Submission in response to: Derby Groundwater Allocation Plan

30 June 2021

Submitted to:
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Executive Summary

Groundwater is one of the most important sources of water for environmental, cultural and economic purposes in Australia.[1] Globally, over-extraction of groundwater has caused a plethora of social and ecological problems, with attempts to reign in over-abstraction proving extremely difficult – if not impossible – in most jurisdictions. Against this backdrop, it is now widely accepted that water resource planning must adopt a risk-based approach and seek to prevent over-development and over-extraction with a view to preserving the integrity of our rivers, floodplains and aquifers for future generations. Hydrogeology can be complex, making changes to quantity and quality of groundwater resources difficult and expensive to monitor comprehensively. This is one of the reasons why hydrogeological processes are still poorly understood in many groundwater-dependent environments, including WA. This necessarily requires a commitment to filling knowledge gaps, implementing rigorous water laws and broader governance mechanisms and allocating water conservatively and sustainably. It also requires a commitment to respecting and acting on the basis of Indigenous knowledges about water resources and committing to providing Aboriginal water justice through legally enforceable Aboriginal water entitlements.

This submission focusses on five main areas and makes the following observations and recommendations. First, the Derby Plan must be considered in conjunction with the Martuwarra-Fitzroy planning process. There is a lack of data as to how the aquifers in the Derby Plan connect to the Martuwarra-Fitzroy.[2] Traditional Owners are therefore concerned about the impact if the Derby Plan aquifers and the river are connected in unexpected ways. Further, there are cultural relationships and policy issues (such as those relating to Aboriginal Water Reserves) that cross both planning process areas.

Second, the Derby Plan, alongside the Martuwarra-Fitzroy planning process, presents an opportunity to address Aboriginal water dispossession and achieve Aboriginal water justice. The first step to achieving this is to undertake a more detailed assessment of cultural values in collaboration with Traditional Owners. The allocation plan should also clearly account for native title rights and interests. Water licencing should consider impacts on these rights and interests more comprehensively and follow the principle of free, prior and informed consent. Finally, and importantly, in the context of Aboriginal economic uses, the WA Government must commit to further consultation (in line with the principle of free, prior and informed consent), in relation to the proposed Aboriginal Water Reserves model.

Third, we have identified hydro-geological deficiencies with the proposal. We note inadequacies and uncertainties in: (a) recharge rate calculations, (b) assessment of the

[1] Nikki Harrington and Peter Cook, 'Groundwater in Australia' (2014) National Centre for Groundwater Research and Training <Groundwater in Australia_FINAL for web.pdf>.

[2] Adrian H. Gallardo, 'Hydrogeological characterisation and groundwater exploration for the development of irrigated agriculture in the West Kimberley region, Western Australia' (2019) 8 *Groundwater for Sustainable Development* 187, p 188.

impacts of increased extraction in the Greater Derby sub-area on the saltwater intrusion problem; and (c) consideration of climate change impacts on groundwater recharge rates. One of our overarching concerns, in relation to all of these issues, is poor baseline data and the risk that this poses over the longer term to the sustainable management of the resource. We make several recommendations about committing to further research on baseline data and increased monitoring to fill knowledge gaps. Further, the best available climate change information must be used to guide water planning.

Fourth, we raise particular concerns about a number of matters linked to water allocations for the water source as a whole, as well as access to water by individual licence holders. These include a lack of transparency regarding water allocations, water availability and water for environmental and cultural purposes and the corresponding need to improve access to information about the same. In addition, we raise concerns about the proposed duration of the Derby Plan, particularly given the dearth of baseline data and possible need to reduce allocations in response to improved knowledge about the resource. We further note that the rules for allocating water licences are not made clear in the specific context of the Derby Plan. Finally, it is widely accepted that the volume of water accessible under any individual water licence should vary on an annual basis depending on recharge, surface flows and other factors. Thus, water licences should be expressed in nominal volumes with the possibility that permitted annual extractions fall between 0 and 100% of that nominal volume depending on water availability (and other relevant factors). This sort of seasonal management is necessary to ensure extractions reflect climatic conditions and, in turn, that Aboriginal values and public good values are achieved first.

Fifth, we raise several issues relating to governance. We are particularly concerned that the Derby Plan is being superimposed over a broken legal and governance framework that is in urgent need of major reform. In particular, we raise concerns about the adaptive management approach. There is a lack of detail about how adaptive management principles will be monitored and how any data collected regarding the implementation of these principles will be used to inform possible changes to the Plan. We accordingly recommend that the Derby Plan contain more specific details about the time intervals between evaluations and also make information about evaluations available to the public. Further, there must be specific criteria for evaluating and monitoring objectives and Traditional Owners must be directly involved in evaluating and monitoring. To enable effective evaluation, the WA Government must commit to research to increase both the quantity and quality of baseline data, and improve systems of metering.

This submission has been co-authored by the Martuwarra Council, the Water Justice Hub and the Environmental Defenders Office through a collaborative process. The overarching theme we keep returning to in this submission is uncertainty and the need for more research. We are keen to work with the WA Government to further discuss the scope of this research and continuing involvement of the author organisations.

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Recommendations

Links between Martuwarra/Fitzroy and Derby Plan

Recommendation 1: The Derby Plan needs to be based on best available scientific evidence about groundwater-surface water interactions. This includes evidence concerning rainfall recharge to the aquifers and any potential links between the Martuwarra-Fitzroy River and the groundwater bodies affected by the Derby Plan. If this

further evidence is not currently available, the WA Government needs to commit to further research in relation to these issues.

Recommendation 2: The Derby Plan must be considered as part of a larger cultural process attached to the Martuwarra-Fitzroy region. Therefore, the WA Government must specifically consult with the Martuwarra Council with respect to the Derby Plan.

Aboriginal rights, interests and cultural heritage values

Recommendation 3: Discussions about use of the Aboriginal Water Reserve mechanism should cover both the Derby Plan and the Martuwarra-Fitzroy. No determination should be made about the Aboriginal Water Reserve in the Derby Plan until after further consultations have been held on that concept in relation to the Martuwarra-Fitzroy planning process.

Recommendation 4: There must be clear provision for water allocated for 'traditional cultural purposes' as per the National Water Initiative Clause 54.

Recommendation 5: Traditional Owners must be further consulted about the assessment of cultural values for the Derby Plan before it is finalised and before the approval of any additional extractions or increases in extraction associated with existing water licences.

Recommendation 6: The Derby Plan must have a strategy that provides for Traditional Owners to regularly assess cultural impacts of groundwater extraction. Funding and resources to undertake this assessment must be provided to Traditional Owners.

Recommendation 7: The WA Government must engage with Traditional Owners around WA, but in this case the Martuwarra Council, with respect to the concepts of Aboriginal Water Reserves. In the context of free, prior and informed consent, there needs to be more discussion, and consent from Traditional Owners, about this model.

Recommendation 8: Given the exceptionally high level of water resources in the Derby Plan that are subject to native title determinations or claims, Traditional Owners should have more than 30% of the available water in the Greater Derby sub-area.

Recommendation 9: Like the Yamatji Indigenous Land Use Agreement, AWRs must also come with resources and funding to enable Traditional Owners to develop businesses using their water allocation.

Recommendation 10: There must be an appropriate management strategy in place to review and, if necessary, amend the AWR.

Recommendation 11: The WA Government needs to make clear that water for AWRs is a priority (including in the Derby Plan) – now and into the future. In this context, specific rules are needed with respect to allocations to ensure the AWR is prioritised.

Recommendation 12: To access the AWR, Traditional Owners should not have to apply for a 'regular' licence (under the RiWI Act), rather an alternative and specific system should be negotiated with Traditional Owners.

Recommendation 13: At a minimum, the Derby Plan needs to make the 'next steps' clearer in terms of planning the rules for the AWR.

Recommendation 14: The WA Government should not issue new water licences until the AWR 'policy' (or another option) has been agreed to by Traditional Owners.

Hydrology/hydrogeology – knowledge gaps

Recommendation 15: Further measurement, documentation and modelling of the recharge mechanisms must be undertaken before the Derby Plan is finalised.

Recommendation 16: Specific consideration must be given to future climate conditions whereby intense yet infrequent rainfall events may result in a decrease of groundwater recharge.

Recommendation 17: A more robust risk management approach is required to determine the proportion of recharge for allocation.

Recommendation 18: Extensive monitoring must be carried out in the Greater Derby sub-area to fill the current knowledge gap about the impact increased extraction might have on the Derby sub-area before finalising the allocation limit or increasing extractions.

Recommendation 19: Water demand, along with the management of the groundwater, should be part of the overall plan.

Recommendation 20: The WA Government should charge water licence holders for the full cost of water planning and management. However, Traditional Owners should not have to pay full costs, particularly if licences are required for AWRs.

Recommendation 21: The WA Government must commit to further research to understand the impacts of extraction in the Greater Derby area on seawater intrusion in the Derby peninsula. Such research should also consider impacts of reduced groundwater recharge and rising sea levels.

Recommendation 22: Best available climate change information must guide water planning in the Derby Plan and, if necessary, additional independent research concerning climate change should be commissioned.

Recommendation 23: Climate change must inform any groundwater allocation limits.

Water availability, allocation limits and estimates of water extractions

Recommendation 24: The information on allocations in the Derby Plan needs to be made more transparent. There should be one table in the Derby Plan that sets out all of this information.

Recommendation 25: General uses should be renamed 'commercial uses'.

Recommendation 26: The WA Government must commit to research into baseline data regarding the actual volume abstracted for licence-exempt uses of stock and domestic self-supplied bores.

Recommendation 27: The Derby Plan must adopt a precautionary principle approach to all water allocation limits. This must recognise that sustainable allocation limits will not be able to be determined on a system-wide basis in the absence of longitudinal ecological data, and address the need for conservative baselines and ongoing monitoring.

Governance

Recommendation 28: The approach to environmental and cultural values needs to reflect a holistic approach, rather than a licence-by-licence approach.

Recommendation 29: The Derby Plan needs to outline a strategy for Traditional Owners to regularly assess cultural values and provide resources and funds for this task.

Recommendation 30: All water extractions, with the exception of town water supplies and for stock and domestic use, should be treated as a residual. Then, only after defined cultural, environmental and sustainable outcomes are achieved should water extractions be permitted.

Recommendation 31: The duration of the Derby Plan should be amended such that consideration must be given to whether the plan needs revision five years after publication. There must be a specific and transparent process for this evaluation that involves feedback from the public.

Recommendation 32: The Derby Plan must contain more specific details about the time intervals for when evaluations will take place, what sort of evaluation will be undertaken and how the information about that evaluation will be made public so that the information is transparent.

Recommendation 33: The criteria for evaluating and monitoring objectives and associated responses must be more specific and transparent.

Recommendation 34: Evaluation and monitoring (and determining the response) must include direct involvement of Traditional Owners to assess the impact on cultural values, significant cultural places, heritage and native title rights and interests.

Recommendation 35: As part of the Derby Plan, the WA Government must commit to research to increase the amount of baseline data in the Derby groundwater area. The aim of this exercise should be to gather the extensive data needed to support a more robust method for setting allocation limits.

Recommendation 36: Telemetering of all bores must be mandatory and supported by adequate compliance and enforcement mechanisms. Outlier analysis of telemetered data should also occur.

Recommendation 37: The Derby Plan must outline clear licensing rules that are specific to the circumstances of the Derby groundwater region.

Recommendation 38: Annual individual water allocations of between 0 and 100 percent for individual licences are required to take into account seasonal variability in water availability. The method for determining annual allocations must be codified, documented and completely transparent.

Recommendation 39: All extractions must be managed to minimise adverse impacts, within clearly agreed and transparent limits, on flows, particularly in seasons of low in-flows in the catchment. To reduce the risks of such adverse impacts, there should be strict pumping rules, annual licence reviews, accurate metering and effective compliance measures (such as regular on-ground auditing and licensees' penalties).

Recommendation 40: The WA Government must make licence conditions publicly available.

Recommendation 41: The WA Government must place a moratorium on additional water abstractions in the Derby Plan area until new governance processes are established [with the exception of moving some existing water licences away from the coast, in order to reduce seawater intrusion].

1. Introduction

This submission is divided into six substantive sections: links between Martuwarra/Fitzroy and Derby Plan; Aboriginal rights, interests and cultural heritage values; principles of good water governance; hydrology/hydrogeology – knowledge gaps; water availability, allocation limits and estimates of water extractions; and governance.

More generally, this submission is part of a broader response to a continuing conversation about water governance in the Martuwarra-Fitzroy region. In this context, this submission must be read in conjunction with our 'Submission in response to: Managing Water in the Fitzroy River Catchment: Discussion Paper For Stakeholder Consultation' (**Submission on the Fitzroy Paper**) (which was produced contemporaneously).

In the context of both these submissions we note that in 2018, the Martuwarra Council was established as a 'collective governance model to maintain the spiritual, cultural and environmental health of the Fitzroy River catchment'.[3] In 2020, the Martuwarra Council (with the River as the primary author) produced 'A Conservation and Management Plan for the National Heritage listed Fitzroy River Catchment Estate' which is available online (**Martuwarra Management Plan**).[4] This document was produced through a consultative

[3] Derby Plan, p 21.
[4] RiWI Act, ss26GW(3), 26GX(3), 26GY(3) and 26GZG.

process that began in 2016. Position Statement 1 of the Martuwarra Management Plan emphasises the importance of First Law [Indigenous laws and legal systems]. Adoption of First Law principles by the WA Government and other stakeholders will enable every person and body involved in managing the Martuwarra-Fitzroy to see the River as Living Waters enabling holistic sustenance of heritage and environmental values:

> Position Statement 1: The Concept of Living Waters is Central to Sustaining Heritage Values The conventional approaches to cultural heritage conservation need to be broadened so that waters' place in First Law, sociality, sacredness, identity and life giving are better recognised. The Martuwarra Council seeks greater recognition of the centrality of Living Waters – which link material and spiritual connections - as being important to cultural and natural heritage in the region.[5]

In the context of the Martuwarra Management Plan and First Law, Traditional Owners need to be consulted about the settler-state water planning distinction that has been made, and boundary that has been declared, between the groundwater in the Derby Plan and the waters of the Martuwarra-Fitzroy. Cultural values associated with Living Water systems need to be respected and central to decision making processes.

With respect to consultation, our Submission on the Fitzroy Paper also noted that Western Australia's approach to collaborating with Aboriginal people on water governance should be judged against the fundamental international law principle that Aboriginal people must give their free, prior and informed consent in relation to decisions that impact protection of their heritage and Country. The Environmental Defenders Office set out, in detail, the application of international law principles, in the context of Aboriginal heritage, in their submission to the Juukan Gorge Inquiry and also provided supplementary submissions relating to this issue.[6] We particularly reference the *UN Declaration on the Rights of Indigenous Peoples* (**UNDRIP**) adopted by the UN General Assembly on 13 September 2007. We note that the UNDRIP is a declaration, not a convention. However, it is highly relevant that the Australian Government announced its support for the UNDRIP in 2009.

In these introductory comments we also wish to draw specific attention to three issues in the wider regulatory context in which these submissions are being received; the first relates to water regulation and the latter two to Aboriginal cultural heritage. First, WA's water laws are in urgent need of a major overhaul. The Derby Plan is a non-statutory plan. Pursuant to the *Rights in Water and Irrigation Act 1914* (WA) (**RiWI Act**) the making of statutory plans is 'entirely within the discretion of the government', and none have been made.[7] Part of the RiWI Act reform must be compulsory statutory plans that have clear environmental and cultural requirements. Further, and importantly in this context, the RiWI Act contains no provisions relating to Aboriginal rights and interests in water.

[5] Derby Plan, p 21.
[6] Derby Plan, pp 31-33.
[7] Alex Gardner et al, *Water Resources Law* (LexisNexis Butterworths, 2nd ed, 2018) p 389. Also see RiWI Act, s26GU.

Second, in 2020 we saw the devastating destruction of Juukan Gorge and the clear acknowledgement that both WA and Commonwealth heritage laws are inadequate. Third, and relatedly, the Independent Review of the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (**EPBC Act**) also revealed major deficits in the way that statute regulates Aboriginal heritage.[8] This regulatory background means that the WA Government cannot rely on this inadequate regulatory system to protect the environmental and heritage values of the Derby and Greater Derby sub-areas.

2. Links between Martuwarra/Fitzroy and Derby Plan

There are two submission processes going on simultaneously: the Derby Plan and the Fitzroy Paper. We note there is no mention of the Derby Plan in the Fitzroy Paper. There are a few brief references to the Fitzroy Paper in the Derby Plan in the context of what plan will regulate the Martuwarra-Fitzroy River. There are three core areas of overlap between the waters in the two planning processes: 1) hydrological in the sense of possible knowledge gaps (which is the factor focussed on in the Derby Plan); 2) cultural, in terms of Country and Living Waters; and, relatedly, 3) policy in terms of potential adoption of Aboriginal Water Reserves (**AWRs**).

a. Hydrological knowledge gaps

The Derby Plan states that: 'Based on our current information, groundwater in the Wallal Sandstone and Erskine Sandstone is generally moving away from the Fitzroy River, in a north to north-westerly direction towards the coast'.[9] There is no footnote in the Derby Plan identifying this current information which makes it difficult to analyse.

We note that the paper by Adrian H. Gallardo summarised the research in this area and identified that there is still a substantial lack of data.[10] Other reports also highlight the lack of data.[11] Traditional Owners are concerned that the lack of data might prohibit effective water management. They are further concerned about the impact if the Derby Plan aquifers and the river are connected in unexpected ways. We also note that although the Derby Plan identifies that the aquifers do not contribute to the Martuwarra-Fitzroy, there is no information about whether the surface water from the Martuwarra-Fitzroy contributes to the groundwater (at any, or particular, times during the year). Further research is needed to ensure that surface and groundwater abstractions granted under the Fitzroy Plan do not adversely impact groundwater levels in aquifers managed under the Derby Plan. 'External' factors, ie, those outside the plan areas, can determine the

[8] Graeme Samuel, *The independent review of the Environment Protection and Biodiversity Conservation Act 1999* (Final Report, 28 January 2021) p 57 ('**Review of EPBC Act**').
[9] Derby Plan, p 5.
[10] Adrian H. Gallardo, 'Hydrogeological characterisation and groundwater exploration for the development of irrigated agriculture in the West Kimberley region, Western Australia' (2019) 8 *Groundwater for Sustainable Development* 187, p 188.
[11] Ryan Vogwill, 'Water Resources of the Mardoowarra (Fitzroy River) Catchment' (2015) The Wilderness Society and UWA <FitzroyRiverReport.pdf (wilderness.org.au)>.

boundary conditions (i.e. water levels and fluxes in/out of the area considered) and thus must be considered in water management plans.

The Derby Plan simply states that: 'If new information becomes available which shows that taking water from the Derby groundwater resources affects the Fitzroy River or its dependent values, then we would amend this plan and its associated allocation limits or licensing policies.'[12] This is the first of many occurrences in the Derby Plan, which we will point out in this submission, where broad adaptive management-style techniques are proposed (because it seems there is some uncertainty) but they do not have real meaning and will, therefore, not be effective. The relevant statement here has no commitment to further research or any form of structured requirement to make amendments if further research reveals important new information.

Recommendation 1: The Derby Plan needs to be based on best available scientific evidence about groundwater-surface water interactions. This includes evidence concerning rainfall recharge to the aquifers and any potential links between the Martuwarra-Fitzroy River and the groundwater bodies affected by the Derby Plan. If this further evidence is not currently available, the WA Government needs to commit to further research in relation to these issues.

b. Cultural (Country and Living Waters) and policy (Aboriginal Water Reserves)

The Derby Plan is being considered as part of a larger cultural process attached to the Martuwarra-Fitzroy region. Further, the Martuwarra-Fitzroy flows into and through the south-west corner of the Derby Plan area (even though the Derby Plan notes that it does not regulate surface water and this will be regulated in a 'future Fitzroy water allocation plan') so there is clear geographic overlap. Country and Living Waters do not stop at the borders of aquifers and the Traditional Owners have relationships, First Law(s) and knowledges that cross over the boundary of both the planning processes.

In a more technical sense, there are some elements of both the Derby Plan and the Fitzroy Paper that must be considered together. For example, the potential adoption of AWRs. The Derby Plan, and simultaneously, the Fitzroy Paper, are the first time that such a model has been proposed outside an Indigenous Land Use Agreement process in WA. The use of an AWR in these two contexts would, if adopted, therefore, set an important policy precedent in WA. One option that should be considered is to put parts of the Derby Plan process on hold while the discussions about the Martuwarra-Fitzroy are continuing (but also to balance that by amending some parts of the Derby Plan in the areas that are over or fully allocated in the short-term to ensure action is taken immediately to resolve these urgent issues).

[12] Derby Plan, p 5.

Recommendation 2: The Derby Plan must be considered as part of a larger cultural process attached to the Martuwarra-Fitzroy region. Therefore, the WA Government must specifically consult with the Martuwarra Council with respect to the Derby Plan.

Recommendation 3: Discussions about use of the Aboriginal Water Reserve mechanism should cover both the Derby Plan and the Martuwarra-Fitzroy. No determination should be made about the Aboriginal Water Reserve in the Derby Plan until after further consultations have been held on that concept in relation to the Martuwarra-Fitzroy planning process.

3. Aboriginal rights, interests and cultural heritage values

a. Rights and interests under First Law

Aboriginal peoples have rights, interests and obligations to water under First Law. However, 'Western' (settler-state) law often does not appropriately recognise Aboriginal peoples' rights and interests.[13] Despite these limitations, as explained above, UNDRIP provides a powerful human rights benchmark for the rights of Indigenous peoples, including the principle of free, prior and informed consent. Further, again as explained above, Traditional Owners are seeking to fulfil their obligations to water at the decision-making level by establishing the Martuwarra Council and advocating for new water governance structures.

We submit that there should be clear provision for water allocated for 'traditional cultural purposes' (ie. water that supports native title holders' rights) as per the National Water Initiative Clause 54.[14] We note that the Derby Plan describes requirements to inform native title holders of water licence applications that are considered future acts. However, we submit that the Derby Plan should commit to going above legislated requirements to actively require Traditional Owners' free, prior and informed consent to water licences.

Recommendation 4: There must be clear provision for water allocated for 'traditional cultural purposes' as per the National Water Initiative Clause 54.

b. Cultural values

The Derby Plan does not contain a detailed description of water requirements for Aboriginal cultural values and no evidence is provided of water allocated for cultural values.

Section 3.4 states that: 'We conducted an environmental scan to identify groundwater-dependent environmental, social and cultural values in the plan area and assess[ed] the likelihood of connectivity to groundwater (DWER 2017 and Appendix B).'[15] DWER 2017 is

[13] Virginia Marshall, *Overturning Aqua Nullius* (Aboriginal Studies Press, 2017).
[14] Council of Australian Governments, 'Intergovernmental Agreement on a National Water Initiative between the Commonwealth of Australia and the Governments of New South Wales, Victoria, Queensland, South Australia, the Australian Capital Territory and the Northern Territory' (2004).
[15] Derby Plan, p 19.

unpublished.[16] Appendix B is very short and sets out the methodology without any of the detail. There is a note that related documents (like DWER 2017) may be obtained by contacting the Kununurra office.[17] We have obtained the 'scan of groundwater-dependent values' (DWER 2017) document via an email inquiry, but it is important that such documents are provided alongside the Derby Plan. Currently, there is no transparency for the public about the identified cultural values from reading the Derby Plan.

With respect to the scan of groundwater-dependent values, we note that this was a desktop review with limited site visits (that were conducted in 2015).[18] We note that several sites were identified on the heritage register (which does not necessarily contain all sites in WA) and that: 'There may be other sites of cultural importance that are not mapped that could also be groundwater dependent. Consultation with traditional owners is likely needed to identify these sites and whether they are reliant on groundwater.' It is not clear what additional work was done to consult with Traditional Owners. We are not aware of any such consultation. Further, this scan was done prior to the Walalakoo and Bunuba Healthy Country Plans.[19] It is unclear if/how these plans were considered by the Derby Plan.

Water moves through a living and connected cultural landscape. The state and national heritage listings should not be seen as discrete sites, but as part of a wider, living whole within Country. Impacts to Country can damage cultural values. The Derby Plan is short on details about how culture and heritage will be protected. We applaud the May River and Munkayarra Pool management zones, but question whether this is sufficient.

As a comparison, we note the specific study that was undertaken as part of the La Grange groundwater allocation plan (also in the Kimberley region).[20] We note that that study highlighted that one key characteristic of groundwater that was important to Aboriginal people in that area was the interface between salt and freshwater, which has not been identified in the Derby Plan.[21] We contend that such an assessment of cultural values and location attributes is required for the Derby Plan before it is finalised and before the approval of any additional extractions or increases in extractions associated with existing water licences. Traditional Owners must be involved in this assessment and, aside from anything that is confidential for cultural reasons, the assessment should be made public.

Further, we note that, at a minimum, cultural impacts must be regularly assessed by Traditional Owners. There is no strategy for this in the Derby Plan. As a matter of good governance and respect, Traditional Owners should be notified under the Derby Plan in

[16] Derby Plan, p 57.
[17] Derby Plan, p 38.
[18] DWER, Derby groundwater allocation plan: Scan of groundwater-dependent values (2017), p 1.
[19] Walalakoo Aboriginal Corporation, 'Walalakoo Healthy Country Plan 2017–2027' (2017) <https://static1.squarespace.com/static/54cee140e4b04d4fe172c60b/t/592272b5b8a79b59dfc2c7a5/1495429843809/Walalakoo+Final+screen+res+version+hi+res+images-2.pdf> and Bush Heritage Australia, 'Bunuba Healthy Country Plan' (2018) <https://www.bushheritage.org.au/blog/bunuba-healthy-country-plan>.
[20] Department of Water (WA), 'La Grange: Groundwater allocation plan' (2010) <82626.pdf (water.wa.gov.au)>.
[21] Ibid, p 10.

relation to any new water licence or application for an increase in extraction from an existing water licence and the information should be clear, comprehensive and in an appropriate format. This would enable Traditional Owners to identify any relevant risks to cultural values. Funding and resources to undertake this assessment must be provided to Traditional Owners.

Recommendation 5: Traditional Owners must be further consulted about the assessment of cultural values for the Derby Plan before it is finalised and before the approval of any additional extractions or increases in extraction associated with existing water licences.

Recommendation 6: The Derby Plan must have a strategy that provides for Traditional Owners to regularly assess cultural impacts of groundwater extraction. Funding and resources to undertake this assessment must be provided to Traditional Owners.

c. Water for Aboriginal economic uses

We strongly agree that provision must be made for Aboriginal economic development. However, we wish to raise some questions and concerns about the proposed AWR and query if it is the best (or only) option in the circumstances. As noted above, we also think that this conversation should take place at a higher level than the Derby Plan, and must be subject to discussion not only in the broader context of the Martuwarra-Fitzroy but also in Western Australia more broadly. The Derby Plan, and simultaneously, the Fitzroy Paper, are the first time that the AWR model has been proposed outside an Indigenous Land Use Agreement process in WA. The use of an AWR in these two contexts would, if adopted, therefore, set an important policy precedent in WA.

We emphasise that AWRs may provide a good opportunity for Traditional Owners, but there are still many questions to be answered. There has also not been any form of free, prior or informed consent in relation to the proposal of this particular model. We provided a detailed critical analysis of the AWR model in our Submission on the Fitzroy Paper and that must be read in conjunction with this submission. Therefore, in this section, we make comments that are more particular to the Derby Plan context.

A total of 2.19 GL/year from the Derby Wallal and Erskine Sandstone resources (Greater Derby) have been put aside for the Derby AWR.[22] The AWR 'will be available once rules for sharing and administering the reserve have been finalised by the department in consultation with [T]raditional [O]wners'.[23] The 2.19 GL/year is approximately 30% of 'the water still available'. The rationale for the AWR to only be 30% of the 'water still available' is not explained (and that is not the position in the Northern Territory where they have notional allocations where resources are, for example, over-allocated). We are not

[22] Derby Plan, p 17. We note that water has not been put aside from the Derby sub-area due to its over/full allocation. In the context of the NT, there is the opportunity to put aside notional water for AWRs. However, this raises potential problems if the notional water will never be (re)gained.
[23] Derby Plan, pp 17 and 24.

suggesting that 30% is the 'correct' size, but we are concerned about defining exactly what the proposed 30% is in this plan. As it stands, it seems that the WA Government's policy for AWRs is 30% of the 'leftovers'. In this context, we emphasise upfront that, as is stated in the Derby Plan: 'Most of the extent of the Derby Wallal (96%) and Erskine (91%) water resources are subject to either native title held by the Nyikina Mangala or Bunuba people or native title claims'.[24] Given this, 30% of the 'leftovers' does not seem equitable.

We also note, on a more fundamental level, that the calculation of the 30% is numerically confusing, and not at all transparent in the Derby Plan. There is a calculation of a general component limit at Table A13 that does not match the allocation limits or current water availability for Greater Derby in Table 1. The calculations for the numbers in the general component limit in Table A13, that are used to calculate the 30%, are not clear.

The Derby Plan states that the native title holders are not yet in a position to identify specific water requirements (and notes that the AWR is future focussed) and that therefore a methodology was needed to work out the amount of water for the AWR.[25] The methodology started at 2.19 GL/year which is based on the allocation used in other AWR models in the Northern Territory and in the Yamatji Nation Indigenous Land Use Agreement. We note that we made comments on the lack of evidence behind the 30% allocation in our Submission on the Fitzroy Paper. The Derby Plan then assessed whether that proposed 30% reserve should be increased or decreased based on several considerations. In this context, the Derby Plan made an attempt to quantify how much water might be needed for small, medium and large scale developments (based on current water use).[26] The Derby Plan noted that 2.19 GL/y is equivalent to the total amount of private/commercial water use that has been licenced to date, could reasonably support a range of small-medium scale horticulture/agriculture projects and would leave 5 GL/yr (aside from the AWR) available to meet demands from others (and if required, to top up the AWR).

While we acknowledge that there were further calculations done beyond just choosing the 30%, these further calculations were not relied upon to justify any potential change in approach (and it is not clear what sort of evidence would have been required to go beyond 30%). The 30% just appears to be the set limit that has come from the Northern Territory's policy.

We do note that the Derby Plan states at the end of the discussion on the AWR in Appendix A that 'we can further consult with the traditional owners about their water needs and demands. We may adjust the reserve's volume once we have had this opportunity'.[27] However, there is no strategy for this, nor any sense of the evidence that might be

[24] Derby Plan, p 49.
[25] Derby Plan, p 49.
[26] Derby Plan, p 48.
[27] Derby plan, p 49.

required to change what seems to be the set limit of 30%. Into the future, there is also no strategy in relation to reviewing and amending the AWR specifically. Such a management strategy would seem particularly important for an allocation that the Derby Plan acknowledges is somewhat of an estimation and a new concept.

We also note that the AWR calculations are premised on considering other (predominantly non-Indigenous) people's water demands and needs (even though there 'have been relatively low levels of demand for water in the Derby Wallal and Erskine water resources to date').[28] Given the exceptionally high level of water resources in the Derby Plan that are subject to native title determinations or claims, and the opportunity available for Traditional Owners to determine they want to work with businesses (including non-Indigenous businesses) to use water, Traditional Owners should have more than 30% in the Derby Plan. This would give Traditional Owners certainty to negotiate economic opportunities into the future.

In this context we also note that, similarly to the Yamatji Indigenous Land Use Agreement, AWRs must also come with resources and funding to enable Traditional Owners to develop businesses using their water allocation. We note that the Derby Plan states that: 'The government is also committed to entering into negotiated agreements with native title holders to link community priorities with the support and resourcing needed to leverage economic opportunities.'[29] Negotiated agreements about resources are an inherently good practice, but again, the process here is problematic as Traditional Owners are being asked to agree on the format of the agreement, the AWR with certain conditions pre-determined, prior to the negotiation.

The Derby Plan provides that a water licence will be required to access the AWR. We are concerned, generally, that this indicates there is a discretionary element to whether water will be granted from the AWR. Further, this also might be an insurmountable administrative burden for Aboriginal people. Although we do not believe that Aboriginal people should be required to apply for a water licence to access water on their Country in the same way as other water users, we also understand that there is a need for a process through which there is a record of where the water is being used, particularly as future projects may be large. We suggest this needs to be discussed directly with Traditional Owners and an alternative specific process set up. We submit that, similarly to the NT, AWRs should have specific requirements in the legislation (separate to other licences), and this would include requirements relating to where non-Indigenous people wish to negotiate with Traditional Owners to take water with their consent.

There is also high uncertainty in the Derby Plan as to how AWRs will operate as rules for sharing and administration are still yet to be drafted. We note that the Derby Plan states

[28] Derby Plan, p 49.
[29] Derby Plan, p. ix.

that the timeline for this process was 'to be confirmed during the public comment period' but we have not been advised of this.[30] While we acknowledge that Traditional Owners must be consulted about these rules, the root of the problem here is that a model, with very little detail as to how it will actually operate, has been proposed and Traditional Owners are being asked to comment on that model without really understanding what it means.

Recommendation 7: The WA Government must engage with Traditional Owners around WA, but in this case the Martuwarra Council, with respect to the concepts of Aboriginal Water Reserves. In the context of free, prior and informed consent, there needs to be more discussion, and consent from Traditional Owners, about this model.

Recommendation 8: Given the exceptionally high level of water resources in the Derby Plan that are subject to native title determinations or claims, Traditional Owners should have more than 30% of the available water in the Greater Derby sub-area.

Recommendation 9: Like the Yamatji Indigenous Land Use Agreement, AWRs must also come with resources and funding to enable Traditional Owners to develop businesses using their water allocation.

Recommendation 10: There must be an appropriate management strategy in place to review and, if necessary, amend the AWR.

Recommendation 11: The WA Government needs to make clear that water for AWRs is a priority (including in the Derby Plan) – now and into the future. In this context, specific rules are needed with respect to allocations to ensure the AWR is prioritised.

Recommendation 12: To access the AWR, Traditional Owners should not have to apply for a 'regular' licence (under the RiWI Act), rather an alternative and specific system should be negotiated with Traditional Owners.

Recommendation 13: At a minimum, the Derby Plan needs to make the 'next steps' clearer in terms of planning the rules for the AWR.

Recommendation 14: The WA Government should not issue new water licences until the AWR 'policy' (or another option) has been agreed to by Traditional Owners.

4. Principles of Good Water Governance

This section emphasises overarching principles of good water governance that must be implemented. These principles must be adopted generally, but also in order to support the Martuwarra Council's governance model.

Good water governance is, amongst other things, underpinned by a climate-ready legal regime. This is particularly important in northern Western Australia where climate

[30] Derby Plan, p 36.

projections, as noted in the Derby Plan, lack a clear trend and could involve increased or decreased rainfall. This makes evidence-based decision-making vital. Further, to effectively adopt such measures, there must be proper measurement of water extractions, full transparency and the ability for third parties to enforce water laws where necessary. At a granular level, we submit that the principles of good water governance relevant to the Derby Plan include:

- an evidence-based cap on extractions at catchment scale which is informed by climate projections;
- an adaptive water allocation scheme with an embedded climate projection signal;
- protecting cultural and environmental flows from extraction;
- protecting different components of the flow regime (from no flows to overbank flows), each of which is required to maintain ecosystem function;
- managing public storages on the basis of climate projections, not historic climate data;
- accurately measuring and reporting water extractions (noting the difficulty of enforcing the law at the licence holder and catchment levels in the absence of reliable evidence);
- fulsome monitoring of groundwater resources, and appropriate limits on extractions which take into account connectivity with surface water, as well as the tendency to shift to consumption from aquifers during periods of water scarcity;
- accurate water accounting which, inter alia, takes into account return flows, water theft and any potential floodplain harvesting;
- a requirement to ensure modelling for compliance purposes is based on latest levels of development and its assumptions are transparent and communicable;
- the support, particularly for enforcement, of an independent regulator;
- third party standing to enforce water laws (this is particularly important given the virtual impossibility of obtaining a writ of mandamus compelling the government to enforce its own laws); and
- more generally, provisions in water legislation that are justiciable.

We will comment more particularly on aspects of these good water governance principles throughout this submission. However, we also emphasise them in the context of reform of the RiWI Act which is urgently required.

5. Hydrology/hydrogeology – knowledge gaps

We note several knowledge gaps in relation to hydrology/hydrogeology, which, based on our scientific understanding, need to be filled before any decision can be made regarding future allocations. We note that the Derby Plan acknowledges these knowledge gaps, particularly in relation to the Greater Derby sub-area. For example:

> ‘While our knowledge of the Derby area’s groundwater resources has improved, our knowledge remains limited in some areas.’[31]
>
> ‘The Erskine Sandstone aquifer underlies a large geographical area. The extent of the aquifer and limited nature of our understanding makes it difficult to distinguish between where the aquifer is unconfined and confined. For this reason, we will manage the aquifer as a single water resource.’[32]
>
> ‘Greater Derby subarea: Further inland there are fewer water users who are separated by large distances... Water level monitoring is limited to Water for Food project data and one private user, Mowanjum Station. This localised water level and quality information is not enough to identify regional groundwater trends.’[33]

In this section, we will analyse four issues that relate to gaps in hydrological/ hydrogeological data/evidence: recharge rates; impacts of increased extraction in the Greater Derby area; saltwater intrusion; and taking into account climate change.

a. Recharge rates

Understanding of the recharge mechanisms to the aquifers and the subsequent estimation of recharge and throughflow rates to the confined and unconfined aquifers, is, at best, rudimentary. The calculation of recharge is based on uncertain estimates of aquifer surface area. Furthermore, the recharge rate is based on a rainfall average which does not take into account the sequencing of rainfall events that generate recharge, nor how this sequencing might change due to climate change.[34] However, it is upon these highly uncertain estimates of recharge that future water availability is calculated.

The Derby Plan states:

> Recent groundwater investigations have refined our estimations of the rates of rainfall recharge (DWER 2018). Based on chloride content in rainfall and groundwater samples, we estimate the recharge rate for the:
>
> - Wallal aquifer is between 2 and 2.8 per cent of average annual rainfall at Derby (for the Derby groundwater allocation plan we selected a mid-point of 2.4 per cent)
> - Erskine Sandstone aquifer is about 1 per cent of average annual rainfall at Camballin.

This was based on a calculation outlined in Figure 10 on page 43 of the Derby Plan:

[31] Derby Plan, p 38.
[32] Derby Plan, p 38.
[33] Derby Plan, p 40
[34] Gallardo, ‘Hydrogeological characterisation and groundwater exploration for the development of irrigated agriculture in the West Kimberley region, Western Australia’ (2019) 8 *Groundwater for Sustainable Development* 187, p 196.

Figure 10 Rainfall recharge of aquifers in the Derby groundwater allocation plan area

Recharge (kilolitres) = SA x P x % x 1000

Where:

SA	=	*Area (km^2) of resource outcrop area*
P	=	*Precipitation (long-term average annual rainfall in millimetres)*
%	=	*Proportion of rainfall which becomes recharge*

Recharge to the Wallal Sandstone aquifer	=	699* x 695.2[a] x 2.4% x 1,000
	=	11,662,675 kilolitres
Recharge to the Erskine Sandstone aquifer	=	2,168^ x 643.7[b] x 1% x 1,000
	=	13,955,416 kilolitres

* Area includes entire extent of Wallal Sandstone outcrop and sub-crop, not including coastal mudflats (Derby subarea area 34 km^2 and Greater Derby subarea area 665 km^2)

^ Area includes entire extent of Erskine Sandstone outcrop and sub-crop

[a] Average annual rainfall at Derby Aero rainfall station, n = 62

[b] Average annual rainfall at Camballin rainfall station, n = 44

We submit that the preliminary method of recharge estimation undermines the scientific merit of the Derby Plan and is inadequate for the task of supporting decision-making about future allocation limits. As noted above, the method is simplistic. It does not properly take into account rainfall sequencing and climate change. The figures used in the calculations are estimates based on averages from limited data, and might not reflect aquifer heterogeneity. Gallardo recommends that 'additional recharge data is needed to better quantify safe yields'.[35] This fundamental weakness in the estimation, measurement and modelling of the recharge nature and magnitude poses serious uncertainty in the Derby Plan. The total surface area that contributes to aquifer recharge remains very poorly understood.

We note that the 2019 paper of Gallardo identifies that there is a high level of uncertainty in calculations in this area:

> Thus, the estimates of hydraulic parameters presented herein represent at best some average value, but might not be representative for the entire formation. The mapping of linear features is one of the keys to understanding groundwater occurrence (Sander, 2007). Fractures zones appear somewhat concealed and could

[35] Gallardo, 'Hydrogeological characterisation and groundwater exploration for the development of irrigated agriculture in the West Kimberley region, Western Australia' (2019) 8 *Groundwater for Sustainable Development* 187, p 196.

not be clearly identified with the current data available. Thus, the distribution and significance of the lineaments remain inconclusive and open to further work. Finally, additional recharge data is needed to better quantify safe yields. A uniform recharge has been applied to estimate replenishment rates in the Erskine Sandstone. Vertical leakage was probably overestimated in the confined sections of the aquifer therefore, total inflows into those areas should be considered as a maximum. The simplifications and uncertainties discussed certainly complicate the hydrogeological interpretation…[36]

We submit that lack of proper understanding of recharge rates and volumes is a serious flaw in the Derby Plan, warranting further research. In particular, there are no measurements or observations reported in the Derby Plan establishing the hydrological mechanism of recharge. Therefore, we strongly recommend that measurement, documentation and modelling of the recharge mechanisms are undertaken before the Derby Plan is pursued any further.

Total annual rainfall is not the only factor that matters for recharge. The sequencing of rainfall events, and their variability, have substantial effects on recharge mechanisms. Given multiple factors affecting recharge mechanisms, including soil saturation, understanding future rainfall is fundamental to accurately predict future recharge into Derby's aquifers.[37] Although climate modelling for the region indicates a range of future possibilities, following the precautionary principle, allocations should be based on a reduced rainfall scenario and the changes in rainfall sequences.

In this context, we also note that the risk management approach for determining the proportion of recharge for allocation (Table A14) fails to apply the precautionary principle.[38] We submit that a more robust risk management approach should be adopted. Estimates for groundwater abstraction limits should take into account uncertainty associated with several factors. These include, but are not limited to, climate change impacts on rainfall patterns, rudimentary methods for groundwater recharge estimation, impact of groundwater abstractions on aquifer levels, reduced throughflow into the Derby area and its impact on seawater intrusion. Following NSW Natural Resources Commission (2006),[39] we propose that uncertainty factors (**UF**) are applied to the proposed groundwater abstraction limits. Depending on the risk tolerance that is considered acceptable, the UF will change. Lower risk tolerance, and thus greater degree of resource protection, will entail higher uncertainty factors.

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[36] Gallardo, 'Hydrogeological characterisation and groundwater exploration for the development of irrigated agriculture in the West Kimberley region, Western Australia' (2019) 8 *Groundwater for Sustainable Development* 187, p 196.
[37] CSIRO and Bureau of Meteorology, 'Climate Change in Australia' (2018) <https://www.climatechangeinaustralia.gov.au/en/climate-projections/future-climate/regional-climate-change-explorer/super-clusters/?current=SSC&tooltip=true&popup=true>.
[38] Further, Table A14 in the Derby Plan fails to include 'development for the community' considerations, which are specifically part of 'development risks' in the referenced risk matrix (which is from the WA Government 'Groundwater risk-based allocation planning process' document): Department of Water (WA), 'Groundwater risk-based allocation planning process' (2011) <Risk-based approach to setting groundwater allocation limits>.
[39] NRC, 'Lower Lachlan Groundwater Sharing Plan' (2006) <https://www.nrc.nsw.gov.au/lower-lachlan-wsp-review>.

Limits proposed in the current version of the Derby Plan do not acknowledge such uncertainty, and thus, are to be considered as reflecting UF=0. This implies the lowest risk tolerance level possible, i.e. ignoring risk. A 'risk tolerant approach' with a UF=20% would result in allocation limits reduced by 20% from the ones initially proposed. For example, 2020 Allocation limits for the Erskine in the Greater Derby area are currently proposed at 6,408,000 kL/year. Adopting a UF=20% will result in an allocation limit of 5,126,400 kL. Likewise, a 'risk adverse' approach with a UF=40% would result in an allocation limit equal to 3,844,800 kL/year. We assert that risk must be taken into account when establishing allocation limits and that the UF should be determined based on the precautionary principle, and thus, be of at least 20%.

Recommendation 15: Further measurement, documentation and modelling of the recharge mechanisms must be undertaken before the Derby Plan is finalised.

Recommendation 16: Specific consideration must be given to future climate conditions whereby intense yet infrequent rainfall events may result in a decrease of groundwater recharge.

Recommendation 17: A more robust risk management approach is required to determine the proportion of recharge for allocation.

b. Impacts of increased extraction in Greater Derby area

The Derby Plan has increased in size as compared to the 1992 Plan and now includes the two distinct sub-areas of Derby and Greater Derby. The water allocation limit assumes a substantial increase in water use compared to current levels of abstraction. It seems that this expansion was partially based on increased knowledge about the Wallal and Erskine Sandstone aquifers that cross both the Derby and Greater Derby sub-areas (so that the entirety of both aquifers have now been included in the Derby Plan).[40] However, the Derby Plan appears to ignore the potential impacts of increased extraction in the Greater Derby sub-area on groundwater levels in the Derby sub-area. Impacts on throughflow to the Derby sub-area should be considered by the allocation plan.

Although the Lower Erskine has been shown to have been over-allocated, water licences have been granted in these Erskine aquifers in the Greater Derby area. This is because in the Greater Derby area, the Lower and Upper Erskine are treated as one, connected aquifer, despite the lack of evidence to justify this assumption.[41] In this context, it appears key information is missing that is necessary to be able to make a groundwater allocation, including the extent of the aquifers and the aquitard function between the aquifers. We recommend that extensive monitoring be carried out in the Greater Derby area to fill the

[40] Derby Plan, p 38.
[41] Derby Plan, p 8: 'Although the Erskine Sandstone aquifer can be confined and unconfined across the subarea, for the purposes of this plan we manage it as a single resource.'

current knowledge gap before finalising the allocation limit or increasing extractions by issuing new licences.

More broadly, we note that in the Derby Plan, the presumption is that groundwater demand will (and should) rise over time. We contend that water demand, along with the management of the groundwater, should be part of the overall plan. In particular, demand reduction is needed in the overallocated Derby sub-area. However, demand reduction is not covered by the Derby Plan.

According to the National Water Initiative Pricing Principles, water users should contribute to the cost of water planning and management.[42] WA has yet to implement full cost recovery and only charges some sectors (mining and public water supply) for water licences.[43] We oppose the view that the Government of WA should mobilise public resources to satisfy private water demands, without proper cost-benefit analysis and justification. The current paradigm is a clear illustration of how public goods (in this case groundwater) are allocated for private benefits, without consideration for the losses inflicted in the greater population. Thus, we urge the WA Government to consider full cost recovery. Funds generated through such fees could be dedicated to further research to fill current knowledge gaps and mitigation of impacts caused by additional water extraction, such as aggravated seawater intrusion.

However, we emphasise that Traditional Owners should not have to pay full costs, particularly if licences are required for AWRs.

Recommendation 18: Extensive monitoring must be carried out in the Greater Derby sub-area to fill the current knowledge gap about the impact increased extraction might have on the Derby sub-area before finalising the allocation limit or increasing extractions.

Recommendation 19: Water demand, along with the management of the groundwater, should be part of the overall plan.

Recommendation 20: The WA Government should charge water licence holders for the full cost of water planning and management. However, Traditional Owners should not have to pay full costs, particularly if licences are required for AWRs.

c. Saltwater intrusion

As noted in the Derby Plan: 'A key challenge for managing groundwater abstraction near the coast is to maintain the interface between sea water and fresh water in aquifers'.[44] Relatedly, the first water resource objective of the Derby Plan is: 'Groundwater abstraction does not cause the seawater interface to move inland and affect groundwater quality for users or groundwater-dependent ecosystems and cultural values near the coast.'[45]

[42] Natural Resource Management Ministerial Council, 'National Water Initiative Pricing Principles' (2010) <http://www.agriculture.gov.au/SiteCollectionDocuments/water/national-water-initiative-pricing-principles.pdf>.
[43] DWER, 'Water Licensing Fees' <https://www.water.wa.gov.au/licensing/water-licensing-fees>.
[44] Derby Plan, p viii.
[45] Derby Plan, p 14.

However, the Derby Plan fails to adequately respond to the growing problem of seawater intrusion.

In this context we first note that there appears to be a lack of baseline data on the interface which inhibits the ability to make effective decisions. In the section on the seawater interface it states: 'We know from water quality monitoring that at current abstraction levels, the seawater interface has moved inland in the Lower Erskine aquifer in the Derby subarea along the peninsula. The extent has not yet been accurately delineated.'[46]

Seawater intrusion in Derby is *prima facie* evidence of extraction exceeding recharge in the Derby subarea. The Derby Plan reduces groundwater allocation in the impacted area, but does not set objectives for remediation or a plan for doing so. Further, as discussed in the previous section, it is unclear how the seawater interface will move if there is increased extraction in the Greater Derby sub-area. Risks of seawater intrusion increase with:

- possible reduced throughflows as a result of greater extraction within the Greater Derby sub-area;
- rising sea levels due to climate change;
- possible reduced recharge due to climate change particularly through the change in rainfall variability and sequence of rainfall events; and
- changes to the water balance resulting from possible changes in land use, particularly increased vegetation cover resulting from irrigated crop plantations.[47]

In our view, none of these potential impacts are examined sufficiently in the Derby Plan, nor in supporting documents. It appears the way that uncertainty has been dealt with in this context is to conclude the analysis on the seawater interface by stating: 'We will manage groundwater abstraction near the coast more precisely through licensing policies and terms and conditions on individual water licences.'[48] This statement is highly general, does not provide the public with the information required to evaluate the monitoring and response, and it gives no indication of the licencing policies or how decisions will be made. Relevantly, it also fails to take into account other mechanisms (including in relation to land management) which may be required to address seawater intrusion.

We also note that seawater intrusion can be 'far more sensitive to pumping rates and recharge than to aquifer properties such as hydraulic conductivity'.[49] See, for example, the research of Narayan et al in the North Queensland context.[50] In this study, the effects of seawater intrusion are investigated through computer modelling simulations under various pumping and recharge rates. The paper shows that pumping rates have the

[46] Derby Plan, p 20.
[47] Adrian D Werner, 'A Review of Seawater Intrusion and Its Management in Australia' (2010) 18(1) *Hydrogeology Journal* 281–85.
[48] Derby Plan, p 20.
[49] Kumar A. Narayan, Carsten Schleeberger, and Keith L. Bristow, 'Modelling seawater intrusion in the Burdekin Delta Irrigation Area, North Queensland, Australia' (2007) 89 *Agricultural Water Management* 217, 217.
[50] Ibid.

highest impact on seawater intrusion – much greater than aquifer properties and tidal fluctuations. The analysis seen in Narayan et al. is the minimum analysis we would expect in the context of saltwater intrusion, and this has not been done for the Derby Plan.

As noted in the previous section, the beneficiaries of water use, not the public, should pay for environmental costs. In this case, the costs include remediating seawater intrusion and implementing a robust water monitoring regime to prevent further damage.

Recommendation 21: The WA Government must commit to further research to understand the impacts of extraction in the Greater Derby area on seawater intrusion in the Derby peninsula. Such research should also consider impacts of reduced groundwater recharge and rising sea levels.

d. Taking into account climate change

According to the Productivity Commission's *National Water Reform 2020 -Draft Report*, water planning should account for climate change. It recommended that:

> 'provisions in water plans [should] deal with water scarcity arising from drought, including priorities for water sharing and actions relating to meeting critical human and environmental needs. In relatively undeveloped and developing areas, there is an opportunity to set consumptive and environmental shares in ways that manage the risk of future resource reductions'. [51]

We note that Appendix A to the Derby Plan has a few short sentences on climate change. The totality of this is:

> 'The department has developed standard climate scenarios for five broad climatic regions based on Global Circulation Models (GCM). The scenarios are based on information from the World Climate Research Program and Intergovernmental Panel on Climate Change (IPCC 2007). The GCM for northern Western Australia project a hotter future but are less definitive on rainfall. About half of them project a wetter and half a drier future (DoW 2015). Because of the uncertainty associated with rainfall projections for the north, we used a long-term historical sequence of rainfall that captures variability to make decisions on average annual rainfall and water availability in this plan.'[52]

The water allocation limits in the Derby Plan do not account for climate change, yet climate impacts are being reported by Elders and others. These observations are supported by the broad scientific consensus that climate change is upon us.[53] We contend

[51] Productivity Commission (National Water Reform: Draft Report), Supporting Paper A: Water entitlements and planning p 4 <Draft report - National Water Reform Productivity Commission (pc.gov.au)>.
[52] Derby Plan, p 44.
[53] Climate Change in Australia, 'Western Australia's Changing Climate' <Western Australia (climatechangeinaustralia.gov.au)>.

that this is a major gap in the Derby Plan that risks undermining the reliability of its projections for future water availability.

Recommendation 22: Best available climate change information must guide water planning in the Derby Plan and, if necessary, additional independent research concerning climate change should be commissioned.

Recommendation 23: Climate change must inform any groundwater allocation limits.

6. Water availability, allocation limits and estimates of water extractions

We have general concerns about the limited data that allocation limits are based on (and associated uncertainty regarding extractions) and the lack of transparency regarding water availability.

a. Water extractions

We are concerned that estimates of water extractions are based on unreliable data and assumptions and to that extent are very unlikely to be accurate. First, Appendix A sets out the method for determining allocation limits. Although the methodology is set out in detail, it frequently references the lack of evidence and related uncertainty. The volume of water licences on issue is listed but there is no clear statement about how much water is currently being extracted (actual use). Whilst it lists the broad purposes of licenced water use, it does not indicate the relative volume used for each category.

Second, the allocation limit includes water uses exempt from licencing and measurement. Estimates of volumes used for stock and domestic purposes (i.e. bores on semi-rural blocks) are accordingly uncertain.[54] Furthermore, estimated water for domestic purposes was partially based on a survey from Exmouth as this was 'the only data available for a town located in northern Western Australia'.[55] Derby is 1,500 km further north than Exmouth, Indeed, if we consult the Bureau of Meteorology's Map of Climate Zones of Australia, they are in different zones.[56] The accuracy of the estimate could be improved by a survey or by installing meters.

In the context of livestock use we note that Appendix A identified that 'accurate data on actual stocking numbers was unavailable and would not have accounted for future growth'.[57] Partially as a result of this, an estimation method, based on potential carrying capacity and water needs for cattle on pastoral land, was used. While we support the use of an estimation that includes forecasting into the future, this is, again, another example of missing baseline data.

Separately, we also note that the largest category of allocations is 'general'. General water uses are defined as 'general and commercial purposes'.[58] We understand this to mean,

[54] Derby Plan, pp. 45-46.
[55] Derby Plan, p 46.
[56] Bureau of Meteorology, 'Map of Climate Zones of Australia' <Australian Climate Zones (bom.gov.au)>.
[57] Derby Plan, p 45.
[58] Derby Plan, p 17.

predominately, irrigation, pastoral and mining uses. It seems that the description of 'commercial', rather than general, would be more apt in this context.

Recommendation 24: The information on allocations in the Derby Plan needs to be made more transparent. There should be one table in the Derby Plan that sets out all of this information.

Recommendation 25: General uses should be renamed 'commercial uses'.

Recommendation 26: The WA Government must commit to research into baseline data regarding the actual volume abstracted for licence-exempt uses of stock and domestic self-supplied bores.

b. Water allocation limits

The previous section demonstrates the knowledge gaps and uncertainties in the Derby Plan. These uncertainties cast doubt over whether the Derby Plan allocation limits are sustainable.

In the context of this uncertainty, the Derby Plan must adopt a precautionary approach to all water allocation limits. Specifically, this approach must recognise that sustainable allocation limits cannot be determined on a system-wide basis in the absence of longitudinal ecological data. It is also necessary given the need for conservative baselines and ongoing monitoring.

Recommendation 27: The Derby Plan must adopt a precautionary principle approach to all water allocation limits. This must recognise that sustainable allocation limits will not be able to be determined on a system-wide basis in the absence of longitudinal ecological data, and address the need for conservative baselines and ongoing monitoring.

7. Governance

We are concerned about the absence of clear rules to prevent future over-allocation. By way of example, the Derby Plan states that: 'Where a resource is fully allocated, we are *likely* to refuse applications for new entitlements.'[59] There must be more certain rules than this – especially where the resource is fully allocated.

a. Environmental/cultural 'allocations'

Section 3.1 of the Derby Plan states that: 'Before we set the allocation limits, we account for water that must be left in an aquifer to support in situ values, such as wetlands, cultural values and the seawater interface.'[60] However, no evidence is provided of the water that is set aside for these purposes in the Derby Plan. There is one paragraph on 'environmental, cultural and social values' in Appendix A that notes the environmental

[59] Derby Plan, p 15.
[60] Derby Plan, p 15.

scan that was undertaken and references Appendix B.[61] Appendix B is brief and sets out a methodology that is entirely lacking in the detail.

As noted above, we obtained the 'Derby groundwater allocation plan: Scan of groundwater-dependent values' and are accordingly concerned about the way in which the scan interacts with the Derby Plan. Specifically, the scan recommends further mapping, analysis or ground-truthing and yet this appears to only be required when and where a licence is applied for. This is problematic insofar as it reflects a reactive, licence-by-licence approach to water planning rather than a more holistic, 'whole of landscape' approach which considers cumulative impacts over the Greater Derby and Derby sub-areas and environmental thresholds within this context.

The Derby Plan area contains important environmental values.[62] Many of these are located near the May River and wetlands such as the Mankajarra wetland. However, several important places fall outside of the Derby Plan management zones.[63] The Derby Plan has not specified what triggers would indicate unacceptable impacts to these areas and what licencing conditions would protect them.

We note more generally that good water governance would see all water extractions, with the exception of town water supplies and for stock and domestic use, treated as a residual. Then, only after defined cultural, environmental and sustainable outcomes are achieved should water extractions be permitted. It is not clear from the Derby Plan that this is the approach being adopted.

Recommendation 28: The approach to environmental and cultural values needs to reflect a holistic approach, rather than a licence-by-licence approach.

Recommendation 29: The Derby Plan needs to outline a strategy for Traditional Owners to regularly assess cultural values and provide resources and funds for this task.

Recommendation 30: All water extractions, with the exception of town water supplies and for stock and domestic use, should be treated as a residual. Then, only after defined cultural, environmental and sustainable outcomes are achieved should water extractions be permitted.

b. Duration of plan

The duration of the Derby Plan will be 10 years.[64] The way this is expressed in the Derby Plan is: 'Unless replaced or revoked earlier, we will consider the need to replace this plan 10 years after its publication date.'[65] We contend this is too long a duration. We note that this is not a statutory plan under the RiWI Act, but if it was, the Minister would need to

[61] Derby plan, p 44.
[62] DWER, Derby groundwater allocation plan: Scan of groundwater-dependent values (2017), p 18.
[63] Ibid.
[64] Derby Plan, p 12.
[65] Derby Plan, p 12.

consider whether any action needs to be taken within 7 years.[66] Further, in this context we also emphasise the major themes that are apparent from this submission – uncertainty, lack of data, the need for close monitoring of the saltwater intrusion, and the importance of increasing the understanding of Aboriginal economic uses of water – which all point to the fact that consideration must be given to whether the plan needs revision at the five year mark. There must be a specific and transparent process for this evaluation that involves feedback from the public.

Recommendation 31: The duration of the Derby Plan should be amended such that consideration must be given to whether the plan needs revision five years after publication. There must be a specific and transparent process for this evaluation that involves feedback from the public.

c. Adaptive Management

We note that the 'plan timeframe' states that the Derby Plan uses an adaptive management approach and that, as part of this approach, the Derby Plan will be regularly evaluated against its stated outcomes.[67] Further, that depending on the results of the evaluation, management approaches may be adjusted or a new planning cycle may be undertaken. Relevantly, the 'Water Allocation Planning in WA: A Guide to our Process' (**WAP Guide**) sets out an evaluation process:

> 'Once a plan has been in place for at least a year, the plan evaluation cycle begins. Plan evaluation then takes place on a regular basis, generally annually. If the plan is not meeting its objectives, the annual evaluation process may trigger the start of new planning work. This may be an update of a particular aspect of the plan or, if needed, a full replacement similar to the original plan-making process. This link within the planning process is how we achieve adaptive management.'[68]

We further note that in the section in the Derby Plan on 'measuring the plan's success' it states:

> 'Our approach is adaptive, and our work in the plan area will be ongoing to refine how we monitor, report and licence groundwater over time. Periodically, we will publish an evaluation statement to rate our success in meeting the plan's outcomes and resource objectives.'[69]

While adaptive management has an important role to play in ensuring long term sustainable use of natural resources, there have been considerable concerns raised about the application of adaptive management, and in particular its ability to overcome uncertainty regarding environmental responses to water extraction (especially in the

[66] See, for example, RiWI Act, s26GY(3).
[67] Derby Plan, p 12. Also see p 37.
[68] Department of Water (WA), 'Water Allocation Planning in WA: A Guide to our Process' (2011) <100774.pdf (water.wa.gov.au)> p 4.
[69] Derby Plan, p 14.

context of groundwater). Thomann et al reviewed adaptive management principles and groundwater management case studies, identifying significant shortcomings in the application of adaptive management including a lack of definitions and guidelines for its use, a lack of substantive mitigation measures available to support adaptation, and a failure to undertake assessment of the potential for remediation should problems be identified.[70] In this context, we have several concerns about the loose use of the adaptive management concept in the Derby Plan.

In raising issues about adaptive management we wish to note that both interim (during the life of the plan) and end of plan/renewal forms of evaluation must take place. Adaptive management principles must be used to continually, and transparently, review management of the Derby Plan. The notion, both from the Derby Plan and the WAP Guide, that formal evaluation will take place 'regularly', and in the WAP Guide 'generally annually', is unacceptably vague. Similarly, in relation to measuring the Derby Plan's success, the release of an evaluation statement 'periodically' is also too vague. The section on evaluating the Derby Plan further states that: 'We *aim* to publish the results in a periodic evaluation statement',[71] which appears even more vague. There must be more specific details about the time intervals for when evaluations will take place, what sort of evaluation will be undertaken and how the information about that evaluation will be made public so that the information is transparent. We note that the WA Government's evaluation statements for other WAPs have not always been issued annually even if that was incorporated into the plan. For example, the La Grange groundwater allocation plan suggested that evaluation statements would be published annually.[72] Evaluation statements were issued in 2011, 2012 and 2017 (not annually).[73]

We further note that adaptive management must specifically include monitoring and evaluating changes to flows from extraction both on natural *and* cultural values and significant cultural places. Following such monitoring and evaluation, there must then be ways to efficiently and effectively respond and make necessary changes. There must be specific information about 'levers' that will be used for adaptive management, this might include, for example: reduced seasonal allocation, refusing to renew a licence, renewing but for a reduced amount, or changing extraction rules.

We note that Table 5[74] provides the objectives and a sense of how these will be monitored, evaluated and what the responses might be, but all of these are very broad. While there is reference to targets and trigger levels in some (but definitely not all), these are not

[70] J. Thomann, A. Werner, D. Irvine and M. Currell, 'Adaptive management in groundwater planning and development: A review of theory and applications' (2020)*Journal of Hydrology* 586 (124871).
[71] Derby Plan, p 37.
[72] Department of Water (WA), 'La Grange: Groundwater allocation plan' (2010) <https://www.water.wa.gov.au/planning-for-the-future/allocation-plans/north-west-region-allocation-plan/la-grange-groundwater-allocation-plan> p 29 (Table 6).
[73] Ibid.
[74] Derby Plan, p 35.

identified in the Derby Plan so they are not transparent. Further, there is no sense of the timeline involved; for example, will more frequent evaluation happen if a trigger is reached, and how quickly will a response be mounted?

We also note that all of these objectives have cultural elements. Therefore, evaluation and monitoring (and determining the response) must also include direct involvement of Traditional Owners to assess the impact on cultural values and significant cultural places.

We also have an overarching concern about how adaptive management can operate without a plan to increase the amount of baseline data. We note that Appendix A states, in the context of selecting the best method to set the allocation limits:

> 'The department does not have an ongoing and detailed groundwater monitoring program in Derby because of the relatively low use of groundwater (compared with other areas of the state). As a result, we do not have available to us the extensive data needed to support quantitative methods for setting allocation limits, such as a numerical model.'[75]

It is difficult to use adaptive management techniques without sufficient data. Therefore, it is vital to commit to research to increase the amount of baseline data in the Derby groundwater area. As part of the Derby Plan, the WA Government must commit to gathering more extensive data to determine sustainable allocation limits. The lack of baseline data also contributes to the lack of transparency in relation to evaluation processes in the Derby Plan. As noted in the section on evaluation, the evaluation statement will include the allocation status for each resource and how the Department is managing the resource using the performance indicators to meet the Derby Plan's objectives. However, without numerical models the evaluation criteria are always going to be vague as it is not quantitative/numerical.

Monitoring and metering are a fundamental part of adaptive management and both are inadequate in the Derby Plan. Meters should be required on all bores and telemetry should be used for automatic data collection. Telemetry should be supplemented by spot checks by duly qualified compliance officers (to check for meter tampering, for example). Furthermore, the current monitoring bore network is not comprehensive, and the Derby Plan indicates an over reliance on data collected from existing user bores (rather than a strategically planned monitoring network). This poses a conflict of interest and undermines confidence in the Derby Plan. Further, it seems to rely on self-reporting[76] which may not be accurate. Without accurate monitoring and metering it is impossible to achieve a system with adequate compliance and enforcement mechanisms (reasonable likelihood of being identified of not being in compliance with extraction rules and sufficiently large consequences associated with failures to comply with the rules).

[75] Derby Plan, p 50.
[76] For example, Derby Plan, pp 22 and 34.

Recommendation 32: The Derby Plan must contain more specific details about the time intervals for when evaluations will take place, what sort of evaluation will be undertaken and how the information about that evaluation will be made public so that the information is transparent.

Recommendation 33: The criteria for evaluating and monitoring objectives and associated responses must be more specific and transparent.

Recommendation 34: Evaluation and monitoring (and determining the response) must include direct involvement of Traditional Owners to assess the impact on cultural values, significant cultural places, heritage and native title rights and interests.

Recommendation 35: As part of the Derby Plan, the WA Government must commit to research to increase the amount of baseline data in the Derby groundwater area. The aim of this exercise should be to gather the extensive data needed to support a more robust method for setting allocation limits.

Recommendation 36: Telemetering of all bores must be mandatory and supported by adequate compliance and enforcement mechanisms. Outlier analysis of telemetered data should also occur.

d. Water licences

The rules for allocating water licences are not made clear in the Derby Plan. The water licensing approach is set out in section 4.3 (pp. 27-28) and is limited to outlining relatively vague rules relating to managing the seawater interface and managing three particular management zones. While we support managing these issues, and areas, this section does not provide a high level of detail. We note there is also some local licensing policies in section 4.4 and we support some of the additional rules identified there, particularly relating to the Munkajarra, May River and Derby Town Commanage management zones. However, we do note the reliance on operating strategies (where licence conditions cannot satisfactorily address all water resource management issues) and self-monitored reporting (the risks of which we discussed above). We also note that cl 7(2) of Sch 1 of the RiWI Act provides matters which the Minister can consider in granting or refusing a licence, but these are very broad and there is no context for how these factors should be weighed up.

Best practice water allocation should also limit abstractions on an annual basis depending on recharge, surface flows and other factors. Thus, water licences should be expressed in nominal volumes with the possibility that permitted annual extractions fall between 0 and 100% of that nominal volume depending on water availability (and other relevant factors). Further, the methodology for setting annual allocations must be transparent and evidence based as this provides confidence in the system. This sort of seasonal management is necessary to ensure extractions reflect climatic conditions and,

in turn, that Aboriginal values and public good values are achieved first. As a related point, allocations at less than the nominal water allocations should not require compensation to be paid to water licence holders. Furthermore, and as per the National Water Initiative, compensation should not be paid if allocations are reduced due to climate change.

All extractions must be managed to minimise adverse impacts, within clearly agreed and transparent rules that minimise impacts. To reduce the risks of such adverse impacts, there should be strict pumping rules, annual licence reviews, accurate meters and effective compliance measures (such as licensees' penalties and spot checks).

We also note that more generally in WA the conditions put on water licences are not publicly available which makes it difficult for the public to understand water licencing. This information should be made public.

Recommendation 37: The Derby Plan must outline clear licensing rules that are specific to the circumstances of the Derby groundwater region.

Recommendation 38: Annual individual water allocations of between 0 and 100 percent for individual licences are required to take into account seasonal variability in water availability. The method for determining annual allocations must be codified, documented and completely transparent.

Recommendation 39: All extractions must be managed to minimise adverse impacts, within clearly agreed and transparent limits, on flows, particularly in seasons of low in-flows in the catchment. To reduce the risks of such adverse impacts, there should be strict pumping rules, annual licence reviews, accurate metering and effective compliance measures (such as regular on-ground auditing and licensees' penalties).

Recommendation 40: The WA Government must make licence conditions publicly available.

Recommendation 41: The WA Government must place a moratorium on additional water abstractions in the Derby Plan area until new governance processes are established [with the exception of moving some existing water licences away from the coast, in order to reduce seawater intrusion].

8. Conclusion

We would welcome the opportunity to meet with the WA Government on any of the issues raised in these submissions. We are keen to work with the WA Government to further discuss the scope of additional research required in relation to the Derby Plan, and continuing involvement of the author organisations of this collaborative submission in the planning process.