



18 July 2018

EDO NSW  
Level 5, 263 Clarence Street  
Sydney NSW 2000  
Australia

**Re: Engine Road Waste Management Facility**

This letter was prepared in response to a request by EDO NSW, acting on behalf of Lock the Gate, to provide independent expert advice in relation to the Engine Road Waste Management Facility operated by We Kando Pty Ltd. I wish to point out that I have not visited this Facility and am informed only by the following documents, which have been provided to me by EDO NSW:

- Department of Environment and Heritage Protection Environmental Authority Permit Number EPPR03467515 (32 pages)
- Documents watermarked “RTI DL RELEASE – EHP” including Environmental Authority No. EPPR01067913 and associated paperwork including application and assessment details (61 pages)
- Documents watermarked “RTI DL RELEASE – EHP” including a “Response to Information Request – Engine Road Waste Management Facility” and associated correspondence (222 pages)

From your brief to me, I understand that We Kando have applied for ERA 60 (1)(d) — operating a regulated waste disposal facility with more than 200,000t/year. The objective of the facility is to support waste disposal needs for local industry, including existing and future proposed agricultural/ farming, coal mining and coal seam gas activities. We Kando propose to extend the scope of its current waste management activities to include the following:

- 1) Acceptance of a range of soils and solids-dominated by slurries/sludges, with these materials to be subject to any combination of the following:
  - i) Dewatering by sedimentation and/or evaporation (air-drying);
  - ii) Treatment and stabilisation of solids by land farming for:
    - (1) Use in site activities;
    - (2) Addition to feedstock for composting/soil conditioner manufacture;
    - (3) Direct beneficial use as blended soil product for sale; and/or
  - iii) Disposal by landfilling on-site, with or without pre-treatment.

- 2) Acceptance for temporary storage of product salt, derived from a locally sited RO plant brine treatment facility;
- 3) Acceptance of waste salt from RO plant brine treatment to landfill;
- 4) Acceptance of a solid waste stream generated from local industry, with this waste stream comprising either:
  - a) General (non-putrescible) waste, made-up primarily of construction; and
  - b) General (putrescible) waste from site operations and accommodation camps.

Please note that my expertise is in water quality, rather than landfill design or management.

However, one of the particular areas of water quality in which I work is water quality risk management. In this field, there is a strong focus on understanding hazards, which may pose a risk to water quality in water resources such as rivers. In this sense, I believe I have some qualification to comment on this proposal since it clearly involves a substance (salt), which is to be disposed of in close proximity to an important water resource, thus posing realistic risks to water quality.

This salt is sourced from concentrated coal seam gas produced water. The proposal is to store the salt in a landfill with water-resistant lining, drainage and monitoring. However, in my opinion, there are still a number of important risks that should be properly quantified. These risks relate to potential salt-contamination of the adjoining creek (Stockyard Creek) and the river system into which it flows (the Condamine River), as well as local groundwater. The risks are exacerbated by the very close proximity of the proposed salt stock-pile and storage area to the creek (less than 100m).

One potential hazardous event involves the failure of the landfill liner and seepage of saline water (leachate) to groundwater and the creek. There are measures proposed to be in place to manage this risk, but these measures will not completely eliminate the risk. Importantly, the lifespan of this salt storage will need to be properly considered. Salt does not biodegrade in the environment and has an infinite environmental residence time. Consequently, salt storages will need to be maintained on a permanent basis (decades or longer) or until the salt is re-mined and removed from the facility. Failure to do so will guarantee that the salt will eventually contaminate the local environment including groundwater and surface water. Unless satisfactory measures are in place to manage this risk over many decades (or longer), the risk is not managed.

A further important potential hazardous event is that of flooding, which can impact an open landfill monocell (one that is still in the process of being filled)

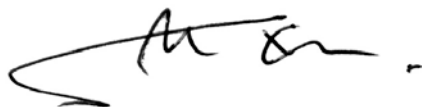
and well as the existing stock-piles of salt, being prepared for landfill. These stock-piles will be relatively uncontained and therefore, much more prone to causing environmental contamination during a flooding or large wet weather events.

Another important potential source of environmental contamination is from the leachate ponds. Leachate from the landfill (which can be expected to be extremely saline) will be collected and stored in Pond 1 (a lined brine pond, which will also function as an evaporation pond). This pond will also be subject to risks from leakage and infiltration to groundwater, as well as potential over-topping during flooding events. Such events will lead to contamination of groundwater and surface water in the creek.

I was interested to read the DEHP Assessment Report (File No. SWR/090927). I note that with regard to the "product salt", it is stated by that "according to the proponent, the material would likely be geotechnically benign, although marginally dissolvable under certain conditions, such as contact with moisture/infiltration". In fact, the salt can be expected to be composed primarily of sodium bicarbonate (or other similar sodium salts such as sodium hydroxide and sodium chloride). These are all highly water-soluble salts, with the solubility of sodium bicarbonate approaching 100 g/L at 20°C (and more at warmer temperatures). For comparison, seawater contains around 35 g/L of salt, so leachates from this landfill can be expected to approach almost 3 times the salinity of seawater. The fact that this solubility risk has been so clearly understated by the proponent (and accepted by DEHP) should be a red-flag suggesting that the proponents may not fully understand the risks that they will be required to manage.

From a water quality management perspective, I would consider an operation such as this to be a high risk operation. The likelihood of contaminating groundwater and surface water over the long term is considerable. The responsibility for managing these risks over the long term will likely be inherited by future generations.

I hope you will find these comments to be helpful,

A handwritten signature in black ink, appearing to read 'Stuart Khan', with a long horizontal line extending to the left.

Stuart Khan  
Professor,  
School of Civil & Environmental Engineering.  
s.khan@unsw.edu.au