



Assets | Engineering | Environment | Noise | Spatial | Waste

Clearing Permit Supporting Document

Site G1 - Great Northern Highway, Roebuck, WA



Prepared for Shire of Broome

January 2020

Project Number: TW19113



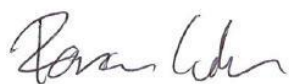
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Approval for Release

Name	Position	File Reference
Ronan Cullen	Director – Waste Management Section Leader	TW19113-Clearing Permit (G1).1a

Signature



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Appendix A : Reconnaissance Flora and Level 1 Fauna Survey Report

Appendix B : Certificate of Title and Authority to Access Land

1 Introduction

The Shire of Broome (the Shire) proposes to undertake environmental investigations within a site (G1) located on the Great Northern Highway, Roebuck, WA, located approximately 38 km north-east of the town of Broome (Figure 1). The site is located on Lot 1544 on deposited plan 75840. The site occupies an area of 143.6ha of which the proposed development footprint is approximately 37.6 hectares (ha) (376,600m²).

Preliminary environmental investigations are required to determine the sites' suitability for locating the Broome Regional Resource Recovery Park (RRRP). The proposed activities include establishing boreholes, trial pits and temporary tracks in order to conduct hydrogeological and geotechnical investigations.

This document has been prepared to support the application for a clearing permit required to undertake the proposed activities. The information included within this supporting document includes details on the following aspects:

- Existing environment;
- Scope of Works;
- Equipment;
- Proposed Clearing and Disturbance Area;
- Environmental Management;
- Heritage; and
- Safety.

2 Existing Environment

The site is 143.6ha in size and consists of native vegetation. An aerial view of the site is shown in Figure 2. During 9-14 November 2016 an area immediately east was subject to a Hydrogeological Investigation which included the installation of five groundwater wells, five shallow groundwater wells and temporary tracks. A small portion of the previously surveyed area overlaps the current site boundary. The previous boundary and current boundary are shown in Figure 3.

The flora and fauna surveys previously completed are listed below:

- Level 1 single phase fauna survey (November 2016) – Astron
- Level 2 flora and vegetation survey (April 2017) – Astron
- Targeted Bilby survey (April 2017) – Astron

A Reconnaissance survey was undertaken at the site by a qualified ecologist from Spectrum Ecology on the 26 November 2020. The survey included a desktop assessment which considered these previous surveys as well as others within the region. A summary of the key findings of the Reconnaissance survey are provided in **Table 2-1**. A copy of the full report is provided in Appendix A.

Table 2-1: Summary of environmental aspects

Aspect	Findings
Climate	<p>Dry, hot and tropical, divided into a dry and wet season.</p> <p>Dry season - April to November, little rain and daily temperatures around 30°C.</p> <p>Wet season - December to March, average temperatures are a few degrees higher along with erratic, often heavy rainfall, high humidity and the possibility of tropical cyclones.</p> <p>Annual average rainfall - 628.1mm however highly variable, from as low as 132mm up to 1599mm.</p>
Bioregion	Pindanland (DAL02) IBRA subregion within the larger Dampierland (DAL) region
Land systems	<p>Yeeda: Sandplains and occasional dunes with shrubby spinifex grasslands or pindan woodlands.</p> <p>Wanganut: Sandplains and dunes with pindan woodlands and spinifex/tussock grasslands</p>
Pre European Vegetation Mapping	<i>Acacia tumida</i> shrubland with grey box and cabbage gum medium woodland over ribbon grass & curly spinifex
Geology	<p>Qs -Sand, silt; minor gravel: mixed alluvial and Aeolian (66%)</p> <p>Qa -Sand, silt, clay; minor gravel: alluvial and lacustrine (34%)</p>
Vegetation type(s)	<i>Bauhinia cunninghamii</i> open woodland over <i>Acacia eriopoda</i> and <i>A. platycarpa</i> sparse shrubland over <i>Grewia rustifolia</i> and <i>Pterocaulon</i>

Aspect	Findings
	<i>intermedium</i> isolated heath shrubs over <i>Chrysopogon fallax</i> isolated tussock grasses. <i>Corymbia flavescens</i> and <i>C. greeniana</i> (+/- <i>Brachychiton diversifolius</i> ssp. <i>diversifolius</i> , <i>Bauhinia cunninghamii</i>) open woodland over <i>Acacia eriopoda</i> sparse shrubland over <i>Sorghum plumosum</i> sparse tussock grassland.
Vegetation condition	Excellent
Years since last fire	<5
Threatened and Priority Flora	None recorded within the site although highly likely to occur. Two Priority flora are known to occur in the vicinity (20 km): <ul style="list-style-type: none"> • Jacquemontia sp. Broome (P1) • Polymeria sp. Broome (P3)
Threatened and Priority Ecological Communities	No TECs or PECs located within the Site.
Environmental Sensitive Areas or Conservation Estates	None located within the site.
Conservation Significant Fauna	No conservation significant fauna species or evidence of these species was recorded within the site. High likelihood of occurrence of the Greater Bilby (<i>Macrotis lagotis</i>) due to presence in surrounding areas.
Fauna Habitat	Pindan Shrubland habitat
Short Range Endemics	No WAM records within the site. Four taxa (<i>Urodacus</i> 'fossor?', <i>Urodacus</i> 'kraepelini', <i>Quistrachia leptogramma</i> and <i>Rhagada bulgana</i>) have a high likelihood of occurrence and eight are considered to have a medium likelihood of occurrence (<i>Aname</i> 'MYG284', <i>Aname</i> 'MYG388', <i>Kwonkan</i> 'MYG285' and <i>Lychas</i> 'JPP', <i>Conothele</i> 'MYG613', <i>Conothele</i> 'MYG615', <i>Conothele</i> 'MYG616', <i>Conothele</i> 'MYG617').
Introduced species	None

The following key conclusive statements were extracted from the report:

- Although the G1 Study Area has appropriate habitat for conservation significant flora, clearing of the G1 Study Area is unlikely to threaten the continued existence of these priority Flora.
- The clearing of vegetation in the G1 Study Area is not considered to impact on the environmental values of any adjacent or nearby conservation area.
- Clearing of either Study Area is not expected to significantly impact any terrestrial vertebrate fauna species identified during this study.

- Clearing activity conducted in either Study Area is not expected to have a significant impact on any SRE invertebrate taxa due to the widely distributed habitats present with the study area.
- Given the species count, vegetation types, literature review and the Pre-European vegetation units, the vegetation at the study areas is not considered to have a high level of biological diversity.
- Pindan Shrubland habitats identified within both Study Areas occur extensively across the Dampier Peninsula and is not considered a significant habitat type.

2.1 Ten Clearing Principles

To further assess the potential impacts of clearing, the site was assessed against the ten Native Vegetation Clearing Principles. The sites variance to each principle is shown in Table 2-2 . The reasoning behind each variance is provided within section 5.4 of the Reconnaissance Flora and Level 1 Fauna Survey report (Appendix A).

Table 2-2: Native Vegetation Clearing Principles

Principle		Variance
a)	Native vegetation should not be cleared if it comprises a high level of biological diversity	Not at variance
b)	Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to Western Australia	Not at variance
c)	Native vegetation should not be cleared if it includes, or is necessary for, the continued existence of rare flora	Not at variance
d)	Native vegetation should not be cleared if it comprises the whole or part of, or is necessary for the maintenance of, a threatened ecological community	Not at variance
e)	Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared	Not at variance
f)	Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland	Unlikely to be at variance
g)	Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation	Not at variance
h)	Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area	Not at variance
i)	Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water.	Unlikely to be at variance



Principle		Variance
j)	Native vegetation should not be cleared if clearing the vegetation is likely to cause, or exacerbate, the incidence of flooding.	Not at variance

3 Clearing Works

The Shire proposes to establish a number of groundwater monitoring bores and trial pits within the RRRP footprint to further extend the current understanding of the groundwater and geology attributes of the site. The proposed activities are described in the following subsections.

3.1 Site details, ownership and access

The site is located on Lot 1544 on deposited plan 75840. A copy of the Certificate of title is provided in Appendix B. The Site will be accessed via Great Northern Hwy. The site is owned by the Yawuru who are the traditional owners of the land. Permission has been granted by Yawuru who are the Native title holders and land owners. A copy of the Authority to access and undertake investigations is provided in Appendix B.

3.2 Groundwater Monitoring Bores

The old site boundary was previously drilled in 2016, however as the proposed layout has shifted since this was undertaken, further investigation is required. The groundwater bores are required to monitor groundwater depths across the site for period of twelve months thereafter selected bores will remain around the proposed landfill footprint to be utilised for monitoring through the lifespan of the facility should the investigation yield positive results.

Several bores from the previous investigation still yield pertinent information regarding groundwater depth. Based on previously gathered data, it was determined that the regional groundwater sits between 10 metres below ground level (mbgl) and 15 mbgl, with the aquifer being the Broome Sandstone. Therefore, five (5) nested monitoring wells will be sunk across the site. A nested monitoring well involves the installation of two monitoring wells at a single location, in this case, one to 20 metres below ground level (mbgl) targeting the deeper regional groundwater aquifer (Broome Sandstone), and a further shallower monitoring well targeting the potential for a perched/seasonal groundwater within the superficial soils. The location of these wells is shown in Figure 4.

3.2.1 Installation Process

The groundwater bores will be established along semi-permanent roads that will be utilised during monitoring events. The drill rig, water truck and support vehicle will move to each location along the proposed semi-permanent access tracks to each bore location. The bore holes will be drilled using diamond drilling techniques (deeper monitoring wells) and auger drilling (shallow monitoring wells), and installed in accordance with ASTM D5092-04 Standard Practice for Design and Installation of Groundwater Monitoring Wells.

The precise installation process will be established following assessment of site conditions however, the general process proposed for installation will be:

- Groundwater wells will be installed at least 3m into groundwater;
- 50mm diameter, class 18 threaded PVC casing;

- Minimum 6m length (for 25m wells) and up to 7.5m length (for 9m wells) slotted screens to intersect groundwater;
- 0.5m casing uprising above ground surface level;
- Lockable steel monument cover;
- Gravel/filter pack will be placed around the well from the bottom of the well cap to 0.5m above the screen;
- At least 1m bentonite will be placed above the gravel layer;
- Backfill of the well annulus with concrete spoil/sand;
- Landfill gas tap (9m wells only); and
- Bottom cap to prevent entry of fines into the boreholes.

The drill holes will be sunk using 76mm hollow stem augers (150mm hole size) and HQ diamond drilling (115mm hole size). Core samples approximately 1m in length will be extracted from each bore in order to understand the geology of the site. The core samples will be removed from site and stored at the Shire's depot. At the completion of the last bore on each track, the support vehicles and drill rig will traverse back along the established access track to minimise disturbance.

3.3 Pump Test

A single larger diameter water well will be installed to complete a hydrogeological pump test. This test will be undertaken to gain an understanding of aquifer conditions, specifically the hydraulic conductivity of the Broome Sandstone.

3.3.1 Installation Process

The water well will be established along semi-permanent roads that will be utilised during monitoring events. The drill rig, water truck and support vehicle will move to the location along proposed semi-permanent access tracks which were created during the installation of monitoring wells. The water well will be drilled using *Air Hammer* drilling techniques and installed in accordance with Minimum Construction requirements for Water Bores in Australia, Third Edition, National Uniform Drillers Licensing Committee, 2012.

The precise installation process will be established following assessment of site conditions however, the general process proposed for installation will be:

- The water well will be installed to ~ 50 m bgl;
- 100mm diameter, class 12 threaded PVC casing;
- Minimum 20m length slotted screens from base of monitoring well;
- 0.5m casing uprising above ground surface level;
- Appropriate headworks;
- Gravel/filter pack will be placed around the well from the bottom of the well cap to 0.5m above the screen;
- Bentonite/concrete will be placed above the gravel layer to surface; and
- Bottom cap to prevent entry of fines into the boreholes.

The drill holes will be sunk using Air Hammer techniques (150mm hole size) and all rock chips will be placed adjacent to the water well. At the completion of the works, the support vehicles and drill rig will traverse back along the established access track to minimise disturbance.

3.4 Trial Pits

In order to aid the design of the facility, there is a requirement to complete a geotechnical assessment of the site to understand the characteristics and properties of the in-situ soils. A total of 50 trial pits are proposed to be established across the site to allow baseline geotechnical investigations to occur. The indicative locations of the trial pits are shown in Figure 4.

3.4.1 Installation Process

The trial pits will be established using the excavator with a disturbance area of approximately 2m by 4m. The trial pits will be established to an approximate depth of 4.5m. A maximum of four soil samples up to 20kg will be removed from the trial pit, bagged, taken off site for laboratory testing where required. The remaining excavated soil will be placed back in the pit, and levelled. Following the completion of trial pits along each temporary access track, the excavator will traverse from the last pit location to the nearest location in the adjacent access track thereby minimising disturbance. Each row of trial pits will therefore be linked by one movement of machinery and support vehicles.

3.5 Equipment

The equipment required to support and undertake the investigation includes:

- 20 Tonne Excavator;
- Desco Drill Rig (DR003) (4.5 tonnes);
- Isuzu Support Truck (SV001);
- Iveco Water Truck (WT003)(5,000Litre tank);
- Toyota Landcruiser Service Vehicle (LV001);
- KL50T custom built drill rig (Rig 1) (pumping tests);
- Water Truck 1 (7000L) (pumping tests)
- Support Truck (pumping tests)

The transporter truck will remain on the proposed access track to unload the drill rig, and associated drilling materials. The drill rig, water cart and service vehicle will be required to access each drilling location. The service vehicle will be used to transport personnel, tools required for installation and safety equipment.

3.6 Proposed Clearing and Disturbance Area

Prior to disturbance activities, the clearing and disturbance area will be demarcated. The clearance and disturbance area will be defined using high visibility tape and or spray paint where suitable to ensure operators undertake activities within the clearing boundary. A maximum of 30ha (~20% of the whole site) will be disturbed within the 37.66ha development footprint during the site investigations, however, the Shire will aim to minimise this through the following management methods:

- Vehicles and machinery to keep to existing cleared areas and track over small vegetation where practicable, rather than clearing;
- Adopting the shortest possible routes to the investigation locations;
- Installing bores and trial pits at the side of the tracks as much as practicable;
- Modifying tracks when necessary to avoid any significant vegetation;
- Modifying borehole and trial pit locations when necessary to avoid any significant vegetation;
- Supervision of site investigations and contractor's access by qualified personnel; and
- A Site Supervisor and Spotter will be present at all times to ensure all clearing and disturbance is undertaken within the proposed clearing boundaries. The excavator will be used to clear access tracks where necessary to facilitate the installation of the boreholes and trial pits. It should be noted that large areas within the proposed clearing boundary does not contain vegetation.

3.7 Environmental Management

3.7.1 Priority Flora

The following management measures will be undertaken to minimise the impact on the environmental and maximise the amount of environmental information recorded at the Study Areas to inform future decision making and approvals.

- A trained Ecologist, familiar with the conservation significant species, will perform a clearance survey role in front of the machinery whilst clearing is taking place and inform operators to avoid conservation significant species. The ecologist will also provide training to project personnel in the identification of conservation significant species to aid in future avoidance.
- Clearing for access tracks and bore sites to be undertaken using a front end loader to remove vegetation, while limiting disturbance to the soil surface

3.7.2 Priority Fauna

The following management measures will be undertaken to minimise the impact on the environmental and maximise the amount of environmental information recorded at the Study Areas to inform future decision making and approvals.

- Immediately prior to clearing, a suitable qualified zoologist or country manager will walk along the clearing path to ensure no new active Greater Bilby burrows have been constructed post fauna survey. Clearance areas will be altered to avoid damaging active burrow systems.

3.7.3 Hydrocarbon Spills

To manage the potential for hydrocarbon spills on site, the drill rig, transporter and service vehicle will carry a hydrocarbon spill kit. Any contaminated material/rags etc. will be removed from site in an appropriate container and disposed of appropriately.

3.7.4 Water Discharge

The water required for cooling and extraction during the drilling process will be discharged into localised sumps in the ground, adjacent to the investigation hole for evaporation.

3.7.5 Weed Control

To avoid the introduction of weeds, all vehicles and machinery will be inspected prior to access to site. In the event any seeds or weeds are identified, they will be removed, contained and disposed of appropriately.

3.7.6 Heritage

A heritage survey will be undertaken prior to any clearing activities. Any recommendations arising from the report will be adopted by the Shire.

3.7.7 Safety

To ensure the safety of personnel and the environment the following controls are proposed:

- Pre-operation weather check to ensure conditions are suitable for activities;
- All personnel to undertake a Job Hazard Assessment (JHA) at the morning daily pre-start meetings prior to commencement of activities;
- All personnel involved in the investigations will conform to fitness to work criteria;
- All plant/equipment to be subject to a daily Pre-start Check;
- Site supervisor to inspect area to identify & assess for any further hazards;
- A Take 5 will be conducted for new/other hazards if required; and
- Clear communication between rigger, supervisor and heritage representative to be maintained at all times;
- Operation of machinery will occur according to the contractors method statements and safe-work procedures;
- Correct Personnel Protective Equipment (PPE) will be worn by all personnel at all times; and
- The drill rig, service vehicle transporter will contain:
 - Hydrocarbon spill kit;
 - First aid kit; and
 - Fire extinguisher.

3.8 Summary

The information in this document has been provided to support the Shire of Broome's clearing application for the site. All proposed clearing will be undertaken as outlined in this document to ensure all environmental impacts are minimised and managed. Clearing works will be undertaken immediately prior to the Site investigation works planned to commence in April 2020 following the grant of a Clearing Permit.



Figures

Figure 1: Site locality

Figure 2: Site aerial

Figure 3: Old and new site boundary

Figure 4: Trial pits and bore locations



LEGEND

- Site Boundary
- Primary Distributor Road
- Regional Distributor Road

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LOCALITY

0 100 200 300 400 500 km

LOCALITY

Site G1

NVCP Application
Shire of Broome

0 2 4 6 8 km

Coordinate System: GDA 1994 MGA Zone 51
Projection: Transverse Mercator, Datum: GDA 1994
Scale @ A3: 1:200,000

Prepared:	F Walker	Date:	17/01/2020
Reviewed:	E Porter	Revision:	A
Project:	TW19113		

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Figure 01

Data source: Roads - MRWA, 2019; Suburbs - Landgate, 2019; Imagery: ESRI, 2019

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LEGEND

- Site Boundary
- Cadastre
- Primary Distributor Road

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LOCALITY

0 10 20 30 40 km

AERIAL
Site G1

NVCP Application
Shire of Broome

0 100 200 300 400 m

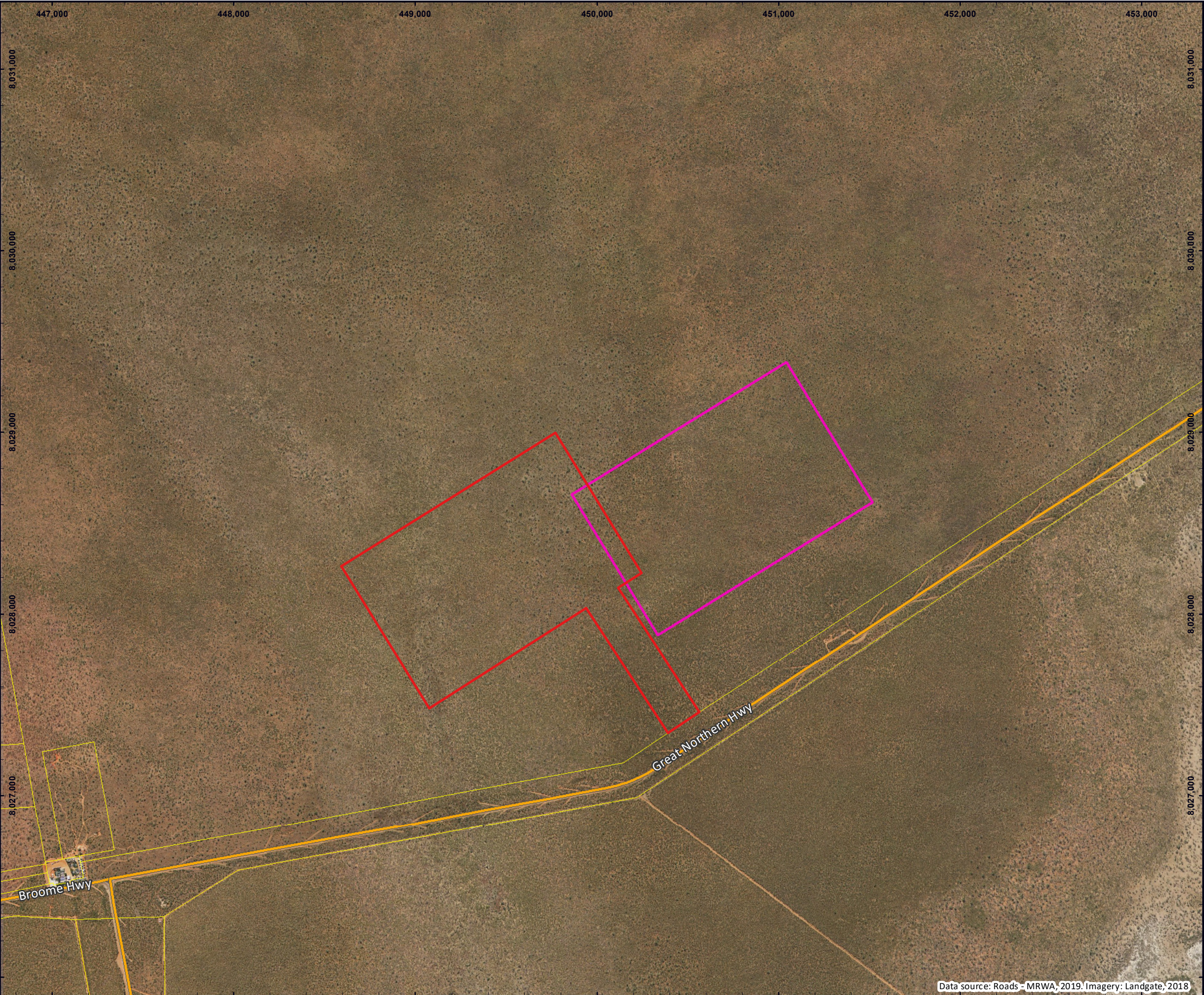
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Projection: Transverse Mercator, Datum: GDA 1994
Scale @ A3: 1:10,000

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Reviewed:	E Porter	Revision:	A
Project:	TW19113		

Figure 02

Data source: Roads - MRWA, 2019. Imagery: Landgate, 2018

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LEGEND

- Site Boundary
- Old Site Boundary
- Cadastre
- Primary Distributor Road

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LOCALITY

0 10 20 30 40 km

OLD AND NEW BOUNDARIES

Site G1

NVCP Application
Shire of Broome

0 210 420 630 840 m

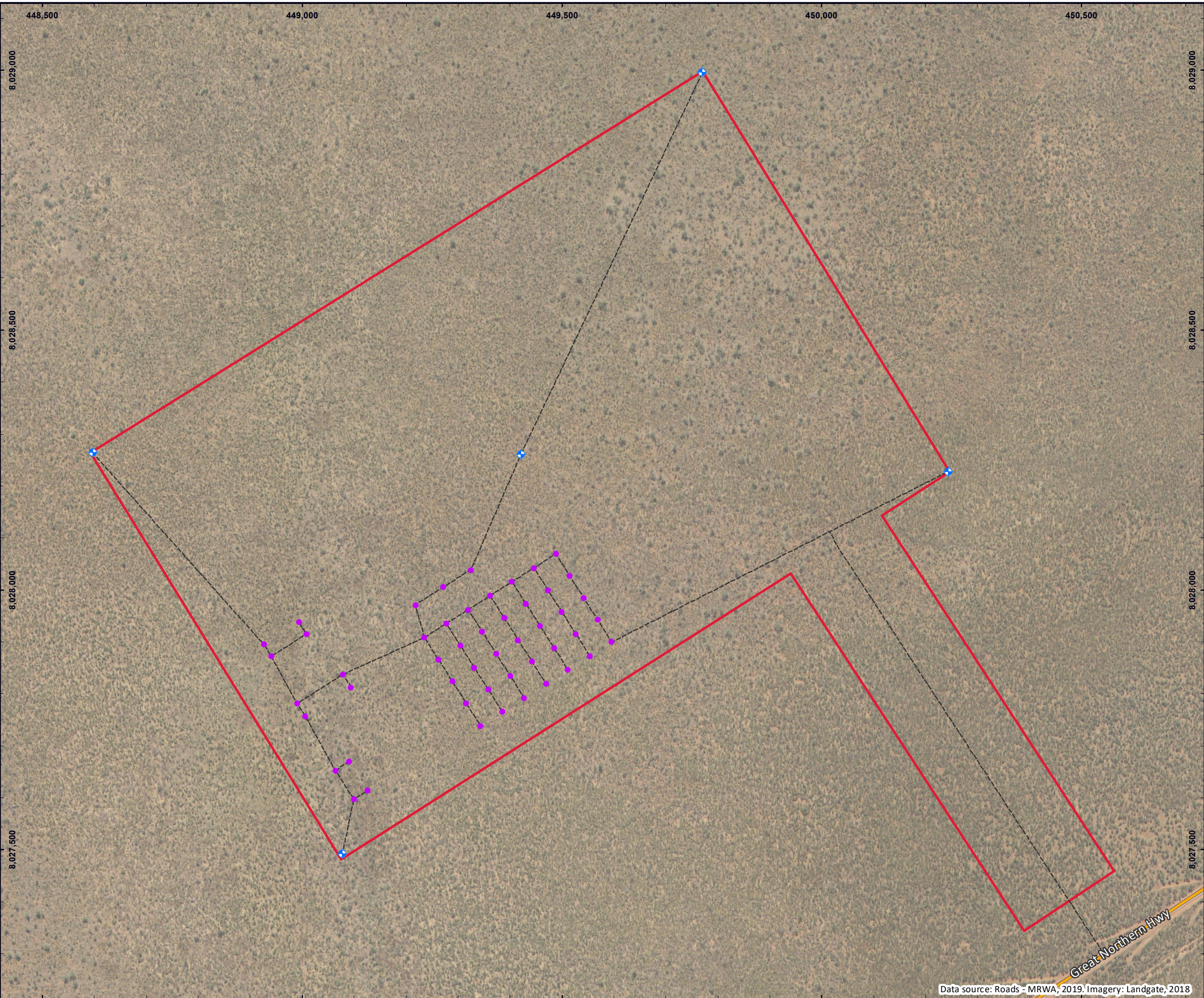
Coordinate System: GDA 1994 MGA Zone 51
Projection: Transverse Mercator, Datum: GDA 1994
Scale @ A3: 1:20,000

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Project:	TW19113		

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Figure 03

Data source: Roads - MRWA, 2019. Imagery: Landgate, 2018



LEGEND

- Site Boundary
- Primary Distributor Road
- Trial Pit Location
- Proposed Monitoring Well
- Temporary Access Track

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LOCALITY

0 10 20 30 40 km

**GROUNDWATER MONITORING
BORES AND TRIAL PIT
LOCATIONS**
Site G1

NVCP Application
Shire of Broome

0 75 150 225 300 m
Coordinate System: GDA 1994 MGA Zone 51
Projection: Transverse Mercator, Datum: GDA 1994
Scale @ A3: 1:7,000

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Figure 04