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Committee Secretary
Senate Standing Committee on Environment and Communications
Department of the Senate
PO Box 6100
Parliament House
CANBERRA ACT 2600

Submission for the Senate inquiry into the rehabilitation of mine site and ash dams

We would firstly like to thank the senate for this opportunity to contribute to the discussion on mine and ash dam rehabilitation. This is an industry that we work within and a subject that we are currently engaged with on a technical level.

While Aurecon can give broad advice on mine site rehabilitation, through our work with a number of large miners in NSW, our expertise really lies specifically with ash dams, the topic of recent public interest, having been newly included within this inquiry.

We feel that as an engineering company with a long history working with ash dams, we are in a unique position to offer technical assistance to the senate inquiry. We feel that there are a number of nuances to ash dam storages, in differentiation to the rehabilitation of mine sites and tailings dams.

We wish to broadly address the following terms of reference in this submission:

- b. the adequacy of existing regulatory, policy and institutional arrangements to ensure adequate and timely rehabilitation.
- d. the effectiveness of current Australian rehabilitation practices in safeguarding human health and repairing and avoiding environmental damage.
- e. the effectiveness of existing and past power station ash dams with regard to repairing environmental damage and safeguarding human health.
- g. the potential social, economic and environmental impacts, including on matters of national environmental significance under the EPBC Act, of inadequate rehabilitation.

1 Aurecon's history and experience with ash dams

Aurecon is a global engineering and infrastructure advisory company delivering engineering expertise to provide advisory, design, delivery and asset management services to bring ideas to life. We currently provide engineering consultancy and design services to several clients that own and operate ash dams, as well as many of the large miners.

Specifically, we currently provide dam safety management services to all the NSW coal fired power stations (six in total), as well as another three stations in Queensland. We currently assist in the engineering and management of 15 large ash dams and storages in total.

Ash dams are storage / containment structures, constructed as part of the key infrastructure for any coal fired power station. As the name suggests, it is a dam that stores the ash generated from the burning of coal, over the life of the station. This ash typically arrives at the dam in the form of a slurry

mix, roughly 30 % ash to 70 % water, pumped via a dedicated pipeline. There are however a small number of ash storage facilities that are operated as a 'dry' facility, where solid ash is transported to the containment area via a trucking (or conveyor) operation, and moved / compacted into place using bulldozers, broadly similar to a typical landfill operation.

Aurecon are currently providing engineering and planning support on the rehabilitation of five ash dams, including the decommissioning and rehabilitation of the Munmorah Power Station Ash Dam located near Doyalson, on the shores of Lake Munmorah, Central Coast of NSW for Generator Property Management Pty Ltd.

In 2003 Aurecon acquired Pacific Power International, the engineering branch of the old NSW Electricity Commission, when it was privatised by the then state government. This gives us a unique history and corporate memory, dating back over 40 years, to when many of the ash dams were first constructed in NSW.

2 Precedents for ash dam rehabilitation

Due to the age and implementation of the current generation of coal fired power stations in Australia, many remain in service and very few have reached the end of their design life. However, this is gradually changing as a series of stations are progressively now coming to the end of their use.

Given there are very few coal fired power stations that have been decommissioned, there are not many precedents for the rehabilitation of ash dams in Australia. The Tullawarra Power Station Ash Dams, located on the NSW south coast, is an example of one dam that has undergone rehabilitation, that we are aware of. This were completed at the time by the NSW Electricity Commission in the 1990's.

3 NSW context

Given that most of our experience comes from NSW, we are in best position to comment on this region. When it comes to decommissioning dams in general, we believe that a reasonably robust regulatory environment exists in NSW. An ash dam owner needs to consult and obtain endorsement from several regulatory stakeholders when both operating and decommissioning ash dams, including:

- NSW Dam Safety Committee
- Local Council
- NSW Department of Planning and Environment
- NSW Environmental Protection Authority

This is quite different to the mining rehabilitation context, as miners will go to the Department of resources and industry, mining sub department, as the central regulatory body for closure of the mine.

3.1 NSW Dam Safety Committee

The NSW Dam Safety Committee regulates all significant dams in NSW. When a proposal is put forward to rehabilitate a regulated dam, the Committee will review and endorse (provided it is found to be technically acceptable) the proposal, from a public safety standpoint. The Committee is currently made up of leading dams specialists, who will judge the proposal on technical feasibility and merit, to ensure that any rehabilitation will remain safe and not be at risk of 'dam break failure' at any point in the future.

3.2 Determining Authority

The Local Council or NSW Department of Planning and Environment will typically be the main approval body for any given ash dam in NSW, setting the minimum standard required for the site's rehabilitation. This will typically be administered through a set of approval conditions, specific to the site. The relevant approval pathway for each rehabilitation project is affected by the site's original development consent and the actual works required. Projects that require significant earthworks, located in sensitive areas, or were originally approved under state significant or major project approval pathways typically require approval at a state government level. While other projects with smaller impacts can be approved by the local council, or even undertaken without development consent.

4 Ash dams vs mine tailings dams

Within the broad scope of this inquiry, the decommissioning and rehabilitation of ash dams are different to mine sites for the following reasons:

- Ash dams are typically older, in comparison to mine tailing dams.
- The engineering properties of ash are different to mine tailings. The properties and makeup of coal ash will be dependent upon the coal that has been burnt within the station.
- The construction histories of ash dams are quite different. Typically, power stations will have a very long planning horizon, as they know that the station will remain in operation for many years. In contrast, mining operations and production can be variable, dependent upon prevailing economic conditions. Therefore, planning horizons for mining infrastructure can be much shorter.
- The deposition environment can be quite different. In many cases, as ash storage dam will be constructed within a natural valley, at some location near the power station. Whereas tailings dams will often be placed within mined out voids, where they are available.

Historically, the ash dams within NSW have been constructed, owned and operated by the NSW government, through the NSW Electricity Commission, until the privatisation of the electricity generation industry in late 2008.

5 Decommissioning considerations

All dam sites are different. In response, this requires different approaches to decommissioning and rehabilitation. The method adopted for any site will largely be dependent upon:

- the impact to surrounding receptors (natural i.e. receiving surface water bodies, and human i.e. neighbouring residential and commercial);
- the effectiveness of the original design;
- the construction quality;
- the manner in which the dam was operated over its lifetime;
- the natural topography;
- the location;
- availability of local resources;
- groundwater conditions;
- the condition of the ash; and
- prevailing and future climatic / weather conditions.

6 Rehabilitation issues

The typical issues that should be addressed when decommissioning and rehabilitating any ash storage dam include:

- **Dam safety.** This should always be the forefront issue at hand and considered at every step. This minimum requirement covers what needs to occur to ensure the ash dam will never be at risk of breaching and placing downstream lives and environment at risk.
- **Impact upon groundwater.** Ash dams are typically also large repositories of water, as the ash is normally completely saturated behind the dam wall. This is because the ash is normally transported from the power station to the dam as a slurry mix, pumped via a pipeline. As part of any remediation, consideration into how this ash water can be removed, treated or contained to ensure it does not impact upon local groundwater resources.
- **Dust emissions.** As ash deposits dry out over time, they have the potential to emit airborne dust, which poses a risk to neighbouring people. A self-sustaining cover is required to prevent exposure to wind gusts. This cover will typically need to be implemented in stages, going from an initial cover to prevent ash dust and create a stable working platform, to build successive layers to:
 - Prevent upwards migration of salts from the ash deposit through the cover
 - Prevent downwards infiltration of rainfall (if the project deems its required)
 - Enable a suitable growing medium for the selected vegetation regrowth, to prevent dusting of the cover layer.
- **Recycling potential.** The reuse and recycling of ash has been found to be very beneficial in some circumstances. Ash is a potential resource for future engineering projects, such as road construction (subgrade material), and use as a light weight fill. Any rehabilitation scheme should not exclude this potential resource from being accessed and utilised in some fashion in the future.
- **Surface water.** In the early stages of rehabilitation, before vegetation has the opportunity to take hold, sediment transport in rainfall runoff can be problematic.
- **Vegetation.** A selection of appropriate vegetation, dependent upon the goals and constraints of the rehabilitation, taking into consideration:
 - Vegetation that will not threaten the integrity of the dam, or any of its safety features
 - Vegetation suitable with the selected end use of the site
 - Vegetation that may thrive in the resulting environmental conditions (acknowledging that it may not always be possible to entirely restore the site back to its original condition)
 - Vegetation that is self-sustaining and does not require ongoing intervention.
- **Ongoing Monitoring.** Any ash dam rehabilitation project will be a long-term undertaking, likely requiring the ongoing monitoring of:
 - Safety of the dam structure, and performance against design predictions
 - Vegetation regrowth against predictions
 - Surface and groundwater quality improvements over time
 - Dust emission reductions over time

7 Regulatory recommendations

In our opinion, it may be very difficult to establish a prescriptive regulatory process, due to the large variability across ash dam sites, as mentioned earlier. To achieve the best possible long-term solution, dam owners will need some flexibility to investigate all alternatives available to them.

Our experience in NSW has shown that the current state dams regulatory regime is mature, with appropriate expertise available to guide, support and advise on the safe rehabilitation of dams.

8 Conclusions

To conclude, we would again like to reiterate that we would be very interested to offer further technical assistance and unbiased, evidence based research based upon our experience with ash dams, to best assist the inquiry.

For further information, please don't hesitate to contact our power stations civil leader, Loni Karabesinis

Sincere thanks for the opportunity to present this information,

Yours faithfully

 Loni Karabesinis
Technical Director, Energy and Renewables