Our ref: DOC21/511147-7
Your ref: Modification 1 to SSD 6666

Department of Planning and Environment
Industry Assessments
4 Parramatta Square
PARRAMATTA NSW

16 July 2021

Attention: Ms Sheelagh Laguna

Dear Ms Laguna,

**State Significant Development 6666 – Modification 1 – On Site Temporary Water Treatment Plant – Hydro Aluminium Smelter, Hart Road, Loxford**

I refer to your email dated 22 June 2021 requesting comment from the Environment Protection Authority (**EPA**) about Modification 1 to SSD 6666 (**the Modification**). The Modification seeks to enable the construction and operation of an onsite Temporary Water Treatment system and associated infrastructure; and to enable discharge of the treated leachate into the existing water management system.

On 3 February 2021, the EPA received a request for advice for SEARs from Planning. In addition to this, the EPA also reviewed the information provided in the Draft Statement of Environmental Effects (**Draft SEE**) and required further information prior to supporting the Modification. As part of Planning's most recent request for advice, the EPA has reviewed the Statement of Environmental Effects (**SEE**) and notes several deficiencies related to soil, surface water and groundwater that were outlined in our previous correspondence but have not been sufficiently addressed. The EPA's comments are attached to this letter (**Attachment A**).

If you have any questions about this matter, please contact Kasey Williams on 4908 6859.

Yours sincerely

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# Attachment A

The EPA provides the following comments outlining the key issues outstanding following the review of both the draft SEE and the finalised SEE:

1. **The existing water quality and soil condition and has not been appropriately characterised**

   *Capped waste stockpile and containment cell leachate*
   The SEE indicates that 11 samples of the Capped Waste Stockpile leachate have been collected and sampled on two occasions (2015, 2019) however most analytes have been sampled less frequently. Fluoride is the only analyte which has 11 sampling events, with most analytes sampled on only two occasions. It is unclear what year these samples were collected as the data has been consolidated. Samples from 2015 are not considered contemporary for the purposes of an impact assessment. The SEE indicates the leachate quality is highly variable, and the SEE has not demonstrated the sampling events have captured this variability in quality. There is no comparison of the leachate quality against the national water quality guidelines (ANZG 2018) guidelines to identify which pollutants are at potentially non-trivial concentrations and therefore require treatment.

   *Dickson Road South leachate*
   Leachate from the Dickson Road South Landfill is proposed to be transferred to the Water Treatment Plant for treatment. The SEE has not characterised the Dickson Road South leachate quality.

   *Dickson Road South perched aquifer*
   Groundwater from the perched aquifer at the Dickson Road South site is proposed to be transferred untreated to the North Dam. The SEE has not characterised the groundwater quality of the perched aquifer.

   *North Dam*
   The North Dam is part of the former aluminium smelter's site water management system. It receives sub surface and open surface water drainage throughout the smelter and the Western Surge Pond. The SEE has not characterised the existing water quality within the North Dam, however the SEE indicates a long-term surface water sampling program has been undertaken within the North Dam. A sound understanding of the North Dam water quality is required prior to adding additional water sources to it.

   *Downstream receiving environments*
   The downstream receiving environments include an unnamed tributary of Black Waterholes Creek, Black Waterholes Creek, Swamp Creek and Wentworth Swamp. The SEE has not characterised the receiving water quality in the downstream receiving environments, however the SEE indicates a long-term surface water sampling program has been undertaken within the downstream receiving environment.

   *Irrigation area soil quality*
   The existing EPL allows for the discharge of effluent to land within the designated irrigation area, which has been occurring for the past 25 years. The SEE has not characterised the existing soil and groundwater quality within the designated irrigation area to demonstrate the cumulative contaminant loading is not prohibitive to ongoing irrigation.

2. **The expected effluent quality from the TWTP is unclear**

   The proposed TWTP is designed '*based on the leachate collected from the Capped Waste Stockpile*', and is stated to treat the following pollutants to the following levels:

- conductivity (4000µS/cm)
- fluoride (15mg/L)
- cyanide (<0.005 mg/L)
- pH (6.5-8.5)
- total suspended solids (<50mg/L)
- total dissolved solids (none specified)
- oils and grease (none visible)
- polyaromatic hydrocarbons (<1ug/L)
- total recoverable hydrocarbons (<100ug/L)

Following each batch of leachate treated, the treated water holding tanks would be tested to ensure concentrations are consistent with the limits above prior to transfer to the North Dam. The SEE indicates that compliance with these limits would mean that '*the leachate is consistent with water in the North East Dam, and therefore what has been discharged via irrigation for the past 25 years'*. If testing indicated that treated effluent was non-compliant with the above criteria, it would be retreated or tankered for off-site disposal.

The SEE has not demonstrated the TWTP can treat the other pollutants to levels that would not cause harm to the environment if irrigated or discharged to receiving waters. This is a requirement of the SEARS. EPA notes each batch should be tested for all pollutants which are present at non-trivial concentrations prior to transfer to the North Dam.

**3. The expected combined water quality within the North Dam is unclear**

The expected combined water quality within the North Dam under a range of scenarios (such as wet and dry weather) is unclear noting the following information is required:

- the water quality within the North Dam
- the groundwater quality from the Dickson Road South perched aquifer
- the water quality from the Smelters site water management system
- the expected treated effluent quantity and quality

4. **The SEE has not assessed the sustainability on site irrigation and dust suppression**

Treated effluent is also proposed to be utilised for onsite dust suppression and irrigation. Currently, irrigation from the North Dam is not to occur unless the North Dam's discharge criteria are met. Except for fluoride, the site's discharge criteria are based on the *Use of Effluent by Irrigation Guidelines* (NSW DEC 2004) and the *Short-term Trigger Values for Heavy Metals in Irrigation Water* (ANZECC 2000). The EPA notes that 'short term irrigation' trigger values are for irrigation up to 20 years. As irrigation has been occurring for the past 25 years, the long-term irrigation trigger values should be considered with reference to existing pollutant loadings in the soil.

The SEE has not demonstrated the nominated discharge criteria reflect all pollutants that may exceed the long-term irrigation trigger values. A high level review (Table 1 below) indicates the untreated leachate contains a number of pollutants that exceed the long-term irrigation trigger values including arsenic, cadmium, cobalt, copper, manganese, molybdenum, nickel, iron.

The SEE indicates that the "*water quality of the North East Dam improves with rainfall and it is following these events that discharge to the irrigation area is required to be utilised. During dry periods irrigation will not occur".* This practice is not consistent with the principles and practices of the *Use of Effluent by Irrigation Guidelines (NSW DEC 2004).* Irrigating when soils are waterlogged potentially allows excess effluent to run off to downstream environments.

The SEE indicates that water will be preferentially used on site for dust suppression with 4 ML estimated to be used during the project. It is unclear if the water quality within the Northern Dam is monitored prior to its use for dust suppression. Depending on the final pollutant levels and areas where the wastewater is used for dust suppression, it could be necessary to consider potential risks to human receptors.

The SEE has not demonstrated that irrigation can sustainably continue. Consistent with the *Use of Effluent by Irrigation Guidelines* (NSE DEC 2004) an assessment of the soil and groundwater within the irrigation area should be conducted to assess the cumulative contaminant loading present within the soils and groundwater and demonstrate that irrigation can sustainably occur on site.

**5. The water balance for the North Dam is unclear**

The SEE report has not provided a detailed site water balance as requested by the SEARS. It is unclear if there are uncontrolled discharges from the North Dam to either surface or groundwater.

The SEE report has provided details of the volume of leachate to be generated under a range of rainfall scenarios, with up to 1.8 ML/month of leachate generated from the capped waste stockpile and the containment cell.

However, the storage capacity of the Northern Dam is unclear, with conflicting volumes presented within different technical reports. For example, the 2016 *Environmental Impact Statement* indicates that the North Dam has a storage capacity of 129.5 ML, while the *Stormwater Management Report – Flood Modelling and Hydrology Review (*PCB 2018*)* indicates the combined storage capacity of the 'North Stilling and North Surge Pond' (the Northern Dams) is 33.1 ML.

It is unclear what size rainfall event the Northern Dams have been designed to contain, and whether there are uncontrolled overflows from the Northern Dam. The *Stormwater Management Report – Flood Modelling and Hydrology Review (*PCB 2018*)* indicates that the Northern Dam had uncontrolled overflows three times between 2013-2016. The SEE also indicates that the North Dam will be receiving perched groundwater as part of the previously approved *Remedial Action Plan: Dickson Road South, Kurri Kurri (Ramboll 2018)* as well as any water collected within the empty containment cells.

It is unclear what additional volume of water will be added from these additional activities and how this will affect the site water balance.

It is unclear if there is any seepage from the North Pond to groundwater. The *Stormwater Management Report – Flood Modelling and Hydrology Review (*PCB 2018*)* indicates flows to groundwater is unlikely '*as the underlying soils are densely compacted and generally most surfaces are impervious'.* It is recommended that the EPA's hydrogeologists are consulted regarding this matter and the potential for groundwater pollution.

**6. There is no assessment of potential impacts of uncontrolled discharges on the downstream environment**

There is no consideration of the potential impacts of any uncontrolled discharges on the downstream environment and whether further management measures are required to mitigate any identified impacts. The downstream receiving environment is Wentworth Swamp, which is mapped as potential habitat to threatened fish species.

A high-level review of the untreated leachate indicates that the maximum observed concentrations for several pollutants significantly exceeded the ANZG (2018) guidelines at

the 95 percent species protection level (Table 1). Untreated, the leachate poses a significant risk of harm to receiving waters, with arsenic, cadmium, chromium, copper, molybdenum, nickel, lead, zinc, cyanide, and uranium at concentrations which are at potentially acutely toxic levels to some aquatic organisms.

The SEE has not demonstrated that the combined water quality within the North Dam will not be acutely toxic to aquatic ecosystems.

**Table 1 Assessment of Leachate Quality (where 'n' is the number of samples)**

| Parameter | Maximum Concentration (ug/L) | 95% Protection Level (ANZG 2018) | Minimum Acute Toxicity (ANZG 2018) | Long Term Irrigation Trigger Values (NSW DEC 2004) |
|---|---|---|---|---|
| Aluminium | 2860 (*n=5)* | 55 | 600000 | 5000 |
| Mercury | 0.1 (*n=2)* | 0.06 | 2.2 | 2 |
| Arsenic | 1000 (*n=2)* | 13 | 812 | 100 |
| Cadmium | 50 (*n=2)* | 0.2 | 1 | 10 |
| Cobalt* | 270 (*n=2)* | 1.4 | 1100 | 50 |
| Chromium | 100 (*n=2)* | 1 | 5.3 | 100 |
| Copper | 1050 (*n=2)* | 1.4 | 40 | 200 |
| Manganese | 100 (*n=2)* | 1900 | - | 200 |
| Molybdenum * | 1500 (*n=2)* | 34 | 30 | 10 |
| Nickel | 2100 (*n=2)* | 11 | 510 | 200 |
| Lead | 300 (*n=2)* | 3.4 | 143 | 2000 |
| Antimony | 200 (*n=2)* | - | 9000 | |
| Iron | 79000 (*n=3)* | - | - | 200 |
| Tin | 100 (*n=2)* | - | - | |
| Vanadium* | 7400 (*n=2)* | 6 | 17000 | |
| Zinc | 350 (*n=2)* | 8 | 51 | 2000 |
| Tungsten | 400 (*n=2)* | - | - | |
| Cyanide | 227000 (*n=10)* | 7 | 100 | |
| Fluoride | 4200000 (*n=11*) | - | - | |
| Uranium* | 3000 (*n=2)* | 0.5 | 200 | |
| | *Shaded cells indicate potentially acutely toxic levels* | | | |
| * | *Low reliability interim guideline value (ANZG 2018)* | | | |

## 7. The proposed monitoring programs require additional information

The SEE indicates monitoring will continue in accordance with the Soil and Water Management Plan, however this document has not been provided for EPA's review. The SEE has provided a summary of the pollutants that are monitored by the SWMP, however based upon the untreated leachate quality, the proposed list may not include all pollutants that may be present within the Dam at levels that could cause harm. It is unclear if the SWMP allows for soil monitoring in the irrigation area to assess the potential impacts and ongoing sustainability of discharges to soil and water.

**Request for additional information**

The EPA recommends that the applicant provides the following information to address the SEARs and inform the matters the EPA must consider under section 45 of the *Protection of the Environment Operations Act* 1997:

- A contemporary characterisation of the influent leachate quality (including the Capped Waste Stockpile, Containment Cell and Dickson Road South Landfill) and existing water in the North Dam for all pollutants likely to be present at non-trivial levels.
- The expected effluent quality from the Water Treatment Plant for all pollutants present at non-trivial levels within the influent.
- The expected combined water quality in the Northern Dam (including the treated effluent and the untreated Dickson Road perched aquifer) under a range of operational and climatic scenarios (e.g. wet weather, dry weather).
- A contemporary characterisation of the downstream receiving environments.
- An updated water balance for the North Dam that:
    a. includes all water sources
    b. the frequency and volume of controlled discharges via irrigation and dust suppression under a range of climatic scenarios
    c. assesses the frequency and volume of uncontrolled discharges to receiving waters under a range of climatic scenarios
    d. demonstrates that the North Dam is sized commensurate with the risk to the downstream receiving waters.
- An assessment of the potential impacts of continued irrigation including a characterisation of the expected irrigation water quality and sustainability of ongoing irrigation consistent with the relevant guidelines e.g. Environmental Guidelines: Use of Effluent by Irrigation (NSW DEC 2004), noting that irrigation has occurred for over 25 years.
- If the water balance indicates that uncontrolled discharges occur from the North Dam, an assessment of the potential impact to the downstream environment with reference to the appropriate guidelines, including the Australian & New Zealand Guidelines for Fresh and Marine Water Quality (ANZG (2018)).
- A soil, surface and groundwater monitoring program that assesses controlled (via irrigation) and where applicable, uncontrolled overflows from the North Dam.
- Identifies the practical measures that will be taken to prevent, control or mitigate pollution, including contingencies that will be implemented.

The EPA notes that several points above were requested previously, however the EPA considers that the information provided was insufficient. In those circumstances, the EPA requests more thorough details, which may require additional onsite investigations, numerical modelling or calculations.