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12 October 2023

NSW Department of Planning and Environment
Attention: Anthony Ko

Email: Via the Major Projects Portal

Dear Anthony,

Oven Mountain Pumped Hydro Energy Storage (SSI-12422997)
Additional Information required following review of Environment Impact Statement

Thank you for the request for advice from Public Authority Consultation (PAE-62358211), requesting the review by the NSW Environment Protection Authority (EPA) of the Environmental Impact Statement (EIS) for the proposed Oven Mountain Pumped Hydro Energy Storage project (Application 12422997) at 9823 Kempsey Armidale Road, Carrai NSW 2440.

The Oven Mountain Pumped Hydro Energy Storage proposal involves the construction and operation of a pumped hydro energy storage system on an ephemeral tributary of the Macleay River known as Fingerboard Crossing Creek. The Project will produce up to 900MW of electricity and will store enough water for up to between 8 and 12 hours of dispatchable, reliable energy at full generation. The pumped hydro system will connect to the existing transmission network that runs between Kempsey and Armidale.

The project includes construction of an underground power station cavern, upper and lower dam reservoirs, spillway, water intake structures, headrace and tail race tunnels, access tunnel, a 15km transmission line and substation. The project will also include ancillary works including accommodation camps, spoil emplacement sites and construction compounds. The Project will also require a new two-lane unsealed access road and a minimum of one new single lane low-level bridge crossing of the Macleay River, to connect the Project area to Kempsey Armidale Road. Approximately 25km of new roads will be constructed for the project.

The EPA has reviewed the EIS and determined that it will require further information or clarification to complete its assessment and to provide further advice on the proposal. These requirements are detailed in **Attachment A** and relate to:

- Greenhouse Gas Assessment
- Noise
- Waste Management
- Water & Groundwater

Should you require any further information, please contact Gabby Sutherland no (02) 6640 2508 or email environmentprotection.planning@epa.nsw.gov.au .

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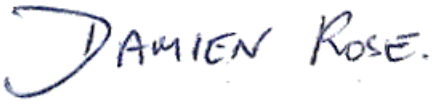
Yours sincerely



DAMIEN ROSE
Unit Head – Environment Protection Planning

Attachment A: EPA information requirements following review of Oven Mountain Pumped Hydrogen EIS

ATTACHMENT A – EPA information requirements following review of Oven Mountain Pumped Hydro Energy Storage Environmental Impact Statement (EIS)

1. GREENHOUSE GAS ASSESSMENT

Further information required:

1. Provide annual scope 1 and scope 2 emissions for the life of the project (2029-2050) and describe how these emissions will be minimised, especially in the first 5 years. This could include, but not be limited to:
    a. Use of onsite renewables to power pumps. If onsite renewables are not proposed, please provide justification;
    b. Use of energy efficient pumps, including justification why variable speed drives are not being considered, and how energy requirements during the pumping cycle will be minimised;
    c. Purchasing renewable electricity; and
    d. Use of fuel efficient vehicles and/or other methods to reduce on-site fuel combustion.
2. Provide the annual emissions savings by avoiding peak gas fired generation (to produce the equivalent electricity as the project);
3. Describe how climate forecasting for the region has been considered in the design and construction of the project;
4. The EIS discussed adaptation measures, however provided little background on the Climate Change Risk Assessment used to inform these measures. Please provide a Climate Change Risk Assessment for the proposal that considers risks for both the construction and operational phases of the project and how they will be mitigated; and
5. Describe how emissions will be minimised during construction, including Scope 3 emissions and a description of how the materials used will reduce Scope 3 emissions.

2. NOISE

Reasonable and Feasible noise mitigation measures

The EPA regulates construction noise through the *Interim Construction Noise Guideline* (ICNG – EPA, DECC, 2009) where proponents are to detail all reasonable and feasible (R&F) mitigation measures to manage any predicted exceedances in Noise Management Levels (NMLs) for the project.

Further information required:

1. The proposal is a greenfield project in a rural area, any exceedances of NMLs will potentially impact receivers. Given there are predicted exceedances for both R2 and R27 further information is required to demonstrate all R&F mitigation measures that will be put in place to manage any exceedances in NMLs. Prior engagement, consultation and negotiation with nearby receivers is strongly encouraged.
2. Similarly, for noise resulting from construction road traffic, all feasible and reasonable mitigation measures should be mentioned in the EIS, to manage noise during more sensitive periods of time.

24/7 Works

Further information required:

The EIS noted “Construction and operation of the Project will be 24/7 and 365 days per year”, however the *Noise and vibration impact assessment* developed by EEM states that a strong justification would typically be required for works outside the recommended standard hours. Further information is required to support work being undertaken 24/7. This information should include the proposed works to occur outside of standard construction hours.

3. WASTE MANAGEMENT

The EIS states that certain vegetation will be composted or mulched, with controlled burning considered in some cases. It is important to consider the *Waste Avoidance and Resource Recovery Act 2001* and the waste hierarchy, which prioritise the efficient use of resources. Given these considerations, the EPA does not encourage or support burning of vegetation as there are higher-priority alternatives for utilising this vegetation.

4. WATER & GROUNDWATER

- **Process water and groundwater**

A median and 95%ile concentration for groundwater has been used to compare against surface water quality. It is unclear which groundwater bore this represents or the sample size. Summary tables for groundwater (Appendix O, Table 4.5) indicate that many samples had limits of reporting which were higher than the ANZG (2018) guidelines, and it is unclear if these samples were in the summary statistic calculations.

Based on the results provided, it is likely groundwater captured will require treatment prior to discharge. As the EIS has not adequately characterised the groundwater influent quality it is unclear how the water treatment plant(s) will be appropriately designed to treat the potentially contaminated water encountered during construction. It is also unclear if chemical additives (coagulants, antifoulants etc) will be discharged from the plant.

It is unclear if the proponent is proposing to line/grout the entire access tunnel/caverns or if mitigation measures will only occur in some areas. If only select sections are to be lined it is unclear what groundwater inflow criteria will be used. Design, management and mitigation measures (such as lining) should be employed to minimise groundwater inflows, limit groundwater drawdown, limit streamflow reduction and reduce the volume of groundwater requiring treatment and discharge.

The proposed discharge quality from the process water / groundwater treatment plants is unclear, however the report indicates *"some residual risks may remain… where concentrations of contaminants in treated water are above the water quality objectives and ambient receiving water values".* A discharge impact assessment is required to demonstrate that treated process water and groundwater inflows will be appropriately managed, to achieve water quality outcomes consistent with the restoring or maintaining the environmental values of the slightly to moderately disturbed receiving environment.

Further information required:

1. Please provide further groundwater information on the Project's strategies to manage spoil (see below section 4(.5) for further information regarding spoil) and enhance any new landforms created is required. The level of assessment provided in the EIS is not proportional to the significance of the impact.

2. There are no baseline groundwater monitoring bores within the vicinities of the proposed soil emplacement areas. Comparisons of infiltrated leachate to baseline groundwater quality cannot be determined as a result of the spatial limitations with the existing monitoring network. It is recommended that further shallow monitoring locations are installed downgradient of proposed spoil emplacements.

3. A review of groundwater quality and leachate quality results, as presented in EIS Appendix O: Geochemistry Assessment, attachment B: Result and Guideline Comparisons, show

high detects of naturally occurring aluminium and iron. Comparisons to a baseline groundwater median and a 95th percentile are presented, but details of that baseline groundwater value and its description could not be found in the EIS.

a. Please provide a more succinct comparison table for all sampled groundwater quality events, with details regarding the adopted guidelines used for comparison is requested. This will enable a more thorough analysis of the variability of naturally occurring leachable metals across the site.

4. Please provide a discharge impact assessment for all groundwater/process water discharges, the assessment must:
   a. characterise the groundwater quality and expected process water quality for all pollutants at non-trivial concentrations;
   b. characterise each construction and operational groundwater/process water discharge in terms of the expected concentrations and loads of all pollutants that may be introduced into the water cycle by source and discharge point, including any chemical additives (e.g., brine, coagulants, antifoulants);
   c. identify the proposed discharge point(s);
   d. assess the potential impact of discharges on the environmental values of the receiving waterway(s), including typical through to worst-case scenarios with reference to the relevant guideline values. Where a mixing zone is proposed, demonstrate how the National Water Quality Guideline criteria for relevant chemical and non-chemical parameters are met at the edge of the initial mixing zone of the discharge;
   e. demonstrate that all practical and reasonable measures to avoid or minimise water pollution and protect human health and the environment from harm are investigated and implemented including (but not limited) to grouting/lining of tunnels and cavern(s) and management of groundwater intercepted during surface excavations;
   f. demonstrate how the proposal will be designed and operated to:
      a. protect the NSW Water Quality Objectives for receiving waters where they are currently being achieved; and
      b. contribute to achieving the NSW Water Quality Objectives over time where they are not being achieved.
   g. propose additional or alternative treatment measures if non-trivial risks to waters are identified and contingency measures in the event of the water treatment plant(s) being un-operational; and
   h. propose discharge criteria for any pollutants that have the potential to cause non-trivial harm based on the impact assessment. If site-specific guideline values are developed for these should be derived consistent with ANZECC (2000) environment (including at least 24 months of contiguous monitoring data from an appropriate reference site).

   In addition to ANZG (2018), guidance on conducting a water pollution discharge impact assessment can be found at: Water pollution discharge assessments (nsw.gov.au)

- **Spoil management**

The project is estimated to generate 5,500,000m^3 of spoil, some of which will be used as aggregate for construction of dam walls with the rest emplaced at three permanent spoil placement locations. 300,000-400,000m^3 of spoil is to be placed within dead storage space within the reservoirs.

It is unclear if the excavated material has been appropriately characterised. Geochemical testing of the likely spoil material indicated it is non-acid forming (NAF), however leachate tests indicate that samples may leach metals. These findings suggest that if untreated, the leachate from the spoil emplacement may pose a non-trivial risk to the downstream receiving

environment. An appropriate level of testing of the physical and chemical characteristics of the excavated material is required to develop suitable procedures for handling, storing, treating, and disposing of excavated material to avoid/minimise potential water pollution impacts associated with the emplacement area.

The EIS has not demonstrated that the proposed methods to manage spoil will prevent the generation of leachate which could contain pollutants at levels that cause harm. EPA notes that standard erosion and sediment controls based on *Managing Urban Stormwater: Soils and Construction* are not adequate for managing the potential water pollution impacts associated with contaminated areas (such as spoil which leaches metals).

Further information required:

5. For EPA to complete its assessment of the proposal, the proponent must:
    a. review inconsistencies between the Surface Water and Geochemistry Reports and if applicable, undertake geochemical/leachability tests with the level of reporting sensitive enough to detect pollutants at levels related to their environmental risk and guideline value (where available) while having regard to the best available analytical practical quantification limits using available technology;
    b. use updated data to develop suitable procedures for handling, storing, treating and disposing of excavated materials and inform the emplacement areas discharge impact assessments (refer to discharge from sediment basins (Section 4(.10));
    c. outline mitigation measures and contingencies to be put in place to manage runoff and potential pollution from excavated material yet to be classified;
    d. identify the testing frequency for excavated material prior to emplacement;
    e. provide further details regarding the management of spoil seepage, particularly the detection of metalliferous rock drainage, its prevention, and capture is requested. Additional context is to be provided for the containment capabilities preventing infiltration of leachate into the underlying strata and groundwater environments;
    f. consider and assess any potential risks and impact to receiving waters for all pollutants at non-trivial levels from the rock/spoil emplacements, including leachate, migration of sediment and surface water runoff. If any potential impacts are identified appropriate management and mitigation measures should be proposed;
    g. develop Trigger Action Response Plan(s) that include (but is not limited to):
        i. contingencies allowing for alternate spoil disposal in the case of unexpected volumes of material unsuitable for disposal
        ii. contingencies for inadequate treatment of leachate from the spoil/ rock emplacement.

The water quality risks of sub-aqueous emplacement of spoil within the reservoir has not been characterised. The EIS water balance indicates that overflows from the lower dam and reservoir spillway are predicted to occur in 45% of years, typically during years with above average rainfall. The maximum annual overflow volume was estimated at 1,400 ML/year. Any overflows will discharge via spillway into the Macleay River.

The EIS has not assessed the potential water quality impacts from the emplaced stockpile material within the reservoirs. The EIS does not provide an appropriate assessment of the potential water quality impacts associated with spoil and sediment mobilisation during commissioning and operation of the scheme.

Further information required:

For EPA to complete its assessment of the proposal, the proponent must:

h. provide further information on the water quality risks associated with subaqueous emplacement of spoil to demonstrate that the water pollution risks to the Macleay River will be appropriately managed. This should include, but is not limited to:
    i. details of any sediment quality and particle size assessment
    ii. the specific measures that will be implemented to mitigate the water pollution risks of these activities (e.g. specifications and locations of silt curtains, monitoring and management responses)
    - The proponent should carry out an assessment of the potential impact of these proposed activities after mitigation measures have been implemented. This assessment should include predictions of the level and extent of water quality changes, the potential impact of these changes on the downstream environmental values and uses (with reference to the relevant guideline values), including potential sedimentation impacts.

- **Wastewater discharges**

The proposed discharge quality from the wastewater treatment plants is unclear, however the Surface Water Assessment indicates that some concentrations within the treated water may be above the WQOs and ambient receiving water values (e.g. nitrogen and phosphorus). The EIS has not assessed the impacts of these discharges upon the downstream receiving environment.

A discharge impact assessment is required to demonstrate that STP effluent will be appropriately managed to achieve water quality outcomes consistent with the environmental values of the slightly to moderately disturbed receiving environment. It will also help demonstrate that surplus wastewater from concrete batching sites/ will be appropriately managed to achieve water quality outcomes consistent with the environmental values of the slightly to moderately disturbed receiving environment.

The EIS has not considered the potential water quality impacts associated with the construction and operation of a new substation. It is unclear if an oil spill containment system is proposed, and if so, if stormwater pits are appropriately sized and where water used for the testing the containment system would discharge to. It is unclear how captured stormwater during routine operation of the substation will be managed. Additional details regarding water management at the substation is required. If a discharge to the downstream receiving environment is proposed, a discharge impact assessment is required to demonstrate that runoff from the substation will be appropriately managed to achieve water quality outcomes consistent with the environmental values of the slightly to moderately disturbed receiving environment.

Further information required:

6. Please provide a discharge impact assessment for all wastewater discharges. The assessment must:
    a. characterise the STP/concrete batching/substation wastewater for all pollutants at non-trivial concentrations;
    b. characterise each discharge in terms of the expected concentrations and loads of all pollutants that may be introduced into the water cycle by source and discharge point, including any chemical additives (e.g. pH buffering, coagulants, antifoulants);
    c. identifies the proposed discharge point(s) and wastewater storage specifications including design storm sizing and details of any liners (if applicable);
    d. assess the potential impact of discharges on the environmental values of the receiving waterway(s), including typical through to worst-case scenarios with reference to the relevant guideline values. Where a mixing zone is proposed, demonstrate how the National Water Quality Guideline criteria for relevant chemical and non-chemical parameters are met at the edge of the initial mixing zone of the discharge;

e. demonstrate that all practical and reasonable measures to avoid or minimise water pollution and protect human health and the environment from harm are investigated and implemented including;

f. demonstrate how the proposal will be designed and operated to:

   a. protect the NSW Water Quality Objectives for receiving waters where they are currently being achieved; and
   b. contribute to achieving the NSW Water Quality Objectives over time where they are not being achieved.

g. propose additional or alternative treatment measures if non-trivial risks to waters are identified and contingency measures in the event of the water treatment plant(s) being un-operational; and

h. propose discharge criteria for any pollutants that have the potential to cause non-trivial harm based on the impact assessment. If site-specific guideline values are developed for these should be derived consistent with ANZECC (2000) including at least 24 months of contiguous monitoring data from an appropriate reference site.

In addition to ANZG (2018), guidance on conducting a water pollution discharge impact assessment can be found at: Water pollution discharge assessments (nsw.gov.au)

- **Erosion and Sediment Control**

The erosion risk for the entire study area is classified as 'high' due to the erodibility of the soils, slope, terrain, duration of construction and high rainfall erosivity of the project areas.

High efficiency sediment basins, sized to accommodate a minimum of a 5-day 85th percentile rainfall depth capacity have been '*recommended'* by the proponent. The locations and capacity of sediment basins has been deferred until detail design; however indicative sediment basin locations have been provided. A total of 18 sediment basins (including two spoil emplacement basins) are proposed for the project. EPA notes over half of the project alignment (over 8km of unsealed access tracks) which cross many waterways have no sediment basins proposed.

The EIS has not provided specific details of the criteria used to determine areas where '*construction of sediment basins is not feasible'* and it is unclear if the proponent has appropriately considered all practical measures that can be taken to prevent, control, abate or mitigate the pollution and protect the environment from harm.

Further information required:

7. Please provide further details and commitments on the erosion and sediment control approaches with reference to practices and principles of Volume 2 of the *Managing Urban Stormwater* series and other industry best practice. This could include, but is not limited to:
   - i engaging a specialist soil and erosion control practitioner to oversee soil and erosion control for the site during construction;
   - ii installing larger basins where practicable;
   - iii prioritise reuse over discharge and pumping between storages to avoid a discharge;
   - iv stage construction activities so that land disturbance is confined to the minimum area possible;
   - v use timber windrows during clearing to assist erosion control;
   - vi retain vegetation within flow lines for as long as possible; and
   - vii retain groundcover on soils to minimise the potential loss of sediment.
8. Please provide further details on the criteria used to determine whether a sediment basin 'is not feasible', and where if so, provide additional details of alternative erosion and soil measures proposed (such as undersized basins which can be transferred to larger basins); and

9. Please provide further details of the soil and erosion control measures proposed for each access track and transmission tower pylon in the study area.

- **Discharge from sediment basins**

The EIS has not characterised the expected sediment basin discharge quality adequately. The expected discharge quality for each sediment basin is unclear. Some sediment basins may contain pollutants other than 'clean' sediment, for example runoff from temporary spoil and excavated rock stockpiles or dewatered groundwater from excavations.

Coagulants and flocculants are also proposed to enhance sediment removal. Any discharges which contain flocculants would need additional consideration in the discharge impact assessment.

The spoil management approach largely relies upon dilution within the receiving waters and does not identify the length of the mixing zone, or account for background concentrations of pollutants in the receiving environment. There is no assessment of non-metalloid pollutants such as pH, conductivity, nutrients, turbidity and suspended solids.

The expected volume of leachate generated from the emplacement area is unclear. It is also unclear if the emplacement sediment basin has been appropriately sized to contain and treat contaminated stormwater/leachate.

Additional information is needed to assess the discharge quality, volume, and frequency from the sediment basins used for emplacement. As well as details regarding the treatment methods and other practical mitigation measures regarding sediment basins. An appropriate assessment of the potential environmental impacts resulting from the discharges from these sediment basins is also required.

Further information required:

10. Please provide a discharge impact assessment for all pollutants that may be present at non-trivial levels for each sediment basin. The discharge impact assessment must include, at a minimum:
    a. identification of all potential pollutants at non-trivial levels which may be present in a discharge from site (including flocculants/coagulants/ spoil/stockpile leachate);
    b. estimation of the expected frequency and volume of discharges ;
    c. details of any proposed treatment plant(s) and other measures to minimise potential impacts of discharges;
    d. assess the potential impact of discharges on receiving waters with reference to the ANZG (2018) guidelines. Where a mixing zone is proposed, demonstrate how the National Water Quality Guideline criteria for relevant chemical and non-chemical parameters are met at the edge of the initial mixing zone of the discharge; and
    e. where pollutants have the potential to cause non-trivial harm in discharges, additional or alternate treatment measures should be developed to avoid, minimise and mitigate water pollution risks.

In addition to ANZG (2018), guidance on conducting a water pollution discharge impact assessment can be found at: Water pollution discharge assessments (nsw.gov.au)

- **Monitoring Program**

The proponent indicates that a baseline monitoring program for the project commenced in August 2021 and surface water was collected up to the beginning of August 2022 '*i.e. 12 months of data'.* However, at each site only 1-5 sampling events has been collected, not 12 months of data. The Surface Water and Groundwater Assessment Papers makes comparison of impacts to '*ambient receiving water quality*'. However, the EIS has not undertaken enough

sampling events to capture the baseline water quality. It is also unclear if each sampling event is representative of wet or dry weather conditions.

If the applicant is proposing Site Specific Trigger Values they should be derived consistent with the ANZECC (2000) guidelines including the identification of a suitable reference site and the collection of 24 month of contiguous data. Toxicants are usually compared with a single default trigger value and less commonly with a background or reference distribution as the default values are prepared by analysis of a comprehensive set of available ecotoxicological data. However, for naturally occurring and some non-metallic inorganics, site specific trigger values can be developed using a similar methodology.

Further information required:

11. If proposing Site Specific Trigger Values (such as for aluminium and iron) please ensure they are developed consistent with the ANZECC (2000) guidelines including the selection of an appropriate reference site, and the collection of 24 months of contiguous data.

The proposed monitoring sites are not appropriate to also monitor downstream water quality impacts associated with disturbance areas along the transmission line and access tacks. There are no water quality monitoring sites proposed downstream of RWO4, despite over 6km of additional access tracks and disturbance areas occurring further downstream. The proposed monitoring program frequencies are not appropriate commensurate with the construction phase risk and duration of works.

Further information required:

12. Please provide a surface water quality monitoring program that includes (but is not limited to):
    a. identification of water quality monitoring locations during baseline and construction phases;
    b. analyte list and limits of reporting with reference to the relevant ANZG (2018); assessment criteria for a slightly to moderately disturbed receiving environment
    c. sampling frequency for each project phase that includes:
        i. baseline monitoring at a frequency that reflects seasonable variability; and
        ii. construction phase monitoring at a frequency commensurate with risk and to inform any Trigger Action Response Plan(s).
    d. a Trigger, Action, Response Plan detailing water quality triggers and operational responses for water quality exceedances; and
    e. develops a plan to regularly confirm that water quality is consistent with water quality triggers.