Appendix J

Air quality and odour

133 Castlereagh Street, Level 15
Sydney, New South Wales

www.ghd.com

Your ref: D
Our ref: 12524108

10 March 2023

Nanxi Zheng
Plasrefine Recycling Pty Ltd
Suite 607, Level 6, 109 Pitt Street
Sydney NSW 2000
via email: aunano18@gmail.com

Moss Vale Plastics Recycling and Reprocessing Facility – Response to Submissions – Air Quality

Dear Nanxi

1. Introduction

As part of the Environmental Impact Statement for Plasrefine Recycling's Moss Vale Plastics Recycling and Reprocessing Facility, an air quality and odour assessment (GHD, 2022) (the 'EIS AQOA') was completed. Submissions on the EIS AQOA were provided by DPE, NSW EPA, Wingecarribee Shire Council and the community, and a comprehensive response has been prepared. This Air Quality Response to Submissions Letter (AQ RtS Letter) provides response to significant issues raised in submissions including:

– Further detailed description of the sources of air emissions, including the equipment generating emissions and the equipment treating emissions prior to release.
– Further discussion of potential emissions from the equipment, including discussion of specific air toxics including volatile organic compounds (VOCs) and persistent organic pollutants (POPs).
– Presentation of cumulative impacts for $PM_{2.5}$ and $PM_{10.}$
– Further discussion of the potential for odour impacts and how odours will be minimised and managed.

2. Assumptions and limitations

This letter is prepared in response to submissions on the EIS AQOA and as such should be read in conjunction with that report. The content of this letter is subject to assumptions and limitations as outlined in the EIS AQOA.

The following assumptions were made to complete the assessment:
– Plastics being heated include Polyethylene (PE), polypropylene (PP) and polyethylene terephthalate (PET)
– Maximum emission concentrations from emission control units as provided by Plasrefine Recycling would be complied with during operation of the proposal.

3. Process and controls

3.1 Emission generating processes

Processes within the proposed facility with potential to emit pollutants are identified in Table 1 and shown in Figure 1 and Figure 2. Key pollutants expected to be emitted prior to pollution control units include volatile organic compounds (VOCs) and particulate matter (PM).

Concentrations of total and individual VOCs from heating plastics vary depending on the type of plastic and temperatures at which the plastics are heated. Higher temperatures during heating of plastics can result in higher emissions of both VOCs. The maximum processing temperature for any plastic in the proposed process is 220 degrees Celsius.

As shown in Figure 1 (building 1) and Figure 2 (building 2), each process area would have a series of air collection hoods located above relevant process emission points. Flow rates would ensure that all fumes are collected. All captured air would be piped to air pollution control (APC) systems (APC1, APC2, APC3 and APC4) for treatment prior to being emitted from a stack above the roof.

Table 1 provides a summary of building areas, relevant processes, associated APC systems and APC flow rates. Further detail on pollution controls is provided in Section 3.2.

Table 1 Overview of controlled emissions

Building	Process	Extracted to APC
Building 1 Zone 1 (red in figure)	PET sheet production line	APC1
	PET packing belt production line	
	Film crushing, cleaning and granulation production line	
	ABS double stage brace granulation	
Building 1 Zone 2 (yellow in figure)	HDPE single stage water ring granulation	APC2
	PP single stage underwater granulation	
Building 2 (blue in figure)	PET tray blow moulding machine	APC3
	Injection moulding machine	
Building 2 (green in figure)	PE wood plastic floor production line	APC4

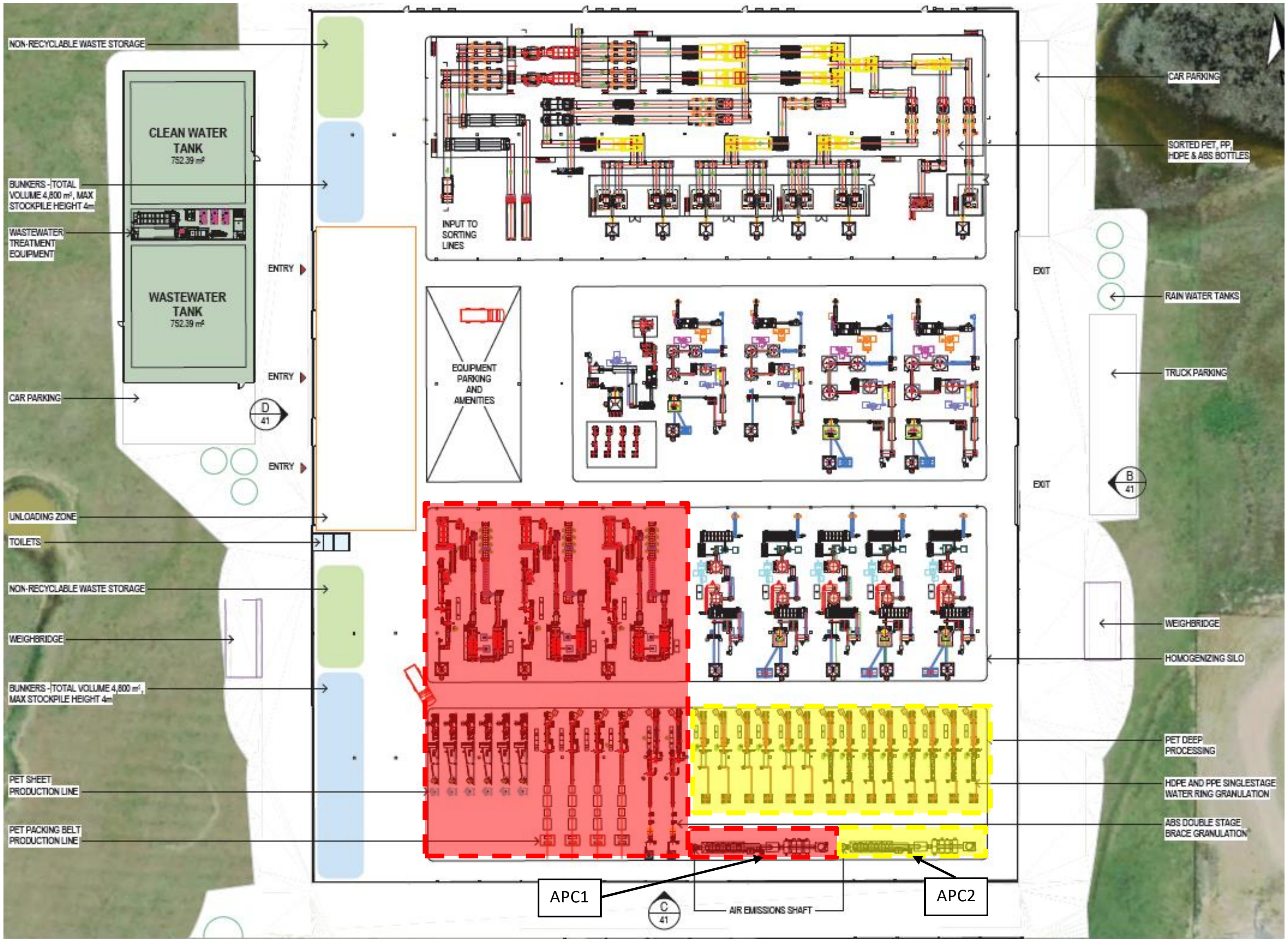

Figure 1 ***Building 1 air collection zones and pollution control units***

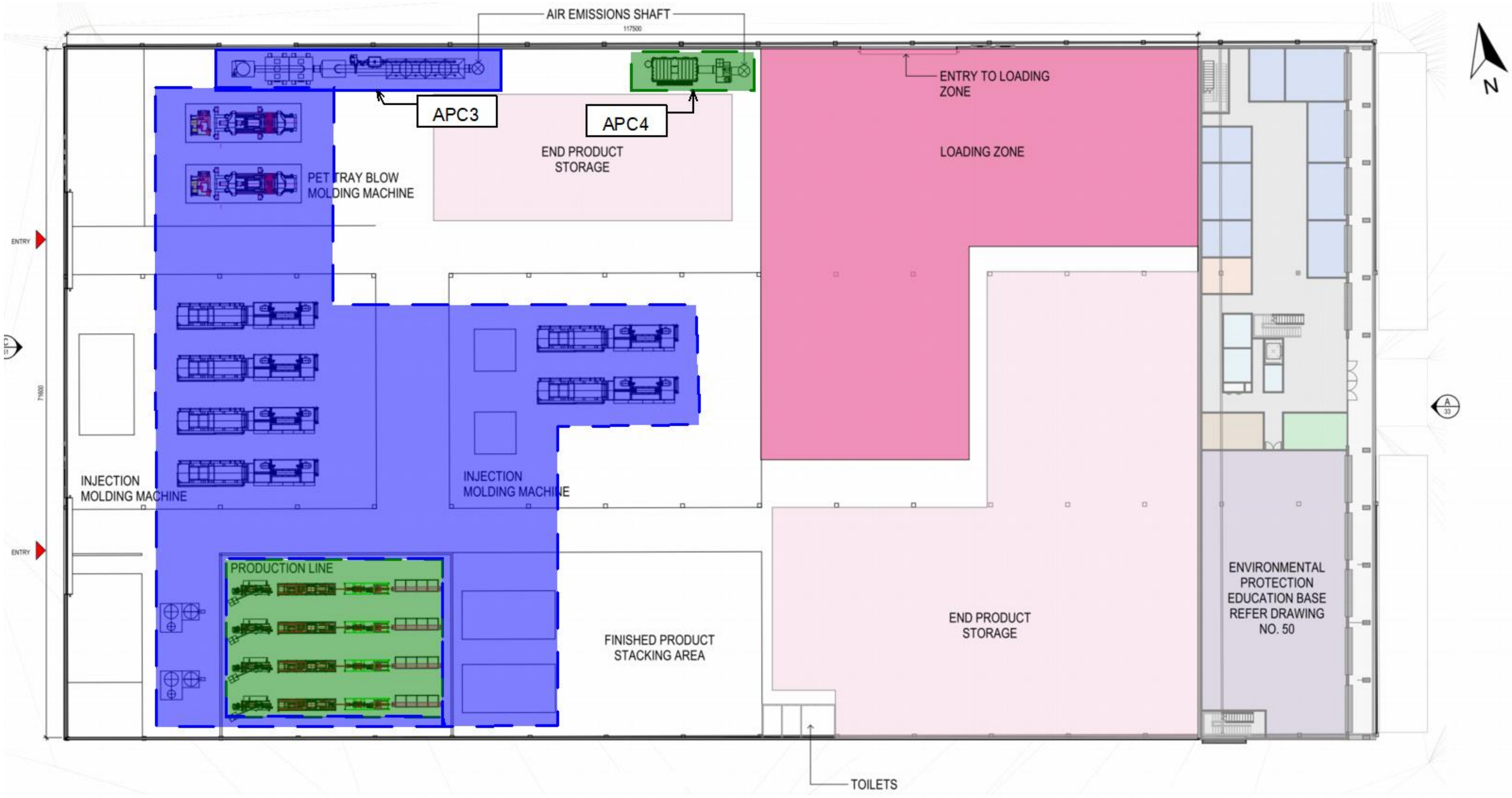

Figure 2 ***Building 2 air collection zones and pollution control units***

3.2 Overview of pollution control equipment

Emissions from the plastic recycling and reprocessing activities at the facility would be relatively low due to the low process temperatures and would likely meet NSW government POEO limits without any additional pollution controls (refer Section 4). Plasrefine Recycling is nonetheless committed to best practice and minimising emissions and has therefore included numerous controls including the following:

- All processes which may generate emissions would be located within fully enclosed buildings
- Processes likely to generate emissions would be grouped in different zones, from where all air is collected and directed to pollution control devices
- Emissions would go through a staged emission reduction process (refer Table 2 and Figure 3)
- Residual air would then be discharged from a stack on the roof and dispersed to minimise ground level impacts.

These steps are considered best practice for eliminating, reducing and controlling emissions from the facility.

Specific emission control equipment has not yet been ordered for the proposal, however Plasrefine Recycling is committed to using best available technology at the facility and equipment selected would ensure that emissions meet relevant NSW limits or better. Plasrefine Recycling is currently pursuing a system as detailed below.

Four separate pollution control devices would be provided as part of the proposal. These are described below:

- APC1 – single multi-stage pollution treatment unit
- APC2 – single multi-stage pollution treatment unit
- APC3 – single multi-stage pollution treatment unit
- APC4 – dust collector system with filter cartridges. The filter cartridge device is composed of shell, filter unit, air storage bag, electromagnetic pulse valve, pulse controller, ash collecting hopper. Filter material is a PTFE (teflon) coated flame retardant filter element.

Table 2 Overview of the staged VOC treatment units

Unit name	Pollution control	Description
Emission control system for VOCs APC1, APC2 and APC3 are equivalent units	Exhaust gas collection hood	The cross section wind speed of the smoke hood at the exhaust port of the granulator is not less than 0.8 m/s, and it is necessary to ensure that there is no retention of fumes in this area
	Waste gas collection pipeline	The collection main pipeline are equipped with pressure and air volume monitoring instruments, overflow components, etc
	Pneumatic cyclone spray tower	The system adopts "pneumatic cyclone spray + high voltage electrostatic degreasing + demister" as the pre-treatment in this case, and the removal rate of water-soluble substances is 95%
	Industrial electrostatic oil fume purification equipment	When the air flow enters the high-voltage electrostatic field, the oil fume gas is ionized, the mist is charged, and most of it can be degraded and carbonised. Ozone is generated in the air in the electric field to remove most of the odours in the emissions.
	High efficiency filter box	The organic waste gas after spraying is treated with primary filter cotton to remove any particulate and water vapour prior to adsorption.

Unit name	Pollution control	Description
	Activated carbon adsorption desorption + CO catalytic combustion equipment	When the waste gas containing organic matter passes through the activated carbon adsorption layer, the organic matter is intercepted inside by the activated carbon, and the clean gas is discharged. CO_2 and water would be produced by the catalytic combustion process. The organic waste gas maintains combustion in the catalytic combustion chamber, and the gas discharged is regenerated and recycled until the organic matter is completely separated from the activated carbon and decomposed in the catalytic chamber. The activated carbon is then regenerated and the organic matter is treated by catalytic decomposition
	Stack	Design of the sampling point (including the sampling platform) will comply with the national specifications. Clear height from the exhaust outlet to the ground is ≥ 22 m

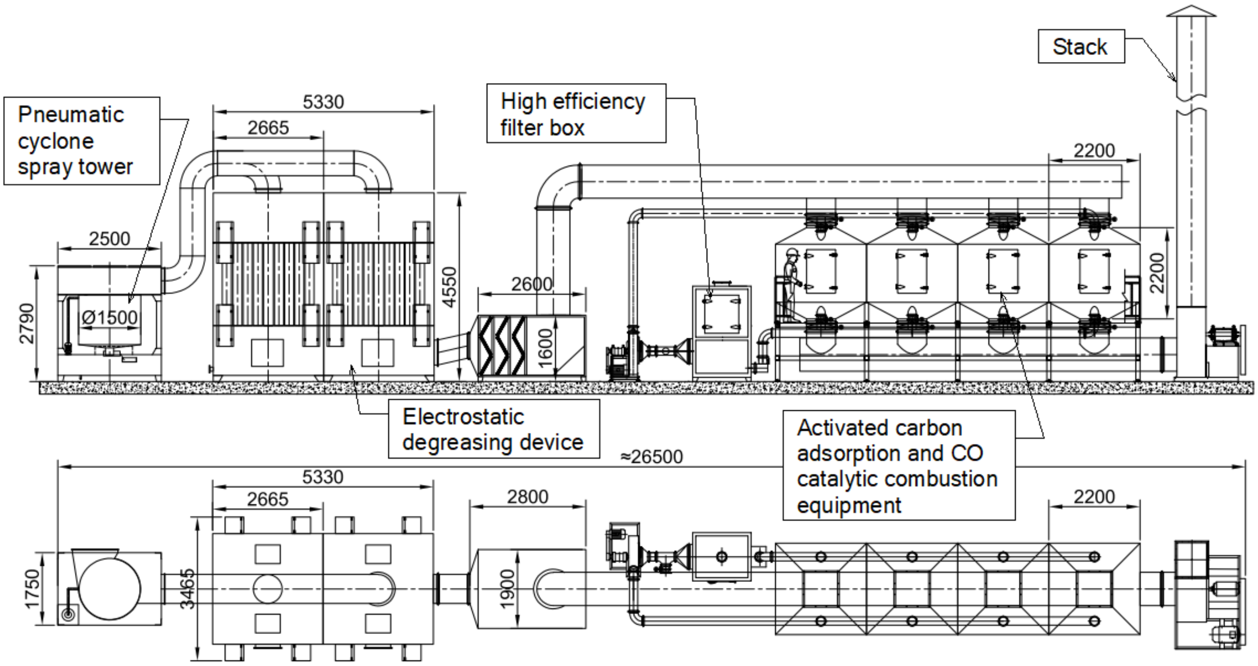

Figure 3 *Overview of the staged VOC treatment units*

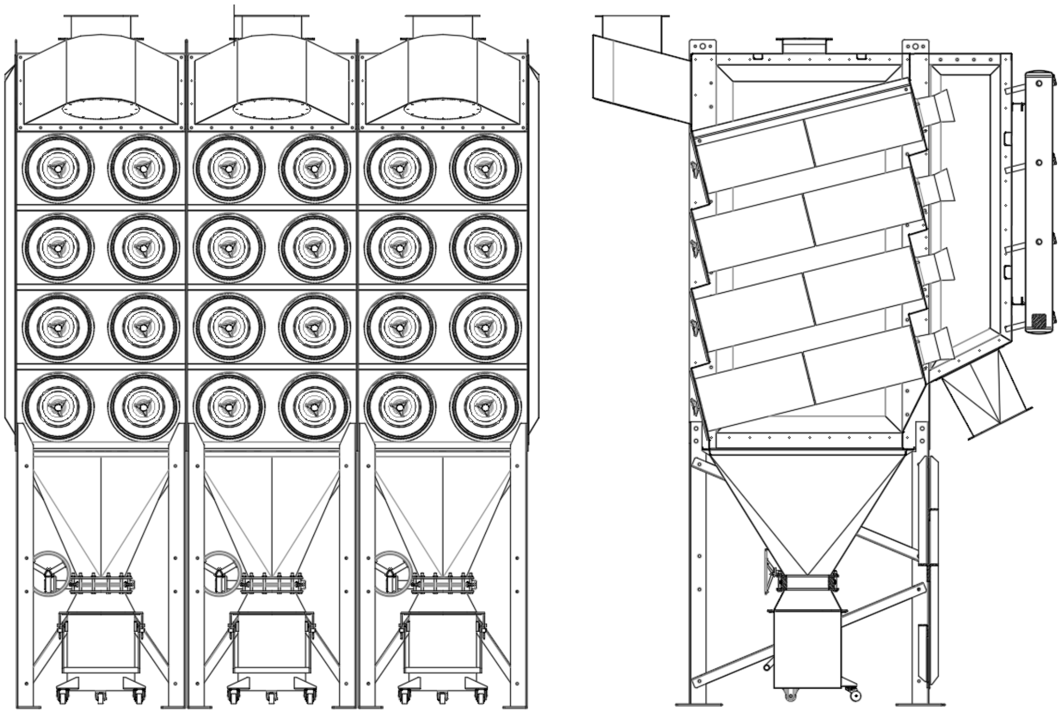

Figure 4 Dust collector system with filter cartridges

Figure 5 Example photo of dust collector system

3.3 Design specifications

As outlined in the NSW EPA Approved Methods, 'design specifications can be used to estimate the emission rate of air pollutants from proposed sources'. Further, the Approved Methods state that 'such specifications provide a reliable means of determining the upper limit to the emission rate or concentration of air pollutants for sources that are maintained and operated in a proper and efficient manner.'

As outlined previously, Plasrefine Recycling has been in discussions with various pollution control system providers, but has not yet formally engaged a provider and therefore cannot provide manufacturer guarantees.

However, based on expected emission levels, compliance with the NSW POEO Clean Air Regulation and protection of the local air quality environment, Plasrefine has established the design specifications outlined in Table 3.

Table 3 APC system design specifications

Discharge point	Pollutant	Design specification concentration (mg/Nm³, 273K, 1 atm)
APC1, APC2, APC3	Total volatile organic compounds	20
	Benzene	0.8
	Toluene	5
	Styrene	5
APC4	Total particulate matter	20

It is noted that the design specifications (as summarised in Table 3) comply with the relevant or most representative NSW POEO Clean Air Regulation Standards of concentration including:

– For total particulate matter: General activities and plant (group 6): Solid particles (total) – Any crushing, grinding, separating, or material handling activity – 20 mg PM/Nm³

– For total volatile organic compounds: Afterburners, flares, and vapour recovery units – Vapour recovery units and other non-thermal treatment plant (group 6): Volatile organic compounds (VOCs), as n-propane – Any vapour recovery unit treating air impurities that originate from material containing any principal toxic air pollutant - 20 mg VOC/Nm³.

3.4 Best practice

As described in section 3.2, emissions of principal air toxics (e.g. benzene) would be treated and managed by specifically designed pollution control systems. Further discussion is provided below on the best practice nature of the proposed emissions management systems:

– **Emissions from individual process units would be collected at the source** – minimising the potential for fugitive emissions to escape the facility prior to control.

– **Emissions would be ducted to dedicated APC systems** – each processing area would have a dedicated APC, minimising load on an individual system and allowing for operations to continue where an individual unit is down due to failure or maintenance.

– **The VOC APC systems would be a multi-stage process** – four distinct control operations are proposed allowing for control of varying mixtures of VOCs to be treated. Use of greater than one control operation is considered to be advanced management of pollutants, and builds redundancy into the control system.

– **The APC systems would be subject to rigorous maintenance program –** processes with emissions to air would not operate if the APC systems are not operating as per design. The VOC APC units would have continual monitoring of key parameters linked to performance and alerts are given to operators when filter sponges and activated carbon filters need to be changed. APC4 would use an intelligent control system and would be shut down if needed to change any filter media. At no time would there be uncontrolled release of emissions. Routine APC maintenance and filter changes would be included in the site management plan including air quality management plan.

– **Total VOC emissions would be compliant with the NSW POEO Clean Air Regulation standards of concentration**.

– An impact assessment in accordance with the Approved Methods, as presented in the EIS AQOR predicted that concentrations of principal air toxics were less than the relevant NSW EPA criteria at anywhere beyond the site boundary.

4. Additional information on emissions

Concentrations of individual VOCs from heating plastics are highly variable between type of plastic and temperatures at which plastic are heated. VOCs captured would then be treated in the emission control system as described in Section 3.2.

In order to provide a better understanding of emissions from heating of plastics, a review of literature has been undertaken which provide emissions from the heating of different types of plastics and resins at various temperatures. Sampling data from a plastics processing facility with similar plastic types and treatment system has also been provided.

4.1 VOC speciation from various plastics

Additional information was requested regarding individual VOCs that could be contained within the total VOC emissions. Four sources were reviewed which provided emission factors for individual VOCs and total VOCs as a result of processing of various plastic types.

For each of these sources the following are completed and presented in this section:

– Individual and total VOC emission factors extracted from data source
– Individual VOC emissions presented as the percentage of the total VOC
– The Approved Methods criteria (1-hour average, 99.9th percentile) are presented for each individual VOC.
– For each individual VOC, the maximum ground level concentration is presented, based on:
  - Locations at or beyond the site boundary
  - 1-hour average, 99.9th percentile
  - Total VOC emissions at the design specification of 20 mg/m³ (as summarised in section 3.3)
  - Individual VOC impacts scaled from the predicted total VOC impact based on the emission percentages determined.
  - VOC emissions from all three VOC pollution control systems (APC1, APC2, APC3), except for VOC emissions from processing of ABS which were from APC1 only, as ABS plastics would be handled in plant extracted to APC1 only.
– This exercise is not completed for emissions of benzene, toluene and styrene, as these emissions are subject to performance specification with results presented in the EIS AQOR.

Emission factors for four types of plastics which would be processed at the facility are provided as follows:

– Acrylonitrile Butadiene Styrene – sampled VOCs and developed emission factors are provided in Table 4
– low density polyethylene – sampled VOCs and developed emission factors are provided in Table 5
– high density polyethylene – sampled VOCs and developed emission factors are provided in Table 6
– polypropylene – sampled VOCs and developed emission factors are provided in Table 7.

Where emission factors are provided for a number of melting temperatures, the closest one with a higher temperature than the 220° Celsius as proposed at the facility has conservatively been adopted.

Table 4 VOC emissions from ABS

Substance	Emission factor (g/kg)	% of total VOC emission	Criterion (mg/m^3)	Predicted impact (% of criteria)	Predicted compliance
Acrylonitrile	7.8E-03	4%	0.008	38%	YES
Ethyl benzene	8.0E-03	4%	8	0%	YES
Cumene (isopropyl benzene)	2.7E-03	1%	0.01	8%	YES
Methyl styrene	1.3E-02	7%	0.14	4%	YES
Total VOC	1.9E-01	-			
Emission factors sourced from table 4 in *'Sampling and analysis of VOCs evolved during thermal processing of ABS composite resins',* using ABS at 443 ºF (228 ºC) Emitted pollutants with no criterion in Approved Methods: 4-vinyl-1-cyclohexene, n-propylbenzene, acetophenone Predicted impact associated with total VOC emissions from APC1 only achieved by division of total impact from APC1, AP2 and APC3 by 3. This is considered an appropriate approximation as APC1 is the furthest of the three sources to the site boundary.					

Table 5 VOC emissions from low density polyethylene

Substance	Emission rate (g/kg)	% of total VOC emission	Criterion (mg/m^3)	Predicted impact (% of criteria)	Predicted compliance
Formaldehyde	1.0E-07	0.3%	0.02	3%	YES
Acrolein	1.0E-08	0.03%	0.00042	16%	YES
Acetaldehyde	1.2E-07	0.3%	0.042	2%	YES
Acetone	2.0E-08	0.1%	22	0%	YES
Methyl ethyl ketone	1.0E-07	0.3%	3.2	0%	YES
Acetic acid	1.7E-07	0.5%	0.27	0%	YES
Acrylic acid	2.0E-08	0.1%	0.11	0%	YES
Total VOC	3.5E-05	-			
Emission factors source from table 7 in '*Development of emission factors for polyethylene processing',* using LDPE at 500 ºF (260 ºC) Emitted pollutants with no criterion in Approved Methods: Ethane, ethylene/ethene, propylene, propionaldehyde, formic acid					

Table 6 VOC emissions from high density polyethylene

Substance	Emission rate (g/kg)	% of total VOC emission	Criterion (mg/m^3)	Predicted impact (% of criteria)	Predicted compliance
Formaldehyde	6.0E-08	0.2%	0.02	2%	YES
Acrolein	2.0E-08	0.1%	0.00042	35%	YES
Acetaldehyde	5.0E-08	0.2%	0.042	1%	YES
Acetone	3.0E-08	0.1%	22	0%	YES
Methyl ethyl ketone	2.0E-08	0.1%	3.2	0%	YES
Acetic acid	1.7E-07	0.5%	0.27	0%	YES
Acrylic acid	2.0E-08	0.1%	0.11	0%	YES
Total VOC	3.1E-05	-			
Emission factors source from table 7 in '*Development of emission factors for polyethylene processing',* using HDPE at 430 ºF (220 ºC) Emitted pollutants with no criterion in Approved Methods: Ethane, ethylene/ethene, propylene, propionaldehyde, formic acid					

Table 7 VOC emissions from polypropylene

Substance	Emission rate (g/kg)	% of total VOC emission	Criterion (mg/m^3)	Predicted impact (% of criteria)	Predicted compliance
Formaldehyde	1.3E-03	0.7%	0.02	8%	YES
Acrolein	1.4E-04	0.07%	0.00042	40%	YES
Acetaldehyde	5.3E-04	0.3%	0.042	2%	YES
Acetone	9.4E-03	5%	22	0%	YES
Methyl ethyl ketone	2.6E-04	0.1%	3.2	0%	YES
Acetic acid	4.9E-03	3%	0.27	2%	YES
Acrylic acid	8.0E-05	0.04%	0.11	0%	YES
Total VOC	1.9E-01	-			
Emission factors source from table 5 in '*Development of emission factors for polypropylene processing',* using controlled rheology homopolymer (with antistat) Emitted pollutants with no criterion in Approved Methods: Ethane, ethylene/ethene, propylene, propionaldehyde, butyraldehyde, benzaldehyde, formic acid					

4.2 Total VOC from sampling data

TVOC sampling data from a facility[1] which performs similar plastic processing to the proposal has been reviewed and emission concentrations from the air pollution control system have been compared to the data used in EIS AQOR. The measured concentration is an indication of the low emissions from the process and the efficiency of the air pollution control system.

The TVOC concentration used in the assessment and the maximum emission concentration from the sampled facility are presented in Table 8.

Table 8 TVOC emission estimation based on sampling data

	Flow rate (m^3/hr)	Emission concentration (mg/m^3)
Sample data (9/06/2022)	3,651	0.954
Estimated proposal emissions	50,000	20*
*design specification		

4.3 POPs

Persistent organic pollutants (POPs) including dioxins can be emitted into the atmosphere from a wide variety of sources and processes including waste incineration, combustion of fuels, and bushfires. Most literature on the formation of POPs refer to combustion factors which include temperature and oxygen concentrations during combustion and downstream of combustion, as well as chlorine content of material combusted.

The proposal would not involve combustion of any plastics, just heating them for forming. The maximum temperatures used for melting of plastics would only be 220° Celsius. As previously discussed in this letter, pollution control devices would capture and treat potential VOC emissions from the process, and would also be capable of treating any POPs released from the process.

Based on a review of available literature, formation of significant concentrations of POPs is unlikely, given the lack of combustion at the facility and the relatively low process temperatures proposed.

[1] Changshu Xinhuafeng Zipper Co. Ltd Test Report, SuZuou Changhe Environmental Testing Company Limited 14 June 2022

4.4 Microplastics

Moulded plastic products would be formed within the PE wood plastic floor production line. This could result in generation of some fine particulate matter. As described in section 3 of this letter, all emissions would be extracted from the source, and treated in a dust collector. This would minimise the amount of particulate matter being released to the environment.

Emissions of fine particulate matter to the atmosphere would comply with the NSW POEO Clean Air Regulation standards of concentration.

The cumulative impact assessment for particulate matter (section 5) predicts that there would be no exceedances of the NSW EPA criteria at any residential location, but that there would be a minor exceedance at the nearest commercial receptor (Australian Bioresources), if the background levels were unusually high, due to bushfires or external circumstances.

5. Particulate matter cumulative impact assessment

An extension to the existing particulate matter impact assessment contained in the EIS is presented in this section. All model inputs, settings and outputs are as per those presented in the EIS AQOR.

Whilst the incremental impact assessment presented in the EIS AQOR used a full five years of meteorological data (2016-2020), the cumulative impact assessment has been completed for a two-year model period (2017, 2018). The two-year period represented a period where PM monitoring data were available from the nearest station at Goulburn, and one where PM measurements were not influenced by elevated bushfire activity, such as they were during 2019 and the start of 2020. Completing a cumulative impact assessment for a period of two years is more than the required one year period and increases the number of meteorological and background air quality conditions which are considered.

5.1 Impact assessment criteria

The criteria for the impact assessment are shown in Table 9, which is stated in the Approved Methods.

Table 9 Approved Methods Impact Assessment Criteria for PM_{10} and $PM_{2.5}$

Averaging period	PM_{10}	$PM_{2.5}$
24-hour average	50 µg/m³	25 µg/m³
Annual average	25 µg/m³	8 µg/m³

5.2 $PM_{2.5}$

5.2.1 Annual average

The predicted annual average $PM_{2.5}$ impact is presented in Table 10 for the most affected commercial receptor and most affected residential receptor.

The impact assessment predicts a 0.3 µg/m³ exceedance of the annual average criterion at the most affected commercial receptor only.

No exceedances of the criterion are predicted at the most affected residential receptor.

Table 10 Annual average $PM_{2.5}$ impacts

Most affected receptor	Predicted ground level concentration (µg/m³)		
	Background	Increment	Total impact
Commercial	6.4	1.8	8.3
Residential	6.4	0.5	6.9

5.2.2 24-hour average

The predicted maximum 24-hour average impact is presented in Table 11 for the most affected commercial receptor and most affected residential receptor. The impact is shown as the maximum concentration resulting from a contemporaneous assessment of impacts in accordance with the Approved Methods.

The impact assessment predicts an exceedance of the criterion at the most affected commercial receptor (Australian Bioresources) only.

No exceedances of the criterion are predicted at the most affected residential receptor.

Table 11 24-hour average $PM_{2.5}$ impacts

Most affected receptor	Predicted ground level concentration (µg/m³)		
	Background	**Increment**	**Total impact**
Commercial	24.5	4.6	29.1
Residential	24.5	0.0	24.5

Given the predicted exceedance at the most affected commercial receptor, additional assessment was completed as presented in Table 11.3 of the Approved Methods. This assessment is shown in Table 12 below.

The results presented in Table 12 show that only one exceedance of the $PM_{2.5}$ 24-hour average criterion is predicted. This exceedance occurs on a day (9/04/2018) where the background concentration was approximately 98% of the criterion (24.5 µg/m³).

These elevated background concentrations would typically be caused by external sources of particulates such as bushfires, controlled burns, or dust storms, and would only occur infrequently. In such cases, the elevated air quality levels would be communicated in advance of or during the event through the DPE 'Current and forecast air quality' page[2], and consequently people living near the site would be able to manage their exposure to air quality impacts, through minimising time spent outdoors. Further it is expected that employees or laboratory mice at Australian Bioresources would ordinarily spend the majority of time in controlled air conditioned environments, and would therefore not be exposed to external, elevated air pollutant concentrations.

Table 12 shows that elevated background concentrations do not coincide with elevated incremental concentrations, and as such the risk of the proposal emissions leading to additional exceedances of the criteria at the Australian Bioresources site is low. This suggests, for this receptor, that the meteorological conditions which are conducive to worst-case impacts from the proposal are not the same as the meteorological conditions during which background air quality is degraded.

GHD does not consider that the predicted exceedances at Australin Bioresources represent any actual increased risk of air quality impacts above acceptable levels, based on the following:

- ambient 24-hour $PM_{2.5}$ concentrations already exceed the criteria at times due to external factors such as bushfires
- the predicted exceedances occur on days where background air quality is heavily degraded due to external factors such as bushfires
- the proposal impact (incremental) during elevated background days is not significant, and based on the modelling assumption is likely an overprediction
- employees of Australian Bioresources would not ordinarily be exposed to external air quality for any significant portion of the 24-hour period
- laboratory mice at Australian Bioresources would not exposed to external air quality, due to being kept in a controlled temperature environment, with air filters used to maintain internal air quality

[2] **https://www.dpie.nsw.gov.au/air-quality**

- all persons potentially exposed to elevated background air quality levels, including employees of Australian Bioresources, would be made aware of degraded air quality through DPE's 'Current and forecast air quality' page, and would be able to further minimise their exposure to air pollution during these periods.

Table 12 24-hour average $PM_{2.5}$ impacts

Date	Concentrations ordered by highest background (µg/m³)			Date	Concentrations ordered by highest increment (µg/m³)		
	Background	Predicted increment	Total impact		Background	Predicted increment	Total impact
9/04/2018	24.5	4.6	29.1	25/05/2017	5.3	11.8	17.1
14/08/2017	20.9	0.5	21.4	17/05/2018	6.2	11.3	17.6
27/05/2018	20.2	0.4	20.6	23/06/2017	8.1	10.7	18.8
11/05/2017	19.2	3.1	22.3	23/05/2018	7.3	10.6	17.9
26/05/2018	19.0	1.4	20.4	22/06/2018	9.8	9.9	19.7
2/08/2018	18.3	3.0	21.3	9/10/2018	4.6	9.7	14.3
29/07/2017	16.8	4.0	20.8	19/05/2018	4.1	9.4	13.5
29/12/2018	16.3	2.3	18.6	5/06/2017	7.8	9.3	17.1

5.3 PM_{10}

5.3.1 Annual average

The annual average PM_{10} impact is presented in Table 13 for the most affected commercial receptor and most affected residential receptor.

No exceedances of the criterion are predicted at the most affected commercial receptor.

No exceedances of the criterion are predicted at the most affected residential receptor.

Table 13 Annual average PM_{10} impacts

Most affected receptor	Predicted ground level concentration (µg/m³)		
	Background	Increment	Total impact
Commercial	15.1	1.8	16.9
Residential	15.1	0.5	15.6

5.3.2 24-hour average

The predicted maximum 24-hour average impact is presented in Table 14 for the most affected commercial receptor and most affected residential receptor. The impact is shown as the maximum concentration resulting from a contemporaneous assessment of impacts in accordance with the Approved Methods.

The impact assessment predicts an exceedance of the criterion at the most affected commercial receptor (Australian Bioresources) only.

No exceedances of the criterion are predicted at the most affected residential receptor.

Table 14 24-hour average PM_{10} impacts

Most affected receptor	Predicted ground level concentration (µg/m³)		
	Background	Increment	Total impact
Commercial	47.7	4.2	51.9
Residential	49	0	49

Given the predicted exceedance at the most affected commercial receptor, additional assessment was completed as presented in Table 11.3 of the Approved Methods. This assessment is shown in Table 15 below.

The results presented in Table 15 show that two exceedances of the PM_{10} 24-hour average criterion are predicted. These exceedances occur on days where the background concentrations were at approximately 98% and 95% of the criterion.

These elevated background concentrations would typically be caused by external sources of particulates such as bushfires, controlled burns, or dust storms, and would only occur infrequently. In such cases, the elevated air quality levels would be communicated in advance of or during the event through the DPE 'Current and forecast air quality' page[3], and consequently people living near the site would be able to manage their exposure to air quality impacts, through minimising time spent outdoors. Further it is expected that employees or laboratory mice at Australian Bioresources would ordinarily spend the majority of time in controlled air conditioned environments, and would therefore not be exposed to external, elevated air pollutant concentrations.

Table 15 shows that elevated background concentrations do not coincide with elevated incremental concentrations, and as such the risk of the proposal emissions leading to additional exceedances of the criteria at Australian Bioresources is low. This suggests, for the Australian Bioresources receptor, that the meteorological conditions which are conducive to worst-case impacts from the proposal are not the same as the meteorological conditions during which background air quality is degraded.

GHD does not consider that the predicted exceedances at Australian Bioresources represent any actual increased risk of air quality impacts above acceptable levels, based on the following:

- ambient 24-hour PM_{10} concentrations already exceed the criteria at times due to external factors such as bushfires
- the predicted exceedances occur on days where background air quality is heavily degraded due to external factors such as bushfires
- the proposal impact (incremental) during elevated background days is not significant, and based on the modelling assumption is likely an overprediction
- employees of Australian Bioresources would not ordinarily be exposed to external air quality for any significant portion of the 24-hour period
- laboratory mice at Australian Bioresources would not exposed to external air quality, due to being kept in a controlled temperature environment, with air filters used to maintain internal air quality
- all persons potentially exposed to elevated background air quality levels, including employees of Australian Bioresources would be made aware of degraded air quality through DPE's 'Current and forecast air quality' page, and would be able to further minimise their exposure to air pollution during these periods.

[3] **https://www.dpie.nsw.gov.au/air-quality**

Table 15 24-hour average PM_{10} impacts

Date	Concentrations ordered by highest background (µg/m³)			Date	Concentrations ordered by highest increment (µg/m³)		
	Background	Predicted increment	Total impact		Background	Predicted increment	Total impact
14/04/2018	49.0	2.4	51.4	25/05/2017	9.3	11.8	21.1
18/07/2018	47.7	4.2	51.9	17/05/2018	14.8	11.3	26.1
8/04/2018	47.6	2.1	49.7	23/06/2017	11.4	10.7	22.1
26/04/2018	47.3	1.5	48.8	23/05/2018	16.3	10.6	26.9
9/04/2018	43.1	4.6	47.7	22/06/2018	12.5	9.9	22.4
19/07/2018	42.1	4.6	46.7	9/10/2018	13.0	9.7	22.7
19/03/2018	41.8	8.7	50.5	19/05/2018	9.0	9.4	18.4
15/12/2018	41.8	0.1	41.9	5/06/2017	7.7	9.3	17.0

5.4 Discussion of cumulative impact assessments

The predicted exceedances of the PM_{10} and $PM_{2.5}$ criterion do not represent a significantly elevated risk to human health at the nearest commercial receptor due to the following:

- The nature of the use means that staff and visitors at the commercial facility would not be exposed to any emissions for the full model period, as they would be at the premises only during working hours on working days.
- The nature of the facility, being an indoor working environment means that staff and visitors would be protected by external air filters and air conditioning against outdoor air quality impacts including bushfire pollution (both background and incremental).
- The emission rate was modelled as always being at the emission limit, where realistically the emission rate would be always below the emission limit.
- The emission is modelled to occur 24/7 for the entire two-year model period, where realistically the emission would be intermittent, depending on product batches being produced.

6. Odour assessment

6.1 Odour from VOCs

Individual pollutants, including VOCs can be odorous at certain concentrations in the air. The Approved Methods provide impact assessment criteria for individual odorous pollutants, including acetaldehyde and styrene. Odorous pollutants with potential to be emitted from the air treatment systems have been assessed as described in Section 4.1 of this letter and are predicted to comply with the relevant criteria. The proposed facility would have numerous best practice pollution and odour controls and odour impacts are not anticipated.

6.2 Fugitive odour emissions

6.2.1 Raw material

The facility would accept pre-sorted mixed plastics, which have minimal odour potential, less than the waste sorting facilities (or materials recovery facilities) from which it comes. Baled mixed plastics accepted at the facility would already have contaminated waste streams removed from it at source. In addition, Plasrefine Recycling would apply its patented disinfectant solution to the incoming material. The solution comprises tea tree oil, essential oils and other natural plant-based ingredient to deodorise the incoming material.

The proposed facility would be enclosed, including the receival area, and any ventilation air would be released from the top of the building. The potential for odour from receiving pre-sorted plastics is considered negligible to low. Potential odours could arise from the wastewater treatment system (refer to Section 6.2.2) and the processing of plastics (as per Section 6.1) which are assessed elsewhere in this letter.

6.2.2 Wastewater treatment plant and sludge handling

Plastic waste would arrive at the facility pre-sorted. This pre-sorted plastic would then be washed during processing to remove any residues and product labels. The washing system would be fully enclosed and process steam would be condensed and reused. Odours from this process, including any added disinfectants (turpentines, natural oils etc) would not be discharged as steam or vented outside the washing facility.

The wastewater treatment system has potential to be a source of odour. However, the wastewater would be highly diluted with minimal residual wastes such as beverage liquids compared to total water flows and is unlikely to be source of offensive odours.

The incoming water from plastic washing would be pre-treated for pH and any flocculent dosing, prior to the dissolved air flotation (DAF). The DAF would divert potentially odorous suspended solids and lighter liquids such as oils and greases to the sludge tank. The expected wastewater would have a low dissolved oil content which means oils and solids can be readily removed by oil separation and air flotation. Water would finally be treated with a multimedia filter to make the water adequate for reuse in the facility. The wastewater treatment plant would be in an enclosed building. Any venting would occur above the wastewater treatment plant roof, ensuring additional dispersion of odours.

Sludge in the tank would be dewatered in a screw press and filter cakes would be produced from the sludge that would be immediately placed into sealed storage bags in order to minimise any odours prior to transporting off site. There would be minimal odour from this system as sludge would not be further treated onsite and would not be stored openly in any location. Enclosing potentially odorous sludge filter cake material is considered best practice as it is eliminating the source.

Avoidance and mitigation strategies considered for the facility as defined in *Technical framework - assessment and management of odour from stationary sources in NSW* are summarised below:

– Selecting an appropriate site and design layout:
  - The wastewater treatment plant has a buffer of approximately 500 m to the nearest residential receptor and there are no identified other wastewater treatment plants within this buffer
– Managing odour at the source
  - The wastewater treatment plant would process low odour producing wastewater in an enclosed building.
  - Any venting would be above the facility roofline.
  - Sludge filter cakes would be immediately placed into enclosed bags until taken offsite.
  - If required (considered unlikely), any venting of odorous air could be captured and treated prior to discharge. This could be readily retrofitted with a fan and carbon absorption system.

– Managing odour in the pathway

  - Wastewater treatment plant would be located on the north of the facility, which is the furthest location on site from residential receptor locations. Other buildings and vegetation between the source and receptor would act to increase turbulence and improve odour dispersion

– Managing odour at receptors

  - The facility would have an air quality management plan (including odour) which details communication strategy
  - Management plan would include sludge handling and treatment including immediate placement of sludge filter cakes into sealed bags prior to removal from site.

Regards

Evan Smith
Technical Director - Air Quality