



Our ref: DOC21/654833-4  
Your ref: Modification 1 to SSD 6666

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

Attention: Ms Sheelagh Laguna

23 August 2021

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 2 August 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 Plant (**TWTP**) 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 the Department of Planning Industry and Environment (**DPIE**). 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. On 16 July 2021 the EPA provided written correspondence to DPIE after reviewing Hydro's revised Statement of Environmental Effects (**SEE**). The EPA noted several deficiencies related to surface water that were outlined in previous correspondence but had not been sufficiently addressed.

On 29 July 2021, DPIE and the EPA met with Hydro and their environmental consultants, Ramboll to discuss the deficiencies outlined in the 16 July 2021 correspondence. In response to this, Hydro provided updated information on 31 July 2021. The EPA's comments in response to the updated information are attached to this letter (**Attachment A**). If DPIE grants approval for the proposed Modification, the EPA recommends incorporating the Recommended Conditions of Consent provided (**Attachment B**).

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

Yours sincerely,

A handwritten signature in blue ink, appearing to read 'Steven James', written over a circular stamp or seal.

**STEVEN JAMES**  
**Unit Head Regulatory Operations Metro North**  
**Environment Protection Authority**



## Attachment A

**Table 1 EPA Comments in Response to Statement of Environmental Effects and Supporting Data**

EPA Comment	SEE and Supporting Data	Recommendation
<i>A contemporary characterisation of the influent leachate quality (including the Capped Waste Stockpile, Containment Cell and Dickson Road South Landfill), the receiving water quality within the Northern Dam for <u>all pollutants</u> likely to be present at non-trivial levels</i>	<p>Leachate from Dickson Road South Landfill will no longer be directed to the TWTP or North Dam.</p> <p>There is limited characterisation of the influent leachate quality from the Capped Waste Stockpile and Containment Cell. For several pollutants only two samples have been collected.</p>	As the leachate quality is likely to be variable and the influent hasn't been adequately characterised, conditions of consent are recommended for monitoring of influent and treated leachate quality for all pollutants with the potential to cause harm.
<i>A contemporary characterisation of the downstream receiving environments for <u>all pollutants</u> likely to be present at non-trivial levels</i>	<p>Following review of the SEE and additional raw data for the surrounding environment, the EPA notes:</p> <ul style="list-style-type: none"> <li>many pollutants have only been sampled twice</li> <li>the sampling has not included all pollutants with the potential to cause harm (as indicated by the leachate quality)</li> <li>it is unclear when, where or how the samples were collected</li> <li>the SEE has not provided any interpretation of the raw data against the relevant ANZG (2018) guideline values.</li> </ul> <p>The EPA's review (refer to Table 2 below) indicates that maximum concentrations of aluminium, arsenic, mercury, cadmium, cobalt, chromium, copper, nickel, lead, zinc significantly exceed the ANZG (2018) guidelines for the 95% species protection</p>	Due to the poor water quality observed in the downstream receiving environment, conditions of consent are recommended for water quality monitoring in the downstream receiving environment.

level. Zinc is at acutely toxic levels (ANZECC 2000). Fluoride concentrations downstream appear highly variable with a mean concentration of 3.1mg/L and a maximum of 81mg/L.

The SEE proposes to undertake a baseline monitoring round prior to the operation of the TWTP.

**Table 2 Assessment of ‘Surrounding Environment’ Quality (where ‘n’ is the number of samples)**

Parameter	Maximum Concentration (ug/L)	95% Protection Level (ANZG 2018)	Minimum Acute Toxicity (ANZG 2018)
Aluminium	1500 (n=2)	55	600000
Mercury	0.4 (n=5)	0.06	2.2
Arsenic	15 (n=5)	13	812
Cadmium	0.6 (n=5)	0.2	1
Cobalt*	9.05 (n=2)	1.4	1100
Chromium	5 (n=5)	1	5.3
Copper	20 (n=5)	1.4	40
Manganese	536.52 (n=2)	1900	-
Molybdenum*	1 (n=2)	34	30
Nickel	67 (n=5)	11	510
Lead	10 (n=5)	3.4	143
Antimony	1 (n=2)	-	9000
Iron	not sampled	-	-
Vanadium*	not sampled	6	17000
Zinc	<b>210 (n=5)</b>	8	51
Tungsten	not sampled	-	-
Cyanide	5 (n=110)	7	100
Fluoride	81000 (n=1641) <b>(<math>\bar{x}</math>=3074)</b>	-	-
Uranium*	not sampled	0.5	200

	<div>Shaded cells exceed ANZG (2018) 95% species protection level</div> <div>BOLD text exceeds acute toxicity levels</div> <div>* Low reliability interim guideline value (ANZG 2018)</div>																	
The expected discharge quality from the Water Treatment Plant for <u>all pollutants</u> that are at non-trivial levels within the influent	<p>The SEE includes treatment trials of leachate collected from waste in the capped waste stockpile in 2020. The trials assessed 9 ‘non-trivial pollutants’ however the EPA notes that there were <u>many pollutants</u> within the leachate that were at concentrations that may cause harm to both soil and receiving waters. The SEE has not demonstrated the plant can appropriately treat <u>all pollutants</u> to levels that will not cause harm to potential receptors.</p> <p>The SEE (Table 3-2) erroneously states ‘<i>the results achieve compliance with the treated leachate target values for non-trivial pollutants</i>’. EPA notes that three of the nine pollutant concentrations did not meet the proposed water treatment target values (as per the Table 3 below).</p> <p><b>Table 3 Treatment Trial Results</b></p> <table><tr><th>Parameter</th><th>Trial Maximum</th><th>Trial Mean</th><th>TWTP Target Values</th></tr><tr><td>pH</td><td>9.9</td><td>8.39</td><td>6.5-8</td></tr><tr><td>Free Cyanide</td><td>0.096</td><td>0.0322</td><td>&lt;0.005</td></tr><tr><td>Fluoride</td><td>550</td><td>143.34</td><td>15</td></tr></table> <p>The SEE has revised the treated leachate <u>target values</u> to include metals, with the limits based on the ANZECC (2000) long term trigger values. The notable exception is fluoride (target value 15mg/L), which is 15 times the ANZECC (2000) long term irrigation value. The SEE indicates this target value is consistent with historic irrigation practices on site and the site’s Environment Protection Licence (<b>EPL</b>).</p> <p>There are no discharge limits on EPL1548 for irrigation or for uncontrolled overflows from the North Dam. The EPA notes that the historical irrigation target value of 15mg/L is 15x higher than the ANZECC (2000) long term irrigation value (1mg/L). This elevated fluoride irrigation target value is not reflected in in the EPL. The</p>	Parameter	Trial Maximum	Trial Mean	TWTP Target Values	pH	9.9	8.39	6.5-8	Free Cyanide	0.096	0.0322	<0.005	Fluoride	550	143.34	15	<p>Conditions of consent are recommended to:</p> <ul style="list-style-type: none"><li>• address the significant risks to land and water due to a lack of data regarding the treated effluent quality</li><li>• undertake further work to explore all reasonable and practical options make the fluoride target value consistent with the ANZECC (2000) long term irrigation value noting historical loadings at the site and elevated levels in receiving waterways.</li></ul>
Parameter	Trial Maximum	Trial Mean	TWTP Target Values															
pH	9.9	8.39	6.5-8															
Free Cyanide	0.096	0.0322	<0.005															
Fluoride	550	143.34	15															

	<p>applicant is reminded that it must therefore comply with section 120 of the <i>Protection of the Environment Operations Act 1997</i>.</p> <p>Within the downstream receiving environment, the maximum fluoride concentration has on occasion been very high (81mg/L), whilst the mean concentration (3.1mg/L) exceeds the ANZECC (2000) livestock drinking water guidelines (2mg/L). There is limited toxicity data available, however the US EPA freshwater chronic toxicity concentration is 2.1 mg/L. These results suggest both the soil and the downstream receiving environment has limited to no capacity to assimilate fluoride. To minimise further fluoride related impacts a condition of consent is recommended requiring the target value to be consistent with the ANZECC (2000) long term irrigation value.</p>	
<p><i>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)</i></p>	<p>The SEE has not demonstrated the expected combined water quality within the North Dam and it is unclear how the North Dam is managed (such as how much of the dam is emptied when it reaches 85% capacity). Without adequately demonstrating how treated effluent within the North Dam will be diluted, an emphasis is placed on ensuring the treated effluent meets the ANZECC (2000) long term irrigation criteria.</p> <p>However, EPA notes that as the TWTP discharge will be batch based and water will be tested prior to release, the expected water quality within the North Dam should generally be consistent with the long-term irrigation values.</p>	<p>Conditions of consent are recommended to address the risks of poor water quality in the North Dam.</p>
<p><i>Provides an updated water balance for the North Dam that:</i></p> <ul style="list-style-type: none"> <li><i>includes the treated effluent and imported groundwater from Dickson Road South.</i></li> <li><i>assesses the frequency and volume of controlled discharges via irrigation and dust suppression under a range of scenarios</i></li> <li><i>assesses the frequency and volume of uncontrolled discharges (either via uncontrolled overflow or through</i></li> </ul>	<p>Dickson Road South is no longer being added to the North Dam.</p> <p>The water balance indicates that the North Dam has uncontrolled discharges in conditions equivalent to a 20% AEP (1 in 5 year rainfall event).</p> <p>The SEE indicates <i>'the frequency and volume of controlled discharges via irrigation and dust suppression would be consistent with that for the currently approved project. Irrigation would continue in accordance with the existing EPL' and 'The frequency and volume of uncontrolled discharges would be consistent with that for the approved project'</i>. This information has not been summarised in the SEE, and the volumes of both controlled and uncontrolled discharges from the North Dam and how the North Dam storage capacity is maintained remains unclear.</p>	<p>Conditions of consent are recommended to ensure the water level in the North Dam is managed to maintain appropriate freeboard.</p>

<p><i>groundwater seepage) under a range of scenarios</i></p> <ul style="list-style-type: none"> <li>• <i>demonstrates that the North Dam is appropriately sized commensurate with the risk to the downstream receiving waters</i></li> </ul>	<p>It is noted that the current EPL does not have any discharge limits set for irrigation or discharges to water. The applicant must therefore comply with section 120 of the <i>Protection of the Environment Operations Act 1997</i>.</p>	
<p><i>Provides an assessment of the potential impacts of continued irrigation including:</i></p> <ul style="list-style-type: none"> <li>• <i>a soil and groundwater study within the irrigation area that assesses the cumulative contaminant loading present and demonstrates that ongoing irrigation can sustainably occur on site</i></li> <li>• <i>confirmation that irrigation does not occur during wet weather events</i></li> <li>• <i>a characterisation of the expected irrigation water quality against the Environmental Guidelines: Use of Effluent by Irrigation (NSW DEC 2004), noting that as irrigation has occurred for over 25 years, the appropriate guidelines are the 'long term irrigation trigger values'.</i></li> </ul>	<p>The SEE has provided limited soil data within the irrigation area. EPA notes:</p> <ul style="list-style-type: none"> <li>• most pollutants have only been sampled once</li> <li>• the sampling has not assessed all pollutants with the potential to cause harm (as indicated by the leachate quality)</li> <li>• it is unclear when, where or how the samples were collected</li> <li>• the SEE and additional data package has not provided any interpretation of the raw data.</li> </ul> <p>EPA notes irrigation has occurred on site for the past 30 years, and that only two years of irrigation remain whilst the site is remediated, and that with the exception of fluoride, the irrigated water quality is proposed to be consistent with the ANZECC (2000) long term irrigation values.</p> <p>EPA notes there are inconsistencies within the SEE with regards to the frequency and pollutants to be monitored prior to irrigation.</p>	<p>Noting the remediation project will provide for long-term environmental and human health benefits and a commitment to irrigate using long-term irrigation guideline values, the conditions of consent requiring effluent treatment performance provided below are considered appropriate in this instance.</p>
<p><i>If the water balance indicates that uncontrolled discharges occur from the North Dam, the applicant should provide an assessment of the potential impact of the to the downstream environment with</i></p>	<p>The water balance indicates that the North Dam has uncontrolled discharges in conditions equivalent to a 20% AEP (1 in 5 year rainfall event).</p> <p>The SEE has not provided an assessment of the downstream water quality impacts from uncontrolled discharges. EPA notes that the SEE downstream water quality data indicates that many pollutants exceed the ANZG (2018) guidelines.</p>	<p>Noting the remediation project will provide for long-term environmental and human health benefits, a commitment to treat the</p>

reference to the appropriate guidelines, including the Australian & New Zealand Guidelines for Fresh and Marine Water Quality (ANZG (2018)		effluent consistent with the long-term irrigation guideline values, and the relatively short-term duration (2 years) of the project, conditions of consent are considered appropriate to ensure the water level in the North Dam is managed to avoid and minimise overflows.
A soil, surface and groundwater monitoring program that assesses controlled (via irrigation) and where applicable, uncontrolled overflows from the North Dam	<p>The SEE states “as there are no additional impacts predicted from the discharge of treated water from the TWTP to the North Dam, the existing monitoring program, which has not identified any impacts from the historical use of the irrigation area is considered appropriate monitoring program for the proposal”.</p> <p>Based upon the monitoring data provided in the SEE:</p> <ul style="list-style-type: none"> <li>the existing program has only monitored many pollutants twice (or once at two sites)</li> <li>it is unclear how many downstream sites there are, but based on the number of sampling events, it is less than 2 sites.</li> <li>the monitoring program does not monitor all pollutants that have the potential to cause non-trivial harm (such as uranium).</li> </ul>	Due to the lack of clarity on the existing monitoring program, conditions of consent are recommended to ensure the monitoring program is fit-for-purpose.
Identifies the practical measures that will be taken to prevent, control or mitigate pollution including contingencies that will be implemented if WQOs are not met.	It remains unclear how water within the North Dam will be managed in the event that water levels reach 85% and the water quality is not suitable for irrigation to land.	A condition of consent to develop a Trigger Action Response Plan in the event of poor water quality within the North Dam is proposed below.





## Attachment B

### EPA's Recommended Conditions of Consent

The EPA provides the following Recommended Conditions of Consent for SSD 6666 Mod 1 should DPIE grant approval.

#### **Water Treatment Plant Management Plan:**

Prior to operation of the Temporary Water Treatment Plant (TWTP) the applicant must prepare, in consultation with the EPA, a TWTP Management Plan that includes, but is not limited to, details regarding treatment processes and commissioning and operation stage management protocols. The TWTP Management Plan must include, at a minimum:

- (a) specifications and final design details of the Water treatment Plant (TWTP), including expected treatment performance for all pollutants of concern at the site
- (b) a TWTP commissioning stage monitoring program that includes, at a minimum:
  - the collection and collation of data on both the influent and treated effluent quality for all pollutants of concern at the site
  - a verification process to ensure that the treated water quality is consistent with the 'Treated Leachate Target Values' (Document: Hydro Kurri Kurri Aluminium Smelter Remediation-Mod-1 (SSD-6666-Mod-1): Additional Information, dated 31 July 2021) before discharge to the North Dam
- (c) a TWTP operational stage monitoring program that ensures each treated effluent batch meets all the 'Treated Leachate Target Values' prior to discharge to the North Dam
- (d) protocols and operational rules in the event the treated effluent does not meet all the 'Treated Leachate Target Values' including but not limited to:
  - i. recirculation through the TWTP
  - ii. offsite tankering for disposal at a licensed facility.

#### **Fluoride Treatment**

Prior to operation of the TWTP, the applicant must explore all practical and reasonable treatment measures to reduce the fluoride concentration in the treated effluent to levels consistent with the ANZECC (2000) long term trigger values for irrigation. The fluoride target value in 'Treated Leachate Target Values' (Document: Hydro Kurri Kurri Aluminium Smelter Remediation-Mod-1 (SSD-6666-Mod-1): Additional Information, dated 31 July 2021) should be adjusted to reflect the final target fluoride level following investigation and implementation of further treatment measures.

#### **Irrigation Management Plan**

Prior to construction, the applicant must develop an Irrigation Management Plan that includes, but is not limited to:

1. Irrigation rules to ensure that irrigation water quality meets the North East Dam Target Values prior to irrigation (Document: Hydro Kurri Kurri Aluminium Smelter Remediation-Mod-1 (SSD-6666-Mod-1)).
2. Details of ongoing treated effluent quality monitoring, including sample take location and frequency.
3. Identification of operational triggers (such as 'trigger action response plans') to ensure that the treatment process is functioning correctly and to prevent unacceptable impacts to the



irrigated area. Triggers and associated responses must be provided for, but not limited to, the following:

- a. excessive saturation of the soil profile (waterlogging)
  - b. any surface water runoff of treated effluent from the North Dam
  - c. any water quality impacts to the downstream receiving environment
4. Operating rules to ensure the North Dam maintains a 1 in 5 year rainfall event or 20% AEP design storm capacity
5. Develops a Trigger Action Response Plan (TARP) which includes contingencies to identify and manage any unpredicted impacts (such as poor water quality within the North Dam) and ensure corrective actions are implemented. Contingency measures could include, but are not limited to:
  - a. additional treatment of leachate through the TWTP
  - b. treatment of the North Dam water quality through the TWTP
  - c. offsite tankering for disposal at a licensed facility.

#### **Water Quality Monitoring Program**

Prior to operation of the Water Treatment Plant, the applicant must prepare a Water Quality Monitoring Program that informs the Irrigation Management Plan and Trigger Action Response Plans. The monitoring program should include, at a minimum:

- a. water quality monitoring locations (including but not limited to the North Dam and downstream receiving environment)
- b. analyte list for all pollutants with the potential to cause non-trivial harm (including all the 'Treated Leachate Target Values' (Document: Hydro Kurri Kurri Aluminium Smelter Remediation-Mod-1 (SSD-6666-Mod-1)).
- c. sampling method for each location
- d. the method of analysis as per Approved Methods for the Sampling and Analysis of Water Pollutants in NSW, 2004) and practical quantitation limit
- e. timing and frequency information for each sampling regime. Sampling should be carried out with a frequency commensurate with risk and stage of operation (including prior to any irrigation occurring).