Preliminary contamination investigation

Lot 1 and part Lot 2 361 Oxley Highway, Gilgandra NSW

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Summary report

Background
Land rezoning for employment purposes is proposed for rural land comprising Lot 1 and part Lot 2, 361 Oxley Highway, Gilgandra, NSW. The site has approximately 52ha and may be impacted by historical agricultural land-uses that may affect the contamination status of the site.

A preliminary contamination assessment is required to determine if any contamination is present and if further investigation is needed to make suitable for the proposed commercial rezoning.

Objectives of investigation
The objective of the investigation was to determine suitability of the site for the proposed land-use.

Scope
The scope was to identify past potentially contaminating activities, identify potential contamination types, discuss the site condition, provide an assessment of site contamination and assess the need for remediation or suitability for residential land-use. The scope of works included site inspection, review of available information, soil sampling, analysis and recommend suitable land-uses.

Summary
An inspection of the site was made on 14 November 2023. The current and historical land-use is broadacre agricultural comprising grazing and cereal cropping. The site is in a historically rural locality with grazing and cereal cropping occurring on neighbouring land to the west and south.

The site is fenced and divided in three paddocks. No buildings were identified on the site from review of historical imagery or site inspection. Ruins of a water tank were located in the southern section of the site. A windmill and a round structure comprising concrete were located adjacent to the ruins.

Surface cover in the was generally 100%. Vegetation included grasses, curly doc, fleabane, thistle and paddy melon. Juncus spp. was identified in the dam to the south east. Shelter belts consisting of remnant eucalypts, casuarina and cypress pine trees were identified across the site.

No evidence of staining, odours, orchards, mines, sheep dips, mixing sheds or contaminating industrial activities are known to have been located on the site from the review of site history or site walkover. No areas of fill were observed on the site.

Soil samples were collected from each paddock on an approximate 200m grid pattern. Samples were collected from the 0-100mm and analysed for heavy metals, considered the contaminants of concern. Discrete samples were combined to form a composite sample for analysis.

Two discrete soil samples were collected from the dam and from the water tank ruins, considered areas of environmental concern.

The soil sampling program did not detect elevated levels of heavy metals in the soil samples analysed over the paddock areas.

Recommendations
The site is suitable for commercial/industrial land-use. Foreign materials including the building materials from the former water tank located in the southern section of the site are considered an amenity hazard.

An unexpected finds procedure should be adopted for site development works.

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1. Introduction

Land rezoning for employment purposes is proposed for rural land comprising Lot 1 and part Lot 2, 361 Oxley Highway, Gilgandra, NSW. The site has approximately 52ha and may be impacted by historical agricultural land-uses that may affect the contamination status of the site.

A preliminary contamination assessment is required to determine if any contamination is present and if further investigation is needed to make the site suitable for the proposed rezoning.

2. Objectives

The objective of the investigation was to determine suitability of the site for the proposed commercial/industrial land-use.

3. Scope of work

Envirowest Consulting Pty Ltd was commissioned by Gilgandra Shire Council to undertake a preliminary contamination investigation, in accordance with the contaminated land management planning guidelines, from the *Contaminated Land Management Act 1997* and the *SEPP (Hazards and Resilience)* of *Lot 1 and part Lot 2,* 361 Oxley Highway, Gilgandra NSW. The scope of works included site inspection, review of available information, soil sampling, analysis and reporting.

4. Site identification

Address	361 Oxley Highway, Gilgandra NSW
Deposited plans	Lot 1 and part Lot 2 DP1070081
Latitude and longitude	-31.7113^{o} 148.6330^{o}
Geographic coordinates	55J E654762m N6490486m
Client	Gilgandra Shire Council
Owner	Andrew Barry Schier and Meichelle Gai Schier
Current occupier	Vacant
Area	Approximately 52ha
Local government area	Gilgandra Shire Council
Current zoning	RU1 – Primary Production (Gilgandra LEP 2011)
Trigger for investigation	Proposed change in land zoning
Locality map	Figure 1

5. Site history

5.1 Land-uses

The current and historical land-use is broadacre agriculture comprising grazing on introduced pasture and seasonal cereal cropping.

5.2 Summary of council records

The southern section of the site is mapped as an area of biodiversity sensitivity (Gilgandra LEP 2011).

5.3 EPA databases

The investigation area is not listed on the NSW EPA register of contaminated sites (29 November 2023) or sites notified to the EPA (9 November 2023).

No sites listed on NSW EPA register of contaminated sites or sites notified to the EPA have been identified within 1km of the site.

5.4 Safework NSW Storage of hazardous chemicals

A search of the SafeWork NSW dangerous goods database was not considered necessary as no use of fuels was indicated from the searches and past land-uses.

5.5 POEO public register

No current or delicensed and former licensed activities under the POEO Act 1997 have been identified for the site.

Sites listed on NSW EPA POEO public register have not been identified within 1km of the site.

5.6 Other government agency databases

The site is not listed on the following databases:

- National Waste Management Site database
- National Liquid Fuel Facilities database
- The NSW Government PFAS Investigation Program
- Defence PFAS Investigation Program
- Defence PFAS Management Program
- Airservices Australia National PFAS Management Program

Gilgandra Community Recycling Centre is mapped in the waste management database and located approximately 860m east of the site. Potential contamination from the recycling centre is not expected to impact the site. No other sites listed on government agency databases have been identified within 1km of the investigation area.

5.7 Sources of information

Site inspection 14 November 2023 by Felipe Canavez of Envirowest Consulting Pty Ltd
NSW EPA records of public notices under the CLM Act 1997
Soil and geological maps
Historical aerial photographs including NSW Government historical imagery and Google Earth
Gilgandra LEP 2011

5.8 Review of historic aerial photographs, maps and plans

5.8.1 Aerial photographs

Year	Visual observations on site	Surrounding area
1961	The site is in a rural locality. Lots 1 and 2 appear to be managed collectively. No fences are identified within the investigation area. The site is cleared agricultural land with sparse clusters of trees and a row of windbreaker trees to the north. Farm tracks are identified traversing the paddock. Land-use appears to be grazing. A water tank is located to the south.	Land-use to the north of the site appears to be rural, the Gilgandra Aerodrome is located further north. Land use to the east comprises a large reserve covered in trees. One building is located in the northern section of the reserve. Land use to the south and west comprises grazing. A building is identified adjacent to the southern boundary of the site, next to the water tank.
1972	No obvious changes are evident on-site.	A dwelling has been built and a number of trees have been planted to the north of the site. Additional commercial sheds are also identified to the north of the site. Rural-residential dwellings are identifiable to the east of the site.
1981	No obvious changes are evident on-site.	No obvious changes are evident in the surrounding area.
1992	Exposed soil is identified in the south eastern section of the site in the current dam location.	Additional development is identifiable to the north of the site including rural-residential dwellings.
1996	A small bare area is identified in the central western section of the site potentially due to stock movements. Reworked soil is identifiable in the south eastern section of the site. The area is partially covered with water.	The building in the southern boundary of the site is no longer identifiable. Additional rural-residential dwellings are identifiable to the south. Adjacent land to the west appears to be used for cropping.
2006	Two dams are identifiable in the eastern section of the site.	The paddock located to the west is being used for cropping.
2013	The dams appear to be dry. Land-use in the southern section of the site (part Lot 2) has changed to cropping.	The paddock located to the south is being used for cropping.
2015	No obvious changes are evident on-site.	The paddock located to the west is being used for cropping.
2021	The site is being used for cropping.	No obvious changes are evident in the surrounding area.
2023	No obvious changes are evident on-site.	No obvious changes are evident in the surrounding area.

5.8.2 Topographic maps

The current topographic map (SIX Maps) depicts the site as vacant. A built-up area is depicted to the north including a council depot. The lot to the east is depicted as a reserve with some buildings. Land to the west and south is depicted as vacant.

5.8.3 Historical parish maps

The site is situated in the parish of Bobarah, County of Ewenmar.

Map date	Details	Owner
1884	Part of Castlereagh run	-
1885	Part of Portions 61, 90 and 93	ME Humphries (Portion 61), John Carbery Byrne (Portions 90 and 93)
1909	Part of Portions 61, 90 and 93. Portion 93 presents the notation "*subdivided"*	ME Humphries (Portion 61), JC Byrne (Portion 90), Thomas Jones (Portion 93)

Map date	Details	Owner
1914	Part of Portions 61, 90, 93 and 206. Portions 93 and 206 presents notation "*subdivided"*	The Commercial Banking Co. of Sydney Ltd (Portion 61), JC Byrne (Portion 90), Thomas Jones (Portion 93), Gov. Savings Bank of NSW (Portion 206)
1924	Part of Portions 61, 90, 93 and 206. Portions 93 and 206 notation "*subdivided"*	The Commercial Banking Co. of Sydney Ltd (Portion 61), WW Bayliss (Portion 90), Thomas Jones (Portion 93), Gov. Savings Bank of NSW (Portion 206)
1936	Part of Portions 61, 90, 93 and 206.	The Commercial Banking Co. of Sydney Ltd (Portions 61 and 206), WW Bayliss (Portion 90), AF&GH Bayliss (Portion 93)
1950	Part of Portions 61, 90, 93 and 206.	The Commercial Banking Co. of Sydney Ltd (Portions 61 and 206), WW Bayliss (Portion 90), AF&GH Bayliss (Portion 93)

5.8.4 Title search

According to cadastral records, the site was previously subdivided into two portions (Appendix 6).

Date of Acquisition and term held	Registered Proprietor(s) & Occupations where available
As regards the part tinted yellow on D.P. 1070081: -	
15.03.1932	Walter William Bayliss (Tanner)
(1932 to 1940)	
30.04.1940	Augusta Fanny Bayliss (Widow)
(1940 to 1956)	Gordon Horace Bayliss (Tanner)
As regards the part tinted pink on D.P. 1070081: -	
15.09.1914	The Commercial Banking Company of Sydney Limited
(1914 to 1915)	
29.06.1915	Nicholas Travers (Farmer)
(1915 to 1921)	
08.11.1921	Jane Elizabeth Travers (Widow)
(1921 to 1924)	
16.04.1924	Minnie Hitchen (Married Woman)
(1924 to 1925)	
01.05.1925	John Henry Hitchen (Storekeeper)
(1925 to 1931)	
01.05.1931	Walter William Bayliss (Tanner)
(1931 to 1940)	
30.04.1940	Augusta Fanny Bayliss (Widow)
(1940 to 1956)	Gordon Horace Bayliss (Tanner)
Continued as regards the whole: -	
16.02.1956	Roy McCumstie (Grazier)
(1956 to 1956)	Arthur Charles McCumstie (Grazier)
15.06.1956	Melville Carl Lewis (Grazier)
(1956 to 1965)	
19.02.1965	Russell James Moston (Farmer)
(1965 to 1982)	Elva Clarice Moston (Married Woman)
10.12.1982	Barry John Schier
(1982 to 2000)	Margaret Anne Schier
03.08.2000	Walter Prout
(2000 to 2016)	Leonie Joyce Prout
10.08.2016	# Andrew Barry Schier
(2016 to date)	# Meichelle Gai Schier

# Denotes current registered proprietors

5.8.5 Historical land-use of the site

The site is cleared agricultural land that is semi-improved. The primary land-use has been sheep grazing with intermittent cereal cropping. No historical contaminating activities have been identified.

5.9 Interview with site representative

Discussions with a representative of Gilgandra Shire Council indicated that historical land-use on-site comprised majorly grazing and cropping.

5.10 Chronological list of site uses

The site has a historical broadacre agricultural land-use comprising grazing and cropping. Crops are identifiable on the site in the 2021 aerial photograph.

5.11 Heritage listings

The site is not listed on the following government heritage databases:

- Commonwealth Heritage List
- National Heritage List
- State Heritage Register
- Local Environmental Plan (Gilgandra LEP 2011)

The site is identified as being within 1km of two general items on the Gilgandra LEP (2011) heritage map. The items *Butler Airline Hangar* (I26) and The Igloo (I53) located approximately 100m to the north of the site are not expected to have impacted on the contamination status of the site.

No items listed on the State Heritage Register, Commonwealth Heritage List and National Heritage List are located within 1km of the site.

5.12 Buildings and infrastructure

No buildings are currently located on the site. The site is divided into three paddocks by fences. The northern and central paddocks comprise Lot 1 and the southern paddock comprises part of Lot 2. A power transmission line and power poles traverse the central section of the site in the east-west direction. Ruins identified as a former water tank were located in the southern section of the site. A windmill and a round concreted structure were located adjacent to the ruins.

5.13 Spills, losses or discharges

No records for spills or losses on the site were available. No records for discharges to land, water or air were available.

5.14 Relevant complaint history

None expected.

5.15 Previous investigations

None known.

5.16 Historical neighbouring land-use

North – Oxley Highway, rural, Butler Airlines hangar, residential
South – Grazing and cropping
East – Reserve
West – Grazing and cropping

Historical neighbouring land-uses are not expected to impact the contamination status of the site.

5.17 Contaminant sources

Potential exists for contaminating activities to have been undertaken on-site which may impact on the suitability for the proposed land-use. Agricultural land-use may have resulted in the application of heavy metals in weed control products and fertilisers applied to the site. No bio solids are known to have been applied to the site.

Ruins of a former water tank were identified on the southern section of the site. The foreign materials contained in the ruins represent an amenity hazard.

5.18 Contaminants of concern

Based on historical activities and site inspection the potential contaminants of concern associated with agricultural land-use are:

- Heavy metals (arsenic, cadmium, chromium, copper, nickel, lead, zinc and mercury)

5.19 Integrity assessment

The site history was obtained from a site inspection and history review. The information is consistent with the current site condition and to the best of the assessor's knowledge is accurate.

6. Site condition and surrounding environment

6.1 Site inspection

The site was inspected by Felipe Canavez of Envirowest Consulting Pty Ltd on 14 November 2023.

6.2 Land-use

The current land-use is vacant pasture.

6.3 Current neighbouring land-use

North – Oxley Higway, residential, council depot, aerodrome
South – Grazing
East – Reserve
West – Grazing

6.4 Surface cover and vegetation

Vegetation cover on site was generally 100% including grasses and broadleaved weeds. Vegetation included curly doc, fleabane, thistle and paddy melon. Juncus spp. was identified in the dam to the south east. Clusters of remnant eucalypts and cypress pine trees were identified across the site.

6.5 Evidence of visible contamination

No signs of visible contamination such as discolouration or staining were identified on the surface of the site. No signs of settlement or subsidence was identified on the site.

Ruins of a former water tank were identified on the southern section of the site. The ruins comprised bricks, corrugated metal walls, pipes and timber (Figure 5).

6.6 Topography

The site morphology is a low-slope with very gently inclined slope of 0 to 1% to the south west. The average elevation is 288 metres above sea level.

6.7 Soils and geology

The site is mapped as an area of quaternary sediments including alluvium, gravel, sand, silt and clay (Offenberg AC, 1967). The Australian Soil Classification soil type map has the site mapped as a chromosol (State Government of NSW and Department of Planning and Environment 2012). Surface soils observed on site comprised brown clayey sand.

6.8 Water

6.8.1 Surface water

Surface water is expected to infiltrate in the sandy soils, discharge into the southern dam or flow south west to Marthaguy Creek located approximately 4km south west of the site. The dam was found to be dry at the day of the inspection.

6.8.2 Groundwater

Two groundwater bores are identified on the site on the NSW Government Water NSW website (2023). One of the bores was discontinued. The bores were not identified during the site inspection.

Thirty-four registered groundwater bores are identified within 500m of the site on the NSW Government Water NSW website (2023). The characteristics of selected bores are listed below. The selected bores are licenced for stock, domestic and monitoring. Water-bearing zones (WBZ) for bores which information is available were from 14m to 81.7m in clay, sand and gravel. Standing water levels were from 14m and generally deeper than 20m.

No.	Date drilled	Location	SWL (m)	Use	Status
GW009598	1/08/1951	On-site	18.2	Stock	Current
GW036257	1/10/1977	On-site	26.3	Monitoring bore	Filled, backfilled
GW802954	12/12/2004	77m E	20	Stock, domestic	Supply obtained
GW803610	7/11/2006	100m E	40	Stock, domestic	Supply obtained
GW030498	1/05/1974	100m N	23	Monitoring bore	Manual observations monthly
GW803015	25/09/2005	110m E	14	Domestic	Supply obtained
GW803664	10/07/2008	130m N	22.4	Domestic	Supply obtained
GW803304	6/12/2006	160m N	22.8	Domestic	Supply obtained
GW051271	1/09/1980	200m NE	24.4	Stock, domestic	Unknown
GW066574	24/03/1989	210m NE	22.9	Stock, domestic	Supply obtained
GW055751	1/03/1982	240m N	26.2	Domestic	Supply obtained
GW061200	1/07/1985	290m N	23.2	Domestic	Abandoned

6.9 Evidence of possible naturally occurring contaminants

No natural sources of PAH were identified.

The site is not mapped as an acid sulphate soil risk (State Government of NSW and Department of Planning, Industry and Environment 1998).

The site is not mapped as a geological unit with asbestos potential (State Government of NSW and Department of Regional New South Wales 2015).

6.10 Environmentally sensitive features or habitats

The site is cleared agricultural land containing a number of clusters of trees. The cluster of remnant trees located in the south eastern section of the site is mapped as an area of biodiversity sensitivity. Part of the large reserve located to the east of the site is also mapped as area of biodiversity sensitivity (Gilgandra LEP 2011).

6.11 Integrity assessment

The site history was obtained from a site inspection and history review. The information is consistent with the current site condition and to the best of the assessor's knowledge is accurate.

7. Conceptual site model

7.1 Contaminant sources

Potential exists for contaminating activities to have been undertaken on-site which may impact on the suitability for the proposed land-use. The agricultural land-use may have resulted in application of heavy metals on the site. Fertilisers and weed control products applied may contain heavy metal contaminants. No bio solids are known to have been applied to the site.

Ruins of a former water tank were identified on the southern section of the site. The foreign materials contained in the ruins represent an amenity hazard.

Runoff from the site discharges to the dam and the sediments at the base of the dam are indicative of potential historical contaminating activity.

7.2 Contaminants of concern

Based on historical activities and site inspection the potential contaminants of concern associated with agricultural land-use are:

- Heavy metals (arsenic, cadmium, chromium, copper, nickel, lead, zinc and mercury)

7.3 Potential receptors

The proposed land-use of the site is commercial/industrial. Current and historical land-use is broadacre agriculture comprising introduced pasture and occasional cereal cropping.

Human receptors include:

- On-site workers
- Users of the site
- Construction workers
- Intrusive maintenance workers

Ecological receptors include:

- Flora and fauna on the site and adjacent to the site
- Aquatic flora and fauna receptors off-site

7.4 Exposure pathways

Pathways for exposure to contaminants are:

- Dermal contact following soil disturbance
- Ingestion and inhalation after soil disturbance
- Surface water and sediment runoff into waterways
- Leaching of contaminants into the groundwater
- Direct contact of flora and fauna with the soil

7.5 Source receptor linkages

Potential source pathway receptor linkages are identified to enable evaluation of any adverse impact on human health or ecology.

The proposed land-use of the site is commercial/industrial and human receptors to the investigation area are likely. Proposed users of the site may have a risk of exposure if contaminants are present and the soil is disturbed. Residents, visitors, construction workers and intrusive maintenance workers may potentially be receptors to soil contaminants through direct contact to soil which includes ingestion and dermal contact.

Inhalation may occur as a result of soil disturbance and dust production. Major soil disturbance before and after the development of the site is considered unlikely. Soil disturbance during construction and development of the site is expected to be accompanied by erosion control measures which will reduce the incidence of dust production.

Vegetation on the site may be potential receptors to soil contamination through direct uptake of contaminants.

The source receptor linkage to aquatic organisms and ecosystems is considered incomplete as the site is well vegetated and movement of sediments from the site is unlikely. During construction work it is expected that erosion control measures will be implemented and movement of sediment off site will be unlikely. Following development of the site it is expected that vegetation or hard surfaces will be re-established which will control sediment movement from the site. The nearest waterway to the site is Marthaguy Creek located approximately 4km south west of the site. It is not expected that contaminants from the site will be transported to aquatic receptors within the creek. Marthaguy Creek is considered to be a slightly disturbed ecosystem.

Groundwater is not identified as a potential receptor to contamination as potential contamination occurs on the surface and groundwater is identified at depths greater than 14m. Clay subsoils restrict downward movement of potential contaminants. No potential sensitive surface water receptors are located on the site.

Source/contaminants	Transport	Potential exposure pathways	Receptors
☒ Use of fertilisers Heavy metals	☒Wind ☒Sedimentation ☐Groundwater ☐Surface water ☐Volatilisation	☒Direct contact (ingestion and absorption) (human and environment) ☐Inhalation ☐Runoff ☐Leaching	☒Site workers (staff) ☒Construction workers ☒Intrusive maintenance workers ☐Terrestrial flora and fauna ☐Aquatic flora and fauna

☒Potential, ☐unknown/unlikely

8. Data quality objectives (DQO)

8.1 State the problem

Land rezoning from primary production (RU1) to commercial/industrial (E4) is proposed for the site (Figure 4). The site has historically been used for agriculture which may have resulted in the application of fertilisers and contaminating activities during general management activities.

Ruins of a former water tank were identified on the southern section of the site. The foreign materials contained in the ruins represent an amenity hazard.

Runoff from the site discharges to the dam and sediments are indicative of potential historical contaminating activity.

8.2 Identify the decision

Land rezoning is proposed and the levels of contaminants should be suitable for commercial/industrial based criteria and less than the thresholds listed in Section 11. The decision problem is, do the levels of potential contaminants exceed the assessment criteria and thresholds listed in Section 11.

8.3 Identify the inputs decision

Investigations of the site is required to identify any potential contaminants from the historical land-use. The inputs include:

- Field observation of aesthetic impacts of visible contamination
- Soil samples across the site
- Inspection of the condition of the site

8.4 Define the boundaries of the study

The investigation area is *Lot 1 and part Lot 2* DP1070081 361 Oxley Highway, Gilgandra NSW.

8.5 Develop a decision rule

Data collected for the purpose of the contamination investigation must be sufficiently accurate in representativeness. The accuracy will be assessed by determination of:

- Current and historical land-use to describe potential contamination sources
- Site setting, potential receptors and pathways
- Soil samples to characterise the extent of contamination and analysis in accredited laboratories

The adopted criteria is the suitability for commercial/industrial land-use including the health and ecological investigation levels listed in Schedule B1 of the NEPM (1999) *Guideline on Investigation Levels for Soil and Groundwater*. The data must be sufficiently representative to identify the extent of contamination.

The decision rule for the investigation is:

- If the contamination levels were less than the adopted levels, are potential risks low and acceptable
- If the levels were equal or greater than the investigations level, will exceedances affect the suitability for the proposed land-use

8.6 Specify acceptable limits on the decision errors

A decision error in the context of the decision rule would lead to either underestimation or overestimation of the risk level associated with the property. Decision errors include:

- Limitations in available site history information
- Constraints associated with the ability to access certain areas of a site
- Errors in the sampling plan
- Data quality including comparability, representativeness and accuracy for data collection and analysis
- Analytic data validation

Where sample analysis is undertaken the quality of the data collected was assessed on a range of factors including:

- Documentation and data completeness
- Reference to relevant guidance documents
- Consistency of methodology
- Data quality including comparability, representativeness and accuracy for data collection and analysis

- Analytical data validation
- Satisfactory acceptance limits are the 95% upper confidence limit of samples collected is less than the threshold levels, the standard deviation of results should be less than 50% of the relevant investigation or screening level and the levels are less than 250% the relevant thresholds.

8.7 Optimize the design for obtaining data

The methodology described in Sections 9 and 10 presents a framework for the contamination investigation which has been designed to meet the scope objectives and the nominated DQO.

Optimisation of the data collection process was informed by a review of historical information and observations made at the time of site inspection. The sampling was used to inform the potential contamination status of the site. The scope of work was undertaken to a level of accuracy and confidence in the ASC NEPM (NEPC 1999).

Analytes included arsenic, cadmium, total chromium, copper, lead, nickel, zinc and mercury.

9. Sampling analysis plan and sampling methodology

9.1 Sampling strategy

9.1.1 Sampling design

Visual inspections were undertaken over the site for indicators of contamination.

A systematic sampling pattern was adopted to assess the probable location of contamination. Uniform management practices are expected to have occurred within each paddock.

A judgemental sampling pattern was adopted to assess potential areas of environmental concern including the water tank ruins and the dam sediments.

9.1.2 Sampling locations

Discrete soil samples were collected on an approximate 200m grid pattern across the general site. Four discrete samples were combined to form a composite soil sample. A total of 12 discrete soil samples were collected from the site and combined to form 3 composite samples for analysis of heavy metals.

One additional soil sample was collected from the sediments of the dam.

One sample from a potential area of environmental concern was collected. Sampling locations in areas of environmental concern were selected based on the most likely location of contaminants.

The sampling locations are described in Figure 3.

9.1.3 Sampling density

The sampling density can detect a potential hot spot across the site with a radius of 120m at a 95% level of confidence. The samples collected are expected to be representative of each paddock. The sampling frequency is less than the minimum recommended by EPA (2022) but expected to be sufficient due to preliminary nature of investigation and land-use history.

9.1.4 Sampling depth

Potential heavy metals present are generally immobile and expected to be contained in the 0 to 100mm which was the target sampling depth as minimal soil disturbance has occurred.

9.2 Analytes

The composite and discrete soil samples collected were evaluated for arsenic, cadmium, chromium, copper, lead, nickel, zinc and mercury.

Heavy metals were identified as the contaminants of concern possibly present as a result of broadacre agricultural activities onsite (Table 1).

9.3 Sampling methods

Soil samples from the site were taken using a stainless-steel hand trowel. Soil was taken at each individual sampling location below the vegetative and detrital layer. The soil was transferred to a clean plastic bag, mixed and transferred to a solvent rinsed glass jar with a Teflon lid. Combining 4 discrete samples made a composite sample for chemical analysis. Discrete soil samples were transferred directly to a solvent rinsed glass jar with a Teflon lid.

Tools were decontaminated between sampling locations to prevent cross contamination by brushing to remove caked or encrusted material, rinsing with clean tap water and allowing to air dry or using a clean towel.

The sampling log is presented in Appendix 2.

Table 1. Schedule of samples and analyses

Sample ID	Sub-area	Location (Figure 3)	Date collected	Sample type	Analysis undertaken
G1C	Lot 1	11, 12, 13, 14	14/11/2023	Composite	Arsenic (As), cadmium (Cd), chromium (Cr), copper (Cu), lead (Pb), Nickel (Ni), zinc (Zn), mercury (Hg)
G2C	Lot 1	21, 22, 23, 24	14/11/2023	Composite	As, Cd, Cr, Cu, Pb, Ni, Zn, Hg
G3C	Lot 2	31, 32, 33, 34	14/11/2023	Composite	As, Cd, Cr, Cu, Pb, Ni, Zn, Hg
D1	Dam sediments	D1	14/11/2023	Discrete	As, Cd, Cr, Cu, Pb, Ni, Zn, Hg
HS1	Water tank ruins	HS1	14/11/2023	Discrete	As, Cd, Cr, Cu, Pb, Ni, Zn, Hg

10. Quality assurance and quality control

10.1 Sampling design

The sampling program is intended to provide data as to the presence and levels of contaminants.

Discrete soil samples were collected on a systematic grid pattern of approximately 200 metres. This sampling density will enable the detection of an area with an elevated concentration on a radius of 120m with a 95% confidence level. The number of sampling locations is less than the recommended density in the EPA sampling guidelines but expected to be sufficient due to preliminary nature of investigation and broadscale agricultural land-use.

10.2 Field

The collection of samples was undertaken in accordance with accepted standard protocols (NEPC 1999). Composite sampling was undertaken to reduce the cost of chemical analysis. Combining equal amounts from four discrete samples created the composite sample. A composite sample represents the average concentration of the sub-sample. The rules for composite sampling were observed (EPA 2022). The composite samples were analysed for arsenic, cadmium, total chromium, copper, lead, nickel, zinc and

mercury. Discrete soil samples were collected from the dam and water tank and analysed for heavy metals.

Sampling equipment was decontaminated between each sampling event. The appropriate storage conditions and duration were observed between sampling and analysis. A chain of custody form accompanied the samples to the laboratory (Appendix 3).

A single sampler was used to collect the samples using standard methods. Soil collected was a fresh sample from a hand trowel. After collection the samples were immediately placed in new glass sampling jars and placed in a cooler.

One duplicate sample was collected. No field blank, rinsate, trip blank or matrix spikes were submitted for analysis. Some samples from all batches did not contain contaminants which confirm the absence of cross contamination during transport and storage.

A field sampling log is presented in Appendix 2.

10.3 Laboratory

Chemical analysis was conducted by SGS Laboratories, Alexandria, which is NATA accredited for the tests undertaken. The laboratories have quality assurance and quality control programs in place, which include internal replication and analysis of spike samples and recoveries.

Method blanks, matrix duplicates and laboratory control samples were within acceptance criteria. The quality assurance and quality control report is presented together with the laboratory report as Appendix 3.

10.4 Data evaluation

The laboratory quality control report indicates the data variability is within acceptable industry limits. The data is considered representative and usable for the purposes of the investigation. Data quality indicators are presented in Appendix 1.

11. Assessment criteria

The main reference for environmental site assessment in Australia is the ASC NEPM (NEPC 1999 rev 2013). This document includes criteria for use in evaluating potential risk to human health and ecosystems from chemical impacts, which are presented as generic investigation levels and screening levels appropriate to a Tier 1 risk-based assessment applicable for site assessment. The application of these investigation levels and screening levels is subject to a range of limitations, and their selection and use must be in the context of a conceptual site model (CSM) relating to the nature and distribution of impacts and potential exposure pathways.

The proposed land-use is for commercial/industrial and appropriate initial criteria are described in *Guideline on Investigation Levels for Soil and Groundwater* (NEPC 1999). A land rezoning is proposed for the site, future development is expected to comprise commercial offices and sheds.

The criteria lists health investigation levels (HIL) for a range of land-uses. The appropriate initial comparison for the site is commercial/industrial (HIL D).

Ecological investigation levels (EIL) have been developed for the protection of terrestrial ecosystems for selected metals and organic substances in the soil in the guideline (NEPC 1999). The EILs consider the

properties of the soil and contaminants and the capacity of the local ecosystem to accommodate increases in contaminant levels.

Typical CEC value for the site is >5 to 10cmol(+)/kg, clay content of >15 to 20%, pH values of between 5.0 and 5.5 and organic carbon of 1 to 2% (eSPADE, 2023). The proposed land-use is commercial/industrial. The contaminants have been identified in the soil for at least two years and are considered aged.

EILs vary with land-use and apply to contaminants up to 2m depth below the surface. The ASC NEPM EIL calculation spreadsheet was used to determine the EIL. The EILs for commercial/industrial land-use are listed in Table 2.

The investigation threshold was adjusted to enable the detection of an individual location being diluted in the composting process (EPA, 2022). For composite sampling, the analyte result was divided against the number of discrete samples making up the composite. This is based on a worst-case scenario in which one sample has a high concentration whilst other discrete samples have zero concentration. This is a conservative approach.

Chromium is analysed as total chromium which is the sum of chromium (III) and chromium (VI). Chromium (VI) is a potential contaminant from industrial processes including ferrochrome production, electroplating, pigment production and tanning (WHO 1998). Chromium (VI) is reduced to chromium (III) when it comes into contact with organic matter in biota, soil and water. Chromium in the environment is present in the trivalent state (WHO 1998).

The aesthetic state of sites is required to be assessed in preliminary site investigations (PSI). Aesthetic issues generally relate to the presence of materials with a negligible risk or non-hazardous inert foreign material in soil or fill resulting from human activity. Sites that have been assessed as being acceptable from a human health and environmental perspective may still contain such foreign material. An assessment of the site aesthetics requires consideration of the natural state of soil on any given site, and a comparison between it and the soil encountered during investigation works. Soils on site should not exhibit discolouration (staining), malodorous nature (odours) or abnormal consistency (rubble and asbestos).

Table 2. EIL Calculation sheet, commercial/industrial land-use

Analyte	Rationale	EIL (mg/kg)
Arsenic	Generic	160
Chromium (III)	Clay content 20%	840
Copper	CEC 10cmol/kg, pH 5.5, organic carbon 2%	210
Lead	Generic	1,800
Nickel	CEC 10cmol/kg	290
Zinc	CEC 10cmol/kg, pH 5.5	500

EIL – Ecological investigation level

Table 3. Soil investigation levels (mg/kg) (NEPC 1999) for commercial/industrial land-use

Analyte	HIL A Commercial/industrial		EIL Commercial/industrial	
	Discrete	Composite	Discrete	Composite
Arsenic	3,000	750	160	40
Cadmium	900	225	-	-
Chromium (total)	3,600[1]	900[1]	840[2]	210[2]
Copper	240,000	60,000	210	52.5
Lead	1,500	375	1,800	450
Nickel	6,000	1,500	290	72.5
Zinc	400,000	100,000	500	125
Mercury	730	182.5	-	-

[1] Threshold for Chromium (VI), [2] Threshold for Chromium (III), HIL – health investigation level, EIL – ecological investigation level

12. Results and discussion

The site is currently vacant pasture. Historical land-use is broadacre agricultural comprising grazing and cropping. No buildings were identified on the site. Ruins of a water tank were located in the southern section of the site. A windmill and a round concreted structure were located adjacent to the ruins. A dam is located in the south eastern section of the site.

Surface cover across the site was generally 100% dominated by grasses and broadleaved weeds

No surface staining or odours were detected on-site. No evidence of mines, orchards, sheep dips, mixing sheds or contaminating industrial activities were identified on the site from the review of site history or site inspection.

Elevated levels of zinc were identified in the water tank ruins, the levels are expected to be from leaching of the metal walls. The level of zinc at the ruins was less than the adopted thresholds.

The levels of all heavy metals analysed were less than the adopted commercial/industrial thresholds for human health and environment for all soil samples collected from the general site and areas of environmental concern, including the dam sediments and water tank (Table 4).

Table 4. Analytical results and threshold concentrations - heavy metals (mg/kg)

Sample ID	Location	Sample type	Arsenic	Cadmium	Chromium (total)	Copper	Lead	Nickel	Zinc	Mercury
G1C	Northern paddock	Composite	1	<0.3	2.4	0.9	1	0.6	3	<0.05
G2C	Central paddock	Composite	<1	<0.3	2.3	1.1	1	0.7	3	<0.05
G3C	Southern paddock	Composite	<1	<0.3	2.6	1.0	1	0.6	2	<0.05
D1	Dam sediments	Discrete	<1	<0.3	2.3	0.6	<1	0.5	3	<0.05
HS1	Water tank ruins	Discrete	<1	0.6	4.6	6.6	8	0.9	250	<0.05
Health Investigation Levels – Commercial/industrial land-use threshold (NEPC 1999)										
Discrete			*3,000*	*900*	*3,600[1]*	*240,000*	*1,500*	*6,000*	*400,000*	*730*
Composite			*750*	*225*	*900[1]*	*60,000*	*375*	*1,500*	*100,000*	*182.5*
Ecological Investigation Levels – Urban Commercial/industrial and public open space (NEPC 1999)										
Discrete			*160*	*-*	*840[2]*	*210*	*1,800*	*290*	*500*	*-*
Composite			*40*	*-*	*210[2]*	*52.50*	*450*	*72.5*	*125*	*-*

[1] Chromium VI, [2] Chromium III

13. Site characterisation

13.1 Environmental contamination

Not applicable as no contamination was detected.

13.2 Chemical degradation production

Not applicable as no contamination was detected.

13.3 Exposed population

Not applicable as no contamination was detected.

14. Conclusions and recommendations

14.1 Summary

An inspection of the site was made on 14 November 2023. The current and historical land-use is broadacre agricultural comprising grazing and cereal cropping. The site is in a historically rural locality with grazing and cereal cropping occurring on neighbouring land to the west and south.

The site is fenced and divided in three paddocks. No buildings were identified on the site from review of historical imagery or site inspection. Ruins of a water tank were located in the southern section of the site. A windmill and a round structure comprising concrete were located adjacent to the ruins.

Surface cover in the was generally 100%. Vegetation included grasses, curly doc, fleabane, thistle and paddy melon. Juncus spp. was identified in the dam to the south east. Shelter belts consisting of remnant eucalypts, casuarina and cypress pine trees were identified across the site.

No evidence of staining, odours, orchards, mines, sheep dips, mixing sheds or contaminating industrial activities are known to have been located on the site from the review of site history or site walkover. No areas of fill were observed on the site.

Soil samples were collected from each paddock on an approximate 200m grid pattern. Samples were collected from the 0-100mm and analysed for heavy metals, considered the contaminants of concern. Discrete samples were combined to form a composite sample for analysis.

Two discrete soil samples were collected from the dam and from the water tank ruins, considered areas of environmental concern.

The soil sampling program did not detect elevated levels of heavy metals in the soil samples analysed over the paddock areas.

14.2 Assumptions in reaching the conclusions

It is assumed the sampling sites are representative of the site. An accurate history has been obtained and typical past farming practices were adopted.

14.3 Extent of uncertainties

The analytical data relate only to the locations sampled. Soil conditions can vary both laterally and vertically and it cannot be excluded that unidentified contaminants may be present. The sampling density was designed to detect a ‘hot spot’ with a radius of approximately 120m and with a 95% level of confidence.

14.4 Suitability for proposed use of the site

The site is suitable for commercial/industrial land-use.

14.5 Limitations and constraints on the use of the site

Nil

14.6 Recommendation for further work

The site is suitable for commercial/industrial land-use. Foreign materials including the building materials from the former water tank located in the southern section of the site are considered an amenity hazard.

An unexpected finds procedure should be adopted for site development works (Appendix 5).

15. Report limitations and intellectual property

This report has been prepared for the use of the client to achieve the objectives given the clients requirements. The level of confidence of the conclusion reached is governed by the scope of the investigation and the availability and quality of existing data. Where limitations or uncertainties are known, they are identified in the report. No liability can be accepted for failure to identify conditions or issues which arise in the future and which could not reasonably have been predicted using the scope of the investigation and the information obtained.

The investigation identifies the actual subsurface conditions only at those points where samples are taken, when they are taken. Data derived through sampling and subsequent laboratory testing is interpreted by geologists, engineers or scientists who then render an opinion about overall subsurface conditions, the nature and extent of the contamination, its likely impact on the proposed development and appropriate remediation measures. Actual conditions may differ from those inferred to exist, because no professional, no matter how well qualified, and no sub-surface exploration program, no matter how comprehensive, can reveal what is hidden by earth, rock or time. The actual interface between materials may be far more gradual or abrupt than a report indicates. Actual conditions in areas not sampled may differ from predictions. It is thus important to understand the limitations of the investigation and recognise that we are not responsible for these limitations.

16. References

Environment Protection Authority (2020) *Consultants reporting on contaminated land* (NSW Environment Protection Authority, Chatswood)

EPA (2017) *Contaminated Sites: Guidelines for the NSW Site Auditors Scheme* (NSW Department of Environment and Conservation, Chatswood)

EPA (2022) *Contaminated Land Guidelines: Sampling design part 1 – application* (NSW Environment Protection Authority, Parramatta

State Government of NSW and Department of Planning, Industry and Environment (2023*) eSPADE v2.2* (www.environment.nsw.gov.au/eSpade2WebApp)

NEPC (1999 revised 2013) *National Environment Protection (Assessment of Site Contamination) Measure 1999* (National Environment Protection Council Service Corporation, Adelaide)

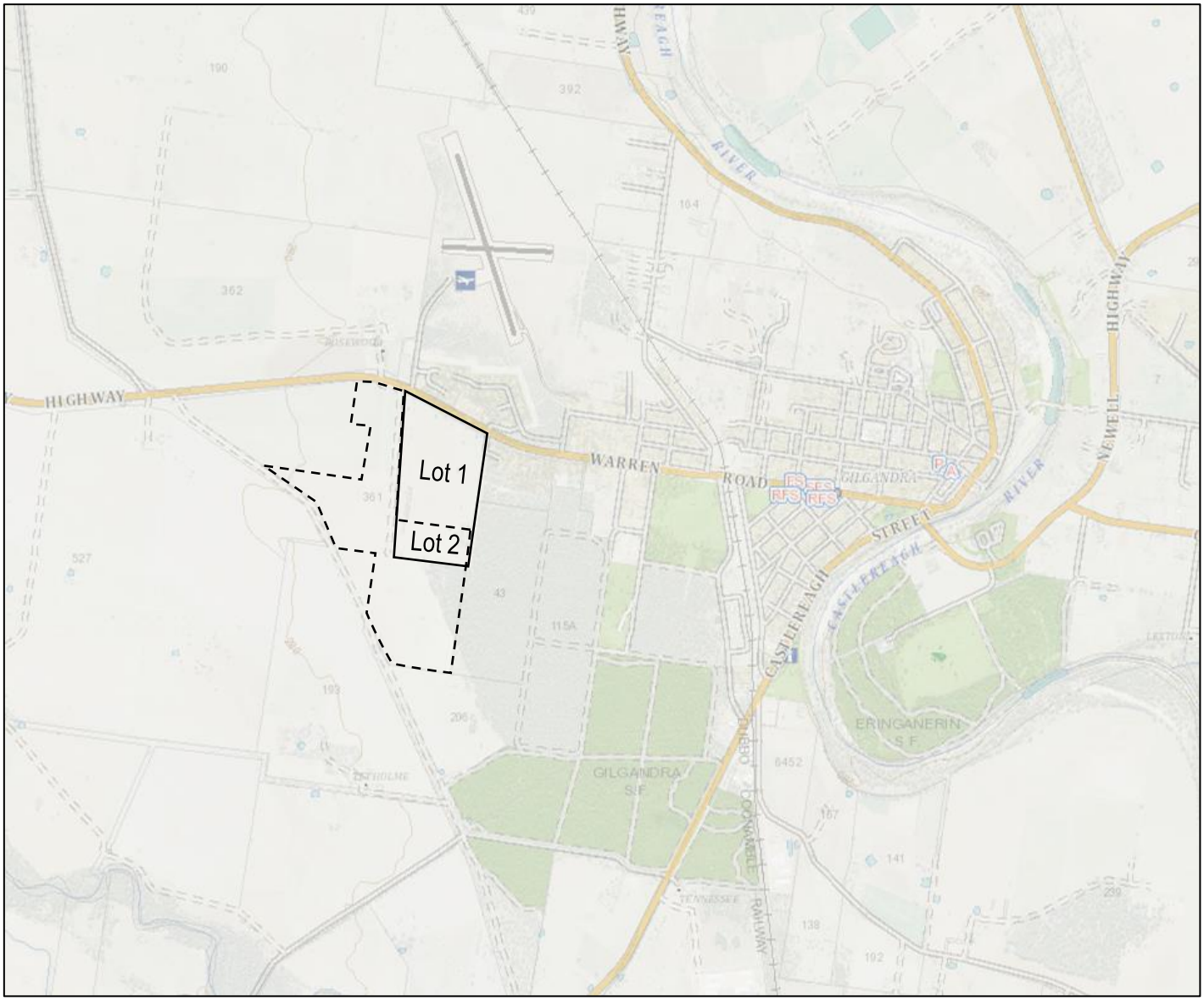
Offenberg, A.C. 1967, Gilgandra 1:250,000 geological sheet. Geological Survey of New South Wales, Sydney.

State Government of NSW and Department of Regional New South Wales (2015) *Naturally occurring asbestos,* viewed October 2023 (datasets.seed.nsw.gov.au/dataset/naturally-occurring-asbestos)

State Government of NSW and Department of Planning, Industry and Environment (1998) *Acid sulphate soils risk,* viewed October 2023 (datasets.seed.nsw.gov.au/dataset/ acid-sulfate-soils-risk0196c)

State Government of NSW and Department of Planning and Environment 2012, Australian Soil Classification (ASC) soil type map of NSW, accessed from The Sharing and Enabling Environmental Data Portal (https://datasets.seed.nsw.gov.au/dataset/86c6ee62-c127-4f09-84dd-655d36efb234)

Figures

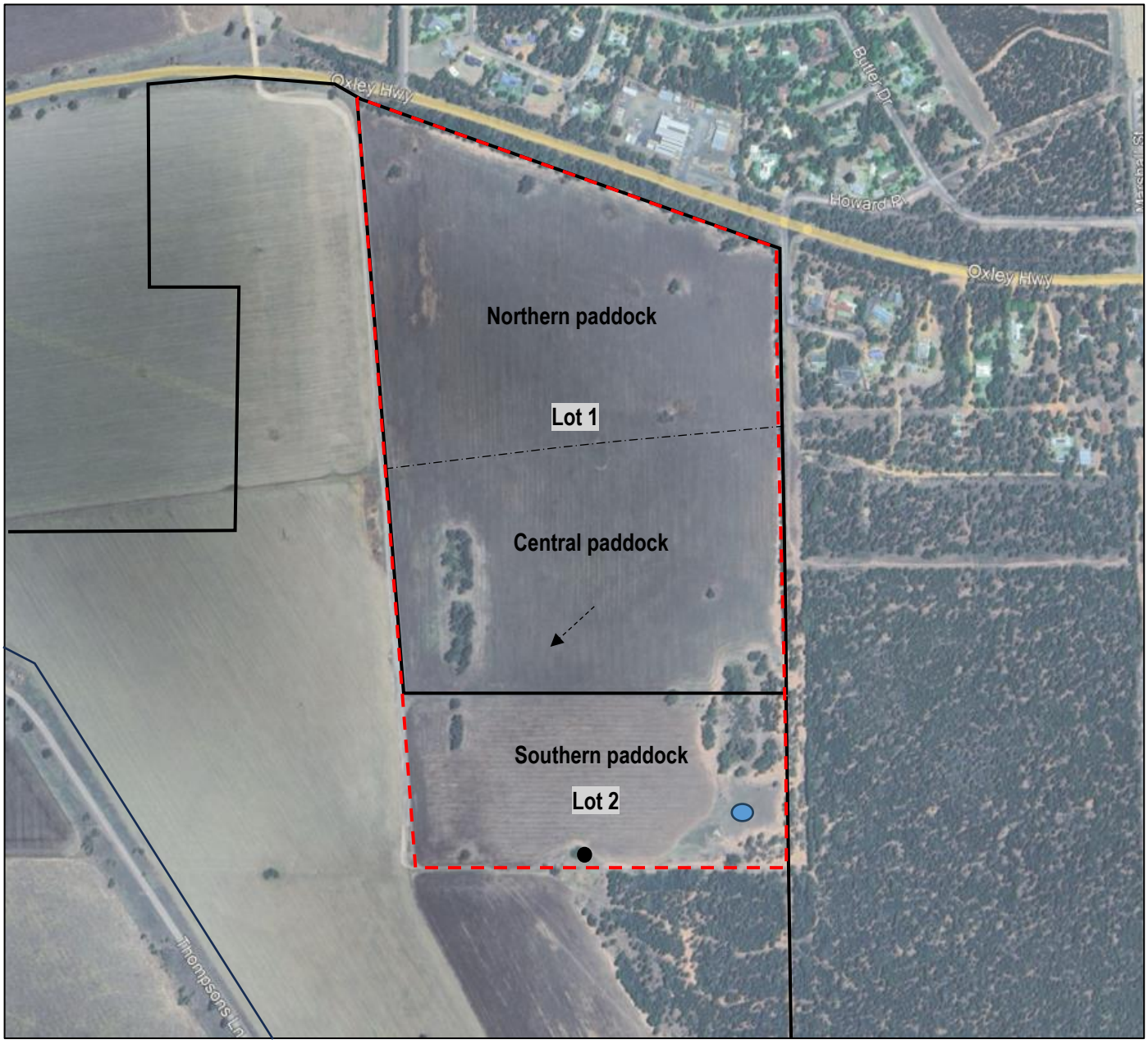


Legend

—— Investigation area

- - - - Lot boundary

Figure 1. Site locality		
Lot 1 and part Lot 2, 361 Oxley Highway, Gilgandra NSW		
	Envirowest Consulting Pty Ltd	
Job: R16336c	Drawn by: FC	Date: 27/11/2023



Legend

- Investigation area
- Lot boundary
- Internal fence
- Slope
- Water tank ruins
- Dam (dry)

Approximate Scale 1: 8,600

0 86 172 344m

Figure 2. Aerial image (2023) and site layout		
Lot 1 and part Lot 2, 361 Oxley Highway, Gilgandra NSW		
	Envirowest Consulting Pty Ltd	
Job: R16336c	Drawn by: FC	Date: 27/11/2023

Legend

- Investigation area
- Lot boundary
- Internal fence
- Slope
- Water tank ruins
- Dam (dry)

Approximate Scale 1: 8,600

0 86 172 344m

Figure 3. Sampling locations		
Lot 1 and part Lot 2, 361 Oxley Highway, Gilgandra NSW		
	Envirowest Consulting Pty Ltd	
Job: R16336c	Drawn by: FC	Date: 27/11/2023

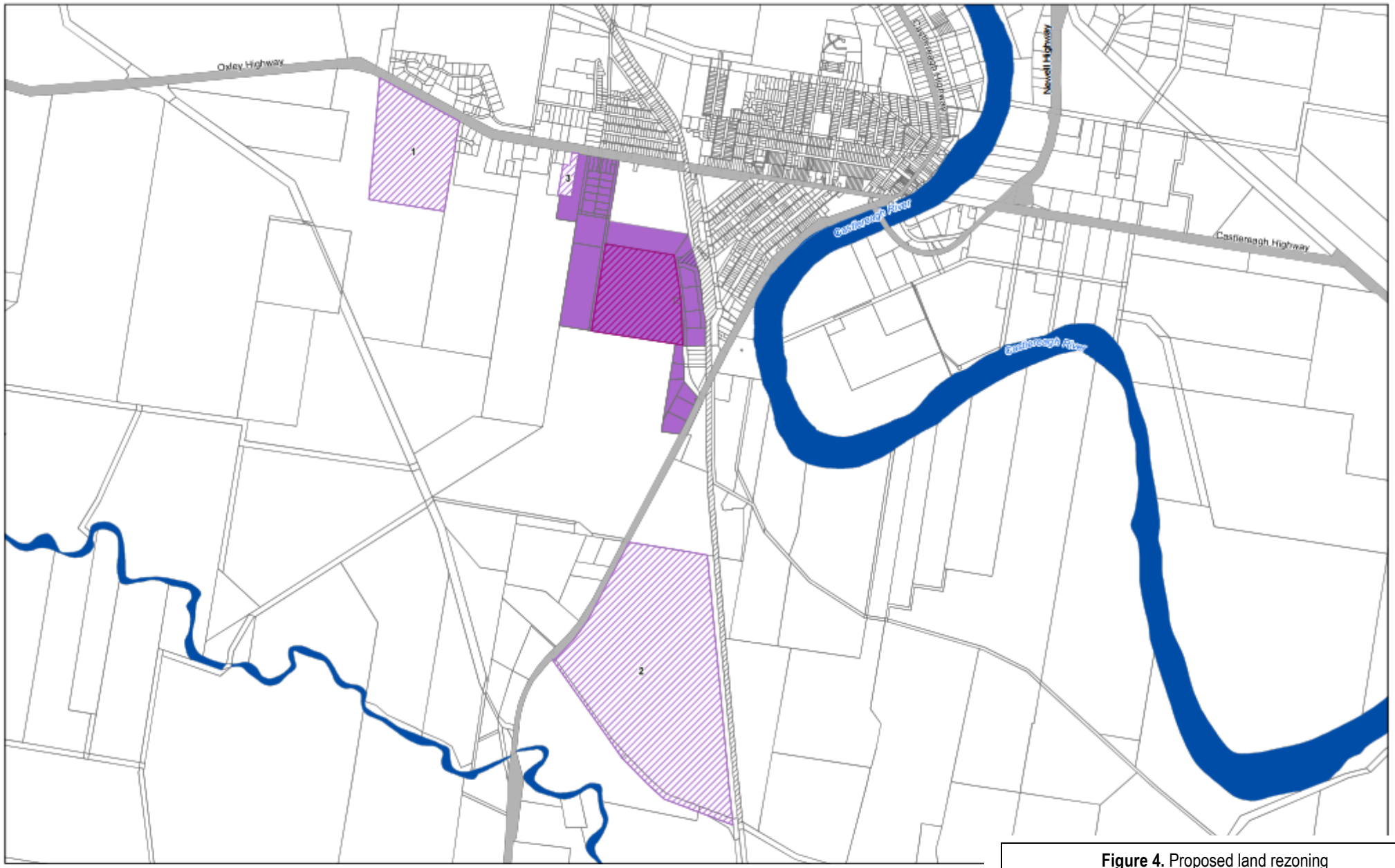


Figure 4. Proposed land rezoning

Lot 1 and part Lot 2, 361 Oxley Highway, Gilgandra NSW

Envirowest Consulting Pty Ltd

Job: R16336c	Drawn by: -	Date: 27/11/2023

Figure 5. Photographs of the site

Looking south from the central section of the site

Looking west from the central section of the site

Looking east from the central section of the site

Looking north from the central section of the site

Water tank ruins

Water tank ruins

Dam location (dry)

Appendices

Appendix 1. Sample analysis, quality assurance and quality control (QAQC) report

1. Data quality indicators (DQI) requirements

1.1 Completeness

A measure of the amount of usable data for a data collection activity. Greater than 95% of the data must be reliable based on the quality objectives. Where greater than two quality objectives have less reliability than the acceptance criterion the data may be considered with uncertainty.

1.1.1 Field

Consideration	Requirement
Locations and depths to be sampled	Described in the sampling plan. The acceptance criterion is 95% data retrieved compared with proposed. Acceptance criterion is 100% in crucial areas.
SOP appropriate and compiled	Described in the sampling plan.
Experienced sampler	Sampler or supervisor
Documentation correct	Sampling log and chain of custody completed

1.1.2 Laboratory

Consideration	Requirement
Samples analysed	Number according to sampling and quality plan
Analytes	Number according to sampling and quality plan
Methods	EPA or other recognised methods with suitable PQL
Sample documentation	Complete including chain of custody and sample description
Sample holding times	Metals 6 months, OCP 14 days

1.2 Comparability

The confidence that data may be considered to be equivalent for each sampling and analytical event. The data must show little or no inconsistencies with results and field observations.

1.2.1 Field

Consideration	Requirement
SOP	Same sampling procedures to be used
Experienced sampler	Sampler or supervisor
Climatic conditions	Described as may influence results
Samples collected	Sample medium, size, preparation, storage, transport

1.2.2 Laboratory

Consideration	Requirement
Analytical methods	Same methods, approved methods
PQL	Same
Same laboratory	Justify if different
Same units	Justify if different

1.3 Representativeness

The confidence (expressed qualitatively) that data are representative of each media present on the site.

1.3.1 Field

Consideration	Requirement
Appropriate media sampled	Sampled according to sampling and quality plan or in accordance with the EPA (2022) sampling guidelines.
All media identified	Sampling media identified in the sampling and quality plan. Where surface water bodies on the site sampled.

1.3.2 Laboratory

Consideration	Requirement
Samples analysed	Blanks

1.4 Precision

A quantitative measure of the variability (or reproduced of the data). Is measured by standard deviation or relative percent difference (RPD). An RPD analysis is calculated and compared to the adopted criteria of 30%.

Data not conforming to the acceptance criterion will be examined for determination of suitability for the purpose of site characterisation.

1.4.1 Field

Consideration	Requirement
Field duplicates	Frequency of 5%, results to be within RPD or discussion required indicate the appropriateness of SOP

1.4.2 Laboratory

Consideration	Requirement
Laboratory and inter lab duplicates	Frequency of 5%, results to be within RPD or discussion required. Inter laboratory duplicates will be one sample per batch.
Field duplicates	Frequency of 5%, results to be within RPD or discussion required
Laboratory prepared volatile trip spikes	One per sampling batch, results to be within RPD or discussion required

1.5 Accuracy

A quantitative measure of the closeness of the reported data to the true value.

1.5.1 Field

Consideration	Requirement
SOP	Complied
Inter laboratory duplicates	Frequency of 5%. Analysis criterion 60% RPD for levels greater than 10 times the PQL 85% RPD for levels between 5 to 10 times the PQL 100% RPD at levels between 2 to 5 times the PQL Absolute difference, 3.5 times the PQL where levels are, 2 times PQL

1.5.2 Laboratory

Recovery data (surrogates, laboratory control samples and matrix spikes) data subject to the following control limits:

- 60-140% acceptable data
- 20-60% discussion required, may be considered acceptable
- 10-20% data should considered as estimates
- 10% data should be rejected

Consideration	Requirement
Field blanks	Frequency of 5%, <5 times the PQL, PQL may be adjusted
Rinsate blanks	Frequency of 5%, <5 times the PQL, PQL may be adjusted
Method blanks	Frequency of 5%, <5 times the PQL, PQL may be adjusted
Matrix spikes	Frequency of 5%, results to be within +/-40% or discussion required
Matrix duplicates	Sample injected with a known concentration of contaminants with tested. Frequency of 5%, results to be within +/-40% or discussion required
Surrogate spikes	QC monitoring spikes to be added to samples at the extraction process in the laboratory where applicable. Surrogates are closely related to the organic target analyte and not normally found in the natural environment. Frequency of 5%, results to be within +/-40% or discussion required
Laboratory control samples	Externally prepared reference material containing representative analytes under investigation. These will be undertaken at one per batch. It is to be within +/-40% or discussion required
Laboratory prepared spikes	Frequency of 5%, results to be within +/-40% or discussion required

2. Laboratory analysis summary

One analysis batch was undertaken over the preliminary investigation program. Samples were collected on 14 November 2023. A total of 5 samples were submitted for analytical testing. The samples were collected in the field by an environmental scientist from Envirowest Consulting Pty Ltd, placed into laboratory prepared receptacles as recommended in NEPM (1999). The samples preservation and storage was undertaken using standard industry practices. A chain of custody form accompanied transport of the samples to the laboratory.

The samples were analysed at the laboratories of SGS laboratories, Alexandria NSW which is National Association of Testing Authorities (NATA) accredited for the tests undertaken. The analyses undertaken, number of samples tested and methods are presented in the following tables:

Laboratory analysis schedule

Sample id.	Number of samples	Duplicate	Analyses	Date collected	Substrate	Laboratory report
G1C, G2C, G3C, D1, HS1	5	1	Arsenic (As), cadmium (Cd), chromium (Cr), copper (Cu), lead (Pb), nickel (Ni), zinc (Zn), mercury (Hg)	14/11/2023	Soil	SE256825

Analytical methods

Analyte	Extraction	Laboratory methods
Metals	USEPA 200.2 Mod	APHA USEPA SW846-6010
Chromium (III)	-	APHA 3500 CR-A&B & 3120 and USEPA SW846-3060A
Chromium (VI)	USEPA SW846-3060A	USEPA SW846-3060A
Mercury	USEPA 200.2 Mod	APHA 3112
TRH(C6-C9)	USPEA SW846-5030A	USPEA SW 846-8260B
TRH(C10-C40), PAH	Tumbler extraction of solids	USEPA SW 846-8270B
PCB	Tumbler extraction of solids	USEPA SW 846-8270B
BTEX	Tumbler extraction of solids	USEPA SW 846-8260B
OC Pesticides	Tumbler extraction of solids	USEPA SW 846-8270B

3. Field quality assurance and quality control

One laboratory duplicate sample was collected for the investigation. The frequency was 20% which was in accordance with the recommended frequency of 5%. Table A1 outlines the samples collected and

differences in replicate analyses. Relative differences were deemed to pass if they were within the acceptance limits of +/- 30% for replicate analyses or less than 5 times the detection limit.

Field duplicate frequency

Sample id.	Number of samples	Duplicate	Frequency (%)	Date collected	Substrate	Laboratory report
G1C, G2C, G3C, D1, HS1	5	1	20	14/11/2023	Soil	SE256825

Table A1. Relative differences for intra laboratory duplicates

	GR1C	GRDA	Relative difference (%)	Pass/Fail
Arsenic	1	<1	NA	Pass
Cadmium	<0.3	<0.3	NA	Pass
Chromium (total)	2.4	2.5	4	Pass
Copper	0.9	1.0	11	Pass
Lead	1	1	0	Pass
Nickel	0.6	0.7	15	Pass
Zinc	3	3	0	Pass
Mercury	<0.05	<0.05	NA	Pass

NA – relative difference unable to be calculated as results are less than laboratory detection limit

No trip blanks or spikes were submitted for analysis. This is not considered to create significant uncertainty in the analysis results because of the following rationale:

- The fieldwork was completed within a short time period and consistent methods were used for soil sampling.
- Soil samples were placed in insulated cooled containers after sampling to ensure preservation during transport and storage.
- The samples were placed in single use jars using clean sampling tools and disposable gloves from material not in contact with other samples. This reduces the likelihood of cross contamination.
- Samples in the analysis batch contain analytes below the level of detection. It is considered unlikely that contamination has occurred as a result of transport and handling.
- Target analytes not volatile

4. Laboratory quality assurance and quality control

Sample holding times are recommended in NEPM (1999). The time between collection and extraction was generally less than the criteria listed below:

Analyte	Maximum holding time
Metals	6 months
Hexavalent chromium	30 days
Mercury	28 days
BTEXN, TRH, PAH, OCP, OPP	14 days

Outliers were identified for hexavalent chromium. The laboratory interpretative reports are presented with individual laboratory report. Assessment is made of holding time, frequency of control samples and quality control samples. The laboratory report also contains a detailed description of preparation methods and analytical methods.

The results, quality report, interpretative report and chain of custody are presented in the attached appendices. The quality report contains the laboratory duplicates, spikes, laboratory control samples, blanks and where appropriate matrix spike recovery (surrogate).

5. Data quality indicators (DQI)

5.1 Completeness

A measure of the amount of usable data for a data collection activity (total to be greater than 90%)

5.1.1 Field

Consideration	Accepted	Comment
Locations to be sampled	Yes	In accordance with sampling methodology, described in the report.
SOP appropriate and compiled	Yes	In accordance with sampling methodology
Experienced sampler	Yes	Environmental scientist
Documentation correct	Yes	Chain of custody completed

5.1.2 Laboratory

Consideration	Accepted	Comment
Samples analysed	Yes	In accordance with chain of custody and analysis plan.
Analytes	Yes	In accordance with chain of custody and analysis plan.
Methods	Yes	Analysed in NATA accredited laboratory with recognised methods and suitable PQL
Sample documentation	Yes	Completed including chain of custody and sample results and quality results
Sample holding times	Yes	Metals < 6 months, CrVI <30 days Mercury < 28 days OCP, OPP, PAH, TRH, PCB, BTEXN < 14 days

5.2 Comparability

The confidence that data may be considered to be equivalent for each sampling and analytical event.

5.2.1 Field

Consideration	Accepted	Comment
SOP	Yes	Same sampling procedures used and sampled on one date
Experienced sampler	Yes	Experienced environmental scientist
Climatic conditions	Yes	Sampling log
Samples collected	Yes	Suitable size and storage

5.2.2 Laboratory

Consideration	Accepted	Comment
Analytical methods	Yes	Same methods all samples
PQL	Yes	Suitable for analytes
Same laboratory	Yes	-
Same units	Yes	-

5.3 Representativeness

The confidence (expressed qualitatively) that data are representative of each media present on the site.

5.3.1 Field

Consideration	Accepted	Comment
Appropriate media sampled	Yes	Sampled according to sampling and quality plan
All media identified	Yes	Soil sampling media identified in the sampling and quality plan

5.3.2 Laboratory

Consideration	Accepted	Comment
Samples analysed	Yes	Undertaken in NATA accredited laboratory. Samples in the analysis batch contain analytes below the level of detection. It is considered unlikely that contamination has occurred as a result of transport and handling.

5.4 Precision

A quantitative measure of the variability (or reproduced of the data)

5.4.1 Field

Consideration	Accepted	Comment
SOP	Yes	Complied
Field duplicates	Yes	Collected

5.4.2 Laboratory

Consideration	Accepted	Comment
Laboratory duplicates	Yes	Frequency of 5%, results to be within +/-40% or discussion required.
Field duplicates (intra and inter laboratory)	Yes	Frequency of 5%, results to be within +/-30% or discussion required.
Laboratory prepared volatile trip spikes	NA	Frequency of 5%, results to be within +/-30% or discussion required.

5.5 Accuracy

A quantitative measure of the closeness of the reported data to the true value

5.5.1 Field

Consideration	**Accepted**	**Comment**
SOP	Yes	Complied
Field blanks	No	Not collected

5.5.2 Laboratory

Consideration	**Accepted**	**Comment**
Method blanks	Yes	Frequency of 5%, <5 times the PQL, PQL may be adjusted
Matrix spikes	Yes	Frequency of 5%, results to be within +/-40% or discussion required
Matrix duplicates	Yes	Frequency of 5%, results to be within +/-40% or discussion required.
Surrogate spikes	Yes	Frequency of 5%, results to be within +/-40% or discussion required.
Laboratory control samples	Yes	Frequency of 5%, results to be within +/-40% or discussion required.
Laboratory prepared spikes	Yes	Frequency of 5%, results to be within +/-40% or discussion required.

No trip blanks, field spikes or sample rinsates were submitted for analysis. This is not considered to create significant uncertainty in the analysis results because of the following rationale:

- The fieldwork methods used for soil sampling were consistent throughout the project with all in situ samples collected from material which had not been subject to exposure.
- The fieldwork was completed within a short time period and consistent methods were used for soil sampling.
- Soil samples were placed in insulated cooled containers as quickly as possible, with the containers filled to minimize headspace. The sample containers were sealed immediately after the sample was collected and chilled in an esky containing ice.

- The samples were stored in a refrigerator and transported with ice bricks to ensure preservation during transport and storage.

- The samples were placed in single use jars using clean sampling tools and disposable gloves from material not in contact with other samples. This reduces the likelihood of cross contamination.

- Samples in the analysis batches contained analytes below the level of detection. It is considered unlikely that contamination has occurred as a result of transport and handling.

- Target analytes not volatile

6. Conclusion

All media appropriate to the objectives of this investigation have been adequately analysed and no area of significant uncertainty exist. It is concluded the data is usable for the purposes of the investigation.

Appendix 2. Field sampling log

Sampling log

Client	Gilgandra Shire Council
Contact	Kristy Cosier
Job number	16336
Location	Lot 1 and part Lot 2, 361 Oxley Highway, Gilgandra NSW
Date	14 November 2023
Investigator	Felipe Canavez
Weather conditions	Fine and hot

Sample ID	Matrix	Date	Analysis required	Observations/comments
G1C	Soil	14/11/2023	Arsenic (As), cadmium (Cd), chromium (Cr), copper (Cu), lead (Pb), Nickel (Ni), zinc (Zn), mercury (Hg)	Northern paddock
G2C	Soil	14/11/2023	As, Cd, Cr, hexavalent chromium (CrVI) Cu, Pb, Ni, Zn, Hg	Central paddock
G3C	Soil	14/11/2023	As, Cd, Cr, CrVI, Cu, Pb, Ni, Zn, Hg	Southern paddock
D1	Soil	14/11/2023	As, Cd, Cr, Cu, Pb, Ni, Zn, Hg	Dam sediment
HS1	Soil	14/11/2023	As, Cd, Cr, Cu, Pb, Ni, Zn, Hg	Adjacent water tank
DA	Soil	14/11/2023	As, Cd, Cr, Cu, Pb, Ni, Zn, Hg	Duplicate of G1C

Appendix 3. Soil analysis results – SGS report number SE256825

ANALYTICAL REPORT

Accreditation No. 2562

CLIENT DETAILS

Contact	Felipe Canavez
Client	ENVIROWEST CONSULTING PTY LIMITED
Address	PO BOX 8158 NSW 2800
Telephone	61 2 63614954
Facsimile	(Not specified)
Email	felipe@envirowest.net.au
Project	**16336**
Order Number	**16336**
Samples	6

LABORATORY DETAILS

Manager	Huong Crawford
Laboratory	SGS Alexandria Environmental
Address	Unit 16, 33 Maddox St Alexandria NSW 2015
Telephone	+61 2 8594 0400
Facsimile	+61 2 8594 0499
Email	au.environmental.sydney@sgs.com
SGS Reference	**SE256825 R0**
Date Received	17/11/2023
Date Reported	24/11/2023

COMMENTS

Accredited for compliance with ISO/IEC 17025 - Testing. NATA accredited laboratory 2562(4354).

SIGNATORIES

Huong CRAWFORD
Production Manager

Kamrul AHSAN
Senior Chemist

Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES [AN040/AN320] Tested: 22/11/2023

PARAMETER	UOM	LOR	G1C SOIL - 14/11/2023 SE256825.001	G2C SOIL - 14/11/2023 SE256825.002	G3C SOIL - 14/11/2023 SE256825.003	D1 SOIL - 14/11/2023 SE256825.004	HS1 SOIL - 14/11/2023 SE256825.005
Arsenic, As	mg/kg	1	1	<1	<1	<1	<1
Cadmium, Cd	mg/kg	0.3	<0.3	<0.3	<0.3	<0.3	0.6
Chromium, Cr	mg/kg	0.5	2.4	2.3	2.6	2.3	4.6
Copper, Cu	mg/kg	0.5	0.9	1.1	1.0	0.6	6.6
Lead, Pb	mg/kg	1	1	1	1	<1	8
Nickel, Ni	mg/kg	0.5	0.6	0.7	0.6	0.5	0.9
Zinc, Zn	mg/kg	2	3	3	2	3	250

PARAMETER	UOM	LOR	DA SOIL - 14/11/2023 SE256825.006
Arsenic, As	mg/kg	1	<1
Cadmium, Cd	mg/kg	0.3	<0.3
Chromium, Cr	mg/kg	0.5	2.5
Copper, Cu	mg/kg	0.5	1.0
Lead, Pb	mg/kg	1	1
Nickel, Ni	mg/kg	0.5	0.7
Zinc, Zn	mg/kg	2	3

Mercury in Soil [AN312] Tested: 22/11/2023

PARAMETER	UOM	LOR	G1C SOIL - 14/11/2023 SE256825.001	G2C SOIL - 14/11/2023 SE256825.002	G3C SOIL - 14/11/2023 SE256825.003	D1 SOIL - 14/11/2023 SE256825.004	HS1 SOIL - 14/11/2023 SE256825.005
Mercury	mg/kg	0.05	<0.05	<0.05	<0.05	<0.05	<0.05

PARAMETER	UOM	LOR	DA SOIL - 14/11/2023 SE256825.006
Mercury	mg/kg	0.05	<0.05

Moisture Content [AN002] Tested: 22/11/2023

PARAMETER	UOM	LOR	G1C SOIL - 14/11/2023 SE256825.001	G2C SOIL - 14/11/2023 SE256825.002	G3C SOIL - 14/11/2023 SE256825.003	D1 SOIL - 14/11/2023 SE256825.004	HS1 SOIL - 14/11/2023 SE256825.005
% Moisture	%w/w	1	**2.0**	**2.1**	**1.5**	**3.4**	**17.0**

PARAMETER	UOM	LOR	DA SOIL - 14/11/2023 SE256825.006
% Moisture	%w/w	1	**3.6**

METHOD	METHODOLOGY SUMMARY
AN002	The test is carried out by drying (at either 40°C or 105°C) a known mass of sample in a weighed evaporating basin. After fully dry the sample is re-weighed. Samples such as sludge and sediment having high percentages of moisture will take some time in a drying oven for complete removal of water.
AN040/AN320	A portion of sample is digested with nitric acid to decompose organic matter and hydrochloric acid to complete the digestion of metals. The digest is then analysed by ICP OES with metals results reported on the dried sample basis. Based on USEPA method 200.8 and 6010C.
AN040	A portion of sample is digested with Nitric acid to decompose organic matter and Hydrochloric acid to complete the digestion of metals and then filtered for analysis by AAS or ICP as per USEPA Method 200.8.
AN312	Mercury by Cold Vapour AAS in Soils: After digestion with nitric acid, hydrogen peroxide and hydrochloric acid, mercury ions are reduced by stannous chloride reagent in acidic solution to elemental mercury. This mercury vapour is purged by nitrogen into a cold cell in an atomic absorption spectrometer or mercury analyser. Quantification is made by comparing absorbances to those of the calibration standards. Reference APHA 3112/3500

FOOTNOTES

*	NATA accreditation does not cover the performance of this service.	-	Not analysed.	UOM	Unit of Measure.
**	Indicative data, theoretical holding time exceeded.	NVL	Not validated.	LOR	Limit of Reporting.
***	Indicates that both * and ** apply.	IS	Insufficient sample for analysis.	↑↓	Raised/lowered Limit of Reporting.
		LNR	Sample listed, but not received.		

Unless it is reported that sampling has been performed by SGS, the samples have been analysed as received.
Solid samples expressed on a dry weight basis.

Where "Total" analyte groups are reported (for example, Total PAHs, Total OC Pesticides) the total will be calculated as the sum of the individual analytes, with those analytes that are reported as <LOR being assumed to be zero. The summed (Total) limit of reporting is calculated by summing the individual analyte LORs and dividing by two. For example, where 16 individual analytes are being summed and each has an LOR of 0.1 mg/kg, the "Totals" LOR will be 1.6 / 2 (0.8 mg/kg). Where only 2 analytes are being summed, the " Total" LOR will be the sum of those two LORs.

Some totals may not appear to add up because the total is rounded after adding up the raw values.

If reported, measurement uncertainty follow the ± sign after the analytical result and is expressed as the expanded uncertainty calculated using a coverage factor of 2, providing a level of confidence of approximately 95%, unless stated otherwise in the comments section of this report.

Results reported for samples tested under test methods with codes starting with ARS-SOP, radionuclide or gross radioactivity concentrations are expressed in becquerel (Bq) per unit of mass or volume or per wipe as stated on the report. Becquerel is the SI unit for activity and equals one nuclear transformation per second.
Note that in terms of units of radioactivity:

a. 1 Bq is equivalent to 27 pCi
b. 37 MBq is equivalent to 1 mCi

For results reported for samples tested under test methods with codes starting with ARS-SOP, less than (<) values indicate the detection limit for each radionuclide or parameter for the measurement system used. The respective detection limits have been calculated in accordance with ISO 11929.

The QC and MU criteria are subject to internal review according to the SGS QAQC plan and may be provided on request or alternatively can be found here: www.sgs.com.au/en-gb/environment-health-and-safety.

STATEMENT OF QA/QC PERFORMANCE

SE256825 R0

CLIENT DETAILS

Contact	Felipe Canavez
Client	ENVIROWEST CONSULTING PTY LIMITED
Address	PO BOX 8158 NSW 2800
Telephone	61 2 63614954
Facsimile	(Not specified)
Email	felipe@envirowest.net.au
Project	**16336**
Order Number	**16336**
Samples	6

LABORATORY DETAILS

Manager	Huong Crawford
Laboratory	SGS Alexandria Environmental
Address	Unit 16, 33 Maddox St Alexandria NSW 2015
Telephone	+61 2 8594 0400
Facsimile	+61 2 8594 0499
Email	au.environmental.sydney@sgs.com
SGS Reference	**SE256825 R0**
Date Received	17 Nov 2023
Date Reported	24 Nov 2023

COMMENTS

All the laboratory data for each environmental matrix was compared to SGS' stated Data Quality Objectives (DQO). Comments arising from the comparison were made and are reported below.

The data relating to sampling was taken from the Chain of Custody document.
This QA/QC Statement must be read in conjunction with the referenced Analytical Report.
The Statement and the Analytical Report must not be reproduced except in full.

All Data Quality Objectives were met (within the SGS Alexandria Environmental laboratory).

SAMPLE SUMMARY

Sample counts by matrix	6 Soil	Type of documentation received	COC
Date documentation received	17/11/2023	Samples received in good order	Yes
Samples received without headspace	Yes	Sample temperature upon receipt	15.9°C
Sample container provider	SGS	Turnaround time requested	Standard
Samples received in correct containers	Yes	Sufficient sample for analysis	Yes
Sample cooling method	Ice Bricks	Samples clearly labelled	Yes
Complete documentation received	Yes		

HOLDING TIME SUMMARY

SE256825 R0

SGS holding time criteria are drawn from current regulations and are highly dependent on sample container preservation as specified in the SGS "Field Sampling Guide for Containers and Holding Time" (ref: GU-(AU)-ENV.001). Soil samples guidelines are derived from NEPM "Schedule B(3) Guideline on Laboratory Analysis of Potentially Contaminated Soils". Water sample guidelines are derived from "AS/NZS 5667.1 : 1998 Water Quality - sampling part 1" and APHA "Standard Methods for the Examination of Water and Wastewater" 21st edition 2005.

Extraction and analysis holding time due dates listed are calculated from the date sampled, although holding times may be extended after laboratory extraction for some analytes. The due dates are the suggested dates that samples may be held before extraction or analysis and still be considered valid.

Extraction and analysis dates are shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria. If the

Mercury in Soil

Method: ME-(AU)-[ENV]AN312

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
G1C	SE256825.001	LB297411	14 Nov 2023	17 Nov 2023	12 Dec 2023	22 Nov 2023	12 Dec 2023	24 Nov 2023
G2C	SE256825.002	LB297411	14 Nov 2023	17 Nov 2023	12 Dec 2023	22 Nov 2023	12 Dec 2023	24 Nov 2023
G3C	SE256825.003	LB297411	14 Nov 2023	17 Nov 2023	12 Dec 2023	22 Nov 2023	12 Dec 2023	24 Nov 2023
D1	SE256825.004	LB297411	14 Nov 2023	17 Nov 2023	12 Dec 2023	22 Nov 2023	12 Dec 2023	24 Nov 2023
HS1	SE256825.005	LB297411	14 Nov 2023	17 Nov 2023	12 Dec 2023	22 Nov 2023	12 Dec 2023	24 Nov 2023
DA	SE256825.006	LB297411	14 Nov 2023	17 Nov 2023	12 Dec 2023	22 Nov 2023	12 Dec 2023	24 Nov 2023

Moisture Content

Method: ME-(AU)-[ENV]AN002

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
G1C	SE256825.001	LB297397	14 Nov 2023	17 Nov 2023	28 Nov 2023	22 Nov 2023	27 Nov 2023	24 Nov 2023
G2C	SE256825.002	LB297397	14 Nov 2023	17 Nov 2023	28 Nov 2023	22 Nov 2023	27 Nov 2023	24 Nov 2023
G3C	SE256825.003	LB297397	14 Nov 2023	17 Nov 2023	28 Nov 2023	22 Nov 2023	27 Nov 2023	24 Nov 2023
D1	SE256825.004	LB297397	14 Nov 2023	17 Nov 2023	28 Nov 2023	22 Nov 2023	27 Nov 2023	24 Nov 2023
HS1	SE256825.005	LB297397	14 Nov 2023	17 Nov 2023	28 Nov 2023	22 Nov 2023	27 Nov 2023	24 Nov 2023
DA	SE256825.006	LB297397	14 Nov 2023	17 Nov 2023	28 Nov 2023	22 Nov 2023	27 Nov 2023	24 Nov 2023

Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES

Method: ME-(AU)-[ENV]AN040/AN320

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
G1C	SE256825.001	LB297410	14 Nov 2023	17 Nov 2023	12 May 2024	22 Nov 2023	12 May 2024	24 Nov 2023
G2C	SE256825.002	LB297410	14 Nov 2023	17 Nov 2023	12 May 2024	22 Nov 2023	12 May 2024	24 Nov 2023
G3C	SE256825.003	LB297410	14 Nov 2023	17 Nov 2023	12 May 2024	22 Nov 2023	12 May 2024	24 Nov 2023
D1	SE256825.004	LB297410	14 Nov 2023	17 Nov 2023	12 May 2024	22 Nov 2023	12 May 2024	24 Nov 2023
HS1	SE256825.005	LB297410	14 Nov 2023	17 Nov 2023	12 May 2024	22 Nov 2023	12 May 2024	24 Nov 2023
DA	SE256825.006	LB297410	14 Nov 2023	17 Nov 2023	12 May 2024	22 Nov 2023	12 May 2024	24 Nov 2023

Surrogate results are evaluated against upper and lower limit criteria established in the SGS QA/QC plan (Ref: MP-(AU)-[ENV]QU-022). At least two of three routine level soil sample surrogate spike recoveries for BTEX/VOC are to be within 70-130% where control charts have not been developed and within the established control limits for charted surrogates. Matrix effects may void this as an acceptance criterion. Water sample surrogate spike recoveries are to be within 40-130%. The presence of emulsions, surfactants and particulates may void this as an acceptance criterion.

Result is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

No surrogates were required for this job.

Blank results are evaluated against the limit of reporting (LOR), for the chosen method and its associated instrumentation, typically 2.5 times the statistically determined method detection limit (MDL).

Result is shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria.

Mercury in Soil — Method: ME-(AU)-[ENV]AN312

Sample Number	Parameter	Units	LOR	Result
LB297411.001	Mercury	mg/kg	0.05	<0.05

Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES — Method: ME-(AU)-[ENV]AN040/AN320

Sample Number	Parameter	Units	LOR	Result
LB297410.001	Arsenic, As	mg/kg	1	<1
	Cadmium, Cd	mg/kg	0.3	<0.3
	Chromium, Cr	mg/kg	0.5	<0.5
	Copper, Cu	mg/kg	0.5	<0.5
	Nickel, Ni	mg/kg	0.5	<0.5
	Lead, Pb	mg/kg	1	<1
	Zinc, Zn	mg/kg	2	<2

Duplicates are calculated as Relative Percentage Difference (RPD) using the formula: RPD = | OriginalResult - ReplicateResult | x 100 / Mean

The RPD is evaluated against the Maximum Allowable Difference (MAD) criteria and can be graphically represented by a curve calculated from the Statistical Detection Limit (SDL) and Limiting Repeatability (LR) using the formula: MAD = 100 x SDL / Mean + LR

Where the Maximum Allowable Difference evaluates to a number larger than 200 it is displayed as 200.

RPD is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

NOTE: The RPD reported is calculated from the unrounded data for the original and replicate result. Manual calculation of the RPD from the rounded data reported may

Mercury in Soil

Method: ME-(AU)-[ENV]AN312

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE256826.004	LB297411.014	Mercury	mg/kg	0.05	0.00156314270	0.0001026305	200	0
SE256827.006	LB297411.024	Mercury	mg/kg	0.05	0.01042141910	0.0104770950	200	0

Moisture Content

Method: ME-(AU)-[ENV]AN002

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE256826.004	LB297397.011	% Moisture	%w/w	1	1.578947368	41.3793103448	98	13
SE256827.006	LB297397.021	% Moisture	%w/w	1	5.527638190	94.8723897911	49	13

Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES

Method: ME-(AU)-[ENV]AN040/AN320

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE256826.004	LB297410.014	Arsenic, As	mg/kg	1	0.978338068	11.0768387832	127	7
		Cadmium, Cd	mg/kg	0.3	0.015478776	70.0179056719	200	0
		Chromium, Cr	mg/kg	0.5	10.47754428	472.1704435872	34	15
		Copper, Cu	mg/kg	0.5	2.650442847	52.8161874287	48	6
		Nickel, Ni	mg/kg	0.5	2.011050300	82.3015034627	53	13
		Lead, Pb	mg/kg	1	3.872869318	14.0854080827	55	5
		Zinc, Zn	mg/kg	2	5.465198863	66.4231393004	64	16
SE256827.006	LB297410.024	Arsenic, As	mg/kg	1	7.017925531	96.4297849991	45	9
		Cadmium, Cd	mg/kg	0.3	0.044104609	90.0360249418	200	0
		Chromium, Cr	mg/kg	0.5	24.15830008	824.9194752369	32	3
		Copper, Cu	mg/kg	0.5	13.88104388	292.0861456284	34	14
		Nickel, Ni	mg/kg	0.5	8.096283244	67.9935343286	36	1
		Lead, Pb	mg/kg	1	11.28460549	648.9946719113	40	23
		Zinc, Zn	mg/kg	2	14.15184618	793.4719940103	44	5

Laboratory Control Standard (LCS) results are evaluated against an expected result, typically the concentration of analyte spiked into the control during the sample preparation stage, producing a percentage recovery. The criteria applied to the percentage recovery is established in the SGS QA /QC plan (Ref: MP-(AU)-[ENV]QU-022). For more information refer to the footnotes in the concluding page of this report.

Recovery is shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria.

Mercury in Soil

Method: ME-(AU)-[ENV]AN312

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB297411.002	Mercury	mg/kg	0.05	0.18	0.2	80 - 120	92

Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES

Method: ME-(AU)-[ENV]AN040/AN320

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB297410.002	Arsenic, As	mg/kg	1	340	318.22	80 - 120	106
	Cadmium, Cd	mg/kg	0.3	4.4	4.81	70 - 130	92
	Chromium, Cr	mg/kg	0.5	36	38.31	80 - 120	93
	Copper, Cu	mg/kg	0.5	320	290	80 - 120	111
	Nickel, Ni	mg/kg	0.5	180	187	80 - 120	99
	Lead, Pb	mg/kg	1	94	89.9	80 - 120	104
	Zinc, Zn	mg/kg	2	290	273	80 - 120	105

Matrix Spike (MS) results are evaluated as the percentage recovery of an expected result, typically the concentration of analyte spiked into a field sub -sample during the sample preparation stage. The original sample's result is subtracted from the sub-sample result before determining the percentage recovery. The criteria applied to the percentage recovery is established in the SGS QA/QC plan (ref: MP-(AU)-[ENV]QU-022). For more information refer to the footnotes in the concluding page of this report.

Recovery is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

Mercury in Soil

Method: ME-(AU)-[ENV]AN312

QC Sample	Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE256825.001	LB297411.004	Mercury	mg/kg	0.05	0.22	<0.05	0.2	109

Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES

Method: ME-(AU)-[ENV]AN040/AN320

QC Sample	Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE256825.001	LB297410.004	Arsenic, As	mg/kg	1	48	1	50	93
		Cadmium, Cd	mg/kg	0.3	42	<0.3	50	84
		Chromium, Cr	mg/kg	0.5	50	2.4	50	94
		Copper, Cu	mg/kg	0.5	52	0.9	50	102
		Nickel, Ni	mg/kg	0.5	49	0.6	50	96
		Lead, Pb	mg/kg	1	50	1	50	97
		Zinc, Zn	mg/kg	2	52	3	50	98

Matrix spike duplicates are calculated as Relative Percent Difference (RPD) using the formula: RPD = | OriginalResult - ReplicateResult | x 100 / Mean

The original result is the analyte concentration of the matrix spike. The Duplicate result is the analyte concentration of the matrix spike duplicate.

The RPD is evaluated against the Maximum Allowable Difference (MAD) criteria and can be graphically represented by a curve calculated from the Statistical Detection Limit (SDL) and Limiting Repeatability (LR) using the formula: MAD = 100 x SDL / Mean + LR

Where the Maximum Allowable Difference evaluates to a number larger than 200 it is displayed as 200.

RPD is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the

No matrix spike duplicates were required for this job.

Samples analysed as received.

Solid samples expressed on a dry weight basis.

QC criteria are subject to internal review according to the SGS QA/QC plan and may be provided on request or alternatively can be found here: https://www.sgs.com.au/~/media/Local/Australia/Documents/Technical Documents/MP-AU-ENV-QU-022 QA QC Plan.pdf

*	NATA accreditation does not cover the performance of this service.
**	Indicative data, theoretical holding time exceeded.
***	Indicates that both * and ** apply.
-	Sample not analysed for this analyte.
IS	Insufficient sample for analysis.
LNR	Sample listed, but not received.
LOR	Limit of reporting.
QFH	QC result is above the upper tolerance.
QFL	QC result is below the lower tolerance.
①	At least 2 of 3 surrogates are within acceptance criteria.
②	RPD failed acceptance criteria due to sample heterogeneity.
③	Results less than 5 times LOR preclude acceptance criteria for RPD.
④	Recovery failed acceptance criteria due to matrix interference.
⑤	Recovery failed acceptance criteria due to the presence of significant concentration of analyte (i.e. the concentration of analyte exceeds the spike level).
⑥	LOR was raised due to sample matrix interference.
⑦	LOR was raised due to dilution of significantly high concentration of analyte in sample.
⑧	Reanalysis of sample in duplicate confirmed sample heterogeneity and inconsistency of results.
⑨	Recovery failed acceptance criteria due to sample heterogeneity.
⑩	LOR was raised due to high conductivity of the sample (required dilution).
†	Refer to relevant report comments for further information.

Chain of Custody Form – Ref 16336

Ref:	**16336**
Investigator:	Envirowest Consulting 9 Cameron Place PO Box 8158 ORANGE NSW 2800
Telephone:	(02) 6361 4954
Email:	felipe@envirowest.net.au
Contact Person:	Felipe Canavez
Invoice:	accounts@envirowest.net.au
Laboratory:	SGS SYDNEY 16/33 Maddox Street ALEXANDRIA NSW 2015
Quotation #:	Envir_70119_2019
Courier/CN:	

			Sample matrix			**Sample preservation**			**Analysis**				
									SGS Method Code				
									CL2T				
Sample ID	**Container***	**Sampling Date/Time**	Water	Soil	Sludge	Cool	HNO3/HCl	Unpre-served	8 Metals				
1 G1C	A	14/11/2023		X		X		X	X				
2 G2C	A	14/11/2023		X		X		X	X				
3 G3C	A	14/11/2023		X		X		X	X				
4 D1	A	14/11/2023		X		X		X	X				
5 HS1	A	14/11/2023		X		X		X	X				
6 DA	A	14/11/2023		X		X		X	X				

SGS EHS Sydney COC
SE256825

Investigator: I attest that the proper field sampling procedures were used during the collection of these samples.

Sampler name: Felipe Canavez
Date: 14/11/2023 Time: 1500

Relinquished by: (print and signature)	Virginia Bragg	Date: 16/11/2023	Time 13:00	Received by: (print and signature)	Date 17/11/23 Time 6:30AM

Please return completed form to Envirowest Consulting, *A = Solvent rinsed glass jar with Teflon lined lid and green label, B= Plastic with green label, C= Amber with green label, D= Vial with white label, E= Plastic with red label

Appendix 4. Soil sampling protocols

1. Sampling

The samples will be collected from the auger tip, mattock, hand auger or excavator bucket immediately on withdrawal.

The time between retrieval of the sample and sealing of the sample container will be kept to a minimum.

The material will be collected using single use disposal gloves or a stainless-steel spade which represented material which has not been exposed to the atmosphere prior to sampling.

All sampling jars will be filled as close to the top as possible to minimise the available airspace within the jar.

2. Handling, containment and transport

Daily sampling activities will be recorded including sampling locations, numbers, observations, measurements, sampler, date and time and weather condition.

The sampling jars will be new sterile glass jars fitted with plastic lid and airtight Teflon seals, supplied by the laboratories for the purpose of collecting soil samples for analysis. Sample containers will be marked indelibly with the sample ID code to waterproof labels affixed to the body of the container.

All samples will be removed from direct sunlight as soon as possible after sampling and placed in insulated containers. Samples will be stored in a refrigerator at 4°C prior to transportation to the laboratory in insulated containers with ice bricks in accordance with AS4482.1.

Handling and transportation to the laboratory will be accompanied with a chain of custody form to demonstrate the specimens are properly received, documents, processed and stored.

Maximum holding time for extraction (AS4482.1) are:

Analyte	Maximum holding time
Metals	6 months
Mercury	28 days
Sulfate	7 days
Organic carbon	7 days
OCP, OPP, PCB	14 days
TRH, BTEX, PAH, phenols	14 days

3. Decontamination of sampling equipment

Sampling tools will be decontaminated between sampling locations by

- Removing soil adhering to the sampling equipment by scraping, brushing or wiping
- Washing with a phosphate-free detergent
- Rinsing thoroughly with clean water
- Repeating if necessary
- Collect rinsate per sampling time and preserve according to AS 2031.1
- Dry equipment with disposable towels or air

Appendix 5. Unidentified finds procedure

Unidentified finds procedure

1. Introduction

Commercial/industrial land-use is proposed for Lot 1 and part Lot 2, 361 Oxley Highway, Gilgandra NSW.

A procedure is required describing the actions if potential contamination or hazards are encountered during demolition / soil disturbance / subdivision / excavation / construction activities.

2. Scope

Prepare a procedure to enable the identification and management of unexpected hazards identified during excavation works and/or construction activities.

3. Site identification

Lot 1 and part Lot 2 DP1070081, 361 Oxley Highway, Gilgandra NSW.

4. Responsible person

The landowner / site supervisor is responsible for implementation of the unexpected finds protocol. The landowner will appoint an environmental scientist to induct and provide information on hazard identification and responses to earthwork supervisors and personnel which may uncover unexpected hazards.

5. Identification of unexpected hazards

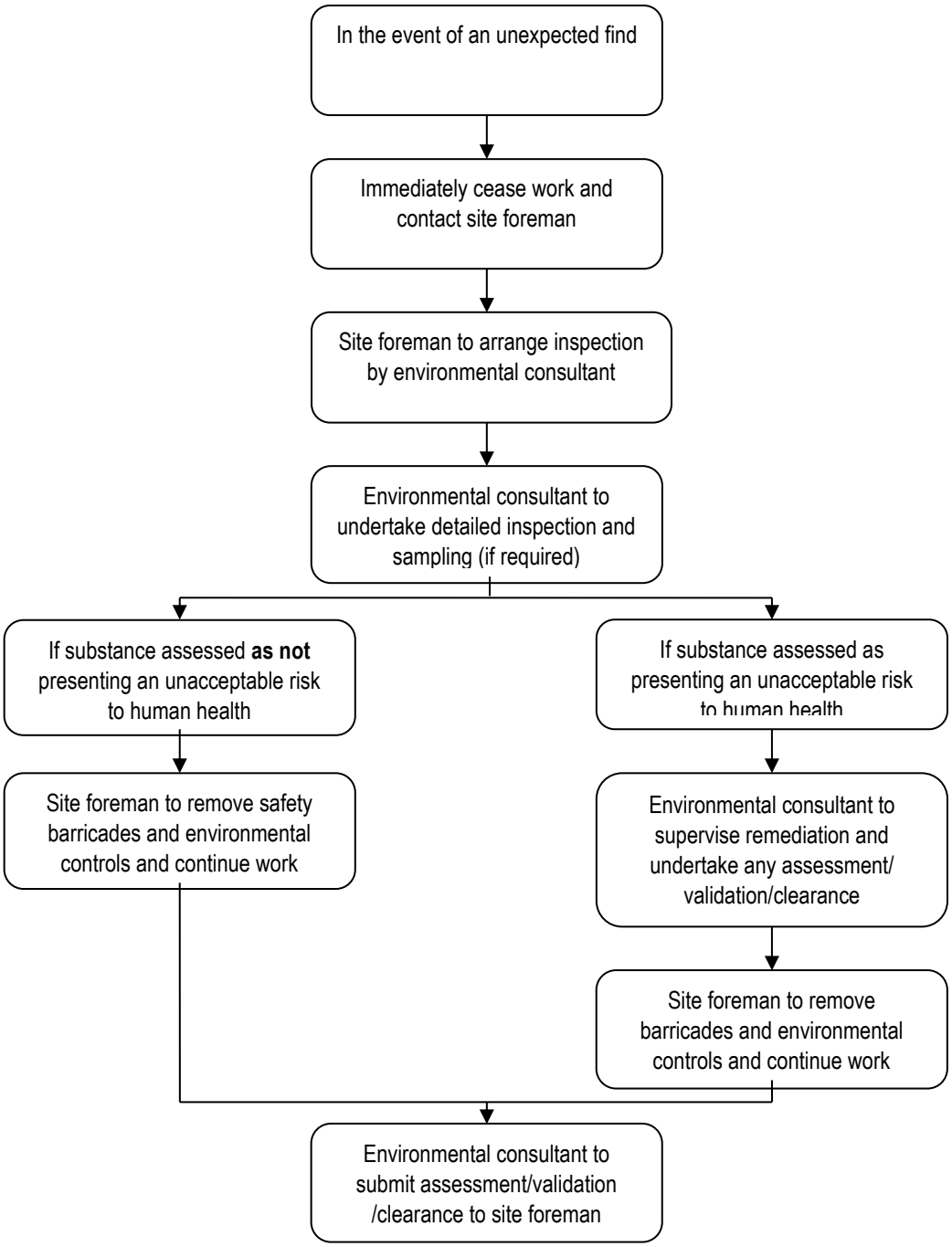
Potential hazards will be identified by appearance and odour include:

- A filled pit or gully
- Demolition waste
- Discoloured soil
- Oil/diesel/tar
- Sheens on water
- An offensive odour
- Asbestos cement sheeting
- Ash or slag
- Underground storage tank

6. Training and induction

All excavation/construction personnel are to be inducted on the identification of potential hazards. The induction can be undertaken at the time of general site induction and toolbox meetings. The training will include display of information to alert worker of potential hazards.

7. Procedure



8. Recommencement of works

The potential hazards will be assessed by the environmental scientist and a report prepared describing:

- Preliminary assessment of the contamination and need for clean-up
- Preparation of a remediation action plan
- All works to be undertaken in accordance with contaminated site regulations and guidelines
- Remediation works
- Validation of the remediation
- Works can commence on the potentially hazardous area after the environmental scientist has provided a clearance.

Information to assist workers in identifying hazards.

BE AWARE

UNEXPECTED HAZARDS MAY BE PRESENT

drums

asbestos

chemical bottles

blood stains

odour

ash / slag

demolition waste

if you <u>SEE</u> or <u>SMELL</u> anything unusual

<u>STOP WORK</u> & contact the Site Foreman

do not restart working before the area has been investigated and cleared by an Environmental Consultant

PLAN FORM 2 — Plan Drawing only to appear in this space — * OFFICE USE ONLY

SIGNATURE AND SEALS ONLY

DP1070081

Registered: 9-7-2004

Title System: TORRENS

Purpose: SUBDIVISION

Ref map: PARISH #

Last Plan: DP775350, 421.1890

PLAN OF SUBDIVISION OF LOT 920 IN D.P. 775350 AND LOT 61 IN D.P. 752554

Lengths are in metres. Reduction Ratio 1:6000

L.G.A.: GILGANDRA

Locality: GILGANDRA

Parish: BOBARAH

County: EWENMAR (7)

This is sheet 1 of my plan in 2 sheets. (Delete if inapplicable)

Surveying Regulation, 2001

I, HARVEY WILLIAM ROWE of LANGFORD & ROWE, P.O. BOX 373, DUBBO a surveyor registered under the Surveying Act 2002, hereby certify that the survey represented in this plan is accurate, has been made in accordance with the Surveying Regulation,

The survey relates to LOT 1 AND CONNECTIONS (here specify the land actually surveyed or specify any land shown in the plan that is not the subject of the survey)

Signature: ... Dated: 3-5-04

Surveyor registered under the Surveying Act, 2002

Datum Line: PM 79403 TO PM 67953

Type: Urban/Rural

Plans used in preparation of survey/compilation.

D.P. 1004833, D.P. 641261, D.P. 853253, D.P. 230476, D.P. 103752

PANEL FOR USE ONLY for statements of intention to dedicate public roads, to create public reserves, drainage reserves, easements, restrictions on the use of land or positive covenants.

Department of Land and Water Conservation Approval

I ..... in approving this plan certify (Authorised Officer) that all necessary approvals in regard to the allocation of the land shown herein have been given.

Signature: .....

Date: .....

File Number: .....

Office: .....

Subdivision Certificate

I certify that the provisions of s. 109J of the Environmental Planning and Assessment Act 1979 have been satisfied in relation to the proposed SUBDIVISION set out herein (insert 'subdivision' or 'new road')

* Authorised Person/General Manager/Accredited Certifier

Consent Authority: GILGANDRA SHIRE COUNCIL

Date of endorsement: 21 MAY 2004

Accreditation No.:

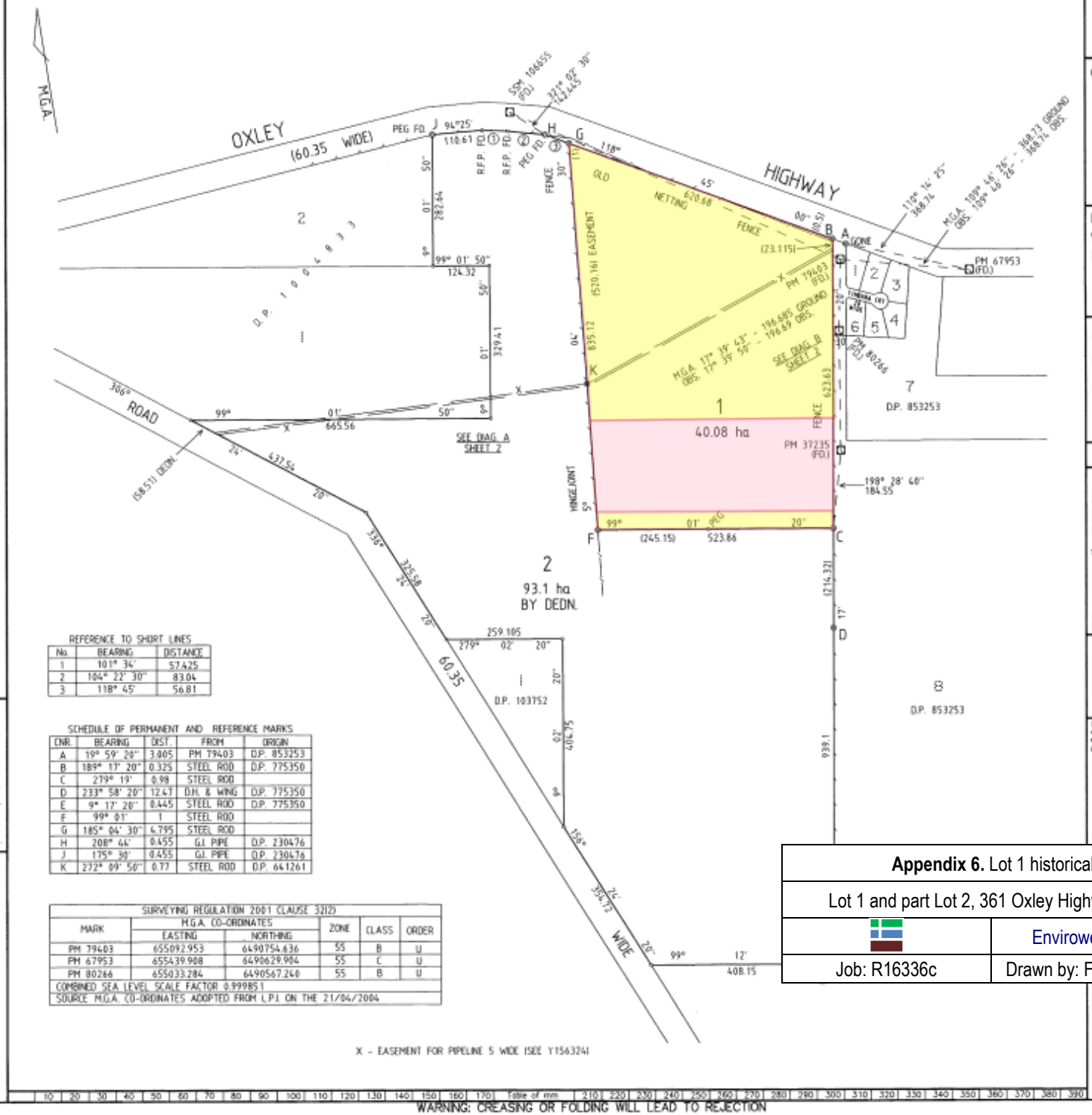
Subdivision Certificate No.: S0204

File No: P0174

Note: When the plan is to be lodged electronically in the Land Titles Office, it should include a signature in an electronic or digital format approved by the Registrar-General.

* Delete whichever is inapplicable

SURVEYORS REFERENCE: 04/051 (CHECKLIST)



REFERENCE TO SHORT LINES

No.	BEARING	DISTANCE
1	101° 36'	57.425
2	104° 22' 30"	83.04
3	118° 45'	56.81

SCHEDULE OF PERMANENT AND REFERENCE MARKS

CNR.	BEARING	DIST.	FROM	ORIGIN
A	19° 59' 20"	3.005	PM 79403	D.P. 853253
B	189° 17' 20"	0.325	STEEL ROD	D.P. 775350
C	279° 19'	0.98	STEEL ROD	
D	233° 58' 20"	12.47	D.H. & WING	D.P. 775350
E	9° 17' 20"	0.445	STEEL ROD	D.P. 775350
F	99° 01'	1	STEEL ROD	
G	185° 04' 30"	4.795	STEEL ROD	
H	208° 44'	0.455	G.I. PIPE	D.P. 230476
J	175° 30'	0.455	G.I. PIPE	D.P. 230476
K	272° 09' 50"	0.77	STEEL ROD	D.P. 641261

SURVEYING REGULATION 2001 CLAUSE 32(2)

MARK	M.G.A. CO-ORDINATES EASTING	M.G.A. CO-ORDINATES NORTHING	ZONE	CLASS	ORDER
PM 79403	655092.953	6490754.636	55	B	U
PM 67953	655439.908	6490629.984	55	C	U
PM 80266	655033.284	6490567.240	55	B	U

COMBINED SEA LEVEL SCALE FACTOR 0.999851

SOURCE M.G.A. CO-ORDINATES ADOPTED FROM L.P.I. ON THE 21/04/2004

WARNING: CREASING OR FOLDING WILL LEAD TO REJECTION

Appendix 6. Lot 1 historical subdivision

Lot 1 and part Lot 2, 361 Oxley Highway, Gilgandra NSW

Envirowest Consulting Pty Ltd

Job: R16336c | Drawn by: FC | Date: 27/11/2023