Narrabri Special Activation Precinct – Environment and Heritage

Soils, Geology and Contamination Assessment Report

Department of Planning and Environment

05 May 2023

Project No.: 0617761

ERM

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Cover page artwork:
Top: Aerial view of Narrabri (Narrabri Shire Council 2022)
Middle: Narrabri shire (Community welcomes recreational vehicles nd)
Bottom: View of LEP listed Club House Hotel (CMCA nd)

Signature Page

5 May 2023

Narrabri Special Activation Precinct

Soils, Geology and Contamination

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Acronyms and Abbreviations

Name	Description
ACM	Asbestos Containing Material
AHD	Australian Height Datum
AMG	Australian Map Grid
ASC NEPM	National Environment Protection (Assessment of Site Contamination) Measure
ASS	Acid Sulphate Soils
BTEX	Benzene, Toluene, Ethylbenzene and Xylenes
CLM	Contaminated Land Management Act 1997
CoPC	Contaminant of Potential Concern
CSM	Conceptual Site Model
DP	Deposited Plan
DPI	Department of Primary Industries
DPE	Department of Planning and Environment
DSI	Detailed Site Investigation
EPL	Environment Protection License
ESA	Environmental Site Assessment
m	Metre
m AHD	Metres Above Australian Height Datum
m bgl	Metres Below Ground Level
NEPC	National Environment Protection Council
NEPM	National Environment Protection Measure
NSW EPA	New South Wales Environment Protection Authority
OCP	Organochlorine Pesticides
OPP	Organophosphorus Pesticides
PACM	Potential Asbestos Containing Material
PAH	Polycyclic Aromatic Hydrocarbons
PFAS	Per and Polyfluoroalkyl Substances
PFOA	Perfluorooctanoic Acid
PFOS	Perfluorooctane Sulphonate
POEO Act	Protection of the Environment Operations Act 1997
PSI	Preliminary Site Investigation
RAP	Remedial Action Plan
SAQP	Sampling and Analysis Quality Plan
SAP	Narrabri Special Activation Precinct
SVOC	Semi-volatile Organic Compounds
TRH	Total Recoverable Hydrocarbons
VOC	Volatile Organic Compounds

ACKNOWLEDGEMENT OF COUNTRY

We acknowledge country and pay respects to the Gomeroi/Gamilaroi/Gamilaraay/Kamilaroi people as the Traditional Owners and Custodians of the land and waters on which the Narrabri Special Activation Precinct is located on.

We recognise their continued connection to Country and that this connection can be seen through stories of place and cultural practices such as art, songs, dances, storytelling and caring for the natural and cultural landscape of the area.

We also recognise the continuing living culture of Aboriginal people, and the significance of Narrabri in that living culture. We recognise the contemporary stories of displacement and the cultural significance of Narrabri in the continued journey of self-determination in Australia.

EXECUTIVE SUMMARY

This Soils, Geology and Contamination Assessment has been prepared for the Department of Planning and Environment (DPE) to support the development of the Narrabri Special Activation Precinct (SAP) Masterplan.

This assessment considers the past and present land uses across the site, and the impact that has on the proposed land uses and how any risk associated with that contamination can be managed through the development planning process.

Contamination

In NSW, contaminated land is assessed as part of the development planning process, with key technical documentation to be provided to the Approval Authority as part of a development approval. There are a number of current industrial operations across the SAP, as well as broad acre agricultural uses, which may trigger a requirement for additional contamination assessment where the rezoning is for a more sensitive land use. This can be undertaken as part of the rezoning process, however as the development timeframe for the SAP is up to 20 years, it may be more appropriate to include the requirement for the assessment as a performance measure tied to the contaminated land guidelines applicable at the time of the development.

Where the land is currently used for potentially contaminating activities at the specific industrial sites, and no change in use is proposed, it is unlikely that further assessment would be triggered under Clause 4.6(4) of the SEPP. For example, the operational sites such as the Narrabri Landfill, for which there are no proposed changes under the SAP structure plan, these would continue to be managed under the approved EPL with regulation from EPA.

In most instances, the proposed rezoning results in a change to a similar or less sensitive land-use from a contamination perspective. The exception to this are areas outside of the Narrabri SAP investigation area boundary including:

- An area proposed for residential development outside of the NIA (to the east) currently zoned as RU1 which includes permissible uses where the land may have currently or formerly been used for potentially contaminating activities (as listed in Table 1 to the Contaminated Land Planning Guidelines). Where the land is proposed for sensitive land-uses such as residential, further assessment may be triggered under the SEPP.
- A road alignment and rail corridor adaption to a green loop (public recreational area) are proposed which transect areas of primary production (RU1), industrial and current open space. There is potential for contamination hazards to be present along or adjacent to the proposed public recreation areas including:
  - Hazardous building materials such as asbestos and uncontrolled waste dumping;
  - Contaminants associated with railway uses (e.g. hydrocarbons, asbestos, heavy metals); and
  - Proximity to existing industrial uses and the landfill which may pose a hazard.

Where a change to a more sensitive land-use is proposed, further assessment may be required. This can be undertaken by the proponent at the individual site level during the development application stage. However, it is noted that the draft Contaminated Land Planning Guidelines also advise the planning authority to consider whether appropriate provisions may be needed within the relevant environmental planning instrument or development control plan, where potentially contaminated land is suspected, to further investigate before land use changes occur.

In addition to the above, there is a broad potential for contamination on all land across the SAP associated with hazardous building materials, small scale chemical storage and use and uncontrolled waste dumping, which should be assessed further prior to approval of development to prevent potential exposure to contamination hazards. Given the staging of the works (over a period of up to 20 years for different precincts), investigations would be best placed as the development/planning progresses to accommodate the likely changes to land that will occur over that time (i.e. ongoing activities may generate change in contamination potential). A clear framework for management of these risks is needed for public safety and to mitigate the potential for substantial cost and time delays and can be developed to fit within the planning process framework.

Where groundwater extraction for beneficial re-use is proposed this should consider potential for contamination, and an assessment should be undertaken which considers the potential contaminants of concern.

Salinity

Based on regional soil mapping the majority of the soil landscapes within the investigation area may be subject to localised salinity (low to moderate risk),and may represent aggressive soils and foundation hazards. The salinity, sodicity and aggressivity soil conditions are unlikely to represent a significant constraint on the proposed SAP structure plan, as these constraints can be managed during the design and development phase.

In addition to the above, it is noted that salinity conditions are dependent on several variables, which include surface water infiltration to soil and groundwater levels which may be modified by development in the area. The application of the principles of Water Sensitive Urban Design should be considered in the proposed development areas to mitigate potential changes to soil water levels and salinity conditions in the catchment. The impact of the extraction of groundwater for beneficial re-use on catchment level salinity conditions should also be considered, and groundwater monitoring for salinity should be considered as part of a hydrogeological assessment for beneficial re-use.

Acid Sulfate Soils

No significant risk of acid sulfate soil was identified within the Site nor within a 200 m buffer zone based on the available Acid Sulfate Soil risk maps. The Atlas of Australian Acid Sulfate Soil indicates that there is a low to very low probability for acid sulfate soils occurring within the Site. The potential risk of acid sulfate soils is unlikely to represent a significant constraint on the proposed SAP structure plan.

1. INTRODUCTION

1.1 Purpose of this Report

Environmental Resources Management Australia Pty Ltd (ERM) was engaged by the NSW Department of Planning and Environment (NSW DPE or "the Client") to undertake a program of environmental and heritage studies to support the development of the Narrabri Special Activation Precinct (SAP) Masterplan. This report is a Preliminary Site Investigation (PSI) focused on contamination, soils, and geology, for the Narrabri SAP.

1.2 Project Background

The New South Wales (NSW) Government, through its introduction of the Special Activation Precincts (SAPs) has identified six distinct areas throughout regional NSW to bring together planning and investment to stimulate economic growth across a range of industries including freight and logistics, manufacturing, waste management and recycling, energy generation and agricultural and food processing activities. The planning and creation of these areas is partially facilitated and funded through the $4.2 billion Snowy Hydro Legacy Fund.

The establishment of SAPs is a joint NSW Government Agency initiative by the Department of Regional Growth NSW, Department of Planning and Environment (DPE) and the Regional Growth NSW Development Corporation (RGDC) as part of the 20-Year Economic Vision for Regional NSW. DPE is responsible for preparing the planning framework whereas the Department of Regional NSW manages each precinct.

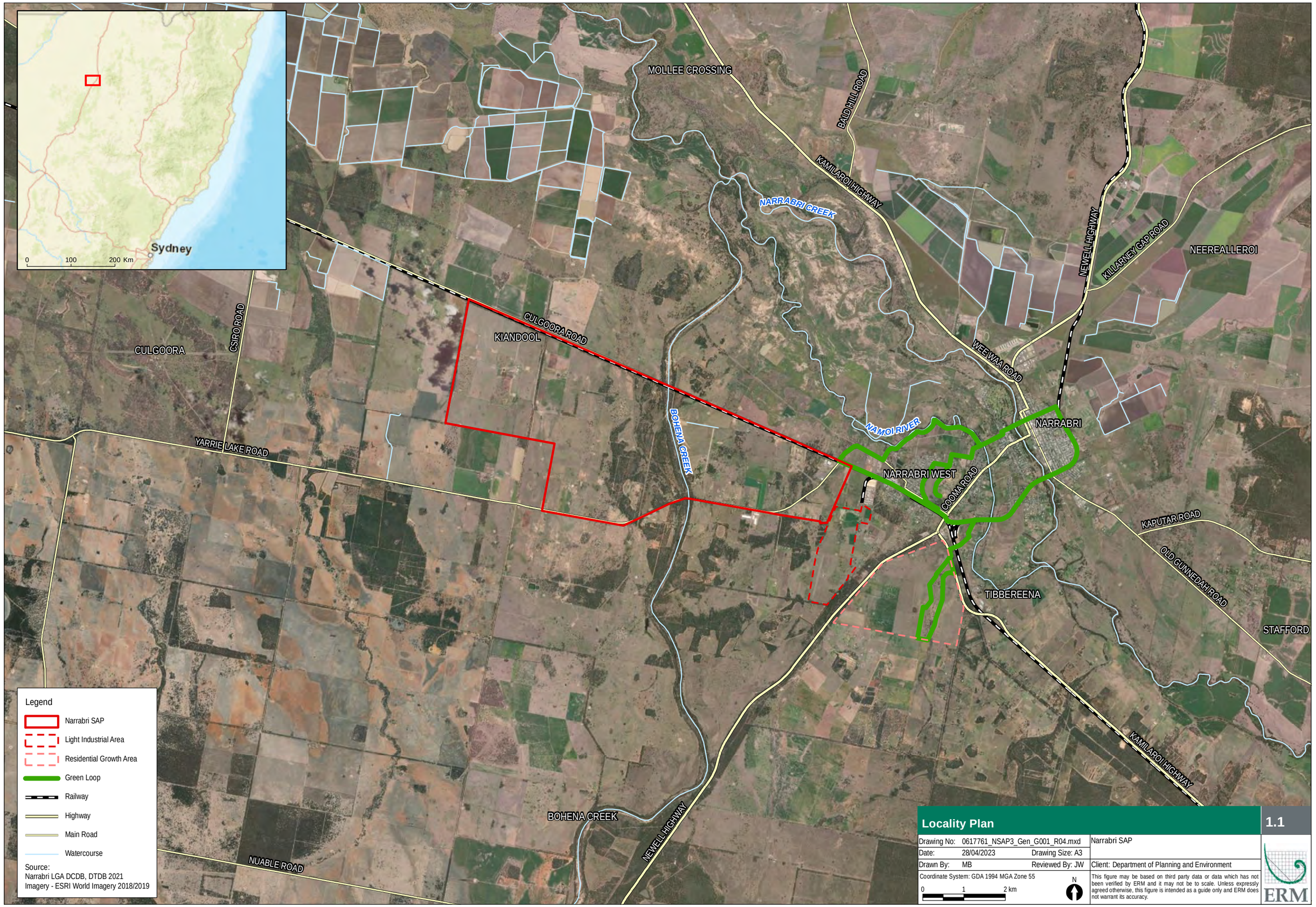
In November 2020, Narrabri was declared the sixth and final SAP investigation area, enabled by its strong reputation and location within Australia's highest productive grain region as well as its strong transportation linkages including existing road and rail connections and the future Inland Rail. To facilitate the planning within this precinct DPE has engaged Environmental Resources Management Australia Pty Ltd (ERM) to prepare a technical study regarding contamination, soils, and geology within the Narrabri SAP investigation area.

As part of the master planning process and to inform this technical study two Enquiry by Design (EbD) workshops were organised. A preliminary EbD was held on the 29th and 30th of March 2022 to develop three initial land use scenarios. Following an interdisciplinary assessment of the three scenarios, a final EbD workshop was held between 5th and 8th of September 2022 to study the interdisciplinary constraints of the three scenarios and identify and develop a preferred land use Structure Plan. This report assesses the land use Structure Plan from the final EbD workshop from the perspective of contamination, soils, and geology.

1.3 Narrabri Strategic Significance and Local Context

Narrabri township is located within the Narrabri Shire local government area (LGA), approximately 530 km northwest of Sydney, as shown in Figure 1-1. As of 2021 census, the population of Narrabri township was 6,898 persons with 16% identifying as Aboriginal and/or Torres Strait Island Peoples.

The township lies at the junction of the Newell and Kamilaroi highways and has direct rail connection to the Port of Newcastle via the Walgett branch of the Main North line. Once completed, Narrabri will also have a direct connection to the new Inland Rail route which will connect Melbourne to Brisbane via new and upgraded track.



Locality Plan

1.1

Drawing No:	0617761_NSAP3_Gen_G001_R04.mxd		Narrabri SAP
Date:	28/04/2023	Drawing Size: A3	
Drawn By:	MB	Reviewed By: JW	Client: Department of Planning and Environment

Coordinate System: GDA 1994 MGA Zone 55

0 1 2 km

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1.4 Structure Plan

The Narrabri SAP Structure Plan preferred land use scenario is summarised in Figure 1-2 below. The area of the Narrabri SAP covers an area of approximately 3000 ha. It is located to the west of the existing township and incorporates two areas separated by an environmental buffer zone.

The Structure Plan describes the preferred land use scenario and the sequencing and/or staging of development and includes the following key elements:

- The relationship between the Inland Port and the Narrabri SAP;
- The relationship and interactions between the Narrabri SAP and the existing Narrabri Town Centre; and
- The provision of a residential growth area, associated infrastructure for new residential area, and the relationship between the new residential area and the SAP.

The Narrabri SAP Structure Plan with proposed land uses is summarised in Figure 1-2. The area of the Narrabri SAP is defined as the red outline on Figure 1-2 below and forms the basis of the boundary for this technical study report. Additional areas outside the Narrabri SAP but within the place making proposal of the Narrabri SAP are shown including the residential growth area, light industrial uses and recreational/open-space use (Green Loop). These areas outside the SAP are not considered as part of this technical study, however recommendations for next steps and planning considerations have been included.

1.5 Master Planning

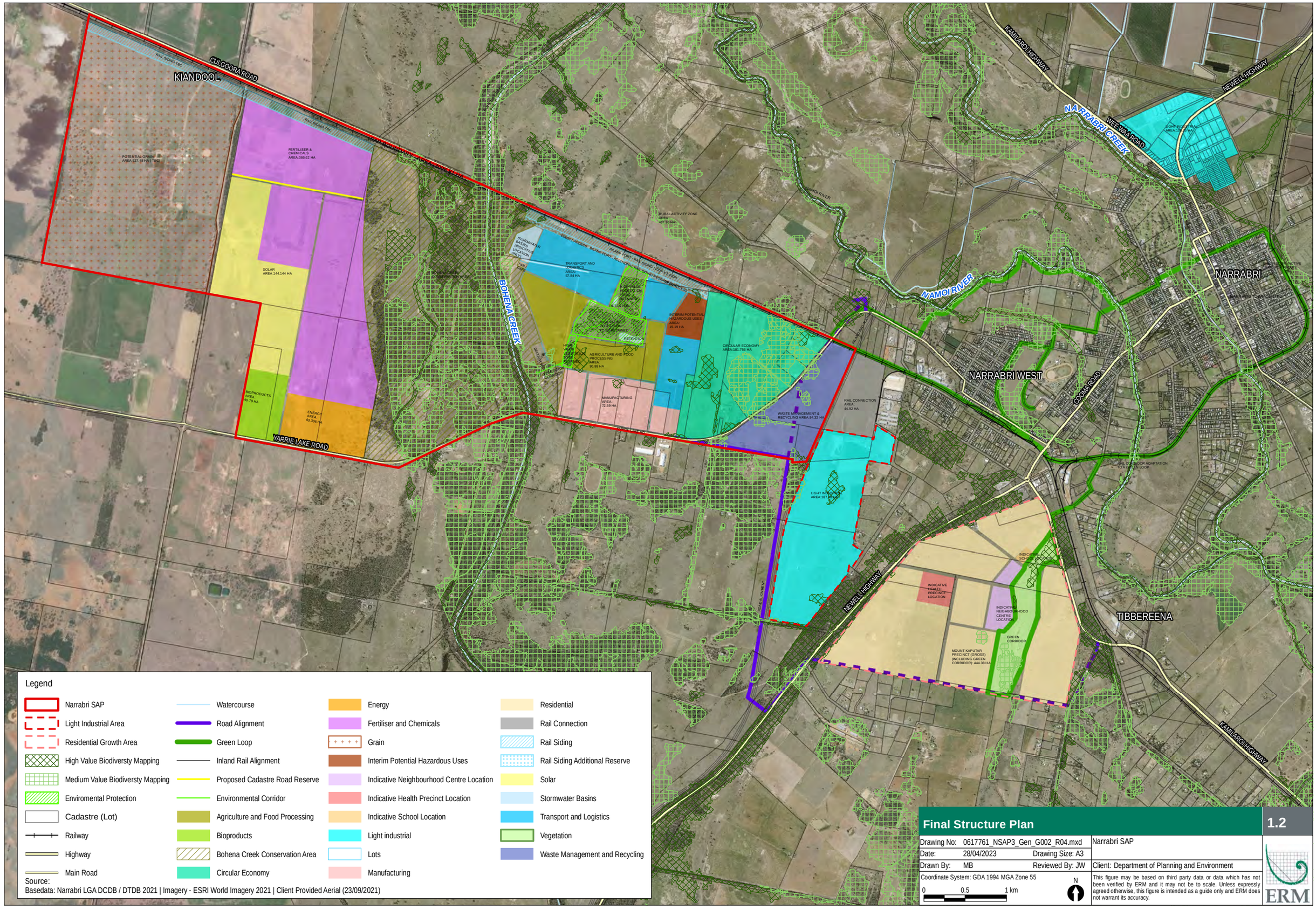
The master planning process for the SAPs involves the engagement of a range of technical experts to investigate the study area and prepare technical studies (such as this report) specifically designed and scoped for each SAP.

A master planning process for the Precinct is being undertaken by the Department of Planning and Environment (DPE) for Narrabri through an iterative process that explored a number of planning options for the precinct across a range of technical disciplines.

The technical reports will ultimately inform the development of planning controls for the Narrabri SAP to guide the Precinct's development. These controls will be contained in the master plan, State Environmental Planning Policy Precincts (Precincts Regional) 2021 (Precincts Regional SEPP) and delivery plan and will relate to matters such as amenity, environmental performance and infrastructure provision.

1.6 Purpose of this report

The objective of this report is to build on the analysis undertaken within the Preliminary Site Investigation (PSI) and further refine the understanding of soils, geology, potential contamination, salinity and soil aggressivity issues within the Narrabri SAP area (as defined in Figure 1-2) in the context of the land use Structure Plan (as defined in Figure 1-2) as proposed following the final EbD workshop in September 2022. This report includes updated searches to include the area included within the Narrabri SAP boundary since the previous PSI was conducted.



Legend

- Narrabri SAP
- Light Industrial Area
- Residential Growth Area
- High Value Biodiversty Mapping
- Medium Value Biodiversty Mapping
- Enviromental Protection
- Cadastre (Lot)
- Railway
- Highway
- Main Road
- Watercourse
- Road Alignment
- Green Loop
- Inland Rail Alignment
- Proposed Cadastre Road Reserve
- Environmental Corridor
- Agriculture and Food Processing
- Bioproducts
- Bohena Creek Conservation Area
- Circular Economy
- Energy
- Fertiliser and Chemicals
- Grain
- Interim Potential Hazardous Uses
- Indicative Neighbourhood Centre Location
- Indicative Health Precinct Location
- Indicative School Location
- Light industrial
- Lots
- Manufacturing
- Residential
- Rail Connection
- Rail Siding
- Rail Siding Additional Reserve
- Solar
- Stormwater Basins
- Transport and Logistics
- Vegetation
- Waste Management and Recycling

Source:
Basedata: Narrabri LGA DCDB / DTDB 2021 | Imagery - ESRI World Imagery 2021 | Client Provided Aerial (23/09/2021)

Final Structure Plan

1.2

Drawing No:	0617761_NSAP3_Gen_G002_R04.mxd		Narrabri SAP
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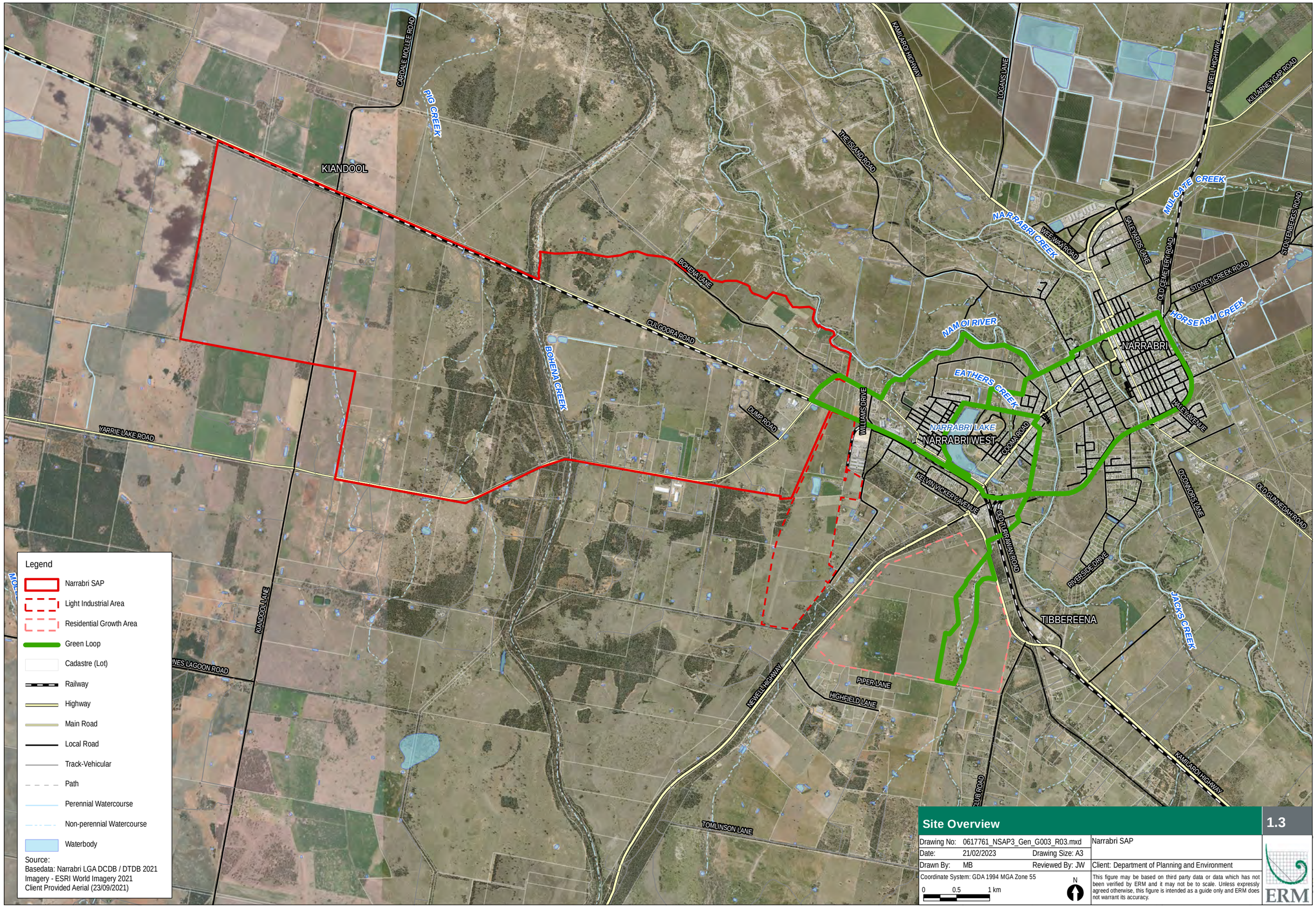

Site Overview

1.3

Drawing No:	0617761_NSAP3_Gen_G003_R03.mxd		Narrabri SAP
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Drawn By:	MB	Reviewed By: JW	Client: Department of Planning and Environment

Coordinate System: GDA 1994 MGA Zone 55

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2. STRATEGIC CONTAMINATED LAND PLANNING

The NSW land use planning framework provides two main phases: strategic planning (this assessment) and development assessment (future development within the SAP). Guidance for contaminated land planning in NSW is provided through:

- the State Environmental Planning Policy (Resilience and Hazards) 2021;
- the Contaminated Land Management Act (CLM Act);
- the draft Contaminated Land Planning Guidelines (2018); and
- the National Environmental Protection (Assessment of Site Contamination) Measure, 1999 (ASC NEPM) as updated in 2013.

The Contaminated Land Planning Guidelines (draft) recommend approval authorities consider the following with regards to requiring a more detailed contamination assessment when rezoning land:

- Whether land is considered as significant contaminated within the meaning of the CLM Act;
- Whether an activity listed in the SEPP (Resilience and Hazards) is being carried out on the land potentially causing contamination;
- Whether there are any records that a potentially contaminating activity was carried out on the land;
- If there are incomplete records related to land use and of potentially contaminating activities could have lawfully been conducted during the periods associated with the missing records;
- If the proposed rezoning, or proposed change to the planning controls, would allow the land to be used for residential, educational, recreational or childcare purposes, or for the purposes of a hospital.

A high-level assessment of the potential for contamination and the proposed land-use changes in the SAP structure plan has been undertaken to inform the planning process.

3. LAND USE ANALYSIS WITHIN THE NARRABRI SAP

3.1 Consideration of Land Use Categories

The Narrabri SAP is proposed to be rezoned as a Regional Enterprise Zone under the Regional-Precincts SEPP, with the exceptions of areas to be conserved for environmental protection. In order to support this proposed rezoning, the risk-based land-use categories defined in the ASC NEPM for development of the health investigation levels (HILs) have been provisionally applied to assist in developing assumptions for this review.

Based on the information in the Masterplan, Table 3-1 below summarises the current understanding of the potential land-uses in the proposed sub-precincts, as they relate to the land-use contexts applied in the risk assessment process of the ASC NEPM.

Table 3-1 Land-use Categories

Structure Plan Land-use	ASC NEPM Land-use
Environmental Protection	Environmental Conservation – no public access
Regional Enterprise Zone	Commercial/Industrial (HIL-D) Activities permitted with consent are primarily commercial or industrial, but can include “any other development not specified in item 2 or 4”. If other more sensitive concurrent uses such as dwelling houses, residential with accessible soils (HIL-A) or residential with no accessible soils (Residential HIL-B).
None proposed within SAP area	Residential, education, health (HIL-A or HIL-B)
Outside SAP area: Residential Sub-precinct Health Precinct School	Residential with accessible soils (HIL-A) or residential with no accessible soils (Residential HIL-B)
Light industry	Commercial/Industrial (HIL-D)

The majority of the SAP is currently zoned Primary Production (RU1), SP1 Special Activities and General Industrial (IN1), as shown on Figure 3-1. The proposed re-zoning to Regional Enterprise Zone includes changes to land-use which in most instances is predominantly a change to a similar or less sensitive land-use from a contamination perspective. However it is noted that the activities permitted with consent can include “any other development not specified in item 2 or 4”, which may allow for more sensitive land-uses.

Where the land is currently used for potentially contaminating activities at the specific industrial sites, and no change in use is proposed, it is unlikely that further assessment would be triggered under

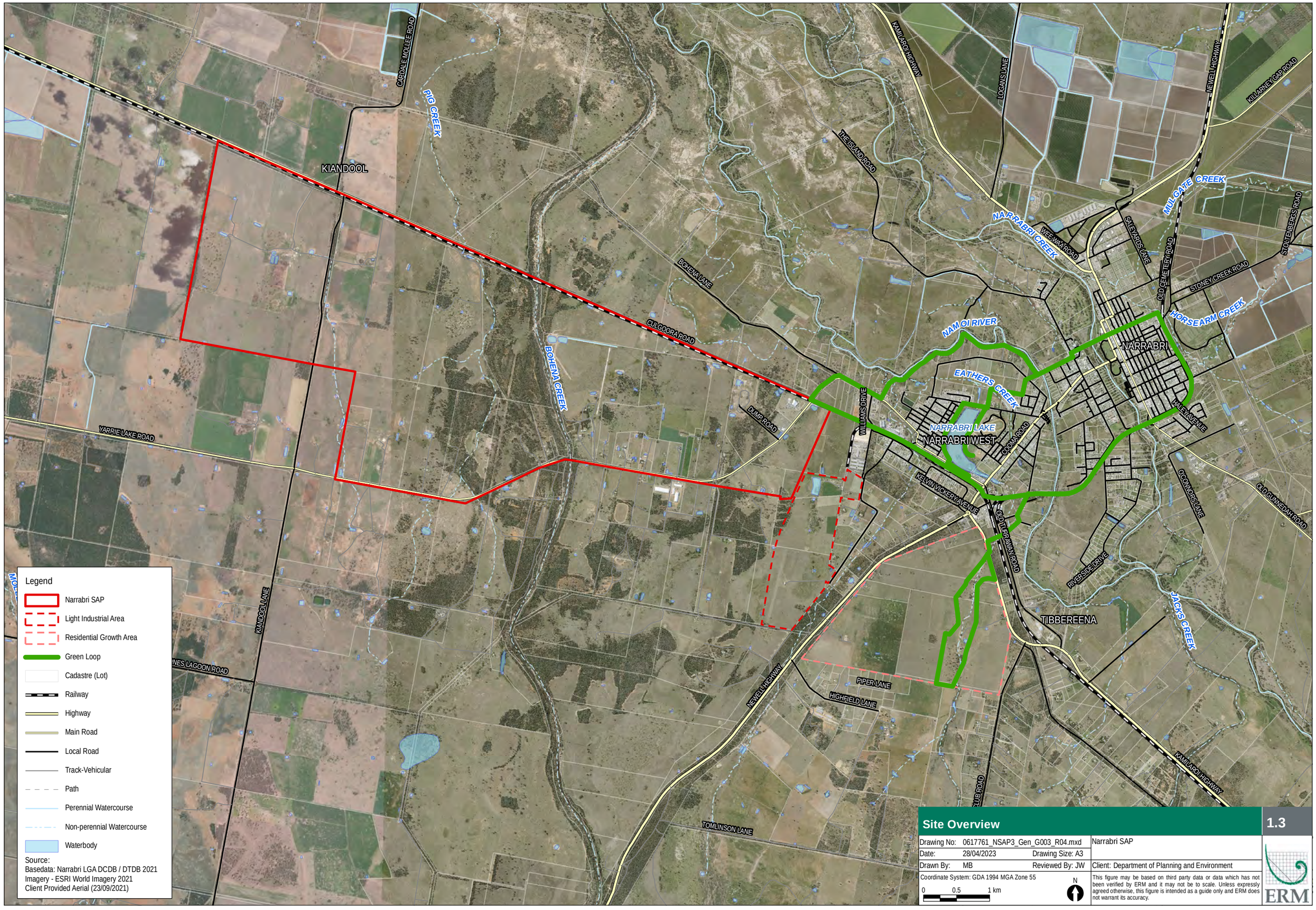
Clause 4.6(4) of the SEPP. For example, the operational sites such as the Narrabri Landfill for which there are no proposed changes under the SAP structure plan, would continue to be managed under the approved EPL with regulation from EPA.

In most instances these changes are predominantly a change to a similar or less sensitive land-use from a contamination perspective. The exception to this is:

- An area proposed for residential development outside of the NIA (to the east) currently zoned as RU1 which includes permissible uses where the land may have currently or formerly been used for potentially contaminating activities (as listed in Table 1 to the Contaminated Land Planning Guidelines). Where the land is proposed for sensitive land-uses such as residential, further assessment is triggered under the SEPP.
- A road alignment and rail corridor adaption to a green loop (public recreational area) are proposed which transect areas of primary production (RU1), industrial and current open space. There is potential for contamination hazards to be present along or adjacent to the proposed public recreation areas including:
  - Hazardous building materials such as asbestos and uncontrolled waste dumping;
  - Contaminants associated with railway uses (e.g. hydrocarbons, asbestos, heavy metals); and
  - Proximity to existing industrial uses and the landfill which may pose a hazard.

There is potential for contamination to be present within these areas and further assessment may be required to identify mitigation measures.

Consideration should be given to further assessment of soil conditions within the proposed road corridor, as the costs of managing risks during construction and the cost of disposal of soil may be significant and could contribute to delays in the project commencement.



Site Overview

1.3

Drawing No:	0617761_NSAP3_Gen_G003_R04.mxd		Narrabri SAP
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Drawn By:	MB	Reviewed By: JW	Client: Department of Planning and Environment

Coordinate System: GDA 1994 MGA Zone 55

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3.2 Review of the SAP structure plan

The following discussion is provided as it is relevant to the application of the Contaminated Land Planning Guidelines for proposed changes to land-uses at the strategic planning and rezoning stage.

The NSW Government (2018) Contaminated Land Planning Guidelines (Draft) provide further detail on the application of contamination assessments at the strategic planning and rezoning stage, including the general guidance on when a planning proposal to rezone land must be accompanied by a preliminary site investigation or detailed site investigation. The following table summarises the key aspects which the contaminated land planning guidelines (draft) recommends should be considered when preparing a planning proposal to rezone land:

Table 3-2 Strategic Planning and Rezoning Considerations

Contaminated Land Planning Guidelines	Applicability to SAP:
Land is significantly contaminated land within the meaning of the CLM Act	No sites within the SAP have been identified as significantly contaminated within the meaning of the CLM Act. It is noted that there is a licenced operating landfill which would be considered a contaminated site.
An activity listed in the SEPP is being carried out on the land and is potentially causing contamination	Yes - Some activities that may cause contamination include: ■ landfill (current & licenced) ■ agricultural/horticultural activities (including former piggery, bulk storage sites) ■ service stations
Records show that a potentially contaminating activity has been carried out on the land	Yes - Potentially contaminating activities were identified as described in section 3.4.
There are incomplete records about the use of the land and during the periods not covered by those records, it would have been lawful to carry out a potentially contaminating activity and	Available records have been reviewed.
The proposed rezoning, or proposed change to planning controls, would allow the land to be used for residential, educational, recreational or childcare purposes, or for the purposes of a hospital.	Yes – there are proposed areas for residential, recreational and education use.

As the planning process for the SAP is ongoing, the assessment of potential contamination should be considered at the relevant stages of the process with consideration of the guidance in the contaminated land planning guidelines, including the considerations for decision making in the planning proposal and rezoning process (Chart 1) and the development assessment process (Chart 2).

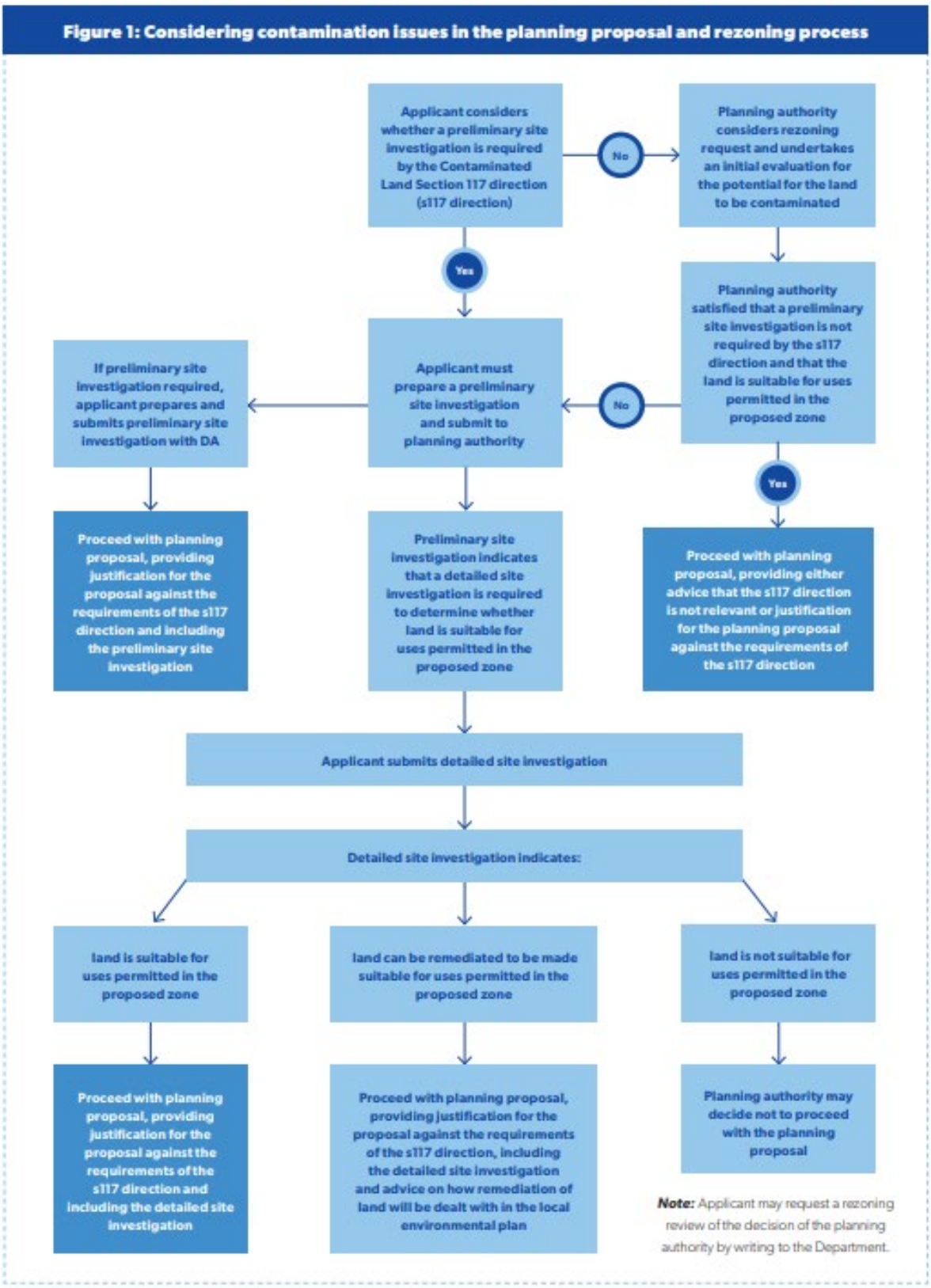


Chart 1 Extract Figure 1 NSW Government (2018) Contaminated Land Planning Guidelines (Draft)

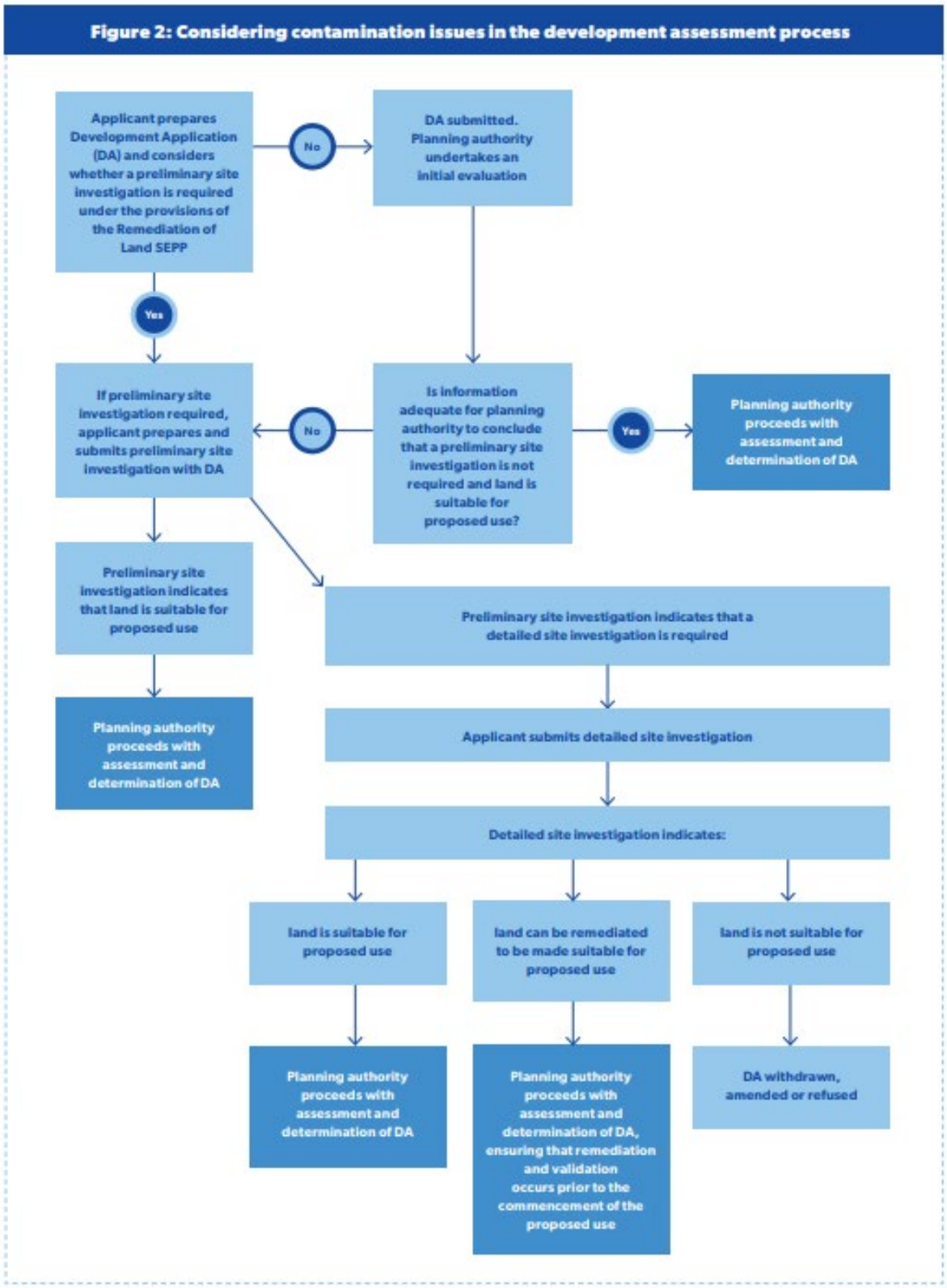


Chart 2 Extract Figure 2 Source: NSW Government (2018) Contaminated Land Planning Guidelines (Draft)

4. SUMMARY OF THE PSI

4.1 Methodology

ERM has undertaken a Preliminary Site Investigation (PSI) including a desktop review of public records and a site walkover in selected areas where access was available. No environmental sampling has been undertaken. The PSI is included in Appendix A of this report, and is based on multiple searches over the period of time that the structure plan has been developed, to account for the changes to the geographical boundary of the Narrabri SAP prior to the final plan being developed. This includes the Insight Report dated 28 September 2022 (Appendix B) and additional searches of public databases conducted on 20 February 2023 once the final structure plan was made available to ERM.

The PSI included the area defined as the Narrabri Special Activation Precinct (SAP) as shown on Figure 1-2. Other features proposed within the SAP structure plan, such as the residential area and the recreational area known as the “Green Belt” which are outside these boundaries were not assessed as part of the PSI.

The PSI was undertaken in general accordance with the National Environmental Protection (Assessment of Site Contamination) Measure, 1999, (ASC NEPM) (as updated 2013). In order to achieve the project objectives, the following scope of work was carried out:

- Review of background information relating to the site, including:
  - Previous investigations relating to site contamination;
  - The NSW Environment Protection Authority (EPA) Contaminated Land Register;
  - Historical and recent aerial photographs;
  - Land titles information;
  - Relevant government databases; and
  - Published soil, geology and topographic maps.
- Fieldwork including a site walkover;
- Preparation of a preliminary Conceptual Site Model identifying potential contamination sources, pathways, receptors and potentially complete source-pathway-receptor linkages; and,
- Review of the proposed land-use changes and identification of recommendations for further investigations to support the SAP.

The PSI was conducted with reference to relevant parts of the following guidelines:

- National Environment Protection (Assessment of Site Contamination) Measure 1999 (ASC NEPM (1999)) (as amended May 2013) – herein referred to as the ASC NEPM (2013);
- NSW EPA (2017). *Guidelines for the NSW Site Auditor Scheme* (3rd edition); and
- NSW EPA (2020) Contaminated Land Guidelines, Consultants Reporting on Contaminated Land (May 2020).

Key assumptions and limitations of thePSI were as follows:

- No soil, groundwater, ground gas or surface water sampling or laboratory analysis was undertaken to support the assessment;
- There were limited previous investigations available to review; and
- The report has only reviewed the proposed land-use changes within the boundary of the Narrabri SAP as defined in Figure 1-2.

The following sections provides the technical outcomes of the PSI.

4.2 Salinity

Based on regional soil mapping, the majority of the soil landscapes within the Narrabri SAP area may be subject to localised salinity (low to moderate risk) and may represent aggressive soils and foundation hazards. The salinity, sodicity and aggressivity soil conditions are unlikely to represent a significant constraint on the proposed SAP structure plan, as these constraints can be managed during the design and development phase.

In addition to the above, it is noted that salinity conditions are dependent on several variables, which include surface water infiltration to soil and groundwater levels which may be modified by development in the area. The application of the principles of Water Sensitive Urban Design should be considered in the proposed development areas to mitigate potential changes to soil water levels and salinity conditions in the catchment. The impact of the extraction of groundwater for beneficial re-use on catchment level salinity conditions should also be considered, and groundwater monitoring for salinity should be considered as part of a hydrogeological assessment for beneficial re-use.

4.3 Acid Sulfate Soils

No significant risk of acid sulfate soil was identified within the Site nor within a 200 m buffer zone based on the available Acid Sulfate Soil risk maps. The Atlas of Australian Acid Sulfate Soil indicates that there is a low to very low probability for acid sulfate soils occurring within the Site. The potential risk of acid sulfate soils is unlikely to represent a significant constraint on the proposed SAP structure plan.

4.4 Contamination

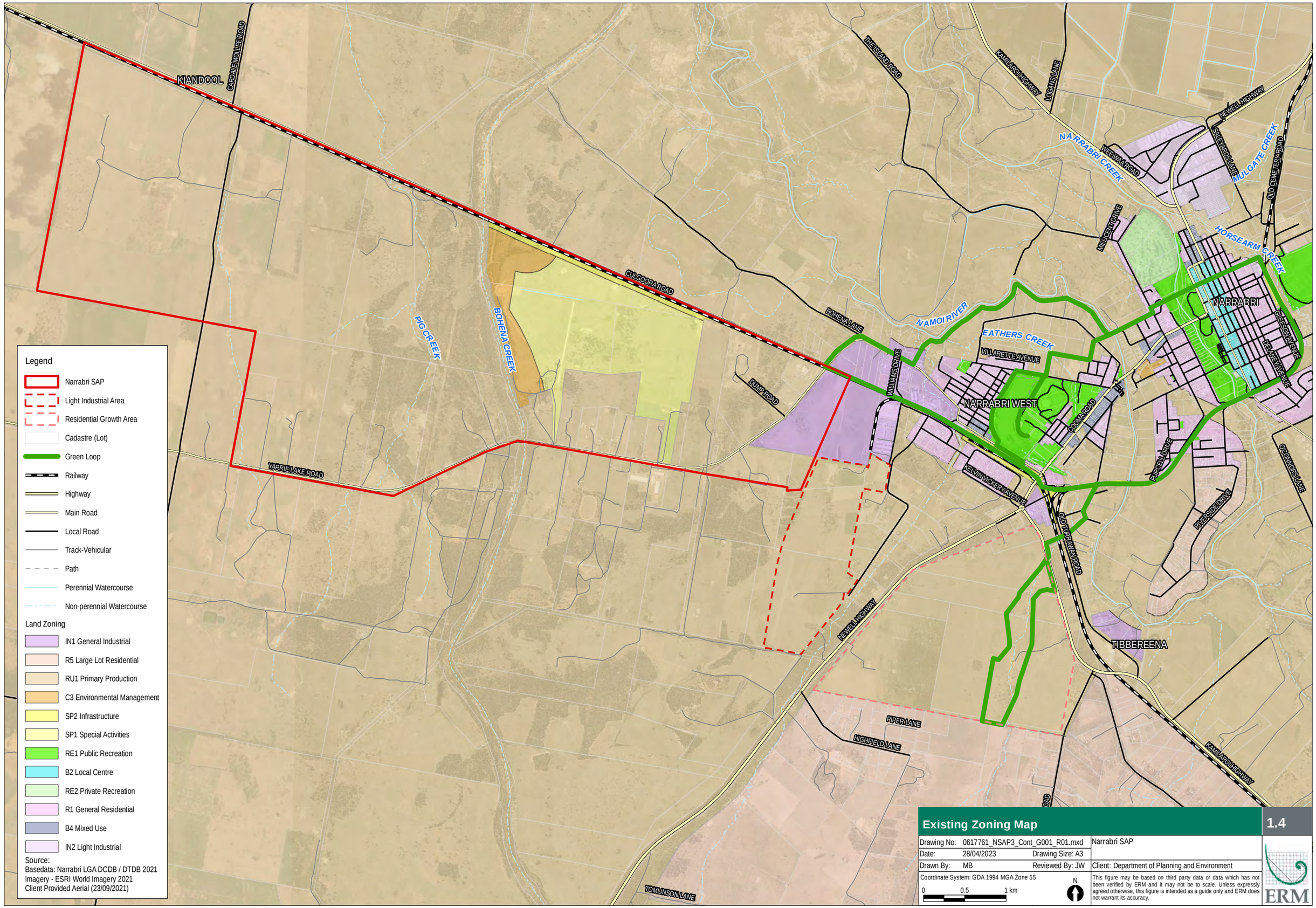
Based on the findings of the Preliminary Site Investigation (PSI) as presented in Appendix A, the following potentially contaminating activities were identified within the SAP boundary, as shown on Figure 4-1:

- Specific sites which are currently or formerly operated potentially contaminating industries and/or activities (as listed in Appendix 1 of the Land Contamination Planning Guidelines (Draft)), have the potential for contamination to be present:
  - Narrabri Landfill
  - Australian Recycled Plastics (Recycled Plastics);
  - Narrabri Breakdown Service (Depot and Storage Yard);
  - KA & VK Stubbs Pty Ltd (Electrical or Electrical Components);
  - HL & JH Gale Pty Ltd (Mechanical and Automative);
  - Narrabri Gas Project (Oil & Gas);
  - North West Ag & Diesel (Agriculture/Horticulture);
  - Grainflow Narrabri (Agriculture/Horticulture);
  - Former/Current Inglegreen Piggery - 821 Culgoora Road Narrabri
  - Other agricultural and industrial uses on-site
- The following areas of potential contamination have been identified adjacent to the SAP area:
  - Narrabri Works Depot – Transport NSW (Mechanical & Automotive);
  - Gun Club (Gun, Pistol or Rifle Range)
- The remaining land has the broad potential for contamination associated with:

- Built structures and/or infrastructure (current), which may include hazardous building materials (such as asbestos, lead paints, PCBs) that may pose a risk if demolished in an uncontrolled manner;
- General rural use sites which may currently or formerly had chemical storage and use including but not limited to underground or above-ground chemical storage tanks; and
- Remains of built structures and/or infrastructure which have been demolished in an uncontrolled manner, which may include hazardous building materials (such as asbestos);
- Uncontrolled/opportunistic waste dumping.

Proposals for beneficial re-use of groundwater should avoid extraction of groundwater near known contaminated sites within or adjacent to the SAP. There is limited data available to review on existing groundwater conditions in the area. As described in the Stage 1 PSI report, available public databases indicate that groundwater was measured to be present within underlying aquifers at depths ranging from 0.9 – 60 mbgl within the NIA and surrounding area. Groundwater bores within the NIA and surrounding area were identified to be utilised for a range of uses including monitoring, exploration, irrigate agriculture and domestic water supply.

The Narrabri landfill site is a potential source of groundwater contamination. Given the location of the landfill within the SAP, consideration should be given to an assessment of contamination of groundwater in the immediate vicinity of the landfill and industrial uses throughout the precinct where groundwater extraction bores are proposed, to assess the suitability of groundwater for beneficial re-use (i.e. recreational, drinking water, agricultural, stock watering).



Existing Zoning Map

1.4

Drawing No:	0617761_NSAP3_Cont_G001_R01.mxd		Narrabri SAP
Date:	28/04/2023	Drawing Size: A3	
Drawn By:	MB	Reviewed By: JW	Client: Department of Planning and Environment

Coordinate System: GDA 1994 MGA Zone 55

0 0.5 1 km

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ERM

A high-level assessment of the potential for contamination, the proposed land-use changes in the SAP structure plan and the triggers under the SEPP has been undertaken to inform the planning process as detailed in Table 4-1 below and shown graphically in Chart 3:

- No sites within the SAP have been identified as significantly contaminated within the meaning of the CLM Act. It is noted that there is a licenced operating landfill which would be considered a contaminated site.
- The majority of the Narrabri SAP is currently zoned for agricultural and industrial uses (including Primary Production (RU1), SP1 Special Activities and General Industrial (IN1)), and these uses are included in the activity list in the SEPP as "activities that may cause contamination". Non-specific activities on rural industrial land have potential for contamination associated with pesticide use, hazardous building materials, small scale chemical storage and use and uncontrolled waste dumping.
- Whilst there is not a specific trigger in the SEPP for further investigation of contamination based on the continuation of industrial land use, there are specific activities (both current and historic), which may be associated with contamination, such as the former piggery. These areas are shown on Figure 4-1 and will require further investigation, and we recommend that occurs where future development is proposed. Investigation can occur as part of the rezoning process, however due to the long development timeframe for the SAP consideration should be given to including the detailed assessment and any subsequent remediation as part of the performance criteria included in the SAP development approval process.
- Where the land is currently used for potentially contaminating activities at specific industrial sites, and no change in use is proposed, it is unlikely that further assessment would be triggered under Clause 4.6(4) of the SEPP. For example, operational sites such as the Narrabri Landfill for which there are no proposed changes under the SAP structure plan, would continue to be managed under the approved EPL with regulation from EPA.

In addition to the areas within the Narrabri SAP area, there are proposed changes to land-uses in areas outside of the Narrabri SAP area which are more sensitive from a contamination perspective, including proposed residential, recreational and educational uses which triggers the requirement for further assessment of potential contamination as set out in Clause 4.6(4) of the SEPP. Further assessment may be required to identify mitigation measures, including:

- An area proposed for residential (and potentially education or health) development outside of the NIA (to the east) is currently zoned as RU1 which includes permissible uses such as agriculture. Agricultural activities are listed in Table 1 to the Contaminated Land Planning Guidelines which is a list of "*activities which may cause contamination*". Where the land is proposed for more sensitive land-uses such as residential, further assessment may be triggered under the SEPP.
- A road alignment and rail corridor adaption to a green loop (public recreational area) are proposed which transect areas of primary production (RU1), industrial and current open space. There is potential for contamination hazards to be present along or adjacent to the proposed public recreation areas including:
  - Hazardous building materials such as asbestos and uncontrolled waste dumping;
  - Contaminants associated with railway uses (e.g. hydrocarbons, asbestos, heavy metals); and
  - Proximity to existing industrial uses and the landfill which may pose a hazard.

A light industrial area is proposed outside of the Narrabri SAP area, which is not a more sensitive use from a contamination perspective, however a preliminary assessment of contamination from current and historical uses has not been undertaken as part of this assessment as this is outside the Narrabri SAP area.

Table 4-1 Summary of Proposed Structure Plan and Contamination Assessment Triggers in SEPP (Resilience & Hazards)

Potential Contamination	Potential Sources of Contamination from CSM	Current Zoning	Structure Plan Proposed Change to Land Use	Does the Structure Plan Trigger Contamination Assessment in accordance with SEPP (Resilience and Hazards)?
Specific Activities	Former Inglegreen Piggery - 821 Culgoora Road Narrabri (General rural uses as AEC 2,3,4,5,6,7)	RU1 Primary Production	Grain	Assessment of potentially contaminating activities should be addressed at development application stage. Proposed for predominantly commercial and industrial uses which are generally not more sensitive than the current land-use Consider need for further assessment based on the intended use and potential exposure setting and apply principles of SEPP (Resilience and Hazards). Due diligence to be used to establish a process for assessment of potential for hazardous building materials (e.g., asbestos) or uncontrolled waste dumping prior to development commencement.
	KA & VK Stubbs Electrical Components (General rural uses as AEC 2,3,4,5,6,7)	SP2	Rail Siding	
	AEC – 1 Narrabri Waste Management Facility AEC – 2 Australian Recycled Plastics Narrabri Gas Project HL & JH Gale Mechanical & Automotive	RU1 Primary Production	Circular Economy Area	
Non-specific (general) Industrial Uses	AEC – 2 On-site Commercial / Industrial Land Uses AEC – 3 Hazardous Materials Associated with Current and Former Structures / Service Conduits etc. AEC – 4 Sewer / Septic Lines AEC – 5 General Site Usage AEC – 6 Potential Illegally Dumped Wastes	RU1 Primary Production	Fertiliser and Chemicals	Proposed for predominantly commercial and industrial uses which are generally not more sensitive than the current land-use If the land is to be proposed for development of concurrent uses which are more sensitive such as child-care, school or health facility, this may trigger assessment under SEPP (Resilience and Hazards).
		RU1 Primary Production	Solar	
		RU1 Primary Production	Bioproducts	
		RU1 Primary Production	Energy	

Potential Contamination	Potential Sources of Contamination from CSM	Current Zoning	Structure Plan Proposed Change to Land Use	Does the Structure Plan Trigger Contamination Assessment in accordance with SEPP (Resilience and Hazards)?
	AEC – 7 Surrounding Agricultural and Commercial Industrial Land Uses	RU1 Primary Production; INI Industrial; SP2	Waste Management and Recycle	Consider need for further assessment based on the intended use and potential exposure setting and apply principles of SEPP (Resilience and Hazards). Due diligence to be used to establish a process for assessment of potential for hazardous building materials (e.g., asbestos) or uncontrolled waste dumping prior to development commencement.
		SP1 – Freight Transport Facility, Heavy Industrial Storage SP2 - Infrastructure	Transport and Logistics	
			Interim Potential Hazardous Uses Area	
			Agriculture and Food Processing Area	
			Bioproducts	
		RU1 Primary Production	Manufacturing	
Outside Narrabri SAP area	North West Ag & Diesel (Agriculture/Horticulture); AEC – 2 Agricultural / Industrial Land Uses AEC – 3 Hazardous Materials Associated with Current and Former Structures / Service Conduits etc. AEC – 4 Sewer / Septic Lines AEC – 5 General Site Usage AEC – 6 Potential Illegally Dumped Wastes AEC – 7 Surrounding Agricultural and Commercial Industrial Land Uses	RU1 Primary Production	Residential, Education and Health Precinct	Yes. Change to a more sensitive land-use (residential, health, education), which triggers assessment under SEPP (Resilience and Hazards) prior to rezoning.

Potential Contamination	Potential Sources of Contamination from CSM	Current Zoning	Structure Plan Proposed Change to Land Use	Does the Structure Plan Trigger Contamination Assessment in accordance with SEPP (Resilience and Hazards)?
	Surrounding potential contaminating sites: Narrabri Works Depot – Transport NSW (Mechanical & Automotive); Gun Club (Gun, Pistol or Rifle Range) Narrabri Breakdown Service (Depot and Storage Yard);			
	(not assessed as alignment not confirmed)	Various	Green Zones	Further assessment required to assess potential contamination under public recreational uses.
	Light Industrial	n/a	Light industrial	Not included as part of this assessment as this is outside the SAP. No proposed change to more sensitive land-use (residential, health or education). A Phase 1 PSI should be undertaken as a minimum to identify potentially contaminating activities.

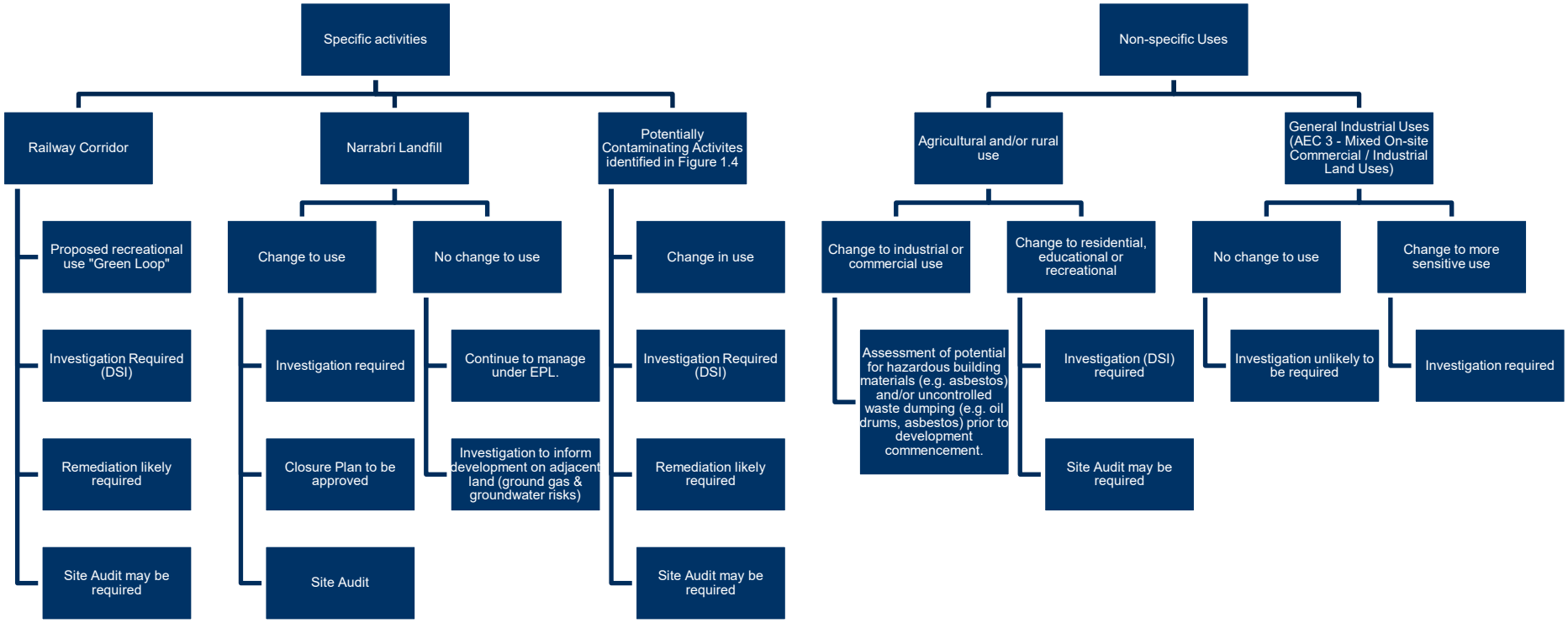


Chart 3 Summary of Likely Further Investigation Triggers

Note: Based on the available information at the time of this assessment on potential contamination and proposed land-use changes.

5. RECOMMENDATIONS

The following recommendations should be considered during the appropriate phases of the planning process:

- Further investigation can occur as part of the rezoning process, however due to the long development timeframe for the SAP, consideration should be given to including the detailed assessment and any subsequent remediation as part of the performance criteria included in the SAP development approval process.
- Contamination assessments should be undertaken by suitably qualified and experienced consultants. In some circumstances, a statutory Site Audit may be required (refer to the draft Contaminated Land Planning Guidelines for further information on when a statutory Site Audit is required). The use of suitably qualified and experienced consultants (certified by a scheme currently recognised by NSW EPA) in conducting third-party formal independent review should be considered where a statutory Site Audit is not required and a non-statutory audit may be overly onerous on the proponent.
- Further assessment will be required for the public recreational areas, including the Green Loop re-use of the railway corridor and any environmental conservation areas which will be made accessible to members of the public;
- Further assessment will be required prior to commencement of development, specific to the design proposed and with consideration of the potential sensitive receptors (i.e. future residents, future workers, members of the community, ecological receptors).
- The areas proposed for residential use will require a Phase 2 ESA. The timing of this to be determined as part of the planning process;
- The timing of further assessment should be considered around the precinct timeframe, as there is potential for change in conditions or new contamination sources to emerge in the time that the land remains undeveloped (e.g. potentially contaminating activities over 10-20 years);
- The existing landfill is managed by Council in accordance with the EPL and any changes to the operation of the landfill are communicated to EPA in accordance with the EPL. If there is a proposed change in use of the landfill, either for closure or re-use of the facility this will need to be assessed by EPA in accordance with relevant guidelines for landfill operation and closure. Re-use of the landfill for any other purpose will require at a minimum closure in accordance with landfill closure guidelines, and a detailed contaminated land assessment (Phase 2 ESA) with a Site Audit.
    - A landfill closure plan developed in accordance with the NSW EPA (2016) *Environmental Guidelines: Solid Waste Landfills* must be submitted to EPA no later than 12 months before the completion of waste receipt operations;
    - On-going monitoring is likely to be required until a certified statement of completion is obtained from EPA, which may take several years (e.g. EPA (2016) advises this may not be reached until 30 years after the site stops receiving waste);
    - There are specific guidelines for development on closed landfills in EPA (2016) including stabilisation and monitoring criteria for leachate, stormwater and hazardous ground gas levels;
    - The development should not compromise the functioning of environmental controls for the landfill such as capping, lining or gas collection systems, and the closed landfill must be structurally and geotechnically sound; and,
    - The risk of ground gas accumulation in enclosed spaces must be appropriately investigated and managed. Hazardous ground gas (e.g. methane, hydrogen sulfide, carbon dioxide) is of a higher risk for developments which include enclosed spaces (e.g. buildings, basements,

service tunnels or shafts) compared to open space use (such as parks or sporting fields) as the accumulation of gases in enclosed spaces may pose a risk of asphyxiation or explosion in the short-term and potential for long-term health impacts. Closed landfills are typically unsuitable for these types of development due to the risk posed by hazardous ground gases, without significant remediation and engineering controls.

- A broad plan should be established for investigation of rural properties at an appropriate point in the process given the land may not be developed for some time (e.g. prior to acquisition, post-acquisition or prior to development approval or commencement). This should begin with a site walkover to identify in detail potential sources of contamination such as hazardous building materials (e.g. asbestos, lead paint), storage and/or use of agricultural chemicals, fuel, oils or other chemicals, on-site waste disposal (e.g. legacy waste disposal).
- Hazardous Building Material Surveys should be undertaken for existing structures on the site prior to any demolition or redevelopment works;
- Assessment of potential for contamination in the areas outside the Narrabri SAP area boundary where transition to more sensitive land use is proposed, initially via a PSI and likely a subsequent DSI;
- Consideration should be given to further assessment of soil conditions within the proposed road corridor, as the costs of managing risks during construction and the cost of disposal of soil may be significant and could contribute to delays in the project commencement. Further detailed assessment for potential contamination may be required for ground disturbance associated with road construction, particularly where soil is excavated for off-site disposal, which can be used to inform the development of a soil management plan to be implemented during construction; and
- Further detailed assessment for potential contamination along the proposed public recreation areas for potential contamination hazards.
- The Narrabri landfill site is a potential source of groundwater contamination. Given the location of the landfill within the SAP, consideration should be given to an assessment of contamination of groundwater in the immediate vicinity of the landfill site and other industrial uses where groundwater extraction bores are proposed, to assess the suitability of groundwater for beneficial re-use (i.e. recreational, drinking water, agricultural, stock watering), and to improve the understanding of the potential for migration of contaminants and hazardous ground gases from the Narrabri Landfill and the potential for risks to redevelopment in the surrounding areas;
- The SAP proposes sub-precincts with further detail on the specific land-uses, zoning and/or permissible activities to be finalised at a later stage of the planning process. The detail of specific uses permissible under the final zoning would also require further consideration to further assess the potential for introduction of more sensitive uses where compatible uses are allowed for e.g. rural residential or childcare can be a concurrent use.
- If groundwater extraction for beneficial re-use is proposed this should consider potential for contamination, and an assessment should be undertaken which considers the potential contaminants of concern.

The below table summarises the key aspects identified in this report and suggested wording for actions to be undertaken prior to development commencement, which should be included in the relevant planning instruments for management of contamination risks:

Sites	Suggested wording for inclusion in relevant Planning Instrument (e.g. Development Control Plan, LEP, other)
Precinct wide – broadly agricultural and industrial land has the broad potential for contamination associated with: - Built structures and/or infrastructure (current), which may include hazardous building materials (such as asbestos, lead paints, PCBs) that may pose a risk if demolished in an uncontrolled manner; - General rural use sites which may currently or formerly had chemical storage and use including but not limited to underground or above-ground chemical storage tanks; and - Remains of built structures and/or infrastructure which have been demolished in an uncontrolled manner, which may include hazardous building materials (such as asbestos); - Uncontrolled waste dumping.	■ Demolition and removal of built structures and infrastructure such as underground pipes, conduits or tanks must be removed by an appropriately licenced professional in accordance with Australian Standards and NSW EPA endorsed guidelines and disposed of off-site at a facility licenced to accept that waste. ■ An inspection should be undertaken prior to commencement of development to identify potential hazardous materials in buildings or waste stored on-site, the presence of waste materials (such as contaminated soil or asbestos containing materials) or waste burial, and/or the presence of chemicals and fuels (including underground or above-ground storage tanks by an appropriately licenced professional. An appropriately licenced professional may include a consultant certified in accordance with NSW EPA (January 2022) *Contaminated Land Consultant Certification Policy – Version 3.* These materials should be removed from the site by an appropriately licenced professional in accordance with Australian Standards and NSW EPA endorsed guidelines and disposed of at a facility licenced to accept that waste.
Existing industrial sites that have been identified as potentially contaminated based on current activities including (but not limited to): - Narrabri Landfill - Australian Recycled Plastics (Recycled Plastics); - Narrabri Breakdown Service (Depot and Storage Yard);	If new development is proposed on existing industrial sites further investigation should be undertaken to determine that the site is suitable for ongoing industrial use consistent with the development proposal: ■ A Detailed Site Investigation must be conducted to determine the nature and extent of potential contamination. The detailed site investigation/s must be undertaken, and the subsequent report(s), must be prepared in accordance with relevant guidelines made or approved by the EPA under section 105 of the CLM Act. If the Detailed Site Investigation determines that remediation is required to ensure the site is suitable for the proposed use, a Remediation Action Plan must be developed.

Sites	Suggested wording for inclusion in relevant Planning Instrument (e.g. Development Control Plan, LEP, other)
- KA & VK Stubbs Pty Ltd (Electrical or Electrical Components); - HL & JH Gale Pty Ltd (Mechanical and Automative); - Narrabri Gas Project (Oil & Gas); - North West Ag & Diesel (Agriculture/Horticulture); - Grainflow Narrabri (Agriculture/Horticulture); - Former/Current Inglegreen Piggery - 821 Culgoora Road Narrabri ■ Other agricultural and industrial uses on-site	■ Prior to granting development consent, the Consent Authority must be satisfied that the site is suitable, or can be made suitable, for the proposed use. Remediation works identified in the Remediation Action Plan may require consent prior to commencing works. ■ All reports submitted as part of the planning application must be prepared, or reviewed and approved, by a consultant certified in accordance with NSW EPA (January 2022) *Contaminated Land Consultant Certification Policy – Version 3*. Where remediation works have been undertaken, the Planning Authority must require the applicant to submit a Section A1 Site Audit Statement – or a Section A2 Site Audit Statement accompanied by an Environmental Management Plan. The Site Audit Statement (and accompanying Site Audit Report) is to be prepared by a NSW EPA accredited Site Auditor and must confirm that the site is suitable for the proposed use.
Industrial or agricultural land proposed for recreation and conservation areas that are publicly accessible	In addition to the above, the SEPP does not specifically require assessment of land to be zoned for public recreation along the “green belt”, however we note that this would also be a more sensitive use, and consideration to be given to assessment of potential contamination in proposed conservation or recreational areas where publicly accessible (for example, potential asbestos or waste stockpiles). The potential for any such risks would require consideration and assessment on a case-by-case basis to evaluate the potential risks to relevant human health and / or environmental receptors. Where relevant advice should be sought from a consultant certified in accordance with NSW EPA (January 2022) *Contaminated Land Consultant Certification Policy – Version*.

APPENDIX A PRELIMINARY SITE INVESTIGATION

1. INTRODUCTION

The following sections present the key findings of a preliminary site investigation (PSI) for the Narrabri SAP. The information in the following sections has been obtained from multiple searches over the period of time that the structure plan has been developed, to account for the changes to the geographical boundary of the Narrabri SAP prior to the final plan being developed. This includes the Insight Report dated 28 September 2022 and additional searches of public databases conducted on 20 February 2023 when the final structure plan was available to ERM.

This PSI includes the are defined as the Narrabri Special Activation Precinct (SAP) as shown on Figure A-1 and Figure A-2. Other features proposed within the SAP structure plan, such as the Mount Kaputar Precinct, Green Belt which are outside these boundaries have not been assessed as part of this PSI.

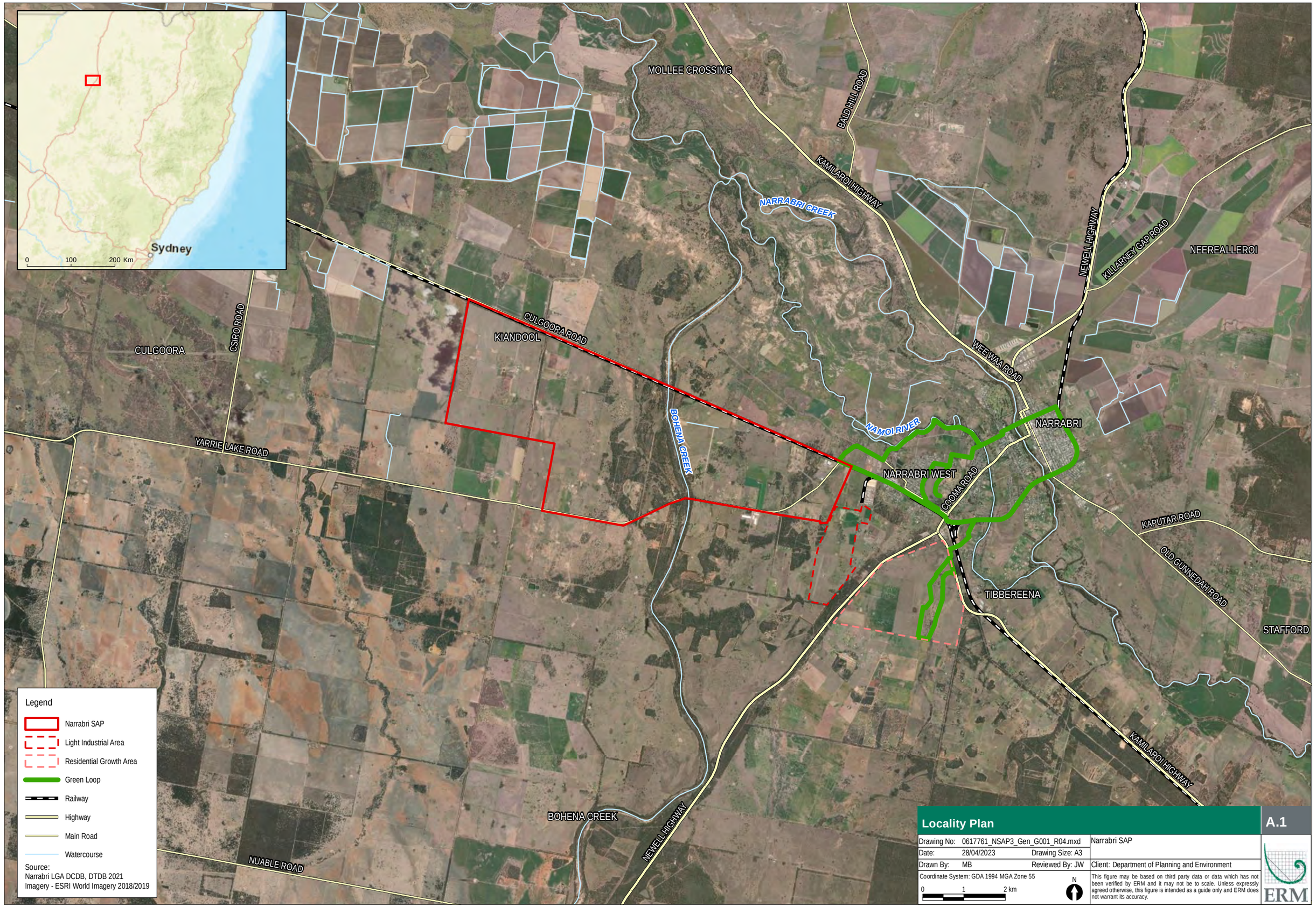
2. SITE IDENTIFICATION, SITE SETTING, SITE CONDITION AND SURROUNDING ENVIRONMENT

The site address and legal description (i.e lot details) have not been defined in this report as this covers a broad area, with multiple lots and addresses. For the purpose of the PSI “the Site” is defined by the boundary of the Narrabri SAP as presented in Figure A-2.

The following sections summarise the information obtained during the site background and history desktop review. Copies of all database search results are provided in **Appendix B**

Item	Description
Site area	SAP is approximately 2500 hectares
Local Government Area	Narrabri Shire Council
Geographical Co-Ordinates	30º21’05”S 149º42’50” E (Approximate centre of Site)
Site Location and Site Layouts	Figure A-1, A-2 and A-3
Current land use	The following land uses are described under the LEP: ■ C3 Environmental Management ■ IN1 General Industrial ■ R1 General Residential ■ R5 Large Lot Residential ■ RU1 Primary Production ■ SP1 Special Activities ■ SP2 Special Purposes Zone – Infrastructure
Surrounding Land use	The Narrabri Town Centre is located to the north of the site. The land uses surrounding the site include: ■ **North:** Primary Production, General Industrial, ■ **South:** Primary Production, Large Lot Residential; ■ **East:** Primary Production, Large Lot Residential; ■ **West:** Primary Production.
Site Elevation	Approximately 210-220 m Australian Height Datum (AHD)
Topography	The Site and regional topography is generally comprised of flat land with a slight slope to the north east, with localised slopes towards ephemeral drainage lines.

Item	Description
Hydrology	The nearest natural surface water bodies at the Site were identified as: ■ Bohena Creek flowing through the centre of the SAP; and ■ the Namoi River located to the north. A review of aerial imagery also indicates the presence of several ephemeral drainage lines and farm dams located within the SAP boundary.
Geology	As shown on Figure A-5 the geology mapping from the Geological Survey of NSW Narrabri 1: 250,000 Sheet SH 55-12 indicates that the Site is underlain by the following geological units: ■ Alluvial valley clastic sediment deposits comprising fluvially-deposit quartz-lithic sand, silt, gravel and clay from the Quarternary age; ■ Colluvium clastic sediments comprising undifferentiated colluvial and residual deposits from the Quarternary age; and ■ Colluvium clastic sediments comprising unconsolidated surficial lag deposits of rounded to subangular pebble to cobble sized (usually) polymictic clasts derived from underlying or adjacent upslope parent material, surficial sheet flow removed fine-grained material, from the Quarternary age.
Soil Landscapes	Available mapping from the Soil and Land Resources of the Moree Plains dataset (Soil and Land Resources of the Moree Plains | Anzlic_Dataset | SEED (nsw.gov.au)) indicates that a total of five different soil landscapes are present across the Site as follows: ■ Bohena Creek; ■ Etoo Creek; ■ Mehi River; ■ Moglewit; and, ■ Namoi; ■ Nee Nee Creek; ■ Piliga Forest Way.; and, ■ Tippiari Road; ■ Womera; Figure A-7 presents the available mapping of these areas within the Site, detailed descriptions are presented in Section 3 (below). Soils within the Narrabri SAP are predominantly classified as Womera soil landscape (STwmr) characterised by Yellow Sodosols and Grey Vertosols, with other soil landscape groups are present associated with floodplain deposits along waterways. Soils along the Bohena Creek floodplain are characterised by Bohena Creek (ALbmo) Red Kandosols along alluvial terrace and Etoo Creek (ALett) Brown-Orthic Tenosols on lower terraces, Brown Chromosols on higher terraces or Sodosols on lower floodplains. Soils in areas with ephemeral or historic creeks are characterised by Sodosols of the Moglewit (TRmwn) group and Grey, Yellow and Brown Sodosols and Red Tenosol/Red Kandosol intergrades of the Piliga Forest Way (TRpfx). Soils within the residential growth area are broadly Womera soil landscape (STwmr) characterised by Yellow or Brown Sodosols or Grey Vertosols with an area of Tippiari Road (REtrn) along the southern boundary, and Piliga Forest Way (TRpfx) to the west along the western boundary.
Salinity and Soil Aggressivity	Soil landscapes within the area are subject to localised salinity and may represent aggressive soils and foundation hazards.
Acid Sulfate Soils	Available mapping indicates that there is a low to extremely low potential for acid sulfate soils to be present within the Site.
Hydrogeology	Information provided by NSW Department of Industries – Office of Water indicated the following: ■ Groundwater aquifers on the site and surrounding buffer area (2 km) were described as porous, extensive highly productive aquifers; ■ A search of registered groundwater bores identified 291 bores within the 2 km search radius. Standing water levels were measured between 0.9 m bgl to 66 m bgl; and The registered bores are reported to be used for a mix of irrigated agriculture, water supply for household, water supply for livestock, monitoring, exploration or research, manufacturing and industry and unknown purposes.



Locality Plan

A.1

Drawing No:	0617761_NSAP3_Gen_G001_R04.mxd		Narrabri SAP
Date:	28/04/2023	Drawing Size: A3	
Drawn By:	MB	Reviewed By: JW	Client: Department of Planning and Environment

Coordinate System: GDA 1994 MGA Zone 55

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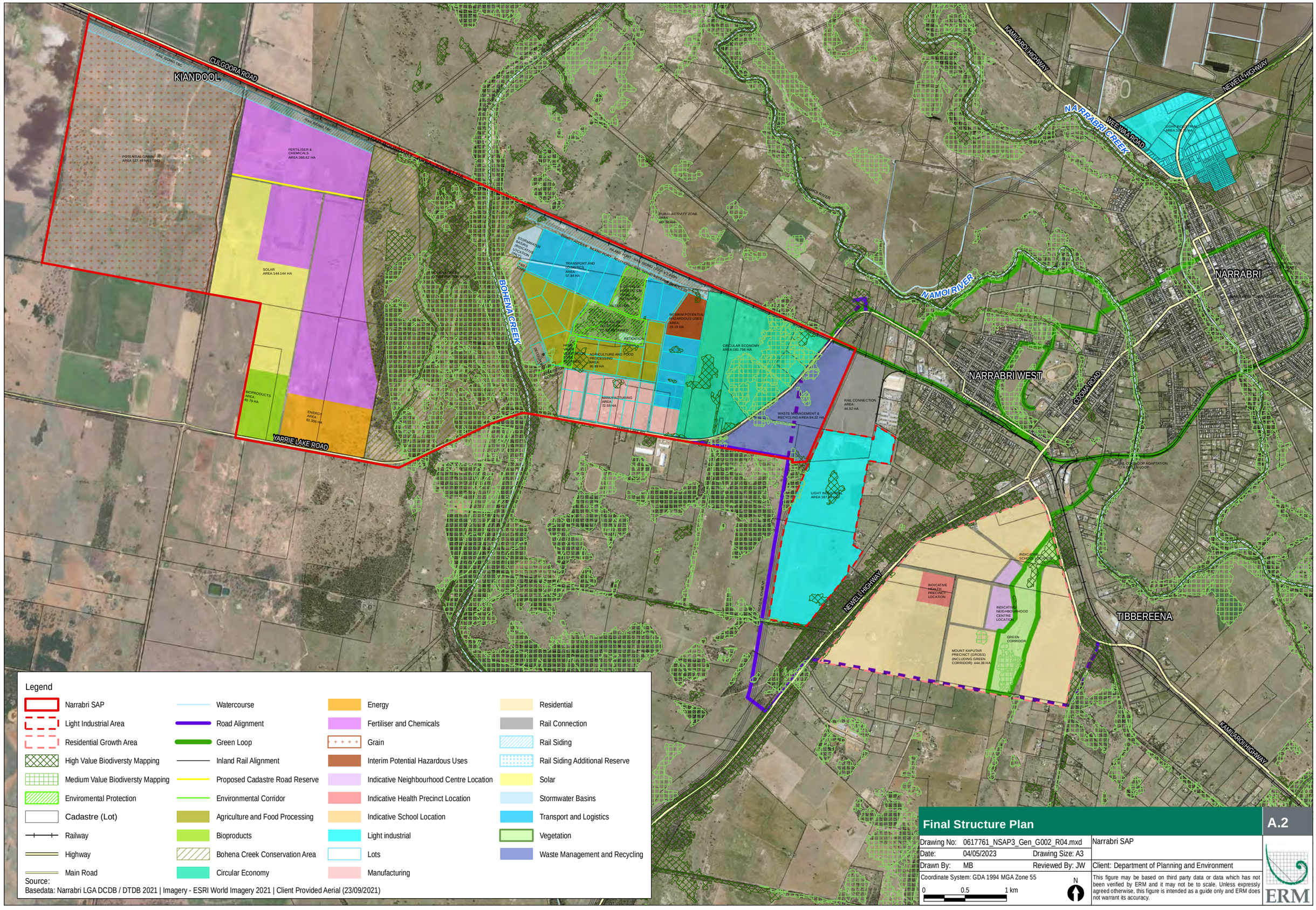

Legend

- Narrabri SAP
- Light Industrial Area
- Residential Growth Area
- High Value Biodiversty Mapping
- Medium Value Biodiversty Mapping
- Enviromental Protection
- Cadastre (Lot)
- Railway
- Highway
- Main Road
- Watercourse
- Road Alignment
- Green Loop
- Inland Rail Alignment
- Proposed Cadastre Road Reserve
- Environmental Corridor
- Agriculture and Food Processing
- Bioproducts
- Bohena Creek Conservation Area
- Circular Economy
- Energy
- Fertiliser and Chemicals
- Grain
- Interim Potential Hazardous Uses
- Indicative Neighbourhood Centre Location
- Indicative Health Precinct Location
- Indicative School Location
- Light industrial
- Lots
- Manufacturing
- Residential
- Rail Connection
- Rail Siding
- Rail Siding Additional Reserve
- Solar
- Stormwater Basins
- Transport and Logistics
- Vegetation
- Waste Management and Recycling

Source:
Basedata: Narrabri LGA DCDB / DTDB 2021 | Imagery - ESRI World Imagery 2021 | Client Provided Aerial (23/09/2021)

Final Structure Plan

A.2

Drawing No:	0617761_NSAP3_Gen_G002_R04.mxd		Narrabri SAP
Date:	04/05/2023	Drawing Size: A3	
Drawn By:	MB	Reviewed By: JW	Client: Department of Planning and Environment

Coordinate System: GDA 1994 MGA Zone 55

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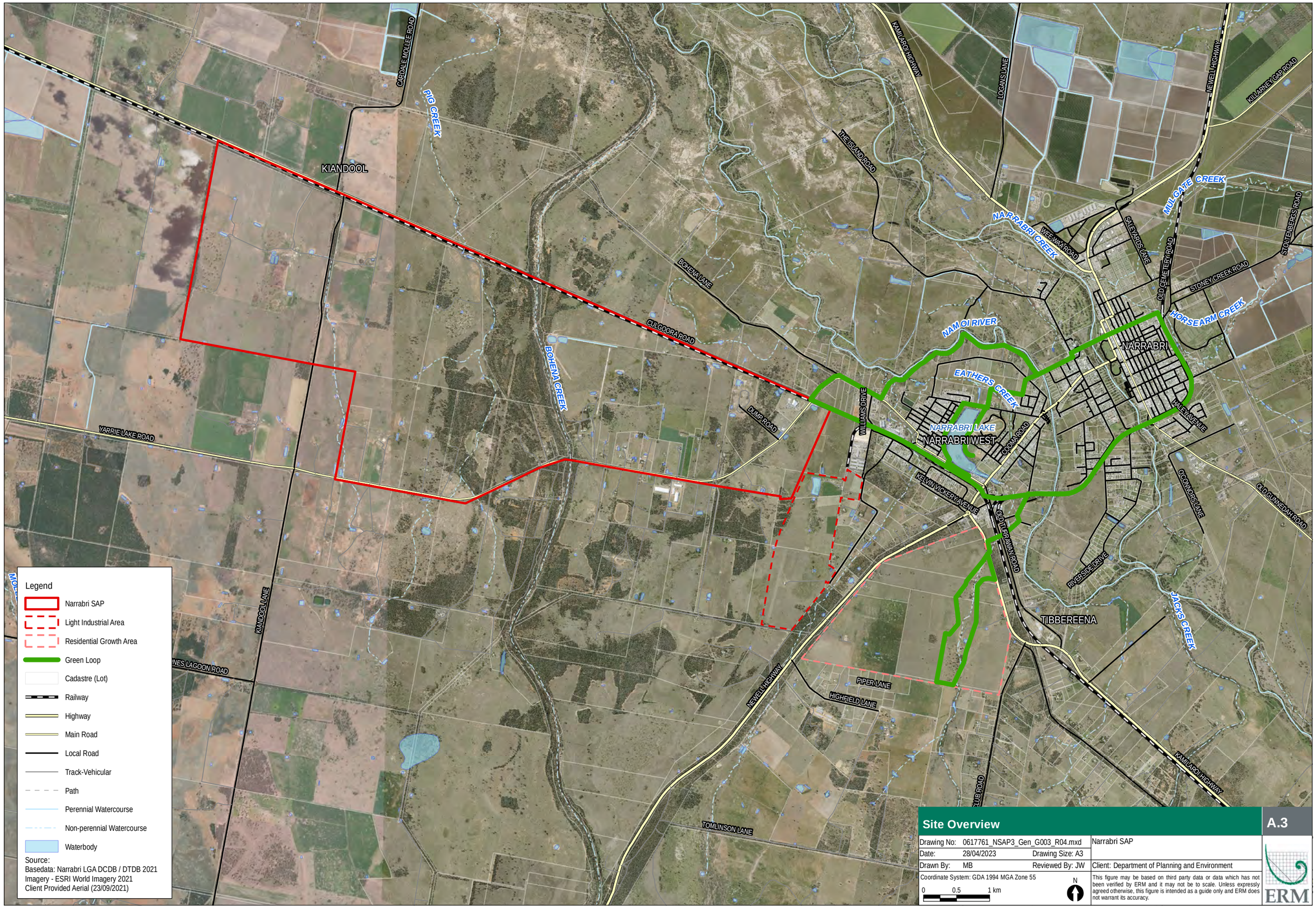

Site Overview

A.3

Drawing No:	0617761_NSAP3_Gen_G003_R04.mxd		Narrabri SAP
Date:	28/04/2023	Drawing Size: A3	
Drawn By:	MB	Reviewed By: JW	Client: Department of Planning and Environment

Coordinate System: GDA 1994 MGA Zone 55

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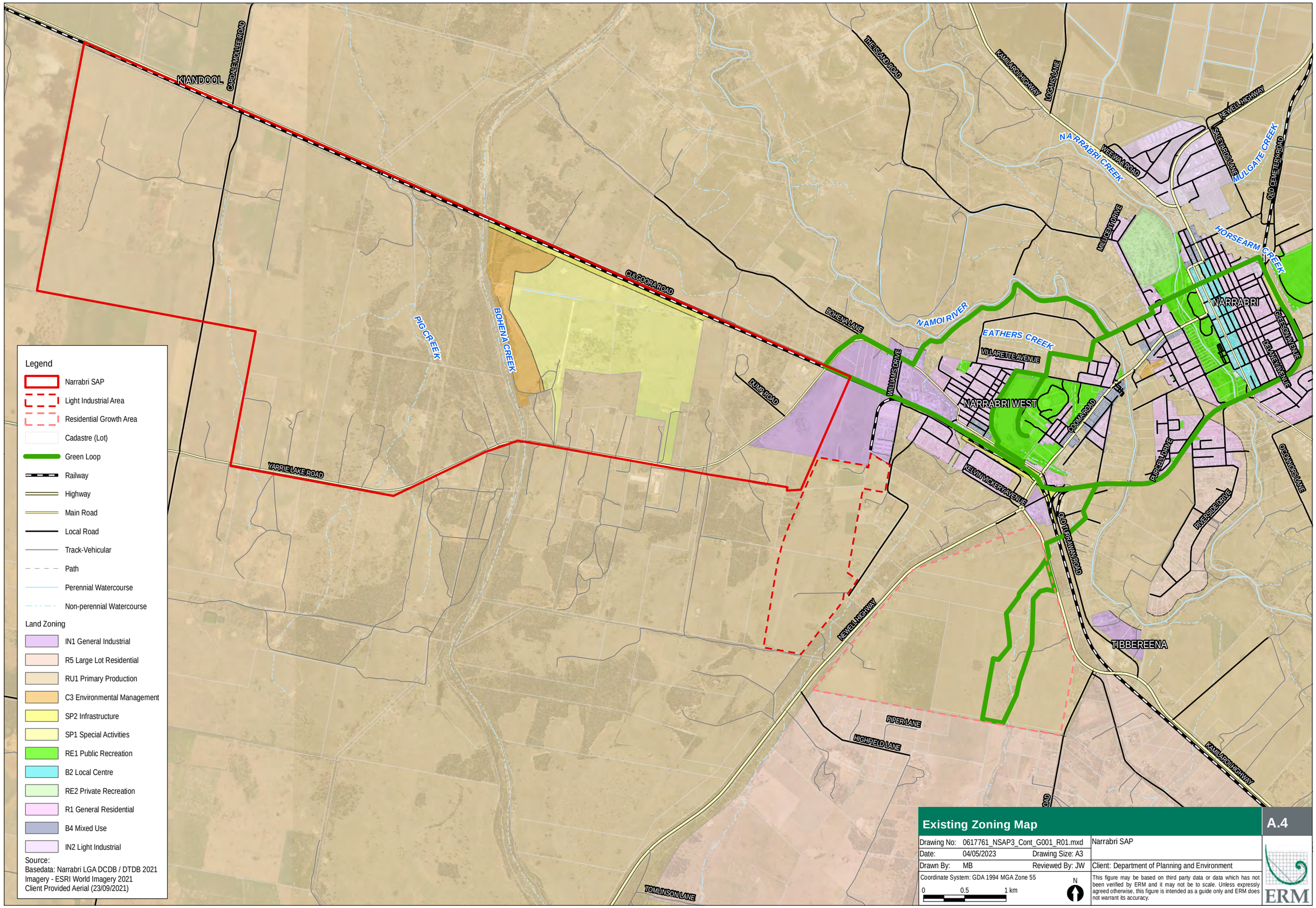

Legend

- Narrabri SAP
- Light Industrial Area
- Residential Growth Area
- Cadastre (Lot)
- Green Loop
- Railway
- Highway
- Main Road
- Local Road
- Track-Vehicular
- Path
- Perennial Watercourse
- Non-perennial Watercourse

Land Zoning

- IN1 General Industrial
- R5 Large Lot Residential
- RU1 Primary Production
- C3 Environmental Management
- SP2 Infrastructure
- SP1 Special Activities
- RE1 Public Recreation
- B2 Local Centre
- RE2 Private Recreation
- R1 General Residential
- B4 Mixed Use
- IN2 Light Industrial

Source:
Basedata: Narrabri LGA DCDB / DTDB 2021
Imagery - ESRI World Imagery 2021
Client Provided Aerial (23/09/2021)

Existing Zoning Map

A.4

Drawing No:	0617761_NSAP3_Cont_G001_R01.mxd		Narrabri SAP
Date:	04/05/2023	Drawing Size: A3	
Drawn By:	MB	Reviewed By: JW	Client: Department of Planning and Environment

Coordinate System: GDA 1994 MGA Zone 55

0 0.5 1 km

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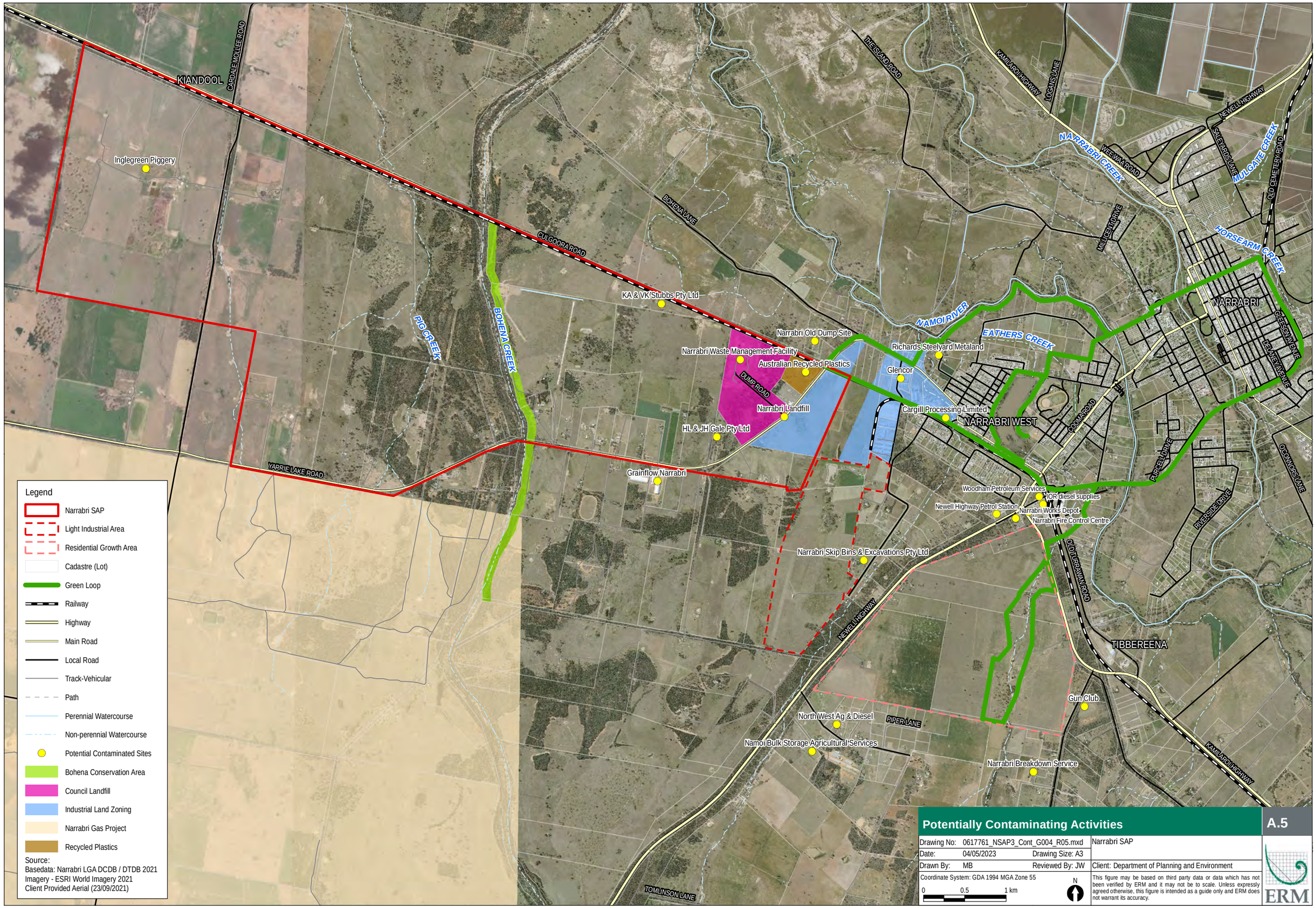


Legend

- Narrabri SAP
- Light Industrial Area
- Residential Growth Area
- Cadastre (Lot)
- Green Loop
- Railway
- Highway
- Main Road
- Local Road
- Track-Vehicular
- Path
- Perennial Watercourse
- Non-perennial Watercourse
- Potential Contaminated Sites
- Bohena Conservation Area
- Council Landfill
- Industrial Land Zoning
- Narrabri Gas Project
- Recycled Plastics

Source:
Basedata: Narrabri LGA DCDB / DTDB 2021
Imagery - ESRI World Imagery 2021
Client Provided Aerial (23/09/2021)

Potentially Contaminating Activities

A.5

Drawing No:	0617761_NSAP3_Cont_G004_R05.mxd		Narrabri SAP
Date:	04/05/2023	Drawing Size: A3	
Drawn By:	MB	Reviewed By: JW	Client: Department of Planning and Environment

Coordinate System: GDA 1994 MGA Zone 55

0 0.5 1 km

N

ERM

KIANDOOL
Q_cs
Q_avf
Q_avf
CULGOORA ROAD
BOHENA LANE
THE ISLAND ROAD
PIG CREEK
BOHENA CREEK
DUMP ROAD
YARRIE LAKE ROAD
NAMOI RIVER
NARRABRI CREEK
WEE WAA ROAD
NEWELL HIGHWAY
SAMMARDS LANE
MULGATE CREEK
OLD CEMETERY ROAD
HORSE ARM CREEK
MILLICENT DRIVE
NARRABRI
GLEESON AVENUE
DELANEY AVENUE
WILLIAMS DRIVE
NARRABRI WEST
EATHERS CREEK
COOMA ROAD
OLD TURRAWAN ROAD
KELVIN MCKERVAVENUE
PURCELL DRIVE
RIVERSIDE DRIVE
OCONNORS LANE
NEWELL HIGHWAY
TIBBEREENA
PIPER LANE
KAMILAROI HIGHWAY
TOMLINSON LANE

Legend

- Narrabri SAP
- Light Industrial Area
- Residential Growth Area
- Cadastre (Lot)
- Green Loop
- Railway
- Highway
- Main Road
- Local Road
- Track-Vehicular
- Path
- Perennial Watercourse
- Non-perennial Watercourse

Surface Geology

- Q_avf, Alluvial fan deposits
- Q_cr, Colluvial and residual deposits
- Q_cs, Colluvial sheetwash

Source:
Basedata: Narrabri LGA DCDB/DTDB | NSW SEED
Imagery - ESRI World Imagery 2021
Client Provided Aerial (23/09/2021)

Geology Map

A.6

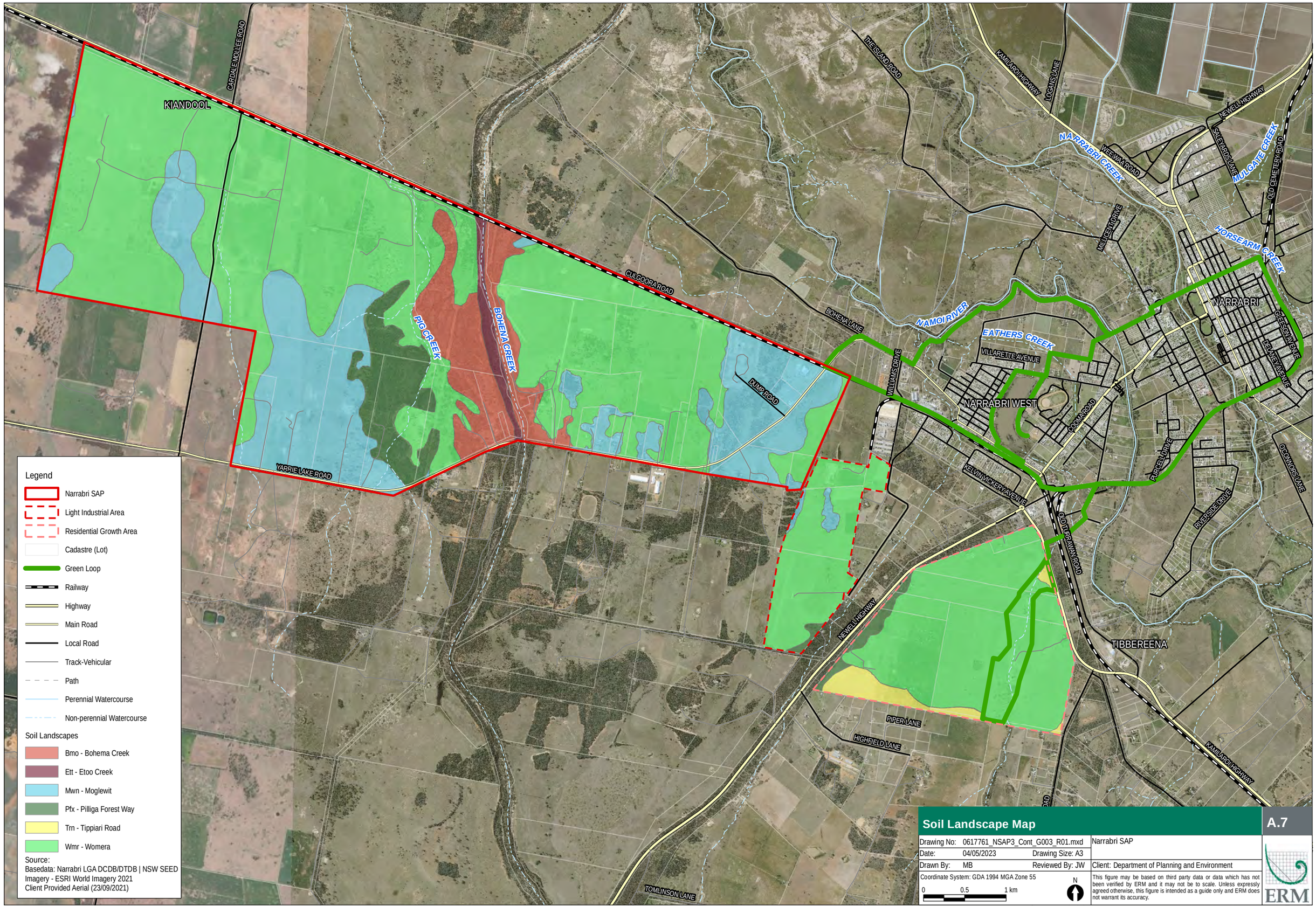
Drawing No:	0617761_NSAP3_Cont_G002_R01.mxd		Narrabri SAP
Date:	04/05/2023	Drawing Size: A3	
Drawn By:	MB	Reviewed By: JW	Client: Department of Planning and Environment

Coordinate System: GDA 1994 MGA Zone 55

0 0.5 1 km

N

ERM



Soil Landscape Map

A.7

Drawing No:	0617761_NSAP3_Cont_G003_R01.mxd		Narrabri SAP
Date:	04/05/2023	Drawing Size: A3	
Drawn By:	MB	Reviewed By: JW	Client: Department of Planning and Environment

Coordinate System: GDA 1994 MGA Zone 55

0 0.5 1 km

N

ERM

3. DETAILED SOIL LANDSCAPE DESCRIPTIONS

Pertinent points from the Soil Landscape Reports (SLAM Soil Landscape Report for Moree Plains v 1.0.1, 20 December 2016) for each of the identified soil landsapes within the Narrabri SAP area are presented below with the distribution of these landscapes across the Site.

Soil Landscape	Description
Bohena Creek	■ **Landscape**— Narrow alluvial terraces on Quaternary sheetwash alluvium in the western Pilliga Outwash. Slopes 0 - 2%, local relief <3 m, elevation ~240 - 300 m. Largely uncleared woodland in the south, extensively cleared woodland in the north. ■ **Soils**— Dominated by deep (>150 cm), well-drained Red Kandosols (Red Earths). Rapidly drained Rudosols and low terraces of rapidly drained Stratic Tenosols (Earthy Sands/Alluvial Soils) in unmapped areas of Etoo Creek (etta). ■ **Qualities and limitations**— localised complex soils, widespread poor moisture availability, widespread non-cohesive soils, localised foundation hazard, widespread recharge zone, localised discharge zone, localised streambank erosion hazard, localised high run-on, localised poor drainage, localised flood hazard.
Etoo Creek	■ **Landscape** — Level to gently inclined recent alluvial floodplain and terrace system starting in the upper Pilliga Outwash and Pilliga south and east, and often extending and broadening into complex alluvial plains and stagnant alluvial plains on the northern margins of the Pilliga Outwash. Slope gradients <3%, local relief <10 m, elevation 180 - 260 m. Partially cleared woodland and grassland. ■ **Soils**— Deep (>150 cm), rapidly drained Brown-Orthic Tenosols (Earthy Sands) on lower terraces, deep (>150 cm), imperfectly drained Brown Chromosols (Red-brown Earths) on higher terraces and deep (>150 cm), poorly drained Sodosols (Solodized Solonetzic and Solodic Soils) on lower floodplains. ■ **Qualities and limitations** — widespread complex soils, localised poor moisture availability, localised non-cohesive soils, localised foundation hazard, localised woody weeds, localised dieback, widespread recharge zone, localised discharge zone, localised salinity hazard, localised wind erosion hazard, localised streambank erosion hazard, localised high run-on, localised poor drainage, localised permanently high watertables, localised permanent waterlogging, localised seasonal waterlogging, widespread flood hazard.
Moglewit	■ **Landscape** — Flat to very gently inclined plains of old coalescing fans, prone to scalding, in the northern Pilliga Outwash in the southern Moree Plains. Slopes 0 - 3%, local relief <3 m, elevation 180 - 230 m. Partially to extensively cleared open-woodland. ■ **Soils** — Deep (>150 cm), imperfectly to poorly-drained Sodosols (Solodic Soils and Solonized Solonetz). ■ **Qualities and limitations** — localised non-cohesive soils, localised foundation hazard, localised recharge zone, localised discharge zone, localised wind erosion hazard, widespread sheet erosion hazard, widespread high run-on, widespread poor drainage, widespread seasonal waterlogging, localised flood hazard.
Pilliga Forest Way	■ **Landscape** — Broad stagnant alluvial plains and fan deposits derived from old outwash of the Pilliga Sandstone in the far southern Moree Plains. Slopes <2%, local relief <10 m, elevation 180 - 300 m. Partially cleared open-woodland. ■ **Soils** — Dominated by giant (>500 cm), well-drained to imperfectly drained, Grey, Yellow and Brown Sodosols (Solodic Soils), with minor moderately deep to deep (100 - >150 cm), well-drained Red Tenosol/Red Kandosols intergrades (Earthy Sands/Red Earths). Giant (>500 cm), poorly-drained, scalded Sodosols (Solodic Soils) at northern terminal extent. ■ **Qualities and limitations** — localised complex soils, widespread poor moisture availability, widespread non-cohesive soils, localised woody weeds, localised dieback, widespread recharge zone, localised discharge zone, localised salinity hazard, localised wind erosion hazard, localised gully erosion hazard, widespread sheet erosion hazard, localised streambank erosion hazard, widespread high run-on, widespread poor drainage, localised seasonal waterlogging, localised flood hazard.

Soil Landscape	Description
Tippiari Road	■ **Landscape –** gently undulating rises to undulating hills on sandstones of the Cretaceous Keelindi Beds of the central and eastern Piligia, in the far south of the Moree Plains. Slopes 0-5%, local relief 10-30m, elevation 220-320m. Mainly uncleared woodland and open-forest. ■ **Soils –** deep to very deep (100 – 500 cm), rapidly drained Brown-Orthic Tenosol (Earthy Sands) on coarse-grained parent materials, moderately deep (50-100cm), imperfectly drained Brown or Yellow Sodosols (Solodic Soils) on finer grained parent materials, and shallow (<50cm), well-drained Leptic Tenosols (Lithosols) on occasional ferruginised sandstone crests with abundant ironstone gravels. Shallow to moderately deep (25 – 100cm), rapidly drained Rede Kandosols (Red Earths) on broombrush heathlands. ■ **Qualities and limitations** — localised shallow soils, widespread poor moisture availability, widespread non-cohesive soils, localised rock outcrop hazard, widespread recharge zone, localised discharge zone, localised gully erosion hazard, widespread sheet erosion hazard, localised high run-on, localised poor drainage, localised seasonal waterlogging.
Womera	■ **Landscape** — Broad, clayey, often gilgaied, stagnant alluvial plain dominated by older alluvium in the north of the Pilliga Outwash. Slopes <1%, local relief 0 - 3 m, elevation 180 - 240 m. Extensively cleared open-woodland. ■ **Soils** — Deep (>150 cm), imperfectly drained, Eutrophic, Brown or Yellow Sodosols (Solodic Soils) and Epipedal to Selfmulching, Grey Vertosols (Grey Clays). Minor giant, scalded, poorly-drained, Episodic-Gypsic Crusty Brown Vertosol (Brown Clays) in north. ■ **Qualities and limitations**— localised complex soils, localised poor moisture availability, localised non-cohesive soils, widespread foundation hazard, localised productive arable land, localised woody weeds, localised dieback, widespread recharge zone, localised discharge zone, localised salinity hazard, localised wind erosion hazard, localised gully erosion hazard, widespread sheet erosion hazard, localised high run-on, widespread poor drainage, widespread seasonal waterlogging, widespread flood hazard.

4. PAST POTENTIALLY CONTAMINATING ACTIVITIES

4.1 Site History

A desktop review of available historical information is presented in the following sections. This information was reviewed to identify past potentially contaminating activities, the key findings are presented on Figure A-4.

4.2 Aerial Photographs

Historical aerial photographs (presented in **Appendix B**) were reviewed to assess potential historical land use practices undertaken within and surrounding the site. The SAP boundary in the Insight Report dated 28 September 2022 presented in Appendix B was based on the SAP boundary at that time. A summary of information obtained from the review based on the current SAP boundary is presented within the table below.

Year	Description
1964 – Black & White	■ **Narrabri SAP:** The site consists of agricultural land and undeveloped land. Structures including farm outbuildings, houses, farm dams are present in several areas, indicating active agricultural development has commenced. Buildings are present on the location of the Inglegreen Piggery in the western part of the SAP. A railway line is present along the northern boundary of the site. The current-day main roads, Yarrie Lake Road and Culgoora Rd, are present. ■ **Surrounding Area:** There is limited development north of Culgoora Road, with the land predominantly open grass land, with some vegetation and large areas of surface scalding (typical of this soil landscape). The surrounding area is primarily comprised of agricultural land and undeveloped land. The road layout and subdivision has been undertaken / developed to the north east of the Site within Narrabri West. The Narrabri Works Depot is present on the Newell Highway directly north of the proposed residential area.
1989 – Black & White	■ **Narrabri SAP:** The majority of the site remains agricultural land, with further development of farm dams, sheds, buildings and houses associated with rural industries. These structures are widely spaced and not indicative of intensive agricultural use, with the exception of the piggery site in the western part of the SAP. In the southern part of the Narrabri SAP there are several buildings and farm dams on rural properties with entrances off Yarrie Lake Road. ■ **Surrounding Area:** An area of ground disturbance is visible between Culgoora Rd and Bohena Lane which may be the location of the “Old Dump” identified in Section A.1.2 of this report. The Cargill Processing plant has been constructed to the east of the SAP north of Culgoora Rd. The Narrabri West urban area has expanded with construction of additional dwellings within the existing footprint of road subdivision.
1994 – Colour	■ **Narrabri SAP:** There are several small areas of vegetation clearance within the Site with soil exposed, but no other indication of site activities. A large area has been cleared within the central western portion of the Site to the south of a large shed. A second large clearing is present in the centre of the Narrabri SAP, which appears to be the location of the Narrabri Landfill located on Dump Road. Stockpiles of soil or waste materials are present within the landfill area. There have been some additions to the buildings on rural properties with entrances off Yarrie Lake Road. ■ **Surrounding Area:** There has been further development within the Narrabri West area to the north-east of the Narrabri SAP, with construction of additional houses. An unsealed circular track is present on a property to the south of Yarrie Lake Rd, which may be a horse or dog training track.

Year	Description
1998 – Colour	■ **Narrabri SAP:** There has been further expansion of the Narrabri Landfill, with several surface water dams and stockpiles of material present. A large shed has been constructed on the site of the current day Australian Plastics Recyclers. Minor flooding is present within the SAP, with farm dams full and other standing water visible in ephemeral waterways, and standing water in erosional features particularly in the areas along Bohena Creek. ■ **Surrounding Area:** The region has experienced recent flooding, with flood waters visible on the Namoi River, Narrabri Creek, and through the Narrabri West township including flooding of the Showground. Sheds have been constructed adjacent to the rail siding to the east of the SAP.
2010 – Colour	■ **Narrabri SAP:** Construction of additional sheds and water treatment ponds on the Inglegreen Piggery site. A larger shed has been constructed on the current day Australian Plastics Recyclers site. A shed and cleared area is present on the corner of Dump Rd and Yarrie Lake Rd, where the current day public waste transfer station is located. The remainder of the area is generally consistent with previous aerial imagery. ■ **Surrounding Area:** Some clearance was observed on the south east of the SAP. Some development was observed in Narrabri West to the north east of the SAP.
2013 – Colour	■ **Narrabri SAP:** Further expansion on the landfill and the waste transfer station on the corner of Dump Rd and Yarrie Lake Rd with additional clearance of vegetation. No other significant changes were observed for the SAP since previous aerial photography. ■ **Surrounding Area:** No significant changes were observed since previous aerial photography.
2017 – Colour	■ **Narrabri SAP:** Some changes to the surface features of the landfill within the prior footprint. No significant changes were observed for the site since previous aerial photography. ■ **Surrounding Area:** No significant changes were observed for the land surrounding the site since previous aerial photography.
2019 – Colour	■ **Narrabri SAP:** Some changes to the surface features of the landfill within the prior footprint. No significant changes were observed since previous aerial photography. ■ **Surrounding Area:** No significant changes were observed since previous aerial photography.
2020 – Colour	■ **Narrabri SAP:** Some changes to the surface features of the landfill within the prior footprint. No significant changes were observed since previous aerial photography. ■ **Surrounding Area:** No significant changes were observed since previous aerial photography.

4.3 Historical Business Records

A search of historical business records and land titles for the Narrabri SAP and surrounding area (200 m radius) was undertaken from the 1920s to date. The results of the search are provided within **Appendix B.** It is noted that this search was reported by Land Insight on 28 September 2022 and is based on the Narrabri SAP boundary at that time

The historical business records identify historical commercial and industrial operations which may be associated with potential sources of contamination in the Narrabri SAP area, however it is noted that these are generally consistent with the current uses and/or zoning for the local area. There were no specific historical business that have been identified for further investigation.

5. PRESENT POTENTIALLY CONTAMINATING ACTIVITIES

A search of public records was conducted to identify potentially contaminating activities associated with present-day activities as reported in the Insight Report dated 28 September 2022 (presented in Appendix B) based on the SAP boundary at that time. The following sections consolidate the findings of these record searches.

The following potentially contaminating activities within and nearby to the SAP were identified based on current land-uses and activities:

- A search of the NSW EPA contaminated land database undertaken for the site and a 1 km buffer area identified no records of sites notified to NSW EPA under the CLM Act 1997;
- A search of the NSW EPA Contaminated Land Records of Notice database was undertaken for the site and 1 km buffer and indicates there are no Contaminated Land Records of Notice;
- A search of the NSW EPA record of licensed activities under the *Protection of the Environment Operations Act 1997* undertaken for the site and 500 m buffer area identified Environment Protection Licences (EPL) were held by the following sites located within the SAP boundary:
  - Santos NSW (Eastern) Pt Ltd - Non-thermal treatment of hazardous and other waste, Waste storage (EPL 20378, within SAP boundary); Petroleum exploration, assessment and production (EPL 20350, immediately to the south of the SAP boundary);
  - Narrabi Shire Council - Waste disposal by application to land; Waste storage – waste tyres (EPL 12193);
- A search of the NSW EPA record of licensed activities under the *Protection of the Environment Operations Act 1997* undertaken for the site and a 1 km buffer area identified the following sites where EPL were previously held but have been surrendered:
  - Forestry Corporation of New South Wales - Logging operations
  - CSR Limited - Concrete works on Culgoora Rd (address not provided)
  - Inglegreen Piggery – pig accommodation - 821 Culgoora Road Narrabri (within SAP boundary)
- A search of the NSW EPA record of licensed activities under the *Protection of the Environment Operations Act 1997* identified the following sites issued with clean up or penalty notices within the Site and surrounding area 500m buffer area:
  - Narrabri Shire Council Landfill – penalty notices 1509558,1509559, 1509560; Clean-up Notice 1572456 (within SAP boundary)
  - Narrabri Coal Operations Pty Ltd - Clean-up Notice 1578807 (within SAP boundary)
  - Santos NSW (Eastern) Pty Ltd – penalty notice, clean-up notice1523754 (immediately to the south of the SAP boundary)
- A search of Department of Defence databases did not identify any Defence or UXO impacted sites within the Site or surrounding 2km buffer area.
- A search of the NSW EPA PFAS investigation program database indicated that no PFAS investigations had been or were being undertaken at the site or within the 2 km report buffer area.
- A search of the National Pollutant Inventory (NPI) register indicated the following sites to be located within the 2km search buffer area:
  - Cargill Processing Narrabri, Primary ANZSIC Class - Oil and Fat Manufacturing (~700m east); and
  - Wilga Park Power Station, Fossil Fuel Electricity Generation (~1.6km south).

- A search for former potentially contaminating activities undertaken for the site and 500 m buffer area did not identify any derelict mines or quarries, contaminated legacy areas or incident sites, but did identify historical landfilling activities at Narrabri Waste Management (Narrabri Tip) and Narrabri Old Dump Site.
- A search was undertaken for industries, businesses and activities which may cause contamination within the site and 200 m buffer area identified the following sites:
  - Narrabri Waste Management Facility (landfill);
  - Narrabri Breakdown Service (Depot and Storage Yard);
  - KA & VK Stubbs Pty Ltd (Electrical or Electrical Components);
  - HL & JH Gale Pty Ltd (Mechanical and Automative);
  - Australian Recycled Plastics (Recycled Plastics);
  - Narrabri Gas Project (Oil & Gas);
  - North West Ag & Diesel (Agriculture/Horticulture);
  - Grainflow Narrabri (Agriculture/Horticulture);
  - Narrabri Works Depot – Transport NSW (Mechanical & Automotive);
  - Gun Club (Gun, Pistol or Rifle Range)
  - Petrol Station, 11541-11553 Newell Highway, Narrabri;
  - Narrabri Skip Bins & Excavations Pty Ltd (Excavating contractor);
  - Narrabri Fire Control Centre;
  - IOR diesel supplies;
  - Woodham Petroleum Services; and,
  - Wilson Diesel Repairs.

6. PREVIOUS INVESTIGATIONS

In developing this PSI, ERM undertook a review of the following previous investigations:

- JBS&G Australia Pty Ltd (2019) Preliminary Site Investigation, Narrabri Logistics and Industrial Hub Precinct. 434, 488 and 622 Yarrie Lake Road and 237 and Part 362 Culgoora Road, Narrabri Ref No 57529 / 125551 (Rev A) (JBS&G 2019)

JBS&G 2019

JBS&G were engaged by Narrabri Council to undertake a PSI at the site located at 434, 488 and 622 Yarrie Lake Road and 237 and Part 362 Culgoora Road, Narrabri.

The PSI included a desktop review, site inspection and limited site investigation woks included XRF screening and the collection of select soil samples.

Based on the results of the PSI, JBS&G concluded the following;

- The site has historically been used for rural residential purpose from the 1920's;
- The council operated Narrabri Tip was located within the northern portion of the Site.
- Localised salinity was a characteristic of the soil landscape within the Site, however obvious visual indicators of salinity were not observed during site inspections;
- Imported materials including slag and cotton husks were present within the Site within stockpiled materials or on the site surface.
- No significant areas of filling were observed within the Site;
- A number of Above Ground Storage Tanks (ASTs), chemical drums, hydrocarbon staining and general waste (including ACM was identified at several locations throughout the Site.
- Asbestos was identified at 10 locations throughout the Site;
- TRH exceeding the adopted assessment criteria were identified at two locations at the Site.
- JBS&G recommended that a hazardous materials survey of onsite building structures and a DSI be undertaken at the Site upon submission of a DA for redevelopment of any land within the Site.

7. SITE INSPECTION

Site inspections were undertaken by ERM's environmental consultants concurrent with preliminary biodiversity and heritage survey works in September 2022. The site inspections on privately owned land were limited to areas where access was granted. The inspection did not identify visual evidence of gross contamination, however dead animal burial areas were identified on several rural use properties.

8. PRELIMINARY CONCEPTUAL SITE MODEL

8.1 Overview

The following Conceptual Site Model has been prepared based on the PSI and the current version of the SAP land-use plan. It is noted that the land is currently owned and operated by multiple parties. This assessment has been prepared to inform the SAP planning process, however we note that the proposed SAP timeframe extends beyond the next 10-20 years and changes in site conditions are likely to occur over that time which may require further assessment prior to changes of land-use or development.

Based on the data collected in this investigation, the following section presents a summary of the contamination sources, exposure pathways and receptors applicable to the Site, as well as identifying potential source-pathway-receptor (SPR) linkages. The identification of SPR linkages forms a key part of developing the CSM. The CSM components are described in the following sections and summarised in Table A-1.

The following summary of the CSM for the Site has been prepared based on the desktop assessment and site inspection as discussed in the above sections. The location of the potential sources of contamination area illustrated in Figure A-4.

The potential for SPR linkages to exist has been assessed based on the current commercial/industrial land use only.

A CSM is a representation of the site-specific exposure pathways which may enable linkages between the potential contamination sources and on-site or off-site sensitive receptors. The principles of developing a CSM are outlined in the ASC NEPM with reference to the ASTM E1689–95 (2008), *Standard guide for developing conceptual site models for contaminated sites*.

Potential sources of contamination are current and historical activities undertaken in specific areas of the Site which have the potential to release contaminants into the environment. *Contaminants* are any substance that is potentially hazardous to human health or the environment and is present in the environment at concentrations above its background concentration. *Contaminants of potential concern* (COPCs) are specific contaminants associated with the current and historical activities undertaken at the Site. The potential sources of contamination and associated COPCs are outlined in Section 8.2 below.

Release mechanisms are the means by which contaminants are transported in the environment from a primary source to an environmental media (e.g. soil, groundwater). *Potential exposure pathways* are the mechanisms which enable the exposure of sensitive receptors to the identified contaminants. The potential *exposure pathways* are outlined in Section 8.3 below.

Potential receptors are humans and/or ecological communities which may be potentially exposed to contaminants by the migration of contaminants along exposure pathways. The potential receptors are outlined in Section 8.4 below.

8.2 Contamination Sources and Contaminants of Potential Concern

Based on a review of the available information and site visits, the following areas of environmental concern (AECs) based on potential historical and/or current contamination sources on Site were identified:

- Narrabri Landfill
  - The Narrabri landfill is located within the central northern portion of the Site.
  - The site is recorded as being issued with a number of penalty notices / clean up notices from NSW EPA.
  - Potential discharge of PFAS within leachate and potential use / storage of AFFF.
  - Onsite fuel and chemical storage
  - Leaks and spills of fuels / chemicals associated with refuelling and maintenance
  - Hazardous materials associated with degrading building structures.
- Australian Recycled Plastics (Recycled Plastics);
- Narrabri Breakdown Service (Depot and Storage Yard);
- KA & VK Stubbs Pty Ltd (Electrical or Electrical Components);
- HL & JH Gale Pty Ltd (Mechanical and Automative);
- Narrabri Gas Project (Oil & Gas);
- North West Ag & Diesel (Agriculture/Horticulture);
- Grainflow Narrabri (Agriculture/Horticulture);
- Narrabri Works Depot – Transport NSW (Mechanical & Automotive);
- Gun Club (Gun, Pistol or Rifle Range)
- Former/Current Inglegreen Piggery - 821 Culgoora Road Narrabri
- Other On-site Commercial / Industrial Land Uses
  - Onsite fuel and chemical storage
  - Leaks and spills of fuels / chemicals associated with refuelling and maintenance
  - Hazardous materials (e.g. asbestos) associated with degrading building structures.
  - Potential storage of firefighting foams due to flammable liquids storage
- Broad Agricultural Uses
  - Current and historical agricultural land uses
  - Potential use of nutrients, fertilisers and/or pesticides within irrigated portions of Site
  - Hazardous Materials Associated with Current and Former Structures / Service Conduits etc.
  - Potential building waste from demolition of former building structures located within the Site and adjacent area.
  - Potential redundant service lines / conduits
  - Potential leaks from current and former sewer lines / septic tanks within the site
  - Current / former farm dams collecting potential contaminated surface water run off from agricultural activities
  - Storage of fuels, oils, chemicals, fertilisers and pesticides (potential for above-ground storage tanks (ASTs), underground storage tanks (USTs) as well as smaller volume storage)

- Historical Activities
  - Potential former raceway located within the central portion of the Site
  - Former landfill north of Culgoora Rd
  - Historical operation of the Narrabri landfill
- Uncontrolled/opportunistic waste dumping. A review of aerial imagery and information from previous investigations indicates that unauthorised or uncontrolled disposal of waste materials may have occurred within the boundaries of the SAP.
- Surrounding Agricultural and Commercial Industrial Land Uses. General use of the site prior to current operational uses and agricultural land uses undertaken within the surrounding area.
- Railway line corridor and supporting sites.

Based on the site history and background data reviewed and ERMs professional experience, the Contaminants of Potential Concern (CoPC) associated with current and historical land uses undertaken in the general area are considered to include the following:

Potential Source	CoPC
AEC – 1 Narrabri Landfill	Asbestos, total recoverable hydrocarbons (TRH); benzene, toluene, ethylbenzene and xylenes (BTEX); semi-volatile organic compounds (SVOCs), Volatile Organic Compounds (VOCs), heavy metals, polycyclic aromatic hydrocarbons (PAHs), phenols, OCP / OPP, Ammonia, Landfill gases (e.g. methane), Total Dissolved Solids (TDS) and Per and polyfluoroalkyl substances (PFAS)
AEC – 2 On-site Commercial / Industrial Land Uses **Key areas include:** ■ Australian Recycled Plastics (Recycled Plastics); ■ Narrabri Breakdown Service (Depot and Storage Yard); ■ KA & VK Stubbs Pty Ltd (Electrical or Electrical Components); ■ HL & JH Gale Pty Ltd (Mechanical and Automative); ■ Narrabri Gas Project (Oil & Gas); ■ North West Ag & Diesel (Agriculture/Horticulture); ■ Grainflow Narrabri (Agriculture/Horticulture); ■ Narrabri Works Depot – Transport NSW (Mechanical & Automotive); ■ Gun Club (Gun, Pistol or Rifle Range) ■ Former/Current Inglegreen Piggery - 821 Culgoora Road Narrabri	■ Petroleum hydrocarbons; TRH, BTEX, PAH ■ Solvents, Chlorinated Hydrocarbons (CHC), ■ Heavy Metals, ■ PFAS, ■ PCBs ■ Asbestos. ■ Piggery: nutrients, pathogens Fertiliser storage: ammonia, nitrate, phosphorous
AEC – 3 Hazardous Materials Associated with Current and Former Structures / Service Conduits etc.	Asbestos, heavy metals and Polychlorinated Biphenyl (PCBs)

Potential Source	CoPC
AEC – 4 Sewer / Septic Lines and Tanks	Pathogens (E Coli and Entercocci) Nutrients, Phosphorus, Nitrates, Nitrogen and Heavy Metals.
AEC – 5 General Site Usage	TRH, BTEX, Solvents, Chlorinated Hydrocarbons (CHC), PAH, Heavy Metals, PFAS, PCBs, OCP/OPP, Herbicides, Phosphates, Nutrients and Asbestos.
AEC – 6 Potential Illegally Dumped Wastes	Asbestos, TRH, BTEX, SVOCs, VOCs, heavy metals, polycyclic PAHs, phenols and OCP / OPP
AEC – 7 Surrounding Agricultural and Commercial Industrial Land Uses	TRH, BTEX, Solvents, Chlorinated Hydrocarbons (CHC), PAH, Heavy Metals, PFAS, PCBs, Asbestos, Ammonia, Landfill gases (e.g. methane), Total Dissolved Solids (TDS) and Per and PFAS

8.3 Potential Pathways

The primary potential exposure pathways of concern at the site are:

- Inhalation of vapour (from soil and/or groundwater) and contaminated dust (from soils).
- Dermal contact and / or incidental ingestion with contaminated surface water and soils / sediments.
- Transport of contamination through surface water flows.
- Transport of contamination to underlying groundwater aquifers.
- Transport of contaminants through mechanical transport (i.e. excavation, tracking during vehicle movement etc.).

8.4 Potential Receptors

Key receptors have been identified as:

- Current site users (agricultural, residential and commercial / industrial).
- Future site users (agricultural, residential and commercial / industrial).
- Potential future users of groundwater (identified use of groundwater for a range of purposes).
- Workers carrying out construction, installation or maintenance works within the site.
- Groundwater beneath the site.
- Adjacent sensitive receptors e.g. adjacent residents, cattle (or other grazing animals) and sensitive ecological receptors.

8.5 Preliminary Conceptual Site Model

Based on the results of the desktop assessment, site inspection and the potential sources, pathways and receptors identified above ERM developed the below Conceptual Site Model (CSM).

Table A-1: Preliminary Conceptual Site Model

Potential Sources	Pathways	Potential Receptors	Risk of Potentially Complete Pollutant Linkage	Comment
AEC – 1 Narrabri Landfill	■ Dermal contact, inhalation, and / or incidental ingestion with contaminated surface waters / soils.	■ Current and future site users; and ■ Workers carrying out development, installation or maintenance works within the site.	■ High	■ The Narrabri landfill is located within the central northern portion of the Site. ■ The site is recoded as being issued with a number of penalty notices / clean up notices from NSW EPA.
	■ Transport of contamination through surface water flows.	■ Adjacent sensitive receptors; ■ Current and future site users; and ■ Workers carrying out development, installation or maintenance works within the site.	■ High	
	■ Transport of contamination to underlying groundwater aquifers	■ Adjacent sensitive receptors; and ■ Future potential on-site users of groundwater.	■ High	
	■ Transport of contaminants through mechanical transport	■ Workers carrying out development, installation or maintenance works within the site.	■ High	

Potential Sources	Pathways	Potential Receptors	Risk of Potentially Complete Pollutant Linkage	Comment
AEC – 2 On-site Commercial / Industrial Land Uses	■ Dermal contact, inhalation, and / or incidental ingestion with contaminated surface waters / soils.	■ Current and future site users; and ■ Workers carrying out development, installation or maintenance works within the site.	■ High	■ A review of aerial imagery indicates a number of commercial / industrial properties located throughout the Site. ■ Potential for the storage, handling and use of a range of chemicals within operational processes.
	■ Transport of contamination through surface water flows.	■ Adjacent sensitive receptors; ■ Current and future site users; and ■ Workers carrying out development, installation or maintenance works within the site.	■ High	
	■ Transport of contamination to underlying groundwater aquifers	■ Adjacent sensitive receptors; and ■ Future potential on-site users of groundwater.	■ High	
	■ Transport of contaminants through mechanical transport	■ Workers carrying out development, installation or maintenance works within the site.	■ High	
AEC – 3 Hazardous Materials Associated with Current and Former Structures / Service Conduits etc.	■ Dermal contact, inhalation, and / or incidental ingestion with contaminated surface waters / soils.	■ Current and future site users; and ■ Workers carrying out development, installation or maintenance works within the site.	■ Low	■ Potential for hazardous materials to be present within onsite service conduits. ■ A detailed assessment / survey of onsite services would be required to assess the extent of onsite service conduits and the potential for hazardous materials to be present within pits / conduits etc.
	■ Transport of contamination through surface water flows.	■ Adjacent sensitive receptors; ■ Current and future site users; and ■ Workers carrying out development, installation or maintenance works within the site.	■ Low	

Potential Sources	Pathways	Potential Receptors	Risk of Potentially Complete Pollutant Linkage	Comment
	■ Transport of contamination to underlying groundwater aquifers	■ Adjacent sensitive receptors; and ■ Future potential on-site users of groundwater.	■ Low – Moderate	
	■ Transport of contaminants through mechanical transport	■ Workers carrying out development, installation or maintenance works within the site.	■ Moderate	
AEC – 4 Sewer / Septic Lines	■ Dermal contact, inhalation, and / or incidental ingestion with contaminated surface waters / soils.	■ Current and future site users; and ■ Workers carrying out development, installation or maintenance works within the site.	■ Low	■ A number of sewer lines to are likely to be present and bisecting the site. ■ Due to the age of the Site there is also the potential for septic tanks to be present.
	■ Transport of contamination through surface water flows.	■ Adjacent sensitive receptors; ■ Current and future site users; and ■ Workers carrying out development, installation or maintenance works within the site.	■ Low	
	■ Transport of contamination to underlying groundwater aquifers	■ Adjacent sensitive receptors; and ■ Future potential on-site users of groundwater.	■ Low – Moderate	
	■ Transport of contaminants through mechanical transport	■ Workers carrying out development, installation or maintenance works within the site.	■ Moderate	

Potential Sources	Pathways	Potential Receptors	Risk of Potentially Complete Pollutant Linkage	Comment
AEC – 5 General Site Usage	■ Dermal contact, inhalation, and / or incidental ingestion with contaminated surface waters / soils.	■ Current and future site users; and ■ Workers carrying out development, installation or maintenance works within the site.	■ Moderate	■ Current and historical uses of the site for agricultural purposes. ■ Previous investigations identified staining and elevated TRH within surface soils. ■ ACM has been identified on the surface of the Site ■ Potential historical land uses including stockpiling of waste soils, general vehicle maintenance etc. may have been undertaken within the Site
	■ Transport of contamination through surface water flows.	■ Adjacent sensitive receptors; ■ Current and future site users; and ■ Workers carrying out development, installation or maintenance works within the site.	■ Moderate - High	
	■ Transport of contamination to underlying groundwater aquifers	■ Adjacent sensitive receptors; and ■ Future potential on-site users of groundwater.	■ Low – Moderate	
	■ Transport of contaminants through mechanical transport	■ Workers carrying out development, installation or maintenance works within the site.	■ Moderate	
AEC – 6 Potential Illegally Dumped Wastes	Dermal contact, inhalation, and / or incidental ingestion with contaminated surface waters / soils.	■ Current and future site users; and Workers carrying out development, installation or maintenance works within the site.	■ Moderate	■ During previous investigations, surface fill materials within various portions of the site were observed to contain demolition waste materials including slag, anthropogenic wastes and ACM. ■ Potential for disposal of domestic waste on rural/agricultural properties
	Transport of contamination through surface water flows.	■ Adjacent sensitive receptors; ■ Current and future site users; and Workers carrying out development, installation or maintenance works within the site.	■ Moderate - High	

Potential Sources	Pathways	Potential Receptors	Risk of Potentially Complete Pollutant Linkage	Comment
	Transport of contamination to underlying groundwater aquifers	■ Adjacent sensitive receptors; and Future potential on-site users of groundwater.	■ Low – Moderate	
	Transport of contaminants through mechanical transport	Workers carrying out development, installation or maintenance works within the site.	■ Moderate	
AEC – 7 Surrounding Agricultural and Commercial Industrial Land Uses	■ Dermal contact, inhalation, and / or incidental ingestion with contaminated surface waters / soils.	■ Current and future site users; and ■ Workers carrying out development, installation or maintenance works within the site.	■ Moderate	■ Current and historical uses of the surrounding area for agricultural and commercial / industrial purpose.
	■ Transport of contamination through surface water flows.	■ Adjacent sensitive receptors; ■ Current and future site users; and ■ Workers carrying out development, installation or maintenance works within the site.	■ Moderate - High	
	■ Transport of contamination to underlying groundwater aquifers	■ Adjacent sensitive receptors; and ■ Future potential on-site users of groundwater.	■ Low – Moderate	
	■ Transport of contaminants through mechanical transport	■ Workers carrying out development, installation or maintenance works within the site.	■ Moderate	

APPENDIX B LAND INSIGHT REPORT

Land Insight

Due Diligence Insight Report

Narrabri Special Activation Precinct
Narrabri, NSW

28 September 2022

Report nº:
LI-2960 DDR

Understanding your report

Your Report has been produced by Land Insight and Resources (Land Insight).

Your Report is based on information available from public databases and sources at the date of reporting. The information gathered relates to land that is within a 200 to 2000m radius (buffer zone) from the boundaries of the Property. A smaller or larger radius may be applied for certain records (as listed under records and as shown in report maps).

While every effort is made to ensure the details in your Report are correct, Land Insight cannot guarantee the accuracy or completeness of the information or data provided.

The report provided by Land Insight includes data listed on page 4 (table of contents). All sources of data and definitions are provided in the Product Guide (Attached). For a full list of references, metadata, publications or additional information not provided in this report, please contact info@landinsight.co

The report does not include title searches; dangerous good searches or; property certificates (unless requested); or information derived from a physical inspection, such as hazardous building materials, areas of infilling or dumping/spilling of potentially contaminated materials. It is important to note that these documents and an inspection can contain information relevant to contamination that may not be identified by this Report.

Due to the ongoing nature of database development and frequency of updates provided by various state government regulators the data displayed within this report is only current from date of production.

This Report, and your use of it, is regulated by Land Insight's Terms and Conditions (See Land Insight's Product Guide).

Index

SUMMARY

Section 1	**PROPERTY SETTING**	**Identified**
Sensitive Receptors Planning Control Heritage Soil and Land Information Geology and Topography		

Section 2	**HYDROGEOLOGY**	**Identified**
Aquifer Groundwater Bores and Other Borehole investigations Groundwater Dependent Ecosystems (GDE) Hydrogeology Units Wetlands		

Section 3	**ENVIRONMENTAL REGISTERS LICENCES AND INCIDENTS**	**Identified**
Contaminated Land Public Register Sites Regulate by Other Jurisdictional Body (Former Gaswork sites / PFAS sites) Licensing and Regulated Sites National Pollutant Inventory (NPI)		

Section 4	**POTENTIALLY CONTAMINATED AREAS**	**Identified**
Former Potentially Contaminated Land Current and Historical Potentially Contaminating activities (PCA)		

Section 5	**NATURAL HAZARDS**	**Identified**
Erosion risk Bushfire prone land Fire history Flood hazards		

Section 1 Property Setting

1.1 SENSITIVE RECEPTORS

Map 1.1 (200m Buffer)

Sensitive receptor	Category	Distance (m)	Direction
Wayvic Park Pottery	Parks	180.5	North-west

1.2 PLANNING CONTROLS

Map 1.2 (onsite)

Zoning

Code	Zoning	Details
C3	Environmental Management	Narrabri Local Environmental Plan 2012
IN1	General Industrial	
R5	Large Lot Residential	
RU1	Primary Production	
SP1	Special Activities	

Environmental Planning Instruments

Type	Category	Details
Not identified	-	-

Other Planning Information

Type	Category	Details
Not identified	-	-

1.3 HERITAGE

Map 1.3 (200m Buffer)

State and Local Heritage

Site ID	Site Name	Type	Details	Distance (m)	Direction
Not identified	-	-	-	-	-

Australian Heritage Database

Site ID	Site Name	Type	Details	Distance (m)	Direction
Not identified	-	-	-	-	-

Commonwealth Heritage List, National Heritage List and World Heritage Area.

1.4 SOIL AND LAND USE INFORMATION

Map 1.4a/1.4b (onsite)

Soil Landscape

Soil Landscape	ALbmo	Bohema Creek	**Soil Group**	Alluvial
Description	Landscape— Narrow alluvial terraces on Quaternary sheetwash alluvium in the western Pilliga Outwash. Slopes 0 - 2%, local relief <3 m, elevation ~240 - 300 m. Largely uncleared woodland in the south, extensively cleared woodland in the north. Soils— Dominated by deep (>150 cm), well-drained Red Kandosols (Red Earths). Rapidly drained Rudosols and low terraces of rapidly drained Stratic Tenosols (Earthy Sands/Alluvial Soils) in unmapped areas of Etoo Creek (etta)."			
Soil Landscape	ALett	Etoo Creek	**Soil Group**	Alluvial
Description	Landscape— Level to gently inclined recent alluvial floodplain and terrace system starting in the upper Pilliga Outwash and Pilliga south and east, and often extending and broadening into complex alluvial plains and stagnant alluvial plains on the northern margins of the Pilliga Outwash. Slope gradients <3%, local relief <10 m, elevation 180 - 260 m. Partially cleared woodland and grassland. Soils— Deep (>150 cm), rapidly drained Brown-Orthic Tenosols (Earthy Sands) on lower terraces, deep (>150 cm), imperfectly drained Brown Chromosols (Red-brown Earths) on higher terraces and deep (>150 cm), poorly drained Sodosols (Solodized Solonetzic and Solodic Soils) on lower floodplains."			
Soil Landscape	ALnmt	Namoi	**Soil Group**	Alluvial
Description	Landscape— Level floodplains and terraces of modern Quaternary alluvium, forming the lower Namoi alluvial systems. Slopes <1%, local relief <1 m, elevation 160 - 220 m. Cleared grasslands to open-woodland, extensively cultivated with irrigated cotton growing. Soils— Deep to very deep (>150 cm), imperfectly drained Grey Vertosols (Grey Clays) and Black Vertosols (Black Earths) on floodplains."			
Soil Landscape	ALnnv	Nee Nee Creek	**Soil Group**	Alluvial
Description	Landscape— Largely abandoned and relict sections of former floodplain channels occurring as ephemeral linear closed depressions, intermittent shallow channels and swales, and other areas of poor drainage on alluvial plains. Slopes 0 - 1%, local relief <1 m, elevation 160 - 300 m. Partially to extensively cleared grasslands, woodlands and swamps. Soils— Field observations identified deep to very deep (>150 cm), imperfectly drained Black Vertosols (Black Earths) and Grey Vertosols (Grey Clays) in swales, prior stream channels and drainage lines."			
Soil Landscape	REtrn	Tippiari Road	**Soil Group**	Residual
Description	Landscape— Gently undulating rises to undulating hills on sandstones of the Cretaceous Keelindi Beds of the central and eastern Pilliga, in the far south of the Moree Plains. Slopes 0 - 5%, local relief 10 - 30 m, elevation 220 - 320 m. Mainly uncleared woodland and open-forest. Soils— Deep to very deep (100 - 500 cm), rapidly drained Brown-Orthic Tenosol			

	(Earthy Sands) on coarse-grained parent materials, moderately deep (50 -100 cm), imperfectly drained Brown or Yellow Sodosols (Solodic Soils) on finergrained parent materials, and shallow (<50cm), well-drained Leptic Tenosols (Lithosols) on occasional ferruginised sandstone crests with abundant ironstone gravels. Shallow to moderately deep (25 - 100cm), rapidly drained Red Kandosols (Red Earths) on broombush heathlands."			
Soil Landscape	STwmr	Womera	**Soil Group**	Stagnant alluvial
Description	Landscape— Broad, clayey, often gilgaied, stagnant alluvial plain dominated by older alluvium in the north of the Pilliga Outwash. Slopes <1%, local relief 0 - 3 m, elevation 180 - 240 m. Extensively cleared open-woodland. Soils— Deep (>150 cm), imperfectly drained, Eutrophic, Brown or Yellow Sodosols (Solodic Soils) and Epipedal to Selfmulching, Grey Vertosols (Grey Clays). Minor giant, scalded, poorly-drained, Episodic-Gypsic Crusty Brown Vertosol (Brown Clays) in north."			
Soil Landscape	TRmwn	Moglewit	**Soil Group**	Transferral
Description	Landscape— Flat to very gently inclined plains of old coalescing fans, prone to scalding, in the northern Pilliga Outwash in the southern Moree Plains. Slopes 0 - 3%, local relief <3 m, elevation 180 - 230 m. Partially to extensively cleared open-woodland. Soils— Deep (>150 cm), imperfectly to poorly-drained Sodosols (Solodic Soils and Solonized Solonetz)."			
Soil Landscape	TRpfx	Pilliga Forest Way	**Soil Group**	Transferral
Description	Landscape— Broad stagnant alluvial plains and fan deposits derived from old outwash of the Pilliga Sandstone in the far southern Moree Plains. Slopes <2%, local relief <10 m, elevation 180 - 300 m. Partially cleared open-woodland. Soils— Dominated by giant (>500 cm), well-drained to imperfectly drained, Grey, Yellow and Brown Sodosols (Solodic Soils), with minor moderately deep to deep (100 - >150 cm), well-drained Red Tenosol/Red Kandosols intergrades (Earthy Sands/Red Earths). Giant (>500 cm), poorly-drained, scalded Sodosols (Solodic Soils) at northern terminal extent."			

Salinity

Salinity Hazard	Not identified	-

Radon

Radon Level	Bq/m³	8

Typical radon levels in Australia are low and the values shown are the average values for each census district. For specific location, factors such as the local geology and house type could lead to different values. (ARPANSA).

Acid Sulfate Soil

ASS Risk Map *(Table 1.4.1)*	**On the Property?**	**Within Buffer?**
Class	Not identified	Not identified

National Acid Sulfate Soils Atlas

Atlas of Australian ASS *(Table 1.4.2)*	Bn(p4)	ASS in inland lakes, waterways, wetlands and riparian zones	**Probability of Occurrence**	Low Probability of occurrence
	Co(p4)	SS in inland lakes, waterways, wetlands and riparian zones		Extremely low probability of occurrence

Table 1.4.1. Classification scheme in the ASS Planning Maps	
Class of Land as shown on ASS Planning Maps	
1	Any works.
2a	Works below the natural ground surface. Works by which the watertable is likely to be lowered.
2b	Works other than ploughing below the natural ground surface. Works by which the watertable is likely to be lowered.
3	Works more than 1 metre below the natural ground surface. Works by which the watertable is likely to be lowered more than 1 metre below the natural ground surface.
4	Works more than 2 metres below the natural ground surface. Works by which the watertable is likely to be lowered more than 2 metres below the natural ground surface.
5	Works within 500 metres of adjacent Class 1, 2a, 2b, 3 or 4 land that is below 5 metres Australian Height Datum and by which the watertable is likely to be lowered below 1 metre Australian Height Datum on adjacent Class 1, 2a, 2b, 3 or 4 land.

For each class of land, the maps identify the type of works likely to present an environmental risk if undertaken in the particular class of land. If these types of works are proposed, further investigation is required to determine if ASS are actually present and whether they are present in such concentrations as to pose a risk to the environment.

Table 1.4.2. Atlas of Australian Acid Sulfate Soils1 (ASRIS) (CSIRO/NatCASS)	
Probability of Occurrence of ASS[1]	
A	**High Probability of occurrence -** (>70% chance of occurrence in mapping unit)
B	**Low Probability of occurrence** - (6-70% chance of occurrence in mapping unit)
C	**Extremely low probability of occurrence** - (1-5% chance of occurrence in mapping unit)
D	**No probability of occurrence** - (<1% chance of occurrence in mapping unit)
x	**Disturbed ASS[1] terrain -** (ASS[1] material present below urban development).
u	**Unclassified** - (Insufficient information to classify map unit)
Zones	
a	Potential acid sulfate soil material and/or Monosulfidic Black Ooze (MBO).
b, c	Potential acid sulfate soil generally within upper 1 m.
c, d, e	ASS[1] generally within upper 1 m.
f	ASS[1] generally below 1 m from the surface
g	ASS[1], generally below 3 m from the surface.
h	ASS[1] generally within 1 m of the surface.
i, j	ASS[1] generally below 1 m of the surface.
k	ASS[1] material and/or Monosulfidic Black Ooze (MBO).
l, m, n, o, p, q	ASS[1] generally within upper 1 m in wet / riparian areas.
Subscripts to codes	
(a)	Actual acid sulfate soil (AASS) = sulfuric material.
(p)	Potential acid sulfate soil (PASS) = sulfidic material.
(q)	Monosulfidic Black Ooze (MBO) is organic ooze enriched by iron monosulfides.
Confidence levels	
(1)	All necessary analytical and morphological data are available
(2)	Analytical data are incomplete but are sufficient to classify the soil with a reasonable degree of confidence
(3)	No necessary analytical data are available, but confidence is fair, based on a knowledge of similar soils in similar environments
(4)	No necessary analytical data are available, and classifier has little knowledge or experience with ASS, hence classification is provisional

[1]Acid Sulfate Soils (ASS) are all those soils in which sulfuric acid may be produced, is being produced, or has been produced in amounts that have a lasting effect on main soil characteristics (Pons 1973). Acid sulfate soil (ASS) may include PASS or AASS + PASS. Potential acid sulfate soil (PASS) = sulfidic material. Actual acid sulfate soil (AASS) = sulfuric material.

1.5 GEOLOGY AND TOPOGRAPHY

Map 1.5 (onsite)

Geology

Map Sheet	Code	Formation	Age	Group	Dominant Lithology	Description
Narrabri 1:250 000 Geological Map	Q_cr	Colluvial and residual deposits	Quaternary	Colluvium	Clastic sediment	Undifferentiated colluvial and residual deposits.
	Q_cs	-	Quaternary	Colluvium	Clastic sediment	Unconsolidated surficial lag deposits of rounded to sub-angular pebble- to cobble-sized (usually) polymictic clasts derived from underlying or adjacent upslope parent material; surficial sheet flow removes fine-grained material.
	Q_avf	Alluvial valley deposits	Quaternary	Alluvium	Clastic sediment	Fluvially-deposited quartz-lithic sand, silt, gravel, clay.

Naturally Occurring Asbestos Potential (NOA)

Category	On the Property?	Within Buffer?
Not identified	-	-

Topography

Topography	212 – 220 mAHD

Section 2 Hydrogeology

2.1 HYDROGEOLOGY AND GROUNDWATER BORES

Map 2.1 (2000m Buffer)

	On the Property?	Within Buffer?
Aquifer Type	Porous, extensive highly productive aquifers	Porous, extensive highly productive aquifers
Drinking Water Catchments	Not identified	Not identified
Protected Riparian Corridor	Bohena Creek Pig Creek	Bohena Creek Pig Creek Namoi River
UPSS Environmentally Sensitive Zone	Namoi River	Namoi River
Wetlands	Not identified	Not identified

Groundwater Bores

Map ID	Groundwater Bore ID	Authorised Purpose	Completion Date	Drilled Depth (m)	Final Depth (m)	SWL (m)	Salinity (mg/l)	Yield (L/s)	Distance (m)	Direction
12	GW025223	Unknown	1/11/1968	<Null>	<Null>	28.5	1001-3000 ppm	3.158	0.0	Onsite
14	GW900535	Household	18/12/1984	43.9	<Null>	28.34	<Null>	<Null>	0.0	Onsite
15	GW025222	Unknown	1/11/1968	<Null>	<Null>	<Null>	1001-3000 ppm	<Null>	0.0	Onsite
16	GW025222	Unknown	1/11/1968	<Null>	<Null>	<Null>	1001-3000 ppm	<Null>	0.0	Onsite
54	GW970748	Domestic	2/09/2013	65.0	61.0	18	<Null>	2	0.0	Onsite
55	GW970749	Domestic	1/09/2013	65.0	62.0	18	<Null>	2	0.0	Onsite

Map ID	Groundwater Bore ID	Authorised Purpose	Completion Date	Drilled Depth (m)	Final Depth (m)	SWL (m)	Salinity (mg/l)	Yield (L/s)	Distance (m)	Direction
66	GW037376	Irrigated agriculture	1/08/1969	91.4	91.4	8.5	<Null>	10.74	0.0	Onsite
69	GW000001	Monitoring	1/02/2013	31.7	31.6	25.9	Good	0.631	0.0	Onsite
76	GW009211	Household	1/05/1951	39.6	39.6	28	Good	0.378	0.0	Onsite
77	GW010259	Household	1/08/1950	70.1	70.1	24.3	Brackish	0.568	0.0	Onsite
89	GW006278	Water supply for livestock	1/03/1938	91.4	34.7	<Null>	Fair	1.263	0.0	Onsite
102	GW063636	Household	1/01/1988	109.7	104.9	<Null>	<Null>	0.758	0.0	Onsite
106	GW051059	Water supply for livestock	1/02/1980	31.1	31.1	25.3	Fair	0.505	0.0	Onsite
110	GW060759	Household	1/09/1986	98.7	98.7	<Null>	<Null>	<Null>	0.0	Onsite
111	GW063826	Monitoring	1/12/1986	185.0	185.0	<Null>	<Null>	<Null>	0.0	Onsite
112	GW060714	Household	1/03/1983	152.0	152.0	<Null>	<Null>	0.65	0.0	Onsite
118	GW054077	Water supply for livestock	1/09/1981	40.0	40.0	15.1	Fair	0.639	0.0	Onsite
119	GW054974	Household	1/10/1981	30.5	30.5	9.1	Fresh	1.76	0.0	Onsite
121	GW050026	Household	1/10/1979	40.0	40.0	6.6	Good	0.92	0.0	Onsite
129	GW061132	Household	1/09/1986	67.0	32.0	<Null>	Salty	<Null>	0.0	Onsite
137	GW056582	Household	1/04/1982	35.4	29.3	10.7	<Null>	0.3	0.0	Onsite
141	GW068310	Unknown	1/08/1990	76.0	76.0	12	Good	0.5	0.0	Onsite
156	GW901496	Irrigated agriculture	10/05/1998	90.0	90.0	6.05	Fresh	1.2	0.0	Onsite
157	GW965918	Manufacturing and industry	14/01/2002	150.0	150.0	<Null>	<Null>	<Null>	0.0	Onsite
159	GW965548	Household	28/06/2002	100.6	100.6	10	<Null>	<Null>	0.0	Onsite
164	GW034775	Household	1/09/1972	57.9	57.9	16.1	<Null>	0.53	0.0	Onsite
168	GW025223	Monitoring	1/11/1968	93	40.8	28.5	1001-3000 ppm	3.158	0.0	Onsite
180	GW063827	Monitoring	1/12/1986	185	185	<Null>	Salty	<Null>	0.0	Onsite
186	GW058149	Household	1/03/1984	106.5	106.5	7.6	Good	2.61	0.0	Onsite
188	GW024013	Household	1/08/1966	70.7	70.7	5.7	<Null>	1.42	0.0	Onsite
189	GW901190	Irrigated agriculture	29/05/1998	90	90	<Null>	Good	<Null>	0.0	Onsite
191	GW902700	Household	29/09/1994	141	141	8.2	<Null>	<Null>	0.0	Onsite
193	GW901497	Irrigated agriculture	12/05/1998	84	84	8.2	Fresh	1.1	0.0	Onsite
199	GW042612	Irrigated agriculture	1/03/1976	74.7	74.6	14.6	Good	0.757	0.0	Onsite
200	GW026964	Irrigated agriculture	1/07/1967	65.5	65.5	3.6	<Null>	30.31	0.0	Onsite
207	GW052545	Household	1/02/1981	54	54	19	Good	1.53	0.0	Onsite
213	GW968147	Household	29/11/2006	60	60	27	Good	1	0.0	Onsite

Map ID	Groundwater Bore ID	Authorised Purpose	Completion Date	Drilled Depth (m)	Final Depth (m)	SWL (m)	Salinity (mg/l)	Yield (L/s)	Distance (m)	Direction
214	GW967443	Household	20/10/2005	76.24	76.24	14.5	<Null>	<Null>	0.0	Onsite
219	GW025222	Monitoring	1/11/1968	102.1	76.2	<Null>	1001-3000 ppm	<Null>	0.0	Onsite
224	GW968869	Household	25/05/2009	84	84	26	<Null>	5	0.0	Onsite
242	GW969347	Household	4/11/2009	126	126	7	<Null>	3.16	0.0	Onsite
246	GW050237	Household	1/08/1979	<Null>	28	<Null>	<Null>	<Null>	0.0	Onsite
247	GW046671	Household	<Null>	<Null>	34.7	<Null>	<Null>	1.01	0.0	Onsite
249	GW049575	Household	1/10/1977	<Null>	60	<Null>	<Null>	<Null>	0.0	Onsite
250	GW901737	Irrigated agriculture	<Null>	<Null>	180	<Null>	<Null>	<Null>	0.0	Onsite
251	GW966227	Household	18/08/1998	<Null>	140.2	8.5	<Null>	1.7	0.0	Onsite
252	GW062398	Irrigated agriculture	1/01/1981	<Null>	62	<Null>	<Null>	<Null>	0.0	Onsite
260	GW967879	Irrigated agriculture	1/02/1989	<Null>	110	60	<Null>	<Null>	0.0	Onsite
262	GW968419	Household	24/05/2006	<Null>	120	15	Good	<Null>	0.0	Onsite
264	GW969950	Household	2/09/2010	55	55	<Null>	<Null>	<Null>	0.0	Onsite
266	GW969670	Unknown	18/06/1985	<Null>	40	33	<Null>	1.03	0.0	Onsite
279	GW903989	Null	N/A	54	54	66	<Null>	2	0.0	Onsite
263	GW968646	Household	31/08/2006	<Null>	70.104	9.754	<Null>	2.5	16.1	South
11	GW030442	Unknown	1/09/1973	<Null>	<Null>	<Null>	<Null>	<Null>	47.1	North
166	GW030442	Monitoring	1/09/1973	119.9	115.8	<Null>	<Null>	<Null>	47.1	North
170	GW030442	Monitoring	1/09/1973	119.9	115.8	<Null>	<Null>	<Null>	47.1	North
206	GW030357	Monitoring	1/05/1973	87.7	57.9	22.2	Stock	0.3	47.1	North
220	GW030357	Monitoring	1/05/1973	87.7	57.9	22.2	Stock	0.3	47.1	North
205	GW030255	Monitoring	1/02/1972	81.59	21.3	4.2	<Null>	0.051	47.3	North
222	GW968713	Household	11/03/2009	97.5	86.9	7.6	<Null>	<Null>	48.2	South
212	GW968140	Household	18/09/2004	48	48	35	<Null>	0.75	86.7	East
223	GW968701	Household	24/12/2005	95	95	51	<Null>	1	104.1	South-east
255	GW071970	Household	23/12/1993	<Null>	95	18	Good	12	120.1	South
209	GW967999	Household	6/09/2006	42	42	31	Good	1	131.5	North-east
122	GW042691	Irrigated agriculture	1/04/1976	51.8	51.8	10	Good	<Null>	132.0	South-west
163	GW034115	Household	1/07/1971	21.3	21.3	5.8	Good	0.947	149.9	North-east
282	GW904614	Null	N/A	58	58	28	<Null>	-0.5	159.7	South-east
114	GW047450	Irrigated agriculture	1/04/1980	97	81.8	6.6	<Null>	7.5	162.1	East

Map ID	Groundwater Bore ID	Authorised Purpose	Completion Date	Drilled Depth (m)	Final Depth (m)	SWL (m)	Salinity (mg/l)	Yield (L/s)	Distance (m)	Direction
177	GW043080	Household	1/09/1974	45.7	45.7	19.2	Good	0.64	170.1	East
244	GW970125	Irrigated agriculture	13/02/2011	85.3	84	11.3	<Null>	<Null>	172.3	East
273	GW970601	Domestic,stock	29/10/2013	55	60	<Null>	<Null>	1.5	190.7	South
78	GW014486	Water supply for livestock	1/11/1956	33.5	33.5	1.5	Fresh	<Null>	221.3	South-east
117	GW043641	Household	1/07/1972	63.4	63.3	<Null>	Good	1.34	228.2	East
81	GW035454	Water supply for livestock	<Null>	48.8	48.7	6	Good	0.631	239.3	North-west
128	GW043487	Household	1/09/1974	45.7	45.7	21.3	Very Good	1.01	257.7	South-east
68	GW000020	Household	1/04/2015	91.4	91.4	<Null>	Good	<Null>	267.6	South
125	GW064124	Household	1/06/1987	78.3	78.3	4	<Null>	0.6	297.1	North-west
120	GW056418	Household	1/11/1982	43.3	43.3	<Null>	S.Salty	<Null>	298.5	North-west
40	GW968684	Household	17/12/2008	53	53	8	<Null>	2.28	307.0	North-east
145	GW901889	Household	22/01/1999	54	54	10.5	Fresh	2.6	307.3	East
37	GW966816	Monitoring	29/01/2003	6	6	<Null>	<Null>	<Null>	321.3	North
34	GW966817	Monitoring	29/01/2003	10	10	<Null>	<Null>	<Null>	327.1	North
36	GW966818	Monitoring	30/01/2003	10	10	<Null>	<Null>	<Null>	329.9	North
35	GW966819	Monitoring	30/01/2003	10	10	<Null>	<Null>	<Null>	331.7	North
107	GW045401	Household	1/07/1976	46	46	22	<Null>	0.7	336.5	South-east
190	GW056623	Household	1/08/1982	65	65	14.1	Good	0.694	338.7	South
29	GW068139	Unknown	4/09/1989	89.6	89.6	5.56	Fresh	4.44	350.3	North
25	GW900811	Household	12/04/1997	46.65	46.65	7.32	GOOD	1.13	352.8	North
26	GW902062	Household	12/04/1997	46.65	46.65	7.32	<Null>	1.13	352.8	North
228	GW043642	Household	31/12/1975	<Null>	<Null>	<Null>	<Null>	<Null>	363.6	East
261	GW968285	Household	17/12/2002	<Null>	48	20	<Null>	<Null>	364.7	East
131	GW058767	Irrigated agriculture	1/02/1981	54	54	19	Good	1.53	371.0	South
48	GW970600	Domestic,stock	9/11/2013	107	107	10	<Null>	1.9	378.9	South
183	GW020673	Water supply	1/05/1963	15.2	15.2	8.2	Fresh	0.378	385.7	East
161	GW034558	Household	1/05/1972	41.1	41.1	15.8	0-500 ppm	0.76	386.2	South
9	GW067564	Unknown	26/03/1990	76.2	<Null>	<Null>	<Null>	<Null>	400.6	East
149	GW901495	Irrigated agriculture	18/05/1998	48	48	35.3	Fresh	0.8	409.5	West
18	GW026649	Irrigated agriculture	1/04/1967	83.5	83.5	10	<Null>	<Null>	413.5	South-east
116	GW044770	Household	1/08/1975	42.7	42.7	12.8	<Null>	0.63	417.8	East

Map ID	Groundwater Bore ID	Authorised Purpose	Completion Date	Drilled Depth (m)	Final Depth (m)	SWL (m)	Salinity (mg/l)	Yield (L/s)	Distance (m)	Direction
108	GW054590	Household	1/11/1980	45.5	45.5	13.8	Good	1.66	446.6	East
22	GW056923	Household	1/03/1983	36	30	7.6	1001-3000 ppm	0.4	449.5	North-west
31	GW061144	Household	1/06/1985	47	47	7.4	Good	0.3	449.5	North-west
196	GW902083	Water supply for livestock	5/09/1994	103.63	99.06	12	<Null>	2	453.3	South
44	GW971359	Domestic,stock	30/04/2015	86	86	5.8	<Null>	1.7	460.7	South
174	GW056424	Household	1/01/1983	34.5	34.5	13.1	Good	0.972	473.9	North
130	GW045133	Household	1/08/1974	48.8	48.8	13.1	Good	0.632	476.4	South-west
50	GW970750	Domestic,stock	26/02/2014	103	101	15.5	<Null>	2.5	482.2	North-west
30	GW063630	Household	1/09/1987	77.7	77.7	12.2	<Null>	0.45	509.1	North-west
23	GW070491	Household	11/04/1993	24.3	24.3	14.3	<Null>	<Null>	515.1	North
172	GW070003	Household	28/04/1992	<Null>	52.6	8.2	Fresh	4.2	518.1	East
43	GW967388	Household	<Null>	<Null>	59	6.1	<Null>	<Null>	558.9	North-west
235	GW273314.1	Null	N/A	<Null>	<Null>	<Null>	<Null>	<Null>	560.1	North
236	GW273314.1.1	Null	N/A	<Null>	<Null>	<Null>	<Null>	<Null>	560.1	North
274	GW273314	Null	N/A	217	197.5	<Null>	<Null>	20	560.1	North
82	GW037096	Irrigated agriculture	1/09/1973	57	56.9	9.1	Good	1.64	586.7	East
204	GW966828	Household	20/06/2004	<Null>	51.5	17	<Null>	3	609.2	South
278	GW902973	Null	N/A	0	55	<Null>	<Null>	<Null>	609.6	South-east
208	GW025224	Monitoring	1/11/1968	93	44	19.7	<Null>	1.01	624.3	West
158	GW965818	Household	18/02/2003	64	59.7	9.1	<Null>	<Null>	634.9	South-east
147	GW901548	Household	20/11/1998	88	76	26	Good	1.01	638.2	South
24	GW900236	Unknown	3/12/1991	47.8	47.8	11.1	Good	0.88	652.1	North-west
39	GW968056	Household	4/05/2007	40.6	40.6	4.65	<Null>	1.25	652.3	North
42	GW018807	Household	<Null>	<Null>	27.4	6	invalid code	1.52	656.8	North
113	GW043186	Household	1/10/1974	45.7	45.7	19.8	Good	0.88	669.2	South-east
198	GW050158	Water supply	1/02/1980	60	60	1.8	Good	0.983	671.2	East
178	GW071515	Household	16/12/1993	48	48	7.3	Fresh	1.42	673.5	East
281	GW904463	Null	N/A	81	81	10.9	<Null>	25	686.7	East
179	GW049369	Household	1/06/1978	37	37	15	Good	0.7	707.4	South-east
87	GW003996	Household	1/08/2007	60.19	53.4	<Null>	<Null>	<Null>	707.6	West
72	GW037916	Water supply	1/02/1972	75	74.9	<Null>	<Null>	<Null>	713.6	West

Map ID	Groundwater Bore ID	Authorised Purpose	Completion Date	Drilled Depth (m)	Final Depth (m)	SWL (m)	Salinity (mg/l)	Yield (L/s)	Distance (m)	Direction
75	GW034520	Exploration or research	1/04/1972	103.6	103.6	2.4	501-1000 ppm	<Null>	713.6	West
83	GW003716	Water supply for livestock	1/05/1940	80.2	74.3	<Null>	Soft	<Null>	730.3	South
74	GW035121	Water supply	1/03/1973	44.5	42.5	9.1	Fair	<Null>	747.8	East
73	GW000927	Water supply for livestock	1/03/2022	38.7	38.7	27.4	Fresh	0.757	749.5	West
248	GW056928	Unknown	<Null>	<Null>	40	<Null>	Salty	<Null>	770.7	West
152	GW901674	Household	22/10/1998	64.5	64	14	Good	3.75	773.1	South
19	GW063657	Household	1/10/1986	47.5	47.5	10.7	<Null>	0.51	781.3	South-east
32	GW030123	Monitoring	1/11/1970	77.7	73.2	7.2	invalid code	1.263	823.6	North-east
33	GW030123	Monitoring	1/11/1970	77.7	73.2	7.2	invalid code	1.263	823.6	North-east
277	GW902959	Null	N/A	0	47.5	<Null>	<Null>	3.5	825.8	East
63	GW970949	Domestic,stock	28/03/2014	59	59	22	<Null>	1.9	836.9	South
105	GW053767	Irrigated agriculture	1/03/1982	38	38	8.7	Good	1.278	840.2	North-east
124	GW044709	Household	1/11/1975	45.7	45.7	22.9	<Null>	0.76	842.7	South
20	GW071866	Household	30/11/1993	67	67	<Null>	Good	1.52	851.6	South-east
215	GW968148	Exploration or research	13/07/2007	82.6	82.6	3	<Null>	3.5	863.0	North-east
182	GW044082	Household	1/07/1974	54.9	54.8	15.2	<Null>	1.14	871.5	South
90	GW017318	Irrigated agriculture	1/11/1958	45.7	45.7	9.4	<Null>	2.53	911.4	East
197	GW966938	Household	15/11/2004	45	45	8.5	Fair	<Null>	919.3	East
2	GW030259	Unknown	1/03/1972	<Null>	<Null>	<Null>	<Null>	<Null>	921.9	North
3	GW030259	Unknown	1/03/1972	<Null>	<Null>	<Null>	<Null>	<Null>	921.9	North
4	GW030259	Unknown	1/03/1972	<Null>	<Null>	<Null>	<Null>	<Null>	921.9	North
160	GW030259	Monitoring	1/03/1972	<Null>	220	<Null>	<Null>	<Null>	921.9	North
169	GW030259	Monitoring	1/03/1972	<Null>	220	<Null>	<Null>	<Null>	921.9	North
21	GW061059	Household	1/04/1985	91.4	91.4	15.2	Very Good	<Null>	926.9	North-west
38	GW967624	Household	10/06/2006	44	44	10	<Null>	<Null>	931.2	North-west
138	GW050544	Household	1/02/1979	25	25	6.5	Good	0.83	935.5	South-east
101	GW035740	Household	1/10/1973	46.3	46.3	8.8	Good	0.63	975.7	East
133	GW050107	Household	1/10/1979	52	52	9.2	Good	1.01	982.5	East
167	GW000023	Household	1/06/2015	105.2	100.6	<Null>	501-1000 ppm	<Null>	988.1	South
85	GW005848	Water supply for livestock	1/09/1934	42.7	42.6	21.3	Fresh	0.568	994.7	South-west

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17	GW032358	Household	1/05/1970	26.5	26.5	11.2	Good	1.26	1006.5	North
231	GW968548	Water supply for livestock	10/04/2005	<Null>	<Null>	<Null>	<Null>	<Null>	1064.1	South-east
272	GW970560	Domestic	14/07/2013	70	70	<Null>	<Null>	1.5	1068.4	East
70	GW001658	Household	1/09/2025	29	28.9	22.2	Fresh	0.568	1072.6	North-west
79	GW030310	Monitoring	1/09/1973	117.3	112.7	16.7	501-1000 ppm	0.86	1075.4	North
80	GW030310	Monitoring	1/09/1973	117.3	112.7	16.7	501-1000 ppm	0.86	1075.4	North
232	GW030310.1	Null	N/A	<Null>	<Null>	<Null>	<Null>	<Null>	1085.5	North
233	GW030310.1.1	Null	N/A	<Null>	<Null>	<Null>	<Null>	<Null>	1085.5	North
234	GW030310.1.2	Null	N/A	<Null>	<Null>	<Null>	<Null>	<Null>	1085.5	North
134	GW055733	Household	1/10/1981	60	60	11	Good	0.556	1090.1	South
202	GW049370	Household	1/06/1978	34	34	16	Good	0.69	1110.8	South-east
286	GW971656	Null	N/A	0	65	<Null>	<Null>	<Null>	1114.2	East
276	GW902943	Null	N/A	0	69	19.5	<Null>	5.5	1126.1	South
126	GW045152	Household	1/02/1975	42.7	42.7	20.1	Good	0.76	1128.9	South
143	GW059840	Household	1/12/1982	48	48	16.5	Good	0.69	1153.4	South
47	GW970753	Domestic	12/10/2013	75	73	8	<Null>	2	1155.8	East
284	GW971627	Null	N/A	<Null>	59	<Null>	<Null>	<Null>	1168.2	East
140	GW067914	Household	26/05/1989	63	63	11	Good	0.63	1174.0	East
115	GW054621	Household	1/06/1981	47	47	6.5	Good	1.39	1183.6	East
123	GW060789	Household	1/08/1985	76	76	<Null>	Good	1	1185.5	North-east
41	GW969289	Household	31/01/2010	30	30	7	270 mg/L	1.9	1186.0	East
148	GW901203	Household	28/06/1998	90	90	10.1	Fresh	3.6	1202.7	East
100	GW025225	Monitoring	1/11/1968	88.4	88.4	<Null>	<Null>	<Null>	1268.5	South-west
258	GW967056	Household	<Null>	<Null>	15	6	<Null>	8	1282.6	North-east
135	GW053397	Household	1/07/1980	60	60	9.07	0-500 ppm	5.05	1286.1	South-east
71	GW034259	Household	1/01/1972	54.3	54.3	15.2	<Null>	1.9	1288.5	South
45	GW970316	Domestic,stock	16/11/2012	71	71	7.5	<Null>	3.8	1291.6	East
57	GW970313	Domestic	28/11/2012	52	52	20	<Null>	2.5	1295.1	South
150	GW902073	Household	26/05/1997	24	24	6.7	<Null>	<Null>	1302.2	North-east
203	GW068184	Household	15/07/1992	9.2	9.2	6.09	<Null>	1	1302.9	North-east

Map ID	Groundwater Bore ID	Authorised Purpose	Completion Date	Drilled Depth (m)	Final Depth (m)	SWL (m)	Salinity (mg/l)	Yield (L/s)	Distance (m)	Direction
201	GW044012	Household	1/04/1975	45.7	45.7	23.1	Good	0.76	1311.0	South
136	GW050136	Household	1/11/1979	60	60	5	Good	0.84	1323.2	East
257	GW967500	Household	20/03/2006	190	190	<Null>	<Null>	<Null>	1344.9	East
218	GW968225	Household	17/03/2003	92	92	7.5	<Null>	4.1	1356.0	East
237	GW971582	Null	N/A	<Null>	<Null>	<Null>	<Null>	<Null>	1356.5	South
88	GW017369	Irrigated agriculture	1/03/1959	10.1	10	<Null>	Good	<Null>	1392.4	North-east
285	GW971629	Null	N/A	<Null>	59	<Null>	<Null>	<Null>	1393.1	East
84	GW014249	Irrigated agriculture	<Null>	6.4	6.4	5.7	<Null>	<Null>	1395.0	North-east
243	GW970124	Household	28/11/2010	64	64	8	<Null>	2.53	1396.8	East
146	GW900494	Household	18/09/1996	18.8	18.8	<Null>	Fresh	<Null>	1397.8	North-east
56	GW970303	Domestic	24/09/2012	55	54	20	<Null>	1.2	1403.4	South
238	GW969458	Monitoring	4/05/2010	9.5	9.5	7.1	<Null>	<Null>	1406.9	North-east
239	GW969459	Monitoring	4/05/2010	10	10	8.2	<Null>	<Null>	1409.6	North-east
211	GW020367	Water supply	1/04/1963	14.3	14.3	7	Good	11.37	1421.4	North-east
275	GW902890	Null	N/A	0	48	8.7	<Null>	1	1428.6	East
254	GW065851	Recreation	5/07/1992	<Null>	27.5	5.2	<Null>	<Null>	1431.3	North-east
216	GW968442	Household	16/02/2008	25	25	6	Good	<Null>	1444.2	North-east
95	GW020360	Exploration or research	1/02/1963	14.6	14.6	5.7	<Null>	<Null>	1457.9	North-east
241	GW969457	Monitoring	3/05/2010	10	10	6.8	<Null>	<Null>	1459.3	North-east
240	GW969456	Monitoring	3/05/2010	10	10	6.8	<Null>	<Null>	1460.2	North-east
265	GW969824	Household	4/03/2011	42	42	<Null>	<Null>	<Null>	1474.4	South
154	GW965093	Household	15/06/2001	50	50	20	Good	1.4	1480.0	South-east
155	GW966718	Household	22/06/2004	101	101	26	<Null>	<Null>	1491.0	West
1	GW020361	Exploration or research	1/05/1963	9.4	<Null>	6.7	Good	<Null>	1495.5	North-east
210	GW968187	Household	24/10/2007	60	60	6	<Null>	2	1515.0	East
67	GW000021	Household	1/04/2015	103.6	98.7	<Null>	Good	<Null>	1541.8	South-west
175	GW028741	Water supply	1/08/1967	13.4	13.4	6	Brackish	26.52	1543.3	North-east
283	GW971618	Null	N/A	0	29.5	11	<Null>	2.5	1554.3	East
46	GW970349	Domestic	18/12/2012	54	54	8	<Null>	2.5	1562.4	South-east
280	GW904032	Null	N/A	87	87	10	<Null>	0.8	1569.0	South-west
7	GW020364	Exploration or research	1/02/1963	14.6	<Null>	7	Fair	<Null>	1571.0	North-east

Map ID	Groundwater Bore ID	Authorised Purpose	Completion Date	Drilled Depth (m)	Final Depth (m)	SWL (m)	Salinity (mg/l)	Yield (L/s)	Distance (m)	Direction
13	GW020366	Exploration or research	1/05/1963	12.5	<Null>	5.4	Fair	3.789	1580.2	North-east
5	GW020365	Exploration or research	1/02/1963	4.6	<Null>	0.9	<Null>	<Null>	1584.5	North-east
96	GW020362	Exploration or research	1/02/1963	3	3	<Null>	<Null>	<Null>	1597.1	North-east
6	GW025221	Unknown	1/11/1968	<Null>	<Null>	14	501-1000 ppm	<Null>	1603.9	North
8	GW025221	Unknown	1/11/1968	<Null>	<Null>	14	501-1000 ppm	<Null>	1603.9	North
10	GW025221	Unknown	1/11/1968	<Null>	<Null>	14	501-1000 ppm	<Null>	1603.9	North
99	GW025221	Monitoring	1/11/1968	111.3	106.9	14	501-1000 ppm	<Null>	1603.9	North
139	GW044310	Household	1/08/1975	48.8	48.8	18.3	Good	0.63	1631.2	South
245	GW065083	Household	20/04/1989	<Null>	60	26	Good	0.82	1634.9	South
98	GW020359	Exploration or research	1/05/1963	6.1	6	<Null>	Fair	<Null>	1642.4	North-east
27	GW030544	Monitoring	1/11/1970	85.3	31.3	<Null>	<Null>	<Null>	1643.5	East
28	GW030544	Monitoring	1/11/1970	85.3	31.3	<Null>	<Null>	<Null>	1643.5	East
184	GW045419	Household	1/12/1976	34.5	34.5	3.5	Good	1.11	1659.1	East
217	GW968360	Household	1/06/2005	39.48	39.48	8	<Null>	2	1677.4	East
195	GW901993	Household	1/02/2000	54	49.5	40	<Null>	1.4	1684.3	South-west
173	GW048725	Irrigated agriculture	1/10/1973	114.3	114.3	9.8	<Null>	3.79	1686.7	East
92	GW020358	Exploration or research	1/05/1963	7	7	1.5	Fair	<Null>	1687.5	North-east
162	GW008245	Water supply	1/05/1951	12.2	12.1	<Null>	501-1000 ppm	<Null>	1698.6	North-east
53	GW970439	Monitoring	24/11/2012	0	35.3	17.5	<Null>	<Null>	1702.4	South
59	GW970440	Monitoring	24/11/2012	0	22.9	20.25	<Null>	<Null>	1702.6	South
132	GW056034	Household	1/06/1982	46	46	6	Good	1.39	1707.1	South-east
94	GW026665	Irrigated agriculture	1/05/1966	41.1	41.1	28.3	Poor	<Null>	1716.3	West
104	GW062393	Irrigated agriculture	1/02/1988	33.5	30.5	<Null>	<Null>	15.16	1719.8	North-east
187	GW902055	Irrigated agriculture	11/12/1997	84	84	12	Fresh	3.5	1722.1	South
269	GW970430	Monitoring	19/11/2012	0	18	<Null>	<Null>	<Null>	1728.4	South
61	GW970435	Monitoring	23/11/2012	0	37.7	22	<Null>	<Null>	1740.9	South
62	GW970436	Monitoring	24/11/2012	0	23.9	22	<Null>	<Null>	1742.7	South
52	GW970431	Monitoring	3/12/2012	25	25	16.8	<Null>	<Null>	1749.3	South
270	GW970432	Monitoring	16/11/2012	0	20.3	<Null>	<Null>	<Null>	1749.9	South

Map ID	Groundwater Bore ID	Authorised Purpose	Completion Date	Drilled Depth (m)	Final Depth (m)	SWL (m)	Salinity (mg/l)	Yield (L/s)	Distance (m)	Direction
171	GW054952	Household	1/04/1981	50	50	21.5	Good	1.8	1759.6	South
109	GW060698	Unknown	1/10/1985	795.8	783	<Null>	7001-10000 ppm	<Null>	1760.8	South
225	GW968519	Household	14/09/2008	40.5	40.5	8	<Null>	<Null>	1763.7	East
253	GW071653	Water supply for livestock	31/12/1983	609	609	<Null>	<Null>	<Null>	1782.6	South
97	GW020357	Water supply	1/05/1963	11.6	11.5	4.5	<Null>	<Null>	1787.1	North-east
268	GW970429	Monitoring	19/11/2012	0	16.9	<Null>	<Null>	<Null>	1791.5	South
103	GW063825	Monitoring	1/11/1986	185	185	<Null>	7001-10000 ppm	<Null>	1800.5	South
51	GW970441	Monitoring	15/11/2012	0	31.3	16	<Null>	<Null>	1808.1	South
153	GW902779	Household	30/04/1999	40.23	40.23	24	<Null>	0.76	1810.3	South-east
226	GW968521	Household	30/08/2008	46	46	13.15	<Null>	<Null>	1815.3	South-east
144	GW901861	Household	26/09/1999	41.5	41.5	<Null>	<Null>	1.5	1819.5	South
185	GW037703	Irrigated agriculture	1/07/1970	8.5	8.5	6	Very Good	7.578	1843.7	North-east
259	GW967880	Irrigated agriculture	1/02/1989	<Null>	105	60	<Null>	<Null>	1847.0	South
227	GW968520	Household	30/09/2008	38	38	8.3	<Null>	<Null>	1854.3	East
176	GW060386	Irrigated agriculture	1/03/1985	120	120	<Null>	<Null>	<Null>	1859.4	East
229	GW058943	Household	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	1866.9	East
151	GW901740	Household	6/08/1999	108	108	7	Good	6	1872.5	East
86	GW030356	Monitoring	1/04/1973	75	57.9	24.3	<Null>	0.3	1876.5	North-west
93	GW030356	Monitoring	1/04/1973	75	57.9	24.3	<Null>	0.3	1876.5	North-west
127	GW051381	Household	1/09/1980	46	46	6.5	Good	0.97	1876.6	South-east
230	419018	Unknown	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	1882.0	East
181	GW058110	Household	1/03/1984	57	57	28	Good	<Null>	1883.5	South
165	GW008233	Water supply	1/05/1951	31.1	19.2	4.3	0-500 ppm	10.23	1908.5	North-east
65	GW970742	Domestic	29/11/2012	55	55	26.6	<Null>	1	1911.1	South
91	GW020363	Water supply	1/09/1961	25.6	17	<Null>	Good	8.083	1911.1	North-east
256	GW964961	Water supply for livestock	1/11/1998	<Null>	809.5	<Null>	<Null>	<Null>	1916.0	South
60	GW970433	Monitoring	21/11/2012	35	35	20.8	<Null>	<Null>	1921.8	South
271	GW970434	Monitoring	20/11/2012	0	17.9	<Null>	<Null>	<Null>	1922.8	South
49	GW970443	Monitoring	25/11/2012	0	31.2	14.5	<Null>	<Null>	1927.9	South
221	GW969080	Household	10/11/2008	41.5	41.5	8.5	<Null>	<Null>	1933.7	East

Map ID	Groundwater Bore ID	Authorised Purpose	Completion Date	Drilled Depth (m)	Final Depth (m)	SWL (m)	Salinity (mg/l)	Yield (L/s)	Distance (m)	Direction
58	GW970442	Monitoring	3/12/2012	0	23.3	20	<Null>	<Null>	1955.8	South
267	GW970428	Monitoring	20/11/2012	0	14.9	<Null>	<Null>	<Null>	1958.0	South
194	GW900673	Irrigated agriculture	20/10/1997	28.9	23	6.5	<Null>	<Null>	1965.0	North-east
64	GW970304	Domestic	4/11/2012	52	52	26	<Null>	1.5	1968.7	South
142	GW068461	Household	30/08/1990	39.6	39.6	5.5	Good	0.76	1968.9	East
192	GW965182	Household	18/09/2001	30	30	7	<Null>	4	1982.5	East

Groundwater Bores Driller Lithology Details

Groundwater Bore ID	From Depth – To Depth (m) Lithology	Distance (m)	Direction
GW025223	0m-0.3m Sand 0m-1.53m Sandy clay; brown, fine 0.3m-1.52m Clay grey 1.52m-3.05m Clay red sandy 1.53m-3.05m Sand; reddish brown, fine to medium, silt & clay 3.05m-24.38m Clay sandy 3.05m-4.58m Sand; brown, fine, silt & clay 4.58m-6.1m Clay; brown 6.1m-7.63m Silty clay; brown 7.63m-9.15m Sand; light brown, fine & some clay 9.15m-10.68m Silty clay; light brown 10.68m-16.78m Silty clay; brown 16.78m-25.93m Gravel; brown, medium, with some fine sand, silt & a little fine gravel, pebbles subrounded to rounded 24.38m-28.96m Gravel coarse 25.93m-27.45m Gravel; brown, fine, some coarse sand, mediumt o fine sand & silt. a few medium gravel pebbles 27.45m-28.98m Gravel; brown overall, coarse, pebbles subrounded 28.96m-32m Sand coarse water supply 28.98m-30.5m Sand; brown, coarse, some fine gravel, fine to medium sand, a little silt grains, mainly quartz 30.5m-32.03m Sand; brown, coarse, some fine gravel, fine to medium sand & silt 32m-38.1m Gravel claybound 32.03m-36.6m Gravel; light brown, fine to medium, some pebbles 1/4 to 1/2 in diameter, some fine to medium sand 36.6m-38.13m Gravel; light brown, medium, some fine gravel, a little sand 38.1m-41.15m Sand gravel coarse water supply 38.13m-42.7m Gravel; light brown, fine, some medium gravel & coarse sand 41.15m-51.82m Clay sandy 42.7m-44.23m Silty clay; light brown 44.23m-47.28m Sandy clay; light brown, fine & silt 47.28m-48.8m Sandy clay; brown, fine, & silt 48.8m-50.33m Sandy clay; orange brown, fine, silt with a few fine gravel grains, mainly subangular to subrounded quartz 50.33m-51.85m Sandy clay; orange brown, fine, silt, with a few medium gravel pebbles, subrounded 51.82m-70.1m Sandstone 51.85m-53.38m Sandy clay; reddish brown, fine to medium, & silt 53.38m-56.43m Sandy clay; orange brown, fine to medium, with a few medium gravel pebbles, subrounded, some silt 56.43m-59.48m Silty clay; light brown to whitish, a few fineg ravel pebbles 59.48m-61m Silty clay; brown 61m-64.05m Silty clay; light grey 64.05m-65.58m Clay; light grey, a few fine gravel (quartz) grains 65.58m-67.1m Silty clay; light grey to whitish, a few rock fragments 67.1m-68.63m Silty clay; as above - also a few fine gravel grains & some pebbles 1/4 in size 68.63m-71.68m Silty clay; light brown, some rock fragments 70.1m-70.71m Sand coarse 70.71m-92.96m Sandstone	0.0	Onsite

Groundwater Bore ID	From Depth – To Depth (m) Lithology	Distance (m)	Direction
	71.68m-73.2m Silty clay; light brown to light grey, some fine sand & a few rock fragments - some fine gravel grains, mainly quartz 73.2m-74.73m Sandy clay; light brown to light grey, fine, with fine to medium gravel pebbles 74.73m-76.25m Silty clay; light brown to light grey 76.25m-82.35m Silty clay; light brown to whitish 82.35m-83.88m Silty clay; light brown 83.88m-85.4m Silty clay; light brown to light grey, slightly mottled 85.4m-86.93m Silty clay; light brown to grey 86.93m-88.45m Silty clay; light brown to grey, some coasre sand grains, mainly quartz 88.45m-89.98m Silty clay; light brown to grey 89.98m-91.5m Silty clay; as above - plus a few fine gravel grains present 2%, jasper, subrounded 91.5m-93.03m Silty clay; light brown to grey, a few grains of quartz, sandstone?		
GW900535	0m-0.3m Topsoil 0.3m-0.6m Clayey fine brown sand 0.6m-5.48m Sandy grey and brown clay 5.48m-13.71m Sandy grey and brown clay with bands of cemented fine brown sand 13.71m-17.06m Sandy grey and brown clay with clayey sand bands 17.06m-19.81m Tough gritty grey and red clay 19.81m-22.25m Sandy grey and red clay with bands with bands of clayey red & white sand v.f. 22.25m-26.21m Grey and brown clay with some limestone 26.21m-27.73m Grey and brown clay with some limestone 27.73m-30.78m Grey and brown clay with some limestone becoming clayey 30.78m-31.39m Clayey sands and gravel 31.39m-35.96m Brown and white sand (f - v.c.) and gravel 35.96m-36.27m Silt, brown and grey clay 36.27m-40.53m Brown and white sand (v.f - v.c.) and gravel 40.53m-42.06m Mostly clayey sand and gravel, some silty clay 42.06m-43.89m Silty brown and grey clay with some clayey sandbands	0.0	Onsite
GW025222	0m-3.05m Clay 0m-1.53m Clay; brown 1.53m-3.05m Clay; light brown 3.05m-15.24m Sand sandy clay 3.05m-4.58m Sand; light brown to yellowish, fine to medium, a little clay 4.58m-6.1m Sand; light brown to orange, fine to medium 6.1m-7.63m Sand; light brown to orange, & some clay 7.63m-9.15m Sand; light brown to orange, fine, some medium sand 9.15m-10.68m Sand; brown to orange brown, fine to medium, some coarse sand & fine gravel 5% 10.68m-12.2m Sand; orange brown, fine & silt, a little clay 12.2m-13.73m Sand; light rown to light grey & silt 13.73m-15.25m Sand; light brown, fine & silt, some medium sand 15.24m-18.29m Clay red 15.25m-18.3m Clay; light brown to light grey 18.29m-22.86m Gravel claybound 18.3m-19.83m Sandy clay; light brown & light grey, fine 19.83m-21.35m Gravel; light brown, medium & fine to medium sand, some coarse gravel 21.35m-22.88m Gravel; overall colour greyish to light brown, medium to coarse, some pebbles 1 in diameter, some medium to fine sand 22.86m-32m Gravel fine-coarse water supply 22.88m-24.4m Gravel; light brown to greyish, fine, some medium gravel & coarse to medium sand 24.4m-25.93m Gravel; light brown, fine to medium, a little fine to medium sand 25.93m-27.45m Gravel; light brown to greyish (overall), fine to medium, some coarse gravel & coarse sand 27.45m-28.98m Gravel; light brown to greyish, fine to medium, a little fine to medium sand 28.98m-30.5m Gravel; light brown to greyish, medium, some fine gravel, a little fine to medium sand 30.5m-32.03m Sand; light brown, medium to coarse, a few coarse gravel pebbles, a little clay & fine sand 32m-41.15m Clay 32.03m-33.55m Gravel; light brown to light grey, medium & clay, some coarse gravel & fine sand	0.0	Onsite

Groundwater Bore ID	From Depth – To Depth (m) Lithology	Distance (m)	Direction
	33.55m-36.6m Sandy clay; light brown to light grey, fine to medium 36.6m-38.13m Sandy clay; as above - & coarse gravel pebbles, a little fine to coarse and 38.13m-39.65m Sand; light brown to greyish, medium to coasre & clay, some fine sand 39.65m-41.18m Sand; light brown light grey, fine to medium & clay, some coarse sand, a few medium gravel pebbles 41.15m-42.67m Gravel 41.18m-42.7m Sand; ligth grey to yellowish, coarse to fine gravel (mainly quartz), some fine to medium sand 42.67m-56.39m Clay 42.7m-44.23m Sand; light grey, fine & silty clay, a little coarse sand 5% 44.23m-45.75m Sand; light grey to grey, medium to coarse & clay, some fine sand & silt 45.75m-47.28m No sample 47.28m-51.85m Sandy clay; light brown to light grey, fine to medium 51.85m-53.38m Sandy clay; as above, but fine sandy clay 53.38m-54.9m Sandy clay; light brown, fine 54.9m-56.43m Clay; light brown, containing fine-medium sand, some fine gravel, pebles present 56.39m-62.48m Sand coarse water supply 56.43m-57.95m Sand; light brown to cream, medium to coarse, some fine sand 57.95m-59.48m Sand; as above - except fine to medium sand & some coarse sand 59.48m-61m No sample 61m-62.53m Sand; light brown, coarse to medium, some fine sand, a little fine gravel 5% 62.48m-65.53m Clay 62.53m-64.05m Sandy clay; light brown, fine to medium, some coarse sand 64.05m-65.58m Sandy clay; light brown, fine to coarse 65.53m-96.93m Gravel coarse water supply 65.58m-71.68m Gravel; light brown to cream, fine to coarse sand, some medium to fine sand 71.68m-76.25m Sand; light brown, fine to coarse, some fine gravel 76.25m-77.78m Sand; light grey, fine to medium, some coarse sand, a little fine gravel 5% 77.78m-79.3m Silty clay; light grey, containing some fine gravel & fine sand 79.3m-80.83m Sand; light brown to light grey, fine to medium, & fine gravel 80.83m-82.35m Sand; light brown to greyish, medium to coarse, fine to medium gravel, some fine sand 82.35m-83.88m Sand; light brown, medium to coarse, some fine to medium gravel 83.88m-85.4m Sand; light brown to grey, fine to coarse, fine gravel (grey) 85.4m-88.45m Sand; greyish, fine to coarse & fine gravel 88.45m-89.98m Sand; light brown to cream, fine to coarse, some fine & medium gravel 15% (greyish) 89.98m-93.03m Gravel; overall light brown to greyish, fine (greyish), fine to coasre sand (light brown) 93.03m-94.55m Sand; light brown, medium to coarse, a little fine gravel & fine sand 94.55m-96.08m Gravel; light brown, fine to medium, some fine to coarse sand 96.08m-97.6m Clay; light grey, & medium gravel 96.93m-102.11m Sandstone 97.6m-100.65m Silty clay; grey (sandstone?) 100.65m-105.23m Sandy clay; light grey (sandstone bedrock?)		
GW025222	0m-3.05m Clay 0m-1.53m Clay; brown 1.53m-3.05m Clay; light brown 3.05m-15.24m Sand sandy clay 3.05m-4.58m Sand; light brown to yellowish, fine to medium, a little clay 4.58m-6.1m Sand; light brown to orange, fine to medium 6.1m-7.63m Sand; light brown to orange, & some clay 7.63m-9.15m Sand; light brown to orange, fine, some medium sand 9.15m-10.68m Sand; brown to orange brown, fine to medium, some coarse sand & fine gravel 5% 10.68m-12.2m Sand; orange brown, fine & silt, a little clay 12.2m-13.73m Sand; light rown to light grey & silt 13.73m-15.25m Sand; light brown, fine & silt, some medium sand 15.24m-18.29m Clay red 15.25m-18.3m Clay; light brown to light grey	0.0	Onsite

Groundwater Bore ID	From Depth – To Depth (m) Lithology	Distance (m)	Direction
	18.29m-22.86m Gravel claybound 18.3m-19.83m Sandy clay; light brown & light grey, fine 19.83m-21.35m Gravel; light brown, medium & fine to medium sand, some coarse gravel 21.35m-22.88m Gravel; overall colour greyish to light brown, medium to coarse, some pebbles 1 in diameter, some medium to fine sand 22.86m-32m Gravel fine-coarse water supply 22.88m-24.4m Gravel; light brown to greyish, fine, some medium gravel & coarse to medium sand 24.4m-25.93m Gravel; light brown, fine to medium, a little fine to medium sand 25.93m-27.45m Gravel; light brown to greyish (overall), fine to medium, some coarse gravel & coarse sand 27.45m-28.98m Gravel; light brown to greyish, fine to medium, a little fine to medium sand 28.98m-30.5m Gravel; light brown to greyish, medium, some fine gravel, a little fine to medium sand 30.5m-32.03m Sand; light brown, medium to coarse, a few coarse gravel pebbles, a little clay & fine sand 32m-41.15m Clay 32.03m-33.55m Gravel; light brown to light grey, medium & clay, some coarse gravel & fine sand 33.55m-36.6m Sandy clay; light brown to light grey, fine to medium 36.6m-38.13m Sandy clay; as above - & coarse gravel pebbles, a little fine to coarse and 38.13m-39.65m Sand; light brown to greyish, medium to coasre & clay, some fine sand 39.65m-41.18m Sand; light brown light grey, fine to medium & clay, some coarse sand, a few medium gravel pebbles 41.15m-42.67m Gravel 41.18m-42.7m Sand; ligth grey to yellowish, coarse to fine gravel (mainly quartz), some fine to medium sand 42.67m-56.39m Clay 42.7m-44.23m Sand; light grey, fine & silty clay, a little coarse sand 5% 44.23m-45.75m Sand; light grey to grey, medium to coarse & clay, some fine sand & silt 45.75m-47.28m No sample 47.28m-51.85m Sandy clay; light brown to light grey, fine to medium 51.85m-53.38m Sandy clay; as above, but fine sandy clay 53.38m-54.9m Sandy clay; light brown, fine 54.9m-56.43m Clay; light brown, containing fine-medium sand, some fine gravel, pebles present 56.39m-62.48m Sand coarse water supply 56.43m-57.95m Sand; light brown to cream, medium to coarse, some fine sand 57.95m-59.48m Sand; as above - except fine to medium sand & some coarse sand 59.48m-61m No sample 61m-62.53m Sand; light brown, coarse to medium, some fine sand, a little fine gravel 5% 62.48m-65.53m Clay 62.53m-64.05m Sandy clay; light brown, fine to medium, some coarse sand 64.05m-65.58m Sandy clay; light brown, fine to coarse 65.53m-96.93m Gravel coarse water supply 65.58m-71.68m Gravel; light brown to cream, fine to coarse sand, some medium to fine sand 71.68m-76.25m Sand; light brown, fine to coarse, some fine gravel 76.25m-77.78m Sand; light grey, fine to medium, some coarse sand, a little fine gravel 5% 77.78m-79.3m Silty clay; light grey, containing some fine gravel & fine sand 79.3m-80.83m Sand; light brown to light grey, fine to medium, & fine gravel 80.83m-82.35m Sand; light brown to greyish, medium to coarse, fine to medium gravel, some fine sand 82.35m-83.88m Sand; light brown, medium to coarse, some fine to medium gravel 83.88m-85.4m Sand; light brown to grey, fine to coarse, fine gravel (grey) 85.4m-88.45m Sand; greyish, fine to coarse & fine gravel 88.45m-89.98m Sand; light brown to cream, fine to coarse, some fine & medium gravel 15% (greyish) 89.98m-93.03m Gravel; overall light brown to greyish, fine (greyish), fine to coasre sand (light brown) 93.03m-94.55m Sand; light brown, medium to coarse, a little fine gravel & fine		

Groundwater Bore ID	From Depth – To Depth (m) Lithology	Distance (m)	Direction
	sand 94.55m-96.08m Gravel; light brown, fine to medium, some fine to coarse sand 96.08m-97.6m Clay; light grey, & medium gravel 96.93m-102.11m Sandstone 97.6m-100.65m Silty clay; grey (sandstone?) 100.65m-105.23m Sandy clay; light grey (sandstone bedrock?)		
GW970748	#N/A	0.0	Onsite
GW970749	#N/A	0.0	Onsite
GW037376	0m-0.61m Topsoil 0.61m-1.83m Clay red 1.83m-2.74m Clay yellow 2.74m-8.84m Sandstone yellow 8.84m-15.24m Clay white 15.24m-18.59m Mudstone white water supply 18.59m-25.91m Clay white 25.91m-33.22m Sandstone yellow 33.22m-38.71m Clay 38.71m-47.85m Sandstone yellow 47.85m-79.86m Clay dark brown 79.86m-82.91m Sandstone water supply 82.91m-91.44m Clay dark brown	0.0	Onsite
GW000001	0m-1.82m Sand 1.82m-28.34m Clay 28.34m-31.69m Drift water supply	0.0	Onsite
GW009211	0m-1.21m Soil black 1.21m-3.35m Clay grey 3.35m-20.72m Clay yellow sandy 20.72m-24.07m Clay yellow 24.07m-26.21m Clay yellow gravel 26.21m-31.69m Gravel coarse 31.69m-32.61m Sand water supply 32.61m-35.35m Gravel fine 35.35m-36.57m Sand 36.57m-39.62m Gravel	0.0	Onsite
GW010259	0m-1.21m Soil light 1.21m-31.69m Sandstone 31.69m-68.88m Sandstone yellow water supply 68.88m-70.1m Driller	0.0	Onsite
GW006278	0m-9.14m Clay 9.14m-26.51m Sandstone 26.51m-85.03m Gravel nominal water supply 85.03m-85.64m Sand nominal water supply 85.64m-91.44m Shale nominal	0.0	Onsite
GW063636	0m-0.6m Topsoil 0.6m-9.14m Clay 9.14m-10.66m Sand fine water supply 10.66m-12.19m Sand coarse water supply 12.19m-18.28m Clay sand 18.28m-31.69m Clay sand 31.69m-33.52m Sandstone red 33.52m-35.05m Slate white 35.05m-54.86m Clay red sandstone 54.86m-64.61m Sandstone hard 64.61m-67.05m Slate 67.05m-77.72m Clay green sandy 77.72m-78.02m Sandstone 78.02m-82.29m Sand white 82.29m-91.44m Clay sandy 91.44m-97.53m Sand 97.53m-101.8m Clay stones 97.53m-101.8m Sand 101.8m-104.85m Sand water supply 104.85m-109.72m Clay sandy	0.0	Onsite
GW051059	0m-0.91m Soil light brownish 0.91m-1.83m Clay light brownish 1.83m-4.27m Clay light brownish sandy 4.27m-9.75m Clay dark yellowish sandy 9.75m-17.37m Clay light yellowish sandy	0.0	Onsite

Groundwater Bore ID	From Depth – To Depth (m) Lithology	Distance (m)	Direction
	17.37m-22.25m Clay dark yellowish sandy 22.25m-26.52m Clay yellow grey fatty 26.52m-28.35m Clay compacted 26.52m-28.35m Gravel fine-medium 28.35m-31.09m Gravel small sand water supply 28.35m-31.09m Silt water supply		
GW060759	0m-1.21m Topsoil 1.21m-7.62m Clay yellowish green 7.62m-30.17m Sandstone 30.17m-45.72m Clay 45.72m-48.15m Sand fine water bearing 48.15m-50.28m Clay sandy 50.28m-54.85m Sandstone 54.85m-66.42m Clay 66.42m-72.51m Sandstone clay 72.51m-74.64m Clay sandy 74.64m-76.16m Sandstone 76.16m-80.73m Sand water bearing clay 80.73m-83.77m Clay 83.77m-92.96m Coal seams 83.77m-92.96m Sandstone 92.96m-97.53m Clay yellowish green 97.53m-98.74m Sand coarse water supply	0.0	Onsite
GW063826	0m-1m Loam black 1m-6m Clay yellow sandy 6m-8m Clay grey sandy 8m-14m Sandstone red weathered 14m-20m Shale grey sandy 20m-23m Sandstone weathered coarse water supply 23m-30m Shale red clay 30m-38m Sandstone white 38m-49m Sandstone red pebbles(quartz) 49m-58m Clay red sandy 58m-74m Clay yellow pebbles/pebbly 74m-77m Sandstone white 77m-100m Sandstone white water supply 100m-105m Sandstone hard tuffaceous 105m-126m Siltstone grey 126m-141m Sandstone white coarse 141m-152m Sandstone grey water supply 152m-158m Sandstone pink 158m-163m Sandstone soft coarse 163m-171m Sandstone grey hard 171m-185m Sandstone	0.0	Onsite
GW060714	0m-1m Topsoil 1m-3m Clay 3m-22m Sandstone orange 22m-26m Sandstone yellow soft 26m-30m Shale 30m-45m Sandstone white 45m-73m Clay red 73m-110m Sandstone hard 110m-122m Sandstone soft water supply 122m-145m Sandstone white water supply 145m-152m Sandstone hard	0.0	Onsite
GW054077	0m-1.5m Topsoil 1.5m-21.8m Clay 21.8m-24.5m Sandstone water supply 24.5m-30.5m Clay 30.5m-34m Gravel clayey sandstone water supply 34m-39m Clay	0.0	Onsite
GW054974	0m-0.3m Topsoil 0.3m-4.57m Clay 4.57m-13.71m Sand 13.71m-15.85m Clay 15.85m-22.86m Rock broken water supply, small bands 22.86m-30.48m Clay grey	0.0	Onsite
GW050026	0m-0.65m Topsoil 0.65m-4m Clay	0.0	Onsite

Groundwater Bore ID	From Depth – To Depth (m) Lithology	Distance (m)	Direction
	4m-9m Sandstone 9m-12m Sand water supply 12m-26.5m Sandstone water supply 26.5m-33m Clay 33m-40m Sandstone water supply		
GW061132	0m-2m Sand red silty 2m-5m Sand light brown dirty 5m-6m Sand 6m-7m Sand light brown 7m-20m Sand silty water bearing 20m-25m Clay silty sandy 25m-27m Clay light brown 27m-29m Sand water bearing clay 29m-31m Sand dirty gravel water bearing 31m-42m Shale light brown grey 42m-44.5m Sandstone grey fine 44.5m-59m Sandstone light brown 44.5m-59m Shale fine bands 59m-63m Shale red 63m-67m Sandstone light brown	0.0	Onsite
GW056582	0m-1.2m Topsoil 1.2m-12.8m Sand red grey fine cemented 12.8m-15.9m Clay sandy 15.9m-18.9m Sand medium-coarse cemented 18.9m-19.5m Clay sandy 19.5m-22m Clay weathered limestone 22m-22.9m Clay grey 22.9m-29.6m Sand black tight gravel water supply 29.6m-35.4m Clay grey red	0.0	Onsite
GW068310	66m-76m Aquifer from 69.0 - 76.0 quality good.	0.0	Onsite
GW901496	0m-0.8m Loam topsoil 0.8m-30.6m Sandy clay - brown 30.6m-39.1m Claybound quartz sand 39.1m-57.4m Sandy clay - light brown 57.4m-90m Fine grained quartz/sandstone	0.0	Onsite
GW965918	0m-12m Topsoil 12m-42m Sand 42m-54m Sandy clay 54m-68m Sand 68m-94m Clay 94m-122m Gravel 122m-138m Gravel 138m-141m Gravelly clay 141m-146m Gravel 146m-150m Clay	0.0	Onsite
GW965548	0m-1.8m Topsoil 1.8m-23m Multicoloured 23m-29m Sand 29m-34m Brown clay 34m-43m Clay 43m-48m Sand 48m-49m Clay 49m-54.2m Sand 54.2m-59m Coloured clays 59m-61m Multicoloured 61m-100.6m Sand	0.0	Onsite
GW034775	0m-0.91m Topsoil 0.91m-20.42m Sandstone red 20.42m-20.73m Sand water supply 20.73m-31.39m Sandstone yellow 31.39m-43.59m Clay 43.59m-47.24m Sandstone 47.24m-57.61m Sand yellow water supply 57.61m-57.91m Sandstone	0.0	Onsite
GW025223	0m-0.3m Sand 0m-1.53m Sandy clay; brown, fine 0.3m-1.52m Clay grey 1.52m-3.05m Clay red sandy 1.53m-3.05m Sand; reddish brown, fine to medium, silt & clay	0.0	Onsite

Groundwater Bore ID	From Depth – To Depth (m) Lithology	Distance (m)	Direction
	3.05m-24.38m Clay sandy 3.05m-4.58m Sand; brown, fine, silt & clay 4.58m-6.1m Clay; brown 6.1m-7.63m Silty clay; brown 7.63m-9.15m Sand; light brown, fine & some clay 9.15m-10.68m Silty clay; light brown 10.68m-16.78m Silty clay; brown 16.78m-25.93m Gravel; brown, medium, with some fine sand, silt & a little fine gravel, pebbles subrounded to rounded 24.38m-28.96m Gravel coarse 25.93m-27.45m Gravel; brown, fine, some coarse sand, mediumt o fine sand & silt. a few medium gravel pebbles 27.45m-28.98m Gravel; brown overall, coarse, pebbles subrounded 28.96m-32m Sand coarse water supply 28.98m-30.5m Sand; brown, coarse, some fine gravel, fine to medium sand, a little silt grains, mainly quartz 30.5m-32.03m Sand; brown, coarse, some fine gravel, fine to medium sand & silt 32m-38.1m Gravel claybound 32.03m-36.6m Gravel; light brown, fine to medium, some pebbles 1/4 to 1/2 in diameter, some fine to medium sand 36.6m-38.13m Gravel; light brown, medium, some fine gravel, a little sand 38.1m-41.15m Sand gravel coarse water supply 38.13m-42.7m Gravel; light brown, fine, some medium gravel & coarse sand 41.15m-51.82m Clay sandy 42.7m-44.23m Silty clay; light brown 44.23m-47.28m Sandy clay; light brown, fine & silt 47.28m-48.8m Sandy clay; brown, fine, & silt 48.8m-50.33m Sandy clay; orange brown, fine, silt with a few fine gravel grains, mainly subangular to subrounded quartz 50.33m-51.85m Sandy clay; orange brown, fine, silt, with a few medium gravel pebbles, subrounded 51.82m-70.1m Sandstone 51.85m-53.38m Sandy clay; reddish brown, fine to medium, & silt 53.38m-56.43m Sandy clay; orange brown, fine to medium, with a few medium gravel pebbles, subrounded, some silt 56.43m-59.48m Silty clay; light brown to whitish, a few fineg ravel pebbles 59.48m-61m Silty clay; brown 61m-64.05m Silty clay; light grey 64.05m-65.58m Clay; light grey, a few fine gravel (quartz) grains 65.58m-67.1m Silty clay; light grey to whitish, a few rock fragments 67.1m-68.63m Silty clay; as above - also a few fine gravel grains & some pebbles 1/4 in size 68.63m-71.68m Silty clay; light brown, some rock fragments 70.1m-70.71m Sand coarse 70.71m-92.96m Sandstone 71.68m-73.2m Silty clay; light brown to light grey, some fine sand & a few rock fragments - some fine gravel grains, mainly quartz 73.2m-74.73m Sandy clay; light brown to light grey, fine, with fine to medium gravel pebbles 74.73m-76.25m Silty clay; light brown to light grey 76.25m-82.35m Silty clay; light brown to whitish 82.35m-83.88m Silty clay; light brown 83.88m-85.4m Silty clay; light brown to light grey, slightly mottled 85.4m-86.93m Silty clay; light brown to grey 86.93m-88.45m Silty clay; light brown to grey, some coasre sand grains, mainly quartz 88.45m-89.98m Silty clay; light brown to grey 89.98m-91.5m Silty clay; as above - plus a few fine gravel grains present 2%, jasper, subrounded 91.5m-93.03m Silty clay; light brown to grey, a few grains of quartz, sandstone?		
GW063827	0m-1m Loam black 1m-8m Sandstone yellow weathered 8m-16m Sandstone red weathered 16m-23m Shale grey 23m-26m Sandstone weathered coarse water supply 26m-28m Clay red 28m-37m Sandstone white 37m-43m Sandstone red weathered 43m-61m Clay red sandy	0.0	Onsite

Groundwater Bore ID	From Depth – To Depth (m) Lithology	Distance (m)	Direction
	61m-76m Clay yellow sandy 76m-100m Sandstone white water supply 100m-104m Sandstone hard tuffaceous 104m-129m Siltstone grey 129m-136m Sandstone white coarse 136m-154m Sandstone grey water supply 154m-160m Sandstone pink 160m-185m Sandstone grey		
GW058149	0m-1m Topsoil 1m-7.7m Clay 7.7m-10m Sandstone 10m-25.5m Clay 25.5m-35m Sandstone water supply 35m-37m Clay 37m-70m Sandstone water supply 70m-94.6m Sandstone water supply 94.6m-96m Clay 96m-106.5m Sandstone water supply	0.0	Onsite
GW024013	0m-0.3m Driller 0.3m-1.82m Clay 1.82m-54.86m Clay red 54.86m-70.71m Sand water supply	0.0	Onsite
GW901190	0m-0.7m Top soil 0.7m-14m Brown clay 14m-14.5m Coarse sand 14.5m-21.5m Brown clay 21.5m-23m Sand stone 23m-27m Brown clay 27m-37.5m Medium size gravel 37.5m-66m Blue clay 66m-90m Sandstone	0.0	Onsite
GW902700	0m-0.6m Brown sandy loam 0.6m-3.31m Very firm sandy, grey, red and brown clay 3.31m-14.6m Clayey yellow and white sand 14.6m-19.8m Firm grey and yellow clay 19.8m-24.7m Very firm semi-hard red sandstone 24.7m-27.1m Mostly weathered sandstone with some thin hard bands 27.1m-29.9m Hard white sandstone with some very firm weathered bands 29.9m-48.8m Softer multi-coloured sandstone with some thin hard bands 48.8m-52.4m Sticky grey clay 52.4m-54.3m Yellow and grey clay 54.3m-64m Soft yellow and grey weathered sandstone 64m-71.3m Firmer weathered sandstone 71.3m-73.8m Firm weathered sandstone with a few thin coal seams 73.8m-75.6m Very firm grey weathered sandstone 75.6m-75.8m Hard sandstone 75.8m-76.2m Firm weathered shale 76.2m-81.7m Firm weathered sandstone 81.7m-82.3m Weathered sandstone with some thin coal seams 82.3m-83.8m Softer weathered sandstone 83.8m-84.8m Very firm to hard sandstone 84.8m-86.9m Very sandy sandstone 86.9m-88.4m Firm weathered sandstone 88.4m-90.2m Very firm to hard sandstone 90.2m-90.5m Hard brown shale 90.5m-92.7m Very firm grey weathered sandstone 92.7m-94.5m Very sandy material with frequent bands of coal 94.5m-112.8m Firm blue grey shale 112.8m-120.1m Firm weathered grey sandstone 120.1m-121.3m Firm sand (well graded) 121.3m-129.3m Firm grey weathered sandstone 129.3m-132.3m Firm white sand (well graded) 132.3m-134.5m Grey weathered sandstone 134.5m-135.7m Firm white sand (well graded) 135.7m-139.3m Firm white sand with some bands of weathered stone 139.3m-141m Weathered sandstone	0.0	Onsite
GW901497	0m-0.4m Loam - grey 0.4m-3.5m Sandy clay - brown 3.5m-11.6m Clay - light brown	0.0	Onsite

Groundwater Bore ID	From Depth – To Depth (m) Lithology	Distance (m)	Direction
	11.6m-44.3m Sandy clay - brown 44.3m-50.8m Weathered sandstone - dark brown 50.8m-61.2m Clay - grey/green 61.2m-84m Quartz sandstone		
GW042612	0m-0.3m Clay yellow sandy 0.3m-3.04m Clay dark yellow compacted 3.04m-5.18m Clay 5.18m-10.36m Clay light yellow sandy 10.36m-15.84m Clay yellow sandy 15.84m-19.81m Clay sandy 19.81m-32.3m Pipe clay yellow grey 32.3m-33.83m Clay reddish sandy 33.83m-38.1m Clay yellow sandy 38.1m-39.62m Mudstone light yellow broken water supply 39.62m-46.63m Clay pinkish soft 46.63m-49.37m Clay dark yellow 49.37m-57.6m Clay dark yellow grey 57.6m-58.52m Clay yellow sandy 58.52m-64.31m Clay grey yellow 64.31m-71.01m Clay dark yellow grey 71.01m-72.23m Clay gravel sandy water supply 72.23m-74.67m Clay yellow grey	0.0	Onsite
GW026964	0m-4.57m Clay 4.57m-11.88m Sandstone white 11.88m-16.76m Sandstone yellow 16.76m-18.28m Sandstone red 18.28m-19.81m Clay white sand 19.81m-38.1m Sandstone yellow 38.1m-54.86m Clay white 38.1m-54.86m Sand yellow 54.86m-65.53m Sand coarse water supply	0.0	Onsite
GW052545	0m-0.7m Topsoil 0.7m-1.8m Clay 1.8m-23m Sandstone 23m-28m Clay 28m-30m Sandstone 30m-37.5m Sandstone water supply 37.5m-43.5m Sandstone 43.5m-50m Sandstone water supply 50m-54m Sandstone	0.0	Onsite
GW968147	0m-2m Topsoil 2m-7m Sandy clay 7m-22m Sandstone, fine 22m-36m Clay 36m-44m Sandstone, fine, soaks 44m-50m Sandstone, yellow, coarse 50m-60m Fractured sandstone, coarse, water bearing	0.0	Onsite
GW967443	0m-1m Topsoil 1m-4m Red clay 4m-12m Grey clay 12m-14m Sand and clay 14m-15.5m Grey clay 15.5m-17m Sand 17m-31m Grey clay 31m-34m Sand and gravel 34m-39m Grey clay 39m-42m Gravel and clay 42m-44m Grey clay 44m-68m Red clay 68m-75.5m Sandstone 75.5m-76.24m Yellow clay	0.0	Onsite
GW025222	0m-3.05m Clay 0m-1.53m Clay; brown 1.53m-3.05m Clay; light brown 3.05m-15.24m Sand sandy clay 3.05m-4.58m Sand; light brown to yellowish, fine to medium, a little clay 4.58m-6.1m Sand; light brown to orange, fine to medium 6.1m-7.63m Sand; light brown to orange, & some clay 7.63m-9.15m Sand; light brown to orange, fine, some medium sand	0.0	Onsite

Groundwater Bore ID	From Depth – To Depth (m) Lithology	Distance (m)	Direction
	9.15m-10.68m Sand; brown to orange brown, fine to medium, some coarse sand & fine gravel 5% 10.68m-12.2m Sand; orange brown, fine & silt, a little clay 12.2m-13.73m Sand; light rown to light grey & silt 13.73m-15.25m Sand; light brown, fine & silt, some medium sand 15.24m-18.29m Clay red 15.25m-18.3m Clay; light brown to light grey 18.29m-22.86m Gravel claybound 18.3m-19.83m Sandy clay; light brown & light grey, fine 19.83m-21.35m Gravel; light brown, medium & fine to medium sand, some coarse gravel 21.35m-22.88m Gravel; overall colour greyish to light brown, medium to coarse, some pebbles 1 in diameter, some medium to fine sand 22.86m-32m Gravel fine-coarse water supply 22.88m-24.4m Gravel; light brown to greyish, fine, some medium gravel & coarse to medium sand 24.4m-25.93m Gravel; light brown, fine to medium, a little fine to medium sand 25.93m-27.45m Gravel; light brown to greyish (overall), fine to medium, some coarse gravel & coarse sand 27.45m-28.98m Gravel; light brown to greyish, fine to medium, a little fine to medium sand 28.98m-30.5m Gravel; light brown to greyish, medium, some fine gravel, a little fine to medium sand 30.5m-32.03m Sand; light brown, medium to coarse, a few coarse gravel pebbles, a little clay & fine sand 32m-41.15m Clay 32.03m-33.55m Gravel; light brown to light grey, medium & clay, some coarse gravel & fine sand 33.55m-36.6m Sandy clay; light brown to light grey, fine to medium 36.6m-38.13m Sandy clay; as above - & coarse gravel pebbles, a little fine to coarse and 38.13m-39.65m Sand; light brown to greyish, medium to coasre & clay, some fine sand 39.65m-41.18m Sand; light brown light grey, fine to medium & clay, some coarse sand, a few medium gravel pebbles 41.15m-42.67m Gravel 41.18m-42.7m Sand; ligth grey to yellowish, coarse to fine gravel (mainly quartz), some fine to medium sand 42.67m-56.39m Clay 42.7m-44.23m Sand; light grey, fine & silty clay, a little coarse sand 5% 44.23m-45.75m Sand; light grey to grey, medium to coarse & clay, some fine sand & silt 45.75m-47.28m No sample 47.28m-51.85m Sandy clay; light brown to light grey, fine to medium 51.85m-53.38m Sandy clay; as above, but fine sandy clay 53.38m-54.9m Sandy clay; light brown, fine 54.9m-56.43m Clay; light brown, containing fine-medium sand, some fine gravel, pebles present 56.39m-62.48m Sand coarse water supply 56.43m-57.95m Sand; light brown to cream, medium to coarse, some fine sand 57.95m-59.48m Sand; as above - except fine to medium sand & some coarse sand 59.48m-61m No sample 61m-62.53m Sand; light brown, coarse to medium, some fine sand, a little fine gravel 5% 62.48m-65.53m Clay 62.53m-64.05m Sandy clay; light brown, fine to medium, some coarse sand 64.05m-65.58m Sandy clay; light brown, fine to coarse 65.53m-96.93m Gravel coarse water supply 65.58m-71.68m Gravel; light brown to cream, fine to coarse sand, some medium to fine sand 71.68m-76.25m Sand; light brown, fine to coarse, some fine gravel 76.25m-77.78m Sand; light grey, fine to medium, some coarse sand, a little fine gravel 5% 77.78m-79.3m Silty clay; light grey, containing some fine gravel & fine sand 79.3m-80.83m Sand; light brown to light grey, fine to medium, & fine gravel 80.83m-82.35m Sand; light brown to greyish, medium to coarse, fine to medium gravel, some fine sand 82.35m-83.88m Sand; light brown, medium to coarse, some fine to medium gravel		

Groundwater Bore ID	From Depth – To Depth (m) Lithology	Distance (m)	Direction
	83.88m-85.4m Sand; light brown to grey, fine to coarse, fine gravel (grey) 85.4m-88.45m Sand; greyish, fine to coarse & fine gravel 88.45m-89.98m Sand; light brown to cream, fine to coarse, some fine & medium gravel 15% (greyish) 89.98m-93.03m Gravel; overall light brown to greyish, fine (greyish), fine to coasre sand (light brown) 93.03m-94.55m Sand; light brown, medium to coarse, a little fine gravel & fine sand 94.55m-96.08m Gravel; light brown, fine to medium, some fine to coarse sand 96.08m-97.6m Clay; light grey, & medium gravel 96.93m-102.11m Sandstone 97.6m-100.65m Silty clay; grey (sandstone?) 100.65m-105.23m Sandy clay; light grey (sandstone bedrock?)		
GW968869	0m-4m Topsoil, grey, clay 4m-30m Sandstone, tan 30m-31m Sand & gravel, salt water aquifer 31m-48m Clay, with sandstone bands 48m-54m Sandstone, orange 54m-78m Sandstone, tan & white bands 78m-84m Sandstone, grey, coarse	0.0	Onsite
GW969347	0m-2m Sand, red 2m-29m Sandstone, tan 29m-42m Gravel, in sand 42m-82m Sandstone, tan, soft, wet, unconsolidasted with some clay bands 82m-126m Sandstone, harder, tan, with water bearing bands of gravel (consolidated), bands at 88 & 96m, thicker & more obvious tha	0.0	Onsite
GW050237	#N/A	0.0	Onsite
GW046671	#N/A	0.0	Onsite
GW049575	#N/A	0.0	Onsite
GW901737	#N/A	0.0	Onsite
GW966227	#N/A	0.0	Onsite
GW062398	#N/A	0.0	Onsite
GW967879	#N/A	0.0	Onsite
GW968419	#N/A	0.0	Onsite
GW969950	#N/A	0.0	Onsite
GW969670	#N/A	0.0	Onsite
GW903989	#N/A	0.0	Onsite
GW968646	#N/A	16.1	South
GW030442	0m-1.5m Clay dark brown 0m-1.5m Dark brown clay. 1.5m-3.4m Clay light brown 1.5m-3.4m Light brown clay. 3.4m-7m Clay grey fine sandy 3.4m-7m Fine sandy brown and grey clay. 7m-7.9m Clay grey coarse sandy 7m-7.9m Coarse sandy brown and grey clay. 7.9m-9.1m Clay yellow coarse sandy 7.9m-9.1m Coarse sandy yellow clay. 9.1m-10.4m Clay grey fine sandy 9.1m-10.4m Fine sandy grey and brown clay. 10.4m-10.7m Clay reddish grey fine sandy 10.4m-10.7m Fine sandy reddish brown and grey clay. 10.7m-11.3m Clay yellow grey fine sandy 10.7m-11.3m Fine sandy yellow and grey clay. 11.3m-12.2m Clay light brown grey	47.1	North

Groundwater Bore ID	From Depth – To Depth (m) Lithology	Distance (m)	Direction
	11.3m-12.2m Light brown and grey clay. 12.2m-13.4m Clay greyish coarse sandy 12.2m-13.4m Coarse sandy reddish brown clay. 13.4m-14m Clay very coarse sandy 13.4m-14m Very coarse sandy brown clay. 14m-15.2m Clay light brown grey 14m-15.2m Light brown and grey clay. 15.2m-16.6m Brown and grey sandy clay. 15.2m-16.6m Clay grey sandy 16.6m-23.2m Brown and grey clay. 16.6m-23.2m Clay grey 23.2m-25.3m Clay gravel sandy 23.2m-25.3m Gravelly brown sandy clay. 25.3m-29m Brown sand and gravel. 25.3m-29m Sand gravel 29m-30.2m Brown clay. 29m-30.2m Clay 30.2m-30.8m Brown clay some sand. 30.2m-30.8m Clay some sand 30.8m-32.3m Brown and grey clay. 30.8m-32.3m Clay grey 32.3m-42.1m Fine grey sand and gravel brown clay bands. 32.3m-42.1m Sand grey fine gravel clay bands 42.1m-44.2m Brown clay. 42.1m-44.2m Clay 44.2m-51.2m Fine grey sand and gravel brown clay bands. 44.2m-51.2m Sand grey fine gravel clay bands 51.2m-67.1m Brown and grey clay. 51.2m-67.1m Clay grey 67.1m-74.7m Brown clay. 67.1m-74.7m Clay 74.7m-76.2m Brown and grey clay. 74.7m-76.2m Clay grey 76.2m-81.4m Blue grey clay. 76.2m-81.4m Clay grey 81.4m-99.7m Fine grey sand, gravel and clay bands and wood. 81.4m-99.7m Sand grey fine gravel clay bands wood 99.7m-102.1m Clay grey 99.7m-102.1m Grey clay. 102.1m-104.5m Brown and grey clay. 102.1m-104.5m Clay grey 104.5m-111.9m Fine grey sand and gravel, some wood. 104.5m-111.9m Sand grey fine gravel some wood 111.9m-114m Wood 111.9m-114m Wood. 114m-116.4m Fine grey sand and gravel. 114m-116.4m Sand grey fine gravel 116.4m-117.7m Grey sandstone. 116.4m-119.9m Sandstone grey 117.653m-119.482m Sandstone - jurassic pilliga(?); light grey, medium to coarse grained, angular, grains predominantly clear quartz in an argillaceous cement. minor smoky quartz, mica & pyrite are also present. carbonaceous material is scarce & is associated with well		
GW030442	0m-1.5m Clay dark brown 0m-1.5m Dark brown clay. 1.5m-3.4m Clay light brown 1.5m-3.4m Light brown clay. 3.4m-7m Clay grey fine sandy 3.4m-7m Fine sandy brown and grey clay. 7m-7.9m Clay grey coarse sandy 7m-7.9m Coarse sandy brown and grey clay. 7.9m-9.1m Clay yellow coarse sandy 7.9m-9.1m Coarse sandy yellow clay. 9.1m-10.4m Clay grey fine sandy 9.1m-10.4m Fine sandy grey and brown clay. 10.4m-10.7m Clay reddish grey fine sandy 10.4m-10.7m Fine sandy reddish brown and grey clay. 10.7m-11.3m Clay yellow grey fine sandy 10.7m-11.3m Fine sandy yellow and grey clay.	47.1	North

Groundwater Bore ID	From Depth – To Depth (m) Lithology	Distance (m)	Direction
	11.3m-12.2m Clay light brown grey 11.3m-12.2m Light brown and grey clay. 12.2m-13.4m Clay greyish coarse sandy 12.2m-13.4m Coarse sandy reddish brown clay. 13.4m-14m Clay very coarse sandy 13.4m-14m Very coarse sandy brown clay. 14m-15.2m Clay light brown grey 14m-15.2m Light brown and grey clay. 15.2m-16.6m Brown and grey sandy clay. 15.2m-16.6m Clay grey sandy 16.6m-23.2m Brown and grey clay. 16.6m-23.2m Clay grey 23.2m-25.3m Clay gravel sandy 23.2m-25.3m Gravelly brown sandy clay. 25.3m-29m Brown sand and gravel. 25.3m-29m Sand gravel 29m-30.2m Brown clay. 29m-30.2m Clay 30.2m-30.8m Brown clay some sand. 30.2m-30.8m Clay some sand 30.8m-32.3m Brown and grey clay. 30.8m-32.3m Clay grey 32.3m-42.1m Fine grey sand and gravel brown clay bands. 32.3m-42.1m Sand grey fine gravel clay bands 42.1m-44.2m Brown clay. 42.1m-44.2m Clay 44.2m-51.2m Fine grey sand and gravel brown clay bands. 44.2m-51.2m Sand grey fine gravel clay bands 51.2m-67.1m Brown and grey clay. 51.2m-67.1m Clay grey 67.1m-74.7m Brown clay. 67.1m-74.7m Clay 74.7m-76.2m Brown and grey clay. 74.7m-76.2m Clay grey 76.2m-81.4m Blue grey clay. 76.2m-81.4m Clay grey 81.4m-99.7m Fine grey sand, gravel and clay bands and wood. 81.4m-99.7m Sand grey fine gravel clay bands wood 99.7m-102.1m Clay grey 99.7m-102.1m Grey clay. 102.1m-104.5m Brown and grey clay. 102.1m-104.5m Clay grey 104.5m-111.9m Fine grey sand and gravel, some wood. 104.5m-111.9m Sand grey fine gravel some wood 111.9m-114m Wood 111.9m-114m Wood. 114m-116.4m Fine grey sand and gravel. 114m-116.4m Sand grey fine gravel 116.4m-117.7m Grey sandstone. 116.4m-119.9m Sandstone grey 117.653m-119.482m Sandstone - jurassic pilliga(?); light grey, medium to coarse grained, angular, grains predominantly clear quartz in an argillaceous cement. minor smoky quartz, mica & pyrite are also present. carbonaceous material is scarce & is associated with well		
GW030442	0m-1.5m Clay dark brown 0m-1.5m Dark brown clay. 1.5m-3.4m Clay light brown 1.5m-3.4m Light brown clay. 3.4m-7m Clay grey fine sandy 3.4m-7m Fine sandy brown and grey clay. 7m-7.9m Clay grey coarse sandy 7m-7.9m Coarse sandy brown and grey clay. 7.9m-9.1m Clay yellow coarse sandy 7.9m-9.1m Coarse sandy yellow clay. 9.1m-10.4m Clay grey fine sandy 9.1m-10.4m Fine sandy grey and brown clay. 10.4m-10.7m Clay reddish grey fine sandy 10.4m-10.7m Fine sandy reddish brown and grey clay. 10.7m-11.3m Clay yellow grey fine sandy	47.1	North

Groundwater Bore ID	From Depth – To Depth (m) Lithology	Distance (m)	Direction
	10.7m-11.3m Fine sandy yellow and grey clay. 11.3m-12.2m Clay light brown grey 11.3m-12.2m Light brown and grey clay. 12.2m-13.4m Clay greyish coarse sandy 12.2m-13.4m Coarse sandy reddish brown clay. 13.4m-14m Clay very coarse sandy 13.4m-14m Very coarse sandy brown clay. 14m-15.2m Clay light brown grey 14m-15.2m Light brown and grey clay. 15.2m-16.6m Brown and grey sandy clay. 15.2m-16.6m Clay grey sandy 16.6m-23.2m Brown and grey clay. 16.6m-23.2m Clay grey 23.2m-25.3m Clay gravel sandy 23.2m-25.3m Gravelly brown sandy clay. 25.3m-29m Brown sand and gravel. 25.3m-29m Sand gravel 29m-30.2m Brown clay. 29m-30.2m Clay 30.2m-30.8m Brown clay some sand. 30.2m-30.8m Clay some sand 30.8m-32.3m Brown and grey clay. 30.8m-32.3m Clay grey 32.3m-42.1m Fine grey sand and gravel brown clay bands. 32.3m-42.1m Sand grey fine gravel clay bands 42.1m-44.2m Brown clay. 42.1m-44.2m Clay 44.2m-51.2m Fine grey sand and gravel brown clay bands. 44.2m-51.2m Sand grey fine gravel clay bands 51.2m-67.1m Brown and grey clay. 51.2m-67.1m Clay grey 67.1m-74.7m Brown clay. 67.1m-74.7m Clay 74.7m-76.2m Brown and grey clay. 74.7m-76.2m Clay grey 76.2m-81.4m Blue grey clay. 76.2m-81.4m Clay grey 81.4m-99.7m Fine grey sand, gravel and clay bands and wood. 81.4m-99.7m Sand grey fine gravel clay bands wood 99.7m-102.1m Clay grey 99.7m-102.1m Grey clay. 102.1m-104.5m Brown and grey clay. 102.1m-104.5m Clay grey 104.5m-111.9m Fine grey sand and gravel, some wood. 104.5m-111.9m Sand grey fine gravel some wood 111.9m-114m Wood 111.9m-114m Wood. 114m-116.4m Fine grey sand and gravel. 114m-116.4m Sand grey fine gravel 116.4m-117.7m Grey sandstone. 116.4m-119.9m Sandstone grey 117.653m-119.482m Sandstone - jurassic pilliga(?); light grey, medium to coarse grained, angular, grains predominantly clear quartz in an argillaceous cement. minor smoky quartz, mica & pyrite are also present. carbonaceous material is scarce & is associated with well		
GW030357	0m-48m Clay green 48m-48.7m Sand grey 48.7m-53.3m Clay 53.3m-58m Clay coloured 58m-61.5m Clay mixed 61.5m-72m Clay 72m-76.2m Clay mixed 76.2m-81m Shale 81m-81.7m Sand or sandstone 81.7m-87.7m Shale	47.1	North
GW030357	0m-48m Clay green 48m-48.7m Sand grey 48.7m-53.3m Clay 53.3m-58m Clay coloured	47.1	North

Groundwater Bore ID	From Depth – To Depth (m) Lithology	Distance (m)	Direction
	58m-61.5m Clay mixed 61.5m-72m Clay 72m-76.2m Clay mixed 76.2m-81m Shale 81m-81.7m Sand or sandstone 81.7m-87.7m Shale		
GW030255	0m-1.53m Sand; light orangey brown, silty & clayey, fine to coarse, angular to subangular, micaceous, mainly clear quartz. 1.53m-3.05m Clayey sand & sandy clay; grey & orangey brown, fine to coarse grains, angular, slightly micaceous, mainly composed of clear quartz, minor amounts of jasper & basalt. carbonaceous material present in sample. 3.05m-3.97m Clay; multicoloured, micaceous, silty, fine to coasre sandy (<30%), angular to subangular, mainly clear quartz. traces of carbonaceus material is present in sample. 3.97m-6.1m Sand; very light brown, silty (fine 20%, medium 30% & coarse to very coarse 50%), angular to subangular, almost entirely composed of clear quartz, with minor amounts of basalt & rose quartz. 6.1m-9.15m Sand; 80%, silty, light greyish brown (fine 30%, medium 20% & coarse 30%), angular to subangular, mainly clear quartz. gravel 20%, fine, subangular to subrounded, mainly clear quartz. 9.15m-10.68m Sand; 70%, fine to coasre, light brown, silty & slightly clayey, angular to subangular, mainly clear quartz. gravel 30%, fine, angular to subrounded, composed mainly of clear quartz, minor amounts being rose & smokey quartz. carbonaceous material is 10.68m-12.2m Sand; 90%, micaceous, light orangey brown, silty & slightly clayey, angular to subangular, mainly clear quartz. gravel 10%, fine, subangular to subrounded, composed of clear & smokey quartz & basalt. carbonaceous material is present & has been retained 12.2m-13.73m Sand; light yellowish brown, micaceous, silty & sample is slightly compacted, fine to coarse grains, angular to subangular, mainly composed of clear quartz. 13.73m-15.25m Sand & gravel; sand 50%, light greyish brown, micaceous, fine to coasre, angular to subangular, mainly composed of clear quartz. gravel 50%, fine, angular to subrounded, composed of clear smokey & rose quartz. 15.25m-16.78m Sand; light orangey brown, very silty & slightly clayey, micaceous, fine to very coasre, angular to subangular, mainly composed of clear quartz, minor amounts of smokey & rose quartz. 16.78m-18.3m Sandy clay 60%; & gravelly clay 40%; multicoloured, silty & micaceous, fine to coarse sand grains, angular to subangular, composed mainly of clear quartz, fine gravel grains subangular to subrounded, composed of clear smokey & rose quartz, jasper & 18.3m-19.83m Clay; light brown, silty & micaceous, fine to coasre sandy (<20%), angular, mainly clear quartz & fine gravelly (<5%), subangular to subrounded, mainly clear quartz, minor amounts of smokey quartz. 19.83m-21.35m Sand; light brown, very silty & clayey, fine to very coarse grains, angular to subangular, composed of clear smokey & rose quartz. 21.35m-24.4m Clay; light orangey brown & greyish brown, fine to coasre sandy (<20%), angular to subangular, composed mainly of clear quartz. 24.4m-27.45m Clay; light brown & greyish brown, micaceous, fine to coasre sandy (<30%), angular to subangular, composed mainly of clear quartz, fine gravelly (<5%), subangular to subrounded, composed of clear smokey & rose quartz, basalt & jasper. 27.45m-28.98m Sand; 50%, light brownish grey, fine to very coasre, silty, angular to subangular, mainly composed of clear quartz. gravel 40%, fine to meidum grains, angular to subrounded, composed of clear smokey & rose quartz, jasper, basalt, trachyte, quartz 30.5m-30.5m Gravel; 95%, fine to medium, angular to subrounded, composed of clear smokey & rose quartz, jasper, basalt, quartz feldspar porphyry, siltstone & chert. clay 5%, very light brown, silty & slightly micaceous, fine to coasre sandy & fine to medium 30.5m-32.03m Gravel; 95%, reddish brown, fine to medium, angular to subangular, mainly composed of jasper, minor amounts being clear & smokey quartz, porphyry & basalt. clay 5%, light brown, silty, micaceous & fine to coarse sandy. 32.03m-33.55m Gravel; reddish grey (fine 80% & medium 20%), angular to subrounded, polymictic, composed of clear smokey & rose quartz, jasper, basalt, quartz porphyry, quartz feldspar porphyry, chert, siltstone, quartzite, sandstone & an amygdaloidal basalt. 33.55m-36.6m Sand & gravel; 50%, light yellowish brown, silty, clayey, angular to	47.3	North

Groundwater Bore ID	From Depth – To Depth (m) Lithology	Distance (m)	Direction
	subangular, mainly clear quartz. gravel 50%, fine to medium, subangular to subrounded, smokey & rose quartz, jasper, basalt & porphyry. 36.6m-42.7m Clay; light orange brown & grey, silty, micaceous, fine to medium sandy, angular to subangular, mainly clear quartz. 42.7m-47.28m Clay; multicoloured, pink, grey & orange brown, fine to coarse sandy (<10%), angular, mainly clear quartz & fine to medium gravelly (<5%), subangular to subrounded, mainly clear quartz, basalt & jasper. 47.28m-53.38m Clay; light orangey brown, silty, fine to coasre sandy (<10%), angular, mainly clear quartz & fine to medium gravelly (<20%), subangular to subrounded, composed of clear quartz, jasper & basalt. 53.38m-61m Clay; light orangey brown, grey & whitish grey, micaceous, silty, fine to medium sandy (<10%), angular to subangular, mainly clear quartz & fine to medium gravelly (<10%), subangular to subrounded, mainly jasper, basalt & quartz. dentrites appears in 78.69m-78.77m Quartz feldspar porphyry; dark reddish brown, matrix with large pinkish phenocrysts of feldspar (orthoclase) up to 50mm in dia, & having a tendency to be orientated in 1 direction & a smaller, much less numberous, quartz phenocryst being up to 10mm in 78.77m-79.3m Sandstone; very hard, ligth grey, medium to coarse grains, clear quartz, angular to subangular, argillaceous cementing material, little to no calcareous material. carbonaceous veins of up to 30mm in dia. intersect the sandstone at 78.84m & 79.15m, both 79.3m-79.45m Sandstone; grading into a gritstone, light grey, coarse sand grains into a fine gravel, angular to subrounded, the main constituent being clear quartz with several other quartz varieties as minor constituents. cementing material is argillaceous. 79.45m-79.76m Sandstone; medium to coarse sand grains, clear quartz is the main constituent, angular to subangular, argillaceous cementing material, only a minute amount of calcareous material is present. carbonaceous veins are present in this section up to 40mm in 79.76m-80.67m Sandstone; very coarse, grading into a medium sized gritstone, light yellowish grey. medium to coarse sand & fine to medium gravel grains, angular to subrounded, composed mainly of clear quartz, smokey quartz & basalt are minor constituents. the 80.67m-81.59m Sandstone; light khaki grey, medium to coarse grains, mainly composed of clear quartz, angular to subrounded, cementing material is argillaceous, with little to no calcareous material. only one carbaonceous vein is present in this section of about 20mm		
GW968713	0m-0.6m Topsoil 0.6m-4.6m Clay, brown 4.6m-6.1m Sand, brown, fine to medium 6.1m-34.7m Clay, some sandy 34.7m-35.1m Sand, brown, fine to coarse 35.1m-54.9m Sandy clay 54.9m-71.3m Sandstone, grey 71.3m-71.6m Shale, hard, grey 71.6m-88.4m Sandstone 88.4m-97.5m Shale, dark grey	48.2	South
GW968140	0m-1m Topsoil 1m-22m Clay, brown 22m-35m Sandstone, soft 35m-47m Fractured sandstone 47m-48m Sandstone, hard	86.7	East
GW968701	0m-1m Topsoil 1m-5m Sandy, brown, dry 5m-7m Sand, white, water bearing 7m-12.5m Sand, compacted, red 12.5m-31m Clay, grey 31m-76m Clay, coloured 76m-94m Sandstone, fractured, water bearing 94m-95m Sandstone, hard	104.1	South-east
GW071970	#N/A	120.1	South
GW967999	0m-1m Topsoil 1m-3m Clay 3m-5m Sandy clay 5m-10.5m Clay, yellow & grey 10.5m-12m Sand, dry 12m-17m Sandy clay	131.5	North-east

Groundwater Bore ID	From Depth – To Depth (m) Lithology	Distance (m)	Direction
	17m-20m Sandstone, mauve 20m-27m Sandstone, soft, water bearing 27m-28m Sandstone, hard 28m-35m Sandstone, soft, water bearing 35m-39m Sandstone with clay bands, water bearing 39m-41m Sand, water bearing 41m-42m Sandstone, hard		
GW042691	0m-0.61m Topsoil 0.61m-16.8m Sandstone 16.8m-17.8m Sandstone water supply 17.8m-22m Clay 22m-30.5m Shale 30.5m-33.8m Sandstone 33.8m-34.6m Sandstone water supply 34.6m-45.8m Sandstone 45.8m-51m Sandstone water supply 51m-51.8m Clay	132.0	South-west
GW034115	0m-0.91m Topsoil 0.91m-5.48m Clay 5.48m-10.66m Clay sandstone 10.66m-19.81m Sandstone water supply 19.81m-21.33m Sandstone	149.9	North-east
GW904614	#N/A	159.7	South-east
GW047450	0m-0.7m Loam 0.7m-4.3m Clay yellow 4.3m-6.1m Clay grey 6.1m-10.6m Clay grey sandy 10.6m-13.9m Sandstone hard soak 13.9m-47.3m Clay red grey sandy some small gravel, calcite bands 47.3m-54m Clay yellow hard sandy 54m-62.1m Clay yellow sandy 62.1m-62.7m Sandstone hard 62.7m-69.6m Sandstone yellow soft fine medium water supply 69.6m-72.6m Sandstone white light yellow water supply 72.6m-76.9m Clay yellow sandy 76.9m-79.9m Sandstone yellow white soft water supply 79.9m-84m Clay yellow sandy soft 84m-84.6m Sandstone hard 84.6m-85.9m Clay 85.9m-92.1m Shale light blue sandy 92.1m-93m Shale yellow hard sandy 93m-97m Shale yellow hard	162.1	East
GW043080	0m-0.91m Topsoil 0.91m-45.11m Sandstone water supply 45.11m-45.72m Clay sandstone	170.1	East
GW970125	0m-1.2m Topsoil 1.2m-4.9m Clay, brown 4.9m-7.9m Sandstone, hard 7.9m-8.8m Clay, brown 8.8m-16.2m Sandstone, hard 16.2m-33.2m Clay, rocky, red & grey 33.2m-55.2m Sandstone, clayey, grey 55.2m-62.5m Sandstone, clayey, yellow 62.5m-73.1m Sandstone, white/grey 73.1m-78m Clay, white 78m-81.7m Sandstone, white 81.7m-85.3m Shale, grey & black	172.3	East
GW970601	#N/A	190.7	South
GW014486	0m-15.24m Sand water supply 15.24m-24.38m Sandstone soft 24.38m-33.52m Sand water supply	221.3	South-east
GW043641	0m-1.83m Clay 1.83m-6.1m Clay red sandy 6.1m-21.34m Sandstone red 21.34m-21.95m Water supply 21.95m-30.48m Sandstone yellow 30.48m-51.82m Sandstone clayey	228.2	East

Groundwater Bore ID	From Depth – To Depth (m) Lithology	Distance (m)	Direction
	51.82m-57.91m Sandstone water supply 57.91m-59.44m Sandstone yellow 59.44m-63.4m Sandstone water supply		
GW035454	0m-0.61m Topsoil 0.61m-4.57m Clay 4.57m-10.67m Sandstone yellow 10.67m-11.58m Sandstone red 11.58m-12.19m Sandstone water supply 12.19m-25.6m Sandstone red 25.6m-39.93m Sandstone 39.93m-45.42m Sandstone water supply 45.42m-48.77m Sandstone	239.3	North-west
GW043487	0m-0.91m Topsoil 0.91m-21.34m Sandstone 21.34m-22.86m Clay 22.86m-45.72m Sandstone water supply	257.7	South-east
GW000020	0m-0.91m Soil 0.91m-1.52m Cement 1.52m-3.04m Clay 3.04m-27.43m Sand rock 27.43m-44.19m Clay water supply 44.19m-45.72m Gravel 45.72m-59.43m Sandstone 59.43m-79.24m Shale water supply 79.24m-87.17m Sand 87.17m-89.91m Clay 89.91m-91.44m Sand solid water supply	267.6	South
GW064124	0m-0.6m Topsoil 0.6m-2.43m Clay 2.43m-7.92m Sandstone 7.92m-12.19m Clay sandy soak 12.19m-24.38m Clay 24.38m-25.9m Clay sandy water bearing 25.9m-38.1m Clay 38.1m-39.62m Sandstone sandy water bearing 39.62m-48.76m Clay 48.76m-50.29m Sandstone 50.29m-74.67m Clay 74.67m-77.72m Sand water bearing water supply 77.72m-78.33m Sandstone	297.1	North-west
GW056418	0m-2m Clay 2m-3.3m Sandstone white hard 3.3m-4m Clay red sandy 4m-8m Clay red yellow sandy water bearing 8m-12.3m Sandstone yellow water bearing 12.3m-14m Clay yellow grey water bearing 14m-15.6m Clay grey water bearing 15.6m-18m Sandstone yellow soft water bearing 18m-22m Sandstone yellow coarse 22m-23.3m Sandstone yellow grey 23.3m-25.3m Clay grey 25.3m-27.3m Clay yellow grey 27.3m-30.3m Clay grey 30.3m-35.6m Clay grey yellow water bearing 35.6m-36.3m Clay grey hard 36.3m-37m Clay grey yellow water supply 37m-38.3m Clay yellow water supply 38.3m-39m Clay yellow 38.3m-39m Sandstone grey lumps 39m-40m Clay grey sandy water bearing 40m-43.3m Sandstone red	298.5	North-west
GW968684	0m-5m Sandy clay, grey 5m-10m Sandstone, coarse, tan 10m-11m Clay, grey 11m-30m Sandstone, coarse, yellow & tan 30m-35m Sandstone, white, with clay bands 35m-53m Sandstone, coarse, yellow & tan, with some gravel & ironstone bands, water bearing	307.0	North-east

Groundwater Bore ID	From Depth – To Depth (m) Lithology	Distance (m)	Direction
GW901889	0m-0.6m Sandy topsoil 0.6m-4.8m Hard red sandstone with iron stone bands 4.8m-18.2m Soft red sandstone 18.2m-20.1m Ironstone 20.1m-41.3m Soft brown sandstone 41.3m-54m Soft quartz sandstone	307.3	East
GW966816	0m-0.2m Gravel 0.2m-0.8m Fill 0.8m-2m Silty sand 2m-6m Sandstone	321.3	North
GW966817	0m-0.1m Gravel 0.1m-1m Gravelly sand 1m-1.8m Clayey silty sand 1.8m-5.5m Sandstone 5.5m-10m Clayey sand	327.1	North
GW966818	0m-0.1m Gravel 0.1m-1m Fill 1m-2m Silty sand 2m-4m Sandstone 4m-10m Sandstone	329.9	North
GW966819	0m-10m Sandstone	331.7	North
GW045401	0m-1m Topsoil 1m-29.4m Sandstone 29.4m-30.4m Sandstone water bearing water supply 30.4m-35.3m Clay 35.3m-45m Sandstone water bearing water supply 45m-46m Sandstone	336.5	South-east
GW056623	0m-0.3m Topsoil 0.3m-6m Clay 6m-64m Sandstone water supply 64m-65m Clay	338.7	South
GW068139	0m-1.8m Top soil 1.8m-16.2m Sandy clay 16.2m-17.1m Gravel & clay 17.1m-37.4m Sandy clay 37.4m-41.6m Clay 41.6m-75.8m Sandy clay 75.8m-89.6m Quartz sandstone	350.3	North
GW900811	0m-3.66m Brown clay 3.66m-12m Sandstone 12m-16.46m Brown clay 16.46m-28.96m Sandstone 28.96m-38.11m Clay 38.11m-46.65m Sandtsone	352.8	North
GW902062	0m-3.66m Brown clay 3.66m-12m Sandstone 12m-16.46m Brown clay 16.46m-28.96m Sandstone 28.96m-38.11m Clay 38.11m-46.65m Sandstone	352.8	North
GW043642	#N/A	363.6	East
GW968285	#N/A	364.7	East
GW058767	0m-0.7m Topsoil 0.7m-1.8m Clay 1.8m-23m Sandstone 23m-28m Clay 28m-54m Sandstone water supply	371.0	South
GW970600	#N/A	378.9	South
GW020673	0m-4.57m Loam clay 4.57m-6.4m Limestone soft 6.4m-8.22m Clay 8.22m-15.24m Sand some porous clay coarse	385.7	East
GW034558	0m-0.6m Topsoil 0.6m-1.82m Clay red	386.2	South

Groundwater Bore ID	From Depth – To Depth (m) Lithology	Distance (m)	Direction
	1.82m-21.33m Sandstone yellow 21.33m-23.16m Clay white 23.16m-27.12m Sandstone yellow 27.12m-30.48m Sandstone water supply 30.48m-37.18m Sandstone yellow 37.18m-40.84m Sandstone water supply 40.84m-41.14m Clay red		
GW067564	0m-0.8m Topsoil 0.8m-4.5m Sandy clay 4.5m-18.6m Limestone 18.6m-19.8m Weathered sandstone 19.8m-23.1m Clay 23.1m-76.2m Sandy clay	400.6	East
GW901495	0m-0.6m Loam topsoil 0.6m-30.2m Sand clay - brown 30.2m-40.1m Sand and fine gravel 40.1m-42.3m Sand clay - brown 42.3m-45m Sand and gravel 45m-48m Sandy clay - brown	409.5	West
GW026649	0m-1.21m Topsoil 1.21m-2.74m Clay 2.74m-4.26m Clay light brown sandy 4.26m-6.4m Clay yellow sandy 6.4m-8.83m Sand yellow compacted 8.83m-17.06m Clay pinkish sandy 17.06m-24.99m Clay pinkish sandy stones large ferruginous 24.99m-28.04m Sandstone red clayey 28.04m-31.08m Sandstone yellow clayey 31.08m-32m Sandstone yellow soft water supply 32m-47.85m Clay yellow sandy 47.85m-48.46m Clay yellow sticky 48.46m-57.3m Clay yellow sandy 57.3m-62.78m Clay yellow sticky 62.78m-64.61m Clay yellow white sandy gravel 64.61m-65.22m Sandstone yellow tight water supply 65.22m-70.1m Clay yellow grey tight sandy 70.1m-71.62m Clay yellow tight sandy gravel soft 71.62m-76.2m Clay yellow tight sandy gravel hard 76.2m-80.46m Sandstone yellow clayey 80.46m-81.38m Sandstone yellow coarse water supply 81.38m-83.51m Clay yellow sandy hard	413.5	South-east
GW044770	0m-0.6m Topsoil 0.6m-2.3m Clay 2.3m-4.5m Sandstone 4.5m-29m Clay 29m-30m Sandstone 30m-42.7m Sandstone water supply	417.8	East
GW054590	0m-0.4m Topsoil 0.4m-2m Clay 2m-6m Sandstone 6m-7.5m Shale 7.5m-45.5m Sandstone water supply	446.6	East
GW056923	0m-0.7m Loam sandy 0.7m-2.4m Clay 2.4m-7.2m Clay light brown sandy 7.2m-10m Clay light grey sandy 10m-11.4m Clay light grey gravel 11.4m-15m Sand light grey water bearing some clay 15m-19.5m Clay sandy 19.5m-23.4m Clay reddish dark brown soft sandy water supply 23.4m-24m Clay reddish hard sandy some gravel water supply 24m-26m Clay reddish sandy 26m-36m Clay dark yellow soft sandy	449.5	North-west
GW061144	0m-1.3m Topsoil 1.3m-1.8m Clay 1.8m-2m Sand 2m-13.2m Clay 13.2m-15.3m Sand 15.3m-17.3m Clay	449.5	North-west

Groundwater Bore ID	From Depth – To Depth (m) Lithology	Distance (m)	Direction
	17.3m-33.9m Sandstone water supply 33.9m-38m Sandstone some seams water supply 38m-43.6m Clay 43.6m-45m Sandstone water supply 45m-47m Clay		
GW902083	0m-1.52m Topsoil 1.52m-7.62m Clay 7.62m-10.66m Sandy clay 10.66m-24.38m Clay 24.38m-28.95m Gravelly clay 28.95m-39.62m Clay 39.62m-44.19m Water bearing gravel 44.19m-48.76m Sandy clay 48.76m-53.34m Water bearing gravel 53.34m-60.96m Clay 60.96m-64m Water bearing gravel 64m-70.1m Clay 70.1m-83.82m Sandstone 83.82m-88.39m Clay 88.39m-89.91m Water bearing gravel 89.91m-96.01m Sandstone 96.01m-97.53m Water bearing gravel 97.53m-103.63m Clay	453.3	South
GW971359	#N/A	460.7	South
GW056424	0m-1m Topsoil 1m-2.8m Sand 2.8m-21.7m Clay 21.7m-28.2m Clay gravel 28.2m-34.5m Gravel sand water supply	473.9	North
GW045133	0m-0.91m Topsoil 0.91m-5.79m Sandstone 5.79m-24.38m Clay 24.38m-27.43m Shale 27.43m-42.67m Clay 42.67m-48.77m Sandstone water supply	476.4	South-west
GW970750	#N/A	482.2	North-west
GW063630	0m-4.57m Topsoil 4.57m-10.66m Clay sandy 10.66m-18.28m Sand clay 18.28m-25.9m Clay sandy 25.9m-28.95m Sand water supply 28.95m-42.67m Clay sandy 42.67m-48.76m Clay 48.76m-68.27m Sandstone 68.27m-71.62m Sandstone hard 71.62m-73.15m Clay soft 73.15m-76.2m Sand water supply 76.2m-77.72m Sandstone hard	509.1	North-west
GW070491	0m-0.914m Topsoil 0.91m-6m Sandy clay 6m-11.5m Fine sand 11.5m-13.1m Clay 13.1m-16.4m White sand & gravel 16.4m-21.6m White clay 21.6m-24.3m Washed river gravel	515.1	North
GW070003	0m-1.3m Topsoil 1.3m-5.2m Sandy clay 5.2m-5.5m Grey clay 5.5m-7.1m Limestone 7.1m-13.9m Sandy clay 13.9m-14.3m Limestone 14.3m-19.6m Red clay 19.6m-20.9m Sand 20.9m-21.1m Lime stone 21.1m-33.2m Sandy clay 33.2m-36.5m Sand 36.5m-41.7m Brown clay	518.1	East

Groundwater Bore ID	From Depth – To Depth (m) Lithology	Distance (m)	Direction
	41.7m-45.9m Sandy clay 45.9m-46.8m Sand 46.8m-47.3m Sandy clay 47.3m-51.1m Sand 51.1m-52.5m Sandy clay 52.5m-52.6m Ironstone		
GW967388	#N/A	558.9	North-west
GW273314.1	#N/A	560.1	North
GW273314.1.1	#N/A	560.1	North
GW273314	#N/A	560.1	North
GW037096	0m-25.9m Driller 25.9m-28.04m Clay white 28.04m-29.87m Sandstone 29.87m-35.05m Sandstone water supply 35.05m-42.67m Sandstone yellow 42.67m-56.69m Sandstone water supply 56.69m-56.99m Clay	586.7	East
GW966828	0m-1m Topsoil 1m-38m Sandstone 38m-51.5m Sandstone	609.2	South
GW902973	#N/A	609.6	South-east
GW025224	0m-4.57m Clay 0m-3.05m Clay; brown 3.05m-6.1m Sand; light brown, silty 4.57m-15.24m Sand sandy clay 6.1m-9.15m Sand; light brown, fine to coarse, few gravel grains 9.15m-12.2m Sand; brown, fine to coarse 12.2m-13.73m Sand; as above - some grey clay 10% 13.73m-15.25m Sand; as above - no clay 15.24m-18.29m Clay yellow 15.25m-16.78m Sand; yellow brown, fine to coarse & fine gravel 16.78m-19.83m Sand; orange-brown, silty 18.29m-25.91m Sand red 19.83m-21.35m Sand; red brown, silty 21.35m-24.4m Sand; orange brown & some grey clay 10% 24.4m-25.93m Sand; red brown, silty & grey clay 5% 25.91m-38.1m Clay 25.93m-28.98m Sandy clay; grey & brown 28.98m-33.55m Sandy clay; brown 33.55m-38.13m Sandy clay; grey & brown 38.1m-39.62m Gravel 38.13m-39.65m Gravel; fine, brown, silty, few medium grains, rounded to subrounded quartz jasper quartzite 39.62m-42.67m Clay 39.65m-42.7m Sandy clay; brown 42.67m-44.2m Gravel water supply 42.7m-44.23m Gravel; fine, brown 44.2m-60.96m Clay grey 44.23m-45.75m Gravel; fine brown & brown sandy clay 50/50 45.75m-57.95m Sandy clay; brown & grey, few gravel grains 57.95m-76.25m Sandy clay; brown & grey 60.96m-68.58m Sandstone 68.58m-74.68m Clay 74.68m-92.96m Sandstone 76.25m-79.3m Sandy clay; multicoloured, brown grey orange, tc & red nodules 79.3m-83.88m Sandy clay; grey & brown, & some fine gravel 5% 83.88m-85.4m Sand; light brown & fine gravel, mainly quartz, & grey & brown sandy clay 30% 85.4m-86.93m Clay; light brown, & sand & fine gravel, mainly quartz & grey & brown sandy clay 50/50 86.93m-88.45m Sand; light brown, silty, & fine gravel mainly quartz, & grey & brown sandy clay 20% 88.45m-91.5m Sandy clay; grey & brown, & few fine gravel grains	624.3	West

Groundwater Bore ID	From Depth – To Depth (m) Lithology	Distance (m)	Direction
	91.5m-93.03m Sand; light brown, silty & fine gravel with grey & brown sandy clay 50/50		
GW965818	0m-1.8m Topsoil/ sandy loam 1.8m-5.5m Sand/red - very fine 5.5m-13.7m Clay/grey and sand bands 13.7m-33.5m Clay/grey and some limestone 33.5m-55.8m Clay/yellow and grey 55.8m-60.9m Sandstone/fine to medium 60.9m-61.5m Sand/fine grey 61.5m-64m Clay/grey and yellow	634.9	South-east
GW901548	0m-1m Top soil 1m-3m Sand 3m-73m Red clay 73m-75m Sand 75m-88m Clay	638.2	South
GW900236	0m-0.9m Topsoil 0.9m-4.87m Clay 4.87m-14.63m Sandstone 14.63m-14.93m Sand & water 14.93m-16.15m Sandstone 16.15m-22.86m Clay & sand 22.86m-30.17m Coarse sand & water 30.17m-30.78m Clay 30.78m-31.39m Coarse sand water 31.39m-35.05m Clay & sand 35.05m-43.89m Water bearing sandstone 43.89m-44.19m Ironstone 44.19m-47.8m Clay & sand	652.1	North-west
GW968056	0m-1m Topsoil 1m-7m Mudstone 7m-13.6m Sandstone 13.6m-21m Mudstone 21m-25m Sandstone, water bearing 25m-30m Mudstone, soft 30m-30.25m Sandstone, soft, water bearing 30.25m-40.6m Mudstone, hard, medium grained	652.3	North
GW018807	#N/A	656.8	North
GW043186	0m-0.91m Topsoil 0.91m-1.82m Clay 1.82m-29.26m Sandstone 29.26m-30.17m Clay 30.17m-45.72m Sandstone water supply	669.2	South-east
GW050158	0m-0.7m Topsoil 0.7m-29.5m Clay 29.5m-31.3m Sandstone water supply 31.3m-43.5m Clay 43.5m-44.5m Sand water supply 44.5m-55.5m Clay 55.5m-60m Sandstone water supply	671.2	East
GW071515	0m-1.6m Sandy topsoil 1.6m-4.1m Limestone 4.1m-23.7m Brown sandy clay 23.7m-37.4m Purple and white clay 37.4m-46.8m Quartz sandstone 46.8m-47.1m Ironstone 47.1m-48m Quartz sandstone	673.5	East
GW904463	#N/A	686.7	East
GW049369	0m-0.6m Topsoil 0.6m-3m Clay 3m-37m Sandstone	707.4	South-east
GW003996	0m-3.04m Soil sandy 3.04m-11.27m Sand dry 11.27m-13.72m Sand dry gravel 13.72m-16m Gravel coarse 16m-24.38m Sandstone rotten 24.38m-34.44m Clay sandy	707.6	West

Groundwater Bore ID	From Depth – To Depth (m) Lithology	Distance (m)	Direction
	34.44m-35.35m Gravel 35.35m-36.88m Gravel sand water supply 36.88m-53.34m Clay sandy water supply 53.34m-59.58m Shale sandy 59.58m-60.19m Rock hard		
GW037916	0m-2.13m Clay 2.13m-5.48m Sandstone 5.48m-13.71m Sandstone red 13.71m-16.45m Clay 16.45m-18.89m Sandstone soft 18.89m-21.64m Clay 21.64m-22.25m Sand red 22.25m-24.68m Gravel water supply 24.68m-36.57m Clay gravel 36.57m-51.81m Sand clay 51.81m-64m Clay red 64m-67.97m Sand gravel 67.97m-74.98m Sandstone water supply	713.6	West
GW034520	0m-1.83m Soil brownish sandy subsoil 1.83m-3.05m Clay yellow sandy 3.05m-6.71m Sandstone yellow grey coarse 6.71m-10.67m Clay grey yellow sandy water supply 10.67m-15.24m Gravel small clay 10.67m-15.24m Sand 15.24m-17.98m Clay grey 17.98m-19.51m Clay light red sandy 19.51m-21.95m Conglomerate 21.95m-39.01m Clay red 39.01m-53.34m Clay dark brown 53.34m-65.84m Clay grey sandy soft water supply 65.84m-79.25m Clay sandy hard 79.25m-97.54m Mudstone hard 97.54m-98.45m Clay sandy 98.45m-101.8m Silt sand drift water supply 101.8m-103.63m Sandstone	713.6	West
GW003716	0m-22.86m Clay 22.86m-65.83m Shale puggy 65.83m-73.15m Shale 73.15m-74.37m Sandstone 74.37m-76.8m Sand drift water supply 76.8m-80.16m Clay sandy	730.3	South
GW035121	0m-0.6m Clay yellow sandy 0.6m-2.74m Clay sandy 2.74m-4.57m Sand fine 4.57m-8.53m Clay grey sandy 8.53m-9.75m Clay grey 9.75m-11.88m Clay yellow 11.88m-15.24m Clay red sandy gravel water supply 15.24m-24.38m Clay yellow sandy 24.38m-39.62m Sandstone yellow clayey water supply 39.62m-44.5m Clay yellow sandy gravel water supply	747.8	East
GW000927	0m-8.53m Clay 8.53m-22.25m Clay sandy 22.25m-25.29m Clay slippery 22.25m-25.29m Shale 25.29m-27.43m Shale 27.43m-38.7m Sand gravel water supply	749.5	West
GW056928	#N/A	770.7	West
GW901674	0m-3m Sand 3m-31m Clay brown 31m-32m Sandstone 32m-57m Clay 57m-62m Sand 62m-64.5m Clay	773.1	South
GW063657	0m-1.82m Topsoil 1.82m-6.09m Clay 6.09m-7.31m Ironstone 7.31m-17.06m Clay sandy	781.3	South-east

Groundwater Bore ID	From Depth – To Depth (m) Lithology	Distance (m)	Direction
	17.06m-18.9m Sand water bearing 18.9m-24.38m Clay sandy 24.38m-28.03m Sand water bearing 28.03m-29.24m Clay sandy 29.24m-29.85m Rock 29.85m-36.57m Clay sandy 36.57m-42.67m Clay 42.67m-47.54m Sand gravel water bearing		
GW030123	0m-3.05m Driller 0m-1.53m Silty sandy loam; brown 1.53m-3.05m Sandy clay; light brown, mottled 3.05m-7.32m Sandstone grey 3.05m-4.58m Sandy clay; light brown, very sandy 4.58m-6.1m Sand; light brown yellowish, silty, mainly quartz grains 6.1m-7.63m Sand; brownish yellow, slightly silty, medium to coarse 7.32m-17.07m Clay yellow grey 7.63m-9.15m Sandy clay; light brown 9.15m-10.68m Sandy clay; light brown, fine, mottled 10.68m-12.2m Sandy clay; light grey, mottled 12.2m-13.73m Sandy clay; light greyish brown 13.73m-15.25m Clay; light yellowish brown, mottled 15.25m-16.78m Clay; light grey & light brownish, slightly micaceous, mottled 16.78m-18.3m Silty clay; orange brown, mottled, a few fine gravel grains, mainly quartz & jasper 2% 17.07m-26.21m Sandstone grey water supply 18.3m-19.83m Sand; light brown, fine to coarse, silty 19.83m-21.35m Sand; light brown, silty, fine to medium 21.35m-22.88m Silt; light brown, fine sandy silt, & sandy mottled clay 20% 22.88m-24.4m Sandy silty clay; light brown, fine sand (mainly jasper & quartz) silty mottled clay - somewhat micaceous 24.4m-25.93m Sand; light brown, silty, fine to medium 25.93m-27.45m Sand; light brown, silty, fine 26.21m-42.67m Clay yellow very sandy water supply 27.45m-28.98m Sand; light brown, silty, fine, & light brown silty mottled clay 40% 28.98m-30.5m Sandy clay; brownish yellow, a few large sand grains 1% 30.5m-32.03m Sand & sandy clay; light yellowish brown, very silty, fine to medium sand, & sandy clay 32.03m-33.55m Sand; orangey brown, as above, sandy clay 20% 33.55m-35.08m Sandy clay; yellowish brown, fine to medium 35.08m-36.6m Sandy clay; as above, but mottled 36.6m-38.13m Silt; yellowish brown, very sandy, 70%, & sandy mottled clay 30%, a few fine gravel (quartz) grains 38.13m-39.65m Silt; light yellowish brown, very sandy (fine) 39.65m-41.18m Silt; as above, but sandy fine to coarse 41.18m-42.7m Silt; as above - 60%, & silty mottled clay 40% 42.67m-67.97m Clay yellow sandy 42.7m-44.23m Silt & silty clay; as above, but 50/50 44.23m-45.75m Silt; light brown, slightly sandy (fine) 45.75m-47.28m Sandy silty clay; orange brown, very sandy (fine), mottled, a few fine grained quartz gravels 1% 47.28m-48.8m Sandy silty clay; light orangey brown, sandy fine to medium, mottled 48.8m-50.33m Sandy silty clay; light oraney brown, sandy fine to medium, & a few medium quartz gravels 1% 50.33m-51.85m Sandy silty clay; as above, but also mottled 51.85m-53.38m Sandy silty clay; as above, but yellowish brown, & no mottle or gravels 53.38m-54.9m Sandy silty clay; as above, but sandy fine, & mottled 54.9m-56.43m Sandy silty clay; light orangey brown, sandy fine, slightly mottled 56.43m-57.95m Sandy silty clay; dark orangey brown, sandy fine, slightly mottled 57.95m-61m Sandy silty clay; dark yellowish brown, sandy fine 61m-62.53m Sandy silty clay; orangey brown, very sandy (fine to medium), mottled 62.53m-64.05m Sand; light orangey brown, slightly gravelly (fine), silty, sand rounded to subrounded, fine to coarse, fine gravel composed mainly of quartz, 1/3 of sample consolidated. 65.58m-68.63m Sand; as above, but light yellowish brown, gravel composed mainly of quartz, jasper & ironstone & 30% of sample consolidated 67.97m-70.1m Ironstone decomposed	823.6	North-east

Groundwater Bore ID	From Depth – To Depth (m) Lithology	Distance (m)	Direction
	68.63m-70.15m Sand; light orangey brown, slightly silty, rounded to subrounded, fine to coarse, 20% of sample consolidated 70.1m-77.72m Sandstone yellow crumbly water supply 70.15m-71.68m Sand; as above, but orangey brown 71.68m-73.2m Sand; as above, but 30% of sample consolidated 73.2m-74.73m Sand; brownish orange, silty, fine to coarse, rounded to subrounded, 10% of sample consolidated 74.73m-76.25m Sand; orangey brown, silty, fine to coarse, rounded to subrounded, 10% of sample consolidated 76.25m-77.78m Sandstone; reddish yellow, iron rich, grains mainly of quartz.		
GW030123	0m-3.05m Driller 0m-1.53m Silty sandy loam; brown 1.53m-3.05m Sandy clay; light brown, mottled 3.05m-7.32m Sandstone grey 3.05m-4.58m Sandy clay; light brown, very sandy 4.58m-6.1m Sand; light brown yellowish, silty, mainly quartz grains 6.1m-7.63m Sand; brownish yellow, slightly silty, medium to coarse 7.32m-17.07m Clay yellow grey 7.63m-9.15m Sandy clay; light brown 9.15m-10.68m Sandy clay; light brown, fine, mottled 10.68m-12.2m Sandy clay; light grey, mottled 12.2m-13.73m Sandy clay; light greyish brown 13.73m-15.25m Clay; light yellowish brown, mottled 15.25m-16.78m Clay; light grey & light brownish, slightly micaceous, mottled 16.78m-18.3m Silty clay; orange brown, mottled, a few fine gravel grains, mainly quartz & jasper 2% 17.07m-26.21m Sandstone grey water supply 18.3m-19.83m Sand; light brown, fine to coarse, silty 19.83m-21.35m Sand; light brown, silty, fine to medium 21.35m-22.88m Silt; light brown, fine sandy silt, & sandy mottled clay 20% 22.88m-24.4m Sandy silty clay; light brown, fine sand (mainly jasper & quartz) silty mottled clay - somewhat micaceous 24.4m-25.93m Sand; light brown, silty, fine to medium 25.93m-27.45m Sand; light brown, silty, fine 26.21m-42.67m Clay yellow very sandy water supply 27.45m-28.98m Sand; light brown, silty, fine, & light brown silty mottled clay 40% 28.98m-30.5m Sandy clay; brownish yellow, a few large sand grains 1% 30.5m-32.03m Sand & sandy clay; light yellowish brown, very silty, fine to medium sand, & sandy clay 32.03m-33.55m Sand; orangey brown, as above, sandy clay 20% 33.55m-35.08m Sandy clay; yellowish brown, fine to medium 35.08m-36.6m Sandy clay; as above, but mottled 36.6m-38.13m Silt; yellowish brown, very sandy, 70%, & sandy mottled clay 30%, a few fine gravel (quartz) grains 38.13m-39.65m Silt; light yellowish brown, very sandy (fine) 39.65m-41.18m Silt; as above, but sandy fine to coarse 41.18m-42.7m Silt; as above - 60%, & silty mottled clay 40% 42.67m-67.97m Clay yellow sandy 42.7m-44.23m Silt & silty clay; as above, but 50/50 44.23m-45.75m Silt; light brown, slightly sandy (fine) 45.75m-47.28m Sandy silty clay; orange brown, very sandy (fine), mottled, a few fine grained quartz gravels 1% 47.28m-48.8m Sandy silty clay; light orangey brown, sandy fine to medium, mottled 48.8m-50.33m Sandy silty clay; light oraney brown, sandy fine to medium, & a few medium quartz gravels 1% 50.33m-51.85m Sandy silty clay; as above, but also mottled 51.85m-53.38m Sandy silty clay; as above, but yellowish brown, & no mottle or gravels 53.38m-54.9m Sandy silty clay; as above, but sandy fine, & mottled 54.9m-56.43m Sandy silty clay; light orangey brown, sandy fine, slightly mottled 56.43m-57.95m Sandy silty clay; dark orangey brown, sandy fine, slightly mottled 57.95m-61m Sandy silty clay; dark yellowish brown, sandy fine 61m-62.53m Sandy silty clay; orangey brown, very sandy (fine to medium), mottled 62.53m-64.05m Sand; light orangey brown, slightly gravelly (fine), silty, sand rounded to subrounded, fine to coarse, fine gravel composed mainly of quartz, 1/3 of sample consolidated. 65.58m-68.63m Sand; as above, but light yellowish brown, gravel composed	823.6	North-east

Groundwater Bore ID	From Depth – To Depth (m) Lithology	Distance (m)	Direction
	mainly of quartz, jasper & ironstone & 30% of sample consolidated 67.97m-70.1m Ironstone decomposed 68.63m-70.15m Sand; light orangey brown, slightly silty, rounded to subrounded, fine to coarse, 20% of sample consolidated 70.1m-77.72m Sandstone yellow crumbly water supply 70.15m-71.68m Sand; as above, but orangey brown 71.68m-73.2m Sand; as above, but 30% of sample consolidated 73.2m-74.73m Sand; brownish orange, silty, fine to coarse, rounded to subrounded, 10% of sample consolidated 74.73m-76.25m Sand; orangey brown, silty, fine to coarse, rounded to subrounded, 10% of sample consolidated 76.25m-77.78m Sandstone; reddish yellow, iron rich, grains mainly of quartz.		
GW902959	#N/A	825.8	East
GW970949	#N/A	836.9	South
GW053767	0m-1m Topsoil 1m-3.7m Clay 3.7m-6.5m Sandstone 6.5m-11.8m Clay 11.8m-38m Sandstone water supply	840.2	North-east
GW044709	0m-1m Topsoil 1m-5m Clay 5m-30m Sandstone water supply 30m-31m Clay 31m-34m Sandstone 34m-44.72m Sandstone water supply 44.72m-45.72m Clay	842.7	South
GW071866	54m-57m Soft sandstone	851.6	South-east
GW968148	0m-1.8m Topsoil 1.8m-4.5m Clay, brown 4.5m-6.5m Sandstone 6.5m-17.7m Clay, grey 17.7m-22.8m Clay, brown 22.8m-24m Sandstone, red 24m-25m Sandstone, hard band 25m-30m Sandstone, grey 30m-50.8m Sandstone, red 50.8m-56m Sand, water bearing 56m-63.3m Sandstone, yellow 63.3m-69m Sandy clay, yellow & grey 69m-72m Sand, white, water bearing 72m-75m Clay, red 75m-76m Sandstone, red & yellow 76m-81m Sand, white, water bearing 81m-82.6m Clay, grey & yellow	863.0	North-east
GW044082	0m-1.83m Topsoil 1.83m-5.49m Clay sandy 5.49m-7.01m Clay 7.01m-47.24m Clay sandy multicoloured 47.24m-53.64m Sand water supply 53.64m-54.86m Clay	871.5	South
GW017318	0m-7.62m Clay red heavy 7.62m-21.33m Sandstone yellow 21.33m-23.77m Sandstone water supply 23.77m-27.43m Sandstone yellow 27.43m-45.72m Sandstone water supply	911.4	East
GW966938	0m-1m Topsoil 1m-8.5m Clay/sandy 8.5m-9m Gravel/fine water bearing 9m-12m Sand/gravel water bearing 12m-15m Sandy/clay 15m-19m Sandstone water bearing 19m-21m Sandy/clay red 21m-27m Sandstone soft water bearing 27m-45m Sand between sandstone water bearing	919.3	East

Groundwater Bore ID	From Depth – To Depth (m) Lithology	Distance (m)	Direction
GW030259	0m-3.66m Clay loam; brown 0m-3.05m Loam; chocolate brown, silty, fine to coarse sandy (<10%), angular to subangular, mainly clear quartz. 3.05m-4.58m Clay; dark brown, silty, fine to coarse sandy (<30%) & fine gravelly (<20%). sand grains are angular, mainly clear quartz. gravel subangular to subrounded, jasper, basalt, clear & smokey quartz. 3.66m-6.1m Clay; 50%, brown. brown sand & gravel 50%. 4.58m-6.1m Gravel; 50%, fine to medium, subangular to subrounded, jasper, basalt, quartz feldspar porphyry & smokey quartz. sand 30%, fine to coarse, angular to subangular, clear & smokey quartz. clay 20%, dark brown, silty & fine sandy 6.1m-7.63m Gravel; 70% (fine 60% & medium 10%), subangular to subrounded, jasper, basalt, porphyry, clear & smokey quartz. sand 20%, silty & clayey (fine to medium 10% & coarse 10%), angular, clear quartz, jasper & basalt. clay 10%, dark brown, silty, fine to 6.1m-7.63m Gravel; fine, brown, mainly subrounded, chert, jasper, basalt 7.63m-9.15m Clay; 40%, sticky, brownish yellow, silty. gravel 40%, fine to medium, subangular to subrounded, jasper, basalt, clear & smokey quartz & baded chert. sand 20%, fine to coarse, angular to subangular, clear quartz. 7.63m-9.15m Gravel & sandy clay; fine & medium 50%, brown sandy clay 50% 9.15m-12.2m Clayey sand; to a very coarse sandy clay, yellowish brown & whitish grey, sand grains angular to subangular, mainly clear quartz with rose quartz a minor constituent. grave, medium (<1%) are also present, angular to subrounded, jasper, basalt, 9.15m-12.2m Sandy clay; 70%, light brown & orange brown, & light brown sand & fine gravel 30% 12.2m-19.83m Clay; brownish orange, whitish grey & brown, fine to coarse sandy (<30%), angular, mainly clear quartz. fine to medium gravels (<2%) are present, clear quartz, jasper & ferrugineous sandstone 12.2m-15.25m Sandy clay; pale brown & orange brown 15.25m-18.3m Clay; brown & grey 18.3m-19.83m Sandy clay; light brown 19.83m-21.35m Gravel; 80% (fine 20%, medium 59% & coarse 1%), angular to subrounded, jasper, basalt, clear & smokey qyartz, serpentine, quartz feldspar porphyry & ferrugineous sandstone. sandy clay 20%, greyish brown & orangey brown, silty, fine to coarse sandy, 19.83m-22.88m Gravel; fine & medium, brown, subrounded to subangualr, jasper, chert, etc 21.35m-22.88m Gravel; (fine 30%, medium 69% & coarse 1%), angular to sburounded, jasper, basalt, clear & smokey quartz, quartz feldspar porphyry, ferrugineous sandstone, calcareous sandstone & serpentine. 22.88m-25.93m Gravel; 80%, very clayey, brown (fine 50% & medium 30%), angular to subrounded, jasper, basalt, serpentine, ferrugineous & calcareous sandstone, quartz feldspar porphyry. clay 20%, brown, fine to coarse very sandy, angular, mainly clear quartz. 22.88m-25.93m Gravel; 90%, as above. sandy clay 10%, ligth brown 25.93m-27.45m Clay; orangey brown, fine to coarse very sandy (<20%), angular, clear quartz & fine to medium gravelly (<30%), subangular to subrounded, jasper, basalt, smokey quartz & sandstone 25.93m-27.45m Sandy clay; 80%, light brown & orange. gravel 20%, fine, brown 27.45m-28.98m Gravel; 70%, angular to subrounded (fine 20% & medium 50%), jasper, basalt, ferrugineous sandstone, serpentine, quartz feldspar porphyry, calcareous sandstone & banded chert. sandy clay 30%, orangey brown, fine to coarse, angular to subangular, clear 27.45m-28.98m Gravel; 90%, fine & medium, subrounded to subangular, jasper, basalt, chert. clay 10%, light brown & orange 28.98m-34.47m Gravel; (fine 30%, medium 69% & coarse 1%), fairly clayey, subangular to subrounded, jasper, basalt, clear & smokey quartz, quartz feldspar porphyry, ferrugineous & calcareous sandstone. 28.98m-30.5m Gravel; 95%, medium & fine, jasper, quartz, chert, subrounded, to subangular. clay 5%, pale brown 30.5m-34.47m Gravel; fine, brown, chert, jasper, etc, rounded to subangular. 34.47m-36.6m Clay; 80%, brown, silty, fine to coarse sandy, angular, clear quartz. gravel 20%, fine to medium, subangular to subrounded, jasper, basalt, chert, quartz feldspar porphyry & smokey quartz. 34.47m-36.6m Sandy clay; brown 36.6m-44.23m Clay; 95%, grey, brownish grey & orange, fine to coarse sandy, angular, clear quartz. gravel 5%, fine to medium, subangular to subrounded, jasper, clear & smokey quartz, basalt, porphyry & chert.	921.9	North

Groundwater Bore ID	From Depth – To Depth (m) Lithology	Distance (m)	Direction
	36.6m-44.23m Sandy clay; white, light brown & light grey 44.23m-51.85m Clay; reddish orange grey & crimson, fine to coarse sandy, angular, clear quartz. fine to medium gravels (<5%) are present, subangular to subrounded, basalt, jasper & quartz feldspar porphyry. 44.23m-54.9m Sandy clay; light brown, light grey, brick red 51.85m-59.48m Clay; brownish yellow & grey, fine to coarse sandy, angular to subangular, mainly clear quartz. fine to medium gravel (<20%), subangular to subrounded, jasper, basalt, quartz feldspar porphyry, siltstone, sandstone & a banded porphyry. 54.9m-56.43m Sandy clay; orange brown, fine gravel grains 56.43m-61m Sandy clay; orange & ligth brown 59.48m-67.1m Weathered sandstone (?); clay, light orangey brown & grey, fine to coarse sandy, angular, clear quartz. 61m-67.1m Sandy clay; light grey 67.1m-68.63m Sandy clay; light brown 67.1m-90.89m Weathered sandstone; definnite light khaki grey, fine to coasre sand grains, argillaceous cement, angular, clear quartz. 68.63m-88.45m Sandy clay; light grey		
GW030259	0m-3.66m Clay loam; brown 0m-3.05m Loam; chocolate brown, silty, fine to coarse sandy (<10%), angular to subangular, mainly clear quartz. 3.05m-4.58m Clay; dark brown, silty, fine to coarse sandy (<30%) & fine gravelly (<20%). sand grains are angular, mainly clear quartz. gravel subangular to subrounded, jasper, basalt, clear & smokey quartz. 3.66m-6.1m Clay; 50%, brown. brown sand & gravel 50%. 4.58m-6.1m Gravel; 50%, fine to medium, subangular to subrounded, jasper, basalt, quartz feldspar porphyry & smokey quartz. sand 30%, fine to coarse, angular to subangular, clear & smokey quartz. clay 20%, dark brown, silty & fine sandy 6.1m-7.63m Gravel; 70% (fine 60% & medium 10%), subangular to subrounded, jasper, basalt, porphyry, clear & smokey quartz. sand 20%, silty & clayey (fine to medium 10% & coarse 10%), angular, clear quartz, jasper & basalt. clay 10%, dark brown, silty, fine to 6.1m-7.63m Gravel; fine, brown, mainly subrounded, chert, jasper, basalt 7.63m-9.15m Clay; 40%, sticky, brownish yellow, silty. gravel 40%, fine to medium, subangular to subrounded, jasper, basalt, clear & smokey quartz & baded chert. sand 20%, fine to coarse, angular to subangular, clear quartz. 7.63m-9.15m Gravel & sandy clay; fine & medium 50%, brown sandy clay 50% 9.15m-12.2m Clayey sand; to a very coarse sandy clay, yellowish brown & whitish grey, sand grains angular to subangular, mainly clear quartz with rose quartz a minor constituent. grave, medium (<1%) are also present, angular to subrounded, jasper, basalt, 9.15m-12.2m Sandy clay; 70%, light brown & orange brown, & light brown sand & fine gravel 30% 12.2m-19.83m Clay; brownish orange, whitish grey & brown, fine to coarse sandy (<30%), angular, mainly clear quartz. fine to medium gravels (<2%) are present, clear quartz, jasper & ferrugineous sandstone 12.2m-15.25m Sandy clay; pale brown & orange brown 15.25m-18.3m Clay; brown & grey 18.3m-19.83m Sandy clay; light brown 19.83m-21.35m Gravel; 80% (fine 20%, medium 59% & coarse 1%), angular to subrounded, jasper, basalt, clear & smokey qyartz, serpentine, quartz feldspar porphyry & ferrugineous sandstone. sandy clay 20%, greyish brown & orangey brown, silty, fine to coarse sandy, 19.83m-22.88m Gravel; fine & medium, brown, subrounded to subangualr, jasper, chert, etc 21.35m-22.88m Gravel; (fine 30%, medium 69% & coarse 1%), angular to sburounded, jasper, basalt, clear & smokey quartz, quartz feldspar porphyry, ferrugineous sandstone, calcareous sandstone & serpentine. 22.88m-25.93m Gravel; 80%, very clayey, brown (fine 50% & medium 30%), angular to subrounded, jasper, basalt, serpentine, ferrugineous & calcareous sandstone, quartz feldspar porphyry. clay 20%, brown, fine to coarse very sandy, angular, mainly clear quartz. 22.88m-25.93m Gravel; 90%, as above. sandy clay 10%, ligth brown 25.93m-27.45m Clay; orangey brown, fine to coarse very sandy (<20%), angular, clear quartz & fine to medium gravelly (<30%), subangular to subrounded, jasper, basalt, smokey quartz & sandstone 25.93m-27.45m Sandy clay; 80%, light brown & orange. gravel 20%, fine, brown 27.45m-28.98m Gravel; 70%, angular to subrounded (fine 20% & medium 50%),	921.9	North

Groundwater Bore ID	From Depth – To Depth (m) Lithology	Distance (m)	Direction
	jasper, basalt, ferrugineous sandstone, serpentine, quartz feldspar porphyry, calcareous sandstone & banded chert. sandy clay 30%, orangey brown, fine to coarse, angular to subangular, clear 27.45m-28.98m Gravel; 90%, fine & medium, subrounded to subangular, jasper, basalt, chert. clay 10%, light brown & orange 28.98m-34.47m Gravel; (fine 30%, medium 69% & coarse 1%), fairly clayey, subangular to subrounded, jasper, basalt, clear & smokey quartz, quartz feldspar porphyry, ferrugineous & calcareous sandstone. 28.98m-30.5m Gravel; 95%, medium & fine, jasper, quartz, chert, subrounded, to subangular. clay 5%, pale brown 30.5m-34.47m Gravel; fine, brown, chert, jasper, etc, rounded to subangular. 34.47m-36.6m Clay; 80%, brown, silty, fine to coarse sandy, angular, clear quartz. gravel 20%, fine to medium, subangular to subrounded, jasper, basalt, chert, quartz feldspar porphyry & smokey quartz. 34.47m-36.6m Sandy clay; brown 36.6m-44.23m Clay; 95%, grey, brownish grey & orange, fine to coarse sandy, angular, clear quartz. gravel 5%, fine to medium, subangular to subrounded, jasper, clear & smokey quartz, basalt, porphyry & chert. 36.6m-44.23m Sandy clay; white, light brown & light grey 44.23m-51.85m Clay; reddish orange grey & crimson, fine to coarse sandy, angular, clear quartz. fine to medium gravels (<5%) are present, subangular to subrounded, basalt, jasper & quartz feldspar porphyry. 44.23m-54.9m Sandy clay; light brown, light grey, brick red 51.85m-59.48m Clay; brownish yellow & grey, fine to coarse sandy, angular to subangular, mainly clear quartz. fine to medium gravel (<20%), subangular to subrounded, jasper, basalt, quartz feldspar porphyry, siltstone, sandstone & a banded porphyry. 54.9m-56.43m Sandy clay; orange brown, fine gravel grains 56.43m-61m Sandy clay; orange & ligth brown 59.48m-67.1m Weathered sandstone (?); clay, light orangey brown & grey, fine to coarse sandy, angular, clear quartz. 61m-67.1m Sandy clay; light grey 67.1m-68.63m Sandy clay; light brown 67.1m-90.89m Weathered sandstone; definnite light khaki grey, fine to coasre sand grains, argillaceous cement, angular, clear quartz. 68.63m-88.45m Sandy clay; light grey		
GW030259	0m-3.66m Clay loam; brown 0m-3.05m Loam; chocolate brown, silty, fine to coarse sandy (<10%), angular to subangular, mainly clear quartz. 3.05m-4.58m Clay; dark brown, silty, fine to coarse sandy (<30%) & fine gravelly (<20%). sand grains are angular, mainly clear quartz. gravel subangular to subrounded, jasper, basalt, clear & smokey quartz. 3.66m-6.1m Clay; 50%, brown. brown sand & gravel 50%. 4.58m-6.1m Gravel; 50%, fine to medium, subangular to subrounded, jasper, basalt, quartz feldspar porphyry & smokey quartz. sand 30%, fine to coarse, angular to subangular, clear & smokey quartz. clay 20%, dark brown, silty & fine sandy 6.1m-7.63m Gravel; 70% (fine 60% & medium 10%), subangular to subrounded, jasper, basalt, porphyry, clear & smokey quartz. sand 20%, silty & clayey (fine to medium 10% & coarse 10%), angular, clear quartz, jasper & basalt. clay 10%, dark brown, silty, fine to 6.1m-7.63m Gravel; fine, brown, mainly subrounded, chert, jasper, basalt 7.63m-9.15m Clay; 40%, sticky, brownish yellow, silty. gravel 40%, fine to medium, subangular to subrounded, jasper, basalt, clear & smokey quartz & baded chert. sand 20%, fine to coarse, angular to subangular, clear quartz. 7.63m-9.15m Gravel & sandy clay; fine & medium 50%, brown sandy clay 50% 9.15m-12.2m Clayey sand; to a very coarse sandy clay, yellowish brown & whitish grey, sand grains angular to subangular, mainly clear quartz with rose quartz a minor constituent. grave, medium (<1%) are also present, angular to subrounded, jasper, basalt, 9.15m-12.2m Sandy clay; 70%, light brown & orange brown, & light brown sand & fine gravel 30% 12.2m-19.83m Clay; brownish orange, whitish grey & brown, fine to coarse sandy (<30%), angular, mainly clear quartz. fine to medium gravels (<2%) are present, clear quartz, jasper & ferrugineous sandstone 12.2m-15.25m Sandy clay; pale brown & orange brown 15.25m-18.3m Clay; brown & grey 18.3m-19.83m Sandy clay; light brown 19.83m-21.35m Gravel; 80% (fine 20%, medium 59% & coarse 1%), angular to	921.9	North

Groundwater Bore ID	From Depth – To Depth (m) Lithology	Distance (m)	Direction
	subrounded, jasper, basalt, clear & smokey qyartz, serpentine, quartz feldspar porphyry & ferrugineous sandstone. sandy clay 20%, greyish brown & orangey brown, silty, fine to coarse sandy, 19.83m-22.88m Gravel; fine & medium, brown, subrounded to subangualr, jasper, chert, etc 21.35m-22.88m Gravel; (fine 30%, medium 69% & coarse 1%), angular to sburounded, jasper, basalt, clear & smokey quartz, quartz feldspar porphyry, ferrugineous sandstone, calcareous sandstone & serpentine. 22.88m-25.93m Gravel; 80%, very clayey, brown (fine 50% & medium 30%), angular to subrounded, jasper, basalt, serpentine, ferrugineous & calcareous sandstone, quartz feldspar porphyry. clay 20%, brown, fine to coarse very sandy, angular, mainly clear quartz. 22.88m-25.93m Gravel; 90%, as above. sandy clay 10%, ligth brown 25.93m-27.45m Clay; orangey brown, fine to coarse very sandy (<20%), angular, clear quartz & fine to medium gravelly (<30%), subangular to subrounded, jasper, basalt, smokey quartz & sandstone 25.93m-27.45m Sandy clay; 80%, light brown & orange. gravel 20%, fine, brown 27.45m-28.98m Gravel; 70%, angular to subrounded (fine 20% & medium 50%), jasper, basalt, ferrugineous sandstone, serpentine, quartz feldspar porphyry, calcareous sandstone & banded chert. sandy clay 30%, orangey brown, fine to coarse, angular to subangular, clear 27.45m-28.98m Gravel; 90%, fine & medium, subrounded to subangular, jasper, basalt, chert. clay 10%, light brown & orange 28.98m-34.47m Gravel; (fine 30%, medium 69% & coarse 1%), fairly clayey, subangular to subrounded, jasper, basalt, clear & smokey quartz, quartz feldspar porphyry, ferrugineous & calcareous sandstone. 28.98m-30.5m Gravel; 95%, medium & fine, jasper, quartz, chert, subrounded, to subangular. clay 5%, pale brown 30.5m-34.47m Gravel; fine, brown, chert, jasper, etc, rounded to subangular. 34.47m-36.6m Clay; 80%, brown, silty, fine to coarse sandy, angular, clear quartz. gravel 20%, fine to medium, subangular to subrounded, jasper, basalt, chert, quartz feldspar porphyry & smokey quartz. 34.47m-36.6m Sandy clay; brown 36.6m-44.23m Clay; 95%, grey, brownish grey & orange, fine to coarse sandy, angular, clear quartz. gravel 5%, fine to medium, subangular to subrounded, jasper, clear & smokey quartz, basalt, porphyry & chert. 36.6m-44.23m Sandy clay; white, light brown & light grey 44.23m-51.85m Clay; reddish orange grey & crimson, fine to coarse sandy, angular, clear quartz. fine to medium gravels (<5%) are present, subangular to subrounded, basalt, jasper & quartz feldspar porphyry. 44.23m-54.9m Sandy clay; light brown, light grey, brick red 51.85m-59.48m Clay; brownish yellow & grey, fine to coarse sandy, angular to subangular, mainly clear quartz. fine to medium gravel (<20%), subangular to subrounded, jasper, basalt, quartz feldspar porphyry, siltstone, sandstone & a banded porphyry. 54.9m-56.43m Sandy clay; orange brown, fine gravel grains 56.43m-61m Sandy clay; orange & ligth brown 59.48m-67.1m Weathered sandstone (?); clay, light orangey brown & grey, fine to coarse sandy, angular, clear quartz. 61m-67.1m Sandy clay; light grey 67.1m-68.63m Sandy clay; light brown 67.1m-90.89m Weathered sandstone; definnite light khaki grey, fine to coasre sand grains, argillaceous cement, angular, clear quartz. 68.63m-88.45m Sandy clay; light grey		
GW030259	0m-3.66m Clay loam; brown 0m-3.05m Loam; chocolate brown, silty, fine to coarse sandy (<10%), angular to subangular, mainly clear quartz. 3.05m-4.58m Clay; dark brown, silty, fine to coarse sandy (<30%) & fine gravelly (<20%). sand grains are angular, mainly clear quartz. gravel subangular to subrounded, jasper, basalt, clear & smokey quartz. 3.66m-6.1m Clay; 50%, brown. brown sand & gravel 50%. 4.58m-6.1m Gravel; 50%, fine to medium, subangular to subrounded, jasper, basalt, quartz feldspar porphyry & smokey quartz. sand 30%, fine to coarse, angular to subangular, clear & smokey quartz. clay 20%, dark brown, silty & fine sandy 6.1m-7.63m Gravel; 70% (fine 60% & medium 10%), subangular to subrounded, jasper, basalt, porphyry, clear & smokey quartz. sand 20%, silty & clayey (fine to medium 10% & coarse 10%), angular, clear quartz, jasper & basalt. clay 10%, dark brown, silty, fine to	921.9	North

Groundwater Bore ID	From Depth – To Depth (m) Lithology	Distance (m)	Direction
	6.1m-7.63m Gravel; fine, brown, mainly subrounded, chert, jasper, basalt 7.63m-9.15m Clay; 40%, sticky, brownish yellow, silty. gravel 40%, fine to medium, subangular to subrounded, jasper, basalt, clear & smokey quartz & baded chert. sand 20%, fine to coarse, angular to subangular, clear quartz. 7.63m-9.15m Gravel & sandy clay; fine & medium 50%, brown sandy clay 50% 9.15m-12.2m Clayey sand; to a very coarse sandy clay, yellowish brown & whitish grey, sand grains angular to subangular, mainly clear quartz with rose quartz a minor constituent. grave, medium (<1%) are also present, angular to subrounded, jasper, basalt, 9.15m-12.2m Sandy clay; 70%, light brown & orange brown, & light brown sand & fine gravel 30% 12.2m-19.83m Clay; brownish orange, whitish grey & brown, fine to coarse sandy (<30%), angular, mainly clear quartz. fine to medium gravels (<2%) are present, clear quartz, jasper & ferrugineous sandstone 12.2m-15.25m Sandy clay; pale brown & orange brown 15.25m-18.3m Clay; brown & grey 18.3m-19.83m Sandy clay; light brown 19.83m-21.35m Gravel; 80% (fine 20%, medium 59% & coarse 1%), angular to subrounded, jasper, basalt, clear & smokey qyartz, serpentine, quartz feldspar porphyry & ferrugineous sandstone. sandy clay 20%, greyish brown & orangey brown, silty, fine to coarse sandy, 19.83m-22.88m Gravel; fine & medium, brown, subrounded to subangualr, jasper, chert, etc 21.35m-22.88m Gravel; (fine 30%, medium 69% & coarse 1%), angular to sburounded, jasper, basalt, clear & smokey quartz, quartz feldspar porphyry, ferrugineous sandstone, calcareous sandstone & serpentine. 22.88m-25.93m Gravel; 80%, very clayey, brown (fine 50% & medium 30%), angular to subrounded, jasper, basalt, serpentine, ferrugineous & calcareous sandstone, quartz feldspar porphyry. clay 20%, brown, fine to coarse very sandy, angular, mainly clear quartz. 22.88m-25.93m Gravel; 90%, as above. sandy clay 10%, ligth brown 25.93m-27.45m Clay; orangey brown, fine to coarse very sandy (<20%), angular, clear quartz & fine to medium gravelly (<30%), subangular to subrounded, jasper, basalt, smokey quartz & sandstone 25.93m-27.45m Sandy clay; 80%, light brown & orange. gravel 20%, fine, brown 27.45m-28.98m Gravel; 70%, angular to subrounded (fine 20% & medium 50%), jasper, basalt, ferrugineous sandstone, serpentine, quartz feldspar porphyry, calcareous sandstone & banded chert. sandy clay 30%, orangey brown, fine to coarse, angular to subangular, clear 27.45m-28.98m Gravel; 90%, fine & medium, subrounded to subangular, jasper, basalt, chert. clay 10%, light brown & orange 28.98m-34.47m Gravel; (fine 30%, medium 69% & coarse 1%), fairly clayey, subangular to subrounded, jasper, basalt, clear & smokey quartz, quartz feldspar porphyry, ferrugineous & calcareous sandstone. 28.98m-30.5m Gravel; 95%, medium & fine, jasper, quartz, chert, subrounded, to subangular. clay 5%, pale brown 30.5m-34.47m Gravel; fine, brown, chert, jasper, etc, rounded to subangular. 34.47m-36.6m Clay; 80%, brown, silty, fine to coarse sandy, angular, clear quartz. gravel 20%, fine to medium, subangular to subrounded, jasper, basalt, chert, quartz feldspar porphyry & smokey quartz. 34.47m-36.6m Sandy clay; brown 36.6m-44.23m Clay; 95%, grey, brownish grey & orange, fine to coarse sandy, angular, clear quartz. gravel 5%, fine to medium, subangular to subrounded, jasper, clear & smokey quartz, basalt, porphyry & chert. 36.6m-44.23m Sandy clay; white, light brown & light grey 44.23m-51.85m Clay; reddish orange grey & crimson, fine to coarse sandy, angular, clear quartz. fine to medium gravels (<5%) are present, subangular to subrounded, basalt, jasper & quartz feldspar porphyry. 44.23m-54.9m Sandy clay; light brown, light grey, brick red 51.85m-59.48m Clay; brownish yellow & grey, fine to coarse sandy, angular to subangular, mainly clear quartz. fine to medium gravel (<20%), subangular to subrounded, jasper, basalt, quartz feldspar porphyry, siltstone, sandstone & a banded porphyry. 54.9m-56.43m Sandy clay; orange brown, fine gravel grains 56.43m-61m Sandy clay; orange & ligth brown 59.48m-67.1m Weathered sandstone (?); clay, light orangey brown & grey, fine to coarse sandy, angular, clear quartz. 61m-67.1m Sandy clay; light grey 67.1m-68.63m Sandy clay; light brown		

Groundwater Bore ID	From Depth – To Depth (m) Lithology	Distance (m)	Direction
	67.1m-90.89m Weathered sandstone; definnite light khaki grey, fine to coasre sand grains, argillaceous cement, angular, clear quartz. 68.63m-88.45m Sandy clay; light grey		
GW030259	0m-3.66m Clay loam; brown 0m-3.05m Loam; chocolate brown, silty, fine to coarse sandy (<10%), angular to subangular, mainly clear quartz. 3.05m-4.58m Clay; dark brown, silty, fine to coarse sandy (<30%) & fine gravelly (<20%). sand grains are angular, mainly clear quartz. gravel subangular to subrounded, jasper, basalt, clear & smokey quartz. 3.66m-6.1m Clay; 50%, brown. brown sand & gravel 50%. 4.58m-6.1m Gravel; 50%, fine to medium, subangular to subrounded, jasper, basalt, quartz feldspar porphyry & smokey quartz. sand 30%, fine to coarse, angular to subangular, clear & smokey quartz. clay 20%, dark brown, silty & fine sandy 6.1m-7.63m Gravel; 70% (fine 60% & medium 10%), subangular to subrounded, jasper, basalt, porphyry, clear & smokey quartz. sand 20%, silty & clayey (fine to medium 10% & coarse 10%), angular, clear quartz, jasper & basalt. clay 10%, dark brown, silty, fine to 6.1m-7.63m Gravel; fine, brown, mainly subrounded, chert, jasper, basalt 7.63m-9.15m Clay; 40%, sticky, brownish yellow, silty. gravel 40%, fine to medium, subangular to subrounded, jasper, basalt, clear & smokey quartz & baded chert. sand 20%, fine to coarse, angular to subangular, clear quartz. 7.63m-9.15m Gravel & sandy clay; fine & medium 50%, brown sandy clay 50% 9.15m-12.2m Clayey sand; to a very coarse sandy clay, yellowish brown & whitish grey, sand grains angular to subangular, mainly clear quartz with rose quartz a minor constituent. grave, medium (<1%) are also present, angular to subrounded, jasper, basalt, 9.15m-12.2m Sandy clay; 70%, light brown & orange brown, & light brown sand & fine gravel 30% 12.2m-19.83m Clay; brownish orange, whitish grey & brown, fine to coarse sandy (<30%), angular, mainly clear quartz. fine to medium gravels (<2%) are present, clear quartz, jasper & ferrugineous sandstone 12.2m-15.25m Sandy clay; pale brown & orange brown 15.25m-18.3m Clay; brown & grey 18.3m-19.83m Sandy clay; light brown 19.83m-21.35m Gravel; 80% (fine 20%, medium 59% & coarse 1%), angular to subrounded, jasper, basalt, clear & smokey qyartz, serpentine, quartz feldspar porphyry & ferrugineous sandstone. sandy clay 20%, greyish brown & orangey brown, silty, fine to coarse sandy, 19.83m-22.88m Gravel; fine & medium, brown, subrounded to subangualr, jasper, chert, etc 21.35m-22.88m Gravel; (fine 30%, medium 69% & coarse 1%), angular to sburounded, jasper, basalt, clear & smokey quartz, quartz feldspar porphyry, ferrugineous sandstone, calcareous sandstone & serpentine. 22.88m-25.93m Gravel; 80%, very clayey, brown (fine 50% & medium 30%), angular to subrounded, jasper, basalt, serpentine, ferrugineous & calcareous sandstone, quartz feldspar porphyry. clay 20%, brown, fine to coarse very sandy, angular, mainly clear quartz. 22.88m-25.93m Gravel; 90%, as above. sandy clay 10%, ligth brown 25.93m-27.45m Clay; orangey brown, fine to coarse very sandy (<20%), angular, clear quartz & fine to medium gravelly (<30%), subangular to subrounded, jasper, basalt, smokey quartz & sandstone 25.93m-27.45m Sandy clay; 80%, light brown & orange. gravel 20%, fine, brown 27.45m-28.98m Gravel; 70%, angular to subrounded (fine 20% & medium 50%), jasper, basalt, ferrugineous sandstone, serpentine, quartz feldspar porphyry, calcareous sandstone & banded chert. sandy clay 30%, orangey brown, fine to coarse, angular to subangular, clear 27.45m-28.98m Gravel; 90%, fine & medium, subrounded to subangular, jasper, basalt, chert. clay 10%, light brown & orange 28.98m-34.47m Gravel; (fine 30%, medium 69% & coarse 1%), fairly clayey, subangular to subrounded, jasper, basalt, clear & smokey quartz, quartz feldspar porphyry, ferrugineous & calcareous sandstone. 28.98m-30.5m Gravel; 95%, medium & fine, jasper, quartz, chert, subrounded, to subangular. clay 5%, pale brown 30.5m-34.47m Gravel; fine, brown, chert, jasper, etc, rounded to subangular. 34.47m-36.6m Clay; 80%, brown, silty, fine to coarse sandy, angular, clear quartz. gravel 20%, fine to medium, subangular to subrounded, jasper, basalt, chert, quartz feldspar porphyry & smokey quartz. 34.47m-36.6m Sandy clay; brown	921.9	North

Groundwater Bore ID	From Depth – To Depth (m) Lithology	Distance (m)	Direction
	36.6m-44.23m Clay; 95%, grey, brownish grey & orange, fine to coarse sandy, angular, clear quartz. gravel 5%, fine to medium, subangular to subrounded, jasper, clear & smokey quartz, basalt, porphyry & chert. 36.6m-44.23m Sandy clay; white, light brown & light grey 44.23m-51.85m Clay; reddish orange grey & crimson, fine to coarse sandy, angular, clear quartz. fine to medium gravels (<5%) are present, subangular to subrounded, basalt, jasper & quartz feldspar porphyry. 44.23m-54.9m Sandy clay; light brown, light grey, brick red 51.85m-59.48m Clay; brownish yellow & grey, fine to coarse sandy, angular to subangular, mainly clear quartz. fine to medium gravel (<20%), subangular to subrounded, jasper, basalt, quartz feldspar porphyry, siltstone, sandstone & a banded porphyry. 54.9m-56.43m Sandy clay; orange brown, fine gravel grains 56.43m-61m Sandy clay; orange & ligth brown 59.48m-67.1m Weathered sandstone (?); clay, light orangey brown & grey, fine to coarse sandy, angular, clear quartz. 61m-67.1m Sandy clay; light grey 67.1m-68.63m Sandy clay; light brown 67.1m-90.89m Weathered sandstone; definnite light khaki grey, fine to coasre sand grains, argillaceous cement, angular, clear quartz. 68.63m-88.45m Sandy clay; light grey		
GW061059	0m-1.83m Topsoil 1.83m-24.99m Clay sandy water bearing 24.99m-28.96m Clay sandy water bearing streaks 28.96m-34.14m Clay sandy 34.14m-37.19m Sand coarse gravel water bearing 37.19m-40.54m Clay sandy 40.54m-45.11m Sand coarse gravel water bearing 45.11m-71.71m Clay hard water bearing 71.71m-75.59m Sand coarse gravel water bearing 75.59m-86.26m Clay sandy water bearing 86.26m-89m Sand coarse water bearing 89m-91.44m Sandstone	926.9	North-west
GW967624	0m-1m Topsoil 1m-5m Clay 5m-13m Sandstone 13m-14.5m Sand 14.5m-16m Sandstone 16m-19m Sandy clay 19m-20m Sand 20m-22m Sandy clay 22m-26m Sandstone 26m-28m Sandy clay 28m-29m Sand 29m-37m Sand 37m-39m Clay 39m-43m Water bearing sandstone 43m-44m Sandstone	931.2	North-west
GW050544	0m-1m Topsoil 1m-11.5m Sandstone 11.5m-12.3m Sand water supply 12.3m-24m Sandstone water supply 24m-25m Clay	935.5	South-east
GW035740	0m-1.82m Topsoil 1.82m-11.58m Clay 11.58m-22.86m Clay red 22.86m-23.46m Sand 23.46m-38.7m Sandstone yellow 38.7m-45.72m Sandstone water supply 45.72m-46.32m Driller	975.7	East
GW050107	0m-0.6m Topsoil 0.6m-4m Clay 4m-31.5m Sandstone water supply 31.5m-40m Clay 40m-52m Sandstone water supply	982.5	East
GW000023	0m-1.82m Clay 1.82m-6.09m Ironstone 6.09m-18.28m Sandstone 18.28m-20.11m Clay	988.1	South

Groundwater Bore ID	From Depth – To Depth (m) Lithology	Distance (m)	Direction
	20.11m-24.38m Sand rock red 24.38m-27.43m Sand rock yellow 27.43m-34.13m Clay 34.13m-42.36m Gravel dry 42.36m-43.28m Clay sandy 43.28m-51.51m Gravel water supply 51.51m-54.25m Clay sand 54.25m-78.94m Clay 78.94m-85.64m Clay 85.64m-88.08m Clay white 88.08m-103.63m Sandstone water supply 103.63m-105.15m Gravel drift		
GW005848	0m-1.82m Soil black heavy 1.82m-36.57m Clay red 36.57m-42.67m Gravel coarse water supply	994.7	South-west
GW032358	0m-0.6m Topsoil 0.6m-2.13m Clay red 2.13m-3.96m Clay grey 3.96m-11.27m Sandstone red 11.27m-18.28m Sandstone yellow 18.28m-25.6m Sand water supply 25.6m-26.51m Clay white	1006.5	North
GW968548	#N/A	1064.1	South-east
GW970560	#N/A	1068.4	East
GW001658	0m-12.19m Clay sandstone 12.19m-19.81m Sandstone sharp 19.81m-24.38m Sandstone gravel 24.38m-25.9m Sand 25.9m-27.43m Sand gravel 27.43m-28.95m Gravel water supply	1072.6	North-west
GW030310	0m-1.5m Clay 1.5m-4.5m Clay grey 4.5m-9.1m Clay yellow sandy 9.1m-23.4m Clay yellow 23.4m-26.8m Clay gravel 26.8m-28.3m Stones large boulder 28.3m-32m Clay hard 32m-33.5m Clay 33.5m-35m Stones large 35m-37.1m Stones large gravel 37.1m-40.2m Stones large 40.2m-41.7m Gravel clay bands 41.7m-46.6m Sand clay bands 46.6m-49.9m Clay hard 49.9m-53.6m Clay 53.6m-60.3m Clay 60.3m-64m Clay waddy 64m-65.8m Clay very hard stones large 65.8m-70.1m Clay waddy 70.1m-74.4m Clay waddy or shale 74.4m-75.5m Clay 75.5m-81m Gravel water supply 81m-81.2m Sand gravel water supply 81.2m-85.3m Shale or clay 85.3m-86.2m Stones large cemented gravel 86.2m-86.5m Gravel dry 86.5m-88.3m Stones large cemented gravel 88.3m-89.9m Gravel 89.9m-90.5m Sand gravel coarse 90.5m-94.1m Stones large gravel 94.1m-98.7m Stones large 98.7m-108.8m Stones large gravel 108.8m-110.6m Stones large 110.6m-115.2m Stones large boulder 115.2m-116.1m Stones large 116.1m-117.3m Sandstone	1075.4	North

Groundwater Bore ID	From Depth – To Depth (m) Lithology	Distance (m)	Direction
GW030310	0m-1.5m Clay 1.5m-4.5m Clay grey 4.5m-9.1m Clay yellow sandy 9.1m-23.4m Clay yellow 23.4m-26.8m Clay gravel 26.8m-28.3m Stones large boulder 28.3m-32m Clay hard 32m-33.5m Clay 33.5m-35m Stones large 35m-37.1m Stones large gravel 37.1m-40.2m Stones large 40.2m-41.7m Gravel clay bands 41.7m-46.6m Sand clay bands 46.6m-49.9m Clay hard 49.9m-53.6m Clay 53.6m-60.3m Clay 60.3m-64m Clay waddy 64m-65.8m Clay very hard stones large 65.8m-70.1m Clay waddy 70.1m-74.4m Clay waddy or shale 74.4m-75.5m Clay 75.5m-81m Gravel water supply 81m-81.2m Sand gravel water supply 81.2m-85.3m Shale or clay 85.3m-86.2m Stones large cemented gravel 86.2m-86.5m Gravel dry 86.5m-88.3m Stones large cemented gravel 88.3m-89.9m Gravel 89.9m-90.5m Sand gravel coarse 90.5m-94.1m Stones large gravel 94.1m-98.7m Stones large 98.7m-108.8m Stones large gravel 108.8m-110.6m Stones large 110.6m-115.2m Stones large boulder 115.2m-116.1m Stones large 116.1m-117.3m Sandstone	1075.4	North
GW030310.1	#N/A	1085.5	North
GW030310.1.1	#N/A	1085.5	North
GW030310.1.2	#N/A	1085.5	North
GW055733	0m-0.6m Topsoil 0.6m-5m Sand 5m-9m Sand drift 9m-47.5m Clay 47.5m-49.5m Sand water supply 49.5m-56m Clay 56m-58.5m Sandstone water supply 58.5m-60m Shale	1090.1	South
GW049370	0m-0.6m Topsoil 0.6m-3m Clay 3m-34m Sandstone water supply	1110.8	South-east
GW971656	#N/A	1114.2	East
GW902943	#N/A	1126.1	South
GW045152	0m-0.61m Topsoil 0.61m-1.83m Clay 1.83m-41.76m Sandstone water supply 41.76m-42.67m Clay	1128.9	South
GW059840	0m-0.3m Topsoil 0.3m-7.4m Clay 7.4m-48m Sandstone water supply	1153.4	South
GW970753	#N/A	1155.8	East
GW971627	#N/A	1168.2	East

Groundwater Bore ID	From Depth – To Depth (m) Lithology	Distance (m)	Direction
GW067914	29.5m-30.5m Water bearing sand soak 44.5m-63m Water bearing sandstone	1174.0	East
GW054621	0m-0.3m Topsoil 0.3m-2m Clay 2m-10.5m Sandstone 10.5m-21m Clay 21m-46m Sandstone water supply 46m-47m Sandstone some clay	1183.6	East
GW060789	0m-0.6m Topsoil 0.6m-7.2m Clay silty 7.2m-11.1m Sand water supply 11.1m-11.5m Clay 11.5m-39m Sandstone 39m-39.7m Clay 39.7m-76m Sandstone water supply	1185.5	North-east
GW969289	0m-2m Clay, black 2m-5m Sandstone, white, coarse 5m-13m Sandstone, tan, coarse 13m-30m Sandstone, bands of varing colours with small bands of gravel between 18-30m, water bearing	1186.0	East
GW901203	0m-0.8m Red top soil 0.8m-2.6m Brownn sandy clay 2.6m-8.4m Light brown sandy clay 8.4m-10.7m Brown sand clay 10.7m-17m Light brown sandy clay 17m-22.5m Dark red sandy clay 22.5m-24.6m Ironstone 24.6m-27.8m Brown sandy clay 27.8m-31.5m Light brown sandy clay 31.5m-67.5m Brown sandy clay 67.5m-88m Quartz sandstone 88m-90m Ironstone	1202.7	East
GW025225	0m-1.52m Soil black 0m-1.52m Soil; black 1.52m-19.81m Clay sandy 1.52m-3.05m Sandy clay; brown 3.05m-6.1m Silty sand & sandy clay; silty sand (90%, yellow-brown, fine), and sandy clay (10%, grey) 6.1m-16.76m Silty sand & sandy clay; silty sand (80%, fine and medium, light brown), and sandy clay (20%, grey) 16.76m-22.86m Silty sand & sandy clay; silty sand (80%, fine and medium, orange-brown), and sandy clay (20%, grey) 19.81m-25.91m Sand 22.86m-25.91m Sand; fine to coarse, red-brown 25.91m-48.77m Clay 25.91m-27.43m Silty sand & sandy clay; silty sand (70%, red-brown) and sandy clay (30%, brown) 27.43m-28.96m Silty sand & sandy clay; silty sand (50%, red-brown) and sandy clay (50%, brown) 28.96m-32m Sand & sandy clay; sand (50%, fine to coarse, brown) and sandy clay (50%, grey) 32m-53.74m Sandy clay; brown and grey 48.77m-88.39m Sandstone 53.74m-62.48m Sandy clay; blue-grey 62.48m-73.15m Sandy clay; sandy clay (grey-brown and orange), and a few gravel grains (fine, quartz) 73.15m-76.2m Clayey sand; fine to coarse, grey 76.2m-88.39m Sandy clay; grey	1268.5	South-west
GW967056	#N/A	1282.6	North-east
GW053397	0m-0.8m Topsoil 0.8m-60m Sandstone water supply	1286.1	South-east
GW034259	0m-0.3m Topsoil 0.3m-5.79m Clay sandy 5.79m-8.53m Sandstone red hard 8.53m-22.55m Sandstone red soft water supply 22.55m-45.72m Clay red 45.72m-47.24m Sand white water supply 47.24m-54.25m Clay red	1288.5	South

Groundwater Bore ID	From Depth – To Depth (m) Lithology	Distance (m)	Direction
GW970316	#N/A	1291.6	East
GW970313	#N/A	1295.1	South
GW902073	0m-1.2m Topsoil 1.2m-6.7m Gravel 6.7m-10.9m Sand 10.9m-13.1m Sand and gravel 13.1m-17.6m Sandy clay 17.6m-24m Sandstone	1302.2	North-east
GW068184	0m-1m Top soil 1m-2.4m Clay 2.4m-6.1m Dry gravel 6.1m-9.2m W.b gravel	1302.9	North-east
GW044012	0m-0.91m Topsoil 0.91m-4.57m Clay 4.57m-27.74m Sandstone 27.74m-29.26m Sandstone water supply 29.26m-31.7m Clay 31.7m-34.75m Sandstone 34.75m-44.81m Sandstone water supply 44.81m-45.72m Sandstone	1311.0	South
GW050136	0m-0.5m Topsoil 0.5m-1.2m Clay 1.2m-7.7m Sandstone 7.7m-8.7m Clay wet 8.7m-21.3m Sandstone water supply 21.3m-45m Clay 45m-47.5m Sandstone water supply 47.5m-56.5m Clay 56.5m-58m Sandstone water supply 58m-60m Clay	1323.2	East
GW967500	#N/A	1344.9	East
GW968225	0m-1.3m Topsoil, sandy 1.3m-10.5m Clay, brown, light 10.5m-28.5m Sandy clay, light brown 28.5m-45m Sandstone, weathered, ligtht brown 45m-61m Sandstone, light brown, fine grained 61m-78m Sandstone, white, coarse grained 78m-90m Sandstone, white, coarse, fractured 90m-92m Sandstone, white, coarse	1356.0	East
GW971582	#N/A	1356.5	South
GW017369	0m-2.13m Soil 2.13m-4.87m Gravel loose 4.87m-7.31m Clay some very soft 4.87m-7.31m Sandstone soft water supply 7.31m-7.92m Sand water supply 7.92m-10.05m Sandstone white very soft clayey	1392.4	North-east
GW971629	#N/A	1393.1	East
GW014249	0m-5.79m Nominal 5.79m-6.4m Gravel nominal water supply	1395.0	North-east
GW970124	0m-4m Sandy clay, tan, wet 4m-9m Sandstone, tan, coarse, wet 9m-11m Sand, & gravel 11m-35m Sandstone, clayey, red 35m-43m Sandy clay, red, bands of brown white & black 43m-57m Sandstone, with clay bands 57m-64m Sandstone, coarse, red & white, with bands of quartz gravel, water bearing	1396.8	East
GW900494	0m-1.7m Black topsoil 1.7m-3.1m Brown sandy clay 3.1m-9.8m Sand 9.8m-16.5m Brown sandy clay 16.5m-18.1m Sand & fine gravel 18.1m-18.8m Brown sandy clay	1397.8	North-east

Groundwater Bore ID	From Depth – To Depth (m) Lithology	Distance (m)	Direction
GW970303	#N/A	1403.4	South
GW969458	0m-0.3m Sand, fine grained, red/brown 0.3m-0.8m Silt, with trace of sand, red/brown 0.8m-1.5m Sand, fine grained, red/brown 1.5m-2.5m Silt, red/brown 2.5m-5.75m Clay, brown 5.75m-7.25m Silt, with trace of sand, brown 7.25m-9.5m Sand, medium grained, brown, saturated @7.5m	1406.9	North-east
GW969459	0m-0.3m Clay, dark brown 0.3m-4.5m Clay, red/brown 4.5m-10m Sand, medium grained, brown, saturated @ 8.2m	1409.6	North-east
GW020367	0m-0.6m Soil 0.6m-7.62m Gravel compacted 7.62m-9.75m Sand fine water supply 9.75m-11.27m Gravel small 9.75m-11.27m Sand fine 11.27m-12.8m Gravel medium 12.8m-14.32m Gravel some sand	1421.4	North-east
GW902890	#N/A	1428.6	East
GW065851	#N/A	1431.3	North-east
GW968442	0m-1m Fill 1m-2m Topsoil 2m-3m Clay, gravelly 3m-4.5m Sand 4.5m-6m Clay, grey 6m-11m Sand & gravel 11m-16m Clay, grey & orange 16m-22m Gravel (big rocks) 22m-22.1m Clay 22.1m-24m Sand 24m-25m Sandstone	1444.2	North-east
GW020360	0m-1.82m Soil 1.82m-7.62m Clay 7.62m-11.27m Clay dark blue fatty water supply 11.27m-12.49m Gravel small 11.27m-12.49m Sand clay 12.49m-14.63m Clay yellow	1457.9	North-east
GW969457	0m-0.4m Sand, fine to medium grained, with small gravel, red/brown 0.4m-2m Clayey silty sand, medium grained, brown 2m-4.5m Sand, fine to medium grained, red/brown 4.5m-9.3m Sand, medium grained, light brown, saturated at 8m 9.3m-10m Clay, grey/brown	1459.3	North-east
GW969456	0m-0.4m Sand, fine to medium grained, with small gravel, red/brown 0.4m-2.5m Clayey sand, coarse grained, red/brown 2.5m-7.5m Sand, fine grained, brown 7.5m-8m Clayey sand, coarse grained, brown 8m-10m Sand, fine to medium grained, brown, saturated	1460.2	North-east
GW969824	#N/A	1474.4	South
GW965093	0m-0.9m Topsoil 0.9m-24m Sandstone 24m-50m Water bearing sandstone	1480.0	South-east
GW966718	0m-3m Topsoil 3m-15m Clay 15m-68m Red clay 68m-76m White clay 76m-82m Sandstone 82m-101m Clay with sandstone	1491.0	West
GW020361	0m-0.6m Soil dark 0.6m-5.48m Clay sandy 5.48m-6.09m Sand compacted coarse 6.09m-7.01m Clay yellow 7.01m-7.92m Gravel small sand water supply 7.92m-9.44m Gravel compacted 7.92m-9.44m Sand clay	1495.5	North-east

Groundwater Bore ID	From Depth – To Depth (m) Lithology	Distance (m)	Direction
GW968187	0m-1m Topsoil 1m-55m Sandstone, soft with seams of clay 55m-60m Sand, water bearing	1515.0	East
GW000021	0m-6.09m Clay 6.09m-15.24m Sandstone yellow 15.24m-21.33m Sandstone red 21.33m-42.67m Clay 42.67m-44.19m Sand water supply 44.19m-49.07m Gravel 49.07m-74.67m Clay water supply 74.67m-76.2m Sand coarse 76.2m-103.02m Sandstone water supply 103.02m-103.63m Clay	1541.8	South-west
GW028741	0m-1.82m Loam sandy 1.82m-6.09m Clay yellow sandy 6.09m-7.62m Gravel clay medium 7.62m-7.92m Sand fine-coarse 7.92m-11.27m Gravel some sand medium 11.27m-13.1m Sand fine 13.1m-13.41m Clay sand fine	1543.3	North-east
GW971618	#N/A	1554.3	East
GW970349	#N/A	1562.4	South-east
GW904032	#N/A	1569.0	South-west
GW020364	0m-1.82m Soil black 1.82m-9.14m Clay water supply 9.14m-9.93m Clay grey gravel 9.93m-10.97m Gravel small 9.93m-10.97m Sand clay 10.97m-11.58m Gravel grey small 10.97m-11.58m Sand coarse water supply 11.58m-11.88m Gravel fossils:wood water supply 11.88m-13.71m Gravel small fine water supply 11.88m-13.71m Sand coarse 13.71m-14.63m Clay gravel water supply	1571.0	North-east
GW020366	0m-2.74m Soil black 2.74m-6.09m Clay 6.09m-6.4m Clay grey 6.4m-7.92m Clay grey red 7.92m-8.22m Clay gravel 8.22m-9.14m Gravel medium water supply 8.22m-9.14m Sand coarse 9.14m-9.75m Gravel medium fossils:wood water supply 9.75m-10.36m Gravel small water supply 9.75m-10.36m Sand coarse 10.36m-10.97m Gravel small sand fossils:wood water supply 10.97m-11.58m Gravel sand medium water supply 11.58m-12.49m Clay light grey water supply	1580.2	North-east
GW020365	0m-0.91m Soil sandy 0.91m-4.57m Clay wet some gravel water supply	1584.5	North-east
GW020362	0m-3.04m Gravel small 0m-3.04m Sand fine-coarse mixed	1597.1	North-east
GW025221	0m-3.05m Clay 0m-1.53m Sandy loam; light brown 1.53m-4.58m Clay loam; light brown 3.05m-9.14m Clay sandy 4.58m-9.15m Sand; light brown, fine, minor grey clay 5% 9.14m-10.67m Sand 9.15m-10.68m Missing 10.67m-18.29m Clay yellow sandy 10.68m-13.73m Sand; brown, fine to coarse, minor dark brown clay 5% 13.73m-16.78m Sandy clay; light brown & grey, few medium gravel grains 16.78m-18.3m Sand; silty, fine to very coarse, light brown 30% & grey & light brown clay 70% 18.29m-36.58m Gravel fine-coarse water supply 18.3m-19.83m Sand; as above - but with some fine gravel & clay, now 40%	1603.9	North

Groundwater Bore ID	From Depth – To Depth (m) Lithology	Distance (m)	Direction
	19.83m-21.35m Sand; light brown, fine to coarse & fine to medium gravel, few lumps of grey clay 21.35m-22.88m Sand; as above - but with 15% coarse gravel 22.88m-24.4m Gravel; fine to medium, rounded to subrounded. minor fine gravel & medium & coarse sand, little silt, gravel jasper quartzite & quartz, some weathered igneous 24.4m-33.55m Gravel; fine to medium, as above, & medium to coarse sand 33.55m-36.6m Gravel; medium & coarse, rounded to angular, jasper quartzite etc 36.58m-40.54m Gravel claybound 36.6m-38.13m Gravel; as above - but with minor fine & medium sand & silt 38.13m-41.18m Sand; mainly medium & coarse, pale brown with fine & medium gravel 20% 40.54m-42.67m Sand coarse 41.18m-42.7m Sand; mainly medium & coarse, grey brown, few medium gravel grains 42.67m-44.2m Clay 42.7m-44.23m Gravel; grey, medium, rounded to subrounded, mainly quartz & jasper 50%, grey sandy clay 50% 44.2m-50.29m Sand coarse water supply 44.23m-47.28m Sand; grey, very coarse & fine gravel, some medium gravel grains, sandy clay 10% 47.28m-53.38m Sand; as above - no clay 50.29m-68.58m Clay 53.38m-57.95m Sand; as above - minor fine sand 57.95m-64.05m Gravel; fine & medium, grey brown, subrounded to angular, quartz quartzite jasper, minor brown sandy clay & clay 20% 64.05m-65.58m Gravel; as above - but clay 10% 65.58m-67.1m Sandy clay; grey & brown, with fine gravel grains 20% 67.1m-70.15m Sand; grey, very coarse & fine gravel, minor pale brown sandy clay 5% 68.58m-74.68m Sand coarse water supply 70.15m-71.68m Sand; as above - no clay 71.68m-73.2m Sand; as above - no clay but with medium & coarse gravel 20% 73.2m-76.25m Gravel; mainly fine, grey, rounded to angular quartz jasper chert etc 74.68m-80.16m Clay 76.25m-82.35m Gravel; as above - but with 10% grey sandy clay 80.16m-108.2m Sand gravel coarse water supply 82.35m-85.4m Gravel; as above - but with little clay 85.4m-89.98m Gravel; mainly medium, grey - rounded to angular quartz & jasper 89.98m-91.5m Gravel; as aobve - but with 20% coarse gravel 91.5m-94.55m Gravel; fine to medium, grey, quartz jasper quartzite, rounded to subrounded 94.55m-97.6m Gravel; medium, grey, as above, minor fine gravel, little silt 97.6m-99.13m Sand; coarse, grey & fine & medium gravel 99.13m-102.18m Gravel; mainly fine, grey, rounded to angular quartz jasper etc 102.18m-103.7m Missing 103.7m-108.28m Gravel; as above - but with 50% medium gravel 108.2m-111.25m Sandstone 108.28m-111.33m Clayey sand; grey (siltstone?)		
GW025221	0m-3.05m Clay 0m-1.53m Sandy loam; light brown 1.53m-4.58m Clay loam; light brown 3.05m-9.14m Clay sandy 4.58m-9.15m Sand; light brown, fine, minor grey clay 5% 9.14m-10.67m Sand 9.15m-10.68m Missing 10.67m-18.29m Clay yellow sandy 10.68m-13.73m Sand; brown, fine to coarse, minor dark brown clay 5% 13.73m-16.78m Sandy clay; light brown & grey, few medium gravel grains 16.78m-18.3m Sand; silty, fine to very coarse, light brown 30% & grey & light brown clay 70% 18.29m-36.58m Gravel fine-coarse water supply 18.3m-19.83m Sand; as above - but with some fine gravel & clay, now 40% 19.83m-21.35m Sand; light brown, fine to coarse & fine to medium gravel, few lumps of grey clay 21.35m-22.88m Sand; as above - but with 15% coarse gravel 22.88m-24.4m Gravel; fine to medium, rounded to subrounded. minor fine gravel & medium & coarse sand, little silt, gravel jasper quartzite & quartz, some	1603.9	North

Groundwater Bore ID	From Depth – To Depth (m) Lithology	Distance (m)	Direction
	weathered igneous 24.4m-33.55m Gravel; fine to medium, as above, & medium to coarse sand 33.55m-36.6m Gravel; medium & coarse, rounded to angular, jasper quartzite etc 36.58m-40.54m Gravel claybound 36.6m-38.13m Gravel; as above - but with minor fine & medium sand & silt 38.13m-41.18m Sand; mainly medium & coarse, pale brown with fine & medium gravel 20% 40.54m-42.67m Sand coarse 41.18m-42.7m Sand; mainly medium & coarse, grey brown, few medium gravel grains 42.67m-44.2m Clay 42.7m-44.23m Gravel; grey, medium, rounded to subrounded, mainly quartz & jasper 50%, grey sandy clay 50% 44.2m-50.29m Sand coarse water supply 44.23m-47.28m Sand; grey, very coarse & fine gravel, some medium gravel grains, sandy clay 10% 47.28m-53.38m Sand; as above - no clay 50.29m-68.58m Clay 53.38m-57.95m Sand; as above - minor fine sand 57.95m-64.05m Gravel; fine & medium, grey brown, subrounded to angular, quartz quartzite jasper, minor brown sandy clay & clay 20% 64.05m-65.58m Gravel; as above - but clay 10% 65.58m-67.1m Sandy clay; grey & brown, with fine gravel grains 20% 67.1m-70.15m Sand; grey, very coarse & fine gravel, minor pale brown sandy clay 5% 68.58m-74.68m Sand coarse water supply 70.15m-71.68m Sand; as above - no clay 71.68m-73.2m Sand; as above - no clay but with medium & coarse gravel 20% 73.2m-76.25m Gravel; mainly fine, grey, rounded to angular quartz jasper chert etc 74.68m-80.16m Clay 76.25m-82.35m Gravel; as above - but with 10% grey sandy clay 80.16m-108.2m Sand gravel coarse water supply 82.35m-85.4m Gravel; as above - but with little clay 85.4m-89.98m Gravel; mainly medium, grey - rounded to angular quartz & jasper 89.98m-91.5m Gravel; as aobve - but with 20% coarse gravel 91.5m-94.55m Gravel; fine to medium, grey, quartz jasper quartzite, rounded to subrounded 94.55m-97.6m Gravel; medium, grey, as above, minor fine gravel, little silt 97.6m-99.13m Sand; coarse, grey & fine & medium gravel 99.13m-102.18m Gravel; mainly fine, grey, rounded to angular quartz jasper etc 102.18m-103.7m Missing 103.7m-108.28m Gravel; as above - but with 50% medium gravel 108.2m-111.25m Sandstone 108.28m-111.33m Clayey sand; grey (siltstone?)		
GW025221	0m-3.05m Clay 0m-1.53m Sandy loam; light brown 1.53m-4.58m Clay loam; light brown 3.05m-9.14m Clay sandy 4.58m-9.15m Sand; light brown, fine, minor grey clay 5% 9.14m-10.67m Sand 9.15m-10.68m Missing 10.67m-18.29m Clay yellow sandy 10.68m-13.73m Sand; brown, fine to coarse, minor dark brown clay 5% 13.73m-16.78m Sandy clay; light brown & grey, few medium gravel grains 16.78m-18.3m Sand; silty, fine to very coarse, light brown 30% & grey & light brown clay 70% 18.29m-36.58m Gravel fine-coarse water supply 18.3m-19.83m Sand; as above - but with some fine gravel & clay, now 40% 19.83m-21.35m Sand; light brown, fine to coarse & fine to medium gravel, few lumps of grey clay 21.35m-22.88m Sand; as above - but with 15% coarse gravel 22.88m-24.4m Gravel; fine to medium, rounded to subrounded. minor fine gravel & medium & coarse sand, little silt, gravel jasper quartzite & quartz, some weathered igneous 24.4m-33.55m Gravel; fine to medium, as above, & medium to coarse sand 33.55m-36.6m Gravel; medium & coarse, rounded to angular, jasper quartzite etc 36.58m-40.54m Gravel claybound 36.6m-38.13m Gravel; as above - but with minor fine & medium sand & silt	1603.9	North

Groundwater Bore ID	From Depth – To Depth (m) Lithology	Distance (m)	Direction
	38.13m-41.18m Sand; mainly medium & coarse, pale brown with fine & medium gravel 20% 40.54m-42.67m Sand coarse 41.18m-42.7m Sand; mainly medium & coarse, grey brown, few medium gravel grains 42.67m-44.2m Clay 42.7m-44.23m Gravel; grey, medium, rounded to subrounded, mainly quartz & jasper 50%, grey sandy clay 50% 44.2m-50.29m Sand coarse water supply 44.23m-47.28m Sand; grey, very coarse & fine gravel, some medium gravel grains, sandy clay 10% 47.28m-53.38m Sand; as above - no clay 50.29m-68.58m Clay 53.38m-57.95m Sand; as above - minor fine sand 57.95m-64.05m Gravel; fine & medium, grey brown, subrounded to angular, quartz quartzite jasper, minor brown sandy clay & clay 20% 64.05m-65.58m Gravel; as above - but clay 10% 65.58m-67.1m Sandy clay; grey & brown, with fine gravel grains 20% 67.1m-70.15m Sand; grey, very coarse & fine gravel, minor pale brown sandy clay 5% 68.58m-74.68m Sand coarse water supply 70.15m-71.68m Sand; as above - no clay 71.68m-73.2m Sand; as above - no clay but with medium & coarse gravel 20% 73.2m-76.25m Gravel; mainly fine, grey, rounded to angular quartz jasper chert etc 74.68m-80.16m Clay 76.25m-82.35m Gravel; as above - but with 10% grey sandy clay 80.16m-108.2m Sand gravel coarse water supply 82.35m-85.4m Gravel; as above - but with little clay 85.4m-89.98m Gravel; mainly medium, grey - rounded to angular quartz & jasper 89.98m-91.5m Gravel; as aobve - but with 20% coarse gravel 91.5m-94.55m Gravel; fine to medium, grey, quartz jasper quartzite, rounded to subrounded 94.55m-97.6m Gravel; medium, grey, as above, minor fine gravel, little silt 97.6m-99.13m Sand; coarse, grey & fine & medium gravel 99.13m-102.18m Gravel; mainly fine, grey, rounded to angular quartz jasper etc 102.18m-103.7m Missing 103.7m-108.28m Gravel; as above - but with 50% medium gravel 108.2m-111.25m Sandstone 108.28m-111.33m Clayey sand; grey (siltstone?)		
GW025221	0m-3.05m Clay 0m-1.53m Sandy loam; light brown 1.53m-4.58m Clay loam; light brown 3.05m-9.14m Clay sandy 4.58m-9.15m Sand; light brown, fine, minor grey clay 5% 9.14m-10.67m Sand 9.15m-10.68m Missing 10.67m-18.29m Clay yellow sandy 10.68m-13.73m Sand; brown, fine to coarse, minor dark brown clay 5% 13.73m-16.78m Sandy clay; light brown & grey, few medium gravel grains 16.78m-18.3m Sand; silty, fine to very coarse, light brown 30% & grey & light brown clay 70% 18.29m-36.58m Gravel fine-coarse water supply 18.3m-19.83m Sand; as above - but with some fine gravel & clay, now 40% 19.83m-21.35m Sand; light brown, fine to coarse & fine to medium gravel, few lumps of grey clay 21.35m-22.88m Sand; as above - but with 15% coarse gravel 22.88m-24.4m Gravel; fine to medium, rounded to subrounded. minor fine gravel & medium & coarse sand, little silt, gravel jasper quartzite & quartz, some weathered igneous 24.4m-33.55m Gravel; fine to medium, as above, & medium to coarse sand 33.55m-36.6m Gravel; medium & coarse, rounded to angular, jasper quartzite etc 36.58m-40.54m Gravel claybound 36.6m-38.13m Gravel; as above - but with minor fine & medium sand & silt 38.13m-41.18m Sand; mainly medium & coarse, pale brown with fine & medium gravel 20% 40.54m-42.67m Sand coarse 41.18m-42.7m Sand; mainly medium & coarse, grey brown, few medium gravel grains	1603.9	North

Groundwater Bore ID	From Depth – To Depth (m) Lithology	Distance (m)	Direction
	42.67m-44.2m Clay 42.7m-44.23m Gravel; grey, medium, rounded to subrounded, mainly quartz & jasper 50%, grey sandy clay 50% 44.2m-50.29m Sand coarse water supply 44.23m-47.28m Sand; grey, very coarse & fine gravel, some medium gravel grains, sandy clay 10% 47.28m-53.38m Sand; as above - no clay 50.29m-68.58m Clay 53.38m-57.95m Sand; as above - minor fine sand 57.95m-64.05m Gravel; fine & medium, grey brown, subrounded to angular, quartz quartzite jasper, minor brown sandy clay & clay 20% 64.05m-65.58m Gravel; as above - but clay 10% 65.58m-67.1m Sandy clay; grey & brown, with fine gravel grains 20% 67.1m-70.15m Sand; grey, very coarse & fine gravel, minor pale brown sandy clay 5% 68.58m-74.68m Sand coarse water supply 70.15m-71.68m Sand; as above - no clay 71.68m-73.2m Sand; as above - no clay but with medium & coarse gravel 20% 73.2m-76.25m Gravel; mainly fine, grey, rounded to angular quartz jasper chert etc 74.68m-80.16m Clay 76.25m-82.35m Gravel; as above - but with 10% grey sandy clay 80.16m-108.2m Sand gravel coarse water supply 82.35m-85.4m Gravel; as above - but with little clay 85.4m-89.98m Gravel; mainly medium, grey - rounded to angular quartz & jasper 89.98m-91.5m Gravel; as aobve - but with 20% coarse gravel 91.5m-94.55m Gravel; fine to medium, grey, quartz jasper quartzite, rounded to subrounded 94.55m-97.6m Gravel; medium, grey, as above, minor fine gravel, little silt 97.6m-99.13m Sand; coarse, grey & fine & medium gravel 99.13m-102.18m Gravel; mainly fine, grey, rounded to angular quartz jasper etc 102.18m-103.7m Missing 103.7m-108.28m Gravel; as above - but with 50% medium gravel 108.2m-111.25m Sandstone 108.28m-111.33m Clayey sand; grey (siltstone?)		
GW044310	0m-0.91m Topsoil 0.91m-5.49m Clay 5.49m-6.1m Sandstone 6.1m-35.97m Clay 35.97m-41.15m Sandstone 41.15m-48.77m Sand water supply	1631.2	South
GW065083	#N/A	1634.9	South
GW020359	0m-0.6m Soil dark 0.6m-2.13m Clay 2.13m-4.26m Clay sandy water supply 4.26m-5.18m Clay 5.18m-6.09m Clay sandy	1642.4	North-east
GW030544	0m-1.21m Clay grey hard 1.21m-2.13m Clay 2.13m-2.74m Clay sandy gravel 2.74m-6.7m Clay sandy 6.7m-7.31m Sand gravel fine 7.31m-12.8m Sand grey gravel fine-medium 12.8m-12.95m Clay grey 12.95m-17.67m Sand grey gravel medium 17.67m-21.03m Clay grey khaki 21.03m-24.99m Clay sandy gravel 24.99m-25.6m Clay gravel 24.99m-25.6m Sand 25.6m-26.21m Sand grey gravel fine 25.6m-26.21m Some clay 26.21m-31.69m Clay 26.21m-31.69m Sand grey gravel medium 31.69m-32.3m Clay white grey 32.3m-35.35m Clay white gravel 35.35m-38.1m Clay sandy gravel 38.1m-78.02m Clay yellowish sandy 78.02m-82.29m Clay sandy	1643.5	East

Groundwater Bore ID	From Depth – To Depth (m) Lithology	Distance (m)	Direction
	82.29m-83.82m Shale grey 83.82m-85.34m Shale		
GW030544	0m-1.21m Clay grey hard 1.21m-2.13m Clay 2.13m-2.74m Clay sandy gravel 2.74m-6.7m Clay sandy 6.7m-7.31m Sand gravel fine 7.31m-12.8m Sand grey gravel fine-medium 12.8m-12.95m Clay grey 12.95m-17.67m Sand grey gravel medium 17.67m-21.03m Clay grey khaki 21.03m-24.99m Clay sandy gravel 24.99m-25.6m Clay gravel 24.99m-25.6m Sand 25.6m-26.21m Sand grey gravel fine 25.6m-26.21m Some clay 26.21m-31.69m Clay 26.21m-31.69m Sand grey gravel medium 31.69m-32.3m Clay white grey 32.3m-35.35m Clay white gravel 35.35m-38.1m Clay sandy gravel 38.1m-78.02m Clay yellowish sandy 78.02m-82.29m Clay sandy 82.29m-83.82m Shale grey 83.82m-85.34m Shale	1643.5	East
GW045419	0m-6m Topsoil 6m-9m Sand water supply 9m-14.5m Clay 14.5m-18m Sandstone 18m-34.5m Sandstone water bearing water supply	1659.1	East
GW968360	0m-1m Topsoil 1m-6m Clay, grey 6m-33m Sandstone, soft 33m-39.48m Sand, coarse, water bearing	1677.4	East
GW901993	0m-2m Topsoil 2m-24m Sand stone & clay 24m-33.5m Sandy clay 33.5m-35m Sand dry 35m-42m Sandy clay 42m-49m Coarse sand (wb) 49m-54m White clay	1684.3	South-west
GW048725	0m-0.91m Topsoil sandy 0.91m-2.74m Sandstone soft 2.74m-6.71m Sandstone yellow 6.71m-15.24m Sandstone red water supply 15.24m-18.59m Sandstone red hard water supply 18.59m-24.99m Clay red sandy water supply 24.99m-35.97m Clay sandy water supply 35.97m-114.3m Clay thin layers 35.97m-114.3m Sand water supply	1686.7	East
GW020358	0m-0.6m Soil dark 0.6m-3.04m Clay 3.04m-4.57m Clay 4.57m-5.79m Clay sandy 5.79m-7.01m Sand gravel water supply	1687.5	North-east
GW008245	0m-1.82m Clay 1.82m-2.43m Clay sandy 2.43m-5.18m Clay 2.43m-5.18m Gravel compacted 5.18m-5.79m Gravel water supply 5.79m-6.4m Sandstone soft 6.4m-10.66m Sandstone 10.66m-12.19m Clay sticky	1698.6	North-east
GW970439	#N/A	1702.4	South
GW970440	#N/A	1702.6	South

Groundwater Bore ID	From Depth – To Depth (m) Lithology	Distance (m)	Direction
GW056034	0m-0.5m Topsoil 0.5m-46m Sandstone water supply	1707.1	South-east
GW026665	0m-0.6m Topsoil 0.6m-29.26m Sandstone yellow 29.26m-32.3m Sandstone light yellow 32.3m-35.96m Gravel water supply 35.96m-41.14m Clay yellow	1716.3	West
GW062393	0m-1.52m Topsoil 1.52m-7.62m Clay 7.62m-13.71m Gravel water bearing water supply 13.71m-16.76m Clay 16.76m-28.95m Gravel water bearing water supply 28.95m-32m Clay 32m-33.52m Sandstone	1719.8	North-east
GW902055	0m-0.7m Topsoil 0.7m-6.8m Red sandy clay 6.8m-15.9m Grey clay 15.9m-45.6m Red clay 45.6m-48m Yellow clay 48m-56m Sandstone 56m-58m Yellow clay 58m-70m Quartz sandstone 70m-84m Sandstone	1722.1	South
GW970430	#N/A	1728.4	South
GW970435	#N/A	1740.9	South
GW970436	#N/A	1742.7	South
GW970431	#N/A	1749.3	South
GW970432	#N/A	1749.9	South
GW054952	0m-0.7m Topsoil 0.7m-2m Clay 2m-50m Sandstone water supply	1759.6	South
GW060698	0m-4.6m Geologist 4.6m-232.9m Sandstone white porous loose medium-coarse sub-rounded/rounded geologist 232.9m-267m Sandstone white grey silty fine-coarse sub angular geologist 232.9m-267m Shale silty some coal geologist 232.9m-267m Siltstone light grey light brown sandy geologist 267m-302.1m Sandstone white light grey some shale geologist 267m-302.1m Siltstone light grey light brown sandy fine-coarse sub angular-sub rounde geologist 302.1m-372.5m Claystone silty sandy geologist 302.1m-372.5m Sandstone white silty fine sub angular-sub rounde geologist 302.1m-372.5m Shale grey black geologist 372.5m-397.5m Sandstone white grey conglomeratic medium-coarse sub-angular/sub-rounded geologist 372.5m-397.5m Siltstone tuff geologist 397.5m-432.8m Coal black shaley some interlayere geologist 397.5m-432.8m Sandstone white grey water bearing silty very fine sub-angular/sub-rounded geologist 397.5m-432.8m Shale black carbonaceous layered geologist 397.5m-432.8m Siltstone white grey hard layered geologist 432.8m-448.1m Coal geologist 432.8m-448.1m Sandstone white grey black water bearing loose calcareous geologist 432.8m-448.1m Siltstone some tuff geologist 448.1m-471.5m Coal grey black shaley some tuff geologist 448.1m-471.5m Sandstone cream white calcareous fine-coarse sub-angular/sub-rounded geologist 448.1m-471.5m Siltstone grey shaley hard carbonaceous geologist 471.5m-477.3m Coal grey black geologist 477.3m-495.6m Coal traces geologist 477.3m-495.6m Sandstone porous coarse conglomeratic sub-angular/sub-rounded geologist	1760.8	South

Groundwater Bore ID	From Depth – To Depth (m) Lithology	Distance (m)	Direction
	477.3m-495.6m Siltstone grey sub angular-sub rounde geologist 477.3m-495.6m Tuff traces geologist 495.6m-502.9m Calcarenite white cream grey hard some pyrite fine calcareous geologist 502.9m-547.4m Limestone white fossiliferous geologist 502.9m-547.4m Sandstone white grey black medium-coarse calcareous sub-angular/sub-rounded geologist 502.9m-547.4m Siltstone shaley sub angular-sub rounde geologist 547.4m-565.4m Shale grey black carbonaceous geologist 547.4m-565.4m Siltstone white light grey layered geologist 565.4m-611.7m Sandstone white light brown loose calcareous coarse interlayere sub-angular/sub-rounded geologist 565.4m-611.7m Shale dark grey black micaceous some limestone interlayere geologist 565.4m-611.7m Siltstone white grey sandy interlayere geologist 611.7m-616m Clay matrix geologist 611.7m-616m Sandstone white grey porous some conglomeratic fine-coarse sub-angular/sub-rounded geologist 616m-621.8m Dolerite dark grey green black hard coarse geologist 621.8m-626.7m Clay matrix geologist 621.8m-626.7m Sandstone white grey porous some conglomeratic fine-coarse sub-angular/sub-rounded geologist 626.7m-642.5m Coal black brittle geologist 626.7m-642.5m Sandstone white light brown grey water bearing fine layered sub-angular/sub-rounded geologist 626.7m-642.5m Siltstone dark grey black shaley interlayere geologist 626.7m-642.5m Volcanic rock white light grey very hard geologist 642.5m-685.2m Sandstone white grey water bearing fine-medium layered sub-angular/sub-rounded geologist 642.5m-685.2m Shale dark grey black silty some carbonaceou geologist 685.2m-718.1m Coal black layered geologist 685.2m-718.1m Shale dark grey black carbonaceous layered geologist 685.2m-718.1m Tuff white some soft geologist 718.1m-762m Coal black layered geologist 718.1m-762m Sandstone argillaceous matrix medium-coarse interlayere sub-angular/sub-rounded geologist 718.1m-762m Shale dark grey black carbonaceous layered geologist 718.1m-762m Some geologist 718.1m-762m Tuff white some soft geologist 762m-764.7m Diorite white light grey very hard crystalline fine geologist 762m-764.7m Some geologist 764.7m-795.8m Light grey green crystalline hard coarse geologist 764.7m-795.8m Some geologist		
GW968519	0m-6m Sand, brown, light, larg grained 6m-6.2m Ironstone, brown, dark 6.2m-9m Clay/sand, yellow, dark, large grained 9m-11.5m Clay, orange, dark, large grained 11.5m-28m Sand/clay, yellow, light, large grained 28m-29m Clay, yellow, light, large grained 29m-32m Clay, yellow, light, pink light, large grained 32m-40.5m Sandstone, brown, light, medium grained	1763.7	East
GW071653	#N/A	1782.6	South
GW020357	0m-1.52m Soil dark 1.52m-4.88m Clay 4.88m-5.79m Clay sandy dark 5.79m-7.01m Clay sandy water supply 7.01m-8.23m Sand some clay fine-coarse 8.23m-9.45m Sand some small gravel fine-coarse mixed water supply 9.45m-10.06m Gravel small some clay 9.45m-10.06m Sand fine water supply 10.06m-11.58m Gravel some sand medium water supply	1787.1	North-east
GW970429	#N/A	1791.5	South
GW063825	0m-1m Loam black 1m-5m Clay yellow sandy 5m-6m Clay grey sandy 6m-12m Sandstone yellow weathered 12m-14m Sandstone red weathered	1800.5	South

Groundwater Bore ID	From Depth – To Depth (m) Lithology	Distance (m)	Direction
	14m-21m Shale grey sandy 21m-24m Sandstone weathered coarse water supply 24m-30m Clay red shaley 30m-35m Sandstone white 35m-46m Sandstone red weathered 46m-50m Sandstone red pebbles(quartz) 50m-60m Clay red sandy 60m-74m Clay yellow pebbles(quartz) 74m-76m Clay bands 74m-76m Sandstone white 76m-100m Sandstone white water supply 100m-104m Sandstone hard tuffaceous 104m-128m Siltstone grey 128m-140m Sandstone white coarse water supply 140m-150m Sandstone grey 150m-155m Sandstone buff 155m-164m Sandstone soft coarse 164m-170m Sandstone grey hard 170m-176m Sandstone soft coarse 176m-185m Sandstone grey hard		
GW970441	#N/A	1808.1	South
GW902779	0m-1.4m Topsoil 1.4m-30.5m Sandstone 30.5m-40m Water bearing sandstone 40m-40.23m Clay	1810.3	South-east
GW968521	0m-0.4m Topsoil, dark brown, fine grained 0.4m-12m Clay/sand, light brown, fine grained 12m-12.5m Clay, light grey & light pink, fine grained 12.5m-20m Clay, dark red, fine grained 20m-22m Clay, dark yellow, fine grained 22m-28m Sandstone, light brown, medium grained 28m-35m Clay, light yellow, fine grained 35m-40m Clay, dark yellow, fine grained 40m-46m Sandstone, light brown, medium grained	1815.3	South-east
GW901861	0m-2m Topsoil 2m-6m Clay 6m-24m Soft sandstone 24m-41.5m Broken sandstone	1819.5	South
GW037703	0m-0.61m Loam 0.61m-5.79m Clay dark blue 5.79m-8.53m Gravel grey fine-coarse water supply	1843.7	North-east
GW967880	#N/A	1847.0	South
GW968520	0m-0.2m Topsoil 0.2m-7m Sandstone, grey, medium-fine grained, soft 7m-8.5m Sandstone, brown, medium-fine grained, soft 8.5m-10m Sandstone, grey, light, fine grained, lumps 10m-10.5m Sandstone, red, dark, fine grained 10.5m-11m Sandstone, dark red & light grey, coarse grained 11m-11.5m Sandstone/clay, red/brown light, coarse grained 11.5m-12m Sandstone, light red, large grained 12m-14m Sandstone, dark red, light grained 14m-14.2m Clay, light grey, large grained 14.2m-18m Sandstone, dark yellow, large grained 18m-20m Sandstone, light yellow, large grained 20m-22m Sandstone, dark yellow, large grained 22m-24m Sandstone, light yellow, coarse grained 24m-31m Sandstone, dark yellow, large grained 31m-38m Sandstone, light brown, medium grained.	1854.3	East
GW060386	0m-12m Fill topsoil 12m-20m Sand gravel water bearing 20m-120m Sediment	1859.4	East
GW058943	#N/A	1866.9	East
GW901740	0m-1m Topsoil 1m-6m Clay 6m-22.5m Sandy clay 22.5m-23.5m Sandstone	1872.5	East

Groundwater Bore ID	From Depth – To Depth (m) Lithology	Distance (m)	Direction
	23.5m-87m Sandy clay and fine gravel stringers 87m-87.5m Ironstone 87.5m-108m Sandstone fractured bands		
GW030356	0m-6m Clay 6m-10m Clay 10m-19m Clay yellow 19m-30m Clay gravel 30m-32.5m Rock 32.5m-35.4m Sand 35.4m-41.1m Clay gravel 41.1m-42.6m Rock 42.6m-47.2m Clay sandy 47.2m-51.8m Sand water supply 51.8m-52.7m Clay 52.7m-65.8m Clay sandy 65.8m-73.7m Clay hard 73.7m-75m Clay hard	1876.5	North-west
GW030356	0m-6m Clay 6m-10m Clay 10m-19m Clay yellow 19m-30m Clay gravel 30m-32.5m Rock 32.5m-35.4m Sand 35.4m-41.1m Clay gravel 41.1m-42.6m Rock 42.6m-47.2m Clay sandy 47.2m-51.8m Sand water supply 51.8m-52.7m Clay 52.7m-65.8m Clay sandy 65.8m-73.7m Clay hard 73.7m-75m Clay hard	1876.5	North-west
GW051381	0m-1.4m Topsoil 1.4m-6m Clay 6m-12.5m Sandstone 12.5m-37m Clay 37m-46m Sandstone water supply	1876.6	South-east
419018	#N/A	1882.0	East
GW058110	0m-0.3m Topsoil 0.3m-26.8m Sandstone 26.8m-33.6m Clay 33.6m-57m Sandstone water supply	1883.5	South
GW008233	0m-3.05m Driller 3.05m-4.88m Clay 4.88m-14.94m Gravel sand water supply 14.94m-15.24m Clay gravel water supply 15.24m-18.9m Gravel sand water supply 18.9m-20.73m Gravel very silty 18.9m-20.73m Sand water supply 20.73m-22.56m Clay gravel 22.56m-23.16m Clay gravel sticky 23.16m-25.6m Gravel sand water supply 25.6m-25.91m Gravel 25.6m-25.91m Sand very silty 25.91m-26.52m Clay gravel 26.52m-28.65m Clay sticky 28.65m-31.09m Sandstone soft	1908.5	North-east
GW970742	#N/A	1911.1	South
GW020363	0m-1.52m Soil 1.52m-4.57m Clay sandy 4.57m-11.27m Gravel small 4.57m-11.27m Sand coarse 11.27m-11.58m Clay yellow 11.58m-13.41m Gravel small sand coarse water supply 13.41m-16.15m Clay sandy 16.15m-18.28m Gravel sloppy 16.15m-18.28m Sand clay	1911.1	North-east

Groundwater Bore ID	From Depth – To Depth (m) Lithology	Distance (m)	Direction
	18.28m-23.16m Clay sandy gravel 23.16m-25.6m Gravel sand coarse		
GW964961	#N/A	1916.0	South
GW970433	#N/A	1921.8	South
GW970434	#N/A	1922.8	South
GW970443	#N/A	1927.9	South
GW969080	0m-0.6m Topsoil, brown, dark 0.6m-5.5m Sandstone, soft, grey, light 5.5m-9m Sandstone/clay, brown, dark 9m-11m Sandstone/clay, small stones, dark 11m-16m Clay, yellow 16m-18.5m Clay, brown red 18.5m-23m Clay, brown, light 23m-23.5m Clay, white 23.5m-24.5m Clay, yellow, with stones to 20mm 24.5m-26m Clay, red, with stones to 20mm 26m-28.5m Sand/clay, light brown & white, stones up to 30mm 28.5m-30m Clay, brown, traces purples 30m-41.5m Sandstone, water bearing	1933.7	East
GW970442	#N/A	1955.8	South
GW970428	#N/A	1958.0	South
GW900673	0m-1.3m Top soil 1.3m-3.4m Clay 3.4m-6.4m Sandy clay 6.4m-22.2m Sand and gravel 22.2m-28.9m Sandstone yellow	1965.0	North-east
GW970304	#N/A	1968.7	South
GW068461	0m-0.6m Top soil 0.6m-3m Clay 3m-26.2m Sandstone 26.2m-39.6m Water bearing sandstone	1968.9	East
GW965182	0m-2m Topsoil 2m-10m Sandy clay 10m-26m Sandstone 26m-30m Sandstone	1982.5	East

2.2 HYDROGEOLOGY AND OTHER BOREHOLES

Map 2.2 (500m Buffer)

	On the Property?	Within Buffer?
Groundwater Vulnerability	Not identified	Not identified
Groundwater Exclusion Zones[1,2]	Not identified	Not identified
Hydrogeologic Unit	Surficial Sediment Aquifer (porous media - unconsolidated) Mesozoic (GAB) (porous media - consolidated)	Surficial Sediment Aquifer (porous media - unconsolidated) Mesozoic (GAB) (porous media - consolidated)

[1] - Botany Groundwater Management Zones (BGMZ): Zone 1 – the use of groundwater remains banned; Zones 2 to 4 – domestic groundwater use is banned, especially for drinking water, watering gardens, washing windows and cars, bathing, or to fill swimming pools.

[2] - Williamtown Groundwater Management Zones (WGMZ): Primary Management Zone – this area has significantly higher levels of PFAS detected and therefore, the strongest advice applies. Secondary Management Zone – this area has some detected levels of PFAS; Broader Management Zone – the topography and hydrology of the area means PFAS detections could occur now and into the future.

Groundwater Dependent Ecosystems (GDE)

	On the Property?	Within Buffer?
Aquatic	Moderate potential GDE - from national assessment	Moderate potential GDE - from national assessment
Terrestrial	High potential GDE - from regional studies Moderate potential GDE - from regional studies Low potential GDE - from regional studies	High potential GDE - from regional studies Moderate potential GDE - from regional studies Low potential GDE - from regional studies

Aquatic - Ecosystems that rely on the Surface expression of groundwater.
Terrestrial - Ecosystems that rely on the Subsurface expression of groundwater.

Other Known Borehole Investigations (Coal Seam Gas (CSG), Petroleum Wells and Other Boreholes)

Borehole ID	Purpose	Project	Client/ Licence	Date Drilled	Depth (m)	Distance (m)	Direction
T_TP33	Test Pit	Inland Rail - Narromine to Narrabri (N2N) - Phase 1	ARTC	21/04/2016	3.0	0.0	T_TP33
43275	Water Well	Water Bore	Department Of Water Resources	01/01/1972	81.6	47.6	43275
MIN_43275	<Null>	DPI Minerals Borehole Register - Department Of Water Resources,	Department Of Water Resources,		0.0	47.9	MIN_43275

Section 3 Environmental Registers, Licences and Incidents

3.1 CONTAMINATED LAND PUBLIC REGISTER

Map 3.1 (1000m Buffer)

Sites Notified as Contaminated to the EPA

Site Name	Address	Activity that caused Contamination	EPA Site Management Class *(Table 3.1.1)*	Distance (m)	Direction
Not identified	-	-	-	-	-

If the record does not contain a complete street address and/or cannot be located, the records' geographic location will be approximated and reported as being within the surrounding area.

Contaminated Land Record of Notices

Site Name	Area n°	Address	Notices	Distance (m)	Direction
Not identified	-	-	-	-	-

If the record does not contain a complete street address and/or cannot be located, the records' geographic location will be approximated and reported as being within the surrounding area.

Table 3.1.1 EPA Site Management Class Explanation	
EPA Site Management Class	
Under Assessment	The contamination is being assessed by the EPA to determine whether regulation is required. The EPA may require further information to complete the assessment. For example, the completion of management actions regulated under the planning process or Protection of the Environment Operations Act 1997. Alternatively, the EPA may require information via a notice issued under s77 of the Contaminated Land Management Act 1997 or issue a Preliminary Investigation Order.
Regulation under the CLM Act not required	The EPA has completed an assessment of the contamination and decided that regulation under the Contaminated Land Management Act 1997 is not required.

Table 3.1.1 EPA Site Management Class Explanation	
Regulation being finalised	The EPA has completed an assessment of the contamination and decided that the contamination is significant enough to warrant regulation under the Contaminated Land Management Act 1997. A regulatory approach is being finalised.
Contamination currently regulated under the CLM Act	The EPA has completed an assessment of the contamination and decided that the contamination is significant enough to warrant regulation under the Contaminated Land Management Act 1997 (CLM Act). Management of the contamination is regulated by the EPA under the CLM Act. Regulatory notices are available on the EPA's Contaminated Land Public Record.
Contamination currently regulated under the POEO Act	The EPA has completed an assessment of the contamination and decided that the contamination is significant enough to warrant regulation. Management of the contamination is regulated under the Protection of the Environment Operations Act 1997 (POEO Act). The EPA's regulatory actions under the POEO Act are available on the POEO public register.
Contamination being managed via the planning process (EP&A Act)	The EPA has completed an assessment of the contamination and decided that the contamination is significant enough to warrant regulation. The contamination of this site is managed by the consent authority under the Environmental Planning and Assessment Act 1979 (EP&A Act) planning approval process, with EPA involvement as necessary to ensure significant contamination is adequately addressed. The consent authority is typically a local council or the Department of Planning and Environment.
Contamination formerly regulated under the CLM Act	The EPA has determined that the contamination is no longer significant enough to warrant regulation under the Contaminated Land Management Act 1997 (CLM Act). The contamination was addressed under the CLM Act.
Contamination formerly regulated under the POEO Act	The EPA has determined that the contamination is no longer significant enough to warrant regulation. The contamination was addressed by the appropriate consent authority via the planning process under the Environmental Planning and Assessment Act 1979 (EP&A Act).
Contamination was addressed via the planning process (EP&A Act)	The EPA has determined that the contamination is no longer significant enough to warrant regulation. The contamination was addressed by the appropriate consent authority via the planning process under the Environmental Planning and Assessment Act 1979 (EP&A Act).
Ongoing maintenance required to manage residual contamination (CLM Act)	The EPA has determined that ongoing maintenance, under the Contaminated Land Management Act 1997 (CLM Act), is required to manage the residual contamination. Regulatory notices under the CLM Act are available on the EPA's Contaminated Land Public Record.

The EPA maintains a record of sites that have been notified to the EPA by owners or occupiers as contaminated land. The sites notified to the EPA are recorded on the register at various stages of the assessment and/or remediation process.

3.2 LICENCES, APPROVALS & ASSESSMENTS

Map 3.2 (500m Buffer)

Licences

Licence N°	Licence holder	Location Name	Premise Address	Fee Based Activity	Distance (m)*	Direction
12193	NARRABRI SHIRE COUNCIL	NARRABRI LANDFILL	Yarrie Lake Road, NARRABRI NSW	Waste disposal by application to land	0.0	Onsite
12193	NARRABRI SHIRE COUNCIL	NARRABRI LANDFILL	Yarrie Lake Road, NARRABRI NSW	Waste storage - waste tyres	0.0	Onsite
20350	SANTOS NSW (EASTERN) PTY LTD	NARRABRI GAS FIELD	X LINE ROAD, NARRABRI NSW	Petroleum exploration, assessment and production	0.0	Adjacent
20378	SANTOS NSW (EASTERN) PTY LTD	Santos Narrabri Operations Centre	300 Yarrie Lake Road, NARRABRI NSW	Non-thermal treatment of hazardous and other waste	0.0	Adjacent
20378	SANTOS NSW (EASTERN) PTY LTD	Santos Narrabri Operations Centre	300 Yarrie Lake Road, NARRABRI NSW	Waste storage - hazardous, restricted solid, liquid, clinical and related waste and asbestos waste	0.0	Adjacent

If the record does not contain a complete street address and/or cannot be located, the records' geographic location will be approximated and reported as being within the surrounding area.

Other Licences still Regulated by EPA

Licence N°	Licence holder	Location Name	Premise Address	Fee Based Activity	Status	Distance (m)*	Direction
11572	MALCOLM FRANCIS GETT	INGLEGREEN PIGGERY	CULGOORA ROAD, NARRABRI WEST, NSW 2390	Pig accommodation	Surrendered	0.0	Onsite
12981	FORESTRY CORPORATION OF NEW SOUTH WALES	IFOA Area "the Brigalow-Nandewar Region"	Brigalow and Nandewar Community Conservation Area, DUBBO, NSW 2830	Logging operations	No longer in force	Not mapped	Not mapped
1477	CSR LIMITED	CSR LIMITED	CSR LIMITED	Concrete works	Surrendered	Not mapped	Not mapped

If the record does not contain a complete street address and/or cannot be located, the records' geographic location will be approximated and reported as being within the surrounding area.

Clean Up and Penalty Notices

Location ID	Notice Type	Notice N°	Licence holder	Location Name	Premise Address	Distance (m)*	Direction
1	Penalty Notice	<Null>	SANTOS NSW (EASTERN) PTY LTD	Bibblewindi Water Transfer Facility	X Line Road, NARRABRI, NSW, 2390	0.0	Adjacent
2	Penalty Notice	1509558	NARRABRI SHIRE COUNCIL	NARRABRI LANDFILL	Yarrie Lake Road, NARRABRI, NSW 2390	0.0	Onsite
3	Penalty Notice	1509559	NARRABRI SHIRE COUNCIL	NARRABRI LANDFILL	Yarrie Lake Road, NARRABRI, NSW 2390	0.0	Onsite
4	Penalty Notice	1509560	NARRABRI SHIRE COUNCIL	NARRABRI LANDFILL	Yarrie Lake Road, NARRABRI, NSW 2390	0.0	Onsite
5	Clean Up Notice	1523754	SANTOS NSW (EASTERN) PTY LTD	NARRABRI GAS FIELD	X Line Road, NARRABRI, NSW, 2390	0.0	Adjacent
6	Clean Up Notice	1572456	NARRABRI SHIRE COUNCIL	NARRABRI LANDFILL	Yarrie Lake Road, NARRABRI, NSW 2390	0.0	Onsite
7	Clean Up Notice	1578807	NARRABRI COAL OPERATIONS PTY LTD	NARRABRI LANDFILL	Yarrie Lake Road, NARRABRI, NSW 2390	0.0	Onsite

If the record does not contain a complete street address and/or cannot be located, the records' geographic location will be approximated and reported as being within the surrounding area.

3.3 SITES REGULATED BY OTHER JURISDICTIONAL BODY Map 3.3 (2000m Buffer)

Defence, Military Sites and UXO Areas

Site name	Type*	Details	Distance (m)	Direction
Not identified	-	-	-	-

**RCIP (Regional Contamination Investigation Program). UXO (Unexploded Ordnance Areas)*

Former Gasworks Sites

Site name	Description	Distance (m)	Direction
Not identified	-	-	-

PFAS Sites

Site name	Description	Source	Distance (m) *	Direction
Not identified	-	-	-	-

National Pollutant Inventory (NPI)

Facility name	Address	Primary ANZSIC Class	Latest report	Distance (m)	Direction
Cargill Processing Narrabri	Baranbar Street, Narrabri West	Oil and Fat Manufacturing	2018/2019	726.3	East
Wilga Park Power Station	Kiandool Lane, Narrabri	Fossil Fuel Electricity Generation	2020/2021	1613.0	South

Section 4 Potentially Contaminated Areas

4.1 FORMER POTENTIALLY CONTAMINATED LAND

Map 4.1 (500m Buffer)

Contaminated Legacy Areas

Site Name	Description	Distance (m)	Direction
Not identified	-	-	-

Includes known contaminated areas such as James Hardies Asbestos waste legacy areas, Pasminco Smelter and Uranium processing site.

Derelict Mines and Quarries

Site name	Description	Distance (m)	Direction
Not identified	-	-	-

Historical Landfills

Site name	Description	Distance (m)	Direction
Narrabri Waste Management (Narrabri Tip)	Accepted waste: general household waste; scrap metal; green waste; used machinery oil; general household comingled recycling; gassed/degassed fridges and freezers; Electronic Waste (including computers, TVs, monitors and accessories)	0.0	Onsite

4.2 POTENTIALLY CONTAMINATING ACTIVITIES (PCA) Map 4.2 (200m Buffer)

Industries, businesses and activities that may cause contamination

ID	Site name	Category	Location	Status*	Distance (m)	Direction
4	Narrabri Waste Management Facility	Waste and Recycling Facilities	73 Dump Road, Narrabri	Current	0.0	Onsite
6	Narrabri Breakdown Service	Depots and Storage Yards	152 Gun Club Rd NARRABRI 2390 NSW	Current	0.0	Onsite
7	KA & VK Stubbs Pty Ltd	Electrical or Electrical Components	237 Culgoora Rd NARRABRI 2390 NSW	Current	0.0	Onsite
8	H L & J H Gale Pty Ltd	Mechanical and Automotive	432 Yarrie Lake Road NARRABRI 2390 NSW	Current	0.0	Onsite
11	Australian Recycled Plastics	Waste and Recycling Facilities	268 Yarrie Lake Rd, Narrabri NSW 2390	Current	0.0	Onsite
12	Narrabri Gas Project	Oil and Gas	300 Yarrie Lake Rd, Narrabri NSW 2390	Current	0.0	Onsite
14	North West Ag & Diesel	Agriculture / Horticulture	87 Highfield Ln, Narrabri NSW 2390	Current	0.0	Onsite
9	Grainflow Narrabri	Agriculture / Horticulture	501 Yarrie Lake Rd, Narrabri NSW 2390	Current	0.0	South
16	Namoi Bulk Storage - Agriculture services	Agriculture / Horticulture	Narrabri, NSW	Current	30.3	South
13	Narrabri Works Depot - Transport NSW	Mechanical and Automotive	11566 Newell Hwy, Narrabri NSW 2390	Current	44.6	North-east
10	Gun Club	Gun, Pistol or Rifle Ranges	43 Gun Club Rd, Narrabri NSW 2390	Current	81.7	East

**Status:*
Data is current as when this report was created.
The operational status of the business is determined using the available data sources and does not indicate real-time conditions at the site.
Current: business is operating on the day this report was issued.
Former: business that have been closed or discontinued within 2 years from the date of this report.

Categories included in this search.		
Abattoirs	Explosives and Dangerous Goods	Paint Industries
Abrasive Blasting	Extractive Industries	Petrol Stations
Agriculture / Horticulture	Fire and Rescue	Pharmaceuticals
Airports	Food Manufacturing	Port and Marina Operations
Asbestos	Foundry, Smelting or Refining	Power Plants
Asphalt or Bitumen	Fuel Terminals & Depots	Printing and Photography
Batteries	Glass, Ceramics and Plastic	Rail Industry and Associated Activities
Breweries / Distilleries	Gun, Pistol or Rifle Ranges	Rubber and Tyre
Cement, Concrete or Lime	Hospitals and Research Facilities	Storage Tanks
Cemeteries	Landfill Sites	Substations and Switching Stations
Chemicals	Livestock Dips	Textiles and Tannery
Coal Yards	Mechanical and Automotive	Timber, Pulp and Paper Works
Depots and Storage Yards	Metal Fabrication and Treatments	Waste and Recycling Facilities
Dry Cleaners	Oil and Gas	Wastewater Treatment Facilities
Electrical or Electrical Components	Other Infrastructure Facilities	-

Industries, businesses, and activities identified as having an increased likelihood of causing contamination.

The industries and business activities listed above have been identified as having an increased likelihood of causing contamination and have been identified through published state and national guidelines and regulations. These industries

are noted due to their potential to store or use substances that could cause contamination to the surrounding environment if not managed appropriately. The identification of these activities does not imply the presence of contamination at the site.

The records identified are based on the reported business activity and have not been assessed based on any current or previous site inspection. Please note that records not identified within this section (due to error or unforeseen omission) does not necessarily mean that the screened area is not potentially contaminated or free of any risks.

4.3 HISTORICAL BUSINESS DIRECTORIES (not mapped)

1930 Historical Business Data

Activity	Name	Address	Positional accuracy[1]	Distance (m)	Direction
Not identified	-	-	-	-	-

1940 Historical Business Data

Activity	Name	Address	Positional accuracy[1]	Distance (m)	Direction
Not identified	-	-	-	-	-

1950 Historical Business Data

Activity	Name	Address	Positional accuracy[1]	Distance (m)	Direction
Not identified	-	-	-	-	-

1965 Historical Business Data

Activity	Name	Address	Positional accuracy[1]	Distance (m)	Direction
Not identified	-	-	-	-	-

1970 Historical Business Data

Activity	Name	Address	Positional accuracy[1]	Distance (m)	Direction
Farmers	Haire P F	Rockbank,NSW	Suburb		Onsite

1980 Historical Business Data

Activity	Name	Address	Positional accuracy[1]	Distance (m)	Direction
Not identified	-	-	-	-	-

1990 Historical Business Data

Activity	Name	Address	Positional accuracy[1]	Distance (m)	Direction
Not identified	-	-	-	-	-

2005 Historical Business Data

Activity	Name	Address	Positional accuracy[1]	Distance (m)	Direction
Not identified	-	-	-	-	-

2010 Historical Business Data

Activity	Name	Address	Positional accuracy[1]	Distance (m)	Direction
Shearers & Shearing Contractors	Namoi Valley Shearing Services	496 Yarrie Lake Rd NARRABRI 2390 NSW	Address	0.0	Onsite

Activity	Name	Address	Positional accuracy[1]	Distance (m)	Direction
Hydraulic Supplies & Equipment Sales & Service	Ka & Vk Stubbs Pty Ltd	237 Culgoora Rd NARRABRI 2390 NSW	Address	0.0	Onsite
Saddlers & Riding Supplies	Pz Products	11171 Newell Hwy NARRABRI 2390 NSW	Address	140.0	North-west

2015 Historical Business Data

Activity	Name	Address	Positional accuracy[1]	Distance (m)	Direction
Hydraulic Supplies & Equipment Sales & Service	KA & VK Stubbs Pty Ltd	237 Culgoora Rd Narrabri NSW 2390	Address	0.0	Onsite
Cotton Growers & Associations	Cotton Seed Distributors Ltd	Shenstone Wee Waa NSW 2388	Street		North

Land Insight uses a number of address geocoding techniques and has characterised them based on completeness (match rates) and positional accuracy. When a historical street address is incomplete or a match is not found, a record identified as being in the surrounding area will be included for reference and the accuracy of the data is approximate only. An explanation of the positional accuracy records is defined in the table below.

Historical data positional accuracy and georeferencing results explanation		
Positional accuracy	**Georeferenced**	**Description**
Address	Located to the address level	*When street address and names fully match.*
Street	Located to the street centroid	*When street names match but no exact address was found. Location is approximate.*
Place	Located to the structure, building or complex	*When building, residential complex or structure name match but no exact address was found. Location is approximate.*
Suburb	Located to the suburb area	*When suburb name match but no exact address was found. Location is approximate.*

The data used in this section was extracted from range of historical commercial trade directories and business listings. The business addresses were geocoded using historical information and the accuracy of the data may vary due to changes to the physical address at a given locality over time or the quality of the original records. From 2005, the historical business records in this section are considered more accurate as information was extracted from digital directories with geographic coordinate location information available. On this basis, reliance on the historic listing data should be considered when assessing the risk of contamination from an activity at the site. The presence of a business listing does not definitively confirm the actual activity that has occurred at the site. For more information on how these records were geocoded and the methodology used by Land Insight, contact us at info@landinsight.co.

Historical business directory listings have been filtered to match activities and industries identified as PCAs in Section 4.2. Please note that any record not identified within this section (due to error or unforeseen omission) does not necessarily mean that the screened area is not potentially contaminated or free of any risks.

Section 5 Natural Hazards

5.1 Natural Hazards

Map 5.1 (500m Buffer)

Erosion Risk

Category	On the Property?	Within Buffer?
Not identified	-	-

Fire Hazard

Category	On the Property?	Within Buffer?
Bush Fire Prone Land (BLP)	-	-
Fire History	-	2007-08 2009-10

Flood Hazard

Category	On the Property?	Within Buffer?
Flood Planning Area	Yes	Yes

Appendix A

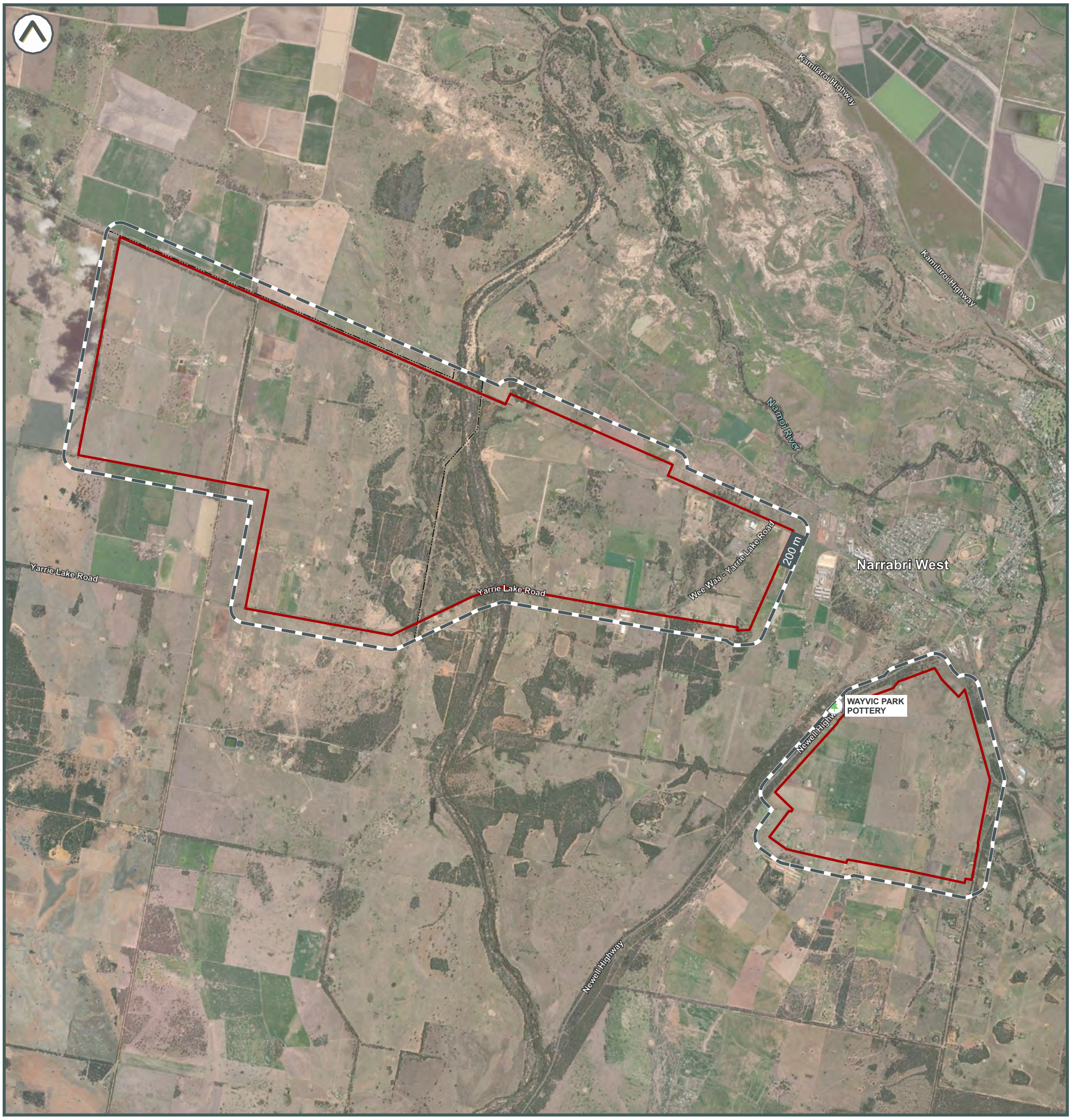
REPORT MAPS

Narrabri Special Activation Precinct
Narrabri, NSW

PROPERTY SETTING

MAP 1.1

Subject Area and Sensitive Receptors



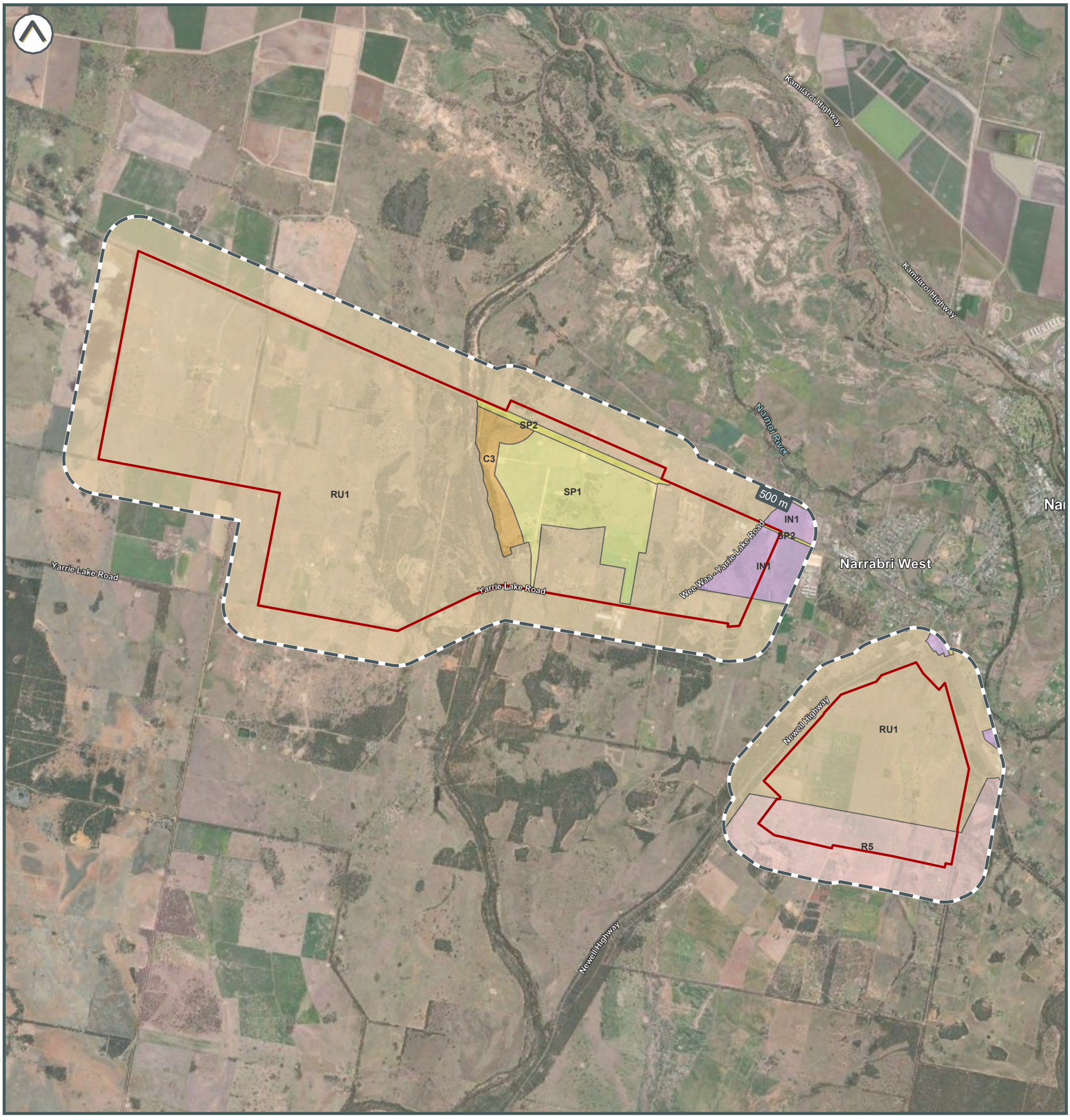
Subject area
Parks
Transmission line

0 1,000 2,000 3,000 4,000 5,000m

Land Insight

Planning Controls

MAP 1.2



Subject area

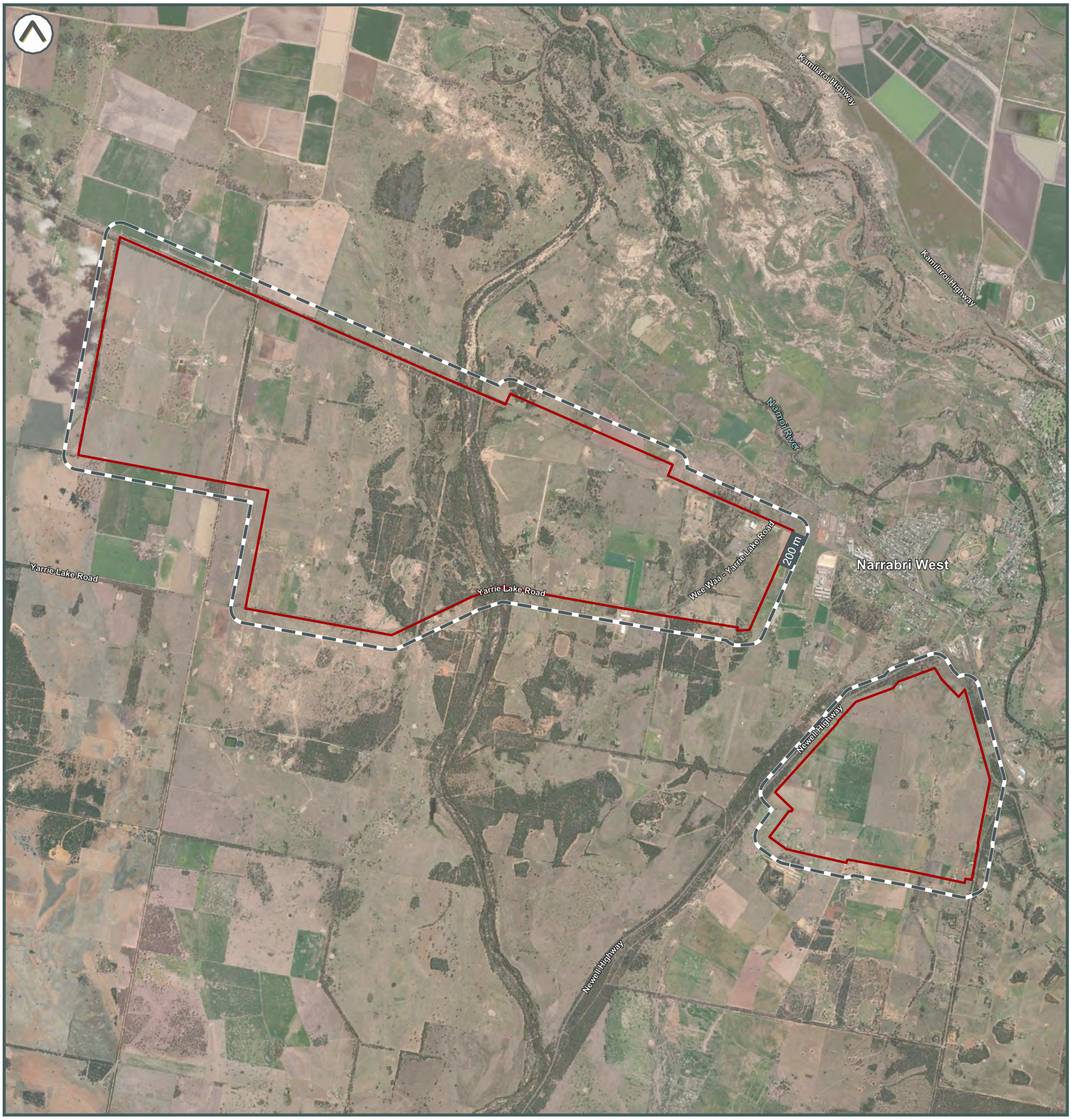
Land Zoning
- C3 | Environmental Management
- IN1 | General Industrial
- R1 | General Residential
- R5 | Large Lot Residential
- RU1 | Primary Production
- SP1 | Special Activities
- SP2 | Special Purposes Zone – Infrastructure

0 1,000 2,000 3,000 4,000 5,000m

Land Insight

MAP 1.3

Heritage



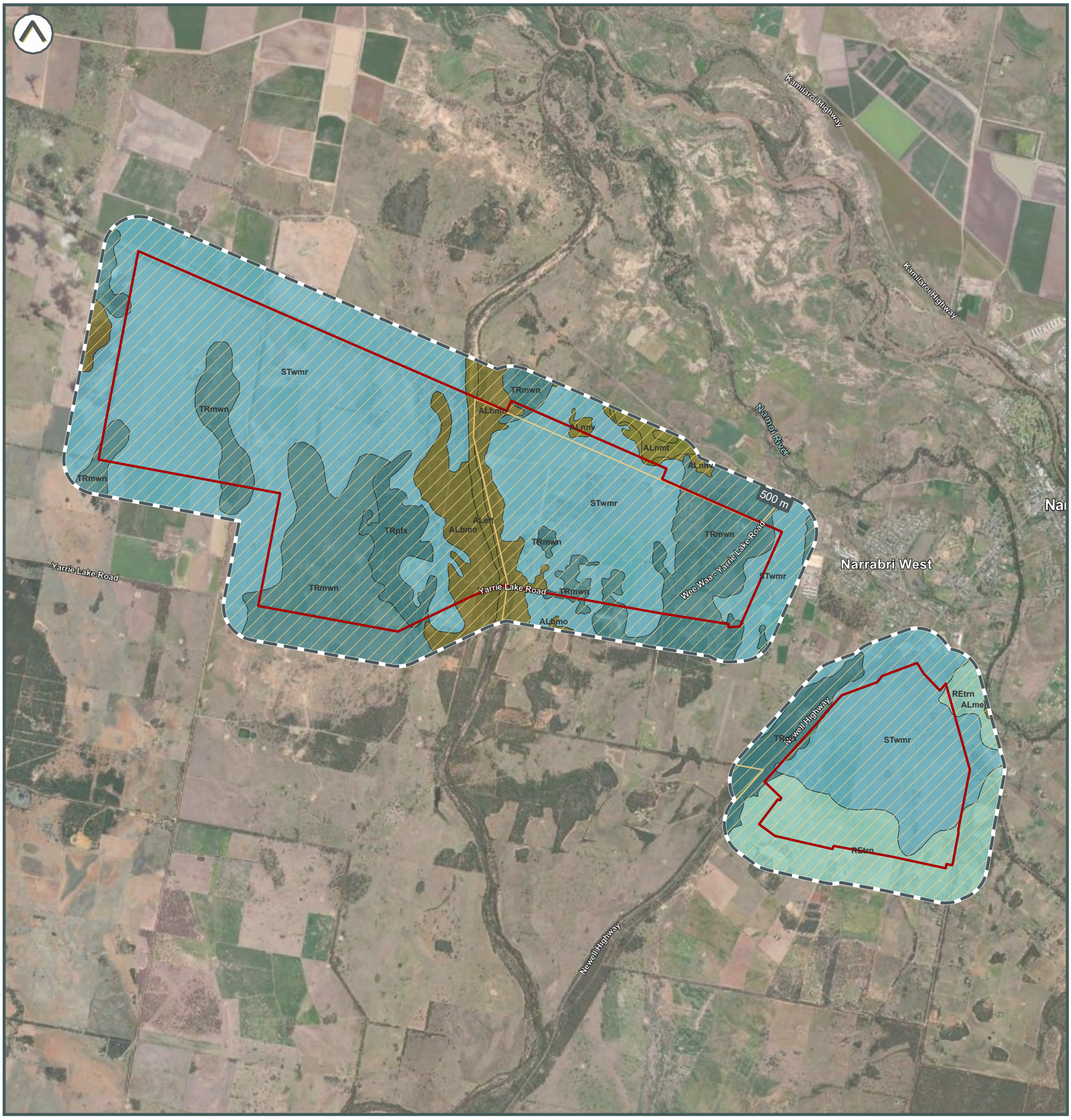
Subject area
Heritage (LEP)
State Heritage Register (SHR)
Commonwealth Heritage List (CHL)
National Heritage List (NHL)
World Heritage Area (WHA)

0 1,000 2,000 3,000 4,000 5,000m

Land Insight

MAP 1.4a

Soil Landscape and Salinity



Subject area

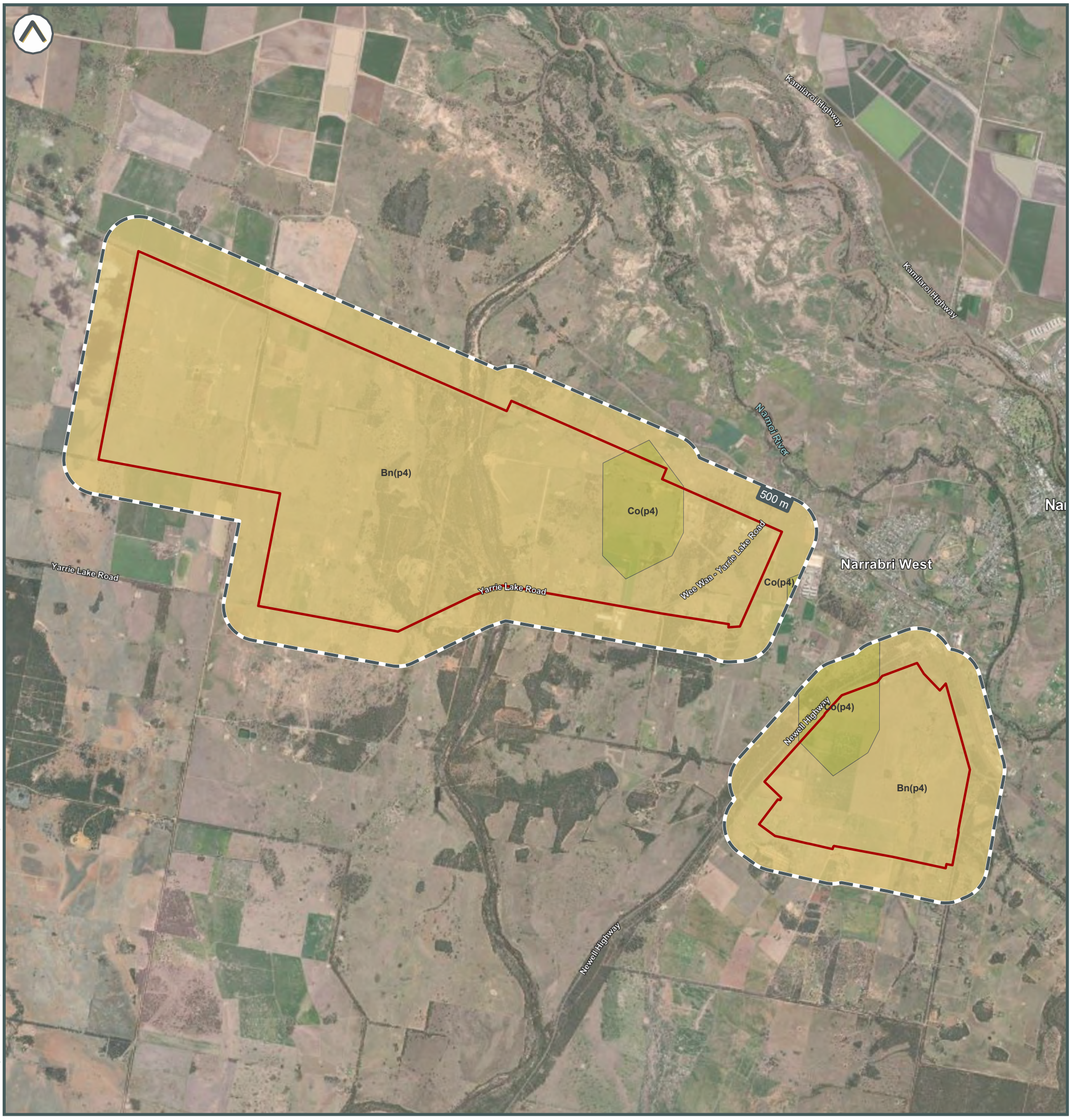
Radon Level (Bq/m3)
5–19

Soil Landscape
- ALbei,Alluvial
- ALbmo,Alluvial
- ALett,Alluvial
- ALmei,Alluvial
- ALnmt,Alluvial
- ALnnv,Alluvial
- REtrn,Residual
- STwmr,Stagnant alluvial
- TRmwn,Transferral
- TRpfx,Transferral

Land Insight

Acid Sulfate Soils

MAP 1.4b



Subject area

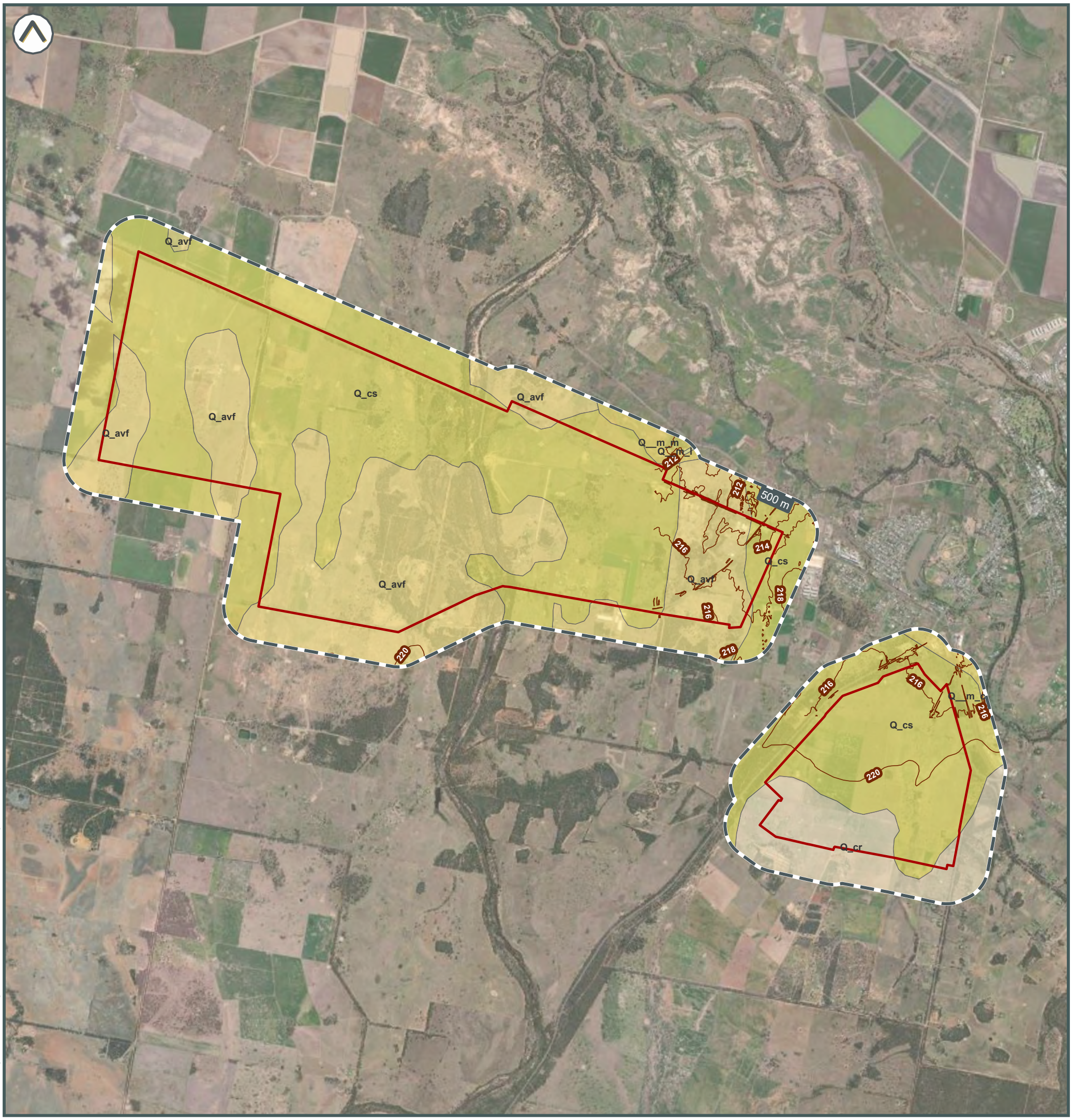
ASRIS Atlas of Australian Sulfate Soils
- Bn(p4) | ASS in inland lakes, waterways, wetlands and riparian zones
- Co(p4) | ASS in inland lakes, waterways, wetlands and riparian zones

0 1,000 2,000 3,000 4,000 5,000m

Land Insight

MAP 1.5

Geology and Topography



Subject area — Topographic contour (m)

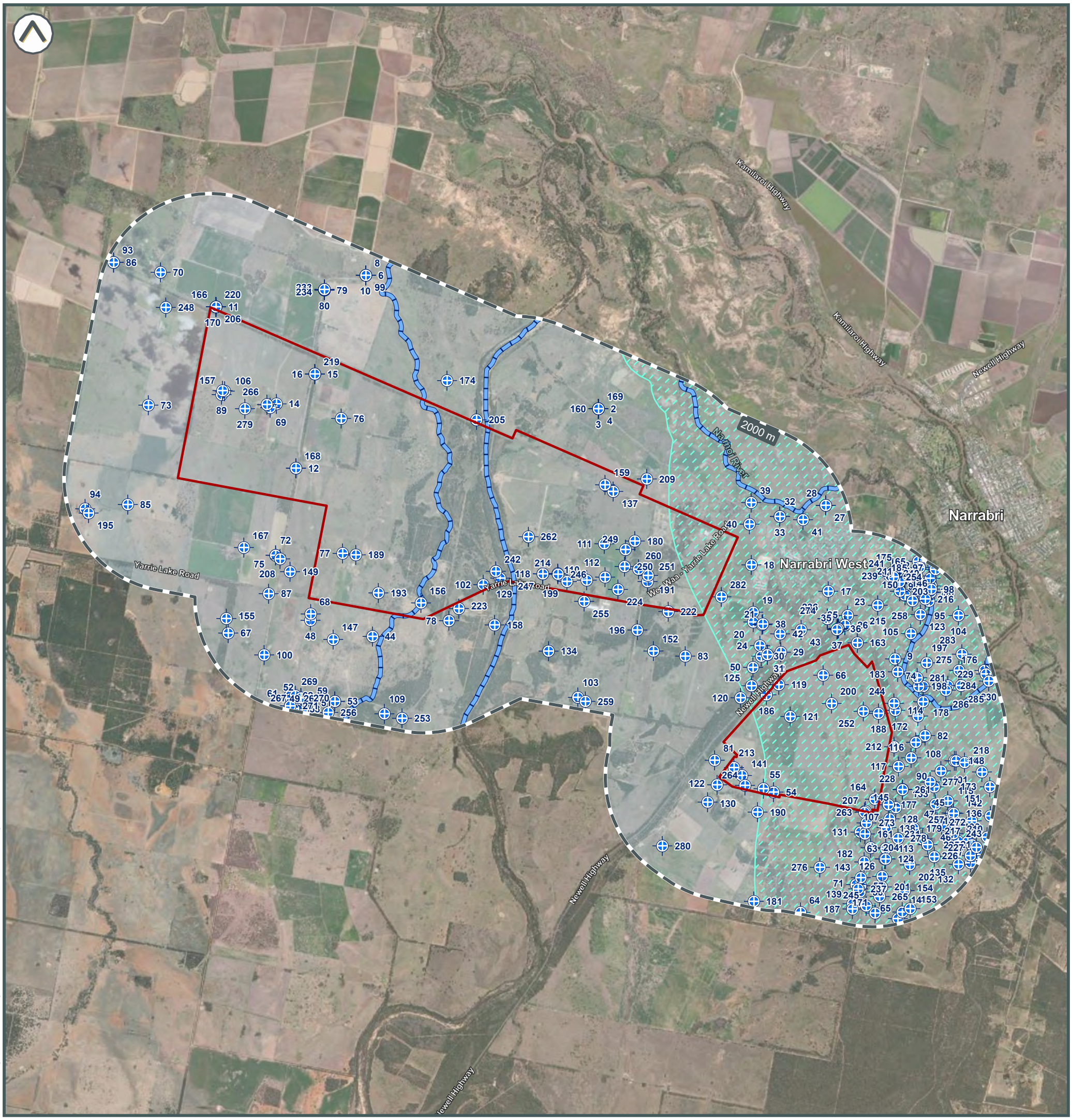
0 1,000 2,000 3,000 4,000 5,000m

Land Insight

POTENTIALLY CONTAMINATED AREAS

Hydrogeology and Groundwater Bores

MAP 2.1



Subject area

Groundwater bores

Protected Riparian Corridor

Drinking Water Catchments

UPSS Environmentally Sensitive Zone

Wetlands

Aquifer type

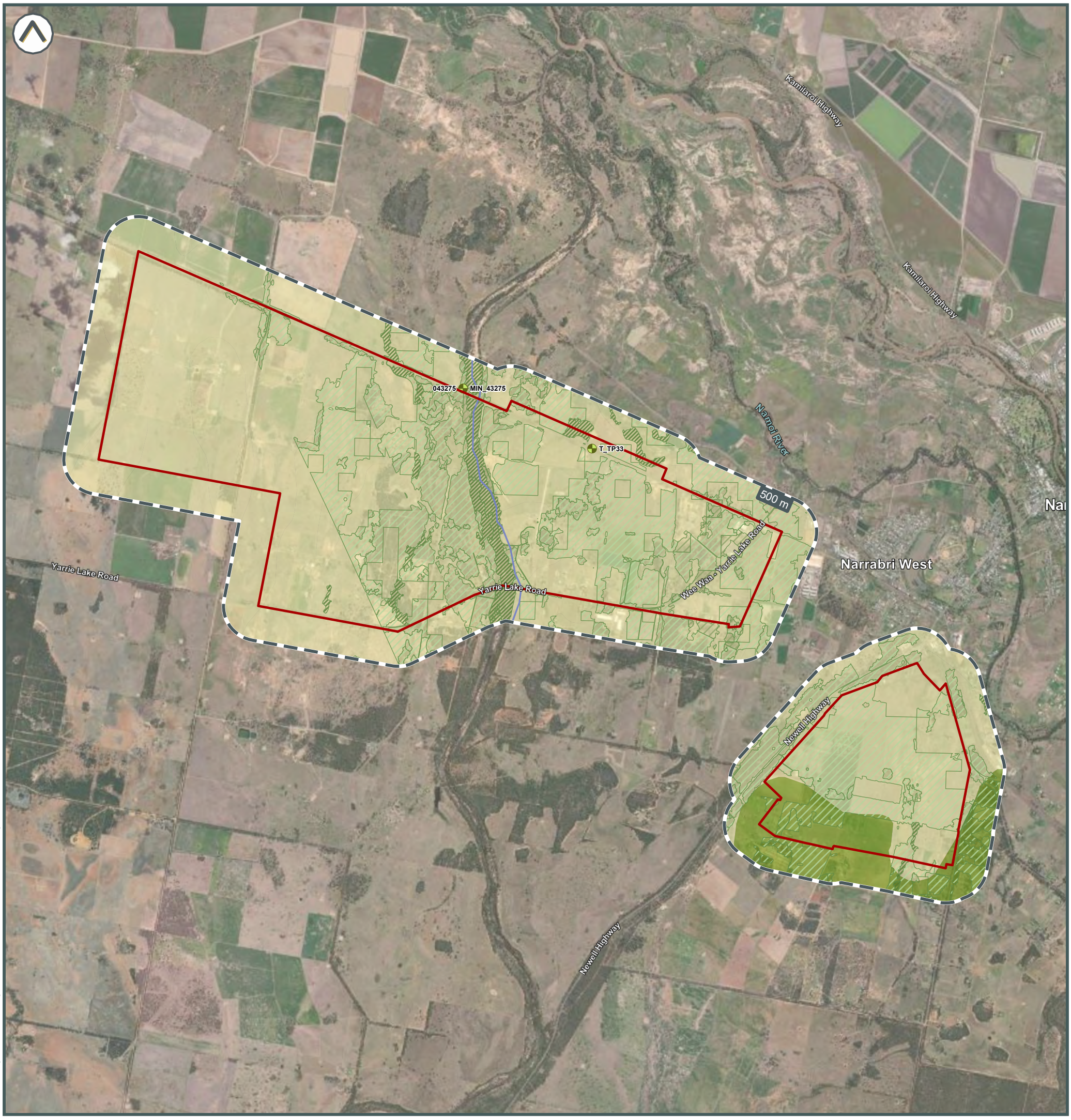
Porous, extensive highly productive aquifers

0 1,000 2,000 3,000 4,000 5,000m

Land Insight

MAP 2.2

Hydrogeology and Other Boreholes



Subject area

Other borehole/monitoring well location

Ecosystems that rely on the Surface expression of Groundwater
- Moderate potential GDE – from national assessment

Ecosystems that rely on Subsurface presence of Groundwater
- High potential GDE – from regional studies
- Moderate potential GDE – from regional studies
- Low potential GDE – from regional studies

Hydrogeologic Unit
- Surficial Sediment Aquifer (porous media – unconsolidated)
- Mesozoic (GAB) (porous media – consolidated)

0 1,000 2,000 3,000 4,000 5,000m

Land Insight

ENVIRONMENTAL REGISTERS LICENSES AND INCIDENTS

MAP 3.1

Contaminated Land Public Register

Subject area

EPA Notified Contaminated Sites

EPA Record of Notices

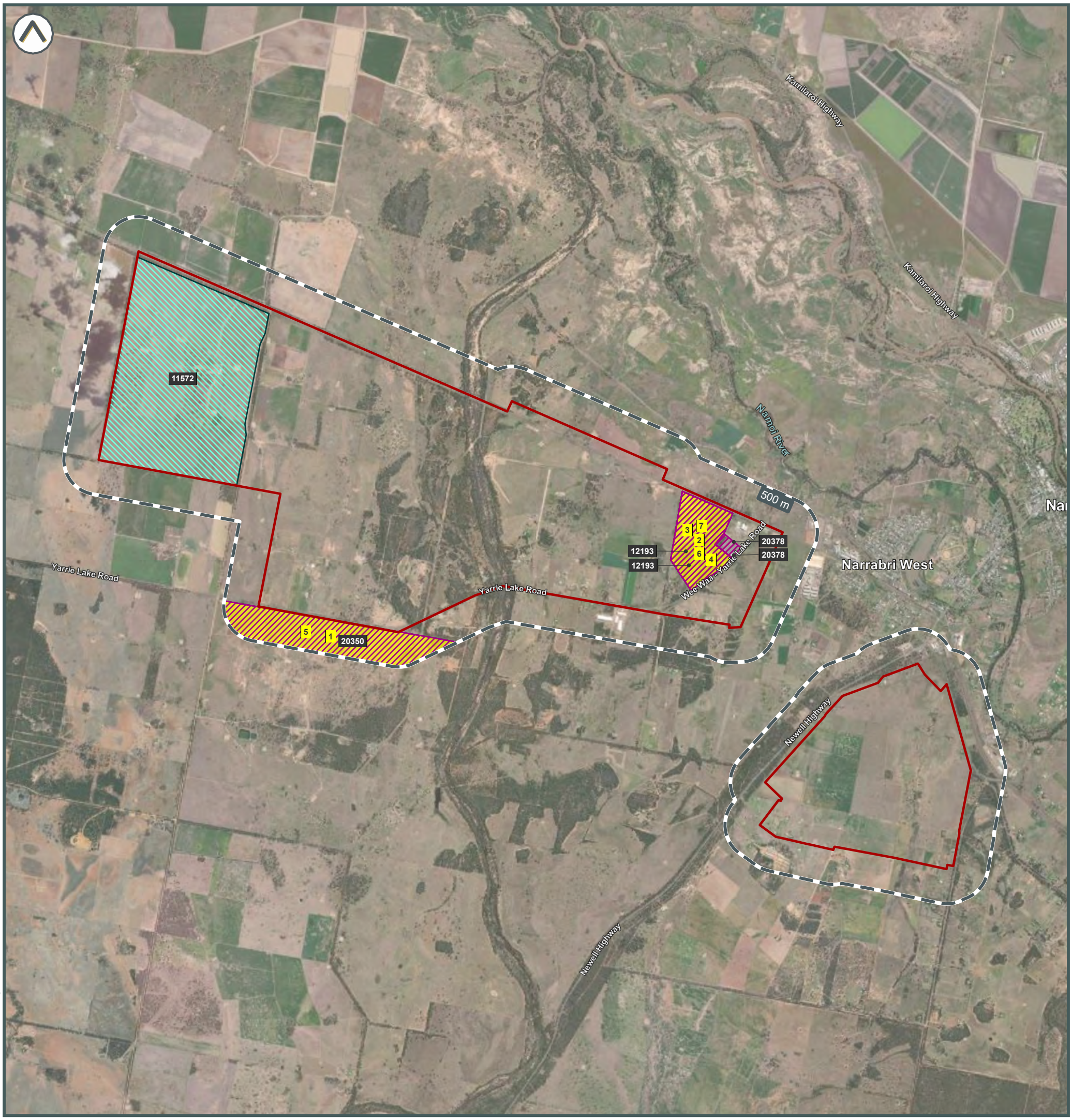
0 1,000 2,000 3,000 4,000 5,000m

Land Insight

ENVIRONMENTAL REGISTERS LICENSES AND INCIDENTS

Licences, Approvals & Assessments

MAP 3.2



Subject area

POEO Licences
- Issued
- Suspended / Revoked
- Delicensed / No longer in force
- Surrendered

Clean Up and Penalty Notices

0 1,000 2,000 3,000 4,000 5,000m

Land Insight

ENVIRONMENTAL REGISTERS LICENSES AND INCIDENTS

MAP 3.3

Sites Regulated by Other Jurisdictional Body

Subject area

PFAS sites
Former Gasworks
NPI Facilities

Defence Area / Military Sites
Defence Controlled Area

Unexploded Ordnance (UXO) Areas
Substantial Potential
Slight potential
Sea Dumping of Depth Charges
Sea Dumping of Depth Charges (Chemical munitions sea dumping)
Other Sea Dumping Sites
Other

0 1,000 2,000 3,000 4,000 5,000m

Land Insight

POTENTIALLY CONTAMINATED AREAS

Former Potentially Contaminated Land

MAP 4.1

Subject area

Historical (legacy) Landfill Sites

0 1,000 2,000 3,000 4,000 5,000m

Land Insight

POTENTIALLY CONTAMINATED AREAS

MAP 4.2

Current Potentially Contaminating Activities (PCAs)

Subject area

PCA_cat

- Agriculture / Horticulture
- Depots and Storage Yards
- Electrical or Electrical Components
- Gun, Pistol or Rifle Ranges
- Mechanical and Automotive
- Oil and Gas
- Waste and Recycling Facilities

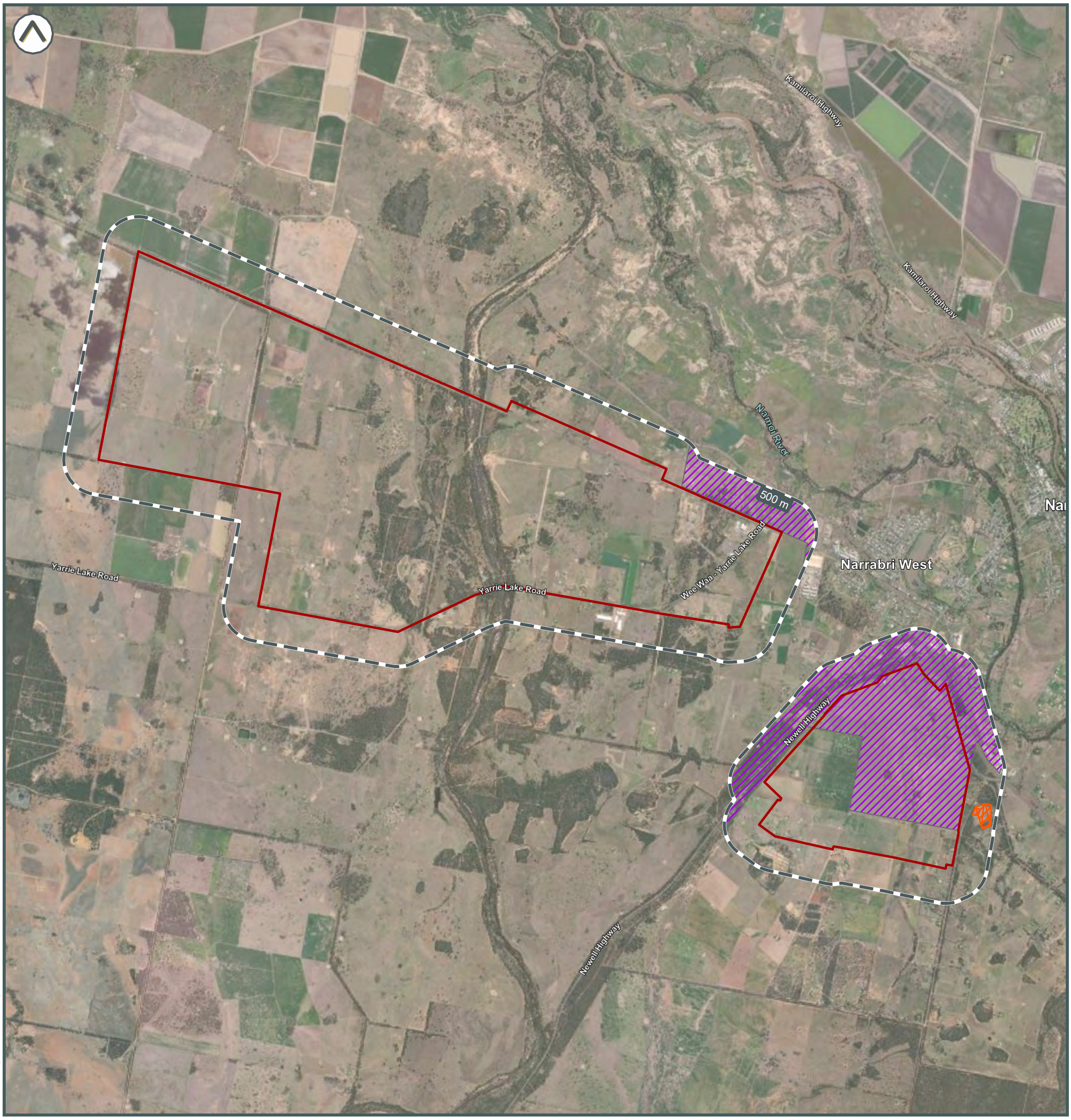
0 400 800 1,200 1,600 2,000m

Land Insight

POTENTIALLY CONTAMINATED AREAS

MAP 5.1

Fire and Flood Hazards



Subject area

Flood
Flood Planning Area

Fire History

0 1,000 2,000 3,000 4,000 5,000m

Land Insight

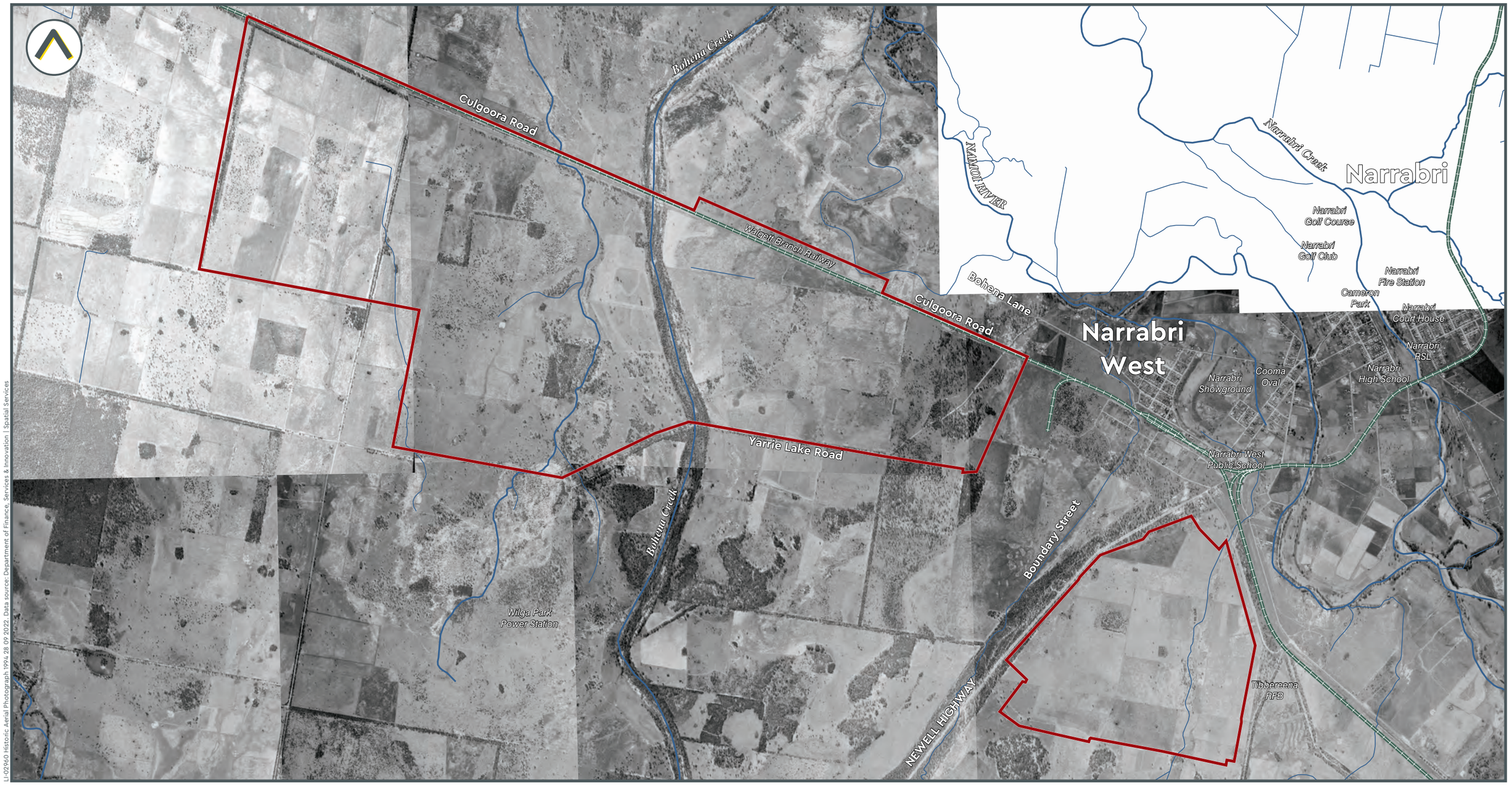
Land
Insight

Appendix B

HISTORIC IMAGERY

Narrabri Special Activation Precinct
Narrabri, NSW

Historic Aerial Photograph - 1964



Subject area

0 2km

Land Insight

Historic Aerial Photograph - 1989

Subject area

0 2km

LI 02960 Historic Aerial Photograph 1989 28 09 2022. Data source: Department of Finance, Services & Innovation | Spatial Services

Land Insight

Historic Aerial Photograph - 1994

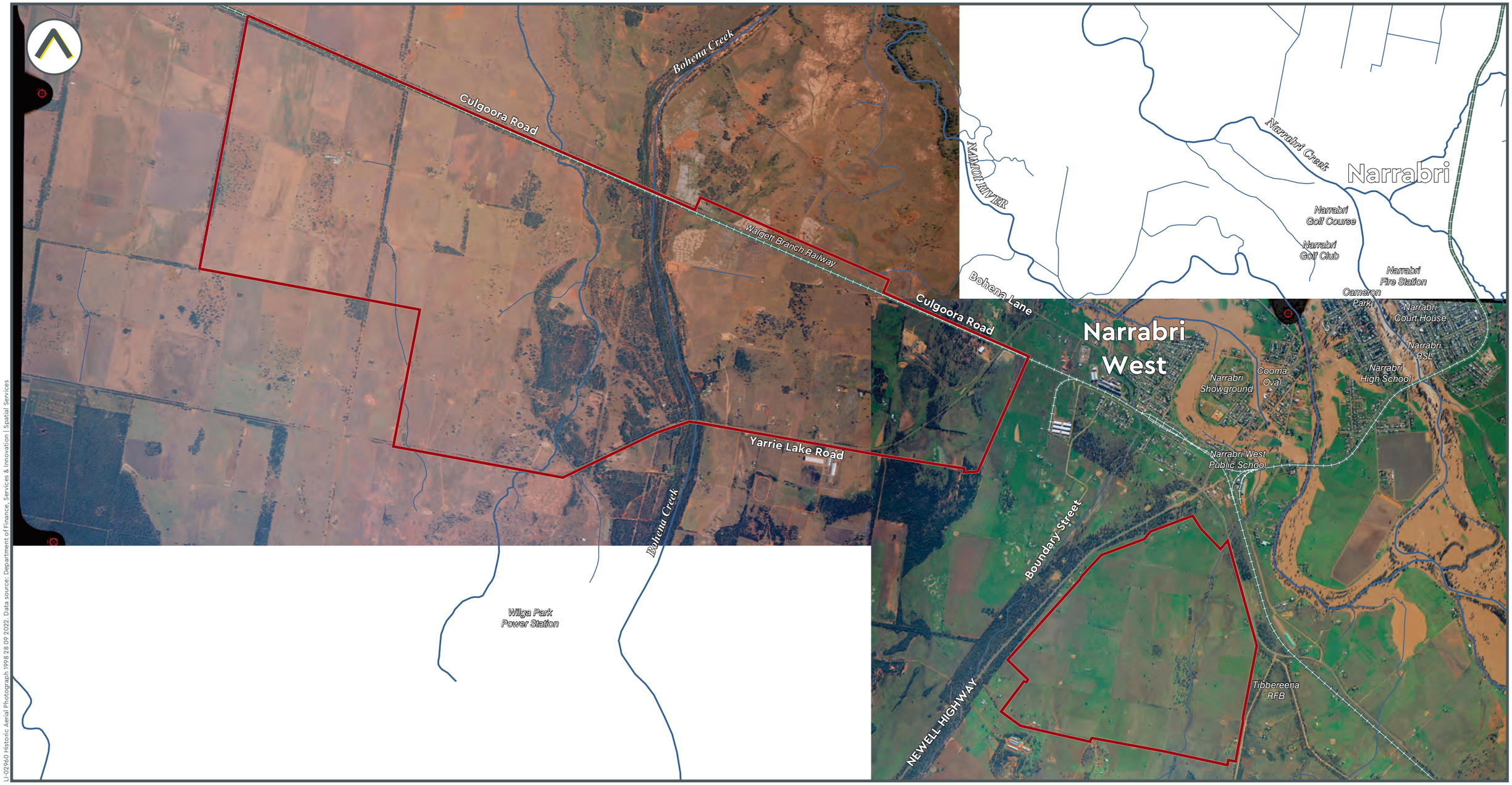
Subject area

0 2km

LI 02960 Historic Aerial Photograph 1994 28 09 2022. Data source: Department of Finance, Services & Innovation | Spatial Services

Land Insight

Historic Aerial Photograph - 1998



LI-02960 Historic Aerial Photograph 1998 28 09 2022. Data source: Department of Finance, Services & Innovation | Spatial Services

Subject area

0 2km

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Historic Aerial Photograph - 2010

LI 02960 Historic Aerial Photograph 2010 28 09 2022. Data source: Department of Finance, Services & Innovation | Spatial Services

Subject area

0 2km

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Historic Aerial Photograph - 2013

Subject area

0 2km

LI 02960 Historic Aerial Photograph 2013 28 09 2022. Data source: Department of Finance, Services & Innovation | Spatial Services

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Historic Aerial Photograph - 2017

LI 02960 Historic Aerial Photograph 2017 28 09 2022. Data source: Department of Finance, Services & Innovation | Spatial Services

Subject area

0 2km

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Historic Aerial Photograph - 2019

Subject area

0 2km

LI02960 Historic Aerial Photograph 2019 28 09 2022. Data source: Department of Finance, Services & Innovation | Spatial Services

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Historic Aerial Photograph - 2021

Subject area

0 2km

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RESOURCES

Product Guide

NEW SOUTH WALES

About this Report

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Contaminated Land Record of Notices, Sites Notified as Contaminated to the NSW EPA, Former Gasworks and PFAS investigation program - © State of NSW Environment Protection Authority.

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UXO and Military Facilities- Australian Government - Various sources and Department of Defence © Commonwealth of Australia, 2017-2019. *The data supplied is based on Defence's assessment of information obtained from a variety of sources. It does not reflect any UXO remediation conducted on behalf of any person or organisation other than Defence. While Defence makes all reasonable efforts to ensure that the information provided is accurate, complete and up-to-date, there may be limitations to the sources available to Defence and the information may be subject to change.*
The information relating to a specific parcel of land should not be relied upon without additional checks and/or verification from the relevant state, territory or local government. Further information as to Defence's UXO categorisation criteria; along with Defence's recommendations to state and local authorities, is available on the Defence internet.

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Other Data – if applicable

Cattle Dip Site Locator Northern Rivers Region - © State of New South Wales through NSW Department of Industry

Legacy Landfills – LI Resources proprietary dataset. Dataset is derived from verified Council Records, Aerial Photography Interpretation, Historic Zoning Maps, Historic Topographic Maps, Historic Parish Maps and Derelict Mines and Quarries Information - © State of New South Wales through NSW Department of Industry.

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Historical Commercial & Trade Directory Data –

Sydney

1932-1933 John Sands Sydney Trades Directory – Copyright Expired

1940 & 1950 Commonwealth of Australia Telephone Directory Sydney – Copyright Expired

1960-1961 Telecom Australia Pink Pages Sydney – Permission for use Sensis, 2017.

1970-1971 United Business Directories Sydney – Licenced under Hardie Grant, 2017.

1974-1975 NSW Post Office Yellow Pages Sydney Buying Guide and Commercial/Industrial Directories – Permission for use Sensis, 2017.

1980-1981 & 1990-1991 Telecom Australia Yellow Pages Sydney – Permission for use Sensis, 2017.

2005 - 2015 Datajet.com.au - Permission for Use, 2022.

Regional NSW

1971, 1981 & 1991 Telecom Australia Yellow Pages Country NSW Directories – Permission for use Sensis, 2017.

While every effort is made to ensure the details in your Report are correct, LI Resources cannot guarantee the accuracy or completeness of the information or data provided or obtained from the data sources.

For more detailed information regarding data source and update frequency, please contact LI Resources at info@landinsight.co

Glossary

AVIATION RESCUE FIRE FIGHTING FACILITIES (ARFF); LIQUID FUEL & AVIATION FUEL DEPOTS/TERMINALS; POWER STATIONS; TELEPHONE EXCHANGES & WASTEWATER TREATMENT FACILITIES

These facilities may be associated with the use, storage, treatment and disposal of a range of chemicals and products such as PFAS (Per- and poly-fluoroalkyl substances), solvents, petroleum products, asbestos, PCBs (polychlorinated biphenyls) and others.

BUSHFIRE PRONE LAND

This data may assist environmental consultants, developers and others understand whether any bushfire risk is present in the area that may require specific management and/or restrict site investigations and development works.

COAL SEAM GAS, PETROLEUM WELLS AND BOREHOLES

This data may assist environmental consultants during investigations as to previous resource exploration with an area, resources present (i.e. coal, gas and petroleum), lithological data and potential for environmental contamination.

DEPARTMENT OF DEFENCE UNEXPLODED ORDNANCE (UXO) SITES

UXO is any sort of military ammunition or explosive ordnance which has failed to function as intended. It includes a range of ammunition used by the Navy, Army and Air Force; and many other types of ammunition and explosives including training munitions. UXO contamination has arisen mainly as a result of military training activities, since European settlement. In the past large numbers of ranges and training areas were approved for use in many areas of Australia. As a result, there are now a number of sites around Australia which are affected by UXO. For more information see www.defence.gov.au/UXO

DERELICT MINES AND QUARRIES

Outstanding legacy issues surrounding derelict mines and quarries have the potential to cause safety and environmental impacts and may also be an indicator of the presence of unregulated landfill.

DRY CLEANERS (CURRENT)

Dry cleaners often use or have used hazardous and flammable chemicals in their operations. Incorrect storage and disposal of these chemicals may result in fire/explosion risks or contamination of soil and groundwater or result in human health risks.

GROUNDWATER EXCLUSION ZONES

Groundwater exclusion zones are present in certain areas where aquifers are known to be contaminated or where past activities may have affected groundwater quality. Restrictions on the use of groundwater in those areas are in place and differ between the various management/exclusion zones.

HERITAGE – FEDERAL, STATE AND LOCAL

This data may assist environmental consultants, developers and others understand whether any heritage items are present on the site that may require specific management and/or restrict site investigations and development works.

HISTORICAL COMMERCIAL & TRADE DIRECTORY DATABASE (1932, 1940, 1950, 1960, 1970; 1974, 1980 and 1990)

An LI Resources proprietary database of historical potentially contaminating activities previously listed as having been undertaken on the property or surrounding area. Activities have been catalogued based on 'low to high risk activities' either known to cause potential contamination risk (based on Managing Land Contamination Planning Guidelines, SEPP 55 remediation of land, 1998) or to assist in guidance for sampling and remediation programs by environmental consultants.

HISTORICAL (LEGACY) LANDFILLS

An LI Resources proprietary dataset containing the location of former legacy landfills. Legacy landfills are widely present across the country, with many locations unknown. Most of these landfills were created prior to current environmental guidelines (i.e. remain unlined and uncapped) resulting in the potential for leaching of hazardous substances into waterways, production of odours, migration of landfill gas and stability issues.

HYDROGEOLOGY

This data includes information for environmental consultants on aquifer properties, the presence of wetlands and groundwater monitoring bores. This information can assist in the understanding of contaminant pathways and receptors.

Groundwater monitoring bores are primarily needed to assess changes to water table levels, groundwater quality and to assess groundwater flow direction. Impacts on groundwater result from contaminated water movement, leaching of surface pollutants caused by rainfall or irrigation water percolation, leakage of stored matter or the disposal of wastes. The presence of a monitoring bore may indicate that a site has been or is being investigated.

LICENSING UNDER THE POEO ACT 1997

The POEO public register includes a range of specified information on environment protection licences issued under the POEO Act to regulate air, noise, water and waste pollution and impacts. The licences and notices provide information on the type of industrial activities undertaken in an area and if any clean-up and preventative action notices have been issued under that licence.

MILITARY FACILITIES

Military practices at certain facilities may cause potential contamination through the use of chemicals ranging from cleaning solvents and paints to ammunition, explosives and firefighting foam. These chemicals can cause human and ecological health risks.

NATURALLY OCCURRING ASBESTOS

Asbestos is found as a naturally occurring mineral in many areas of regional NSW and may occur in veins within rock formations. Naturally occurring asbestos is generally found when building roads, working on construction sites and undertaking excavation activities. This data provides information on the areas identified with a low to high probability of naturally occurring.

NPI INDUSTRIAL FACILITIES

Industrial facilities that trigger a defined threshold(s) for the emission of pollutants identified in the National Pollution Inventory (NPI), must estimate and report their emissions. The pollutants identified under the NPI are those that are known to have possible effects on human health and the environment.

NSW EPA CONTAMINATED LAND RECORD OF NOTICES ISSUED UNDER THE CLM Act 1997

The EPA is required by law to maintain a record of notices relating to contaminated land, including notices declaring land to be 'Significantly Contaminated Land' under the Contaminated Land Management Act 1997. The EPA record of notices provides information on all sites that have been declared significantly contaminated.

NSW EPA FORMER GASWORKS SITES

Former gasworks often leave a legacy of soil and groundwater contamination. The major contaminants in these instances include tars, oils, hydrocarbon sludges, spent oxide wastes, ash and ammoniacal recovery wastes. Some of these contaminants are carcinogenic to humans and toxic to aquatic ecosystems and therefore may pose a risk to human health and the environment.

NSW EPA FORMER URANIUM PROCESSING SITE AT HUNTERS HILL

In 2008 a Parliamentary Inquiry held into the former uranium processing site at Hunters Hill, Sydney, found radiation levels were too low to require site remediation. During the investigation it became evident that there were two separate causes of gamma radiation in the vicinity of Nelson Parade (7-9 Nelson Parade – former uranium processing plant and Kelly's Bush – former tin smelter). The investigations found that levels of radiation on properties surrounding 7-9 Nelson Parade, at Kelly's Bush and in nearby areas of Hunters Hill were below relevant national and international guidelines for the protection of health and therefore remediation was not warranted. Further information can be found at www.epa.nsw.gov.au

NSW EPA JAMES HARDIE ASBESTOS WASTE CONTAMINATION LEGACY

During the 1960s and 70s, bulk asbestos waste associated with manufacturing and waste disposal by the former James Hardie Industries was delivered as fill to areas targeted because of their low-lying geography. Between December 2007 and February 2008, the Department of Environment Climate Change and Water conducted site inspections of those disposal sites. None of the inspected sites were found to be a significant risk to human health or the environment, provided the sites remained sealed or undisturbed. Further information can be found at www.epa.nsw.gov.au

NSW EPA SITES NOTIFIED AS CONTAMINATED TO THE NSW EPA

The EPA maintains a record of all sites notified to it by owners or occupiers of sites believed to be significantly contaminated.

NSW EPA PFAS INVESTIGATION PROGRAM

The NSW EPA is investigating particular sites to better understand the extent of PFAS use and contamination in NSW. PFAS are a group of chemicals that include perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA).

They have many specialty applications and are widely used in a range of products in Australia and internationally. PFAS are an emerging contaminant, which means that their ecological and/or human health effects are unclear. Further information can be found at www.epa.nsw.gov.au

OTHER POTENTIALLY CONTAMINATED SITES

An LI Resources proprietary database of recent potentially contaminating activities previously listed as having been undertaken on the property or surrounding area. Activities have been catalogued based on 'moderate to high risk activities' either known to cause potential contamination risk or to assist in guidance for sampling and remediation programs by environmental consultants. Please note this database is not exhaustive and may not list all activities in the area.

PARRAMATTA RIVER CATCHMENT LAND USE AREAS

An LI Resources proprietary dataset containing land use changes around the Parramatta River catchment area. Details include land reclamation areas, loss of foreshore and major land use changes (i.e. industrial to residential land). These changes may indicate presence of unregulated landfill and potential contamination associated with former industrial land use.

PUBLIC REGISTER OF PROPERTIES AFFECTED BY LOOSE-FILL ASBESTOS INSULATION

The NSW Government is required to maintain a register of residential properties that contain loose-fill asbestos insulation. This assists members of the wider community to be informed about any risks associated with a specific property and to take any appropriate safety measures. For more information see www.fairtrading.nsw.gov.au

SENSITIVE RECEPTORS

This data may assist environmental consultants during investigations as to the location and proximity of any sensitive receptors in the area, such as aged care, child care, community and religious facilities; sports grounds; national and state parks etc.

COASTAL MANAGEMENT (STATE ENVIRONMENTAL PLANNING POLICY)

The aim of this Policy is to promote an integrated and co-ordinated approach to land use planning in the coastal zone in a manner consistent with the objects of the Coastal Management Act 2016, including the management objectives for each coastal management area, by

(a) managing development in the coastal zone and protecting the environmental assets of the coast, and

(b) establishing a framework for land use planning to guide decision-making in the coastal zone, and

(c) mapping the 4 coastal management areas that comprise the NSW coastal zone for the purpose of the definitions in the Coastal Management Act 2016.

SOIL LANDSCAPE AND GEOLOGY

This data may assist environmental consultants during investigations as to the physical site properties that could govern potential contaminant retention or migration.

SERVICE STATIONS (CURRENT)

Service stations may contain leaking tanks which can result in petroleum products migrating into, and contaminating, the soil or groundwater or other pathways to human and biological contact.

UNDERGROUND PETROLEUM STORAGE SYSTEMS (UPSS) ENVIRONMENTALLY SENSITIVE ZONES

UPSS environmentally sensitive zones represent a conservative assessment of areas likely to be vulnerable to contamination from leaking UPSS. This information can assist environmental consultants on the risk a UPSS site poses to a recognised environmentally sensitive receptor.

WASTE MANAGEMENT FACILITIES

A waste facility is a premises used for the storage, treatment, processing, sorting or disposal of waste. These include landfills, waste transfer stations and waste reprocessing facilities. Waste facilities emit regulated substances to air and water, such as methane gas, and can produce odours, dust and noise.

Terms and Conditions

1. Land Insight and Resources (LI Resources) will perform the Services in accordance with these terms and conditions

2. By submitting the Application Form, the User acknowledges that it has read and understood these terms and conditions and agrees to be bound by them.

3. LI Resources reserves the right to change these terms and conditions. Any change shall be effective upon notice, which may be given by LI Resources posting such change on the Website, or by direct communication with the User.

Services

4. LI Resources agrees to undertake the Services using due skill, care and diligence.

5. The User assumes the sole risk of making use of, and/or relying on, the Report and the Services. LI Resources makes no representations about the suitability, completeness, timeliness, reliability, legality, or accuracy of the Services.

6. Unless LI Resources agrees expressly otherwise:

   (A) The Services are solely for the use and benefit of the User; and

   (B) LI Resources does not accept any liability, whether directly or indirectly, for any liability or loss suffered or incurred by any third party placing any reliance on the performance of the Services or any Documents or material arising from or in connection with the Services.

7. The User warrants to LI Resources that it will not use the Services for any purpose that is unlawful or is otherwise inconsistent with these terms and conditions.

8. The User will not alter in any way or provide a copy of the Report or any Document prepared by LI Resources to any other person without LI Resources's prior written consent.

Payment Terms

9. The Fee will be payable at the time of submitting the Application Form unless invoicing payment terms have been negotiated prior to purchase with LI Resources.

10. The User and LI Resources may agree in writing to vary the Services. The fee for each variation shall be agreed between LI Resources and the User.

11. The User agrees to pay LI Resources the Fee, including the fee for any variation requested in accordance with clause 12.

12. If the User's rights are terminated and the User has made an advance payment, LI Resources will refund the User a reasonable proportion of the balance as determined by LI Resources in relation to the value of Services already provided.

13. GST at the prevailing rate is payable in addition to the Fee. The User agrees to pay any other applicable taxes, duties or government imposed fees related to the User's use of the Services.

Intellectual Property

14. LI Resources owns all intellectual property in the Report and arising from or in connection with the Services.

15. LI Resources grants the User a royalty free licence to use LI Resources's intellectual property for that User's personal assessment of its Property(s) only.

Privacy Policy

16. Upon submitting the Application Form the User consents to LI Resources's use of the personal data provided by the User for the purposes of providing the Services.

17. The Reliance on the Report, the use of the Services and the use of LI Resources's Website is at the User's own risk. The User accepts that LI Resources does not guarantee the confidentiality of any communication or information transmitted through the use of the Website.

18. LI Resources will not provide to any third party any personal data provided by a User without the User's permission.

19. The User acknowledges that any feedback provided to LI Resources over the Website is not confidential and that LI Resources has the right to publish, reproduce, disseminate, transmit, distribute and copy (in whole or in part) any such feedback without the approval of the User.

20. LI Resources assumes no responsibility or liability for any content, communications or feedback submitted by a User over the Website. If a User has submitted objectionable content, communications or Feedback, LI Resources may, in its sole discretion, terminate that User's account, take legal action, or notify the appropriate authorities or parties, without prior notice.

Third Party Services

21. The User accepts that, although the Website may contain or provide information regarding applications, products and/or services provided or offered by third parties, LI Resources does not recommend or endorse any such third party applications, products and/or services.

22. The report contains content provided to LI Resources by other parties (Third Party Content). LI Resources is not responsible for, does not endorse and makes no representations either expressly or impliedly concerning the accuracy or completeness of any Third Party Content. You rely on the Third Party Content completely at your own risk.

Limit and Extent of Liability

23. LI Resources's liability is limited to the amount of the Fee. Liability arising in the provision of the Services is reduced to the extent that it arises out of or in connection with any negligent act or omission by the User.

24. Neither party is liable to the other for loss of actual or anticipated revenue or profits, increased capital or financing costs, increased operational or borrowing costs, pure economic loss, exemplary or punitive damages or indirect or consequential damages or loss.

25. In no event shall LI Resources or any directors, officers, employees or agents be liable for any indirect, punitive, incidental, special, or consequential damages arising out of or in any way connected with the use of the Website, any delay or inability to use the Website, any information available on the Website, or otherwise arising out of the utilisation of the Website, whether based in contract, tort, strict liability, or otherwise, even if LI Resources has been advised of the possibility of such damages. The negation of damages set forth herein is a fundamental element of the basis of the bargain between LI Resources and the User. The Services would not be provided without such limitations.

Property Verification

26. The User accepts that the Services provided do not take into account any information relating to the actual state or condition of the Property.

27. The User acknowledges that the Services are not to be interpreted as commenting on the physical characteristics or condition of the Property, any particular purpose or use of that Property or the saleability or value of the Property.

Termination and Modification

28. LI Resources reserves the right in its sole discretion to terminate, block or restrict the User's use of the Services or any portion thereof, for any reason, and without notice. In addition, LI Resources reserves the right in its sole discretion to terminate or modify any part of the Website without notice, for any reason.

Anti-Hacking

29. The User agrees not to directly or indirectly, attempt to or disrupt, impair, interfere with, alter or modify the Website or any of its content.

30. The User agrees not to allow, aid or abet third parties to directly or indirectly, attempt to or disrupt, impair, interfere with, alter or modify the Website or any of its content, or obtain access to any information regarding any User or any other Report issued to a User.

Complaints

31. Any complaints in relation to the Services should, in the first instance, be in writing and addressed to LI Resources Customer Service at: info@liresources.com.au. LI Resources will respond to any such complaints in writing as soon as practicably possible.

General Matters

32. These terms and conditions are governed by and will be construed and enforced in accordance with the laws of the State of New South Wales, Australia. If any dispute, controversy or claim arises out of or relating to these terms and conditions, whether sounding in contract, tort or otherwise, it shall be resolved by use of an alternative dispute resolution procedure acceptable to both parties with the assistance of a mediator. If the dispute has not been resolved to the satisfaction of either party within 60 days of initiation of the procedure or if either party fails or refuses to participate in or withdraws from participating in the procedure, then either party may refer the dispute to the court.

33. These terms and conditions apply to all Services provided by LI Resources.

34. If there is any inconsistency between these terms and conditions and any other document or agreement between the parties, these terms and conditions will prevail.

35. These terms and conditions represent the entire agreement between the parties.

36. The User authorises LI Resources to destroy Documents which LI Resources has prepared or holds in connection with the Services 7 years after the last date on which the Services were provided.

37. If any of the terms of the Application Form or the terms and conditions are invalid, unenforceable or void, the relevant term must be read down to the maximum extent possible or severed from the rest of the Application Form or these terms and conditions.

38. These terms and conditions can only be amended or varied by a written document signed by both parties.

39. Neither party may assign or transfer any rights or obligations arising in the provision of the Services or these terms and conditions without the other party's written consent.

Defined Terms

Application Form Means the form and accompanying information provided on the Website, completed and submitted by the User to request the Services.

Document Includes a report, and any other written or electronic document.

Fee Means the amount set out in the Application Form or confirmed via an invoice.

Property Means the property to which the Services and the Report relate.

Report Means the Document prepared by LI Resources and provided to the User which contains the environmental and development data which is relevant to the Property.

Services Means the review of data and information on which the Report is based, and the preparation and provision to the User of the Report.

Website Means LI Resources's online site, that is: www.liresources.com.au

User Means the person(s) set out in the Application Form including that person's permitted successors.

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