Environment Centre NT
protecting nature | living sustainably | creating a climate for change

Northern Territory Environment Protection
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To whom it may concern,

RE: **Referral of Adelaide River Off-stream Water Storage (AROWS)**

The Environment Centre NT (**ECNT**) is the peak community sector environment organisation in the Northern Territory of Australia, raising awareness amongst community, government, business, and industry about environmental issues, assisting people to reduce their environmental impact, and supporting community members to participate in decision-making processes and action.

ECNT appreciates the opportunity to comment on the proposed Adelaide River Off-stream Water Storage (AROWS) project (**the proposal**), referred to the NTEPA by the Department of Logistics and Infrastructure (DLI) (**the proponent**). In recognition of the potential for the proposal to have significant impacts on the environment, including matters protected under NT and Commonwealth legislation, the proponent has initiated an EIS referral under the *Environment Protection Act 2019*. Along with the referral documentation, the proponent has submitted a draft terms of reference (**ToR**) for the EIS, the adequacy of which is the subject of the current public consultation.

In the following submission, ECNT recommends changes to the **ToR**, which in its current form is not acceptable as it does not adequately requite the proponent to engage with the full range of potential risks and impacts from the proposal.

Overall concept and design

Overall, there is not sufficient evidence that the precautionary principle nor the principles of ecologically sustainable development have been followed from the outset of the proposal design. Comments throughout the referral documentation that the AROWS project design is for the purpose of "preserving the natural flow of the Adelaide River" (e.g. 1.2 of the *Proponent Draft TOR for an EIS*) is problematic; there is not an appropriate evidentiary basis to make this assertion, and indeed it is one of the matters to be determined over the course of the EIS process the extent to which natural flows will be impacted by the Project. The inclusion of such a statement as part of the overall framing and rhetoric accompanying the proposal is not only unscientific but undermines confidence in the factual basis of the way the Project is presented to the public.

The determination of extraction levels and basin size *a priori*, without appropriate hydrogeological studies being undertaken, is a problem, and pre-empts the conclusions of an assessment process that may find that certain levels of extraction are unsustainable and pose an unacceptable impact. ECNT notes that the Adelaide River water allocation process is currently ongoing, with no determinations made yet regarding the ecologically sound management of that river or its catchment system. The outcomes of the development of the

Water Allocation Plan (WAP) for that area may have implications for the proposal. In this context, the referral and preparation of referral documentation including the ToR is premature.

The description of the project area including land disturbance of 5,610.50ha is the most conservative estimate possible, only including the directly inundated area and not the floodplain which will be impacted due to reduced wet season flows. The ToR does not sufficiently consider the downstream impacts of AROWS and therefore must be expanded to include the full scope of impacts. The project is described in such a way as to localise the project to its infrastructural components, instead of accurately describing the project as something with the potential for whole-of-ecosystem impacts. We note that the Hyrdology Impact Assessment (Appendix D) models impacts on flood inundation and water levels over an area extending from an area 7km upstream of the infrastructure footprint to a location approximately 15 km downstream of the footprint. It finds the potential for reduction of flood levels at the Adelaide River adjacent to the project site (an area not considered to be part of the infrastructure footprint) up of up to 0.53 m.[1] This impact assessment recommends that the EIS seek to expand the hydraulic modelling to more accurately establish the area of impact.

The limitation of most aspects of the ToR has grave implications for the capacity of the EIS to appropriate assess project risks and impacts. Freshwater flows into estuarine and coastal ecosystems support biodiversity and strengthen food webs, maintain sediment flows and nutrient loads. Reduced freshwater flows may create significant ecosystem changes for coastal and marine ecosystems downstream of the Adelaide River and the Terms of Reference across all factors must be amended to more sufficiently cover the broad scope of downstream impacts including lateral floodplains, wetlands and aquifer recharge.

The Proponent has established a binary distinction between proposal footprint (direct disturbance) and area of influence (indirect disturbance), regularly referring only to the former as a way of avoiding discussion of impacts from water extraction itself, including alteration of flows and reduction of floodplain inundation.

The separation of the proposal into five main components is problematic insofar as this separation can be used to retreat from analysis of the full range of impacts arising from the project as a whole. It is not clear under which of these five main components the actual extraction of vast quantities of water from the Adelaide River system is intended to be captured.

Factor	ECNT recommendation
Overview and summary	2.2.6 under 'design', third dot point, adaptation to a changing climate should also consider such impacts as sea level rise, saltwater incursion, change in ecosystems, and interaction of these aspects with design of the proposal.
Across all factors	Downstream impacts should be considered against each of the factors.
	The Avoidance, Mitigation, and Management section should be forced to consider the extent of extraction that would correspond to different levels of impact, i.e. what is the scientifically determined estimated level of

[1] https://ntepa.nt.gov.au/__data/assets/pdf_file/0003/1467642/appendix-d-hydrology-impact-assessment.PDF, p42

	sustainable yield (ELSE) for the water source, and whether this is consistent with the proposed extraction levels.
	Monitoring and reporting activities for all factors should be substantiated in accordance with best practice **and** in consultation with qualified scientific experts **and** potential native title holders, Traditional Owners

Landforms

Factor	ECNT Recommendation
Landforms	The 'characteristics and conditions of the landforms in the current area' that must be described should be expanded to include the Adelaide River **and its floodplains**.

Terrestrial Environment Quality

This project has the potential for wide-reaching impacts on terrestrial environment quality, and ECNT is concerned that a narrow scope of assessment has been used in the ToR. Seasonal flooding and river levels are essential parts of the maintenance of terrestrial environment quality, and the potential impacts of reduced flow and altered flooding regimes should be accounted for in the EIS.

Factor	ECNT Recommendation
Terrestrial environment quality	Under Relevant Activities, include 'extraction of water'.
	Under Relevant Environmental values, include downstream terrestrial environments and floodplains.
	Under potential risks and impacts, Include altered flood regime and water flow in potential risks and impacts

Terrestrial ecosystems

Factor	ECNT Recommendation
Terrestrial ecosystems	Under Relevant Activities, proponent must identify how extraction of water from the Adelaide River may impact terrestrial ecosystems along the entire downstream area of the Adelaide River, including its lateral floodplains.
	Under Relevant Environmental values, include downstream terrestrial environments and floodplains.
	Under Relevant Environmental Values, the 'likelihood of occurrence assessment for all threatened and listed aquatic species' should include downstream ecosystems and lateral floodplains likely to be impacted by altered flood regimes and changes to water flow, and allow for greater inclusion of species with greater range such as ghost bats.
	Under Potential Significant Impacts and Risks, include habitat fragmentation due to infrastructure development **and altered flows, altered floodplain regime**.

	Identifying/monitoring of flora and fauna should be done repeatedly throughout the year as the occurrence of species will change/fluctuate depending on the season.

Hydrological processes

The full spectrum of impact on lateral floodplain ecosystems through extraction of seasonal high flow periods is not acknowledged in the referral report, threatened species assessment or draft TOR.

Factor	ECNT Recommendation
Hydrological processes	Under Potential Significant Impacts and Risks, specify that "Changes to surface water flows under proposed water extraction scenarios / operating rules including(...) An alteration to the surface water inundation area" refers to the entire downstream area including lateral floodplains.
	Under Potential Significant Impacts and Risks, specify that cumulative risk and impact assessment should include future water extraction and climate change.

Aquatic Ecosystems

Water extraction for AROWS will have significant downstream impact including to lateral floodplain ecosystems. These ecosystems rely on wet season flows and support rich biodiversity including culturally and commercially significant species. The ToR does not sufficiently consider the downstream impacts of AROWS and therefore must be expanded to include the full scope of impacts.

These ecosystems are entirely dependent on seasonal flows, and they harbor significant threatened species and sensitive communities. These flows are essential ecological processes for a range of culturally and economically significant species, such as barramundi. Floodplain ecosystems of the Adelaide River are highly valuable habitats for juvenile barramundi, providing refuge and food requirements during this stage of their life history. Connectivity of these ecosystems with main river channels and flushing into receiving coastal environments are essential to maintain healthy barramundi populations which support subsistence fishing for First Nations communities as well as strong socioeconomic benefits from tourism and recreational fishing industries.

The freshwater sawfish is EPBC listed but not included in scope of the ToR as the geographic range of assessment proposed is too narrow. However, this is inadequate because the referral documents themselves acknowledge that the mouth of Adelaide River is known pupping habitat, with juveniles mostly in freshwater. The Main Referral Report notes that "surface water extraction has the potential to affect natural flow regimes of rivers and the export of nutrients, impacting estuarine habitats and coastal fisheries, including listed threatened species such as sawfish."[2] This indicates a high level of potential high risk and impact currently unaccounted for in the TOR.

[2] Referral main report Adelaide River Off-stream Water Storage, p173

Similarly, the speartooth shark is listed as critically endangered under the EPBC Act, and although the Adelaide River is considered an important habit for the species[3] the extent of this project's impact on the species will not be considered under the current ToR. The Referral Main report states that "(m)ovements of the species to downstream areas coincide with increased freshwater inflow and reduced salinity, suggesting that natural environmental flows are important cues for seasonal migration."[4]

Factor	ECNT Recommendation
Aquatic Ecosystems	Under Potential Significant Risks and Impacts, Identify potential impact from pumping operations and infrastructure associated with pumping (i.e. will fish be killed, how many, what will this do to fish populations)
	Under Environmental Values, include descriptive and spatial information for aquatic habitats along the downstream area of the Adelaide River, including floodplains
	Under Environmental Values, include an assessment of the likely occurrence and habitat availability for listed aquatic species along the downstream area of the Adelaide River and its floodplains.
	The scope of the threatened species assessment is insufficient, taking only the AROWS basin and intake site into account and threatened species that may occur in this area, instead of the realistic and significant impact that extraction will have on downstream environmental processes and ecosystem function, in lateral floodplains and coastal environments, through reduction in seasonal high flows of freshwater and flushing of nutrients, increasing primary production, maintaining physicochemical parameters such as salinity and nutrient levels for habitat forming communities and higher trophic levels, and ecosystem connectivity.
	Include an assessment of potential impacts to all species along the downstream area including floodplains. Two examples are provided below of species insufficiently considered in the existing referral documentation: The **freshwater sawfish** is EPBC listed but not included in scope of EIS as the threatened species assessment suggests "unlikely" impact due to no suitable habitat within scope of the EIS referral. However, this is inadequate because the referral documents themselves acknowledge that: • Mouth of Adelaide River is known pupping habitat, with juveniles mostly in freshwater;

[3] Referral main report Adelaide River Off-stream Water Storage, p158

[4] HYPERLINK "https://ntepa.nt.gov.au/___data/assets/pdf_file/0005/1467635/referral-main-report.PDF"Referral main report Adelaide River Off-stream Water Storage, p 158

	○ Recruitment of largetooth sawfish depends on river flows, with most juvenile replenishment in years with 14 or more high flood levels; ○ This indicates high risk of impact to largetooth sawfish populations through water extraction. As such, impacts to the freshwater sawfish should be included in the EIS.
	The **speartooth shark** is critically endangered under the EPBC act, and, noting the following, the EIS should contain an impact assessment on this species: ○ The Adelaide Tiver is considered to be an important habit for the species; however, it is not listed in threatened species assessment due to insufficiency of scope; ○ The high density of this species in AR makes it one of the last refuges for this critically endangered species; ○ Movements of the species to downstream areas coincide with increased freshwater flow and reduced salinity, suggesting that natural environmental flows are important cues for seasonal migration for this euryhaline species. Despite recognition of this in the referral documentation, the species is not included in the assessment.
	Under Potential Significant Impacts and Risks, include impacts of operations on foodwebs, sediment flows, and nutrient loads along the downstream area of the Adelaide River and its floodplains.

Marine ecosystems, Marine environmental quality, Coastal processes

ECNT does not agree that there is insufficient potential for impact against these factors and asserts they should be included as factors in the EIS. There is not sufficient information provided by the proponent to establish that there will be no significant impact to estuarine and coastal ecosystems, including on numerous EPBC listed species such as barramundi which rely on whole-of-ecosystem health and food web robustness at every part of the riverine, wetland, and coastal environment.

Water extraction at the scale proposed for AROWS has the ability to impact coastal and marine processes such as the mixing ratio of freshwater into coastal waters through wet season floods and the subsequent dispersal of primary production, bolstering food webs and ecosystem drivers, and alteration of physiochemical parameters such as salinity, turbidity and oxygenation, all of which are essential for ecosystem health. Freshwater flows into estuarine and coastal ecosystems support biodiversity and strengthen foodwebs, maintain sediment flows and nutrient loads. Reduced freshwater flows may create significant ecosystem changes for coastal and marine ecosystems downstream of the Adelaide River and the Terms of Reference must be amended to include marine and coastal impacts and more sufficiently cover the broad scope of downstream impacts.

Factor	ECNT Recommendation
Marine ecosystems, Marine environmental quality, Coastal processes	The ToR should include the NT EPA factors of marine ecosystems, marine environmental quality, and coastal processes. In particular the ToR for this Factor should examine in particular the potential for saltwater incursion, and the mixing ratio of freshwater into coastal waters.

Community and economy

As identified elsewhere in this submission, the proposal to extract vast quantities of water from the Adelaide River has the potential to impact terrestrial and aquatic environmental and ecological values. By extension, the project also has significant potential to impact community and economic activities that rely on those values, along the entire extent of the area of impact. A fragmentation or deterioration of seasonal flooding cycles has the potential to significantly impact recreational enjoyment of the impacted areas, as well as the economic activities that rely upon them – including but not limited to tourism and fishing.

Factor	ECNT Recommendation
Community and economy	The relevant activities should include the extraction of water from the Adelaide River.
	The TOR should specify that the social and economic profile that may be impacted includes the entire downstream area of the Adelaide River, including its lateral floodplains. This should include impacts to tourism and fishing.
	The broadening of the terms of reference proposed above should facilitate an assessment of each of the proposed risk and impact factors along the length of the Adelaide River including its lateral floodplains, to account for potential change to flood regimes and associated terrestrial and aquatic environmental quality and ecological values.

Culture and heritage

As identified elsewhere in this submission, the proposal to extract vast quantities of water from the Adelaide River has the potential to impact terrestrial and aquatic environmental and ecological values. By extension, the project also has significant potential to impact cultural and heritage values tied to those environments.

ECNT is not satisfied on the basis of the documentation provided that adequate consultation or engagement has occurred with Traditional Owners.

Factor	ECNT Recommendation
Culture and Heritage	The direction to "Describe the characteristics and current condition of sacred sites, cultural and heritage values (both tangible and intangible) in the proposal footprint" and associated activities should be extended along the downstream area of the Adelaide River, including lateral floodplains.

	This section must specifically address potential impacts and risks that result from altered river flow and flooding regimes along the length of the Adelaide River inclusive of its lateral floodplains. The Terms of Reference should require assessment and consultation on the consequent risks and impacts to environmental quality, ecological values, culture, and sites of significance.
	The EIS should address the question of relevant free, prior, and informed consent (FPIC) from relevant Traditional Owners. The proposal should not proceed without FPIC.

EPBC Referral

ECNT will provide separate comments to the relevant processes regarding approval for the proposal under the EPBC Act, but reiterates here the comments in relation to aquatic ecosystems that the threatened species assessment is as it stands inadequate. The scope of the threatened species assessment is insufficient, taking only the AROWS basin and intake site into account and threatened species that may occur in this area, instead of the realistic and significant impact that extraction will have on downstream environmental processes and ecosystem function, in lateral floodplains and coastal environments, through reduction in seasonal high flows of freshwater and flushing of nutrients, increasing primary production, maintaining physicochemical parameters such as salinity and nutrient levels for habitat forming communities and higher trophic levels, and ecosystem connectivity.

Future Referral under the EPBC Act should be based on an assessment for all matter of National Environmental Significance modelled to occur or known to occur downstream including lateral floodplains.