SWEETWATER AGRICULTURAL DEVELOPMENT STAGE 1

Environmental Referral Report Support Document

Prepared for and on behalf of

Southern Cross Agri Pty Ltd
Level 12, 12 Eagle Street
BRISBANE QLD 4000

by

Kimberley Boab Consulting Pty Ltd t/as Cygnium
ABN 74 610 412 836
E: cygnium@cygnium.com.au
T: 0411 717 570

Disclaimer and Limitation

Document Control

Date	Version	Reviewed / endorsed by
4 October 2024	DRAFT A	For client review
7 October 2024	DRAFT B	For client review
9 October 2024	DRAFT C	For client review
16 May 2025	DRAFT D	For client review
2 July 2025	FINAL	For client review, endorsement and submission
14 July 2025	FINAL	For submission

This document has been prepared to address the referral requirements of the *Environment Protection Act 2019* (NT), the Environment Protection and *Biodiversity Conservation Act 1999* (Cwth) and the *Pastoral Land Act 1992* (NT) and to supplement referral applications lodged with the relevant regulators of these Acts.

Proponent Details Summary

Name of proponent	Southern Cross Agri Pty Ltd (SCA) (a wholly owned subsidiary of AAM Investment Group Pty Ltd)
Proponent representative 1	**Garry Edwards** Director, Southern Cross Agri Pty Ltd compliance@aamig.com.au 07 3153 8830
Proponent representative 2	**Tim Gallagher** Director, Southern Cross Agri Pty Ltd compliance@aamig.com.au 07 3153 8830
Physical address	Level 12, 1 Eagle Street, Brisbane, Qld, 4000
Postal address	GPO Box 352, Brisbane, Qld, 4001
ABN	67 605 335 368
ACN	605 335 368
Email addresses for notices	compliance@aamig.com.au Andrew.mccarron@aamig.com.au

Table of contents

PROPONENT DETAILS SUMMARY **4**
Table of contents 5
Figures 7
Tables 8
Acronyms and abbreviations used 9

1. SWEETWATER PROJECT SUMMARY **10**

2. SWEETWATER STAGE 1 OVERVIEW **19**

2.1. Sweetwater Stage 1 – Environmental Referrals **19**
2.1.1 Key components of proposal 19
2.1.2 Preliminary farm design 20
2.1.3 Future irrigated agriculture 23

2.2. Sweetwater Stages 2 and 3 ..... **23**

2.3. Proposal alternatives **25**

3. STATUTORY CONTEXT **26**

3.1. Environment Protection Act 2019* (NT) and *Environment Protection Regulations 2020 ..... **27**
3.1.1 Overview of requirements 27
3.1.2 Application of the principles of environment protection and management 27

3.2. *Environment Protection and Biodiversity Conservation Act 1999* (Cwth) **28**

3.3. *Planning Act 1999* (NT) **28**

3.4. *Pastoral Land Act 1992* (NT) **28**

3.5. NT Planning Scheme Land Clearing Guidelines **29**

3.6. *Northern Territory Aboriginal Sacred Sites Act 1989* (NT) **29**

3.7. *Water Act 1992* (NT) **29**

3.8. *Rights in Water and Irrigation Act 1914* (WA) **29**

3.9. Greenhouse Gas Emissions **29**

3.10. Other statutory considerations **29**

4. STAKEHOLDER CONSULTATION AND ENGAGEMENT **30**

4.1. First Nations Engagement **30**

4.2. Other Stakeholder Engagement **31**

5. ENVIRONMENTAL FACTORS – LAND **32**

5.1. Landforms **33**

5.2. Terrestrial Environmental Quality 37

5.3. Terrestrial Ecosystems 43
5.3.1 Terrestrial flora 46
5.3.2 Vegetation types, structures and condition 46
5.3.3 Terrestrial Fauna 49

6. ENVIRONMENTAL FACTORS – WATER 53

6.1. Hydrological Processes 53
6.1.1 Surface Water Resources 54
6.1.2 Flooding and Surface Drainage 56
6.1.3 Groundwater 59

6.2. Inland Water Environmental Quality 62

7. ENVIRONMENTAL FACTORS – AIR 65

7.1. Air Quality 65

7.2. Atmospheric Processes 65

8. ENVIRONMENTAL FACTORS – SEA 65

9. ENVIRONMENTAL FACTORS – PEOPLE 66

9.1. Community and Economy 66

9.2. Culture and Heritage 67

9.3. Human Health 67

10. CUMULATIVE IMPACTS 68

11. DRAFT TERMS OF REFERENCE – NT EPA ENVIRONMENTAL IMPACT ASSESSMENT 68

12. STATEMENT OF REASONS 68

13. EPBC ACT 1999 REFERRAL 69

13.1. Matters of National Environmental Significance 69

13.2. Flora and Fauna MNES 70

13.3. Heritage MNES 75

13.4. Wetlands 75

13.5. Hydrology 75

13.6. Impacts and Mitigation 75

13.7. Impact Summary 75

13.8. Alternatives 76

14. PASTORAL LAND CLEARING APPROVAL 77

15. BIBLIOGRAPHY 78

16. LIST OF ATTACHMENTS 82

ATTACHMENT A – Sweetwater Stage 1 Shapefiles 82

ATTACHMENT B – Proof of Tenure 82

ATTACHMENT C – Draft Terms of Reference – Sweetwater Stage 1 82

ATTACHMENT D – Statement of Reasons – Sweetwater Stage 1 82

ATTACHMENT E – EPBC Act Protected Matters Report – Sweetwater Stage 1 82

ATTACHMENT F – Sweetwater Stage 1 National MNES Distribution Mapping 82

ATTACHMENT G – Sweetwater Typhonium Survey 2025 82

Figures

FIGURE 1. SWEETWATER REGIONAL LOCATION 16
FIGURE 2. SWEETWATER STAGE 1 PRELIMINARY LAYOUT 17
FIGURE 3. SWEETWATER STAGE 1 PROXIMITY TO NATIONAL PARK AND CONSERVATION AREAS 18
FIGURE 4. PRELIMINARY FARM DESIGN - STAGE 1 21
FIGURE 5. SWEETWATER STAGE 1 Q10 FLOOD RISK 22
FIGURE 6. SWEETWATER - ALL STAGES 24
FIGURE 7. NT APPROVALS FRAMEWORK - SWEETWATER PROJECT 26
FIGURE 8. SWEETWATER STAGE 1 TOPOGRAPHY 34
FIGURE 9. ROCK OUTCROPS (SPIRIT HILLS EXCLUDED) 35
FIGURE 10. LAND FORMATION - SWEETWATER STAGE 1 36
FIGURE 11. SOIL TYPES 39
FIGURE 12. SOIL DEPTH 40
FIGURE 13. SOIL DRAINAGE 41
FIGURE 14. LAND CAPABILITY CLASS 42
FIGURE 15. KEEP RIVER SITE OF CONSERVATION SIGNIFICANCE 45
FIGURE 16. VEGETATION DESCRIPTIONS 47
FIGURE 17. STAGE 1 VEGETATION STRUCTURE 48
FIGURE 18. KEEP RIVER POOLS AND EXTENT OF TIDAL INFLUENCE 55
FIGURE 19. WATER INUNDATION DEPTH MODELLED FOR Q5 AND Q10 EVENT SCENARIOS 56
FIGURE 20. FLOOD CLASS 57
FIGURE 21. DRAINAGE CLASS 58
FIGURE 22. SOIL SALINITY RISK, INFORMED BY DEPTH TO GROUNDWATER 59
FIGURE 23. EXISTING GROUNDWATER MONITORING BORE NETWORK 61
FIGURE 24. EPBC ACT PROJECT MATTERS SEARCH TOOL - MAPPING AREA 69

Tables

TABLE 1. PROJECT DETAILS 11
TABLE 2. PROJECT SUMMARY 12
TABLE 3. KEY COMPONENTS OF SWEETWATER STAGE 1 PROPOSAL 19
TABLE 4. PRE-2019 SOIL AND LAND RESOURCE ASSESSMENTS WITHIN THE ORD, WEABER AND KEEP PLAINS AREA 32
TABLE 5. LAND CAPABILITY CLASSIFICATIONS 37
TABLE 6. AREAS OF LAND CAPABILITY CLASSES ON SWEETWATER STAGE 1 38
TABLE 7. RELEVANT TERRESTRIAL BIODIVERSITY STUDIES 44
TABLE 8. TPWC ACT AND EPBC-LISTED TERRESTRIAL FAUNA SPECIES WHICH MAY BE PRESENT ON SWEETWATER STAGE 1 ±10KM 50
TABLE 9. NEW ASSESSMENTS REVIEWED BY SHORT ET AL (2019) 53
TABLE 10. TPWC AND EPBC ACT-LISTED AQUATIC SPECIES KNOWN TO BE PRESENT IN THE KEEP RIVER 62
TABLE 11. RELEVANT AQUATIC FAUNA STUDIES 63
TABLE 12. SUMMARY - MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE 69
TABLE 13. MNES-LISTED SPECIES KNOWN, LIKELY OR MAY OCCUR IN PROPOSAL AREA 71

Acronyms and abbreviations used

AAPA	Aboriginal Affairs Planning Authority
AEM	Airborne Electromagnetic
ANZECC	Australian and New Zealand Environment and Conservation Council
APM	Animal Plant Mineral Pty Ltd
ASS	Acid Sulfate Soils
CSIRO	Commonwealth Scientific Industrial Research Organisation
Cth	Commonwealth
DAWE	(Former) Department of Agriculture, Water and the Environment
DCCEEW	Department of Climate Change, Environment, Energy and Water (Commonwealth)
DEPWS	Department of Environment, Parks and Water Security
DIPL	Department of Infrastructure, Planning and Logistics
DITT	Department of Industry, Tourism and Trade
DPIRD	Department of Primary Industries and Regional Development (WA)
EC	Electrical Conductivity
ECD	Ecological Character Description
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
EMP	Environmental Management Plan
EP Act	*Environmental Protection Act 2019* (NT)
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cth)
ESD	Ecologically Sustainable Development
FullCAM	Full Carbon Accounting Model
GA	Geoscience Australia
GHG	Greenhouse Gas
ha	Hectare(s)
IBRA	Interim Biogeographic Regionalisation of Australia
ILUA	Indigenous Land Use Agreement
KBR	Kellogg Brown Root
km	Kilometre(s)
LCA	Land Capability Assessment
MJA	Marsden Jacobs Associates
MNES	Matter(s) of National Environmental Significance
MG	Miriuwung and Gajerrong (peoples)
MG Corporation	Yawoorroong Miriuwung Gajerrong Yirrgeb Noong Dawang Aboriginal Corporation
NAIF	Northern Australia Infrastructure Facility
NGER Act	*National Greenhouse and Energy Reporting Act 2007* (Cth)
NPUP	Non-Pastoral Use Permit
NT	Northern Territory
NT EPA	Northern Territory Environment Protection Authority
NTG	Northern Territory Government
NTLC	Northern Territory Land Corporation
ORIA	Ord River Irrigation Area
PBC	Prescribed Body Corporate
PEC	Priority Ecological Community
PLB	Pastoral Land Board
PLC	Pastoral Land Clearing
PMST	Protected Matters Search Tool
PPL1200	Spirit Hills Perpetual Pastoral Lease 1200
PWA	Power Water Authority
SCA	Southern Cross Agri Pty Ltd
SoR	Statement of Reasons
TEC	Threatened Ecological Community
TEQ	Terrestrial Environmental Quality
TO	Traditional Owner
ToR	Terms of Reference
TPWC Act	*Territory Parks and Wildlife Conservation Act 1976* (NT)
VT	Vegetation Type
WA	Western Australia
VB	Victoria Bonaparte
WoNS	Weed of National Significance
WRM	Wetland Research and Management

1. Sweetwater Project Summary

In 2019, following decades of consideration of expansion opportunities for irrigated agricultural cropping into the Keep River area from the nearby Ord River Irrigation Area (ORIA), the Northern Territory Government (NTG) released *A Feasibility Assessment of Irrigated Agriculture on the Keep River Plains* (DENR, 2019).

The review assessed agricultural feasibility across various portions of the Spirit Hills pastoral lease, and was informed by the Australian Government's preliminary assessment of Ord Stage 3 completed in 2014, and subsequent additional geophysical data gathering and risk assessments.

Following this review, the NTG released the Spirit Hills development to public tender in 2020. Through this process, AAM Investment Group (AAM) secured the right to develop agriculture on Spirit Hills and subsequently nominated one of its direct subsidiary entities, Southern Cross Agri Pty Ltd (SCA), to be the proponent for the project on the subject land. AAM, through its Pastoral Development Trust, also holds the lease on the adjacent Legune Station.

SCA has established a three-stage development plan for the Spirit Hills lease area. The name 'Sweetwater' is taken from historic naming of a local area on Spirit Hills Station.

Sweetwater Stage 1, the subject of this referral, comprises the development of 3,269.37 hectares for farms and supporting infrastructure such as tracks and crossings, within a total proposed envelope of 4,524.52 hectares.

This referral document has been prepared to support applications to the Northern Territory Environment Protection Authority (NT EPA) for a proponent-referred Environmental Impact Statement (EIS); the NT Pastoral Land Board (PLB) for a permit to clear native vegetation (clearing permit) and to the Commonwealth Minister for the Environment for approval under the *Environment Protection and Biodiversity Conservation Act 1999*. The singular referral summary document and the supporting draft Terms of Reference (submitted under the requirements of the *NT Environment Protection Act 2019*) have been designed to comprehensively address the intersecting requirements of the multiple environmental protection statutes relevant to the proposal. This allows for consistency and for streamlined administrative processing.

This document has been prepared to support the environmental assessment process for Stage 1 of the Sweetwater Agricultural Development only. The scope of the development is initially for dryland agricultural cropping, with possible on-farm rainfall retention and no external irrigation supply in its initial development. The option for augmenting water supply with irrigation supplied from the Ord system (Lake Argyle and Lake Kununurra, via supporting infrastructure including the M1 and M2 channels system) will continue to be investigated and negotiated over time. Should supplemented irrigation proceed in the future, relevant approvals will be secured at that time.

An overview of the scale and location of Sweetwater Stages 2 and 3 is presented in section 2.2 for future outlook purposes only. Stages 2 and 3 are not the subject of this referral as they will likely be conditional on the successful delivery of the proposed Stage 1.[1]

Table 1 provides the project details. Table 2 gives a summary and general layout of the Stage 1 proposed development. These are supplemented by the regional location plan in Figure 1, and the layout of Stage 1, including envelope and development footprint areas, in Figure 2. For regional ecological context, Figure 3 illustrates the scale and proximity of the proposal area to nearby proposed and approved Conservation Reserves and the existing boundary of the Keep River National Park.

[1] Shapefiles are provided in GDA94 datum [Attachment A] for the Sweetwater Stage 1 proposal which is the subject of this referral, and the expected (future) development envelopes for Stages 2 and 3.

The anticipated approvals and development timeline is as follows:

Development timeline (Calendar Year)

Q3 2025	Lodge NT EPA and EPBC Referrals.
Q3 2025	NT EPA EIS Terms of Reference agreed. *EPBC Act* level of assessment determined. Public comment period/s commence. NT PLB approval processes continue. Engage relevant specialist expertise to meet regulator requirements.
Q1 2026	Lodge EIS documentation.
Q3 2026	NT EPA and DCCEEW assessments finalised and approvals received including conditions.
Q1 2027	Commence clearing and development.
2027-2028 (or earlier)	Commence dryland farming.

Table 1. Project Details

NT EPA Requirement	Response
Name of proposal	Sweetwater Agricultural Development – Stage 1
Project summary Provide a brief summary (one or two paragraphs) of the proposal including the activity type/ industry/ duration.	The Sweetwater Agricultural Development Stage 1 proposal involves the clearing and development of a proposed minimum of 3,269.37 hectares of land for cropping and associated farm infrastructure, on NT Portion 1584 and a small component of Portion 3221 of Spirit Hills Pastoral Lease in the Keep River catchment of the Northern Territory. An overall Stage 1 development envelope of 4,524.52 hectares encompasses the farm and infrastructure components, buffer zones, and allows for on-site farm layout adaptability within the parameters of any approvals received. The Stage 1 development will commence upon receipt of all required approvals, with the intention that dryland, or non-irrigated farming can begin in or before 2028. Selected crops including but not limited to corn, cotton, sorghum, chickpeas, mung beans and other grain legumes and cereals will be grown in various rotations in this permanent agricultural development. Future extensions (which are not the subject of this referral) include an additional 24,685 hectares of development envelopes across the proposed Sweetwater Stages 2 and 3. It is anticipated that irrigation options will be investigated and developed for Stages 1, 2 and 3 at an appropriate time based on the finalisation of an already proposed inter-governmental agreement and investigations on water supply alternatives currently being undertaken by the NT Government.
Location details	The proposed Sweetwater Agricultural Development will be undertaken on a portion of Spirit Hills pastoral lease. Specifically, the lots below will be directly impacted:
a) street address, suburb	Spirit Hills Pastoral Lease, Legune Road, Baines, Northern Territory.
b) tenement, lot/section numbers, town/hundred, NT Portion or pastoral lease numbers, as applicable	NT Portion 1584 NT Portion 3221
c) the nearest town, recognisable feature, and distance and direction from that town/feature to the site of the proposed action.	NT-WA Border (western boundary of development envelope). Kununurra, WA, approximately 60km by road south-west of Stage 1.
Local Government Area	Victoria-Daly Regional Council
Land tenure	Sublease under *Pastoral Land Act 1992* on Spirit Hills PPL1200, supported by a proposed Pastural Land Clearing and Non-Pastoral Use Permit for primary production activities.

NT EPA Requirement	Response
Legal access	Legal access is via a sublease between Northern Territory Land Corporation and Southern Cross Agri Pty Ltd (ACN 605 335 368) over part of pastoral lease 1200 – being NT Portions 1584 and 3221 for a 99 year term (expiring 2123).
Zoning under NT Planning Scheme	Unzoned
Distance to closest human sensitive receptor (eg Indigenous community)	Kneebone Community Outstation – approximately 10km east of Stage 1 (not permanently occupied). Marralum Community Outstation – approximately 20km east of Stage 1 (not permanently occupied). Kununurra – 60km southwest of Stage 1.
Current land use	Pastoral lease
Proposed end use of site	Agricultural cropping, consistent with the adjacent Ord River Irrigation Area and production activities currently undertaken and proposed for the adjoining Legune Station pastoral lease.

Table 2. Project Summary

NT EPA Requirement	Response
Publication statement	Referral documentation prepared by – Dr Debra Pearce, Bachelor of Science (Population, Resources and Technology); Master of Arts (Ecologically Sustainable Development); Doctor of Philosophy (Agriculture); Integrated Management Systems Lead Auditor; Graduate Australian Institute of Company Directors; Member Environmental Institute Australia and New Zealand; Member Environmental Consultants Association (WA). Mr Brendan Griffiths, Bachelor of Business; Diploma of Market Research; Graduate Certificate in Rural Science; Master of Agriculture; PhD Candidate (Agriculture). Mr Andrew McCarron, Bachelor of Applied Science (Systems Agriculture).
Executive summary	The Sweetwater Agricultural Development Stage 1 proposal involves a land improvement project that incorporates the clearing and development of a minimum of 3,269.37 hectares of land for cropping and intensive agricultural production and associated farm infrastructure, on a small portion of the Spirit Hills pastoral lease in the Keep River catchment of the Northern Territory. An overall Stage 1 development envelope of 4,524.52 hectares encompasses the farm and infrastructure components, buffer zones, and allows for on-site farm layout adaptability within the parameters of any approvals received. The Stage 1 development will commence upon receipt of all required approvals, with the intention that dryland, or non-irrigated farming can begin in 2028 (if not before). Selected crops including corn, cotton, sorghum, chickpeas, mung beans and other grain legumes and cereals will be grown in various rotations in this permanent agricultural development. Future extensions (not the subject of this referral) include an additional 24,685 hectares of proposed development envelopes across Sweetwater Stages 2 and 3. It is anticipated that irrigation options will be investigated and developed for Stages 1, 2 and 3 at an appropriate time, and the appropriate approvals sought accordingly. Impact areas are summarised below. These will be further assessed and quantified in the environmental impact assessment process and documented in the Environmental Impact Statement to be prepared following this referral. This process will assist in determining the significance of impacts associated with: • Clearing and development of a minimum of 3,269.37 hectares of land for agriculture and related infrastructure • Soils and soil quality, including erosion risk and other soil property changes • Loss of habitat for listed migratory bird species • Loss of habitat for other terrestrial species • Flora changes, including removal of vegetation, and impacts on the condition of remaining vegetation • Flood risk and hydrodynamic changes due to landscape change • Quality and volume of natural groundwater flow to the Keep River, arising from clearing and development

NT EPA Requirement	Response
	• Potential impact on water quality in wet season (stormwater) runoff to Knox and Border Creeks and the Keep River • Potential impact on listed aquatic fauna species in the Keep River • Greenhouse gas emissions arising from clearing, development and farming activities • Cumulative impacts associated with the expansion of agriculture in the nearby Ord River Irrigation Area • Indigenous values and cultural heritage in the proposal area • Social and community values, including recreational (especially Keep River fishing downstream) values • Nearby conservation areas, including the Keep River National Park. These matters will be assessed in the EIS.
Introduction	Southern Cross Agri Pty Ltd (SCA), a wholly owned subsidiary of AAM Investment Group Pty Ltd (hereby referred to as AAM), is the proponent entity for the development of the Northern Agricultural Development area proposed by the NT Land Corporation in the Northern Territory. In 2021, AAM submitted a successful Expression of Interest for the NT Land Corporation's (NTLC's) now named 'Northern Agricultural Development' project, which comprised a minimum of 67,500ha. The vision espoused by the NTLC, supported by the NT Government, was for a "thriving agricultural precinct providing exciting investment opportunities for emerging agribusiness in northern Australia." The development was created to "consolidate the region's already strong reputation as a premium quality food producer [enhancing] the development of sustainable industries in the region whilst developing regional and remote economies and creating training, employment and business opportunities" (NTLC, 2020). It is within this vision and context that SCA proposes the Sweetwater Agricultural Development on the nominated portion of the Spirit Hills pastoral lease. The Stage 1 of the Sweetwater development, comprising a proposed minimum of 3,269.37 hectares of farmland for cropping and intensive agriculture, will commence upon receipt of the required approvals, with the intention that dryland (or non-irrigated) farming activities can begin in or before 2028. Broadacre crops including, but not limited to, corn, cotton, sorghum, chickpeas and mung beans will be grown in various rotations in this permanent agricultural development. Stages 2 and 3 of the Sweetwater Project, which are not the subject of this referral, are in planning, and will be referred to regulators at a later date. The proposed farming areas adjoin the existing Ord Stage 2, and have been envisioned over recent decades, supported by multiple historic and ongoing ecological assessments in addition to those relating to land use capability. Future irrigation supply can be sourced from Lake Argyle via the Ord irrigation system, subject to negotiations with the WA water regulator and the managers of current water transfer infrastructure. The Sweetwater Agricultural Development planning and proposed future environmental impact monitoring are informed by vast and detailed current and historical studies monitoring activities in the region in relation to general biodiversity, aquatic fauna, birdlife, wetland impacts, groundwater and surface water management, and soil quality maintenance. The avoidance hierarchy and principles of ecological sustainable development have been applied in the project planning. SCA refers Sweetwater Stage 1 to the Northern Territory Environment Protection Authority (NT EPA) for assessment as a proponent-initiated Environmental Impact Statement (EIS) under the *Environment Protection Act 2019* (NT). Concurrently, the proposal is referred for Australian Government assessment under the *Environment Protection and Biodiversity Conservation Act 1999* (Cth). It is anticipated that assessment will be completed by the NT regulator under the bilateral agreement between the Commonwealth and the NT which enables a singular, streamlined assessment process.
Proposal description - Key components	Proposal spatial data is provided in Attachment A. The proposed Sweetwater Stage 1 development will be located on NT Portions 3221 and 1584, which form part of the Spirit Hills Perpetual Pastoral Lease No.1200 (PPL1200).
Project description	A key components summary is provided in Table 3.

NT EPA Requirement	Response
	The Sweetwater Stage 1 development will establish at least 3,269.37 hectares of farms for broadacre food and fibre production. The farm lots will be supplemented by supporting infrastructure including levee banks and drainage networks, unsealed on-farm tracks, crossings and roads, on-site farm sheds and worker accommodation facilities, and associated infrastructure. The land will be cleared and stick-raked, surveyed and prepared for initial levelling. Laser buckets are intended to be used to ensure that each field is designed to maximise farming efficiency and yield. Property design plans will include water capture and reuse facilities wherever possible, to maximise rainwater use efficiency, minimise any off-site impacts from farm runoff, and to prepare for potential future irrigation activities. All infrastructure will be designed and constructed with consideration of sustainable resources and technology – for example, solar power and satellite connectivity – which will also likely be adopted to ensure timely monitoring, management and reporting on any obligations arising from the Sweetwater Stage 1 environmental approvals.
Final design determination	Final farm design and infrastructure locations will be determined following the completion of the assessments outlined in the *Draft Terms of Reference for an Environmental Impact Statement*, included as Attachment C with this submission, under the requirements of the NT EPA. The Stage 1 envelope encompasses the entire development area, including the proposed farm fields, infrastructure areas and zones for exclusion due to cultural heritage sensitivities. It is expected that the final field and infrastructure layout could be amended to accommodate environmental values, topographical challenges or other factors which affect the feasibility of the farm layouts as currently proposed. Any areas within the overall envelope which are not required to be cleared will remain in their pre-development condition. However, by assessing and referring an area larger than the anticipated development footprint, SCA is ensuring that future modifications can be made within the confines of this referral. Further, it ensures that any modifications are informed by the full extent of environmental assessment work to be completed under the attached Draft *Terms of Reference* (Draft ToR).
Provide an account of past, present and reasonably foreseeable future development, operations, or industries that are related the current proposal.	The agricultural development of the Keep River and Knox Creek Plains region has been envisaged for decades, in line with the expansion of the Ord River Irrigation Area (ORIA), irrigated by Lakes Argyle and Kununurra. This region is referenced nationally due to is abundance of natural resources (underutilised fresh water and suitable land and soil types) as being the future 'food bowl of Australia and Southeast Asia'. Since 2010, the nearby ~7,500ha Goomig (or Weaber Plain) farm area has been developed and farmed, with the ~5,000ha Knox development currently under way. Both are located within the Keep River catchment, within which the proposed Sweetwater development is located. A significant number of environmental surveys and assessments, cultural heritage investigations, land capability assessments, water supply, groundwater and surface water impact assessments and biodiversity assessments have been conducted since the 1970s over this parcel of land and throughout the broader region. Additionally, native title has been determined and a multitude of historical and current cultural heritage assessments have been conducted with the knowledge that agricultural development is planned for the area. This existing detailed survey works have been essential to assist the planning and scoping of the proposed development across the Spirit Hills pastoral lease. Native title for the Spirit Hills Pastoral Lease falls under the Consent Determination by the Federal Court handed down on 31 May 2011. The Federal Court determined that non-exclusive native title is held by the members of six estate groups: Miriuwung-Nyawam Nyawam group, the Miriuwung-Bindjen group, the Gajerrong-Gurrbijim group; the Gajerrong-Djarradjarrany group, the Gajerrong-Djandumi group and the Gajerrong-Wadanybang group. The Sweetwater Stage 1 proposal is submitted in line with the expressed intention of the NT Government, through the Northern Territory Land Corporation (NTLC), to develop the Keep River area for agriculture.

NT EPA Requirement	Response
	The Australian Government's National Water Grid Fund is supporting the rigorous scientific, environmental, social and economic assessment of the irrigation supply options to the Keep River Plains area in which the Sweetwater Project is located. This is further supported by the NTG's feasibility assessment of irrigated agriculture on the Keep River Plains, completed in 2019. The Western Australian State Government and the Australian Federal Government have both supported the construction of the Kimberley Cotton Company's Kununurra cotton gin, with statutory approvals facilitation, grants and a Northern Australia Infrastructure Facility (NAIF) loan underwriting the establishment of local cotton processing. This enabling infrastructure provides the opportunity for commercially viable agricultural expansion in the region based around a core rotation crop in cotton. This project therefore aligns with the strategic intent of both the NT and Australian Governments in relation to sustainable development of food and fibre production and water management systems in Northern Australia. This is a long-term (100 year plus) food and fibre proposal with no foreseeable decommissioning plans. Should decommissioning be required in the future, it is expected that the proponent will refer any relevant decommissioning plans to the environmental regulators at that time.
Proposal description - Location and regional context	The proposed Sweetwater Agricultural Development is located in the Baines area of the Victoria-Daly Regional Council district, in the north-western corner of the Northern Territory. Figure 1 illustrates the location to the immediate east of the Northern Territory-Western Australia border. The site adjoins the eastern extent of the Ord River Irrigation Area, being the Knox Creek Plain, currently under development for irrigated agriculture. Figure 2 illustrates the immediate locality. The nearest regional centre is Kununurra in WA, with Timber Creek in NT approximately 150 kilometres south-east of the site. The closest occupied facilities are at Legune Station (also owned by AAM); the Kneebone outstation and Marralum to the east, which are both not permanently occupied; and farm service facilities including worker accommodation on the Knox Creek Plain. The proposal is within the Victoria-Bonaparte biogeographic region and falls within the Keep River Area Site of Conservation Significance classified by the NT and Australian Governments. Long term identification of large portions of this area for intensive and irrigated agriculture projects is noted in the relevant listing advice. Conservation Reserves and the Keep River National Park Extension area have been established within the region in parallel with the long-term discussions regarding further agricultural development, as illustrated in Figure 3. This has ensured the retention and preservation of regional conservation assets. To the west of the proposal area are the two land parcels which comprise Ord Stage 2: the Goomig (Weaber Plain) farm area, and the Knox Creek Plain farm area, both of which have active EPBC and Western Australian EPA approvals in place. The environmental matters of significance addressed through conditions in the relevant approvals applied to Ord Stage 2 are considered in this referral and are consequently reflected in the draft Terms of Reference for an Environmental Impact Statement (EIS) for the Sweetwater Stage 1 proposal. To the southwest of Sweetwater is the original Ord River Irrigation Area, supported by Lakes Argyle and Kununurra. To the east and north-east of Sweetwater is Legune Station. To the far north-east is the site of the proposed Seafarms 'Project Sea Dragon' prawn aquaculture facility. Outside of these development precincts, the land is predominantly pastoral lease, under NT and WA legislation respectively. This includes Legune Station and Carlton Hill Station, and the northern and surrounding areas of Spirit Hills leased and managed by AAM within the immediately proximity. With the exception of station and farm staff accommodation on nearby properties, and the seasonally occupied Marralum and Kneebone community outstations, there are no residential areas or townships within fifty kilometres of the Sweetwater site.

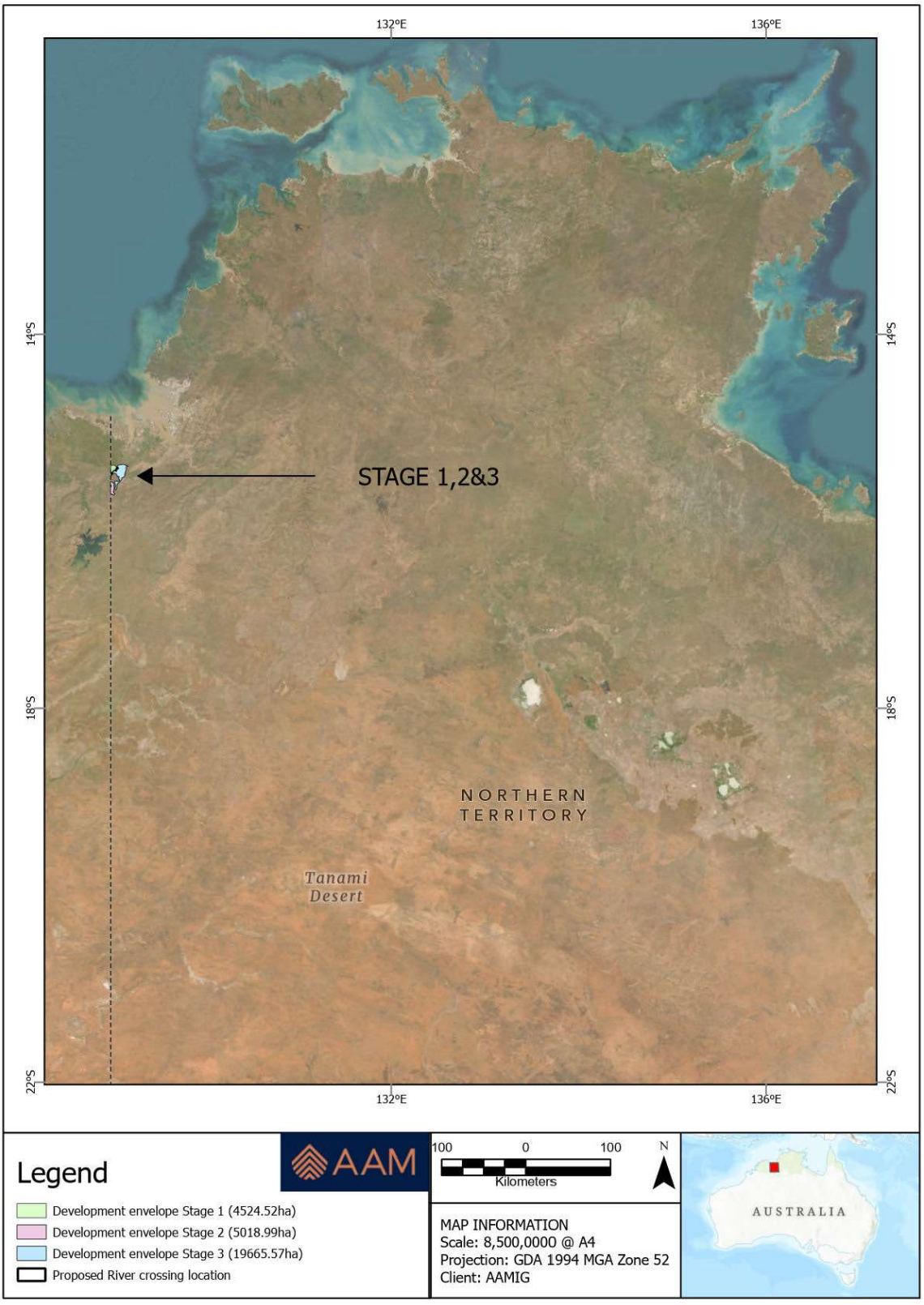


Figure 1. Sweetwater Regional Location

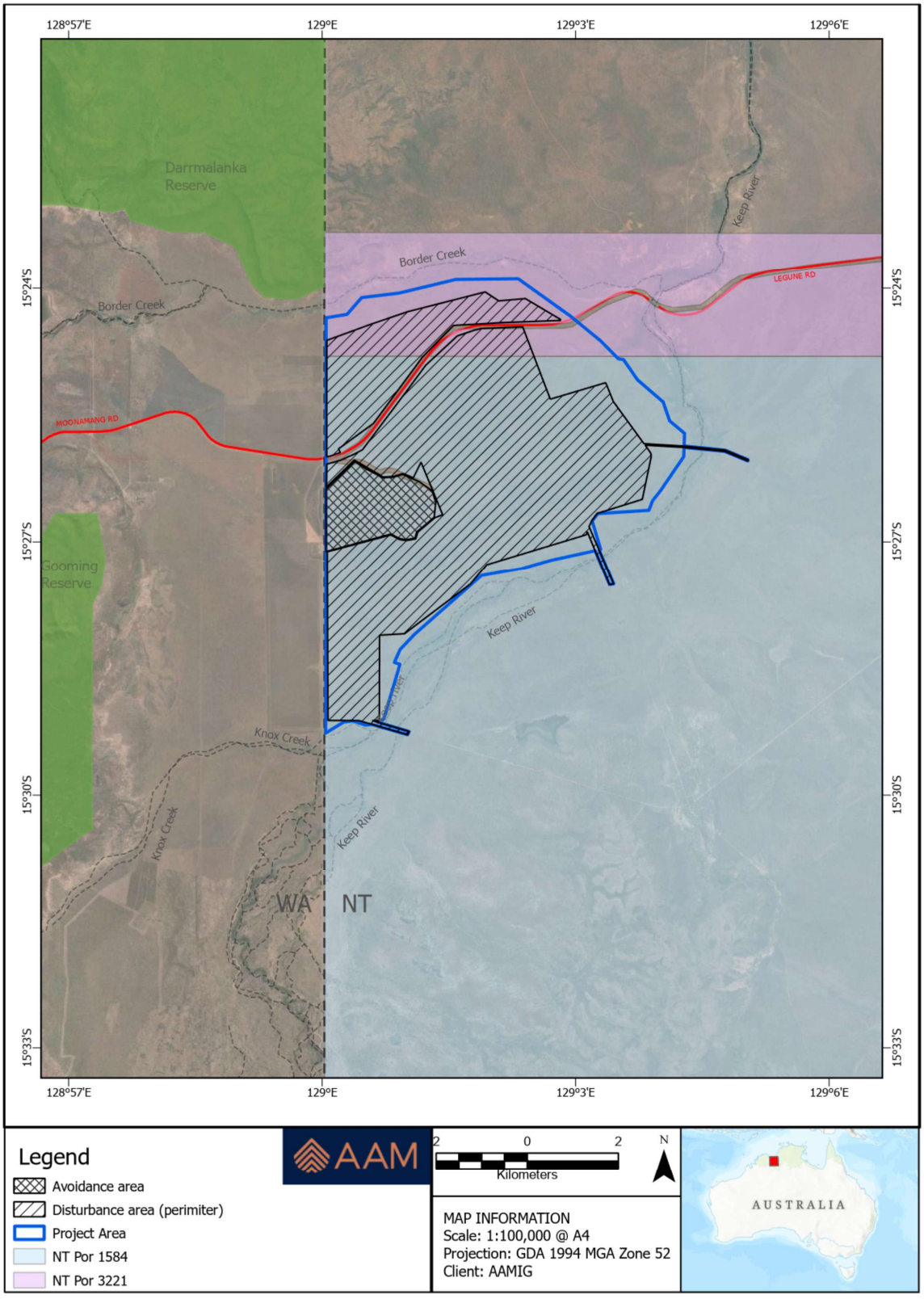


Figure 2. Sweetwater Stage 1 Preliminary Layout

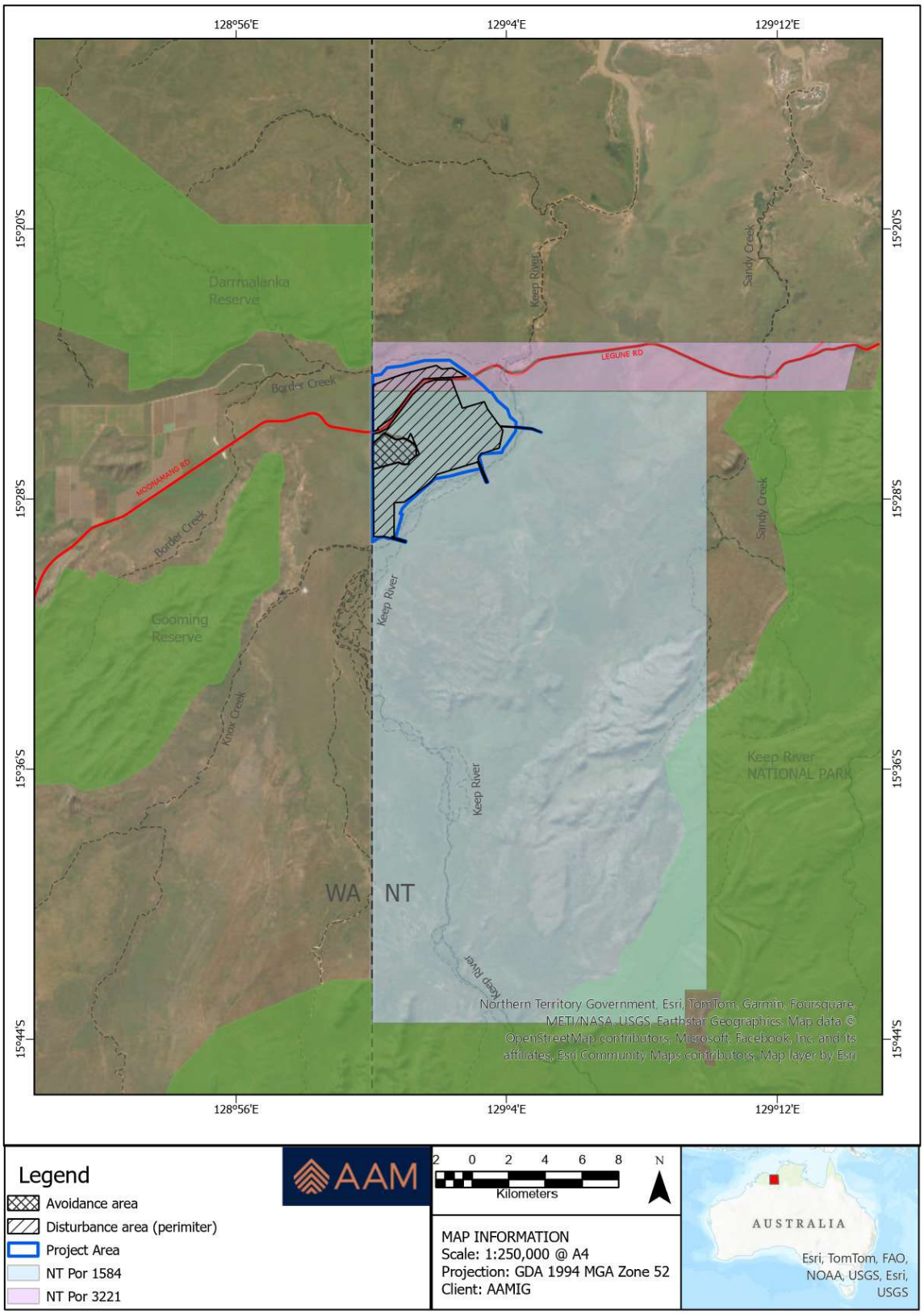


Figure 3. Sweetwater Stage 1 Proximity to National Park and Conservation Areas

2. Sweetwater Stage 1 Overview

2.1. Sweetwater Stage 1 – Environmental Referrals

Sweetwater Stage 1 is referred for Environmental Impact Assessment (EIA) in accordance with the requirements of the *Environment Protection Act 2019* (NT) (EP Act) and the *Environment Protection Regulations 2020* (EP Regulations).

The proposal is concurrently referred for Australian Government assessment under the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act).

Further, this referral document and the *Draft Terms of Reference for an EIS* (Draft ToR) (Attachment C) simultaneously seek to address the requirements of the *Pastoral Land Act 1992* (NT) in relation to a Pastural Land Clearing Permit (PLC) and a Non-pastoral Use Permit (NPUP) which will be sought for the proposal area.

The Proponent anticipates the assessment of the Sweetwater Stage 1 development will be undertaken in line with the bilateral agreement between the NTG and the Australian Government. Under the bilateral agreement the Australian Government has accredited the NTG to assess proposals on behalf of both governments. Any decisions by the Commonwealth Minister for the Environment are made independently from NTG decisions, however the assessment is administratively streamlined through the single process.

Section 13 of this document refers specifically to Matters of National Environmental Significance (MNES) listed under the EPBC Act.

Section 13 addresses the requirements of the *NT Land Clearing Guidelines* (NTG, 2021), with further consideration in the Draft ToR.

2.1.1 Key components of proposal

Key elements of the Sweetwater Stage 1 development are summarised in Table 3. SCA is referring an envelope area within which the development footprint will be located. The EIA process includes assessment of the environmental values and impacts associated with the full envelope.

Table 3. Key components of Sweetwater Stage 1 proposal

Component	Estimated extent
Clearing and development of land for agricultural cropping, including on-farm water distribution and drainage networks and unsealed farm vehicle access tracks.	3,269.37 hectares
Clearing and development of land for infrastructure, including machinery sheds, chemical storage facilities, silos and other commodity storage infrastructure, and farm workforce accommodation.	Included above
Construction of levee banks	43 kilometres 126 hectares
River crossings	17.09 hectares
On-site retention of stormwater for use in cropping	200 hectares (within farm footprint; location to be determined) 10 GL storage
Potential Keep River crossings for future (Sweetwater Stage 3) access and service provision.	Three (3) – these are existing crossings currently used to support land management activities *Note: this excludes additional crossings utilised by traditional owners on the site presently*
Retained vegetation in areas not to be developed for farms or infrastructure	1,255.15 hectares; remainder of land within Stage 1 envelope.
Cultural heritage exclusion zone within Stage 1 envelope (Spirit Hills)	314.43 hectares

2.1.2 Preliminary farm design

The preliminary farm layout is presented in Figure 4. Within the overall development envelope (black line on Figure 4), SCA will maximise the available cropping area.

Following initial review and topographical assessment, the farm layout as presented is the basis on which the investigations proposed in the Draft ToR (Attachment C) will be undertaken. As noted earlier, retention of overland flow from the fields is proposed, with locations of retention facilities to be determined following comprehensive environmental assessments including groundwater and surface water interactions.

Aboriginal cultural heritage areas have been, and will continue to be, excluded and protected from clearing and development.

Buffer recommendations in the *Land Clearing Guidelines* (NTG, 2021) will be factored into the development planning and the final proposal layout to be submitted with the *Sweetwater Stage 1 Environmental Impact Statement* which will be prepared following this initial referral.

Multiple existing river crossing locations are identified in this Stage 1 referral, and form part of the Draft ToR assessment requirements. Proposed crossing locations coincide with existing fence and track crossings predominantly utilised during the dry season through the Keep River, wherever possible. It is noted that both the Keep River and Knox Creek are ephemeral (that is, seasonally dry), with river crossings historically used for cultural and station management purposes.

To manage flood risk, the proponent will construct levee banks to manage wet season overland flows. Likely locations of levee bank release points have been identified per Figure 4, however these will be finalised following flood studies to be completed under the requirements of the Draft ToR. Supplementing Figure 4 is the Q10 flood map for the Sweetwater Stage 1 area (Figure 5), which indicates the extent to which hydrological data is guiding the proposal footprint.

The locations of farm infrastructure, including sheds, power facilities and worker accommodation are yet to be identified, but will be included in final design plans submitted with the EIS during the next stage of the environmental assessment process.

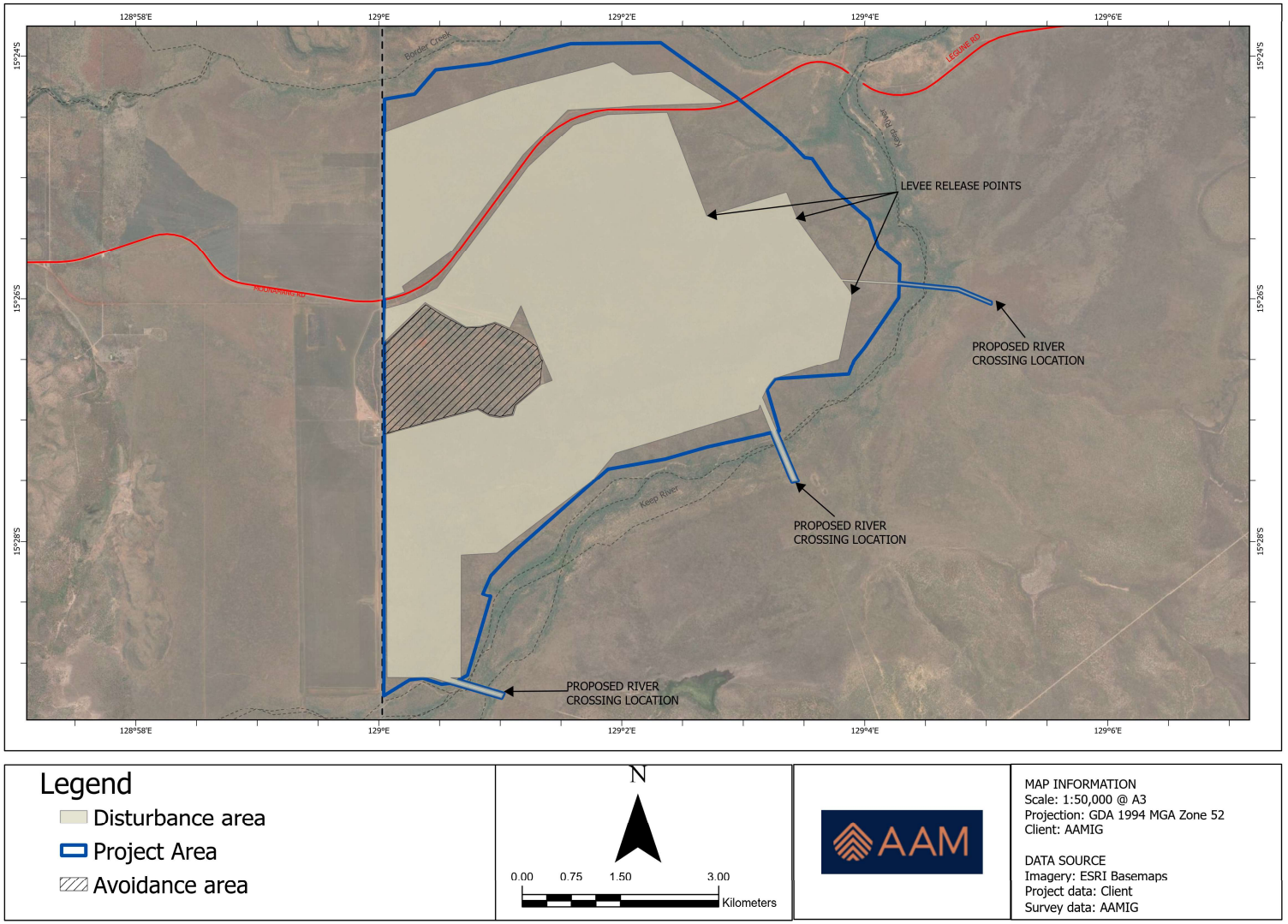


Figure 4. Preliminary Farm Design - Stage 1

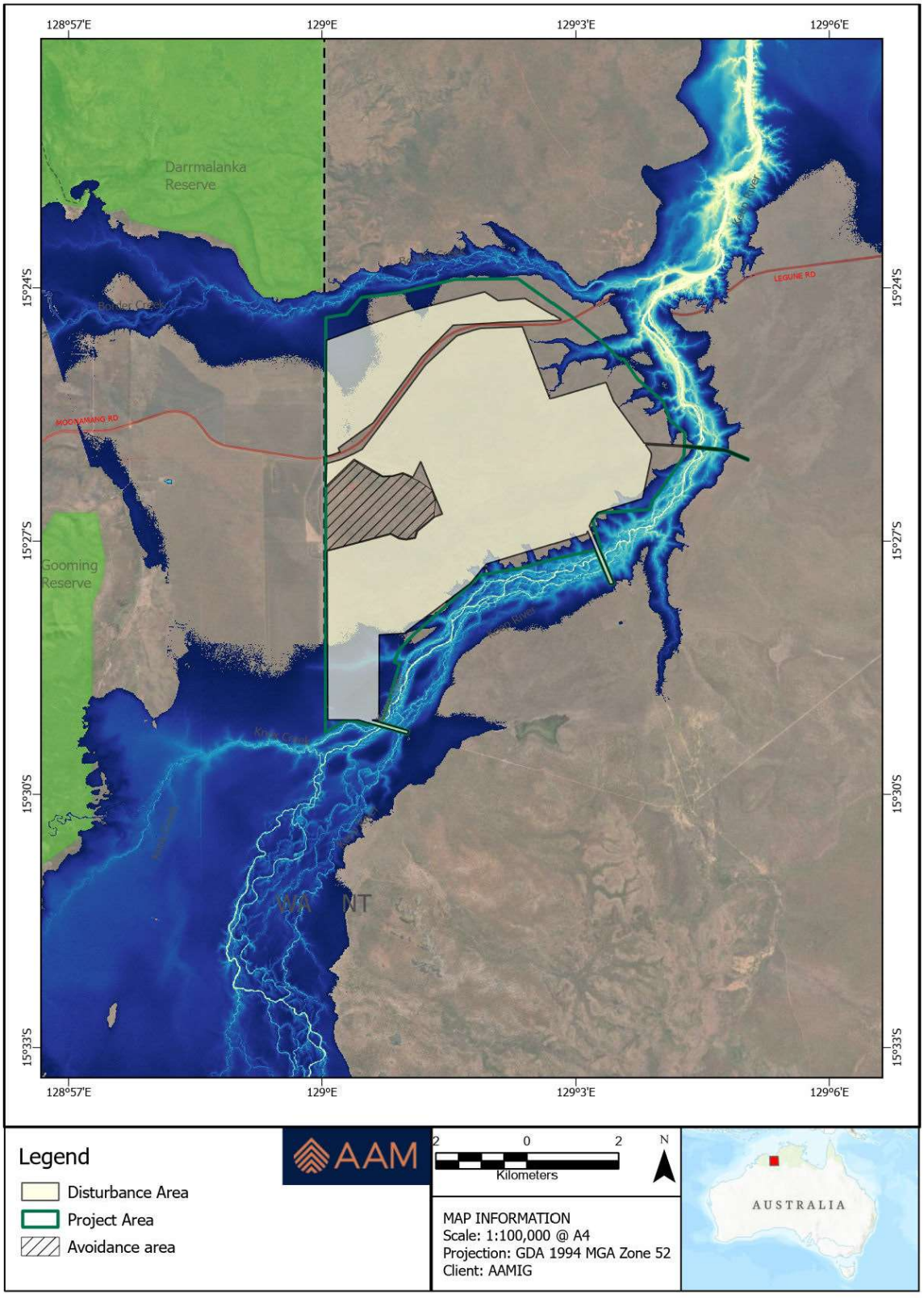


Figure 5. Sweetwater Stage 1 Q10 Flood Risk

2.1.3 Future irrigated agriculture

Initially, Sweetwater Stage 1 will be developed as a dryland (monsoonal rain fed) farming enterprise.

It is intended that this will be augmented by 10,000 megalitres (ML) of on-site water storage capacity, at location/s to be determined following hydrogeological assessment per the Draft ToR.

Annual crops may include corn, cotton, sorghum, chickpeas and other grain legumes and cereals suited to the tropical northern environment.

The site topography allows for drainage management and tailwater reticulation from the proposed storage location. Farm designs will be finalised for maximum water retention and reuse.

Irrigation opportunities for Stage 1 will be developed over time. Future irrigation across all three stages is anticipated, using surface water diverted from Lake Argyle via Ord irrigation infrastructure. Access and will be negotiated with the WA Government (through the WA Water Corporation) and private infrastructure owners and/or managers of supply infrastructure.

A licence under the *Rights in Water and Irrigation Act 1914* (WA) (RiWI Act) will be sought, noting that the *Ord Surface Water Allocation Plan* (Department of Water, 2013) nominally allocates 750 gigalitres (GL) of water per annum to the 'Main Ord' subregion, which includes the Keep River Plain in the NT.

Within that volume, there is a provision in the Ord water plan of 160GL per year for the NT portion of the original M2[2] irrigation supply area. This provision allows for a nominal minimum 10ML/ha of irrigation for approximately 14,000ha in total, with an allowance of 20GL for distribution losses, in 95% of years (Department of Water, 2013).

Consequently, there should be adequate water available to support an irrigation project if conversion from dryland to external irrigation supply occurs, subject to future licensing and supply negotiations.

2.2. Sweetwater Stages 2 and 3

Sweetwater Stages 2 and 3 envelope boundaries are illustrated in Figure 6.

Total development envelopes of 24,685 hectares are proposed, within which SCA will seek to optimise farm lots for irrigated and dryland or non-irrigated agriculture. The potential Keep River crossovers from Stage 1 to Stage 3, which will be used for access and water transfer purposes under future irrigated farming, are included in this Stage 1 proposal, as noted earlier.

This includes existing tracks and river crossings which have historically been used in station management and for Indigenous cultural access to and across the Keep River.

It is noted that the total development is not anticipated to exceed 60% of the proposed development envelope.

[2] The 'M2' irrigation area is the area able to be serviced by the M2 irrigation channel, including Weaber Plain, Knox Creek Plain and the Keep River Plain.

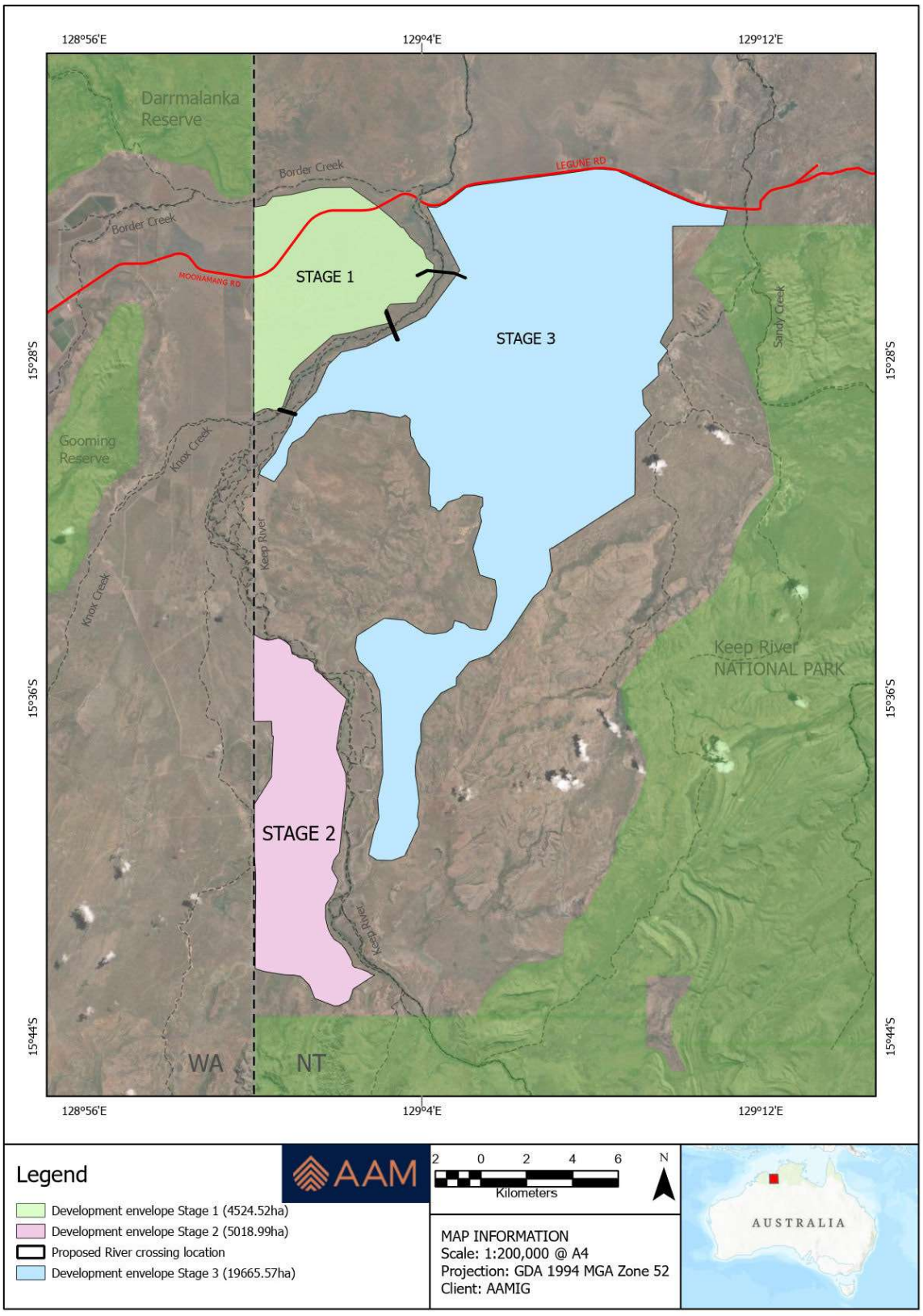


Figure 6. Sweetwater - All Stages

2.3. Proposal alternatives

The Sweetwater proposal has arisen following decades of government and industry planning, cultural assessments, liaison and a multitude of inspections with Traditional Owners, Native Title negotiations, land tenure changes, environmental studies and the reservation of conservation areas and the Keep River National Park.

The proposed three-stage Sweetwater development is the outcome of this long-term planning process and is the current name for the NT portion of the Ord Stage 2 M2 Development Area (Wesfarmers-Marabeni, 1998-2003), also referred to as Ord Stage 3 or the Keep River Plains project and more recently as the Northern Agricultural Development.

The overall 'Keep Plains Agricultural Development' area was released to the market by the NT Land Corporation (NTLC) in 2020, covering 67,500 hectares. The anticipated outcome was investment in agricultural infrastructure to support broadacre crops like corn, cotton, sorghum, and chickpeas. Having successfully secured the NTLC tender and reviewed the development parameters affecting the site, AAM has determined there are no feasible alternatives that will be commercially viable.

To accommodate minor on-site footprint amendments, this proposal includes a broader envelope, and the maximum development (clearing) area within that envelope. However, there is no option to relocate the proposal to an alternative location.

The long-term outlook for the Sweetwater development is significant, and materially positive to the region and the Northern Territory, especially in the context of agricultural expansion and regional infrastructure improvements. It aligns with the NT's broader agricultural strategy, which aims to grow the sector as a significant contributor to both domestic and export markets.

Several factors enhance the long-term potential of this region, that include but are not limited to;

- The NT Government has invested over $58 million in upgrading the Keep River Plains Road, facilitating better access to the area, which is key for logistical and commercial development.
- The Keep River Plains is part of a larger effort to diversify the NT economy, create sustainable jobs, and position the territory as a competitive agricultural producer globally. These developments are expected to create new jobs and foster opportunities in agribusiness, logistics, and infrastructure.
- Given the region's proximity to the Ord River Irrigation Scheme, later stages of the Sweetwater project will capitalise on the water resources and infrastructure in place, further supporting its agricultural productivity.
- This expansion will contribute to Northern Australia's goal of attracting private investment and promoting long-term economic resilience.

3. Statutory Context

The approvals framework for the Sweetwater agricultural development is summarised in Figure 7. While the EPA referral will initiate the environmental approvals, the requirements of the *Pastoral Land Act 1992* to secure a pastoral land clearing (PLC) permit and a non-pastoral use permit (NPUP) under that Act remain in force. It is anticipated that the EIS proposed in this referral will concurrently address the PLC and NPUP requirements. These and other approvals and statutory compliance requirements are outlined in this section.

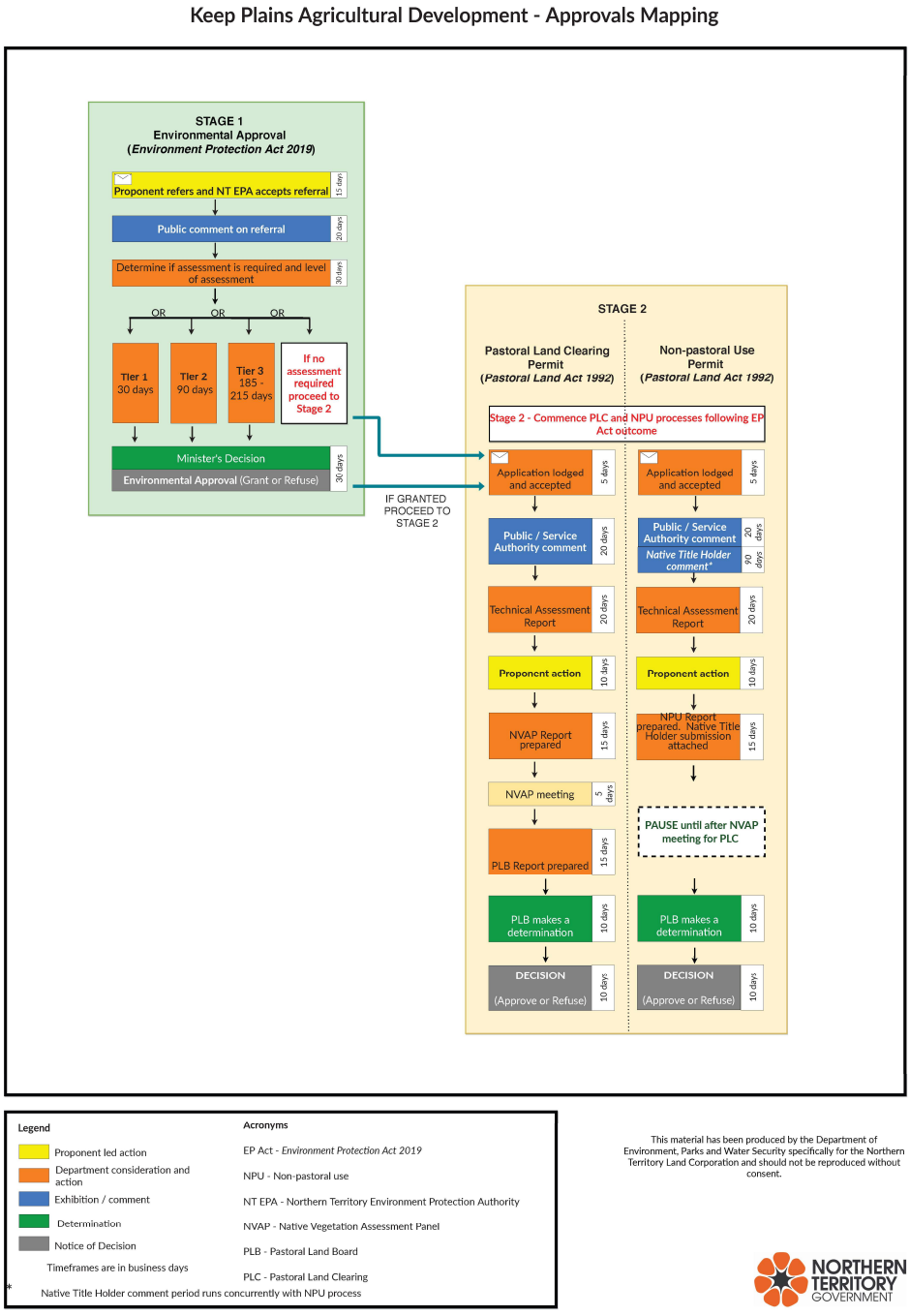


Figure 7. NT Approvals Framework - Sweetwater Project

3.1. *Environment Protection Act 2019* (NT) and *Environment Protection Regulations 2020*

3.1.1 Overview of requirements

The purpose of the *Environment Protection Act 2019* (NT) (EP Act) is "to enable and promote sustainable development in the NT that is ecologically sustainable" (NTG, 2021). A proponent must refer a proposal to the NT EPA if it meets a referral trigger or has the potential to have a significant impact on the environment. The definition of a significant impact under s11 of the EP Act is an impact of major consequence, having regard to the context and intensity of the impact and the sensitivity, value and quality of the environment impacted on and the duration, magnitude and geographic extent of the impact.

This proposal is referred to the NT EPA in relation to the context, magnitude and geographic extent of the impact, for standard assessment under section 48 of the EP Act.

The *Environment Protection Regulations 2020* (NT) provide process guidance for compliance with the EP Act. Section 43 of the EP Regulations allows for a proponent-initiated EIS referral. This document has been prepared to support a referral under s43. The attached draft Terms of Reference (ToR) and Statement of Reasons (SoR) have been prepared to meet the requirements of s43. Refer to Attachments C and D respectively for the draft ToR and the SoR.

3.1.2 Application of the principles of environment protection and management

Section 26 of the EP Act requires that actions be designed to avoid adverse impacts on the environment; to identify management options to mitigate adverse impacts; and if this cannot be done adequately, to provide for environmental offsets for residual impacts that cannot be mitigated or avoided.

The Sweetwater Stage 1 proposal is informed by decades of environmental assessments on or near to the Spirit Hills pastoral lease location of the development. Avoidance of higher environmental risk areas including the Keep River, and of cultural heritage sites, has strongly informed the proposed farm layout and infrastructure plans.

Sections 17 to 24 of the EP Act require that the principles of ecologically sustainable development (ESD) be considered, including evidence-based decision making and the application of the precautionary principle.

The principles of ESD and the mitigation hierarchy have been applied by the proponent in the development of the Sweetwater Stage 1 project. These are discussed in the attached SoR document (Attachment D).

The general duty of proponents under s43 of the EP Act specifies community consultation, Aboriginal engagement and cultural values assessments and other related matters which must be incorporated into an EIA and addressed in an EIS. These matters are addressed in section 4 and discussed further in the SoR and ToR.

3.2. *Environment Protection and Biodiversity Conservation Act 1999* (Cwth)

The EPBC Act 1999 protects nationally significant animals, plants, habitats and places. This relates largely to matters where Australia has an international obligation, including in relation to migratory birds and the habitats which support them. Attachment E provides the protected matters report for Sweetwater Stage 1, with a ten (10) kilometre buffer added to the development envelope.

As noted earlier, the Sweetwater Stage 1 proposal is concurrently referred for assessment under the Commonwealth EPBC Act and the NT EP Act. The Proponent anticipates the EIA of the Sweetwater Stage 1 development will be undertaken under the bilateral agreement between the NTG and the Australian Government. Under the bilateral agreement the Australian Government has accredited the NTG to assess proposals on behalf of both governments.

Section 13 of this document addresses the Matters of National Environmental Significance (MNES) listed under the EPBC Act, where they are not otherwise addressed in this document.

3.3. *Planning Act 1999* (NT)

The *Planning Act 1999* (NT) (Planning Act) governs land use and development in the Territory.

The Planning Act provides the framework that ensures pastoral land development in the NT aligns with sustainable land use, environmental protections, and regional planning objectives. Because Spirit Hills is currently a pastoral lease, land use control and zoning, development permits, community and stakeholder consultation, and compliance with regional land use plans, which are all covered under this Act, must be addressed. Other matters including pastoral clearing permits and NPUPs are also covered under this Act.

The proponent will address matters arising from the Planning Act in and integrated matter with the EP Act, for a comprehensive and consistent approach to meeting all statutory requirements of the NTG.

3.4. *Pastoral Land Act 1992* (NT)

The *Pastoral Land Act 1992* (NT) provides the NTG's legal framework for the use and management of pastoral land, focusing on the sustainable development and conservation of pastoral resources. The Act relates to the Spirit Hills pastoral lease as the location on which the Sweetwater Agriculture Development is proposed.

The Pastoral Land Board (PLB) is responsible for overseeing compliance with the conditions of pastoral leases, including how the land is developed and managed. The proponent will continue to comply with PLB requirements including any rangeland monitoring. The PLB is the consent authority for pastoral clearing applications.

In summary, the *Pastoral Land Act 1992* (NT) is essential for regulating and guiding how pastoral land can be developed. It ensures that while pastoralists have the opportunity to improve and develop their land for agricultural and other uses, they must do so in a way that is environmentally sustainable and compliant with the conditions of their pastoral lease. The act's framework aims to balance development with conservation to protect the land's long-term productivity.

Pursuant with NTG guidelines, SCA has initiated the Pastoral Land Clearing (PLC) and Non-Pastoral Use (NPU) application processes for Stage 1 of the Sweetwater Development Project under this Act, noting that PLC and NPU applications will be submitted simultaneously alongside this EPA referral. The significant impacts identified in relation to the proposal would likely trigger a referral to the NT EPA of Sweetwater Stage 1 if SCA did not self-refer.

Per Figure 7, a PLC permit under the *Pastoral Land Act 1992* will be required once EPA approval is obtained. Consequently, to avoid future repetition, this document and the attached Terms of Reference (Attachment C) simultaneously address the requirements of the PLB in relation to land clearing.

3.5. NT Planning Scheme Land Clearing Guidelines

The *NT Planning Scheme Land Clearing Guidelines* (NTG, 2021) are recognised under the *Planning Act 1999* (NT) and the *Pastoral Land Act 1992* (NT) and also provide guidance for proposals assessed under the EP Act. The guidelines provide advice on the interaction of the EP Act, the Planning Act and the Pastoral Land Act in relation to development applications. The guidelines focus on minimising the impacts of environmental degradation arising from the clearing of native vegetation and provide guidance for other developments assessed under the EP Act.

The information requirements of the land clearing guidelines are discussed further in section 14.

3.6. *Northern Territory Aboriginal Sacred Sites Act 1989* (NT)

Under the *Northern Territory Aboriginal Sacred Sites Act 1989*, all sacred sites in the NT are protected from unauthorised entry or damage. SCA has obtained and assessed multiple historic Abstract of Records, certificates and survey work with findings recorded on various Aboriginal Areas Protection Authority (AAPA) Abstract of Records for the proposed area. The details contained within the certificates have been developed from numerous surveys and inspections undertaken over the past three decades. SCA has been informed that these historical certificates are well informed, as they reflect extensive input from experienced elders and custodians—many of whom were born on, lived on, or worked in close proximity to the project area. Accordingly, these surveys are likely to offer a higher degree of cultural accuracy and credibility than contemporary inspections. SCA will continue to liaise with Traditional Owners, and AAPA where applicable, in relation to ongoing heritage site management and protection.

3.7. *Water Act 1992* (NT)

The *Water Act 1992* (NT) governs investigations, allocation, use, control, protection, management and administration of water resources in the Territory.

SCA will secure the appropriate and required licences for overland water storage and flood protection works required for the Sweetwater Stage 1 development. In doing so, the proponent will comply with the requirements of the NTG's *Surface water take – wet season flow policy* (NTG, 2023) and other guidance provided by the NTG.

3.8. *Rights in Water and Irrigation Act 1914* (WA)

A licence to access water under the Western Australian RiWI Act will be required should water from the Ord system be required. This will be negotiated with the WA Department of Water and Environmental Regulation at an appropriate time.

As noted earlier, it is estimated that the total water volume which could potentially be supplied from the Ord system is a nominal 160GL per year across all stages of the Sweetwater development. Consequently, there should be adequate water available for irrigation if conversion from dryland to external irrigation supply occurs, subject to future licensing and supply discussions with relevant WA authorities.

3.9. Greenhouse Gas Emissions

SCA will comply with its obligations under the Commonwealth *National Greenhouse and Energy Reporting Act 2007*. Greenhouse emissions arising from the proposal are presented for further consideration in the ToR and SoR.

3.10. Other statutory considerations

Other statutory considerations include the *Heritage Act 2011* (NT), and the *Territory Parks and Wildlife Conservation Act 1976* (NT) and its associated by-laws (1984) and regulations (2001). Obligations under the *Bushfires Management Act 2016,* the *Weeds Management Act* 2001 and the *Plant Health Act* 2008, *Heritage Act 2011*, and any other statutory matters, will also be addressed in management planning for the Sweetwater development. This includes Commonwealth legislative requirements including those

governed by the *Native Title Act 1993* (Cth). The proponent is aware of its obligations and responsibilities to comply with NT and Australian Government laws in all aspects of the development process.

4. Stakeholder Consultation and Engagement

Section 3 of the *Environmental Protection Act 2019* (NT) specifies community engagement in the environmental impact assessment process as follows:

> *3(d) to provide for broad community involvement during the process of environmental impact assessment and environmental approval*
>
> *3(e) to recognise the role that Aboriginal people have as stewards of their country as conferred under their traditions and recognised in law, and the importance of participation by Aboriginal people and communities in environmental decision-making processes.*
>
> (*Environmental Protection Act 2019* (NT)).

Guidance provided by the NT EPA (2022c) in relation to stakeholder engagement is and will continue to be integrated into overall Sweetwater Agricultural development consultation processes.

4.1. First Nations Engagement

A specific focus is applied to indigenous stakeholders, and in particular Traditional Owners. Section 9.2 of this document provides additional insight into related cultural heritage matters which are informing and guiding the Sweetwater Stage 1 development proposal.

First Nations engagement activities to date have included the following:

Yawoorroong Miriuwung Gajerrong Yirrgeb Noong Dawang Aboriginal Corporation (MG Corporation)

AAM has maintained regular engagement with the Executive Chair and Directors of MG Corporation in relation to the Sweetwater Development proposal and associated planning pathways, including formal presentations to the Board on 10 September 2024 and 15 May 2025. MG Corporation represents the interests of native title holders and has confirmed its willingness to act as a facilitator - supporting engagement and consultation with representatives of native title estate groups. Additionally, MG Corporation has communicated to AAM that they are willing to play an active role in any discussions relating to the Northern Land Council. SCA is committed to meaningful collaboration with MG Corporation, Northern Land Council and the traditional owners relevant to the project.

Djarrany Djarrany Aboriginal Corporation

AAM has regular discussions with the representatives of the Djarrany Djarrany group. This has been a combination of formal and informal meetings on a range of matters including the developments on Legune, Sacred Site identification, tourism ventures on Legune and in relation to the Indigenous Land Use Agreement (ILUA) on Legune between Sea Farms Group (SFG) and the Djarrany Djarrany group, to which AAM is a party to as the Landowner.

The majority of the meetings have been held in Kununurra either directly with MG corporation or in the case of the Djarrany Djarrany with the presence of various Northern Land Council (NLC) representatives.

Matters raised during the consultations have included -

- General interaction on location
- Fishing rights
- Managing tourists
- The identification and protection of Sacred Sites
- Tourism ventures
- Development proposals on Legune and Spirit Hills inclusive of Sweetwater

As an outcome of the discussions, a number of changes have been made to the proposal planning, including in relation to heritage protection and Keep River access, and incorporating potential access to AAM's adjacent Legune Station for a tourism venture.

ILUA negotiations and Native Title responsibilities, as well as heritage obligations, are integrated and are addressed holistically in the discussions. SCA has held high level discussions with the Northern Land Council (NLC) in relation to the proposed development and engagement in the development of an ILUA. As the approval process progresses, SCA will continue to engage with First Nations people and NLC as required acknowledging the historic role NLC has played in these processes.

The EPBC *Interim Engaging with First Nations People and Communities on Assessments and Approvals Under the Environment Protection and Biodiversity Conservation Act 1999* guidance (DCCEEW, 2023a) is also informing consultation activities.

4.2. Other Stakeholder Engagement

Consultation and engagement activities to date have also involved representatives of industry and government in the adjacent Ord River Irrigation Area (ORIA), including holders of environmental approvals for similar developments, to ensure consistent and congruent approvals are sought. There is a significant focus on environmental matters in these discussions.

It is noted that this proposal is the outcome of decades of scientific and agricultural research, and economic development planning, which have been communicated broadly by the NT, Commonwealth and Western Australian governments.

The attached draft Terms of Reference (Attachment C) outlines the stakeholder consultation and engagement processes and inclusions in the proposed EIS. The approaches to be taken will continue to address the Indigenous and other public participation requirements of the NT EPA and the DCCEEW (in relation to the EPBC Act) and will inform an economic and social impact assessment which meets the requirements of the NT EPA (2013b).

5. Environmental Factors – Land

Considerations for the land factors in the environmental impact assessment of the Stage 1 development are discussed in this section. The attached Draft Terms of Reference (Attachment C) outlines the areas requiring further investigations and data collection to support the preparation of a comprehensive Environmental Impact Statement for this proposal. This includes the verification of existing and known data, as well as additional investigations.

The preliminary assessment of land-related matters is largely informed by soil and land capability assessments completed by or for the NTG and others, and in particular, the work of Carnavas et al (2019) in the *Soil and Land Capability Assessment of the Lower Weaber and Keep River Plains, Northern Territory*. This Land Capability Assessment (LCA) was completed for the NT and Australian Governments to better understand the soil and water resources of the region.

The 'Lower Weaber' area is inclusive of Sweetwater Stage 1. Maps presented in this section are derived from the NTG's natural resources data available at www.data.nt.gov.au and illustrate the full Lower Weaber area.

The LCA is informed by multiple previous soil and land assessments in the region, as summarised in Table 4.

Table 4. Pre-2019 soil and land resource assessments within the Ord, Weaber and Keep Plains Area

Year	Report / Investigation Title	Author(s)	Agency
1944	*Soil surveys and related investigations in the Ord River area, East Kimberley, 1944*	G Burvill	Department of Agriculture, WA
1978	*Report on lands of the Ord River catchment, Northern Territory*	J Aldrick, D Howe, C Dunlop	Department of the Northern Territory
1986	*Land Resources of the Keep River National Park*	D Silversten, H Van- Cuylenburg	Conservation Commission Northern Territory
1990	*Soils of the Ivanhoe Plain, East Kimberley, Western Australia*	J Aldrick, M Cuylenburg, P Moody, B Wren, A Clarke	Department of Agriculture & Food, WA
1996	*Assessment of the suitability for horticulture of the Packsaddle infill area, Kununurra*	N Schoknecht	Department of Agriculture, WA
1996	*Soils of the Ivanhoe West Bank East Kimberley Western Australia*	C Grose, N Schoknecht	Department of Agriculture, WA
1996	*Soils of the Knox Creek Plain East Kimberley Western Australia and Northern Territory*	C Grose, N Schoknecht	Department of Agriculture, WA
1996	*Soils of the Mantinea Loop Ord River Valley East Kimberley Western Australia*	N Schoknecht, C Grose	Department of Agriculture, WA
1996	*Soils of the Weaber Plain, East Kimberley, Western Australia*	J Dixon	Department of Agriculture, WA
2010	*Cockatoo sands soil survey: assessment of the potential irrigation areas, Kununurra area, East Kimberley.*	H Smolinski, K Kuswardiyanto, J Laycock	Department of Agriculture and Food, WA
2011	*Land systems of the Kimberley region, Western Australia*	N Schoknecht	Department of Agriculture and Food, WA
2011	*Soil assessment of the Weaber Plain (Goomig) farmlands*	H Smolinski, J Laycock, J Dixon	Department of Agriculture and Food, WA
2015	*Cockatoo Sands in the Victoria Highway and Carlton Hill areas, East Kimberley: land capability assessment for developing irrigated agriculture*	H Smolinski, S Pathan, P Galloway, K Kuswardiyanto, J Laycock	Department of Agriculture and Food, WA
2015	*Preliminary soil and groundwater assessment of the Mantinea Development area, East Kimberley, Western Australia*	P Raper, R George, N Schoknecht	Department of Agriculture and Food, WA

(Taken from Carnavas et al, 2019, p8)

5.1. Landforms

The NT EPA's objective for the factor 'landforms' is to conserve the variety and integrity of distinctive physical landforms (NT EPA 2022a). This includes geological features in the landscape including rock outcrops, ranges, and caves. Values of these areas include Aboriginal heritage, and ecological features of the vegetation and habitats which grow in rocky areas, along with the flora and fauna species they support. The presence of such landforms on the Lower Weaber plain is limited.

In addition to protecting the environmental and cultural heritage values of notable landforms, it is in the interest of productive agricultural development to avoid areas where cultivation will be difficult due to rock presence and terrain. Consequently, there is a commercial imperative to focus on suitable farming land (that is, flat plains) and not on modifying land which is not suitable.

Avoidance of unique and special landforms is therefore a key element of the design of the Sweetwater development. The proposed Stage 1 design excludes the Spirit Hill rocky outcrop area for both cultural and geophysical reasons.

Figure 8 illustrates the topography of the Stage 1 development. Notably there is very little west to east fall over the extent of the plain. This topographical representation is supplemented by Figure 9, identifying potential rocky sites in the project area. Rock outcrops will be avoided. The remainder of the development area is alluvial plains, as illustrated in Figure 10. It is the alluvial plains which are of farming value due to the combination of soil type and topography.

Due to the adoption of the highest level of impact minimisation (avoidance), the distinctive landforms within the Sweetwater Stage 1 envelope will not be cleared and developed. The preliminary assessment therefore indicates the environmental values of those areas, including the cultural and biodiversity values, will not be significantly impacted by the proposal. This will be further explored in the EIS.

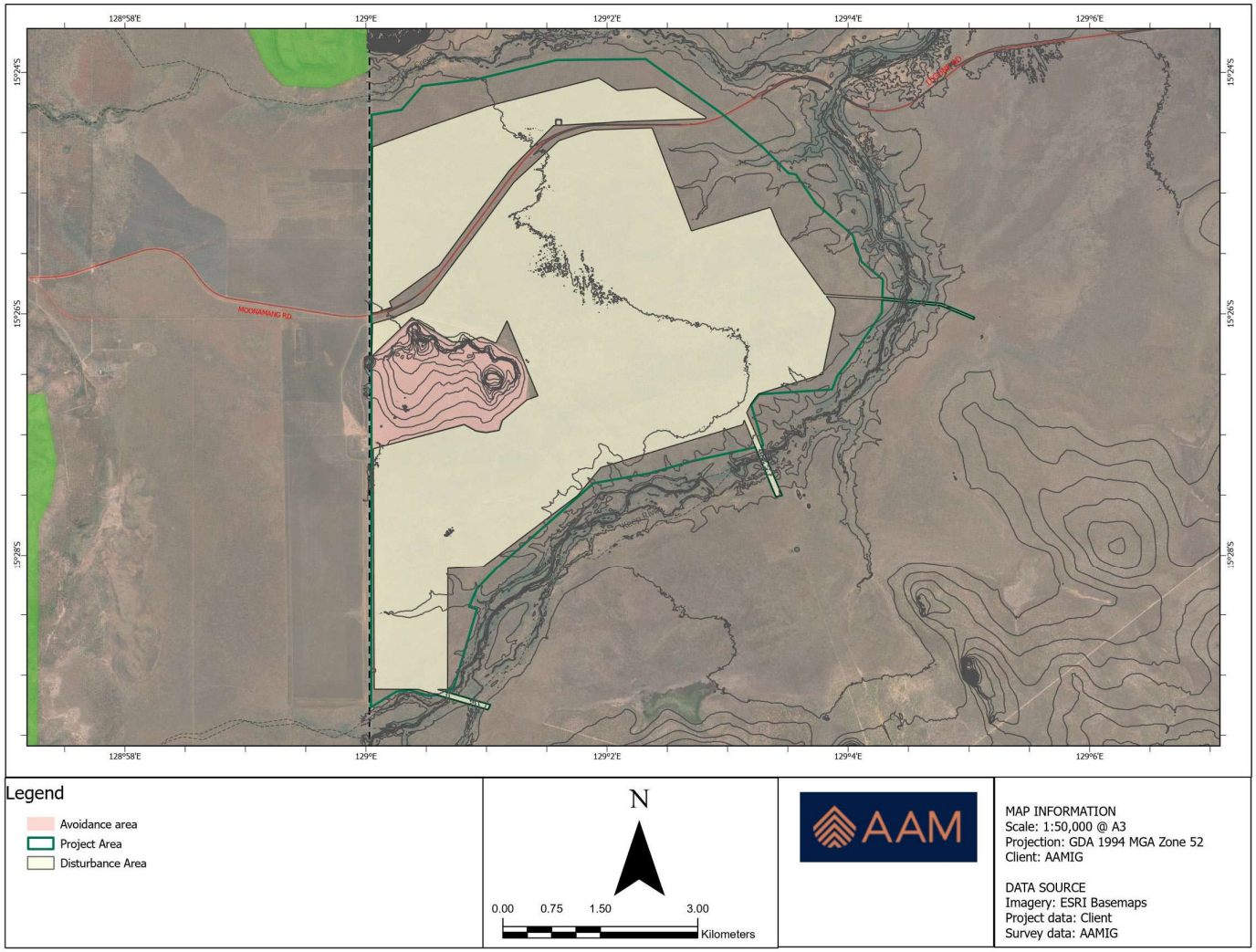


Figure 8. Sweetwater Stage 1 Topography

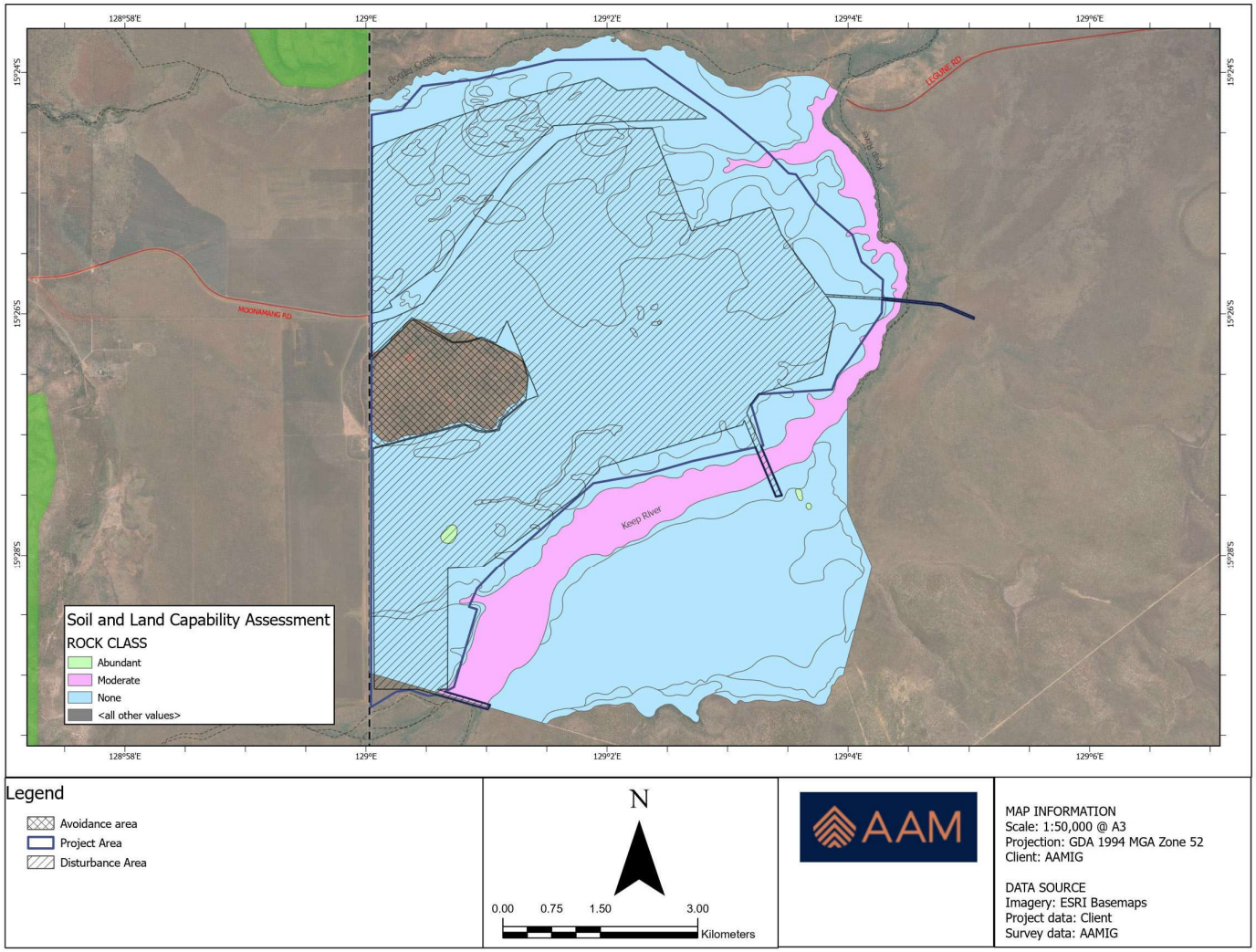


Figure 9. Rock Outcrops (Spirit Hills Excluded)

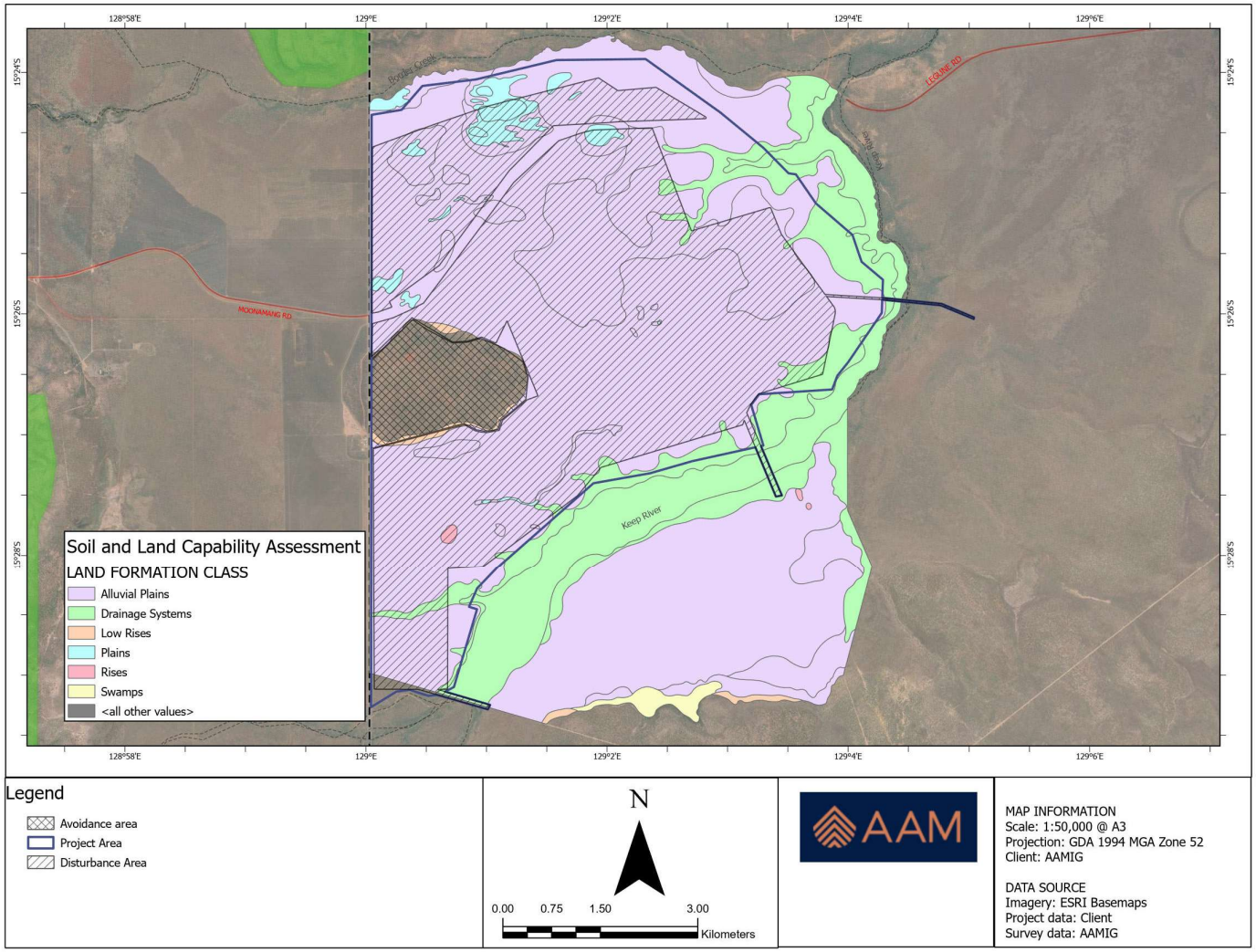


Figure 10. Land Formation - Sweetwater Stage 1

5.2. Terrestrial Environmental Quality

The objective of the NT EPA in relation to Terrestrial Environmental Quality (TEQ) is to protect the quality and integrity of land and soils so that environmental values are supported and maintained (NT EPA 2022a). Values and sensitivities to be considered include the chemical, physical, biological and aesthetic qualities of soils, and the biological processes that depend on soil quality.

The consideration of TEQ aligns with the land resource assessment requirements of the NT *Land Clearing Guidelines* (NTG, 2021), which will be addressed in the EIS. The Draft ToR (Attachment C) includes items required to inform the PLB's clearing assessment processes.

Available soils and land capability assessment information (Carnavas et al, 2019) and the associated NTG soil mapping data address the initial data requirements for environmental referral and planning purposes.

The soils of the proposal area fall within the Ord-Victoria Area Land System, and specifically the Ivanhoe Land System.

Soil types in the development area (Figure 11) correspond with the soil formations provided in Figure 10. Vertosols, or clay soils with shrinking and swelling properties, dominate the location. These clays exceed a depth of 1.5m across the entire proposal envelope, with the exception of the Knox Creek and Keep River drainage lines, and the rocky outcrop in the southwest corner. Soil depth is mapped in Figure 12. Associated with the deep clays is sodicity risk, particularly where drainage is poor (see Figure 13).

Overall land capability classification mapping is provided in Figure 14, illustrating the extent of the classes described in Table 5:

Table 5. Land Capability Classifications

Land Capability	Description
Class 1	**Land with negligible constraints** that require only a basic level of inputs, expertise and investment to develop and manage the land sustainably. (ASS not present; 0-1% slope; no surface rock; soil depth >1.0 m; rapid to well-drained soil; ECe <2 dS/m; ESP <6%; flood-free; gilgai absent)
Class 2	**Land with minor or moderate constraints** that require a greater level of inputs, expertise and investment than Class 1 to develop and manage the land sustainably. (ASS not present; and/or 1-2% slope; and/or 0-2% surface rock; and/or 0.5-1.0 m soil depth; and/or moderately well drained soil; and/or ECe 2-4 dS/m; and/or ESP 6-15%; and/or extremely rare flooding; and/or gilgai vertical interval <0.3 m)
Class 3	**Land with severe constraints** that require a high level of inputs, expertise and investment to develop and manage the land sustainably. (ASS not present; and/or 2-3% slope; and/or 2-10% surface rock; and/or 0.25-0.5 m soil depth; and/or imperfectly drained soil; and/or ECe 4-8 dS/m; and/or ESP 15-20%; and/or rare flooding; and/or gilgai vertical interval 0.3-0.6 m)
Class 4	**Land with extreme constraints** that generally require an unacceptable level of inputs, expertise and investment to develop and manage the land sustainably, making it either impractical, uneconomic or environmentally unsound to proceed. Where development must proceed the effects must be mitigated. (ASS present; and/or >3% slope; and/or >10% surface rock; and/or <0.25 m soil depth; and/or poorly to very poorly drained soil; and/or ECe >8 dS/m; and/or ESP >20%; and/or regular to permanent flooding; and/or gilgai vertical interval >0.6 m)

(Source: Carnavas et al, 2019, p103).

The LCA considers soil and land characteristics associated with acid sulfate soil (ASS), slope, surface rock, soil depth, soil drainage, salinity, sodicity, flooding and microrelief. Wind erosion was not assessed by Carnavas et al (2019) as the NTG authors considered it to be only applicable in arid zone landscapes or where coastal sand masses are involved. The characteristics were assessed against the defined land capability criteria, and a classification (per Table 5) assigned based on the most limiting characteristic recorded for each land unit. Table 6 summarises the areas of each land capability class present in the Stage 1 envelope.

Table 6. Areas of Land Capability Classes on Sweetwater Stage 1

Capability Class	1	2	2 to 3	3	4
Land Units	None	8a1, 8a2, 8b1, 8b2	9a1, 9a2, 9b	7a, 9a3, 9c	6a, 9d1, 9d2, 10a, 10b, 11a
Area (ha)	0.00	124.09	3263.90	616.04	520.49
Stage 1 Development Area %	0.00%	2.74%	72.14%	13.62%	11.50%
Limiting attributes (do not all apply to each land unit)	None	Moderately well drained soil.	Moderately well to imperfectly drained soil.	High risk slope. Imperfectly drained soil. High sodicity. Rare flooding.	Very high risk slope. Abundant surface rock. Very shallow soil depth. Poorly to very poorly drained soil. Regular to permanent flooding.

In summarising the findings of the LCA, Carnavas et al 2019 determined that the bulk of the area which is included in the Sweetwater Stage 1 envelope is:

> *… potentially capable of irrigated agricultural development. Areas of Class 2 land are largely unconstrained, while Class 2-3 land, which accounts for* [the majority of the area] *incorporates areas of known drainage variability. The Class 2-3 category recognises parts of the plain that are imperfectly drained at the local level, and as a consequence will require additional preparation and longer term management for ongoing productivity for some crops. Similar drainage variability is recognised within the existing Ord Irrigation area which has been intensively farmed with appropriate management for a significant period. The remaining* [area of] *Class 3 and 4 land was largely constrained by unacceptable slope, soil drainage, root zone sodicity or flood risk.*
>
> (Carnavas et al, 2019, pi)

Carnavas et al (2019) found that soil drainage is the major potential agricultural constraint. Root zone salinity risks were considered minor in the area to the west of the Keep River which includes the Stage 1 development. The authors found that

> *On an average of the whole soil profile (0-1.5 m), all landscapes assessed within the Lower Weaber … are effectively non-saline. However, unpredictability regarding slightly to moderately elevated salt loads below 1m depth within some Class 2-3 land, means that further detailed root zone salinity investigations to fully establish the extent, distribution, and severity of local salt load variability and potential root zone constraints are recommended.*
>
> (Carnavas et al, 2019, piv).

The impacts of the development upon the land and soils will be residual and ongoing, given the long term (permanent) nature of the proposed agricultural activity. The Draft ToR includes further analysis of the impacts of the proposed Sweetwater Stage 1 development upon the TEQ values and specifically the potential salinity risk noted above. Farm planning will necessarily include management activities to minimise the environmental and productivity risks associated with the soil and landscape conditions.

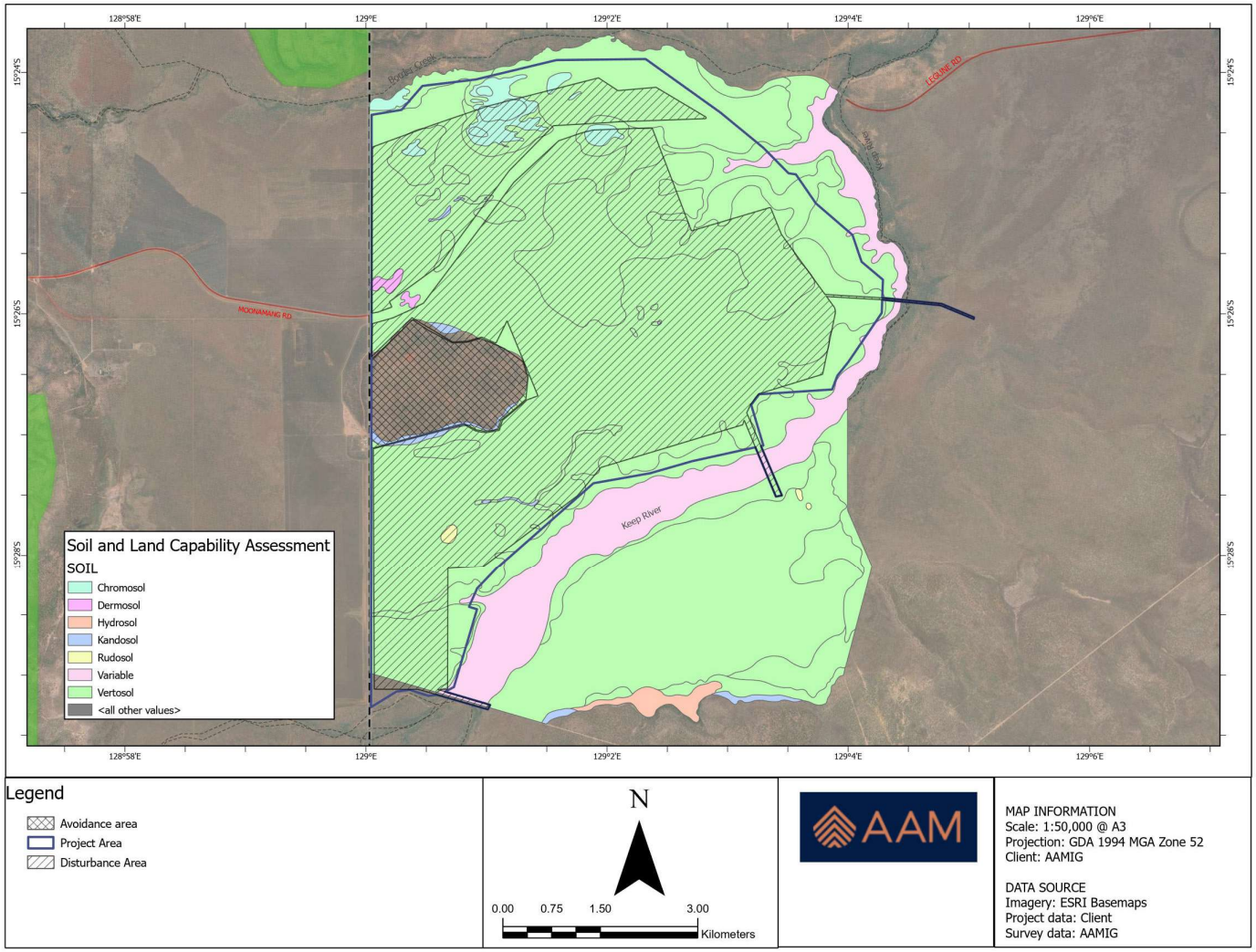


Figure 11. Soil Types

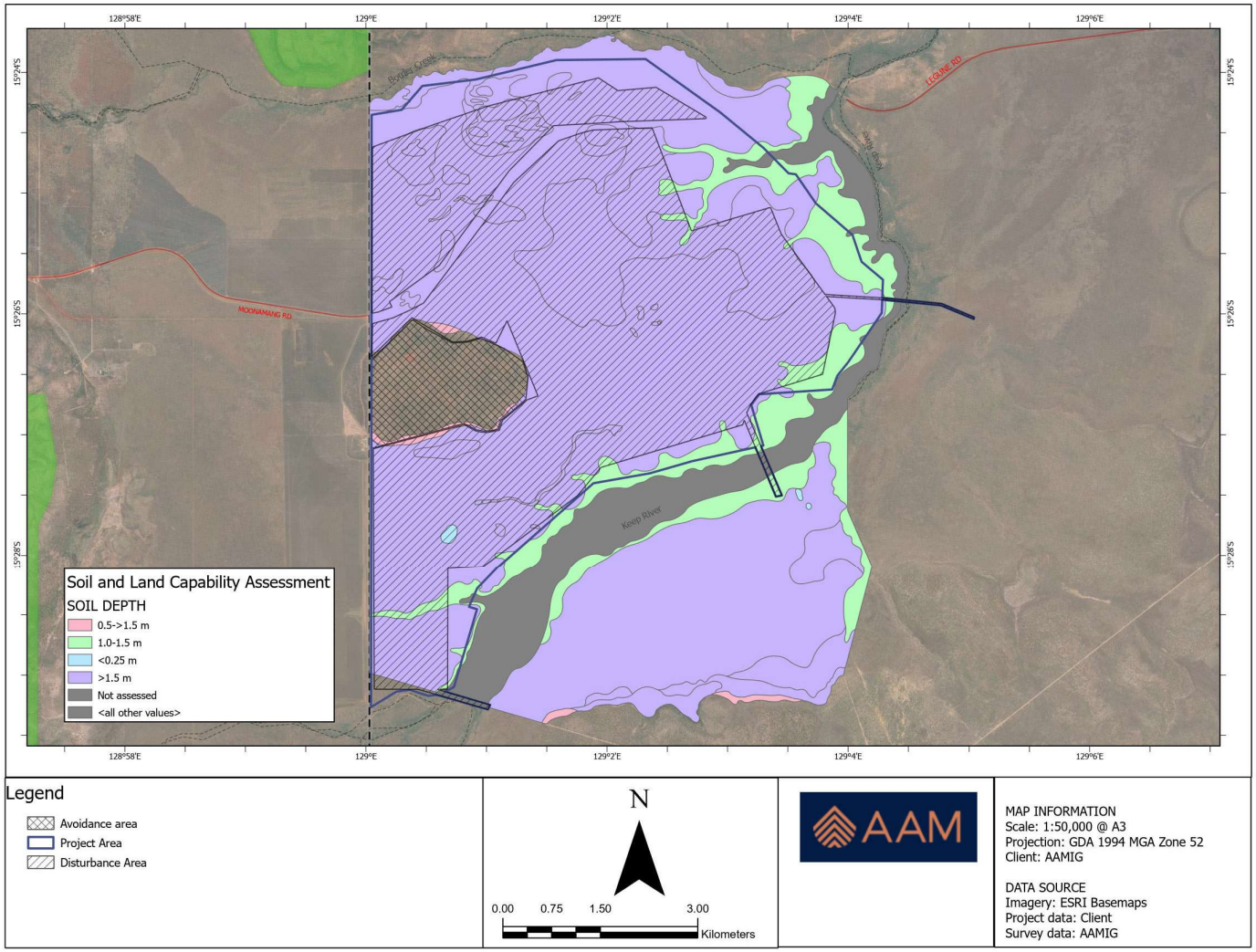


Figure 12. Soil Depth

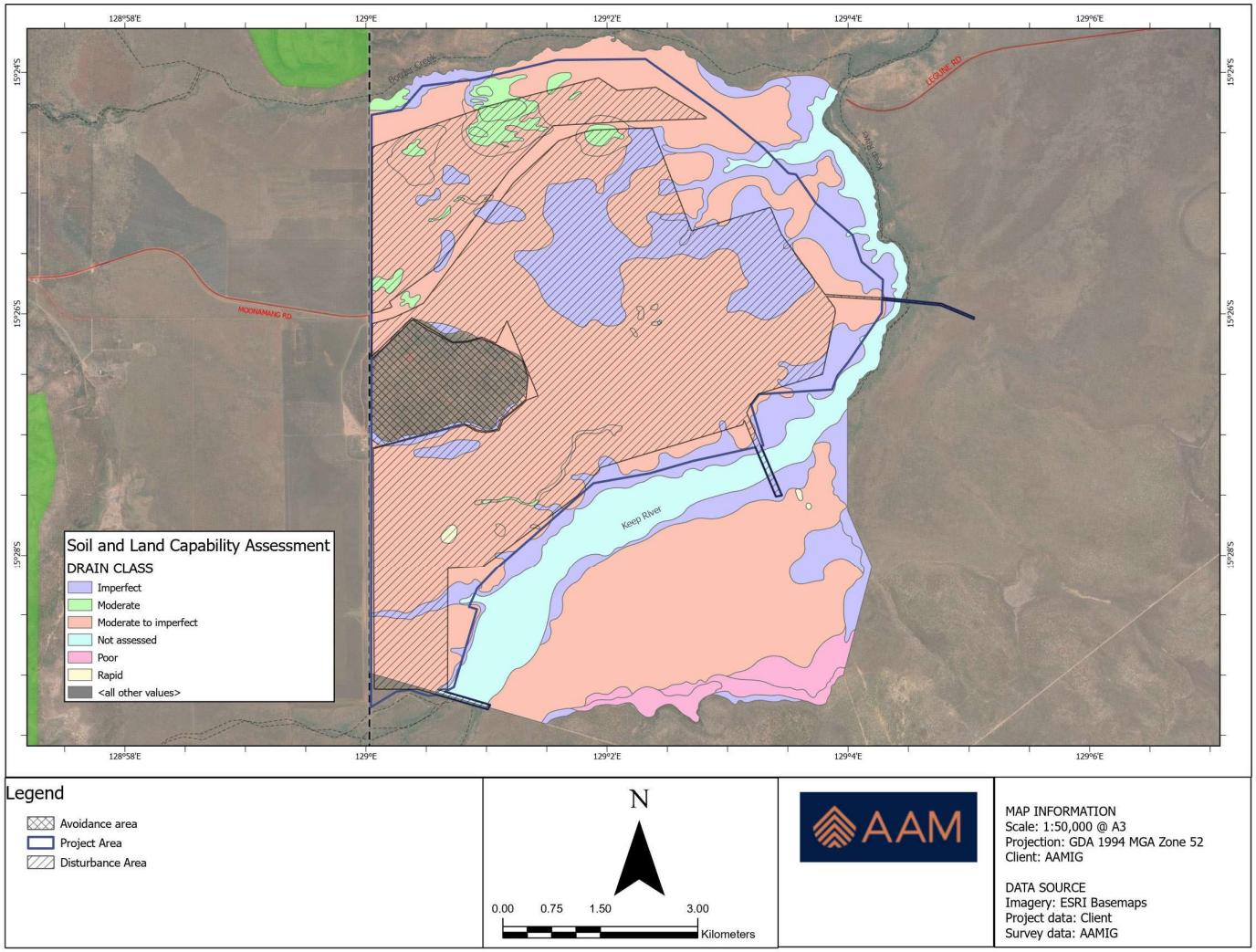


Figure 13. Soil Drainage

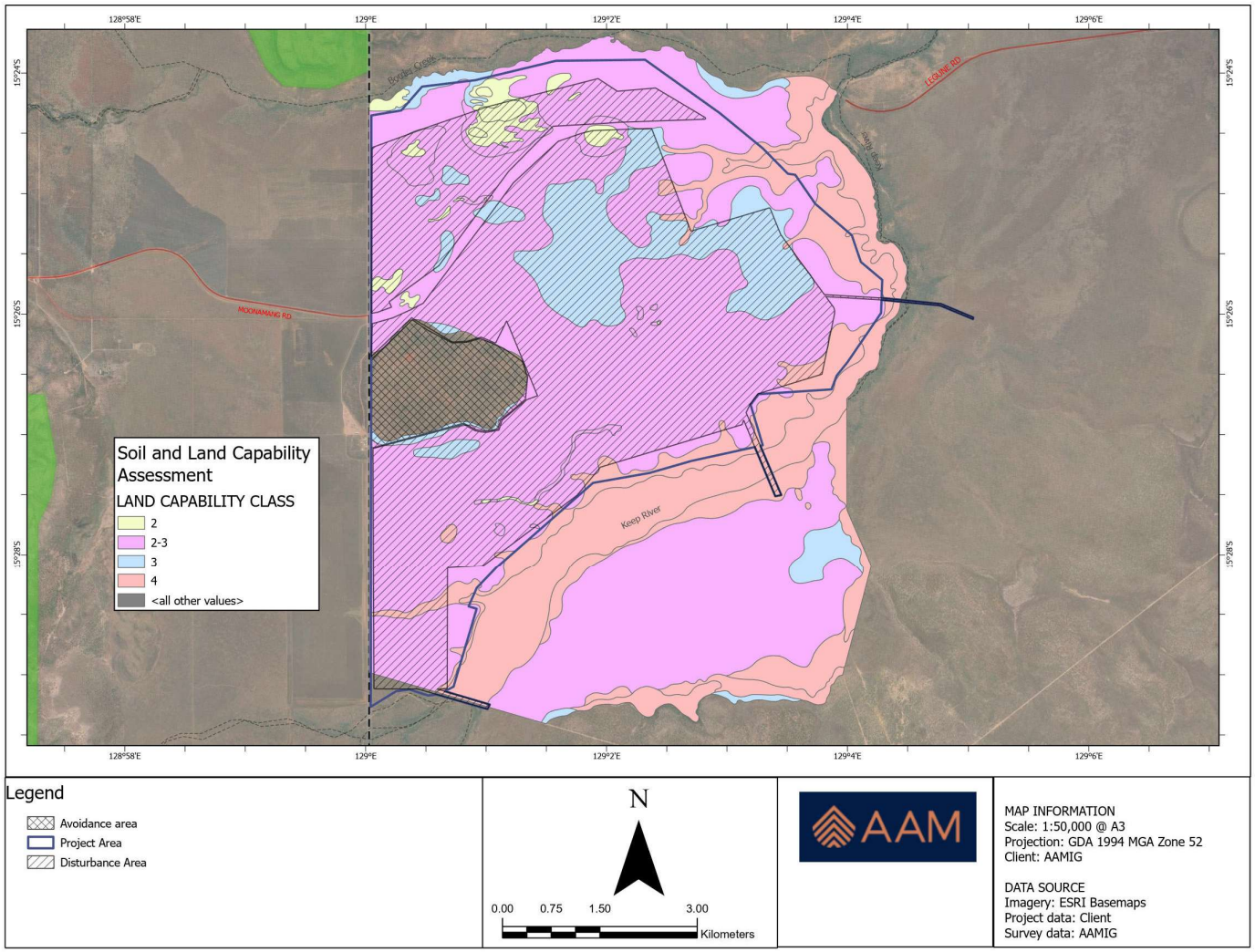


Figure 14. Land Capability Class

5.3. Terrestrial Ecosystems

THE NT EPA objecting for the factor 'Terrestrial Ecosystems' is to protect terrestrial habitats to maintain environmental values including biodiversity, ecological integrity and ecological functioning. (NT EPA 2022a).

Relevant environmental values and sensitivities include vegetation, threatened or migratory species, Threatened Ecological Communities (TECs), locally endemic or restricted species and their habitat, data-deficient species and high quality biological and functional biodiversity, integrity and services. The project area falls within the Keep River Site of *Conservation Significance* in the NT, pictured in Figure 15.

As noted in section 5.2, the proposal area is within the Ivanhoe Land System. This land system is classified under the Western Australian *Biodiversity Conservation Act 2016* as a Priority 3(iii) ecological community. This classification is applied to *poorly known ecological communities made up of large, and/or widespread occurrences, that may or may not be represented in the reserve system, but are under threat of modification of much of their range from processes such as grazing by domestic and/or feral stock, inappropriate fire regimes, clearing, hydrological change, etc.* (Department of Environment and Conservation, 2013, p6). This legislation and therefore the classification does not apply in the Northern Territory.

The proposal is informed by the NT EPA's *Guidelines for Assessment of Impacts on Terrestrial Biodiversity* (NT EPA, 2013), noting that protection does not mean there will be no impacts. The focus is on potentially significant consequences of an action, and maintaining environmental values.

A non-exhaustive summary of relevant terrestrial biodiversity studies which have been undertaken in the region is provided in Table 7. These studies inform the environmental impact assessment in relation to flora, fauna, ecological communities and habitat.

Table 7. Relevant Terrestrial Biodiversity Studies

Author	Year	Title	Geographic relevance
Animal Plant Mineral Pty Ltd	2011	Bird Species Richness and Diversity in Sorby Management Proprietary Limited (SMPL) Sorby Hills Silver Lead Zinc Project (Sorby Hills)	Sorby Hills (west of Sweetwater)
Animal Plant Mineral Pty Ltd	2013	Matters of National Environmental Significance Assessment Knox Creek Plain	Knox Creek Plain (west of and adjacent to Sweetwater)
Ecologia	1997	Ord River Irrigation Area - Stage 2 M2 Development Area Terrestrial Biological Assessment	M2 area (including Sweetwater Stage 1 proposal area)
Ecowise Environmental	2005	Stage 2 M2 Area - Subterranean Fauna Survey	M2 area (including Sweetwater Stage 1 proposal area)
Environment and Heritage Division, Department of Lands, Planning and Environment	2000	Ord River Irrigation Area - Stage 2 Biodiversity Assessment	M2 area (including Sweetwater Stage 1 proposal area)
HLA-Envirosciences	2005	Herpetofauna Survey Ord River Irrigation Area, Stage 2 M2	M2 area (including Sweetwater Stage 1 proposal area)
Kinhill	1999a	A fauna survey of the M2 Development Area of the Ord River Irrigation Scheme	M2 area
Kinhill	1999b	A Vegetation survey to map the vegetation communities of the M2 Development Area of the Ord River Irrigation Scheme	M2 area
Larson	1999	Keep River Aquatic Fauna Survey	Keep River
Metserve	2014	Impacts of the Knox Creek Plain Irrigation Development on the Gouldian Finch	Knox Creek Plain
Pilbara Flora	2010	Flora and Vegetation Survey of Ord Stage 2 Agricultural Areas at Kununurra	M2 area
Pryke	2010	Ord Irrigation Expansion Stage Two: Gouldian Finch Preliminary Survey and Recommendations	Weaber Plain (Goomig)
Pryke	2011	Ord East Kimberley Expansion Project - Weaber Plain Development Area: Gouldian Finch Breeding Assessment	Weaber Plain (Goomig)
Pryke	2012	Ord River Irrigation Area - Weaber Plain Development Project: Gouldian Finch Breeding Surveys	Weaber Plain (Goomig)
Pryke	2013	Ord-East Kimberley Expansion Project - Weaber Plain Development Area: Gouldian Finch Wet Season Feeding Grasses and Habitat	Weaber Plain (Goomig)
Pryke and Svedin	2013	Ord-East Kimberley Expansion Project - Weaber Plain Development Area Gouldian Finch Breeding Surveys (2013)	Weaber Plain (Goomig)
Pryke and Svedin	2014	Ord-East Kimberley Expansion Project - Weaber Plain Development Area Gouldian Finch Non-breeding Population and Habitat Assessment 2014	Weaber Plain (Goomig)
Shedley	2012	Ord River Irrigation Area Fauna Habitat Mapping Project	Weaber Plain and Conservation Reserves established as offsets

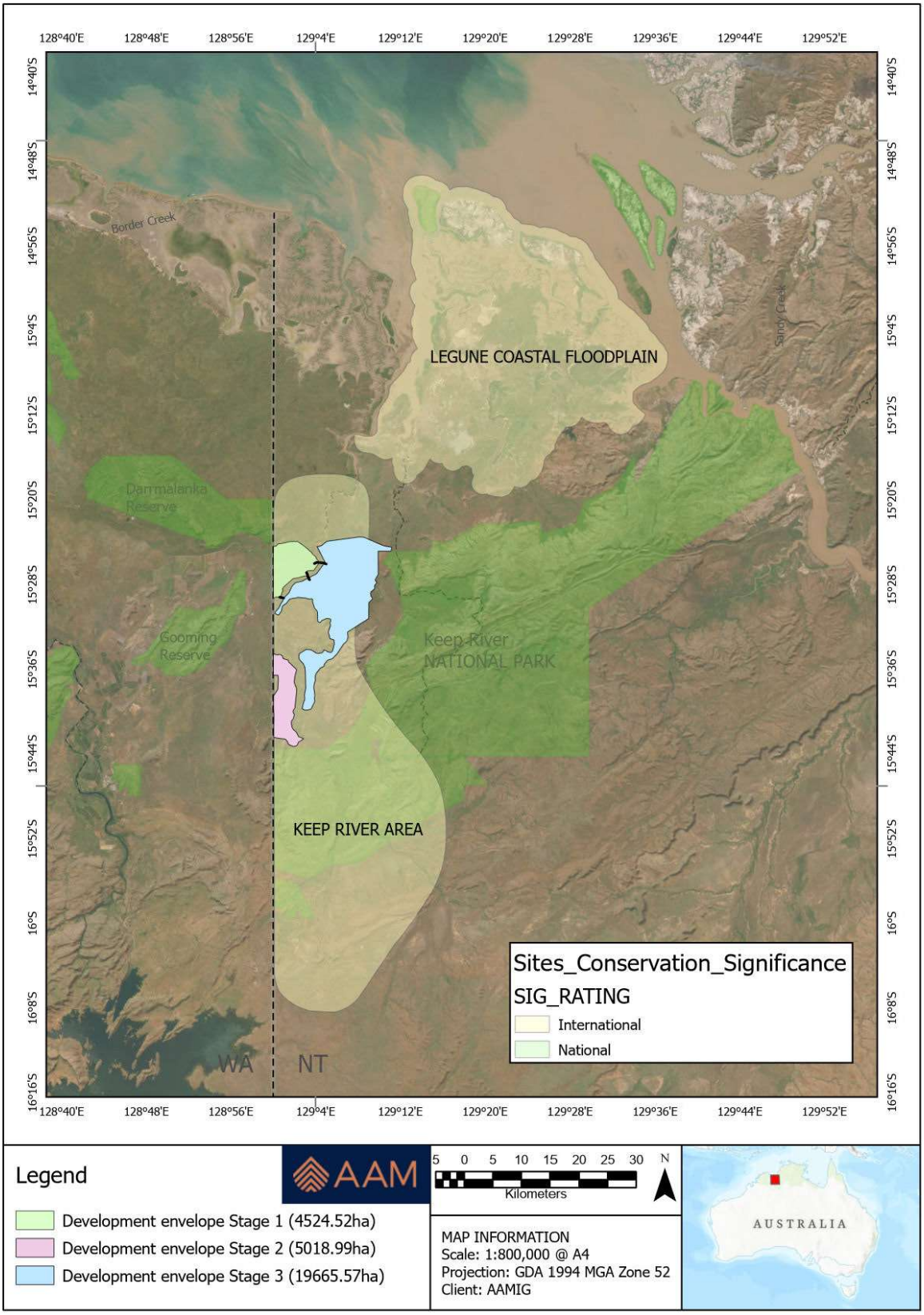


Figure 15. Keep River Site of Conservation Significance

5.3.1 Terrestrial flora

Under the *Territory Parks and Wildlife Conservation Act 1976* (TPWC Act), 70 angiosperm species are listed as *Critically Endangered*, *Endangered* or *Vulnerable*. Of these, 46 are listed under the Commonwealth EPBC Act across the entire NT. A September 2024 search of the Flora NT website by SCA's consultant botanists (Ecosystem Solutions) of the Stage 1 site found none of the listed species have been recorded in the area, either as specimens taken and later botanically confirmed, or by observation. The Commonwealth Protected Matters Search Tool (PMST) identifies no Federally-listed vegetation within a 10km radius of the Sweetwater Stage 1 envelope.

It is noted that *Typhonium* (potentially including *Typhonium sp. kununurra* and *Typhonium sp. keep river*) are likely to be present in the Sweetwater area. Targeted searches for the species will be conducted by suitable people trained in *Typhonium* survey and identification by the Department of Primary Industries and Regional Development (DPIRD)in Kununurra. This is noted in the attached ToR (Attachment C). The area to be surveyed will be specially targeted to key habitat areas, and undertaken in consultation with current and ex-NT herbarium staff. Attachment G presents results of a targeted survey undertaken in February 2025 for *Typhonium sp kununurra* on proposed areas of future development in the Keep River/Sweetwater area.

5.3.2 Vegetation types, structures and condition

Knox and Keep River Plains soils reports, as discussed in section 5, identify 20 different land units based on soil mapping. Vegetation descriptions derived from these and other studies are contained within the NTG's natural resource database (www.data.nt.gov.au). Figure 16 illustrates (with species descriptions) vegetation communities present in the proposal area. The vegetation communities' data is aggregated in Figure 17, which presents the vegetation structure. The project area is dominated, as shown, by low open woodland and low sedgeland.

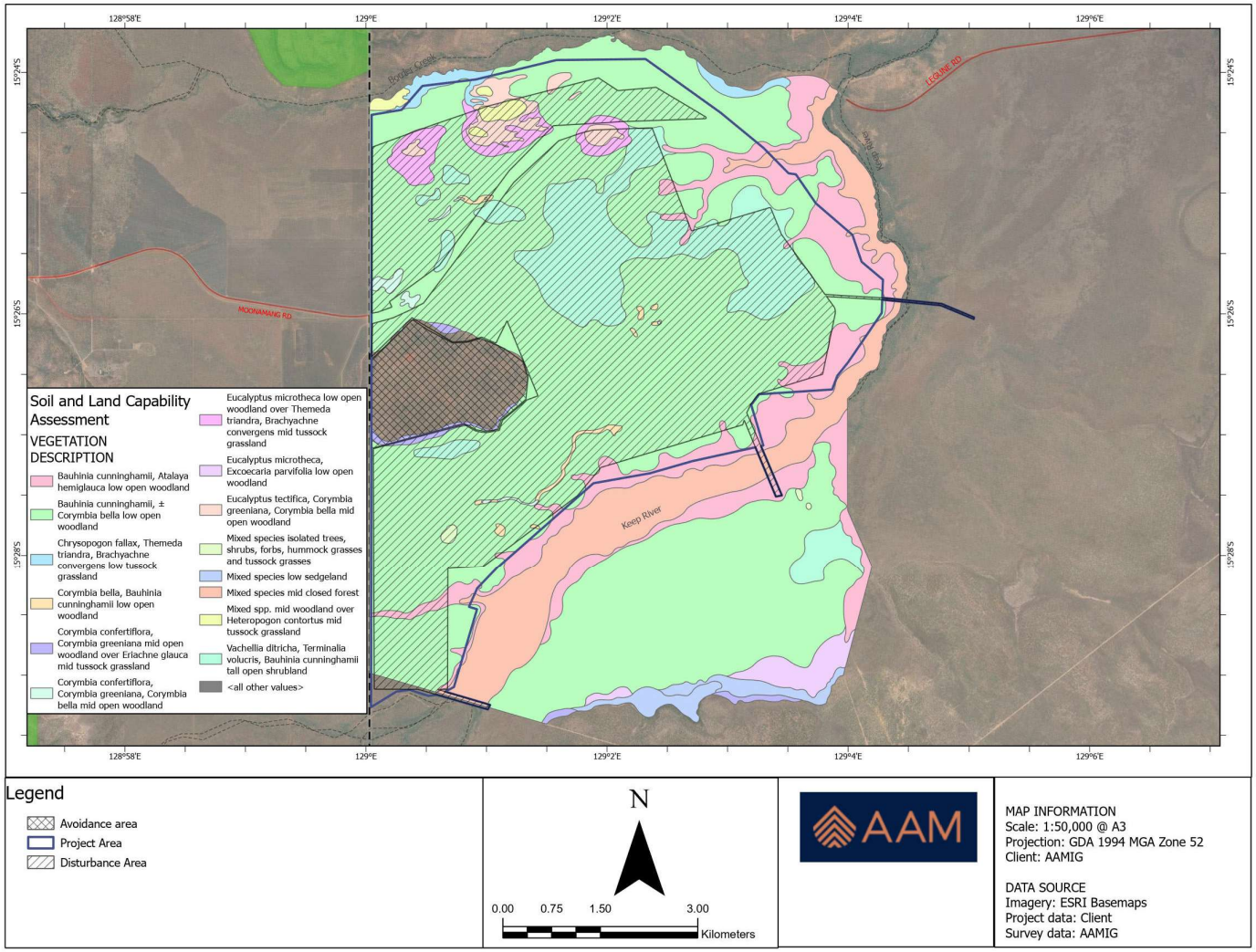


Figure 16. Vegetation Descriptions

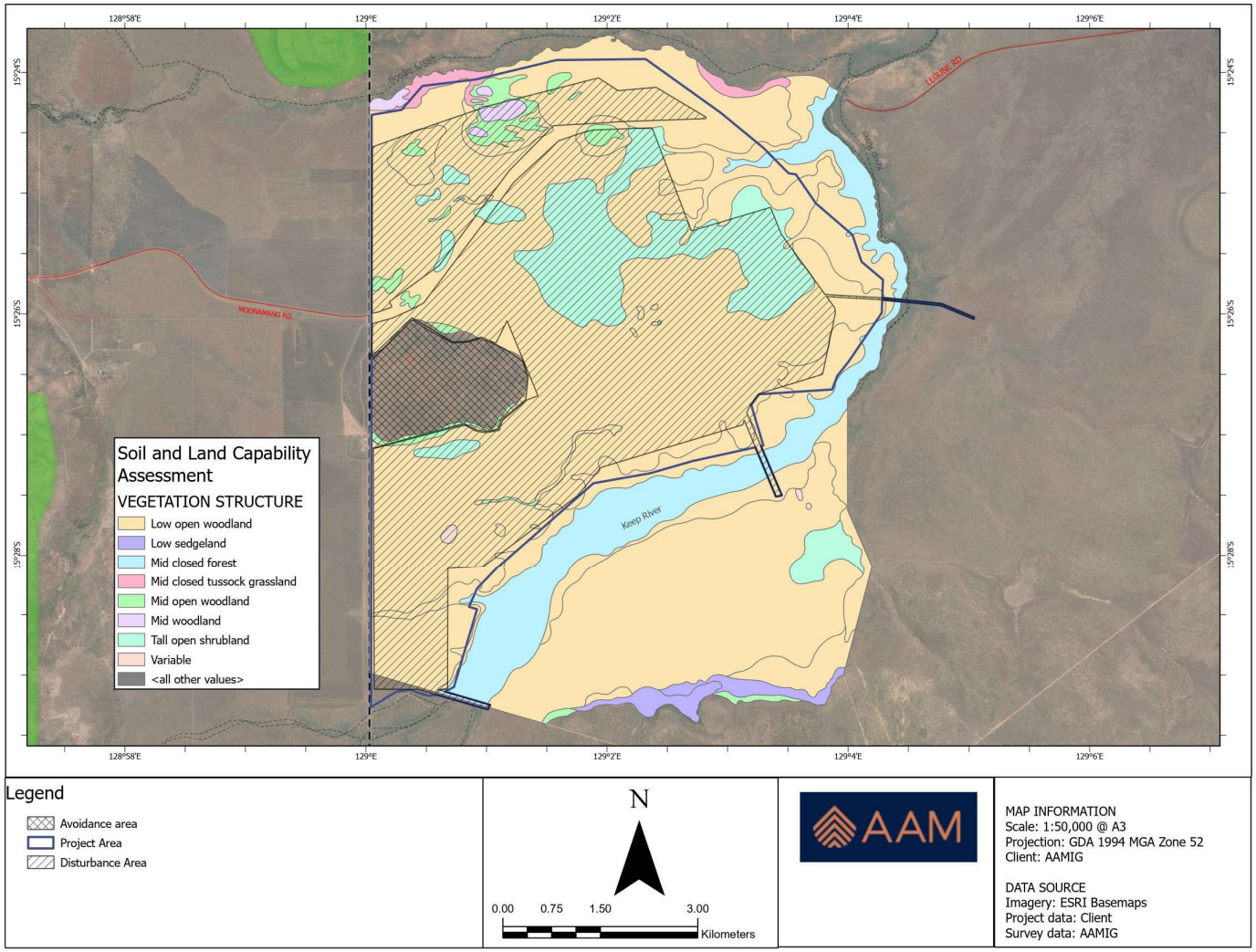


Figure 17. Stage 1 Vegetation Structure

Preliminary (reconnaissance) inspections were undertaken by consultant botanists from Ecosystem Solutions in May 2024. Basic relevee surveys and drone inspections were conducted. Ecosystem Solutions noted the broad categorisations of the vegetation structure and type were reasonably homogeneous (Ecosystem Solutions, 2024). The botanists identified that considerable portions of the site were highly degraded, with evidence of impact of cattle grazing and introduced grasses and pest weeds having reduced the integrity and ecological resilience of the vegetation classes observed. This will be quantified in further detailed surveys of the sites.

Due to the extent of clearing proposed, and to ensure Draft ToR (Attachment C) includes further flora assessments to be undertaken. These are scheduled to occur following the 2025 'wet season' (nominally April/May 2025) when plant flowering enables improved plant identification opportunities, and the onset of the dry season permits access to the black soil plains. The assessment methodology will be consistent with the *Full Characterisation site survey* as described in Brocklehust et al (2007*) Northern Territory Guidelines and Field Methodology for Vegetation Survey and Mapping*, and the *NT EPA Guidelines for Assessment of Impacts on Terrestrial Biodiversity* (NT EPA, 2013a).

Following the completion of the 2025 field studies, an assessment of the significance and residual impacts on terrestrial flora and vegetation communities will inform the EIS.

5.3.3 Terrestrial Fauna

Considerations in relation to terrestrial fauna include the presence of listed species, and their habitats, in order to maintain high quality biological and functional diversity, integrity and services.

Terrestrial fauna species listed under the *Territory Parks and Wildlife Conservation Act 1976* (NT) and the EPBC Act 1999 (Cth) which may be present within a buffer of 10 kilometres of the proposal area are listed in Table 8.

It is noted that the 'simple presence' category is as indicated by the EPBC Protected Matters Search Tool (PMST) in a search conducted on 29 September 2024 (see Attachment E). A preliminary review of available NT records indicates that not all species listed as likely to be present in the PMST have been historically recorded in the region. This will be further explored in the EIS investigations, per the draft ToR attached.

Direct impacts on ecologically significant terrestrial fauna species, and on the habitats that support those species, will be investigated and quantified wherever possible as a key element of the EIS proposed per the Draft ToR (Attachment C).

Numerous fauna surveys have previously been conducted in the adjoining Knox Plain and Sorby Hills landscapes to the west of the Sweetwater Stage 1 area, including those prepared by Sorby Hills (2012) Ecologica (1997) HLA (2005) Kinhill (1999), Ecowise (2005), Lumsden et al (2005) and APM (2009). Other studies, including both species and habitat investigations, have been undertaken in the delivery of the Weaber Plain (Goomig) and Knox Creek Plain environmental approval requirements over the past fifteen years. The EIS will draw on this information, and targeted field surveys to be completed in 2025, to determine the likelihood and significance of impacts upon listed terrestrial fauna. The *NT EPA Guidelines for Assessment of Impacts on Terrestrial Biodiversity* (NT EPA, 2013a) will guide the survey methodologies.

Should mitigatory actions be required, these will be identified during the EIA process and proposed in the final EIS.

Table 8. TPWC Act and EPBC-listed terrestrial fauna species which may be present on Sweetwater Stage 1 ±10km

EPBC-COLOUR CODE
Known to occur in Proposal Area
Likely to occur in Proposal Area
May occur in Proposal Area

Scientific Name	Common Name	Class	Simple Presence	TPWC Act listing	EPBC Act Threatened Category	Migratory Status	Migratory Category	Marine Status
	BIRD SPECIES							
Acrocephalus orientalis	Oriental Reed-Warbler	Bird	May			Migratory	Migratory Wetlands Species	Listed - overfly marine area
Actitis hypoleucos	Common Sandpiper	Bird	Likely			Migratory	Migratory Wetlands Species	Listed
Anseranas semipalmata	Magpie Goose	Bird	May					Listed - overfly marine area
Apus pacificus	Fork-tailed Swift	Bird	Likely			Migratory	Migratory Marine Birds	Listed - overfly marine area
Bubulcus ibis	Cattle Egret	Bird	May					Listed - overfly marine area (as *Ardea ibis*)
Calidris acuminata	Sharp-tailed Sandpiper	Bird	May		Vulnerable	Migratory	Migratory Wetlands Species	Listed
Calidris ferruginea	Curlew Sandpiper	Bird	May	Critically Endangered	Critically Endangered	Migratory	Migratory Wetlands Species	Listed - overfly marine area
Calidris melanotos	Pectoral Sandpiper	Bird	May			Migratory	Migratory Wetlands Species	Listed - overfly marine area
Cecropis daurica	Red-rumped Swallow	Bird	May			Migratory	Migratory Terrestrial Species	Listed - overfly marine area (as *Hirundo daurica*)
Chalcites osculans	Black-eared Cuckoo	Bird	Likely					Listed - overfly marine area (as *Chrysococcyx osculans*)
Charadrius veredus	Oriental Plover, Oriental Dotterel	Bird	May			Migratory	Migratory Wetlands Species	Listed - overfly marine area
Chloebia gouldiae (Erythrura gouldiae)	Gouldian Finch	Bird	Known	Vulnerable	Endangered			
Cuculus optatus	Oriental Cuckoo, Horsfield's Cuckoo	Bird	May			Migratory	Migratory Terrestrial Species	
Erythrotriorchis radiatus	Red Goshawk	Bird	Likely	Vulnerable	Endangered			
Falco hypoleucos	Grey Falcon	Bird	Likely	Vulnerable	Vulnerable			

Scientific Name	Common Name	Class	Simple Presence	TPWC Act listing	EPBC Act Threatened Category	Migratory Status	Migratory Category	Marine Status
Falcunculus frontatus whitei	Crested Shrike-tit (northern), Northern Shrike-tit	Bird	Likely	Not listed	Vulnerable			
Glareola maldivarum	Oriental Pratincole	Bird	May			Migratory	Migratory Wetlands Species	Listed - overfly marine area
Haliaeetus leucogaster	White-bellied Sea-Eagle	Bird	Known					Listed
Hirundo rustica	Barn Swallow	Bird	May			Migratory	Migratory Terrestrial Species	Listed - overfly marine area
Merops ornatus	Rainbow Bee-eater	Bird	May					Listed - overfly marine area
Motacilla cinerea	Grey Wagtail	Bird	May			Migratory	Migratory Terrestrial Species	Listed - overfly marine area
Motacilla flava	Yellow Wagtail	Bird	Likely			Migratory	Migratory Terrestrial Species	Listed - overfly marine area
Numenius madagascariensis	Eastern Curlew, Far Eastern Curlew	Bird	May	Critically Endangered	Critically Endangered	Migratory	Migratory Wetlands Species	Listed
Pandion haliaetus	Osprey	Bird	Likely			Migratory		Listed. In buffer area only
Pezoporus occidentalis	Night Parrot	Bird	May		Endangered			
Rostratula australis	Australian Painted Snipe	Bird	Likely	Endangered	Endangered			Listed - overfly marine area (as *Rostratula benghalensis (sensu lato)*)
Tyto novaehollandiae kimberli	Masked Owl (northern)	Bird	Likely	Vulnerable	Vulnerable			
	MAMMAL SPECIES							
Dasyurus hallucatus	Northern Quoll, Digul [Gogo-Yimidir], Wijingadda [Dambimangari], Wiminji [Martu]	Mammal	Likely	Critically Endangered	Endangered			
Macroderma gigas	Ghost bat	Mammal	Likely	Not listed	Vulnerable			
Petrogale concinna concinna	Nabarlek (Victoria River District)	Mammal	May		Critically Endangered			
Saccolaimus saccolaimus nudicluniatus	Bare-rumped Sheath-tailed Bat	Mammal	Likely	Not listed	Vulnerable			
Trichosurus vulpecula arnhemensis	Northern Brushtail Possum	Mammal	May		Vulnerable			

Scientific Name	Common Name	Class	Simple Presence	TPWC Act listing	EPBC Act Threatened Category	Migratory Status	Migratory Category	Marine Status
	REPTILE SPECIES							
Acanthophis hawkei	Plains Death Adder	Reptile	May	Vulnerable	Vulnerable			
Ctenotus rimacola camptris	Crack-dwelling ctenotus (Keep-Ord Rivers)	Reptile	Known	Vulnerable	Not listed			
Crocodylus johnstoni	Freshwater Crocodile, Johnston's Crocodile, Johnstone's Crocodile	Reptile	May					Listed
Crocodylus porosus	Salt-water Crocodile, Estuarine Crocodile	Reptile	Likely			Migratory	Migratory Marine Species	Listed
Tiliqua scincoides intermedia	Northern Blue-tongued Skink	Reptile	Known		Critically Endangered			
Varanus mertensi	Mertens' Water Monitor	Reptile	Known		Endangered			
Varanus mitchelli	Mitchell's Water Monitor	Reptile	Likely		Critically Endangered			

6. Environmental Factors – Water

6.1. Hydrological Processes

The objective of the NT EPA in relation to hydrological processes is to protect the surface water and groundwater regimes so that environmental values, including ecological health, land uses and the welfare and amenity of people are maintained (NT EPA, 2022b). This includes the supply and quantity of water in rivers, creeks and wetlands and groundwater, and the ecosystems they support, including groundwater dependent ecosystems (GDEs) and stygofauna.

Considerations include present and future uses and users of water, water supplies, and culturally important water features. It is noted that the downstream, coastal portions of the Keep River are traditional fishing grounds, with significant recreational use by residents of and tourists visiting Kununurra and the surrounding region.

As Sweetwater Stage 1 will initially be a dryland farming development augmented by the capture of rainfall runoff, SCA will comply with the NTG's *Surface water take – wet season flow policy* (NTG, 2023). The EIS process outlined in the attached draft ToR (Attachment C) will quantify the available stormwater water which can be diverted and utilised for on-farm irrigation purposes. Data from the nearby Keep River and Border Creek gauging stations will inform this assessment. Water licence application/s will be submitted to the NTG accordingly.

The environmental risks and agricultural feasibility of irrigated agriculture on the Keep River Plains, including the Sweetwater Stage 1 proposal area, have been considered in depth by Short et al (2019) in *A Feasibility Assessment of Irrigated Agriculture on the Keep River Plains*. This review was undertaken by the NT Department of Environment and Natural Resources in conjunction with Geoscience Australia, and informs the project planning. Table 9 summarises recent reports considered by Short et al in this comprehensive review of environmental (and therefore economic feasibility) risks associated with irrigated agriculture. The reports listed are in addition to the multiple studies undertaken prior to 2018 in earlier assessment and planning for agriculture in the region.

Table 9. New Assessments Reviewed by Short et al (2019)

Year	Author(s)	Agency	Title
2018	Dilshad	Water Resources Division (DENR)	Results of the 2017/18 Water Quality Monitoring of the Lower Keep River, NT
2018	Dilshad	Water Resources Division (DENR)	Impact of Landuse on Sediment and Analyte Load Delivery to the Lower Keep River, NT: A Preliminary Modelling Exercise
2019	Gautam	Water Resources Division (DENR)	Keep River Catchment Assessment and Development of a Rainfall-Runoff Model
2019	Gautam	Water Resources Division (DENR)	Keep River Flood Study and Inundation Mapping
2019	Carnavas et al.	Rangelands Division (DENR)	Soil and Land Capability Assessment of the Lower Weaber and Keep River Plain, Northern Territory. Section 1: Lower Weaber and Upper Keep
2019	Carnavas & Burgess	Rangelands Division (DENR)	Soil and Land Capability Assessment of the Lower Weaber and Keep River Plain, Northern Territory. Section 2: Lower Keep
2019	Harris-Pascal et al.	Geoscience Australia	Ord Stage 3 Keep River Plains Hydrogeological Assessment, Northern Territory
2019	McPherson et al.	Geoscience Australia	East Kimberley groundwater borehole completion report, Western Australia and Northern Territory
2019	Mauger and Gordon	Government of South Australia (prepared for Geoscience Australia)	Bonaparte Gulf: Sonic, diamond core and chip HyLogger scanning for Geoscience Australia

Hydrological resource descriptions are provided below. The potential hydrological implications of the proposed Sweetwater development will be considered in depth in the EIS proposed in Attachment C.

6.1.1 Surface Water Resources

The Sweetwater proposal area falls within the Keep River catchment, and specifically between Border Creek to the north and Knox Creek to the south of the development envelope. In the upstream, the Keep River is ephemeral (seasonal). Flows are generally restricted to the wet season, which can commence in October but is usually observed between December and March/April. There is only minimal base flow, if any, in the upper reaches of the Keep River during the dry season from June through to October.

Both the Knox and Border creeks are also seasonal. NTG gauging stations Border Creek Weaber Range (G8100106) and Keep River Legune Road Crossing (G8100225) provide telemetered monitoring of water levels and flows. Upstream of the Legune Road crossing, the main watercourse of the Keep River is reasonably well defined. Secondary flood channels exist parallel to the river along most of the river length. Billabongs and lagoons occur at various locations on the upstream floodplain, particularly within former drainage lines of the river. The Keep River has a catchment of over 5,000 km2, of which the Sweetwater Stage 1 envelope comprises less than 1 per cent. The river is highly dynamic and can be classified as moderately disturbed due largely to a century of cattle grazing along its banks.

Figure 18 illustrates the location of the Keep River pools currently monitored by the WA DPIRD and other environmental approval holders, in relation to water quality. The pool nomenclature, including the 'K4 pool' being the 1.5 kilometre stretch upstream of the Legune Road crossing, will be adopted in the EIS proposed per the draft ToR. This will ensure consistency with existing WA and Commonwealth Government environmental approvals monitoring requirements. Anecdotal evidence also indicates that there was no dry season flow out of this pool prior to 2000. Since 2001, pool K4 has maintained dry season flow, under natural conditions (including increase in rainfall recharge to groundwater in recent decades).

Bennett & George (2011) describe that groundwater now discharges continuously during dry seasons from the K4 to the K3 pool. Tidal interchange occurs in the K1, K2 and K3 pools, effectively providing year-round flow in the Keep River (ie the pools do not regularly become isolated). Due to the tidal influence, the water quality (particularly in relation to EC levels) within the Keep River is highly variable in the K1-K3 pools.

Surface water changes associated with the proposed development could include increased stream flow arising from land clearing; and changes in flow dynamics due to the drainage, storage and levee bank systems proposed for the Stage 1 development. These will be investigated and quantified (wherever possible) in the EIS process to assess their significance. This will be undertaken in line with the requirements of the NTG's *Surface water take – wet season flow policy* (NTG 2023) to ensure long term sustainability. Flow-related environmental outcomes will then be quantified, and mitigation proposed if impacts are considered significant.

Following their review of the irrigation feasibility of the area including the Sweetwater Stage 1 proposal envelope, Short et al (2019) made the following technical recommendations to further improve the surface water knowledge prior to cropping development:

- *Update rainfall-runoff model to incorporate LiDAR DEM, and to include Sandy Creek and coastal influences.*
- *Undertake and maintain surface water quality monitoring to track baseline conditions before and after any development.*
- *Undertake targeted investigations to determine groundwater contributions to streamflow and water quality.*

(Short et al, 2019, p45).

These matters will be addressed in the EIS, per the draft ToR, including an assessment of the significance of any surface water impacts arising from Stage 1.

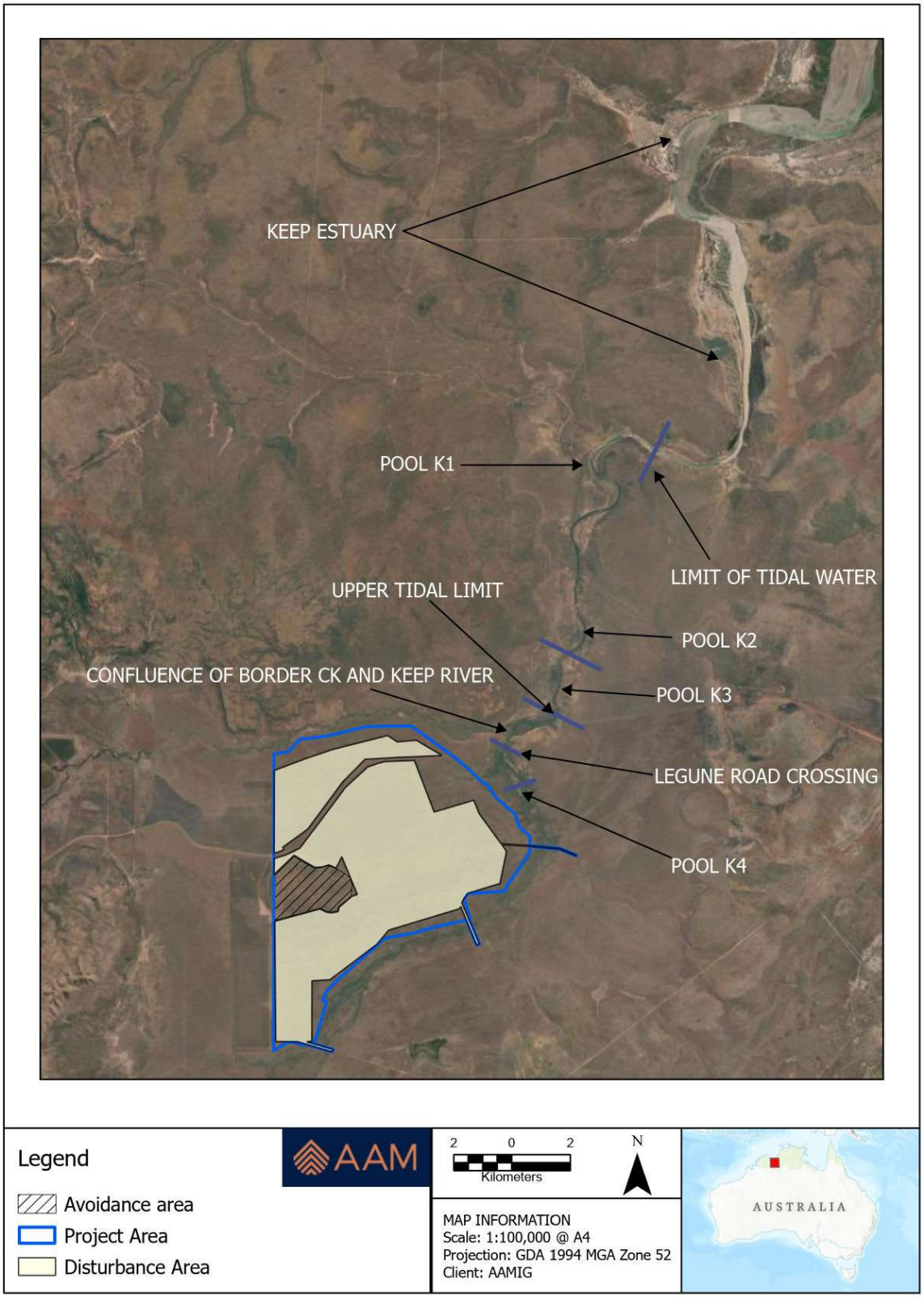


Figure 18. Keep River Pools and Extent of Tidal Influence

6.1.2 Flooding and Surface Drainage

Flood risk in the Sweetwater Stage 1 proposal area is mapped earlier in this document in Figure 5, which indicates the extent to which flood risk (and associated features such as topography per Figure 8) have guided the project planning and informed the application of avoidance and minimisation strategies.

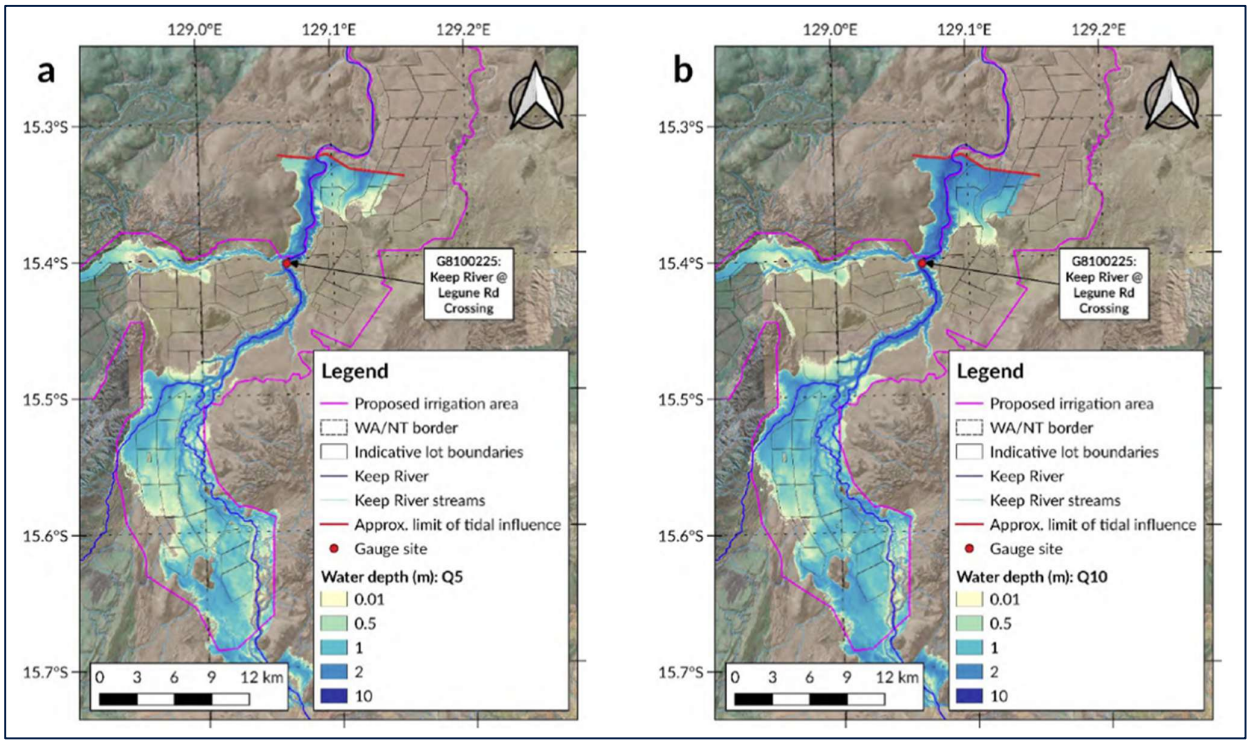
Flood risk and drainage have been considered in the irrigation feasibility and land capability assessment completed for the (former) NT Department of Environment and Natural Resources (DENR) by Short et al (2019) and Carnavas et al (2019) respectively.

Figure 19, taken from Short et al (2019), illustrates the 1-in-5-year (Q5) and 1-in-10 year (Q10) flood event scenarios for the broader Knox and Keep River plains area. Notably, in both modelled scenarios, the Stage 1 proposal area predominantly avoids inundation, as shown.

Figure 20 and Figure 21 reflect the flood and drainage risks to soil capability identified during that assessment. The bulk of the project site is classified as 'moderate to imperfect' or 'imperfect' drainage, reflecting the combined interactions of the surface water hydrology, coastal processes (for example, tidal influence in the lower Keep River pools and estuary), and the topography of the lower Weaber Plain.

These interactions, and their potential for environmental impact when the proposed development commences, will be considered in the EIS, per the attached draft ToR. The mitigation of flood and drainage-related impacts, including through the use of levee banks and controls to ensure fertiliser and chemical use on farm is not lost to the downstream environment.

In addition to the flood and drainage mapping provided below, sub-surface drainage and associated salinity risks are discussed further in section 6.1.3.



(Source: Short et al, 2019, p29)

Figure 19. Water Inundation Depth Modelled for Q5 and Q10 Event Scenarios

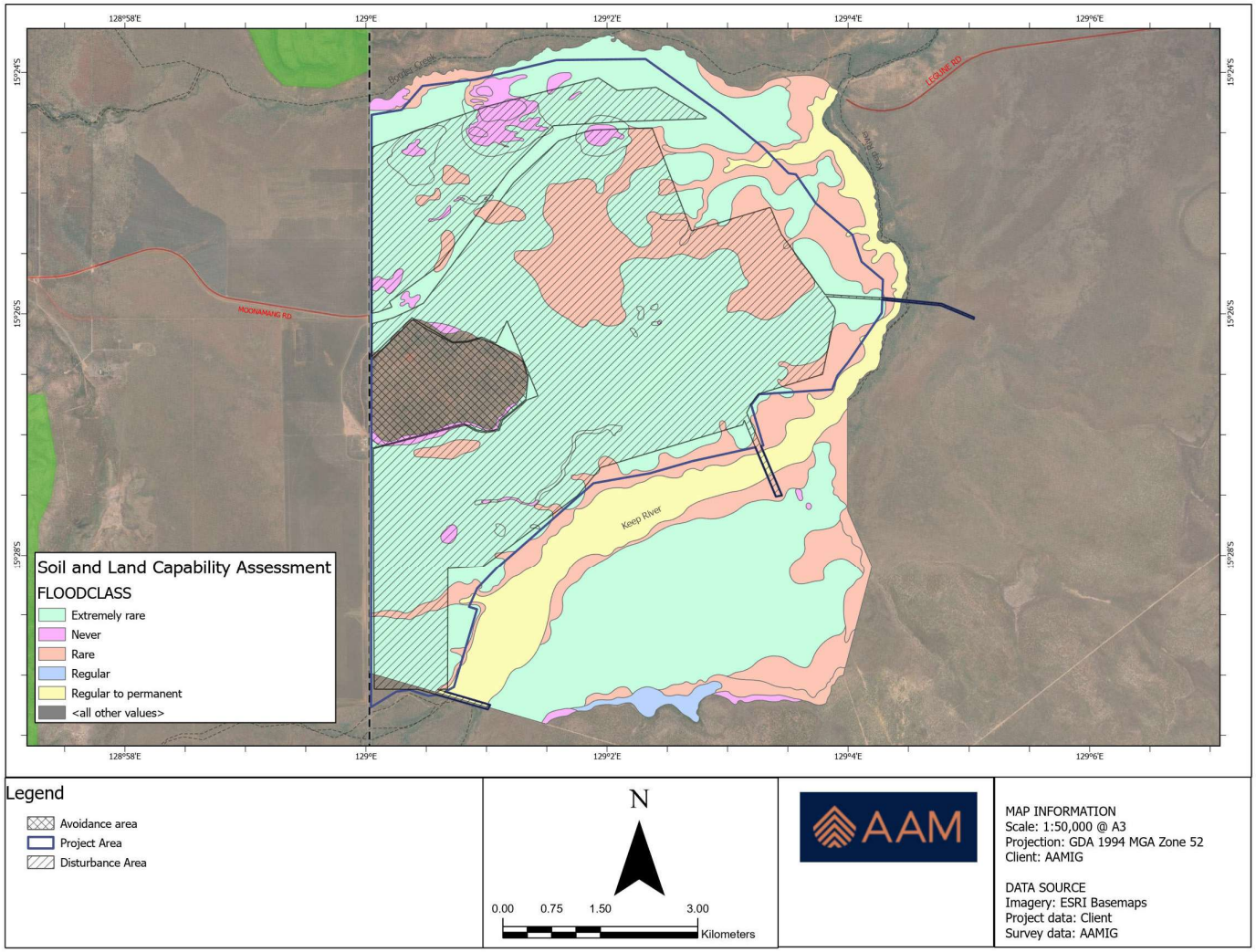


Figure 20. Flood Class

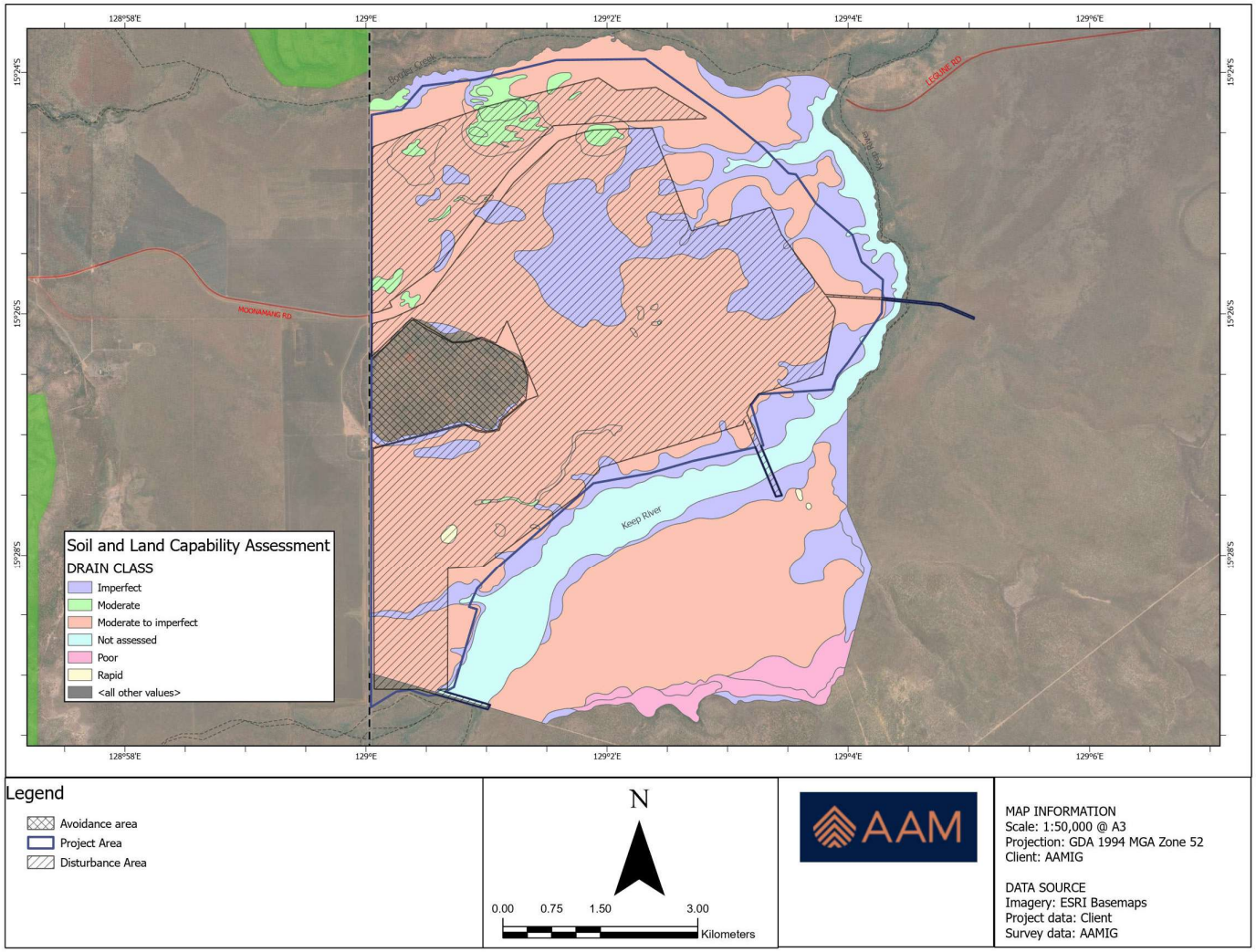


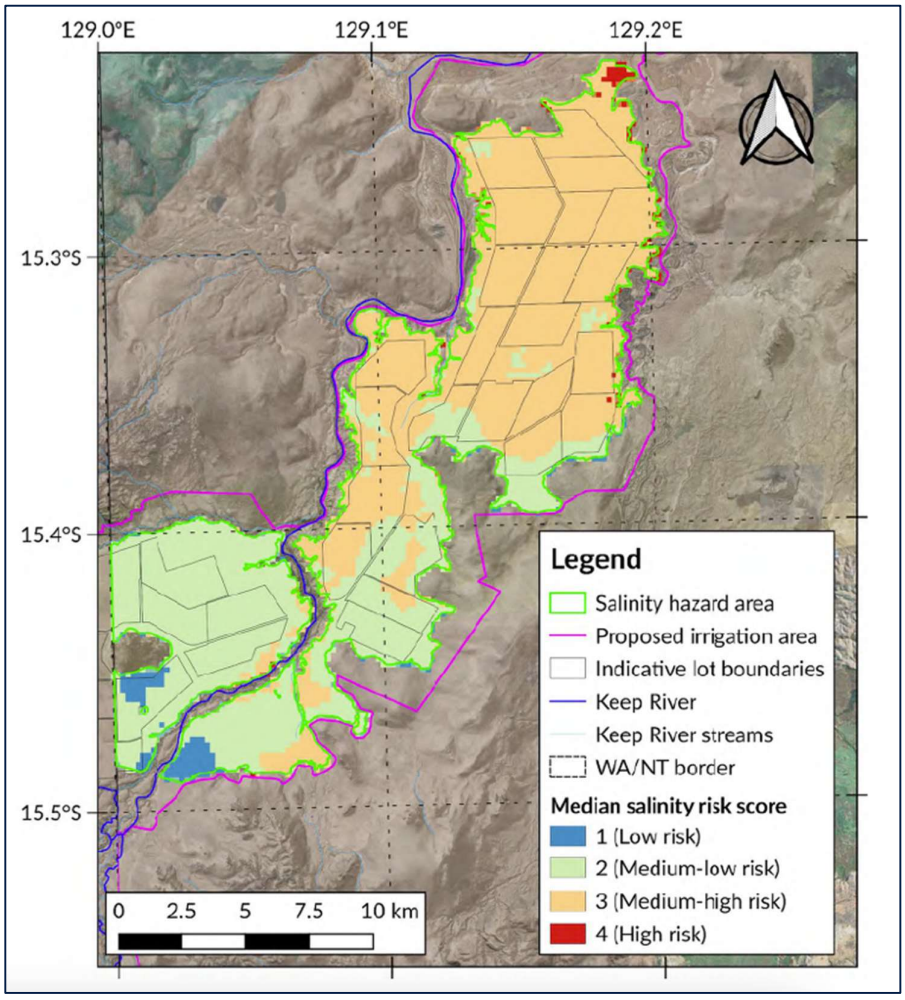
Figure 21. Drainage Class

6.1.3 Groundwater

The groundwater receiving environment of the lower Weaber Plain and surrounding areas has been the subject of multiple and ongoing studies and modelling over recent decades, including those by Humphries (1995), Chin et al (1997), O'Boy et al (2001), KBR (2005 and 2011) and the WA Government through the (George et al, 2011), and Harris-Pascal et al (2019).

Environmental impacts to be considered include groundwater chemistry change arising from clearing and farming, and the implications of natural and induced groundwater rise, including in relation to soil salinity risk (see below) and the volume and quality of water naturally discharged into the Keep River. Additionally, as identified during the Ord Stage 2 (Weaber Plain) environmental approvals processes, the proposed management of groundwater across the region includes dewatering. The use and implications of dewatering options, if ever required, is a further consideration.

The comprehensive review of available literature and data completed for the irrigated agriculture feasibility assessment (Short et al, 2019) found that soils in the Sweetwater Stage 1 area exhibited low or medium-low salinity risk when combining soil salinity, soil drainage potential, shallow groundwater salinity and depth to water table. Figure 22, taken from this assessment, indicates the overall salinity risk for Stage 1 and other areas.



(Source: Short et al, 2019, p23)

Figure 22. Soil salinity risk, informed by depth to groundwater

The work by Short et al (2019), on reviewing available geophysical data, drilling reports and groundwater studies applicable across the entire study area including substantial (higher risk) areas outside of the Sweetwater Stage 1 proposal envelope, and comparing these with Ord Stage 2 assessments, provided the following recommendations which will be considered in the EIS:

- *Overall, there is limited available data on groundwater levels, quality, distribution and dynamics, and sub-surface salt stores in the proposed Ord Stage 3 area. Additional data acquisition and interpretation would be required to enable a robust hydrogeological assessment of the area, including implications for potential development of irrigated agriculture.*

- *There is evidence for relatively shallow saline to hypersaline groundwater underlying significant parts of the Ord Stage 3 area. This would pose a significant threat to irrigated agriculture. The highly saline nature of this groundwater makes dealing with the consequences of watertable rise due to irrigation leakage more difficult, when compared with parts of the existing Ord Stage 1 and 2 areas underlain by relatively fresh groundwater.*

- *There is also evidence of very high salt loads stored in the subsoils in parts of the Ord Stage 3 area. Closer to the coast, high groundwater salinity associated with dynamic seawater intrusion into the aquifer also compounds salinity management.*

- *Monitoring bores in the WA portion of the Keep River Plains show a recharge response associated with above average rainfall and associated inundation. On this basis, there is a likelihood of watertable rises in the Ord Stage 3 area due to recharge responses from land clearing and irrigation development, which could trigger salinity management issues. Designing and implementing the most appropriate cropping and irrigation strategy to minimise recharge and watertable rise is essential.*

- *Initial satellite-based time-series monitoring shows evidence of inundation for the upper parts of the Keep River Plains as well as near-coastal zones, warranting further assessment of the issue.*

- *The identification of potentially significant salinity and inundation hazards in the proposed Ord Stage 3 area warrants a more detailed assessment to properly identify the risks to any proposed irrigated agricultural activity and also to potential Australian Government investment.*

(Short et al, 2019, p45).

The geographic and hydrological relevance of each of these points to the Sweetwater Stage 1 area will be considered in the environmental impact assessment. The higher risk areas, as illustrated in Figure 22, are outside of the Stage 1 envelope, and the north-eastern Lower Keep River high risk zone is not proposed for development (refer to proposal areas in Figure 6. Sweetwater - All Stages).

The significance of salinity risk in the Stage 1 area will be addressed in the EIS, per the attached draft ToR. Impact assessment will also consider options for dewatering, should it be required, in line with nearby environmental approvals (including Weaber Plain, Sorby Hills and the Knox Plain agricultural development).

Increased groundwater discharge into the Keep River K4 pool (see Figure 18) and downstream water quality and associated aquatic fauna implications of this increased freshwater inflow will also be considered in the EIS, to assess whether any impacts on water quality and riverine health will be significant. This is further discussed in section 6.2, below.

Figure 23 illustrates the locations of existing groundwater monitoring bores for which varying extents of time series groundwater depth and water quality data may be available. As addressed in the draft ToR, SCA will access available data to inform the pre-development assessments required. This baseline will guide operational monitoring and management responses.

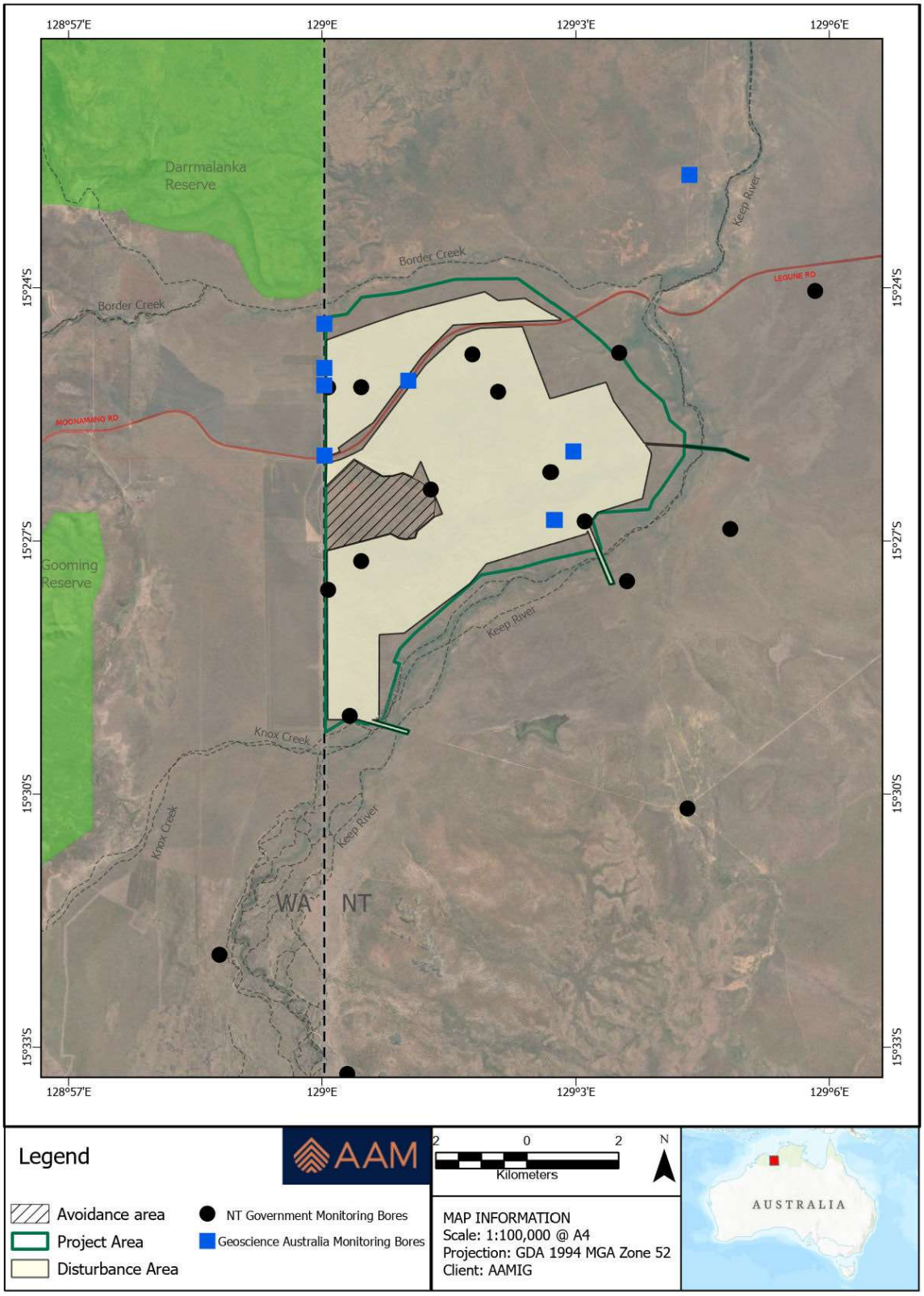


Figure 23. Existing Groundwater Monitoring Bore Network

6.2. Inland Water Environmental Quality

The NT EPA's objective for inland water environmental quality relates to the quality of water in surface water features including creeks and wetlands, billabongs, intermittent (or seasonal) stream areas and drainage lines. As illustrated in Figure 8, the Sweetwater Stage 1 proposal area has ephemeral creeks (Border Creek and Knox Creek) to the north and south, and the Keep River to the east.

The potential impacts of the proposal on this inland aquatic system include changes to groundwater inflow to the Keep River, arising from land clearing, and the potential for farming-related impacts, which may impact on water quality in the river system itself, and on threatened species present in the river.

Aquatic fauna species listed as Matters of National Environmental Significance under the *EPBC Act 1999* (Cth) and the *TPWC Act 1976* (NT) known to be present in the Keep River are listed in Table 10.

Table 10. TPWC and EPBC Act-listed aquatic species known to be present in the Keep River

Scientific Name	Common Name	Class	Simple Presence	TPWC Act listing	EPBC Act Threatened Category	Migratory Status	Migratory Category
Pristis clavata	Dwarf Sawfish	Shark	Known	Vulnerable	Vulnerable (did not appear in PMST search 29/9/24)		
Pristis pristis	Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish	Shark	Known	Vulnerable	Vulnerable	Migratory	Migratory Marine Species

Baseline water quality and aquatic fauna studies of the Keep River were completed in 2013 as a requirement of the Weaber Plain EPBC approval 2010/5491, with post-development studies undertaken in recent years. Annual Keep River water quality monitoring (by others) continues as a requirement of EPBC 2010/5491 and the Knox Creek Plain EPBC approval 2014/7143.

These studies have included sediment sampling, targeted sawfish and shark surveys, and aquatic fauna ecological health assessment via macroinvertebrate, fish and water quality sampling in the Keep River pools and five reference sites. A summary of recent studies is provided in Table 11. The draft ToR for the EIS includes integration and compliance with existing Keep River water quality monitoring and management activities which have been informed by these studies.

Table 11. Relevant Aquatic Fauna Studies

Author	Year	Title	Geographic relevance
Larson	1999	Keep River Aquatic Fauna Survey	Keep River
Storey et al.	2005	Aquatic Fauna Survey of the Ord Stage II M2 Area	M2 area
Wetland Research and Management	2010	ORIA Stage II Expansion Aquatic Fauna Surveys - Late Wet Season Sampling 2009 Final Report	Keep River
Wetland Research and Management	2011	ORIA Stage II Expansion Weaber Plain / Keep River Water Quality and Aquatic Fauna Sampling 2009-2010	Keep River
Wetland Research and Management	2013a	Keep River Baseline Aquatic Fauna and Targeted Fish Surveys September/October 2011	Keep River
Wetland Research and Management	2013b	ORIA Stage II Expansion Lower Ord River Aquatic Fauna Monitoring - Synthesis of Baseline Surveys	Lower Ord
Wetland Research and Management	2014	Keep River Baseline Aquatic Fauna and Targeted Fish Surveys	Keep River
Shelley et al.	2018	A Guide to the Freshwater Fishes of the Kimberley	Kimberley / NT
Wetland Research and Management	2020	First Post-Development Aquatic Fauna and Targeted Sawfish Survey - 2020	Keep River
Indo-Pacific Environmental	2021	ORIA Stage II Expansion Post-Development Keep River Aquatic Fauna and Targeted Sawfish Survey 2021	Keep River
Indo-Pacific Environmental	2022	ORIA Stage II Expansion Post-Development Keep River Aquatic Fauna and Targeted Sawfish Survey 2022	Keep River

The final of three post- development aquatic fauna surveys required under that approval found that, in relation to the irrigation development on the Weaber Plain (Goomig farmlands), there was "no evidence found in 2022 to suggest that the development has had any adverse impacts on the water or sediment quality in the Keep River" (Indo-Pacific Environmental, 2023, piii). The survey report also notes, in relation to water quality and species presence, the following:

> *Although there were several exceedances of site-specific guideline values in 2022 for general water quality parameters, the majority were considered to be the result of natural processes, particularly tidal influence, a lack of rainfall and runoff, and increased evapoconcentration due to above average air temperatures around the time of the field survey. Nutrient concentrations in water and sediment were similar to those recorded in 2021. Sediment concentrations of metals did not increase markedly compared to the results of previous years at most sites except at K4, where the concentrations of most metal analytes were at least double those recorded in 2021. These results are not likely to be attributable to any inputs or releases from the Goomig development via Border Creek, as K4 is situated upstream of its confluence with the Keep River. The observed increases may be due to ongoing leaching of metal contaminants from roadworks and bridge construction on the nearby Legune Road, which took place in September 2020.*
>
> *Consistent with all previous surveys of the Keep River, no Glyphis (River Shark) species were captured in 2022. A solitary* Pristis pristis *(Largetooth Sawfish) individual was captured at K3 [pool] in brackish water, while six* Pristis clavata *(Dwarf Sawfish) were captured at site K1. This was the first time this species has been recorded at a non-estuarine site in the Keep River system, a result attributable to the higher than usual salinity levels at K1 in 2022. Total numbers of* Pristis *captured in 2022 were comparable to previous surveys and were within the range of numbers expected based on the magnitude of rainfall and runoff experienced during the preceding wet season, indicating that there have been no recent adverse impacts on* Pristis *in the lower Keep River.*
>
> (Indo-Pacific Environmental, 2023, piii).

This previous data provides a timely and relevant comprehensive baseline for assessing inland water quality in relation to the impacts, if any, of the proposed development on the Keep River and the significant species it supports.

Development-related risks to inland environmental water quality could nevertheless include changing water chemistry, through nutrient increases or potential farm chemical loss. Risk avoidance will be implemented through design inclusions included riparian setbacks, levee banks around the development, stormwater retention (particularly late in the wet season following the application of fertilisers and/or herbicides) and in irrigation water recycling in the future.

Appropriate risk avoidance, management and monitoring measures will be discussed in the EIS per the attached draft ToR, and will integrate with existing regional efforts in relation to Keep River water quality and aquatic fauna protection.

7. Environmental Factors – Air

7.1. Air Quality

The NT EPA's factor objective is to protect air quality and minimise emissions and their impact, so that environmental values are maintained. This relates to ambient air quality in the local airshed, the chemical, physical and biological characteristics of quality air, and the biological processes that depend upon quality air (NT EPA, 2022).

The receiving environment in relation to air quality is predominantly the immediate vicinity of the Sweetwater Stage 1 development. During clearing and development, this will include localised dust generation. Upon commencement of farming, seasonal cultivation practices may temporarily create dust issues, however these will be managed to reduce topsoil loss for environmental and commercial reasons.

As discussed earlier in this referral document, there are no permanent residences near to the Sweetwater Stage 1 area, for which human health impacts may be of significance.

Air quality matters are not anticipated to be of significant consequence in relation to Sweetwater Stage 1.

7.2. Atmospheric Processes

The NT EPA seeks to minimise greenhouse gas (GHG) emissions so as to contribute to the NTG's goal of net zero emissions by 2050. Relevant to this agricultural development is the volume of emissions which may be emitted during the clearing and development phases, then on an annual basis during agricultural production activities.

This will be addressed in the EIS through a thorough investigation of the GHG emissions risks, including options for minimisation and mitigation. Nationally-accepted emissions calculation frameworks (such as the FullCAM model) will be applied, with modelling outcomes compared to agricultural industry benchmarks. From this work, an assessment of the significance of the project upon GHG targets will be made. This matter is included in the draft ToR (Attachment C).

8. Environmental Factors – Sea

The NT EPA's objectives for 'sea' factors relate to impacts upon coastal morphology and marine environmental quality.

The Sweetwater Stage 1 proposal will neither directly nor indirectly impact on coastal morphology.

Proposal activities that could potentially impact upon marine environmental quality are more relevantly assessed under the factor 'Inland Water Environmental Quality', per section 6.2, in relation to Keep River water quality changes. Figure 18 illustrates the extent of the tidal water in the Keep River, and the 'upper tidal limit' indicating the location where tidal push (force) is no longer observed.

The attached draft ToR excludes sea factors on this basis. It is unlikely that significant marine impacts will arise from this proposal.

9. Environmental Factors – People

9.1. Community and Economy

The objective of the 'community and economy' factor is to enhance communities and the economy for the welfare, amenity and benefit of current and future generations of Territorians (NT EPA, 2022b). Specifically, the NT EPA considers the communities and towns where people live, the aspirations of those communities for a liveable environment, good amenity (including air quality, aesthetics and noise), access to natural resources, infrastructure, recreation, jobs and education. Impacts on vulnerable sectors of the community are also a focus.

Guidance provided by the NT EPA includes the Guidelines for the Preparation of an Economic and Social Impact Assessment (NT EPA, 2013b) and the Stakeholder Engagement and Consultation Guide (NT EPA 2022c). Further advice is taken from the publication *Interim Engaging with First Nations People and Communities on Assessments and Approvals under the Environment Protection and Biodiversity Conservation Act 1999* (DCCEEW, 2023).

In the Northern Territory, the closest town is Timber Creek, approximately 150 kilometres south-east of the site. The nearest regional centre is Kununurra in WA. The closest occupied facilities are at Legune Station (also owned by AAM); Kneebone outstation community 10 kilometres to the east, and the Marralum outstation community 20 kilometres to the east, which are both not permanently occupied. There are also farm service facilities including worker accommodation on the Knox Creek Plain.

Timber Creek has a population of 278 people, of which (at least) 55.8% are Aboriginal or Torres Strait Islander (ABS, 2021 census data). The median age is 33. Most recent census data for Kununurra indicates a population of 4,515 people, of which approximately one third is Indigenous (ABS, 2021).

Marsden Jacob Associates (MJA) was recently engaged by the NTG, with support from the Commonwealth Government through the National Water Grid (fund), to prepare a preliminary business case for extending water supply to the 'Ord Stage 3' area which includes Sweetwater Stage 1 (MJA, 2024). The MJA assessment addressed opportunities and constraints, including those relating to people and community. Social and economic impact summaries from this analysis are directly relevant to the Stage 1 proposal in that they demonstrate the potential outcomes of the agricultural development.

MJA (2024) found that extending irrigation supply to the (Sweetwater) area will generate between $28-$81m in direct economic benefits, and $128m-$276m in value add to the Australian economy through agricultural output. Across the full Sweetwater development (all stages), enabling agricultural production through water supply could support between 1,291 and 2,781 full time equivalent jobs, directly on-farm and indirectly across processing, production and supply chains. The MJA assessment found that the entire development proposal could "*drive sustainable economic growth in the Wyndham-East Kimberley and Victoria Daly Local Government Areas, and the broader regional economy, through increased agricultural outputs and the project's ongoing operations"* (MJA, 2024, p30).

Social impact and benefits will require careful consideration and ongoing engagement, given the population of the region includes marginalised First Nations members who have had varying degrees of access to the economic and social benefits of agricultural development to date. MJA (2024) summarises previous analyses of the Ord Stage 2 development, and notes that previous reviews recommend ways of doing things differently for better socio-economic outcomes:

- *Engaging First Nations people in the project's design and delivery to ensure that potential opportunities match community aspirations, and that potential cultural impacts are appropriately managed.*
- *Leveraging procurement, employment and training policies to create targeted and specified opportunities for First Nations people and businesses.*
- *Leveraging HR, recruitment and retention policies to create targeted and specified professional development and career progression opportunities for First Nations employees.*
- *Implementing cultural safety policies and practices to ensure workplaces are safe for and supportive of First Nations employees and contractors.*

(MJA, 2024, p31).

These matters will be the subject of consideration in the EIS to be prepared for the Sweetwater Stage 1 proposal. The attached draft ToR incorporates social, economic and First Nations outcomes. These will be integrated with Indigenous Land Use Agreement (ILUA) discussions with the Traditional Owners for whom Native Title has been determined, and for residents of Kneebone and Marralum communities.

9.2. Culture and Heritage

The objective of protecting culture and heritage applies to this NT EPA factor. The proponent also has obligations under *Heritage Act 2011* (NT) and Commonwealth heritage legislation and is working with Traditional Owners to ensure known cultural heritage sites are protected, and to establish avoidance and risk mitigation processes should any new sites be identified during development.

Informed by AAPA certificates reflecting registered cultural heritage mapping, the Sweetwater Stage 1 proposal area has been developed on the basis of avoiding known sites. The proposed draft ToR addresses culture and heritage requirements to avoid future risk to known and unknown sites.

Further, the proposal area avoids the historic Spirit Hills pastoral lease homestead site.

9.3. Human Health

The NT EPA's 'human health' factor objective is to protect the health of the Northern Territory population. As noted earlier, seasonally occupied community living areas at Kneebone and Marralum, and station and farm worker accommodation at Legune and Knox Plain, are the closest potential human receptors of impacts from the Sweetwater Stage 1 proposal.

Matters such as drinking water quality and air quality (with the exception of short term impacts during clearing and annual cultivation practices) should not be significantly impacted by this development.

10. Cumulative Impacts

The development of 3,269.37 hectares of agricultural land on the Sweetwater Stage 1 proposal will add to the ~14,000ha Ord Stage 1 area, ~7,500ha Goomig and ~5,000ha Knox areas of Ord Stage 2, and the ~3,000ha Carlton Plain agricultural area potentially serviced by irrigation water supplied from Lake Argyle through the Ord River Irrigation Scheme.

The cumulative impacts of Ord Stages 1 and 2 in WA, and the expansion into the NT, will be addressed in the Environmental Impact Statement, per the attached draft ToR. This will include direct, indirect, cumulative and facilitated impacts associated with the factors outlined in this referral document, and the EPBC-listed Matters of National Environmental Significance (MNES).

Section 13 specifically addresses the MNES which may be affected by the proposal.

The EIS will further discuss the staging proposed, and how this may affect the significance of the overall environmental outcomes in relation to the factors and the MNES.

11. Draft Terms of Reference – NT EPA Environmental Impact Assessment

The draft terms of reference for the environmental impact assessment to be conducted to inform the NT EPA's assessment of the Sweetwater Stage 1 proposal is appended as Attachment C. It is expected that the final terms of reference will be sufficient to meet the requirements of both the NT EPA in relation to the EPA Act 2019 (NT) and the DCCEEW in relation to the EPBC Act 1999 (Cth).

12. Statement of Reasons

The Statement of Reasons supporting the draft ToR is appended as Attachment D. This document outlines the rationale for the inclusion of relevant matters in the terms of reference.

13. EPBC Act 1999 Referral

13.1. Matters of National Environmental Significance

A search of the EPBC Protected Matters Search Tool was undertaken for the Stage 1 envelope plus a ten (10) kilometre buffer on 29 September 2024. Figure 24 illustrates the search area.

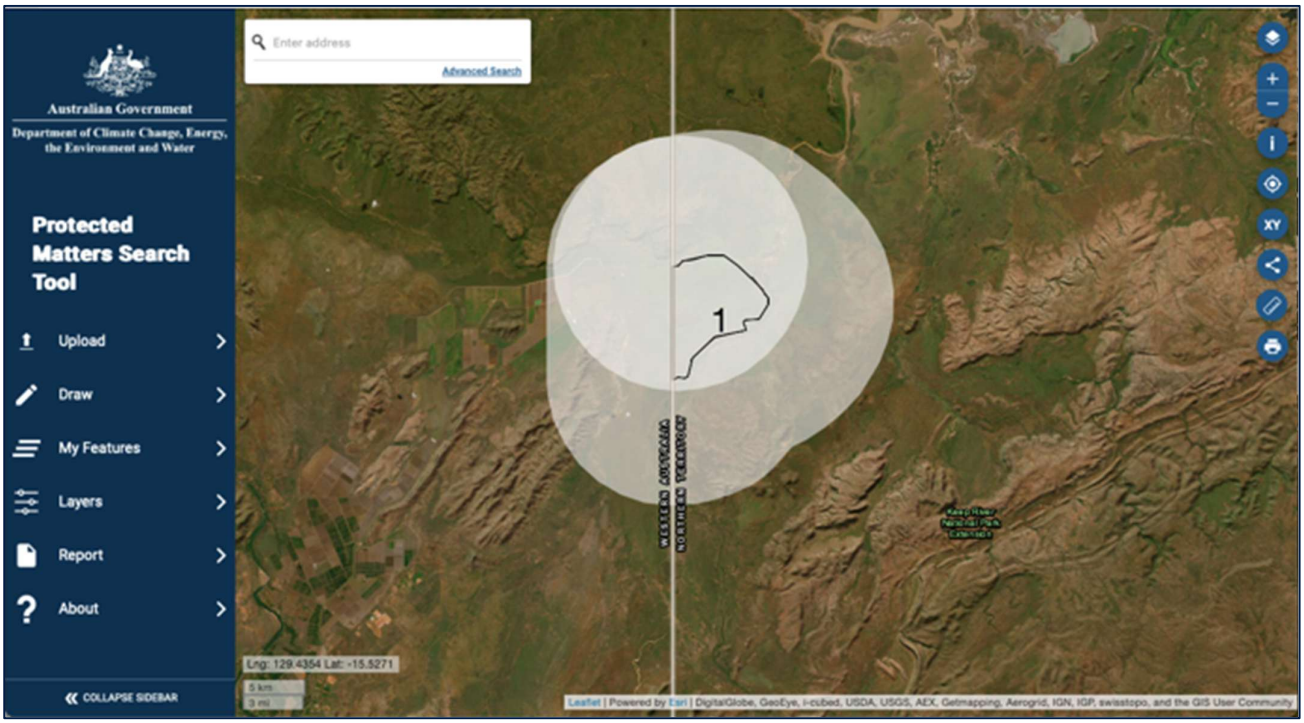


Figure 24. EPBC Act Project Matters Search Tool - Mapping Area

The search report generated from the PMST (Attachment E) listed the matters summarised in Table 12. The detailed assessment of the flora and fauna MNES (listed by species in Table 13), and the potential impact of the Stage 1 proposal on the listed species, will be addressed in the EIS proposed in the Draft ToR.

Table 12. Summary - Matters of National Environmental Significance

PMST Feature	#	Cross-Reference
State and Territory Reserves	3	Refer to Figure 3
Regional Forest Agreements	0	N/A
Nationally Important Wetlands	0	N/A
Nearby EPBC Act Referrals	5	2023/09576 Sorby Hills Silver Lead Zinc Project 2017/7856 Moonamang Road to the WA/NT Border 2014/7143 Knox Creek Plain Irrigation Development 2011/6230 Sorby Hills Silver Lead Zinc Project 2010/5491 Weaber Plain Project
Key Ecological Features	0	N/A
Biologically Important Areas	0	N/A
Bioregional Assessments	0	N/A
Geological and Bioregional Assessments	0	N/A
Listed Species – Proposal Area + 10km buffer	39	Refer to Table 13

13.2. Flora and Fauna MNES

The EPBC-listed species known, likely or which may occur in the Stage 1 proposal area +/- a 10km buffer include 27 bird species, 5 mammal species, 6 reptile and one shark species. An additional shark species (Pristis clavata) which is known to be present in the Keep River did not appear in the PMST search, but is included in Table 13 for thoroughness.

Numerous terrestrial fauna surveys have been conducted in the adjoining landscapes to the west of the Sweetwater project area. These include Ecologica (1997), Kinhill (1999), HLA (2005), and APM (2012, 2013). These surveys have indicated the presence of Conservation Significant (Federal or Territory-listed) species in the vicinity of the Stage 1 proposal area including

- Freshwater Crocodile (*Crocodylus johnstoni*)
- *Ctenotus rimacola* (vulnerable in NT)
- Yellow spotted monitor (*Varunus panopetes* subsp *panoptes*- Vulnerable in NT)
- Mertens' Water Monitor (*Varanus mertensi* – Vulnerable n NT)
- Gouldian Finch (*Chloebia gouldiae)*
- Ghost Bat (*Macroderma gigas)*

Migratory (predominantly wetland) birds listed under the EPBC Act are also known to be present in the immediate vicinity.

The Freshwater Sawfish is known to be present in pools in the Keep River, and is the subject of conditions applied in relation to the EPBC approvals for the Weaber Plain and Knox Creek Plain farming developments.

Table 13 provides a summary of the species which may be present in the proposal area. Further assessment of the likelihood and impacts upon each of these species will be addressed in the EIS, per the attached Draft ToR. Note that this table repeats data presented in Table 8 but does so deliberately in order to focus on MNES and the analysis of obligations under the EPBC Act 1999.

Table 13. MNES-Listed species known, likely or may occur in Proposal Area

COLOUR CODE
Known to occur in Proposal Area
Likely to occur in Proposal Area
May occur in Proposal Area

Scientific Name	Common Name	Class	Simple Presence	TWPC Act listing	EPBC Act Threatened Category	Migratory Status	Migratory Category	Marine Status
	BIRD SPECIES							
Acrocephalus orientalis	Oriental Reed-Warbler	Bird	May			Migratory	Migratory Wetlands Species	Listed - overfly marine area
Actitis hypoleucos	Common Sandpiper	Bird	Likely			Migratory	Migratory Wetlands Species	Listed
Anseranas semipalmata	Magpie Goose	Bird	May					Listed - overfly marine area
Apus pacificus	Fork-tailed Swift	Bird	Likely			Migratory	Migratory Marine Birds	Listed - overfly marine area
Bubulcus ibis	Cattle Egret	Bird	May					Listed - overfly marine area (as *Ardea ibis*)
Calidris acuminata	Sharp-tailed Sandpiper	Bird	May		Vulnerable	Migratory	Migratory Wetlands Species	Listed
Calidris ferruginea	Curlew Sandpiper	Bird	May	Critically Endangered	Critically Endangered	Migratory	Migratory Wetlands Species	Listed - overfly marine area
Calidris melanotos	Pectoral Sandpiper	Bird	May			Migratory	Migratory Wetlands Species	Listed - overfly marine area
Cecropis daurica	Red-rumped Swallow	Bird	May			Migratory	Migratory Terrestrial Species	Listed - overfly marine area (as *Hirundo daurica*)
Chalcites osculans	Black-eared Cuckoo	Bird	Likely					Listed - overfly marine area (as *Chrysococcyx osculans*)
Charadrius veredus	Oriental Plover, Oriental Dotterel	Bird	May			Migratory	Migratory Wetlands Species	Listed - overfly marine area

Scientific Name	Common Name	Class	Simple Presence	TWPC Act listing	EPBC Act Threatened Category	Migratory Status	Migratory Category	Marine Status
Chloebia gouldiae (Erythrura gouldiae)	Gouldian Finch	Bird	Known	Vulnerable	Endangered			
Cuculus optatus	Oriental Cuckoo, Horsfield's Cuckoo	Bird	May			Migratory	Migratory Terrestrial Species	
Erythrotriorchis radiatus	Red Goshawk	Bird	Likely	Vulnerable	Endangered			
Falco hypoleucos	Grey Falcon	Bird	Likely	Vulnerable	Vulnerable			
Falcunculus frontatus whitei	Crested Shrike-tit (northern), Northern Shrike-tit	Bird	Likely	Not listed	Vulnerable			
Glareola maldivarum	Oriental Pratincole	Bird	May			Migratory	Migratory Wetlands Species	Listed - overfly marine area
Haliaeetus leucogaster	White-bellied Sea-Eagle	Bird	Known					Listed
Hirundo rustica	Barn Swallow	Bird	May			Migratory	Migratory Terrestrial Species	Listed - overfly marine area
Merops ornatus	Rainbow Bee-eater	Bird	May					Listed - overfly marine area
Motacilla cinerea	Grey Wagtail	Bird	May			Migratory	Migratory Terrestrial Species	Listed - overfly marine area
Motacilla flava	Yellow Wagtail	Bird	Likely			Migratory	Migratory Terrestrial Species	Listed - overfly marine area
Numenius madagascariensis	Eastern Curlew, Far Eastern Curlew	Bird	May	Critically Endangered	Critically Endangered	Migratory	Migratory Wetlands Species	Listed
Pandion haliaetus	Osprey	Bird	Likely			Migratory		Listed. In buffer area only
Pezoporus occidentalis	Night Parrot	Bird	May		Endangered			
Rostratula australis	Australian Painted Snipe	Bird	Likely	Endangered	Endangered			Listed - overfly marine area (as *Rostratula benghalensis (sensu lato)*)

Scientific Name	Common Name	Class	Simple Presence	TWPC Act listing	EPBC Act Threatened Category	Migratory Status	Migratory Category	Marine Status
Tyto novaehollandiae kimberli	Masked Owl (northern)	Bird	Likely	Vulnerable	Vulnerable			
	MAMMAL SPECIES							
Dasyurus hallucatus	Northern Quoll, Digul [Gogo-Yimidir], Wijingadda [Dambimangari], Wiminji [Martu]	Mammal	Likely	Critically Endangered	Endangered			
Macroderma gigas	Ghost bat	Mammal	Likely	Not listed	Vulnerable			
Petrogale concinna concinna	Nabarlek (Victoria River District)	Mammal	May		Critically Endangered			
Saccolaimus saccolaimus nudicluniatus	Bare-rumped Sheath-tailed Bat	Mammal	Likely	Not listed	Vulnerable			
Trichosurus vulpecula arnhemensis	Northern Brushtail Possum	Mammal	May		Vulnerable			
	REPTILE SPECIES							
Acanthophis hawkei	Plains Death Adder	Reptile	May	Vulnerable	Vulnerable			
Ctenotus rimacola camptris	Crack-dwelling ctenotus (Keep-Ord Rivers)	Reptile	Known	Vulnerable	Not listed			
Crocodylus johnstoni	Freshwater Crocodile, Johnston's Crocodile, Johnstone's Crocodile	Reptile	May					Listed
Crocodylus porosus	Salt-water Crocodile, Estuarine Crocodile	Reptile	Likely			Migratory	Migratory Marine Species	Listed
Tiliqua scincoides intermedia	Northern Blue-tongued Skink	Reptile	Known		Critically Endangered			
Varanus mertensi	Mertens' Water Monitor	Reptile	Known		Endangered			
Varanus mitchelli	Mitchell's Water Monitor	Reptile	Likely		Critically Endangered			
	SHARK SPECIES							

Scientific Name	Common Name	Class	Simple Presence	TWPC Act listing	EPBC Act Threatened Category	Migratory Status	Migratory Category	Marine Status
Pristis clavata	Dwarf Sawfish	Shark	Known	Vulnerable	Vulnerable (did not appear in PMST search 29/9/24)			
Pristis pristis	Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish	Shark	Known	Vulnerable	Vulnerable	Migratory	Migratory Marine Species	

Attachment F provides national distribution mapping for each of the species listed in Table 13, derived from the online PMST database. Understanding the distribution of the listed species is an important factor in determining the proportionality of any impacts which may arise from the Sweetwater proposal. The extent to which each species may be present and/or utilising the proposal area for breeding/nesting or foraging is included in the draft ToR (Attachment C).

13.3. Heritage MNES

There are no World Heritage-listed or National Heritage areas within 10km of the Sweetwater Stage 1 area.

13.4. Wetlands

No Ramsar wetlands are located within the 10km buffer applied to the Stage 1 area. No nationally important wetlands are within the same radius of the site.

13.5. Hydrology

Hydrology matters, and their consequent impacts on MNES-listed species in the Keep River, are considered in this document in section 6, in relation to the 'water' factor. The extent and significance of impacts will be considered in the EIS as proposed in the draft ToR (Attachment C).

13.6. Impacts and Mitigation

Impact areas are summarised below. These will be further assessed and quantified in the environmental impact process, and documented in the Environmental Impact Statement to be prepared following this referral. This process will assist in determining the significance of impacts associated with:

- Clearing and development of a minimum of 3,269.37 hectares of land for agriculture and related infrastructure
- Soils and soil quality, including erosion risk and other soil property changes
- Loss of habitat for listed migratory bird species
- Loss of habitat for other terrestrial species
- Flora changes, including removal of vegetation, and impacts on the condition of remaining vegetation
- Flood risk and hydrodynamic changes due to landscape change
- Quality and volume of natural groundwater flow to the Keep River, arising from clearing and development
- Potential impact on water quality in wet season (stormwater) runoff to Knox and Border Creeks and the Keep River
- Potential impact on listed aquatic fauna species in the Keep River
- Greenhouse gas emissions arising from clearing, development and farming activities
- Cumulative impacts associated with the expansion of agriculture in the nearby Ord River Irrigation Area
- Indigenous values and cultural heritage in the proposal area
- Social and community values, including recreational (especially Keep River fishing downstream) values
- Nearby conservation areas, including the Keep River National Park.

These matters will be assessed and quantified in the EIS. Outcomes-based mitigation measures will be proposed, including suitable monitoring to verify the success of the mitigation.

13.7. Impact Summary

There will be unavoidable impacts in relation to the clearing of farmlands, however these will be offset by (a) the protection of habitat in the riparian and heritage exclusion zones, and (b) the protection of habitat in the substantial conservation reserves established as an offset to the M2 development and the Keep River National Park Extension, as illustrated in Figure 3.

Should an impact be identified in the EIS, appropriate monitoring and management plans will be established. Where there is uncertainty about the presence of an EPBC-listed species, SCA will manage as if the species is present. The precautionary principle is built into the existing management plans for the nearby Weaber Plain and Knox Creek Plain developments, both approved under the EPBC Act 1999, and the acceptable management activities will be carried forward to the Sweetwater Stage 1 development.

SCA is confident the design parameters for the Sweetwater development, including the 'envelope and footprint' approach which enables on-site adaptation within a controlled area should any environmental matters affect the proposed farm layouts and stormwater management systems, and careful groundwater monitoring and management, will result in the sustainable development of farming operations.

13.8. Alternatives

As discussed in section 2.3, the Sweetwater Stage 1 proposal area has been developed following an extensive assessment process over decades which has determined the most suitable farming areas and avoided matters of cultural heritage and significant environmental impact. There are no alternatives to the proposal. A development envelope larger than the farm and infrastructure footprint enables some internal boundary modifications, within approval parameters, should geophysical, topographical or heritage matters arise which trigger on-site adaptations.

Allowances have been made for three potential crossing locations over the Keep River, based on existing Spirit Hills Station fence and track locations, and preferred sites for future connection to Sweetwater Stage 3. This provides flexibility within the overall envelope, noting that the environmental assessments proposed in the ToR will cover the full envelope area.

14. Pastoral Land Clearing Approval

PLC approval is required under the *Pastoral Land Act 1992* (NT), as noted in section 3.5. Specifically, the NT Planning Scheme *Land Clearing Guidelines* require that the following matters be considered:

- Biodiversity
- Cultural Heritage
- Land Management
- Soil
- Vegetation
- Water
- Weeds

These matters broadly correspond with the 'Land' and 'Water' factors described in sections 5 and 6 respectively.

Additionally, the *Land Clearing Guidelines* specify steps to be taken in preparing a clearing application:

1. *Determine water requirements and availability.*
2. *Prepare land type map identifying landscape, soil and vegetation attributes (including landscape features such as riparian areas and attributes such as slopes).*
3. *Complete a land suitability or capability assessment.*
4. *Identify land unconstrained by natural resources. Exclude unsuitable soils, excessive slope etc.*
5. *Complete biodiversity assessment to determine presence of threatened species habitat, for exclusion.*
6. *Apply recommended buffers in accordance with the guidelines (including buffers to natural and cultural features).*
7. *Design proposed clearing areas taking into account land management considerations and the need for wildlife corridors.*
8. *Prepare written application identifying matters to be addressed, including weeds.*

(Source: NTG, 2021, p20).

These steps align with the referral approach, including application of the avoidance hierarchy, to be applied in the EIS process proposed in the attached ToR (Attachment C).

The EIS will therefore be prepared in such a manner as to comprehensively address the requirements of the *Pastoral Land Act 1992* and the associated *Land Clearing Guidelines*, in order to minimise the duplication of effort in planning, survey, assessment and administration.

The final development footprint, following studies to be undertaken to inform the EIS process, will include the required buffers and wildlife corridors as stipulated under the *Land Clearing Guidelines*.

15. Bibliography

Aldrick, J.M. and Moody, P.W., 1997, *Report on the Soils of the Lower Weaber and Keep Plains N.T.* Animal Industry and Agriculture Branch, Department of Northern Territory, Darin.

Animal Plant Mineral Pty Ltd. 2011. *Bird Species Richness and Diversity in Sorby Management Proprietary Limited (SMPL) Sorby Hills Silver Lead Zinc Project (Sorby Hills)*. Perth.

Animal Plant Mineral Pty Ltd. 2013. *Matters of National Environmental Significance Assessment Knox Creek Plain*. Perth.

Aldrick, J.M. and Moody, P.W. 1977. *Report on the Soils of the Lower Weaber and Keep Plains, NT*. Department of Northern Territory (Animal Industry and Agriculture Branch), Australian Government, Darwin. Available from: https://www.territorystories.nt.gov.au/jspui/bitstream/10070/228193/1/LRD77019.pdf

Bennett, D L, and George, R J. (2011), *Surface Water Characteristics of the Weaber Plain and lower Keep River Catchments: data review and preliminary results.* Resource Management Technical Report 370. Department of Primary Industries and Regional Development, Perth. Available at https://library.dpird.wa.gov.au/cgi/viewcontent.cgi?article=1364&context=rmtr

Bickerton D., Cuff N., Chong C., Cowie I. and Lewis D. 2020. Northern Territory threatened plant survey guidelines, Supplement 1: Typhonium field surveys, 50/2020, Department of Environment, Parks and Water Security, Darwin, Northern Territory.

Brocklehust, Lewis, Napier and Lynch (2007*) Northern Territory Guidelines and Field Methodology for Vegetation Survey and Mapping* 02/2007D.

Carnavas M., Burley P., Hempel J., and Burgess J. 2019. *Soil and Land Capability Assessment of the Lower Weaber and Keep River Plains, Northern Territory Section 1: Lower Weaber and Upper Keep*. Agricultural Land Suitability Series – Report 16a DENR Technical Report 38/2019. Department of Environment and Natural Resources, Darwin.

Chin, D, Humphreys, G. and Jolly, P. 1997. *Sub-Surface Hydrology of the Knox Creek Plains (NT Portion): Executive Summary*. Technical Report 41/1997D. Department of Lands, Planning and Environment (Water Resources Division), Northern Territory Government, Darwin. Available at: https://www.territorystories.nt.gov.au/jspui/bitstream/10070/229201/1/WRD97041.pdf

Commonwealth of Australia, 2009, *Ord Valley AEM Interpretation Project*, Geoscience Australia, Canberra.

Cotton Incorporated, 2016, The Life Cycle Inventory and Life Cycle Assessment of Cotton Fiber and Fabric. Available at https://australiancotton.com.au/supply_chain/cotton-life-cycle-assessment

Cymod 2014, Initial Assessment of Water Level and Water Quality Changes on the Knox Plain using the Weaber Knox Aquifer Model. Prepared for Kimberley Agricultural Investment (Knox Creek Plain EPBC referral 2014/7143). Available at http://epbcnotices.environment.gov.au/_entity/annotation/18b536f2-b468-e511-b93f-005056ba00a7/a71d58ad-4cba-48b6-8dab-f3091fc31cd5?t=1728183396257

Department of Agriculture, Water and the Environment, 2012, Interim Biogeographic Regionalisation for Australia, Version 7. Available at https://www.dcceew.gov.au/sites/default/files/env/pages/5b3d2d31-2355-4b60-820c-e370572b2520/files/ibra-subregions.pdf

Department of Climate Change, Energy, the Environment and Water, 2023a, Interim engaging with First Nations People and Communities on Assessments and Approvals under the Environment Protection and Biodiversity Conservation Act 1999. Available at https://www.dcceew.gov.au/environment/epbc/advice/engagement-first-nations-people-referrals-under-epbc-act#:~:text=Engagement%20with%20First%20Nations%20people%20is%20part%20of%20referring%20and,to%20be%20tailored%20and%20respectful

Department of Climate Change, Energy, the Environment and Water, 2023b, EPBC Act referral form and application template – Preparation guide. Available at https://www.dcceew.gov.au/sites/default/files/documents/epbc-act-referral-form-template-prep-guide.pdf

Department of Climate Change, Energy, the Environment and Water, 2024, Protected Matters Search Tool – Sweetwater Stage 1 +10km. Accessed September 2024. https://pmst.awe.gov.au

Department of Environment and Conservation. 2011. *Yoorrooyang Dawang Proposed Conservation Parks Draft Management Plan*. Perth.

Department of Environment and Conservation, 2013, Definitions, categories and criteria for threatened and priority ecological communities. Department of Environment and Conservation, Perth. Available at https://www.dbca.wa.gov.au/wildlife-and-ecosystems/threatened-ecological-communities

Department of the Environment, 2013, *Matters of National Environmental Significance. Significant impact guidelines 1.1*. Available at https://www.dcceew.gov.au/environment/epbc/publications/significant-impact-guidelines-11-matters-national-environmental-significance

Department of Water, 2012, *Ord surface water allocation plan methods report.* Department of Water, Perth.

Department of Water, 2013, *Ord Surface Water Allocation Plan*, Department of Water, Perth.

Dilshad, M. 2018a. *Impact of Landuse on Sediment and Analyte Load Delivery to the Lower Keep River, NT: A Preliminary Modelling Exercise*. Department of Environment and Natural Resources (Water Resources Division), Northern Territory Government, Palmerston.

Dilshad, M. 2018b. *Results of the 2017/18 Water Quality Monitoring of the Lower Keep River,* NT. Department of Environment and Natural Resources (Water Resources Division), Northern Territory Government, Palmerston.

Ecologia. 1997. *Ord River Irrigation Area - Stage 2 M2 Development Area Terrestrial Biological Assessment*. Perth.

Ecosystem Solutions, 2024, Preliminary advice to AAM (SCA) following reconnaissance survey of Sweetwater Stage 1 area.

Ecowise Environmental. 2005. *Ord Stage 2 M2 Area – Subterranean Fauna Survey*. Brisbane.

Environmental Protection Authority, 2013, Report and Recommendations of the Environmental Protection Authority Sorby Hills Project Report 1491, October 2013. EPA, Perth.

Environmental Protection Authority. 2000. *Ord River Irrigation Area Stage 2 (M2 Supply Channel), Kununurra, Part 1 - Biodiversity Implications. EPA Bulletin 988.* Perth: Environmental Protection Authority.

Federal Court No: NTD 38 of 2010; National Native Title Tribunal No: DC10/25. http://www8.austlii.edu.au/cgi-bin/viewdoc/au/cases/cth/FCA/2011/576.html

Gautam, B. 2019a. *Keep River Catchment Assessment and Development of a Rainfall-Runoff Model*. Department of Environment and Natural Resources (Water Resources Division), Northern Territory Government, Palmerston.

Gautam, B. 2019b. *Keep River Flood Study and Inundation Mapping*. Department of Environment and Natural Resources (Water Resources Division), Northern Territory Government, Palmerston.

George, R J, Simons, J A, Raper, P, Paul, R J, Bennett, D L, and Smith, R H. (2011), Weaber Plain hydrogeology: preliminary results. Department of Primary Industries and Regional Development, Western Australia, Perth. Report 366. https://library.dpird.wa.gov.au/rmtr/362

Harris-Pascal, C., Hostetler, S., Symington, N., Halas, L., Tan, K.P., Gibson, K., Steklova, A., Haiblen, A., McPherson, A., Northey, J., Barnes, M., Clarke, J., Cathro, D., Ray, A. and Halas, V. 2019. *Ord Stage 3 Keep River Plains Hydrogeological Assessment,* Northern Territory. Geoscience Australia (Department of Industry, Innovation and Science), Australian Government, Canberra.

Harrison, L., McGuire, L., Ward, Simon, Fisher, A., Pavey, C., Fegan, M., Lynch, M., Natural Heritage Trust (Australia) and Northern Territory Department of Natural Resources, Environment, The Arts and Sport. Biodiversity Conservation Unit. Division of Environment, Heritage and the Arts. 2009. *Keep River area*. Northern Territory Government, Palmerston. Available at https://hdl.handle.net/10070/531798

Hill, R., Miriuwung and Gajerrong Peoples, Hill, D. G., & Goodson., S. 2008. *Miriuwung-Gajerrong Cultural Planning Framework. 2008*. Perth.

Hill, R., Miriuwung and Gajerrong Peoples, Hill, D. G., Moncrieff, D., Goodson, S., & Bullen, L. 2009. *Yoorrooyang Dawang Joint Planning Guidelines For Preparation of Management Plans for Conservation Reserves under the Ord Final Agreement.* Perth.

HLA-Envirosciences. 2005. *Herpetofauna Survey Ord River Irrigation Area, Stage 2 M2*. Palmerston.

Humphreys, G., Tickell, S., Yin Foo, D. and Jolly, P. 1995. Sub-Surface Hydrology of the Keep River Plains. Technical Report 25/95D (WRD95025). Power and Water Authority (Water Resources Division), Northern Territory Government, Darwin. Available at: https://www.territorystories.nt.gov.au/bitstream/10070/228631/1/Sub-surface%20Hydrology%20of%20the%20Keep%20River%20Plains%20-%20Technical%20Report.pdf

Indo-Pacific Environmental, 2023, *ORIA Stage II Expansion Post-Development Keep River Aquatic Fauna and Targeted Sawfish Survey 2022*. Prepared for Department of Primary Industries and Regional Development, Perth.

Indo-Pacific Environmental, 2022, *ORIA Stage II Expansion Post-Development Keep River Aquatic Fauna and Targeted Sawfish Survey 2021*. Prepared for Department of Primary Industries and Regional Development, Perth.

KBR. 2005. Hydrodynamic Studies of the Ord Stage 2. Report prepared by KBR for Department of Industry and Resources, Western Australian Government, East Perth.

KBR 2010, Weaber Plain groundwater modelling report Stage 1 results, report prepared for LandCorp, Western Australia, Kellogg Brown & Root Pty Ltd, Perth.

KBR. 2011. *Weaber Plains Groundwater Modelling Report - Final (Including Stage 4 Results)*. Perth.

Kinhill. 1999a. *A Fauna survey of the M2 Development Area of the Ord River Irrigation Scheme*. Perth.

Kinhill. 1999b. *A Vegetation survey to map the vegetation communities of the M2 Development Area of the Ord River Irrigation Scheme*. Perth.

Kinhill. (2000). *Ord River Irrigation Area Stage 2 Proposed Development of the M2 Area - Environmental Review and Management Programme Draft Environmental Impact Statement*. Perth.

Koushki, R., Sharma, S., Warren, J., and Foltz, M., 2023, Life cycle greenhouse gas emissions for irrigated corn production in the U.S. great plains, Environmental Challenges, Volume 13, 2023, 100750. Available at https://www.sciencedirect.com/science/article/pii/S2667010023000744

Larson, H. 1999. *Keep River Aquatic Fauna Survey, Report to Kinhill Pty Ltd (contained as Appendix L of the Kinhill 2000 ERMP).* Darwin.

Lawrie, KC, Tan, KP, Clarke, JC, Munday, TJ, Fitzpatrick, A, Brodie, RS, Apps, H, Halas, L, Cullen, K, Pain, CF, Kuske, TJ, Cahill, K & Davis, A 2010, 'Using the SkyTEM Time Domain Airborne Electromagnetics (AEM) System to Map Aquifer Systems and Salinity Hazard in the Ord Valley, Western Australia', Geoscience Australia Professional Opinion, 2010/01, viewed 17 October 2018, https://d28rz98at9flks.cloudfront.net/69583/Prof2010_001.pdf

Lillicrap, AM, George, RJ, Ryder, A & Bennett, D., 2015, *Groundwater chemistry of the Weaber Plain (Goomig Farmlands): baseline results 2010–13*, Resource management technical report 392, Department of Agriculture and Food, Western Australia, Perth.

Lopez M.B., Ekonomou A., Eckard R.J., 2023, A Greenhouse Accounting Framework for cotton farms (C-GAF) based on the Australian National Greenhouse Gas Inventory methodology. Updated November 2022 http://www.piccc.org.au/resources/Tools.

Lumsden, L., Churchill, S. and Schulz, M. 2005. *Bat Survey of the Ord River Stage 2 M2 Area, Western Australia*. Arthur Rylah Institute for Environmental Research, Department of Sustainability and Environment, Victoria.

Marsden Jacob Associates, 2024, *Preliminary Business Case for the Ord River Expansion to the Northern Territory*. Prepared for the Northern Territory Government and the National Water Grid. Available at https://industry.nt.gov.au/__data/assets/pdf_file/0005/1403735/ord-pbc-summary.pdf

Northern Territory Environment Protection Authority, 2013a, *Guidelines for Assessment of Impacts on Terrestrial Biodiversity*. Available at https://NT EPA.nt.gov.au/__data/assets/pdf_file/0004/287428/guideline_assessment_terrestrial_biodiversity.pdf

Northern Territory Environment Protection Authority, November 2013b, *Guidelines for the Preparation of an Economic and Social Impact Assessment*. Available at https://NT EPA.nt.gov.au/__data/assets/pdf_file/0007/904318/draft_guidelines_economic_social_impact_assessment.pdf

Northern Territory Environment Protection Authority, 2022a, *NT EPA Environmental factors and objectives*, V3.0. Available at https://NT EPA.nt.gov.au/__data/assets/pdf_file/0020/804602/guide-NT EPA-environmental-factors-objectives.pdf

Northern Territory Environment Protection Authority, 2022b, *Referring a proposal to the NT EPA. Environmental Impact Assessment Guidance for Proponents*. NT EPA, Darwin.

Northern Territory Environment Protection Authority, 2022c, *Stakeholder Engagement and Consultation. Environmental Impact Assessment Guidance for Proponents.* NT EPA, Darwin.

Northern Territory Government, 2021, *Land Clearing Guidelines Northern Territory Planning Scheme*. Available at https://nt.gov.au/__data/assets/pdf_file/0007/236815/land-clearing-guidelines.pdf

Northern Territory Government, 2023, *Surface water take – wet season flow policy.* Available at https://nt.gov.au/__data/assets/pdf_file/0008/1348190/surface-water-take-wet-season-flow-policy.pdf

Northern Territory Land Corporation, 2020, Keep Plains Agricultural Development Call for Expressions of Interest. NTLC in conjunction with NT Farmers, Darwin.

O'Boy, C.A., Tickell, S.J., Yesertener, C., Commander, D.P., Jolly, P., and Laws, A.T. 2001. Hydrogeology of the Ord River Irrigation Area. Water and Rivers Commission Hydrogeological Record Series Report HG 7. Perth.

Pilbara Flora, 2010, *Flora and Vegetation Survey of Ord Stage 2 Agricultural Areas at Kununurra*. Unpublished report prepared for Strategen Environmental Consultants Pty Ltd, for LandCorp, Perth.

Power and Water Authority, 1995, *Sub-surface Hydrology of the Keep River Plains.* Report 24/95D. Water Resources Division, PWA, Darwin.

Pryke, S. 2011. *Ord-East Kimberley Expansion Project - Weaber Plain Development Area: Gouldian Finch Breeding Assessment*. Sydney.
Pryke, S. 2012. *Ord River Irrigation Area – Weaber Plain Development Project: Gouldian Finch Breeding Surveys*. NSW.

Pryke, S. 2013. *Ord-East Kimberley Expansion Project - Weaber Plain Development Area Gouldian Finch Wet Season Feeding Grasses and Habitat*. NSW.

Pryke, S., & Svedin, N. 2013. *Ord-East Kimberley Expansion Project - Weaber Plain Development Area Gouldian Finch Breeding Surveys 2013*. NSW.

Pryke, S., & Svedin, N. 2014. *Ord-East Kimberley Expansion Project - Weaber Plain Development Area: Gouldian Finch Non-Breeding Population and Habitat Assessment 2014*. NSW.

Schoknecht, N. 1998. Soils of the Knox Creek Plain, East Kimberley, Northern Territory: Supplementary report. Department of Agriculture and Food, Western Australia, Perth. Available at: https://researchlibrary.agric.wa.gov.au/cgi/viewcontent.cgi?article=1136&context=rmtr

Schoknecht, N. and Grose, C. 1996. Soils of the Knox Creek Plain East Kimberley Western Australia and Northern Territory. Resource Management Technical Report 153. Department of Agriculture and Food, Western Australia, Perth. Available at: https://www.territorystories.nt.gov.au/bitstream/10070/228501/1/LRD96153.pdf

Sevenster M., Renouf M., Islam N., Cowie A., Eckard R., Hall M., Hirlam K., Laing A., Longbottom M., Longworth E., Ridoutt B., Wiedemann S., 2023a, A Common Approach to Sector-Level GHG Accounting for Australian Agriculture. Project overview and non-technical summary. CSIRO, Australia. Available at https://aginnovationaustralia.com.au/ghg-accounting/

Sevenster M., Renouf M., Islam N., Cowie A., Eckard R., Hall M., Hirlam K., Laing A., Longbottom M., Longworth E., Ridoutt B., Wiedemann S., 2023b, A Common Approach to Sector-Level GHG Accounting for Australian Agriculture; Methods and data guidance. CSIRO, Australia. Available at https://aginnovationaustralia.com.au/ghg-accounting/

Shedley, E. 2012. *Ord Irrigation Area Fauna Habitat Mapping Project*. Perth.

Shelley, James J., Morgan, David L., Hammer, Michael P., Le Feuvre, Matthew C., Moore, Glenn I., Gomon, Martin F., Allen, Mark G., and Saunders, Thomas. 2018. A field guide to the Freshwater Fishes of the Kimberley. Museum and Art Gallery Northern Territory, University of Melbourne, Museums Victoria, Freshwater Fish Group & Fish Health Unit, Murdoch University, and Western Australian Museum.

Short, M.A., Yin Foo, D. and Tickell, S. 2019. A Feasibility Assessment of Irrigated Agriculture on the Keep River Plains, Technical Report 46/2019. Northern Territory Department of Environment and Natural Resources, Northern Territory Government. Palmerston, Northern Territory.

Smith, A.J. 2008. Rainfall and irrigation controls on groundwater rise and salinity risk in the Ord

Sorby Management Pty Ltd. 2013. *Public Environmental Review Sorby Hills Silver Lead Zinc Project*. Perth.

Umwelt (Australia) Pty Ltd, 2021a, Knox Plain Survey Results and Habitat Mapping – Typhonium sp. Kununurra (A.N. Start ANS 1467), Draft Rev A, unpublished report, October 2021.

Umwelt (Australia) Pty Ltd, 2021b, Knox Irrigated Agriculture Development – Typhonium sp. Kununurra impact assessment and section 40 supporting document, Final, unpublished report, September 2021.

Wetland Research and Management, 2013. ORIA Stage II: Lower Ord River Aquatic Fauna Monitoring – Synthesis of Baseline Surveys 2009-2011. Unpublished report to LandCorp and the Department of Water (WA) by Wetland Research & Management. Final Report, February 2013.

Wetland Research and Management. 2010. Ord Stage II Aquatic Fauna Surveys - Late Wet Season Sampling 2009 Final Report. Perth: Wetland Research and Management.

Wetland Research and Management. 2011. *ORIA Stage II Expansion Weaber Plain / Keep River Water Quality and Aquatic Fauna Sampling 2009-2010*. Perth.

Wetland Research and Management. 2013a. *Keep River Baseline Aquatic Fauna and Targeted Fish Surveys: September/October 2011*. Perth.

Wetland Research and Management. 2013b. *ORIA Stage II Expansion Lower Ord River Aquatic Fauna Monitoring - Synthesis of Baseline Surveys 2009-2011*. Perth.

Wetland Research and Management. 2014. *ORIA Stage II - Keep River Baseline Aquatic Fauna and Targeted Sawfish Survey September/October 2013*. Perth.

Wetland Research and Management, 2021, *ORIA Stage II Expansion Keep River – First Post-development Aquatic Fauna and Targeted Sawfish Survey 2020*. Prepared for Department of Primary Industries and Regional Development, Perth.

16. List of Attachments

ATTACHMENT A – Sweetwater Stage 1 Shapefiles

ATTACHMENT B – Proof of Tenure

ATTACHMENT C – Draft Terms of Reference – Sweetwater Stage 1

ATTACHMENT D – Statement of Reasons – Sweetwater Stage 1

ATTACHMENT E – EPBC Act Protected Matters Report – Sweetwater Stage 1

ATTACHMENT F – Sweetwater Stage 1 National MNES Distribution Mapping

ATTACHMENT G – Sweetwater Typhonium Survey 2025