Our ref: DOC25/185456-8

Mandana Mazaheri
Team Leader Assessments
Department of Planning, Housing, and Infrastructure

By email: mandana.mazaheri@planning.nsw.gov.au

Dear Mandana,

MT PIPER POWER STATION – ENERGYAUSTRALIA
Operational Efficiency Improvements – Mod 9 (DA 80-10060)

I refer to your request from the Department of Planning, Housing, and Infrastructure (DPHI) for advice from the Environment Protection Authority (EPA) on the proposed modification (Mod 9) to development consent DA 80-10060 for the Mt Piper Power Station (MPPS), owned and operated by EnergyAustralia (EA).

In preparing this advice, the EPA has included a review of the following documents provided by EA:

- *'Mount Piper Power Station – DA 80-10060, Energy Australia NSW Pty Ltd, Xenith (February 2025)'.*
- *'Mount Piper Power Station – Water Impact Assessment, DA 80/10060 – Modification 9, Energy Australia, NSW Pty Ltd, ERM (December 2024)'.*
- '*Mt Piper Ash Repository – further modelling in support of capping design, ERM (July 2023)'.*
- *'Mt Piper Power Station, Ash Repositories Water Assessment – Numerical Groundwater Modelling – Groundwater Flow Model Report, ERM (July 2023).*

The EPA understands the proposed modification is seeking to modify DA 80-10060 to authorise revisions to the currently approved capping strategy for the Mount Piper Ash Repository (MPAR). The proposed modification includes the following:

- Installation of a low-permeability synthetic capping layer on the top section of the MPAR over portions of the top section of Stage 1 and Stage 2 ash placement areas.
- Installation of a Leachate Barrier Management System (LBMS) on the eastern end of the MPAR (Zone 2) to enable additional placement of Brine Conditioned Ash (BCA), solid mixed salts, and other authorised wastes as per the Environment Protection Licence (EPL 13007).
- Construction of water drop structures and energy dissipators to direct clean water flows from the cap and the rehabilitated MPAR to Wangcol Creek.

EPA Advice on the Proposed Modification

For your information, the EPA provided feedback to EA on 21 October 2024, following a presentation to the EPA by EA in August 2024 on the proposed capping strategy. The EPA provided advice on the intention by EA to reduce the capping area over MPAR to the area above 979m AHD. The EPA raised concerns that any reduction to the original capping area could lead to an increased solute concentration in local groundwaters and Wangcol Creek for an extended period, when compared to the full capping strategy.

In addition, the EPA recommended that EA implement an adaptive and phased mitigation approach to manage the migration of contaminants from the MPAR to ensure that short, medium, and long-term protection goals are achieved for Wangcol Creek, and the local and regional groundwaters. Within the October 2024 correspondence, the EPA recommended EA considered an expansion to the capping strategy aligned with the previously approved plan.

In reviewing the current supporting documents for Mod 9, EA has identified the following justifications for the reduced capping area:

- Constraints associated with the capping of MPAR over existing batter slopes, which have slope angles of approximately 1(V):4(H).

- Potential risks associated with capping the slopes including future geotechnical instability, erosion and slope failures for fill material placed over the low permeability layer.

- Awareness that the top section of MPAR contains the most recently placed brine conditioned ash (BCA) and solid mixed salts, and therefore is estimated to contain the highest mass of salts in MPAR with the potential to leach to local groundwater.

- Limiting capping to the top section of MPAR may also provide a better opportunity for reclamation and reuse of ash placed in MPAR compared to a more extensive capping strategy.

The EPA notes that the addendum letter to the Report titled '*Groundwater and Surface Water Assessment, Numerical Groundwater Modelling – Solute Transport Model (the Solute Transport Model Report, ERM 2022a)*' concludes the following:

- The initial modelled option of a greater extent of capping is not considered to be a feasible option due to the constraints associated with capping over existing rehabilitated batter slopes and benches, (as described above).

- While EA considers the greater extent of capping as not being feasible, EA committed to continue rehabilitation of the existing batters and benches on MPAR to mitigate ponding and promote runoff and evapotranspiration. This is to be achieved with the objective of limiting residence time and potential for infiltration into MPAR.

The EPA is aware that assessments of several mitigation options were considered leading up to the submission of Mod 9, and these are included within the '*Mt Piper Power Station, Ash Repositories Water Assessment – Numerical Groundwater Modelling – Groundwater Flow Model Report, ERM (July 2023)'.*

The mitigation options included various groundwater extraction, containment, capture, and treatment methods, including the acknowledgement of the generation of brine wastes post-treatment requiring specialised landfilling requirements.

The preferred longer-term mitigation options identified source mitigation – recharge control as the preferred longer-term mitigation option as a means of influencing and controlling the resulting solute concentrations that might migrate beyond the base of MPAR.

The EPA therefore recommends the following:

- EA have identified the control of recharge over MPAR as the most reasonable and feasible option once MPAR reaches its final approved ash placement extent, and being the most effective long-term solution for control of solutes that are yet to migrate beyond the base of MPAR.

  EA to therefore expand upon and / or identify any additional mitigation measures to improve upon the 'source mitigation – recharge control' method to further reduce infiltration into and through the MPAR. This should include <u>enhanced</u> rehabilitation of the existing batters and benches to mitigate ponding and promote runoff and evapotranspiration.

- EA to clarify if the groundwater model (Scenario 2, the modelled option) has been updated to include any of the potential and / or the progressive improvements over time to the existing batters and benches may contribute towards reducing impacts from MPAR on surrounding surface and groundwater quality.

- EA to provide an environmental – cost-benefit analysis into the justification to avoid the full capping area of MPAR to the reduced size of Mod 9, against the benefits that would be gained by not implementing the full capping extent but be gained by rehabilitating the existing batters and benches with the adoption of the source mitigation – recharge control method and installing a reduced capping area.

- Discharges from the drop structure/energy dissipator are monitored to confirm that these are of a suitable quality to contribute to restoring the environmental values of the receiving waterway. An appropriate trigger action response plan (TARP) should be developed for discharges from the drop structure/energy dissipator.

  This TARP should include appropriate management triggers, developed with reference to the relevant guideline values set out in the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*, and requirements for timely implementation of management measures in response to any identified water quality risks. These monitoring requirements and associated TARP could be reviewed subject to review of monitoring results.

EPA technical feedback

The EPA has provided technical feedback within Attachments 1 to 3 below. With reference to Attachment 2, the EPA technical feedback includes a recommendation for the capping strategy to cover the full extent of the previously approved plan.

In providing the advice on Mod 9 for MPPS, the EPA acknowledges its stewardship role in ensuring the best environmental outcome for generations to come, noting the likely length of time required until MPAR will achieve a non-impacting and stabilised status. The EPA therefore requires EA to provide the most informed (environmental cost – benefit analysis) assessment, to ensure the most appropriate option is selected.

If you have any further questions about this matter, please contact Allan Adams on 6333 3804, or at info@epa.nsw.gov.au.

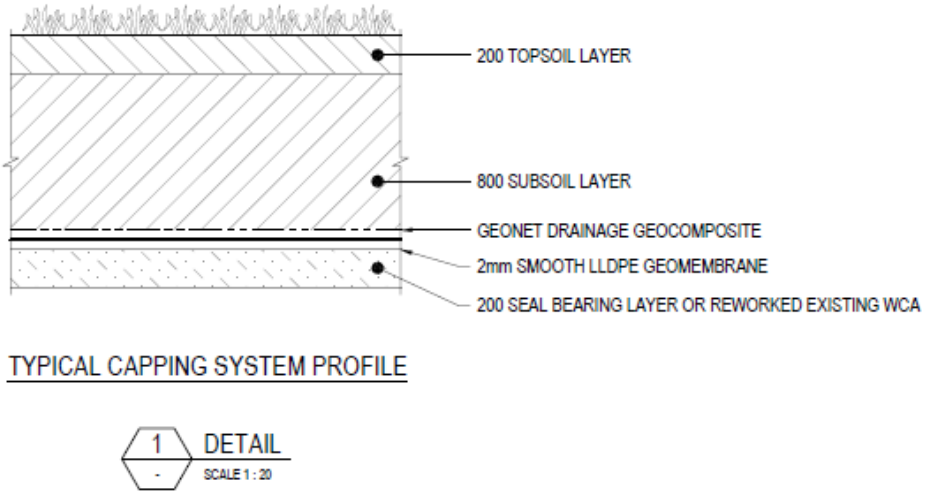
Yours sincerely,

LUCY APPS
Unit Head
Environment Protection Authority
1 April 2025

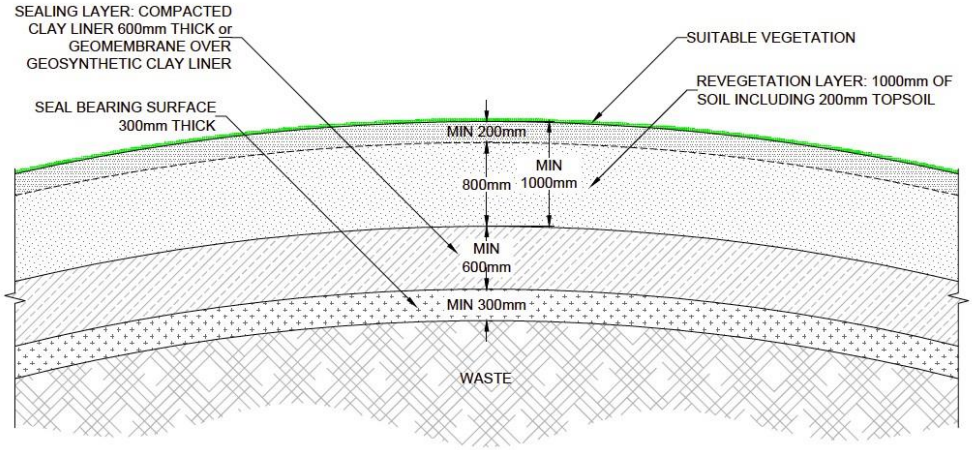
ATTACHMENT 1 – PROPOSED CAPPING STRATEGY

1. Capping Design

The currently approved design includes the application of 200mm of WCA directly over the top of the BCA. This was approved in 2008 and does not reflect contemporary practice for capping ash repositories. The proposed capping system now includes a 200 mm seal bearing layer, 2mm LLDPE membrane, geonet drainage and 1000mm soil layer (see schematic below). This is a significant improvement over the currently approved design.



The capping profile is consistent with the minimum design specifications outlined in the Environmental Guidelines for Solid Waste Landfills (2016) apart from the omission of a geocomposite clay liner. This is usually required when a geomembrane is proposed to be used in the capping profile. The standard capping profile outlined in the Environmental Guidelines for Solid Waste Landfills is shown in the diagram below. The sealing layer includes either 600mm of clay or this can be substituted for a geocomposite clay liner (GCL) in combination with a polyethylene geomembrane (either HDPE or LLDPE).



NOTES:
1. FOR CERTAIN LANDFILLS, THE CAP SEALING LAYER SHOULD ALSO INCLUDE A GEOMEMBRANE OVER THE COMPACTED CLAY - RESTRICTED SOLID WASTE AND GENERAL SOLID WASTE (PUTRESCIBLE) > 20,000 TPA LANDFILLS.
2. THE CAP SHOULD INCLUDE GAS AND INFILTRATION DRAINAGE LAYERS WHERE REQUIRED.
3. THIS FIGURE IS ONLY FOR THE PURPOSE OF ILLUSTRATING THE MAIN CONCEPTS. PROPOSALS TO CAP LANDFILLS MUST CONTAIN FULL CONSTRUCTION DETAILS.

The omission of the geocomposite clay liner (GCL) was considered based on the properties of the ash and the secondary containment systems in place to manage the leachate which may be generated. The Brine Conditioned Ash (BCA) has a permeability of $3x10^{-7}$m/s. This will mean that any infiltration through LLDPE and underlying BCA will be very slow and provide a similar outcome to the use of a GCL. It is also noted that there is a base liner and leachate capture system in place to address any infiltration through the cap.

Based on these considerations the proposed modification is supported.

ATTACHMENT 2 – HYDROGEOLOGY

The Mt Piper Ash Repository (MPAR) is a source of groundwater contamination due to the leaching of elevated levels of chloride, sulfate, and dissolved metals. This contamination poses environmental risks, particularly to Wangcol Creek, a nearby surface water body that is a tributary of the Coxs River catchment and contributes to the Sydney drinking water supply.

The ongoing leachate generation and subsequent migration of contaminants have raised concerns about regulatory compliance and potential impacts to the surrounding environment. Previous groundwater investigations by Environmental Resources Management (ERM) confirmed elevated concentrations of Total Dissolved Solids (TDS) in groundwater linked to BCA placement in the MPAR. ERM recommended improved capping as a preferred mitigation measure. This modification is to improve capping strategy associated with MPAR.

Capping design proposed modification

The current capping design (approved in 2008) consists of a 200 mm Water-Conditioned Ash (WCA) layer placed over BCA at elevations above 946 m Australian Height Datum (AHD). The proposed modification replaces this with:

- 1000 mm soil layer (200 mm topsoil layer and 800 mm subsoil layer)
- Geonet drainage layer
- 2 mm linear low-density polyethylene (LLDPE) membrane
- 200 mm seal-bearing layer
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This proposed design significantly improves the barrier properties and reduces leachate infiltration. However, the revised capping is proposed to be implemented only over portions of the top of approved Stage 1 and Stage 2 BCA placement areas and does not cover the original full capping plan. The extent of the proposed capping area is significantly less than previously approved and does not cover areas above 946m Australian Height Datum (AHD) as per the original plan.

Construction and Groundwater Interaction

Installation of the Zone 2 LBMS does not represent a significant change to the operational water management practices approved under the Mt Piper Consent. Construction activities associated with the proposed energy dissipator will involve shallow excavation (~1-2m). Potential groundwater seepage is expected to be minimal (i.e. estimated to be less than 3 ML), and the construction activity will be short-term and temporary.

Conclusion

The proposed capping design is a significant improvement in capping however the proposed extent it is not covering the original full capping plan (areas above 946 m). Therefore, it is recommended to extend the proposed capping strategy to include the previously approved plan.

ATTACHMENT 3 – SURFACE WATERS

The *Water Impact Assessment* indicates that the modification would involve installation of a leachate barrier system and cap at the Mount Piper Ash Repository to reduce leaching to groundwater, with runoff from the cap surface discharging to Wangcol Creek via a water drop and energy dissipator structure. The assessment predicts that this 'clean' runoff would increase flows in Wangcol Creek by about 7.5%, contributing to restoring natural flow regimes. In this context, if managed appropriately 'clean' runoff from a well vegetated cap should contribute to improved water quality outcomes.

To ensure that potential water quality risks are appropriately managed, the following residual issues should be addressed (either via request for further information or conditions of approval):

- The assessment states that the design of liners, leachate collection system and capping will be 'based on' and 'in general accordance with' the *Environmental Guidelines Solid Waste Landfills* (EPA, 2016) but it is unclear whether the designs would be fully consistent with the guidelines (e.g. establishment of vegetation cover is not discussed).

    - It is recommended that the leachate barrier system and capping are designed and implemented consistent with the *Environmental Guidelines Solid Waste Landfills* (EPA, 2016), including in relation to soil placement and establishment of vegetation cover needed to minimise erosion.

    - There should be no discharges of runoff from disturbed areas until adequate vegetation cover has been established.

- The assessment suggests that the Mt Piper Ash Repository *Water Management Plan* (WMP) may be revised to potentially include wet-weather sampling of 'clean' runoff from the capped area discharging via the proposed energy dissipator. However, it is unclear whether these monitoring requirements would be included in a revised WMP as the assessment also states "Otherwise, the existing MPAR WMP monitoring locations are suitable to assess long-term groundwater and surface water quality outcomes."

    - **It is recommended** that discharges from the drop structure/energy dissipator are monitored to confirm that these are of a suitable quality to contribute to restoring the environmental values of the receiving waterway. An appropriate trigger action response plan (TARP) should be developed for discharges from the drop structure/energy dissipator.

      This TARP should include appropriate management triggers, developed with reference to the relevant guideline values set out in the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*, and requirements for timely implementation of management measures in response to any identified water quality risks. These monitoring requirements and associated TARP could be reviewed subject to review of monitoring results.