Mr Alan Young
General Manager
Fairfield City Council
PO Box 21
Fairfield NSW 1860

Arcadis Australia Pacific Pty Ltd
Level 16, 580 George Street
Sydney NSW 2000
Tel No: +61 2 8907 9000
www.arcadis.com/au

Copy to: [Geraldine Pham]

5/11/2020

Wetherill Park DA Modification (803.1/2014) Response to EPA Comments

Dear Alan,

I am writing in response to the EPA's correspondence dated 26th October 2020 regarding Mainstream Recycling Pty Ltd's (Mainstream) current application with Fairfield City Council (Council) to modify Development Consent 803.1/2014 for the Wetherill Park Waste Recycling Depot (Facility) for the purpose of processing of street sweeper waste (Modification Application).

This letter is intended to provide Council (as the consent authority) with:

- Mainstream's response to the EPA's request for further information in relation to the Modification Application; and
- additional information to demonstrate that the appropriate approval pathway for the Modification Application is Section 4.55(1A) of the EP&A Act.

Before addressing the specific matters raised by the EPA, we note that as part of the Modification Application process a pre-lodgement meeting was held with Mainstream, Council and Arcadis on the 9th September 2020. At this meeting Council indicated that it was satisfied the Modification Application could proceed under Section 4.55(1A) of the EP&A Act on the basis that, among other matters, there was no intensification of development - including no changes to built form or processing infrastructure, no changes to approved throughput, no changes to approved truck volumes, and on the basis that street sweeper waste is similar to the Gross Pollutant Trap (GPT) waste already authorised under the Development Consent.

To support progression of the Modification Application (including responding to the EPA's concerns) and to ensure a robust approach to assessment for the benefit of Council and the EPA, Mainstream has engaged Arcadis (environmental consultants), Gilbert + Tobin (legal review) and SESL (environment and soil sciences) to provide specialist technical input.

As detailed within the Statement of Environmental Effects for the Modification Application (SEE), and the response to the EPA's comments below, the proposed Modification is likely to have negligible or very small overall environmental impacts which are expected to be within the same scale as those that were approved under the original Development Consent. Given similarities to the existing accepted waste streams (GPT waste), no changes to on site processing, no intensification of development – (including no changes to built-form or processing infrastructure), no changes to approved throughput and no changes to approved truck volumes, the Modification is considered to be substantially the same development because the modified development is 'essentially or materially' the same, from both a qualitative and quantitative perspective.

Since lodgement of the SEE to Council, Mainstream has finalised a characterisation study of GPT waste, street sweeper waste and recovered waste in response to EPA guidance which validates the statements in the SEE that street sweeper waste is a similar waste stream to GPT waste in terms of contaminant concentrations and potential environmental risk. In practice, this makes sense because street sweeper waste is effectively an input into GPT waste (once it is washed into the stormwater drain) which is already being processed and treated at the Facility. The report is provided at attachment 'A' to this letter. This supports the Modification Application proceeding under Section 4.55(1A) pathway.

In parallel with the Modification Application process, Mainstream is currently engaging with the EPA to implement the approval pathways identified by the EPA – including securing a site-specific Resource Recovery Order and Resource Recovery Order Exemption. This does not preclude Council from approving the Modification Application while those separate approvals are separately being sought.

Co-Operation with EPA

Mainstream is committed to working closely with the EPA to successfully deliver the waste recycling and reuse operations at the Facility – which will play an important role supporting the NSW recycling targets.

The site is operated under development consent issued by Council in 2015 (DA803.1/2014). The 2015 SEE identified that the Facility would accept and treat stormwater and other stormwater related waste – and the treated material would be transported for beneficial reuse to a standard prescribed by the EPA. The EPA subsequently issued Environment Protection Licence No. 20694 to authorise the operations at the Facility.

The 2019 SEE – in support of a modification application to increase throughput limit to 29,500 tonnes per annum – contains similar statements that the treated material would be transported for beneficial reuse to a standard prescribed by the EPA. The EPA supported the modification.

Since about 25th January 2016, and consistent with the intent of both the 2015 SEE and 2019 SEE, Mainstream has relied on general EPA orders and exemptions to support its current licensed activities under EPL 20694 involving recycling of stormwater/GPT waste (waste classification – General Solid Waste (non-putrescible)).

Mainstream has relied upon consultants advice in relation to its approach to authorise activities at the Facility. Mainstream's intent was always to be transparent and open, and has included, among other matters advice relating to our waste types, quantities of waste processed, quantities of recovered waste, beneficial reuse pathways for recovered product and reliance upon the *Mulch Order 2016*. Example correspondence between Mainstream Recycling and the EPA dated 11th December 2019 is provided at Attachment B.

In early 2020 Mainstream decided, based on its ongoing consultation with the EPA, that a site-specific Resource Recovery Order would be a preferred approval pathway to reliance on existing general Resource Recovery Orders/exemptions. This approach would allow a new site-specific approval regime that would (once granted) supersede and replace Mainstream's reliance on the existing resource recovery framework.

In late February 2020, Mainstream lodged a site-specific Resource Recovery Order and Resource Recovery Order Exemption application for land application of GPT waste, non-destructive digging muds and street sweeper waste as a soil amendment, in a bid to implement the EPA's preferred approval framework for the site. This application was refused by the EPA on 24th April 2020 on the basis that "*the application did not sufficiently*

characterise the waste, nor did it demonstrate the waste is homogenous, predictable, beneficial and poses no risk to human or environmental health".

More recently, Mainstream lodged an application to vary condition L2.1 of EPL 20694 to add waste collected by, or on behalf of, local councils from street sweeping as a permitted waste to be received, stored and processed at the Facility. The EPA refused the licence variation request on 17th August 2020 on the basis that street sweeper waste was not explicitly authorised in the site's development consent. The current Modification Application with Council seeks to address this issue.

Mainstream has made significant progress in implementing the EPA's preferred approval framework for the Facility – and addressing the EPA's issues raised in its correspondence of 24th April 2020 and 17th August 2020 relating to the Resource Recovery Order and EPL variation refusal. Key actions are outlined below:

- Appointment of a dedicated consultant team led by Arcadis, following the announcement of Quadrant's investment in Total Drain Group on 27th August 2020, comprising Arcadis, MS2 and SESL;
- SESL has been engaged to undertake detailed risk assessment and benchmarking of incoming GPT waste and street sweeper waste, and characterisation of recovered product over a three-week period. The results are generally promising and supportive of the current beneficial re-use pathway for utilisation of recovered product as a soil amender and conditioner. Nutritionally, the material is low in nitrogen, phosphorus and potassium, but high in trace elements, which is typical of composted soil conditioners and compost. The recovered product is naturally high in organic matter and organic carbon. A copy of this report is attached to this response (Attachment A). This report attached to this response supports both the current Modification Application submission as well as the early stages for securing a site specific RRO/E. Overall, the GPT and street sweeping waste inputs were similar in terms of contaminant concentrations for the key analytes tested, and were found to be relatively consistent and predictable in this 3 week assessment – meaning that the acceptance of street sweeping waste would not increase the environmental impacts at the Facility.
- Arcadis, on behalf of Mainstream, has prepared the Modification Application to support authorisation of street sweeper waste. A pre-lodgement meeting was held with Fairfield City Council on 10th August 2020 and the formal application was lodged on 23rd September 2020.

Mainstream has been working through a regulatory review of their operation, which includes updating quality control and assurance procedures that will directly benefit the current beneficial reuse of recovered material by focussing on end-to-end management of material being collected through to end-use of processed material.

In parallel with the Modification Application, Mainstream is in the process of requesting a preliminary assessment from the EPA's Resource Recovery Innovation Unit on its proposed approach (including risk assessment methodology and test results completed and reviewed by Arcadis and SESL) for securing a site-specific Resource Recovery Order and Resource Recovery Exemption under the *Protection of the Environment Operations Act 1997* (POEO Act) and the *Protection of the Environment Operations (Waste) Regulation 2014* (Waste Regulation).

Mainstream's preference is for the scope of the Resource Recovery Order and Resource Recovery Exemption to mix stormwater/GPT waste and street sweeper waste as a blended product on the basis of these being similar and complementary waste streams i.e. streetsweeper waste is collection of materials deposited on a street/gutters of streets and roads, which are mostly silt, sediment, organic waste from vegetation growing on or above streets and roads or gardens adjacent to streets, contaminants are

mostly discarded plastic containers and debris from cars. Stormwater/GPT waste is the same waste from the same location but flushed into the GPT by stormwater. The working assumption is that both material streams, once subject to resource recovery, are analytically very similar, represent similar composition and can therefore be blended. This is supported by recent waste characterisation works indicating that GPT and street sweeping waste inputs were similar in terms of contaminant concentrations for the key analytes tested, and were found to be relatively consistent and predictable – meaning that the acceptance of street sweeping waste would not increase the environmental impacts at the Facility. Notwithstanding this position, we are open to alternative approaches that may be suggested by the EPA for proof of our hypothesis.

Mainstream is committed to submitting a licence variation application to the EPA to promote alignment with the development consent, once approved. A draft application is currently being developed in light of the above.

Response to EPA Issues

A response to each of the EPA's comments from its letter dated 26th October 2020 is provided below.

1. Section 4.55(1A) Approval Pathway

A pre-lodgement meeting was held with Mainstream, Council and Arcadis on the 9th September 2020. As part of this meeting Council indicated it was satisfied that the Modification Application could proceed under Section 4.55(1A) of the EP&A Act on the basis that, among other matters, there was no intensification of development including no changes to built form or processing infrastructure, no changes to approved throughput, no changes to approved truck volumes and on the basis that street sweeper waste is complementary to GPT waste already authorised under the development consent.

Once modified, the Facility would accept up to 5,000 tpa of street sweepings, as a component of the total 29,500 tpa limit. The waste would be unloaded into existing bays or pits and be treated, stored, managed and reused through existing processes. The Modification Application would not require any changes to the existing building, layout or processing hours. There would be no increase in operating risk from the Facility, and no changes to parking, operating hours or off-site environmental impacts such as noise, odour or amenity. Existing management systems are appropriate and would continue to be maintained and implemented. As such, the Facility when modified is considered to be substantially the same development.

The acceptance of street sweeper waste is considered to be consistent with the types of waste accepted under the existing development consent. The relationship between street sweeper waste and GPT waste, is that waste located in street gutters (street sweeper waste) becomes GPT waste when washed into a GPT by rainfall events. There is no change to the waste characteristics, however the material is swept up and transported in skip bins or small covered trucks, rather than extracted from GPTs by vacuum tankers.

An assessment of potential environmental impacts associated with the Modification Application was provided in Section 6 of the SEE in support of the Modification Application. The assessment concluded that the Modification would have negligible environmental impacts and no further mitigation measures are required.

Since lodgement of the Modification Application Mainstream has finalised an assessment of the GPT waste, street sweeping waste, and recovered product produced at the Facility. The purpose of this exercise was to benchmark the characteristics (specifically the variability and predictability) of GPT and street sweeper waste, characterise recovered product, examine benefits of the product with regard to the current application being fit-for-purpose and confirm that there are no adverse impacts on human health or the environment as a result of this beneficial re-use. A copy of the technical report completed by SESL is attached to this response (Attachment A).

Benchmarking of street sweeper waste was undertaken on three council waste streams: Burwood Council, Sutherland Council and Georges River Council. All analysis was undertaken offsite, given the Facility is not currently authorised to process street sweeper waste. The results of the benchmarking analysis demonstrate generally low concentrations of Total PAH, Heavy Metals and TPH when compared against the NSW EPA Waste Classification Guidelines 2014 (WC) criteria for contaminant concentrations in General Solid Waste (GSW). Asbestos, PFAS, BaP, PCB, BTEX OCP and OPP were

below limits of reporting (LOR) in the three composite samples from the three council street sweeping waste streams.

Overall, the GPT and street sweeping waste inputs were similar in terms of contaminant concentrations for the key analytes tested, and were found to be relatively consistent and predictable in this 3 week assessment – meaning that the acceptance of street sweeping waste would not increase the environmental impacts at the Facility. Where analytes were identified in concentrations or ranges outside of the *Batch Processed Recovered Fines* (BPRF) Order criteria, they are considered marginal (for zinc and copper), insignificant (in terms of the close to neutral pH of the waste for land application) or, in the case of hydrocarbons which were consistently elevated, further silica gel-clean up analysis demonstrated that the hydrocarbons were attributed to organic sources rather than petroleum. These initial results indicate that contamination within the waste stream, as noted by the EPA, is unlikely to result in any additional environmental impacts.

In summary, the SESL report and the SEE confirms that the proposed modification would be: (i) of minimal environmental impact because it is likely to have a negligible or very small overall environmental impacts which are expected to be within the same scale as those that were approved under the original development consent; and (ii) that the development to which the consent as modified relates is substantially the same development because the modified development is 'essentially or materially the same' as the original approved development, from both a qualitative and quantitative perspective. We respectfully submit that the planning approval pathway adopted is appropriate in accordance with Section 4.55 1(A) of the EP&A Act.

2. Insufficient information

An SEE for a modification application is structured to assess potential environmental impacts from the proposed modification. In parallel with the Modification Application, Mainstream is in the process of requesting a preliminary assessment from the EPA's Resource Recovery Innovation Unit on its proposed approach for securing a site-specific Resource Recovery Order and Resource Recovery Exemption under the POEO Act and the Waste Regulation. Technical details on the waste types, waste management and handling would be provided through this process. A description of where the requested information can be found is provided in Table 1.

As mentioned above further information has been appended to this report regarding the benchmarking of GPT waste and street sweeper waste and characterisation of recovered product which is appended to this letter.

Table 1 Response to EPA information requests

Information request	Response
Details of the sources of the waste to be received at the Premises	A description of the waste types accepted at the existing site and the proposed additional waste types is provided in Section 2.1 and 6.2 of the SEE respectively.
Details of the quantities of the waste type to be received;	Quantities of waste types received are provided in Section 4.1 of the SEE.
Details of the maximum volume of the waste to be stored at any one time	1,250 tonnes (of unprocessed incoming material and outgoing recovered material)

Information request	Response
A detailed description of waste processing procedures for the waste type	A description of the waste processing procedure is provided in Section 2.1.1 of the Modification Report. Waste processing activities generally comprise: • Delivery of wastes to the Facility via vacuum tankers, tipper trucks, and skip bin trucks • Discharge of liquid wastewater into in-ground receival pits • Pumping off of surface liquids to holding tanks for treatment by a plate separator or Dissolved Air Flotation (DAF) plant, followed by discharge to sewer (in accordance with the Sydney Water Trade Waste Agreement 38666) • Discharge of treated air from holding tanks to the atmosphere through a vent stack in the building roof can be actioned as required • Collection of settled solids and other oversize residual material (primarily organic material such as mulch, plant material, soil/silt, leaves and sticks, however also including plastics, PET bottles and tree-bark) from the bottom of the receival pits, • Mixing of settled solids and other oversize residual material with saw dust if required to allow processing. • Non thermal process involving dewatering of remaining solids and separating / sizing through trommel screen to recover mulch, leaves, soils and fine organic material. Recovered organic mulch, leaves, soils and fine material is beneficially reused in landscaping activities • Transport of oversize waste to landfill or for further processing via tipper truck.
A detailed description of the storage procedures for the waste type	Bay 1 80t-120t Receival and/or mixing Bay Pit 1 35t-50t Receival pit and solid/liquid separation Pit 2 35t-50t Receival pit and solid/liquid separation Pit 3 25t-40t Receival pit and solid/liquid separation
A detailed description of how the facility will meet the EPA's record keeping and reporting requirements, including weighing material in and out of the Premises	The Modification Proposal would not alter the current processing and waste management procedures at the Facility. Record keeping and reporting is undertaken in accordance with the Facilities Waste Management Plan, included as Appendix C of the SEE. The weighbridge is the primary location on site for recording the receiving and removing of waste. Typically, the weighbridge reporting information will include the following: • Date and time • Vehicle Registration • Customer • Waste type (liquids, GPT waste etc) • Gross and Tare Weight • Weighbridge Management System Docket Number.

Information request	Response
A list and description, including quantities, of the types of materials (or finished products) to be produced and their intended fate	As flagged above there are no material changes to the existing approval, including finished products produced at the Facility. As described in Section 2.1 and 6.2 of the SEE street sweeper waste would be integrated into existing processes. Processing of the blended material creates 3 material streams: 900t-1300t per month of landscaping material 50t-200t per month of landfill 0.7ML -1ML per month of trade waste The treated material is transported for beneficial reuse (as a high-quality landscaping product), with treated water discharged to sewer and a small quantum of residual non-recoverable waste being disposed to landfill.
A detailed description of how the waste type meets the conditions of a resource recovery order and/or resource recovery exemption to be able to re-use the material or apply that material to land	A description of the Resource Recovery Order/Exemption application that is currently under preparation is provided in response 3 below.
A detailed description of the intended fates of any waste produced on site which is not suitable for re-use	As described in Section 2.1 of the SEE, oversize and residual waste is collected and transported to landfill.
The physical and chemical content of the waste type	A detailed description of the physical properties of the approved and proposed waste types is provided in the attached report prepared by SESL (Attachment A).
The types of pollution which may result from the storage and processing of the waste type and mitigation measures for managing any such impacts including a detailed description of how contaminants will be treated or removed from the recycling process and how that waste will be quarantined, stored and lawfully disposed of, in accordance with the EPA's Waste Classification Guidelines	The Modification Proposal will not alter the processing activities at the Facility. During processing, contaminants are removed using a plate separator or Dissolved Air Flotation plant for liquid wastes. For solids, oversize residual material (including plastics, PET bottles and tree-bark) is collected from the bottom of the receival pits. Other contaminants are separated using a trommel screen. Residual non-recoverable waste is disposed to landfill.

Information request	Response
The EPA notes that the SEE advises that, if necessary, sawdust is added during the resource recovery process to allow conveying of material. This process has not previously been mentioned within documents relating to Mainstream and the Premises. The EPA would require additional information regarding this practice and the sawdust itself	Sawdust is added to dry material such that it can traverse up the incline conveyor as part processing. The addition of the drier street sweeping material will reduce/eliminate the requirement for sawdust. The street sweeping material will be combined with the wet GPT/stormwater material to reduce overall moisture content and allow the blended material to traverse up the incline conveyor. A multiple analysis profile of the sawdust has been prepared to confirm suitability for use. The results are included as Attachment C of this letter.

3. Resource recovery order or exemption strategy

As set out above, Mainstream is committed to working in partnership with the EPA to secure a site-specific Resource Recovery Order/Exemption which will (once granted) supersede and replace Mainstream's reliance on the existing general Resource Recovery Order/Exemptions.

Mainstream recognises the importance of characterising all incoming waste streams that will be the subject of the site-specific Resource Recovery Order to demonstrate that waste is homogenous, predictable, beneficial and poses no material risks to human or environmental health.

Mainstream is seeking a preliminary assessment on their proposed approach and has requested the EPA's feedback on how best to structure responses to ensure relevant information for EPA's decision-making.

An overview of the key elements of Mainstreams approach for securing a site-specific Resource Recovery Order/exemption are outlined below:

- Our approach for securing the RR-Order and RR-Exemption is centred around aligning with application format requirements outlined under Part B of the *NSW EPA Guidelines on Resource Recovery Order/E on the land application of waste materials as a fertiliser or soil amendment* as well as other relevant EPA correspondence;
- As noted, Mainstream's preference is for the scope of the Resource Recovery Order and Resource Recovery Exemption to mix stormwater/GPT waste and street sweeper waste as a blended product on the basis of these being similar and complementary waste streams. i.e. stormwater/GPT waste is the same as street sweeper waste, from the same location but flushed into the GPT by stormwater (refer figure below). The working assumption is that both material streams, once subject to resource recovery, are analytically very similar, represent similar composition and can therefore be blended. Notwithstanding this position, we are open to alternative approaches that may be suggested by the EPA for proof of our hypothesis;

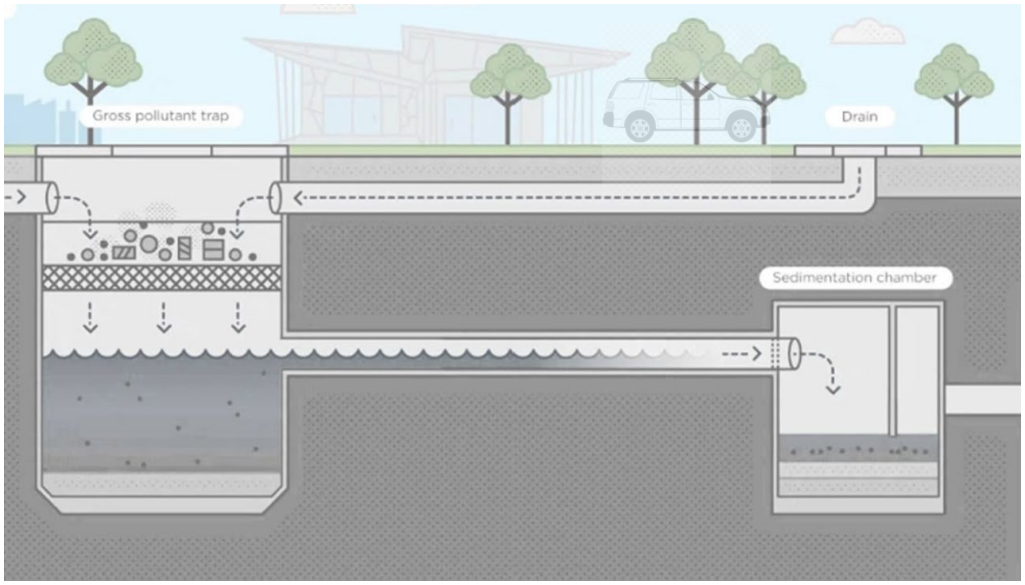


Figure 1 Relationship between street sweeper waste and GPT waste

- SESL have been engaged to undertake an assessment of stormwater/GPT waste and street sweeping waste (incoming waste streams) and recovered outgoing product streams with the objective of identifying any potential risks of harm to human and/or environmental receptors through land application of the recovered outgoing product. Key elements of the SESL scope include the following:
  - Initial benchmarking/characterisation of incoming waste streams (noting street sweeper waste characterised off-site). Chemical concentrations/material characteristics tested in accordance with *Guidelines on Resource Recovery Orders and Exemptions for the Land Application of Waste Materials as a Fertiliser or Soil Amendment 2017.* Focus on identification of contaminants of concern for further detailed investigation.
  - Initial benchmarking established through analysis of three composite samples (composed of minimum of 5 sub-samples) on incoming street sweeper waste from 3 separate local government areas, including Burwood, Sutherland and Georges River Council
  - Analysis of one composite sample (comprised of 5 sub-samples) of GPT waste on 6 different days over a period of 3 weeks
  - A total of 36 samples of the recovered, outgoing product sampled and analysed against chemical and physical parameters outlined in Table 1 of the NSW EPA *The Batch Process Recovered Fines Order 2014* as well as soil chemistry data obtained from *Leake and Haege (2014) Soils for Landscape Development.* We are happy to provide a summary of the results to the EPA.
- The proposed use for recovered product will typically comprise landscape suppliers in the western suburbs of Sydney, which are situated in a semi-rural environment. All sites that will receive recovered product will have appropriate development consents and licenses (where PoEO Act licensing thresholds are exceeded). Note Mainstream manages the volume of material sent to sites to ensure landscape partners' DA consents are not breached.

- Mainstream proposes to complete a trial subject to EPA approval over several months (up to 12 months) to completely characterise the material and validate the recovery process. The following trial sampling methodology is proposed:
  - Collection of 20 composite samples of the resource recovered waste material from every 400 tonne (or part thereof) batch of blended and processed street sweeping and stormwater/GPT waste;
  - All sampling is to be conducted in accordance with the sampling methods detailed in the Australian Standard 1141.3.1_2012 Methods for Sampling and Testing Aggregates or equivalent methodology; and
  - All samples are to be transported and managed under Chain of Custody protocols.
- Mainstream is currently developing a tailored quality assurance protocol. Key elements of this protocol will include risk management procedures to ensure that the constituent waste streams are contaminant free, including random sampling and testing procedure of inbound loads (approx. 1 in 6 loads) and on-site laboratory for testing samples, as well as relationship in place with ALS for NATA testing requirements and confirmation, tailored checklists, signage and record keeping forms that will be used; as well as internal company training that will be carried out to ensure all relevant staff have accountability for key responsibilities.

As described in Section 1 above and detailed in the attached SESL report (Attachment A the outcomes of the detailed risk assessment and benchmarking are generally promising and supportive of the current beneficial re-use pathway. Nutritionally, the material is low in nitrogen, phosphorus and potassium, but high in trace elements, which is typical of composted soil conditioners and compost. The recovered product is naturally high in organic matter and organic carbon. GPT and street sweeping waste inputs were similar in terms of contaminant concentrations for the key analytes tested, and were found to be relatively consistent and predictable.

4. EPL Variation

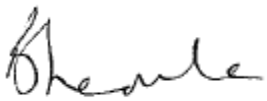
Mainstream apologises for this oversight and seeks to remedy this immediately. It is noted that the General Terms of Approval provided by the EPA for the previous Development Approval did not include a requirement to update the EPL as part of the approval although we are now aware that this was covered in the EPA's cover letter accompanying the GTAs which has resulted in the oversight. Additionally, discussion and review with personnel in the business indicates that during the period in question Mainstream changed environmental consultants and also SHEQ Managers which is likely to have contributed to this situation.

Key aspects identified within the EPA's General Terms of Approval include noise, hours of operation and odour. Mainstream is in the process of preparing an EPL variation for submission to the EPA that would update the EPL to reflect the conditions proposed within the EPA's General Terms of Approval.

Whilst inconsistencies exist between the EPL20694 and the EPA's General Terms of Approval, the site has historically and continues to, operate in accordance with the development consent conditions. Mainstream is committed to working with the EPA to ensure that the EPL authorises all activities at the site.

In light of the above detailed response we look forward to a favourable resolution of this matter.

Yours sincerely,



Brad Searle
Business Leader – Environment and Waste
0408 204 054

Attachment A – Waste risk assessment and benchmarking (SESL)

Document Record

Revision No.	Reviewed By	Action	Issued To	Date	Release Authorisation Signature
1.0	Simon Leake	Preliminary Report	Mainstream Recycling	24th August 2020	
2.0	Simon Leake	Amendments as requested by Arcadis	Arcadis	14th October 2020	
3.0	Samantha Grant-Vest	Amendments as requested by Arcadis	Arcadis	27th October 2020	
4.0	Samantha Grant-Vest	Amendments as requested by Arcadis	Arcadis	2nd November 2020	
5.0	Samantha Grant-Vest	Amendments as requested by Arcadis	Arcadis	3rd November 2020	

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ABN 70 106 810 708
T 1300 30 40 80
F 1300 64 46 89
E info@sesl.com.au
W sesl.com.au

POST PO Box 357, Pennant Hills NSW 1715
LAB 16 Chilvers Rd, Thornleigh NSW 2120
ACT Level 4, 15 Moore St, Canberra ACT 2601
VIC Level 1, 21 Shields St, Flemington VIC 3031
QLD Level 10, 15 Green Square Cl, Fortitude Valley QLD 4006

TABLE OF CONTENTS

DOCUMENT TABLES IN TEXT

ABN 70 106 810 708
T 1300 30 40 80
F 1300 64 46 89
E info@sesl.com.au
W sesl.com.au

POST PO Box 357, Pennant Hills NSW 1715
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ACT Level 4, 15 Moore St, Canberra ACT 2601
VIC Level 1, 21 Shields St, Flemington VIC 3031
QLD Level 10, 15 Green Square Cl, Fortitude Valley QLD 4006

ATTACHMENTS

A - Analytical Tables
B - Certificates of Analysis
C - *J002609 Proposed Risk Assessment and Analytical Schedule*.
D - SESL laboratory summary certificates.

ABN 70 106 810 708
T 1300 30 40 80
F 1300 64 46 89
E info@sesl.com.au
W sesl.com.au

POST PO Box 357, Pennant Hills NSW 1715
LAB 16 Chilvers Rd, Thornleigh NSW 2120
ACT Level 4, 15 Moore St, Canberra ACT 2601
VIC Level 1, 21 Shields St, Flemington VIC 3031
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1 EXECUTIVE SUMMARY

Mainstream Recycling (MR) has relied historically on general New South Wales Environmental Protection Authority (NSW EPA) *Resource Recovery Orders and Exemptions* to support its current licensed activities under EPL 20694 involving recycling of gross pollutant trap (GPT) waste (classified as a non-putrescible, general solid waste under the *NSW EPA Waste Classification Guidelines 2014*).

Based on consultation with the EPA, MR are now seeking to secure a new site-specific Resource Recovery Order (RRO) and Resource Recovery Exemption (RRE) under the *Protection of Environment Operations Act 1997* (POEO Act) and the *Protection of Environment Operations (Waste) Regulation 2014* (Waste Regulation) for their recycling facility located at 6 Sleigh Place, Wetherill Park, NSW, 2164 for high order beneficial reuse of GPT and street sweeping waste as a soil conditioner. The new site-specific RRO and RRE will replace MR's reliance on the existing general resource recovery orders and exemptions.

It is noted in the *Guidelines on Resource Recovery Exemptions (Land Application of Waste Materials as Fertiliser or Soil Amendment)* 2017 (Guidelines on RRE 2017) that NSW EPA encourages the recovery of waste resources where the material is properly managed, is beneficial and poses minimal risk of harm to the environment or human health.

SESL Australia Pty Limited (SESL) has been engaged by MR to undertake an assessment of the GPT waste, street sweeping waste, and recovered product produced at the MR facility in Wetherill Park NSW 2164. The recovered product currently supports beneficial reuse activities via third party landscape facilities associated with soil conditioners as inputs to landscape soil blends. The purpose of this report is to better characterise the product, examine benefits of the product with regard to the current application being fit-for-purpose, and confirm that there are no adverse impacts on human health or the environment as a result of this beneficial re-use.

This assessment provides preliminary data for the client that would support the NSW EPA decision-making process on the proposed approach for securing a site-specific RRO and RRE. The assessment involved the sampling and laboratory analysis of the incoming and recovered, outgoing product streams to identify any potential risks of harm to human and/or environmental receptors that may occur through land application of the recovered, outgoing product. The preliminary assessment approach documented in this report has been guided by feedback provided by the NSW EPA on 24 April 2020.

Preliminary characterisation of the incoming waste stream was undertaken on three council waste streams: Burwood Council, Sutherland Council and Georges River Council. The suite of analytes chosen for the preliminary laboratory characterisation was in accordance with Guidelines on RRE 2017*; Table 1. Chemical*

concentrations/material characteristics to be tested. Three composite samples (composed of a minimum of 5 subsamples) of incoming street sweeping waste from the three councils were analysed.

The results of the preliminary benchmarking analysis demonstrate generally low concentrations of Total PAH, Heavy Metals and TPH when compared against the *NSW EPA Waste Classification Guidelines 2014* (WC) criteria for contaminant concentrations in General Solid Waste (GSW). Asbestos, PFAS, BaP, PCB, BTEX OCP and OPP were below limits of reporting (LOR) in the three composite samples from the three, council street sweeping waste streams.

In line with the NSW EPA's request (24th April 2020) to demonstrate compliance of the recovered material with existing RRO criteria; the *Batch Process Recovered Fines Order 2014* (BPRF Order) was identified as being most suitable. *The Excavated Natural Materials Order 2014* (ENM Order) assessment criteria was proposed by the NSW EPA to support this assessment; however, as the recovered waste has not been excavated from a natural soil profile and has been processed, the recovered waste does not comply with the definitions outlined in the ENM Order. The BPRF Order provides a closer definition of the inputs of the recovered waste, which is predominantly soil, silt and organic wastes that undergo processing. Additionally, the BPRF Order provides additional contaminant criteria for foreign materials (glass, metal and rigid plastics) that is not provided in the ENM Order and more appropriate contaminant concentrations (for metals and hydrocarbons for example) given the source of the waste inputs.

SESL is aware that the BPRF Order is currently under review by the NSW EPA. The date for finalisation of this review is unknown; however the BPRFO in its current format is the most appropriate EPA RRO and RRE for assessment of the recovered outgoing product.

Overall, the GPT and street sweeping waste inputs were similar in terms of contaminant concentrations for the key analytes tested. Where analytes were identified in concentrations or ranges outside of the BPFR Order criteria, they are considered marginal (for zinc and copper), insignificant (in terms of the close to neutral pH of the waste for land application), or, in the case of hydrocarbons which were consistently elevated, further silica gel-clean up analysis demonstrated that the hydrocarbons were attributed to organic sources rather than petroleum.

The key findings of this assessment for the recovered product are as follows:

- Heavy metals were generally low in the outgoing recovered waste stream, however zinc concentrations were frequently observed (in 19 of 36 samples) to contain concentrations (range= 254 mg/kg – 341 mg/kg) that exceed the maximum average concentration permitted under the BPRF Order criteria for zinc (250 mg/kg).
- Additionally, copper exceeded the maximum average criteria in four (4) out of thirty-six (36) samples (range = 76 mg/kg – 148 mg/kg) and chromium in two samples (range = 74 mg/kg – 95 mg/kg).

- Silica gel clean-up of the outgoing recovered waste indicate that hydrocarbons (C_{10} – C_{36}) which were consistently found in concentrations above the BPRF Order criteria are likely to be of organic origin rather than petroleum.
- pH of the outgoing recovered waste was frequently lower than the BPRF Order target range, however never more than 0.3 pH units below the maximum average criteria.
- Total organic carbon was consistently above the BPRF Order maximum average criteria, which was an expected outcome given the predominant inputs of the recovered outgoing waste stream.
- Minor exceedance of the T276 glass, metal and rigid plastics and T106 9.5mm sieve particle size fraction was observed above the BPRF Order maximum average and absolute maximum criteria.

The contaminant levels identified in the outgoing, recovered product are generally low, and those contaminants analysed which pose the greatest health risks to human receptors (PAH, benzo(a)pyrene, asbestos and TRH silica, heavy metals and PFAS/PFOA/PFHxS) are mostly below LOR or below the BPRF Order maximum average and absolute maximum criteria. Although some exceedance of zinc and copper were recorded, we would argue that given the product will be used as a soil improver and not as a soil in its own right (much like composted green waste is used in practice), there is tolerance for higher levels. In this context, zinc and copper can be seen as important plant trace elements required for plant growth. This aspect would be considered in the context of a future trial to be agreed with the NSW EPA to demonstrate the bioavailability of the final zinc and copper level resulting from application to soil. GPT and street sweeping waste must be removed in order to preserve the normal functioning of urban stormwater collection systems and prevent contamination of urban environments. This waste, predominantly comprised of soil, silt and organic waste is normally disposed of as GSW in NSW. When viewed in the context of rural environments, the waste has potential to be land applied as a soil conditioner. This assessment has demonstrated that a genuine re-use opportunity exists to divert this recovered waste away from landfill and land apply the product to improve soil condition under a new site specific RRO and RRE framework.

The results are generally promising and supportive of the current beneficial re-use pathway for utilisation of recovered product as a soil conditioner under a new site specific RRO and RRE framework. Nutritionally, the material is consistently low in nitrogen, phosphorus and potassium, but high in trace elements, which is typical of composted soil conditioners and compost. The recovered product is naturally high in organic matter and organic carbon due to the nature of the inputs, and, like manure and compost, has a number of proven benefits for soils and efficiencies in soil management, such as improvements in soil structure, water-holding capacity and reduced crop irrigation requirements. This preliminary assessment of the recovered waste has identified it contains essential plant elements, high concentrations of organic matter and organic carbon, low levels of salinity, close to neutral pH and low levels of contaminants. While these results are supportive, and the data obtained shows relatively consistent results across the samples, further examination of the waste via testing

across a wider array of samples capturing potential temporal and spatial variation would further validate the data obtained for the purposes of the new site specific RRO and RRE framework.

The results are generally promising and supportive of the current beneficial re-use pathway for utilisation of recovered product as a soil conditioner under a new site specific RRO and RRE framework. If the identified data gaps can be filled through the robust trials proposed (subject to agreement with the NSW EPA) and better statistical validity confirms the current findings, SESL is of the opinion there would be strong prospects of the product being accepted for a site specific RRO/exemption for use as a soil conditioner, albeit with conditions that will require testing and rejection of batches that exceed the limits.

2 INTRODUCTION

SESL Australia Pty Limited (SESL) was engaged by Mainstream Recycling (MR) (the Client) to undertake an assessment of the incoming and outgoing waste streams at the MR facility in Wetherill Park NSW 2064. The incoming waste streams (council street sweeping waste and gross pollutant trap (GPT) waste) were blended with stormwater to produce the outgoing, recovered waste, which has been identified as a waste stream with a bona fide beneficial re-use potential.

It is noted that the site's Development Application (DA) and Environmental Protection Licence (EPL) currently authorise stormwater/GPT waste only. MR are seeking to modify the existing approval to authorise up to 5,000 tonnes per annum processing of street sweeper waste, which would be accommodated within the sites approved throughout limit of 29,500 tonne per annum. A Modification Application and supporting Statement of Environmental Effects (SEE) was submitted to Fairfield City Council on 23rd September 2020. The NSW EPA has provided a response to Fairfield City Council on the 26th October 2020, which MR are in the process of responding to. It should be noted that this report forms an addendum to MR's response.

MR is seeking in the future (subject to appropriate characterisation, DA modification approval and subsequent EPL variation) to blend street sweepings with the existing materials from stormwater management systems in the established resource recovery process. MR is also proposing to separate the gross pollutants from the blended material by screening to an upper size fraction of 18 mm - 24 mm and reprocessing and rescreening if necessary.

There is a complimentary relationship between street sweeping material and stormwater/GPT waste, in that waste located in street gutters (street sweeper material) can become GPT waste when washed into a GPT by rainfall events. An overview of how street sweeping material will be incorporated into the existing resource recovery process is shown in Figure 1.

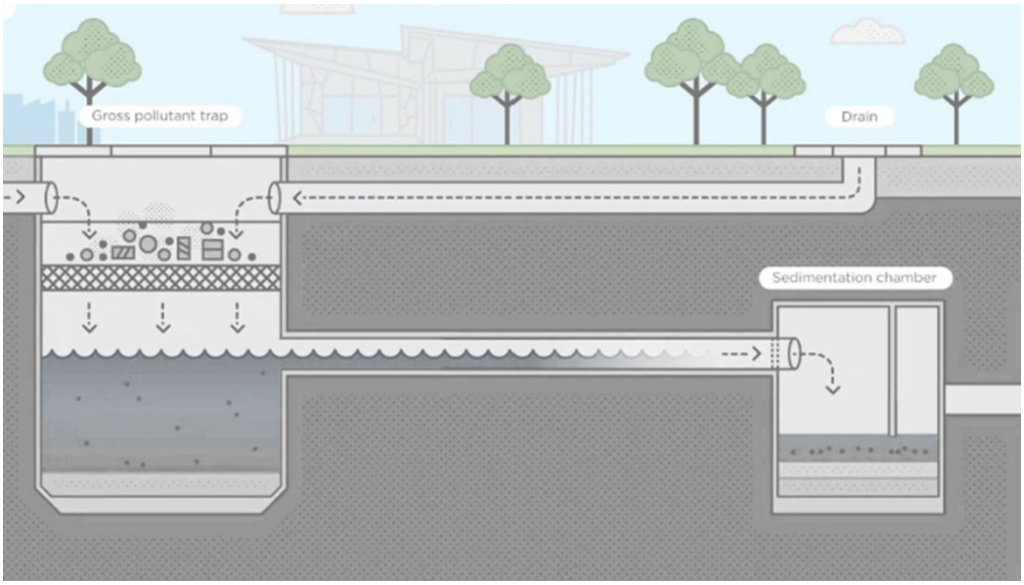

Figure 1. Example of a basic stormwater system (Melbourne City Council, 2015)

This assessment involved the sampling and laboratory analysis of the incoming street sweeping and GPT waste streams and the recovered, outgoing product. The objective of this assessment is to provide preliminary data for the client that would support the NSW EPA decision-making process on the proposed approach for securing a specific resource recovery order (RRO), resource recovery exemption (RRE) or specific exemption for the clients outgoing, recovered waste product for beneficial re-use as a soil conditioner. The results of laboratory analysis are used to identify any potential risks of harm to human and/or environmental receptors through land application of the recovered, outgoing product.

2.1 Initial Benchmarking of Incoming Waste Streams

Preliminary characterisation of the incoming waste stream was undertaken on three council waste streams; Burwood Council, Sutherland Council and Georges River Council. The suite of analytes chosen for the preliminary laboratory characterisation was in accordance with *NSW EPA Guidelines on Resources Recovery Orders and Exemptions for the Land Application of Waste Materials as a Fertiliser or Soil Amendment (2017) Table 1. Chemical concentrations/material characteristics to be tested*. Analysis of three composite samples (composed of a minimum of 5 subsamples) of incoming street sweeping waste from three separate councils was analysed at SESL laboratory NATA #15633 and ALS Laboratory in Smithfield #825.

The objective of the analysis of the incoming waste streams was to identify the potential contaminants of concern and to develop a more targeted analytical program to comprehensively characterise the recovered, outgoing product. A summary of the analytes is provided in Table 1.

Table 1- Initial Benchmarking Analytical Schedule for GPT and Street Sweeping Waste

Characterisation Suite	Analytes
Contaminants	• PFAS (28 analytes) • Asbestos • Heavy metals (arsenic, antimony, cadmium, chromium, copper, lead, mercury, nickel, beryllium, boron, cobalt, selenium, tin, vanadium, molybdenum and zinc) • Polycyclic Aromatic Hydrocarbons • Total Recoverable Hydrocarbons • Benzene, toluene, xylene, ethylbenzene (BTEX) • Organochlorine and organophosphate pesticides (OC and OP pesticides) • Polychlorinated biphenyls (PCB)
Nutrients	• Total nitrogen • Total phosphorus • Total organic carbon
Soil chemistry and physics	• pH • Electrical conductivity • Particle size grading (0.425 mm sieve, 9.5 mm sieve, 16 mm sieve, 26.5 mm sieve) • Moisture content

The results of the analysis of the incoming street sweeping waste stream have been compared against the contaminant concentrations for General Solid Waste (GSW) outlined in *Table 1. CT1 & CT2 values for classifying waste by chemical assessment without the TCLP test*; in the *NSW EPA Waste Classification Guidelines – Part 1, Classifying Waste (2014) (WC Criteria).* A summary of the results can be seen in Appendix A. Analytical Table 1: Initial Benchmarking and the complete results can be seen in the laboratory certificates of analysis provided in Appendix B.

2.2 Characterisation of the Recovered, Outgoing Waste Stream.

The recovered, outgoing waste stream is comprised of grit, sediment, litter and gross pollutants collected in and removed from stormwater treatment devices or stormwater management systems, that has been dewatered so that it does not contain free liquids or stormwater. The final processed and blended material is comprised mainly of silt, sediment and organic material; and due to the high levels of organic carbon and

organic matter, the recovered product has potential for re-use in landscaping as a component of soil blends or as a soil conditioner. The benefit in land application of the material would primarily be attributed to the contribution of organic matter and organic carbon to the soil as well as the identified levels of trace and major plant elements.

Table 2 - Characterisation Schedule

Characterisation Suite	Analytes
Contaminants	• PFAS (28 analytes) • Asbestos • Heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc. • Polycyclic Aromatic Hydrocarbons (PAH) • Total Recoverable Hydrocarbons (TPH) silica gel clean-up • Benzene, toluene, xylene, ethylbenzene, napthalene (BTEXN) • Organochlorine and organophosphate pesticides (OCC, OPP) • Polychlorinated biphenyls (PCB) • Foreign materials (glass, metal and rigid plastics > 2mm) • Foreign materials (light plastics, flexible plastics or plastic film > 5mm) • Chlorinated hydrocarbons
Plant available Nutrients	• Major plant nutrients (nitrogen, phosphorus, potassium, calcium, sulfur) • Minor plant nutrients (magnesium, calcium, iron, manganese, copper, iron, zinc, boron) • Total organic carbon • Total organic matter
Soil Chemistry and Physics	• pH • Electrical conductivity • Cation Exchange Capacity • Moisture content • Particle size grading (0.425 mm sieve, 9.5 mm sieve, 16 mm sieve, 26.5 mm sieve)

Analysis of six (6) composite samples (comprised of at least five (5) subsamples) of the recovered outgoing product was sampled twice a week over three (3) weeks. A total of thirty-six (36) samples of the recovered, outgoing product was sampled and analysed.

In line with the NSW EPA's request (24th April 2020) to demonstrate compliance of the recovered material with existing RRO criteria, the Batch Process Recovered Fines Order 2014 (BPRF Order) was identified as being most suitable. The Excavated Natural Materials Order 2014 (ENM Order) assessment criteria was proposed by the NSW EPA to support this assessment; however, as the recovered waste has not been excavated from a natural soil profile and has been processed, the recovered waste does not comply with the definitions outlined in the ENM Order. The BPRF Order provides a closer definition of the inputs of the recovered waste, which is

predominantly soil, silt and organic wastes that have undergone processing. Additionally, the BPRF Order provides additional contaminant criteria for foreign materials (glass, metal and rigid plastics) that is not provided in the ENM Order and more appropriate contaminant concentrations (for metals and hydrocarbons for example) given the source of the waste inputs.

SESL is aware that the BPRF Order is currently under review by the NSW EPA. The date for finalisation of this review is unknown; however the BPRFO in its current format is the most appropriate EPA RRO and RRE for assessment of the recovered outgoing product.

In addition to the current BPRF Order criteria, soil chemistry data from *Leake & Haege (2014) Soils for Landscape Development* was used to assess the recovered waste from a beneficial re-use perspective as a soil conditioner. A summary of the results of laboratory analysis can be viewed in Appendix A – Analytical Table 2. Characterisation Analysis and the complete results can be seen in the laboratory certificates of analysis provided in Appendix B.

Further detail of the sampling methodology and the analytical schedules required to characterise the incoming street sweeping waste stream and the recovered, outgoing product can be seen in Appendix C. *J002609 Proposed Risk Assessment and Analytical Schedule*.

3 RESULTS

3.1 CONTAMINANT ANALYSIS OF INCOMING WASTE STREAMS

3.1.1 *Street Sweeping Waste*

A summary of the results of the incoming street sweeping waste stream can be seen in Appendix A: Analytical Table 3. Incoming Street Sweeping Waste Results.

Key Findings

Table 3. summarises the key findings of the incoming street sweeping waste analysis. Only two (2) metals exceed the maximum average BPRF Order criteria. Though hydrocarbons are elevated, as discussed in Section 4.1, they are of organic origin and not considered to be problematic. Similarly, the incoming street sweeping waste was observed to be outside of the target BPRF Order pH and particle size analysis target criteria, but again was not considered problematic with respect to human or environmental risks.

Table 3 Key findings for incoming street sweeping waste

Analyte	Concentration (range) exceeding BPRF Order 2014 criteria (mg/kg)	BPRF Order 2014 upper limit for the maximum average concentration (mg/kg)	BPRF Order 2014 upper limit for the absolute maximum concentration (mg/kg)
Incoming Street Sweeping Waste			
Copper	72 – 84	70	200
Zinc	281*	250	600
pH	7.1 – 7.34	7.5 – 9.0	7.0 – 10
TPH (C_{10}-C_{36})	1800 - 3790	800	1600
TRH (C_6-C_{10})	50-346	50	130
T106/107 (portion retained on 9.5 mm sieve)	7-14%	NA	0.05%

** One sample identified above the BPRF Order guideline criteria*

- *Heavy Metals*

When compared against the BPRF Order criteria, the heavy metals were generally low. Minor exceedance of the maximum average concentration criteria for copper (70 mg/kg) was observed in two (2) samples (84 mg/kg and 72 mg/kg) and exceedance of the maximum average concentration criteria for zinc (250 mg/kg) was observed in one (1) sample (281 mg/kg).

- *pH*

pH was outside of the target range (7.5 – 9.0) in all samples but was not observed below pH 6.4.

- Total PAH and Benzo(a)pyrene)

Total PAH and Benzo(a)pyrene was below the BPRF Criteria in all samples.

- *Hydrocarbons*

TPH C_{10} – C_{36} was consistently above the absolute maximum concentration (1600 mg/kg) (range= 1800 mg/kg – 3790 mg/kg). Three (3) of the six (6) samples exceeded the maximum average concentration for TRH C_6 – C_{10} (50 mg/kg) (range = 50 mg/kg – 97 mg/kg) and one (1) sample containing 346 mg/kg exceeded the absolute maximum concentration (130 mg/kg).

- *Organochlorine Pesticides (OCP) and Polychlorinated Biphenyls (PCB)*

OCP and PCB was consistently below the LOR.

- Asbestos

Asbestos was absent in all samples.

The incoming street sweeping waste samples were not submitted for analysis of total organic carbon (TOC), TRH (silica gel clean-up), chlorinated hydrocarbons, or foreign materials. Limited particle size analysis was performed on the samples.

3.1.2 *Gross Pollutant Trap Waste*

A summary of the results of the incoming gross pollutant trap waste stream can be seen in Appendix A: Analytical Table 4. Incoming Gross Pollutant Trap Waste Results.

Key Findings

Table 4. summarises the key findings of the incoming gross pollutant trap waste analysis. Only two (2) metals exceed the maximum average BPRF Order criteria. Benzo(a)pyrene was elevated above the maximum average PBRF Order criteria in one (1) sample. Though hydrocarbons are elevated, as discussed in Section 4.1, they are of organic origin and therefore not considered to be problematic. The gross pollutant trap waste was

observed to be outside of the target BPRF Order pH and particle size analysis target criteria, but again not considered problematic with respect to human or environmental risks.

Table 4 Key findings for incoming gross pollutant trap waste

Analyte	Concentration range exceeding BPRF Order 2014 criteria (mg/kg)	BPRF Order 2014 upper limit for the maximum average concentration (mg/kg)	BPRF Order 2014 upper limit for the absolute maximum concentration (mg/kg)
Incoming Gross Pollutant Trap Waste			
Lead	110*	100	250
Copper	90-92	70	200
pH	6.4-7	7.5 – 9.0	7.0 – 10
Benzo(a)pyrene	1.4*	1.0	6.0
TPH (C_{10}-C_{36})	1040- 7330	800	1600
TRH (C_6-C_9)	173*	80	150
T106/107 (portion retained on 9.5 mm sieve)	2-4%	N/A	0.05%

** Only one sample identified above the BPRF Order criteria*

- *Heavy Metals*

When compared against the BPRFO criteria the heavy metals were generally low. Minor exceedance of the maximum average concentration criteria for lead (100 mg/kg) was observed in one (1) sample (110 mg/kg); exceedance of the maximum average concentration criteria for copper (70 mg/kg) was observed in two (2) samples (90 mg/kg and 92 mg/kg) and zinc concentrations exceeded the maximum average criteria (250 mg/kg) in four (4) of the six (6) samples (range = 262 mg/kg - 486 mg/kg).

- *pH*

pH was outside of the target range (7.5 – 9.0) in all samples but was not observed below pH 6.4.

- Total PAH and Benzo(a)pyrene

Total PAH was below the BPRF Criteria 2014 in all samples and Benzo(a)pyrene was identified above the maximum average concentration permitted (1.0 mg/kg) in one sample which contained 1.4 mg/kg.

- *Hydrocarbons*

TPH C_{10} – C_{36} was consistently above the maximum average concentration (80 mg/kg) and above the maximum average concentration (1600 mg/kg) in five (5) of six (6) samples; range = 1040 mg/kg – 7330 mg/kg.

- *Organochlorine Pesticides (OCP) and Polychlorinated Biphenyls (PCB)*

OCP and PCB was consistently below the LOR.

- Asbestos

Asbestos was absent in all samples.

The incoming street sweeping waste samples were not submitted for analysis of total organic carbon (TOC), TRH (silica gel clean-up), chlorinated hydrocarbons, or foreign materials. Limited particle size analysis was performed on the samples.

3.2 Contaminant Analysis of Outgoing Recovered Waste

- *Heavy Metals*

Mercury concentrations were consistently low with only one (1) of thirty-six (36) samples returning a mercury concentration above the LOR (57503_S4; 0.1 mg/kg, approximately 20% of the maximum average BPRF Order criteria). Cadmium was below the reporting limit in all but five (5) samples and only one (1) sample contained cadmium at the maximum average concentration BPRF Order limit (0.5 mg/kg). However as 0.5 mg/kg is the LOR, analysis at a lower detection limit would be required to support the conclusion that the cadmium concentration is below the maximum average criteria.

No metal exceedances above the maximum average BPRF Order metal criteria were observed in the concentration of lead, arsenic, or nickel for any of the batches sampled. Chromium in two (2) samples (57387_S8; 74mg/kg and 57438_S8; 95 mg/kg) were slightly elevated; however, the maximum average BPRF Order criteria (60 mg/kg) was not exceeded. In each batch, one (1) sample contained a slightly elevated copper concentration (range = 76 mg/kg to 148 mg/kg); however only one (1) batch exceeded the BPRF Order maximum average (60 mg/kg) due to the concentration of 148 mg/kg of copper in one sample (57406_S7).

Zinc exceeded the BPRF Order maximum average concentration (250 mg/kg) in nineteen (19) of thirty-six (36 samples (range = 250mg/kg to 341 mg/kg) and in three (3) of the six (6) batches analysed. Based on the 95% upper confidence limit, the average zinc concentration across all samples was approximately 261 mg/kg.

- *Total Organic Carbon (TOC)*

TOC was consistently higher (95% UCL = 7.62%) than the BPRF Order maximum average criteria (5%) and the absolute maximum criteria (10%).

- *pH*

pH was within the target range of 7.5 - 9.0 in approximately 78% of the samples, with minor exceedance of the maximum average criteria in eight (8) samples.

- Electrical conductivity (EC)

EC was consistently within the ideal range (<2.5 dS/m).

- *Total Polycyclic Aromatic Hydrocarbons (PAH) and Benzo(a)pyrene (BaP)*

Total PAH concentrations (95% UCL= 3.14 mg/kg; range = 0 – 14.8 mg/kg) were consistently below the BPRF Order maximum average criteria (20 mg/kg). Benzo(a)pyrene (95%UCL = 0.37 mg/kg; range = 0 – 2mg/kg) was detected in two (2) individual samples above the BPRF Order maximum average criteria (1.0 mg/kg), however all batch averages were below the guideline criteria.

- *Total Petroleum Hydrocarbons (TPH) and Total Recoverable Hydrocarbons (TRH)*

TPH (C_6 - C_9) was generally low, with concentrations below the reporting limit in approximately 53% of samples. The C_{10} – C_{36} fractions exceeded the maximum average criteria (800 mg/kg) in approximately 67% of samples and the absolute maximum criteria (1600 mg/kg) in approximately 33% of samples. Silica gel clean up (TRH silica) of the samples significantly reduced TPH concentrations with six (6) individual samples exceeding the maximum average criteria (range = 820 mg/kg to 1000 mg/kg); one individual sample (57537_S8) exceeding the absolute maximum criteria (1600 mg/kg) and one (1) of the six (6) batches with an average TRH result exceeding the BPRF Order maximum average limit.

Similarly, Total Recoverable Hydrocarbon (TRH) concentrations were significantly reduced following silica gel clean-up. All but one (1) sample (57537_S8; 2010 mg/kg) contained TRH silica below the BPRF Order maximum average concentration. In addition, all TRH silica samples contained TRH concentrations that were below the National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended April 2013) (NEPM) and/in compliance with(?) Health Screening Levels (HSLs). The HSLs for low density residential land use (HSL-A) has been adopted, as it is the most stringent criteria for the assessment of TRH in soils. NEPM HSLs are provided in CRC CARE, 2011 (Appendix A, Analytical Table 5 TPH/TRH Results).

- *Chlorinated Hydrocarbons, Organochlorine Pesticides (OCP) and Polychlorinated Biphenyls (PCB)*

Chlorinated Hydrocarbons, Organochlorine Pesticides (OCP) and Polychlorinated Biphenyls (PCB) concentrations were consistently below the limit of reporting.

- *Asbestos*

Asbestos was not detected in any of the samples

- *PFAS*

PFAS (Sum of PFOS and PFHxS; PFOA and Sum of PFAS) was below the NEMP 2020 criteria in all samples.

- Foreign Materials

Foreign materials, comprised of light flexible plastic film, was consistently below the LOR (<0.10%). The BPRF Order defines a maximum average and absolute maximum concentration of 0.1% and 0.3% for the combined glass, metal and rigid plastics component. The analytical method employed for detection of foreign materials partitioned the individual glass, metal and rigid plastic fractions. As such, for the purpose of reporting and statistical evaluation, two methods of assessing the glass, metal and rigid plastic foreign materials have been adopted (i) assuming the LOR equals zero and (ii) using half of the LOR value (Appendix A, Analytical Results: Characterisation Analysis). In the first data set, where LOR = 0%, the maximum average concentration of glass metal and rigid plastics was exceeded in three (3) out of six (6) samples. No exceedance of the absolute maximum concentration was observed. In the second data set where half the LOR value was used, the maximum average concentration of glass, metal and rigid plastics was exceeded in all six (6) samples and the absolute maximum concentration exceeded in one (1) out of six (6) samples.

ABN 70 106 810 708
T 1300 30 40 80
F 1300 64 46 89
E info@sesl.com.au
W sesl.com.au

POST PO Box 357, Pennant Hills NSW 1715
LAB 16 Chilvers Rd, Thornleigh NSW 2120
ACT Level 4, 15 Moore St, Canberra ACT 2601
VIC Level 1, 21 Shields St, Flemington VIC 3031
QLD Level 10, 15 Green Square Cl, Fortitude Valley QLD 4006

4 CONTAMINANT ANALYSIS DISCUSSION

4.1 INCOMING STREET SWEEPING AND GROSS POLLUTANT TRAP WASTE

The results of the initial benchmarking analysis demonstrate generally low concentrations of Total PAH, Heavy Metals and TPH when compared against the WC criteria for contaminant concentrations in General Solid Waste. Asbestos, PFAS, BaP, PCB, BTEX OCP and OPP were below LOR in the three composite samples from the three, council street sweeping waste streams. The GPT waste was not analysed in the initial benchmarking analytical schedule.

When compared against the BPRF Order criteria, the incoming street sweeping waste and GPT waste was shown to contain contaminant concentrations that were generally below the guideline criteria except for hydrocarbons which were consistently elevated above the absolute maximum concentration permitted for the C_{10}-C_{36} fractions. Following silica gel clean-up of the blended street sweeping waste and GPT waste, SESL observed significantly reduced concentrations of hydrocarbons (C_{10}-C_{36}), indicating that the hydrocarbon source is more likely to be of organic origin than petroleum origin. Leaves, for example, contain significant quantities of volatile oils that will register as hydrocarbons without silica gel clean-up.

pH was detected outside of the target range; however, in the context of land application of a waste stream, the pH range observed in the incoming waste streams (pH 6.4 – 7.4) is considered to be relatively close to neutral and not problematic in terms of soil chemistry.

The particle size analysis revealed that the incoming wastes contained fractions that are outside of the BPRF Order criteria (prior to screening of the material). This is likely to be attributable to presence of stones, but much will also simply be leaf and branch material of no environmental consequence.

Though not observed in the incoming street sweeping waste, four (4) samples of gross pollutant trap waste contained concentrations of heavy metals (lead, zinc and copper) that exceeded the maximum average concentrations permitted under the BPRF Order 2014 criteria.

As foreign materials were expected to be present in the incoming waste streams prior to screening of the material, analysis for foreign materials was only conducted on the screened, outgoing recovered waste.

4.2 OUTGOING RECOVERED PRODUCT

Significant reductions in the total concentration of TRH and TPH can be seen following silica gel clean-up to remove non-petroleum sources of contamination from the sample. This was not unexpected, as the street sweeping waste is composed of primarily of organic detritus, soil and sediments. As such, it can be reasonably

concluded that a large proportion of the hydrocarbons are of organic origin and are not concerning at the observed residual TRH and TPH concentrations.

TOC was observed to consistently exceed the *BPRF Order* criteria. However, as the material is being assessed as a beneficial waste for land application such as a soil conditioner or a compost, the high TOC results are desirable. TOC is the main component of organic matter which is essential for maintaining soil structure, water holding capacity and fertility. TOC is especially important for compacted soils or poorly structured silty or sandy soils which are prone to erosion and hold little nutritive value for plants. We would advocate there be no upper limit for TOC in the context of site-specific exemption.

Zinc was observed to be the primary analyte of concern. No exceedance of the absolute maximum criteria was observed. Though exceedance of the BPRF Order maximum average limit (250 mg/kg) appears to be minor (average = 251 mg/kg and 95% UCL = 261 mg/kg), and zinc is an essential micronutrient in plants, zinc levels above 300 mg/kg can manifest as plant phytotoxicity. SESL notes that the zinc concentrations are total zinc concentrations derived using nitric acid digestion of the metal. It is unlikely that the total zinc concentration will be available in the soil. The results of soil chemistry analysis (discussed in the following section) show reduced concentrations of zinc when the Mehlich extraction method is used.

When applying the LOR as zero for foreign materials, the maximum average concentration (0.1 % by mass) was observed in three (3) of the six (6 batches) (range = 0.1% to 0.2%). No exceedance of the maximum absolute concentration was observed in the six (6) batches.

During a sampling event conducted on the 2nd August 2020, one of the incoming waste streams was observed to contain excessive amounts of blue metal. The incoming waste stream was rejected after visual inspection of the material by MR staff identified the material did not meet with the MR criteria of acceptable incoming material. SESL understand that ongoing trials and improvements in pre-screening of incoming waste streams are being undertaken as part of MR's quality control procedures. SESL recommend that all quality control procedures are documented along with evidence of staff training and competency records to ensure that any unsuitable incoming waste material is not included as an input to the recovered, outgoing street sweeping product.

5 SOIL CHEMISTRY ANALYSIS RESULTS

The recovered outgoing product was submitted for analysis of soil chemistry to determine the re-use potential of the waste as a soil conditioner or for use in landscaping soil blends. A general summary of the average results of soil chemistry is provided below.

- *pH*

The samples exhibited slight to moderate alkalinity (pH range = 7.4 – 8.2) averaging pH 7.69 in water and pH 7.19 in calcium chloride. The pH in calcium chloride is more representative of the soil pH that plants are exposed to in the soil environment.

- Electrical conductivity (EC)

The EC (a measure of salinity) of the recovered outgoing product is desirably low, averaging 0.49 dS/m (range = 0.36 dS/m – 0.76 dS/m).

- Exchangeable Cations

The exchangeable cation percentage was well-balanced, and the effective cation exchange was generally moderate. This indicates that the matrix has a reasonably good capacity to retain soil nutrients.

- Plant Available Nutrients

Essential plant macronutrients (nitrogen, potassium and phosphorus) were generally low; however, calcium and sulfur were high. Trace nutrients (magnesium, iron, manganese, zinc, copper and boron) were also available to plants in high concentrations.

- Organic Carbon and Organic Matter

Both organic matter and organic carbon were very high.

5.1 SOIL CHEMISTRY ANALYSIS DISCUSSION

The soil chemistry data presents some important findings in the context of beneficial re-use. Due to the slight alkalinity of the recovered, outgoing product, the material would assist with raising the pH of acidic soils. However, the material could easily be amended using various acidifying treatments (such as iron sulfate) to reduce the alkalinity of the material to suit acid-loving plants.

The street sweeping waste has a relatively high proportion of high carbon-containing materials (e.g. sticks, leaves, dried seed pods and bark) and lower levels of high nitrogen-containing materials (e.g. grass clippings and green leaves). It is expected that this may vary at different times of the year (during leaf fall in Autumn and summer when grass is more frequently mown), in line with seasonal change.

The recovered product is naturally high in organic matter and organic carbon due to the nature of the inputs. Incorporating organic matter and organic carbon at the concentrations observed in the recovered product has a number of benefits on soils which are nutrient poor and/or poorly structured. Benefits include improving the water holding capacity of the soil (thereby reducing irrigation requirements); improving the microbial activity in the soil; improving soil structure and fertility; and improving general resilience of soils, thus reducing the incidence of pests and diseases. Since it is the organic matter that provides most of these benefits, we would argue for no upper limit on organic carbon in the context of a site-specific exemption.

Nutritionally, the material is low in nitrogen, phosphorus and potassium, but high in trace elements typical of composted soil conditioners and compost. Plants require a number of essential elements to support normal growth. Deficiencies in these essential elements, which include macronutrients (nitrogen, potassium, phosphorus, calcium magnesium and sulfur) and micronutrients (iron manganese, copper, zinc, boron and molybdenum), can manifest in an array of plant problems ranging from abnormal growth, reduced productivity and increased susceptibility to pests and disease. Soils that are deficient in essential elements can be corrected through the application of manufactured fertilisers; however, this can be costly. Manufactured fertilisers are effective in supplying essential plant elements where soils are identified as being deficient; however, this can also be costly. Recovered wastes that are currently approved for land application (composted green waste, biosolids and manure for example) provide a comparatively inexpensive option for landowners wanting to improve the nutritional and structural qualities of impoverished soils.

The contaminant levels identified in the outgoing, recovered product are generally low, and those contaminants analysed which pose the greatest health risks to human receptors (PAH , benzo(a)pyrene, asbestos and TRH, heavy metals and PFAS/PFOA/PFHxS) are mostly below LOR or well below the current BPRF Order maximum average and absolute maximum criteria.

The principal barrier to gaining acceptance of the product for reuse as a soil conditioner for growing plants will be the zinc concentration and, to some extent, the copper. However, since we would argue that the product be used as a soil improver and not as a soil in its own right (much like composted green waste is used in practice), there is tolerance for higher levels, and in this context zinc and copper can be seen as important plant trace elements. Zinc and copper are essential elements required for plant enzyme function, critical for the synthesis of organic compounds. In rural soils, zinc and copper are typically deficient. Further work would be required to demonstrate the bioavailability of the final zinc and copper level resulting from application to soil; in other words,

designing a trial using soil mixes with varying levels of these products to demonstrate that the final mix does not present problems. Zinc and copper are not at levels where an overall environmental or human health concern may arise, unless zinc or copper levels at the receiving site are already elevated.

SESL consider that any compost proposed for blending with the MR outgoing recovered waste stream should be composted to ensure potential weed propagules are inactivated and should be characterized before and after blending.

MR customers are typically landscape suppliers in the western suburbs of Sydney, which are situated in a semi-rural environment. These facilities have development consents which authorise the production of landscaping products. SESL understand that the outgoing recovered waste is utilized as a soil conditioner for blending to enhance to the quality of product. SESL consider that any product proposed for blending with the MR outgoing recovered waste stream should be characterized before and after blending.

6 SUMMARY OF FINDINGS & RECOMMENDATIONS

MR are seeking to secure a site-specific Resource Recovery Order (RRO) and Resource Recovery Exemption (RRE) under the Protection of Environment Operations Act 1997 (POEO Act) and the Protection of Environment Operations (Waste) Regulation 2014 (Waste Regulation) for their recycling facility located at 6 Sleigh Place, Wetherill Park, NSW, 2164 for high order beneficial reuse of GPT and street sweeping waste as a soil conditioner.

The assessment involved the sampling and laboratory analysis of the incoming and recovered, outgoing product streams to identify any potential risks of harm to human and/or environmental receptors that may occur through land application of the recovered, outgoing product. In line with the NSW EPA's request (24th April 2020) to demonstrate compliance of the recovered material with existing RRO criteria; the Batch Process Recovered Fines Order 2014 was identified as being most suitable.

The key findings of this assessment for the recovered product are as follows:

- Heavy metals were generally low in the outgoing recovered waste stream, however zinc concentrations were frequently observed (in 19 of 36 samples) to contain concentrations (range= 254 mg/kg – 341 mg/kg) that exceed the maximum average concentration permitted under the BPRF Order criteria for zinc (250 mg/kg).
- Additionally, copper exceeded the maximum average criteria in 4 out of 36 samples (range = 76 mg/kg – 148 mg/kg) and chromium in two samples (range = 74 mg/kg – 95 mg/kg).
- Silica Gel Clean-up of the outgoing recovered waste indicate that hydrocarbons (C_{10} – C_{36}) which were consistently found in concentrations above the BPRF Order criteria are likely to be of organic origin rather than petroleum.
- pH of the outgoing recovered waste was frequently lower than the BPRF Order target range, however never more than 0.3 pH units below the maximum average criteria.
- Total organic carbon was consistently above the BPRF Order maximum average criteria, which was an expected outcome given the predominant inputs of the recovered outgoing waste stream.
- Minor exceedance of the T276 glass, metal and rigid plastics and T106 9.5mm sieve particle size fraction was observed above the BPRF Order maximum average and absolute maximum criteria.

The results are generally promising and supportive of the current beneficial re-use pathway for utilisation of recovered product as a soil conditioner. Nutritionally, the material is consistently low in nitrogen, phosphorus and potassium, but high in trace elements, which is typical of composted soil conditioners and compost. The recovered product is naturally high in organic matter and organic carbon due to the nature of the inputs, and,

like manure and compost, has a number of proven benefits for soils and efficiencies in soil management, such as improvements in soil structure, water-holding capacity and reduced crop irrigation requirements.

This preliminary assessment of the recovered waste has identified it contains essential plant elements, high concentrations of organic matter and organic carbon, low levels of salinity, close to neutral pH and low levels of contaminants. While these results are supportive, and the data obtained shows relatively consistent results across the samples, further examination of the waste via testing across a wider array of samples, capturing potential temporal and spatial variation, would further validate the data obtained.

The results are generally promising and supportive of the current beneficial re-use pathway for utilisation of recovered product as a soil conditioner under a new site specific RRO and RRE framework. If the identified data gaps can be filled through the robust trials proposed (subject to agreement with the NSW EPA) and better statistical validity confirms the current findings, SESL is of the opinion there would be strong prospects of the product being accepted for a new site specific RRO/exemption for use as a soil conditioner, albeit with conditions that will require testing and rejection of batches that exceed the limits.

6.1 Proposed Trial Framework

The incoming and outgoing recovered waste streams have been characterised over a three-week period. The incoming wastes have been sourced from three different councils, Burwood Council, Georges River Council and Sutherland Council. SESL consider that the incoming waste streams (and hence the outgoing waste streams) may vary based on factors such as geography or season. Different local government areas may be more densely vegetated or have more concrete hardstand than others; street sweeping waste and gross pollutant trap waste may contain more organic matter in Autumn due to leaf fall; and litter may be more abundant in summer when there is likely to be a greater presence of people outdoors.

Additional characterisation of the wastes would provide closer resolution of data in regard to the potential spatial and temporal influences on the heterogeneity of the waste streams. Should the NSW EPA review of the BPRF Order criteria culminate in new assessment criteria, it is understood that the waste may be required to be compared against the new rather than current BPRF Order criteria. As such SESL propose the following data is obtained via a trial process:

- Council waste collection methodology (frequency of collection, volume/batch size).
- Additional council waste streams to assess potential variability in waste based on Local Government Areas.

- Characterisation of incoming waste stream samples over a longer duration for statistical accuracy and to provide a clearer understanding of the potential environmental risks.
- Analysis of the bioavailability of zinc and copper in the outgoing recovered waste should be measured.
- Potential for further processing of the waste streams to remove the zinc-rich rubber component and foreign materials.
- Assessment of plant propagule content.
- Assessment (laboratory characterisation) of the additional waste streams at the third-party soil processing facilities which are proposed for blending with the MR outgoing, recovered product.
- Assessment (laboratory characterisation) of the final blended product proposed for land application.
- Comparison of the final blended product against criteria such as the Australian Standards 4454_2012 Composts, Soil Conditioners and Mulches and AS4419_2018 Soils for Landscaping and Garden Use.
- Comparison of the final blended and recovered waste product against any new BPRF Order criteria.

Overall, if the data gaps can be filled and better statistical validity confirms the current findings, there would be strong prospects of the product being accepted for a new site specific RRO/exemption for use as a soil conditioner, albeit with conditions that will require testing and rejection of batches that exceed the limits.

7 DATA GAPS AND LIMITATIONS

SESL recognise certain limitations of this assessment of the incoming street sweeping waste, the incoming gross pollutant trap waste and the outgoing, recovered waste stream.

NSW EPA Review of the BPRF Order

There is potential for the amendment of the range of contaminants and contaminant limits, following the NSW EPA review of the current BPRF Order. Changes in the assessment criteria (including the BPRF Order terms and definitions) may impact the compliance status of the waste.

Incoming waste streams

The source of the incoming waste streams was limited to three councils. SESL acknowledge that local government areas are likely to differ widely in vegetation, pollution levels, community littering behaviours, amongst other variables, which could significantly affect the variability of the incoming waste streams. Incoming street sweeping waste and gross pollutant trap waste from a larger number of councils would provide greater clarity around the level of variability between different council waste streams.

Data Set

The data set was obtained through a limited assessment of the incoming and outgoing waste streams over a three-week period. SESL consider that variability of the waste stream presents the greatest limitation to beneficial re-use and as such, consider that a longer assessment period is required to provide greater certainty around the temporal variability in contaminants contained in both the incoming and outgoing recovered waste streams.

Cadmium LOR

The initial benchmarking was conducted at SESL laboratory where the LOR for cadmium is <1mg/kg. For the characterisation analysis of the outgoing recovered waste stream, ALS laboratory was used to provide a result that had closer resolution (Cadmium LOR=0.4 mg/kg) and could be compared against the BPRF Order cadmium criteria (maximum average concentration = 0.5 mg/kg and absolute maximum concentration = 1.5 mg/kg).

Statistical Calculation

In order to derive statistical meaning from the data obtained through laboratory analysis, where results were identified as being below the LOR, half of the detection limit was used to calculate the mean, standard deviation and upper confidence limits (UCL).

Waste Collection

No information regarding how councils collect the GPT and Street Sweeping waste (nor storage, or frequency of collection) has been considered in this assessment.

8 REFERENCES

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SESL AUSTRALIA
Environment & Soil Sciences

Appendix A

ANALYTICAL RESULTS: INITIAL BENCHMARKING

Analyte	Polycyclic Aromatic Hydrocarbons		PCB	BTEX				TPH				TRH	
	PAH: Benzo(a)pyrene	Total PAH		VOC: Benzene	VOC: Ethylbenzene	VOC: Total xylene	VOC: Toluene	VOC: TPH C6-C9	VOC: TPH C10-C14	TPH: C15-C28	TPH: C29-C36	VOC: TRH C6-C10	TRH: >C10-C16
Unit	mg/kg dwb	mg/kg dwb	mg/kg dwb	mg/kg dwb	mg/kg dwb	mg/kg dwb	mg/kg dwb	mg/kg dwb	mg/kg dwb	mg/kg dwb	mg/kg dwb	mg/kg dwb	mg/kg dwb
*GSW Criteria	0.8	200	< 50	<10	600	1000	288	650	nd	nd	nd	nd	
LOR	0.1	0.1	0.2	0.2	0.2	0.2	0.2	25	50	100	100	25	50
S1	< 0.10	0.9	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	91	820	6450	580	220	2300
S2	< 0.10	4.3	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 25	< 50	340	480	40	67
S3	< 0.10	0.6	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	31	< 50	< 100	< 100	81	< 50

*** NSW EPA Waste Classification Guidelines - Part 1 Classifying Waste. Upper Limit of Specific Contaminant Concentration for General Solid Waste**

#No guideline criteria is provided for the TRH NEPM Fractions C10-C40; However C10-C36 TPH upper limit = 10,000 mg/kg

ANALYTICAL RESULTS: INITIAL BENCHMARKING

	1		OCP	OPP		Asbestos				Heavy M							
Analyte	TRH: >C16-C34	TRH: >C34-C40	OCP	Dichlorvos, Monocrotophos, Parathion-methyl, Parathion	Other OPPs	Asbestos Detected	Asbestos (Trace)	Synthetic Mineral Fibre	Organic Fibre	Antimony	Arsenic	Beryllium	Boron	Cadmium	Chromium	Cobalt	Copper
Unit	mg/kg dwb	mg/kg dwb	mg/kg	mg/kg	mg/kg	g/kg	Fibres	g/kg	g/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
*GSW Criteria	#nd			250			absent			nd	100	20	nd	20	100	nd	nd
LOR	100	100	0.02	0.2	0.05	0.1	5	0.1	0.1	5	5	1	50	1	2	2	5
S1	990	510	< 0.02	< 1.0	< 0.25	No	No	No	No	< 5	< 5	< 1	< 50	< 1	3	< 2	16
S2	700	290	< 0.02	< 2.0	< 0.50	No	No	No	No	< 5	< 5	< 1	< 50	< 1	2	< 2	14
S3	120	120	< 0.02	< 1.0	< 0.25	No	No	No	No	< 5	< 5	< 1	< 50	< 1	6	2	25

*** NSW EPA Waste Classification Guidelines - Part 1 Classifying Waste. Upper Limit of Specific Contaminant Concentration for General Solid Waste**

#No guideline criteria is provided for the TRH NEPM Fractions C10-C40; However C10-C36 TPH upper limit = 10,000 mg/kg

ANALYTICAL RESULTS: INITIAL BENCHMARKING

	Metals and Mettaloids									PFAS		
Analyte	Lead	Manganese	Molybdenum	Nickel	Selenium	Tin	Vanadium	Zinc	Mercury	Sum of PFHxS and PFOS	Sum of PFAS	PFOA
Unit	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
*GSW Criteria	100	nd	100	40	20	nd	nd	nd	4	1.8	nd	18
LOR	5	5	2	2	5	5	5	5	0.1	0.0002	0.0002	0.0002
S1	10	92	< 2	2	< 5	< 5	14	44	< 0.1	< 0.0002	0.0005	< 0.0002
S2	11	73	< 2	2	< 5	< 5	7	63	< 0.1	< 0.0002	0.0055	0.0029
S3	9	154	< 2	3	< 5	< 5	27	72	< 0.1	< 0.0002	< 0.0002	< 0.0002

*** NSW EPA Waste Classification Guidelines - Part 1 Classifying Waste. Upper Limit of Specific Contaminant Concentration for General Solid Waste**

#No guideline criteria is provided for the TRH NEPM Fractions C10-C40; However C10-C36 TPH upper limit = 10,000 mg/kg

Analytical Tab le 2: Characterisation Analysis Results

(continued)

Sample Information				Heavy Metals								TOC
Sample Date	ALS Workorder	Batch ID	Sample ID	Mercury	Cadmium	Lead	Arsenic	Chromium	Copper	Nickel	Zinc	
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	% by mass
				0.5	0.5	100.0	20.0	60.0	70.0	40.0	250.0	5.0
				1.5	1.5	250.0	40.0	150.0	200.0	80.0	600.0	10.0
				Mercury	Cadmium	Lead	Arsenic	Chromium	Copper	Nickel	Zinc	TOC
15/7/20	ES2024741	**57371**	S3	0.05	0.20	55.0	7.0	21.0	59.0	11.0	258.0	5.4
15/7/20	ES2024741	57371	S4	0.05	0.20	69.0	6.0	20.0	59.0	13.0	288.0	5.2
15/7/20	ES2024741	57371	S5	0.05	0.20	50.0	6.0	17.0	64.0	14.0	341.0	7.1
15/7/20	ES2024741	57371	S6	0.05	0.20	96.0	6.0	36.0	78.0	13.0	313.0	8.2
15/7/20	ES2024741	57371	S7	0.05	0.20	61.0	5.0	18.0	62.0	10.0	241.0	7.4
15/7/20	ES2024741	57371	S8	0.05	0.20	67.0	6.0	22.0	63.0	13.0	292.0	5.4
Average				0.05	0.20	66.33	6.00	22.33	64.17	12.33	288.83	6.45
17/7/20	ES2025001	**57387**	S3	0.05	0.20	58	2.5	19	55	10	276	4.8
17/7/20	ES2025001	57387	S4	0.05	0.20	69	6	23	58	11	275	5.7
17/7/20	ES2025001	57387	S5	0.05	0.20	60	2.5	22	56	11	269	5.8
17/7/20	ES2025001	57387	S6	0.05	0.20	64	6	20	76	11	276	6.2
17/7/20	ES2025001	57387	S7	0.05	0.20	51	2.5	15	66	11	255	5.2
17/7/20	ES2025001	57387	S8	0.05	0.20	62	5	74	66	14	290	7.5
Average				0.05	0.20	60.67	4.08	28.83	62.83	11.33	273.50	5.87
20/7/20	ES2025191	57406	S3	0.05	0.20	64.0	6.0	16.0	61.0	10.0	290.0	7.1
20/7/20	ES2025191	57406	S4	0.05	0.20	54.0	5.0	14.0	58.0	12.0	254.0	7.1
20/7/20	ES2025191	57406	S5	0.05	0.20	56.0	6.0	19.0	60.0	9.0	223.0	7.8
20/7/20	ES2025191	57406	S6	0.05	0.20	52.0	5.0	14.0	51.0	9.0	224.0	6.4
20/7/20	ES2025191	57406	S7	0.05	0.20	54.0	5.0	29.0	148.0	10.0	228.0	5.6
20/7/20	ES2025191	57406	S8	0.05	0.20	59.0	6.0	19.0	61.0	10.0	286.0	5.0
Average				0.05	0.20	56.5	5.5	18.5	73.2	10.0	250.8	6.5
22/7/20	ES2025626	57438	S3	0.05	0.5	36.0	5.0	20.0	60.0	9.0	207.0	8.4
22/7/20	ES2025626	57438	S4	0.05	0.20	78.0	6.0	18.0	50.0	8.0	201.0	10.2
22/7/20	ES2025626	57438	S5	0.05	0.20	64.0	6.0	20.0	68.0	11.0	295.0	12.0
22/7/20	ES2025626	57438	S6	0.05	0.4	51.0	6.0	20.0	102.0	9.0	237.0	7.6
22/7/20	ES2025626	57438	S7	0.05	0.4	57.0	6.0	23.0	48.0	8.0	224.0	10.2
22/7/20	ES2025626	57438	S8	0.05	0.20	55.0	6.0	95.0	68.0	15.0	267.0	12.4
Average				0.1	0.3	56.8	5.8	32.7	66.0	10.0	238.5	10.1
28/7/20	ES2026191	57503	S4	0.1	0.20	66.0	2.5	14.0	70.0	11.0	254.0	7.9
28/7/20	ES2026191	57503	S5	0.05	0.20	64.0	5.0	19.0	65.0	14.0	277.0	6.2
28/7/20	ES2026191	57503	S6	0.05	0.20	46.0	2.5	13.0	65.0	9.0	181.0	8.2
28/7/20	ES2026191	57503	S7	0.05	0.20	61.0	2.5	18.0	52.0	11.0	226.0	7.9
28/7/20	ES2026191	57503	S8	0.05	0.20	55.0	2.5	37.0	45.0	10.0	212.0	8.1
28/7/20	ES2026191	57503	S9	0.05	0.20	75.0	2.5	15.0	60.0	12.0	227.0	8.3
Average				0.06	0.20	61.2	2.9	19.3	59.5	11.2	229.5	7.8
30/7/20	ES2026590	57537	S3	0.05	0.20	50.0	6.0	21.0	47.0	11.0	213.0	6.4
30/7/20	ES2026590	57537	S4	0.05	0.20	63.0	6.0	16.0	60.0	11.0	233.0	6.8
30/7/20	ES2026590	57537	S5	0.05	0.20	72.0	6.0	18.0	56.0	14.0	267.0	6.8
30/7/20	ES2026590	57537	S6	0.05	0.20	52.0	6.0	19.0	88.0	11.0	242.0	3.4
30/7/20	ES2026590	57537	S7	0.05	0.20	51.0	5.0	26.0	46.0	14.0	200.0	5.3
30/7/20	ES2026590	57537	S8	0.05	0.20	34.0	5.0	21.0	49.0	10.0	181.0	5.7
Average				0.05	0.20	53.67	5.67	20.17	57.67	11.83	222.67	5.73
			Df	1.69	1.69	1.69	1.69	1.69	1.69	1.69	1.69	1.69
			Av	0.05	0.22	59.19	5.00	23.64	63.89	11.11	250.64	7.08
			Std Dev	0.01	0.07	11.32	1.43	16.06	18.42	1.85	37.45	1.93
			95% UCL	**0.05**	**0.24**	**62.38**	**5.40**	**28.16**	**69.08**	**11.63**	**261.19**	**7.62**

Batch Process Recovered Fines Order 2014: Maximum average concentration for one-off characterisation assessment criteria

Batch Process Recovered Fines Order 2014: Absolute maximum concentration for one-off characterisation assessment criteria

* NEMP criteria Human Health Investigation Levels for Soil in Residential sites (HIL A)

Red text indicates that half of the detection limit was used for calculation

Reporting PFAS. If the ratio was 25% PFOS and 75% PFHxS for the total PFOS and PFHxS concentration in soil, then the PFOS + PFHxS screening value would be 0.007 mg/kg (compared with 0.01 mg/kg for a ratio of 50% PFOS and 50% PFHxS).

Analytical Tab le 2: Characterisation Analysis Results

(continued)

Sample Information				Analytes								
				Electrical Conductivity	pH	Polyclyclic Aromatic Hydrocarbons		Total Petroleum Hydrocarbons			Total Recoverable Hydrocarbor	
Sample Date	ALS Workorder	Batch ID	Sample ID			Total PAH	Benzo(a)pyrene	TPH C6-C9	TPH C10-C36	TPH C10-C36 Silica Gel	TRH C6-C10	TRH C10-C40
				dS/m	pH units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
				2.50	7.5-9.0	20.0	1.0	80.0	800.0	800.0	50.0	nd
				3.50	7.0-10.0	80.0	6.0	150.0	1600.0	1600.0	130.0	nd
				EC	pH	PAH	BaP	TPH C6-C9	TPH C10-C36	TPH C10-C36 Silica Gel	TRH C6-C10	TRH C10-C40
15/7/20	ES2024741	**57371**	S3	0.0385	7.4	4.1	0.25	20.0	1770	920.0	33	2130
15/7/20	ES2024741	57371	S4	0.0347	7.5	1.0	0.25	26.0	1510	670.0	41	1850
15/7/20	ES2024741	57371	S5	0.0279	7.4	7.1	0.5	14.0	1020	680.0	23	1340
15/7/20	ES2024741	57371	S6	0.0339	7.6	2.9	0.6	11.0	1510	640.0	16	1840
15/7/20	ES2024741	57371	S7	0.0236	7.3	1.2	0.25	31.0	840	460.0	50	1110
15/7/20	ES2024741	57371	S8	0.0315	7.6	2.3	0.25	10.0	1440	440.0	15	1780
Average				0.03	7.47	3.10	0.35	18.67	1348.33	635.00	29.67	1675.00
17/7/20	ES2025001	**57387**	S3	0.0354	7.7	2.8	0.5	5.0	1690	400.0	13	2050
17/7/20	ES2025001	57387	S4	0.0391	7.7	2.7	0.5	5.0	1650	290.0	11	2060
17/7/20	ES2025001	57387	S5	0.0320	7.7	4.4	0.6	5.0	1320	290.0	<10	1710
17/7/20	ES2025001	57387	S6	0.0402	7.5	2.3	0.0	5.0	1900	380.0	13	2370
17/7/20	ES2025001	57387	S7	0.0381	7.6	2.5	0.0	5.0	1210	390.0	12	1610
17/7/20	ES2025001	57387	S8	0.0347	7.4	2.0	0.0	5.0	2380	330.0	17	2870
Average				0.04	7.60	2.78	0.27	5.0	1691.67	346.67	13.20	2111.67
20/7/20	ES2025191	57406	S3	0.0397	7.6	1.2	0.0	11.0	1520	520	16	2070
20/7/20	ES2025191	57406	S4	0.0393	7.6	1.3	0.0	0.0	1310	590	12	1830
20/7/20	ES2025191	57406	S5	0.0369	7.7	14.8	2.0	29.0	1000	560	49	1350
20/7/20	ES2025191	57406	S6	0.0276	7.9	1.2	0.0	16.0	1020	480	26	1440
20/7/20	ES2025191	57406	S7	0.0374	7.7	2.0	0.0	13.0	1000	530	20	1370
20/7/20	ES2025191	57406	S8	0.0383	7.5	1.4	0.0	17.0	1000	550	25	1410
Average				0.0365	7.7	3.7	0.3	14.3	1141.7	538.3	24.7	1578.3
22/7/20	ES2025626	57438	S3	0.0502	7.7	0.0	0.0	25.0	1810	1000.0	41	2100
22/7/20	ES2025626	57438	S4	0.0460	7.5	1.1	0.0	16.0	2400	77.0	26	2820
22/7/20	ES2025626	57438	S5	0.0421	7.6	1.1	0.0	25.0	2700	820.0	47	3070
22/7/20	ES2025626	57438	S6	0.0519	7.7	0.0	0.0	22.0	2290	600.0	41	2660
22/7/20	ES2025626	57438	S7	0.0450	7.5	0.5	0.0	59.0	3300	590.0	100	3780
22/7/20	ES2025626	57438	S8	0.0432	7.5	2.1	0.0	45.0	3550	530.0	75	4060
Average				0.0464	7.6	0.8	0.0	32.0	2675.0	602.8	55.0	3081.7
28/7/20	ES2026191	57503	S4	0.0350	7.6	3.0	0.6	5.0	1580	490.0	27	2170
28/7/20	ES2026191	57503	S5	0.0299	7.8	5.1	0.8	5.0	1520	310.0	35	2070
28/7/20	ES2026191	57503	S6	0.0349	7.7	10.6	1.7	5.0	1160	500.0	54	1620
28/7/20	ES2026191	57503	S7	0.0357	7.7	2.0	0.0	5.0	1530	720.0	34	1900
28/7/20	ES2026191	57503	S8	0.0314	7.5	1.1	0.0	5.0	1170	380.0	89	1660
28/7/20	ES2026191	57503	S9	0.0326	7.6	1.4	0.0	5.0	1440	500.0	20	1860
Average				0.0333	7.7	3.9	0.5	5.0	1400.0	483.3	43.2	1880.0
30/7/20	ES2026590	57537	S3	0.0341	7.2	0.5	0.0	5.0	970	830.0	21	1410
30/7/20	ES2026590	57537	S4	0.0350	7.4	0.0	0.0	5.0	1180	820.0	17	1540
30/7/20	ES2026590	57537	S5	0.0363	7.4	0.0	0.0	5.0	970	740.0	25	1400
30/7/20	ES2026590	57537	S6	0.0359	7.5	0.0	0.0	5.0	890	640.0	24	1260
30/7/20	ES2026590	57537	S7	0.0363	7.4	0.5	0.0	5.0	1200	910.0	13	1690
30/7/20	ES2026590	57537	S8	0.0369	7.6	0.0	0.0	5.0	2390	1680.0	46	2900
Average				0.0358	7.42	0.17	0.00	5.00	1266.67	936.67	24.33	1700.00
			Df	1.69	1.69	1.69	1.69	1.69	1.69	1.69	1.69	1.69
			Av	0.04	7.56	2.39	0.24	13.33	590.47	32.20	2004.44	721.39
			Std Dev	0.01	0.15	3.02	0.46	12.73	274.42	21.57	683.75	337.07
			95% UCL	**0.04**	**7.60**	**3.24**	**0.37**	**16.92**	**667.79**	**38.28**	**2197.09**	**816.36**

Batch Process Recovered Fines Order 2014: Maximum average concentration for one-off characterisation assessment criteria

Batch Process Recovered Fines Order 2014: Absolute maximum concentration for one-off characterisation assessment criteria

* NEMP criteria Human Health Investigation Levels for Soil in Residential sites (HIL A)

Red text indicates that half of the detection limit was used for calculation

Reporting PFAS. If the ratio was 25% PFOS and 75% PFHxS for the total PFOS and PFHxS concentration in soil, then the PFOS + PFHxS screening value would be 0.007 mg/kg (compared with 0.01 mg/kg for a ratio of 50% PFOS and 50% PFHxS).

Analytical Tab le 2: Characterisation Analysis Results

(continued)

Sample Information													
				s (NEPM 2013)				Foreign Materials		Foreign Materials ct'd	Particle Size Distrib	
Sample Date	ALS Workorder	Batch ID	Sample ID	TRH C10-C40 SGC	Chlorinated Hydrocarbons	Organochlorine Pesticides	Polychlorinated Biphenyls	T276 Glass, metal and rigid plastics (Using LOR=0*	T276 Glass, metal and rigid plastics (Using 0.5 x LOR)	T276 Plastics - light flexible	T106/107 portion retained on 0.425mm sieve	T106 portion retained on 9.5mm sieve
				mg/kg	mg/kg	mg/kg	mg/kg	% by mass	% by mass	% by mass	% by mass	% by mass
				nd	N/A	N/A	N/A	0.10	0.10	0.05	80	N/A
				nd	1.00	1.0000	1.0000	0.30	0.30	0.10	90	0.05
				TRH C10-C40 SGC	Chlorinated Hydrocarbons	OCP	PCB	T276 Glass, metal and rigid plastics	T276 Glass, metal and rigid plastics	T276 Plastics - light flexible film	0.425 mm sieve	9.5 mm sieve
15/7/20	ES2024741	**57371**	S3	1150	0.25	0.5	0.1	0.36	0.41	0.05	52%	0.00
15/7/20	ES2024741	57371	S4	860	0.25	0.5	0.1	0	0.05	0.05	53%	0.04
15/7/20	ES2024741	57371	S5	750	0.25	0.5	0.1	0.17	0.22	0.05	51%	0.00
15/7/20	ES2024741	57371	S6	770	0.25	0.5	0.1	0.13	0.18	0.05	51%	0.00
15/7/20	ES2024741	57371	S7	520	0.25	0.5	0.1	0.32	0.37	0.05	56%	0.08
15/7/20	ES2024741	57371	S8	470	0.25	0.5	0.1	0	0.05	0.05	54%	0.00
Average				753.33	0.25	0.05	0.1	0.16	0.21	0.05	53%	0.02
17/7/20	ES2025001	**57387**	S3	450	0.0	0.5	0.1	0.1	0.15	0.05	50%	0.00
17/7/20	ES2025001	57387	S4	320	0.0	0.5	0.1	0	0.05	0.05	48%	0.00
17/7/20	ES2025001	57387	S5	230	0.0	0.5	0.1	0	0.05	0.05	50%	0.04
17/7/20	ES2025001	57387	S6	420	0.0	0.5	0.1	0.15	0.2	0.05	51%	0.00
17/7/20	ES2025001	57387	S7	460	0.0	0.5	0.1	0.26	0.26	0.05	58%	0.08
17/7/20	ES2025001	57387	S8	260	0.0	0.5	0.1	0.1	0.15	0.05	51%	0.00
Average				356.67	0.00	0.50	0.1	0.10	0.14	0.05	51%	0.02
20/7/20	ES2025191	57406	S3	540	0.0	0.5	0.1	0.11	0.21	0.05	47%	0.03
20/7/20	ES2025191	57406	S4	650	0.0	0.5	0.1	0.27	0.37	0.05	48%	0.02
20/7/20	ES2025191	57406	S5	610	0.0	0.5	0.1	0.26	0.36	0.05	51%	0.00
20/7/20	ES2025191	57406	S6	560	0.0	0.5	0.1	0	0.15	0.05	46%	0.00
20/7/20	ES2025191	57406	S7	580	0.0	0.5	0.1	0.41	0.51	0.05	47%	0.00
20/7/20	ES2025191	57406	S8	610	0.0	0.5	0.1	0.16	0.26	0.05	49%	0.03
Average				591.7	0.0	0.05	0.1	0.20	0.3	0.05	48%	0.01
22/7/20	ES2025626	57438	S3	1200	0.0	0.5	0.1	0	0.15	0.05	52%	0.00
22/7/20	ES2025626	57438	S4	920	0.0	0.5	0.1	0	0.15	0.05	52%	0.02
22/7/20	ES2025626	57438	S5	950	0.0	0.5	0.1	0	0.15	0.05	50%	0.00
22/7/20	ES2025626	57438	S6	720	0.0	0.5	0.1	0	0.15	0.05	52%	0.00
22/7/20	ES2025626	57438	S7	610	0.0	0.5	0.1	0	0.15	0.05	52%	0.00
22/7/20	ES2025626	57438	S8	530	0.0	0.5	0.1	0	0.15	0.05	50%	0.00
Average				821.7	0.0	0.5	0.10	0	0.2	0.05	51%	0.00
28/7/20	ES2026191	57503	S4	630	0.0	0.5	0.1	0	0.15	0.05	36%	0.00
28/7/20	ES2026191	57503	S5	430	0.0	0.5	0.1	0	0.15	0.05	36%	0.00
28/7/20	ES2026191	57503	S6	680	0.0	0.5	0.1	0.15	0.2	0.05	38%	0.00
28/7/20	ES2026191	57503	S7	1010	0.0	0.5	0.1	0.11	0.16	0.05	41%	0.12
28/7/20	ES2026191	57503	S8	520	0.0	0.5	0.1	0	0.15	0.05	36%	0.00
28/7/20	ES2026191	57503	S9	660	0.0	0.5	0.1	0	0.15	0.05	45%	0.00
Average				655.0	0.0	0.5	0.1	0.04	0.2	0.1	39%	0.02
30/7/20	ES2026590	57537	S3	910	0.0	0.5	0.1	0.11	0.21	0.05	47%	0.04
30/7/20	ES2026590	57537	S4	980	0.0	0.5	0.1	0	0.15	0.05	44%	0.00
30/7/20	ES2026590	57537	S5	970	0.0	0.5	0.1	0	0.15	0.05	44%	0.00
30/7/20	ES2026590	57537	S6	770	0.0	0.5	0.1	0.12	0.22	0.05	43%	0.00
30/7/20	ES2026590	57537	S7	1260	0.0	0.5	0.1	0.16	0.26	0.05	63%	0.06
30/7/20	ES2026590	57537	S8	2010	0.0	0.5	0.1	0	0.15	0.05	50%	0.00
Average				1150.00	0.00	0.50	0.10	0.065	0.19	0.05	49%	0.02
			Df	1.69	1.69	1.69	1.69	1.69	1.69	1.69	1.69	1.69
			Av	0.04	0.04	0.50	0.10	0.10	0.194	0.05	48%	0.016
			Std Dev	0.09	0.09	0.00	0.00	0.12	0.102	0.00	6%	0.029
			95% UCL	**0.07**	**0.07**	**0.50**	**0.10**	**0.13**	**0.223**	**0.05**	**50%**	**0.024**

Batch Process Recovered Fines Order 2014: Maximum average concentration for one-off characterisation assessment criteria

Batch Process Recovered Fines Order 2014: Absolute maximum concentration for one-off characterisation assessment criteria

* NEMP criteria Human Health Investigation Levels for Soil in Residential sites (HIL A)

Red text indicates that half of the detection limit was used for calculation

Reporting PFAS. If the ratio was 25% PFOS and 75% PFHxS for the total PFOS and PFHxS concentration in soil, then the PFOS + PFHxS screening value would be 0.007 mg/kg (compared with 0.01 mg/kg for a ratio of 50% PFOS and 50% PFHxS).

Analytical Tab le 2: Characterisation Analysis Results

Sample Information								
				ution		PFAS		
Sample Date	ALS Workorder	Batch ID	Sample ID	T106 portion retained on 26.5mm sieve	Asbestos	Sum of PFOS and PFHxS	Sum of PFOA	Sum of PAS
				% by mass	absence/ presence	mg/kg	mg/kg	mg/kg
				N/A	Absent			
				0.00	Absent	* 0.01	*0.1	nd
				26.5 mm sieve	Asbestos	Sum of PFOS and PFHxS	Sum of PFOA	Sum of PFAS
15/7/20	ES2024741	**57371**	S3	0.0	absent	0.0005	<0.0002	0.0005
15/7/20	ES2024741	57371	S4	0.0	absent	0.0012	<0.0002	0.0012
15/7/20	ES2024741	57371	S5	0.0	absent	0.0006	<0.0002	0.0006
15/7/20	ES2024741	57371	S6	0.0	absent	0.0008	<0.0002	0.0008
15/7/20	ES2024741	57371	S7	0.0	absent	0.0010	<0.0002	0.001
15/7/20	ES2024741	57371	S8	0.0	absent	0.0007	<0.0002	0.0007
Average				0.00	absent	0.0008	<0.0002	0.0008
17/7/20	ES2025001	**57387**	S3	0.0	absent	0.0012	0.0003	0.0031
17/7/20	ES2025001	57387	S4	0.0	absent	0.0024	0.0004	0.0051
17/7/20	ES2025001	57387	S5	0.0	absent	0.0016	0.0002	0.0032
17/7/20	ES2025001	57387	S6	0.0	absent	0.0012	0.0003	0.0035
17/7/20	ES2025001	57387	S7	0.0	absent	0.0011	0.0002	0.0027
17/7/20	ES2025001	57387	S8	0.0	absent	0.0012	0.0003	0.0034
Average				0.00	absent	0.0015	0.0003	0.0035
20/7/20	ES2025191	57406	S3	0.0	absent	<0.0005	<0.0005	<0.0005
20/7/20	ES2025191	57406	S4	0.0	absent	<0.0005	<0.0005	<0.0005
20/7/20	ES2025191	57406	S5	0.0	absent	<0.0005	<0.0005	<0.0005
20/7/20	ES2025191	57406	S6	0.0	absent	<0.0005	<0.0005	<0.0005
20/7/20	ES2025191	57406	S7	0.0	absent	<0.0005	<0.0005	<0.0005
20/7/20	ES2025191	57406	S8	0.0	absent	<0.0005	<0.0005	<0.0005
Average				0.0	absent	<0.0005	<0.0005	<0.0005
22/7/20	ES2025626	57438	S3	0.0	absent	<0.0005	<0.0005	<0.0005
22/7/20	ES2025626	57438	S4	0.0	absent	0.0012	<0.0005	0.0012
22/7/20	ES2025626	57438	S5	0.0	absent	0.0020	<0.0005	0.0020
22/7/20	ES2025626	57438	S6	0.0	absent	<0.0005	<0.0005	<0.0005
22/7/20	ES2025626	57438	S7	0.0	absent	<0.0005	<0.0005	<0.0005
22/7/20	ES2025626	57438	S8	0.0	absent	0.0012	<0.0005	0.0012
Average				0.0	absent	0.0015	<0.0005	0.0015
28/7/20	ES2026191	57503	S4	0.0	absent	0.0008	0.0003	0.0025
28/7/20	ES2026191	57503	S5	0.0	absent	0.0002	0.0002	0.0016
28/7/20	ES2026191	57503	S6	0.0	absent	0.0009	0.0002	0.0023
28/7/20	ES2026191	57503	S7	0.0	absent	0.0010	0.0003	0.0023
28/7/20	ES2026191	57503	S8	0.0	absent	0.0008	0.0003	0.0022
28/7/20	ES2026191	57503	S9	0.0	absent	0.0008	0.0002	0.0021
Average				0.0	absent	0.0008	0.0003	0.0022
30/7/20	ES2026590	57537	S3	0.0	absent	0.0013	0.0003	0.0027
30/7/20	ES2026590	57537	S4	0.0	absent	0.0010	0.0003	0.0025
30/7/20	ES2026590	57537	S5	0.0	absent	0.0010	0.0003	0.0023
30/7/20	ES2026590	57537	S6	0.0	absent	0.0010	0.0003	0.0024
30/7/20	ES2026590	57537	S7	0.0	absent	0.0008	0.0003	0.0022
30/7/20	ES2026590	57537	S8	0.0	absent	0.0015	0.0003	0.0025
Average				0.00	absent	0.00110	0.00030	0.00243
			Df	1.69	1.69	1.69	1.69	1.69
			Av	0.00	absent	0.0	0.0	0.0
			Std Dev	0.00	absent	0.0004	0.0010	0.0014
			95% UCL	**0.00**	absent	**0.0012**	**0.0019**	**0.0024**

Batch Process Recovered Fines Order 2014: Maximum average concentration for one-off characterisation assessment criteria

Batch Process Recovered Fines Order 2014: Absolute maximum concentration for one-off characterisation assessment criteria

* NEMP criteria Human Health Investigation Levels for Soil in Residential sites (HIL A)

Red text indicates that half of the detection limit was used for calculation

Reporting PFAS. If the ratio was 25% PFOS and 75% PFHxS for the total PFOS and PFHxS concentration in soil, then the PFOS + PFHxS screening value would be 0.007 mg/kg (compared with 0.01 mg/kg for a ratio of 50% PFOS and 50% PFHxS).

Analytical Table 3: Incoming Gross Pollutant Trap Waste Results

Sample Date	ALS Workorder	Batch ID	Sample ID	Heavy Metals						
				Mercury	Cadmium	Lead	Arsenic	Chromium	Copper	Nickel
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
				0.5	0.5	100.0	20.0	60.0	70.0	40.0
				1.5	1.5	250.0	40.0	150.0	200.0	80.0
15/7/20	ES2024741	**57371**	S2	0.1	<1	110	8	20	90	12
17/7/20	ES2025001	**57387**	S2	<0.1	<1	14	<5	11	92	14
20/7/20	ES2025191	57406	S2	<0.1	<1	41	<5	10	44	6
22/7/20	ES2025626	57438	S1	<0.1	<1	32	<5	6	28	7
28/7/20	ES2026191	57503	S1	<0.1	<1	58	5	16	61	15
30/7/20	ES2026590	57537	S2	<0.1	<1	13	7	7	12	4

Batch Process Recovered Fines Order 2014: Maximum average concentration for one-off characterisation assessment criteria
Batch Process Recovered Fines Order 2014: Absolute maximum concentration for one-off characterisation assessment criteria
dash (-) no test or no sample
NA = not applicable or no criteria

				Polyclyclic Aromatic Hydrocarbons		Total Petroleum Hydrocarbons				
Zinc	TOC	Electrical Conductivity	pH	Total PAH	Benzo(a)pyrene	TPH C6-C9	TPH C10-C36	Chlorinated Hydrocarbons	Organochlorine Pesticides	Polychlorinated Biphenyls
mg/kg	% by mass	dS/m	pH units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
250.0	5.0	2.50	7.5-9.0	20.0	1.0	80.0	800.0	N/A	N/A	N/A
600.0	10.0	3.50	7.0-10.0	80.0	6.0	150.0	1600.0	1.00	1.0000	1.0000
486	-	0.58	6.9	9.1	<0.8	16	1960		<2	<0.4
298	-	0.38	7.3	<0.5	<0.5	<10	1040		<1	<0.2
262	-	0.16	6.4	13.4	1.4	173	7330		<1	<0.4
103	-	0.14	7	4.9	0.6	24	2320		<1	<0.2
289	-	0.25	7.4	0.6	<0.5	<10	2230		<1	<0.2
13	-	0.28	7	3.6	<0.8	<10	6220		<2	<0.3

	Foreign Materials		Particle Size Distribution			Asbestos	PFAS		
T276 Glass, metal and rigid plastics (Using LOR=0*	T276 Glass, metal and rigid plastics	T276 Plastics - light flexible	T106/107 portion retained on 0.425mm sieve	T106 portion retained on 9.5mm sieve	T106 portion retained on 26.5mm sieve		Sum of PFOS and PFHxS	Sum of PFOA	Sum of PAS
% by mass	% by mass	% by mass	% by mass	% by mass	% by mass	absence/presence	mg/kg	mg/kg	mg/kg
0.10	0.10	0.05	80	N/A	N/A	Absent	NA	NA	NA
0.30	0.30	0.10	90	0.05	0.00	Absent	NA	NA	NA
-	-	-	-	-	-	-	0.0012	<0.0002	0.0012
-	-	-	28	<1	-	No	0.0003	<0.0002	0.0011
-	-	-	71	2	-	No	<0.0010	<0.0010	<0.0010
-	-	-	48	4	-	No	<0.0005	<0.0005	<0.0005
-	-	-	33	2	-	No	0.0017	<0.0002	0.0017
-	-	-	37	<1	-	No	0.002	<0.0002	0.0026

Analytical Table 4: Incoming Gross Pollutant Trap Waste Results

Sample Date	ALS Workorder	Batch ID	Sample ID	Heavy Metals						
				Mercury	Cadmium	Lead	Arsenic	Chromium	Copper	Nickel
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
				0.5	**0.5**	**100.0**	**20.0**	**60.0**	**70.0**	**40.0**
				1.5	**1.5**	**250.0**	**40.0**	**150.0**	**200.0**	**80.0**
15/7/20	ES2024741	**57371**	S2	0.1	<1	110	8	20	90	12
17/7/20	ES2025001	**57387**	S2	<0.1	<1	14	<5	11	92	14
20/7/20	ES2025191	57406	S2	<0.1	<1	41	<5	10	44	6
22/7/20	ES2025626	57438	S1	<0.1	<1	32	<5	6	28	7
28/7/20	ES2026191	57503	S1	<0.1	<1	58	5	16	61	15
30/7/20	ES2026590	57537	S2	<0.1	<1	13	7	7	12	4

Batch Process Recovered Fines Order 2014: Maximum average concentration for one-off characterisation assessment criteria
Batch Process Recovered Fines Order 2014: Absolute maximum concentration for one-off characterisation assessment criteria
dash (-) no test or no sample
NA = not applicable or no criteria

				Polyclyclic Aromatic Hydrocarbons		Total Petroleum Hydrocarbons				
Zinc	TOC	Electrical Conductivity	pH	Total PAH	Benzo(a)pyrene	TPH C6-C9	TPH C10-C36	Chlorinated Hydrocarbons	Organochlorine Pesticides	Polychlorinated Biphenyls
mg/kg	% by mass	dS/m	pH units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
250.0	5.0	2.50	7.5-9.0	20.0	1.0	80.0	800.0	N/A	N/A	N/A
600.0	10.0	3.50	7.0-10.0	80.0	6.0	150.0	1600.0	1.00	1.0000	1.0000
486	-	0.58	6.9	9.1	<0.8	16	1960		<2	<0.4
298	-	0.38	7.3	<0.5	<0.5	<10	1040		<1	<0.2
262	-	0.16	6.4	13.4	1.4	173	7330		<1	<0.4
103	-	0.14	7	4.9	0.6	24	2320		<1	<0.2
289	-	0.25	7.4	0.6	<0.5	<10	2230		<1	<0.2
13	-	0.28	7	3.6	<0.8	<10	6220		<2	<0.3

	Foreign Materials		Particle Size Distribution			Asbestos	PFAS		
T276 Glass, metal and rigid plastics (Using LOR=0*	T276 Glass, metal and rigid plastics	T276 Plastics - light flexible	T106/107 portion retained on 0.425mm sieve	T106 portion retained on 9.5mm sieve	T106 portion retained on 26.5mm sieve		Sum of PFOS and PFHxS	Sum of PFOA	Sum of PAS
% by mass	% by mass	% by mass	% by mass	% by mass	% by mass	absence/presence	mg/kg	mg/kg	mg/kg
0.10	0.10	0.05	80	N/A	N/A	Absent	NA	NA	NA
0.30	0.30	0.10	90	0.05	0.00	Absent	NA	NA	NA
-	-	-	-	-	-	-	0.0012	<0.0002	0.0012
-	-	-	28	<1	-	No	0.0003	<0.0002	0.0011
-	-	-	71	2	-	No	<0.0010	<0.0010	<0.0010
-	-	-	48	4	-	No	<0.0005	<0.0005	<0.0005
-	-	-	33	2	-	No	0.0017	<0.0002	0.0017
-	-	-	37	<1	-	No	0.002	<0.0002	0.0026

Analytical Table 5: Hydrocarbon Fractions v NEPM HSLs

Batch ID	Table 1A (6) HSLs Direct Soil Contact (mg/kg) HSL A Low Density Residential				
	4,400	3,300	4,500	6,300	NA
	C6 - C10 Fraction	>C10 - C16 Fraction SGC	>C16 - C34 Fraction SGC	>C34 - C40 Fraction SGC	>C10 - C40 Fraction (sum) SGC
57371	33	270	650	230	1150
	41	150	500	210	860
	23	<50	490	260	750
	16	120	480	170	770
	50	<50	360	160	520
	15	<50	340	130	470
	C6 - C10 Fraction	>C10 - C16 Fraction SGC	>C16 - C34 Fraction SGC	>C34 - C40 Fraction SGC	>C10 - C40 Fraction (sum) SGC
57387	13	<50	310	140	450
	11	<50	220	100	320
	<10	<50	230	<100	230
	13	<50	300	120	420
	12	<50	300	110	460
	17	<50	260	<100	260
	C6 - C10 Fraction	>C10 - C16 Fraction SGC	>C16 - C34 Fraction SGC	>C34 - C40 Fraction SGC	>C10 - C40 Fraction (sum) SGC
57406	16	<50	400	140	540
	12	<50	450	200	650
	49	<50	420	190	610
	26	<50	360	200	560
	20	<50	390	190	580
	25	<50	410	200	610
	C6 - C10 Fraction	>C10 - C16 Fraction SGC	>C16 - C34 Fraction SGC	>C34 - C40 Fraction SGC	>C10 - C40 Fraction (sum) SGC
57438	41	170	770	260	1200
	26	90	620	210	920
	47	100	670	180	950
	41	70	510	140	720
	100	170	440	<100	610
	75	60	470	<100	530
	C6 - C10 Fraction	>C10 - C16 Fraction SGC	>C16 - C34 Fraction SGC	>C34 - C40 Fraction SGC	>C10 - C40 Fraction (sum) SGC
57503	27	90	360	180	630
	35	90	180	160	430
	54	80	360	240	680
	34	360	420	230	1010
	89	50	270	200	520
	20	80	370	210	660
	C6 - C10 Fraction	>C10 - C16 Fraction SGC	>C16 - C34 Fraction SGC	>C34 - C40 Fraction SGC	>C10 - C40 Fraction (sum) SGC
57537	21	<50	650	260	910
	17	60	620	300	980
	25	<50	530	440	970
	24	<50	460	310	770
	13	130	660	470	1260
	46	410	1140	460	2010

9 GENERAL LIMITATIONS

This assessment is limited to the analysis of incoming and recovered waste streams discussed at the Mainstream Recycling facility. No other warranty or guarantee expressed or implied is made as to the advice indicated in this report.

This report is for the use of the client and any relevant authorities that rely on the information for development applications and approval processes. Any reliance on this report by third parties shall be at such parties' sole risk. This report shall only be presented in full and may not be used to support any other objective other than those set out in the report.

SESL's assessment has relied upon and presumed accurate information provided by the client and/or any third party (or absence thereof) in making the assumptions made in this report. Nothing in this report should be taken to imply that SESL has verified or audited any of the information supplied to us other than as expressly stated in this report. We have assumed this information to be both adequate and accurate for the purposes of this report.

Where findings, observations and conclusions are based solely upon information provided by the client and/or a third party and SESL do not accept, to the maximum extent permitted by law, any liability for any losses, claims, costs, expenses, damages (whether in statute, in contract or tort for negligence or otherwise) suffered or incurred by the client or any third party as a result of or in connection with SESL's reliance on any such the information to the extent that such information is false, misleading or incomplete and SESL give no warranty or guarantee, express or implied as to such findings, observations and conclusions.

If further information becomes available, or additional assumptions need to be made, SESL reserves its right to amend any statements or opinions made in this report.

WATER MINING SPORTS & RECREATION HORTICULTURE & AGRICULTURE ENVIRONMENTAL ENGINEERING & GEOTECH URBAN HORTICULTURE & LANDSCAPING

ABN 70 106 810 708
T 1300 30 40 80
F 1300 64 46 89
E info@sesl.com.au
W sesl.com.au

POST PO Box 357, Pennant Hills NSW 1715
LAB 16 Chilvers Rd, Thornleigh NSW 2120
ACT Level 4, 15 Moore St, Canberra ACT 2601
VIC Level 1, 21 Shields St, Flemington VIC 3031
QLD Level 10, 15 Green Square Cl, Fortitude Valley QLD 4006

Attachment B – Mainstream Recycling and EPA Correspondence

From: Jesse Brown <jbrown@mainstreamrecycling.com.au>
Sent: Monday, 16 December 2019 5:36 PM
To: Alexandra Sands <Alexandra.Sands@epa.nsw.gov.au>
Cc: Alan Ly <Alan.Ly@epa.nsw.gov.au>; Deanne Pitts <Deanne.Pitts@epa.nsw.gov.au>; Celeste Forestal <Celeste.Forestal@epa.nsw.gov.au>
Subject: RE: Mainstream - Current Operations

Hi Alex,

Please see below details as requested.

Let me know if you need anything further.

Regards,

Jesse Brown
General Manager

Mainstream Recycling Pty Ltd
PO Box 6083, Wetherill Park BC NSW 1851

0423 854 692
jbrown@mainstreamrecycling.com.au

From: Alexandra Sands <Alexandra.Sands@epa.nsw.gov.au>
Sent: Wednesday, 11 December 2019 3:27 PM
To: Jesse Brown <jbrown@mainstreamrecycling.com.au>
Cc: Alan Ly <Alan.Ly@epa.nsw.gov.au>; Deanne Pitts <Deanne.Pitts@epa.nsw.gov.au>; Celeste Forestal <Celeste.Forestal@epa.nsw.gov.au>
Subject: Mainstream - Current Operations

Hi Jesse,

Thanks again for coming in for a meeting today. It was helpful to sit down and discuss each matter.

I just had a few follow-up/clarifying queries regarding some of the matters we discussed today. Could you please provide detailed information regarding the following:

1. The types of waste which are currently being received at the facility. **Stormwater waste from cleaning GPTs and drains.**
2. The approximate amount of waste being received for each waste type. **Approximately 16,200 tpa of the above.**
3. How each waste type is handled and processed. **The liquid and solid material is unloaded into pits and gravity separated. Once the liquid is drained off, it is further filtered using separators and then consolidated into trade waste tanks, prior to being discharged to sewer. The solid material is dried out and then screened. The screening process separates the rubbish (i.e. coke bottles, etc) from the mulch material. The rubbish ends up at the end of the screening process and it taken to Brandown. The much material is sent off-site to landscape industry.**
4. The types of waste which are being sent out of the facility. **Recovered mulch from the leaf/soil/bark material and dirty solid waste (i.e. coke bottles, etc).**
5. The approximate amount of waste being sent out for each waste type. **Recovered mulch around 8,500 tpa and general solid waste is approximately 625 tpa.**
6. Where each outgoing waste type is being sent to. **The general solid waste is going to Brandown. The Recovered Mulch is going to Burgess Soils and Go Gro Organics (approx. 50% of the volume to each).**
7. Any sampling results for each outgoing waste type. **We sample the mulch at least once a week as per the NSW EPA Mulch Exemption.**
8. Whether or not each type of outgoing waste is being provided under a current order and exemption. **We work on the requirements of the Mulch Exemption and Order for the recovered mulch waste.**

If you could provide the above information as soon as possible that would be great.

If you have any questions or if there are any issues just let me know.

Best regards,

Alex Sands
Operations Officer - Waste Compliance
Waste & Resource Recovery, NSW Environment Protection Authority
+61 2 9995 5981
Please send all official electronic correspondence to waste.operations@epa.nsw.gov.au
alexandra.sands@epa.nsw.gov.au www.epa.nsw.gov.au @NSW_EPA EPA YouTube
Report pollution and environmental incidents 131 555 (NSW only) or +61 2 9995 5555

I acknowledge and respect the Traditional Custodians of the land on which I work and live.

Attachment C – Sawdust multiple analysis profile (SESL)

SESL AUSTRALIA
Environment & Soil Sciences

Multiple Analysis Profile

Sample Drop Off: 16 Chilvers Road
Thornleigh NSW 2120
Tel: 1300 30 40 80
Fax: 1300 64 46 89

Mailing Address: PO Box 357
Pennant Hills NSW 1715
Em: info@sesl.com.au
Web: www.sesl.com.au

Batch N°: 57040 **Sample N°: 1** **Date Instructions Received: 17/6/20** **Report Status: Final**

Client Name: **Direct Pallets and Recycling**
Client Contact: **Rob James**
Client Order N°:
Address: **3B Williamson Rd**
Ingleburn NSW 2565

Project Name: **Bio Bedding**
SESL Quote N°:
Sample Name: **Bio Bedding 15/06/2020**
Description: **Wood Chips**
Test Type: **M13_PT, MC_PT, TN_DC_PT, VC_4454**

Analysis	Unit	Result
Antimony	mg/kg	<5
Arsenic	mg/kg	<5
Beryllium	mg/kg	<1
Cadmium	mg/kg	<1
Chromium	mg/kg	<2
Copper	mg/kg	<5
Lead	mg/kg	<5
Manganese	mg/kg	48
Nickel	mg/kg	<2
Selenium	mg/kg	<5
Tin	mg/kg	<5
Vanadium	mg/kg	<5
Mercury	mg/kg	<0.1
Moisture Content	%	10.1
Total Nitrogen - N	%	0.15
Visual Contamianants (AS4454)		
>2mm glass, hard plastic, metal	%	<0.01
>5mm plastic (light/film)	%	<0.01
>5mm stones, clods of clay	%	<0.01

Analysed by ALS Laboratory Group, NATA # 825, Report # ES2021201 (Metals only)
Analysed by SESL Australia Pty Ltd, NATA #15633

Results only requested.

Consultant: Murphy
Michelle Murphy

Authorised Signatory: Murphy
Michelle Murphy

Date Report Generated
25/06/2020