



Singleton Environmental Approvals Referral

Arid Lands Environment Centre



Acknowledgement of Country

ALEC acknowledges the Traditional Owners, the Arrernte people, on whose land this submission was written. We also pay respect to the four Kaytetye speaking land-holding groups, Akwerlpe-Waake, Iliyarne, Anerre and Arlpwe who have recognised native title rights around Singleton. In addition, ALEC acknowledges Kaytetye, Warlpiri, Alyawarr, Anmatyerr, Warumunga and Walmanpa who are culturally connected to the project site. We pay our respects to their elders past, present, and emerging. We acknowledge Australia's First Nations were self-governing in accordance with their traditional laws and customs, and they never ceded sovereignty of their lands, seas, and waters.

Who we are

The Arid Lands Environment Centre (ALEC) is Central Australia's peak community environmental organisation that has been advocating for the protection of nature and growing sustainable communities in the arid lands since 1980.

Water is fundamental to the work ALEC is engaged in. This is unsurprising as water underpins everything: it dictates where people live, where biodiversity thrives and how culture is maintained. Water is life; everything comes back to water. In Central Australia, ephemeral rivers traverse landscapes tracking million year old paths, permanent waterholes sustain life and act as critical refugia in climatically stressed environments and ancient groundwater systems store water which connects and sustains much life on the surface.

It is in this context that ALEC engages deeply with water law, governance, management and licensing. We do this through written submissions, community education and advocacy. This includes:

- ALEC staff appointed as members of the Western Davenport Water Advisory Committee and previously the Alice Springs Water Advisory Committee;
- Presenting at the Australian Water Association's 2022 national drinking water conference on the topic 'Climate change, drinking water and Central Australia';
- Presenting at the Australian Water Association's 2022 Territory water conference on the topic 'Contested futures: groundwater dependent ecosystems in the Northern Territory';
- ALEC's 37-page submission as part of the Strategic Water Plan Directions Paper;
- Extensive engagement with the Western Davenport Water Allocation Plan 2018-2021 review;
- Extensive engagement with the Productivity Commission's National Water Reform 2020 alongside Environment Centre Northern Territory;
- Hosting community water workshops e.g. 'Talking Water - kwatye angkeme'. ALEC facilitated a session on groundwater dependent ecosystems;
- Hosting public information sessions on the 11 May 2021 and 1 September 2022 about the Singleton Station water licence, to audiences of approximately 50 and 80 respectively;
- Submissions to the Water Resource Review Panel on the Singleton Station water licence;
- In a first ever due to exceptional circumstances, litigation in the Northern Territory Supreme Court - *Arid Lands Environment Centre Inc. v Minister for Environment and Heritage Agribusiness Funds Management Pty Ltd* (2022-00087-SC).

Title page images: Top - Large *Corymbia aparrerinja* at Singleton Station approximately 4km north of the proposed borefield; bottom - Day 1 of the Supreme Court case in Mparntwe/ Alice Springs in 2022

Table of Contents

1. Executive Summary

Background

- 1.1. Legislative context and the role of the NT EPA
- 1.2. The proposal
- 1.3. Water licence and its conditions precedent
- 1.4. State of the environment
- 1.5. Climate change
- 1.6. Public concern

2. Risk assessment

3. Land

Summary of key points:

- 3.1. State of the environment Western Davenports
- 3.2. Mapping the future surveys 2019
- 3.3. The Guideline: Limits of acceptable change to groundwater dependent vegetation in the Western Davenport Water Control District (The Guideline)
- 3.4. Thring swamp - site of biological and bioregional significance
- 3.5. Other inadequacies in describing impacts and mitigating risks to GDEs
- 3.6. Threatened species
- 3.7. Climate change risk assessment

4. Water

Summary of key points

- 4.1. Groundwater monitoring program and adaptive management plan
- 4.2. Water quality (Salinity)
- 4.3. Water quality (fertilisers, pesticides and herbicides)
- 4.4. Subterranean GDEs (stygo fauna)
- 4.5. Taylor Creek and aquatic ecosystems
- 4.6. Groundwater resource
 - Impact
 - Location of the water

5. AIR

Summary of key points

6. PEOPLE

1. Executive Summary

ALEC welcomes the opportunity to provide comment to the Northern Territory Environment Protection Authority (NT EPA) on Fortune Agribusiness' environmental referral of their Singleton Station Horticulture Project (the Project).¹

ALEC is of the firm view that the Fortune Agribusiness' Singleton Station irrigation development is highly inappropriate in its size and location. As a result it involves serious and unacceptable environmental consequences.

ALEC in the strongest terms possible considers it essential that the Project be required to undergo a Tier 3 Environment Impact Assessment (EIA) by the NT EPA.

The referral fails to avoid and mitigate significant impacts to the environment which may result in a major consequence. The referral consistently sidelines major uncertainty and risk where it consistently adopts a narrow scope to justify the 'low' and 'medium' risks of the irrigation development. These documents are a cynical attempt to avoid the highest level of scrutiny and that is a Tier 3 Environment Impact Assessment.

The Project poses a number of severe environmental risks even after the proposed mitigations. It is likely to have severe environmental impacts to the following environmental values

- Groundwater dependent ecosystems;
- Stygofauna;
- Threatened species;
- Soil salinity;
- Groundwater salinity;
- Cultural values;
- Land condition;
- Greenhouse gas emissions;
- Intergenerational equity.

Further, ALEC has a low level of confidence in Fortune predicting the potential impacts of the project, where there are serious levels of uncertainty due to absent or majorly deficient data, relating to the:

- Groundwater resource
- Groundwater salinity
- Soil salinity
- Groundwater dependent ecosystems
- Stygofauna
- Threatened species
- State and health of the environment
- Climate change risks
- Adaptive management

¹ Fortune Agribusiness Fund Management Pty Ltd, (2022). *Environment Protection Act 2019 Referral Report: Singleton Horticulture Project*.
<https://ntepa.nt.gov.au/_data/assets/pdf_file/0006/1167081/nt-epa-referral-singleton-horticulture-project.pdf>

As a result, ALEC has low levels of confidence that Fortune's proposed measures to avoid, mitigate or manage the potentially significant impact can be effective. Fortune's risk assessment is unacceptable. It is illogical that risks can be managed and mitigated when Fortune Agribusiness does not have key data for various ecological, hydrological and cultural values.

Given the seriousness and size of the area over which these risks occur and the scale of the disruption and values impacted, it is unacceptable for the assessment of these to be deferred.

This proposal and referral does not meet the principles of ecologically sustainable development

ALEC reiterates its calls that a Tier 3 Environmental Impact Assessment is required.

ALEC's submission follows the *NT EPA Environmental factors and objectives: environmental impact assessment general technical guidance*.² We have four sections under four of these themes: land, water, air and people. ALEC's submission expands these positions further below.

Public concern

The Singleton development is extraordinary in its size. It continues to generate deep concern and opposition amongst ALEC's members and stakeholders. It appears to be singularly poorly calibrated to widely held public values of ALEC's members and the wider community, including Traditional Owners and Barkly residents. Our view is that this is because shallow groundwater systems are so integral to arid areas.

² Northern Territory Environment Protection Authority, (2022). *NT EPA Environmental factors and objectives: Environmental impact assessment general technical guidance*.
<https://ntepa.nt.gov.au/_data/assets/pdf_file/0020/804602/guide-ntepa-environmental-factors-objectives.pdf>

Background

1.1. Legislative context and the role of the NT EPA

The Singleton Horticulture Project (**the Project**) has been referred under section 48 of the *Environment Protection Act 2019* (NT) (**EP Act**) as a proposed action that has the potential to have a significant impact.

Section 11 defines the meaning of a significant impact of an action as ‘an impact of major consequence having regard to:

- (a) the context and intensity of the impact; and
- (b) the sensitivity, value and quality of the environment impacted on and the duration, magnitude and geographic extent of the impact’³

In its Environmental Impact Assessment Guidance for Proponents, the NT EPA identified the following factors it may consider when determining if a Project may have a significant impact:

- The value, sensitivity and quality of the environment that will be impacted;
- The extent and consequence of likely impacts;
- The resilience of the environment to cope with impacts and change;
- Cumulative impacts with other Projects; and
- The level of certainty of the potential impacts and planned mitigation.

It is noted the above factors are contained within an NT EPA Guidance document.

Under the *Environment Protection Regulations 2000* (NT) (**EP Regulations**), when deciding or recommending a method of environmental assessment, the NT EPA **must** take into account the following factors when deciding what method of assessment should be used for the Project:⁴

- the significance of the potential impact of the Project;
- the level of confidence in predicting the potential impacts of the Project, taking into account the extent and currency of existing knowledge;
- the level of confidence in the effectiveness of Fortune’s proposed measures to avoid, mitigate or manage the potential significant impacts of the Project;
- the extent of community engagement that has occurred in relation to the Project; and
- the capacity of communities and individuals likely to be affected by the Project to assess and understand information about the Project and its potential significant impacts.

Further, section 17 of the EP Act states that ‘[a] decision-maker **must consider and apply** these principles [of ecologically sustainable development] in making a decision under this Act’ (emphasis added).⁵ The NT EPA would be considered the decision maker in this circumstance.

Section 18 breaks down what these principles of ecologically sustainable development are:

³ *Environment Protection Act 2019* (NT) (“EP Act”) section 11.

⁴ *Environment Protection Regulations 2000* (NT) (“EP Regulations”) regulation 59.

⁵ EP Act section 17.

- (1) Decision-making processes should effectively integrate both long-term and short-term environmental and equitable considerations.
- (2) Decision-making processes should provide for community involvement in relation to decisions and actions that affect the community.⁶

Section 19(1) states a commitment to the precautionary principle and section 19(2) that decision making of the precautionary principle be guided by:

- (a) a careful evaluation to avoid serious or irreversible damage to the environment wherever practicable; and
- (b) an assessment of the risk-weighted consequences of various options.⁷

Sections 20-24 provide principles for evidence-based decision-making, principle of intergenerational and intragenerational equity, sustainable use, conservation of biological diversity and ecological integrity, improved valuation, pricing and incentive mechanisms.⁸

1.2. The proposal

Fortune Agribusiness is proposing to develop 3,300 ha of irrigated horticulture at Singleton Station in the Northern Territory. It is proposed that 4,037 ha will be cleared for the development.⁹

Fortune was granted a groundwater licence on 15 November 2021 to access up to 40,000ML of groundwater annually. The licence was approved for 30-years and permits Fortune to extract water from the Central Plains Management Zone on a staged basis, culminating after 8 years in a minimum of 36,000 ML and a maximum of 40,000 ML of water entitlement per annum for the remaining duration of the License. The Licence includes the following stages:

Stage 1: 12,788ML/yr for a period of 3 years

Stage 2: 22,845ML for a period of 2 years

Stage 3: 31,779 for a period of 2 years

Stage 4: 40,000 for the remain duration of the licence

The License was granted with ten conditions precedent attached.

1.3. Water licence and its conditions precedent

As outlined above, on 15 November 2021, the Minister for Territory Families and Urban Housing, as delegate of the Minister for Environment, granted the Licence on the same basis as the Water Controller but with some amendments as well as additional conditions precedent.

It is ALEC's position that granting the Groundwater Licence with these conditions precedent was inappropriate as the Minister deferred consideration of important aspects of the Project that could

⁶ EP Act section 18.

⁷ EP Act section 19.

⁸ EP Act sections 20-24.

⁹ Fortune Agribusiness Fund Management Pty Ltd, (2022). *Environment Protection Act 2019 Referral Report: Singleton Horticulture Project*, p. 18.

https://ntepa.nt.gov.au/_data/assets/pdf_file/0006/1167081/nt-epa-referral-singleton-horticulture-project.pdf

result in significant variations. The conditions precedent were required due to the potentially significant impacts from the Project, the high level of uncertainty around key parameters and the low level of confidence in Fortune's ability to effectively avoid, mitigate and manage these potentially significant impacts.

It is noted that in her original decision (on which the Minister relied), the Water Controller said the conditions precedent were "to provide an opportunity for the applicant [Fortune] to resolve uncertainties associated with the location and types of GDEs and uncertainties relating to salinity and groundwater quality."¹⁰

The conditions precedent require a number of different reports to be provided to the Water Controller for approval, these include:

- A map, verified through on-ground surveys, of groundwater dependent ecosystems in each landform (CP 5(a)(ii));
- A map demonstrating the modelled spatial extent of predicted impact on groundwater levels (CP 5(b));
- A final version of the borefield design if the predicted impacts to groundwater levels exceed the limits established under the Guideline (CP 5(i)-(iv));
- An assessment of the potential salinity impacts to the Land and Water Resource (CP 6);
- An adaptive management plan (CP 7);
- A monitoring program (CP 8);
- An assessment of water resource on the land (CP 9); and
- A groundwater dependent Aboriginal cultural values impact assessment (CP 10).

The further assessments and information required under the conditions precedent demonstrate the high level of uncertainty surrounding the Project and the poor "extent and currency of existing knowledge" surrounding the Project. Applying the criteria under Reg 59 of the EP Regulations, the NTEPA must conclude it has a low level of confidence in the ability to predict potential significant impacts of the proposal noting the poor extent and currency of existing knowledge.

ALEC holds further concerns regarding the approval process of the conditions precedent. Under the conditions precedent, Fortune is required to submit various assessments to the Water Controller for approval. The approval of these further assessments is not governed by the *Water Act 1992* (Water Act) or *Water Regulations 1992* (Water Regulations). Although this legislative framework regulates compliance with conditions of water licenses, it does not regulate the approval of assessments attached to conditions. In this respect, ALEC understands if Fortune failed to provide an assessment of water resources on the land as required under condition precedent 9, they may be in breach of their license. However, the approval of the assessments required under the conditions precedent and ultimately Fortune's compliance with the conditions is at the discretion of the Water Controller. There is no opportunity for public comment or consultation on the assessments, nor is there a policy or guidance for how the Water Controller reviews these assessments. Disturbingly, there is no publicly available criteria regarding how the Controller will determine the approval (or not) of these assessments for the purpose of compliance with the conditions precedent.

¹⁰ Water Controller's Reasons for Decision.

ALEC stresses that the conditions precedent should not influence the decision-making processes of the NT EPA. These conditions precedent are linked to the water licence approval process. ALEC considers these conditions precedent as irrelevant to this process as what the reports contain and their approval is not known and at the discretion of the Water Controller who is not involved in the decision-making process currently before the NTEPA.

It is ALEC's view the NTEPA should have "called-in" and required Fortune to refer the Project for environmental assessment prior to the determination of the water license. Jessica Lee, an expert on the use of adaptive management in the context of mining projects has stated that:

'Upfront EIA is generally a legal requirement for large mining projects. It is also a fundamental requirement of good adaptive management. It is clear that adaptive management should not be used as an excuse to defer upfront EIA of mining projects to opaque post-approval processes...'.¹¹

Noting that any conditions set by the NTEPA (if the Project is approved) would override (to the extent of their inconsistency) the conditions of the water license, ALEC reiterates that the environmental approval and referral process should have been a prerequisite.

1.4. State of the environment

Northern Territory/ arid and semi-arid

It is important to consider this proposal within the larger health and state of the environment in the Northern Territory. Biodiversity decline, ecosystem collapse and the extinction crisis is the current reality across the Northern Territory.

Four of the Northern Territory's iconic ecosystems are undergoing ecological collapse¹². These are western-central arid zones, Georgina Gidgee woodlands, Australian tropical savanna and mangrove forests. Collapse is understood as an ecosystem which has undergone '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'¹³. In Central Australia, this is due to temperature and precipitation changes, heatwaves and fire weather. Regional human pressures are a result of habitat change and loss, invasive species such as buffel grass, livestock, agriculture and water extraction¹⁴. We are observing Central Australia's unique, diverse and vibrant environments transforming due to these pressures.

There have been 11 recorded extinctions in the Northern Territory. All 11 of these have been based in Central Australia. It places Central Australia at the forefront of the extinction crisis nationally. Further, 10 of these species have been mammals, granting Central Australia the unwanted status as a world leader in mammalian extinctions.

¹¹ Lee, J. (2014). Theory to practice: Adaptive management of the groundwater impacts of Australian mining projects. *Environmental and Planning Law Journal* 31(4), 251-287.

¹² 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), 1692-1703.

¹³ Ibid, 1693.

¹⁴ Ibid, 1694.

The Commonwealth State of the Environment Report 2021 made clear that the NT is falling behind most states and territories in many biodiversity categories, nearly 40% of the Territory's inland waters have no protections at all (highest of all states and territories), nearly double that of NSW/ACT and South Australia.¹⁵ While, over 20% of EPBC listed threatened species have no known distribution, and thus no means of protection in the NT. That level of uncertainty is at least two times higher than all other states and territories.¹⁶

These factors highlight that the arid and semi-arid zone is already sensitive to a diverse range of impacts. These stressors are affecting the resilience of the environment.

1.5. Climate change

While the Territory is already a place of climate extremes, climate change is increasing the intensity, frequency and variability of climatic events.¹⁷ 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, an increase in the likelihood of major flood events, drier soils, increased evapotranspiration, more wildfires and increased risks of erosion.¹⁸

Comparing the 10-year average from 1942-1951 with the last ten years, Tennant Creek has warmed already by 2 degrees C, with many of its hottest years on record occurring in the last 5 years.¹⁹ In Tennant, there were 7 days above 44°C annually between 1990-2019, compared to 0 annually between 1960-1989. Tennant Creek across the same period has experienced 7 days a year above 44°C compared to zero in the 30 years prior.²⁰ Under a high emissions scenario, by the end of the century we can expect Tennant Creek to see close to an extra 100 days above 35°C above the historical average.²¹

1.6. Public concern

The Singleton development is extraordinary in its size. It continues to generate deep concern and opposition amongst ALEC's members and stakeholders. It appears to be singularly poorly calibrated to widely held public values of ALEC's members and the wider community, including Traditional Owners and Barkly residents. Our view is that this is because shallow groundwater systems are so integral to arid areas.

¹⁵ Murphy H & van Leeuwen S. (2021). *Australia State of the Environment 2021: Biodiversity*, Independent Report to the Australian Government Minister for the Environment, Commonwealth of Australia, Canberra, 127.
<<https://soe.dcccew.gov.au/sites/default/files/2022-07/soe2021-biodiversity.pdf>>

¹⁶ Ibid, 137.

¹⁷ Lawrence, J., B. Mackey, F. Chiew, M.J. Costello, K. Hennessy, N. Lansbury, U.B. Nidumolu, G. Pecl, L. Rickards, N. Tapper, A. Woodward, and A. Wreford, 2022: Australasia. In: *Climate Change 2022: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge University Press, Cambridge, UK and New York, NY, USA, pp. 1581–1688.
<https://www.ipcc.ch/report/ar6/wg2/downloads/report/IPCC_AR6_WGII_Chapter11.pdf>

¹⁸ NESP Earth Systems and Climate Change Hub. (2020). *Climate change in the Northern Territory: state of the science and climate change impacts*. NESP ESCC Hub, Melbourne.

<https://denr.nt.gov.au/_data/assets/pdf_file/0011/944831/state-of-the-science-and-climate-change-impacts-final-report.pdf>

¹⁹ Australian Government, Bureau of Meteorology, 'Tennant Creek Airport' *Climate data Online* (Web Page)

<<http://www.bom.gov.au/climate/data/>>

²⁰ Ibid

²¹ Ibid.

The public has been poorly served by conducting this environmental assessment last. The extraction licence decision making process is inefficient and inaccessible. The notice period is relatively short, being only 20 business days, and the notice is only required to be published in a local newspaper (not very accessible).

In our submission we raise concerns that the necessary information for informed consent was not available or considered relevant during the GWEL process (e.g. impacts on up to 30% GDEs). It is therefore concerning that the applicant is seeking to bypass consideration of these matters (e.g impacts on <30% of GDEs) because of the GWEL process.

A petition involving 23,355 signatures was generated on this proposal. Key asks in the petition were:

- Ensure a comprehensive environmental impact assessment is completed and made available for public consultation prior to assessment of future groundwater extraction licence applications.
- Dismiss the departmental guidance that 30% of groundwater dependent vegetation may be ‘negatively impacted’ by FAFM or any future groundwater extraction licensees.

It is symptomatic of the unsuitability of the GWEL advertising process that this petition ran after the obscure advertising period, when the public became more aware of the problems with this irrigation development. The petition was not considered by the Controller of Water resources or the Minister during the S30 review of the licence decision.

2. Risk assessment

It is unacceptable that the proponent has classified all 38 residual risk ratings as ‘low’ or ‘medium’. It means Fortune considers there to be zero residual risks that have been classified as ‘high’ or ‘extreme’.

There are significant risks from the Project to diverse ecological, hydrological and cultural values that will occur over a period of many decades. This is unsurprising as this project is one of the largest irrigation developments in Australia and requires one of the nation’s largest water licences. It is also occurring in a region where there is limited baseline understanding of the key parameters, including the groundwater resource, salinity, groundwater dependent ecosystems, threatened species and cultural values. One cannot manage and mitigate all risks when there is a low understanding of how different values are at risk.

ALEC disagrees with the approach taken to ascertain and assess risk. The adaptive management plan too often fails to demonstrate how risk will be avoided or mitigated. Whilst the identification of different values is important (e.g. location of GDEs, cultural values etc), this understanding does not in and of itself mitigate, reduce or remove the risks of the proposed development.

We use two examples below to capture the low level of confidence ALEC has in relation to Fortune’s risk assessment. See also Section 4.3 Water Quality (fertilisers, pesticides and herbicides) for a third example.

Example 1

In relation to salinity risks (e.g. 1.7 or 2.7 of the risk assessment), where soil quality is affected as there is a change in soil chemistry and health, a proposed control measure includes ‘control measures identified in the salinity impact assessment and will be controlled through implementation of CP6 management plan’.

Upon review of the Salinity Impact Assessment Report (which is CP6) and in particular the residual impact assessment, mitigation measures include:

- More investigation;
- Amending the cropping plan; and
- ‘Irrigation management plan will be developed to capture all mitigation measures related to changes in soil to avoid environmental impact’, with further actions:
 - More monitoring
 - pH adjustment
 - Additional fertilisers
 - Real-time monitoring.

There are no actions relating to salinity in Table 15 ‘FAFM action when triggers are reached’ in the Adaptive Management Plan.

Instead, earlier in the document it reiterates the ‘adoption of “best practice” irrigation management to minimise salinity impacts’.²²

The risk for saline issues is dependent on the irrigation management plan that is yet to be developed. The contents of the plan is unknown, except that ‘all mitigation measures’ will be included. Further information is needed to properly assess and scrutinise the management plan.

ALEC is not confident that Fortune’s proposed measures to avoid, mitigate and manage these risks will be effective. Fortune have failed to demonstrate how they can respond to these risks and provide appropriate and effective actions.

Despite key parameters for salinity risks such as soil salinity not being known, Fortune remains steadfast that they can manage the risk. It is clear that greater assessment is required, and that should be at Tier 3 Environment Impact Assessment.

Example 2

In the groundwater monitoring program a risk register has been developed. This register is applied to at-risk values, including GDEs, existing groundwater users and sacred sites.

²² Fortune Agribusiness Fund Management Pty Ltd, (2022). *Appendix G Groundwater Monitoring Program and Adaptive Management Plan*, p. 32.

<https://ntepa.nt.gov.au/_data/assets/pdf_file/0017/1167101/appendix-g-singleton-horticulture-project-monitoring-program-and-adaptive-management-plan.pdf>

The likelihood of impact has been based on a criteria system that has three levels: low, medium and high. However, completely arbitrary and seemingly misleading criteria have been adopted for this risk register based on distance from the borefield. The criteria is:

Low: SHP production borefield radius of influence greater than 5 km away

Medium: SHP production borefield radius of influence between 2 km and 5 km away

High: SHP production borefield radius of influence within 2 km

Bizarrely, we know that the groundwater table will be lowered across a 25km radius and that negative and significant impacts to GDEs are not confined to those that are based within 5kms of the borefield. This all makes the risk register rating even more confusing.

The risk register rates the risk to springs, soaks and sacred sites as low for all values between Years 0-5 years and low again for most values at Years 26-30. Oddly, the risk register stops at year 30, this is despite the Referral documents demonstrating that the negative impacts to GDEs peaking years after Year 30.

The Salinity Assessment does not attempt to justify why any of this was done. The risk register appears as smoke and mirrors, providing a different narrative to that which is portrayed in other parts of the Referral documents. The risk register provides ALEC with low confidence that Fortune is effectively defining risks. This impacts the confidence ALEC has in the effectiveness of Fortune's proposed measures to avoid, mitigate or manage the potential significant impacts of the Project.

Land



Image: approximately 4km north of the proposed borefield At Singleton Station

3. Land

Summary of key points:

Context:

ALEC raises concerns that the Western Davenport area has been identified as already significantly impacted by a variety of threatening processes and needs to be protected, not degraded. Groundwater dependent ecosystems are a known source of diversity, as reported:²³.

‘Globally, groundwater dependent ecosystems (GDEs) are recognised for their value as ecological refuges, specialised habitat and areas of high indigenous cultural importance...’

Furthermore it can be expected that groundwater dependent ecosystems will be even more important as refugia and a source of resilience with climate change. These will enjoy continuing access to groundwater and thus are better placed to withstand droughts.

Loss of GDEs poses a severe risk and these risks are not mentioned in the risk assessment

The applicant has mischaracterized the risk as only occurring when “negative impacts are felt to over and above 30% of all sandplain and alluvial GDEs. This is highly inappropriate and all negative impacts must be evaluated.

ALEC is opposed to application of the GDV guideline. It is a non-statutory and non-binding guideline, created without public consultation. It has not been approved as a strategic document by the EPA and has been widely opposed. It also represents a radical departure from groundwater extraction that occurs elsewhere in the arid zone where it can and does co-exist with protection of GDEs, for example within the Ti Tree Water Control District, within the Town Basin in Alice Springs and existing extraction in the Western Davenport Area.

The risk of negative impacts to all GDEs potentially impacted must be described in the Risk Assessment. ALEC firmly believes this risk, which involves a residual impact on GDEs across an area approximately 40 km to 50km in length, is extreme.

We also raise significant concerns about how the area of GDEs impacted has been calculated in a way that dangerously underestimates the area impacted.

ALEC raised concerns about specific GDEs impacted (e.g. Thring Swamp) and the failure to properly protect these. It is deeply troubling that significant individual sites will be impacted on the basis of a generalised calculation of the overall quantity of GDEs impacted. We believe there is a false narrative being posed that GDEs must be sacrificed to enable groundwater extraction. Extraction can and does co-exist with protection of GDEs (as mentioned above). It is simply the extraordinarily large size of this proposal, which is causing this project to destroy or damage GDEs over a length of stretch of land of around 50km in length. This proposal may be the largest potable groundwater extraction licence in Australia. It is simply unacceptable and a poor reflection upon the NT’s environmental regulation that this licence should be drawing upon groundwater from a shallow groundwater system with extensive

²³ <https://territorystories.nt.gov.au/10070/868537> (p v)

groundwater dependent ecosystems. As noted, it is also a departure from how GDEs have been protected in arid zones in the past.

ALEC is also deeply concerned that the guideline is also being used to avoid accountability for its impacts on GDEs. It may also be used to avoid the necessity to offset its severe impacts to biodiversity and atmospheric carbon emissions.

Risks to Threatened Fauna poses severe risks

ALEC is deeply concerned that the proponent has based its assertions on desk studies, and regional scale field studies, undertaken for the Mapping the Future project during drought.

Amongst a range of concerns we raise specific concern that disused greater bilby have been identified in the area, but no fieldwork undertaken and that an expected outcome of the proposal is a loss of habitat for the grey falcon, over an enormous area likely to sum to many tens of thousands of hectares.

Discussion

There are an array of land-based values that are at significant impacts of major consequence. Environmental systems are intrinsically connected and complex. As such a significant impact of major consequence needs to be understood in relation to the state of the existing environment.

This section includes commentary on landforms, terrestrial environmental quality and terrestrial ecosystems. These factors are considered as ALEC provides comment on:

- The state of the environment in the Western Davenport region;
- Mapping the futures surveys 2019;
- Threatened species;
- The Guideline;
- Thring Swamp; and,
- Climate change.

This section assesses the risks the Project proposes for land-based values.

3.1. State of the environment Western Davenports

There are old and escalating threats to ecosystem function across the region of the proposed Irrigation Development, including cattle, feral animals, fire, weeds, climate change, land clearing and groundwater depletion. These are well known key threatening processes that exist in a broader ecosystem that is undergoing ecological collapse. The proposed Irrigation Development will further exacerbate a decline in ecological condition.

The report *Biodiversity Assessment of the Western Davenport Area* (Stokeld Report) is useful in better understanding the state of the region, where:²⁴

- 83% of sites within the Western Davenports were visibly impacted by cattle;²⁵

²⁴ Stokeld, D., Leiper, I., Brim Box, J., Jobson, P., Nano, C. and Box, P. (2022). Mapping the Future Project – Western Davenport. Biodiversity assessment of the Western Davenport area. Technical Report 30/2021. Department of Environment, Parks and Water Security. Darwin, Northern Territory. <<https://territorystories.nt.gov.au/10070/868531>>

²⁵ Ibid, p. 34.

- Over a quarter of sites contain buffel grass, where buffel is more likely to grow in alluvial soils and at the base of large trees in sandplain environments;²⁶
- Many GDE sites have already been degraded by cattle;
- ‘Much of the study area is under relatively intense cattle use with cattle impacts most evident where depth-to-groundwater is shallow (< 15 m), and therefore many sensitive and significant vegetation communities, GDEs and wetlands have been heavily degraded’²⁷
- ‘22% of the study area was burnt in 2017 or 2018, 60% between 2010 and 2013, with 49% of the area burnt in 2011, although this study suggests much of Singleton has not burnt in the last decade;²⁸ and,
- ‘Records of fauna are sparse within the study area’²⁹;
- ‘Few fauna surveys have been undertaken in, or adjacent, to the study area prior to this investigation’³⁰
- The Mapping the Futures surveys were done in the middle of drought;³¹
- Cattle, camels, cats and foxes exist in the region.³²

3.2. Mapping the future surveys 2019

The mapping the future surveys that were completed as part of the Stokeld Report were completed during 2019, where:

- Floristic surveys were completed between March and August 2019; and,
- Preliminary fauna surveys were undertaken in March to inform planned fauna surveys in October and November.

As mentioned above, the surveys were completed in the middle of drought which adds considerably to the lack of confidence in the data that was collected. This was stressed numerous times in the Mapping the Futures Biodiversity Assessment report, for example:

‘Drought conditions experienced in the region prior to this study compounded observed impacts, with many areas in poor ecological condition during field surveys. The unfavourable environmental conditions adds a level of uncertainty with respect to identifying areas with enhanced biodiversity value in the study area.’³³

‘Because of the drought conditions experienced in the region in late 2018/2019, inflow dependent vegetation suffered significant water stress except where they were located in areas of shallow groundwater and could access the regional aquifer (Nano et al. 2021). By definition these latter are also considered GDEs (Cook and Eamus 2018b)’.³⁴

²⁶ Ibid, p. 34.

²⁷ Ibid, p. 2.

²⁸ Ibid, p. 19.

²⁹ Ibid, p. 3.

³⁰ Ibid, p. 9.

³¹ Ibid, p. 1.

³² Ibid, p. 50.

³³ Ibid, p. 2.

³⁴ Ibid, p.19.

‘Mammal diversity was exceptionally low in the study area with only five species of small mammal observed. Our observations did not indicate that groundwater depth or landscape influenced mammal species richness. Small mammals often persist in arid environments at low densities during periods of drought and erupt briefly after rain. Fauna sampling for this study was undertaken after several years of below-average rainfall when the environmental conditions in the study area were poor.’³⁵

The region experienced well below average rainfall for several years prior to our survey, with drought conditions evident in the study area during field surveys. Further to the poor weather conditions, much of the study area is under intense cattle use with cattle impacts most evident where there was a shallow depth to groundwater. The environmental conditions, in concert with cattle impacts, are likely to have influenced our survey findings and adds some uncertainty regarding what flora and fauna may be supported during ‘normal’ or wet periods, and with respect to identifying areas with high biodiversity value in the study area.³⁶

So how bad were conditions in the region in 2019?

The Tennant Creek weather station is the closest weather station with complete data to the Irrigation Development. Its records began in 1970. 2019 was the:³⁷

- Driest year on record, where just 63.6mm fell. This represented just 14% of average annual rainfall. The old record was 170.0mm which had stood for 50 years;
- Highest annual mean temperature on record;
- Highest annual mean maximum temperature on record;
- Highest annual mean minimum temperature on record.

2019 followed 2018 which was:³⁸

- At the time the second hottest year ever on record;
- the record highest December mean daily maximum temperature, beating the record by 1.5C;
- the record highest December mean daily minimum temperature, beating the record by 1.1C;
- the record highest December mean temperature where it had 28 days above 40C
- Recorded just 62% of annual average rainfall

It is clear that these are exceptional conditions, supporting the commentary that was provided in the Stokeld Report.

The NT EPA *Guidelines for assessment of impacts on terrestrial biodiversity* states that ‘sampling is to occur at suitable times of year and appropriate intensity to determine the presence of the species

³⁵ Ibid, p. 35.

³⁶ Ibid, p. 58

³⁷ Australian Government, Bureau of Meteorology, ‘Tennant Creek Airport’ *Climate data Online* (Web Page) <<http://www.bom.gov.au/climate/data/>>; Australian Government, Bureau of Meteorology, (2020). ‘Northern Territory in 2019: a very warm and dry year’ *Annual Climate Summary for Northern Territory* (Article, 9 January 2020) <<http://www.bom.gov.au/climate/current/annual/nt/archive/2019.summary.shtml#:~:text=Northern%20Territory%20in%202019%3A%20a%20very%20warm%20and%20dry%20year&text=Averaged%20across%20the%20Territory%2C%20and,was%20second%2Dlowest%20on%20record>>

³⁸ Australian Government, Bureau of Meteorology, ‘Tennant Creek Airport’ *Climate data Online* (Web Page) <<http://www.bom.gov.au/climate/data/>>; Australian Government, Bureau of Meteorology, (2019). ‘Northern Territory in December 2018: Record-breaking heat; driest December since 2002’ *Monthly Climate Summary for Northern Territory* (Article, 10 January 2019) <<http://www.bom.gov.au/climate/current/month/nt/archive/201812.summary.shtml>>

and obtain estimates of population abundance where the species occur... the adequacy of sampling needs to be demonstrated'.³⁹

Whilst Fortune did no sampling of their own, it is apparent that the Mapping the Future exercise was during record conditions and cannot constitute a baseline. Furthermore it was focused on gaining a regional understanding and was not bespoke to the areas most at risk from this proposal. As a result there is significant uncertainty relating to the baselines of fauna species in the region, including threatened species. Whilst it is also important to note that data deficient and least concern annual flora species at Thring Swamp were not surveyed due to the prolonged severe drought conditions.⁴⁰

3.3. The Guideline: Limits of acceptable change to groundwater dependent vegetation in the Western Davenport Water Control District (The Guideline)

Terrestrial ecosystems

The Guideline is a non-statutory and non-binding policy that was developed by DEPWS in February 2020.⁴¹ ALEC submits the NT EPA should not adopt the thresholds established by DEPWS within the Guideline and instead **must** assess the project based on the significance of the proposed impacts as required under the EP Act and EP Regulations. ALEC is not aware of a Guideline of this nature being applied in other jurisdictions and therefore submits the Guideline marks a radical shift in the management of groundwater dependent ecosystems in the Northern Territory and in Australia.

It is noted the lawfulness of the Guideline is a live issue as it is presently being considered by the NT Supreme Court. Section 22B(4) of the Water Act requires water resource management in a water control district "to be in accordance with the water allocation plan" for that district. The applicable water allocation plan to the Western Davenport Water Control District is the Western Davenport WAP 2018-2020 and Western Davenport WAP 2021-22. Both of these WAPs include an objective to 'meet the environmental water requirements of water dependent ecosystems'.⁴² This is clarified further where it states that 'detrimental impacts to water dependent ecosystems as a consequence of consumptive water use will be avoided as far as possible'.⁴³ It mitigates significant impacts by establishing clear triggers guiding groundwater depletion and subsequent impacts on GDE's. These are:

- The maximum depth to groundwater does not exceed 15 metres;
- The magnitude of change in the depth to groundwater is not more than 50%;

³⁹ Northern Territory Environment Protection Authority, (2013). *Guideline for Assessment of Impacts on Terrestrial Biodiversity*, p. 9.

<https://ntepa.nt.gov.au/_data/assets/pdf_file/0004/287428/guideline_assessment_terrestrial_biodiversity.pdf>

⁴⁰ Fortune Agribusiness Fund Management Pty Ltd, (2022). *Appendix C Biodiversity Assessment Report: Singleton Horticulture Project*, p. 1.

<https://ntepa.nt.gov.au/_data/assets/pdf_file/0004/1167097/appendix-c-singleton-horticulture-project-biodiversity-assessment-report.pdf>

⁴¹ Northern Territory, (2020). *Guideline: Limits of acceptable change to groundwater dependent vegetation in the Western Davenport Water Control District*, Department of Environment and Natural Resources: Northern Territory.

<https://denr.nt.gov.au/_data/assets/pdf_file/0006/904758/GDE-Guidance-document-Western-Davenport-2.pdf>

⁴² Northern Territory, (2018). *Western Davenport Water Allocation Plan 2018-2021*, Department of Environment, Parks and Water Security: Northern Territory, p. 6 <<https://territorystories.nt.gov.au/10070/346928>>; Northern Territory, (2021). *Western Davenport Water Allocation Plan 2021-2022*, Department of Environment, Parks and Water Security: Northern Territory, p. 8 <<https://territorystories.nt.gov.au/10070/851647>>

⁴³ Northern Territory, (2018). *Western Davenport Water Allocation Plan 2018-2021*, Department of Environment, Parks and Water Security: Northern Territory, p. 16 <<https://territorystories.nt.gov.au/10070/346928>>; Northern Territory, (2021). *Western Davenport Water Allocation Plan 2021-2022*, Department of Environment, Parks and Water Security: Northern Territory, p. 20 <<https://territorystories.nt.gov.au/10070/851647>>.

- The rate of change of the groundwater table is not more than 0.2 metres per year.⁴⁴

These protection measures in the WAP did not support Fortune's proposed Horticulture Project and would have prevented the approval of the water Licence. The Guideline allows for the circumvention of the WAP and appears to have been an investor-led policy where the policy environment was changed to support one of Australia's largest groundwater licences without public consultation

Through a Freedom of Information request, ALEC understands:

- No draft of the Guideline was developed;
- DEPWS decided to not consult the Western Davenport Water Advisory Committee;
- There was no public consultation or participation;
- Fortune Agribusiness was the only stakeholder consulted in the development of the Guideline;
- The Guideline appears to be largely developed over one week in February 2020;
- Fortune received a finalised version of the guideline on 13/02/20, five months before the document was made publicly available online;
- There appears to be little to no research basis to support this policy, in regards to research that is relevant to the semi-arid/ arid zone or groundwater dependent ecosystems.

The Guideline allows for the destruction of 30% of GDEs in a diverse and rich ecological and cultural landscape that is entirely inappropriate for the Territory context. The Guideline also adopts principles that are unenforceable.⁴⁵

Application of the GDV Guideline

The Guideline is a non-binding document, created without public consultation and has been widely opposed. The enforceability of the Guideline is unclear. It is unclear how the Guideline is to be applied over time, noting temporal factors are not considered in the hastily put together document. ALEC notes the Guideline has no end date attached nor does it include a review period (as would normally be the case in similar policy documents). The applicants appear to have leveraged this ambiguity by failing to identify and protect significant GDEs.

The application of the Guideline to this Project is unacceptable.

⁴⁴ Northern Territory, (2018). *Western Davenport Water Allocation Plan 2018-2021*, Department of Environment, Parks and Water Security: Northern Territory, p. 8 <<https://territorystories.nt.gov.au/10070/346928>>; Northern Territory, (2021). *Western Davenport Water Allocation Plan 2021-2022*, Department of Environment, Parks and Water Security: Northern Territory, p. 10 <<https://territorystories.nt.gov.au/10070/851647>>.

⁴⁵ See Northern Territory, (2020). *Guideline: Limits of acceptable change to groundwater dependent vegetation in the Western Davenport Water Control District*, Department of Environment and Natural Resources: Northern Territory, p. 8 <https://denr.nt.gov.au/_data/assets/pdf_file/0006/904758/GDE-Guidance-document-Western-Davenport-2.pdf>. The Guideline promotes principles that are unenforceable, where it seeks to minimise impacts to GDEs that:

- are large in individual extent;
- are in good condition (relative to the impacts of pressures such as grazing, fire, weeds);
- provide habitat for threatened or rare species;
- have relatively high species richness;
- have relatively complex vegetation structure ;
- represent the range of environmental variation in these ecosystems found in the region;
- are important in maintaining connectivity between habitat patches across the landscape.

The Project proposes to negatively impact 21.9% (or 3184 h) of GDE's.⁴⁶ While this may sit under the 30% threshold permitted under the Guideline (and which we submit is an unacceptable limit), Fortune's impacts accounts for 73% of all groundwater dependent ecosystems that can be destroyed at Singleton Station. As noted above, the Guideline has no end date, review date or time limit. ALEC is therefore extremely concerned regarding for how long the Guideline would be applied and the destruction of 30% GDEs would continue..

ALEC submits the Guideline is contrary to sections 18 and 21 of the EP Act regarding the decision making principle and the principle of intergenerational and intragenerational equity.

Scientific issues with the Guideline

The risks posed to GDEs are unacceptable. GDEs in arid and semi-arid zones are rare, vital parts of the landscape of regional importance. Their importance is amplified because the overwhelming effects of evaporation means surface water is rare and short-lived in arid and semi-arid lands. Arid Zone GDEs must be protected, in all cases.

Damaging less than 30% of GDEs is still a major and unacceptable risk. The risks below the threshold of 30% for each main type are not accounted for in the EIS at all but must be. It is simply unacceptable that these environmental impacts are not acknowledged in the report.

The department's own paper states:⁴⁷

'Globally, groundwater dependent ecosystems (GDEs) are recognised for their value as ecological refuges, specialised habitat and areas of high indigenous cultural importance....';

And another:⁴⁸

'Groundwater dependent ecosystems have intrinsic ecological values and are important for maintaining biodiversity and ecosystem function more widely. Groundwater dependent ecosystems provide important refugia for fauna within, or across, the landscape, particularly during periods of prolonged drought in arid and semi-arid regions. They also play an important role in maintaining land and water quality by holding onto soil and capturing run-off, and preventing development of dryland salinity (Eamus 2009)'.

ALEC is deeply concerned that the GDV guideline⁴⁹ makes a categorical error, by treating GDEs only as an ecosystem type of which a fraction may be given up, rather than groundwater dependence also being an ecosystem property which renders areas innately more likely to be ecologically diverse, have a greater concentration of sacred sites, specialised habitat and increasingly be a source of climate change resilience and therefore warrant preservation in all cases.

⁴⁶ Fortune Agribusiness Fund Management Pty Ltd, (2022). *Environment Protection Act 2019 Referral Report: Singleton Horticulture Project*, pp. 103, 108.

https://ntepa.nt.gov.au/_data/assets/pdf_file/0006/1167081/nt-epa-referral-singleton-horticulture-project.pdf

⁴⁷ Nano, C., Jobson, P., Randall, D. and Brim Box, J. (2021). Ecological characteristics of potential groundwater dependent vegetation in the Western Davenport Water Control District. Technical Report 19/2021. Department of Environment, Parks and Water Security, Northern Territory, p. v. <https://territorystories.nt.gov.au/10070/868536>

⁴⁸ Stokeld, D., Leiper, I., Brim Box, J., Jobson, P., Nano, C. and Box, P. (2022). Mapping the Future Project – Western Davenport. Biodiversity assessment of the Western Davenport area. Technical Report 30/2021. Department of Environment, Parks and Water Security. Darwin, Northern Territory, p. 20. <https://territorystories.nt.gov.au/10070/868531>

⁴⁹ https://denr.nt.gov.au/_data/assets/pdf_file/0006/904758/GDE-Guidance-document-Western-Davenport-2.pdf

Hence GDEs strategically are important for protection in their entirety and work must be done up front to describe them. They must never be reduced to a general summation of area impacted and indifferent to individual sites. The concentration of values in GDE areas is made evident in Donaldson's Addendum. We expect this to be the case for other values also.

A false narrative appears to be being posed that GDEs must be sacrificed to enable groundwater extraction to occur. Extraction can and does co-exist with protection of GDEs. This is occurring within the Ti Tree Water Control District, within the Town Basin in Alice Springs and existing extraction in the Western Davenport Area. It is simply the extraordinarily large size of this proposal, which is causing this project to destroy or damage GDEs over a length of stretch of land 50km in length. This proposal may be the largest potable groundwater extraction licence in Australia. It is simply unacceptable and a poor reflection upon the NT's environmental regulation that this licence should be drawing upon groundwater from a shallow groundwater system with extensive groundwater dependent ecosystems. It is also a departure from how GDEs have been protected in arid zones in the past.

The research basis for this policy cites land clearing policies for regions that have already undergone extensive clearing. These reference documents are not relevant for GDEs and are not relevant to the semi-arid zone.

ALEC is also deeply concerned at the risk that the guideline is also being used to avoid accountability for its impacts on GDEs, as well as the necessity to offset its severe impacts on biodiversity and atmospheric carbon emissions.

The Guideline and cumulative impacts

Part of the issue with the Guideline is its crudeness in providing a prescriptive rate of destruction. In addition to issues with its application (see above), this rate takes a very naive approach to the ongoing viability of ecosystems within the drawdown area in the region. The damage and destruction of GDEs will make these ecosystems simpler and less complex which will have compounding impacts to other fauna and flora.

The proposed Irrigation Development will see a 50km diameter where GDEs are destroyed or damaged. This is occurring in a context where cattle are already severely degrading the landscape, particularly in areas where GDEs are present as shallow depth to groundwater of less than 15 metres is preferred grazing habitat for cattle.⁵⁰ This correlates exactly with where Terrestrial GDEs are most abundant. Saplings are consumed and regrowth can be completely suppressed. Hard-hooves can degrade springs, swamps, soaks and waterholes where there are limited protections. This paints a picture that there are already pre-existing issues with regeneration of GDEs at Singleton Station and in the broader region.

There is the added threat of fire and buffel grass, which under a warming climate will see larger, more frequent and more intense fires. Buffel's preference to grow on alluvial soils and at the base of large trees in sandplain environments will place GDEs at far greater risk. ALEC notes that GDEs in recent years have not been overly exposed to fire in the region.

⁵⁰ Stokeld, D., Leiper, I., Brim Box, J., Jobson, P., Nano, C. and Box, P. (2022). Mapping the Future Project – Western Davenport. Biodiversity assessment of the Western Davenport area. Technical Report 30/2021. Department of Environment, Parks and Water Security. Darwin, Northern Territory. <<https://territorystories.nt.gov.au/10070/868531>>

Then, in a changing climate, temperatures will continue to rise, droughts more intense, rainfall more variable, evapotranspiration rates rising and extreme weather occurring more often. The removal of key climate refugia will promote cascading impacts during periods of extreme climate variability, pushing the system towards tipping points. In a regulatory approach where we know conditions will become more extreme because of climate change, GDEs and climate refugia should be protected as they have far greater resilience than surface water systems. This Guideline does the opposite.

Once we account for the destruction of GDEs as a result of fire, extreme weather events and natural decay, and remember that this is occurring in a context where there is little to no regeneration due to cattle, one quickly understands that negatively impacting 30% of GDEs is a truly radical proposition.

This policy setting will have major consequences for the regional terrestrial systems.

3.4. Thring swamp - site of biological and bioregional significance

Thring swamp is a site of botanical significance, and a site of bioregional significance which is associated with Wycliffe Creek Within Singleton Station.⁵¹ Thring swamp is approximately 5 km northeast of the Irrigation Development.

It is an ‘aggregation of wetland types... It supports coolibah low open woodlands with a highly diverse ephemeral herb group layer. The mid layer can be notably thick in some sites, with species such as inland tea tree and conkerberry forming dense stands that provide important food resources and cover for fauna. The wetlands at Thing Swamp are interconnected and hydrologically complex’.⁵² They also include a semi-permanent waterhole and floodout. It is understood that the groundwater table is 6m below the surface.⁵³

Soils here are alluvial clay and clay loam which promotes different vegetative communities compared to the sandplain dominated region. As a result it provides unique and uncommon habitat for a number of rare or highly restricted plant species.

Vegetation at Thring swamp includes *Eucalyptus victrix* (Gum barked coolibah), which is likely inundation dependent and potentially at certain dry times groundwater dependent and swamps with emergent lignum (*Muehlenbeckia florulenta*).

Thring Swamp also supports uncommon and unique water lilies which are significant taxa:⁵⁴

- Water lily *Nymphaea (immutabilis subsp immutabilis)*; Data Deficient, TPWC Act), this being the southern limit by 180kms in the Northern Territory.
- yellow fringed water lily (*Nymphoides indica*; Least Concern, TPWC Act) – this being the southern range limit for the species by over 300km within the Northern Territory’;

⁵¹ Stokeld, D., Leiper, I., Brim Box, J., Jobson, P., Nano, C. and Box, P. (2022). Mapping the Future Project – Western Davenport. Biodiversity assessment of the Western Davenport area. Technical Report 30/2021. Department of Environment, Parks and Water Security. Darwin, Northern Territory, pp. 37, 57. <<https://territorystories.nt.gov.au/10070/868531>>

⁵² Ibid, 59.

⁵³ Duguid, A. (2009). *Wetlands of the Western Davenports Water Control District*. Unpublished internal report to the Department of Natural Resources, Environment, the Arts and Sport, Northern Territory Government, p. 40. <https://landresources.nt.gov.au/data/assets/pdf_file/0004/254686/WDWCD_Wetlands_Report-Final.pdf>

⁵⁴ Ibid, p. 17.

- Wavy marshwort (*Nymphoides crenata*) is a marshwort (not a true water lily). It is highly restricted in the southern NT (about 10 locations) with nearest being just north of Tennant Creek. Collected at Thring Swamp in 1979.

Several other somewhat uncommon plants are recorded at Thring Swamp flood out. These include *Bergia occultipetala*, *Isotoma luticola*, *Marsilea crenata*, *Rotala occultiflora*, *Velleia macrocalyx*.⁵⁵ None of these species are threatened.

This floral diversity exists in an environment where there is still much uncertainty. In 2009, Duguid emphasised the need for further investigation and research of Thring Swamp to better understand the ecological characteristics of its wetlands, particularly pre and post inundation. This appears to not have happened, as Duguid's report remains a key document on wetlands within the Western Davenport region.

The Mapping the Future survey in 2019 occurred during the driest and hottest year on record. Subsequently, annual wetland flora was not surveyed. Thus, an update on the distribution and state of some of Thring Swamp's most unique and rare flora was not possible.

In regards to threatened fauna, it is understood that Thring Swamp is 'a vegetation community which may provide suitable nesting opportunities for Grey Falcon (*Falco hypoleucos*)' and may also be suitable habitat for the Australian Painted Snipe (*Rostratula australis*) and the migratory species the Curlew Sandpiper (*Calidris ferruginea*).⁵⁶

If the proponent acknowledges that Thing Swamp was 'appropriately avoided by land clearing for the Proposal',⁵⁷ why is groundwater depletion permitted?

While ALEC welcomes that grazing will be restricted at Thring Swamp, how can it state that 'active land management measures within Singleton Station will provide a net benefit to Thring Swamp'.⁵⁸

Fortune in their Referral documents has failed to demonstrate how their mitigation and management measures will effectively mitigate the proposed significant impacts of the irrigation development on Thring Swamp.

Fortune has failed to outline how Thring Swamp may be impacted by the development beyond stating that it is in the drawdown area, nor have they adequately developed a management plan for this unique system that is rightly a site of botanical and bioregional significance.

ALEC has little understanding of how Thring Swamp will be impacted and managed as the Management Strategy is empty.⁵⁹

This provides more evidence that a Tier 3 Environmental Impact Assessment is necessary.

⁵⁵ Ibid, p. 40.

⁵⁶ Fortune Agribusiness Fund Management Pty Ltd, (2022). *Appendix C Biodiversity Assessment Report: Singleton Horticulture Project*, pp. 29-30, 40.

https://ntepa.nt.gov.au/_data/assets/pdf_file/0004/1167097/appendix-c-singleton-horticulture-project-biodiversity-assessment-report.pdf

⁵⁷ Ibid, p. 45.

⁵⁸ Ibid, Appendix B: Assessment of Significance of Residual Impacts on Matters of National Environmental Significance, p. 9.

⁵⁹ Ibid, p. 54.

3.5. Other inadequacies in describing impacts and mitigating risks to GDEs

3.5.1 Incorrect use of GDE probability mapping

The calculation of the area of GDEs impacted is likely to have been excluded some GDEs and understated the impact, based on setting the probability of a model cell being a GDE being higher than 70% for a cell to be considered a GDE. This immediately excludes cells of probability 50-70% which on basis of probability are more likely than not GDEs. The difference between mapping GDE 50% probability is evident in Appendix R Figures 4.9 and 4.11.

Excluding cells which are more likely than not GDEs from calculation of the extent GDEs is the opposite of a precautionary approach. It is incompatible with ecologically sustainable development and results in systematic under-reporting of the proposal's impacts. To be truly precautionary the modelled impact area should be based on a GDE probability less than 50%

Furthermore as single trees in open woodland areas, such as sandplain areas close to the extraction may not occupy the full model cell, these are unlikely to be mapped at GDE 70% or higher. Hence by using a very high GDE probability setting the calculations may be systematically downplaying the impacts on open woodland areas.

Example (Below) from Appendix R (50% GDE produces a much high impact area. A precautionary approach would set the GDE probability <50%

Table 4.4 Scenario 45 –GDE impact area quantified by landform for CPMZ

Analysis set	Unit	Alluvial	Sandplain	Total
70% GDE at 40 yr	Ha	670	2290	2960
	%	21%	11%	13%
50% GDE at 40 yr	Ha	1043	9436	10479
	%	19%	15%	15%

Recommendation: *The risk of impacts to GDEs should report all GDEs impacted, based on a truly precautionary approach. This would set the GDE probability at a conservative value of less than 50% so that GDEs are not missed. This is especially important in open woodland areas.*

3.5.2 Why are GDEs based on current tree extent and not suitable conditions for GDEs?

The applicants should also address the argument that the entire shallow groundwater area is a GDE not just where an isolated tree occurs. It is noted that the vicissitudes of recent history (e.g. fires, overstocking and severe droughts) determine where individual trees grow. However the same underlying conditions (i.e. shallow groundwater) occur throughout the shallow groundwater area.

3.5.3 Unexplained exclusion of modelled GDEs based on depth to groundwater mapping based on scant data, while there is underlying uncertainty about the depths to which GDEs can access groundwater.

A substantial area of GDEs appears to have been snipped out of maps to the north-west of the irrigation area and the impacted area calculations on basis of depth to groundwater being mapped as greater than 15m. However there is not strong evidence either that: that the depth to groundwater in

this area is actually greater than 15m; or that ghostgums cannot access groundwater at even greater depths. These areas should be included on the maps and the impacts on GDEs in these areas included in calculations of the area of GDEs impacted.

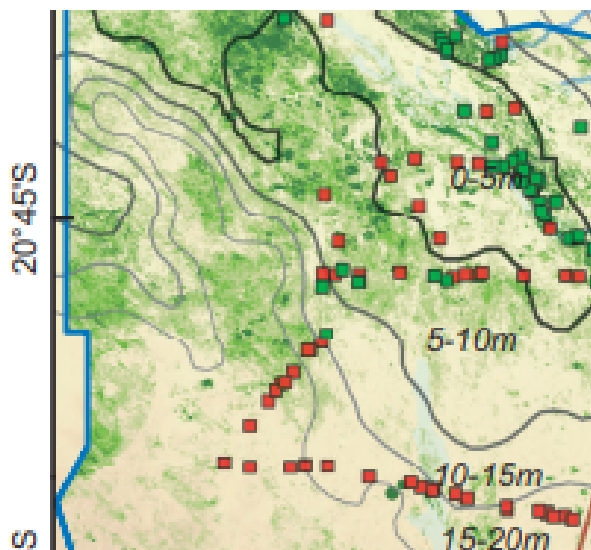
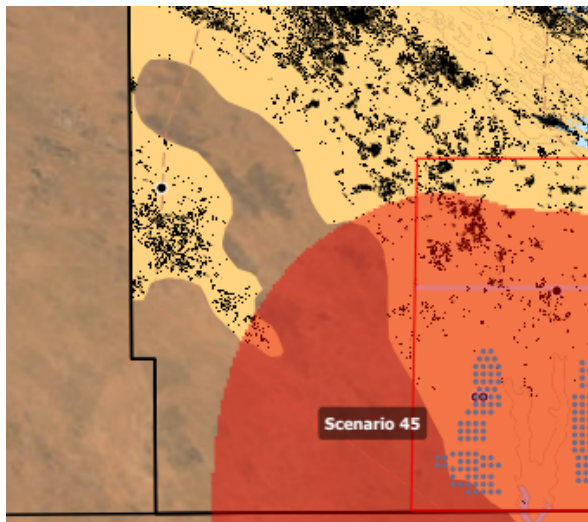


Figure First map is from the EIS, second map is Brim Box et al. The excluded area in the EIS (i.e. in the first figure dark area running NNW-SSE) is the proponent's innovation. This is not excluded by Brim Box et al. This is the area where predicted depth to groundwater is greater than 15m, however GDEs including ghost gums occur in this area. These may be able to access deeper groundwater. Furthermore the depth to groundwater is based on few data points. The applicant has had ample opportunity to drill bores to determine the depth to groundwater in this area but has not done so.

Recommendation - the excluded areas should be reinstated unless it can be proved vegetation in this area is not using groundwater.

3.5.4 Appendix M Groundwater Dependent Ecosystem Mapping appears to criticise the basis of GDE modelling.

We find it odd that the applicant has submitted a validation of the GDE modelling, rather than taken time to provide actual mapping of GDEs. While the criticism appears to be focused upon reports ‘false positives’ it does not inspire confidence in the information basis. At a minimum the Department of Environment, Parks and Water Security (DEPWS) should respond to the information contained in this Appendix.

3.6. Threatened species

The *Territory Parks and Wildlife Conservation Act 1976* (NT) (**TPWC Act**) and *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (**EPBC Act**) outlines the responsibilities for Threatened Species in the Northern Territory and nationally.⁶⁰

The Referral documents make clear that only a desktop survey and field surveys were completed to assess biodiversity values, this includes that no threatened species surveys were conducted.⁶¹ This remains the major concern where the Referral documents rely very heavily on the Mapping the Future surveys completed in 2019. As mentioned in 2.2 this survey occurred during record hot and dry periods.

ALEC reiterates that there is a scarcity of data in the region around fauna and threatened species. As such there is a lack of confidence in the management approach put forward by Fortune.

Threatened fauna records (including EPBC Act migratory records and TPWC Act ‘near threatened’ species records) within 10kms of the proposal area include:

- Bush-stone curlew
- Grey falcon
- Emu
- Common sandpiper
- Great egret
- Rainbow-bee eater
- Greater bilby
- Spectacled hare-wallaby
- Mulga snake

ALEC has serious concerns for threatened species. We make particular comment on the grey falcon (*Falco hypoleucos*) and greater bilby (*Macrotis lagotis*) which are both vulnerable under the EPBC and TPWC Act. In addition ALEC has concerns with the spectacled hare-wallaby (*Lagorchestes conspicillatus*) which is near threatened under the TPWC Act.

Greater Bilby

⁶⁰ *Territory Parks and Wildlife Conservation Act 1976* (NT); *Environment Protection and Biodiversity Conservation Act 1999* (Cth).

⁶¹ Fortune Agribusiness Fund Management Pty Ltd, (2022). *Appendix C Biodiversity Assessment Report: Singleton Horticulture Project*, p. 2

<https://ntepa.nt.gov.au/data/assets/pdf_file/0004/1167097/appendix-c-singleton-horticulture-project-biodiversity-assessment-report.pdf>

There are nine recorded sightings of the greater bilby within the Western Davenport region, most recently in 2009, as well as a disused bilby burrow 4km from the Irrigation Development in 2019. This spinifex sand plain landscape is preferred bilby habitat.

Bilbies are ecosystem engineers where they dig for food and burrow for shelter. Across one year, one bilby will turn over 20 tonnes of soil.⁶² Their digging helps water infiltrate into the soil, collect leaf litter and harbour seeds. Their burrows provide protection from other small fauna such as hopping mice, mulgara and monitor lizards. Turning over the soil is also an effective way to limit the risk of bushfires.

There is inconsistency in the reporting by Fortune where in there land clearing application in 2021 they stated that:

‘Nine sightings recorded within 10 kms of development area, most recently in 2009’⁶³

Now Fortune are stating that there have been:

‘nine sightings recorded within the Western Davenport region, most recently in 2009 approximately 50 km north of the Proposal area on the Stuart Highway (but no records within 10 km of the Proposal area)’⁶⁴

ALEC notes that Fortune has quoted versions of this excerpt from the Stokeld Report five times in the Biodiversity Assessment report that ‘[t]aking into account the grazing history of the study area and lack of recent species observations or sign, it is unlikely the Greater bilby persists in the study area’ (WDWCD)⁶⁵.

ALEC is unclear what this report is referring to in relation to the ‘lack of recent species observations or signs’. As it has been constantly repeated that there is no fauna baseline in this region and that the 2019 mapping the futures survey was completed during the hottest and driest year on record which would have affected and skewed the collected data. Further information gathering is clearly required.

ALEC’s position is that there remains significant uncertainty relating to the greater bilby in the area and this will not be resolved until targeted surveys are conducted in the region. This must be a requirement of Fortune’s Tier 3 Environmental Impact Assessment.

The assertions in 1.9 of the risk assessment that bilby habitat outcomes are disputed given the widespread destruction of GDEs, which are known to be ecological refuges and specialised habitat areas.

Grey falcon

The Referral documents state that there has been one sighting of the grey falcon within 10km of the development site, approximately 3km west of the irrigation development site.

⁶² Australian Wildlife Conservancy, (2021). *Restoring Australia’s ecosystem engineers*.
<<https://www.australianwildlife.org/restoring-australias-ecosystem-engineers/>>

⁶³ Singleton Land Clearing Application, p.12.

⁶⁴ Fortune Agribusiness Fund Management Pty Ltd, (2022). *Appendix C Biodiversity Assessment Report: Singleton Horticulture Project*, p. 26
<https://ntepa.nt.gov.au/_data/assets/pdf_file/0004/1167097/appendix-c-singleton-horticulture-project-biodiversity-assessment-report.pdf>

⁶⁵ Ibid, p. 28.

Its distribution within the NT has primarily occurred around the southern arid areas in areas with less than 500mm of rainfall. The referral identifies that the whole proposal consists of potential suitable foraging habitat. While breeding habitat consists of tall trees particularly on inland drainage systems, which includes around Thring Swamp, Wyckliffe Creek and Skinner Creek.

The impacts of GDE destruction upon the grey falcon is not known and Fortune do not attempt to find out in their referral documents. Tier 3 Environment Impact Assessment is an opportunity to scrutinise what impact the GDE destruction will have on the grey falcon. A threatened species that has been observed in the drawdown area and where thousands of hectares of its habitat will be impacted.

Spectacled hare-wallaby

There have been 4 recent records within the Western Davenport region, including one within the proposal footprint. The most recent sighting was 2020. They are often found in northern desert areas, where there is more than 350mm of rainfall.

Potentially over 4000 ha of suitable habitat will be cleared by this project and a vastly larger area impacted via the loss of GDEs..

ALEC notes that the spectacled hare-wallaby has cultural significance for Warlpiri, Alyawarr, Kaetye and Warumungu people.

3.7. Climate change risk assessment

The Climate change risk assessment is very narrow in its approach. It assesses only the risk of climate change to Fortune's assets. It pays little to no attention to how climate change will compound other risks and impacts that the Project will bring forward. For example, there is no linkage with how climate change may affect biodiversity, GDE health, evapotranspiration rates and increased rates of evaporation contributing to larger salinity issues.

This report does not address the cumulative impacts of this project and how climate change will cascade those impacts.

Section 42(b)(v) of the EP Act states that a Tier 3 Environment Impact Assessment process would require the proponent to take into account the impacts of climate change. This is the appropriate process for the full impacts of climate change and the direct and indirect risks associated with the Irrigation Development.

WATER



Image: Taylor Creek in flow during February 2023

4. Water

Summary of key points

Adaptive management plan

This plan highlights areas of uncertainty but fails to alleviate concerns relating to significant impacts. The plan is poor, and is a plan for a plan. It demonstrates the importance of a Tier 3 EIA.

Impacts on water quality (salinity)

The Salinity Assessment is filled with uncertainty where it lacks data on a number of key parameters, including soil salinity. The Salinity Assessment does not heed the warnings of the Cook and Keane report that there is a high salinity risk in the region. This is a significant risk to ecological, hydrological and cultural values. ALEC highlights the areas of significant uncertainty, demonstrating that there are major consequences that may follow.

Impacts on stygofauna:

Given the uncertainty and significant risks to stygofauna, lack of field studies and certainty of aquifer drawdown and changes in water quality, based upon Dr Davis's advice, the risk assessment should conclude that the risk to stygofauna is severe, not "moderate" as is asserted in the referral.

Risks to aquatic ecosystems and inundation dependent ecosystems

ALEC raises concerns about Taylor Creek and the persistence of surface water in run on areas, swamps and soakages in shallow groundwater areas when the underlying groundwater table is lowered.

Uncertainty about the water resource

ALEC asks the simple question, What aquifer does the groundwater come from that Fortune Agribusiness wants to use for one of Australia's largest irrigation developments? It is never stated and this highlights the lack of basic details relating to one of the largest irrigation developments in the country.

Discussion

4.1. Groundwater monitoring program and adaptive management plan

Water: Hydrological processes, inland water environmental quality

Land: Terrestrial environmental quality, terrestrial ecosystem

People: Culture and heritage

The Groundwater monitoring program and adaptive management plan (Appendix G) are hugely problematic documents.⁶⁶ They highlight significant areas of uncertainty, whilst failing to alleviate concerns relating to significant risks and major consequences.

The Adaptive Management Plan in particular is a key document that is intended to mitigate 8 risks and potential impacts, including:⁶⁷

1. Negative impacts to over and above 30% of all sandplain and alluvial GDEs modelled to occur within both Singleton Station and the whole GDE protection area - Exceeding 30% loss of GDEs may cause unacceptable decline in quality and quantity of habitat and biodiversity values (including Thring Swamp Sites of Botanical Significance, sensitive and/or significant vegetation communities include Coolibah low open woodland, and potentially occurring threatened species such as the Grey Falcon). – A decline in primary productivity including reduced shoot and root growth – Reduced ecosystem function – Reduced reproduction and recruitment – Changes in floristics – Pest plant, animal and pathogen invasion – Major shifts in vegetation structure;
2. Impacts to soil quality - change in soil chemistry and health from application of irrigation waters. I.e., sodicity, salinity and other (nutrients, soil structure, ability to rehabilitate the land after cropping) Operational Impacts to inherent soil conditions diminishing soil productivity and health, reducing options for future land use - Reduced viability of cropping land ;
3. Saline soils formed over 30 years of operation of the project result in poor rehabilitation of the landscape - Biodiversity – GDE and terrestrial vegetation decline or death;
4. Groundwater extraction during operation of up to 40 ML/annum from borefields in the development area - impact on other users in the vicinity- pumping cost increases for surrounding land owners;
5. Fertilizer, pesticide and herbicide entering ground water through seepage - Contaminated groundwater impacts on environmental values and other users
6. Groundwater extraction during operation of up to 40 ML/annum from borefields in the development area - Groundwater drawdown has the potential to reduce the quantity and quality of habitats for stygofauna, which may lead to localised extinctions and reduction in populations and community structure;
7. Operational risk of secondary salinity - recharge of aquifer by irrigation drainage that is re-irrigated. Secondary salinity is caused by saline irrigation water and potentially a local deep drainage throttle creating a perched water table at shallow depth (<3 m) - Impact crop species that can not be grown and productive under saline irrigation
8. Within the GDE protection area, groundwater extraction results in – maximum depth to water table exceeding 15 m – maximum depth to water table declines by more than 50% below the baseline level (i.e. no pumping scenario) – results in a rate of drawdown that exceeds 20 cm (0.2 m / year) - Potential impacts to sacred sites or Aboriginal cultural values from water drawdown

⁶⁶ Fortune Agribusiness Fund Management Pty Ltd, (2022). *Appendix G Groundwater Monitoring Program and Adaptive Management Plan*.

<https://ntepa.nt.gov.au/_data/assets/pdf_file/0017/1167101/appendix-g-singleton-horticulture-project-monitoring-program-and-adaptive-management-plan.pdf>

⁶⁷ Fortune Agribusiness Fund Management Pty Ltd, (2022). *Appendix A EPA Risk Assessment*, pp. 3-5.

<https://ntepa.nt.gov.au/_data/assets/pdf_file/0011/1167095/appendix-a-singleton-horticulture-project-env-risk-register.pdf>

The Adaptive Management Plan is vague and arbitrary, providing little confidence that these risks will be mitigated. However, it is used as justification for reducing the residual risk of the majority of these potential impacts.

There appears to be a presumption that the identification of a risk (e.g. location of GDE's, location of sacred sites) means that a risk will be mitigated when this is not the case. It means the proponent can make better informed decisions, it does not mean that an impact is suddenly avoidable. If a sacred site lies within the drawdown zone of the regional aquifer which is being depleted, that risk cannot be easily avoided if the development is to proceed. It is disheartening that the most common trigger action was simply to drill more bores elsewhere, which appears to have limited foresight that in some circumstances this is just shifting the problem to a different area.

The risk register is also very problematic. The risk register is used to group risk where 'the likelihood of impact has been based upon the following:

- Low: SHP production borefield radius of influence greater than 5 km away
- Medium: SHP production borefield radius of influence between 2 km and 5 km away
- High: SHP production borefield radius of influence within 2 km.'⁶⁸

This criteria for risk is arbitrary and irrelevant to the actual risks of the project. Why parameters of less than 2km, 2-5km and greater than 5kms have been used has not been justified. It is known that the drawdown impacts are far greater, as the proponent has stated that 'it is also noted that modelling indicates the extent of groundwater drawdown at 35 years to extend upwards of 25 km radially from the proposed development (CloudGMS 2019)'⁶⁹

Further, it is unclear why the full extent of impacts has not been captured, where the risk register cuts off at year 30. For example, GDE's at year 30 will see 10% of GDE's be impacted at Singleton, while years later impacts will peak.

Further 8.3.1 is a section of 'measures to avoid impacts' which provides 5 steps that will assist in the avoidance or minimisation of impacts. ALEC challenges their basis to avoid impacts.

Fortune's Perspective on measures to avoid impacts (8.3.1)	ALEC's perspective on measures to avoid impacts (addressing 8.3.1)
A comprehensive groundwater model that is used to predict the rate and extent of groundwater drawdown, and subsequently used to predict the impact on GDEs. This has been	The model is not currently comprehensive. The Referral documents frequently emphasise that there is significant uncertainty around aquifer parameters and groundwater behaviour where the model is 'based on assumptions around aquifer properties that are based on

⁶⁸ Fortune Agribusiness Fund Management Pty Ltd, (2022). *Appendix G Groundwater Monitoring Program and Adaptive Management Plan*, p. 29.

<https://ntepa.nt.gov.au/_data/assets/pdf_file/0017/1167101/appendix-g-singleton-horticulture-project-monitoring-program-and-adaptive-management-plan.pdf>

⁶⁹ Fortune Agribusiness Fund Management Pty Ltd, (2022). *Appendix L Salinity Impact Assessment Report*, p. 20.

<https://ntepa.nt.gov.au/_data/assets/pdf_file/0004/1167106/appendix-l-singleton-horticulture-project-salinity-impact-assessment.pdf>

Fortune's Perspective on measures to avoid impacts (8.3.1)	ALEC's perspective on measures to avoid impacts (addressing 8.3.1)
applied to underpin the timing (staging) of the elements of the monitoring program.	relatively limited data ⁷⁰ , 8.3.2 emphasises uncertainties relating to key characteristics of the resource, CP9 requires a program to identity the aquifers, verify the aquifer properties, determine the interconnectivity between the aquifers and quantify the aquifer yield. ⁷¹
Mapping of GDEs in the Western Davenport region, and in more detail across Singleton Station and areas potentially subject to groundwater drawdown.	Identification of GDEs won't necessarily reduce impact when there is significant groundwater depletion occurring across a 25km radius. Whilst identification is important, it remains unclear how this information will mitigate impacts. Further, it is unclear what Fortune will do if there are more GDEs than first thought, where there is little that can be done but to limit or stop extraction.
The obtaining of an Aboriginal Areas Protection Authority certificate which details sacred sites in the vicinity of the SHP	This is misleading as it is widely understood that Fortune failed to provide the necessary documentation to AAPA when applying for the AAPA certificate. AAPA was not aware that 40 sacred sites would be impacted due to groundwater depletion ⁷²
Consultation with Traditional Owners	The Referral documents make clear that at no point during the referral process were Traditional Owners directly consulted. ⁷³
Adoption of "best practice" irrigation management to minimise salinity impacts	This does not mean that salinity impacts will not happen.

The Adaptive Management Plan lacks rigour and largely kicks the can down the road. This is one of the largest irrigation developments in the country, it is unacceptable for these key reports to have yet been completed. To make an informed decision so as not to create a major consequence it is integral that a Tier 3 Environment Impact Assessment is conducted. These reports must be scrutinised.

⁷⁰ Fortune Agribusiness Fund Management Pty Ltd, (2022). *Appendix G Groundwater Monitoring Program and Adaptive Management Plan*, p. 36.
<https://ntepa.nt.gov.au/_data/assets/pdf_file/0017/1167101/appendix-g-singleton-horticulture-project-monitoring-program-and-adaptive-management-plan.pdf>

⁷¹ Fortune Agribusiness Fund Management Pty Ltd, (2022). *Appendix E Groundwater extraction allocation*, p. 7.
<https://ntepa.nt.gov.au/_data/assets/pdf_file/0006/1167099/appendix-e-groundwater-extraction-allocation-licence-no-wdcp-10358.pdf>

⁷² Jonscher, S, (2021). 'NT's sacred sites authority seeking legal advice over Singleton Station 40,000ML water licence' *ABC Alice Springs* (online, 14 December 2021).
<<https://www.abc.net.au/news/2021-12-14/nt-aboriginal-sacred-sites-not-adequately-protected/100695118>>

⁷³ Fortune Agribusiness Fund Management Pty Ltd, (2022). *Environment Protection Act 2019 Referral Report: Singleton Horticulture Project*, p. 55.
<https://ntepa.nt.gov.au/_data/assets/pdf_file/0006/1167081/nt-epa-referral-singleton-horticulture-project.pdf>

4.2. Water quality (Salinity)

Water: Hydrological processes, inland water environmental quality

Land: Terrestrial environmental quality, terrestrial ecosystems

People: Culture and heritage

The Appendix L Salinity Assessment (Salinity Assessment) is misleading and does not accurately capture the true extent of impacts that salinity risks pose to ecological, hydrological and cultural values from the Irrigation Development.

The report pays inadequate attention to the only other salinity report that has been conducted in the Western Davenport region, *The Risk of Salinity due to irrigation development in the Western Davenport basin, Northern Territory* (Cook and Keane Report). The report was written by Peter Cook and Robert Keane through the National Centre for Groundwater Research and Training in 2021. One would presume this would be a key document considering the region it covers, the lack of other available materials, the high-level of risk that it finds and the eminence of its authors.

Peter Cook is the Director of the National Centre for Groundwater Research and Training and one of the most experienced experts on surface water-groundwater interactions both in Australia and globally. The report represents a comprehensive, unbiased, first principles analysis of salinity impacts given all possible water use scenarios.

Despite Appendix L covering 112 pages, this report receives barely half a page of analysis.⁷⁴ In this half a page it describes the two scenarios, dismisses the conclusions that are made and merely notes a consideration of their findings.

The Salinity assessment does not refer to the conclusions of the Cook and Keane Report which directly conflict with Fortune's narrative that there are limited impacts and risks.⁷⁵ Instead, Cook and Keane conclude that there is the potential of high risks and caution that projects with irrigation rates similar to Fortune Agribusiness' at Singleton Station, that '[t]his predicted salinity increase has very significant implications for the long-term viability of irrigated agriculture in the region'.⁷⁶

The implications of this report are large. Under scenario 1, a layer of salty water will develop across most of Singleton; it will be at least 8000 uS/cm. According to descriptions of salt tolerances for plants common to drylands, such as in the West Davenport region, very few of the local veg would tolerate those conditions.⁷⁷ In Western Australia, 8000 uS/cm is very saline and in South Australia it is highly saline. Can't drink it, can't give it to stock and may destroy native vegetation. Under

⁷⁴ Fortune Agribusiness Fund Management Pty Ltd, (2022). *Appendix L Salinity Impact Assessment Report*, p. 20.
<https://ntepa.nt.gov.au/_data/assets/pdf_file/0004/1167106/appendix-l-singleton-horticulture-project-salinity-impact-assessment.pdf>

⁷⁵ Cook, P.G and Keane, R, (2021). The risk of salinity due to irrigation developments in the Western Davenport Basin, Northern Territory. National Centre for Groundwater Research and Training, Australia.
<<https://territorystories.nt.gov.au/10070/858823/0/5>>

⁷⁶ Ibid, p. 64.

⁷⁷ Department of Primary Industries and Regional Development. *Salinity tolerance of plants for agriculture and revegetation in Western Australia*.
<<https://www.agric.wa.gov.au/soil-salinity/salinity-tolerance-plants-agriculture-and-revegetation-western-australia>>

⁷⁸ State Flora. 'Plants for Saline Sites. Government of South Australia.
<<https://cdn.environment.sa.gov.au/state-flora/docs/plants-for-saline-sites-fact.pdf>>

scenario 2, conditions are much worse. So the best case scenario is that after 50 years the land is a wasteland. We discuss more of the context of Cook and Keane report in Appendix A.

With only three major recharge events occurring every 100 years in the region, there is a risk that these salinity issues will be present for a very long time.

Further, the Salinity Assessment does not address any of the major areas of uncertainty that are identified by Cook and Keane. This meant that there are many areas of major uncertainty that continue to be outstanding, where the Salinity Assessment does not:

- Use soil salinity data that is from the Western Davenport Region (particularly data greater than a few metres below the surface);
- Consider the impact of salinity on land condition;
- Consider the impact of salinity on the water table;
- Consider the impact of salinity on soil salinity;
- Consider the salinisation of the groundwater if soil salinity is greater than groundwater salinity;
- Demonstrate that groundwater dependent ecosystems will not be impacted by salinity;
- Demonstrate that cultural values will not be impacted by salinity;
- Show evidence what the maximum electrical conductivity (EC) value is at the water table;

Due to the significant uncertainty, this makes Cook and Keane's conclusions as conservative.

In addition, the Salinity Assessment highlights a very broad array of assumptions without qualifying the uncertainty and risk that is attached to their use:⁷⁹

- Groundwater levels over the irrigation area;
- Groundwater salinity;
- Aquifer hydraulic parameters;
- Drainage water salinity;
- Lithological profile underlying the cropping areas;
- Hydraulic interaction between the Cainozoic sediments and the Palaeozoic sandstones forming the production aquifer.

Cook and Keane provided a pathway forward for Fortune Agribusiness to address in their Salinity Assessment. Cooke and Keane stated:⁸⁰

‘Importantly, the current report does not provide prediction of salinity risks for individual developments. To do so would require information on the location of extraction bores relative to the areas to be irrigated, as well as local data on soil salinity. Some consideration should be given to requiring proponents of major irrigation development to obtain information on soil salinity as well as local groundwater salinity. Groundwater modelling of water table changes due to groundwater pumping and irrigation recharge and the saturated zone travel time to

⁷⁹ Fortune Agribusiness Fund Management Pty Ltd, (2022). *Appendix L Salinity Impact Assessment Report*, p. 84.
<https://ntepa.nt.gov.au/_data/assets/pdf_file/0004/1167106/appendix-l-singleton-horticulture-project-salinity-impact-assessment.pdf>

⁸⁰ Cook, P.G and Keane, R, (2021). The risk of salinity due to irrigation developments in the Western Davenport Basin, Northern Territory. National Centre for Groundwater Research and Training, Australia, p. 66.
<<https://territorystories.nt.gov.au/10070/858823/0/5>>

irrigation bores could be combined with the unsaturated zone modelling described in this report to determine the timescale for groundwater recycling for such developments and hence predict rates of salinity increase over time. This would provide a much more robust site-specific and development-specific predictions of salinity hazard which should aid both the proponents of the development and the NT Government.'

These areas of major uncertainty that may have major consequences on a diverse array of values was clearly ignored.

ALEC is concerned the applicants double down that there are limited risks, where in its conclusion of the Salinity Assessment they state 'A sensitivity analysis was incorporated into the solute transport modelling, to address some of the uncertainties associated with the quantitative analysis. ***The analysis is not identifying any critical issues with respect to salinity that could compromise the feasibility of the irrigation development***' (emphasis added).⁸¹ It is important to note that one can run as many simulations as you like, but when you lack key data (e.g. soil salinity data) the outputs will lack both precision and accuracy. Further, when models are based on more and more assumptions, the confidence in the models accuracy and precision drops. ALEC does not have confidence that the model is accurate and precise considering these factors.

The NT EPA must take into account this huge array of uncertainty and risk related to salinity impacts and the Irrigation Development. It demonstrates that there is a low level of confidence in predicting the potential impacts of the project. The current currency of existing knowledge states that there is the potentially 'high risk' of salinity impacts.⁸² Further, the level of confidence in the effectiveness of Fortune's proposed measures to avoid, mitigate or manage the potential significant impacts is low, as they do not have the necessary data, nor have they demonstrated how they are going to address all these major areas of uncertainty listed above.

Further, Fortune have failed to demonstrate how there will not be significant impacts as a result of salinity. Instead they provide unsubstantiated assertions. These areas must be taken into account as required under the EP Regulations.

ALEC also notes that the salinity modelling has not been applied in the discussion of water quality impacts on groundwater dependent vegetation, which treats this risk in very general, qualitative terms.

Case Study - Soil salinity

One of the major areas of uncertainty that continues to go unaddressed relates to soil salinity. As Cook and Keane make clear, soil salinity is one of three key areas that will shape salinity risk, alongside groundwater salinity and the time for water to move through the soil profile.⁸³ They caution that their report is likely conservative in its conclusions as soil salinity data from Ti Tree and Rocky Hill suggest that just a few metres under the surface, soil salinity values are at points significantly greater than

⁸¹ Fortune Agribusiness Fund Management Pty Ltd, (2022). *Appendix L Salinity Impact Assessment Report*, p. 85.
<https://ntepa.nt.gov.au/_data/assets/pdf_file/0004/1167106/appendix-l-singleton-horticulture-project-salinity-impact-assessment.pdf>

⁸² Cook, P.G and Keane, R, (2021). The risk of salinity due to irrigation developments in the Western Davenport Basin, Northern Territory. National Centre for Groundwater Research and Training, Australia, p. 79.
<<https://territorystories.nt.gov.au/10070/858823/0/5>>

⁸³ Ibid, p. iv.

groundwater salinity values, where values ranged between 450 – 33,300 S/cm.⁸⁴ Cook and Keane emphasised this soil salinity issue again and again that:

‘the soil salinity is poorly known, and so the risk of groundwater contamination from leaching of soil salinity cannot currently be assessed’⁸⁵

‘Further work is needed to understand the reason for the large degree of variation in soil salinity. If the soil salinity is high, the salinity increases due to irrigated agriculture could be much greater than predicted in this report.’⁸⁶

‘It should be noted that the model applied across the Western Davenport Central Plains region assumes that the soil salinity (c0) is equal to the groundwater salinity (cG). This may not be the case, but this assumption was necessitated by the lack of data on c0 within the Western Davenport area, and the very large uncertainty in this parameter at other sites. Values of c0 from studies in the Ti Tree Basin and Rocky Hill areas range from 450 – 33,000 S/cm, and the reason for the large variation is unclear. High values of this parameter would cause much more rapid increases in salinity than modelled here.’⁸⁷

‘High risk areas generally coincide with areas of shallow water tables.’⁸⁸

The salinity risk is determined by all model parameters, but soil water content and soil salinity parameters have not been varied as part of the Western Davenport analysis due to a lack of knowledge on the spatial variability of these parameters.⁸⁹

Other commentary around salinity impacts in the region

The proponent’s groundwater licence application in 2020 stated in the soil and land capability section that the area for development is ‘non-saline and well drained’⁹⁰.

At the time of the original groundwater licence in 2020, the International Association of Hydrogeologists, Northern Territory Branch in their submission stated:

‘instances of pollution of underground water supplies beneath horticultural developments from mobilization of salts by irrigation, metal contamination from pesticides and nitrate contamination from fertilizer application are documented throughout the scientific literature and elsewhere in the arid zone (e.g. Cook et al., 2017), the impact of groundwater in the Western Davenport Water Control District from agricultural irrigation also needs to be addressed in a future EIS. For instance root zone drainage for this proposal could result in significant amount of salts entering the aquifer at Singleton. If groundwater salinity is assumed to be around 1000mg/L TDS (e.g. nearby bore RN19453 EC = about 1600, then 40GL/ yr A 1 g (i.e. 1000mg/l) is equal to 40,000,000,000 litres X 1 gram = 40,000,000,000

⁸⁴ Ibid, p. 32.

⁸⁵ Ibid, p. iii.

⁸⁶ Ibid, pp. iii, 66, 68.

⁸⁷ Ibid pp. 60-61.

⁸⁸ Ibid, p. 61.

⁸⁹ Ibid.

⁹⁰ Fortune Agribusiness, 2020, p.6. ‘Singleton Horticulture Project: Summary Report, August 2020’.

grams or 40,000 tonnes of salts per year need to be flushed past the root zone for viable agriculture'.⁹¹

The Technical Report written by the Department stated:

'The quality of the underlying groundwater available to Singleton Station, specifically in terms of salt content, may be considered to be significant. Sampling of bores on and near Singleton Station indicate groundwater salinity is approximately 700 to 900 mg/L (as total dissolved solids). For this application, the irrigation of 40,000 ML p.a. of groundwater would bring 28,000 to 36,000 tonnes of dissolved salts to the surface annually. The application of irrigated water that will meet the plants' requirements with adequacy to flush the salts past the root zone brings the potential for deep drainage of saline concentrate to the underlying water table and the consequent deterioration of the water quality in the groundwater system, as well as waste of groundwater.'⁹²

4.3. Water quality (fertilisers, pesticides and herbicides)

ALEC understands that the impact of fertilisers, herbicides and pesticides on water quality has not been assessed. In fact there does not seem to be a quantity of fertilisers, herbicides or pesticides that has been stated.

The risk assessment identifies the issue, 'Fertilizer, pesticide and herbicide entering ground water through seepage - Contaminated groundwater impacts on environmental values and other users'. However the mitigation actions include:

- Implementation and compliance with CPs - adaptive management plan and groundwater monitoring program CP7 and CP8
- Investigate baseline water quality
- Monitor
- Implement Hazardous Materials Management Plan
- Implement ESCP which provide details on drip feed irrigation practices.

The adaptive management plan and groundwater monitoring program both have no mention of fertilisers, herbicides or pesticides. ALEC is not aware of the Hazardous Materials Management Plan or the ESCP, so presume they are yet to be developed. The residual risk is classified as 'low' as a result of these 'actions'.

Further, risks posed by fertilisers and herbicides and pesticides are supposedly mitigated as 'Potential water quality related impacts will be managed with implementation of the additional mitigation measures such as the use of bioretention systems, vegetated swales/buffers and proprietary devices'.⁹³

⁹¹ International Association of Hydrogeologists, Northern Territory Branch, 2020. P.2. 'Fortune Agribusiness Funds Management PTY Ltd. Application for 39 800 ML/ year for agriculture on Singleton Station. Access to documents via the DEPWS Water Licence Portal.

⁹² Northern Territory, (2021). 'Groundwater extraction licence resource assessment: AG06221 (Singleton Station). Water Resources Division Technical Report 5/2021. Department of Environment, Parks and Water Security, Northern Territory Government, p. 29. <<https://territorystories.nt.gov.au/10070/827497>>

⁹³ Fortune Agribusiness Fund Management Pty Ltd, (2022). *Environment Protection Act 2019 Referral Report: Singleton Horticulture Project*, p. 42. <https://ntepa.nt.gov.au/_data/assets/pdf_file/0006/1167081/nt-epa-referral-singleton-horticulture-project.pdf>

It is clear that Fortune does not know what impact fertilisers, herbicides and pesticides may have on water quality (or other factors). There is no information on this issue. ALEC has low confidence in Fortune's ability to avoid, mitigate or manage significant impacts as a result of the Project. This is especially important as the extraction is occurring in a shallow groundwater area, part of the proponent's strategy involves leaching irrigation water to flush salts and the proposal is close to sensitive receptors including Taylor Creek and known sacred sites.

A Tier 3 Environment Impact Assessment is necessary to assess these impacts which have not been included in these referral documents.

4.4. Subterranean GDEs (stygo fauna)

Upon review of Fortune's Referral documentation, ALEC submits the Project will have a significant impact on subterranean groundwater dependent ecosystems (GDEs) noting:

- the project has the potential to result in irreversible impacts;
- the extent and currency of existing knowledge of subterranean GDEs in the Project area is limited; and
- therefore the level of confidence in the proposed mitigation measures is low.

ALEC submits the Project should be assessed at the highest tier of environmental impact assessment to ensure the extent of stygo fauna and subterranean GDEs in the Project area are known with certainty.

Stygo fauna play a key role in regulating water quality, 'the ability of stygo fauna to bioremediate groundwater contaminants means they provide an important ecosystem service for maintaining groundwater quality. Connected surface water systems and terrestrial ecosystems also benefit from the ecosystem services of subterranean GDEs (Tomlinson & Boulton 2008)'.⁹⁴

ALEC instructed the Environmental Defenders Office to brief freshwater ecologist Professor Jenny Davis to review the Project's referral documentation and provide an analysis of the Project's potential impacts on groundwater dependent ecosystems (GDEs). See **enclosed** letter from Professor Davis.

Professor Davis states:

The impacts of a drop in the water table from 0 to 50 metres on subterranean ecosystems and stygo fauna in this region are likely to be both major and irreversible. Species extinctions may occur, accompanied by a loss of ecosystem services, including a reduction in water quality. For this reason, the utmost priority must be given to the accurate determination of the presence and distribution of stygo faunal species. This information must be obtained through the collection and analysis of real time field samples, using a range of methods (netting, pumping and eDNA). The desktop assessment described by AES (2022) represents an important preliminary activity. However, it must be followed by a field data acquisition program before an accurate assessment of the risks to subterranean GDEs and stygo fauna associated with the Singleton Station Horticulture Project can be made

⁹⁴ Australian Government 2013, p.57. *Guidelines for groundwater quality protection in Australia: National Water Quality Management Strategy*, Department of Agriculture and Water Resources, Canberra, March. CC BY 3.0.

. In Professor Davis' view "[a] stygofauna field sampling program is required to ensure that a robust and evidence-based assessment of likely impacts on stygofauna is achieved."

The report prepared by Aquatic Ecology Services and attached to the Project's referral at Appendix N included a "conservative desktop assessment" only. This assessment involved an analysis of water quality monitoring data from 110 bores, none of which were located in the Project's borefield. It is Professor Davis's view this prediction "indicates that a dedicated field sampling program for stygofauna ... should be given the highest priority."

In determining the method of assessment for the Project, the NT EPA must have regard to the level of confidence in predicting potential impacts of the proposal.⁹⁵ Although the extent of stygofauna and subterranean GDEs in the project area is not certain, ALEC submits the Project has the potential to have significant impacts on stygofauna. According to Professor Davis, "[t]he impacts of a drop in the water table from 0 to 50 metres on subterranean ecosystems and stygofauna in this region are likely to be both major and irreversible. Species extinctions may occur, accompanied by a loss of ecosystem services, including a reduction in water quality." These impacts are significant as they represent impacts of major consequence⁹⁶ noting the potential irreversible impacts leading to species extinction.

The desktop assessment conducted by AES and attached to the referral in draft form is a preliminary activity and must be complemented by on the ground field studies. Without this information the NT EPA cannot properly assess the potential impacts from this project. This is incompatible with principles of ecologically sustainable development, given the serious risks of major and irreversible impacts, including potential extinctions

ALEC does not have confidence that Fortune Agribusiness can effectively avoid, mitigate or harm significant impacts to stygofauna. The Australia Guidelines for groundwater protection state that 'where stygofauna communities have been identified, they should be accounted for in determining an appropriate environmental value and setting water quality objectives (Dillon et al. 2009)'.⁹⁷

ALEC emphasises that a Tier 3 Environment Impact Assessment is necessary to overcome this uncertainty and an opportunity to develop effective mitigation and management strategies.

Given the uncertainty and significant risks to stygofauna, lack of field studies and certainty of aquifer drawdown and changes in water quality, based upon Dr Davis's advice, the risk assessment should conclude that the risk to stygofauna is severe.

4.5. Taylor Creek and aquatic ecosystems

ALEC is concerned there is a paucity of information presented in relation to Taylor Creek, we believe this area is threatened by edge effects from clearing and weeds.

Furthermore, extensive field surveys of its length, and it appears to be being described as inflow dependent. We note there is far greater complexity with GDE probability mapping suggesting

⁹⁵ EP Regulations regulation 59.

⁹⁶ EP Act section 11.

⁹⁷ Australian Government 2013, p.20. *Guidelines for groundwater quality protection in Australia: National Water Quality Management Strategy*, Department of Agriculture and Water Resources, Canberra, March. CC BY 3.0.

vegetation depends upon both inflows and shallow groundwater. We are concerned that the lowering of the water table will inevitably lead to loss of large trees along Taylor Creek both close to the development and towards the confluence of Wycliffe Creek. A wait and see approach is not sufficient. The applicant must be able to demonstrate it understands the complex interactions between surface flows, retention of moisture in the vadose zone and depth to groundwater.

ALEC, is similarly concerned about the impact on retention of water in other run on areas, swamps and soakages that can be extended to result from an increase in the depth to groundwater.

We note that flood-out areas at the base of the Davenport Ranges like those impacted by Singleton are described in the Iytwelepty Joint plan of management in section 3.2 as being underrepresented for conservation.⁹⁸ (Furthermore the plan highlights being “off the beaten track” and with minimal development as being values for the park. The risk to this posed by the increased population in the area does not appear to have been evaluated.)

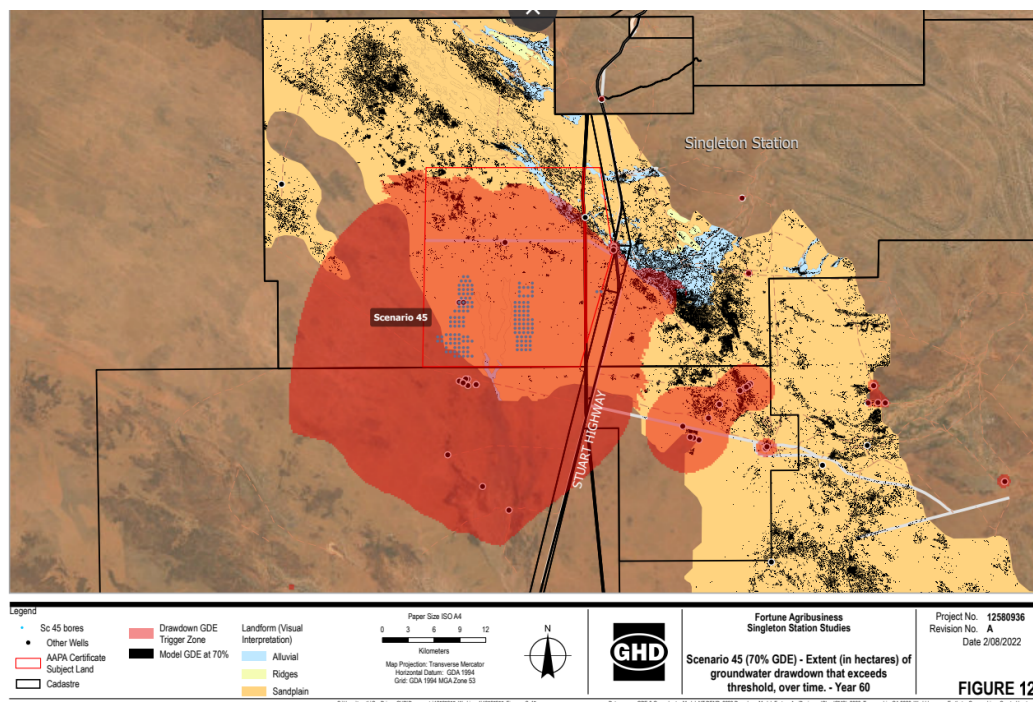
4.6. Groundwater resource

Water: Hydrological processes

Impact

Fortune’s modelling indicates that the groundwater table will drop by 50 metres at its lowest point, where the groundwater table will be lowered across a 50km diameter in which vast ecological, hydrological and cultural values may be impacted. The drawdown area is vast and scattered with GDE’s.

This level of extraction constitutes water mining and is deeply unsustainable. We consider more detailed impacts from groundwater drawdown in other sections on GDEs, salinity and cultural values.



⁹⁸ https://depws.nt.gov.au/data/assets/pdf_file/0010/249076/Iytwelepty-JMP-operational.pdf

Perched aquifers

The Groundwater Monitoring and Adaptive Management Plan referral documents state that there may be perched aquifers which GDEs are reliant on which will not be impacted by the Project.⁹⁹ This is a bold statement with no evidence provided to substantiate it.

This baseless statement reaffirms ALEC's low confidence in the applicant's commitment to and ability to effectively avoid, mitigate and manage significant impacts to the environment that may have a major consequence. It is clear that there are high levels of uncertainty around how GDEs will be impacted. Further it is apparent that Fortune has a low level of understanding of the groundwater resource, its own parameters and its connectivity to other groundwater systems.

It is abundantly clear that a Tier 3 Environmental Impact Assessment is essential.

Location of the water

When considering the risk to the groundwater resource ALEC asks a very basic question:

**What aquifer and what basin does the groundwater come from
that Fortune Agribusiness wants to use for one of Australia's
largest irrigation developments?**

The fact that the Referral documents do not tell us where one of the largest water licences in the country is pulling its water from is damning. The Referral comments on the 'two large regional aquifers' but where this water comes from remains absent.¹⁰⁰ It is a telling revelation which captures much of the uncertainty that underpins this development.

Knapton (2017) states that the two main aquifers occur within the Arrinthrunga and Chabalowe Formations respectively in the region¹⁰¹. The Georgina and Wiso basins are separated 'roughly coincident with the Stuart Highway'.

Groundwater from the Georgina Basin flows north-west into the Wiso Basin. It states that the 'interconnected Wiso and Georgina Basins collectively formed part of a vast depositional area that extended across northern, central and southern Australia. The limit of the Georgina and Wiso Basins is poorly defined by a basement high interpreted from regional geophysics'.¹⁰²

What are the impacts if the water is accessed from the Wiso Basin? What impact if it is from the Georgina? What occurs if it straddles both? Where are these considerations in the Referral? A Tier 3 Environment Impact Assessment is the appropriate process for scrutinising the groundwater resource.

⁹⁹ Fortune Agribusiness Fund Management Pty Ltd, (2022). *Appendix G Groundwater Monitoring Program and Adaptive Management Plan*, p. 36.
<https://ntepa.nt.gov.au/_data/assets/pdf_file/0017/1167101/appendix-g-singleton-horticulture-project-monitoring-program-and-adaptive-management-plan.pdf>

¹⁰⁰ Fortune Agribusiness Fund Management Pty Ltd, (2022). *Environment Protection Act 2019 Referral Report: Singleton Horticulture Project*, p. 70.
<https://ntepa.nt.gov.au/_data/assets/pdf_file/0006/1167081/nt-epa-referral-singleton-horticulture-project.pdf>

¹⁰¹ Knapton, A. (2018) Development of a Groundwater Model for the Western Davenport Plains. WRD Technical Report 27/2017. Northern Territory Government, p. 27. <<https://territorystories.nt.gov.au/10070/858846/0/38>>

¹⁰² Ibid, p. 16.

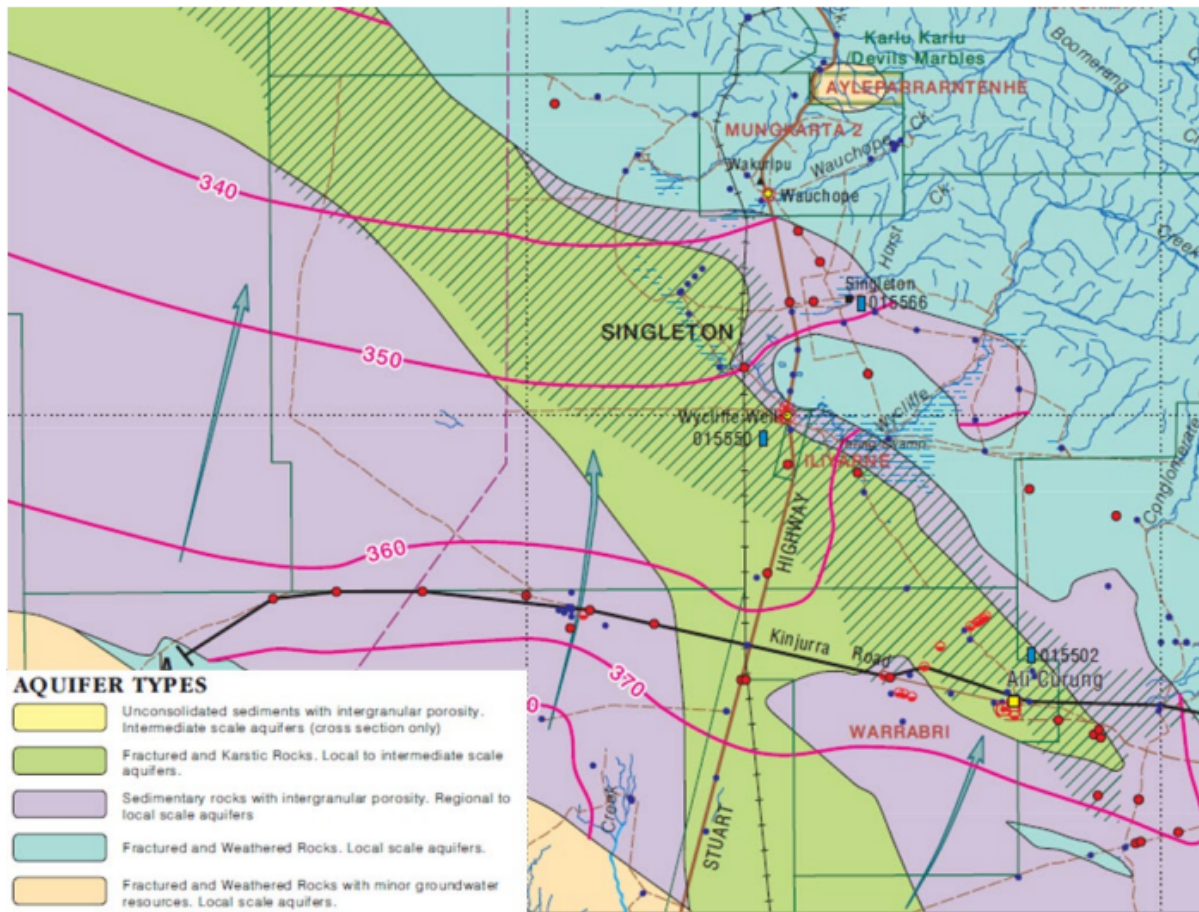


Figure 5.6 Aquifer systems of the Proposal Area

Source: Tickell (2014).

Figure. Aquifer systems of the proposed area. Fortune have not demonstrated a good understanding of the groundwater resource.

AIR



5. AIR

Summary of key points

Impact of clearing: The proposal does not quantify the emissions caused from its land clearing

Impact of loss of stored carbon from damage or destruction of GDEs: the atmospheric emissions caused by reductions stored carbon resulting from changes to ecosystem floristics due to a lowering of the groundwater table are not described and quantified with mitigations described

Overall: *The atmospheric emissions should be described in this referral. These are expected to make the Irrigation Development a “large emitter” and be classified as Severe in this risk assessment.*

Discussion

a. Atmospheric processes

The proposal does not quantify the emissions caused from its land clearing and how these will be mitigated.

Further the proposal quantify the atmospheric emissions caused by reductions stored carbon resulting from changes to ecosystem floristics due to a lowering of the groundwater table. The reduction in stored carbon Nano et al ¹⁰³ describes:

This result provided support for the idea that the different groundwater depth categories can be distinguished according to floristic composition and re alluvial plain ecosystems on p16 reports "Richness of tree, fern (Nardoo), shrub-tree and vine-shrub growth form groups was correlated with the 0-5 m DGW group; while Chenopod shrub richness was correlated with the 5-10 m and the 0-5 m DGW groups; and epiphyte (mistletoe) richness was correlated with the 5-10 m DGW group. No growth form group showed higher richness in association with the deep DGW group (Appendix 5, Figures 5a and 5b). Tree height increased in association with shallow groundwater (0-5 m DGW group). Ground cover was highest in the Taylor Creek channel sites (Group A5). The remaining structural attributes were unresponsive to groundwater. Vegetation condition was slightly elevated in association with the shallowest and deepest DGW groups (river channel). Cattle impacts were most evident in shallow groundwater (Appendix 5, Figures 5a and 5b)."

S.42(b)(v) of the EP Act states that a Tier 3 Environment Impact Assessment process would require the proponent to take into account the impacts of climate change. We note that because the impacts of the proposal are so poorly defined this is likely to be difficult to quantify. Furthermore, because this proposal offers little public benefit and the urgency to reduce the NT's emissions, these large carbon emissions are opposed.

The atmospheric emissions should be described in this referral. These are expected to make the Irrigation Development a “large emitter” and be classified as Severe in this risk assessment

¹⁰³ <https://territorystories.nt.gov.au/10070/868537> (p16)

PEOPLE



6. PEOPLE

6.1. Intergenerational equity

Over a 30 year project life the Irrigation Development draws upon storage from the part of the aquifer closest to transport corridors. It is likely to involve contamination of the resource through concentration of salts and possibly other chemicals.

Although ALEC is of the firm view this irrigation development is unacceptable, even by the propent's own standards the continuing drawdown cannot be sustained beyond the project life.

By denying other users' access to this water the proposal fails the principle of intragenerational equity

By preventing future generations from having access to groundwater of the same volume and quality it fails the principle of intergenerational equity.

6.2. Cultural Values

The project threatens up to 40 sacred sites across the drawdown area as is emphasised in the Donaldson Addendum. These sites reflect a rich and diverse cultural landscape and include soakages, sacred trees, swamps and creeks. ALEC is strongly opposed to the damage or destruction of any sacred sites.

ALEC strongly supports the positions made by the Central Land Council in regard to the protection of cultural values and sacred sites.

Fortune has failed to demonstrate how a significant impact of major consequence will not occur to sacred sites as a result of their project.

A Tier 3 Environment Impact Assessment provide a far more appropriate setting for understanding the impacts and risks to sacred sites. Letting Fortune shape the cultural values impact assessment as outlined in CP10 as part of the water licence is entirely inappropriate. An EIA is a far more suitable setting.

6.3. Public concern

The Singleton development is extraordinary in its size. It continues to generate deep concern and opposition amongst ALEC's members and stakeholders. It appears to be singularly poorly calibrated to widely held public values of ALEC's members and the wider community, including Traditional Owners and Barkly residents. Our view is that this is because shallow groundwater systems are so integral to arid areas.

The public has been poorly served by conducting this environmental assessment last. The extraction licence decision making process is inefficient and inaccessible. The notice period is relatively short, being only 20 business days, and the notice is only required to be published in a local newspaper (not very accessible).

ALEc is concerned that the necessary information for informed consent was not available or considered relevant during the GWEL process (e.g. impacts on up to 30% GDEs). It is therefore concerning that the applicant is seeking to bypass consideration of these matters (e.g impacts on <30% of GDEs) because of the GWEL process.

A petition involving 23,355 signatures was generated on this proposal. It is symptomatic of the unsuitability of the GWEL advertising process that this petition ran after the obscure advertising period, when the public became more aware of the problems with this irrigation development. The petition was not considered by the Controller of Water resources or the Minister during the S30 review of the licence decision.

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Refuse the Current Fortune Agribusiness Ground Water Licence Application



Petition Closed

This petition had 23,355 supporters

 NT Water Controller: Refuse the current 40 Billion Litre / Year Fortun...

[Share on Facebook](#)

[Send an email to friends](#)

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[Tweet to your followers](#)

[Copy link](#)

 **Letters for the Environment Central Australia** started this petition to Joanne Townsend (NT Controller of Water Resources)

Sign this petition to respectfully request The NT Controller of Water

Kind Regards,



Alex Vaughan
Policy Officer
13.02.23



Adrian Tomlinson
Chief Executive Officer
13.02.23

Appendix A - Commentary on Cook and Keane Report: *the risk of salinity due to irrigation developments in the Western Davenport Basins, NT*

What is the Salinity Report

The Risk of Salinity due to irrigation development in the Western Davenport basin, Northern Territory (Salinity Report) was written by Peter Cook and R Keane through the National Centre for Groundwater Research and Training in 2021. The development of this report was an action from the implementation plan part of Western Davenport Water Allocation Plan 2018-2021. A link to Territory Stories was sent to Western Davenport and Ti-Tree Water Advisory Committee members on the 26th May 2022. It is now a public document.

The report makes conclusions around salinity risk (p.41-62) through the application of formulas around soil infiltration and recharge (p.13-17) and groundwater salinisation (p.17-29) into a model. Key model parameters include soil water content and salinity (p.31-32), water table depth (p.32), groundwater salinity (p.32-37), irrigation rate and drainage rate (38-41). It then discusses the impact of groundwater salinity and concludes (p.63-68). The irrigation rate is similar to that at Singleton.

The report considers the risk of salinisation (measured as microsiemens per cm¹⁰⁴) to the water resource of an unconfined aquifer¹⁰⁵ under two different scenarios:

Scenario 1: The source of groundwater that is pumped for irrigation is distinct from and does not include the recharge that occurs beneath the irrigated crop. This might represent the case where the source of water is from a confined aquifer, or if it is remote from the area being irrigated.

Scenario 2: The irrigation drainage water is pumped out and re-used for irrigation as soon as it reaches the aquifer. This represents the case where pumping occurs close to the water table in an unconfined aquifer and the extraction bores are located within or very close to the area that is irrigated. It is also representative of the situation where irrigated agriculture is very widespread. Scenario 1: the source of groundwater that is pumped for

This report:

- Is the first of its kind in the region;
- Models changes in water quality due to changes in salinity;
- Takes a regional approach in understanding the impact of salinity due to irrigation upon the groundwater resource;
- Is filled with uncertainty;
- Makes conclusions that are very pointed regarding the long-term viability of irrigated horticulture in the region;
- Raises more concerns than it quells.

This report does not:

- Use soil salinity data that is from the Western Davenport Region;

¹⁰⁴ Is a unit of measure for electric conductivity (EC). EC is influenced by the concentration and composition of dissolved salts. Salts increase the ability of a solution to conduct an electrical current, so a high EC value indicates a high salinity level.

¹⁰⁵ Where groundwater is in direct contact with the atmosphere through the open pore spaces of the overlying soil or rock, then the aquifer is said to be unconfined. The upper groundwater surface in an unconfined aquifer is called the water table.

- Consider the impact of salinisation upon land condition;
- Consider the impact of salinisation upon soil salinity;
- Consider preferential flow occurring, only piston flow;
- Provide prediction of salinity risks for individual licences.

What does the Salinity Report say?

Salinity Risk

The report concludes that:

- Under Scenario 1: ‘our analysis has suggested that after 30 years of irrigation, the average thickness of this saline layer will be 5.8m, and its salinity will be between 8400 and 31000µS/cm’ increasing to 10-15 metres thickness after 50 years¹⁰⁶;
- Under Scenario 2: ‘After 50 years of irrigation, the salinity of irrigation water is mostly 3600 – 11 000 µS/cm and after 100 years it is mostly 5600 – 19 000 S/cm. This predicted salinity increase has very significant implications for the long-term viability of irrigated agriculture’¹⁰⁷.
- Much of the region is deemed high-risk at 30 years, particularly areas with shallower depth to groundwater¹⁰⁸. Under scenario 2, most of the region is saline after 50 years.

Regarding soil salinity, the report states:

‘A major uncertainty associated with the salinity risk assessment presented in this report is uncertainty over the original salinity of soil water within the unsaturated zone. There are no estimates of this parameter within the Western Davenport, but studies in Ti Tree Basin and 68 at Rocky Hill range between 270 and 19,900 mg/L. Further work is needed to understand the reason for the large degree of variation in soil salinity. If the soil salinity is high, the salinity increases will be much greater than predicted in this report.’¹⁰⁹

Salinity risk and groundwater dependent ecosystems.

The areas with greatest risk of salinity impacts overlap with areas that support groundwater dependent ecosystems and ecological values¹¹⁰. This is the case for the northern section of the Central Plains management zone within the Western Davenport Water Allocation Plan. These are the areas where the standing groundwater table is the most shallow. This means that groundwater in these areas will take a shorter period of time to become more saline. The salts essentially don’t need to travel as far, compared to areas where the depth to groundwater is higher.

Salinity and water quality, with Singleton Station example

The report provides important insights to how water quality will be impacted in the region. There are six different categories for quantifying water quality in relation to salts; fresh, marginal, brackish, saline, highly saline and brine. These are quantified by microsiemens per centimetre.

At Singleton Station around the proposed development site, the water beneath that area is currently brackish, after 10 years parts of it are modelled to deteriorate to be saline and after 100 years parts of it will be highly saline. The salinity of the groundwater recharge will be highly saline at year 10 and

¹⁰⁶ p.63

¹⁰⁷ p.64

¹⁰⁸ P.79, p.57

¹⁰⁹ p67-68

¹¹⁰ Cross referencing the map on p.46 of the WD Biodiversity Assessment report with the maps in the Salinity Report.

brine by Year 30. The paper concludes that the area around Singleton is 'high risk' for salinity after 30 years. High risk is the highest category of risk and refers to projects that have saline levels greater than 5000 $\mu\text{S}/\text{cm}$ ¹¹¹. The area around Singleton has the lowest irrigation time delay and recharge time delay from the options available¹¹². Again reflecting why this region is at high-risk to salinity impacts.

Monitoring

'Monitoring of groundwater salinity is also important. Monitoring of extraction bores is useful, where these are close to the irrigated area and are screened in the unconfined aquifer. Monitoring salinity near existing irrigation developments in central Australia should provide data that can assist refining the salinity model developed in this report. Monitoring of future developments is important to ensure the longevity of the groundwater resource'¹¹³

What is the significance of the Salinity Report?

The Salinity report is significant as it provides an initial indication of the type of risks that will be faced in developing the Western Davenport region for irrigated horticulture. While these results are preliminary and further research and investigation is required, these results are not supportive of a business as usual approach in developing the region. Risk is emphasised and precaution should be heeded as a result. To date, the Department has largely dismissed concerns around the importance of the Salinity Report

This report reaffirms that this region is plagued by uncertainty. To do with salt, key parameters such as soil salinity are not even known. Further, there is no understanding of how irrigated horticulture will impact land condition long-term or how extraction of groundwater will impact soil salinity. In addition, there is essentially no understanding of salinity risk at the individual licence level. Since these parameters are not known, it is acceptable to consider the conclusions of this report to be conservative where salinity impacts could be much greater than modelled in this report.

Salinity impacts cannot be ignored, they impact all stakeholders and all values. Ecological, cultural, social and economic values will potentially be squandered if salinity impacts are not adequately considered and known. Salt is unique in how difficult it is to remove once it has been brought to the surface and introduced into a new system. It has potentially dire and significant consequences for ecosystems which rely on stable water quality. These may be significant cultural or ecological sites, such as special places filled with GDEs. There is a long-held understanding around the world and across Australia, that the risks of salinisation are real and potentially extreme.

This report reiterates the absurd reality that has arisen in this region around the Singleton Station Horticultural Development. By back-ending environmental approvals and granting the water licence first, we find ourselves in a position where essentially a water licence (albeit with conditions) was granted when few impacts are actually known. Over-reliance on adaptive management does not overcome the significant uncertainty that is prevalent across the region, nor will it reduce or adequately address risk.

¹¹¹ p.79

¹¹² p.44, p.43.

¹¹³ p.68



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6 February 2023

Elanor Fenge

Managing Lawyer -Northern Territory

Environmental Defenders Office

2/98 Woods St, Darwin NT 0800

darwin@edo.org.au

REF: s3839

Dear Ms Fenge,

**Request to provide expert evidence – Singleton Station Horticulture Project –
Referral to Environment Protection Authority**

I have prepared the following response to your request of 7 December 2022, for expert advice on Groundwater Dependent Ecosystems (GDEs). I am restricting my evidence here to the **subterranean GDEs and stygofauna** likely to occur within the region affected by the Fortune Agribusiness Project on Singleton Station. I also acknowledge that I have read the **Code of Conduct** attached to your letter of engagement and confirm that I agree to be bound by it.

Given the small amount of information provided on the subterranean GDEs and stygofauna associated with the Singleton Station project area, I am providing my expert advice within this letter, rather than in a separate report.

I have read the report prepared by Aquatic Ecology Services (AES, 2022) for GHD and the project proponent, Fortune Agribusiness Fund Management Pty Ltd (FAFM). The report by AES (2022) describes the desktop assessment undertaken to determine the likely presence of stygofauna and the potential impacts of groundwater drawdown during the construction and operation of the proposal. The desktop assessment applied a multi-criteria analysis protocol (MCAP) to determine the likelihood of stygofauna occurring in the aquifers of bores within and surrounding Singleton Station. The MCAP was based on data compiled from 110 bores from NR Maps (NT Gov 2022) for which water quality monitoring data was available. There were no registered bores near the proposed project borefield, but several were located within identified alluvial aquifer zones and modelled GDEs. Unfortunately, no lithology was available for aquifers in which the bores were located, so this important parameter could not be included in the MCAP. The results of the MCAP indicated that eight bores **were likely or very likely** to contain stygofauna.

The prediction that stygofauna are likely to be present, based on a conservative desktop assessment, indicates that a dedicated field sampling program for stygofauna, based on



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strategically located bores, should be given the highest priority. Given that 110 bores appear to be located within the area of concern, a stygofauna field sampling program should be practically achievable and economically feasible. Further bores should be drilled if the bores currently available, as indicated by NR Maps, are not sufficient to provide the information needed. A stygofauna field sampling program is required to ensure that a robust and evidence-based assessment of likely impacts on stygofauna is achieved. Suitable mitigation measures and an ongoing monitoring program should then be developed based on the results of the field program.

The impacts of a drop in the water table from 0 to 50 metres on subterranean ecosystems and stygofauna in this region are likely to be both major and irreversible. Species extinctions may occur, accompanied by a loss of ecosystem services, including a reduction in water quality. For this reason, the utmost priority must be given to the accurate determination of the presence and distribution of stygofaunal species. This information must be obtained through the collection and analysis of real time field samples, using a range of methods (netting, pumping and eDNA). The desktop assessment described by AES (2022) represents an important preliminary activity. However, it must be followed by a field data acquisition program before an accurate assessment of the risks to subterranean GDEs and stygofauna associated with the Singleton Station Horticulture Project can be made.

Yours sincerely,



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