

**Arid
Lands
Environment
Centre**

Office: 90 Gap Road Alice Springs NT
Mail: PO Box 2796 Alice Springs 0870 NT
Web: www.alec.org.au
Phone: 08 89522497
Email: policy@alec.org.au

20 December 2022

Ammaroo Ammonium Phosphate Fertilisers Project

1. The Arid Lands Environment Centre (ALEC) is Central Australia's peak environment organisation that has been advocating for the protection of nature and growing sustainable communities in the arid lands since 1980. ALEC actively engages with mining through regulatory reform, written submissions, community engagement and advocacy within the community.

Executive Summary

2. Verdant Minerals Ltd (**Verdant**) referred a proposed significant variation to the Northern Territory Environment Protection Authority (**NT EPA**) in relation to the Ammaroo Ammonium Phosphate Fertiliser Project (**the Project**), located around 220 km south-east of Tennant Creek, 270 km north-east of Alice Springs, and 20km north of the community of Ampilatwatja.
3. The Project has been referred under s. 52 of the *Environment Protection Act 2019* (NT) (**EP Act**) as a significant variation of the currently approved phosphate mine. Verdant is proposing to develop on site processing facilities for the production of ammonium phosphate fertilisers from the phosphate rock concentrate being mined. This new proposal is an extremely significant one, being a proposal to develop a major chemical industrial facility in the heart of the Barkly Region.
4. Arid Lands Environment Centre (**ALEC**) is Central Australia's peak environmental organisation, working to protect arid lands, creatures and communities. ALEC has considerable concerns about the Project, which has the potential to have a significant impact on the environment. ALEC submits the Project must be assessed by the NT EPA at the highest level of assessment, being Tier 3 Assessment by Environment Impact Statement (**EIS**). The Project is high risk, complex and involves a high degree of uncertainty. Assessment by way of EIS is crucial.
5. In summary, ALEC submits that:
 - a. The Project is likely to have a range of significant environmental impacts for the region, and in some instances nationally, in relation to greenhouse gas (**GHG**) emissions, air quality, groundwater abstraction and surface and groundwater pollution.
 - b. The Project is likely to have lesser, but far from insubstantial, effects and failings in relation to transport, during the construction phase.

- c. The Project does not include appropriate plans to avoid and mitigate these environmental impacts.
- d. The Project will result in a contaminated site and is likely to require greater remediation and rehabilitation than indicated in the Referral.
- e. The Referral fails to demonstrate that Verdant engaged in comprehensive community engagement and consultation.
- f. The Project should also be referred as a “controlled action” under the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (**EPBC Act**) given that it is a proposal of a substantially different character to what was already approved.

Background

- 6. The Ammaroo Phosphate Project is situated in the Barkly region of the Northern Territory, located in the western Georgina Basin. The facility currently operates as an open cut mine involved in the production of phosphate rock concentrate for export to international markets. It is presently operated by Verdant, formerly known as Rum Jungle Ltd.
- 7. The original project was referred for assessment under the *Environmental Assessment Act 1982* (NT) in 2014 and assessed by way of EIS. ALEC filed a public submission during the consultation process on the Draft EIS which raised several concerns with the proposal.¹
- 8. In October 2018, the NT EPA released Assessment Report 87 in relation to the project which included 12 recommendations to guide regulatory approvals for the mine. At that time, the legislative framework did not allow for an overarching environmental approval as now applies under the EP Act.
- 9. We understand the project was subsequently authorised under the *Mining Management Act 2001* (NT) including approval of a Mining Management Plan (**MMP**), although, concerningly, the current Authorisation and MMP do not appear to be publicly available in any form.²
- 10. In 2014, the then Federal Minister for the Environment also determined that the original proposal was a ‘controlled action’ which required assessment under the *Environment Protection Biodiversity Conservation Act 1999* (Cth) (**EPBC Act**), due to the proposal’s potential impacts on EPBC Act listed species. EPBC Act Approval was granted in January 2018 (EPBC 2014/7260). The particular EPBC Act species of concern were identified as the Greater Bilby (*Macrotis lagotis*) and the Great Desert Skink (*Liopholis kintorei*).

¹ Arid Lands Environment Centre, *Submission to the Northern Territory Environmental Protection Authority on the Ammaroo Phosphate Project: Draft Environmental Impact Statement* (2017): https://d3n8a8pro7vhmx.cloudfront.net/aridlands/pages/57/attachments/original/1545182821/ALEC_submission_Ammaroo_Project_.pdf?1545182821.

² Documentation for some mining projects is available on the Department of Industry, Tourism and Trade website, here: <https://industry.nt.gov.au/publications/mining-and-energy/public-environmental-reports/mining/public-mining-environmental-reports/mines>.

The Proposed Significant Variation

11. Verdant is seeking to develop downstream processing facilities for the production of ammonium phosphate fertilisers from the phosphate rock concentrate onsite.³ This is a significant variation to the project, representing the development of a major chemical industrial facility in the heart of the Barkly Region.
12. Specifically, the Project includes:
 - a. construction and operation of a phosphoric acid plant, sulfuric acid plant, ammonia plant, and granulation plant;
 - b. storage facilities for fertiliser, hazardous materials and reagents;
 - c. natural gas use to 8.7 petajoules per year;
 - d. expansion of the borefield;
 - e. above-ground storage area to stack phosphogypsum waste product;
 - f. upgraded import/export and storage facilities at the Port of Darwin;
 - g. expanded accommodation facilities (800 rooms); and
 - h. construction of an airfield.
13. Verdant referred the Project under section 52 of the EP Act to the NT EPA as it is a proposed significant variation of their approved action which has the potential to have a significant impact on the environment.

Assessment by way of Environmental Impact Statement is required for this project

14. When deciding or recommending a method of environmental assessment, the NT EPA must have regard to the following criteria:⁴
 - a. the significance of the potential impact of the proposal;
 - b. the level of confidence in predicting potential significant impacts of the proposal taking into account the extent and currency of existing knowledge;
 - c. the level of confidence in the effectiveness of any proposed measures identified in the referral to avoid, mitigate or manage potential significant impacts of the proposal;
 - d. The merits of developing a major chemical industrial facility in a very remote location;
 - e. the extent of community engagement that has occurred in relation to the proposal;
 - f. the capacity of communities and individuals likely to be affected to access and understand information about the proposal and its potential significant impacts.
15. It is clear by application of these criteria that the Project should be subject to the highest tier of environmental impact assessment, Tier 3, being assessment by way of EIS. This is necessary in order to properly assess the significant environmental impacts of the Project and to subject it to rigorous scientific assessment with multiple opportunities for public input.

³ NT EPA, 'Ammaroo Ammonium Phosphate Fertiliser Project' (Web page, 23 November 2022) <<https://ntepa.nt.gov.au/your-business/public-registers/environmental-impact-assessments-register/assessments-in-progress-register/ammaroo-ammonium-phosphate-fertiliser-project>>.

⁴ *Environment Protection Regulations 2000 (NT) (EP Regulations)*, reg 59.

16. ALEC holds considerable concerns about the impacts of the Project including the tendency of referral documentation to either minimise or not address wide-ranging environmental impacts. ALEC's concerns around the potential environmental impacts of the Project are outlined in greater detail, **below**.
17. Further, due to the scale of the significant variation, ALEC contends that the entire project should be assessed holistically through a Tier 3, EIS, not just the proposed project. The cumulative impacts of the approved and proposed project should be assessed together.
18. Given the potential impacts of the Project on surrounding communities, including the remote communities of Ampilatwatja, Utopia, Arlparra, Imangara and Ali Curung, ALEC further submits that the assessment by way of EIS is essential.

Impacts from the Ammaroo Ammonium Phosphate Fertiliser Project

19. We have identified a number of very significant environmental impacts which are likely to come from this proposal and potential shortfalls in the referral documentation, necessitating the highest level of environmental impact assessment. These are, specifically:
 - a. Greenhouse gas (**GHG**) emissions from the Project on a national scale;
 - b. Impacts on air quality;
 - c. Groundwater abstraction; and
 - d. Surface and groundwater pollution issues.
20. In addition, we identify a number of other, far from insubstantial, environmental effects, issues and information gaps associated with the Project and Referral which we also discuss, being:
 - a. Impacts from transportation during the construction phase of the Project;
 - b. Potential impacts on Aboriginal and historical cultural heritage including a lack of comprehensive data; and
 - c. Contamination issues at the closure and rehabilitation stages of the Project.

Greenhouse Gas Emissions

21. Upon review of Verdant's Referral documentation, ALEC submits the Project will be a major GHG emitter on a national scale.
22. The Project comes under the NT Government's Policy, *Greenhouse Gas Emissions Management for New and Expanding Large Emitters*,⁵ as it includes estimated Scope 1 emissions of greater than 100,000 tCO₂-e in any financial year over the life cycle of the project.
23. The Project is also covered by the large facility threshold of the Commonwealth *National Greenhouse and Energy Reporting (Safeguard Mechanism) Rule* as it includes estimated

⁵ NT Office of Climate Change, 'Greenhouse Gas Emissions Management for New and Expanding Large Emitters,' <https://climatechange.nt.gov.au/__data/assets/pdf_file/0008/1041938/ntg-large-and-expanding-emitters-policy-2021-version-1.1.pdf>

Scope 1 emissions greater than 100,000 tCO₂-e.⁶ This Rule requires Australia’s largest greenhouse gas emitters to keep their net emissions below a determined emissions limit. The Commonwealth Government will gradually reduce emissions limits under the Safeguard Mechanism to help Australia reach net zero emissions by 2050.⁷ This Project will see an increase in emissions in the Northern Territory and is counter-intuitive to the above policies.

24. Verdant tabulates the various Scope 1, 2 and 3 GHG emissions for the construction and operational phases of the Project in Appendix O of their referral document.⁸ During construction, land clearance (removal of native vegetation to be limited to 3775 ha LOM) over the 3.5 years of this phase is the main contributor to GHG emissions of 384,450 t CO₂-e (Table 3, Appendix O – annualised 128,100 t CO₂-e). Operational Scope 1 GHG emissions are estimated at 491,500 t CO₂-e p.a. (Table 4, Appendix O), ~70% of which arises from the ammonia plant (340,000 t CO₂-e p.a.). This would place the Project among the top 75 corporate emitters in Australia from the National Greenhouse and Energy Reporting (NGER) scheme in 2020-21.⁹
25. In preparing Appendix O, GHD states that “the greenhouse gas assessment is prepared in compliance with the *National Greenhouse Gas and Energy Reporting Act 2007* (NGER Act), NT government guidelines for large emitters and other relevant standards”.¹⁰ However, no detail of the methods has been provided. Under assumptions and limitations, GHD state that “emissions inventory and estimations have been prepared based on the information available at the time, including documents provided by Verdant and other studies conducted as part of the EIS. These numbers are subject to changes from design, new information, and equipment revisions.”¹¹
26. In the absence of calculation details on the largest source of Scope 1 GHG emissions—the ammonia plant (200,000 t NH₃ p.a. – Table 4, Appendix O), which incorporates production of grey hydrogen through steam methane reforming (SMR) of natural gas—we obtained GHG emissions intensity from a recent peer-reviewed publication in an international journal. Liu et al. 2020¹² report 2.6 t CO₂-e per tonne of ammonia for integrated conventional ammonia production based on SMR, which equates to 520,000 t CO₂-e p.a. If all lesser Scope 1 GHG emissions during the operational phase are accepted, annual Scope 1 GHG emissions add up to 633,000 t CO₂-e, a substantial increase from the estimate amount of 491,500 t CO₂-e included in Appendix O.

⁶ *National Greenhouse and Energy Reporting (Safeguard Mechanism) Rule 2015* (Cth) (‘Safeguard Mechanism Rule’)

⁷ Commonwealth Clean Energy Regulator, ‘The Safeguard Mechanism’ (Webpage) <<https://www.cleanenergyregulator.gov.au/NGER/The-safeguard-mechanism>>

⁸ Appendix O, Greenhouse Gas Executive Summary. GHD, Ammaroo Ammonium Phosphate Fertiliser Project. Referral for Significant Variation. prepared for Verdant Minerals Pty Ltd, 9 November 2022.

⁹ National Greenhouse and Energy Reporting, Corporate emissions and energy data 2020-21, 19 April 2022. <https://www.cleanenergyregulator.gov.au/NGER/Pages/Published%20information/Reported%20greenhouse%20and%20energy%20information,%20by%20year/Corporate-emissions-and-energy-data-2020-21.aspx> – Accessed 14 December 2022.

¹⁰ Above n 9, p. 1.

¹¹ Ibid (n 9), p. 3.

¹² Liu, X., Elgowainy, A. and Wang, M., 2020. Life cycle energy use and greenhouse gas emissions of ammonia production from renewable resources and industrial by-products. *Green Chemistry*, 22(17), pp.5751-5761.

27. The Project will represent a large emitter not only nationally but also within the Northern Territory. It will result in higher emissions than the gas-fired Channel Island Power Station located near Darwin which emits 488,157 t CO₂-e per annum.¹³
28. Verdant states that the GHG emissions are estimated to account for 2.84% of the NT's total emissions and 0.1% of Australia's total current emissions.¹⁴ It is important to note that as emphasised above, this may be a substantially lower figure than what is emitted. These emissions will add to the cumulative impacts of climate change.
29. Climate change is increasing the intensity, frequency and variability of climatic events.¹⁵ In Central Australia this means hotter temperatures, more intense heat events, longer periods in drought, more intense rainfall events, more erratic rainfall and aquifer recharge increasing the likelihood of major flood events, drier soils, increased evapotranspiration, more wildfires and increased risk of erosion.¹⁶ The realities of climate change are stark with its impacts cascading and compounding. Climate change will increase the stress on existing and new infrastructure, from roads, pipelines and power stations, to housing, telecommunications, transport and water assets.¹⁷
30. In January 2019, the average daily maximum temperature in Tennant Creek was 41.6°C, 4.6°C above the average maximum temperature for January. Under a high emissions scenario, by the end of the century, Tennant Creek and Elliott will see close to an extra 100 days above 35°C compared to the historical average.¹⁸ In Tennant Creek between 1989-2018, there were 7 days a year above 44C, compared to zero days above 44C between 1959-1988.¹⁹ Alice Springs in the same period experienced six-times more days above 44°C than in the 30 years prior.²⁰ Alice Springs has warmed by 2°C comparing the annual maximum temperatures between 1942-1951 and 2012-2021, while Tennant Creek has warmed by between 1.6°C comparing the annual maximum temperatures between 1970-79 and 2012-2021, and similar trends can be found across Central Australia.²¹
31. Climate change also further threatens already at-risk ecosystems. It is understood that arid and semi arid environments are undergoing collapse, (as are savannah and mangrove environments

¹³ National Greenhouse and Energy Reporting, Designated generation facility data 2020-21, 28 February 2022. <https://www.cleanenergyregulator.gov.au/NGER/National%20greenhouse%20and%20energy%20reporting%20data/Corporate%20emissions%20and%20energy%20data/corporate-emissions-and-energy-data-2020-21> – Accessed 14 December 2022.

¹⁴ Main Referral Document, p. 118.

¹⁵ Intergovernmental Panel on Climate Change, 2022. 'Chapter 11: Australasia'. IPCC WGII Sixth Assessment Report: Full report.

¹⁶ CSIRO. 2020, p.14. 'Climate change in the Northern Territory: State of the science and climate change impacts'.

¹⁷ Organisation for Economic Co-operation and Development, 2018, p.12. 'Climate-resilient infrastructure: policy perspectives. OECD Environment Policy Paper No.14'.

¹⁸ CSIRO. 2020, p.14. 'Climate change in the Northern Territory: State of the science and climate change impacts'.

¹⁹ Ibid.

²⁰ Ibid.

²¹ Bureau of Meteorology. Climate statistics.

in the Top-End).²² This is due to temperature and precipitation changes, habitat change and loss, invasive species such as buffel grass, livestock, agriculture and water extraction. Collapse is understood as an ecosystem which has undergone as ‘a change from a baseline state beyond the point where an ecosystem has lost key defining features and functions and is characterised by declining spatial extent, increased environmental degradation, decreases in, or loss of, key species, disruption of biotic processes, and ultimately loss of ecosystem services and functions’.²³ It is important to consider how the state of the Northern Territory’s environment impacts future infrastructure planning.

32. The Project does not attempt to appropriately avoid or mitigate these emissions and impacts. It is irresponsible and negligent to design a project of this industrial scale and GHG emissions intensity without implementing renewable energy alternatives from the outset. The region has an abundant scope for solar photovoltaics and wind turbines and the option for geothermal energy to generate base power load²⁴ and/or contribute to hydrogen production.²⁵ The argument presented by Verdant that green hydrogen production via electrolysis with renewable energy is currently economically unviable is specious when grey hydrogen is advocated with no consideration of environmental cost of GHG emissions of at least 500,000 t CO₂-e each year.
33. We note that Verdant has a duty under the *EP Act* to apply the environmental decision-making hierarchy in the design of the Proposal²⁶ – namely that it should, in order of priority, ensure the Proposal is designed to avoid adverse impacts on the environment; identify management options to mitigate adverse impacts on the environment to the greatest extent possible, and provide for offsets only where residual impacts cannot be avoided or mitigated.²⁷ It is concerning that this has not been done appropriately here.
34. The environmental impact assessment process must also ensure that actions are assessed, planned and carried out having regard to this hierarchy, and taking into account the principles of ecologically sustainable development (**ESD**) and the impacts of a changing climate.²⁸ The substantial GHG emissions associated with this Project provides one reason amongst many why environmental impact assessment should occur at the highest tier.

²² Bergstrom, D, Wienecke, B, van den Hoff, J, Hughes, L, Lindenmayer, D, Ainsworth, T, Baker, C, Bland, L, Bowman, D, Brooks, S, and Canadell, J. 2021. Combating ecosystem collapse from the tropics to the Antarctic. *Global change biology*, 27(9), pp.1692-1703.

²³ Ibid, p.1693.

²⁴ Ballesteros, M., Pujol, M., Walsh, F. and Teubner, J., 2019. Geothermal Energy Electricity Generation in Australia: Recent Developments and Future Potential. *Australian Geothermal Energy Association*.

²⁵ a) Ghazvini, M., Sadeghzadeh, M., Ahmadi, M.H., Moosavi, S. and Pourfayaz, F., 2019. Geothermal energy use in hydrogen production: A review. *International Journal of Energy Research*, 43(14), pp.7823-7851.

b) Hamlehdar, M., Feitz, A., Narsilio, G.A. and Beardsmore, G. 2022. Hydrogen Production from Geothermal Energy. Geoscience Australia, seminar series. <https://www.youtube.com/watch?v=jBmrlRp5pY> – Accessed 14 December 2022

²⁶ EP Act, s. 43.

²⁷ EP Act, s. 26.

²⁸ EP Act, s. 42.

Air Quality

35. The Project will also emit a range of noxious air pollutants including: sulfur dioxide (SO₂), oxides of nitrogen (NO_x), sulfuric acid (H₂SO₄) vapour, fluorine (F, as HF and airborne fluorides), ammonia (NH₃), as well as fine particulate matter <2.5 µm (PM_{2.5}) and <10 µm (PM₁₀). These air pollutants will mainly be emitted from stack (point) sources associated with the proposed Sulfuric Acid Plant, Phosphoric Acid Plant, Ammonia Plant and Granulation Plant.
36. Verdant's evaluation of the impact from these air pollutants is focused on impacts to humans. The evaluation concludes that "results of the impact assessment show that compliance is predicted for all pollutants" (Appendix N ²⁹). However, it is cautioned that the evaluation of air quality is made on "early-stage design information" and recommendation is made that an updated air quality assessment is completed during detailed design.
37. The referral documentation makes passing mention of the toxic effects of Fluoride on sensitive vegetation in Appendix N, and detailed evaluation is not made (in the manner of PM₁₀). Fluoride is the most phytotoxic of known air pollutants based on atmospheric concentrations required to injure plants.³⁰ Furthermore, vegetation close to phosphate fertiliser plants is known to accumulate large quantities of Fluoride with variable specific symptoms of toxicity.³¹ The long-term threshold concentration for toxicity is around 0.25–0.30 µg F m⁻³³², although some plant species may be more sensitive. This low toxicity threshold is acknowledged in Table 6.1 of Appendix N, but Verdant has failed to explore the ramification of this in a detailed evaluation.
38. Fluoride will not operate in isolation. It is often accompanied by other pollutants that are also toxic to plants (e.g. SO₂).³³ The Referral documentation ignores the *cumulative* effects of these air pollutants—F, SO₂, NO_x, etc.—over prolonged time and in combination on sensitive vegetation within the mining lease and beyond. A comprehensive assessment that examines cumulative impacts is required.
39. The Project will also impact the acidification of soils surrounding the area. This will arise from deposition of the acid vapours (H₂SO₄) from the sulfuric acid plant and the acid gases (SO₂, NO_x)³⁴ from the various stacks. In combination with the phytotoxicity mentioned above, it is likely to lead to irreversible damage to the red earth soils dominated by Mulga or Gidgee plains and the red earth sandplains that support a mixture of hummock and tussock grass, especially to the north-west of the Project facility under the dominant south-easterly

²⁹ Appendix N, Air Quality Impact Assessment. GHD, Ammaroo Ammonium Phosphate Fertiliser Project. Referral for Significant Variation. prepared for Verdant Minerals Pty Ltd, 9 November 2022.

³⁰ Panda, D., 2015. Fluoride toxicity stress: physiological and biochemical consequences on plants. *International Journal of Bioresearch and Environmental Agricultural Science*, 1, pp.70-84.

³¹ Mezghani, I., Elloumi, N., Abdallah, F.B., Chaieb, M. and Boukhris, M., 2005. Fluoride accumulation by vegetation in the vicinity of a phosphate fertilizer plant in Tunisia. *Fluoride*, 38(1), pp.69-75.

³² Weinstein, L.H. and Davison, A.W., 2003. Native plant species suitable as bioindicators and biomonitors for airborne fluoride. *Environmental Pollution*, 125(1), pp.3-11.

³³ Cape, J.N., Fowler, D. and Davison, A., 2003. Ecological effects of sulfur dioxide, fluorides, and minor air pollutants: recent trends and research needs. *Environment International*, 29(2-3), pp.201-211.

³⁴ Vallero, D.A., 2008. *Fundamentals of air pollution*, 4th Edition. Academic Press, London.

winds. No mention of this environmental harm is made in the referral documents and a comprehensive assessment is required.

Groundwater Abstraction

40. The Project proposes to pump 8.5 GL per annum of groundwater, which is more than double the amount currently extracted for use for the mine. The Referral explains six bores will be used to withdraw the water, of which 97% will be sourced from the Georgina Basin.³⁵ Therefore, the groundwater needs for this project represent a significant increase in groundwater withdrawals.
41. The cumulative impacts of this application must be evaluated with regards to groundwater use, as there are other projects applying to use large amounts of water in the Georgina Basin. ALEC notes that in determining whether the Project is capable of having a significant impact on the environment, the NT EPA should have regard to cumulative impacts with other proposals.³⁶ It is difficult to ascertain what is an acceptable cumulative impact of extraction is, given no water allocation plan exists for the water resources of this part of the Georgina Basin.
42. The bores will ostensibly be located at the Southwest margin of the Georgina Basin, and groundwater pumping test analysis and groundwater modelling has been conducted using boundary conditions that assume there is a barrier between the Gum Ridge Aquifer in the Georgina Basin, and the adjacent water in the Western Davenport Basin. However, water quality from samples taken during the pumping test described in Appendix I of the application are chemically similar to water collected at Ampilatwatja and Ali Curung³⁷. This water contains relatively high amounts of nitrogen and heavy metals such as barium, copper, lead, and zinc.
43. Although Verdant admits that the borefield would pull some water from the Western Davenport region,³⁸ the observed water quality during pumping tests suggests that more water may be pulled from that region than the model suggests. This indicates that additional fieldwork is needed to validate modelling assumptions.

³⁵ Main Referral Document, p 76.

³⁶ NT EPA, 'Referring a proposal to the NT EPA' (Web Page, 6 January 2021) 19, 6.3 <https://ntepa.nt.gov.au/data/assets/pdf_file/0009/805167/referring-proposed-action-to-ntepa-guideline.pdf> (NT EPA Referral Process Guide).

³⁷ See Power and Water, 'Past Drinking Water Quality Reports' (Web Page, 2022) <<https://www.powerwater.com.au/about/what-we-do/water-supply/drinking-water-quality/past-drinking-water-quality-reports>> and see in particular *Power and Water Drinking Water Quality Report 2020* and *Power and Water Drinking Water Quality Report 2021*.

³⁸ Appendix I: Groundwater Science 2021 – Bore field Testing and Design, Groundwater Science, Ammaroo Ammonium Phosphate Fertiliser Project. Referral for Significant Variation. prepared for Verdant Minerals Pty Ltd.

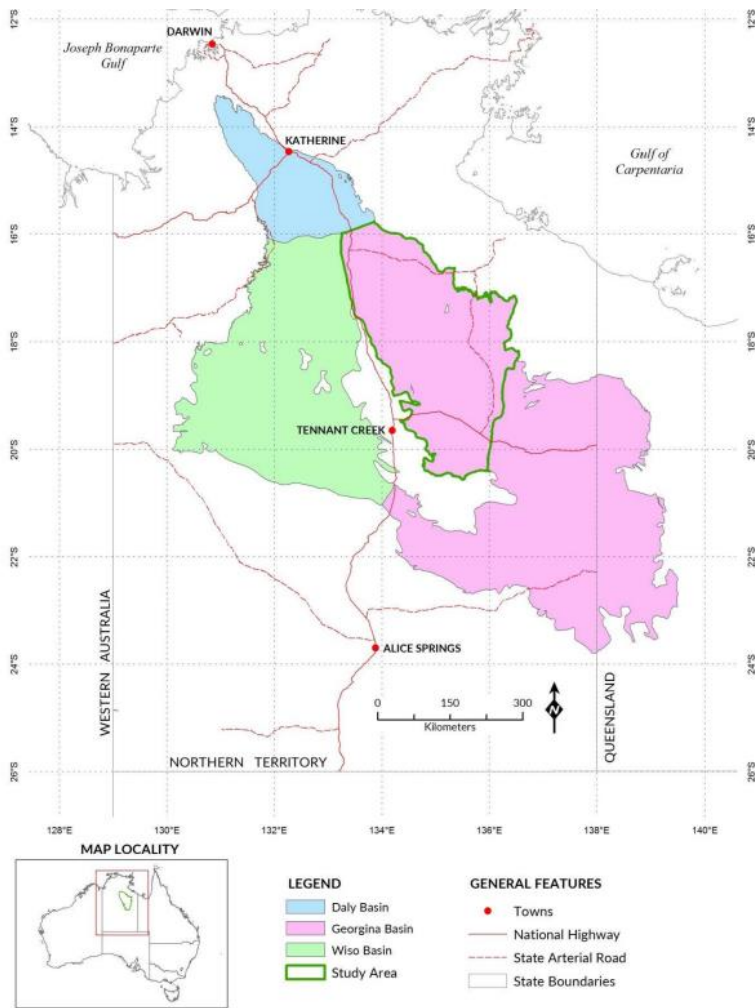


Figure 1 Map of groundwater basins.

44. Further, the impacts of extraction from the Georgina Basin upon the Western Davenports Water Control District need to be quantified. This is both in terms of egress as well as drawdown impacts.

45. Verdant completely neglects to consider the impact of the proposed increase in groundwater extraction on stygofauna. Although little work has been done in the Barkly region to identify

stygofauna populations;³⁹ several sources have indicated that stygofauna are likely to inhabit the aquifers of the region⁴⁰ (Figure 2).

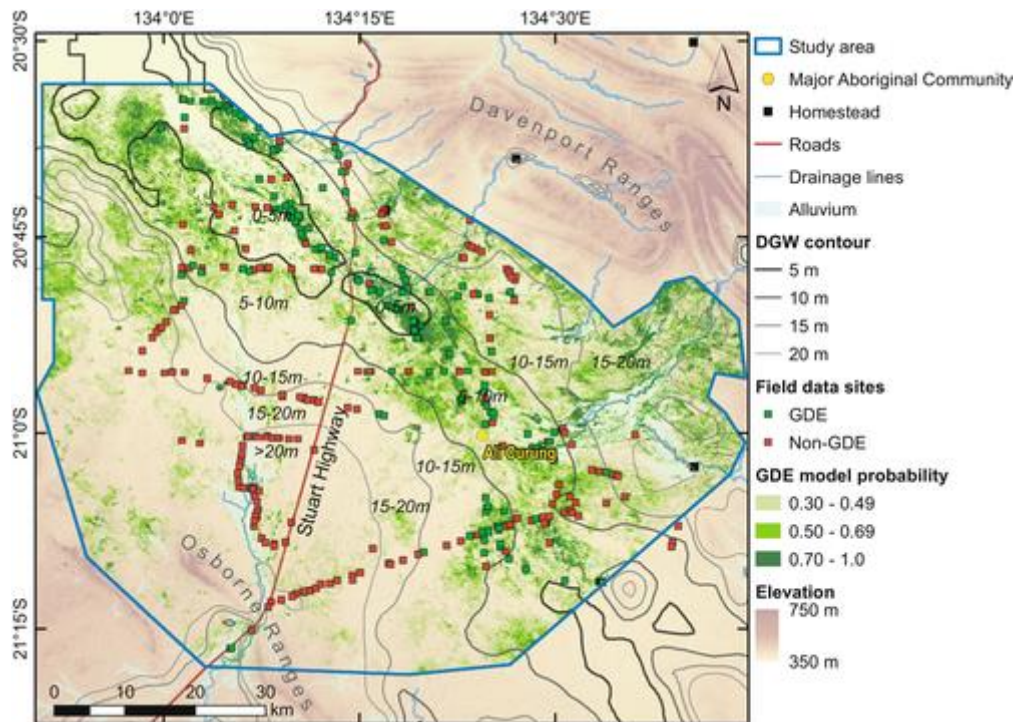


Figure 2. Map from analysis by Brim Box et al. (2022), showing that subterranean GDEs are likely throughout the area.

46. Although the Australian GDE Atlas (BOM) shows that terrestrial and subterranean GDEs have not been assessed in the area, it does indicate evidence of creek lines throughout the area that would be likely GDEs (Figure 3). These are not addressed in the Referral documentation. Verdant does adequately show that GDEs do not exist in the area and will not be impacted by the Project.
47. The anticipated drawdown from the Project is up to 4.9 m at bore sites over 25 years.⁴¹ Even a drawdown of less than 1 m can negatively impact stygofauna, which become stranded and desiccate as water levels drop.⁴² Therefore, a thorough investigation and assessment of potential stygofauna impacts is required.

³⁹ Gibson, L., Humphreys, W.F., Harvey, M., Hyder, B. and Winzer, A., 2019. Shedding light on the hidden world of subterranean fauna: A transdisciplinary research approach. *Science of the Total Environment*, 684, pp.381-389.

⁴⁰ Brim Box, J., Leiper, I., Nano, C., Stokeld, D., Jobson, P., Tomlinson, A., Cobban, D., Bond, T., Randall, D. and Box, P., 2022. Mapping terrestrial groundwater-dependent ecosystems in arid Australia using Landsat-8 time-series data and singular value decomposition. *Remote Sensing in Ecology and Conservation*, 8(4), pp.464-476.

⁴¹ Main Referral Document, p 76.

⁴² Stumpp, C., & Hose, G. C. (2013). The impact of water table drawdown and drying on subterranean aquatic fauna in in-vitro experiments. *PLoS one*, 8(11), e78502.

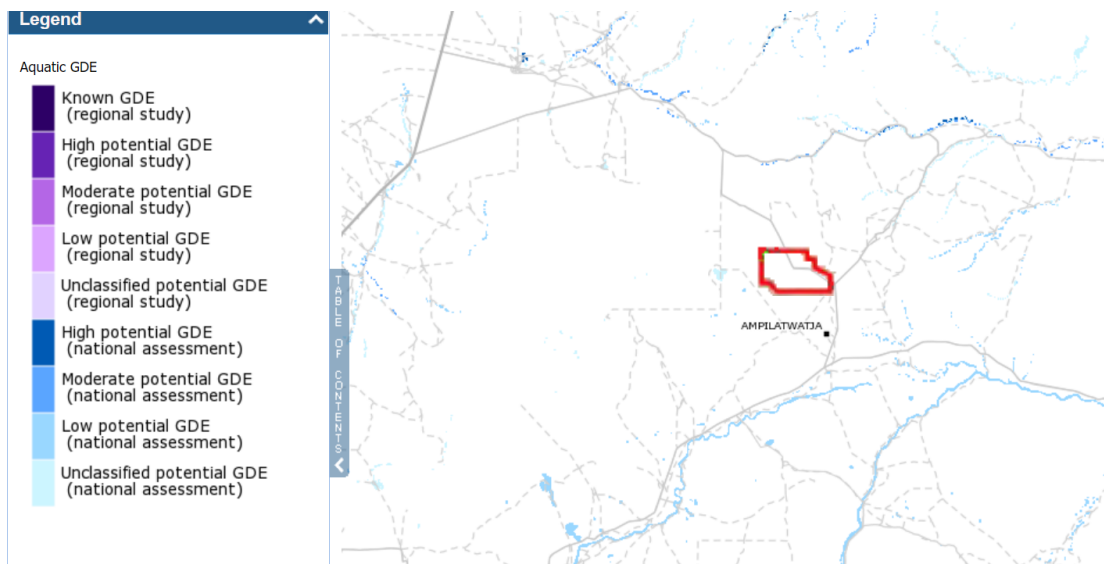


Figure 3. Screenshot from the GDE Atlas of Australia (BOM, <http://www.bom.gov.au/water/groundwater/gde/>) showing that creek lines are present throughout the area. The Project area is indicated by the red polygon

Surface and Groundwater Pollution

48. The Referral does not address the potential for groundwater contamination from the Project. There is long-standing, global evidence of groundwater pollution from phosphogypsum stacks⁴³ that constitute the waste heaps of by-product from ammonium phosphate fertiliser production. Rainfall events are likely to wash heavy metals and any radioactive elements into the Project site soil, creating a plume that essentially cannot be remediated, and therefore, will have long-term impacts and costs for the region.
49. With operation of the Project, spills from acid plants and the granulation plant will also further contaminate site soils adding to the pollutant plume subsurface. Under rare, heavy-rainfall events, mined areas not rehabilitated could also flood providing opportunity for leaching of exposed phosphate rock to further contribute to subsurface pollution.
50. Although the Proposed Project Description in the Referral document indicates that associated with chemical storage, “processing equipment with liquids/chemicals will be provided where necessary with suitable bunding/containment”, it is not obvious whether this includes the footprint of the total facilities area. If areas are not banded, or have bunding of insufficient height, infrequent heavy rainfall could see contaminated surface water flow overland and off site along natural and modified drainage lines. In general, we acknowledge that rain is much more likely to evaporate or percolate into the soils, rather than to run off the Project site.

⁴³ Rutherford, P.M., Dudas, M.J. and Samek, R.A., 1994. Environmental impacts of phosphogypsum. *Science of the Total Environment*, 149(1-2), pp.1-38.

Transport – construction phase

51. In the previously approved EIS (for the mining of phosphate rock and its beneficiation at Ammaroo), transport-related risks were assessed as high (Table 24, Referral document).⁴⁴ These risks must be exacerbated by the Project noting during the construction phase (3.5 years), a peak workforce of 1,600 is suggested to be engaged, of which 160 are predicted to travel regionally by car for their two- and four-week turnovers on site, while the majority will arrive on flights direct to Ammaroo.⁴⁵ Verdant’s analysis suggests that will mean eight additional car trips per day on local roads.
52. Of much greater concern during Project construction will be heavy-vehicle traffic. Verdant concedes that ten additional heavy rigs per day over the previously approved EIS will be required bringing heavy vehicle movements to 16 per day.⁴⁶ Most of this heavy transport will move up and down the Stuart Highway from Darwin onto local roads and some of it will comprise over-dimensional loads. This represents a very significant risk for road traffic accidents, disruption to local travel and business, and degradation of both major and minor roads. ALEC submits the listed mitigation actions are unlikely to significantly reduce these risks.

Closure and Rehabilitation – contaminated site

53. A serious omission in the Proposed Project Description regarding its closure and rehabilitation is that the Project Site will need to be treated as a *contaminated site* after the multi-year operation of the beneficiation plant, sulfuric and phosphoric acid plants, ammonia plant, and granulation/fertiliser plant. This arises from spills of the harmful products themselves (e.g. sulfuric and phosphoric acids), and the use of a wide range of other poisonous, otherwise toxic or harmful pollutants (e.g. spent V_2O_5 and other catalysts, polyacrylamide and polymer flocculants).
54. ALEC submits that as a contaminated industrial site, it will require much greater remediation than indicated in the Referral document (noting it was not referred to as a contaminated site), as well as continued monitoring for many years after closure, remediation and rehabilitation.
55. We have already covered some of the problems with Gypsum Stacking Area (GSA) in the sections above. We note the referral documents explain the GSA will simply be capped at closure. ALEC submits, it is highly unlikely that simply “Capping of the GSA” at closure will be sufficient, and we submit a more active treatment will be needed to obviate the leaching potential of associated pollutants.

Aboriginal and Historic Cultural Heritage Assessment

56. The Aboriginal and Historic Cultural Heritage (AHCH) assessment is threadbare at one-and-a-half pages in the Referral document.⁴⁷ It implies that the Approved EIS (Section N and

⁴⁴ Main Referral Document, p. 92.

⁴⁵ Main Referral Document, p. 103.

⁴⁶ Main Referral Document, p. 107.

⁴⁷ Main Referral Document, pp. 100-101.

Appendix N) is sufficient, without any reference to the significantly changed environmental footprint of the Project.

57. A summary of archaeological field studies more than five years ago, provides a desultory list of “29 artefact scatters, 2 artefact scatters/quarries, 3 artefact scatters/knapping floors and 76 isolated artefacts” in the project Area.⁴⁸ The AHCH assessment goes on to say, “There were no sites of high archaeological significance within the Project site and within the broader project area” and “The impact assessment found that the residual impacts of the Project are expected to be low to medium”, despite acknowledging the likelihood of encountering additional, as yet unknown, archaeological material during construction and mining.⁴⁹

58. In our submission, a comprehensive and up-to-date AHCH assessment is required, given the vastly changed scope and footprint of the Project.

Omissions/failings in the Project Referral Documentation

59. We also flag some concerns with the methodology adopted and information potentially provided during community consultation.

Community Consultation – methodology

60. The Referral document does not include a comprehensive or even detailed community consultation. Only a two-and-a-half page document with two tables has been included. This is not assisted by Appendix L,⁵⁰ where consultation is despatched superficially in a single page. No detailed methodology, figures or statistical analysis of feedback has been included and therefore it is difficult for ALEC to comment on the substance of Verdant’s community engagement.

61. Verdant concedes that “future engagement with stakeholder [sic] and communities” is needed. ALEC submits stakeholder engagement and community consultation is vital and should have occurred prior to the Referral being made, to ensure affected communities were informed and could properly engage with the public consultation process.

62. Of particular concern is the lack of primary documentation or presentation material used in the consultation process for the Project as it has been modified from the previously approved EIS. We are called on to trust Verdant in their representation of the magnitude of change from a phosphate rock mine with minor processing to a phosphate fertiliser plant—a major chemical industry facility.

The Project should be referred under the EPBC Act

63. Finally, ALEC is also concerned that Verdant has not referred the Project as a “controlled action” under the EPBC Act. Verdant concludes in its referral documentation that the Project is unlikely to cause new or increased impacts to protected matters under the EPBC Act as the

⁴⁸ Main Referral Document, p. 100.

⁴⁹ Ibid.

⁵⁰ Appendix L, Revised Social Impact Assessment. GHD, Ammaroo Ammonium Phosphate Fertiliser Project. Referral for Significant Variation. prepared for Verdant Minerals Pty Ltd, 9 November 2022.

changes to the project will not result in any additional clearance to native vegetation (which is limited to 3775 ha under the current approval).⁵¹ It also refers to a consultation with the Commonwealth Department of Climate Change, Energy, Environment and Water (DCCEEW) which indicated that no further referral was required as the approved land clearance was not being exceeded.⁵²

64. However, as emphasised throughout ALEC's submission, the Project represents an entirely new proposal, and one with the potential for significant environmental impacts on biodiversity in the region, including threatened fauna and migratory species. Impacts on those species from the new Proposal, such as potential impacts from air, surface and groundwater pollution, have not been addressed in the referral documentation, and it is not clear what information was provided to DCCEEW about the Project. The environmental impacts from the Project also have the potential to extend far beyond the Project site and may therefore impact on Matters of National Environmental Significance well beyond the mining tenements.
65. ALEC urges the NT EPA to discuss the Project with DCCEEW and ask that it also be called in under the EPBC Act as a controlled action. This is necessary to ensure that the potential impacts of the Project on Matters of Environmental Significance are appropriately considered and rigorously assessed at the Commonwealth level alongside stringent assessment at the Territory level.

Kind Regards,



Alex Vaughan

Policy Officer



Adrian Tomlinson

Chief Executive Officer

⁵¹ Main Referral Document, p. xiv.

⁵² Main Referral Document, p. 12.