

Memo

To: James McMahon (Australian Capital Equity)
From: Grant Wells, Floyd Holmes
CC: Glenn Harrington (Innovative Groundwater Solutions)
Date: 4 August 2022



Subject: Reconnaissance of potential groundwater associated values - Napier Downs

Dear James,

This memo provides an update on the baseline studies conducted to date for the Napier Downs Irrigation Project (the Project) by Phoenix Environmental Sciences (Phoenix). While a brief summary is provided on survey work conducted within the Project area, the main purpose of this memo is to summarise the work undertaken and associated findings, at three locations within the potential zone of groundwater drawdown for the Project: Ngooderoodyne Spring, Hawkstone Creek and the Lennard River.

1 BACKGROUND

Phoenix is engaged by Australian Capital Equity to undertake baseline biological surveys for the Project. The current scope of work is based on the findings of the desktop review for Scrubby paddock (Phoenix 2020) and advice of the Department of Water and Environmental Regulation (DWER) in a meeting on 13 January 2021 (refer to Attachment 1):

- detailed, two season flora and vegetation survey in the study area, including
 - defining and mapping vegetation types and condition
 - conducting targeted searches for significant flora (Threatened and Priority) and Threatened and Priority ecological communities (TEC and PECs), where applicable
 - conducting targeted searches for declared pests and weeds of national significance (WoNS)
- reconnaissance survey 15 km buffer of study area to identify groundwater dependent vegetation (GDV)
 - identify riparian vegetation (riverbanks, creeks, floodplains, waterholes)
 - undertake targeted searches for potential GDV indicator species, based on a list provided by DWER
 - conduct relevé surveys to describe vegetation
- targeted level 2 terrestrial fauna survey, including:
 - detailed habitat assessment and mapping within the study area; mapping within a wider 1 km buffer of the study area for context, to inform the environmental impact assessment
 - identification and mapping of habitat for significant fauna species within the study area and 1 km buffer
 - targeted survey for Threatened mammal species - Bilby *Macrotis lagotis* (VU), Northern Quoll *Dasyurus hallucatus* (EN), Golden Bandicoot *Isoodon auratus auratus* (VU), Northern Short-tailed Mouse *Leggadina lakedownensis* (P4), Kimberley Brush-tailed Phascogale *Phascogale tapoatafa kimberleyensis* (VU) and Northern Brushtail Possum *Trichosurus vulpecula arnhemensis* (VU), including trapping, plot sampling

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and camera trapping within the study area and 1 km buffer, with emphasis on the study area

- daytime searches for signs of significant fauna activity, nocturnal spotlighting where possible
- acoustic recordings for significant bat species – Northern Leaf-nosed Bat *Hipposideros stenotis* (P2), Ghost Bat *Macroderma gigas* (VU), Orange Leaf-nosed Bat *Rhinonictis aurantia* (P4), Bare-rumped Sheath-tailed Bat *Saccolaimus saccolaimus nudicluniatius* (P3) and Yellow-lipped Cave Bat *Vespadelus douglasorum* (P2)
- habitat assessment and, if required, acoustic recordings for Night Parrot *Pezoporus occidentalis* (EN EPBC Act; CR BC Act)
- avifauna surveys for significant bird species within the study area and adjacent riparian habitats within 1 km buffer, and avifauna census generally
- Level 2 survey for short range endemic (SRE) invertebrates, including characterisation and mapping of SRE habitats and systematic sampling in SRE prospective habitats within the study area
- searches for presence of any pools or other surface water features in the study area and adjacent, toward Hawkstone Creek, that may serve as refuges for the Freshwater Sawfish.

DWER has recently provided feedback on the draft H3 hydrogeological assessment for the Project (Attachment 2). DWER has indicated additional information is required to complete the assessment, including additional biological studies at Ngooderoodyne Spring, Hawkstone Creek (Long Hole and Long Pool) and the Lennard River (Lennard Pool).

2 SURVEYS COMPLETED TO DATE

PROJECT AREA

A two-season detailed flora and vegetation survey was conducted in the study area in October 2021 and May 2022, with a total of 14 quadrats and one relevé survey completed.

A single season detailed fauna survey has been conducted within the study area with a total of eight systematic vertebrate trapping sites, four systematic invertebrate trapping sites, and 17 fauna habitat assessments. The wet pitfall SRE samples are scheduled to be collected between the 14-17 August 2022.

NGOODEROODYNE SPRING

No flora survey was undertaken at Ngooderoodyne Spring, as access to areas was restricted due to mustering on adjacent properties. However, relevés were conducted at several seasonally wet depressions / wetlands (four with standing water) to the north and south of Scrubby Paddock.

The fauna team completed one site visit to the spring on 3 July 2022. The team walked a few hundred metres along each side of the stream, taking photos and assessing the fauna habitat values of the area. Water depth was estimated and seepage zone above the spring was located and photographed.

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HAWKSTONE CREEK

Targeted searches for potential groundwater dependent flora species were undertaken by the botany team. Three relevés were completed to describe riparian vegetation where groundwater dependent species were located.

The fauna team visited Long Pool on 30 June 2022 to assess the fauna habitat values associated with the Hawkstone Creek system. While at Long Pool, the team completed a fauna habitat assessment, a bird census, SRE foraging surveys. The pool was photographed, and pool depth estimated.

LENNARD RIVER

No flora survey was undertaken at Lennard River by the botany team, as access to areas was restricted due to mustering on adjacent properties.

The fauna team visited the Lennard River pool on 3 July 2022. While at the Lennard River, they completed a site habitat assessment, a bird census, SRE foraging and vertebrate foraging survey. The pool was photographed, and pool depth was estimated.

3 FINDINGS

PROJECT AREA

Flora

Specimen identifications were completed for the first season survey with a total of 101 taxon recorded representing 41 families and 79 genera. Second season specimen identifications are not yet complete.

A single significant species was recorded in the study area, *Lophostemon grandiflorus* subsp. *grandiflorus* (P3). This species comprised the dominant upper stratum of a seasonally wet depression. This vegetation type was restricted to a small area and comprised a novel combination of species not recorded elsewhere in the study area and is subsequently considered locally significant. In addition, this vegetation type contained two GDV indicator species in the list provided by DWER: *Melaleuca viridifolia* and with *Lophostemon grandiflorus*. Both species are phreatophytic and therefore likely groundwater dependent (Pusey & Kath 2015).

The remaining vegetation in the study area may be broadly classed as Pindan comprised of *Eucalyptus/Corymbia* and/or *Acacia* woodlands over a variable shrub layer over grasslands frequently dominated by *Sorghum* and *Triodia* species.

Fauna

A total of 110 vertebrate fauna species were recorded, including 87 birds, 16 mammals, five reptiles and two amphibians. The invertebrate fauna samples have yet to be collected. The only species of conservation significance that has been detected was the Golden Bandicoot (listed as Vulnerable under the EPBC and BC Acts). Both Northern Brown Bandicoot and Golden Bandicoot were captured in cage traps. One of the Golden Bandicoots was in breeding condition, likely a response to the recent rainfall. In addition to the captured bandicoots, foraging evidence (characteristic digging patterns)

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were recorded across much of the study area while traversing it. These were typically in the shrubland areas which is not a restricted habitat.

Two broad fauna habitat types were identified during the survey. The dominant habitat type was the Pindan woodland/shrubland made up of *Eucalyptus*, *Corymbia*, and *Acacia* woodlands over a variable shrub layer over grasslands, and the far more restricted seasonally wet depression containing a stand of the groundwater dependant *Melaleuca viridifolia*.

NGOODEROODYNE SPRING

Ngooderoodyne Spring contains permanent, relatively clear, running water along a deep channel, >1m in most areas at the time of the fauna survey (Figure 1). Groundwater seepage was evident at the time of the site visit at multiple points, at least 2 m above the headwater pool (Figure 2).

Flora

Vegetation at each of the seasonal wetlands to the north and south of Scrubby Paddock in the vicinity of Scrubby site consistently included several species recorded in the DWER list of potential GDV indicator species: *Typha domingensis*, *Melaleuca viridiflora*, *Nymphaea violacea* (aquatic), *Nymphoides* sp., *Lophostemon grandiflorus*, *Eucalyptus* spp. and *Corymbia* spp. The aquatic fern *Ceratopteris thalictroides* was also recorded at one site. It is probable that a similar suite of potential groundwater dependent species are present at Ngooderoodyne Spring.

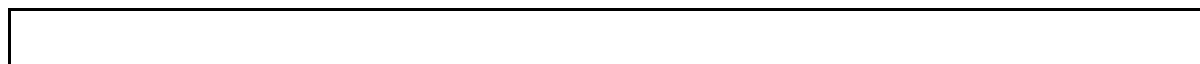
The fauna team also noted presence of vine thickets; several vine thicket species are considered potentially groundwater dependent in the Fitzroy River Valley: *Abrus precatorius*, *Caesalpinia major*, *Capparis lasiantha*, *Jasmin didymium*, *Tinospora smilacina* and *Vincetoxicum cinerascens* (previously known as *Tylophora cinerascens* (Pusey & Kath 2015); the study area is within the known range of most of these (WA Herbarium 2022). Many Kimberley vine thicket patches occur on or near groundwater springs or shallow aquifers, and Indigenous people of the Kimberley often identify vine as areas near jila (living water/ groundwater) (DSEWPac 2013).

As above, *Melaleuca viridiflora* and *Lophostemon grandiflorus* are likely groundwater dependent. *Eucalyptus* spp. possibly represents one of the eucalypts on the DWER list, *E. microtheca*, which is likely groundwater dependent but has high water use efficiency and drought tolerance (Canham *et al.* 2022). The *Corymbia* spp. may represent *Corymbia bella* from the DWER list, which is described as phreatophytic but also recorded to use "minimal amounts of groundwater (if any)" relying instead on soil water reserves (Lamontagne *et al.* 2005; O'Grady *et al.* 2006). The *Nymphoides* sp. could represent *Nymphoides beaglesensis*; in any case all *Nymphoides* are hydrophytic.

Fauna

Ngooderoodyne Spring is surrounded by vine thickets, deep continuous leaf litter, and large cracks, and crevices in 'coffee-rock'. Based on its isolation, this site is likely to have high SRE value, and at least two species of fish were present in the pool (likely Kimberley Archerfish *Toxotes kimberleyensis*, and Rainbowfish *Melanotaenia* sp.). Photos taken during the survey are presented in Figure 1.

The spring has clear value for aquatic and semi-aquatic species along the spring, creekline and terminal wetland, as well as terrestrial fauna for drinking water. Aquatic survey work is likely required to assess the fauna values associated with this area.



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Figure 1 **Photos from Ngooderoodyne Spring**

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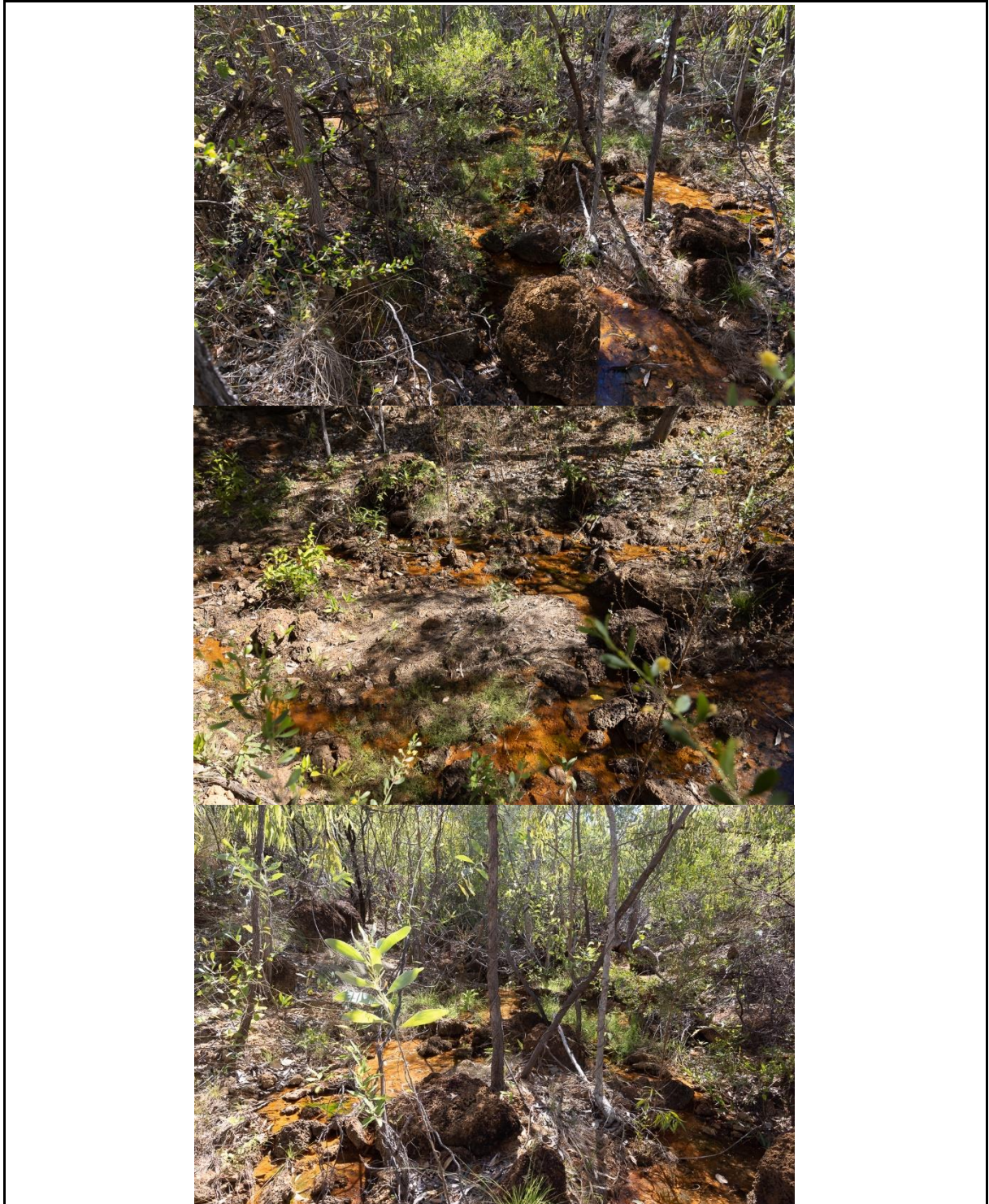


Figure 2 Groundwater seepage above Ngooderoodyne Spring headwater pool

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HAWKSTONE CREEK

Hawkstone Creek site contained a water pool that was approximately 0.5 m deep at its deepest part at the time of the fauna survey and partially opaque (see Figure 3).

Flora

Potential groundwater dependent flora species were recorded at each location visited and could be seen from the helicopter to stretch along the entire length of the creek system. Species recorded included:

- *Eucalyptus camaldulensis* subsp. *obtusa*
- *Terminalia platyphylla*
- *Planchonia careyi*.

Pandanus spirialis was recorded on a separate creek system. The riparian vegetation was recorded to be in Very Good condition with grazing and the presence of livestock tracks the most common disturbances.

Eucalyptus camaldulensis has mixed levels of groundwater dependency but is considered dependent. It is a relatively adaptable species and generally has high variability in physiological traits associated with drought adaptation and water stress (Canham *et al.* 2022; Pusey & Kath 2015). *Terminalia platyphylla* is facultatively deciduous in the dry season and as such has low dry season water use, not necessarily relying on groundwater (Canham *et al.* 2022; C. Woods pers. comm). *Planchonia careyi* is likely groundwater dependent (C. Woods, pers. comm.).

Fauna

The pool contained freshwater crabs and mussels (suggesting a permanent/semi-permanent water source). No aquatic vertebrates were observed. Several species of birds associated with water were observed at the pool including Black-fronted Dotterel and an Intermediate Egret. It is unlikely that this pool would be used as a refuge by Freshwater Sawfish.

LENNARD RIVER

The Lennard River site is a major drainage system, with permanent or near-permanent water pools of varying depths in some areas up to 1 m.

Flora

As Hawkstone Creek is a tributary of the Lennard River it is considered likely that a similar suite of potential groundwater dependent flora species will be present in the riparian vegetation of the river system, though a site visit would be required to confirm.

Fauna

Fish and mussels were both observed in the water while foraging, and extensive tracks of terrestrial fauna (Figure 4). This site was identified as a potential refuge for Freshwater Sawfish.

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Figure 3 **Photos from Long Pool**

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Figure 4 **Photos from Lennard River**

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4 DISCUSSION

From the reconnaissance surveys conducted, all three sites are likely to have at least some groundwater dependent ecological values:

- Ngooderoodyne Spring – likely groundwater fed spring has probable groundwater dependent fringing and aquatic flora species present; potential for SRE invertebrate taxa dependent on the fringing vegetation; habitat for aquatic native fish and a water source for terrestrial fauna in the dry season.
- Hawkstone Creek (and Long Pool) – potential groundwater dependent flora species present, water source for terrestrial fauna, habitat/refuge for aquatic invertebrates.
- Lennard River Pool – potential groundwater dependent fringing and aquatic flora species present (needs site check), potential refuge for freshwater fish and invertebrates, water source for terrestrial fauna.

Based on the drawdown modelling in the H3 hydrogeological assessment for the Project, it is recommended that all three sites be targeted for monitoring as part of groundwater abstraction. Vegetation at each of the seasonal wetlands to the north and south of Scrubby Paddock visited by the botany team also contained potential groundwater dependent species and subsequently could also potentially be targeted for monitoring.

Given the varying distances, and therefore impact timelines, for each site, it would be reasonable to implement a staged survey and monitoring program, with progressive addition of monitoring sites over time. Baseline data for each site would need to be collected prior to any drawdown at the respective site. The timing for this could be prompted if, and when, groundwater level thresholds are triggered at monitoring sites located closer to the abstraction point/s. Monitoring program would be developed for each site dependent on values identified.

Baseline monitoring surveys should include:

Ngooderoodyne Spring

- Fringing vegetation – installation of baseline monitoring transects and quadrats in fringing vegetation in the dry season.
- Aquatic flora – installation of baseline monitoring transects in the wet/post-wet season (contingent on access).
- Significant flora – two groundwater dependent significant flora may occur at Ngooderoodyne Spring swamp, *Lophostemon grandiflorus* subsp. *grandiflorus* (P3) and *Nymphoides beaglensis* (P3), therefore targeted searches should be undertaken for these species. Monitoring of these species would be contingent on presence.
- Terrestrial fauna – camera trapping at permanent pool at end of dry season to identify fauna species using pool for water, SRE survey of vine thickets.
- Aquatic fauna – sampling for native fish to determine the species assemblage; methods may include - seine netting, gill netting, may also trial baited fish traps¹; timing - end of dry season (permanent pools) and wet/post-wet season (timing contingent on access). Sampling

¹ Based on preliminary advice of Dr Tim Storer, DWER; further consultation to be conducted on most appropriate methods.

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for macroinvertebrates; methods - sweep netting using D-frame mesh nets; timing as above. Monitoring contingent on values identified.

Hawkstone Creek

- Fringing vegetation – installation of monitoring transects and quadrats in fringing vegetation in the dry season.
- Terrestrial fauna – dependent on persistence of pools, camera trapping at end of dry season to identify terrestrial fauna species using pools for water. Monitoring contingent on values identified.
- Aquatic fauna – dependent on persistence of pools, sampling for native fish and invertebrates. Monitoring contingent on values identified.

Lennard River pool

- Fringing vegetation – installation of baseline monitoring transects and quadrats in fringing vegetation in the dry season.
- Aquatic flora – initial baseline to determine presence; if present installation of monitoring transects.
- Significant flora – the groundwater dependent Priority 3 species *Nymphoides beaglensis* may occur at Lennard River pool, therefore targeted searches should be undertaken for this species. Monitoring of this species would be contingent on presence.
- Terrestrial fauna – camera trapping at end of dry season to identify fauna species using pool for water. Monitoring contingent on values identified.
- Aquatic fauna – sampling for native fish to determine the species assemblage; methods may include - seine netting, gill netting, may also trial baited fish traps²; timing - end of dry season (permanent pools) and wet/post-wet season (timing contingent on access). Sampling for macroinvertebrates; methods - sweep netting using D-frame mesh nets; timing as above. Monitoring contingent on values identified.

Ideally, the baseline for fringing vegetation and aquatic flora would include multiple years of data to account for natural interannual variability.

Yours Sincerely,

Grant Wells

Principal Botanist

Grant.wells@phoenixenv.com.au

08 6323 5410

2/3 King Edward Road Osborne Park WA 6017

² Based on preliminary advice of Dr Tim Storer, DWER; further consultation to be conducted on most appropriate methods.

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Attachment 1 Letter to DWER advising on proposed baseline studies and meeting notes from subsequent meeting on 13 January 2021



AUSTRALIAN CAPITAL EQUITY

PTY. LIMITED
ABN 88 009 412 328

22 December 2020

Belinda Walker
A/Director, Native Vegetation Protection
Regulatory Services
Department of Water and Environmental Regulation

Dear Ms Walker

NAPIER DOWNS STATION IRRIGATION PROJECT

You may remember we met in late 2018 in relation to a potential irrigated agriculture development at Napier Downs Station (NDS) in the Shire of Derby-West Kimberley as shown by correspondence at **attachment 1**. Since then, NDS has been investigating the feasibility of such a project, with the main focus to date being on characterising the groundwater resource potential, identifying a suitable site within NDS and identifying preliminary environmental values. Following these investigations, NDS now has some certainty that a viable irrigated agriculture development is feasible on NDS and have settled on a preferred site, noting that resource testing is pending for the site.

The purpose of this letter is to provide an update on the feasibility studies conducted to date and the baseline survey program to be undertaken to support a native vegetation clearing permit (NVCP) application for associated clearing. We request that a subsequent meeting be held between NDS and DWER Native Vegetation Protection Branch to discuss the clearing permit process and seek input on the proposed baseline survey program.

Project Purpose

The proposed project would provide for the production of fodder crops (Rhodes Grass) for cattle stocked on NDS and nearby stations, with water to be sourced from the Grant Group sandstone aquifer. The proposed project would entail the development of approximately eight 40-hectare centre irrigation pivots and associated infrastructure.

Site Selection

Initial investigations focussed on two sites, as shown at **attachment 2**, the first (Option 1) located in Naradong Paddock at the Lennard River crossing on Gibb River Road, ~96 km east of Derby, measuring ~3 km by 2 km (600 ha), and the second (Option 2) located in Hawkstone Paddock, 40 km from NDS Homestead on Gibb River Road, ~120 km east of Derby, measuring ~3 km by 5 km (1,573 ha).

Preliminary investigations were undertaken for these two Options, including:

- Environmental desktop assessment with the aim of identifying potential key biological values present and determining the scope of further surveys required to support environmental approvals (**attachment 3** – Jun 19).
- Preliminary sampling of groundwater and surface water (Lennard River)
- Preliminary risk assessment (PRA) associated with the planned H3 assessment for the project as shown at **attachment 4**). DWER Water subsequently provided feedback on the PRA shown at **attachment 5**.
- Investigation into potential connectivity of regional water table near Option 1 with river pools of the Lennard River; these were identified in the PRA as potential groundwater dependent ecosystems following concerns raised by DWER (**attachment 6**).

These investigations identified potential for impact to environmental values at the Lennard River site (Option 1), including hydrological linkage between the Lennard River and the regional Grant Group aquifer (**attachment 6**) and value to significant fauna (**attachment 3**).

NDS is committed to responsible and sustainable development of the project, therefore the Lennard River site was removed from further consideration, with attention subsequently focussed on Option 2 and a third option located in Scrubby paddock (~955 ha, 3.2 km x 3.3 km), 14.2 km WNW of Option 2 (**attachment 2**). Both Option 2 and Scrubby site are set back considerably from the Lennard River to avoid potential drawdown impacts to permanent pools.

Drilling of a stock/monitoring bore was undertaken at each of Hawkstone and Scrubby sites in September 2020 to ascertain groundwater depth, quality and flow rates. Preliminary results from airlifting at the Scrubby site has identified this site as a preferred site over Hawkstone, with better bore yields and depth to water (SWL 30.6 m below TOC, TDS 80 mg/L, yield >20 L/s, compared with SWL 61 m below TOC, TDS 90 mg/L, yield ~5.5 L/s). Radon sampling in river pools more than 10 km south of the Scrubby site identified low potential for connection of groundwater to Lennard River (**attachment 7**).

A subsequent environmental desktop review conducted for the Scrubby site identified no obvious significant environmental constraints (**attachment 8**), although several potential biological values were identified.

NDS has therefore made the decision to proceed with Scrubby as the preferred site based on shallow depth to water, high airlift yield, large distance from Lennard River, and no ecological constraints identified in desktop assessment.

Scrubby Site Overview

Scrubby site is situated within the West Kimberley National Heritage Place and the Fitzroy Trough (DL1) subregion of the Dampier land bioregion. Scrubby site is not situated within

any conservation reserves or Environmentally Sensitive Areas; Wilinggin an Indigenous Protected Area (IPA) is located 3 km to the east.

The Scrubby site occurs over eolian sandplain. No rivers or mapped drainage lines intersect site. Hawkstone Creek runs north to south-west adjacent (~5 kms east of), the site; its floodplains come within ~1.4 km.

According to regional scale mapping by Shepherd *et al.* (2002), a single association is present, 754, Fitzroy Sandplains, *Acacia* thicket with eucalypt woodland over spinifex *Acacia tumida*, *Eucalyptus tectifica*, *Corymbia grandifolia*, *Triodia pungens*, *T. bitextura*. This association has nearly 100% of its pre-European extent remaining. A number of Priority Ecological Communities occur in the vicinity of the Scrubby site, but none of their buffers intersect it.

No Threatened flora are known from the Fitzroy Trough subregion; however, 20 Priority flora have been recorded from the vicinity of Scrubby site based on a desktop search extent of 40 km radius of Hawkstone and Lennard River sites (**attachment 8**). *Stylidium pindanicum* (P3) has previously been recorded in within the site and a further 10 Priority flora are considered to have potential to occur.

Up to 26 significant vertebrate fauna were identified in the desktop assessment (**attachment 8**) as having potential to occur in Scrubby site. Potential for short range endemic (SRE) invertebrate taxa and subterranean invertebrate fauna to occur was also identified.

An indicative pivot layout is shown at **attachment 7**, but it is emphasised that this is subject to change pending outcomes of further baseline surveys, with the objective of avoiding impact to significant environmental values.

Groundwater Licence

NDs has lodged an application (3 Dec 18) with the Department for Water and Environmental Regulation (DWER) Water Division for a licence to abstract groundwater, at 6,000,000 kL per annum (6 GL/yr). Consultation is ongoing with DWER water in relation to the application and proposed H3 hydrogeological assessment for the project.

Heritage/Traditional Owner Groups

NDs has been in ongoing consultation with the relevant Traditional Owners, Wilinggin and Warrwa, in regard to the proposed project. Warrwa granted approval to install monitoring bores at the Lennard site in June 2020. Wilinggin and Warrwa gave cultural heritage clearance to drill at Scrubby and Hawkstone sites in August 2020.

Diversification Permit

A draft Application for Diversification Permit was lodged with the Pastoral Lands Board of WA on 15 December 2020.

Environmental Protection and Biodiversity Conservation Act 1999 (EPBC Act) and Environmental Protection Act 1986 (EP Act) s38 referral

At this stage it is unclear whether the project will require referral to the Commonwealth Department of Agriculture, Water and the Environment under the EPBC Act. A decision on EPBC Act referral will be made once baseline surveys have been conducted.

Based on the proposed scale of the project and the desktop review findings for Scrubby (**attachment 8**), we consider that State approval can most likely be adequately managed via the groundwater licence and NVCP processes, subject to the outcomes of the baseline survey. At this stage it is therefore not anticipated that the project will require referral to the Environmental Protection Authority (EPA).

Planned Studies to Support Project Development and Approvals

Drilling of a test production bore and aquifer pumping tests at Scrubby was planned for December 2020 but has been deferred until early 2021 due to restricted wet season access. Development of the project is subject to pumping test results for the production bore and subsequent modelling as part of the H3 assessment.

A H3 hydrogeological assessment report will be completed around Apr to May 2020, subject to DWER agreement on methodology for the assessment.

The following biological surveys are proposed for Scrubby based on the findings of the desktop assessment (**attachment 8**) and will inform the NVCP application:

- Detailed, two season flora and vegetation survey (wet season primary survey around Feb - March 2021, subject to accessibility, supplementary post-wet survey around May -June 2021), including:
 - Defining and mapping vegetation types and condition.
 - Conducting targeted searches for significant flora (Threatened and Priority) and Threatened and Priority ecological communities (TEC and PECs), where applicable.
 - Conducting targeted searches for declared pests and weeds of national significance (WoNS).
 - Identification and mapping of groundwater dependent vegetation.
- Targeted terrestrial fauna survey, including:
 - Detailed habitat assessment and mapping.
 - Targeted survey for significant mammals that may occur (Bilby, Northern Quoll, Golden Bandicoot, Kimberley Brush-tailed Phascogale, Northern Brushtail Possum and Northern Short-tailed Mouse), including:
 - Plot sampling for Bilby within and adjacent to Scrubby site.
 - Camera trapping within Scrubby site and along Hawkstone Creek.
 - Searches for signs of presence.

- Acoustic recordings for significant bat species and Night Parrot.
 - Avifauna surveys, targeting both significant species and avifauna assemblage generally.
 - Level 2 survey for SRE invertebrates, including systematic sampling and characterisation and mapping of SRE habitats.
 - Searches for presence of any pools or other surface water features in Scrubby site and adjacent toward Hawkstone Creek that may serve as refuges for the Freshwater Sawfish.
- Risk assessment for subterranean fauna.

The surveys will be conducted in accordance with current EPA guidance for biological surveys for Environmental Impact Assessment.

I and our Environmental Project Consultants look forward to meeting with you to discuss the project further and receiving feedback on the proposed survey program to support the NVCP application. As discussed in our earlier correspondence, it may be worth meeting concurrently with regional staff from Department of Biodiversity, Conservation and Attractions and EPA Services to seek input from all parties. Please feel free to contact me when convenient to advise your availability to meet early in the New Year.

Yours faithfully



JAMES MCMAHON
CHIEF OPERATING OFFICER

ATTACHMENTS:

1. 21 Nov 18 belinda.walker@dwer.wa.gov.au email.
2. Water site options.
3. Environmental Desktop Assessment – Jun 19.
4. Preliminary risk assessment (PRA) associated with the planned H3 assessment for the project.
5. DWER response to PRA.
6. Investigation into potential connectivity of regional water table near Option 1 with river pools of the Lennard River.
7. Radon sampling in river pools more than 10 km south of the Scrubby site.
8. Environmental desktop review conducted specifically for the Scrubby site.

From: [Richard Newman](#)
To: [Karen Crews](#)
Cc: [Mike Young](#); [Ray Carvalho](#); [Gary Humphreys](#)
Subject: FW: Minutes of meeting 13 Jan 2021 - NDS Water project - update and clearing process for Scrubby Site - Commercial in Confidence - Please do not distribute without authority of ACE COO
Date: Tuesday, 19 January 2021 2:36:42 PM
Attachments: [NDS letter to DWER - update and clearing process Scrubby site 22 Dec 20.pdf](#)

Thanks Karen. We'll review and incorporate our notes (if any additional to yours) and come back to you.

Regards
Richard

Richard Newman

A/Executive Director Regulatory Services
Department of Water and Environmental Regulation
Prime House, 8 Davidson Terrace Joondalup WA 6027
T (08) 6364 6407 | richard.newman@dwer.wa.gov.au

From: Karen Crews [mailto:karen.crews@phoenixenv.com.au]
Sent: Monday, 18 January 2021 12:04 PM
To: Richard Newman <richard.newman@dwer.wa.gov.au>; Ray Carvalho <ray.carvalho@dwer.wa.gov.au>
Cc: James McMahon <James.McMahon@acequity.com.au>; glenn@innovativegroundwater.com.au
Subject: Minutes of meeting 13 Jan 2021 - NDS Water project - update and clearing process for Scrubby Site - Commercial in Confidence - Please do not distribute without authority of ACE COO

Dear Richard and Ray,

Many thanks to you and your team for the meeting on Wednesday regarding Napier Downs Irrigation Project. James and I felt it was a very constructive and helpful meeting.

We have prepared a brief summary of our key notes and actions from the meeting. I would be grateful if you can review and circulate to any others for input and signoff. I can't remember the third phone participant – please add below.

Participants – James McMahon (JM), Karen Crews (KC), Richard Newman (RN), Penny Wallace-Bell (phone – Hydrogeologist, PWB), Melanie Morcombe (phone, MM), Ray Carvalho (Case Officer – Clearing, RC), Gary Humphreys (GH), Mike Young (MY), Ryan Mincham (RM)

Project overview

- JM gave overview of project, reference Glenn's email below and 22 Dec 20 Clearing Permit Meeting Request letter (attached). Logic for Scrubby site.

Permit process

DWER advised purpose permit would be appropriate for the project (in preference to an area permit), which specifies a maximum amount of clearing within a clearing envelope – allows some flexibility re project layout

- Discussed diversification and clearing permits. DWER advised the two processes can proceed in parallel, just signoff on former can't be given until NVCP issued
- Worth submitting NVCP application before H3 to process commences, however assessment will not proceed until DWER have sufficient information, i.e. supporting doc and technical studies
- Clearing permit assessing officer to be Ray Carvahlo, DWER key point of contact for assessment
- DWER recommend provision of a supporting document for the NVCP. ACE requested DWER provide some current good examples of supporting documents
- ACE requested current guidance on permit process and timelines. DWER assessment timeline – KPI of 80% of assessments completed within 60 business days
- ACE confirmed no plan to install additional access roads to Scrubby, therefore clearing will be confined to the Scrubby site

EPBC Act

- Discussion on likelihood of EPBC referral. ACE advised will consider requirement for referral once field surveys complete and there is a better understanding for potential significant impacts on MNES.
- Potential for bilateral assessment – NVCP/EPBC, only if proposal is designated a controlled action. DWER noted that ACE can choose to run assessments separately or as a bilat
- RN advised currently a process underway to facilitate a single assessment for State and Commonwealth approval. May come into effect around mid-2021 but no set timeline. ACE may want to consider EPBC referral timeline to be assessed under current framework
- ACE to keep in touch with DWER re decision on EPBC referral

Environmental studies to support clearing permit

- DWER agreed Phoenix environmental desktop reviews (attached letter 22 Dec 20 – attachments 3 and 4) had 'no project stopping' environmental issues at this stage of project. DWER preliminary desktop review did not identify any additional potential values to the Phoenix environmental desktop report for Scrubby
- DWER supportive of proposed survey scopes
- DWER to provide prelim advice on adequacy of desktop report and survey scopes and timing
- Noted surveys should consider impacts from groundwater drawdown, i.e. groundwater dependent vegetation within boundary of drawdown contours. Consult with Robyn Loomes if required
- ACE to send detailed methods statement to DWER for review prior to flora/fauna surveys.
- ACE to consult with DBCA regional office on biological survey scope/methods

Water licence

- H3 timeline – drilling March > report May. Biological surveys still required post H3 report
- DWER Director Native Veg Protection (Richard Newman), who chaired meeting, confirmed (via Melanie Morcombe) the initial water licence application (3 Dec 2018) for 6GL stands. This 6GL may change higher or lower once test bore drilled, H3 modelled and report done
- PWB raised consultation on H3 methodology. Glenn Harrington follow up with PWB with

regard to H3 methodology

- GH queried licence to construct bore in place and driller certification – JM confirmed well licence in place, will double check Driller licence requirements for test production bore
- Discussed paper on WA Govt proposed Fitzroy River Catchment and Allocation and Derby Catchment and Allocation. JM confirmed initial assessment of no effect on current ACE operations or water allocation process

Concluding remarks

- RN finished meeting with a thank you to ACE on approach, process, engagement and detail
- DWER will formally respond in a letter to JM/ACE stating no environmental issues at this stage, articulate process for clearing permit and minutes of meeting

We look forward to hearing from you.

Kind regards,

Karen Crews

Phoenix Environmental Sciences Pty Ltd

e: karen.crews@phoenixenv.com.au

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NAPIER DOWNS IRRIGATION DEVELOPMENT

MINUTES OF MEETING

13 January 2021

Attendees

Australian Capital Equity (ACE) Representatives	
James McMahon (JM)	Chief Operating Officer, ACE
Karen Crews (KC)	General Manager, Phoenix Environmental Sciences
Department of Water and Environmental Regulation (DWER) Representatives	
Richard Newman (RN)	Director, Native Vegetation Protection
Mike Young (MY)	A/Senior Manager, Native Vegetation Regulation (NVR)
Ryan Mincham (RM)	Manager, NVR
Ray Carvalho (RC)	Senior Environmental Officer, NVR
Gary Humphreys (GH)	Manager, North West Region
Penny Wallace-Bell (PWB)	Senior Hydrogeologist, North West Region
Melanie Morcombe (MM)	Program Manager, North West Region
Deirdre Gleeson (DG)	Senior Natural Resource Management Officer, North West Region

Proposal background

- JM provided an overview of the project, and the sites identified for potential irrigated agriculture development
- JM noted the 'Scrubby Site' was selected above two others (Lennard River and Hawkestone) based on radon results, water availability, aquifer connectivity, environmental and heritage impact
- JM noted the south west corner of Napier Downs Station was the best option water-wise as stock bores had identified potential stock bore yields of 20 L/s
- JM noted the Scrubby Site was 6-7km west of Hawkestone Peak, which is an area of high indigenous significance

Clearing permit application

- JM noted ACE was keen to progress a clearing permit application while the H3 report was in progress
- JM noted that an application for a diversification permit (DP) through DPLH would be progressed after a clearing permit application was submitted to DWER
- RN advised the DP can be applied for prior to a clearing permit application and progressed to a draft DP approval stage, noting final DP sign off can't be issued until a clearing permit is issued
- KC noted that its not expected for the application to warrant referral to the EPA for assessment under Part IV of the EP Act. This assumption was based on the extent of proposed impact and outcome of a previous proposal for a similar purpose at Shamrock Station (which had greater environmental impacts).
- DWER agreed that the proposal is unlikely to warrant EPA referral
- RN noted that an application can be submitted prior to undertaking biological surveys, where surveys could be provided after application acceptance, while the application would remain in 'stop the clock' until surveys are received
- DWER advised a purpose permit would be appropriate for the project (in preference to an area permit), which allows a certain clearing size within a larger envelope and allows some flexibility regarding project layout
- It was noted that the clearing application can be submitted prior to the H3 process commencing, however assessment will not proceed until DWER have sufficient biological information i.e. surveys
- DWER noted that the clearing permit assessing officer would be RC, and is DWER's key point of contact for that assessment

- ACE requested current guidance on the clearing permit process and timelines. RC noted DWER's assessment timeline KPI with a target of 80% of assessments completed within 60 business days
- ACE confirmed there is no plan to install additional access roads to the Scrubby site, therefore clearing will be confined to the Scrubby site

Actions

1. RC to provide KC with fact sheet on the clearing permit process

EPBC Act

- Discussion had on the potential for referral under the EPBC Act should impacts to MNES occur
- ACE advised it will consider requirement for referral once field surveys are complete and there is a better understanding for potential impacts on MNES
- RN discussed the bilateral arrangements between DWER and DAWE, advising of options for bilateral assessment (or not) should surveys identify impacts to MNES and DAWE make a controlled action decision
- DWER noted that ACE can choose to run assessments separately or under the bilateral process
- DWER noted that a bilateral assessment can only occur if DAWE has determined the action to be a controlled action
- RN noted that there is a proposed bilateral approval agreement being negotiated between DAWE and each state, however this was unlikely to be finalised in the short term
- ACE to keep in touch with DWER regarding decision on referral under the EPBC Act

Actions

2. RC to provide KC with additional information on the bilateral assessment agreement

Environmental studies to support clearing permit

- Discussion had on the Desktop Assessment undertaken by Phoenix, the following was noted:
 - KC advised desktop results for the Scrubby Site were extrapolated from desktop assessments of the Lennard and Hawkstone sites and may not entirely capture all values in the local area
 - RC noted that DWER's desktop assessment largely aligned with that undertaken by Phoenix and was adequate on that basis
 - RC noted that a closer review of the desktop would be undertaken and feedback provided to KC, particularly with regard to conservation significant flora species
 - DWER noted that from a desktop perspective, there did not appear to be any 'project stopping' environmental issues, however biological surveys would be required to confirm
- KC advised that flora surveys are planned immediately post wet season, and noted greater flexibility in timing of fauna surveys
- RC noted the surveys proposed appear adequate to inform DWER' environmental impact assessment
- RM noted that should threatened or priority flora be identified, surveys should incorporate a wider search footprint to better gauge the extent of impact to the local and regional extent
- KC requested DWER's comment on the proposed survey timing
- KC queried whether DBCA should be contacted regarding survey timing and methodology and DWER agreed that DBCA should be contacted, noting limited information is available on several priority flora species that require targeting
- KC advised detailed methods would be sent to DWER for comment prior to flora/fauna surveys
- KC advised that ACE will consult with DBCA's regional office on survey timing, scope and methods
- DWER recommended KC synthesise biological studies into a single supporting document, including a summary of key impacts
- KC requested DWER provide some current good examples of supporting documents
- DWER noted that surveys should consider impacts from groundwater drawdown, i.e. groundwater dependent vegetation within boundary of drawdown contours.
- KC noted that once H3 reporting is complete and drawdown contours available, follow up flora surveys will be done in the broader drawdown area (i.e. any gaps outside current survey area) to ensure groundwater dependant vegetation is adequately considered

- DWER recommended consulting with Robyn Loomes (DWER, Environmental Water planning) if required

Actions

3. RC to provide additional feedback to KC on adequacy of the Phoenix Desktop Assessment
4. RC to provide KC with a good example of supporting information to accompany clearing permit application
5. RC to provide KC with DWER's comments on the proposed survey timing

Water licence

- JM noted the projects progression will depend on the results of a H3 hydrogeological assessment report (H3), with drilling planned for March, and estimated report completion around April-May
- JM noted that the H3 process sequence is:
 - Test production bore → production test/monitoring → H3 report
- RN and MM confirmed the initial water licence application (3 Dec 2018) for 6GL stands. It was noted that this 6GL may change once the test bore is drilled, the H3 modelled and report completed
- PWB queried whether DWER would be consulted on the H3 methodology. JM noted he will request ACE's principle hydrogeologist consultant to follow up regarding the H3 methodology
- GH queried whether the licence to construct the bore was in place and whether the proposed driller had the correct certification
- JM confirmed that the well licence is in place, and while he is confident the driller has the appropriate certification for a test production bore, he will double check with the driller
- A brief discussion was had on DWER's Managing Water in the Fitzroy River Catchment, and Derby Groundwater Allocation Plan discussion papers
- JM queried whether the papers would effect current ACE operations or the water allocation process
- DWER confirmed the papers would not affect current ACE operations or water allocation process, however noted that the Fitzroy paper included management elements that could be applied to the Scrubby site

Actions

6. JM to request ACE's hydrogeologist consultant to follow up with DWER on the H3 methodology
7. JM to confirm that ACE's driller has the appropriate certification to drill a test production bore

Other matters and concluding remarks

- JM briefly discussed the Devonian Reef, decarbonisation and fodder crops as a mechanism
- RN finished meeting with a thank you to ACE on approach, process, engagement and detail

Summary of actions

Action No.	Action
1	RC to provide KC with fact sheet on the clearing permit process
2	RC to provide KC with information on the bilateral assessment agreement
3	RC to provide additional feedback to KC on adequacy of the Phoenix Desktop Assessment
4	RC to provide KC with a good example of supporting information to accompany clearing permit application
5	RC to provide KC with DWER's comments on the proposed survey timing
6	JM to request ACE's hydrogeologist consultant follow up with DWER on the H3 methodology
7	JM to confirm that ACE's driller has the appropriate certification to drill a test production bore

Memo

Attachment 2 DWER letter response to draft H3 assessment



Napier Corporation Pty Ltd
PO BOX 1398
WEST PERTH WA 6872

CC: James McMahon
Email: James.mcmahon@acequity.com.au

Dear Applicant,

Re: Additional information required for a licence under the *Rights in Water and Irrigation Act 1914 – Review of Hydrogeological Assessment*

Property: NAPIER DOWNS STATION

The Department of Water and Environmental Regulation has reviewed the H3 Hydrogeological Assessment Napier Downs Station (the Report), prepared for Australian Capital Equity Pty Ltd by Innovative Groundwater Solutions (IGS). The Report was received at the Department of Water and Environmental Regulation (the Department) 10th December 2021.

It has been determined that further information is required to complete the assessment. In accordance with Schedule 1, Division 2, Clause 4(1c) & (2) of the *Rights in Water and Irrigation Act 1914*.

Application to Take Water

Application (024277) made under Section 5C of the *Rights in Water and Irrigation Act 1914* (RIWI Act) for 6,000,000 kilolitres per annum from the Canning-Kimberley, Canning-Grant aquifer. The abstraction is for irrigation of fodder crops using eight 40-hectare centre pivots each with the average water demand of 750,000 kilolitres per annum. The location of works related to the application is referred to as *Scrubby* and is located on Napier Downs Station, 80 kilometres west of Derby in the State's Northwest.

Hydrogeological Assessment

The Report was requested by the Department under clause 4(2), Schedule 1 of the RIWI Act regarding the provision of a H3 hydrogeological assessment in support of the application. The Report has been reviewed with formal comment provided in this response letter.

The following values were identified within the Scrubby project area through a desktop study and were considered in the Report:

1. Several groundwater springs located outside the project area, the closest being Ngooderodyne Spring located approximately 13 km to the west (Figures 1 & 2);
2. Surface water drainage lines located east of the project area draining into Hawkstone

- Creek, located approximately 5 km to the east, and the Lennard River, located approximately 13 km to the south of the project area (Figures 1 & 2);
3. Potentially groundwater dependent PEC (Kimberley Vegetation Association 759 - Priority 3), associated with the riparian zones of Hawkstone Creek and Lennard River, with the buffer zone approximately 1 km to the east of the project area;
 4. The Indigenous Protected Area, Wiltingin located 3 km to the east of the project;
 5. Several terrestrial fauna and flora species of conservation significance may be associated with the riparian and floodplain ecosystems of Hawkstone Creek to the east of the project area; and
 6. There is the potential for stygofauna to be present in the project area.

A numerical groundwater flow model was provided to quantify the potential drawdown impacts on:

1. Ngooderoodyne Spring; and
2. The closest points (to Scrubby) of Lennard River, Robinson River, May-Meda system, Barker River and Hawkstone Creek.

The Report includes a monitoring program and management framework designed to ensure data collected is sufficient to enable the improved prediction and effective mitigation of any predicted long-term impacts.

Department Environmental Water Planning

The Department Environmental Water Planning completed an environmental review of the Report and provided recommendations and justification for further work as required. In consideration of:

1. The values listed in the Report;
2. Potential impacts identified by the groundwater model; and
3. Recommended monitoring program and management framework.

Recommendations are provided for Ngooderoodyne Spring, Hawkstone Creek and Lennard River as well as recommendations for conservation listed flora and fauna and stygofauna, are provided below.

Ngooderoodyne Spring

The department submits the following recommendations for Ngooderoodyne Spring:

1. Depth of water in Ngooderoodyne Spring (pool), terminal wetland and creek line. The depth of the water in this system must be measured, recorded and reported as it is not possible to assess potential impacts to surface water ecosystems from groundwater drawdown. For example, drawdown of 1.01 meters after 10 years would be catastrophic for a 0.50 meter deep pool.
2. Fauna survey to identify:
 - a. Aquatic and semi-aquatic species and communities that inhabit the water bodies;
 - b. Terrestrial species that rely on the water bodies for drinking and availability of alternative water sources; and
 - c. Terrestrial species dependent on fringing vegetation for habitat.
3. Vegetation survey and condition assessment. On ground survey of vegetation fringing the spring, creekline and terminal wetland and aquatic flora in the water bodies. This is required prior to any further works as there is currently no information available to assess potential impacts to vegetation from modelled drawdowns.
4. Monitoring should extend to:
 - a. water quality;

- b. pool, creekline and terminal wetland water depth;
- c. aquatic fauna; and
- d. aquatic flora.

Hawkstone Creek

The department identified two pools in proximity to Hawkstone bore using aerial photography, referred to as Long Hole and Long Pool, respectively. The Report has depth to groundwater at Hawkstone bore (80310152) located approximately 1.8 kilometres from Long Pool at less than 10 meters. Given this, EWP suggests that a shallow water table may support Long Pool, the protected ecological community (PEC) and vegetation reported as 'taller vegetation'.

A section of the Willinggin Indigenous Protected Area (IPA) occurs along Hawkstone Creek east of the Scrubby site. There is no further information available however, it is highly likely that the value of this area relates directly to the creekline.

Although not discussed in the Report, the groundwater model predicts groundwater (50th percentile) of 3 to 4 meters after 10 years and 30 years of continuous abstraction.

The monitoring program and management framework proposes quarterly depth to groundwater monitoring at Hawkstone Bore. Monitoring of potential groundwater dependent ecosystem (GDE) associated with the Hawkstone Creek have not been discussed.

The department submits the following recommendations for Hawkstone Creek:

- 5. Vegetation Surveys – on ground prior to any further works as there is currently no information available to assess potential impacts to potential groundwater dependent vegetation (GDV) or the IPA from modelled drawdown, specifically:
 - a. 'Taller vegetation' along creekline.
 - b. PEC (Kimberley vegetation association 759) to identify '*coolibah*' species.
- 6. Determine performance, depth and water source of Long Pool and any other pools in the vicinity as these have not been considered in the assessment.
- 7. Fauna Surveys:
 - a. Terrestrial species dependent on creekline/riparian vegetation for habitat.
 - b. Terrestrial species that may rely on Long Pool (or any other pool) as a water source.
 - c. Aquatic or semi-aquatic species that may use Long Pool (or any other pool) as habitat.
- 8. Monitoring – in addition to groundwater depth at Hawkstone bore, the following should be included in monitoring:
 - a. Water quality and depth of Long Pool if found to be groundwater dependent;
 - b. Aquatic fauna and flora associated with Long Pool; and
 - c. Condition of riparian/fringing vegetation of Hawkstone Creek.

Lennard River

The department suggests that although the Report describes Lennard Pool as more than 10 kilometres from the Scrubby site and not at risk, the groundwater model predicts a drawdown (50th percentile) of 0.0 meters, 0.46 meters and 0.67 meters respectively after 1, 10 and 30 years of continuous abstraction.

The monitoring program and management framework proposes ongoing groundwater pressure and quarterly depth to groundwater monitoring at paired bores NDSMB03S and NDSMB03I near the Lennard River Pool.

The department submits the following recommendations:

9. Vegetation survey and condition assessment. On ground survey prior to any further works as there is currently no information available to access potential impacts to vegetation from modelled drawdown. Surveys of:
 - a. PEC (Kimberley veg association 759) to identify 'coolibah' species
 - b. Fringing/ riparian vegetation associated with Lennard Creek
 - c. Aquatic flora associated with Lennard River Pool.
10. Determine permanence, depth and water source of Lennard River Pool and any other pools in the vicinity as these have not been considered in the assessment.
11. Fauna surveys:
 - a. Terrestrial species dependent on creekline/ riparian vegetation for habitat.
 - b. Terrestrial species that may rely of Lennard River Pool (or any other pool) as a water source.
 - c. Aquatic or semi-aquatic species that may use Lennard River Pool (or any other pool) as habitat.
12. Monitoring – in addition to groundwater pressure and depth at nested bores, the following should be included in monitoring:
 - a. Water quality and depth of Lennard River Pool.
 - b. Aquatic fauna and flora associated with Lennard River Pool.
 - c. Condition of riparian/ fringing vegetation of Lennard River.

Conservation listed flora and fauna and stygofauna

The department recommends the following:

13. Undertake a desktop survey of listed flora and fauna at Scrubby site and area of predicted drawdown.
14. Survey creeklines/rivers/pools for potential habitat for listed species.

Department Hydrogeological Review

IGS has compiled and integrated the material that was advised in the original scoping emails. IGS has incorporated the geological interpretations from regional bore data and has determined that a simple numerical groundwater model would be a suitable tool to assess the risks from the station's proposed irrigation project.

In the absence of transient calibration, IGS has chosen to use a parameter sensitivity and uncertainty analysis to predict a range of likely drawdowns, as presented in contour maps (Figure 33, 34 and 35). This is an acceptable approach, given limited observations available.

The model predicted a significant hydraulic gradient along the north-eastern model boundary. IGS attributed this to a steep topographic and basement elevation that results in a thin aquifer. We suggest that IGS should provide a cross section with model layer, hydraulic boundary and modelled flownet to visualise the concepts.

The interaction of streamflow's with groundwater is not represented in the model. Additionally, the modelling of the influence of the Markham Fault is not based on water level information, so has been managed within the sensitivity analysis. When Napier Downs develops its production borefield, then a monitoring network should include locations that inform a revision of the model to assess the boundaries, the creek interactions, and the fault.

The pumping tests show that the test bore is capable of high performance, it was tested at 55L/s with good curve matching, so the proposed borefield (6GL/a from 8 bores) is expected to be able to deliver the expected supply with a stable drawdown within about a decade. This prediction will need to be reviewed with more data. Napier Downs could select monitoring

bore locations to verify drawdowns. This initial prediction of flat and wide drawdown indicates that the production bores in the model can be supported by the aquifer.

In future, when more bores are drilled and tested, and the bore/s have been used for several years, then a better-calibrated model should be developed. A future model should incorporate better hydrogeological conceptualisation, including a layered aquifer (if justified), streamflow boundary and better-constrained hydraulic parameters, also including storage coefficients. This should be done no later than two years after irrigation commences.

While predicted drawdowns at target pools and springs are sub-metre, Napier Downs should conduct additional work on water-level sensitivity.

The Department hydrological review of the Report summarises:

1. The geological conceptualisation is sufficiently sound to justify building a simple numerical model.
2. The numerical model incorporates a formal uncertainty analysis that takes into account aquifer hydraulic conductivity, recharge and evapotranspiration. This enables a transparent assessment of drawdown risks.
3. There is insufficient geological control (bores with geological profiles/logs) to build a multi-layer aquifer or to have widely ranging parameters within the layer.
4. The modelling of the Markham Fault and its role in groundwater flow is not soundly based on three-dimensional hydrogeological data, only on assumption of its effects (but is tested with the sensitivity analysis).
5. Boundary heads and streamflow interaction are not evidence-based in this version of the single-layer model but should be included in future revisions. The reasoning and conceptualisation of these components of the model needs additional explanation with a cross section.
6. The Limitations and Recommendations section of the Report requires commitment to a rigorous adaptive management, with regular review (max every two years, not just at the end of Stage 1) of the hydrogeological conceptualisation as data are collected.
7. Recommendations should include a commitment to improve the understanding of the Spring, and the vegetation on Hawkstone Creek.

Cultural values

You have advised the department that from recent correspondence with Warrwa that a full heritage survey of the Scrubby site will be required once the H3 hydrogeological assessment has demonstrated sufficient groundwater availability for the project and that groundwater drawdown impacts, particularly to the Lennard River pools, can be managed sustainably.

A cultural heritage survey will inform if and how potential impacts can be managed and this information is required for the department to finalise an assessment.

Referral to Other Agencies

The report states that the decision on whether or not the project is likely to have significant environmental effects requiring referral to other agencies will have to await the outcomes of future surveys. Likewise, the application for a Clearing of Native Vegetation permit will be conditional on the outcomes of a baseline environmental survey in 2022.

Conclusion

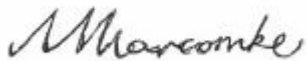
Based on above advice it has been determined that further information must be provided in support of the Report to allow the Department to suitably assess the proposal. Please update the Report in consideration of these recommendations and provide to the Department to allow progression of the assessment.

This letter is notifying you that you have until 1 November 2022 to provide this information to us, however if this date is not suitable, please get in touch to discuss a reasonable and achievable date. If you believe there are extenuating circumstances to justify why you cannot provide the information, you should write to us with these reasons.

Should the information (or explanation of the extenuating circumstances) not be received within this timeframe, we will return your application to you as it is incomplete and there is insufficient information to allow us to make an informed decision.

Should you have any questions regarding the information or comments provided in this letter, please contact the Northwest Region A/Program Manager, Laura Mason on (08) 6364 7366.

Yours sincerely,



Melanie Morcombe
District/Program Manager
Northwest Region
24 May 2022