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15 December 2021

Jeremy Perera
Division Head | Environmental Solutions
DGL Group
Via email: jeremy.perera@dglgroup.com

RE: Response to Submission for Unanderra Liquid Waste Treatment Facility SSD-8304

Dear Jeremy,
The following outlines additional information and clarification to address the New South Wales (NSW) Department of Planning, Industry and Environment (DPIE) and NSW Environment Protection Authority (EPA) requests for further information relating to the *Air Quality Impact and Greenhouse Gas Assessment Hydromet Liquid Waste Treatment Plant* (the AQIA) (**Todoroski Air Sciences, 2021a**) and the *Noise Impact Assessment Hydromet Liquid Waste Treatment Plant* (the NIA) (**Todoroski Air Sciences, 2021b**).

Since the writing of the AQIA additional reports have been prepared for the DGL Group Limited Liquid Waste Treatment Plant (LWTP) and allow us to respond with additional information and clarification requested by the NSW EPA. These reports include *Emissions Equipment Criteria DGL Group – Unanderra* (**Advitech, 2021**) and *Human Health Risk Assessment 201 Five Islands Road, Unanderra, New South Wales* (**EP Risk, 2021**).

Each of the key comments/ recommendations relating are shown in grey italics and is followed by our response to the comment.

NSW DPIE

Air Quality

- *Include relevant information to identify receivers e.g. addresses.*

Table 1 outlines the addresses of the assessed receptors and **Figure 1** presents the location of the Project and the location of selected residential receptors assessed as discrete receptors in the AQIA.

Table 1: Assessed receptor locations for AQIA

Receptor ID	Address
R1	73 O'Donnell Drive, Figtree
R2	45 O'Donnell Drive, Figtree
R3	1 Chapman Street, Unanderra
R4	36 Princes Highway, Unanderra

Figure 1: Project setting and receptor locations

- *Confirm the air quality impact assessment (AQIA) includes the proposed scrubber for Building E and provide details of this scrubber.*

The operation of a scrubber for Building E has been included and is assessed in the AQIA. The scrubber is designed to treat air emissions generated because of an unusual event during the neutralisation process that would not normally occur during typical operations.

At the time of writing the AQIA, detailed specifications for the scrubber associated with Building E were not available which required assumptions to be used for the exhaust parameters, potential control efficiency and likely air pollutants emitted.

Additional information regarding the specifications of the scrubber for Building E has been supplied by the Proponent in the *Emissions Equipment Criteria DGL Group – Unanderra* (**Advitech, 2021**) report.

The scrubber in Building E comprises a SO_X scrubber followed by NH_3 scrubber connected in-series and is a contingency in case of a process deviation that could potentially generate waste gases from the

LWTP neutralisation reactors. The scrubber columns will be designed to be approximately 400 millimetres (mm) in diameter and contain 1.5 metres (m) of packing. The SO_X scrubber will be irrigated with around 2000 litres per hour (L/hr) of dilute caustic scrubbing solution and the NH_3 scrubber irrigated with a dilute acid solution at a similar rate.

The scrubber is designed with an exhaust exit velocity of 15 metres per second (m/s) and a maximum emission concentration of 100 parts per million (ppm) of SO_X and 15ppm of NH_3.

Revised air dispersion modelling for the scrubber in Building E is presented later in this response.

A summary of the parameters for the scrubber in Building E parameters is presented in **Table 2**.

Table 2: Parameters for scrubber in Building E

Parameter	Value
Stack height (m)	20
Stack diameter (m)	0.07
Velocity (m/s)	15
Temperature (°C)	25
Flow rate (m3/s)	0.05
SO_X concentration (mg/m³)	262
SO_X emission rate (g/s)	0.0131
NH_3 concentration (mg/m³)	10
NH_3 emission rate (g/s)	0.0005

- *Confirm the dispersion modelling predictions for the other pollutants in Table 7-3 of the AQIA includes an assessment of cumulative impacts by combining the estimated background concentrations*

Background concentrations of NO_2 identified in Section 5.3.4 of the AQIA have been applied to the modelling predictions for the other pollutants in Tabel 7-3 of the AQIA.

Background concentrations are not applicable to the other assessed pollutants in Table 7-3 of the AQIA (except for lead) and have thus not been applied. The lead results are very low and whilst background data are not available, it is reasonable to consider that cumulative impacts are unlikely. The processing of the batteries from which the lead originates, is a wet, mechanical process, and does not generate significant airborne emissions of lead.

- *Address EPA comments on air quality including additional information on air emissions inventory, control efficiency for the cyclone and inconsistencies with the Approved Methods for the Modelling and Assessment of Air Pollutants in NSW.*

The NSW EPA comments are addressed later in this response.

- *GHG assessment refers to the proposal as a modification – clarify the terminology used in the assessment. Confirm the GHG assessment is for the proposed operation.*

The greenhouse gas assessment has been prepared for the entire Project and incorporates the existing operations at the site.

Noise

Include relevant information to identify receivers e.g. addresses.

Table 3 outlines the addresses of the assessed receptors and **Figure 2** presents the location of the Project and the location of selected residential receptors assessed as discrete receptors in the NIA.

Table 3: Assessed receiver locations for NIA

Receiver ID	Address
R1	73 O'Donnell Drive, Figtree
R2	45 O'Donnell Drive, Figtree
R3	1 Chapman Street, Unanderra
R4	36 Princes Highway, Unanderra
R5	13 O'Donnell Drive, Figtree
Ind-1	203 Five Islands Road, Unanderra
Ind-2	6 Marley Place, Unanderra
Ind-3	6 Marley Place, Unanderra
Ind-4	1 Marley Place, Unanderra
Ind-5	18 Resolution Drive, Unanderra

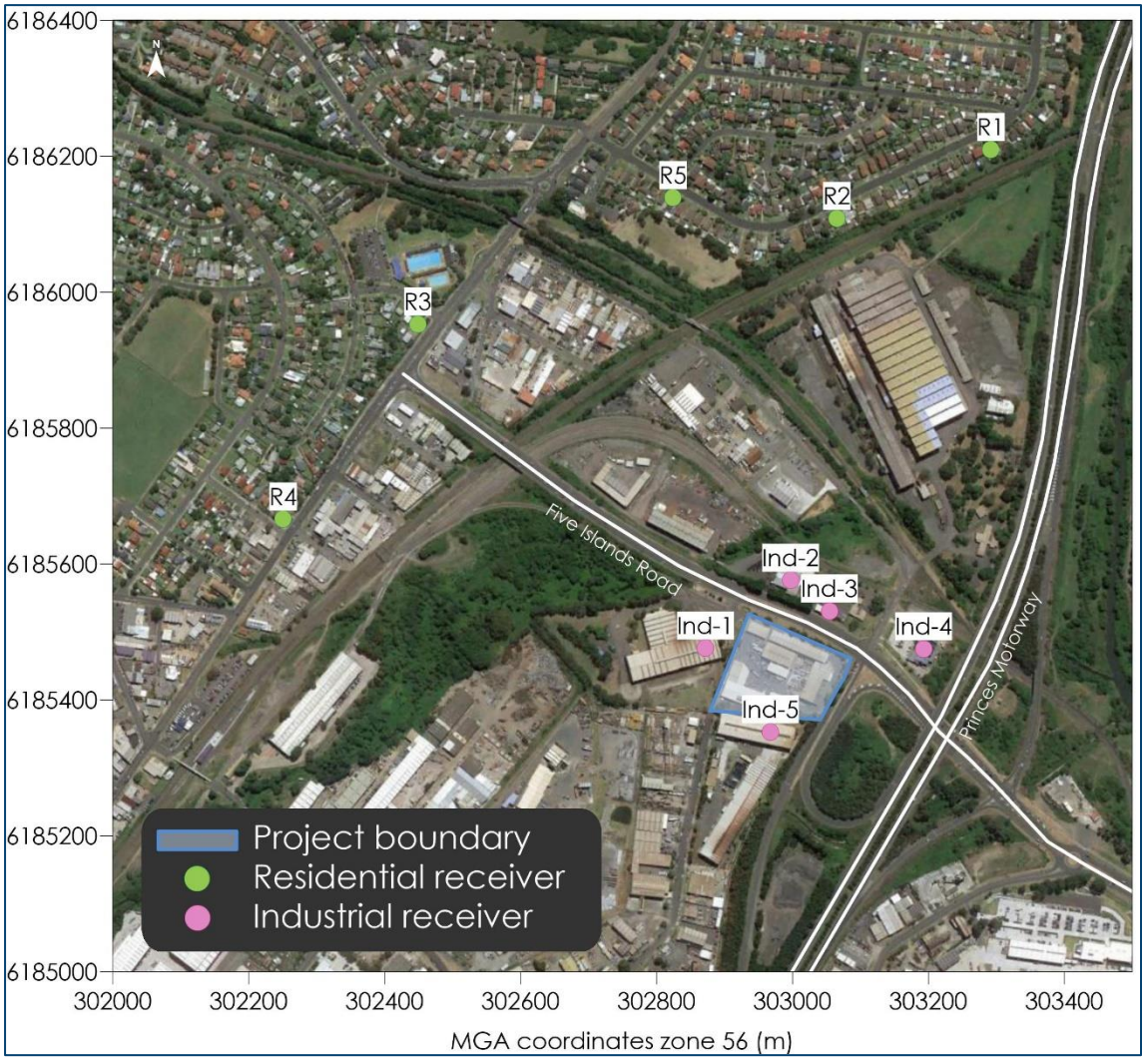

Figure 2: Project setting and receptor locations

It is noted that Table 6-2 shows that while predicted noise impacts would be below the criteria these are above the current noise limits included the EPL for the site. Please confirm whether a variation to the EPL would be sought.

A variation to the current EPL would be sought as part of this application.

The table of sensitive receivers does not appear to include the Aquatic Centre. Please confirm if this receiver has been assessed. Noting that the current EPL includes a noise limit of 45dBA at the Aquatic Centre.

The Aquatic Centre located at 1 Marley Place, Unanderra is assessed as Receiver Ind-4 in the NIA. The predicted operational noise impacts presented in Table 6-2 of the NIA indicate a noise level of 45dBA at Ind-4 and indicate it would comply with the noise limits in EPL 5874 for site.

NSW EPA

AIR QUALITY

Additional Information Required Regarding the Emissions Inventory.

An annual quantity of 6,500tpa of Spent Pickle Liquor (SPL) and 2,000tpa of waste caustic is proposed to be received and treated through the LWTP. The SPL and caustic will be sourced from the aluminium extrusion and galvanizing industries. It is noted in Section 4.4.5 of the EIS (DOC21/563579-1) that 'SPL and waste caustic do not have any contaminants of concern, such as heavy metals'. However, no data was provided to support this.

In section 4.4.3 of the EIS, it is stated that: 'the solidified material from the neutralisation process is composed of a mixture of iron hydroxide (Fe(OH)2) and calcium sulphate (CaSO4), commonly referred to as gypsum. The liquid component is a concentrated salt solution of calcium chloride'. No data has been provided to support this and there is no discussion regarding the possibility that the solidified material contains any other hazardous materials or pollutants of concern.

The waste liquid being treated through the LWTP is sourced from metal processing and related industries, including the Battery Recycling Plant (BRP). It is therefore feasible that dissolved metals, including hazardous (Type 1 and Type 2) metals may be present in both solid and liquid (dissolved in solution) form in the waste liquid. As such, there is a risk these pollutants may be released to air via the kiln dryer. However, the potential for hazardous metals has not been assessed.

The AQIA has included an assessment of Mercury emissions from the premises, by assuming that emissions are 10% of the Protection of the Environment Operations (POEO) (Clean Air) Regulation emission limits. However, there is no justification for the assumed emission concentration. Further, there is no discussion as to why Mercury has been considered, and other hazardous metals have not been.

EPA considers more detailed characterisation of the potential air emissions from the kiln dryer is required. Adequate justification must be provided to support the pollutants assessed and the adopted emission rates.

EPA recommends the AQIA be revised to include characterisation of air emissions from the kiln dryer. Characterisation of the solid and liquid components of the pressed slurry material being

processed through the rotary kiln dryer is required to support the adopted emissions inventory used in the assessment.

The emission inventory in the AQIA for the LWTP was based on the assumed likely air emissions from existing activity at the site, made in the absence of a final plant design specification. Detailed information regarding the LWTP process was thus not available at the time of the assessment and assumptions about the potential air pollutants had to be made for use in the assessment. For example, mercury was assumed as a likely pollutant from the existing and proposed processes at the site, however based on additional information provided this does not appear to be likely.

Additional information regarding the specifications and design of the proposed scrubber, kiln dryer and cyclone with the expected air pollutants associated with the LWTP has been supplied by the Proponent in the *Emissions Equipment Criteria DGL Group – Unanderra* (**Advitech, 2021**) report and summarised below.

The kiln dryer will have a maximum output of 10,000kg/hr of dried filter cake and will reduce the moisture of the filter cake from approximately 50% w/w to approximately 10% w/w. The particle size range of the individual filter cake is between 77µm to 174µm.

The cyclone associated with the kiln dryer should have a removal efficiency of 99.5% based on the particle size range of the filter cake, with an airflow throughput of 31,090m^3/hr and a maximum allowable discharge of 20mg/m^3 of particulates.

Based on the information for the cyclone and the typical concentration of metal species in the filter cake provided by the Proponent, the estimated emissions from this source are outlined in **Table 4**. The expected Type 1 and 2 pollutants include arsenic, cadmium, lead, nickel and selenium.

The estimated emission of these pollutants in **Table 4** from the kiln dryer are low and are unlikely to have any significant ground level impact.

Table 4: Expected air pollutants from kiln dryer

Pollutant	Concentration in filter cake (mg/kg)	Estimated emissions (g/s)
Arsenic (As)	<5	8.64E-07
Cadmium (Cd)	<30	5.18E-06
Hexavalent Chromium (Cr(VI))	<0.5	8.64E-08
Lead (Pb)	<600	1.04E-04
Nickel (Ni)	<100	1.73E-05
Selenium (Se)	<5	8.64E-07

The *Human Health Risk Assessment 201 Five Islands Road, Unanderra, New South Wales* (**EP Risk, 2021**) was reviewed to determine potential air pollutant concentrations associated with the current ULAB facility. The existing process at the ULAB does not involve any heating or combustion, only mechanical processing, and hence there is low potential for air emissions generated. Two key ingredients of the batteries include lead and sulfuric acid (H_2SO_4) and would have some potential to be emitted during the mechanical breaking process.

The concentration of lead within the ULAB building is taken as the maximum measured level from air concentration measurements as 0.015mg/m^3. The report identified that potential for sulfuric acid mist

exposure from the solution to workers in the ULAB is unlikely. The recirculating wet scrubber employed to control potential acid mist generated during the battery crushing stage has no air discharge stacks and therefore there are no air emissions. However, there would be some potential for fugitive acid mist within the ULAB building and thus we have assumed a concentration of 1mg/m^3 based on the Safe Work Australia TWA.

Fugitive emissions associated with the ULAB is estimated using the same ventilation assumptions as applied in the AQIA. **Table 5** presents a summary of the pollutants for the ULAB.

Table 5: Summary of pollutants for ULAB

Pollutant	Concentration within building (mg/m^3)	Estimated emissions (g/s)
Pb	0.015	1.56E-05
H_2SO_4	1	1.04E-03

Adopted Control Efficiency for the Cyclone is Unjustified

In Section 6.2.3.2 of the AQIA it is stated that the cyclone, which will be used to control emissions from the kiln dryer, is assumed to meet at least 90% control efficiency of the POEO (Clean Air) Regulation limits for assessed pollutants.

Cyclones are predominantly used to control dust emissions. Whilst EPA recognises a 90% efficiency may be achievable for particles (noting overall efficiency will be determined based on the particle characteristics and flow rates), it is unlikely that a cyclone would achieve such high removal efficiencies for gaseous pollutants and aerosols, such as NO2, H2SO4, Pb, Hg and HCl. The proponent should provide further justification regarding the adopted control efficiency and associated emission rates for these pollutants.

Whilst EPA may consider it reasonable for the project to assess emissions at the regulatory worst case (at the Clean Air Regulation limits), it is noted that a further 90% reduction in these emissions is proposed, which no longer represents regulatory worst case. Typically, it is recommended that sources are modelled at licence limits, or at concentrations that could be adopted as licence limits. EPA seeks confirmation that the pollutant concentrations assessed are at the proposed licence limits.

EPA recommends further justification for all pollutant emission concentrations adopted in the assessment be provided in a revised assessment. It should be confirmed that the assessed emission rates are achievable and can be applied as emission limits in the site's environment protection licence.

As noted above, the emissions inventory presented in the AQIA was based on assumed values in the absence of specific information regarding the process at the time of the assessment.

Based on the particle size range of the individual filter cake is between 77µm to 174µm, the cyclone associated with the kiln dryer should have a removal efficiency of 99.5% based on the particle size range of the filter cake. We note that gaseous pollutants would be controlled with the cyclone however is not expected to arise from the kiln dryer process. Gaseous pollutants may arise from the neutralisation process at the LWTP and would be treated with the scrubber train.

Design limits for the point sources at the LWTP are outlined in **Table 6**.

Table 6: Summary of pollutant concentrations for LWTP

Source	Pollutant	Concentration (mg/m³)
LWTP Scrubber	SO_X	100
	NH_3	20
Dryer	Particulates	1.0E-04
	Arsenic	6.0E-04
	Cadmium	1.0E-05
	Hexavalent Chromium	1.2E-02
	Lead	2.0E-03
	Nickel	1.0E-04
	Selenium	1.0E-04

Potential for Impacts Have Not Been Adequately Assessed

Table 7-3 presents the predicted dispersion modelling results at assessed residential receptor locations. The modelling predicts minor incremental impacts at these locations. However, impacts at the swim-school (McKeon's Swim Centre), located <200m from the site, on the adjacent corner lot (Corner of Marley Place and Five Island Rd Unanderra), were not explicitly provided. Due to the nature of the activities undertaken and materials handled at the DGL premises, EPA considers the swim-school should be recognised as a community sensitive receptor and tabulated impacts at this receptor be provided.

Furthermore, it is noted that Table 7-3 and associated Figure 7-9, lists the impact assessment criterion for lead as 0.5 µg/m3 at 1-hour average, rather than annual. Whilst it is likely a typographical error, and it is recognised that a 1-hour criterion presents a more conservative approach, for complete transparency it should be corrected in the revised assessment.

EPA recommends the AQIA be revised to;

1) Consider potential for ground level impacts at the swim-school (McKeon's Swim Centre) located on the corner of Marley Place and Five Island Rd, Unanderra.

2) Address identified inconsistencies between the AQIA and Approved Methods for the Modelling and Assessment of Air Pollutants in NSW in regards to correct averaging periods for assessing impacts of lead emissions.

The dispersion modelling for the LWTP and the ULAB have been updated to account for the expected air pollutants arising from the proposed scrubber, kiln dryer and cyclone as presented in the *Emissions Equipment Criteria DGL Group – Unanderra* (**Advitech, 2021**) report and the *Human Health Risk Assessment 201 Five Islands Road, Unanderra, New South Wales* (**EP Risk, 2021**).

The dispersion modelling was setup was identical to that applied in the AQIA, with the exception of the updated emission estimates. Dispersion modelling predictions for the pollutants associated with the LWTP and ULAB are presented in **Table 7**.

Figure 3 and **Figure 4** present isopleths of the spatial distribution of predicted annual average Pb and 1-hour average H_2SO_4 impacts, respectively.

The results show that minimal incremental effects would arise due to the operation of the Project and the predicted levels would be below the relevant criteria for the assessed pollutants. Predicted levels at Ind-4, (McKeon's Swim Centre), would also be below the relevant criteria for the assessed pollutants.

Table 7: Pollutant dispersion modelling results (µg/m³)

Receptor ID	H_2SO_4	NH_3	As	Cd	Cr(VI)	Pb	Ni	Se
	Averaging period							
	1-hour	1-hour	1-hour	1-hour	1-hour	Annual	1-hour	1-hour
	Criteria							
	18	330	0.09	0.018	0.09	0.5	0.18	2*
Maximum predicted offsite	12.5	0.2	0.0001	0.0006	1.1E-05	0.04	0.0014	0.0022
R1	0.4	0.01	2.0E-05	1.2E-04	2.0E-06	2.3E-04	7.4E-05	4.1E-04
R2	0.5	0.02	2.3E-05	1.4E-04	2.3E-06	2.2E-04	5.4E-05	4.6E-04
R3	0.6	0.02	1.5E-05	9.1E-05	1.5E-06	1.4E-04	3.7E-05	3.0E-04
R4	0.5	0.02	1.1E-05	6.8E-05	1.1E-06	9.3E-05	1.9E-05	2.3E-04
Ind-4	2.3	0.1	2.8E-05	1.7E-04	2.8E-06	5.2E-04	1.3E-04	5.5E-04

* TCEQ (2016)

Figure 3: Predicted annual average Pb concentrations (µg/m³)

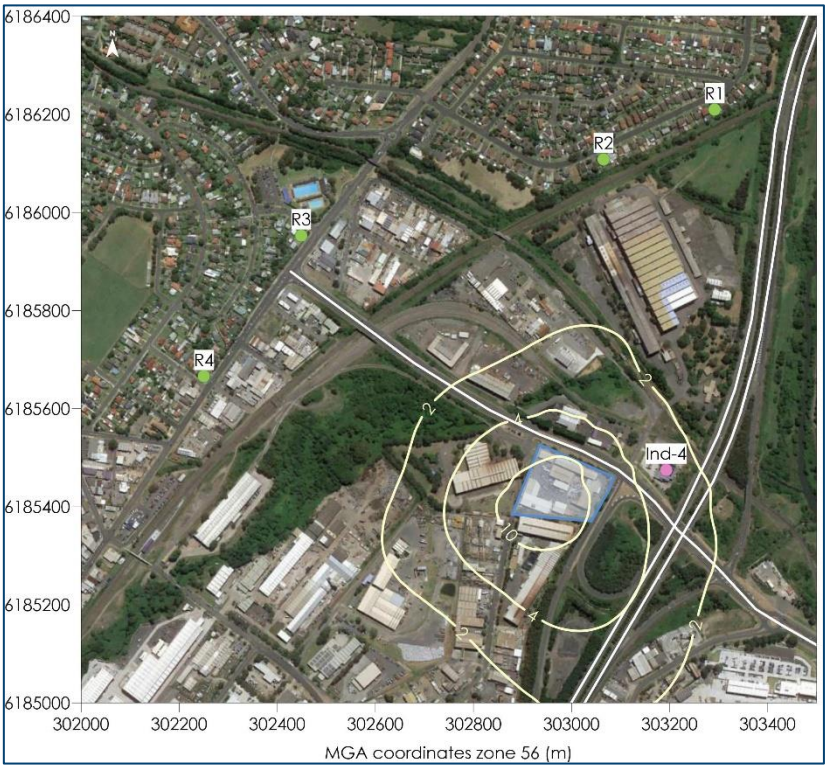

Figure 4: Predicted maximum 1-hour average H_2SO_4 concentrations (µg/m³)

Please feel free to contact us if you would like to clarify any aspect of this letter.

Yours faithfully,
Todoroski Air Sciences

Philip Henschke

Aleks Todoroski

References

Advitech (2021)

"Emissions Equipment Criteria DGL Group – Unanderra", prepared for DGL Group by Advitech, November 2021.

EP Risk (2021)

"Human Health Risk Assessment 201 Five Islands Road, Unanderra, New South Wales", prepared for DGL Group Pty Ltd by EP Risk, June 2021.

TCEQ (2016)

Effects on Screening Level List November 2016, Texas Commission on Environmental Quality.

Todoroski Air Sciences (2021a)

"Air Quality Impact and Greenhouse Gas Assessment Hydromet Liquid Waste Treatment Plant ", prepared for Planning Plus Pty Ltd by Todoroski Air Sciences, June 2021.

Todoroski Air Sciences (2021b)

"Noise Impact Assessment Hydromet Liquid Waste Treatment Plant ", prepared for Planning Plus Pty Ltd by Todoroski Air Sciences, June 2021.