOCUMENT PURPOSE AND STRUCTURE

This **Response to Submissions** (RTS) report has been prepared by Space Urban Pty Ltd (Space Urban) on behalf of Bettergrow, as the Proponent, to address submissions received following the public exhibition of the EIS for SSD-9418. This RTS has been structured as follows:

- **Section 1 -** Project background information and report structure.
- **Section 2 –** Brief description of project, including outline of updates in proposed design compared to 2019 EIS submission.
- **Section 3 –** Summary of Submissions Received.
- **Section 4 -** Response to Submissions Requesting Further Information.
- **Section 5–** Conclusions.
- **Section 6 –** References.

2 REVISED PROJECT

The Project EIS was prepared by RPS Australia East for SSD 9418 on 14 November 2019, with the resultant Department of Planning, Industry and Environment (DPIE) (superseded by the Department of Planning and Environment – DPE) request for a RTS issued to Bettergrow on 7 February 2020.

Following receipt of agencies comments over 2 years ago, and following discussions with DPE, the Project description has been revised to provide a development that better aligns with current operations onsite and removes onsite processing and storage relating to Food Organics (FO), reducing the potential to generate associated air quality and odour impacts.

The revised Project does not include any additional infrastructure beyond that outlined under the 2019 EIS and seeks to remove components and simplify for the operations. The revised Project includes the relocation and removal of some site infrastructure to better streamline site operation under the modified design. In summary, the proposed changes to the design include:

- Removal of mixed Food and Garden Organics (FOGO), as defined in Schedule 1 of the *Protection of the Environment Operations Act 1997* (POEO Act), waste stream from the Proposal. Garden Organics (GO) will still be accepted.
- Removal of the Mobile Aerated Floor for mixed Food and Garden Organics (FOGO) processing. The MAF was described in Section 3.2.2.4 of the Facility EIS (2019). A MAF is a compost aeration system that uses a computer-controlled fan that pushes air through movable perforated pipes underneath the compost pile. The system allows for the control of oxygen levels within the compositing materials. Piping for the system were 15m poly tubes with holes for air distribution and are laid on the ground parallel to each other at 4 metre spacings, and the material to be composted is piled up on top.
- Removal of the product receival and blending shelter. The product receival and blending shelter was described in Section 3.2.2.7 of the Facility EIS (2019) as follows "*The building will be a receivals area for blending various organic wastes prior to being integrated into the composting process on the pad area. The building will be an all-shelter design with a push-wall along the left and right perimeters, with the floor constructed of concrete. The structure will be approximately 60m long, 20m wide, and 5.7m high.*"
- Removal of food waste as an acceptable item from kerbside green bin waste collection. Kerbside green waste will be limited to garden organics only.
- Extension of the Processing Pad approved under DA 140/2016 in the eastern portion of the subject site to include an additional approximate 4.93 ha of processing area. The proposed increase in processing capability to 200,000 tpa of organics has not been altered between the 2019 EIS and this RTS, while surface water controls (e.g. bunding, surface water drainage) that would have applied to the processing pad under the 2019 EIS will now apply to the extended processing pad under this RTS.

Figure 1 shows the development footprint of the Proposal under the 2019 EIS, while **Figure 2** illustrates the revised Project as detailed in this RTS.

Table 1 provides a comparison between the current 2019 EIS Project description and the revised Project detailed in this RTS.

Table 1: Ravensworth Nutrient Recycling Facility – Revised Development 2022

ELEMENT	2019 EIS – PROPOSED DEVELOPMENT	REVISED DEVELOPMENT PROPOSAL 2022
Use	Resource recovery facility for composting and nutrient recycling	Resource recovery facility for composting and nutrient recycling
Processing capacity	Total of up to 200,000 tpa	Total of up to 200,000 tpa
Site Area	Site and development footprint is approximately 57 ha in area.	Site and development footprint is approximately 57 ha in area.
Hours of Operation	7am to 5pm Monday to Friday. 8am to 1pm Saturdays. No work on Sundays or Public Holidays.	7am to 5pm Monday to Friday. 8am to 1pm Saturdays. No work on Sundays or Public Holidays.
Receival	One weighbridge and load inspection bay	One weighbridge and load inspection bay

ELEMENT	2019 EIS – PROPOSED DEVELOPMENT	REVISED DEVELOPMENT PROPOSAL 2022
Site Infrastructure	• Processing pad • Surface water drainage • Leachate dam • Site access and parking • Site office and staff amenities • 300,000 litre water storage • Mobile aerated floor (MAF) • Machinery shelter • Trailer wash • Product receival and blending shelter • Weighbridge • Drill water receival pit	• Processing pad • Surface water drainage • Leachate dam • Site access and parking • Site office and staff amenities • 300,000 litre water storage • Machinery shelter • Trailer wash • Weighbridge • Drill water receival pit
Received wastes	• Urban wood residues for Composting (as defined in 'The compost order 2016'); • Paper Crumble for Composting (defined as General or Specific Exempted Waste); • Wastewater from Bayswater mine Void 4; • Drill mud process water (as defined in 'The Treated Drill Mud Order 2014'); • Natural organic fibrous Composting material (as defined in Schedule 1 of the POEO Act); • Coal ash which meets the conditions of 'The coal ash order 2014'; • Biosolids; • Garden Waste (as defined in Schedule 1 of the POEO Act); and • Food and Garden Organics (FOGO) (as defined in Schedule 1 of the POEO Act).	• Urban wood residues for Composting (as defined in 'The compost order 2016'); • Paper Crumble for Composting (defined as General or Specific Exempted Waste); • Wastewater from Bayswater mine Void 4; • Drill mud process water (as defined in 'The Treated Drill Mud Order 2014'); • Natural organic fibrous Composting material (as defined in Schedule 1 of the POEO Act); • Animal waste (organic); • Biosolids; and • Garden Waste (as defined in Schedule 1 of the POEO Act).
Waste Sources	• Commercial kitchens and restaurants (food organics); • Kerbside green waste collection from residential households (food and garden organics); • Hunter Water and Sydney Water (biosolids); • Sawmills (wood residues); • Paper processors (paper crumble); • Infrastructure projects (drill muds); • Power stations (coal ash); • Mines (raw water); and • Food processors (organic fibrous material).	• Kerbside green waste collection from residential households (garden organics only); • Hunter Water and Sydney Water (biosolids); • Sawmills (wood residues); • Paper processors (paper crumble); • Infrastructure projects (drill muds); • Mines (raw water); and • Food processors (organic fibrous material).
Operational Equipment	• 1 x green waste shredder (if required); • 1 x trommel or stardeck screener; • 1 x 24 tonne excavator; • 3 x 33 tonne front end loader; • 1 x top turn windrow turner; • 2 x 15,000 litre water truck; and • 4 x light vehicles.	• 1 x green waste shredder (if required); • 1 x trommel or stardeck screener; • 1 x 24 tonne excavator; • 3 x 33 tonne front end loader; • 1 x top turn windrow turner; • 2 x 15,000 litre water truck; and • 4 x light vehicles.

ELEMENT	2019 EIS – PROPOSED DEVELOPMENT	REVISED DEVELOPMENT PROPOSAL 2022
Traffic Generation	Up to 146 movements per day	Up to 146 movements per day
Workforce	Up to 15 operational jobs	Up to 15 operational jobs

Advanced Environmental Dynamics (AED) have provided a memorandum to the *Greenspot Ravensworth Greenhouse Gas, Odour and Dust Assessment* (dated 9 August 2019), provided as an Appendix to the Proposal EIS in 2019. The AED memorandum, utilising specific odour emission rates (SOERs) from flux hood odour sampling undertaken at the Ravensworth Facility on 22 November 2018, determined that the revised Project would result in a decrease in odour emissions when compared to the results calculated under the 2019 EIS (see **Table 2**). In addition, Attachment C of the AED (2022) memorandum, provides odour contour modelling for both individual and cumulative impact scenarios. No sensitive receivers shown on Figure 6 (page 35) of the 2019 EIS for the Proposal will be impacted by odour, with 'impacted' defined as having an olfactory response (1 Odour Unit or above) as per the NSW Environment Protection Authority (EPA) document *Technical framework - Assessment and management of odour from stationary sources in NSW* (2006).

See **Appendix B** for the AED memorandum addressing predicted odour impacts under the current revised Project.

Table 2: Odour emission scenario – revised project (AED, 2022).

SOURCE ID	DESCRIPTION	SURFACE AREA (M^2)	SOER ($OUM^3/((M^2))(SEC)$)		ODOUR EMISSION RATE	
			During Working Hours	**Outside working hours**	**During Working Hours OU/s**	**Outside Working Hours OU/s**
Composting Area	Composting	45,360	0.034(1)	0.034(1)	1,542	1,542
	Freshly turned compost	8,640	0.041(1)	0.034(1)	354	294
	Product	12,000	0.032(1)	0.032(1)	384	384
Leachate Pond	Area	19,800	1.00(1)	1.00(1)	19,800	19,800
Site Total – Revised Project					**22,080**	**22,020**
Site Total – 2019 EIS					**23,485**	**22,387**
Note: (1) Based on site-specific odour sampling results taken 22 November 2018						

When comparing the information contained in **Table 2** above (revised project) with that provided in the AED assessment (2019 EIS), there is a net reduction in estimated odour emissions of 6% for the revised project.

Figure: 1	Original 2019 Layout	N	Source: Sources: Esri, HERE, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community, Esri, USGS, Maxar, NSW DFSI - 2021, RPS - 2019
	Nutrient Recycling Facility Lot 10 DP1204457, 74 Lemington Road, Ravensworth, NSW	User: deaneb Version 1 Date: 1/03/2022 11:00 AM	Scale: 1:6,500 0 50 100 150 200 Metres

Space Urban Pty Ltd
ABN: 43 644 377 293

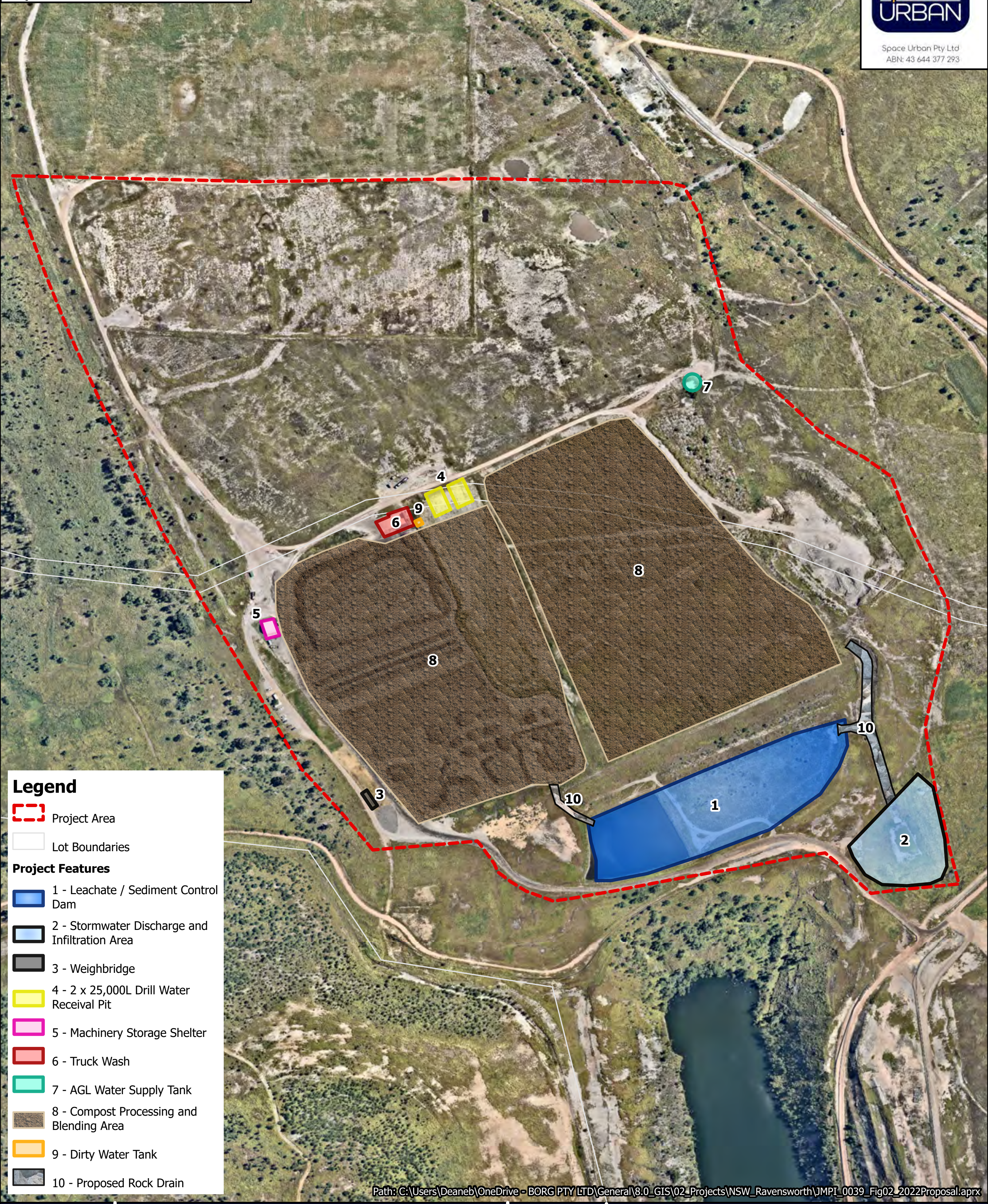

Figure: 2

Proposed Site Infrastructure & Layout - 2022

N

Source: Sources: Esri, HERE, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community, Esri, USGS, NSW DFSI - 2021, RPS -2019, Nearmap - 2022

Nutrient Recycling Facility
Lot 10 DP1204457, 74 Lemington Road, Ravensworth, NSW

User: deaneb

Version 1

Date: 21/04/2022 2:02 PM

Scale: 1:6,000

0 50 100 150 Metres

3 SUMMARY OF SUBMISSIONS RECEIVED

The submissions received in relation to the proposed development are summarised below in **Table 2**. Full details of the submissions and can be viewed on the DPE website at https://www.planningportal.nsw.gov.au/major-projects/project/10366 or attached as **Attachment 1** to this report.

Table 3: Summary of Received Submissions

SUBMISSION SOURCE	OBJECTION / COMMENTS
Public Authorities	
Department of Planning and Environment	Comments to be addressed (see **Section 3.1**)
Crown Lands NSW	No further comments to be addressed
Department of Primary Industries	No further comments to be addressed
Division of Resources and Geosciences	No further comments to be addressed
NSW Fire and Rescue	No further comments to be addressed
Rural Fire Service	No further comments to be addressed
Environment Protection Authority	Comments to be addressed (see **Section 3.2**)
Heritage NSW	No further comments to be addressed
Transport for NSW	Comments to be addressed (See **Section 3.3**)
Office of Environment and Heritage	No further comments to be addressed
Natural Resource Access Regulator / DoPIE Water	No further comments to be addressed
Singleton Council	Comments to be addressed (See **Section 3.4**)
Organisations	
Ausgrid	No further comments to be addressed
Public	
Anonymous	No further comments to be addressed

In total, fourteen (14) submissions were received for the development, including an RTS request from the DPIE (superseded by DPE). The breakdown includes twelve (12) submissions from public authorities (State and local), one (1) from an organisation (power asset owner), and one (1) from an anonymous member of the public. No objections to the Proposal were received. Of the fourteen (14) responses received, 4 government agencies have requested further information.

The government agency submissions requiring a response are discussed below in **Section 3**.

4 SUBMISSIONS REQUESTING ADDITIONAL ASSESSMENT

Submissions were received from twelve (12) government agencies following the public exhibition of the Proposal EIS, with four (4) of these agencies requesting further information. The issues raised by these four (4) agencies are detailed below in **bold with grey background**, followed by the response from the Proponent in normal text.

4.1 DPIE (NOW DPE)

The request received from DPIE (now DPE) requested clarification on a number of matters in relation to the operation of the expanded facility. The issues and responses are provided below.

4.1.1 Relationship with Council Approved Composting Facility

1. As the proposal relates to the expansion of an existing composting facility, the Department requests clarification on the proposed staging and relationship between the Council approved works and the new expanded proposal. This includes clarification on the timeframes for the construction of the leachate dam expansion (ie. the Stage 2 expansion) and how this relates to the surrendering of the Council consent.

Upon issue of the SSD project application, any DAs issued by Singleton Council that approve the current operations would be rescinded. The SSD project approval will replace and approve existing and proposed components of the development. This will provide better outcomes for operations, compliance, and reporting.

The expansion of the development would be a staged process over a 12 month period. The first component of the existing operations to be upgraded will be the expansion of the leachate dam (Stage 2) to the required capacity of 50.2ML. As was the case when the current development was approved, the EPA will require this dam is expanded prior to the commencement of increased operations onsite.

4.1.2 Air Quality and Odour

1. While the Department acknowledges the remote location of the site, the proposal involves the intensification of operations, the introduction of Food and Garden Organics (FOGO) and is in proximity to another composting facility (LOOP Organics). Further information on odour mitigation and control measures is requested as per the submission from the Environment Protection Authority (EPA).

The revised project no longer includes the intake of comingled food organics and garden organics (FOGO) and forced aeration composting will not form part of planned future operations. As such, the odour mitigation and control measures are considered to be adequate and in accordance with best practice. These mitigation measures include:

- Staff will receive training on methods to reduce odour generation,
- Onsite dams, stormwater, and leachate to be suitably managed through separation, reuse, and sampling,
- Only approved wastes will be accepted onsite,
- Windrows will be managed in accordance with site operational procedure for windrow construction and maintenance,
- All odorous wastes are to be mixed immediately with less odorous wastes to reduce odour generation. Where this is not possible odorous wastes will be covered temporarily with green waste or saw dust,
- Homogeneous mixing will be undertaken,
- Compost materials will be watered to a moisture content such as not to create an anaerobic environment, and
- Odour monitoring will be undertaken as required should an issue be identified at a sensitive receiver.

2. The EIS notes the existing environment has elevated levels of PM_{10} due to the surrounding mining operations. Further detail on dust mitigation and management is requested as per the submission from the EPA.

Dust mitigation measures to be implemented at the site will include:

- Hardstand pads and the internal roadways will be regularly watered to suppress dust using site water carts,
- Staff will undertake visual inspections of dust generation to ensure dust is not spreading beyond the site boundary,
- Loads leaving the site will be required to be watered and tarped to prevent dust generation,
- Windrows and stockpiles will be maintained by water cart and will have a minimum moisture content of 45%, with increased watering to occur prior to adverse weather conditions,
- A site weather station will be utilised to inform of onsite weather conditions which will dictate operational activities,

- During excessive wind conditions, loading activities will be reduced until more favourable conditions prevail,
- Staff will receive training on methods to reduce dust generation,
- Gravel or mulch will be spread to better contain fine soil particles, and
- Truck travel speeds on unpaved areas are capped at 40km.

4.1.3 Leachate

3. Specify how leachate will be treated or disposed.

Leachate from the expanded development will be captured in the existing leachate dam but with an increased capacity to accommodate the additional hardstand area. Water from this leachate dam will be used to maintain the compost moisture content as the pasteurisation process occurs. Therefore, there is no need to dispose of the leachate produced at the operations.

4. Provide clarification on the total volume of the expanded leachate dam. Section 3.2.2.3 of the EIS states the leachate dam has been sized to provide a minimum capacity for a 1 in 25 year, 24 hour rainfall event (approx. 50 ML). However, Section 3.10 of the EIS states the leachate dam will have an expanded capacity of 16 ML.

The leachate dam has been designed to a capacity of 50.2ML, however it has only been constructed to a capacity of 14.7ML as less than half of the hardstand area has been constructed and used under Singleton Council DA. The leachate dam will be expanded to 50.2ML to accommodate the entire design area. Refer to *Bettergrow Ravensworth Composting Facility - Sheets 1 to 6* prepared by Tony Mexon and Associates in Appendix C of the EIS.

The leachate dam capacity stated in Section 3.10 is an error.

4.1.4 Construction on Fly Ash

1. Clarification is required on whether there are any limitations associated with building structures on top of fly ash.

The design of the leachate barrier on the fly ash dam has been undertaken by RCA Australia and is provided in Appendix C of the EIS. There are proposed to be no permanent structures built on the void that would require excavation into the fly ash and the establishment of foundations. RCA prepared the design and verification report that certifies the compost pad and leachate barrier have been designed to specification. In addition, prior to the commencement of operations at the site it was a requirement of the EPA that this verification report be prepared and furnished to the EPA. A copy of this verification report prepared by RCA Australia is attached as Appendix C of the EIS.

4.2 NSW Environment Protection Authority

The submission received from the NSW Environment Protection Authority (EPA) requested further information on odour, dust, and mitigation measures. The detail on each issue and responses are provided below.

4.2.1 Air

1. Mitigation and management measures have not been benchmarked against best practise.

Recommendation: The EPA recommends that the proponent consider additional measures to minimise odour and provide an assessment against best management and technology of the proposed measures.

As Food Organics has been removed from this application the same mitigation measures described in the 2019 EIS still apply. These are:

- Staff will receive training on methods to reduce odour generation,
- Onsite dams, stormwater, and leachate to be suitably managed through separation of clean and leachate runoff, reuse, and sampling,
- Only approved wastes will be accepted onsite,
- Windrows will be managed in accordance with site operational procedure for windrow construction and maintenance,
- All odorous wastes are to be mixed immediately with less odorous wastes to reduce odour generation. Where this is not possible odorous wastes will be covered temporarily with green waste or saw dust,
- Homogeneous mixing will be undertaken,
- Compost materials will be watered to a moisture content such as not to create an anaerobic environment, and
- Odour monitoring will be undertaken as required should an issue be identified at a sensitive receiver.

2. Cumulative odour assessment scenario not presented

Recommendation: The EPA recommends that the proponent provide a more robust justification for not conducting a cumulative modelling scenario for odour. Where adequately robust justification is not available, the proponent must present a cumulative odour scenario.

The odour assessment has been updated in line with the revised project description, (ie. no Food Organics (FO)) and has also been revised to consider the cumulative impacts of both this development and the neighbouring LOOP Organics operation. Results of this revised odour assessment concluded that "*the net change in odour outcomes is considered to be immaterial compared with those presented in AED (2019) with results suggesting that cumulative impacts will be below detectable levels at the nearest receptor locations*". The revised odour assessment is provided as **Appendix B**.

3. The odour emissions inventory is based on site sampling and literature values

Recommendation: The EPA recommends that the odour sources are large and the compost input materials are variable, the proponent evaluate the potential variability in odour emission rates and adequately justify the odour emission rates used in dispersion modelling as representing reasonable worst-case conditions.

Prior to materials being received at the site, loads are checked and inspected before being unloaded. Suppliers are contractually bound to provide green waste materials that are not contaminated or contain 'non-approved' waste. This process ensures a consistency in the quality of material being received and ensures that odour generation is representative of odour modelling. Further, onsite odour sampling was undertaken to ensure the most representative odour emission rates were used for the modelling. Green waste material comes from Council green waste collections in NSW. Garden waste is generally the same from all sources, therefore there is very little variation in the materials received onsite. The **Odour Emissions Sampling** report is attached as **Appendix E**.

4. The AQIA models odour and dust dispersion for three years but has not correlated the meteorological data used for modelling against a longer-duration of at least five years

Recommendation: The EPA recommends that the proponent must correlate the modelled meteorological data against a longer-duration site-representative meteorological data of at least five years as required in the Approved Methods for the Modelling and Assessment of Air Pollutants in NSW ("Approved Methods").

The odour modelling has been updated in line with the revised project description and has also been modelled over a 5 year meteorological period. The revised odour assessment is provided as **Appendix B**.

5. $PM_{2.5}$ not assessed and incorrectly referenced as a NEPM advisory goal

Recommendation: The EPA recommends the proponent evaluate $PM_{2.5}$ emissions from the proposed expansion of the facility and provide an impact assessment for $PM_{2.5}$.

$PM_{2.5}$ has been assessed, with a revised dust addendum report attached as **Appendix D**.

In summary, results of the cumulative impact assessment determined the potential for slight increase in the predicted number of PM_{10} exceedance days during drought affected years based on a combination of daily varying background levels and model output. No additional exceedances are predicted associated with more 'typical' background dust levels for TSP, PM_{10} nor $PM_{2.5}$.

Results of the assessment suggest that the diligent watering of the haul road should be sufficient under typical environmental conditions. Under exceptional conditions (such as prolonged drought) the use of binders should be considered if conditions (based on visual inspection) suggest that the use of increased dust mitigation is warranted.

Detailed results are provided in **Appendix D**.

4.2.2 Other

1. It is recommended that the proponent revise the EIS to detail the expected quantity of each waste type proposed to be accepted at the premises, including the state of waste received (ie. raw, screened, processed, pre-blended, partially composted etc.)

Table 4 below details the state of each waste when arriving onsite.

Table 4: Waste type and state on receival

WASTE TYPE	ANNUAL AMOUNT (TPA)	STATE OF WASTE RECEIVED
Garden Organics	110,000	Mulched and screened
Biosolids	25,000	Dewatered – for blending
Paper Crumble	10,000	Shredded – for blending
Urban Wood Residue	2,500	Shredded – for blending

Natural Organic Fibrous Material	2,500	Shredded – for blending
Void Water from Void 4	25,000	Raw – for blending and compost maintenance
Animal Wastes (manure)	5,000	Raw – for blending
Hydro-excavated drilling mud	20,000	Raw – transfer only to another facility for processing
Total	**200,000**	

2. The EPA generally requires any processing or composting of food wastes to be conducted within an enclosed space. If the applicant wishes to deviate from this standard, it will be required to provide justified alternatives that can demonstrate the same level of control gained by enclosing the operation.

Food waste is no longer proposed to be accepted onsite under this application. This comment is now not relevant.

3. Include the categorisation of the various organic wastes proposed to be accepted (outlined in Section 9.13 of the EIS

Table 5 below details the wastes to be accepted and the waste classifications as updated for the revised project description.

Table 5: Waste types and classifications

WASTE TYPE	WASTE CLASSIFICATION
Garden Organics	General Solid Waste (non-putrescible)
Biosolids	General Solid Waste (putrescible)
Paper Crumble	General Solid Waste (non-putrescible)
Urban Wood Residue	General Solid Waste (non-putrescible)
Natural Organic Fibrous Material	General Solid Waste (non-putrescible)
Void Water from Void 4	Liquid Waste
Animal Wastes (manure)	General Solid Waste (putrescible)
Hydro-excavated drilling mud	Liquid Waste

4. Details of any liquid waste (including drill mud water) proposed to be accepted at the premises. These may impact licensing activities and sampling requirements.

It is proposed to accept drill mud at the site under "The Treated Drilling Mud Order 2014". Sources of this drill mud are naturally occurring rock and soil, shale, and clay from hydro-directional drilling, exploration drilling, and earthworks.

5. Regarding the proposed use of ash at the premises, more detailed information is required regarding the source, waste classification and chemical characteristics of this waste. Table 1 of the EPA's coal ash order 2014 is recommended to be used as a basis of the chemical characterisation.

As part of the revised project, it is not proposed to accept ash at the facility. This comment is now not relevant.

4.3 Transport for NSW

The submission received from Transport for NSW has requested further information on peak traffic periods, intersection assessment, and site access. The issues and responses are provided below.

1. The submitted TIA does not assess the PM peak hour impact, stating that AM is the critical peak. There is no evidence within the report to support this claim.

Pavey Consulting Services prepared a Traffic Impact Assessment to accompany the EIS for the Proposal (see Appendix J of EIS). This TIA was subsequently modified in October 2020 following receipt of the DPIE / DPE request for a RTS (dated 07/07/2020). See **Appendix C** for the updated TIA in full.

Figure 5.1 and Table 5.1 of the TIA, reproduced below in **Figure 3** and **Table 6**, show the total amount of vehicles utilising the New England Highway during morning peak (07:00 – 09:00) and afternoon peak (15:00 – 17:00) traffic periods. Morning traffic was measured on 10 February 2018 and afternoon traffic was measured on 20 May 2020 following receipt of the DPIE request for RTS. The updated TIA (**Appendix C**) provides an assessment of the impacts of the Proposal based upon the updated peak traffic modelling.

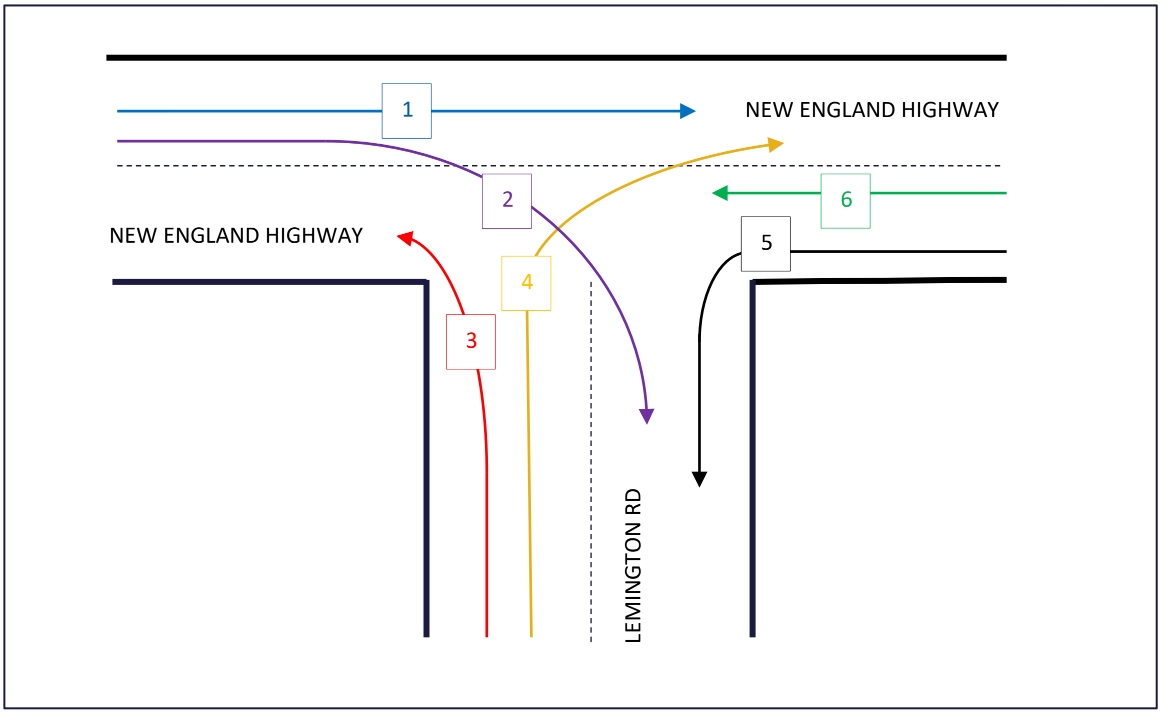

Figure 3: Intersection pathways

Table 6: AM and PM traffic counts

PATH	COUNT DATE 10.2.2018		COUNT DATE 20.5.2020	
	7 am to 8 am	8 am to 9 am	3 pm to 4 pm	4 pm to 5 pm
1 – Light Vehicle	229	464	516	633
1 – Heavy Vehicle	54	111	82	69
2 - Light Vehicle	8	9	12	11
2 - Heavy Vehicle	4	5	2	2
3 - Light Vehicle	17	4	20	19
3 - Heavy Vehicle	5	5	0	3
4 - Light Vehicle	33	15	86	112
4 - Heavy Vehicle	4	5	10	7
5 - Light Vehicle	33	29	4	16
5 - Heavy Vehicle	8	5	12	2
6 - Light Vehicle	371	290	260	303
6 - Heavy Vehicle	62	75	62	45

4.4 Singleton Council

The submission received from Singleton Council has requested further information on existing approvals, land use conflicts, protection of the environment, and potential local road impacts. The issues and responses are provided below.

4.4.1 Existing Approvals

1. Council requires further clarification on the interaction between the existing and future approval requirements, including the management plans and controls that will be required. This includes the controls that would be implemented to mitigate and manage the impacts of the proposed development.

Upon issue of the SSD project application, any DAs issued by Singleton Council that approve the current operations would be rescinded. The SSD project approval will replace and approve existing and proposed components of the development. This will provide better outcomes for operations, compliance, management, and reporting.

4.4.2 Land Use Conflict

2. The EIS does not include consideration of the impact of the existing and proposed development on surrounding land uses, including any future land use that may occur. Having regard to the zone objectives in the Singleton LEP, Council requires further clarification on the measures that have been put in place to evaluate and minimise potential land use conflicts.

The development is located within an area that is dominated by coal mining and heavy industrial activities, including power generation and related activities. As such the development is within a highly altered environment and is generally consistent with the surrounding land uses. The following land uses surrounding land uses include:

- Liddell and Bayswater Power Station, including Lake Liddell to the north-west,
- Liddell Coal Operations to the north-west,
- New England Highway to the east,
- Ravensworth North Open-cut Coal Mine to the west,
- Integra Coal Mine to the south-east, and
- Loop Organics Compost Facility to the south.

The closest sensitive receivers to the development are several rural residential properties at Camberwell Village which is approximately 7km to the south-east. These residential properties are neither impacted from a visual, acoustics, odour, or dust perspective by the development.

The site is zoned RU1 Primary Production under the Singleton Local Environmental Plan 2013. The objectives of the RU1 zone are:

- To encourage sustainable primary industry production by maintaining and enhancing the natural resource base,
- To encourage diversity in primary industry enterprises and systems appropriate for the area,
- To minimise the fragmentation and alienation of resource lands, and
- To minimise conflict between land uses within this zone and land uses within adjoining zones.

Composting operations are neither permissible with or without consent within the RU1 zone and as such are considered a prohibited land-use under the Singleton LEP. However, resource recovery including composting is permissible with consent within the RU1 zone under State Environmental Planning Policy (Planning Systems) 2021.

Measures implemented to minimise land use conflicts include:

- Substantial buffers between the facility and the New England Highway, residential areas, and mining operations,
- Implementation of operational environmental management procedures and mitigation measures,
- Establishment of the development on otherwise low value mined land,
- Re-use of mine water and leachate water onsite rather than capturing and harvesting clean surface water,
- Effective communication with neighbouring landowners and community, and
- Beneficial re-use of materials otherwise destined for disposal to landfill.

4.4.3 Protection of the Environment

1. The surface and groundwater management plan included in and referenced by the EIS appears to be the plan developed for the existing facility and submitted for previous DA140/2016, with the last amendment to the plan in August 2016. This plan should be updated to support the proposed development.

The surface and groundwater management plan would be updated as part of the post consent approvals for the SSD development. The existing surface and groundwater management plan was provided with the SSD application to demonstrate that there is currently a plan in place which would be updated accordingly following project approval.

2. The EIS states, in section 3.5.3 that the installation of additional water management works, expanded stormwater and leachate management systems will be undertaken in accordance with the existing development approval. Clarification is required as to how the current management controls will be adequate to cater for the increased generation of leachate proposed by the development.

The stormwater design for the Singleton Council DA was for both Stage 1 and Stage 2 area as approved. To date Stage 1 has only been constructed and the stormwater management commensurate with the Stage 1 development area has been installed. The total approved pad area under the Council DA is the same pad area for the expanded development under this SSD application. The stormwater management system will be expanded to its full design capacity once the pad area is expanded to its full extent. Accordingly, no further design or controls are required for stormwater management for the subject application as this has been accommodated for in the existing design.

3. The EIS states in section 9.7.1 that due to the remoteness of the facility and the nature and extent of proposed composting activities, no issues were identified in relation to emissions of greenhouse gases, odour or dust. Whilst this may be the case, the proposed development will increase throughput at the facility by 130,000 tonnes. As such, it is not clear how the current mitigation measure (for the 2016 approved development) will be sufficient to ensure compliance.

Food organics has now been removed from this application even though modelling indicated that food organics would not provide any impact at the closest residential receiver. Mitigation measures provided in the EIS for odour, greenhouse gas, and dust are considered industry best practice and are relevant to both the existing 76,000tpa development and the proposed 200,000tpa development.

The following odour mitigation will be implemented for the expanded development:

- Staff will receive training on methods to reduce odour generation,
- Onsite dams, stormwater, and leachate to be suitably managed through separation of clean and leachate runoff, reuse, and sampling,
- Only approved wastes will be accepted onsite,
- Windrows will be managed in accordance with site operational procedure for windrow construction and maintenance,
- All odorous wastes are to be mixed immediately with less odorous wastes to reduce odour generation. Where this is not possible odorous wastes will be covered temporarily with green waste or saw dust,
- Homogeneous mixing will be undertaken,
- Compost materials will be watered to a moisture content such as not to create an anaerobic environment, and
- Odour monitoring will be undertaken as required should an issue be identified at a sensitive receiver.

The following greenhouse gas mitigation will be implemented for the expanded development:

- Whenever practicable, vehicles to leave site with full loads to reduce the number of traffic movements and diesel consumption,
- All vehicles/plant and machinery will be turned off when not in use and regularly serviced in accordance with manufacturers specifications to ensure efficient operation,
- The use of alternative fuels and power sources for construction plant and equipment will be investigated and implemented, where appropriate.
- Recycled materials will be incorporated into the project where possible,
- The energy efficiency and related carbon emissions will be considered in the selection of vehicle and plant equipment,
- All vehicles and machinery will be fitted with OEM exhaust systems to ensure exhaust emissions are within accepted standards.

The following dust mitigation will be implemented for the expanded development:

- Hardstand pads and the internal roadways will be regularly watered to suppress dust using site water carts,
- Staff will undertake visual inspections of dust generation to ensure dust is not spreading beyond the site boundary,
- Loads leaving the site will be required to be watered and tarped to prevent dust generation,
- Windrows and stockpiles will be maintained by water cart and will have a minimum moisture content of 45%, with increased watering to occur prior to adverse weather conditions,

- A site weather station will be utilised to inform of onsite weather conditions which will dictate operational activities,
- During excessive wind conditions, loading activities will be reduced until more favourable conditions prevail, and
- Staff will receive training on methods to reduce dust generation.

4. Further information is required demonstrating the prevention measures that will be implemented to prevent material / matter being tracked by vehicles from the site.

Prior to leaving the site trucks will be washed down at the site vehicle wash which will remove any green waste from both inside the truck body and from the wheels and rims. Trucks will then exit the site via the existing access point on Lemington Road. The internal unsealed access road from the compost pad to the site access on Lemington road is approximately 2.5km in length and provides all weather access. This internal access road is regularly graded, maintained, and watered as part of the lease agreement with AGL Macquarie.

5. Further information is required demonstrating the prevention measures that will be implemented to prevent material from entering waterways and groundwater system, especially during the construction stage of the development.

Refer to **Table 7** below.

6. Additional information is required regarding the use and management of the vehicle wash-down bay, including how the bay will be monitored to ensure all vehicles utilising it are minimising the risk of material being transported offsite.

The site supervisor and site staff will be responsible for ensuring that all trucks utilise the vehicle wash prior to leaving the site. As part of weighing out the trucks on the weighbridge, the weighbridge operator will inspect the truck to ensure that it has been adequately cleaned before permitting the driver to leave. If the truck is not adequately cleaned the driver will be directed back to the vehicle wash.

As part of the post approvals for the site, a Vehicle Wash procedure will be prepared and implemented.

7. Additional information is required on the measures that will be implemented during construction to minimise impacts to the environment, including sediment and erosion controls.

Refer to **Table 7** below.

8. Additional information is required on the measures that will be implemented to prevent soil contamination, particularly from fuel and chemical storage areas, materials bought into the facility and construction activities.

The following mitigations measures present in **Table 7** below were provided as part of the Surface Water Assessment and the Ground Water Assessment prepared for the EIS.

Table 7: Surface water and groundwater mitigation measures

POTENTIAL IMPACT	MITIGATION MEASURES
Pollution from sedimentation, oil/chemical spills and gross pollutants	• Surface and Groundwater Management Plan to be updated to include the expanded facility • Limit fuels and chemicals stored onsite to a minimum • All required chemicals and fuels must be located within a bunded enclosure located away from drainage lines and stormwater drains • Plant and equipment must be regularly inspected and serviced to limit risk of oil loss • Refuelling of vehicles or machinery is to occur within a containment or hardstand area • designed to prevent the escape of spilled substances to the surrounding environment • Wash down areas must be appropriately constructed to capture and treat all wastewater, with collected solid material disposed off-site to a licensed facility • All staff to be appropriately trained in the spill response plan for the minimisation and management of unintended spills • A high standard of site housekeeping is to be maintained to limit risk of gross pollutants entering surface waters (i.e. construction waste, litter) • All reasonable and practicable measures must be taken to prevent pollution of any existing waterways as a result of silt or untreated leachate run-off, and oil or grease spills from any machinery • Wastewater for cleaning equipment must not be discharged or indirectly to any watercourses or stormwater systems

	• Exposed bare earth areas within the composting facility site must be minimised. Unused areas are to be revegetated
Contamination of clean storm water with organics processing increasing leachate volumes	• The facility must be designed to prevent surface water from mixing with the organics received and processed at the premises and the final products, process residuals and contaminated materials stored at the premises. This includes: ○ Drains and spillways ○ Bunding ○ Sediment controls during construction • Clean stormwater must be diverted around waste and leachate catchments through the installation of clean water catch drains and diversion bunds
Increased soil infiltration of contaminated surface water and leachate	• Maintain surface gradient of the hardstand pad and orientation/geometry of windrows to minimise leachate generation and to ensure that leachate flows directly to the primary detention basin without mixing with compost organics • Maintain all water related infrastructure, during construction and operation of expanded infrastructure, and operation, designed to maximise runoff and reduce infiltration including: ○ Low permeability base in the composting processing areas ○ Lining of the leachate dams ○ Bunding and arrangement of windrows ○ Perimeter bunding and diversion drains
High contaminant load in leachate	• Procedures for testing, treatment and discharge of leachate to be established and implemented, including monitoring anaerobic conditions • Undertake aeration of the leachate dam (increase oxygen) if required (i.e. if hydrogen sulphide, dissolved oxygen or pH levels are outside limits)
Uncontrolled releases of contaminates through the bed and banks of the onsite basins or through poorly maintained hardstand pads, bunding and stormwater drains	• Monitor water levels of the detention basin to ensure that the water levels do not drop below the anticipated use of water for composting and evaporation • Maintain integrity of hardstand pad by repairs to areas damaged by plant and machinery movements • Ensure drains and surface water gradients are free of excess vegetation and debris so that the flow of stormwater or leachate is not impeded, and the moisture / compaction levels achieved in embankment construction are maintained • Regular inspections of onsite infrastructure and structural integrity of drains, hardstand, and leachate dam • Repair and maintain any cracks observed in the base and side walls of the dam using clay, preferably bentonite or bentonite clay mixture
Contamination due to poor waste management	• Waste to be accepted at the facility is to be in accordance with the EPA licence. Waste must be effectively vetted so prohibited wastes are not accepted at the facility • Waste is only to be received, stored, or processed in areas where the leachate barrier has been installed • Monitoring of pollutants must be undertaken as per EPL 7654
Surface and groundwater contamination from leachate	• Leachate collection and storage facilities must be maintained to collect and impound all leachate in accordance with the design storm event • Leachate is not to be used for dust suppression on haul roads • Leachate is to be recycled through moisture conditioning of compost, to drawdown on basin volumes and ensure the design capacity of the basin is maintained for future storm events • Management of windrows and gradients to ensure no ponding or pooling occurs • Depressions must be filled promptly by using screened or sieved overburden • All water that has entered processing and storage areas and water that has been contaminated by leachate must be handled and treated in the same manner as leachate
Ineffective collection and storage of leachate	• Leachate must be collected and stored in a lined basin capable of capturing the 1% AEP, 24-hour runoff event. The hardstand pad and basin liner shall be constructed recompacted overburden/clay with an in-situ permeability (K) of less than 1x10–9 m/s in accordance with Aurecon (2017) • The leachate dam must be designed in accordance with AS 3798-2007 – Guidelines on Earthworks for Commercial and Residential Developments • Leachate basin is to be regularly desilted in order to maintain design storage capacity, without compromising basin liner integrity

9. The EIS identifies that the expansion works were assessed for leachate and groundwater impacts. However, the EIS does not provide an adequate assessment of the effectiveness of the controls that were implemented, and what, if any, additional control measures are required as a result of the proposed development. This includes limited information on the structural integrity of leachate and surface water containments, seepages, and leakage.

The stormwater design for the Singleton Council DA was for both Stage 1 and Stage 2 area as approved. To date Stage 1 has only been constructed and the stormwater management commensurate with the Stage 1 development area has been installed. The total approved pad area under the Council DA is the same pad area for the expanded development under this SSD application. The stormwater management system will be expanded to its full design capacity once the pad area is expanded to its full extent. Accordingly, no further design or controls are required for stormwater management for the subject application as this has been accommodated for in the existing design.

Chapter 5 of the Surface Water Impact Assessment provided as Appendix H to the EIS discussed, in detail, the expansion of the surface water management infrastructure and the adequacy of this infrastructure.

Refer to **Table 7** below for surface and groundwater mitigation measures provided as part of the EIS.

10. As with other management plans, the water management plans being relied upon for the proposed development are those that were prepared for the original approval. It is not clear whether the controls identified are adequate to mitigate the impacts of the proposed development, particularly where the EIS acknowledges that there will be a greater risk of leachate seepage.

The surface and groundwater management plan would be updated as part of the post consent approvals for the SSD development. The existing surface and groundwater management plan was provided with the SSD application to demonstrate that there is currently a plan in place which would be updated accordingly following project approval.

11. The EIS states in section 9.1.4.3 that the cumulative impacts of odour have not been explicitly modelled, as they are expected to be minimal, and relies on a management plan developed for the original development, that does not take into account the additional tonnage or material types to be processed on the site. The proposed odour impacts from a different array of material sources should be assessed and where required additional controls implemented. Section 9.1.5.1.4 assess dust based on peak traffic movements of 108, not 146, which requires clarification.

This application no longer proposes to accept food organics at the site.

The odour assessment has been updated in line with the revised project description, (ie. no Food Organics (FO)) and has also been revised to consider the cumulative impacts of both this development and the neighbouring LOOP Organics operation. Results of this revised odour assessment concluded that "*the net change in odour outcomes is considered to be immaterial compared with those presented in AED (2019) with results suggesting that cumulative impacts will be below detectable levels at the nearest receptor locations*". The revised odour assessment is provided as **Appendix B**.

As Food Organics has been removed from this application the same mitigation measures described in the 2019 EIS still apply. These are:

- Staff will receive training on methods to reduce odour generation,
- Onsite dams, stormwater, and leachate to be suitably managed through separation of clean and leachate runoff, reuse, and sampling,
- Only approved wastes will be accepted onsite,
- Windrows will be managed in accordance with site operational procedure for windrow construction and maintenance,
- All odorous wastes are to be mixed immediately with less odorous wastes to reduce odour generation. Where this is not possible odorous wastes will be covered temporarily with green waste or saw dust,
- Homogeneous mixing will be undertaken,
- Compost materials will be watered to a moisture content such as not to create an anaerobic environment, and
- Odour monitoring will be undertaken as required should an issue be identified at a sensitive receiver.

12. The existing composting management plan does not include the inclusion of the new waste types; Food and Garden Organics (FOGO) nor does it reference or provide information regarding the proposed forced aeration method. As identified, existing management plans and controls should be updated.

Food organics are no longer part of this application.

The compost management plan would be updated as part of the post consent approvals for the SSD development. The existing compost management plan was provided with the SSD application to demonstrate that there is currently a plan in place which would be updated accordingly following project approval.

13. Further information is required on the management of residual wastes generated at the site, including expected contamination rates and management.

There is very little residual waste generated from the receipt of green waste at the site due to the inspection protocol. Prior to green waste arriving at the site and being unloaded the load is visually checked for contamination by both eye and by camera. In some instances, the source from where the green waste is originating may also be inspected prior to loads being delivered. Should the load not pass the requirements to be received (ie. contamination with other wastes) the load will be rejected. The existing operations at the site currently use this inspection and rejection system. In the unlikely event that the load is heavy contaminated once unloaded, the load will be rejected and reloaded to the truck from which it was delivered and removed from site by the driver. Further detail on load inspection was provided in Section 9.13.7 of the EIS and in the Compost Management Plan that was provided as Appendix Q to the EIS.

Where contamination is minor and the load is accepted, the contamination will be handpicked from the green waste once unloaded and placed into an onsite front lift bin for disposal to landfill. On average there is one front lift bin removed from site per week currently for the 76,000tpa operation. This may increase to bins for the expanded operation.

14. The life of the facility has not been quantified, nor the duration sought for the approval. As such, there is limited information on the decommissioning and rehabilitation of the site once operations cease. Council and the community should be consulted during these phases of the operational life.

The expanded composting operations would have an operational life of 20+ years. As the need for waste recycling increases and the mining sector declines in the Hunter region there will be a requirement for increased recycling capacity and the need for new and ongoing industries in the surrounding area. This development will not only increase waste recycling capacity but will also provide a viable industry on otherwise unusable mining land. A capped and rehabilitated ash void has minimal future use. The compost operation on the ash dam makes use of otherwise unusable land. The operation of the development also supports the NSW governments Waste and Sustainable Materials Strategy 2041.

With regard to decommissioning and rehabilitation of the site, the EIS provided an overview of the process for decommissioning and rehabilitation. This was provided in Section 3.13 of the EIS. Closer to the formal closure of the site (within 5 years) a detailed decommissioning and closure plan would be prepared in consultation with the landowner, Council, DPE, and relevant stakeholders.

As a post approval requirement, a Concept Decommissioning and Closure Plan would be prepared prior to the operation of the expanded development.

15. The existing facility is located within a Phylloxera Exclusion Zone, and council notes that material imported into the facility can come from areas that are Phylloxera infested, including the Sydney Basin. Council requires clarification on the current and future proposed controls for ensuring that the facility and its products will be Phylloxera free and will not pose and risk to the internationally recognised viticultural region of the Hunter Valley, including pathogen management and any adaptive management responses should Phylloxera be detected at the site.

Materials received at the facility will not be coming from areas that are considered to be high risk for Phylloxera. In any case, the temperatures that are achieved during the composting process would destroy any presence of Phylloxera.
A critical factor in phylloxera mortality is temperature, and the upper thermal limit of all phylloxera life stages has been shown to be between 36°C and 40°C. Temperatures during pile or windrow composting reach maximums > 70°C for several consecutive days. Temperature is the most critical factor in destroying pathogens and weeds and is also relevant to the risk of phylloxera surviving the composting process. Studies show that temperatures reached during composting are sufficient to ensure that phylloxera do not survive under conditions typical of turned windrows (NSW Agriculture, 2002).

Australian Standard (AS) 4454 -2012 requires that all compost material be subjected to pasteurisation temperatures > 55°C for no less than three consecutive days prior to windrow turning, or by an equivalent thermal process. The time at temperature requirements of AS 4454 are well beyond those for heat treatment disinfestation procedures as outlined in the Australian National Phylloxera Management Protocol (NVHSC 2009).

Composting activities onsite are and will continue to be undertaken in accordance with AS 4454 and EPA composting guidelines. Refer to Appendix Q of the EIS which provides a site Compost Management Plan for the existing operations. This CMP will be updated for the expanded project and will continue to be implemented onsite.

4.4.4 Potential Impacts to the Local Road Network

1. The original development approved 16 heavy vehicles per day, and a subsequent modification increased this to 40 heavy vehicles per day. This proposed development is seeking approval for up to 146 heavy vehicle movements per day, and the EIS concludes that this increased traffic will not adversely impact the existing road network. The traffic assessment includes assessment of impacts to the New England Highway and Lemington Road. However, there are other local roads that will be used to transport material from the site. These roads have not been assessed for impact.

A revised traffic assessment has been prepared and is attached as **Appendix C**. This assessment considers impacts to other transport routes as requested by Council.

2. The EIS states that the key dust sources on site is the haulage route, which is unsealed, and concludes that no additional controls are required, as the development is remote. However, the assessment does not take into consideration the cumulative impacts, particularly considering the surrounding sources. Nor does the EIS consider the adequacy or effectiveness of the current controls, and the ability of these controls to manage and mitigate the increased impacts expected from the proposed development.

Cumulative dust impacts have been assessed, with a revised dust addendum report attached as **Appendix D**.

In summary, results of the cumulative impact assessment determined the potential for slight increase in the predicted number of PM_{10} exceedance days during drought affected years based on a combination of daily varying background levels and model output. No additional exceedances are predicted associated with more 'typical' background dust levels for TSP, PM_{10} nor $PM_{2.5}$.

Results of the assessment suggest that the diligent watering of the haul road should be sufficient under typical environmental conditions. Under exceptional conditions (such as prolonged drought) the use of binders should be considered if conditions (based on visual inspection) suggest that the use of increased dust mitigation is warranted.

Detailed results are provided in **Appendix D**.

The following existing and additional mitigation measures will be adopted at the site for the management of dust:

- Traffic will be limited to designated internal roadways,
- Traffic speed for onsite vehicles will be limited to 40km/hr to minimise dust release,
- Hardstand areas (including trafficable areas) will be visually monitored and regularly wetted through the use of the water cart,
- The operation will have a full time person designated to watering the internal roads on a continual basis,
- Daily evaporation to be considered when applying water as a dust suppressant,
- Proprietary products will be considered to seal the surface of trafficable areas as necessary,
- Dust suppression water will be sourced from the onsite void of from the 300,000 litre storage tank to reduce vehicle distance travelled,
- The water cart will be regularly maintained to ensure it is working effectively. The Site Manger will be advised if equipment if not in working order or if watering becomes ineffective,
- Handheld hoses will be used during the unloading of dry solid waste(s) where required,
- Sprays will be used at the exit point of the trommel/screening deck to reduce dust generation,
- Screening, turning, and mixing activities will not be conducted when wind speeds are excessive, and
- The moisture content of windrows will be maintained such that dust is not liberated when turning, mixing or movement of the windrow occurs.

5 CONCLUSIONS

The information provided in this RTS document has been developed to respond to regulator concerns and questions raised in their submissions to the Project EIS. A considerable amount of information provided in this RTS document has been drawn from the original EIS, while other information has been developed and prepared to address specific concerns raised.

Based on the information provided in the EIS, and the additional information provided in this report, it has been demonstrated that the proposal will not result in significant impacts to the environment through the implementation of management and mitigation strategies. The development is considered an appropriate use for the existing site, has positive social and resource recovery benefits for the region, and is in the best interest of the public, environment, and sustainability.

The proposal provides enhanced social and economic benefits by increasing the processing capacity for organic waste into recycled materials, thereby reducing the amount of waste going to landfill, and increasing availability of recycled products. Utilisation of recycled materials contributes to the conservation of natural resources and biodiversity and is consistent with the principles of Ecologically Sustainable Development and NSW government waste initiatives.

6 REFERENCES

- AED (2022a). *Greenspot Ravensworth Greenhouse Gas, Odour, and Dust Assessments AED Report# 957002.1 – Update 2022*.
- AED (2022b).*Greenspot Ravensworth Greenhouse Gas, Odour and Dust Assessments AED Report# 957002.1 – Update 2022: Dust.*
- National Vine Health Steering Committee (2009). *National Phylloxera Management Protocol*.
- NSW Agriculture (2002). *Phylloxera Mortality and Temperature Profiles in Compost,* Australian Journal of Grape and Wine Research.
- NSW EPA (2006). *Technical Framework - Assessment and management of odour from stationary sources in NSW*, Department of Environment and Conservation (NSW), ISBN 1741374596.
- NSW Primary Industries (2020). *Managing farm-related land use conflicts in NSW*, Research Report – Australian Farm Institute.
- Pavey (2020). *Traffic Impact Assessment*, Greenspot Hunter Valley – Nutrient Recycling Facility.

Appendix A Submissions Received

Planning, Industry & Environment

Mr John Vyse
Bettergrow Pty Ltd
48 INDUSTRY ROAD
VINEYARD NSW 2765

07/02/2020

Dear Mr Vyse

Ravensworth Composting Facility Expansion (SSD-9418)
Response to Submissions

The exhibition of the development application including the Environmental Impact Statement (EIS) for the above proposal ended on 31 January 2020. All submissions received by the Department of Planning, Industry and Environment (the Department) during the exhibition of the proposal are available on the Department's website at https://www.planningportal.nsw.gov.au/major-projects/project/10366.

Please be advised the Department is also awaiting a formal submission from Singleton Council. The Department will forward these comments to you for consideration upon receipt.

The Department requires that you provide a response to the issues raised in those submissions, in accordance with clause 85A(2) of the Environment Planning and Assessment Regulation 2000 (the Regulation). Please provide a response to the issues raised in these submissions by 30 April 2020. You are also requested to submit additional information that effectively addresses the issues identified in **Attachment 1**.

If there are any changes to the scope of the development which substantially change the environmental impacts of the development as outlined in the EIS, exhibition of the proposed changes may be required in accordance with Schedule 1 of the *Environmental Planning and Assessment Act 1979*.

Note that under clause 113(7) of the Regulation, the days occurring between the date of this letter and the date on which your response to submissions is received by the Planning Secretary are not included in the deemed refusal period.

If you have any questions, please contact Bianca Thornton, who can be contacted on 02 8217 2040 or at bianca.thornton@planning.nsw.gov.au.

Yours sincerely

Chris Ritchie
Director
Industry Assessments

as delegate for the Planning Secretary

Enclosed/Attached: Department's Comments

ATTACHMENT 1
Department's Comments

Relationship with the council approved composting facility

1. As the proposal relates to the expansion of an existing composting facility, the Department requests clarification on the proposed staging and relationship between the council approved works and the new expanded proposal. This includes clarification on timeframes for the construction of the leachate dam expansion (ie the Stage 2 expansion) and how this relates to the surrendering of the council consent.

Air quality and odour

2. While the Department acknowledges the remote location of the site, the proposal involves the intensification of operations, the introduction of Food and Garden Organics (FOGO) and is in proximity to another composting facility (Loop Organics). Further information on odour mitigation and control measures is requested as per the submission from the Environment Protection Authority (EPA).
3. The EIS notes the existing environment has elevated levels of PM_{10} due to surrounding mining operations. Further detail on dust mitigation and management is requested as per the submission from the EPA.

Leachate

4. Specify how leachate will be treated or disposed.
5. Provide clarification on the total volume of the expanded leachate dam. Section 3.2.2.3 of the EIS states the leachate dam has been sized to provide a minimum capacity for a 1 in 25 year, 24 hour rainfall event (approx. 50 ML). However, section 3.10 of the EIS states the leachate dam will have an expanded capacity of 16 ML.

Construction on fly ash

6. Clarification is required on whether there are any limitations associated with building structures on top of fly ash.

OUT19/15828

Bianca Thornton
Environmental Assessment Officer
Industry Assessments
NSW Department of Planning and Environment

bianca.thornton@planning.nsw.gov.au

Dear Ms Thornton

Ravensworth Composting Facility Expansion (SSD-9418) (Singleton Shire). EIS Exhibition

I refer to your email of 20 November 2019 to the Department of Planning, Industry and Environment (DPIE) Water and the Natural Resources Access Regulator (NRAR) about the above matter.

The following recommendation for you to consider is provided by DPIE Water and NRAR. Please note Crown Lands, the Department of Primary Industries (DPI) – Fisheries and DPI - Agriculture all now provide a separate response directly to you.

Pre-approval

Under the *Water Management Act 2000* the take of water stored in Void 4 is a licensable requirement and is to be accounted for against a water access licence (WAL). Therefore it is recommended that:

- The proponent identifies the WAL to which the estimated take of 125 ML/year water is to be accounted against.

Any further referrals to DPIE – NRAR & Water can be sent by email to: landuse.enquiries@dpi.nsw.gov.au.

Any further referrals to (a) Crown Lands; (b) DPI – Fisheries; and (c) DPI – Agriculture can be sent by email to: (a) lands.ministerials@industry.nsw.gov.au; (b) ahp.central@dpi.nsw.gov.au; and (c) landuse.ag@dpi.nsw.gov.au respectively.

Yours sincerely

Simon Francis
Senior Project Officer, Assessments
Water – Strategic Relations
14 February 2020

DOC19/1100954

DIVISION OF RESOURCES & GEOSCIENCE ADVICE RESPONSE

Bianca Thornton
Energy & Resource Assessments - Planning & Assessment Division
Department of Planning, Industry and Environment
GPO Box 39
SYDNEY NSW 2001

bianca.thornton@planning.nsw.gov.au

Dear Bianca

Project: Ravensworth Composting Facility Expansion
Stage: Advice on Environmental Impact Statement
Development Application: SSD-9418

I refer to your correspondence dated 20 November 2019 inviting the Division of Resources & Geoscience to provide comments on the Ravensworth Composting Facility Expansion (the Project).

The Division has no resource sterilisation issues with the Project as it currently stands at the time of this assessment and is satisfied with the information presented in the Environmental Impact Statement.

The Division requests that the proponent consider potential resource sterilisation should any future biodiversity offset areas be considered/required. The proponent must consult with the Division's Land Use Assessment team and any holders of existing mining or exploration authorities that could be potentially affected by the proposed creation of any such biodiversity offsets, prior to creation occurring. This will ensure there is no consequent reduction in access to prospective land for mineral exploration or potential for the sterilisation of mineral and extractive resources.

The Division requests to review the draft conditions of approval before finalisation and any granting of development consent.

For further enquiries and advice in relation to this matter, please contact Adam W. Banister, Senior Advisor - Assessment Coordination Unit – Resource Assessments on 02 4063 6534 or assessment.coordination@planning.nsw.gov.au.

Yours sincerely

Scott Anson
Manager Assessment Coordination
Resource Operations
Division of Resources & Geoscience
18 December 2019

for
Stephen Wills
Executive Director Resource Operations
Division of Resources & Geoscience

NSW EPA

Our Ref:DOC20/61131

Industry Assessments
Department of Planning, Infrastructure and Environment
GPO Box 39
SYDNEY NSW 2000

Att: Bianca Thornton
bianca.thornton@planning.nsw.gov.au

23 January 2020

Dear Sir/Madam

Further Information Required – SSD-9418 - Ravensworth Composting Facility Expansion

Thank you for inviting the Environment Protection Authority (**EPA**) to comment on the state significant development proposal for Bettergrow Pty Ltd to expand operations at the Ravensworth Composting Facility. The EPA has reviewed the proposal on exhibition, including the Environmental Impact Statement (EIS) prepared by RPS Group dated 14 November 2019.

The EPA understands the proposal involves:

- Increasing the composting capacity of the existing facility from 76,000 tonnes per annum (tpa) to 200,000 tpa;
- The addition of new waste types (including food organics and drilling mud) into the composting waste stream;
- Upgrading existing facilities and expansion of operational areas;
- Installation of a single lane weighbridge, wash bay, 2 x 50,000 litre drill mud process water storage tanks;
- Construction of a machinery shelter and receivals shelter; and
- Commissioning of Stage 2 of the development as approved in DA140/2016.1 and DA140/2016.2 by Singleton Shire Council.

The subject site operates under Environment Protection Licence 7654 (**the Licence**), and if the proposal is approved, the licensee will need to apply for the Licence be varied to include the increase in capacity and operations. Following review of the EIS, the EPA requires further information from the proponent before determining whether the EPA can vary the Licence.

Noise

The EPA provides the following comments and recommendations for noise impacts:

- The review of the noise impact assessment indicates that due to the distance between the facility and the nearest noise sensitive receiver, there will be little to no audible noise from the development.
- As the predicted noise levels from the site are well below the project trigger noise levels, and in some cases are predicted to be inaudible, the required compliance reporting that comes along with noise conditions in a licence would largely be unnecessary.

Phone	131 555	**Fax**	02 4908 6810	Po Box 488G	117 Bull St	**info@epa.nsw.gov.au**
Phone	02 4908 6845	**TTY**	133 677	Newcastle	Newcastle West	**www.epa.nsw.gov.au**
		ABN	43 692 285 758	NSW 2300 Australia	NSW 2302 Australia	

- The EPA does note that a sleep disturbance assessment has not been undertaken for the site as "*a majority of site operations takes place during the day period*". Although the night period noise emissions are likely to be well below the L_{Amax} 52 dB assessment noise level set out in the Noise Policy for Industry, the EPA notes that the noise impact assessment should contain sleep disturbance assessments whenever night time operation is expected.
- As such, there are no noise conditions recommended for the proposal to be incorporated into the Licence and no further information is requested.

Water

The EPA is satisfied with the water assessments and management plans submitted with the EIS, when applied in conjunction with existing licence conditions and requirements within the Stage 2 approvals of development consent.

Air

The EIS and Air Quality Impact Assessment (**AQIA**) does not provide the information required to consider the matters set out under section 45 of the *Protection of the Environment Operations Act* 1997 (**the Act**). In particular, the AQIA does not adequately:

- Described odour mitigation and management measures.
- Benchmark odour mitigation and management measures against best practice (namely the enclosure or covering of food waste composting).
- Provided sample testing reports to verify emission rates from site sampling.
- Consider cumulative odour impacts resulting from the neighbouring compost facility.
- Assess the model generated meteorological data used in the dispersion assessment against longer-term (minimum five years) meteorological data as required in the Approved Methods.

In addition, the dust assessment has not assessed $PM_{2.5}$ and incorrectly referenced the guideline.

Detailed comments on air impacts of the proposal and the shortfalls of the AQIA are provided for the proponent at Attachment A.

Other

Further comments and recommendations from the EPA:

- It is recommended the proponent revise the EIS to detail the expected quantity of each waste type proposed to be accepted at the premises, including the state of the waste received (i.e. raw, screened, processed, pre-blended, partially composted etc.).
- The EPA generally requires any processing or composting of food wastes to be conducted within an enclosed space. If the applicant wishes to deviate from this standard, it will be required to provide justified alternatives that can demonstrate the same level of control gained by enclosing the operation.
- Include the categorisation of the various organic wastes proposed to be accepted (outlined in section 9.13 of the EIS).
- Details of any liquid waste (including drill mud water) proposed to be accepted at the premises. These may impact licensing activities and sampling requirements.
- Regarding the proposed use of ash at the premises, more detailed information is required regarding the source, waste classification and chemical characteristics of this waste. Table 1 of the EPA's coal ash order 2014 is recommended to be used as a basis of the chemical characterisation.

On receipt of the information requested in this letter and any submissions on the proposal, the EPA will reassess the proposal and provide Planning with further comments for consideration. If the proposal is approved, the licensee must apply to the EPA separately to vary the Licence before any works in the proposal can commence.

If you have any questions in relation to this matter, please call me on 02 4908 6892.

Yours faithfully,

MELISSA MOORE
A/Unit Head Waste Compliance Newcastle
<u>Environment Protection Authority</u>

<u>**Attachment A – Comments and Recommendations for Air Impacts**</u>

Section 45 of the Act sets out matters that the EPA must consider when making licensing decisions, including:

- the pollution caused or likely to be caused by the carrying out of the activity or work concerned and the likely impact of that pollution on the environment; and
- the practical measures that could be taken to prevent, control, abate or mitigate that pollution, and to protect the environment from harm as a result of that pollution.

The EIS and AQIA do not provide the information required to consider these matters.

1. Mitigation and management measures have not been benchmarked against best practise

The EPA advises that the *Technical framework: Assessment and management of odour from stationary sources in NSW* ("Odour Technical framework") states that the odour benchmark is whether best management practises and best available technology are being used to minimise odour.

The EPA advises that best available technology for diffuse emissions such as compositing includes storing, treating and handling waste and material in enclosed buildings, maintaining enclosed buildings under adequate pressure and collecting and directing emissions to an appropriate abatement system via air extraction (Best Available Techniques (BAT) Reference Document for Waste Treatment, Industrial Emissions Directive 2010/75/EU (Integrated Pollution Prevention and Control) 2018, European Commission.

The AQIA has not adequately described the mitigation and management of odour from the facility and the proposed expansion and has not benchmarked the management and technology to minimise odour against best practise.

<u>*Recommendation*</u>

The EPA recommends that the proponent consider additional measures to minimise odour and provide an assessment against best management and technology of the proposed measures.

2. Cumulative odour assessment scenario not presented

The EPA advises that the Odour Technical framework requires a cumulative odour assessment where activities with similar odour characteristics exist in the region.

The assessment has not included Loop Organics, a neighbouring composting facility, in a cumulative modelling scenario. Justification presented for the omission of a cumulative assessment scenario, including the minimal odour from Loop Organics, is not adequate.

<u>*Recommendation*</u>

The EPA recommends that the proponent provide a more robust justification for not conducting a cumulative modelling scenario for odour. Where adequately robust justification is not available, the proponent must present a cumulative odour scenario.

3. The odour emissions inventory is based on site sampling and literature values

The proponent must provide odour testing reports to validate the odour rates obtained from samples measured on site and used for odour dispersion modelling in the assessment.

<u>*Recommendation*</u>

The EPA recommends that as the odour sources are large and the compost input materials are variable, the proponent evaluate the potential variability in odour emission rates and adequately justify the odour emission rates used in dispersion modelling as representing reasonable worst-case conditions.

4. **The AQIA models odour and dust dispersion for three years but has not correlated the meteorological data used for modelling against a long-duration of at least five years**

The AQIA generated and used meteorological data from models to assess dispersion of odour and dust. Only three years of meteorological data from Camberwell OEH station was provided to evaluate that the site-representative data adequately describes the expected meteorological patterns of the site.

Recommendation

The EPA recommends that the proponent must correlate the modelled meteorological data against a longer-duration site-representative meteorological data of at least five years as required in the *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW* ("Approved Methods").

5. **$PM_{2.5}$ not assessed and incorrectly referenced as a NEPM advisory goal**

The AQIA has not assessed $PM_{2.5}$ as it states combustion-type emission sources are more likely to contribute to impacts in the $PM_{2.5}$ range.

The EPA advise that $PM_{2.5}$ is now a criteria pollutant as per the Approved Methods and has 24-hour and annual impact assessment criteria of 25 $\mu g/m^3$ and 8 $\mu g/m^3$, respectively.

Recommendation

The EPA recommends the proponent evaluate $PM_{2.5}$ emissions from the proposed expansion of the facility and provide an impact assessment for $PM_{2.5}$.

NSW GOVERNMENT | Planning, Industry & Environment

Our ref: DOC19/1014214-10
Your ref: SSD-9418

Ms Bianca Thornton

Environmental Assessment Officer
Industry Assessments
Department of Planning, Industry and Environment
320 Pitt St
SYDNEY NSW 2000
bianca.thornton@planning.nsw.gov.au

Dear Bianca

Ravensworth Composting Facility Expansion (SSD-9418) – Review of Environmental Impact Statement

I refer to your e-mail dated 20 November 2019 in which the Energy and Resources Division (ERD) of the Department of Planning, Industry and Environment (the Department) invited Biodiversity and Conservation Division (BCD) of the Department for advice in relation to the Ravensworth Composting Facility Expansion Project. BCD have reviewed the Environmental Impact Statement for this project in relation to impacts to Aboriginal cultural heritage and flood risk. The proponent was granted a biodiversity development assessment report (BDAR) waiver for this project on 16 December 2019.

BCD has no comments to make in relation to the Aboriginal cultural heritage assessment, biodiversity or flood risk. If you require any further information regarding this matter, please contact Robert Gibson, Regional Biodiversity Conservation Officer, on 4927 3154 or via email at rog.hcc@environment.nsw.gov.au

Yours sincerely

30 January 2020

STEVEN COX
Senior Team Leader Planning
Hunter Central Coast Branch
Biodiversity and Conservation Division

NSW RURAL FIRE SERVICE

NSW GOVERNMENT

The Secretary
NSW Planning & Environment
GPO Box 39
Sydney NSW 2001

Your Ref: SSD 9418
Our Ref: D17/4115

ATTENTION: Bianca Thornton

24 December 2019

Dear Ms Thornton

Agency Comment:- Environmental Impact Statement (EIS) - Ravensworth Composting Facility Expansion, (Lot 10 DP1204457) 74 Lemington Road, Ravensworth NSW (Singleton LGA)

I refer to your correspondence dated 20 November 2019 seeking NSW Rural Fire Service (NSW RFS) advice and recommended conditions for the above State Significant Development (SSD) proposal.

The NSW RFS understands the development proposal has the following key components:

- *The continued operation of the existing facility in accordance with DA140/2016 as modified;*
- *Receive a total of up to 200,000 tpa of organics;*
- *Transfer of the composted material to other AGL Macquarie sites such as the Liddell Ash Dam, Liddell Power Station and Bayswater Power Station for use in rehabilitation as per existing approval;*
- *Sale of a portion of the finished 'compost' to third parties as per DA140/2016 as modified;*
- *Upgrading of a proportion of the hardstand area and installation of an aerated composting system such as the Mobile Aerated Floor (MAF) (or equivalent) suitable for the management and composting of other organics including a combined Food Organics and Garden Organics (FOGO) resource stream;*
- *Completion of the capping of the hardstand area and expansion of an existing leachate dam as approved as part of the Stage 2 development application to facilitate the management and storage of the increase in organic inputs;*
- *Installation of a single lane weigh bridge approximately 27.5m long;*
- *Installation of covered hard stand areas for the receival and blending, if required, of incoming organics including FOGO;*

- *Installation of a dedicated trailer wash bay;*
- *Installation of two 50,000 litre recycled drill water storage tanks; and*
- *Installation of a machinery shelter that will allow storage of tools and machinery for servicing.*

The subject site (including access) is not mapped bush fire prone by Singleton Shire Council. It is noted that the development may have an increased fire risk through spontaneous combustion processes. The NSW RFS is the primary response agency for fighting fires within the site.

The NSW RFS has reviewed the EIS and associated documents and has no objection to the proposal. The following conditions are recommended to be included to any consent granted:

1. A Fire Management Plan (FMP) shall be prepared in consultation with NSW RFS Upper Hunter Fire Control Centre. The FMP shall include:
   - 24 hour emergency contact details including alternative telephone contact;
   - Site infrastructure plan;
   - Fire fighting water supply plan;
   - Site access and internal road plan;
   - Construction of Asset Protection Zones (APZ) and their continued maintenance;
   - Location of hazards (Physical, Chemical and Electrical) that will affect fire fighting operations and procedures to manage identified hazards during fire fighting operations;
   - Such additional matters as required by the NSW RFS District Office (FMP review and updates).

2. A 20,000 litre water supply (tank) fitted with a 65mm storz fitting shall be located adjoining the internal property access road within the required APZ.

3. To allow for emergency service personnel to undertake property protection activities, a 10 metre defendable space, managed as an Asset Protection Zone (APZ - as outlined within section 4.1.3 and Appendix 5 of 'Planning for Bush Fire Protection 2006' and the NSW Rural Fire Service's document 'Standards for Asset Protection Zones') that permits a minimum 4 metre wide, unobstructed vehicle access is to be provided around the perimeter of the solar array and associated infrastructure.

For any queries regarding this correspondence please contact Alan Bawden on 1300 NSW RFS.

Yours Sincerely

Kalpana Varghese

Acting Manager – Planning and Environment Services East

The RFS has made getting information easier. For general information on 'Planning for Bush Fire Protection, 2006', visit the RFS web page at www.rfs.nsw.gov.au and search under 'Planning for Bush Fire Protection, 2006'.

CR2019/005208
SF2016/194283
MJD

28 January 2020

Department of Planning, Industry and Environment
Industry Assessments
GPO Box 39
SYDNEY NSW 2001

Attention: Bianca Thornton

NEW ENGLAND HIGHWAY (H9): SSD-9418, RAVENSWORTH COMPOSTING FACILITY, LOT: 10 DP: 1204457, 74 LEMINGTON ROAD RAVENSWORTH

Transport for NSW (Transport) advises that legislation to bring Roads and Maritime Services and Transport together as one organisation came into effect on 1 December 2019 so we can deliver more integrated transport services across modes and better outcomes to customers and communities across NSW. Other than a name change from Roads and Maritime to Transport, it's business as usual and you can continue to enjoy the same service you do today.

Reference is made to the Department of Planning, Industry and Environment's (DPIE's) referral received 20 November 2019, regarding the abovementioned application which was referred to Transport for comment pursuant to Section 4.36 of the *Environmental Planning and Assessment Act 1979*. Clause 23 of Schedule 1 of the *State Environmental Planning Policy (State and Regional Development) 2011* (SRD SEPP) identifies development for the purpose of resource recovery or recycling facilities that handle more than 100,000 tonnes per annum (tpa) of waste as being a State Significant Development (SSD).

Transport understands the proposal to be for a nutrient recycling facility with a handling capacity of up to 200,000 tpa. The site currently has consent to receive up to 76,000 tpa.

Transport Response

Transport's primary interests are in the road network, traffic and broader transport issues. In particular, the efficiency and safety of the classified road network, the security of property assets and the integration of land use and transport.

The New England Highway (H9) is a classified State road and Lemington Road is a local road. Council is the roads authority for both roads and all other public roads in the area, in accordance with Section 7 of the *Roads Act 1993*. Transport has reviewed the referred information including the Traffic Impact Assessment (TIA) by Pavey Consulting Services, dated 12 March 2019, and provides the following comments to assist the consent authority in making a determination:

- The submitted TIA does not assess the PM peak hour impact, stating that the AM is the critical peak. There is no evidence within the report to support this claim.

- The distribution of development trips have not been shown diagrammatically, as required in the SEARs issued 11 July 2018.

- The TIA has not considered the use of Lemington Road to access the Golden Highway, which is located at the southern intersection, and the impact of the development traffic on the operation of that intersection.

- The intersection has not been modelled as a seagull (or staged crossing) as per the Sidra Intersection User Guide.

<u>Advice to DPIE</u>

Transport recommends that the following matters should be considered by DPIE in determining this development:

- The property is affected by a road widening proposal shown by pink colour on attached map. Any improvements to the property are to exclude the area required for road widening purposes. Where a road widening proposal affects an existing building, Transport does not object to normal maintenance and repairs or minor alterations and additions to that existing building

- The property has a common boundary with the New England Highway, which has (in part) been declared as Controlled Access Road by notification in Government Gazette No 137 of 15-11-1974 Folio 4401 & Gaz No 39 of 16-3-1990 Folio 2333. Direct access across this boundary is restricted.

On DPIE's determination of this matter, please forward a copy of the Notice of Determination to Transport for record and / or action purposes. Should you require further information please contact Marc Desmond on 0475 825 820, or by emailing development.hunter@rms.nsw.gov.au.

Yours sincerely

Peter Marler
Manager Land Use Assessment
Hunter Region

Lot 3000
DP1132357
Lot 3
DP232149
Lot 228
DP752470
HEBDEN RD
Lot 232
DP752470
Lot 3
DP859544
Lot 5
DP859544
Lot 2
DP534889
Lot 32
DP535087
Lot 1001
DP1153575
Lot 1
DP859924
Lot 311
DP848411
Lot 2
DP859544
Lot 6
DP859544
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DP1204457
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DP848411
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NEW ENGLAND HWY
GLENNIES CREEK RD
Lot 1
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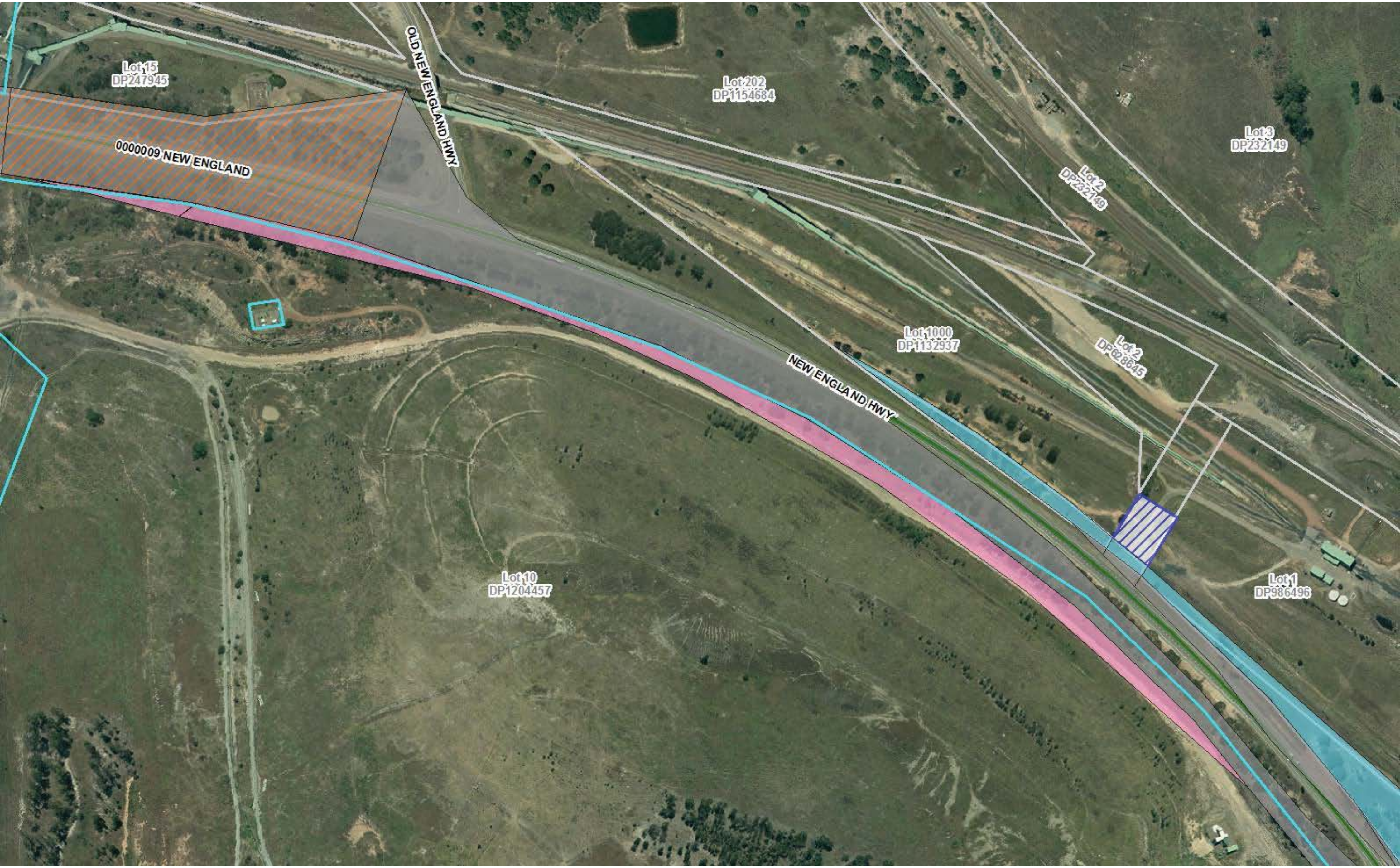
Lot 3
DP1114623
Lot 101
DP635131



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OLD NEW ENGLAND HWY
Lot 202
DP1154684
Lot 3
DP232149
Lot 2
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Lot 2
DP628645
NEW ENGLAND HWY
Lot 1
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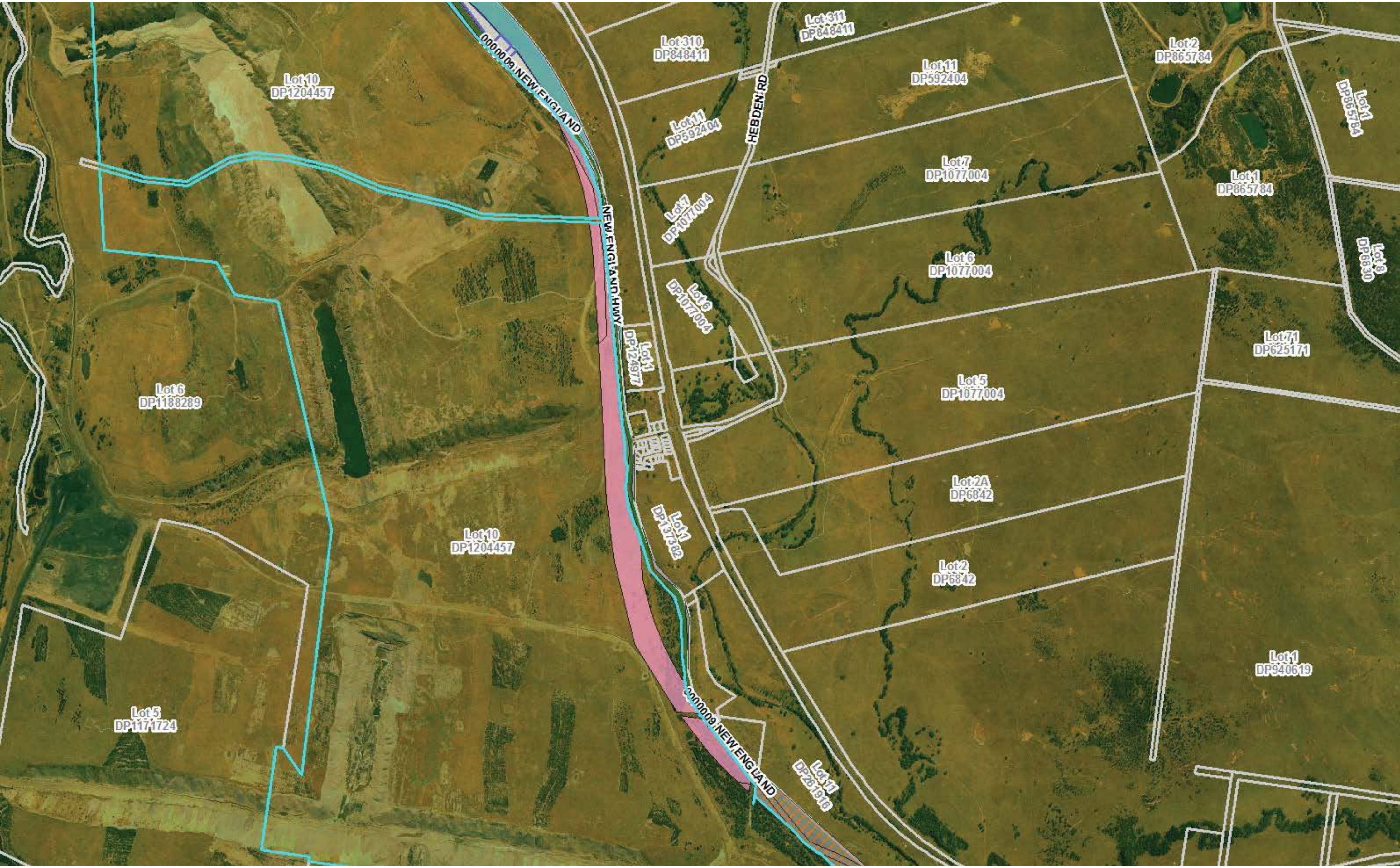
Lot 10
DP1204457



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HEBDEN RD
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DP124977
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DP1188289
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DP261916

SINGLETON
COUNCIL

12 February 2020

Bianca Thornton
Planning Officer
Resource Assessments - Planning Services
Department of Planning and Environment
GPO Box 39
SYDNEY NSW 2001

Dear Bianca

RE: Greenspot Nutrient Recycling Facility (SSD9418)

I refer to your request via the Planning Portal to Singleton Council dated 20 November 2019 requesting advice from Council on the Greenspot Nutrient Recycling Facility. This letter forms Council's feedback in relation to that request.

Council notes that the original due date for submissions was 31st January 2020, with exhibition running over the Christmas period. Prior to exhibition, Council made representation to the Department to delay exhibition to allow adequate time for review. At the same time that this application was on exhibition, a second State Significant Development application for a mining project was also exhibited, for the same timeframe. Council would like to strongly highlight the inadequacy of the timing of exhibition for this Project. The resources required to adequately assess an application of this scale and significance have not been considered by either the Applicant or the Department when determining the timing and duration of the exhibition period.

The ability of council let alone the community, to review and assess the impacts and consequences of a State Significant Development Project in such a short timeframe over the Christmas period, is not only limited, it creates unnecessary stress for communities already stressed through drought and, now, bushfires.

On the basis that council's request was not met, this submission can, at best, be preliminary in nature. The submission focusses on those issues, concerns and questions that are, on first review, considered by council to be of concern to the future of our community. The extent of our submission is directly impacted by the time available to complete a fulsome assessment.

The Project

The development proposal seeks to increase the operations of the existing nutrient recycling facility on Lot 10 on DP 1204457 located at 74 Lemington Road, Ravensworth. The proposal seeks to increase the processing capacity from 76,000 tonnes to 200,000 tonnes, and will consist of products ranging from garden organics,

12-14 Queen Street Singleton NSW 2330
PO Box 314 Singleton NSW 2330
T 02 6578 7290
F 02 6572 4197
E ssc@singleton.nsw.gov.au
W singleton.nsw.gov.au

food organics, biosolids and other wastes from which compost could be produced. The proposal also includes the installation of a aerated composting system, new weigh bridge, washdown bay and the upgrading/expansion of existing infrastructure.

The development for the establishment of the facility was originally approved in November 2016 by Singleton Council (DA140/2016) for the input of 50,000 tonnes of waste with the composted materials to be utilised for the rehabilitation of AGL Macquarie other mine sites. The original development approval has been modified to receive up to 76,000 tonnes per annum, with a second modification to allow truck movements to other sites to facilitate the onselling of product to other third parties.

The site is zoned RU1 – Primary Production, and the development is defined as a *waste or resource management facility*. Under the current *Singleton Local Environment Plan 2013*, the development type is prohibited. Council acknowledges that, under State Environmental Planning Policy (Infrastructure) 2007, the development is permitted with consent. Despite this, consideration should be given to the LEP objectives of the zone, which include:

- To encourage sustainable primary industry production by maintaining and enhancing the natural resource base;
- To encourage diversity in primary industry enterprises and systems appropriate for the area; and
- To minimise conflict between land uses within this zone and land uses within adjoining zones.

Despite the permissibility conflict between the LEP and SEPP, the proposed development is not inconsistent with these objectives.

Existing Approvals

The EIS acknowledges the current approval for the development, DA140/2016. However, the EIS does not identify how the existing approval will interact with a new SSD approval, or whether the surrender of the existing approval will be required. The EIS is proposing *the continued operation of the existing facility in accordance with DA140/2016*. It is not clear how this would practically take place. Further to this, the EIS and accompanying reports state that the proposed development will be managed in accordance with the existing approval and associated management plans. It would be appropriate to surrender the previous consent and consolidate management plans and controls within a new contemporary approval.

Council requires further clarification on the interaction between the existing and future approval requirements, including the management plans and controls that will be required. This includes the controls that would be implemented to mitigate and manage the impacts of the proposed development.

Land Use Conflict

The EIS does not include consideration of the impact of the existing and proposed development on surrounding land uses, including any future land use that may occur. Having regard to the zone objectives in the Singleton LEP, council requires further clarification on the measures that have been put in place to evaluate and minimise potential land use conflicts.

Council supports the proposed hours of operation, as limited by the EIS, to 6am to 6pm Monday to Saturday, with no operations to occur on Sunday or Public Holidays.

Protection of the Environment

The application is supported by a comprehensive and detailed EIS and supporting assessments. Council has reviewed these, within the time constraint available and seeks the following clarifications:

- The surface and groundwater management plan included in and referenced by the EIS appears to be the plan developed for the existing facility and submitted for previous DA140/2016, with the last amendment to the plan in August 2016. This plan should be updated to support the proposed development.

- The EIS states, in section 3.5.3 that the installation of additional water management works, expanded stormwater and leachate management systems will be undertaken in accordance with the existing development approval. Clarification is required as to how the current management controls will be adequate to cater for the increased generation of leachate proposed by the development.

- The EIS state in section 9.7.1 that d*ue to the remoteness of the facility and the nature and extent of proposed composting activities, no issues were identified in relation to emissions of greenhouse gases, odour or dust.* Whilst this may be the case, the proposed development will increase thorugput at the facility by 130,000 tonnes. As such, it is not clear how the current mitigation measure (for the 2016 approved development) will be sufficient to ensure compliance.

- Further information is required demonstrating the prevention measures that will be implemented to prevent material /matter being tracked by vehicles from the site.

- Further information is required demonstrating the prevention measures that will be implemented to prevent material entering the waterways and groundwater system, especially during the construction stage of the development.

- Additional information is required regarding the use and management of the vehicle wash-down bay, including how the bay will be monitored to ensure all vehicles utilising it are minimising the risk of material being transported off site.

- Additional information is required on the measures that will be implemented during construction to minimise impacts to the environment, including sediment and erosion controls.

- Additional information is required on the measures that will be implemented to prevent soil contamination, particularly from fuel and chemical storage areas, materials bought into the facility and construction activities.

- The EIS identifies that the expansion works were assessed for leachate and groundwater impacts. However, the EIS does not provide an adequate assessment of the effectiveness of the controls that were implemented, and what, if any, additional control measures are required as a result of the proposed development. This includes limited information on the structural integrity of leachate and surface water containments, seepages and leakage.

- As with other management plans, the water management plans being relied upon for the proposed development are those that were prepared for the original approval. It is not clear whether the controls identified are adequate to mitigate the impacts of the proposed development, particularly where the EIS acknowledges that there will be a greater risk of leachate seepage.

- The EIS states in section 9.1.4.3 that cumulative impacts of odour have not been explicitly modelled, as they are expected to be minimal, and relies on a management plan developed for the original development, that does not take into account the additional tonnage or material types to be processed on site. The proposed odour impacts from a different array of material sources should be assessed and where required additional controls implemented. Section 9.1.5.1.4 assesses dust based on a peak traffic movements of 108, not 146, which requires clarification.

- The existing composting management plan does not include the inclusion of the new waste types; Food and Garden Organics (FOGO) nor does it reference or provide information regarding the proposed forced aeration method. As identified, existing management plans and controls should be updated.

- Further information is required on the management of residual wastes generated at the site, including expected contamination rates and management.

- The life of the facility has not been quantified, nor the duration sought for the approval. As such, there is limited information on the decommissioning and rehabilitation of the site once operations cease. Council and the community should be consulted during these phases of operational life.

- The existing facility is located within a Phylloxera Exclusion Zone, and council notes that material imported into the facility can come from area that are Phylloxera infested, including the Sydney Basin. Council requires clarification on the current and future proposed controls for ensuring that the facility and its products will be Phylloxera free and will not pose any risk to the internationally recognised viticultural region of the Hunter Valley, including pathogen management and any adaptive management responses should Phylloxera be detected at the site.

Potential Impacts to the Local Road Network

The original development approved 16 heavy vehicles per day, and a subsequent modification increased this to 40 heavy vehicles per day. This proposed development is seeking approval for up to 146 heavy vehicle movements per day, and the EIS concludes that this increased traffic will not adversely impact the existing road network. The traffic assessment includes assessment of impacts to the New England Highway and Lemington Road. However, there are other local roads that will be used to transport material from the site. These roads have not been assessed for impact.

The EIS states that the key dust source on site is the haulage route, which is unsealed, and concludes that no additional controls are required, as the development is remote. However, the assessment does not take into consideration the cumulative impacts, particularly considering the surrounding sources. Nor does the EIS consider the adequacy or effectiveness of the current controls, and the ability of these controls to manage and mitigate the increased impacts expected from the proposed development.

I would like to thank the Department for the opportunity to provide comment on the Greenspot Nutrient Recycling Facility. Should you have any questions or comments, please contact Mary-Anne Crawford, Manager Development and Environmental Services on 02 6578 7290.

Yours faithfully

Mary-Anne Crawford
Manager Development and Environmental Services

Appendix B Odour Assessment Addendum

Advanced Environmental Dynamics

Specialist Consultants

Memorandum

To: Shaun Smith (Space Urban)

From: Darlene Heuff

Date: 06/05/2022

Subject: Greenspot Ravensworth Greenhouse Gas, Odour and Dust Assessments
AED Report# 957002.1 – Update 2022

AED has prepared this memo in response to a request by Space Urban to update the odour component of AED Report #957002.1 *Greenspot Ravensworth Greenhouse Gas, Odour and Dust Assessment,* dated 9 August 2019 which was prepared by AED on behalf of Bettergrow Pty Ltd.

In particular, it is noted that the updated project description no longer includes the intake of comingled food organics and garden organics (FOGO) and forced aeration composting will not form part of planned future operations. There have also been some changes to the proposed layout of activities, in particular, the absence of a dedicated blending area with proposed future practices to align with current operational procedures of the blending of fresh waste streams in situ.

AED understands that despite the proposed changes corresponding to a c. 6% net decrease in site-wide odour emissions, the NSW EPA has requested that the initial AED report be updated to include these project changes.

In relation to the update to the odour modelling, only changes to the projected description noted within this memo have been made. All other elements of the previous study remain unchanged. The reader is directed to the AED (2019) for additional details (for example pertaining to the dispersion model set up and cumulative impacts).

In summary, the net change in odour outcomes is considered to be immaterial compared with those presented in AED (2019) with results suggesting that cumulative impacts will be below detectable levels at the nearest receptor locations (Table 1).

Additional details are provided as attachments to this memo. Contour plots are presented in Attachment C.

Table 1: Cumulative Impacts: Results for the 99th Percentile 1-Second Average Concentration of Odour

Scenario	Project Capacity	Meteorological Year	Camberwell (OU)
Cumulative: Ravensworth and LOOP Organics	Peak	2015	<0.3
		2016	<0.3
		2017	<0.3
		2018	<0.3
		2019	<0.3

I trust you will not hesitate to contact me on 0400 661 182 should you require any additional clarification and/or information.

Regards,

Dr Darlene Heuff
Director and Principal Applied Scientist

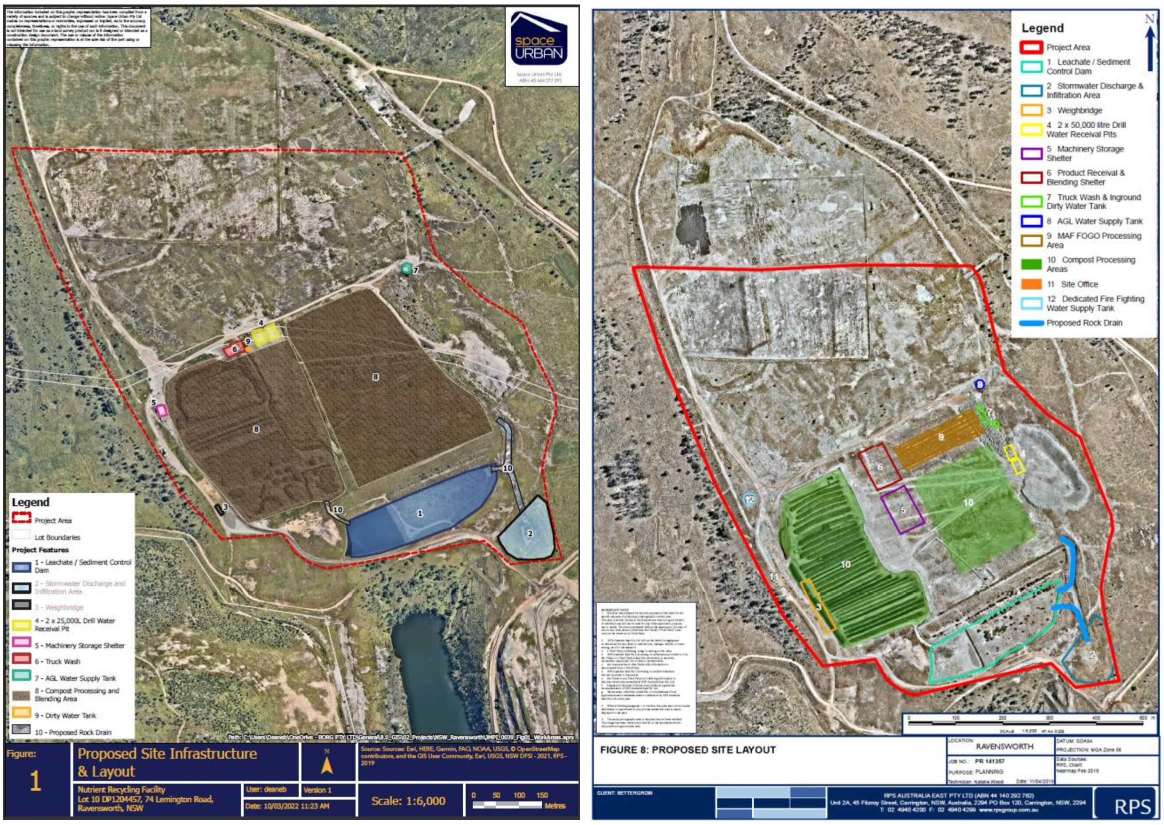
Attachment A

Revised Layout

Provided in Figure 1 is the revised layout that excludes:

- an aerated composting area and
- a dedicated area for blending of the intake waste streams.

Figure 1: Revised Project Layout – (Current Left, Previous Right) (Source: Space Urban, 2022)



Attachment B

Odour Emission Rates

Specific odour emission rates (SOERs) based on odour sampling undertaken at the Ravensworth Composting facility are summarised in Table 2 (AED, 2019).

Table 2: Specific Odour Emission Rates – Composting

Sample Location	Description	SOER(1) ($ou.m^3/m^2/s$)
BG 1	Organic Sample, windrow SP1, fresh green waste	0.027
BG 2	Five week old compost windrow No 26, 3:1 mix (3 parts green organic + 1 part biosolids	0.03
BG 3	Product sample Windrows No 13/14 3:1 Mix (3 parts green organic + 1 part biosolids)	0.032
BG 4	Freshly opened compost windrow No. 23/2	0.041
BG 5	One-week old compost windrow, test windrow, 3:1 mix (3 parts green organic + 1 part biosolids	0.045
BG 6	Biosolids sample windrow 3020 (20/11/2018)	0.553
Note (1): Results based on flux hood odour sampling undertaken at the Ravensworth Facility on 22/11/2018.		

Section 4.4 of AED (2019) outlined the single, conservative odour emissions scenario which was modelled based on peak volumes of material. This worst case 24 hour scenario corresponded to c. 75,000 tonnes of material at various stages of composting and represents c. 38% of the annual throughput of 200,000 tonnes. For the purposes of the dispersion modelling, it was assumed that this scenario applied 24/7 365 days of the year in order to capture a wide range of meteorological conditions.

When comparing the information contained in Table 3 with that provided in Section 4.4 of AED (2019), it is noted that the composting footprint has increased as a result of incorporating of the (excluded) aerated compositing footprint into the composting area and the odour emission sources associated with the Receival and Blending area have been removed. The net reduction in estimated odour emissions is c. 6%.

Table 3: Odour Emission Scenario (Updated Composting Footprint)

Source ID	Description	Surface Area (m^2)	SOER ($OUm^3/((m^2))(sec)$)		Odour Emission Rate	
			During Working Hours	Outside working hours	During Working Hours OU/s	Outside Working Hours OU/s
Composting Area	Composting	45,360	0.034(1)	0.034(1)	1,542	1,542
	Freshly turned compost	8,640	0.041(1)	0.034(1)	354	294
	Product	12,000	0.032(1)	0.032(1)	384	384
Leachate Pond	Area	19,800	1.00(1)	1.00(1)	19,800	19,800
				Site Total	**22,080**	**22,020**
				(AED 2019 Site Total)	**23,485**	**22,387**

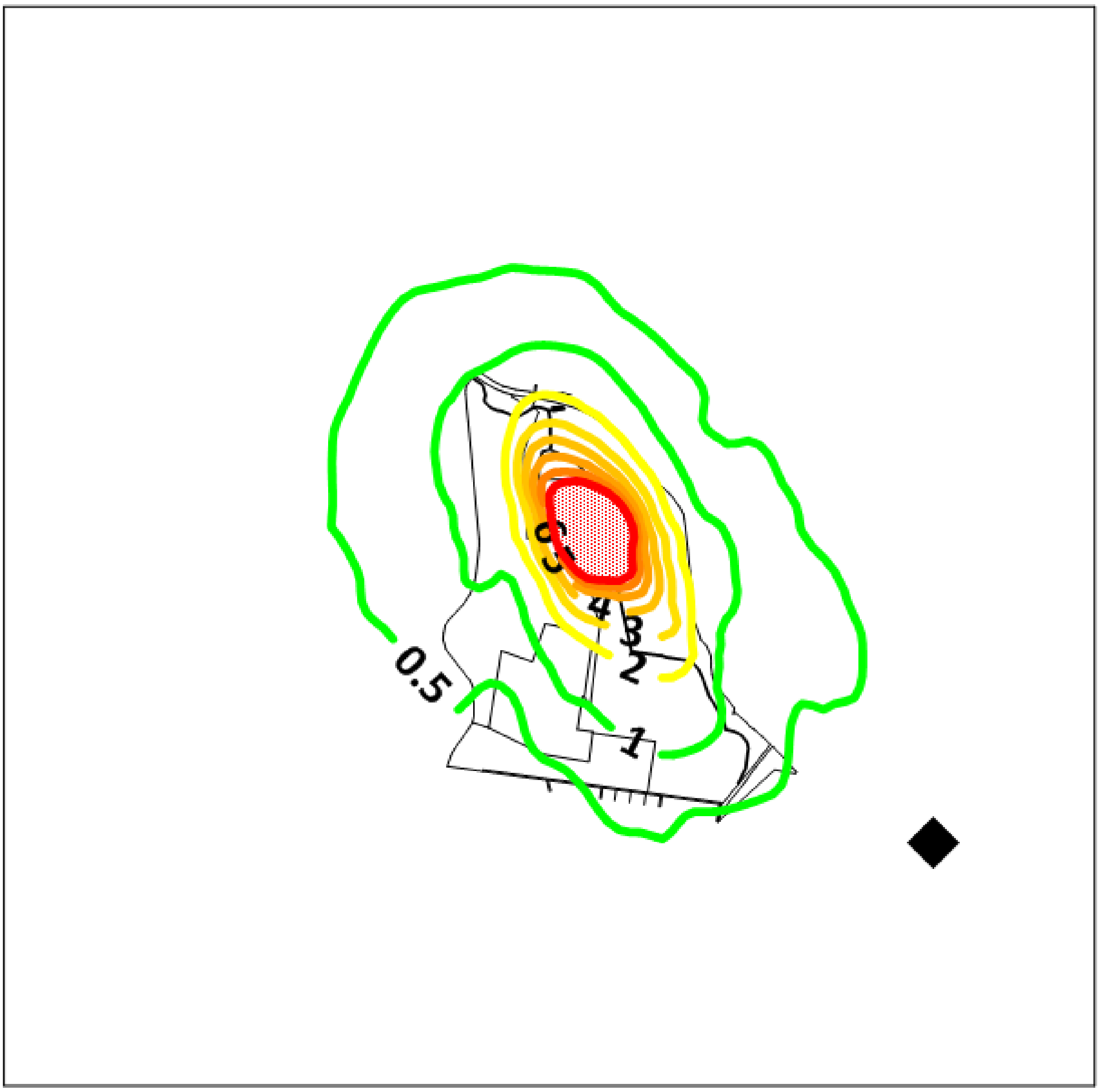
Notes:

(1) Based on site-specific odour sampling results (Table 2).

Attachment C

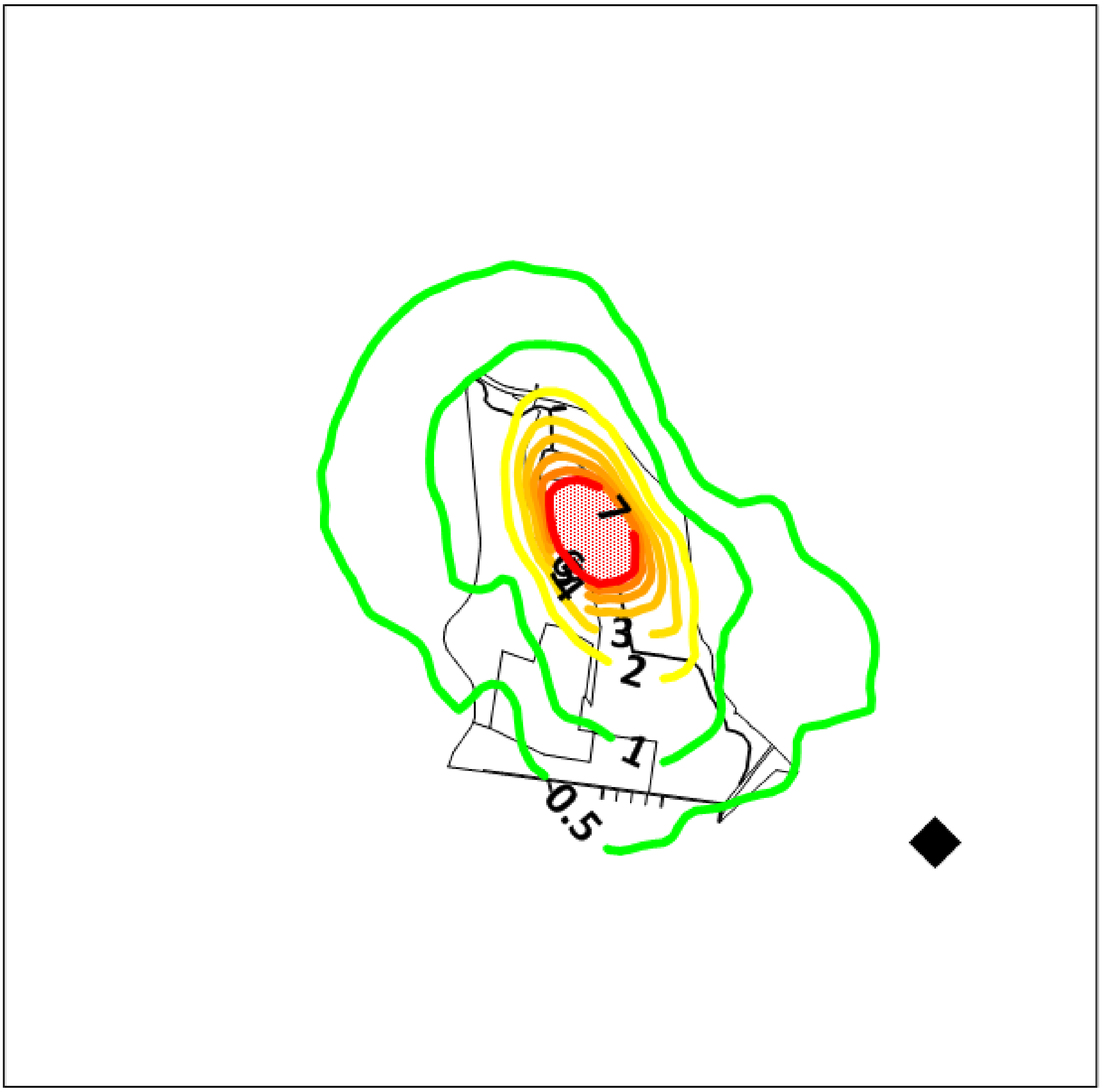
Odour Contour Plots – Project in Isolation

Figure 2: Peak Tonnage Scenario: The 99th Percentile 1-Second Average Concentration of Odour (OU) based on Meteorology for 2015



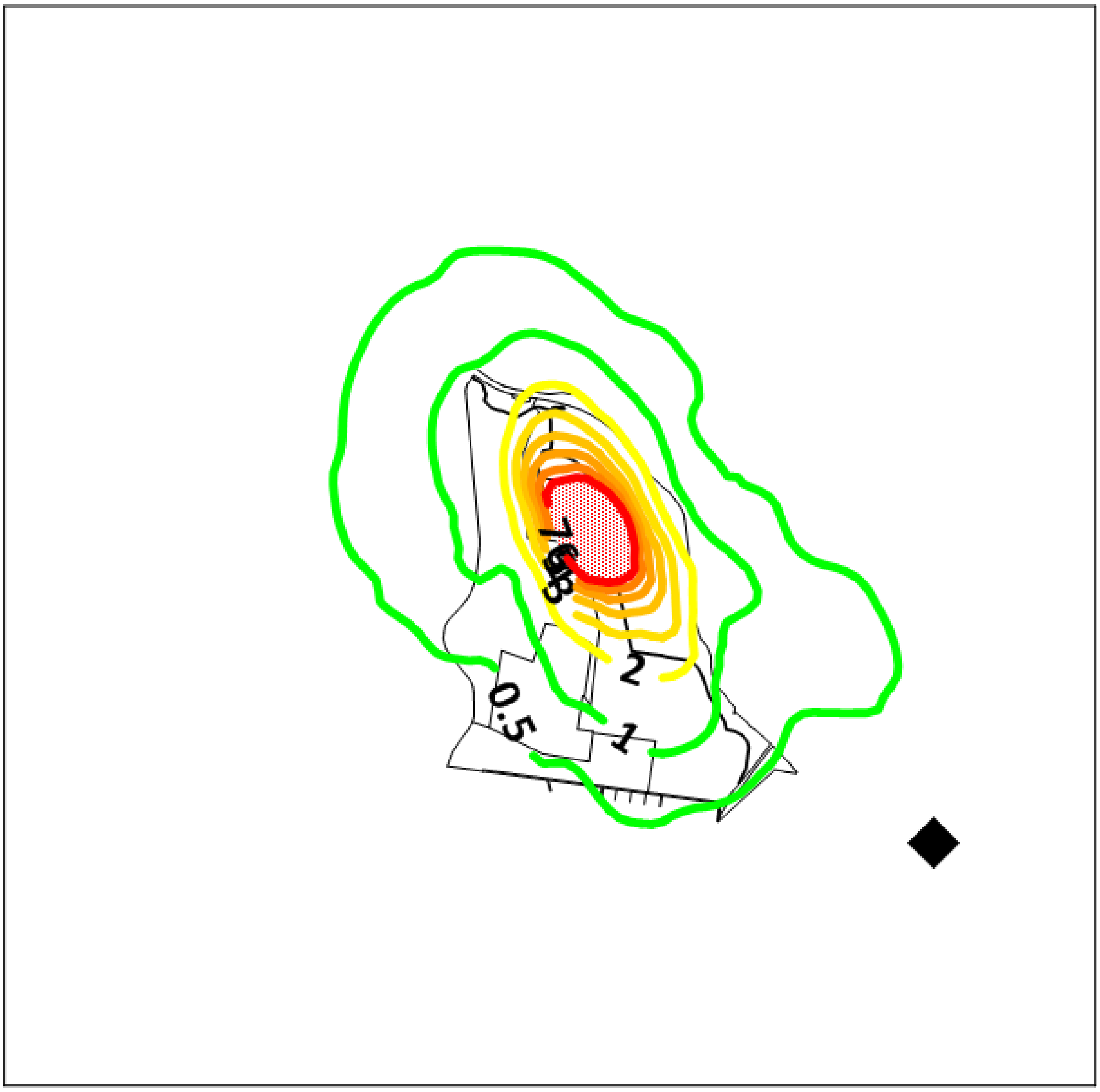
Scenario: Project Only		**Sources included:** All sources	
Pollutant:	Odour	Averaging Period:	1-second
Background-level:	N/A	Rank:	99th percentile based on 2015 meteorology
Project Goal:	7 OU	Contour level(s):	0.5, 1, 2, 3,4, 5, 6, 7 (red) OU

Figure 3: Peak Tonnage Scenario: The 99th Percentile 1-Second Average Concentration of Odour (OU) based on Meteorology for 2016



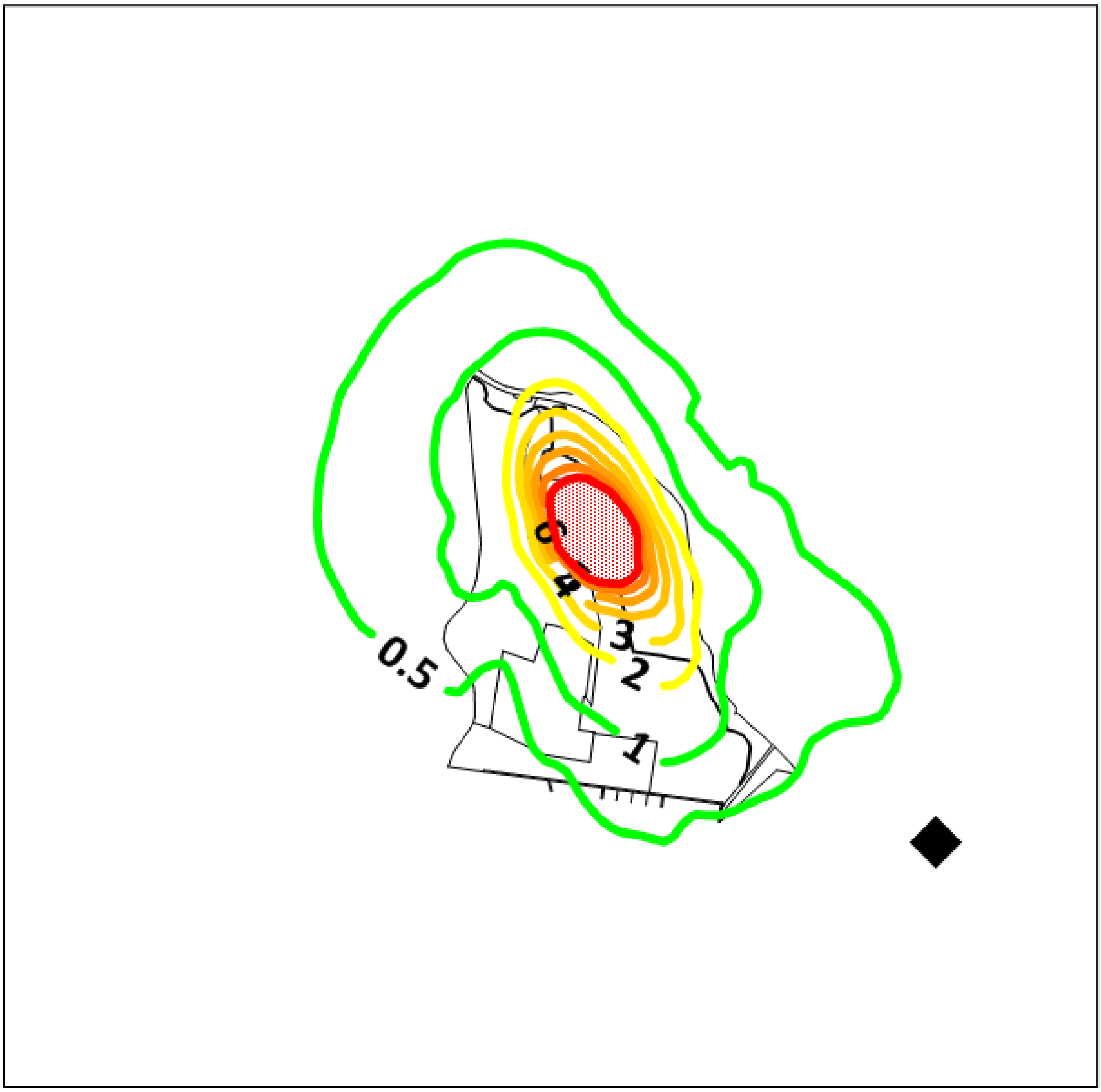
Scenario: Project Only		**Sources included:** All Sources	
Pollutant:	Odour	Averaging Period:	1-second
Background-level:	N/A	Rank:	99th percentile based on 2016 meteorology
Project Goal:	7 OU	Contour level(s):	0.5, 1, 2, 3,4, 5, 6, 7 (red) OU

Figure 4: Peak Tonnage Scenario: The 99th Percentile 1-Second Average Concentration of Odour (OU) based on Meteorology for 2017



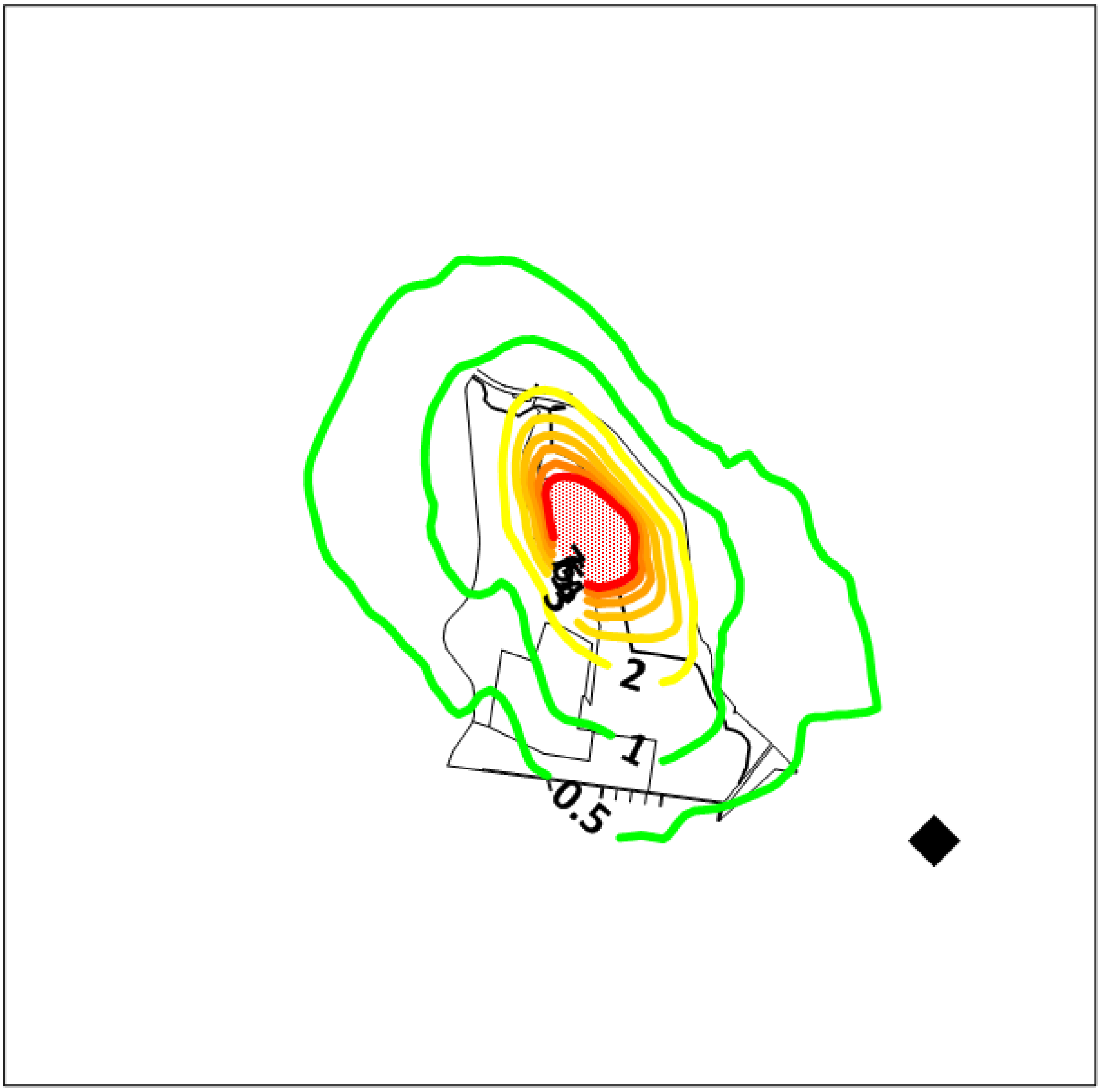
Scenario: Project Only		**Sources included:** All Sources	
Pollutant:	Odour	Averaging Period:	1-second
Background-level:	N/A	Rank:	99th percentile based on 2017 meteorology
Project Goal:	7 OU	Contour level(s):	0.5, 1, 2, 3,4, 5, 6, 7 (red) OU

Figure 5: Peak Tonnage Scenario: The 99th Percentile 1-Second Average Concentration of Odour (OU) based on Meteorology for 2018



Scenario: Project Only		**Sources included:** All Sources	
Pollutant:	Odour	Averaging Period:	1-second
Background-level:	N/A	Rank:	99th percentile based on 2018 meteorology
Project Goal:	7 OU	Contour level(s):	0.5, 1, 2, 3,4, 5, 6, 7 (red) OU

Figure 6: Peak Tonnage Scenario: The 99th Percentile 1-Second Average Concentration of Odour (OU) based on Meteorology for 2019

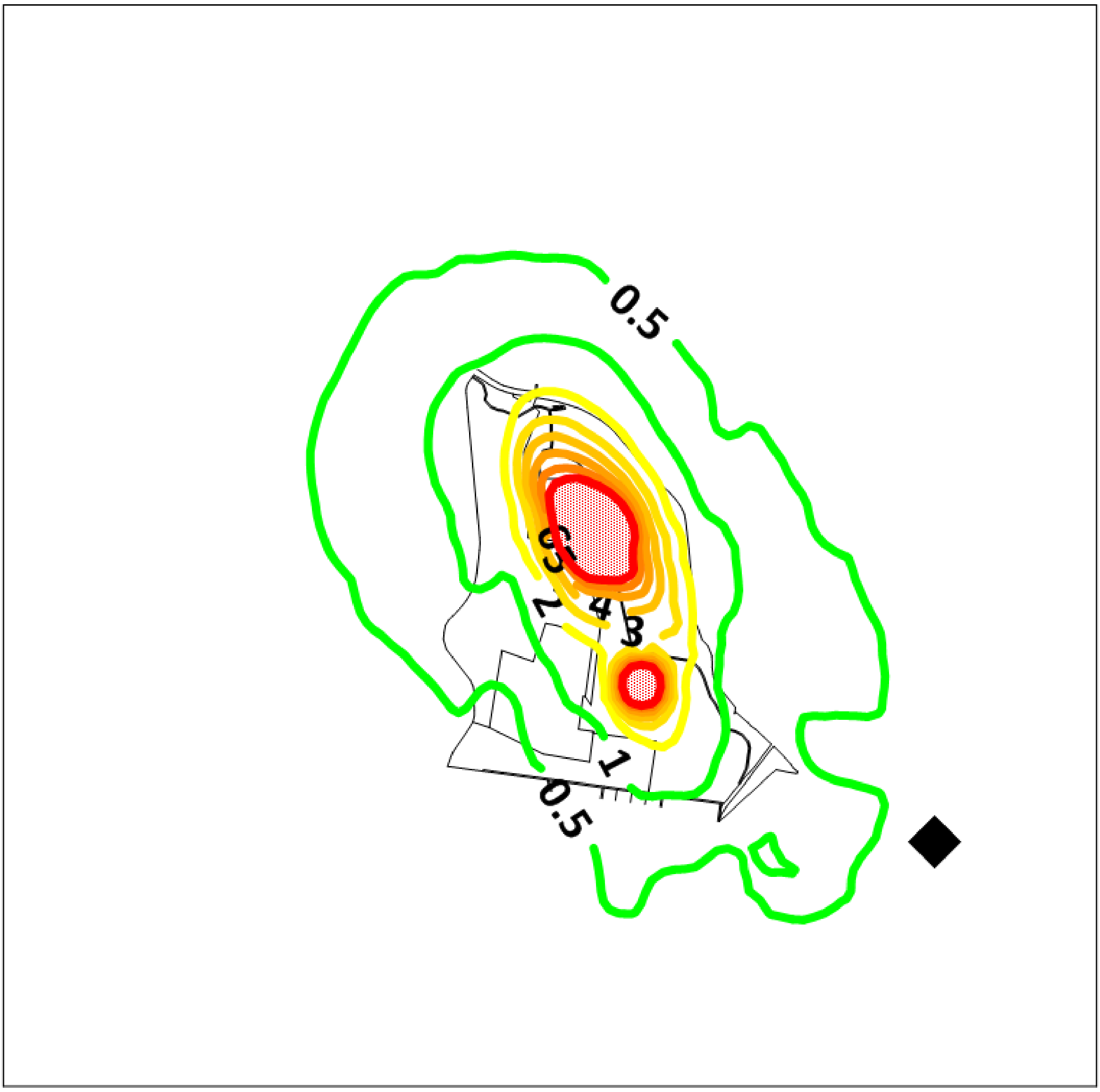


Scenario: Project Only		**Sources included:** All Sources	
Pollutant:	Odour	Averaging Period:	1-second
Background-level:	N/A	Rank:	99th percentile based on 2019 meteorology
Project Goal:	7 OU	Contour level(s):	0.5, 1, 2, 3,4, 5, 6, 7 (red) OU

Attachment C

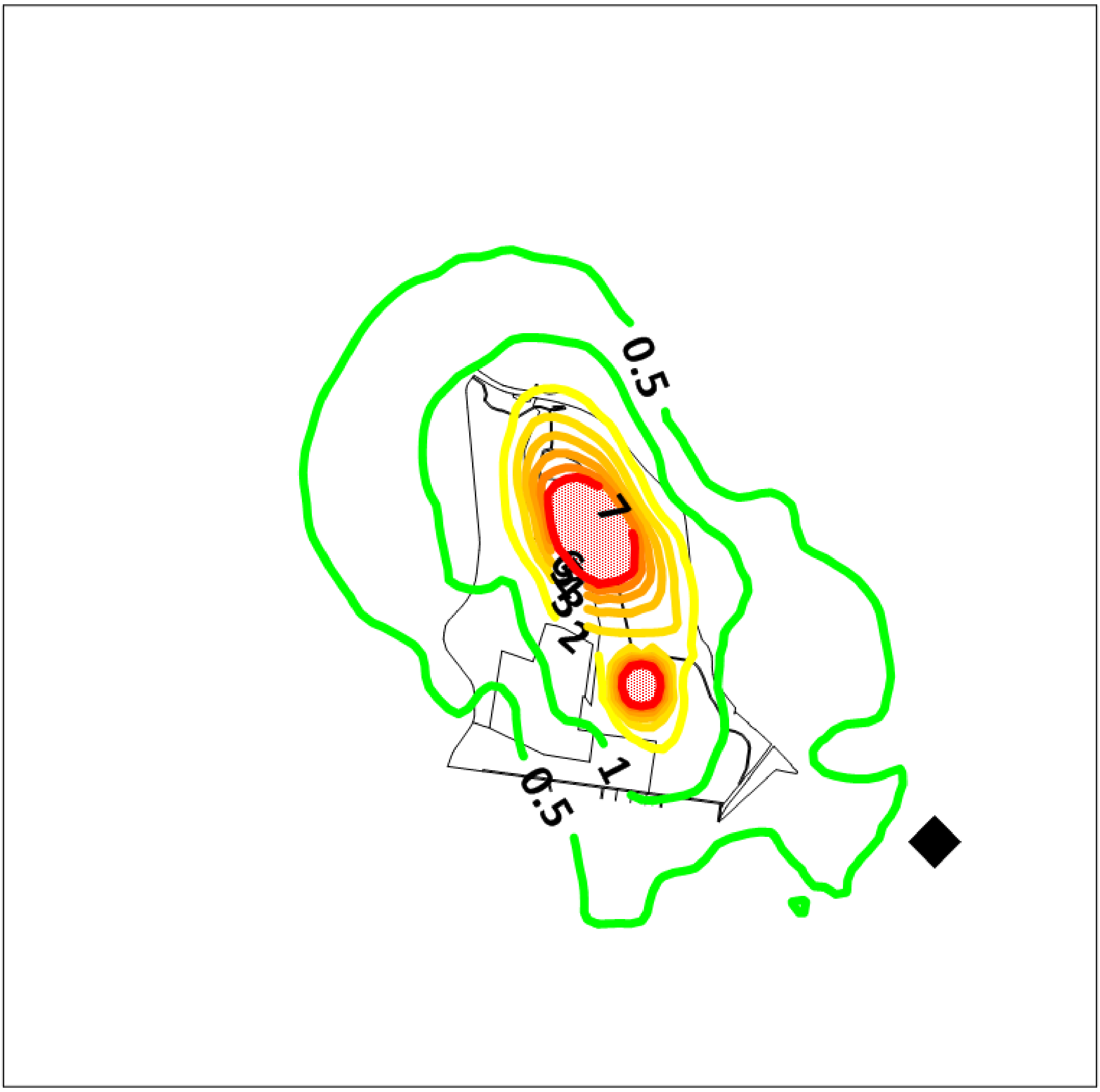
Odour Contour Plots – Cumulative Impacts

Figure 7: Peak Tonnage Scenario: The 99th Percentile 1-Second Average Concentration of Odour (OU) based on Meteorology for 2015



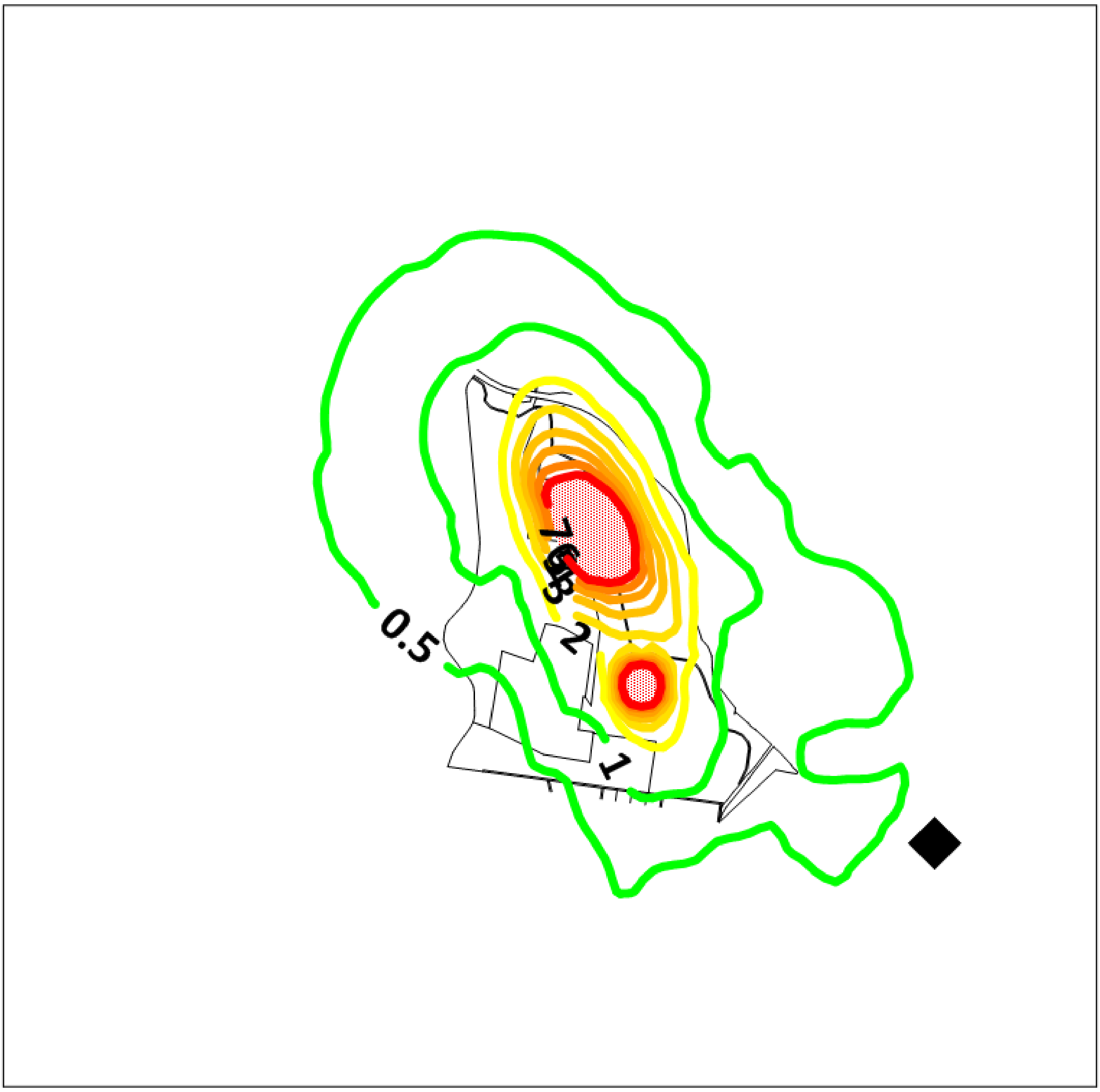
Scenario: Cumulative Impacts		**Sources included:** All sources	
Pollutant:	Odour	Averaging Period:	1-second
Background-level:	N/A	Rank:	99th percentile based on 2015 meteorology
Project Goal:	7 OU	Contour level(s):	0.5, 1, 2, 3,4, 5, 6, 7 (red) OU

Figure 8: Peak Tonnage Scenario: The 99th Percentile 1-Second Average Concentration of Odour (OU) based on Meteorology for 2016



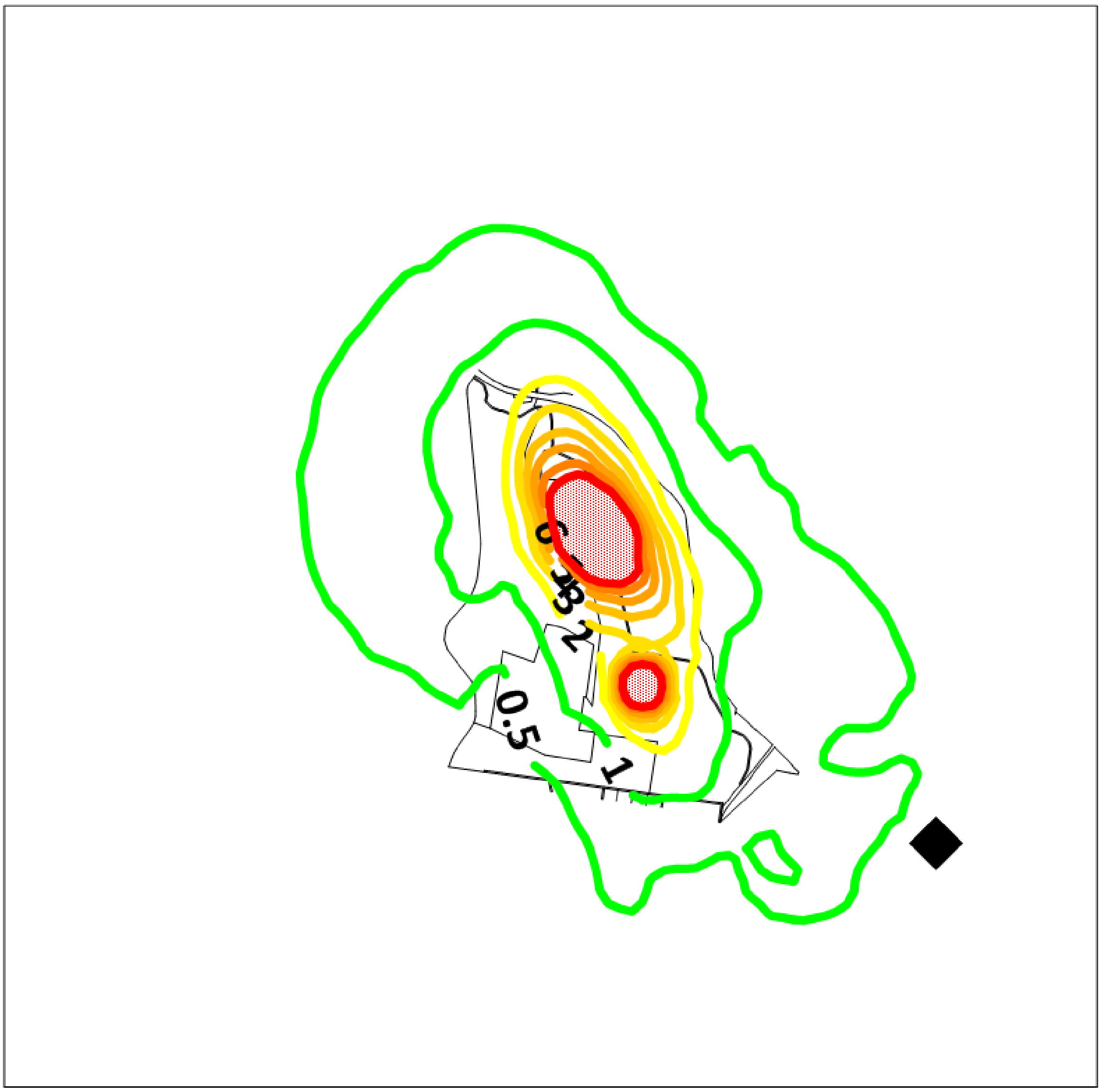
Scenario: Cumulative Impacts		**Sources included:** All Sources	
Pollutant:	Odour	Averaging Period:	1-second
Background-level:	N/A	Rank:	99th percentile based on 2016 meteorology
Project Goal:	7 OU	Contour level(s):	0.5, 1, 2, 3,4, 5, 6, 7 (red) OU

Figure 9: Peak Tonnage Scenario: The 99th Percentile 1-Second Average Concentration of Odour (OU) based on Meteorology for 2017



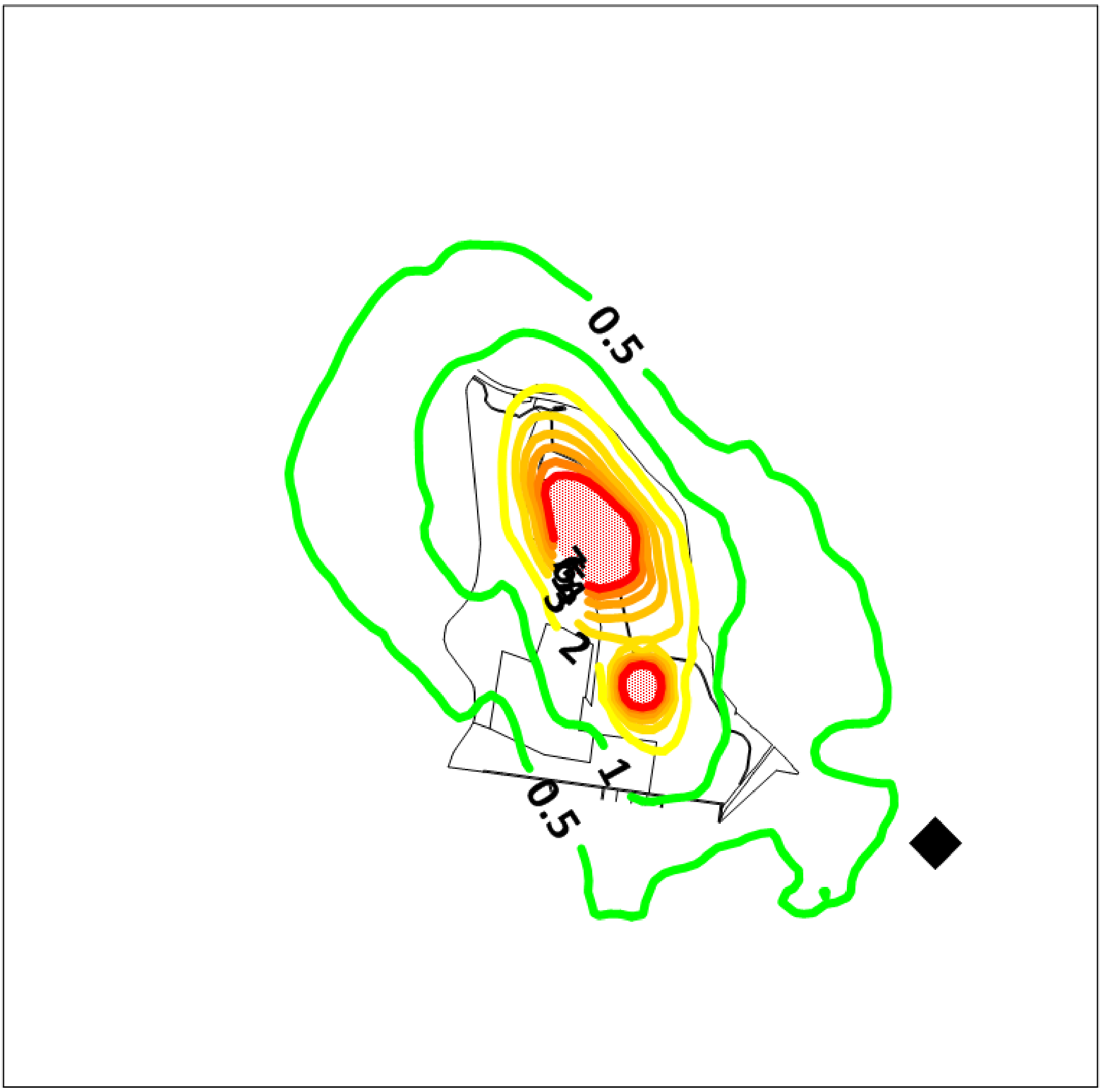
Scenario: Cumulative Impacts		**Sources included:** All Sources	
Pollutant:	Odour	Averaging Period:	1-second
Background-level:	N/A	Rank:	99th percentile based on 2017 meteorology
Project Goal:	7 OU	Contour level(s):	0.5, 1, 2, 3,4, 5, 6, 7 (red) OU

Figure 10: Peak Tonnage Scenario: The 99th Percentile 1-Second Average Concentration of Odour (OU) based on Meteorology for 2018



Scenario: Cumulative Impacts		**Sources included:** All Sources	
Pollutant:	Odour	Averaging Period:	1-second
Background-level:	N/A	Rank:	99th percentile based on 2018 meteorology
Project Goal:	7 OU	Contour level(s):	0.5, 1, 2, 3,4, 5, 6, 7 (red) OU

Figure 11: Peak Tonnage Scenario: The 99th Percentile 1-Second Average Concentration of Odour (OU) based on Meteorology for 2019



Scenario: Cumulative Impacts		**Sources included:** All Sources	
Pollutant:	Odour	Averaging Period:	1-second
Background-level:	N/A	Rank:	99th percentile based on 2019 meteorology
Project Goal:	7 OU	Contour level(s):	0.5, 1, 2, 3,4, 5, 6, 7 (red) OU

Appendix C Revised Traffic Assessment

David Pavey Pty Ltd trading as

Pavey Consulting Services

Specialising in

Traffic Studies and Transportation Planning
Road Safety Reviews
Civil and Structural Design
Project Management and Contract Administration
Mediation and Government Relations

Traffic Impact Assessment

Greenspot Hunter Valley
Nutrient Recycling Facility
Lot 10 DP1204457, 74 Lemington Road, Ravensworth, NSW

12 October 2020 Rev 1

Contact Details
David Pavey
Pavey Consulting Services
Email; paveyconsulting@iinet.net.au
Phone: 0419696212

Prepared By

David Pavey
Director
B.E (Civil) Grad Dip LGE. LGE Cert. MAIPM, MAICD, MAITPM

David Pavey Pty Ltd
23 Stanley Street
Merewether
NSW 2291
ABN 12 150 774 413
ACN 150 774 413

Revision Register

Rev	Date	Author	Checked by	Approved By	Remarks
0	12 March 2019	David Pavey	Sharyn Pavey	David Pavey	Final
1	23 October 2020	David Pavey	Sharyn Pavey	David Pavey	Updated to address TfNSW comments on original report

Table of Contents

Page

1. Introduction

Bettergrow, trading as 'Greenspot Hunter Valley' (the Applicant), is proposing to undertake the expansion and operation of an existing nutrient recycling facility (the Proposal) on Lot 10 DP1204457, 74 Lemington Road, Ravensworth, NSW (the site).

Current composting operations at the site are approved by DA140/2016 to receive up to 76,000 tonnes per annum (tpa) of biosolids and garden organics. The Applicant for DA140/2016 was Bettergrow Pty Ltd who are contracted by AGL Macquarie (the Land Owner) to supply manufactured soil ameliorant and rehabilitation products for use, in part, for approved rehabilitation works at the Ravensworth No. 2 mine and Ravensworth South mine.

The subject application seeks to authorise the receipt of up to 200,000tpa of organic materials, including new feed sources of food waste, to facilitate the sale of a portion of the composted material to third parties.

Pavey Consulting Services has been commissioned by Bettergrow to assess the following traffic and transport Implications:

- Details of all traffic types and volumes likely to be generated during construction and operation, including a description of haul routes. Traffic flows are to be shown diagrammatically to a level of detail sufficient for easy interpretation.
- Plans demonstrating how all vehicles likely to be generated during construction and operation and awaiting loading, unloading or servicing can be accommodated on the site to avoid queuing in the street network.
- An assessment of the predicated impacts of this traffic on road safety and the capacity of the road network, including consideration of cumulative traffic impacts at key intersections using SIDRA or similar traffic model.
- Plans of any proposed road upgrades, infrastructure works or new roads required for the development.

The results of the above analyses are outlined in the following sections.

2. Limits if Report

This report takes into account the particular instructions and requirements of our client. Pavey Consulting has taken care in the preparation of this report, however it neither accepts liability nor responsibility whatsoever in respect of:

- Any use of this report by any third party;
- Any third party whose interests may be affected by any decision made regarding the contents of this report; and/or
- Any conclusion drawn resulting from omission or lack of full disclosure by the client, or the clients' consultants.

3. Site Location

The site is located at Ravensworth No. 2 mine and is formally described as Lot 10 DP1204457 at 74 Lemington Road, Ravensworth, NSW. The site is cleared of native vegetation and is located on part of a capped open cut mining void which has been filled with ash from the AGL Bayswater Power Station.

Access to the facility is provided via an internal access road off Lemington Road which connects to the New England Highway. The site location is shown on Figure 1 and 2. The existing composting facility is located on a graded hardstand area, surrounded by perimeter bunding. Access to the facility is off Lemington Road and along an internal access road.

The key roads that provide access to the site are the New England Highway and Lemington Road. The New England Highway is part of the national highway linking Sydney to Brisbane and is an alternative route to the Pacific Highway. In the vicinity of the site the highway has a speed limit of 100km/h on an undivided carriageway with overtaking lanes.

The most recent traffic volume data from the Roads and Martime Services count station (ID 6156) north of Singleton indicates the average daily traffic volumes are 13984 vehicles per day (two way).

Lemington Road is a rural two-way two-lane road that predominantly provides access to the various coal mines in the area. It has a speed limit of 100km/h and provides links between The Golden Highway and the New England Highway.

4. Proposal

Site Access

An internal haul road, with access from Lemington Road, currently exists on the site. Prior to the commencement of the existing composting operations the haul road was widened to accommodate incoming and outgoing heavy vehicle movement, the road surface was also upgraded to allow all-weather access, and surface water drainage was installed to divert stormwater away from the roadway onto suitably stable areas.

No additional works are proposed on internal access roads.

Proposed Haulage Routes

The site, being a processing site receives raw products (incoming product) for a range of sources and supplies to the market its final products (outgoing product) these are described below.

Incoming Product

The wastes accepted at the facility come from a range of sources and industries including:

- Commercial kitchens and restaurants (food organics) typically from Sydney,
- Kerbside green waste collection from residential households (food and garden organics) from local council waste collection services typically in Sydney, Central Coast, Newcastle and Hunter Valley,
- Biosolids form Hunter Water, Central Coast Water and Sydney Water,
- Paper processors (paper crumble) typically from Sydney,
- Infrastructure projects (drill muds) from various locations,
- Coal ash from the adjacent Liddell and Bayswater Power Stations; and
- Raw water from adjacent mines

Vehicles hauling these products generally utilise the Pacific Motorway, Hunter Expressway, New England Highway and a short section of Lemington Rd to access the site with minor local roads or private roads at the origin prior to accessing the State Road network. These routes are diagrammatically shown in Figure 4.1.

Outgoing Product

The finished growing media including composts and mulches which will be distributed to local and regional customers according to supply and demand. AGL Macquarie as the landowner has an ongoing requirement for site rehabilitation and planting at both Ravensworth Mine complex and Liddell and Bayswater power station. Surrounding mine site operators such, Yancoal, Muswellbrook Coal, Ashton Coal, Glencore and Hunter Valley Operations will also be receivers of the compost and mulches with the majority of these being distributed on internal private road networks

Bettergrow will also produce high quality screened composts and compost blends suitable for use in the agricultural market which will be transported back to the Sydney, Newcastle and Central coast areas. These routes are diagrammatically shown in Figure 4.2 and 4.3

Summary of Haul Roues

The principal haul roads in the vicinity of the site are New England Highway and a short section of Lemington road. All deliveries of incoming product are sourced local from adjacent power stations and mines of from further afield in Newcastle, Central Coast and Sydney utilising the State Road Network of Pacific Motorway, Hunter Expressway and New England Highway.

No vehicle movements are anticipated to travel south along Lemington Road to the Golden Highway due to lack of end-users in this direction and the narrowness of the road particular at Moses Crossing (one lane causeway over the Hunter River)

The main haulage routes are diagrammatically shown in Figure 4.1, 4.2 and 4.3 below.

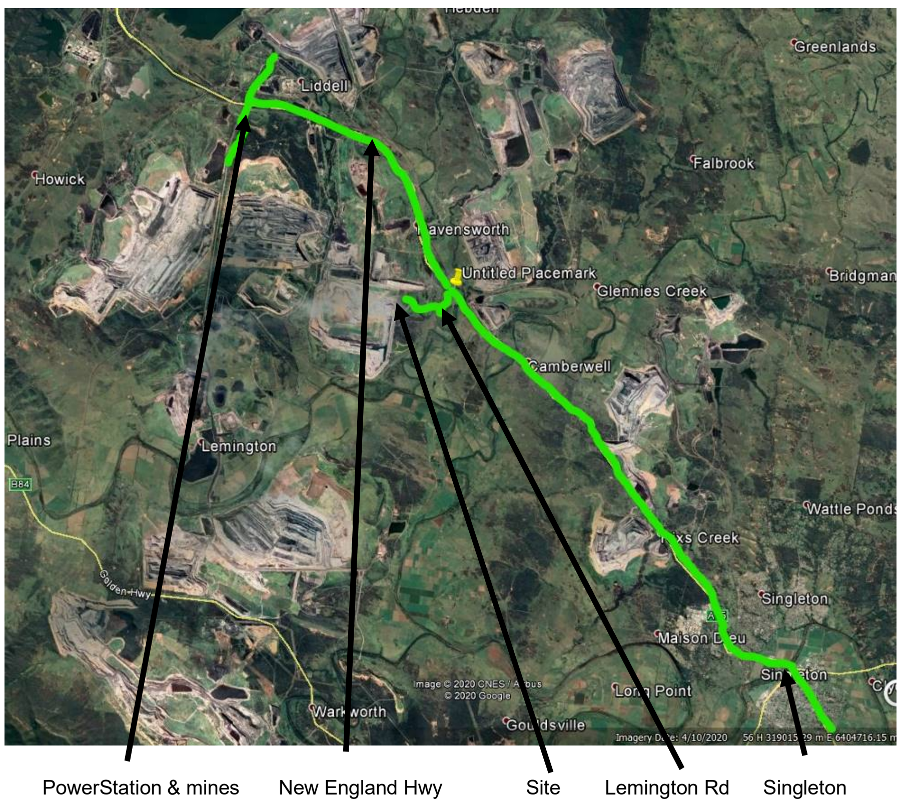
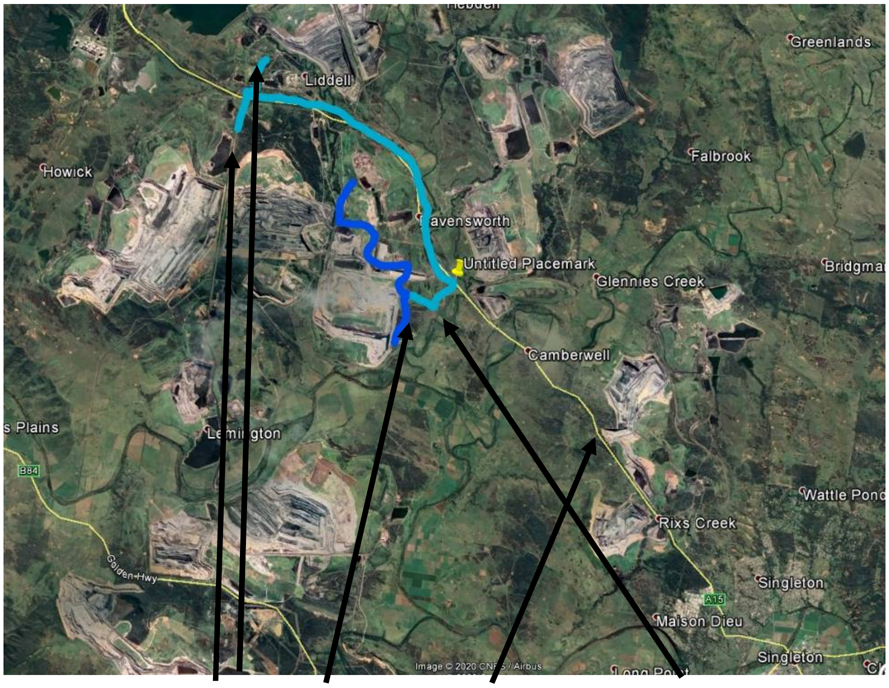


Figure 4.1
Principal Incoming Haul Routes

---- Incoming Haul Route

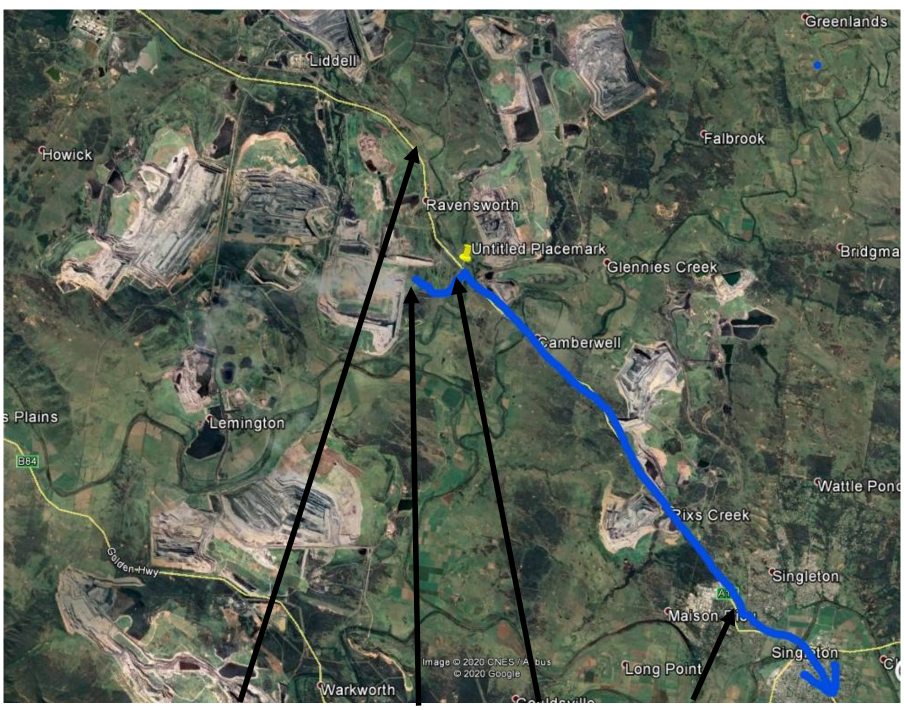


power stations Site New England Hwy Lemington Rd

Figure 4.2
Principal Output Haul Routes

---- Internal Haul Route

---- External Haul Route



New England HWY Site Lemington Rd Singleton

Figure 4.3
Minor Output Haul Route

---- External Haul Route

Traffic Generation

As a result of the expansion of the facility, the quantities of organic materials received and dispatched from the site will increase. Accordingly, truck movements to and from the site will also increase. However, not all finished compost will be exported from the Ravensworth site as a portion will be utilised across the Ravensworth rehabilitation areas.

The projected outgoing traffic volumes below assume all finished compost will leave the site via Lemington road, hence these figures are regarded as worst-case scenario.

Based on the increased annual production amount of 200,000 tpa, the following traffic volumes are anticipated:

- Peak additional truck movement maximum of 114 (in and out) per day;
- Peak additional light vehicles movement maximum of 32 cars (in and out) per day

On the basis that all deliveries and compost transfers will require in-bound and out-bound movements, the worst-case traffic movements generated from the increased operations would be up to 146 movements per day (73 in-bound and 73 out-bound).

The additional traffic movements on these routes would pass through the intersection of New England Highway and Lemington Road.

As shown in Figure 4.4, this intersection is a seagull intersection, which minimizes the impacts of the right-turn traffic movements on the through traffic flows on New England Highway and allows vehicles turning right out of Lemington Road to do so in two stages.

Figure 4.4 Intersection Lamington Rd and New England Highway

It is assumed that heavy vehicles movements will be distributed evenly throughout the day across the 12-hour operation period from 6 am to 6 pm.

It is assumed that light vehicle movements will be distributed evenly across the two hours at the start and end of the day. (i.e. 6 am to 8 am and 3 pm to 5 pm)

Analysis of existing TfNSW permanent counter on New England Highway at Rix Creek indicates that the am peak is generally between 6 am and 8 am whilst the Pl peak is from between 3 pm and 5 pm

Based on analysis of indicated truck movements supplied by Better Grow (Appendix A) the following assumptions have been made

Heavy vehicles per hour distributed as follows:

- 80% to and from the north to other AGL rehabilitation projects accessed via the Bayswater Power Station and Liddell Power Station)
- 20% from the south to/ from Singleton and Newcastle

Light vehicle per hour distributed as follows:

- 20% to from the north to/ from Muswellbrook and beyond
- 80% from the south to/ from Singleton and Newcastle

The additional vehicle movements added into the intersection during morning and evening peak hour would likely be:

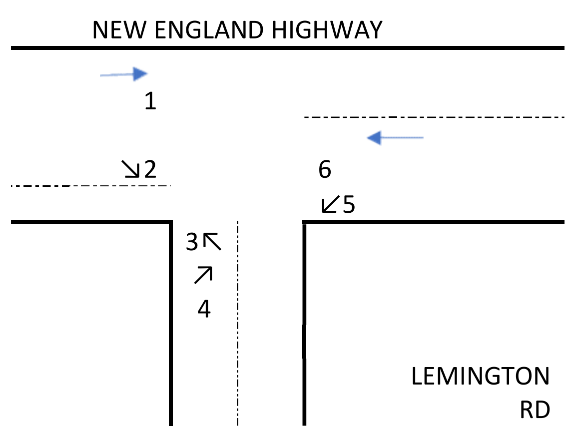


Figure 4.5

	LV	HV			LV	HV	
→ 1	0	0			0	0	5 ←
↓ 2	2	1			9	3	6 ↓
	LV		0	0			
	HV		3	1			
			← 3	→ 4			

Table 4.1 AM Peak Hr

	LV	HV			LV	HV	
→ 1	0	0			0	0	5 ←
↓ 2	0	4			0	1	6 ↓
	LV		2	9			
	HV		4	1			
			← 3	→ 4			

Table 4.2 PM Peak Hr

Public Transport

The project site and surrounding area have no public transport facilities and minimal active transport activities. Therefore, the project would likely have no impacts on public transport and active transport.

Hours of Operation

Hours of operation are expected to be from 6 am to 6 pm, Monday to Saturday.

5. On-site Parking Provisions

All staff and contractor light vehicles will be parked within the site adjacent to the site office. Similarly, heavy vehicles and plant will be parked and store within the site.

6. Effect on adjacent Roadway

Establishment of current traffic volumes

A traffic count was carried out on the 10/2/18 between the hours of 7:00 am and 9:00 am to determine all traffic movements at the intersection and on 20/5/20 between 3.00 pm and 5:00 pm

In summary the following Peak hour movements were determined as shown below

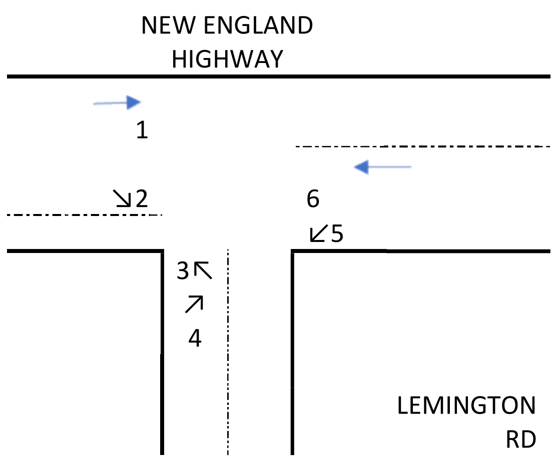


Figure 5.1 Intersection layout

Path	7 am to 8 am	8 am to 9 am	3 pm to 4 pm	4 pm to 5 pm
1 - LV	229	464	516	633
1 - HV	54	111	82	69
2 - LV	8	9	12	11
2 - HV	4	5	2	2
3 - LV	17	4	20	19
3 - HV	5	5	0	3
4 - LV	33	15	86	112
4 - HV	4	5	10	7
5 - LV	33	29	4	16
5 - HV	8	5	12	2
6 - LV	371	290	260	303
6 - HV	62	75	62	45

Table 5.1 AM and PM traffic Count

Based on he most recent Traffic volume data from the Roads and Martime Services count station (ID 6156) north of Singleton indicates the average growth rate is as follows:

year	direction	classification	Daily	total	Increase in 4 yrs	Ave yearly increase	Ave annual growth
2015	Northbound	All Vehicles	6617				
2015	Southbound	All Vehicles	6630				
				13247			
2018	Southbound	All Vehicles	7095				
2018	Northbound	All Vehicles	6889				
				13984	737	246	1.80%
2020	Southbound	All Vehicles	6925		Increase in 2 Yrs		
	Northbound	All Vehicles	7310	14235	251	125.5	0.880%

Table 5.2 Historic Growth Rate New England Highway

Due to COVID 19 impact on travel changes we have adopted a growth rate of 1.8% rather than the current two-year trend.

Effect on Intersection Performance

New England Highway and Lemington Rd

To determine if the proposed movents would have an effect on the operations of the existing intersection a SIDRA analysis was carried out.

Full details of the outputs are found in Appendix B. however a summary of this analysis is provided below

Traffic Modelling Assumption

- Analysis was carried out for AM and PM peak,
- Existing intersection geometry, including lane lengths and widths were measured using aerial images on the NSW Government's Six Maps,
- Developed a SIDRA Network Model using SIDRA version 9,
- We have modelled the intersection as per Type C-1, Coding as suggested on page 785 of the User Guide (see below.),

Staged Crossing at T Intersection Type C

There are two variants of the Network Template of a *Staged Crossing at T-Intersection Type C* as follows:

- *Type C-1* has the *Median Storage* lane orientation set according to the drive the setup as shown in *Figure 9.4.5.4*.
- *Type C-2* has *Median Storage* lane orientation opposite to the drive setup as shown in *Figure 9.4.5.5*.

Types *C-1* and *C-2* are available in the same project file for the *Staged Crossing at T-Intersection Type B Template*. They both lead to the same results.

Stage 1 of *Type C* is the same as *Stage 1* of *Type B*, however *Stage 2* is a merge. The automatic TWSC Calibration requires adjustment for *Stage 1* of *Type C*, due to the same reasons as *Type B* detailed earlier. *Table 9.4.5.2* and *Table 9.4.5.3* apply to *Stage 1* of *Type C*. The Exit Flow Effect was set to 50% for *Stage 1*.

Figure 9.4.5.8 – Staged Crossing at T Intersection Type C-1 Network Template

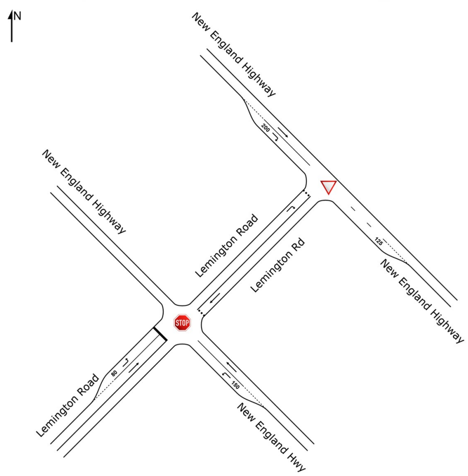


Figure 5.1 SIDRA Excerpt

- Median distance (Lemington Rd north) as 8m,
- Priorities as per Table 9.4.5.1,
- Gap acceptance as per Table 9.4.5,
- SIDRA default values were adopted, and
- Level of Services Method is set to RTA NSW.

Intersection Operation

How adequate the capacity of an intersection is judged by whether it can physically and operationally cater for the traffic using it.

The performances of the intersections relevant to the proposal have been assessed using the intersection modelling SIDRA software. The model provides parameters of the performance of an intersection including the degree of saturation (DoS) and the average delay per vehicle. It provides an accurate and consistent guide to the performance of an intersection under the different traffic flow scenarios. The recommended criteria for evaluating capacity of intersections are shown in Table 3.1.

Level of Service	Degree of Saturation (DoS)	Ave. Delay/ Veh. (Secs)
A/B good operation	less than 0.80	Less than 28
C satisfactory	0.80 to 0.85	29-42
D poor but manageable	0.85 to 0.90	43-56
E at capacity	0.90 to 1.0	57-70
F unsatisfactory, extra capacity required	Over 1.0	Over 70

Table 5.3 Criteria for Evaluating Capacity of Intersection

Criteria	Base	Base with Devel	Base with 10 years growth)	10 Years growth With Develop
Network	LOS A	LOS A	LOS A	LOS A

Table 5.4 Network Performance AM Peak

Criteria	Base	Base with Devel	Base with 10 years growth)	10 Years growth With Develop
Network	LOS B	LOS B	LOS B	LOS B

Table 5.5 Network Performance PM Peak

Criteria	Base	Base with Development	Base with 10 years growth	10 Years growth with Develop
South Bound New England Highway				
Av. Delay (sec)	0.0	0.0	0.0	0.0
Level of Service	A	A	A	A
Que Length (veh)	NA	NA	NA	NA
North Bound New England Highway				
Av. Delay (sec)	0.0	0.0	0.0	0.0
Level of Service	A	A	A	A
Que Length (veh)	NA	NA	NA	NA
Right Turn from New England Highway to Lemington Rd				
Av. Delay (sec)	2.5	2.6	3.3	3.4
Level of Service	A	A	A	A
Que Length (veh)	1	1	1	1
Left Turn from New England Highway to Lemington Rd				
Av. Delay (sec)	8.0	8.0	8.0	8.0
Level of Service	A	A	A	A
Que Length (veh)	0	0	0	0
Left Turn from Lemington road into New England Highway				
Av. Delay (sec)	14.2	14.9	15.3	16.1
Level of Service	A	A	B	B
Que Length(veh)	1	1	1	1
Right Turn from Lemington road into New England Highway				
Av. Delay (sec)	12.7	13.1	13.9	14.3
Level of Service	A	A	A	A
Que Length (veh)	1	1	1	1

Table 5.6 Intersection Performance AM

Criteria	Base	Base with Development	Base with 10 years growth	10 Years growth with Develop
South Bound New England Highway				
Av. Delay (sec)	0.0	0.0	0.0	0.0
Level of Service	A	A	A	A
Que Length (veh)	NA	NA	NA	NA
North Bound New England Highway				
Av. Delay (sec)	0.0	0.0	0.0	0.0
Level of Service	A	A	A	A
Que Length (veh)	NA	NA	NA	NA
Right Turn from New England Highway to Lemington Rd				
Av. Delay (sec)	1.5	1.9	1.5	1.9
Level of Service	A	A	A	A
Que Length (veh)	1	1	1	1
Left Turn from New England Highway to Lemington Rd				
Av. Delay (sec)	7.7	7.8	7.7	7.8
Level of Service	A	A	A	A
Que Length (veh)	0	0	0	0
Left Turn from Lemington road into New England Highway				
Av. Delay (sec)	11.3	10.5	11.2	10.5
Level of Service	A	A	A	A
Que Length (veh)	1	1	1	1
Right Turn from Lemington road into New England Highway				
Av. Delay (sec)	10.8	10.7	10.7	10.6
Level of Service	A	A	A	A
Que Length (veh)	1	1	1	1

Table 5.7 Intersection Performance PM

The modelling outputs as shown in Tables 5.4 through to 5.7 illustrate that there is no deterioration of Av Delay, Level of Service, or Que length when development traffic is added to either of the 2018 or the 10-year simulations of the intersection in the AM or PM.

It 2028 (in either scenarios) the intersection operates at Level of Service of B or above on all legs and turn movements in the morning and evening peak hour.

Further the que length for the right turn into Lemington Rd Street under the development scenario in 10 years of does not exceed the 200 m available for storage of the current road layout in either the morning or evening peak hour.

The relatively low number of additional traffic movements generated by the modification would be within the normal day to day variation of traffic volumes and would have minimal impacts on this intersection.

Lemington Rd and Private Access Road

The relatively low number of additional traffic movements generated by the modification would be within the normal day to day variation of traffic volumes and would have minimal impacts on this intersection.

7. Conclusions

It is proposed to increase the capacity of the Ravensworth Composting Facility by 76,000 tonnes per year to 220,000 tonnes per year and transport composted materials from the site to the Bayswater and Liddell power stations for use in rehabilitation activities.

The proposal modification would generate an additional 9 heavy vehicles per hour and 11 light vehicles in the morning peak hour and 10 heavy vehicles per hour and 11 light vehicles in the afternoon peak hour.

Given the efficient operation of seagull intersections and its existing performance, the impact of the proposal on the intersection would be minimal as no deterioration on level of service is evident from the SIDRA model.

Based on the above assessment, I consider that that this development will have no unacceptable traffic implications on the operation of:

- Intersection of New England Highway and Lemington Road,
- Intersection of Lemington Road and Private Access Rd. or
- the surrounding area.

Based on the findings of this report, Pavey Consulting Services is of the opinion that there are no traffic engineering related matters that should preclude approval of this development application.

Prepared by:
David Pavey
B.E (Civil) Grad Dip LGE. LGE Cert MAICD, MAIPM
Director,
David Pavey Pty Ltd

Appendix A
Propose Traffic Movements

SUMMARY OF ANTICIPATED AVERAGE AND PEAK DAILY VEHICLE MOVEMENTS IN AND OUT OF GREENSPOT RAVENSWORTH IN FULL OPERATION

	Hydro Exc & Drill Mud				Paper Crumble				Biosolids				GO and comingled Food and GO				Compost Out				Recycled Water				Ash & Timber				Satff							
	Average		Peak		Average		Peak		Average		Peak		Average		Peak		Average		Peak		Average		Peak		Average		Peak		Average		Peak		Total Truck	Total Truck		
Vehicle Type	in	out	in	out	in	out	in	out	in	out	in	out	in	out	in	out	in	out	in	out	in	out	in	out	in	out	in	out	in	out	in	out	Ave Movements	Peak Movements	6am to 8am	3pm to 5pm
Truck and Dog					2	2	2	2	3	3	4	4	5	5	9	9	3	3	5	5					2	2	2	2					30	44	2	4
Semi Tippers & Walking Floors													7	7	9	9											1	1					14	20	1	1
19m B' Doubles													4	4	6	6	5	5	7	7													18	26	1	2
Semi Tippers	2	2	3	3																													4	6	1	1
Semi liquid tankers	1	1	2	2																	3	3	4	4									8	12	2	0
																																	74	108	7	8
Total ave truck movements	3	3			2	2			3	3			16	16			8	8			3	3			2	2							74			
Total Peak truck movements			5	5			2	2			4	4			24	24			12	12			4	4			3	3						108		
Staff Cars																													10	10	12	12	20	24	10	10
Visitors Cars																													2	2	4	4	4	8	1	1
Fuel deliveries																													2	2	3	3	4	6	0	0
Total average daily vehicle movements																																	102			
Total peak daily vehicle movements																																		146		

Appendix B
SIDRA Inputs and Outputs

USER REPORT FOR NETWORK

All Movement Classes

Template: Default Network User Report

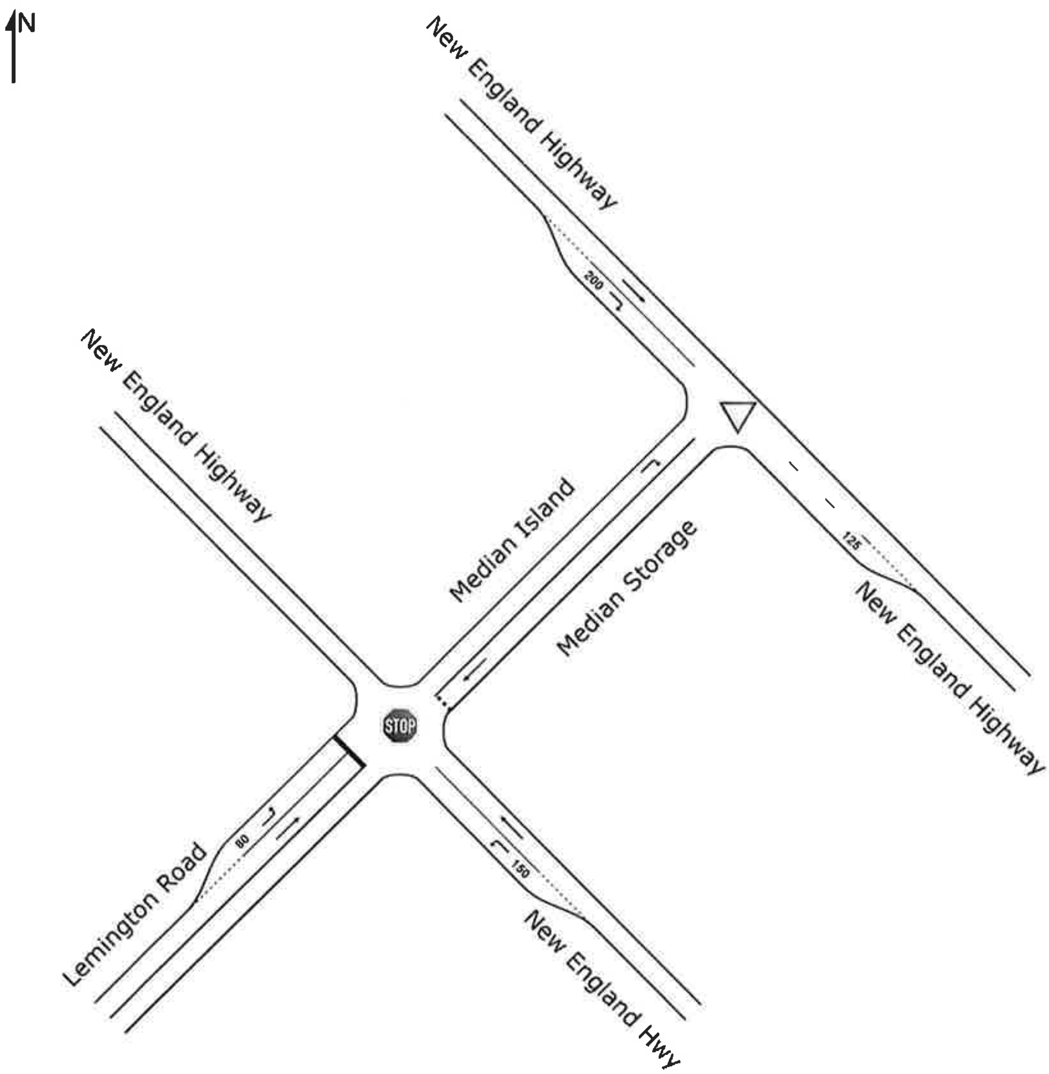
Project: MC2033 NewEnglandHwy-LemingtonRd_v01.sip8

Network: [New England Hwy - Lemington Rd Intersection 2020_Existing_AM (Network Folder: MC2033)]

Intersection of New England Highway and Lemington Road, Ravensworth NSW
Staged Crossing Type C-1
2020 AM Peak Hour - Existing
Network Category: Existing Design

Network Layout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



NETWORK SUMMARY

Network: [New England Hwy - Lemington Rd Intersection 2020_Existing_AM (Network Folder: MC2033)]

Intersection of New England Highway and Lemington Road, Ravensworth NSW
Staged Crossing Type C-1
2020 AM Peak Hour - Existing
Network Category: Existing Design

Network Performance - Hourly Values			
Performance Measure	**Vehicles**	**Per Unit Distance**	**Persons**
Network Level of Service (LOS)	LOS A		
Speed Efficiency	0.92		
Travel Time Index	9.10		
Congestion Coefficient	1.09		
Travel Speed (Average)	80.1 km/h		80.1 km/h
Travel Distance (Total)	809.3 veh-km/h		971.2 pers-km/h
Travel Time (Total)	10.1 veh-h/h		12.1 pers-h/h
Desired Speed (Program)	87.2 km/h		
Demand Flows (Total for all Sites)	839 veh/h		1007 pers/h
Arrival Flows (Total for all Sites)	839 veh/h		1007 pers/h
Demand Flows (Entry Total)	799 veh/h		
Midblock Inflows (Total)	0 veh/h		
Midblock Outflows (Total)	0 veh/h		
Percent Heavy Vehicles (Demand)	19.5 %		
Percent Heavy Vehicles (Arrival)	19.5 %		
Degree of Saturation	0.235		
Control Delay (Total)	0.29 veh-h/h		0.35 pers-h/h
Control Delay (Average)	1.2 sec		1.2 sec
Control Delay (Worst Lane)	14.2 sec		
Control Delay (Worst Movement)	14.2 sec		14.2 sec
Geometric Delay (Average)	1.0 sec		
Stop-Line Delay (Average)	0.3 sec		
Ave. Queue Storage Ratio (Worst Lane)	0.03		
Total Effective Stops	84 veh/h		101 pers/h
Effective Stop Rate	0.10	0.10 per km	0.10
Proportion Queued	0.03		0.03
Performance Index	10.9		10.9
Cost (Total)	554.60 $/h	0.69 $/km	554.60 $/h
Fuel Consumption (Total)	97.8 L/h	120.9 mL/km	
Fuel Economy	12.1 L/100km		
Carbon Dioxide (Total)	239.8 kg/h	296.3 g/km	
Hydrocarbons (Total)	0.021 kg/h	0.026 g/km	
Carbon Monoxide (Total)	0.378 kg/h	0.467 g/km	
NOx (Total)	0.952 kg/h	1.177 g/km	

Network Model Variability Index (Iterations 3 to N): 0.0 %
Number of Iterations: 5 (Maximum: 10)
Largest change in Lane Degrees of Saturation or Queue Storage Ratios for the last three Network Iterations: 0.0% 0.0% 0.0%
Network Level of Service (LOS) Method: SIDRA Speed Efficiency.
Software Setup used: New South Wales.

Network Performance - Annual Values		
Performance Measure	**Vehicles**	**Persons**
Demand Flows (Total for all Sites)	402,720 veh/y	483,264 pers/y
Delay	138 veh-h/y	166 pers-h/y
Effective Stops	40,524 veh/y	48,629 pers/y
Travel Distance	388,482 veh-km/y	466,178 pers-km/y

Travel Time	4,847	veh-h/y	5,817	pers-h/y
Cost	266,207	$/y	266,207	$/y
Fuel Consumption	46,960	L/y		
Carbon Dioxide	115,104	kg/y		
Hydrocarbons	10	kg/y		
Carbon Monoxide	181	kg/y		
NOx	457	kg/y		

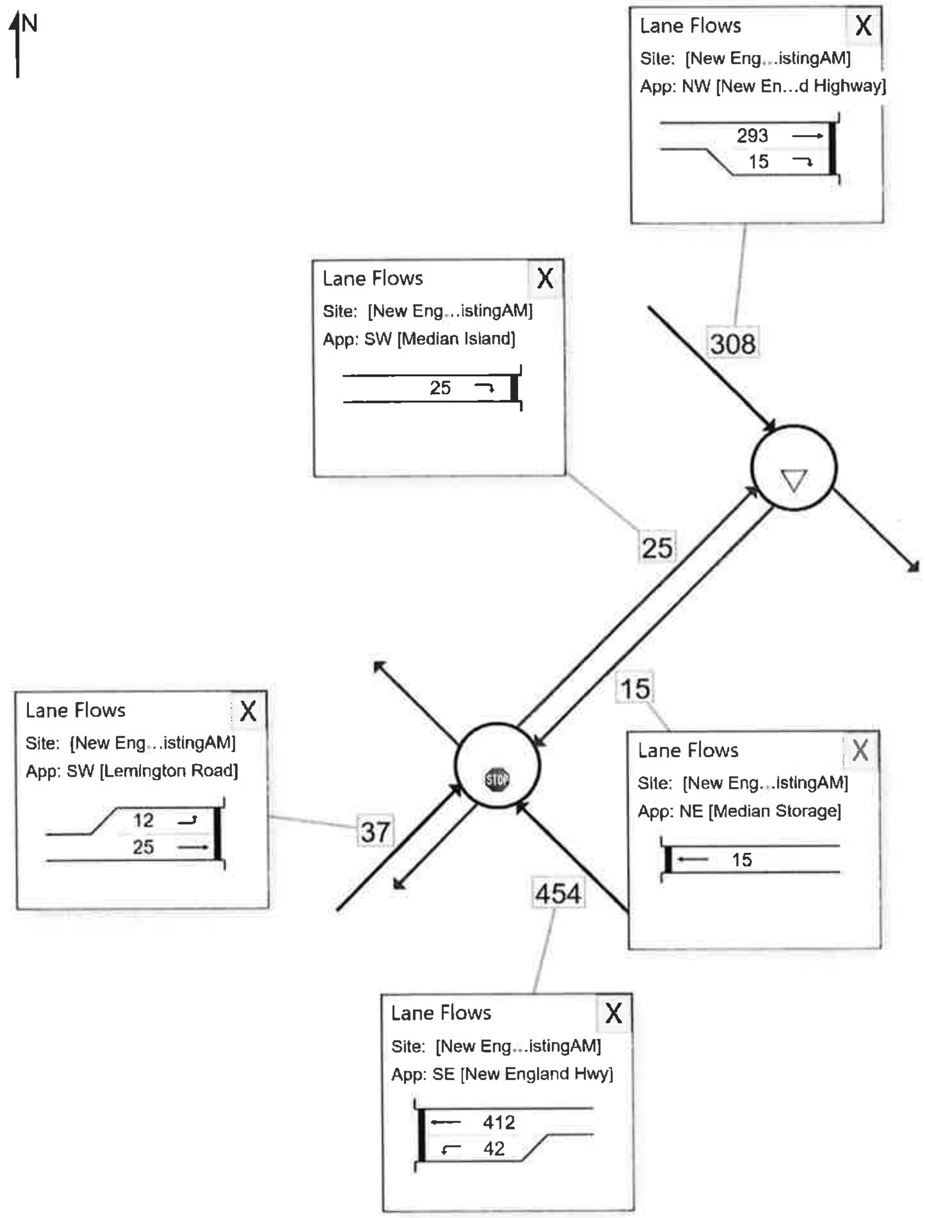
APPROACH LANE FLOWS

Lane flow rates based on arrival flows including the effect of capacity constraint in Network analysis (veh/h)

All Movement Classes

Network: [New England Hwy - Lemington Rd Intersection 2020_Existing_AM (Network Folder: MC2033)]

Intersection of New England Highway and Lemington Road, Ravensworth NSW
Staged Crossing Type C-1
2020 AM Peak Hour - Existing
Network Category: Existing Design
Use the button below to open or close all popup boxes. Click value labels to open selected ones.
Click and drag popup boxes to move to preferred positions.



MOVEMENT SUMMARY

Site: [New England Hwy - Lemington Rd (Stage 1) 2020_Existing_AM (Site Folder: MC2033)]

Network: [New England Hwy - Lemington Rd Intersection 2020_Existing_AM (Network Folder: MC2033)]

Intersection of New England Highway and Lemington Road, Ravensworth NSW
(Staged Crossing Type C-1, Stage 1)
2020 AM Peak Hour - Existing
Site Category: Existing Design
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: New England Hwy														
21	L2	42	23.8	42	23.8	0.026	8.0	LOS A	0.0	0.0	0.00	0.65	0.00	62.5
22	T1	412	17.2	412	17.2	0.235	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	89.8
Approach		454	17.8	454	17.8	0.235	0.8	NA	0.0	0.0	0.00	0.06	0.00	86.3
NorthEast: Median Storage														
25	T1	15	33.3	15	33.3	0.020	2.5	LOS A	0.1	0.6	0.47	0.35	0.47	47.0
Approach		15	33.3	15	33.3	0.020	2.5	LOS A	0.1	0.6	0.47	0.35	0.47	47.0
SouthWest: Lemington Road														
30	L2	12	58.3	12	58.3	0.020	14.2	LOS A	0.1	0.8	0.52	0.92	0.52	44.7
31	T1	25	24.0	25	24.0	0.044	12.7	LOS A	0.2	1.3	0.51	1.01	0.51	44.9
Approach		37	35.1	37	35.1	0.044	13.2	LOS A	0.2	1.3	0.51	0.98	0.51	44.8
All Vehicles		506	19.6	506	19.6	0.235	1.7	NA	0.2	1.3	0.05	0.14	0.05	81.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

▽Site: [New England Hwy - Lemington Rd (Stage 2) 2020_Existing_AM (Site Folder: MC2033)]

Network: [New England Hwy - Lemington Rd Intersection 2020_Existing_AM (Network Folder: MC2033)]

Intersection of New England Highway and Lemington Road, Ravensworth NSW
(Staged Crossing Type C-1, Stage 2)
2020 AM Peak Hour - Existing
Site Category: Existing Design
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
NorthWest: New England Highway														
28	T1	293	18.4	293	18.4	0.168	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	89.9
29	R2	15	33.3	15	33.3	0.010	8.0	LOS A	0.0	0.0	0.00	0.69	0.00	66.4
Approach		308	19.2	308	19.2	0.168	0.4	NA	0.0	0.0	0.00	0.03	0.00	89.1
SouthWest: Median Island														
32	R2	25	24.0	25	24.0	0.016	1.3	LOS A	0.0	0.0	0.00	0.22	0.00	20.2
Approach		25	24.0	25	24.0	0.016	1.3	NA	0.0	0.0	0.00	0.22	0.00	20.2
All Vehicles		333	19.5	333	19.5	0.168	0.5	NA	0.0	0.0	0.00	0.05	0.00	78.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

USER REPORT FOR NETWORK

All Movement Classes

Template: Default Network User Report

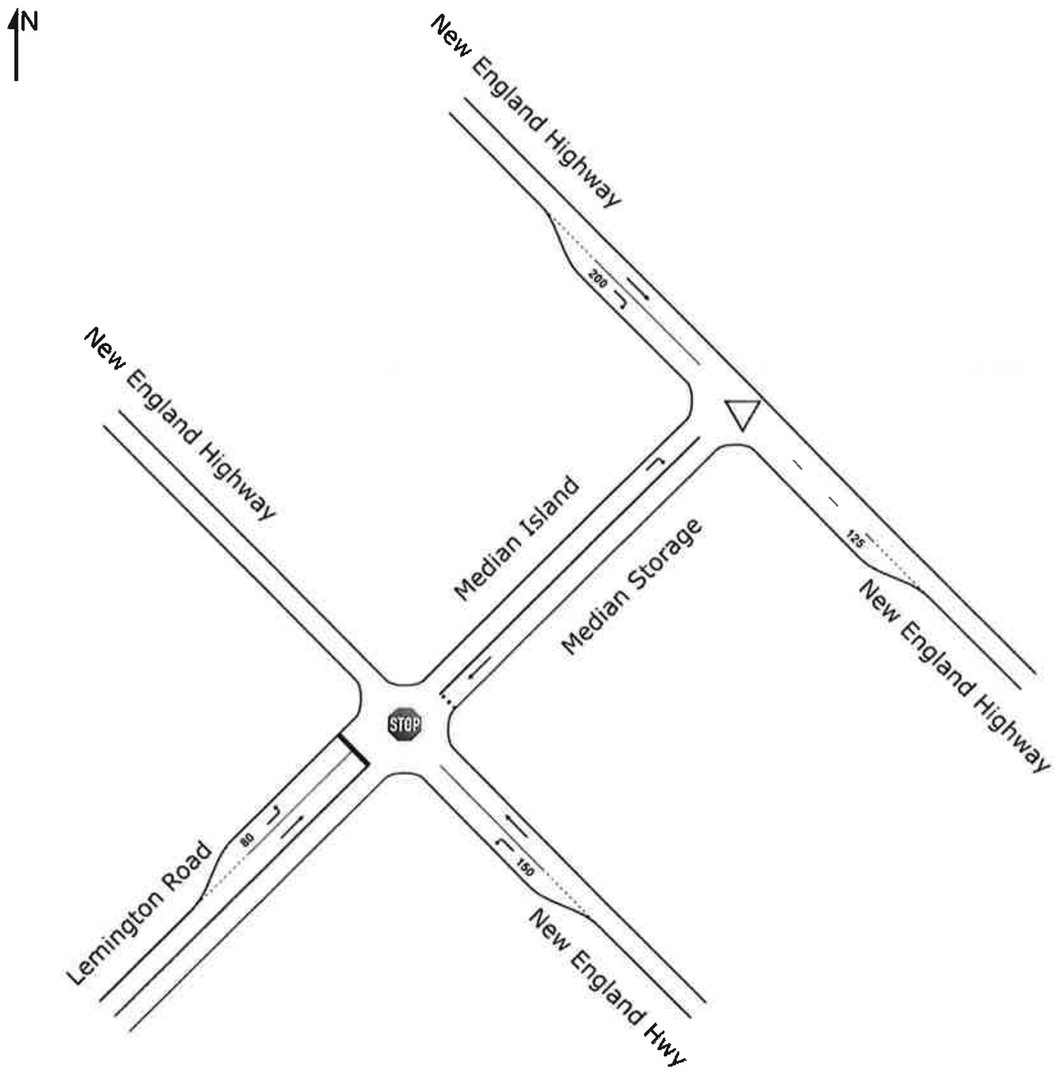
Project: MC2033 NewEnglandHwy-LemingtonRd_v01.sip8

Network: [New England Hwy - Lemington Rd Intersection 2020_with_Dev_AM (Network Folder: MC2033)]

Intersection of New England Highway and Lemington Road, Ravensworth NSW
Staged Crossing Type C-1
2020 with Development AM Peak Hour
Network Category: Proposed Design 1

Network Layout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



NETWORK SUMMARY

Network: [New England Hwy - Lemington Rd Intersection 2020_with_Dev_AM (Network Folder: MC2033)]

Intersection of New England Highway and Lemington Road, Ravensworth NSW
Staged Crossing Type C-1
2020 with Development AM Peak Hour
Network Category: Proposed Design 1

Network Performance - Hourly Values			
Performance Measure	Vehicles	Per Unit Distance	Persons
Network Level of Service (LOS)	LOS A		
Speed Efficiency	0.91		
Travel Time Index	9.03		
Congestion Coefficient	1.10		
Travel Speed (Average)	79.2 km/h		79.2 km/h
Travel Distance (Total)	828.7 veh-km/h		994.4 pers-km/h
Travel Time (Total)	10.5 veh-h/h		12.6 pers-h/h
Desired Speed (Program)	86.7 km/h		
Demand Flows (Total for all Sites)	862 veh/h		1034 pers/h
Arrival Flows (Total for all Sites)	862 veh/h		1034 pers/h
Demand Flows (Entry Total)	818 veh/h		
Midblock Inflows (Total)	0 veh/h		
Midblock Outflows (Total)	0 veh/h		
Percent Heavy Vehicles (Demand)	20.2 %		
Percent Heavy Vehicles (Arrival)	20.2 %		
Degree of Saturation	0.235		
Control Delay (Total)	0.35 veh-h/h		0.41 pers-h/h
Control Delay (Average)	1.4 sec		1.4 sec
Control Delay (Worst Lane)	14.9 sec		
Control Delay (Worst Movement)	14.9 sec		14.9 sec
Geometric Delay (Average)	1.1 sec		
Stop-Line Delay (Average)	0.3 sec		
Ave. Queue Storage Ratio (Worst Lane)	0.04		
Total Effective Stops	100 veh/h		120 pers/h
Effective Stop Rate	0.12	0.12 per km	0.12
Proportion Queued	0.03		0.03
Performance Index	11.4		11.4
Cost (Total)	579.70 $/h	0.70 $/km	579.70 $/h
Fuel Consumption (Total)	103.5 L/h	124.9 mL/km	
Fuel Economy	12.5 L/100km		
Carbon Dioxide (Total)	254.1 kg/h	306.7 g/km	
Hydrocarbons (Total)	0.022 kg/h	0.026 g/km	
Carbon Monoxide (Total)	0.392 kg/h	0.472 g/km	
NOx (Total)	1.040 kg/h	1.255 g/km	

Network Model Variability Index (Iterations 3 to N): 0.0 %
Number of Iterations: 5 (Maximum: 10)
Largest change in Lane Degrees of Saturation or Queue Storage Ratios for the last three Network Iterations: 0.0% 0.0% 0.0%
Network Level of Service (LOS) Method: SIDRA Speed Efficiency.
Software Setup used: New South Wales.

Network Performance - Annual Values		
Performance Measure	Vehicles	Persons
Demand Flows (Total for all Sites)	413,760 veh/y	496,512 pers/y
Delay	166 veh-h/y	199 pers-h/y
Effective Stops	48,035 veh/y	57,642 pers/y

Travel Distance	397,768 veh-km/y	477,322 pers-km/y
Travel Time	5,025 veh-h/y	6,030 pers-h/y
Cost	278,254 $/y	278,254 $/y
Fuel Consumption	49,696 L/y	
Carbon Dioxide	121,979 kg/y	
Hydrocarbons	11 kg/y	
Carbon Monoxide	188 kg/y	
NOx	499 kg/y	

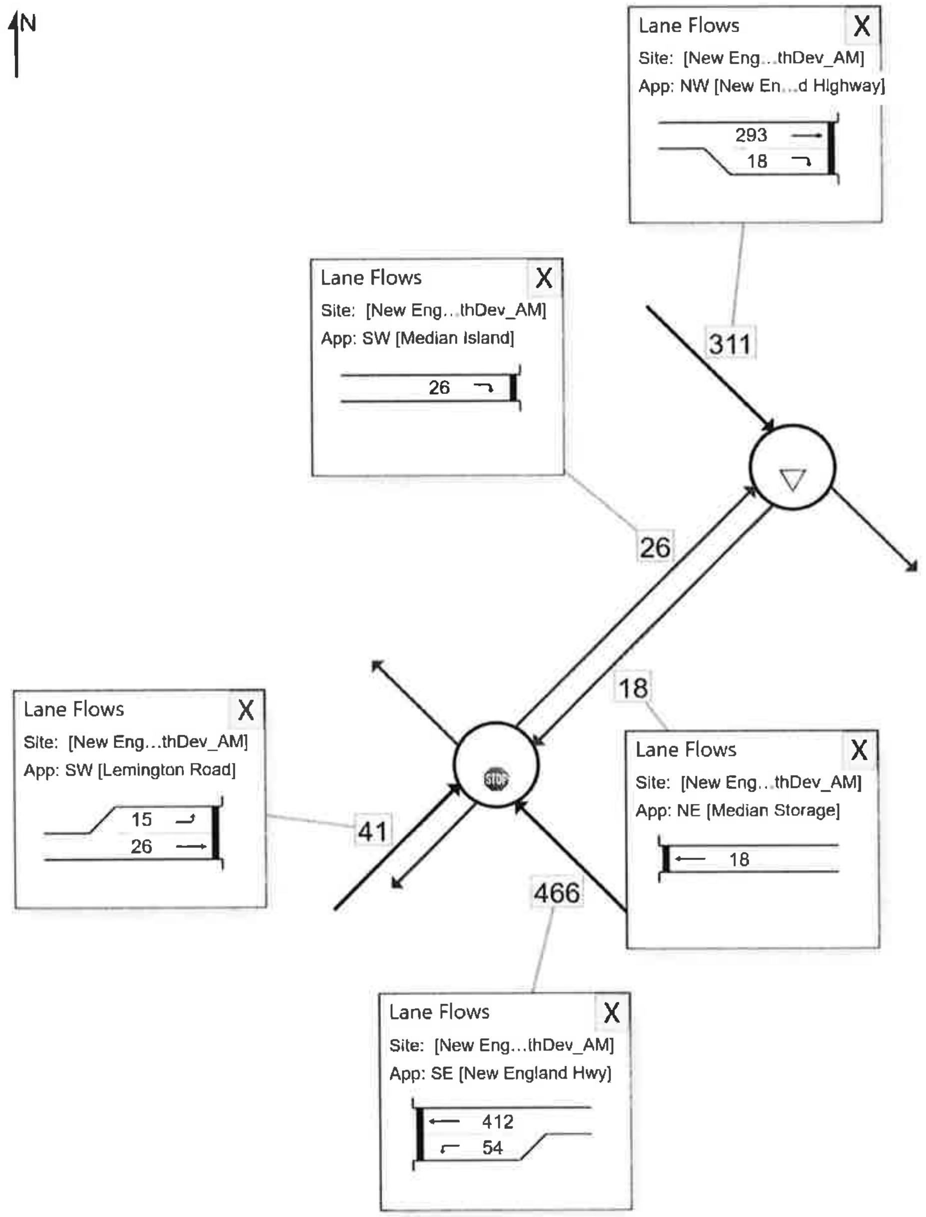
APPROACH LANE FLOWS

Lane flow rates based on arrival flows including the effect of capacity constraint in Network analysis (veh/h)

All Movement Classes

Network: [New England Hwy - Lemington Rd Intersection 2020_with_Dev_AM (Network Folder: MC2033)]

Intersection of New England Highway and Lemington Road, Ravensworth NSW
Staged Crossing Type C-1
2020 with Development AM Peak Hour
Network Category: Proposed Design 1
Use the button below to open or close all popup boxes. Click value labels to open selected ones.
Click and drag popup boxes to move to preferred positions.



MOVEMENT SUMMARY

Site: [New England Hwy - Lemington Rd (Stage 1) 2020_with_Dev_AM (Site Folder: MC2033)]

Network: [New England Hwy - Lemington Rd Intersection 2020_with_Dev_AM (Network Folder: MC2033)]

Intersection of New England Highway and Lemington Road, Ravensworth NSW
(Staged Crossing Type C-1, Stage 1)
2020 with Development AM Peak Hour
Site Category: Existing Design
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total	HV]	ARRIVAL FLOWS [Total	HV]	Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE [Veh.	Dist]	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
SouthEast: New England Hwy														
21	L2	54	24.1	54	24.1	0.034	8.0	LOS A	0.0	0.0	0.00	0.65	0.00	62.4
22	T1	412	17.2	412	17.2	0.235	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	89.8
Approach		466	18.0	466	18.0	0.235	1.0	NA	0.0	0.0	0.00	0.07	0.00	85.5
NorthEast: Median Storage														
25	T1	18	33.3	18	33.3	0.024	2.6	LOS A	0.1	0.7	0.48	0.37	0.48	46.9
Approach		18	33.3	18	33.3	0.024	2.6	LOS A	0.1	0.7	0.48	0.37	0.48	46.9
SouthWest: Lemington Road														
30	L2	15	66.7	15	66.7	0.027	14.9	LOS B	0.1	1.1	0.53	0.94	0.53	43.3
31	T1	26	26.9	26	26.9	0.047	13.1	LOS A	0.2	1.4	0.52	1.02	0.52	44.7
Approach		41	41.5	41	41.5	0.047	13.7	LOS A	0.2	1.4	0.52	0.99	0.52	43.9
All Vehicles		525	20.4	525	20.4	0.235	2.0	NA	0.2	1.4	0.06	0.16	0.06	80.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

▽Site: [New England Hwy - Lemington Rd (Stage 2) 2020_with_Dev_AM (Site Folder: MC2033)]

Network: [New England Hwy - Lemington Rd Intersection 2020_with_Dev_AM (Network Folder: MC2033)]

Intersection of New England Highway and Lemington Road, Ravensworth NSW
(Staged Crossing Type C-1, Stage 2)
2020 with Development AM Peak Hour
Site Category: Existing Design
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total	HV]	ARRIVAL FLOWS [Total	HV]	Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE [Veh.	Dist]	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
NorthWest: New England Highway														
28	T1	293	18.4	293	18.4	0.168	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	89.9
29	R2	18	33.3	18	33.3	0.012	8.0	LOS A	0.0	0.0	0.00	0.69	0.00	66.4
Approach		311	19.3	311	19.3	0.168	0.5	NA	0.0	0.0	0.00	0.04	0.00	89.0
SouthWest: Median Island														
32	R2	26	26.9	26	26.9	0.017	1.3	LOS A	0.0	0.0	0.00	0.21	0.00	20.2
Approach		26	26.9	26	26.9	0.017	1.3	NA	0.0	0.0	0.00	0.21	0.00	20.2
All Vehicles		337	19.9	337	19.9	0.168	0.6	NA	0.0	0.0	0.00	0.05	0.00	77.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

USER REPORT FOR NETWORK

All Movement Classes

Template: Default Network User Report

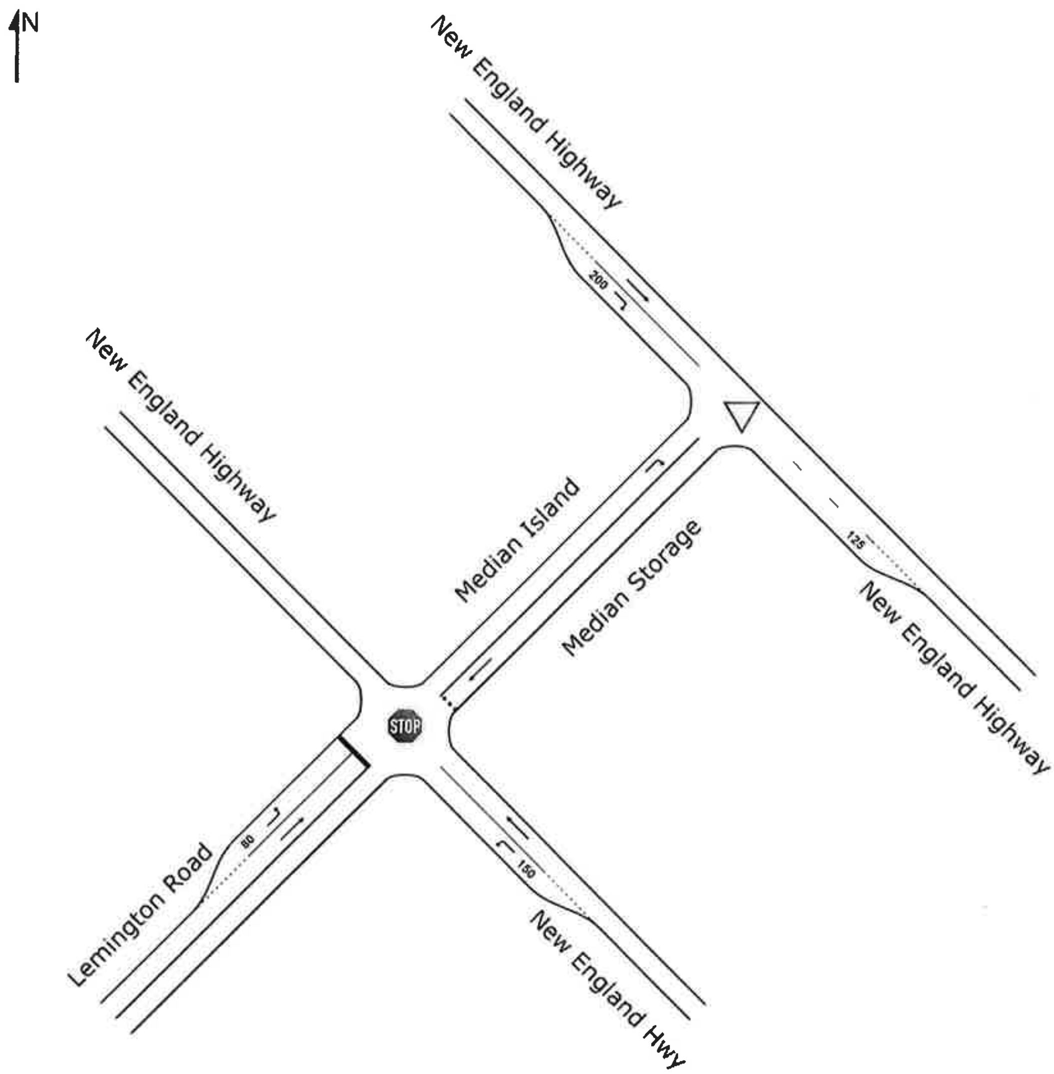
Project: MC2033 NewEnglandHwy-LemingtonRd_v01.sip8

Network: [New England Hwy - Lemington Rd Intersection 2020_10Y_Projection_AM (Network Folder: MC2033)]

Intersection of New England Highway and Lemington Road, Ravensworth NSW
Staged Crossing Type C-1
2020 10 Year Projection AM Peak Hour
Network Category: Future Conditions 1

Network Layout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



NETWORK SUMMARY

Network: [New England Hwy - Lemington Rd Intersection 2020_10Y_Projection_AM (Network Folder: MC2033)]

Intersection of New England Highway and Lemington Road, Ravensworth NSW
Staged Crossing Type C-1
2020 10 Year Projection AM Peak Hour
Network Category: Future Conditions 1

Network Performance - Hourly Values			
Performance Measure	**Vehicles**	**Per Unit Distance**	**Persons**
Network Level of Service (LOS)	LOS A		
Speed Efficiency	0.92		
Travel Time Index	9.15		
Congestion Coefficient	1.08		
Travel Speed (Average)	80.6 km/h		80.6 km/h
Travel Distance (Total)	1019.8 veh-km/h		1223.8 pers-km/h
Travel Time (Total)	12.6 veh-h/h		15.2 pers-h/h
Desired Speed (Program)	87.3 km/h		
Demand Flows (Total for all Sites)	1054 veh/h		1265 pers/h
Arrival Flows (Total for all Sites)	1054 veh/h		1265 pers/h
Demand Flows (Entry Total)	1007 veh/h		
Midblock Inflows (Total)	0 veh/h		
Midblock Outflows (Total)	0 veh/h		
Percent Heavy Vehicles (Demand)	18.4 %		
Percent Heavy Vehicles (Arrival)	18.4 %		
Degree of Saturation	0.277		
Control Delay (Total)	0.36 veh-h/h		0.43 pers-h/h
Control Delay (Average)	1.2 sec		1.2 sec
Control Delay (Worst Lane)	15.3 sec		
Control Delay (Worst Movement)	15.3 sec		15.3 sec
Geometric Delay (Average)	0.9 sec		
Stop-Line Delay (Average)	0.3 sec		
Ave. Queue Storage Ratio (Worst Lane)	0.04		
Total Effective Stops	102 veh/h		122 pers/h
Effective Stop Rate	0.10	0.10 per km	0.10
Proportion Queued	0.03		0.03
Performance Index	13.7		13.7
Cost (Total)	688.48 $/h	0.68 $/km	688.48 $/h
Fuel Consumption (Total)	119.8 L/h	117.5 mL/km	
Fuel Economy	11.7 L/100km		
Carbon Dioxide (Total)	293.2 kg/h	287.5 g/km	
Hydrocarbons (Total)	0.026 kg/h	0.025 g/km	
Carbon Monoxide (Total)	0.478 kg/h	0.468 g/km	
NOx (Total)	1.129 kg/h	1.107 g/km	

Network Model Variability Index (Iterations 3 to N): 0.0 %
Number of Iterations: 5 (Maximum: 10)
Largest change in Lane Degrees of Saturation or Queue Storage Ratios for the last three Network Iterations: 0.0% 0.0% 0.0%
Network Level of Service (LOS) Method: SIDRA Speed Efficiency.
Software Setup used: New South Wales.

Network Performance - Annual Values		
Performance Measure	**Vehicles**	**Persons**
Demand Flows (Total for all Sites)	505,920 veh/y	607,104 pers/y
Delay	174 veh-h/y	208 pers-h/y
Effective Stops	48,960 veh/y	58,751 pers/y
Travel Distance	489,522 veh-km/y	587,426 pers-km/y

Travel Time	6,071 veh-h/y	7,286 pers-h/y
Cost	330,469 $/y	330,469 $/y
Fuel Consumption	57,506 L/y	
Carbon Dioxide	140,718 kg/y	
Hydrocarbons	12 kg/y	
Carbon Monoxide	229 kg/y	
NOx	542 kg/y	

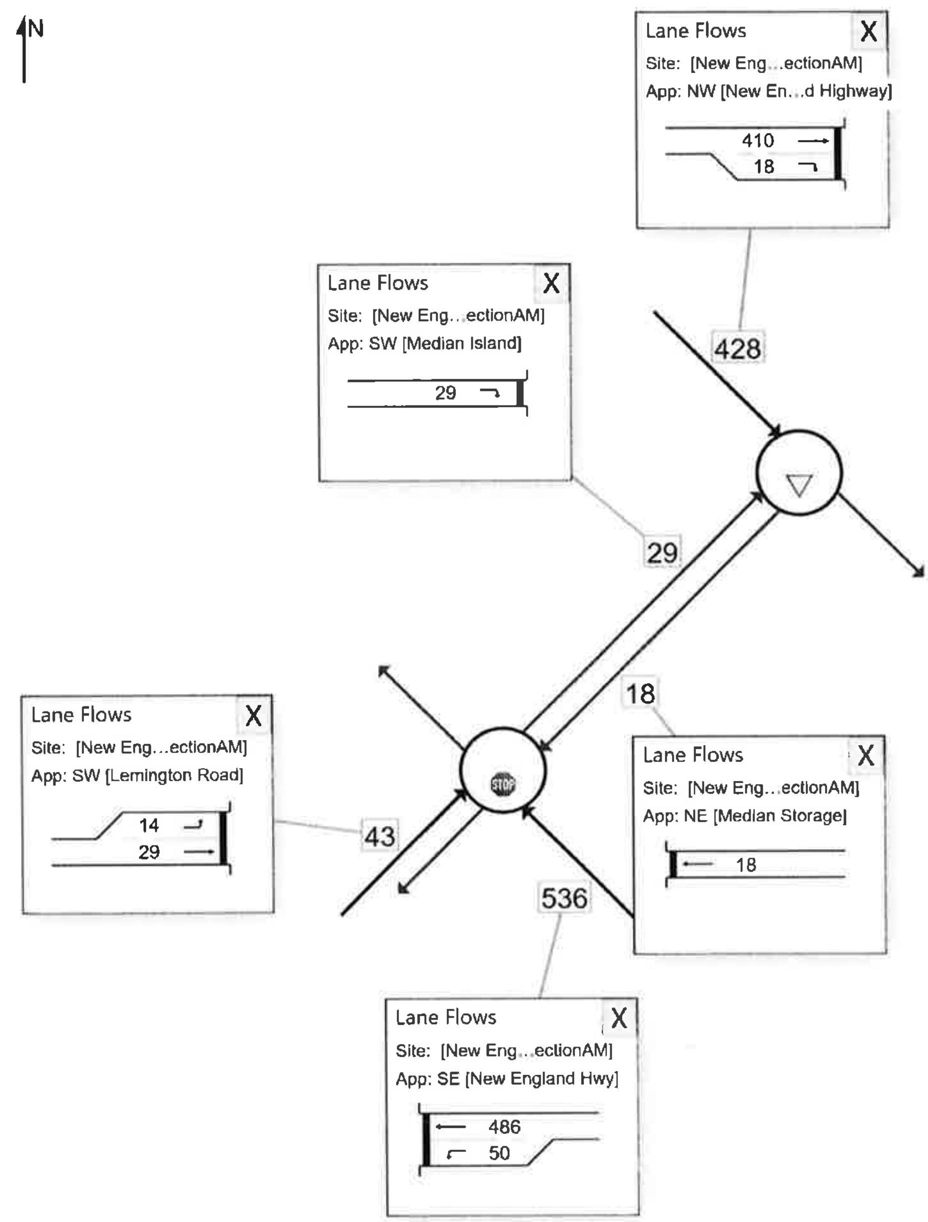
APPROACH LANE FLOWS

Lane flow rates based on arrival flows including the effect of capacity constraint in Network analysis (veh/h)

All Movement Classes

Network: [New England Hwy - Lemington Rd Intersection 2020_10Y_Projection_AM (Network Folder: MC2033)]

Intersection of New England Highway and Lemington Road, Ravensworth NSW
Staged Crossing Type C-1
2020 10 Year Projection AM Peak Hour
Network Category: Future Conditions 1
Use the button below to open or close all popup boxes. Click value labels to open selected ones.
Click and drag popup boxes to move to preferred positions.



MOVEMENT SUMMARY

Site: [New England Hwy - Lemington Rd (Stage 1) 2020_10Y_Projection_AM (Site Folder: MC2033)]

Network: [New England Hwy - Lemington Rd Intersection 2020_10Y_Projection_AM (Network Folder: MC2033)]

Intersection of New England Highway and Lemington Road, Ravensworth NSW
(Staged Crossing Type C-1, Stage 1)
2020 10 Year Projection AM Peak Hour
Site Category: Existing Design
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: New England Hwy														
21	L2	50	24.0	50	24.0	0.032	8.0	LOS A	0.0	0.0	0.00	0.65	0.00	62.5
22	T1	486	17.3	486	17.3	0.277	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	89.8
Approach		536	17.9	536	17.9	0.277	0.8	NA	0.0	0.0	0.00	0.06	0.00	86.3
NorthEast: Median Storage														
25	T1	18	33.3	18	33.3	0.027	3.3	LOS A	0.1	0.8	0.51	0.42	0.51	46.1
Approach		18	33.3	18	33.3	0.027	3.3	LOS A	0.1	0.8	0.51	0.42	0.51	46.1
SouthWest: Lemington Road														
30	L2	14	57.1	14	57.1	0.027	15.3	LOS B	0.1	1.0	0.56	0.95	0.56	44.3
31	T1	29	24.1	29	24.1	0.059	13.9	LOS A	0.2	1.7	0.56	1.04	0.56	43.7
Approach		43	34.9	43	34.9	0.059	14.4	LOS A	0.2	1.7	0.56	1.01	0.56	44.0
All Vehicles		597	19.6	597	19.6	0.277	1.8	NA	0.2	1.7	0.06	0.14	0.06	81.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

▽Site: [New England Hwy - Lemington Rd (Stage 2) 2020_10Y_Projection_AM (Site Folder: MC2033)]

Network: [New England Hwy - Lemington Rd Intersection 2020_10Y_Projection_AM (Network Folder: MC2033)]

Intersection of New England Highway and Lemington Road, Ravensworth NSW
(Staged Crossing Type C-1, Stage 2)
2020 10 Year Projection AM Peak Hour
Site Category: Existing Design
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
NorthWest: New England Highway														
28	T1	410	15.6	410	15.6	0.232	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	89.8
29	R2	18	33.3	18	33.3	0.012	8.0	LOS A	0.0	0.0	0.00	0.69	0.00	66.4
Approach		428	16.4	428	16.4	0.232	0.4	NA	0.0	0.0	0.00	0.03	0.00	89.2
SouthWest: Median Island														
32	R2	29	24.1	29	24.1	0.018	1.6	LOS A	0.0	0.0	0.00	0.22	0.00	20.2
Approach		29	24.1	29	24.1	0.018	1.6	NA	0.0	0.0	0.00	0.22	0.00	20.2
All Vehicles		457	16.8	457	16.8	0.232	0.4	NA	0.0	0.0	0.00	0.04	0.00	79.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

USER REPORT FOR NETWORK

All Movement Classes | **Template: Default Network User Report**

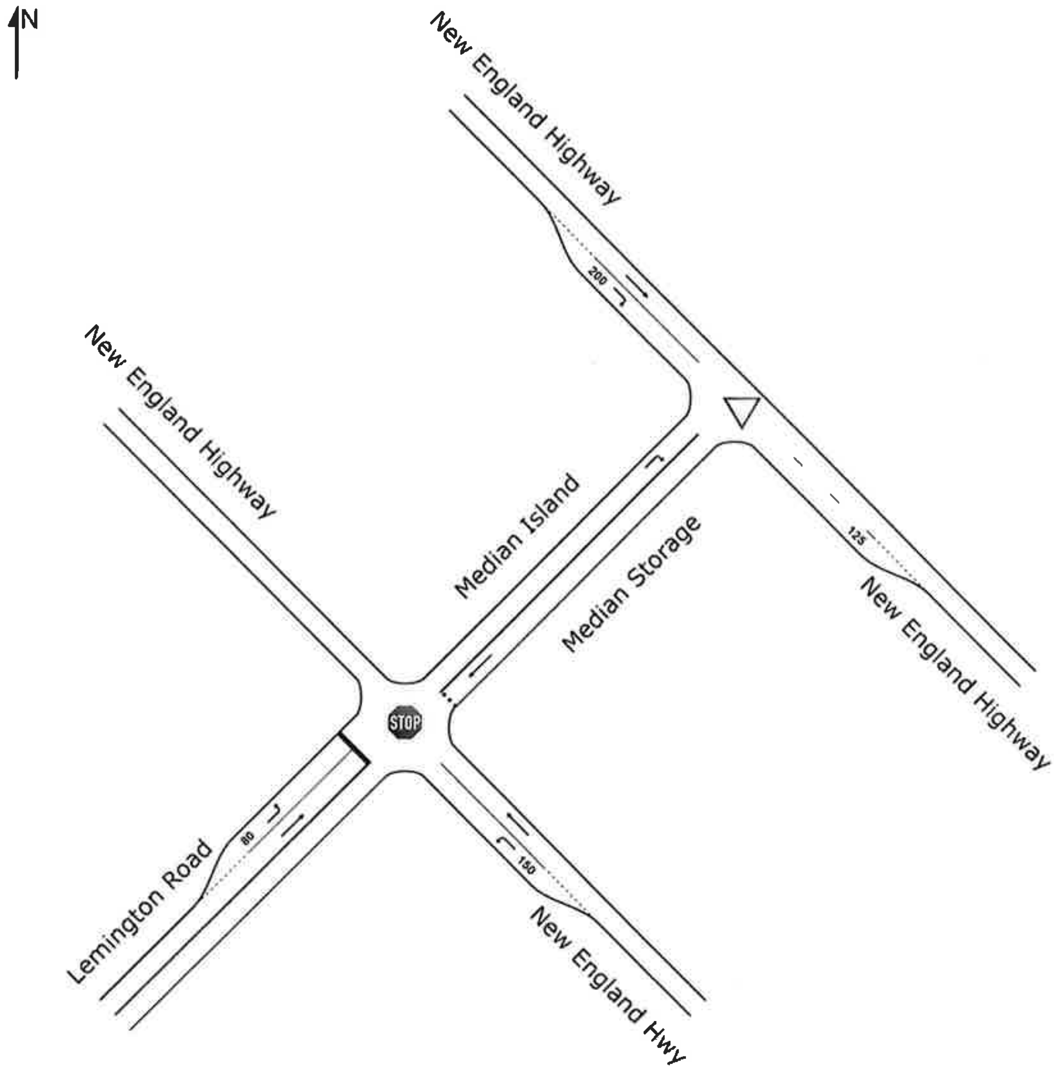
Project: MC2033 NewEnglandHwy-LemingtonRd_v01.sip8

Network: [New England Hwy - Lemington Rd Intersection 2020_10Y_Pro_with_Dev_AM (Network Folder: MC2033)]

Intersection of New England Highway and Lemington Road, Ravensworth NSW
Staged Crossing Type C-1
2020 10 Year Projection with Development AM Peak Hour
Network Category: Future Conditions 2

Network Layout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



NETWORK SUMMARY

Network: [New England Hwy - Lemington Rd Intersection 2020_10Y_Pro_with_Dev_AM (Network Folder: MC2033)]

Intersection of New England Highway and Lemington Road, Ravensworth NSW
Staged Crossing Type C-1
2020 10 Year Projection with Development AM Peak Hour
Network Category: Future Conditions 2

Network Performance - Hourly Values			
Performance Measure	Vehicles	Per Unit Distance	Persons
Network Level of Service (LOS)	LOS A		
Speed Efficiency	0.92		
Travel Time Index	9.08		
Congestion Coefficient	1.09		
Travel Speed (Average)	79.8 km/h		79.8 km/h
Travel Distance (Total)	1039.2 veh-km/h		1247.0 pers-km/h
Travel Time (Total)	13.0 veh-h/h		15.6 pers-h/h
Desired Speed (Program)	87.0 km/h		
Demand Flows (Total for all Sites)	1077 veh/h		1292 pers/h
Arrival Flows (Total for all Sites)	1077 veh/h		1292 pers/h
Demand Flows (Entry Total)	1026 veh/h		
Midblock Inflows (Total)	0 veh/h		
Midblock Outflows (Total)	0 veh/h		
Percent Heavy Vehicles (Demand)	18.9 %		
Percent Heavy Vehicles (Arrival)	18.9 %		
Degree of Saturation	0.277		
Control Delay (Total)	0.42 veh-h/h		0.51 pers-h/h
Control Delay (Average)	1.4 sec		1.4 sec
Control Delay (Worst Lane)	16.1 sec		
Control Delay (Worst Movement)	16.1 sec		16.1 sec
Geometric Delay (Average)	1.1 sec		
Stop-Line Delay (Average)	0.4 sec		
Ave. Queue Storage Ratio (Worst Lane)	0.05		
Total Effective Stops	118 veh/h		142 pers/h
Effective Stop Rate	0.11	0.11 per km	0.11
Proportion Queued	0.03		0.03
Performance Index	14.2		14.2
Cost (Total)	713.69 $/h	0.69 $/km	713.69 $/h
Fuel Consumption (Total)	125.5 L/h	120.8 mL/km	
Fuel Economy	12.1 L/100km		
Carbon Dioxide (Total)	307.5 kg/h	295.9 g/km	
Hydrocarbons (Total)	0.027 kg/h	0.026 g/km	
Carbon Monoxide (Total)	0.491 kg/h	0.473 g/km	
NOx (Total)	1.217 kg/h	1.171 g/km	

Network Model Variability Index (Iterations 3 to N): 0.0 %
Number of Iterations: 5 (Maximum: 10)
Largest change in Lane Degrees of Saturation or Queue Storage Ratios for the last three Network Iterations: 0.0% 0.0% 0.0%
Network Level of Service (LOS) Method: SIDRA Speed Efficiency.
Software Setup used: New South Wales.

Network Performance - Annual Values		
Performance Measure	Vehicles	Persons
Demand Flows (Total for all Sites)	516,960 veh/y	620,352 pers/y
Delay	203 veh-h/y	243 pers-h/y
Effective Stops	56,678 veh/y	68,013 pers/y
Travel Distance	498,808 veh-km/y	598,570 pers-km/y
Travel Time	6,251 veh-h/y	7,501 pers-h/y

Cost	342,573 $/y	342,573 $/y
Fuel Consumption	60,245 L/y	
Carbon Dioxide	147,598 kg/y	
Hydrocarbons	13 kg/y	
Carbon Monoxide	236 kg/y	
NOx	584 kg/y	

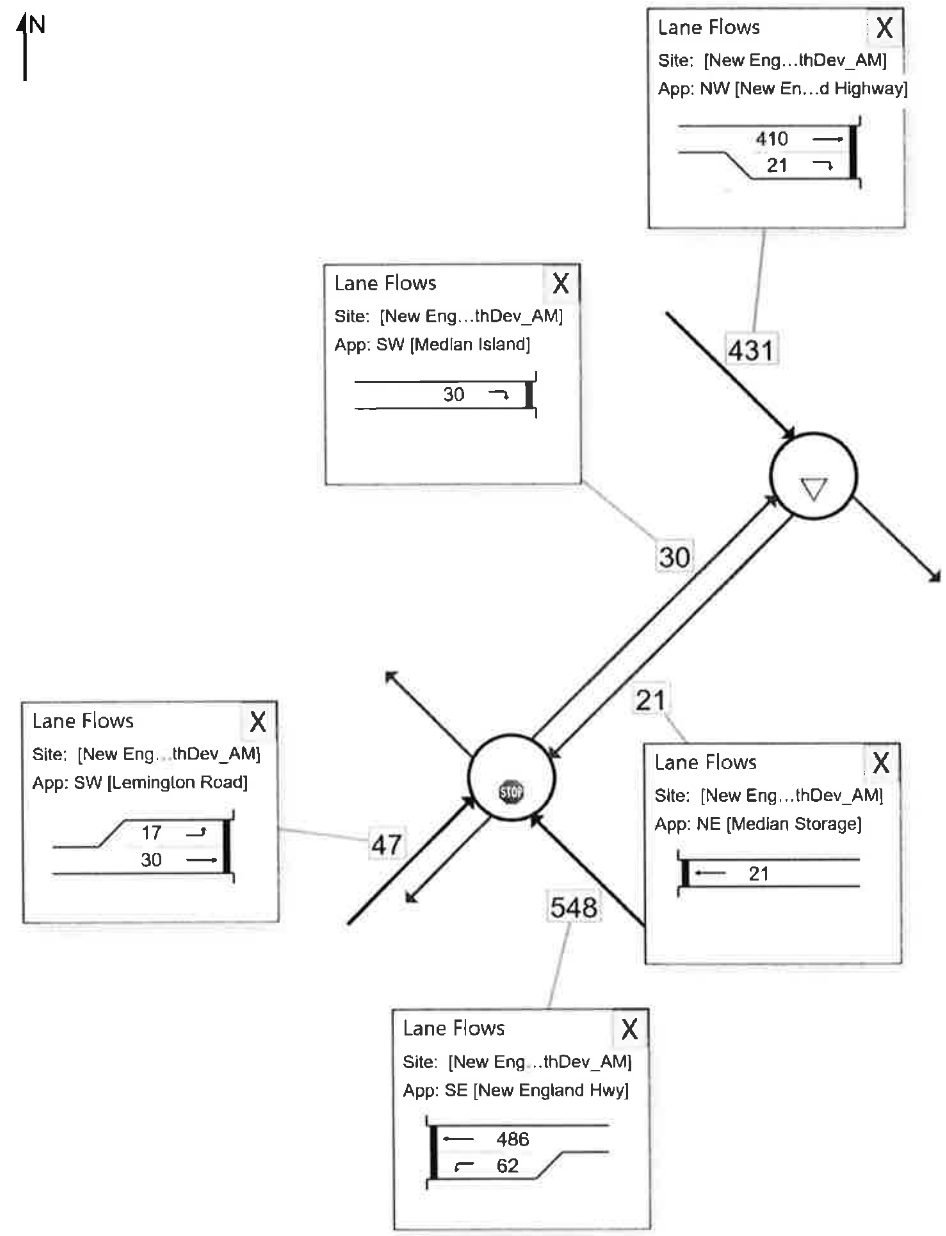
APPROACH LANE FLOWS

Lane flow rates based on arrival flows including the effect of capacity constraint in Network analysis (veh/h)

All Movement Classes

Network: [New England Hwy - Lemington Rd Intersection 2020_10Y_Pro_with_Dev_AM (Network Folder: MC2033)]

Intersection of New England Highway and Lemington Road, Ravensworth NSW
Staged Crossing Type C-1
2020 10 Year Projection with Development AM Peak Hour
Network Category: Future Conditions 2
Use the button below to open or close all popup boxes. Click value labels to open selected ones.
Click and drag popup boxes to move to preferred positions.



MOVEMENT SUMMARY

Site: [New England Hwy - Lemington Rd (Stage 1) 2020_10Y_Pro_with_Dev_AM (Site Folder: MC2033)]

Network: [New England Hwy - Lemington Rd Intersection 2020_10Y_Pro_with_Dev_AM (Network Folder: MC2033)]

Intersection of New England Highway and Lemington Road, Ravensworth NSW
(Staged Crossing Type C-1, Stage 1)
2020 10 Year Projection with Development AM Peak Hour
Site Category: Existing Design
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: New England Hwy														
21	L2	62	24.2	62	24.2	0.039	8.0	LOS A	0.0	0.0	0.00	0.65	0.00	62.4
22	T1	486	17.3	486	17.3	0.277	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	89.8
Approach		548	18.1	548	18.1	0.277	0.9	NA	0.0	0.0	0.00	0.07	0.00	85.5
NorthEast: Median Storage														
25	T1	21	33.3	21	33.3	0.032	3.4	LOS A	0.1	1.0	0.52	0.44	0.52	46.0
Approach		21	33.3	21	33.3	0.032	3.4	LOS A	0.1	1.0	0.52	0.44	0.52	46.0
SouthWest: Lemington Road														
30	L2	17	64.7	17	64.7	0.035	16.1	LOS B	0.1	1.4	0.57	0.97	0.57	43.0
31	T1	30	26.7	30	26.7	0.063	14.3	LOS A	0.2	1.8	0.57	1.05	0.57	43.5
Approach		47	40.4	47	40.4	0.063	14.9	LOS B	0.2	1.8	0.57	1.02	0.57	43.2
All Vehicles		616	20.3	616	20.3	0.277	2.1	NA	0.2	1.8	0.06	0.16	0.06	80.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

▽Site: [New England Hwy - Lemington Rd (Stage 2) 2020_10Y_Pro_with_Dev_AM (Site Folder: MC2033)]

Network: [New England Hwy - Lemington Rd Intersection 2020_10Y_Pro_with_Dev_AM (Network Folder: MC2033)]

Intersection of New England Highway and Lemington Road, Ravensworth NSW
(Staged Crossing Type C-1, Stage 2)
2020 10 Year Projection with Development AM Peak Hour
Site Category: Existing Design
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
NorthWest: New England Highway														
28	T1	410	15.6	410	15.6	0.232	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	89.8
29	R2	21	33.3	21	33.3	0.014	8.0	LOS A	0.0	0.0	0.00	0.69	0.00	66.4
Approach		431	16.5	431	16.5	0.232	0.4	NA	0.0	0.0	0.00	0.03	0.00	89.1
SouthWest: Median Island														
32	R2	30	26.7	30	26.7	0.019	1.6	LOS A	0.0	0.0	0.00	0.21	0.00	20.2
Approach		30	26.7	30	26.7	0.019	1.6	NA	0.0	0.0	0.00	0.21	0.00	20.2
All Vehicles		461	17.1	461	17.1	0.232	0.5	NA	0.0	0.0	0.00	0.05	0.00	79.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

USER REPORT FOR NETWORK

All Movement Classes

Template: Default Network User Report

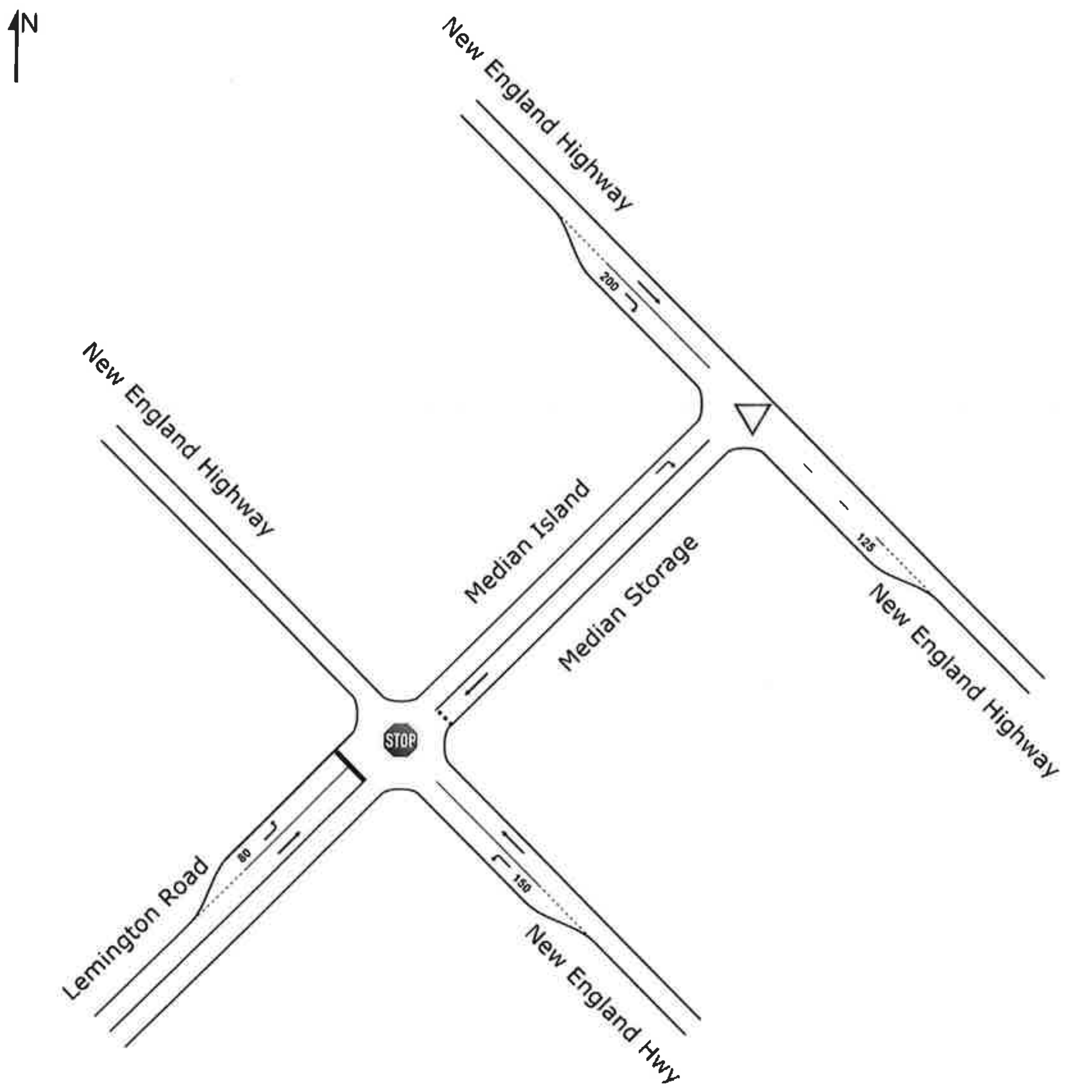
Project: MC2033 NewEnglandHwy-LemingtonRd_v01.sip8

Network: [New England Hwy - Lemington Rd Intersection 2020_Existing_PM (Network Folder: MC2033)]

Intersection of New England Highway and Lemington Road, Ravensworth NSW
Staged Crossing Type C-1
2020 PM Peak Hour - Existing
Network Category: Existing Design

Network Layout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



NETWORK SUMMARY

Network: [New England Hwy - Lemington Rd Intersection 2020_Existing_PM (Network Folder: MC2033)]

Intersection of New England Highway and Lemington Road, Ravensworth NSW
Staged Crossing Type C-1
2020 PM Peak Hour - Existing
Network Category: Existing Design

Network Performance - Hourly Values			
Performance Measure	Vehicles	Per Unit Distance	Persons
Network Level of Service (LOS)	LOS B		
Speed Efficiency	0.84		
Travel Time Index	8.19		
Congestion Coefficient	1.19		
Travel Speed (Average)	72.3 km/h		72.3 km/h
Travel Distance (Total)	1237.9 veh-km/h		1485.5 pers-km/h
Travel Time (Total)	17.1 veh-h/h		20.5 pers-h/h
Desired Speed (Program)	86.4 km/h		
Demand Flows (Total for all Sites)	1354 veh/h		1625 pers/h
Arrival Flows (Total for all Sites)	1354 veh/h		1625 pers/h
Demand Flows (Entry Total)	1222 veh/h		
Midblock Inflows (Total)	0 veh/h		
Midblock Outflows (Total)	0 veh/h		
Percent Heavy Vehicles (Demand)	10.1 %		
Percent Heavy Vehicles (Arrival)	10.1 %		
Degree of Saturation	0.383		
Control Delay (Total)	0.59 veh-h/h		0.71 pers-h/h
Control Delay (Average)	1.6 sec		1.6 sec
Control Delay (Worst Lane)	10.6 sec		
Control Delay (Worst Movement)	10.6 sec		10.6 sec
Geometric Delay (Average)	1.1 sec		
Stop-Line Delay (Average)	0.5 sec		
Ave. Queue Storage Ratio (Worst Lane)	0.02		
Total Effective Stops	188 veh/h		226 pers/h
Effective Stop Rate	0.14	0.15 per km	0.14
Proportion Queued	0.05		0.05
Performance Index	19.1		19.1
Cost (Total)	831.50 $/h	0.67 $/km	831.50 $/h
Fuel Consumption (Total)	117.6 L/h	95.0 mL/km	
Fuel Economy	9.5 L/100km		
Carbon Dioxide (Total)	283.6 kg/h	229.1 g/km	
Hydrocarbons (Total)	0.028 kg/h	0.023 g/km	
Carbon Monoxide (Total)	0.548 kg/h	0.443 g/km	
NOx (Total)	0.757 kg/h	0.611 g/km	

Network Model Variability Index (Iterations 3 to N): 0.0 %
Number of Iterations: 5 (Maximum: 10)
Largest change in Lane Degrees of Saturation or Queue Storage Ratios for the last three Network Iterations: 0.0% 0.0% 0.0%
Network Level of Service (LOS) Method: SIDRA Speed Efficiency.
Software Setup used: New South Wales.

Network Performance - Annual Values		
Performance Measure	Vehicles	Persons
Demand Flows (Total for all Sites)	649,920 veh/y	779,904 pers/y
Delay	283 veh-h/y	339 pers-h/y
Effective Stops	90,318 veh/y	108,381 pers/y

Travel Distance	594,210 veh-km/y	713,052 pers-km/y
Travel Time	8,217 veh-h/y	9,860 pers-h/y
Cost	399,119 $/y	399,119 $/y
Fuel Consumption	56,433 L/y	
Carbon Dioxide	136,137 kg/y	
Hydrocarbons	14 kg/y	
Carbon Monoxide	263 kg/y	
NOx	363 kg/y	

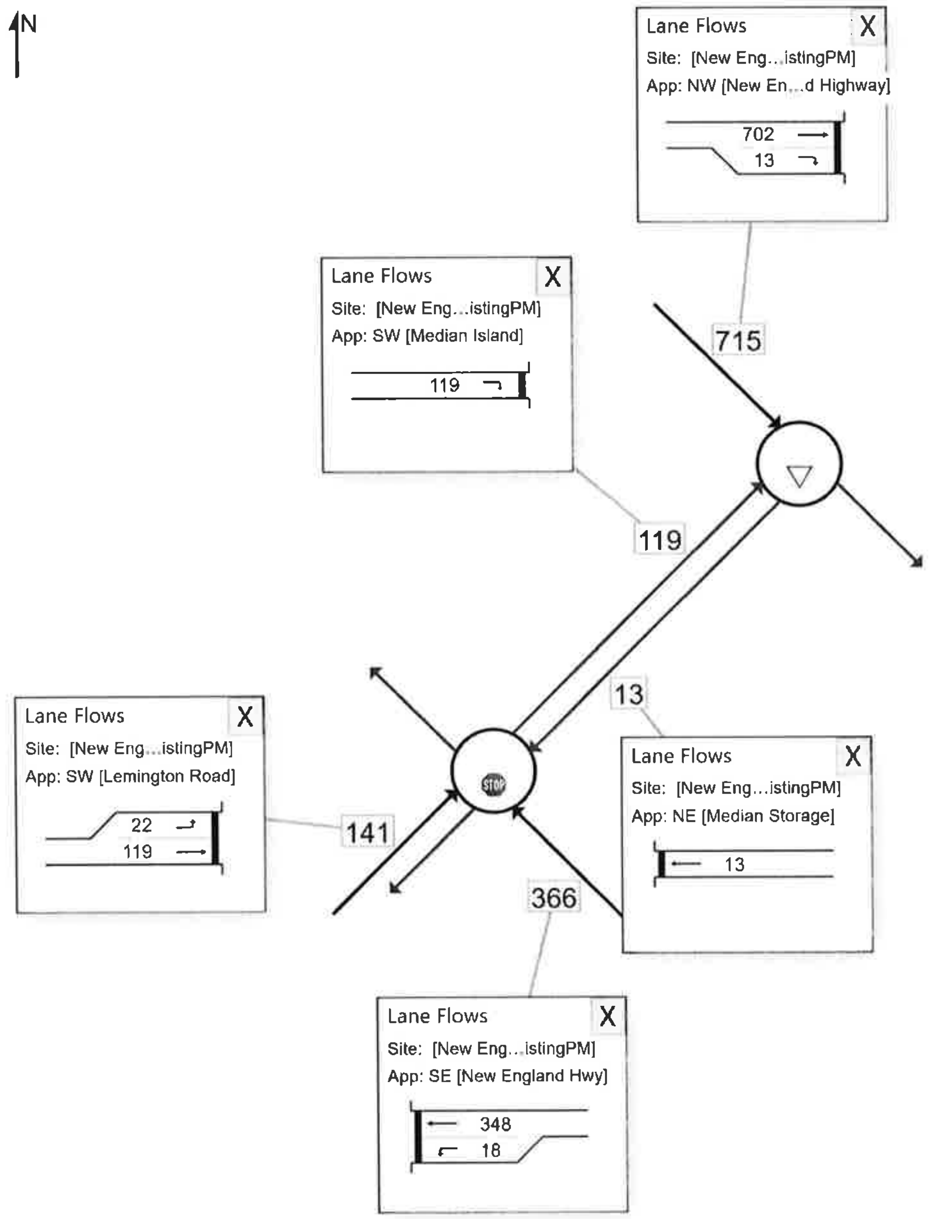
APPROACH LANE FLOWS

Lane flow rates based on arrival flows including the effect of capacity constraint in Network analysis (veh/h)

All Movement Classes

Network: [New England Hwy - Lemington Rd Intersection 2020_Existing_PM (Network Folder: MC2033)]

Intersection of New England Highway and Lemington Road, Ravensworth NSW
Staged Crossing Type C-1
2020 PM Peak Hour - Existing
Network Category: Existing Design
Use the button below to open or close all popup boxes. Click value labels to open selected ones.
Click and drag popup boxes to move to preferred positions.



MOVEMENT SUMMARY

Site: [New England Hwy - Lemington Rd (Stage 1) 2020_Existing_PM (Site Folder: MC2033)]

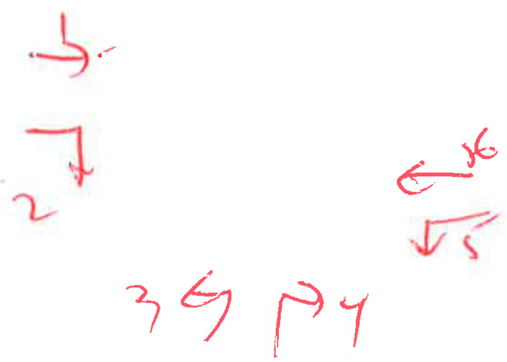
Network: [New England Hwy - Lemington Rd Intersection 2020_Existing_PM (Network Folder: MC2033)]

Intersection of New England Highway and Lemington Road, Ravensworth NSW
(Staged Crossing Type C-1, Stage 1)
2020 PM Peak Hour - Existing
Site Category: Existing Design
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total	HV]	ARRIVAL FLOWS [Total	HV]	Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE [Veh.	Dist]	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
SouthEast: New England Hwy														
21	L2	18	11.1	18	11.1	0.010	7.7	LOS A	0.0	0.0	0.00	0.65	0.00	66.6
22	T1	348	12.9	348	12.9	0.193	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	89.9
Approach		366	12.8	366	12.8	0.193	0.4	NA	0.0	0.0	0.00	0.03	0.00	88.4
NorthEast: Median Storage														
25	T1	13	15.4	13	15.4	0.014	1.5	LOS A	0.0	0.4	0.40	0.26	0.40	49.5
Approach		13	15.4	13	15.4	0.014	1.5	LOS A	0.0	0.4	0.40	0.26	0.40	49.5
SouthWest: Lemington Road														
30	L2	22	13.6	22	13.6	0.025	10.5	LOS A	0.1	0.7	0.43	0.88	0.43	54.2
31	T1	119	5.9	119	5.9	0.161	10.6	LOS A	0.6	4.4	0.48	1.00	0.48	46.2
Approach		141	7.1	141	7.1	0.161	10.6	LOS A	0.6	4.4	0.47	0.98	0.47	48.1
All Vehicles		520	11.3	520	11.3	0.193	3.2	NA	0.6	4.4	0.14	0.29	0.14	76.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.



MOVEMENT SUMMARY

▽Site: [New England Hwy - Lemington Rd (Stage 2) 2020_Existing_PM (Site Folder: MC2033)]

Network: [New England Hwy - Lemington Rd Intersection 2020_Existing_PM (Network Folder: MC2033)]

Intersection of New England Highway and Lemington Road, Ravensworth NSW
(Staged Crossing Type C-1, Stage 2)
2020 PM Peak Hour - Existing
Site Category: Existing Design
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
NorthWest: New England Highway														
28	T1	702	9.8	702	9.8	0.383	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	89.7
29	R2	13	15.4	13	15.4	0.008	7.6	LOS A	0.0	0.0	0.00	0.69	0.00	66.4
Approach		715	9.9	715	9.9	0.383	0.2	NA	0.0	0.0	0.00	0.01	0.00	89.4
SouthWest: Median Island														
32	R2	119	5.9	119	5.9	0.067	2.6	LOS A	0.0	0.0	0.00	0.22	0.00	20.2
Approach		119	5.9	119	5.9	0.067	2.6	NA	0.0	0.0	0.00	0.22	0.00	20.2
All Vehicles		834	9.4	834	9.4	0.383	0.6	NA	0.0	0.0	0.00	0.04	0.00	70.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

USER REPORT FOR NETWORK

All Movement Classes

Template: Default Network User Report

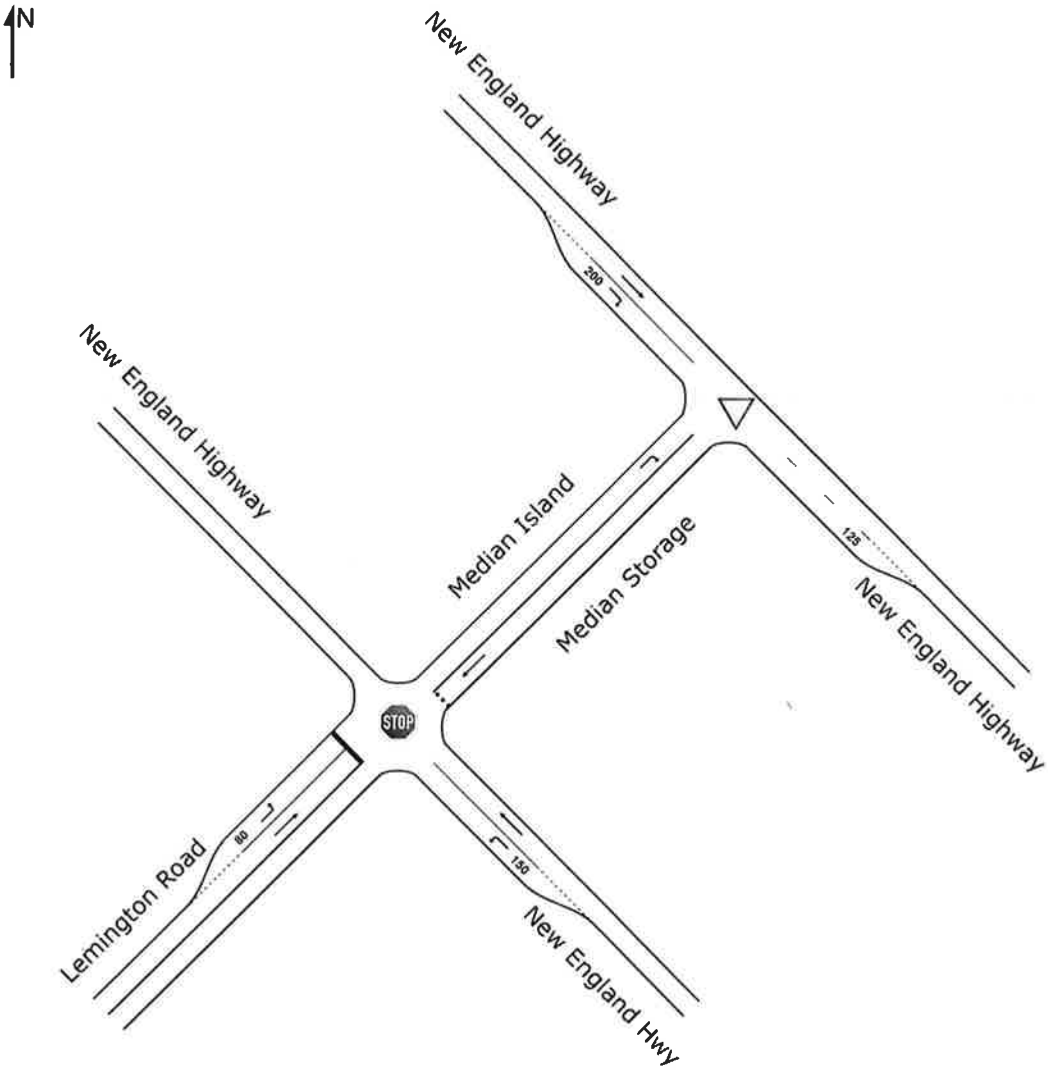
Project: MC2033 NewEnglandHwy-LemingtonRd_v01.sip8

Network: [New England Hwy - Lemington Rd Intersection 2020_with_Dev_PM (Network Folder: MC2033)]

Intersection of New England Highway and Lemington Road, Ravensworth NSW
Staged Crossing Type C-1
2020 with Development PM Peak Hour
Network Category: Proposed Design 1

Network Layout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



NETWORK SUMMARY

Network: [New England Hwy - Lemington Rd Intersection 2020_with_Dev_PM (Network Folder: MC2033)]

Intersection of New England Highway and Lemington Road, Ravensworth NSW
Staged Crossing Type C-1
2020 with Development PM Peak Hour
Network Category: Proposed Design 1

Network Performance - Hourly Values			
Performance Measure	Vehicles	Per Unit Distance	Persons
Network Level of Service (LOS)	LOS B		
Speed Efficiency	0.83		
Travel Time Index	8.07		
Congestion Coefficient	1.21		
Travel Speed (Average)	71.0 km/h		71.0 km/h
Travel Distance (Total)	1259.4 veh-km/h		1511.3 pers-km/h
Travel Time (Total)	17.7 veh-h/h		21.3 pers-h/h
Desired Speed (Program)	86.0 km/h		
Demand Flows (Total for all Sites)	1389 veh/h		1667 pers/h
Arrival Flows (Total for all Sites)	1389 veh/h		1667 pers/h
Demand Flows (Entry Total)	1243 veh/h		
Midblock Inflows (Total)	0 veh/h		
Midblock Outflows (Total)	0 veh/h		
Percent Heavy Vehicles (Demand)	10.9 %		
Percent Heavy Vehicles (Arrival)	10.9 %		
Degree of Saturation	0.383		
Control Delay (Total)	0.67 veh-h/h		0.80 pers-h/h
Control Delay (Average)	1.7 sec		1.7 sec
Control Delay (Worst Lane)	11.2 sec		
Control Delay (Worst Movement)	11.2 sec		11.2 sec
Geometric Delay (Average)	1.2 sec		
Stop-Line Delay (Average)	0.5 sec		
Ave. Queue Storage Ratio (Worst Lane)	0.03		
Total Effective Stops	212 veh/h		254 pers/h
Effective Stop Rate	0.15	0.17 per km	0.15
Proportion Queued	0.06		0.06
Performance Index	20.0		20.0
Cost (Total)	866.09 $/h	0.69 $/km	866.09 $/h
Fuel Consumption (Total)	124.0 L/h	98.4 mL/km	
Fuel Economy	9.8 L/100km		
Carbon Dioxide (Total)	299.6 kg/h	237.9 g/km	
Hydrocarbons (Total)	0.029 kg/h	0.023 g/km	
Carbon Monoxide (Total)	0.560 kg/h	0.445 g/km	
NOx (Total)	0.861 kg/h	0.684 g/km	

Network Model Variability Index (Iterations 3 to N): 0.0 %
Number of Iterations: 5 (Maximum: 10)
Largest change in Lane Degrees of Saturation or Queue Storage Ratios for the last three Network Iterations: 0.0% 0.0% 0.0%
Network Level of Service (LOS) Method: SIDRA Speed Efficiency.
Software Setup used: New South Wales.

Network Performance - Annual Values		
Performance Measure	Vehicles	Persons
Demand Flows (Total for all Sites)	666,720 veh/y	800,064 pers/y
Delay	322 veh-h/y	386 pers-h/y
Effective Stops	101,670 veh/y	122,004 pers/y

Travel Distance	604,531	veh-km/y	725,437	pers-km/y
Travel Time	8,510	veh-h/y	10,212	pers-h/y
Cost	415,722	$/y	415,722	$/y
Fuel Consumption	59,498	L/y		
Carbon Dioxide	143,794	kg/y		
Hydrocarbons	14	kg/y		
Carbon Monoxide	269	kg/y		
NOx	413	kg/y		

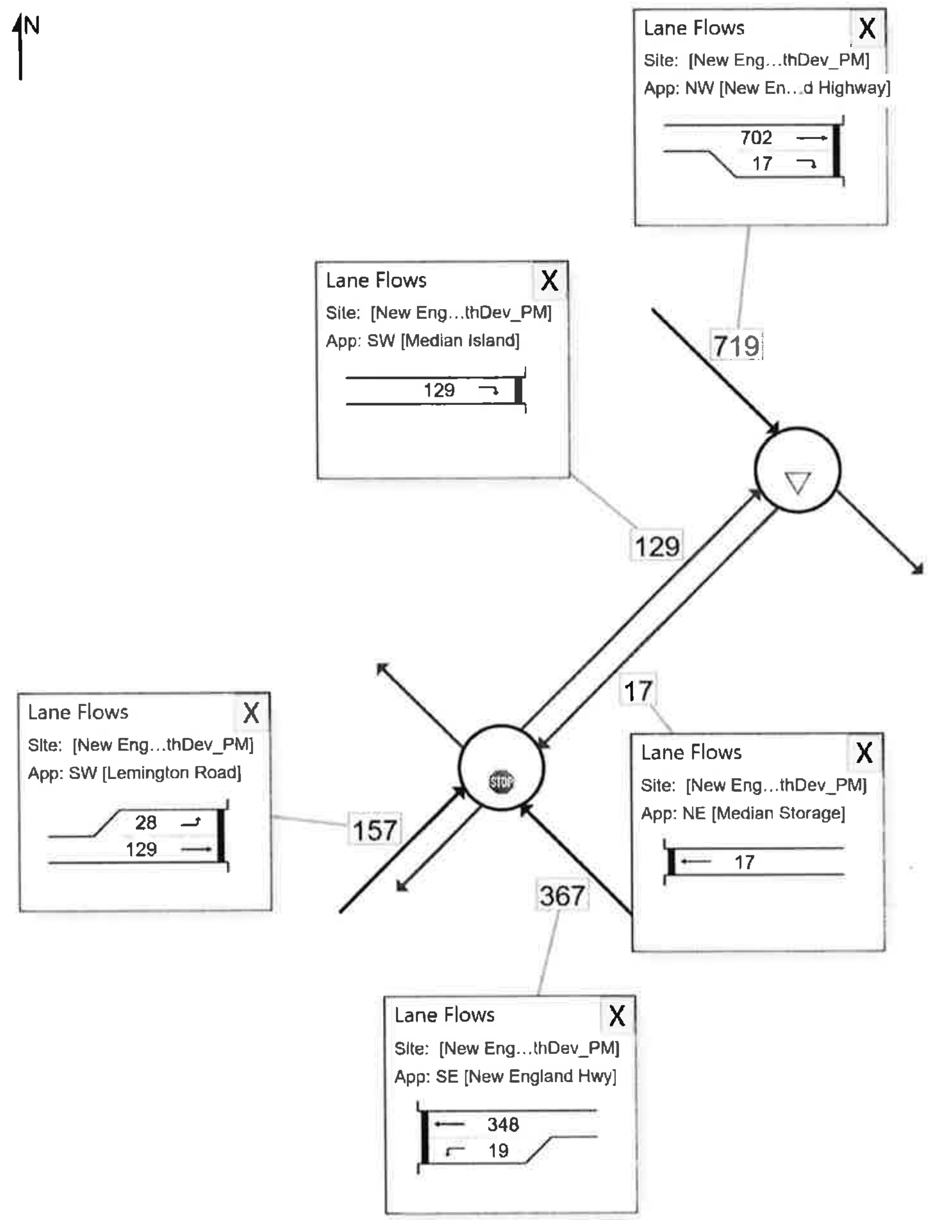
APPROACH LANE FLOWS

Lane flow rates based on arrival flows including the effect of capacity constraint in Network analysis (veh/h)

All Movement Classes

Network: [New England Hwy - Lemington Rd Intersection 2020_with_Dev_PM (Network Folder: MC2033)]

Intersection of New England Highway and Lemington Road, Ravensworth NSW
Staged Crossing Type C-1
2020 with Development PM Peak Hour
Network Category: Proposed Design 1
Use the button below to open or close all popup boxes. Click value labels to open selected ones.
Click and drag popup boxes to move to preferred positions.



MOVEMENT SUMMARY

Site: [New England Hwy - Lemington Rd (Stage 1) 2020_with_Dev_PM (Site Folder: MC2033)]

Network: [New England Hwy - Lemington Rd Intersection 2020_with_Dev_PM (Network Folder: MC2033)]

Intersection of New England Highway and Lemington Road, Ravensworth NSW
(Staged Crossing Type C-1, Stage 1)
2020 with Development PM Peak Hour
Site Category: Existing Design
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: New England Hwy														
21	L2	19	15.8	19	15.8	0.011	7.8	LOS A	0.0	0.0	0.00	0.65	0.00	65.0
22	T1	348	12.9	348	12.9	0.193	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	89.9
Approach		367	13.1	367	13.1	0.193	0.4	NA	0.0	0.0	0.00	0.03	0.00	88.1
NorthEast: Median Storage														
25	T1	17	35.3	17	35.3	0.020	1.9	LOS A	0.1	0.6	0.42	0.29	0.42	47.7
Approach		17	35.3	17	35.3	0.020	1.9	LOS A	0.1	0.6	0.42	0.29	0.42	47.7
SouthWest: Lemington Road														
30	L2	28	25.0	28	25.0	0.034	11.2	LOS A	0.1	1.1	0.45	0.90	0.45	51.6
31	T1	129	6.2	129	6.2	0.176	10.7	LOS A	0.7	4.9	0.48	1.00	0.48	46.1
Approach		157	9.6	157	9.6	0.176	10.8	LOS A	0.7	4.9	0.48	0.98	0.48	47.6
All Vehicles		541	12.8	541	12.8	0.193	3.5	NA	0.7	4.9	0.15	0.32	0.15	74.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

▽Site: [New England Hwy - Lemington Rd (Stage 2) 2020_with_Dev_PM (Site Folder: MC2033)]

Network: [New England Hwy - Lemington Rd Intersection 2020_with_Dev_PM (Network Folder: MC2033)]

Intersection of New England Highway and Lemington Road, Ravensworth NSW
(Staged Crossing Type C-1, Stage 2)
2020 with Development PM Peak Hour
Site Category: Existing Design
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total	HV]	ARRIVAL FLOWS [Total	HV]	Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE [Veh.	Dist]	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
NorthWest: New England Highway														
28	T1	702	9.8	702	9.8	0.383	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	89.7
29	R2	17	35.3	17	35.3	0.011	8.1	LOS A	0.0	0.0	0.00	0.69	0.00	66.4
Approach		719	10.4	719	10.4	0.383	0.3	NA	0.0	0.0	0.00	0.02	0.00	89.3
SouthWest: Median Island														
32	R2	129	6.2	129	6.2	0.073	2.7	LOS A	0.0	0.0	0.00	0.22	0.00	20.2
Approach		129	6.2	129	6.2	0.073	2.7	NA	0.0	0.0	0.00	0.22	0.00	20.2
All Vehicles		848	9.8	848	9.8	0.383	0.6	NA	0.0	0.0	0.00	0.05	0.00	69.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

USER REPORT FOR NETWORK

All Movement Classes

Template: Default Network User Report

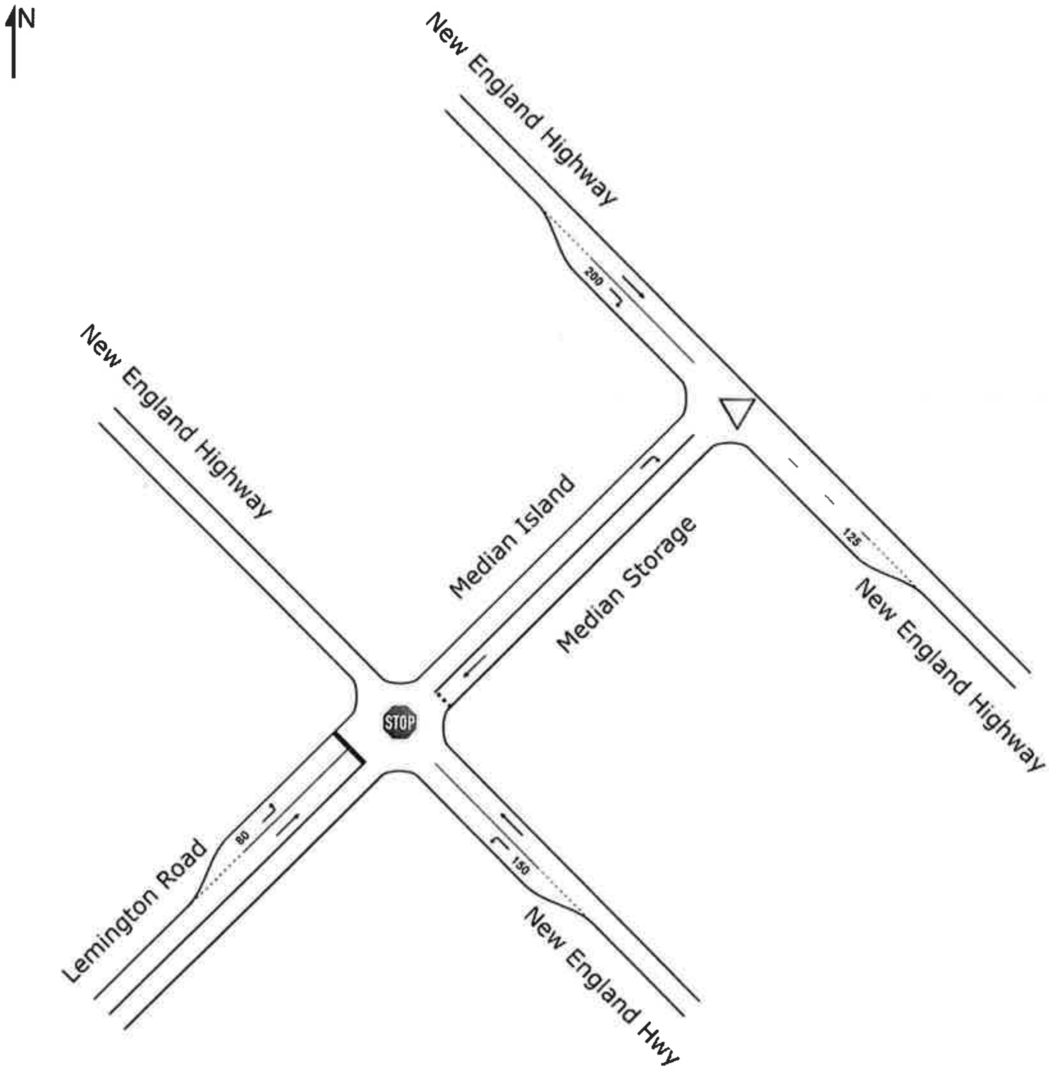
Project: MC2033 NewEnglandHwy-LemingtonRd_v01.sip8

Network: [New England Hwy - Lemington Rd Interseciton 2020_10Y_Projection_PM (Network Folder: MC2033)]

Intersection of New England Highway and Lemington Road, Ravensworth NSW
Staged Crossing Type C-1
2020 10 Year Projection PM Peak Hour
Network Category: Future Conditions 1

Network Layout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



NETWORK SUMMARY

Network: [New England Hwy - Lemington Rd Interseciton 2020_10Y_Projection_PM (Network Folder: MC2033)]

Intersection of New England Highway and Lemington Road, Ravensworth NSW
Staged Crossing Type C-1
2020 10 Year Projection PM Peak Hour
Network Category: Future Conditions 1

Network Performance - Hourly Values			
Performance Measure	Vehicles	Per Unit Distance	Persons
Network Level of Service (LOS)	LOS B		
Speed Efficiency	0.84		
Travel Time Index	8.19		
Congestion Coefficient	1.19		
Travel Speed (Average)	72.3 km/h		72.3 km/h
Travel Distance (Total)	1258.2 veh-km/h		1509.8 pers-km/h
Travel Time (Total)	17.4 veh-h/h		20.9 pers-h/h
Desired Speed (Program)	86.4 km/h		
Demand Flows (Total for all Sites)	1376 veh/h		1651 pers/h
Arrival Flows (Total for all Sites)	1376 veh/h		1651 pers/h
Demand Flows (Entry Total)	1242 veh/h		
Midblock Inflows (Total)	0 veh/h		
Midblock Outflows (Total)	0 veh/h		
Percent Heavy Vehicles (Demand)	10.1 %		
Percent Heavy Vehicles (Arrival)	10.1 %		
Degree of Saturation	0.389		
Control Delay (Total)	0.60 veh-h/h		0.72 pers-h/h
Control Delay (Average)	1.6 sec		1.6 sec
Control Delay (Worst Lane)	10.7 sec		
Control Delay (Worst Movement)	10.7 sec		10.7 sec
Geometric Delay (Average)	1.1 sec		
Stop-Line Delay (Average)	0.5 sec		
Ave. Queue Storage Ratio (Worst Lane)	0.02		
Total Effective Stops	191 veh/h		229 pers/h
Effective Stop Rate	0.14	0.15 per km	0.14
Proportion Queued	0.05		0.05
Performance Index	19.4		19.4
Cost (Total)	844.87 $/h	0.67 $/km	844.87 $/h
Fuel Consumption (Total)	119.4 L/h	94.9 mL/km	
Fuel Economy	9.5 L/100km		
Carbon Dioxide (Total)	288.0 kg/h	228.9 g/km	
Hydrocarbons (Total)	0.029 kg/h	0.023 g/km	
Carbon Monoxide (Total)	0.557 kg/h	0.443 g/km	
NOx (Total)	0.768 kg/h	0.610 g/km	

Network Model Variability Index (Iterations 3 to N): 0.0 %
Number of Iterations: 5 (Maximum: 10)
Largest change in Lane Degrees of Saturation or Queue Storage Ratios for the last three Network Iterations: 0.0% 0.0% 0.0%
Network Level of Service (LOS) Method: SIDRA Speed Efficiency.
Software Setup used: New South Wales.

Network Performance - Annual Values		
Performance Measure	Vehicles	Persons
Demand Flows (Total for all Sites)	660,480 veh/y	792,576 pers/y
Delay	289 veh-h/y	347 pers-h/y
Effective Stops	91,658 veh/y	109,990 pers/y

Travel Distance	603,933	veh-km/y	724,719	pers-km/y
Travel Time	8,351	veh-h/y	10,021	pers-h/y
Cost	405,535	$/y	405,535	$/y
Fuel Consumption	57,312	L/y		
Carbon Dioxide	138,256	kg/y		
Hydrocarbons	14	kg/y		
Carbon Monoxide	267	kg/y		
NOx	369	kg/y		

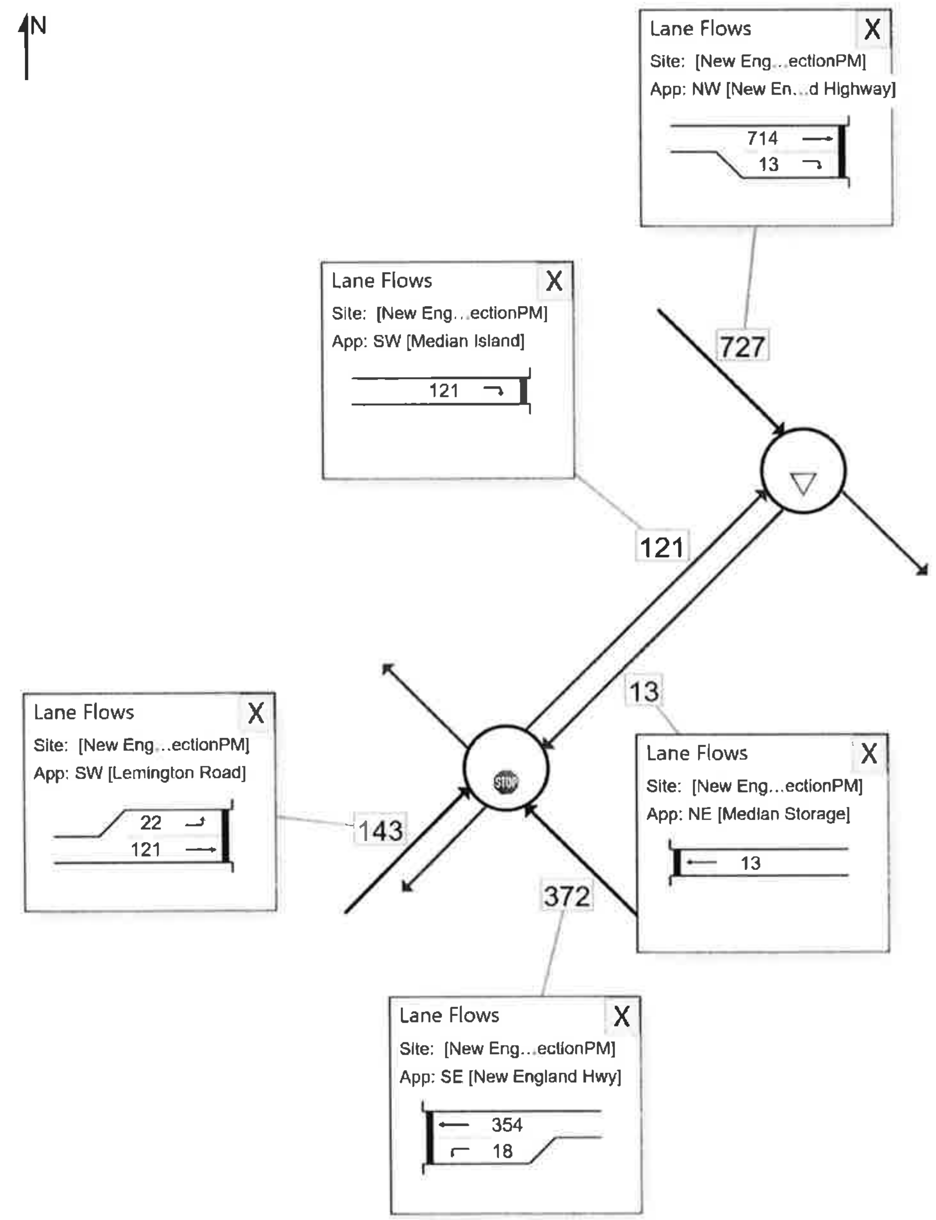
APPROACH LANE FLOWS

Lane flow rates based on arrival flows including the effect of capacity constraint in Network analysis (veh/h)

All Movement Classes

Network: [New England Hwy - Lemington Rd Interseciton 2020_10Y_Projection_PM (Network Folder: MC2033)]

Intersection of New England Highway and Lemington Road, Ravensworth NSW
Staged Crossing Type C-1
2020 10 Year Projection PM Peak Hour
Network Category: Future Conditions 1
Use the button below to open or close all popup boxes. Click value labels to open selected ones.
Click and drag popup boxes to move to preferred positions.



MOVEMENT SUMMARY

Site: [New England Hwy - Lemington Rd (Stage 1) 2020_10Y_Projection_PM (Site Folder: MC2033)]

Network: [New England Hwy - Lemington Rd Interseciton 2020_10Y_Projection_PM (Network Folder: MC2033)]

Intersection of New England Highway and Lemington Road, Ravensworth NSW
(Staged Crossing Type C-1, Stage 1)
2020 10 Year Projection PM Peak Hour
Site Category: Existing Design
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	DEMAND FLOWS HV] %	ARRIVAL FLOWS [Total veh/h	ARRIVAL FLOWS HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	95% BACK OF QUEUE Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: New England Hwy														
21	L2	18	11.1	18	11.1	0.010	7.7	LOS A	0.0	0.0	0.00	0.65	0.00	66.6
22	T1	354	13.0	354	13.0	0.197	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	89.9
Approach		372	12.9	372	12.9	0.197	0.4	NA	0.0	0.0	0.00	0.03	0.00	88.4
NorthEast: Median Storage														
25	T1	13	15.4	13	15.4	0.014	1.5	LOS A	0.0	0.4	0.40	0.26	0.40	49.5
Approach		13	15.4	13	15.4	0.014	1.5	LOS A	0.0	0.4	0.40	0.26	0.40	49.5
SouthWest: Lemington Road														
30	L2	22	13.6	22	13.6	0.025	10.5	LOS A	0.1	0.7	0.44	0.88	0.44	54.1
31	T1	121	5.8	121	5.8	0.165	10.7	LOS A	0.6	4.6	0.48	1.00	0.48	46.1
Approach		143	7.0	143	7.0	0.165	10.6	LOS A	0.6	4.6	0.47	0.98	0.47	48.0
All Vehicles		528	11.4	528	11.4	0.197	3.2	NA	0.6	4.6	0.14	0.29	0.14	76.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: [New England Hwy - Lemington Rd (Stage 2) 2020_10Y_Projection_PM (Site Folder: MC2033)]

Network: [New England Hwy - Lemington Rd Interseciton 2020_10Y_Projection_PM (Network Folder: MC2033)]

Intersection of New England Highway and Lemington Road, Ravensworth NSW
(Staged Crossing Type C-1, Stage 2)
2020 10 Year Projection PM Peak Hour
Site Category: Existing Design
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total	HV]	ARRIVAL FLOWS [Total	HV]	Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE [Veh.	Dist]	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
NorthWest: New England Highway														
28	T1	714	9.8	714	9.8	0.389	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	89.7
29	R2	13	15.4	13	15.4	0.008	7.6	LOS A	0.0	0.0	0.00	0.69	0.00	66.4
Approach		727	9.9	727	9.9	0.389	0.2	NA	0.0	0.0	0.00	0.01	0.00	89.4
SouthWest: Median Island														
32	R2	121	5.8	121	5.8	0.068	2.7	LOS A	0.0	0.0	0.00	0.22	0.00	20.2
Approach		121	5.8	121	5.8	0.068	2.7	NA	0.0	0.0	0.00	0.22	0.00	20.2
All Vehicles		848	9.3	848	9.3	0.389	0.6	NA	0.0	0.0	0.00	0.04	0.00	70.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

USER REPORT FOR NETWORK

All Movement Classes

Template: Default Network User Report

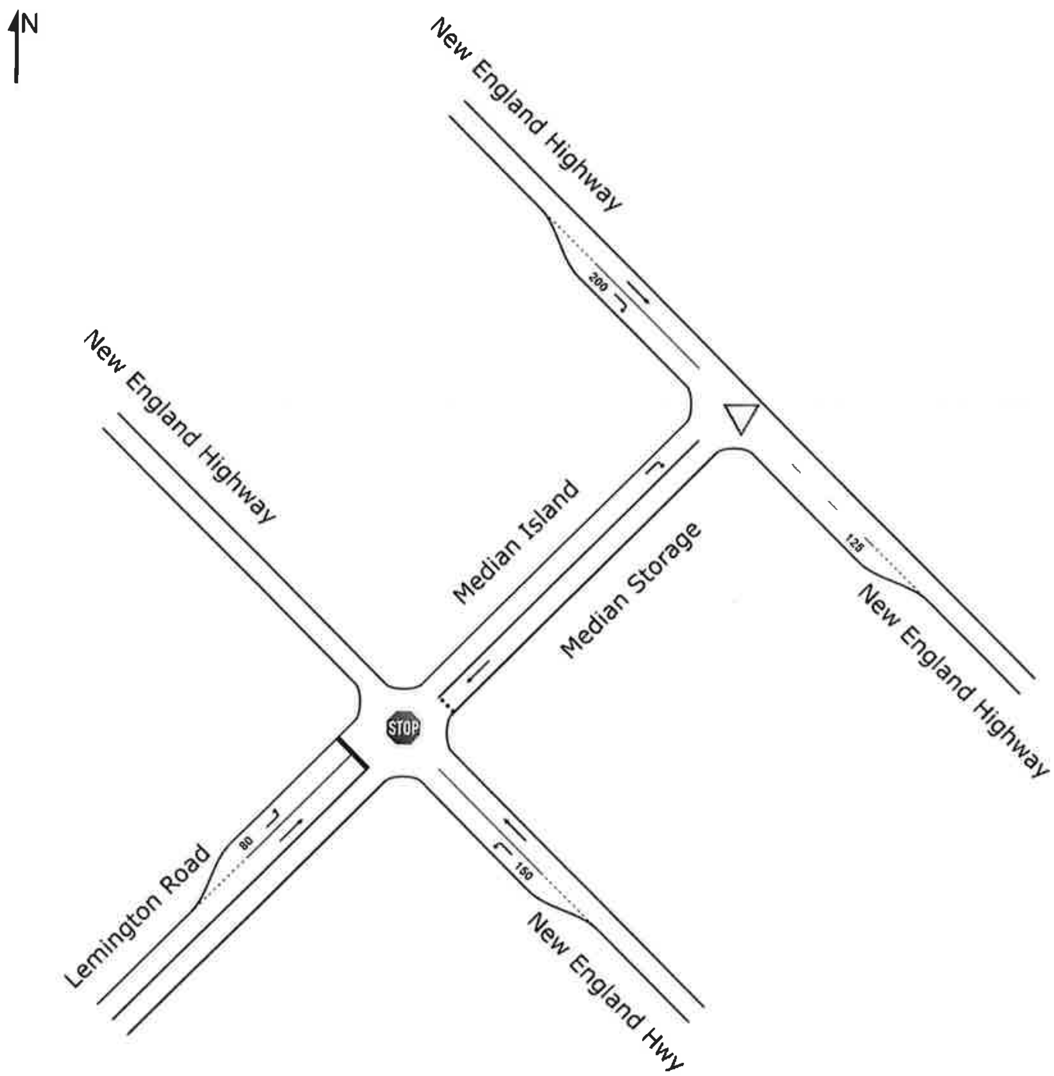
Project: MC2033 NewEnglandHwy-LemingtonRd_v01.sip8

Network: [New England Hwy - Lemington Rd Intersection 2020_10Y_Pro_with_Dev_PM (Network Folder: MC2033)]

Intersection of New England Highway and Lemington Road, Ravensworth NSW
Staged Crossing Type C-1
2020 10 Year Projection with Development PM Peak Hour
Network Category: Future Conditions 2

Network Layout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



NETWORK SUMMARY

Network: [New England Hwy - Lemington Rd Intersection 2020_10Y_Pro_with_Dev_PM (Network Folder: MC2033)]

Intersection of New England Highway and Lemington Road, Ravensworth NSW
Staged Crossing Type C-1
2020 10 Year Projection with Development PM Peak Hour
Network Category: Future Conditions 2

Network Performance - Hourly Values			
Performance Measure	Vehicles	Per Unit Distance	Persons
Network Level of Service (LOS)	LOS B		
Speed Efficiency	0.83		
Travel Time Index	8.07		
Congestion Coefficient	1.21		
Travel Speed (Average)	71.1 km/h		71.1 km/h
Travel Distance (Total)	1279.7 veh-km/h		1535.6 pers-km/h
Travel Time (Total)	18.0 veh-h/h		21.6 pers-h/h
Desired Speed (Program)	86.0 km/h		
Demand Flows (Total for all Sites)	1411 veh/h		1693 pers/h
Arrival Flows (Total for all Sites)	1411 veh/h		1693 pers/h
Demand Flows (Entry Total)	1263 veh/h		
Midblock Inflows (Total)	0 veh/h		
Midblock Outflows (Total)	0 veh/h		
Percent Heavy Vehicles (Demand)	10.9 %		
Percent Heavy Vehicles (Arrival)	10.9 %		
Degree of Saturation	0.389		
Control Delay (Total)	0.68 veh-h/h		0.82 pers-h/h
Control Delay (Average)	1.7 sec		1.7 sec
Control Delay (Worst Lane)	11.3 sec		
Control Delay (Worst Movement)	11.3 sec		11.3 sec
Geometric Delay (Average)	1.2 sec		
Stop-Line Delay (Average)	0.6 sec		
Ave. Queue Storage Ratio (Worst Lane)	0.03		
Total Effective Stops	215 veh/h		258 pers/h
Effective Stop Rate	0.15	0.17 per km	0.15
Proportion Queued	0.06		0.06
Performance Index	20.3		20.3
Cost (Total)	879.47 $/h	0.69 $/km	879.47 $/h
Fuel Consumption (Total)	125.8 L/h	98.3 mL/km	
Fuel Economy	9.8 L/100km		
Carbon Dioxide (Total)	304.0 kg/h	237.5 g/km	
Hydrocarbons (Total)	0.030 kg/h	0.023 g/km	
Carbon Monoxide (Total)	0.569 kg/h	0.444 g/km	
NOx (Total)	0.872 kg/h	0.682 g/km	

Network Model Variability Index (Iterations 3 to N): 0.0 %
Number of Iterations: 5 (Maximum: 10)
Largest change in Lane Degrees of Saturation or Queue Storage Ratios for the last three Network Iterations: 0.0% 0.0% 0.0%
Network Level of Service (LOS) Method: SIDRA Speed Efficiency.
Software Setup used: New South Wales.

Network Performance - Annual Values		
Performance Measure	Vehicles	Persons
Demand Flows (Total for all Sites)	677,280 veh/y	812,736 pers/y
Delay	328 veh-h/y	394 pers-h/y
Effective Stops	103,049 veh/y	123,659 pers/y
Travel Distance	614,254 veh-km/y	737,104 pers-km/y
Travel Time	8,644 veh-h/y	10,373 pers-h/y
Cost	422,146 $/y	422,146 $/y

Fuel Consumption	60,377 L/y
Carbon Dioxide	145,914 kg/y
Hydrocarbons	14 kg/y
Carbon Monoxide	273 kg/y
NOx	419 kg/y

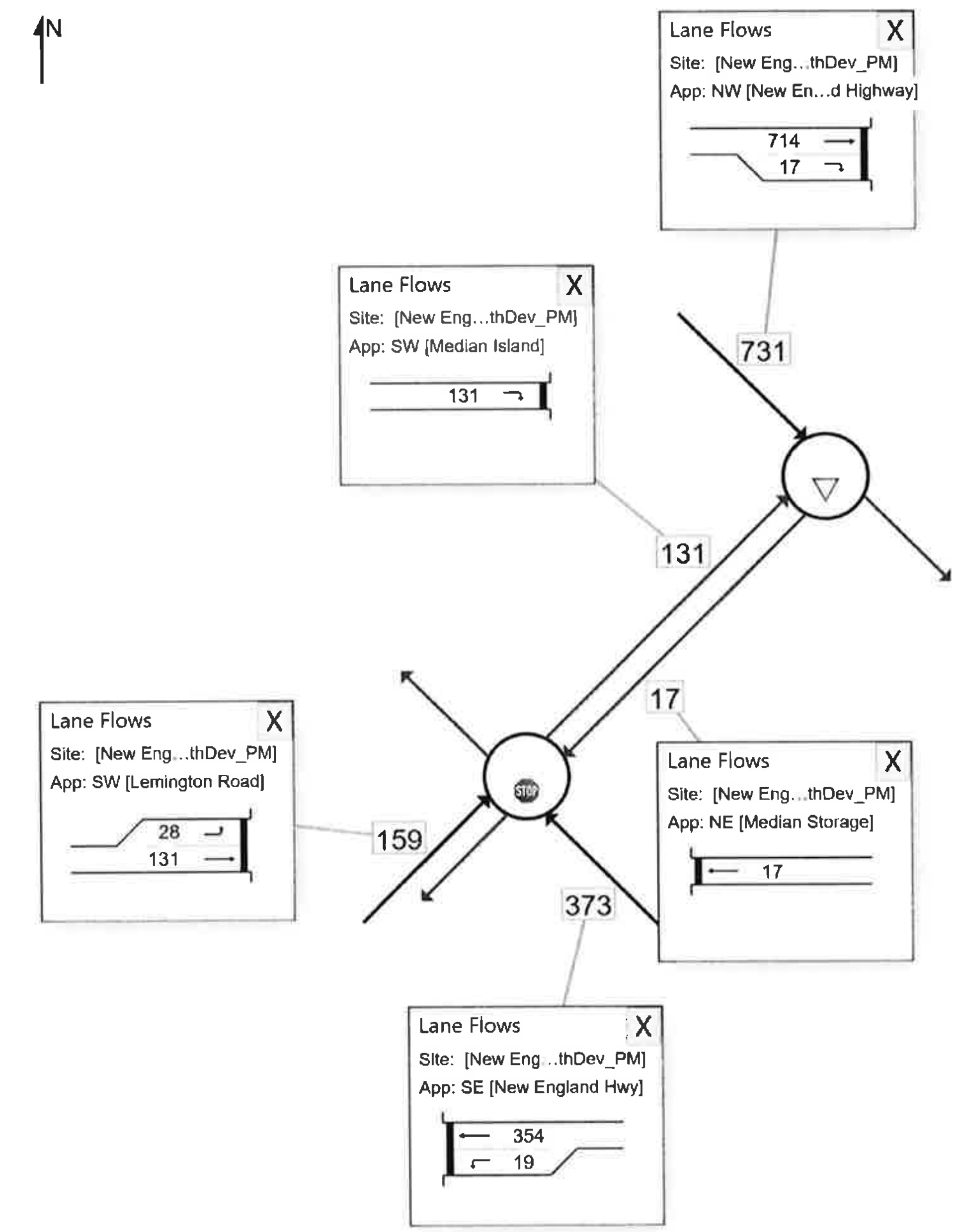
APPROACH LANE FLOWS

Lane flow rates based on arrival flows including the effect of capacity constraint in Network analysis (veh/h)

All Movement Classes

Network: [New England Hwy - Lemington Rd Intersection 2020_10Y_Pro_with_Dev_PM (Network Folder: MC2033)]

Intersection of New England Highway and Lemington Road, Ravensworth NSW
Staged Crossing Type C-1
2020 10 Year Projection with Development PM Peak Hour
Network Category: Future Conditions 2
Use the button below to open or close all popup boxes. Click value labels to open selected ones.
Click and drag popup boxes to move to preferred positions.



MOVEMENT SUMMARY

Site: [New England Hwy - Lemington Rd (Stage 1) 2020_10Y_Pro_with_Dev_PM (Site Folder: MC2033)]

Network: [New England Hwy - Lemington Rd Intersection 2020_10Y_Pro_with_Dev_PM (Network Folder: MC2033)]

Intersection of New England Highway and Lemington Road, Ravensworth NSW
(Staged Crossing Type C-1, Stage 1)
2020 10 Year with Development PM Peak Hour
Site Category: Existing Design
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: New England Hwy														
21	L2	19	15.8	19	15.8	0.011	7.8	LOS A	0.0	0.0	0.00	0.65	0.00	65.0
22	T1	354	13.0	354	13.0	0.197	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	89.9
Approach		373	13.1	373	13.1	0.197	0.4	NA	0.0	0.0	0.00	0.03	0.00	88.2
NorthEast: Median Storage														
25	T1	17	35.3	17	35.3	0.020	1.9	LOS A	0.1	0.6	0.42	0.29	0.42	47.6
Approach		17	35.3	17	35.3	0.020	1.9	LOS A	0.1	0.6	0.42	0.29	0.42	47.6
SouthWest: Lemington Road														
30	L2	28	25.0	28	25.0	0.034	11.3	LOS A	0.1	1.1	0.45	0.90	0.45	51.5
31	T1	131	6.1	131	6.1	0.180	10.8	LOS A	0.7	5.0	0.49	1.01	0.49	46.0
Approach		159	9.4	159	9.4	0.180	10.9	LOS A	0.7	5.0	0.48	0.99	0.48	47.5
All Vehicles		549	12.8	549	12.8	0.197	3.5	NA	0.7	5.0	0.15	0.32	0.15	74.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

▽Site: [New England Hwy - Lemington Rd (Stage 2) 2020_10Y_Pro_with_Dev_PM (Site Folder: MC2033)]

Network: [New England Hwy - Lemington Rd Intersection 2020_10Y_Pro_with_Dev_PM (Network Folder: MC2033)]

Intersection of New England Highway and Lemington Road, Ravensworth NSW
(Staged Crossing Type C-1, Stage 2)
2020 10 Year with Development PM Peak Hour
Site Category: Existing Design
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
NorthWest: New England Highway														
28	T1	714	9.8	714	9.8	0.389	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	89.7
29	R2	17	35.3	17	35.3	0.011	8.1	LOS A	0.0	0.0	0.00	0.69	0.00	66.4
Approach		731	10.4	731	10.4	0.389	0.3	NA	0.0	0.0	0.00	0.02	0.00	89.3
SouthWest: Median Island														
32	R2	131	6.1	131	6.1	0.074	2.7	LOS A	0.0	0.0	0.00	0.22	0.00	20.2
Approach		131	6.1	131	6.1	0.074	2.7	NA	0.0	0.0	0.00	0.22	0.00	20.2
All Vehicles		862	9.7	862	9.7	0.389	0.6	NA	0.0	0.0	0.00	0.05	0.00	69.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Appendix D Dust Assessment Addendum

Memorandum

To: Shaun Smith (Space Urban)

From: Darlene Heuff

Date: 16/06/2022

Subject: Greenspot Ravensworth Greenhouse Gas, Odour and Dust Assessments
AED Report# 957002.1 – Update 2022: Dust

AED has prepared this memo in response to a request by Space Urban to update the dust component of AED Report #957002.1 *Greenspot Ravensworth Greenhouse Gas, Odour and Dust Assessment,* dated 9 August 2019 which was prepared by AED on behalf of Bettergrow Pty Ltd (AED, 2019).

In particular, it is noted that the following two comments required input from AED:

Item 1:

- **$PM_{2.5}$ not assessed and incorrectly referenced as a NEPM advisory goal**
- **Recommendation:** The EPA recommends the proponent evaluate $PM_{2.5}$ emissions from the proposed expansion of the facility and provide an impact assessment for $PM_{2.5}$.

Item 2:

- **The EIS states that the key dust sources on site is the haulage route, which is unsealed, and concludes that no additional controls are required, as the development is remote. However, the assessment does not take into consideration the cumulative impacts, particularly considering the surrounding sources. Nor does the EIS consider the adequacy or effectiveness of the current controls, and the ability of these controls to manage and mitigate the increased impacts expected from the proposed development.**

In summary, results of the cumulative impact assessment highlights the potential for slight increase in the predicted number of PM_{10} exceedance days during drought affected years based on a combination of daily varying background levels and model output. No additional exceedances are predicted associated with more 'typical' background dust levels for TSP, PM_{10} nor $PM_{2.5}$.

Results of the assessment suggest that the diligent watering of the haul road should be sufficient under typical environmental conditions. Under exceptional conditions (such as prolonged drought) the use of binders should be considered if conditions (based on visual inspection) suggest that the use of increased dust mitigation is warranted.

Details are provided in Attachment A to this memo.

I trust you will not hesitate to contact me on 0400 661 182 should you require any additional clarification and/or information.

Regards,

Darlene Heuff

Dr Darlene Heuff
Director and Principal Applied Scientist

Attachment A

Emissions Estimates

Table 19 and Table 20 of AED (2019) have been expanded as Table 1and Table 2 below to include emission factors and dust emission rates for $PM_{2.5}$ based on an assumption that 10% of PM_{10} is in the form of $PM_{2.5}$ (US EPA AP42, Chapter 13.2.2 Unpaved Roads). The reader is referred to AED (2019) for additional information.

Table 1: Dust Emission Factor Options (NPI EETM, 2012)

Vehicle Type	Uncontrolled Emission Factor (kg/KVT)(1)			Control (%)	controlled Emission Factor (kg/KVT)		
	TSP	PM_{10}	$PM_{2.5}$ (2)		TSP	PM_{10}	$PM_{2.5}$ (2)
Truck and Dog	2.657	0.662	0.066	75%	0.664	0.166	0.017
Semi Tippers & Walking Floors	2.344	0.584	0.058	75%	0.586	0.146	0.015
19m B' Doubles	2.759	0.688	0.-69	75%	0.690	0.172	0.017
Semi Tippers	2.344	0.584	0.058	75%	0.586	0.146	0.015
Semi liquid tankers	2.759	0.688	0.069	75%	0.690	0.172	0.017

Notes
(1): A silt content of 4.3% based on USE EPA AP42 Table 11.9.3 has been assumed.
(2): Assumes 10% of PM_{10} is in the form of $PM_{2.5}$

Table 2: Dust Emission Rates

Activity	Units	Average			Peak		
		TSP	PM10	$PM_{2.5}$	TSP	PM10	$PM_{2.5}$
Haul Road length	km	5.3	5.3	0.5	5.3	5.3	0.5
Wheel Generated Dust	kg/VKT/Day	47.7	11.9	1.2	70.7	17.6	1.8
	kg/day	251	63	6.3	372	93	9.3

Estimates of Background Levels

Table 15 from AED (2019) has been expanded as Table 3 below to include an analysis of data from the Camberwell monitoring station for 2018 and 2019 based on information contained in the following references: (The reader is referred to AED (2019) for additional information.)

- NSW Office of Environment and Heritage (2015): *New South Wales Air Quality Statement 2015*.
- NSW Office of Environment and Heritage (2016): *Towards Cleaner Air. New South Wales Air Quality Statement 2016*.
- NSW Office of Environment and Heritage (2017): *Clearing the Air. New South Wales Air Quality Statement 2017*.
- NSW Office of Environment and Heritage (2018): *New South Wales Air Quality Statement 2018*.
- NSW Office of Environment and Heritage (2019): *New South Wales Air Quality Statement 2019*.

Table 3: Summary of the 24-Hour Average and Annual Average Concentration of PM_{10} and $PM_{2.5}$ during 2015 through 2019

Region	Station	Year	PM10			PM2.5		
			Average annual	Max Daily average	Date	Average annual	Max Daily average	Date
Upper Hunter	Camberwell	2015	22.0	**86.7**	6/5	7.2	23.9	10/3
		2016	24.5	**65.7**	23/5	7.5	21.1	8/5
		2017	**27.4**	**101.5**	13/9	7.4	24.7	12/2
		2018	**31.1**	**243.9**	22/11	8.4	22.6	22/11
		2019	**39.9**	**294.4**	26/11	10.5	**80.0**	21/11

Notes (1) : Levels above standards are shown in bold
(2): Camberwell is a Small Upper Hunter Air Quality Monitoring Network community monitoring station which is not suitable for assessing performance against NEPM standards

For the purposes of assessing cumulative impacts the following are noted:

- Estimates for the existing levels of TSP are based on an assumption that 50% of TSP is in the form of PM_{10}.
- Daily varying PM_{10} and $PM_{2.5}$ values are used based on monitoring data from the Camberwell Station.
- Annually varying levels for TSP, PM_{10}, and $PM_{2.5}$ are used based in the information provided in
- Table 3.
- In the absence of site specific data a background estimate for dust deposition of 2 g/m2/month has been assumed.

Results from the Dispersion Modelling including Cumulative Impacts

Table 21 of AED (2019) has been expanded as Table 4 below, to include results from the dispersion modelling for $PM_{2.5}$ as well as estimates for the existing environment, and cumulative impacts. The reader is referred to AED (2019) for additional information.

It is noted that cumulative impacts for the 24 hour averages of PM_{10} and $PM_{2.5}$ have considered daily varying levels of dust based on monitoring data from the Camberwell station combined with the daily varying results from the dispersion modelling.

When interpreting the results presented in Table 4 it is important to note the following:

- Dust data from the Camberwell monitoring station highlight 2017 through 2019 as being associated with an increasing number of PM_{10} exceedance days which may be attributable (at least in part) to increased dust levels associated with wide spread drought conditions that was experienced during this period as well as an increase in the frequency and duration of bushfire events. Dust data for 2018 and 2019 indicate that dust levels exceeded the annual average criteria for both PM_{10} and $PM_{2.5}$. Additionally, a total of 6 exceedance days for $PM_{2.5}$ were recorded during 2019 at this location.
- Results from the cumulative impact assessment suggests that:
  - the Peak Scenario may lead to one additional PM_{10} exceedance day associated with 2017 dust conditions and three additional PM_{10} exceedance days associated with 2018. No other increases in exceedances are predicted. No material changes in the maximum concentration values are predicted.
  - The Average Scenario may lead to three additional PM_{10} exceedance days associated with 2018. No other increases in exceedances are predicted. No material changes in the maximum concentration values are predicted.

Table 4: Results from the Dust Dispersion Model - Camberwell

Scenario	Vehicle Movement Scenario	Pollutant (units)	Averaging Period	Met[7] Year	Project Only Max	Background		Cumulative		Criteria
						Max[5]	Ex[6]	Max	Ex	
1	Peak (108 truck movements /day)	TSP (µg/m³)	Annual[1]	2015	0.4	43.9	0	44.3	0	90
1	Peak (108 truck movements /day)	TSP (µg/m³)	Annual[1]	2016	0.4	49.1	0	49.1	0	90
1	Peak (108 truck movements /day)	TSP (µg/m³)	Annual[1]	2017	0.3	54.7	0	60.0	0	90
1	Peak (108 truck movements /day)	TSP (µg/m³)	Annual[1]	2018	0.4	62.2	0	62.6	0	90
1	Peak (108 truck movements /day)	TSP (µg/m³)	Annual[1]	2019	0.3	79.8	0	20.1	0	90
1	Peak (108 truck movements /day)	PM_{10} (µg/m³)	24 hour	2015	1.6	**86.7**	**11**	**87.3**	**11**	50
1	Peak (108 truck movements /day)	PM_{10} (µg/m³)	24 hour	2016	1.6	**65.7**	**11**	**65.8**	**11**	50
1	Peak (108 truck movements /day)	PM_{10} (µg/m³)	24 hour	2017	1.5	**101.5**	**34**	**101.8**	**35**	50
1	Peak (108 truck movements /day)	PM_{10} (µg/m³)	24 hour	2018	1.8	**243.9**	**44**	**244.0**	**47**	50
1	Peak (108 truck movements /day)	PM_{10} (µg/m³)	24 hour	2019	1.8	**294.4**	**87**	**294.4**	**87**	50
1	Peak (108 truck movements /day)	PM_{10} (µg/m³)	Annual[1]	2015	0.2	22.0	0	22.1	0	30
1	Peak (108 truck movements /day)	PM_{10} (µg/m³)	Annual[1]	2016	0.2	24.5	0	24.7	0	30
1	Peak (108 truck movements /day)	PM_{10} (µg/m³)	Annual[1]	2017	0.2	27.4	0	27.5	0	30
1	Peak (108 truck movements /day)	PM_{10} (µg/m³)	Annual[1]	2018	0.2	**31.1**	**1**	**31.3**	**1**	30
1	Peak (108 truck movements /day)	PM_{10} (µg/m³)	Annual[1]	2019	0.1	**39.9**	**1**	**40.0**	**1**	30
1	Peak (108 truck movements /day)	$PM_{2.5}$ (µg/m³)	24 hour	2015	0.2	23.9	0	23.9	0	25
1	Peak (108 truck movements /day)	$PM_{2.5}$ (µg/m³)	24 hour	2016	0.2	21.1	0	21.1	0	25
1	Peak (108 truck movements /day)	$PM_{2.5}$ (µg/m³)	24 hour	2017	0.2	24.7	0	24.7	0	25
1	Peak (108 truck movements /day)	$PM_{2.5}$ (µg/m³)	24 hour	2018	0.2	22.6	0	22.6	0	25
1	Peak (108 truck movements /day)	$PM_{2.5}$ (µg/m³)	24 hour	2019	0.2	**80.0**	**6**	**80.0**	**6**	25
1	Peak (108 truck movements /day)	$PM_{2.5}$ (µg/m³)	Annual[1]	2015	0.02	7.2	0	7.3	0	8
1	Peak (108 truck movements /day)	$PM_{2.5}$ (µg/m³)	Annual[1]	2016	0.02	7.5	0	7.5	0	8
1	Peak (108 truck movements /day)	$PM_{2.5}$ (µg/m³)	Annual[1]	2017	0.02	7.4	0	7.5	0	8
1	Peak (108 truck movements /day)	$PM_{2.5}$ (µg/m³)	Annual[1]	2018	0.02	**8.4**	**1**	**8.4**	**1**	8
1	Peak (108 truck movements /day)	$PM_{2.5}$ (µg/m³)	Annual[1]	2019	0.02	**10.5**	**1**	**10.5**	**1**	8
1	Peak (108 truck movements /day)	Dust Deposition (g/m²/month)	Monthly[1]	2015	<0.1	2.0	0	2.1	0	2.0/4.0[3]
1	Peak (108 truck movements /day)	Dust Deposition (g/m²/month)	Monthly[1]	2016	<0.1	2.0	0	2.1	0	2.0/4.0[3]
1	Peak (108 truck movements /day)	Dust Deposition (g/m²/month)	Monthly[1]	2017	<0.1	2.0	0	2.1	0	2.0/4.0[3]
1	Peak (108 truck movements /day)	Dust Deposition (g/m²/month)	Monthly[1]	2018	<0.1	2.0	0	2.1	0	2.0/4.0[3]
1	Peak (108 truck movements /day)	Dust Deposition (g/m²/month)	Monthly[1]	2019	<0.1	2.0	0	2.1	0	2.0/4.0[3]

Scenario	Vehicle Movement Scenario	Pollutant (units)	Averaging Period	Met[7] Year	Project Only Max	Background Max[5]	Background Ex[6]	Cumulative Max	Cumulative Ex	Criteria
2	Average (63 truck movements /day)	TSP (µg/m³)	Annual[1]	2015	0.2	43.9	0	44.1	0	90
				2016	0.3	49.1	0	49.4	0	90
				2017	0.2	54.7	0	54.9	0	90
				2018	0.2	62.2	0	62.4	0	90
				2019	0.2	79.8	0	80.0	0	90
		PM_{10} (µg/m³)	24 hour	2015	1.1	**86.7**	**11**	**87.1**	**11**	50
				2016	1.0	**65.7**	**11**	**65.8**	**11**	50
				2017	1.0	**101.5**	**34**	**101.7**	**34**	50
				2018	1.2	**243.9**	**44**	**244.0**	**47**	50
				2019	1.2	**294.4**	**87**	**294.4**	**87**	50
			Annual[1]	2015	0.1	22.0	0	22.1	0	30
				2016	0.1	24.5	0	24.7	0	30
				2017	0.1	27.4	0	27.5	0	30
				2018	0.1	**31.1**	**1**	**31.2**	**1**	30
				2019	0.1	**39.9**	**1**	**40.0**	**1**	30
		$PM_{2.5}$ (µg/m³)	24 hour	2015	0.1	23.9	0	23.9	0	25
				2016	0.1	21.1	0	21.1	0	25
				2017	0.1	24.7	0	24.7	0	25
				2018	0.1	22.6	0	22.6	0	25
				2019	0.1	**80.0**	**6**	**80.0**	**6**	25
			Annual[1]	2015	0.01	7.2	0	7.2	0	8
				2016	0.01	7.5	0	7.5	0	8
				2017	0.01	7.4	0	7.4	0	8
				2018	0.01	**8.4**	**1**	**8.4**	**1**	8
				2019	0.01	**10.5**	**1**	**10.5**	**1**	8
		Dust Deposition (g/m²/month)	Monthly[1]	2015	<0.1	2.0	0	2.1	0	2.0/4.0[3]
				2016	<0.1	2.0	0	2.1	0	2.0/4.0[3]
				2017	<0.1	2.0	0	2.1	0	2.0/4.0[3]
				2018	<0.1	2.0	0	2.1	0	2.0/4.0[3]
				2019	<0.1	2.0	0	2.1	0	2.0/4.0[3]

Notes
(1): Assumes peak movements 365 days per year
(2): Assumes average movements 365 days per year
(3): Assessment criterion is: Project only contribution not to exceed 2 g/m²/month with total (including background) not to exceed 4 g/m²/month.
(4): Reported results are conservative as they are based on vehicle movements at the specified daily rate 365 days per year.
(5): Max – Maximum value
(6): Ex – number of exceedances
(7): Met – meteorological year assessed

Appendix E Odour Emissions Sampling Report

DATE OF REPORT: 4TH DECEMBER 2018

Shaun Smith
Principal Environmental Planner
RPS Group - Australia Asia Pacific
Unit 2A, 45 Fitzroy St
Carrington NSW 2294

TEST REPORT NO. NOV18209.1

ODOUR MONITORING CONDUCTED AT THE BETTERGROW (GREENSPOT) HUNTER VALLEY COMPOSTING FACILITY

DATE OF TESTING: 22ND NOVEMBER 2018

ACCREDITATION:

This laboratory is accredited by the National Association of Testing Authorities (NATA).
NATA Accredited Laboratory No. 15463.
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AUTHORISATION:

Mr. I.S. Brash *Adv.Dip.Mar.Eng.*
TECHNICAL MANAGER

Dr. C.M. Clunies-Ross *PhD(Chem.Eng.)*
LABORATORY MANAGER

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INTRODUCTION

Airlabs Environmental was commissioned by the RPS Group to conduct area source odour testing at the Greenspot Hunter Valley Composting Facility. Surface (flux hood) samples were collected at the following locations:

1. Organic Sample, Windrow SP1, Fresh green waste.
2. Five-week-old, Compost Windrow No. 26, 3:1 mix (3 parts green organic + one-part biosolids).
3. Product Sample, Windrow No. 13/14, 3:1 mix (3 parts green organic + one-part biosolids).
4. Freshly Opened Compost Windrow, Windrow No. 23/3.
5. One-week old Compost Windrow, Test Windrow, 3:1 mix (3 parts green organic + one-part biosolids).
6. Biosolids Sample, Windrow 3020 (21/11/2018).

All sampling was conducted on 22nd November 2018.

QUALITY STATEMENT

Airlabs Environmental is committed to providing the highest quality data to all our clients. This requires strict adherence to and continuous improvement of all our processes and test work. Our goal is to exceed the QA/QC requirements as set by our clients and appropriate governmental entities and to insure that all data generated is scientifically valid.

TEST METHODS

Surface Odour

Sample Collection

Area source samples were obtained using a 'Five Senses' AC'SCENT emissions isolation flux hood in accordance with the Australian/New Zealand Standard 4323.4 'Area Source Sampling – Flux Chamber Technique'. The flux hood comprises a stainless steel constructed isolation flux chamber with a surface area of 0.13m^2. The flux hood was operated using the standard parameters as specified in AS/NZS 4323.4 for a USEPA Chamber as follows:

- Sweep Air Flow Rate = 5 lpm
- Sweep Air Velocity = 5.1 m/s
- Sample Flow Rate = 2.5 lpm (max)

After an initial purge, the flux chamber exhaust was sampled using the 'lung-in-the-box' technique in accordance with the Australian/New Zealand Standard 4323.3 'Stationary Source Emissions – Part 3: Determination of Odour Concentration by Dynamic Olfactometry'. The sample was drawn through a Teflon tube that fed into a Nalophan sample bag located in a vacuum drum. Air was pumped from the drum, creating a vacuum which caused sample gas to be drawn into the Nalophan bag.

Sample Analysis

Odour samples were analysed in accordance with NSW EPA OM-7, directly incorporating the Australian/New Zealand Standard 4323.3 'Stationary Source Emissions – Part 3: Determination of Odour Concentration by Dynamic Olfactometry'. For this procedure we utilised the forced-choice technique.

TEST METHODS CONTINUED

Odour concentrations were determined using a dynamic olfactometer operating in the forced choice mode with a step factor of 2.0. The odour panellists were all familiar with the procedure and specially selected in accordance with the Australian Standard criteria. The total number of dilutions of the sample at which 50 percent of all responses of the panellists confirmed odour detection is reported as the panel threshold, and is expressed in odour units (OU).

Two ports were available to each panel member; one presenting the odorous gas and one presenting a neutral reference gas (carbon-scrubbed air). Each sample was analysed three times. Individual threshold estimates for each panel member were determined and the corresponding odour concentrations were calculated, with the average response of the second and third analyses reported. The precision of results obtained by these techniques lies statistically within the 95% confidence interval.

Methane and Carbon Dioxide

Methane (CH_4) and Carbon Dioxide (CO_2) were monitored using a Geotech GEM5000 Landfill Gas Analyser. This instrument uses a dual wavelength infra-red cell with reference channel for CH_4 and CO_2 determination.

The analyser was calibrated using NATA certified span gases and zeroed with dry nitrogen. The estimated measurement uncertainty is $\pm$ 2%.

Nitrous Oxide

Analysis for Nitrous Oxide was performed in accordance with ISO 21258 'Stationary Source Emissions - Determination of the Mass Concentration of Dinitrogen Monoxide – Reference Method: Non-dispersive Infrared Method'. The sample gas was withdrawn continuously from the gas stream and conveyed to the Thermo Scientific 46i-HL High Level Nitrous Oxide gas analyser which utilises infrared spectrophotometry and gas filter correlation technology to measure high concentrations of Nitrous Oxide (N_2O). The model 46i-HL analyser utilises an exact calibration curve to accurately linearize the instrument output over the selected range.

The instrument was calibrated using NATA certified N_2O span gases and zeroed with dry nitrogen. The estimated measurement uncertainty is $\pm$ 5%.

FLUX HOOD CALCULATIONS

The area source zone flux emission rate (F_i) for a non-aerated surface is calculated from:

$F_i = C_i Q / A_c$

where:
F_i = zone atmospheric contaminant flux emission rate (OU/m^2.s)
C_i = zone chamber atmospheric contaminant concentration (OU/m^3)
Q = chamber flow rate (m^3/s, wet basis)
A_c = area enclosed by chamber (m^2)

DEFINITIONS

'lpm'	Gas flow in liters per minute.
'm/s'	Air velocity in meters per second.
'OU/m^3'	Odour concentration (wet basis).
'K'	Absolute temperature in Kelvin (^{o}C + 273).
'OU/m^2.s'	Odour units emitted per square meter of surface area per second.

DEPICTION OF SAMPLING EQUIPMENT

Figure 1: Biosolid Sample

Figure 2: Five-Week-Old Compost – 3:1 mix Sample

RESULTS

Company Bettergrow Pty Ltd

Site 73 Lemington Road, Ravensworth, NSW

Date of Test 22nd November 2018

Testing Officers I. Brash

Table 1: Odour Results for Area Sources tested on 22nd November 2018

Sampling Location	Odour Source	Test Period, (Purge & Sample Time) (hrs)	Odour Concentration (OU/m³, wet)	Odour Flux Temp (K)	Odour Emission Rate (OU/m².s)
BG1	Organic Sample	09:57 – 10:28	46	300	0.027
BG2	Five-Week-Old Compost Windrow	10:38 – 11:09	52	305	0.030
BG3	Product Sample	11:20 – 11:51	56	305	0.032
BG4	Freshly Opened Compost Windrow	12:25 – 12:56	71	300	0.041
BG5	One-Week-Old Compost Windrow	13:07 – 13:38	79	307	0.045
BG6	Biosolids Sample	13:50 – 14:21	970	311	0.553

RESULTS CONTINUED

Table 2: Greenhouse Gas Analysis Results

Sampling Location	Odour Source	Carbon Dioxide (CO_2) [%]	Methane (CH_4) [%]	Nitrous Oxides (N_2O) (ppm)
BG1	Organic Sample	<0.1	<0.01	<0.1
BG2	Five-Week-Old Compost Windrow	<0.1	<0.01	<0.1
BG3	Product Sample	<0.1	<0.01	<0.1
BG4	Freshly Opened Compost Windrow	<0.1	<0.01	<0.1
BG5	One-Week-Old Compost Windrow	<0.1	<0.01	<0.1
BG6	Biosolids Sample	<0.1	<0.01	<0.1