



NAME REDACTED

OBJECT

Submission ID: 217913

Organisation: N/A	Key issues: Social impacts, Other issues
Location: New South Wales 2576	
Attachment: N/A	

Submission date: 11/25/2024 12:48:05 AM

Dear Commissioners,

Re: Moss Vale Plastics Recycling Facility (SSD-9409987)

Please find enclosed my submission related to the Moss Vale Plastics Recycling facility (Plasrefine) project, currently before the commission for determination.

I am a General Practitioner with over 10 years' experience with special interests and additional training in medical education, women's and child health. In the past 4 years I have been fortunate to live and work on the lands of the Gundungurra people, and contribute to the care of patients in our Southern Highlands community, including my patients who live in the Moss Vale areas most affected by the proposed development.

I strongly object to the proposed facility. In developing this submission, I have read parts of the following documents;

- DPHI Moss Vale Plastics Recycling Facility SSD Assessment Report, October 2024
- EPA Comment on Response to Submissions (31 March 2023),
- Appendix J, GHD Response to Submissions- Air Quality, 10th March 2023
- Moss Vale STP Upgrade REF Final Draft and its associated Fact Sheet (May 2023).
- Social Impact Assessment- Addendum, prepared by Ethos Urban 17 Jan 2024.

I have mainly concerned myself with management of microplastics, air quality and health and social impacts associated with the proposal, and recognise some of my concerns raised may have been addressed in documents I have not reviewed.

I have no commercial interests related to the Plasrefine facility.

Yours faithfully,

[Redacted Signature]

Precautionary Principle

The NSW Protection of the Environment Administration Act (Minister for the Environment, 2024), requires the maintenance of ecologically sustainable development through the implementation of the Precautionary Principle (and others), defined in the act as:

Precautionary Principle- namely, that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In application of the precautionary principle, public and private decisions should be guided by:

- (i) careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment, and
- (ii) as assessment of the risk weighted consequences of various options.



Microplastics and Health

Microplastics (including nanoplastics), ranging in size from 1 micrometer (0.001mm)- 5mm are produced as a waste product through the shredding of materials to be recycled at the facility. There is no indication about the size distribution, volume or amount of microplastics expected to be generated as a result of the processes at the intended facility.

Microplastics are an emerging human health and environmental concern. Expert review of published information by the World Health Organisation to December 2021 (WHO, 2022) concludes that there is heterogeneity with respect to experimental and data collection methods with further studies required to provide more robust data for assessing the risks of exposure to micro and nanoplastics (MNP) to humans, but recognised that particles < 10 µm are probably taken up biologically. Li et al (2023) reported microplastics in human blood can be transported and deposited in 15 organs, including spleen, liver, colon, placenta, microplastics are found in breastmilk, and further that pregnant women and infants are sensitive to microplastics, and that early exposure may lead to adult chronic disease through a variety of mechanisms including DNA damage, impacts on the immune function, metabolic, neurotoxic and reproductive functions of mammalian cells.

This year, an umbrella review by Dizon et al (2024), found there are no systematic reviews with meta-analyses of the health effects of plastic polymers and MNP, and despite the multitude of plastic-associated chemicals in use, only a fraction has been researched more than once, and subsequently meta-analysed, to assess health effects in humans. Exposure to plastic-associated chemicals is linked to a wide range of adverse health outcomes from before birth (miscarriage), at birth (weight, genital development and appearance), in children (neurodevelopment, obesity, blood pressure, asthma and bronchitis, precocious puberty in girls, i.e. onset before eight years), and in adults (endometriosis, sperm concentration and quality, type 2 diabetes and insulin resistance, thyroid function, polycystic ovary syndrome, obesity, cardiovascular disease, hypertension, and cancer). None of the plastic-associated chemicals examined can be considered safe, with multiple harmful health effects linked to each chemical class.

It is not possible to fully assess the risk of the possible human, animal and environmental health impacts at this time. Firstly, quantification of the size, quantity and distribution of MNP to different environment compartments (including air inside the facility, air emissions from the facility, disposal sites for air pollution control devices/dust, effluent water from the facility, sludge from the Moss Vale Sewage Treatment plants (STP)) needs to be understood in order to assess the environmental and subsequent risk to human health. Further, more information about the dose/response relationship between exposure, and the impact of MNP size with respect to health needs to be gleaned through detailed studies.

Given the significant concerns and risks, the precautionary principle approach should be taken and strong consideration given to the control and avoidance of adverse impacts, including more detailed modelling, extrapolation of data from existing facilities or pilot studies prior to the approval of the development.

Airborne micro and nano plastics

Specific consideration should be given to the fate of airborne MNP with further conceptual details provided by the applicant as to how contaminated air around the shredder will be contained, and treated inside the facility in a way that workers will not be exposed by skin contact or inhalation.

Whilst I note the applicant stated in the course of public meetings held by the IPC that the processing equipment will be enclosed and operating under negative pressure, there should be further details provided beyond the DPHI (2024)'s note of air collection hoods located above relevant process emission points and air pollution control devices to reduce emissions through roof vents.

Further data on the expected distribution of sizes of MNP generated from the shredding process and activities at the plant could be gained from existing Australian based plastics recycling facilities e.g. Albury, Altona North



and included for review by the commission now, prior to approval. Modelling has shown (DPHI, 2024, p 45) that PM 2.5 and PM10 had been exceeded at the ABR facility, and with nano plastics as small as 0.001mm (much smaller than 2.5mm and 10mm in the modelling) how is the impact of these potentially very small plastic particles accounted for?

As previously discussed, these nanoparticles may be more harmful to human health than larger 2.5mm and 10mm size particles.

Do the available air pollution control devices control nano plastics? What is the fate of MNP trapped in pollution control devices and how are these to be managed? MNP from such dusts would be dispersible and should not be disposed in an uncontrolled manner into a landfill and need to be appropriately managed either through binding in concrete or through an incineration process targeting the structure of the microplastic particles.

If such data/performance information on MNP does not exist, a pilot plant could be constructed/operated by an independent organization or University to allow for a verifiable plant design. Whilst I understand a detailed design need not be provided at this stage of the approval process, references to equipment that has been independently certified/demonstrated to reach the required levels, and a conceptual diagram with operating specifications (e.g. negative pressure amount) should be provided by the proponent.

To approve such a project without such operating specifications appears to be analogous to a medication/treatment being progressed through clinical trials and into human use without the appropriate pilot studies and first phase trials demonstrating safety. Similarly, unspecified additional contingency measures to be implemented in response to monitoring and preparation of an Operational Air Quality Management Plan (OAQMP) after the facility is built DPHI (2024, p 46), with no specification as to what such contingency measures might entail, or the specific timeframe required for contingency measures to be enacted, are inadequate in managing the substantial risks.

Particulate air pollutants

The Approved Methods impact assessment criteria for particulate matter for PM 2.5 use a higher threshold than that currently proposed to be in place from 2025 in the legislation- National Environment Protection (Ambient Air Quality) Measure (Schedule 2, Table 2: Goal for Particles as PM2.5 from 2025), current as of 18 May 2021, which lists a maximum 24 hour averaging period concentration of 20 $\mu\text{g}/\text{m}^3$ and 1 year averaging concentration of 7 $\mu\text{g}/\text{m}^3$. The thresholds used are also above recommended limits set out by the World Health Organisation in global air quality guidelines (2021), with PM 2.5 over 24 hour average limits of 15 $\mu\text{g}/\text{m}^3$ and 1 year average of 5 $\mu\text{g}/\text{m}^3$ and PM 10 limits of 45 $\mu\text{g}/\text{m}^3$ (24 hour averaging) and 10 $\mu\text{g}/\text{m}^3$ for one year average.

Particulate air pollution has been associated with increased hospital admissions and death from heart and lung disease. Despite extensive epidemiological research, there is currently no evidence of a threshold below which exposure to particulate matter does not cause any health effects (NSW health, 2020). Young children, pregnant women and older adults are particularly vulnerable to the impacts of air pollution, with air pollution also linked to adverse pregnancy outcomes including preterm birth and reduced birth weight. The nearest childcare facility is less than 1km from the proposed site.

Modelling provided by the applicant in Response to Submissions dated 10th March shows 24 hour average PM 2.5 impacts ordered by highest background would be above the limit suggested by the WHO standard, and that when concentrations ordered by the highest increment 6 of the 8 readings provided would be above the WHO standard. The highest predicted increment was 11.8 $\mu\text{g}/\text{m}^3$, accounting for 78% of the allowance in the standard.

For PM10 readings, applying the WHO thresholds would takes the predicted residential (49 $\mu\text{g}/\text{m}^3$) and commercial (51.9 $\mu\text{g}/\text{m}^3$) levels above the recommended 24 hour average ground level concentration of 45



$1\frac{1}{4}\mu\text{g}/\text{m}^3$, and the annual average PM₁₀ impacts well above the suggested threshold of $10\frac{1}{4}\mu\text{g}/\text{m}^3$ (commercial- $16.9\frac{1}{4}\mu\text{g}/\text{m}^3$ and residential- $15.6\frac{1}{4}\mu\text{g}/\text{m}^3$).

In the discussion in the Response to submissions labeled Appendix J from GHD appears to suggest that the predicted exceedances at the nearest commercial facility do not represent any actual increased risk of air quality impacts above acceptable levels, predominantly due to high ambient PM pollution levels, however I note the EPA characterises these as ‘not insignificant’ (NSW EPA, 2023, p.7). Perhaps the high background levels of PM air pollution (e.g. due to bushfires) in this area may act as a signal that this is an inappropriate location for developments which may further worsen air quality, and that a site with lesser background PM levels ought to be sought.

Water born micro and nano plastics

There is no reference to a publication, equipment performance specification or existing facility that substantiates the claim on page 46 of the DPHI Assessment report, whereby 90% of microplastics generated through washing of plastics would be managed by the sites water treatment plant (with the DAF unit’s sludge processed as a dewatered filter cake. (DPHI, 2024, p46). The proponents should be able to demonstrate that this is an achievable target for removal citing a similar facility’s performance or proven performance of existing DAF technologies. As previously discussed with airborne MNP, if available performance data is not available, then a pilot plant with a synthetic wastewater needs to be set up at an independent organisation, such as CSIRO or a University.

In contrast, the NSW EPA (2023, p8) show an existing similar facility for recycling PET performs poorly, with microplastics sent to a local sewerage treatment plant and the EPA working with the CSIRO to perform remediation work to remove microplastics from effluent and biosolids.

The proponent should also further detail the fate of the dewatered filter cake, which if left to dry out on exposed landfill surface would allow microplastics to disperse into the environment. Further management including binding in concrete or other detailed management including labelling of sites where microplastics are buried to avoid future dispersion of microplastics in the event that landfill sites are developed in the future.

The DPHI further refers to volumes of microplastics discharged to sewer as trade waste (without reference to calculations to substantiate these numbers) and makes note that the expected microplastics concentration would be below Council’s trade waste requirement for maximum total particulates of 300 mg/l. I am not aware that there is a current concentration maximum specified for microplastic particulates, and given than microplastics are not inert particulates, and the concern for adverse impacts to human health, they ought to be considered and managed separately and specifically. DPHI (2024, p 47) state the level of microplastics in residual water are predicted to be very low (less than 4 mg/l). There is no reference as to how this concentration was determined, and there is no human health risk assessment provided to demonstrate this is indeed very low and/or at an acceptable level.

There is no information on the removal of microplastics in the Moss Vale Sewage Treatment Plant Upgrade- Review of environmental factors report (NSW Public Works, May 2023) to substantiate the claim that upgrades to the STP would be able to further remove 90% of microplastics disposed of via trade waste, especially given the EPA report detailing concerns that clarifiers have difficulty removing microplastics at other STPs (NSW EPA, 2023, p8). Importantly if microplastics discharged to the STP via trade waste settle in sludge and biosolids in the STP, existing biosolids management plans may need to be updated to ensure that microplastics do not end up being dispersed through the management/disposal of biosolids e.g. through land application or contamination of dusts from biosolids disposed of in landfill or drying processes to the surrounding environment (NSW Public works, 2023, p126). Further, the Moss Vale STP discharges into the Wingecarribee River via Whites Creek, part of the Sydney Drinking Water Catchment, and clarification is required on the fate of microplastics managed at the STP and the risk to sensitive environmental sites including drinking water supply and platypus habitat in the Wingecarribee river.



Mitigation measures detailed in the Social Impact Assessment

The addendum to the social impact assessment completed by Ethos Urban (Jan 2024) notes potential impacts on psychological health and an observed level of impact which 'cannot be substantiated through other evidence'. The black summer bushfires at Green Wattle Creek and Morton Fires of 2019-2020 destroyed around 60 homes in surrounding towns in the Southern Highlands. As the last of the black summer fires were extinguished, Australia began to note the first cases of COVID-19. The cumulative impacts of these stressful events form an important context in which residents bring their own understandings of the risks that fire events and health threats related to the facility will be viewed. A recent Australian meta-analysis of the impact of bushfires on mental health (Zhang et al, 2022) showed a substantial number of people exposed to bushfires experienced mental health concerns, and mental health issues were still highly prevalent in the long term, with up to 15 % of those exposed to bushfires still experiencing PTSD at >8 years. Residents are cognizant of the proposed site being a designated bushfire prone area, and of the risks of fire in plastics recycling facilities, especially with the recent Hume recycling facility fire in 2022 and so have heightened awareness of the risks. The proponent will engage a health and wellbeing service (EAP) to support the mental health and wellbeing of residents, up to and including the first year of operation, however this appears to be a rather short-term and stand-alone intervention, given the longstanding nature of mental health concerns in a post bushfire context, and lacks integration with existing community supports and networks.

Conclusion

The precautionary principle must be applied in the commission's assessment of the proposal. The risks of micro/nano plastics to human and ecological health require further research to reveal outcomes associated with exposure to the range of particle sizes and dose/response relationships, however the available evidence indicates microplastics can damage human health through several mechanisms.

The current proposal does not adequately demonstrate how microplastics generated in the facility can be managed with any reference to existing technologies or real-world examples to provide data for further analysis and accurate estimation of the risks to human health. Where this is not possible, pilot scale trials should be undertaken by independent organisations to demonstrate the effectiveness of technologies to manage the risk. The fate of microplastics in both air and water generated at the proposed site need to be accounted for, to ensure they are not distributed to the environment and waterways (through the Moss vale STP, or inadequate disposal methods of filter cakes, dusts and sludge).

This important work should be undertaken prior to approval of the facility. It is not acceptable to manage such risks through vague wording in the conditions of consent e.g. To ensure the onsite WTP is optimised to effectively reduce microplastics, the Department recommends requiring the Applicant to consult the EPA during its detailed design and regularly consider new wastewater treatment technologies and update the WTP accordingly. (DPHI, 2024). Such conditions are difficult to enforce and do not reference human health risk assessment.

Particulate matter air pollution is of concern, with the current reporting standards using limits that are no longer in keeping with international standards. There is currently no evidence of a threshold below which exposure to particulate matter does not cause any health effects.

The very real risks of fire at such a facility compound social and mental health impacts in a community which has experienced significant, recent and successive stressors through severe bushfires and COVID-19 pandemic restrictions. Consideration should strongly be given to finding a more suitable location for this proposal.

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