New South Wales Government
Independent Planning Commission

STEPHEN SHELLEY		**OBJECT**	Submission ID: 217000
Organisation:	*N/A*		
Location:	*New South Wales 2575*	Key issues:	*Other issues*
Attachment:	*Attached overleaf*		

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I have provided my submission in the attached document

Submission

Moss Vale Plastics Recycling Facility

Name:	Stephen Shelley
Subject matter expertise:	Industrial Design, in particular of Wastewater Treatment Systems.
Experience:	20 years.
Expertise:	I have been a wastewater treatment consultant to government and industry on three continents over 20 years.
Subject of Submission:	Statements in GHD letters to IPC that contradicts global research.
Evidence:	Referenced research studies.
Reasons for Submission:	Provide new and unique information relating to the issue.

Introduction

I have been a wastewater treatment consultant to government and industry on three continents and have been awarded more than 30 wastewater treatment patents in more than a dozen countries including China and Australia.

I have been on the expert panel in international conferences on wastewater treatment, have been a visiting professor at universities throughout SE Asia and China, and was the founder and CEO of one of Australia's highest value "green" companies in the 2000s.

In this submission I will provide references to respected international research that demonstrates the opinion letters provided by GHD to the IPC are contradicted by global research into the particular technical design of this Plastic Recycling Facility.

GHD Information

In GHD's letter of 30 October 2024, GHD states that:

> "While respectful of their concerns, in my opinion the potential risks raised are not significant given the design features of the facility."
>
> And
>
> > "…due to best practice design and pollution controls, predicted incremental concentrations from the proposal are 1% of the annual average $PM_{2,5}$ criteria."

In this submission, I refer to four researchers that contradict the first of these assertions and three researchers that contradict the second.

I am available to the IPC to provide additional research evidence to further support my claims, as well as to provide research references for alternative, less-polluting designs for plastic recycling and/or to research evidence into the distance required to mitigate lethal health effects.

The one study to which Dr Bowman has referred in his opinion letter was done in 2016, it was done at wastewater treatment plants ***not associated*** with any plastics recycling facilities, (in fact most MP[1]s in their study were from toothpaste), and MPs were collected using mesh sizes above 45 uM.

The multiple studies to which I refer were all done in 2020-2024, at plastic recycling facilities using the same process as Plasrefine propose [1], all of which had targeted wastewater treatment plants, and researchers collected MPs using much more sophisticated techniques.

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[1] MP = Micro Plastic

The designed process [1] includes mechanical processing [1] which researchers found to significantly contribute to microplastics emissions [2,3,4,5].

Components of the mechanical process [1] that researchers found generated high MP levels include shredding [4,5], pelletizing [3] and plastic flakes [2].

The particular recycling process explained in the DPHI assessment [1] is conventional and has been studied and identified by all four researchers [2,3,4,5] as producing more pollution than alternative designs would produce.

> "...microplastics are unintentionally generated at extremely high concentrations and released to the aquatic environment during the mechanical recycling of plastic wastes..." [3]

With respect to airborne particles generated during shredding:

> "This study found that number concentrations of particles were 3 to 2910× higher during periods of shredding than pre-shredding background concentrations." [5]

The design of the Plasrefine recycling process [1] has been identified by researchers as producing exceptionally high concentrations of microplastics.

The "contained" facility (and control over discharge)

"Containment" of MP at the facility is not even listed as a key aspect of the development [1 - Section 2.3].

The design [1] includes ventilation stacks to discharge air, and a wastewater treatment plant to discharge treated water.

Researchers [6] have found that:

> "Despite the current and emerging technologies to recycle plastic waste, non-recoverable tiny plastic particles (microplastics) cannot be addressed with existing collection methods due to their exceptionally small size."

So, researchers have established that the micro plastics produced by plastic recycling cannot be contained, nor can they be prevented from entering surrounding air and water.

Researchers [7] also say that:

> "The release of MP pollution in wash water discharge from plastic recycling facilities is significantly understudied and there is a research and knowledge gap

> in understanding how plastic recycling facilities may contribute to the environmental plastic pollution problem."

Despite a state-of-the-art WWTP[2] at a UK plastics recycling facility, Brown et al. [7] found in her case study that:

> "...the MP released relative to the tonnage imported to the plant is up to 0.06 tonne/tonne for post-filtration discharge..."

That's 6% of input tonnage – or 7.2 tonnes per year of micro plastic pollution in the case of the Plasrefine proposal.

Researchers [8] also found that:

> "To sum up, all of the studies claim that there might be much more MPs smaller than the narrowest sieve size."

This summary of studies on plastic recycling facilities in the UK, Vietnam and China that use similar mechanical equipment as this one proposes [1] found that ***in every case***, the ***post***-treatment wastewater caused significant Microplastic pollution.

All the recycling facilities studied by these researchers used the same or similar equipment as the Plasrefine facility proposes [1].

Conclusion

The assertion that the Plasrefine facility is of a design that would increase MP levels by 1% is contradicted by ***all the research*** into ***plastic recycling facilities*** that includes the mechanical stages designed into this one [1].

Research into the ongoing environmental impact of ***plastic recycling facilities*** of the same or similar design to the Plasrefine facility ***all*** found they contribute much more than 1% increase to MP levels in the air and water around the facility.

There are several better designs available[3], which are known to produce less MP pollution. There is also research that suggests negative health effects are reduced several kilometres away from a facility.

[2] WWTP = Waste Water Treatment Plant

[3] Several chemical recycling processes as well as waste-to-energy power plants all produce less pollution, particularly MP pollution, than this design.

References

[1] DPHI Moss Vale Plastics Recycling Facility, SSD-9409987, Section 2.5, pp 14

[2] Gabisa, E.W.; Ratanatamskul, C.; Gheewala, S.H. Recycling of Plastics as a Strategy to Reduce Life Cycle GHG Emission, Microplastics and Resource Depletion. *Sustainability* **2023**, *15*, 11529. https://doi.org/10.3390/su151511529, section 3.2

[3] Go Suzuki, Natsuyo Uchida, Kosuke Tanaka, Osamu Higashi, Yusuke Takahashi, Hidetoshi Kuramochi, Naohisa Yamaguchi, Masahiro Osako, Global discharge of microplastics from mechanical recycling of plastic waste, Environmental Pollution, Volume 348, 2024, 123855, ISSN 0269-7491, https://doi.org/10.1016/j.envpol.2024.123855. (https://www.sciencedirect.com/science/article/pii/S0269749124005694) Introduction, paragraph 2

[4] Michael J. Stapleton, Ashley J. Ansari, Aziz Ahmed, Faisal I. Hai, Evaluating the generation of microplastics from an unlikely source: The unintentional consequence of the current plastic recycling process, Science of The Total Environment, Volume 902, 2023, 166090, ISSN 0048-9697, https://doi.org/10.1016/j.scitotenv.2023.166090. (https://www.sciencedirect.com/science/article/pii/S0048969723047150), Abstract, paragraph 1

[5] Swinnerton, S., Su, J. & Tsai, C.S.J. The emission and physicochemical properties of airborne microplastics and nanoplastics generated during the mechanical recycling of plastic via shredding. *Sci Rep* **14**, 24755 (2024). https://doi.org/10.1038/s41598-024-73775-0, Introduction, paragraph 4

[6] Singh, N., Walker, T.R. Plastic recycling: A panacea or environmental pollution problem.*npj Mater. Sustain.* **2**, 17 (2024). https://doi.org/10.1038/s44296-024-00024-w

[7] Erina Brown, Anna MacDonald, Steve Allen, Deonie Allen, The potential for a plastic recycling facility to release microplastic pollution and possible filtration remediation effectiveness, Journal of Hazardous Materials Advances, Volume 10, 2023, 100309, ISSN 2772-4166, https://doi.org/10.1016/j.hazadv.2023.100309. (https://www.sciencedirect.com/science/article/pii/S2772416623000803)

[8] Emine Büşra Çolakoğlu, İbrahim Uyanık, Plastic waste management in recycling facilities: Intentionally generated MPs as an emerging contaminant, Waste Management, Volume 181, 2024, Pages 79-88, ISSN 0956-053X, https://doi.org/10.1016/j.wasman.2024.04.005. (https://www.sciencedirect.com/science/article/pii/S0956053X24001958)