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To whom it may concern,

I am writing to comment on the Environmental Impact Statement (EIS) prepared by GHD for Plasrefine's proposed plastic recycling facility at Moss Vale, titled "Moss Vale Plastics Recycling and Reprocessing Facility EIS". Most of my comments relate to the section called Technical Report 3 – Air Quality and Odour, which I will refer to as "the report".

The report omits some important information about the impacts on human health from volatile organic compounds (VOCs) and other airborne emissions, and generally presents insufficient detail about how Plasrefine would manage these emissions. The report only assessed 3 individual VOCs (benzene, toluene and styrene), but there are many more VOCs and other noxious compounds that can be released when plastic is melted, some of which are carcinogenic or neurotoxic; a few such as limonene, caffeine, siloxane, and nitrogenous compounds are associated specifically with waste plastic (Yamashita et al. 2009). "Exposure to airborne VOCs has been shown to have severe adverse effects on multiple organ systems of humans" (Zhao et al 2017). The substances of concern also include chlorinated hydrocarbons and phthalates which can affect a number of human organ systems. The report does not even mention these problematic substances, let alone assess their possible impacts on the health of the nearby community, or on Plasrefine's own employees.

The report relies on the stated assumption that the plastics being heated will include only polyethylene (PE), polypropylene (PP) and polyethylene terephthalate (PET). The EIS states, however, that the facility will also process acrylonitrile butadiene styrene (ABS), and up to 20,000 tonnes of polyvinyl chloride (PVC) per year. Both of these plastics should have been included in the report's assessment of air quality impacts, particularly PVC which will represent around one sixth of all plastics processed at the facility and will therefore contribute significantly to its emissions.

The toxic emissions from heating PVC include toxic hydrogen chloride, vinyl chloride (a known carcinogen) (Allsopp & Vianello 2012), and dioxins, which are "among the worst materials for human health impacts." (USGBC, 2007). The exclusion of PVC from the report casts significant doubt on the validity of GHD's claims that airborne emissions from the Plasrefine facility will be "low" or benign.

Scientific studies of plastic recycling processes and facilities elsewhere in the world have documented impacts on human health and wellbeing as a result of airborne emissions (e.g. Forrest et al. 1995, Yassi 2001, Yamashita et al. 2007 and 2009, Tsai et al. 2009, Yorifuji et al. 2012, He et al. 2015, Zhao et al 2017). The impacts on people living near other plastic recycling facilities included respiratory and skin problems, increased cancer risk, and reduced quality of life as a result of unpleasant odours. These effects were sometimes experienced by residents more than a kilometre away, but were most severe for those living closest to or working inside plastic recycling facilities. For instance, residents within 500 m of a plastic recycling factory were 6 times more likely to report eye discharge compared to a reference group elsewhere (Yorifuji et al. 2012). The EIS does not address these human health issues, nor are those studies included in its reference list.

Any emissions from the Plasrefine facility will be in addition to the already high level of VOCs emitted by Dux Manufacturing and Berrima Cement Works (as noted in the EIS), contributing to cumulative impacts on people nearby.

The report appears to imply that containing Plasrefine's activities within buildings will help to minimise airborne emissions, but other plastic recycling facilities are also contained within buildings, and may have used similar air treatment methods to Plasrefine's proposed system, and they nonetheless produced noxious airborne emissions that impacted upon surrounding communities.

The report does not provide information about the efficiency of the proposed systems for treating air emissions within Plasrefine's facility, either in a general sense, or in relation to the particular brand of equipment Plasrefine would use. It is not stated what percentage of emissions these systems would capture. This is an important detail, since it is one of the primary factors determining the amount of airborne pollutants released into the surrounding environment. Without some indication of the efficiency of the capture systems, how can the report justify its claim that emissions will be "low"?

Prior to publishing the EIS, at community presentations, GHD stated that Plasrefine would use "common techniques that are able to capture 99% of emissions" (although no supporting evidence was provided for this statement). Even if this is true, it still unfortunately amounts to a large impact on air quality. Effectively it means that untreated emissions from 1% of the 120,000 tonnes of plastic to be processed each year - i.e. around 1200 tonnes per year, or more than 3 tonnes per day - will be vented straight to the surrounding neighbourhood. If some ordinary citizen was to melt down 3 tonnes of plastic per day in their backyard, with no protection for the neighbours, it seems highly unlikely that would be considered acceptable anywhere close to a residential area, or described as a "low" emission activity.

GHD has previously stated "the air quality assessment identified that nearby sensitive receivers will not experience air quality impacts due to the direction of prevailing winds", and the report makes various similar claims. This is perhaps carefully worded to put the emphasis on "nearby sensitive receivers" rather than discussing the impacts on surrounding communities more broadly. The meteorological data presented in section 4 shows the prevailing winds blow mostly from the North/Northeast in spring and summer, directing emissions straight towards Moss Vale's central residential and business areas for around half the year. Spring is also the time when high wind speeds occur most frequently, further increasing the likelihood of airborne emissions impacting on the town. Moss Vale is a growing community with several housing developments under way, so these airborne emissions could impact on an increasingly large number of people.

The list of "sensitive receptors" in section 4.1 of the report omits the many people in the general community >500 m from the proposed facility who are vulnerable to impacts from VOCs and other airborne emissions. These include young children, the elderly, and people with respiratory issues such as asthma, or other health issues.

Some other problematic aspects of the report are as follows:

- It is not clear whether there are effective barriers to air movement between the processing areas where emissions will be generated and the unloading area where trucks will drive in. If air can flow freely between these areas (as appears to be the case from the diagrams of the buildings' internal layout) then what will prevent untreated emissions escaping every time the roller doors open to allow trucks in and out?
- It is not clear how effective the proposed methods will be to separate the different kinds of plastic, or what would be the consequences of contamination of one type of plastic with another, particularly with regard to the emissions that could be created by melting particular plastics at too high a temperature if they accidentally enter the wrong process stream.
- It is not clear at what temperature the extrusion process in Building 1 will occur, although this temperature will significantly affect the level of toxic emissions produced at this stage of the process.
- The extrusion process in Building 2, where plastics are reformed, will be done at "less than 280° C". This is not particularly comforting, since many plastics emit harmful substances at much lower temperatures than this. For instance waste PVC can emit toxic hydrogen chloride (HCl) at temperatures around 200 °C (Yamashita et al. 2009). A more precise range of treatment temperatures should be provided for each type of plastic in order to realistically assess what the airborne emissions will be.
- The report does not provide sufficient information about how Plasrefine will assess and monitor emissions. Table 7.1 in the Air Quality report mentions monitoring of "dust" but not VOCs or other emissions. Table 7.4 briefly states that monitoring of "operational emissions" will be done, but gives no information as to how, by whom, how often, and what specific kind of emissions will be monitored. These are important details, since a failure of the emissions capture systems could result in unacceptable impacts on the nearby community if this failure is not detected quickly.
- The study area for air quality and odour assessment was defined only as a radius of about 1.2 km, but other studies have shown impacts on communities at greater distances than this from a plastic recycling facility (Zhao et al. 2017).
- The report assumes that Plasrefine will be fully compliant with the permitted emission concentrations and there will be no accidents or slip-ups. There is no assessment of what the impacts on the community would be should there be an undetected failure of the emissions treatment systems.
- There is insufficient information available about the proponent's prior experience in plastics recycling, and their ability to run the plant safely and successfully. The proponent does not appear to have run a similar facility before.

In summary, the report seems to gloss over, ignore or exclude a good deal of information that is not favourable to Plasrefine's proposal. The issues of air quality and human health need to be taken much more seriously than this.

I also have concerns about other sections of the EIS. The proposal involves transporting plastics a long distance from their point of origin in the cities, creating a large carbon footprint. The EIS notes that operational emissions of greenhouse

gases will exceed the threshold for reporting under the NGER scheme. Also, the proposed facility is much larger than other similar facilities in Australia, and accordingly it seems likely to have much larger impacts on the community and local environment. These problems could all be mitigated by having two or three smaller facilities located closer to the outskirts of Sydney, Canberra and/or Wollongong (although still at sufficient distance from residential areas to protect human health).

As climate change intensifies over the next few decades, extreme weather events will increasingly disrupt transport to and from Moss Vale. This is another good reason why plastic recycling facilities should be located closer to major urban centres where the material originates. The haulage route between Wollongong and Moss Vale is particularly problematic, even though it is a smaller distance than the route to Sydney. There are frequent road closures between the Southern Highlands and Wollongong due to weather events, and accidents on the steep, narrow and winding sections of road are common. Alternative routes up and down the mountain (i.e. Macquarie Pass or Jamberoo Mountain Road) are steep, narrow, extremely treacherous for trucks, and even more commonly closed due to adverse weather or accidents.

In addition to the haulage of waste to the site and products from it, the proposal also involves the disposal of approximately 10,000 tonnes per year of waste to landfill sites such as Bowral Waste Centre or Wollongong. Bowral Waste Centre has been the subject of numerous complaints and controversies in recent years; is it really equipped to handle that level of extra input? Transporting large quantities of waste to Wollongong would have the same issues as discussed above for general haulage.

The size and condition of local roads in the Moss Vale and New Berrima area do not seem equal to the challenges presented by increased heavy traffic. The EIS's photos of roads in Figures 11.2-6 show carefully selected sections of fairly good roads, but locals know that many sections of the relevant roads are not usually like this. Adverse weather (such as recently experienced in March 2022) often creates enormous potholes and other problems overnight.

The EIS shows that all of the three local access roads to the proposed Plasrefine site appear to have significant problems associated with their use. It seems very likely that construction of the new access road will be delayed or even prevented altogether due to land acquisition issues. This could cause unacceptable impacts on Beaconsfield Road, and/or a significant reduction in the quantity of plastic waste the facility can receive.

The proposed site itself has previously been described by Wingecarribee Council as "flood prone" land. In 2019 a development application to subdivide the site was refused by council on this basis, and also because future vehicle movements were expected to generate "a significant adverse impact on the residential amenity and safety of Moss Vale residents living to the south of the site". Flood modelling suggests the 1 in 100 year flood would encroach into the Plasrefine site, and it is not clear whether positioning buildings just a few metres above the 1 in 100 year flood level would be sufficient to prevent water ingress in future climate change scenarios. Recent flooding events in NSW have demonstrated that the unexpected is happening more frequently, and many existing flood maps may need to be

reassessed. In March 2022 some areas of the Southern Highlands experienced flooding above their previous high water marks (e.g. <https://www.2st.com.au/news/highlands-news/159832-bowral-beekeeper-stung-by-floods>). Flooding of the Plasrefine facility could be catastrophic if it resulted in the escape of large quantities of plastic into the watercourse.

The need to move a watercourse to build the facility is also a red flag. This cannot be done without having serious impacts on the ecology of the creek.

A failure or inadequacy of the airborne emissions treatment systems, or unusually large emissions if a fire impacts on the facility, could create serious off-site risks or offence to people, property or the environment due to the toxic nature of the substances involved in melting and burning plastics. A build up of these toxic substances in the nearby environment over time could also represent a significant hazard. Therefore, I would suggest this proposal falls into the category of potentially hazardous or offensive development and should be assessed under SEPP 33.

I am also concerned about the proposal's potential impacts on tourism, which is a large source of revenue for the Southern Highlands. This is particularly true for Berrima, which recently won a major tourism award. Why would anyone want to go on holiday near a huge plastic recycling factory that may smell bad, make them cough or itch, or cause them to develop cancer?

While recycling plastics is certainly desirable and necessary, it needs to be done in a way that will protect people and the environment. If the local community cannot be guaranteed protection from noxious airborne emissions and other impacts, then using the precautionary principle, the Plasrefine facility should be located much further away from residential areas.

References

Allsopp, M. W.; Vianello, G. (2012). Poly(Vinyl Chloride). Ullmann's Encyclopedia of Industrial Chemistry. Weinheim: Wiley-VCH.

Forrest MJ, Jolly AM, Holding SR and Richards SJ (1995) Emissions from processing thermoplastics. *Ann Occup Hyg* 39: 35-53.

Chung-Jung Tsai, Mei-Lien Chen, Keng-Fu Chang, Fu-Kuei Chang, I-Fang Mao (2009) The pollution characteristics of odor, volatile organochlorinated compounds and polycyclic aromatic hydrocarbons emitted from plastic waste recycling plants. *Chemosphere* 74(8):1104-10.

USGBC Technical Scientific Advisory Committee Final Report on PVC, 2007. Archived at the Wayback Machine; https://web.archive.org/web/20080602205050/http://www.pharosproject.net/wiki/index.php?title=USGBC_TSAC_PVC

Yorifuji T, Noguchi M, Tsuda T, Suzuki E, Takao S, Kashima S, Yanagisawa Y. (2012) Does open-air exposure to volatile organic compounds near a plastic recycling factory cause health effects? *J Occup Health* 54(2):79-87.

Zhigui He, Guiying Li, Jiangyao Chen, Yong Huang, Taicheng An, Chaosheng Zhang (2015)

Pollution characteristics and health risk assessment of volatile organic compounds emitted from different plastic solid waste recycling workshops. *Environment International* 77: 85-94.

Kyoko Yamashita , Naomichi Yamamoto , Atsushi Mizukoshi , Miyuki Noguchi , Yueyong Ni & Yukio Yanagisawa (2009) Compositions of Volatile Organic Compounds Emitted from Melted Virgin and Waste Plastic Pellets, *Journal of the Air & Waste Management Association*, 59(3): 273-278.

Yamashita, K. & Kumagai, Kazukiyo & Noguchi, Miyuki & Yamamoto, Naomichi & Ni, Y. & Mizukoshi, Atsushi & Yanagisawa, Y.. (2007). VOC emissions from waste plastics during melting processes.

Yassi A (2001) Health effects of specific air pollutants; in *Basic Environmental Health*. Kjellstrom T, de Kok T and Guidotti TL (eds), 1st Ed, Oxford University Press, New York, pp 190-198.

Xin Zhao, Toshihide Tsuda, and Hiroyuki Doi (2017) Evaluating the Effects of Air Pollution from a Plastic Recycling Facility on the Health of Nearby Residents. *Acta Med. Okayama* 71 (3): 209-217.