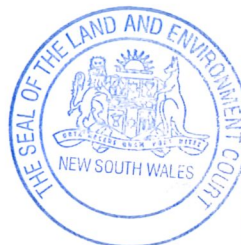


Prepared for
Broaden Management Pty Ltd
Prepared by
Ramboll Australia Pty Ltd
Date
August 2018
Project Number
318000485
Audit Number
FR020



SITE AUDIT REPORT

REMEDIAL ACTION PLAN, FORMER STEGGLES POULTRY FARM, JOHN RENSHAW DRIVE, BLACK HILL

20 August 2018

Broaden Management Pty Ltd
c/o Barr Property and Planning Pty Ltd
Attn.: Liam Buxton
92 Young Street
Carrington NSW 2294

By email: lbuxton@barrpandp.com

Dear Liam

**SITE AUDIT REPORT - REMEDIAL ACTION PLAN, FORMER
STEGGLES POULTRY FARM, JOHN RENSHAW DRIVE,
BLACK HILL**

I have pleasure in submitting the Site Audit Report for the subject site. The Site Audit Statement, produced in accordance with the NSW *Contaminated Land Management Act 1997* and is included as Appendix B of the Site Audit Report. The Audit was commissioned by Broaden Management Pty Ltd to assess the suitability of a remedial action plan. One previous draft and one final Site Audit Statement and Site Audit Report were issued to F&F Properties. At the request of Liam Buxton of Barr Property and Planning, the final Site Audit Statement and Site Audit Report has been amended and re-issued to incorporate a change in property owner from F&F Properties to Broaden Management Pty Ltd.

This Site Audit Report is not currently required by regulation or legislation and is therefore a non-statutory audit.

Thank you for giving me the opportunity to conduct this Audit. Please call me on 4962 5444 if you have any questions.

Yours faithfully,
Ramboll Australia Pty Ltd



Fiona Robinson
EPA Accredited Site Auditor 1506

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APPENDICES

Appendix A

Attachments

Appendix B

Site Audit Statement

LIST OF ABBREVIATIONS

Measures

%	per cent
µg/L	Micrograms per Litre
µg/m ³	Micrograms per Cubic Metre
ha	Hectare
km	Kilometres
m	Metre
mAHD	Metres Australian Height Datum
mbgl	Metres below ground level
mg/kg	Milligrams per Kilogram
mg/L	Milligrams per Litre
mg/m ³	Milligrams per Cubic Metre
mm	Millimetre
ng/L	Nanograms per Litre
ppm	Parts Per Million

General

ABC	Ambient Background Concentration
ACL	Added Contaminant Limit
ACM	Asbestos Containing Material
ADWG	Australian Drinking Water Guidelines
AF	Asbestos Fines
AHD	Australian Height Datum
ALS	Australian Laboratory Services
ASET	Australian Safer Environment and Technology Pty Ltd. (Laboratory)
AST	Aboveground Storage Tank
ANZECC	Australian and New Zealand Environment and Conservation Council
BaP	Benzo(a)pyrene
BGL	Below Ground Level
BTEX	Benzene, Toluene, Ethylbenzene, Xylenes & Naphthalene
CH ₄	Methane
CLM Act	NSW Contaminated Land Management Act 1997
CN	Cyanide (total or free)
CO ₂	Carbon Dioxide
CO	Carbon Monoxide
COC	Chain of Custody
Council	Cessnock City Council
CSM	Conceptual Site Model
CT	Certificate of Title
DA	Development Application
DP	Deposited Plan
DQI	Data Quality Indicator
DQO	Data Quality Objective
EDC	1,2-Dichloroethane
EIL	Ecological Investigation Level
EMP	Environmental Management Plan
EnviroLab	EnviroLab Services Pty Ltd
EPA	Environment Protection Authority (NSW)
ESL	Ecological Screening Level
FA	Fibrous Asbestos
GIL	Groundwater Investigation Level
GME	Groundwater Monitoring Event
H ₂	Hydrogen
He	Helium
HIL	Health Investigation Level
HSL	Health Screening Level
IAA	Interim Audit Advice
LCS	Laboratory Control Sample
LEP	Local Environment Plan
LOR	Limit of Reporting
MAH	Monocyclic Aromatic Hydrocarbons

Mercury	Inorganic mercury unless noted otherwise
Metals	As: Arsenic, Cd: Cadmium, Cr: Chromium, Cu: Copper, Ni: Nickel, Pb: Lead, Zn: Zinc, Hg: Mercury
ML	Management Limits
MS	Matrix Spike
NATA	National Association of Testing Authorities
NC	Not Calculated
ND	Not Detected
NEHF	National Environmental Health Forum
NEPM	National Environment Protection Measure
NHMRC	National Health and Medical Research Council
NL	Non-Limiting
n	Number of Samples
O ₂	Oxygen
OCPs	Organochlorine Pesticides
OEH	Office of Environment and Heritage
OH&S	Occupational Health & Safety
OPPs	Organophosphorus Pesticides
PAHs	Polycyclic Aromatic Hydrocarbons
PCBs	Polychlorinated Biphenyls
PCE	Tetrachloroethene
pH	A measure of acidity, hydrogen ion activity
PID	Photoionisation Detector
PQL	Practical Quantitation Limit
PSH	Phase Separated Hydrocarbon
QA/QC	Quality Assurance/Quality Control
RAP	Remediation Action Plan
RPD	Relative Percent Difference
RSL	Regional Screening Level
SAQP	Sampling Analysis and Quality Plan
SAR	Site Audit Report
SAS	Site Audit Statement
SCEW	Standing Council on Environment and Water
SILs	Soil Investigation Levels
SVOCs	Semi Volatile Organic Compounds
SWL	Standing Water Level
TCE	Trichloroethene
TCLP	Toxicity Characteristic Leaching Procedure
TPHs	Total Petroleum Hydrocarbons
TRHs	Total Recoverable Hydrocarbons
TV	Trigger Value
UCL	Upper Confidence Limit
USEPA	United States Environmental Protection Agency
UST	Underground Storage Tank
VC	Vinyl Chloride
VCH	Volatile Chlorinated Hydrocarbons
VENM	virgin excavated natural material
VMP	Voluntary Management Proposal
VOCs	Volatile Organic Compounds
-	On tables is "not calculated", "no criteria" or "not applicable"

1. INTRODUCTION

1.1 Audit Details

A site contamination audit has been conducted in relation to the site at John Renshaw Drive, Black Hill NSW, 2322.

The Audit was conducted to provide an independent review by an EPA Accredited Auditor of the suitability and appropriateness of a plan of a remedial action plan (RAP) i.e. a "Site Audit" as defined in Section 4 (1) (b) (v) of the NSW *Contaminated Land Management Act 1997* (the CLM Act).

Details of the Audit are:

Requested by:	Mark Griese on behalf of Broaden Management Pty Ltd
Request/Commencement Date:	4 June 2018
Auditor:	Fiona Robinson
Accreditation No.:	1506

1.2 Scope of the Audit

The scope of the Audit included:

- Review of the following reports:
 - 'Environmental Site Assessment, Part Lot 1131 DP1057179, John Renshaw Drive, Black Hill, NSW', 14 August 2018, JBS&G, (the ESA)
 - 'Former Black Hill Steggles Poultry Farm - Remedial Action Plan – Stage 2 Civil Works, John Renshaw Drive, Black Hill, NSW', 14 August 2018, JBS&G, (the RAP)

The following documents were reviewed for background information:

- 'Review of Report on Preliminary Site Investigation Lot 131 DP234203, Black Hill Road, Black Hill,' August 2003, Douglas Partners Pty Ltd.
- 'Environmental Site Assessment of Lot 131 DP234203, Black Hill Road, Black Hill NSW', September 2003, Environmental & Earth Sciences Pty Ltd.
- 'Environmental Site Assessment, Lot 131 DP234203, Black Hill Road, Black Hill', December 2003, Douglas Partners Pty Ltd.
- 'Response to Douglas Partners Pty Ltd review of Lot 131 in DP 234203 Blackhill Road, Blackhill, New South Wales', January 2004, Environmental & Earth Sciences Pty Ltd.
- 'Microbiological analyses of surface water', May 2004, Dr Edla Arzey Consultant in Veterinary Microbiology, Pathology and Biosecurity
- 'Preliminary Site Assessment, Proposed Leasing of On-Site Farmhouse Lot 131 DP 234203 Blackhill Road, Blackhill', June 2004, Douglas Partners Pty Ltd.
- 'Blackhill Microbial Risk Assessment', Douglas Partners Report on Black Hill DRAFT1. Doc, April 2004.
- 'Preliminary Surface Soil Analysis, Proposed Demolition of Chicken Shed, Lot 131 DP 234203, Blackhill Road, Blackhill', July 2004, Douglas Partners.
- 'Proposed sampling plan for additional investigations at Lot 131 Blackhill Road, Blackhill, New South Wales', August 2004, Environmental & Earth Sciences.
- 'Supplementary Contamination Assessment, Lot 131 DP 234203, Blackhill Road, Blackhill', May 2005, Douglas Partners.
- 'Environmental site assessment Lot 131 DP 234203, Blackhill Road, Blackhill', June 2005, Environmental & Earth Sciences.

- 'Review of Environmental Site Assessment – June 2005, Lot 131 DP 234203, Blackhill Road, Blackhill', August 2005, Douglas Partners.
- 'Report on Environmental Assessment Lot 131 DP 234203, Blackhill Road, Blackhill'. September 2007', Douglas Partners.
- 'Review of Environmental Contamination Reports, Former Steggles Site Black Hill Road, Black Hill, NSW', April 2012, Noel Arnold & Associates Pty Ltd (NAA).
- 'Site Contamination Investigation, Former Steggles Poultry Farm Blackhill Road, Black Hill', September 2013, Noel Arnold & Associates Pty Ltd (NAA).
- 'Data Review of Black Hill Site Contamination Report', January 2015, Greencap NAA.
- 'Investigation Summary Report', Lot 1131, DP1057179, Black Hill. August 2017, Douglas Partners Pty Ltd.
- 'Desktop Review – Contamination Proposed Industrial Subdivision Lot 1131, DP1057179, Black Hill', September 2017, Douglas Partners.
- 'Contaminated Land Due Diligence Assessment, Former Steggles Poultry Farm Blackhill Road, Black Hill, NSW', November 2017, JBS&G Australia Pty Ltd (JBS&G).
- 'Former Black Hill Steggles Poultry Farm Remedial Action Plan – Stage 1 Vegetation Clearing', Black Hill, NSW', February 2018, JBS&G Australia Pty Ltd (JBS&G).
- 'Preliminary Site Investigation/Environmental Site Assessment, Part Lot 1131 DP1057179, John Renshaw Drive, Black Hill, NSW', July 2018, JBS&G.
- A site visit by the Auditor on 26 July 2018 and 7 August 2018.
- Discussions with Barr Property and Planning, planners acting for the site owner, Broaden Management (the site owner), and with JBS&G who undertook the investigation.

2. SITE DETAILS

2.1 Location

The site locality is shown on Attachment 1, Appendix A.

The site details are shown in **Table 2-1**.

Table 2-1: Site Details

Site Details	Description
Street address:	John Renshaw Drive, Black Hill, NSW 2322
Identifier:	Part Lot 1131 DP 1057179 (Attachment 2, Appendix A)
Local Government:	Black Hill/Cessnock City Council
Owner:	Broaden Management
Site Area:	Shown by the red boundary on Attachment 2, Appendix A and comprises 220 ha of former Poultry Farm.

The boundaries of the site are well defined to the north by John Renshaw Drive. No clear boundary exists between the adjoining property on the western boundary, eastern and southern boundaries. Part of Lot 1131 to the south of the development site comprises of land zoned E4 Environmental Living. This land does not form part of the audit.

A survey plan of the site has not been provided. If this Site Audit were used for statutory purposes the surveyed site boundaries would be required.

2.2 Zoning

The current zoning of the site is Light Industrial (IN2) comprising approximately 170 ha and E2 Environmental Conservation Zone comprising approximately 50 ha (JBS&G, 2018a).

2.3 Adjacent Uses

The site is located within an area of bushland and rural residential, with commercial/industrial land use to the north. The surrounding site use includes:

- North: Coal mine and bushland
- East: Bushland and residential
- South: Rural residential
- West: Bushland

Current uses of the adjacent areas has not been identified as likely to result in contamination at the site.

2.4 Site Condition

JBS&G (2018a) noted:

- The site is currently used for cattle grazing.
- There are several small dams onsite. Weakleys Flat Creek is located at the northern end of the site and Viney Creek at the southern end of the site. The two creeks flow in a general south-west to north-east direction.
- The majority of the buildings once used for poultry farming were demolished a number of years ago. The remaining building footprints are predominantly covered in grass
- The topography varies from level fields to undulating terrain and has been disturbed by farming activities in areas cleared of vegetation to a depth of at least 200 centimetres. The

original soil in cleared areas has been removed, greatly disturbed or buried. Most of these areas have been levelled to slopes <5%.

- Large areas of native vegetation are located across the site. There are also several small dams and a number of running, stagnant and dry creeks intersecting the site.

The Auditor observations are consistent with the consultants. The following was noted by the Auditor during the site visits:

- Pads constructed for poultry sheds are evident on the site with longitudinal low areas evident between the pads at most farm locations
- Evidence of erosion within the drainage lines was apparent and bedrock outcropping observed
- Drainage lines were dry although some isolated ponding remained
- One site dam was observed to contain water
- Building rubble was noted in former areas of development including some fragments of potential asbestos containing cement
- Other than aesthetic impacts and potential asbestos containing materials, no other signs of contamination were observed

2.5 Proposed Development

It is understood that the site is to be redeveloped as an industrial park. The development will consist of 39 industrial lots (proposed allotments 101-106, 201-208, 301-307, 401-406, 501-506 and 601-605), 1 environmental conservation lot, associated roadways and infrastructure. For the purposes of this audit, the 'commercial/industrial' land use scenario will be assumed for the area zoned as Light Industrial (IN2). For the area zoned as E2 Environmental Conservation Zone, the 'recreational' and 'areas of ecological significance' will be assumed.

3. SITE HISTORY

3.1 Previous Investigations

A number of previous investigations have been completed at the site by a range of consultants. A summary of key historical information is provided in the ESA and RAP and is summarised below.

- From 1967 to 2003 the site was used for intense poultry farming, and may have also been used for intensive pig farming within the south western portion of the site.
- The majority of structures were demolished. No documentation has been provided with regard to the fate of all wastes generated during demolition works.
- A total of 17 farm areas have existed at the site, each with between one and five poultry sheds present at any one time, except for Farm 19, which appeared to never have had buildings constructed. All sheds have subsequently been removed. No documentation of how and when the removal of sheds took place, whether any contamination or Asbestos Containing Material (ACM) clearance was completed, and where the demolished building material was placed. Multiple references were made to the presence of ACM within the sheds.
- Three nominated dump areas exist at the site; northern, southern and western, utilised for the disposal of various items including dead poultry carcasses, building materials and laboratory waste.
- Owing to complaints from surrounding properties, all dead birds were reportedly incinerated from circa 2000. Former employees indicated that the incinerator ash was disposed of both on and off site.
- Evidence suggests that there were up to three underground storage tanks (USTs) located at the site; two adjacent the former workshop area, and a third in an unknown area. The latter UST was removed during 2008, with collected validation samples from the tank pit indicating remediation was successful. The two USTs adjacent the workshops are understood to have been removed at a later date, however, no documentation has been provided for their removal.
- At least one above ground storage tank (AST) was known to have been located at the site, located within the south-eastern portion of the site.
- Anecdotal evidence suggests that a combination of Longlife 250S disinfectant, diesel and formaldehyde was used around poultry sheds as a disinfectant, while hydrocarbons were also used as a wood preservative on poultry shed timber posts.
- ACM was identified at multiple locations across the site; within building materials, on the surface scattered at multiple locations, and co-mingled with soil at multiple locations.
- Portions of the site have been capped with imported or site sourced capping material, including a portion of the northern dump area, as well as a portion of the southern dump area.
- Parts of the site are reportedly undermined and a coal mine is adjacent the site
- A series of ponds are observed adjacent Farm 11,12 and 15 and are backfilled with the exception of one pond.

The summary indicates that the site has been predominately used as a poultry farm. The historical demolition of buildings containing asbestos, filling activities across the site, the use of pesticides and petroleum hydrocarbons around the building footprints and the use and storage of fuel in three USTs and one AST, are identified as the most significant past uses with potential to contaminate the site.

3.2 Auditor's Opinion

In the Auditor's opinion, the site history provides an adequate indication of past activities. The key unknowns with respect to the site history include the exact source and extent of buried materials including poultry waste; contamination surrounding historical building footprints potentially having aesthetic and asbestos impacts; hydrocarbons from the use and storage of hydrocarbons including the USTs/ASTs; and the potential for sediment contamination within the infilled ponds. Other minor activities such as the use of disinfectants, pesticides, incineration and transpiration pits can also give rise to contamination. The Auditor considers that the majority of these have been compensated for by the completion of recent additional investigations and by remediation methodologies proposed.

4. CONTAMINANTS OF CONCERN

The ESA provided a list of the contaminants of concern and potentially contaminating activities. These have been tabulated in **Table 4-1**.

Table 4-1: Contaminants of Concern

Activity	Potential Contaminants
Fill materials used for historical levelling and backfilling of dams at the site.	TRH, BTEX, PAHs, VOCs/SVOCs, Heavy Metals, Asbestos
Poor demolition of former buildings.	Asbestos and Lead
Burial pits for waste including animal carcasses, building materials and laboratory waste.	TRH, BTEX, PAHs, VOCs/SVOCs, Heavy Metals, Asbestos, ground gases
Petroleum storage and use (e.g. former UST, AST areas)	TRH, BTEX, PAH
Transpiration pits and runoff from farm areas	Nutrients and biologicals (including E. Coli)
Dam sediments (seven dams in the south western portion of the site)	Nutrients and biologicals (including E. Coli), Heavy Metals
Operation of incinerator on site and the spreading of ash	PAHs
Chicken shed poles treated with hydrocarbons as a timber preservative	TRH, BTEX, Creosotes
Farm areas that had Longlife 250S, formaldehyde and diesel fuel as a disinfectant applied	TRH, BTEX, formaldehyde
Treatment of farm associated residential buildings, including storage of chemicals	OCPs, PCBs

The RAP reported 70 AECs requiring remediation to make the site suitable for the proposed land use as shown in **Table 4-2**.

Table 4-2: AECs requiring remediation

Farm Shed Footprints	No Sheds	Remediation Driver
Farm 1	2?	No direct evidence of ACM or FA/AF. Estimate takes into account residual uncertainty due to limited scope sampling/analysis, including potential TRH impacts.
Farm 2	4	No direct evidence of ACM or FA/AF. Estimate takes into account residual uncertainty due to limited scope sampling/analysis, including potential TRH impacts.
Farm 3	2	No direct evidence of ACM or FA/AF. Estimate takes into account residual uncertainty due to limited scope sampling/analysis, including potential TRH impacts.
Farm 4	4	No direct evidence of ACM or FA/AF. Estimate takes into account residual uncertainty due to limited scope sampling/analysis, including potential TRH impacts.
Farm 5	4	No direct evidence of ACM or FA/AF. Estimate takes into account residual uncertainty due to limited scope sampling/analysis, including potential TRH impacts.
Farm 6	2	No direct evidence of ACM or FA/AF. Estimate takes into account residual uncertainty due to limited scope sampling/analysis, including potential TRH impacts.
Farm 7	2	No direct evidence of ACM or FA/AF. Estimate takes into account residual uncertainty due to limited scope sampling/analysis, including potential TRH impacts.

Farm Shed Footprints	No Sheds	Remediation Driver
Farm 8	1	No direct evidence of ACM or FA/AF. Estimate takes into account residual uncertainty due to limited scope sampling/analysis, including potential TRH impacts.
Farm 9	5	No direct evidence of ACM or FA/AF. Estimate takes into account residual uncertainty due to limited scope sampling/analysis, including potential TRH impacts.
Farm 11	5	No direct evidence of ACM or FA/AF. Estimate takes into account residual uncertainty due to limited scope sampling/analysis, including potential TRH impacts.
Farm 12	multiple small sheds	No direct evidence of ACM or FA/AF. Estimate takes into account residual uncertainty due to limited scope sampling/analysis, including potential TRH impacts.
Farm 14	4	No direct evidence of ACM or FA/AF. Estimate takes into account residual uncertainty due to limited scope sampling/analysis, including potential TRH impacts.
Farm 15	3	No direct evidence of ACM or FA/AF. Estimate takes into account residual uncertainty due to limited scope sampling/analysis, including potential TRH impacts.
Farm 16	4	No direct evidence of ACM or FA/AF. Estimate takes into account residual uncertainty due to limited scope sampling/analysis, including potential TRH impacts.
Farm 17	4	No direct evidence of ACM or FA/AF. Estimate takes into account residual uncertainty due to limited scope sampling/analysis, including potential TRH impacts.
Farm 18	3 or 4	No direct evidence of ACM or FA/AF. Estimate takes into account residual uncertainty due to limited scope sampling/analysis, including potential TRH impacts.
Farm 19	None known	No direct evidence of ACM or FA/AF. Estimate takes into account residual uncertainty due to limited scope sampling/analysis, including potential TRH impacts. Criteria exceedances not identified in recent sampling.
D1	Bird digester tanks	E Coli/Coliforms identified by NAA. Likelihood of high nutrient levels.
TP1	Transpiration Area 2 adjacent D1 (excluding JBS&G AOI - 12)	NAA identified visual and olfactory signs of biological waste. Area poorly delineated to west, south and north.
D2	Burial trench	E Coli/Coliforms identified by NAA. Likelihood of high nutrient levels.
JBS&G AOI - 7	E1 - Surface ACM and swale fill	ACM identified by JBS&G. Lateral extent based on limited scope visual field observations.
JBS&G AOI - 8	E1 - Surface ACM	ACM identified by JBS&G. Lateral extent based on limited scope visual field observations.
JBS&G AOI - 2	Tip in E3	Construction and general waste, but no direct evidence of ACM. Estimate based on unlikely scenario that ACM contamination exists.
JBS&G AOI - 3	Soil Mounds in E3	Construction and general waste, but no direct evidence of ACM. Estimate based on unlikely scenario that ACM contamination exists.
E4	Farms 11, 12 and 15	No obvious waste material. NAA identified hummocky surface, but no fill in soil identified. Estimate takes into account residual uncertainty due to limited scope sampling/analysis.
E5	Farms 11, 12 and 15 (excluding JBS&G AOI - 9, 10 and 11)	NAA identified visual and olfactory signs of biological waste. Extent appears limited based on other test pits results
JBS&G AOI - 9	E5 - Soil mounds	Construction and general waste, but no direct evidence of ACM. Worst case based on unlikely scenario that ACM contamination exists
JBS&G AOI - 10	E5 - Soil mounds	Construction and general waste, but no direct evidence of ACM. Worst case based on unlikely scenario that ACM contamination exists

Farm Shed Footprints	No Sheds	Remediation Driver
JBS&G AOI - 11	E5 - Soil mounds	Construction and general waste, but no direct evidence of ACM. Worst case based on unlikely scenario that ACM contamination exists
F1	Farm 14	Construction and general waste, but no direct evidence of ACM. Worst case based on unlikely scenario that ACM contamination exists
G	Farm 16	Organic waste identified by NAA. Likelihood of high nutrient levels.
H1	Farm 17	Construction and general waste, but no direct evidence of ACM. Worst case based on unlikely scenario that ACM contamination exists
JBS&G AOI - 13	H1 - Soil Mound	Construction and general waste, but no direct evidence of ACM. Worst case based on unlikely scenario that ACM contamination exists
H2	Farm 17	ACM identified by JBS&G. Lateral extent based on limited scope visual field observations
I	East of Farm 17	NAA identified ACM. Confirmed by JBS&G.
J	Farm 8	NAA and JBS&G identified visual and olfactory signs of biological/organic waste. Extent appears limited based on other test pits results
JBS&G AOI - 14.1	Northern dump area	Burial trench. Construction and general waste, but no direct evidence of ACM. Worst case based on unlikely scenario that ACM contamination exists
JBS&G AOI - 14.2	Northern dump area	Burial trench. No construction waste observed, but inferred as entire trench not inspected and inferred based on historical reports
JBS&G AOI - 14.3	Northern dump area	Burial trench. No construction waste observed, but inferred as entire trench not inspected and inferred based on historical reports
JBS&G AOI - 14.4	Northern dump area	Burial trench. No construction waste observed, but inferred as entire trench not inspected and inferred based on historical reports
JBS&G AOI - 14.5	Northern dump area	Burial trench. Construction and organic waste, but no direct evidence of ACM. Worst case based on unlikely scenario that ACM contamination exists
JBS&G AOI - 14.6	Northern dump area	NAA identified ACM. No visual ACM identified on surface by JBS&G but considerable construction waste
K	Northern dump area - east	No obvious trenches, but construction waste identified by NAA. No direct evidence of ACM. Worst case based on unlikely scenario that ACM contamination exists
Northern Dump Area	Northern Dump Area (excluding K, Z and JBS&G AOI - 14.1-14.6)	Residual area of Northern Dump Area per NAA. No direct evidence of ACM. Worst case based on unlikely scenario that ACM contamination exists
Z	Northern Dump Area	NAA identified fibro cement but did not sample for ACM. No ACM observed by JBS&G and natural from surface. Worst case based on unlikely scenario that ACM contamination exists
L1	Farm 6	NAA identified ACM in north eastern portion. No visual ACM identified on surface by JBS&G but considerable construction waste
L2	Farm 6	NAA identified as a potential fill area but not observe any fill. JBS&G observed all natural vegetation. Estimate takes into account residual uncertainty due to limited scope sampling/analysis.
L3	Farm 6	NAA identified as a potential fill area but not observe any fill. JBS&G observed all natural vegetation. Estimate takes into account residual uncertainty due to limited scope sampling/analysis.
M1	North of Farm 18 (excluding JBS&G AOI - 15)	JBS&G identified construction waste. NAA identified organic waste. No ACM observed on surface. Worst case based on unlikely scenario that ACM contamination exists

Farm Shed Footprints	No Sheds	Remediation Driver
JBS&G AOI - 15	M1	JBS&G identified construction waste. NAA identified organic waste. No ACM observed on surface. Worst case based on unlikely scenario that ACM contamination exists
M2	North of Farm 18	JBS&G identified construction waste. NAA identified organic waste. No ACM observed on surface. Worst case based on unlikely scenario that ACM contamination exists
JBS&G AOI - 19	N2	Small mounds of metal waste, rusted car wreck; Natural from surface JBS&G Investigation
O	Farm 1	Captured above in Farm 1 area
Q	Workshop	NAA reported oxidised material possibly derived from incineration process - "crunchy tactility" and ACM on ground
Y	Farm 18	Reflects road base used all over site. Minor imported ash road base material according to NAA
SDA	Southern Dump Area A (N1)	Construction and general waste, but no direct evidence of ACM. Also bio logical waste. Worst case based on unlikely scenario that ACM contamination exists
WDA	Western Dump Area	NAA identified as a potential fill area but not observe any fill. JBS&G observed all natural vegetation. Contingency estimate as anecdotal evidence of dump has not been confirmed by NAA or JBS&G test pits.
TP2	Transpiration Area 1 adjacent J (excluding JBS&G AOI - 12)	E Coli/Coliforms identified by NAA. Likelihood of high nutrient levels.
JBS&G AOI - 12	Drainage fill - gravels	Construction and general waste, but no direct evidence of ACM. Worst case based on unlikely scenario that ACM contamination exists
CS	Chemical Store	NAA identified ACM. No visual ACM identified on surface by JBS&G
JBS&G AOI - 1	Farm 4 Farm House	ACM identified by JBS&G. Lateral extent based on limited scope visual field observations
JBS&G AOI - 4	Surficial material on Farm 7	Construction and general waste, but no direct evidence of ACM. Worst case based on unlikely scenario that ACM contamination exists
JBS&G AOI - 5.2	Swale fill in farm 2	JBS&G identified construction waste. No ACM observed on surface. Worst case based on unlikely scenario that ACM contamination exists
JBS&G AOI - 5.1	Swale fill in farm 2	JBS&G identified construction waste. No ACM observed on surface. Worst case based on unlikely scenario that ACM contamination exists
JBS&G AOI - 16	NAA TP 84	NAA identified visual and olfactory signs of biological waste. Area poorly delineated to west, south and north
JBS&G AOI - 17	NAA TP57 and 58	Construction and general waste, but no direct evidence of ACM. Worst case based on unlikely scenario that ACM contamination exists
JBS&G AOI - 18	FC04 and FC05	Surficial ACM identified by NAA. Not observed by JBS&G
Infilled Pond 1	-	Depth assumed. Single frag of ACM identified adjacent pond.
Infilled Pond 2	-	Criteria exceedances not identified. Sampling limited and further sampling necessary.
Infilled Pond 3	-	Criteria exceedances not identified. Sampling limited and further sampling necessary.
Infilled Pond 4	-	Criteria exceedances not identified. Sampling limited and further sampling necessary.
Infilled Pond 5	-	Criteria exceedances not identified. Sampling limited and further sampling necessary.
Infilled Pond 6	-	Criteria exceedances not identified. Sampling limited and further sampling necessary.
Infilled Pond 7	-	Criteria exceedances not identified. Sampling limited and further sampling necessary.

Table 4-2 list TRH as COCs at the farms, however anecdotal evidence suggests that a combination of Longlife 250S disinfectant, diesel and formaldehyde was used around poultry sheds as a disinfectant, while hydrocarbons were also used as a wood preservative on poultry shed timber posts.

4.1 Auditor's Opinion

The Auditor considers that the analyte list used by JBS&G adequately reflects the site history and condition. The Auditor notes that groundwater and surface water investigations have not been undertaken. Further discussion on the significance of this is presented in **Section 0**.

5. STRATIGRAPHY AND HYDROGEOLOGY

Following a review of the reports provided, a summary of the site stratigraphy and hydrogeology was compiled as follows.

5.1 Stratigraphy

The ESA references the Newcastle Coalfield Regional Geology 1:100,000 Geological Series Sheet 92312 lithological description of the Black Hill site as being the Tomago Coal Measure and comprising either:

- Siltstone, sandstone, coal, tuff and minor carbonaceous claystone
- Sandstone, minor siltstone, claystone, coal and tuff
- Laminated sandstone, claystone, siltstone, coal and tuff

Bedrock was not encountered during the NAA (2013) investigation, however the Douglas Partners 2005 report (a partial report provided to JBS&G) reportedly indicates that two of the groundwater bores installed at the site encountered bedrock (sandstone and siltstone) at approximately 3 metres below ground level (m bgl). These wells (GW02 and GW03) were installed to the north west of the northern dump area.

The Newcastle Soil Landscape Series Sheet 9232 (Department of Land and Water Conservation of NSW) indicates that the Black Hill Site is of the Beresfield soil landscape type. Test pits excavated as part of the NAA (2013) investigation encountered soil which was consistent with the desktop review, however areas of the Site were found to have been extensively disturbed and fill material included soil, farming/building debris, poultry waste material and clay capping.

The ESA referenced mine subsidence reports detailing underground coal mining occurring across the majority of the Site with the exception of the north west and south west corners. The mine beneath the site ceased operation in 2016 and is currently operating under a 'care and maintenance' phase. The mining lease for the site expires on 15 May 2029. As a result of mining activities, subsidence is known to occur in the regional area (Blackhill Mine Subsidence District) and on the site. Conclusions of the mine subsidence reports indicate that subsidence at the site has practically completed, unless mining activities recommence.

The sub-surface profile of the site is summarised in **Table 5-1**.

Table 5-1: Stratigraphy NAA (2013)

Area	Depth (m bgl)	Subsurface Profile
Entire site	0.0 – 0.1	Fill: Silt, moist, high plasticity, brown/light brown
Entire site	0.1-1.4	Fill; Silty clay, aggregate, miscellaneous rocks, steel, bricks, plastic sheet, suspected ACM, black layer – organic degradation
Entire site	0.2 – 1.9	Natural: Clay, soft/stiff, moist, medium plasticity, brown/orange/grey

The NAA (2013) logs indicate that the fill materials are encountered across the site. One test pit (TP99) of NAA (2013) was terminated at 1.0 m bgl before natural soils were reached.

Table 5-2: Stratigraphy JBS&G (2018a)

Area	Depth (m bgl)	Subsurface Profile
Entire site	0.0 – 1.9	Fill: Heterogeneous mix of Silty Sand/Gravelly Sand/ Sandy Clay, fine-coarse grained sand, metal picket, black staining and charcoal fragments, cobbles, boulders, rootlets and construction rubble (concrete and wood)
Entire site	0.2 – 1.9	Natural: Clay/ Gravelly Clay, medium plasticity, firm, contains fine to

Area	Depth (m bgl)	Subsurface Profile
		coarse grained sub-rounded gravel, brown/ grey/orange mottled
	1.3 - ?	Natural: Shale

The Auditor concludes that the general depth of fill and underlying stratigraphy have been adequately characterised. The Auditor considers that the filling activities are heterogeneous and likely to vary significantly across the site. The proposed additional investigations will assist in defining depths of fill in relation to AECs.

5.2 Hydrogeology

The ESA included a search of the groundwater information database maintained by the NSW Government and identified ten registered groundwater bores within a 1 km radius of the site.

Ten groundwater monitoring bores may have been installed at the site, (one well GW01 is located offsite). It is believed that four were installed by Environmental Earth Sciences (EES) during 2003, another four were installed by the same company during 2004, and Douglas Partners installed two during May 2005.

Wells BH2, BH8, BH15, BH16 were relatively shallow and screened within sediments and/or the top of the shale bedrock. BH2 and BH8 were dry during the first round of sampling in 2003, while the standing water levels within BH15 and BH16 were 2.90 m and 5.10 m bgl respectively.

GW01, GW02 and GW03 were sampled by NAA (2013). The depth of GW01 (offsite) was 34 m bgl and depth to water was 9.14 m bgl. The depth of GW02 and GW03 were 5.1 and 6.66 m bgl and the depth to water was 5.1 and 5.4 m bgl respectively.

The ESA describes a perched groundwater located above of bedrock at the site. This water is likely highly influenced by season rainfall. True groundwater is likely located deeper within bedrock, which is influenced by mining activities below and surrounding the site.

The onsite wells (GW02 and GW03) reported an aerobic dissolved oxygen, neutral pH, fresh to slightly brackish groundwater and reducing conditions.

NAA (2013) collected eight surface water samples from duck pond, pig pond, poultry digester and creek water. The surface water samples reported aerobic dissolved oxygen, neutral pH, freshwater and a mix of oxidising and reducing conditions.

5.3 Auditor's Opinion

The Auditor considers that the understanding of geological and hydrogeological conditions at the site are sufficiently understood to inform the investigations and the conceptual site model.

6. EVALUATION OF QUALITY ASSURANCE AND QUALITY CONTROL

The Auditor has assessed the overall quality of the data by review of the information presented in the referenced reports, supplemented by field observations. The data sources are summarised in **Table 6-1**. NAA (2013) was undertaken as part of a site contamination investigation and JBS&G (2017) completed a Due Diligence report. JBS&G (2018a) details an environmental site assessment and JBS&G (2018b) includes the remedial action plan for Stage 2. Data presented in these reports has been used to develop a data set for the site. Data quality of earlier reports was reviewed by not assessed.

Table 6-1: Summary of Investigations

Investigations	Field Investigations	Analytical Data Obtained
Noel Arnold & Associates (September 2013)	Sampling and analysis of soil, surface water and groundwater investigations	Asbestos, metals, TRH, BTEX, PAHs, OCP, PCBs, nutrients, E.coli/faecal coliforms
JBS&G (November 2017)	Soil investigation - 96 test pits across the former farm areas, waste dump areas and APECs.	Presence/absence of ACM and FA/AF, with relatively limited analysis completed for TRH, BTEXN, PAHs, metals, nitrogen species and total coliforms.
JBS&G (August 2018a)	Environmental Site Assessment (the ESA)	TRH, BTEXN, PAHs, metals, OCP, nitrogen, phosphate, E. Coli and total coliforms and asbestos

The Auditor has assessed the overall quality of the data by review of the information presented in the referenced reports, supplemented by field observations. The Auditor's assessment follows in **Table 6-2**.

Table 6-2: QA/QC – Sampling and Analysis Methodology Assessment

Sampling and Analysis Plan and Sampling Methodology	Auditor's Opinion
<p>Data Quality Objectives (DQO)</p> <p>NAA (2013) - defined specific DQOs in accordance with the seven step process outlined in DEC (2006) <i>Guidelines for the NSW Site Auditor Scheme</i>.</p> <p>JBS&G (2017) - did not define specific DQOs in the due diligence report.</p> <p>JBS&G (2018a) - defined specific DQOs for the additional investigation works to address data gaps required for the development of the RAP. The DQOs were in accordance with the seven step process outlined in DEC (2006) <i>Guidelines for the NSW Site Auditor Scheme</i>.</p> <p>Sampling pattern and locations</p> <p>NAA (2013) - combination of judgemental and random based soil sampling over the entire site (100 test pits), 15 targeted ACM sample locations, seven targeted surface water sampling in key locations and sampling of three existing groundwater samples. This SCI was to update and supplement existing investigations</p>	<p>NAA (2013) – The DQOs were considered appropriate for the investigation works conducted.</p> <p>JBS&G (2017) On the basis that the consultant has clearly stated the project objectives and has designed effective sampling strategies to achieve them, overall the Auditor considers that the omission of specific DQOs does not affect the outcome of the audit.</p> <p>JBS&G (2018a) - The DQOs were considered appropriate for the investigation works conducted.</p> <p>In the Auditor's opinion these investigation locations adequately target the main areas of concern.</p> <p>In the Auditor's opinion the validation pattern and locations adequately target the main areas of concern.</p>

Sampling and Analysis Plan and Sampling Methodology	Auditor's Opinion
<p>undertaken by EES, Douglas Partners and Environ, to further characterise the site.</p> <p>JBS&G (2017) - The investigation comprised the completion of 96 targeted test pits, of which a number were extended laterally to form trenches, across the former farm areas, waste dump areas and APECs.</p> <p>JBS&G (2018a) - The investigation comprised 15 targeted test pits at Farm 19 into natural soils. Twenty test pits from backfilled ponds to natural soils, three sediment samples from ponds which still contained water and 14 surface soil samples from areas where the historical farms were constructed. As this was a staged approach, with the allowance of additional investigations, the number and position of sample locations was considered appropriate to meet the objective.</p> <p>Sampling density</p> <p>NAA (2013) - A combination of random and targeted sampling was completed and submission of 60 soil samples from 100 test pits. Limited surface water and groundwater sampling was completed at the site.</p> <p>JBS&G (2017) - limited soil investigations were targeted towards the former farm footprints and the APECs provided within the desktop review completed by Douglas Partners Pty Ltd in 2017.</p> <p>JBS&G (2018a) - Based on identified data gaps from NAA (2013) and JBS&G (2017), targeted soil sampling was completed at AECs. Farm 19 is approximately 21,800 m² in size, 15 sample locations on an approximate grid was not in accordance with the NSW EPA <i>Sampling Design Guidelines</i> (1995), however was considered sufficient to provide adequate information for the preparation of the RAP. At least two test pits per pond were considered suitable. At least one near surface sample collected from eight representative farms was deemed appropriate, including Farm 9 which was highlighted in historical reports as previously containing hydrocarbon staining around wooden posts.</p> <p>Sample depths</p> <p>NAA (2013) - sample depths collected from the test pits were based on visual and olfactory evidence identified.</p> <p>JBS&G (2017) - Samples were taken at various depths from the test pits based on the lithology encountered, as well as visual or olfactory signs of contamination. Where the potential for ACM was identified, replicate samples were placed in laboratory provided bags for the quantification of asbestos in accordance with the ASC NEPM (as amended 2013). Replicate ACM samples were placed through a 7 mm sieve.</p> <p>JBS&G (2018a) - Soil sample locations were advanced to natural within Farm 19 and the Ponds, with the exception of three locations in Farm 19 which were surface locations only. It is understood this occurred due to time constraints. The surface sampling was considered appropriate for the AECs and COCPs targeted. Soil samples to be collected at regular intervals based upon stratigraphy and EA requirements.</p>	<p>JBS&G (2018) collated the soil data, sampling locations and density of sampling from NAA (2013) and JBS&G (2017) and then identified remaining data gaps associated with AECs. Based on the available information, the analysis focused on a broad spectrum of contaminants which would possibly be present within targeted soils.</p> <p>The Auditor considers the extent of investigation sufficient in combination with an adequately robust surface water and groundwater sampling plan to be implemented as part of the RAP.</p> <p>In the Auditor's opinion, this sampling strategy was appropriate and adequate to characterise the primary material types present on site.</p>

Sampling and Analysis Plan and Sampling Methodology	Auditor's Opinion
<p>Well construction</p> <p>No groundwater wells were installed by NAA (2013), JBS&G (2017 and 2018a).</p> <p>NAA (2013) references three groundwater monitoring bores (GW01 though GW03) that were previously installed at the site, one of which, GW01, was located offsite adjacent Farm 10. Standing water levels within the monitoring wells ranged from 0.15 m to 9.14 m below ground level. No well installation details of the groundwater wells was provided.</p> <p>JBS&G (2018a) note that there have been limited groundwater investigations in the vicinity of the northern dump area. Additional groundwater investigations will be required across the site, particularly in the vicinity of dump areas and transpiration areas. Based on groundwater conditions discussed in previous reports, it is understood that there is perched groundwater located atop of bedrock at the site and proposed groundwater investigations should initially be focused upon perched water above the bedrock.</p> <p>Sample collection method</p> <p>NAA (2013) Samples collected at depth were via an excavator. However the actual method of sample collection was not defined.</p> <p>JBS&G (2017) Samples collected at depth were via an excavator. However the actual method of sample collection was not defined.</p> <p>JBS&G (2018a) Samples collected at depth were via an excavator. Care was taken to collect samples which had not been in contact with plant bucket.</p> <p>The surface and sediment sample collection method from JBS&G (2018a) was not defined.</p> <p><i>Surface Water:</i> eight surface water samples were collected from NAA (2013), however the sample collection method was not defined.</p> <p><i>Groundwater:</i> Groundwater samples were collected from NAA (2013) by disposable bailer.</p> <p>Decontamination procedures</p> <p>NAA (2013) Decontamination methods for soil sampling was not explicitly reported. Although not directly stated it appears that samples may have been collected directly from the excavator. Dedicated sampling equipment (bailer) was used for each well. The decontamination procedure adopted for the water quality meter was not defined.</p> <p>JBS&G (2017) - did not define decontamination procedures.</p> <p>JBS&G (2018a) state soil samples were collected using a clean pair of disposable gloves at each location. Non-disposable equipment were decontaminated between locations using phosphate free detergent, rinsed with deionised water and dried with lint free paper towel.</p> <p>Sample handling and containers</p> <p>NAA (2013) reported samples were chilled during storage and subsequent transport to the laboratories. Samples for asbestos</p>	<p>The groundwater data is considered to remain a data gap. A surface water and groundwater sampling plan detailing the number of wells, sample locations and targeted aquifer/depth should be implemented as part of the RAP.</p> <p>Sample collection from the excavator is considered to be the most appropriate sampling method for the contaminants of concern to adequately assess soil profiles and identify asbestos contamination.</p> <p>Although not directly stated it appears that samples may have been collected directly from the excavator using disposable nitrile gloves.</p> <p>Whilst it is preferable to undertake groundwater sampling using low flow methods, the collection of groundwater samples using a bailer was considered to be acceptable based on the limited number of wells.</p> <p>Some uncertainty surrounds the decontamination procedures for soil, surface water and groundwater sampling where decontamination procedures were not specifically defined for NAA (2013) and JBS&G (2017). The ESA (JBS&G 2018a) undertook a review of the JBS&G (2017) report and stated "Although this is not clearly stated in the report JBS&G can confirm this DQI requirement was met."</p> <p>Some uncertainty exists for the soil sampling conducted by JBS&G (2017) as no details were</p>

Sampling and Analysis Plan and Sampling Methodology	Auditor's Opinion
<p>analysis were placed in plastic zip-lock bags. Groundwater and surface water samples analysed for heavy metals were field filtered.</p> <p>JBS&G (2017) - did not define sample handling methods, storage or transport.</p> <p>JBS&G (2018a) state standard operating procedures for sample collection & handling were applied for all samples. Soil samples were collected into laboratory supplied, clean and unpreserved jars with zero headspace. Samples were placed in an insulated container and chilled using ice.</p> <p>Chain of Custody (COC)</p> <p>Chain of custody forms were not provided in the NAA (2013) and JBS&G (2017) report although the laboratory records having received them. Chain of custody forms and laboratory reports were provided for JBS&G (2018a)</p> <p>Detailed description of field screening protocols</p> <p>Field screening for volatiles was undertaken using a PID for NAA (2013). The soil screening method was not defined.</p> <p>Groundwater and surface water field parameters were measured during groundwater sampling by NAA (2013). Meters were reported to have been calibrated prior to use. Only two measurements were recorded for GW02, at a time of 30 min apart. One measurement was recorded for GW03, this well was purged dry and did not recharge.</p> <p>JBS&G (2017 and 2018a) No soil screening methods were adopted during sampling.</p> <p>Calibration of field equipment</p> <p>Calibration certificates from the equipment supplier were not provided by NAA (2013).</p> <p>JBS&G (2017 and 2018a) No field equipment was used during sampling.</p> <p>JBS&G (2018a) The PID calibration certificate was provided.</p> <p>Sampling logs</p> <p>NAA (2013) Soil logs are provided within the report, indicating sample depth, PID readings and lithology. Groundwater field sampling records were provided, indicating SWL, field parameters and observations.</p> <p>JBS&G (2017) Soil logs are provided within the report, indicating sample depth, ACM fragments and lithology.</p> <p>JBS&G (2018a) Soil logs are provided within the report, indicating sample depth and lithology.</p>	<p>provided to the sample handling, containers or transport of samples to the laboratory.</p> <p>Acceptable – noting, in the absence of the COC for NAA (2013) and JBS&G (2017), a Summary Receipt Notice is provided from the laboratory.</p> <p>No details were provided as to the soil screening approach for NAA (2013). Uncertainty exists for the lack of measurements recorded for GW02 and no reasoning was provided.</p> <p>Acceptable – on the basis the calibration certifications for JBS&G are provided during the validation works.</p> <p>Acceptable</p>

Table 6-3: QA/QC – Field and Lab Quality Assurance and Quality Control

Field and Lab QA/QC	Auditor's Opinion
Field quality control samples	The Auditor agrees with the statement by JBS&G (2018a) regarding lack of trip blanks/spikes and

Field and Lab QA/QC	Auditor's Opinion
<p>NAA (2013): Collected six soil intra-laboratory replicate samples undertaken at a frequency of 10%. One water intra-laboratory replicate sample was undertaken at a frequency of 9%.</p> <p>No trip blanks or spikes were analysed. This was not considered to affect the usability of the data since no volatile compounds (BTEX and TPH C₆-C₉) were detected in the other soil samples analysed.</p> <p>Wash blanks were not required since the majority of sampling involved dedicated sampling equipment used for each location.</p> <p>Inter-laboratory replicates were not collected, however Eurofins MGT are NATA accredited to ISO17025 (Accreditation No 1261). The results were found to be acceptable.</p> <p>JBS&G (2017): No field QA/QC samples were collected.</p> <p>JBS&G (2018a) state that lack of trip blanks or spikes for the JBS&G (2017) and NAA (2013) is considered to be acceptable based upon the focus of the investigation (i.e. asbestos), noting no evidence of volatile contamination was detected and field quality assurance controls to minimise volatile loss were implemented.</p> <p>JBS&G (2018a) state that the lack of duplicates and triplicates is not considered to represent a critical issue considering that the majority of the data obtained pertains to the visual evidence of asbestos contamination, with relatively minor analysis for other contaminants. The limited data collected for other contaminants is considered to be consistent with what may reasonably be expected based upon NAA (2013) and this assessment. As such, the lack of duplicate/triplicates is not considered to represent a critical issue.</p> <p>JBS&G (2018a): Field duplicates and triplicates were collected at a rate greater than 1/20 in accordance with the DQI. One trip spike and blank was submitted to the laboratory. This is not in accordance with DQI requirement of one per sampling event. One field blank was collected as part of the investigation.</p> <p>Field quality control results</p> <p>NAA (2013): RPDs for the intra-laboratory soil replicate samples ranged from 0% to 190%. All primary sample results reported higher concentrations than the replicate sample with the exception of phosphorous which was reported higher in the duplicate sample. No QA/QC assessment was made in regards to using the highest result from the primary/duplicate sample.</p> <p>JBS&G (2017): No QA/QC assessment was completed.</p> <p>JBS&G (2018a): RPDs for duplicate and triplicate soil replicate sample included general metal exceedances within most duplicate/triplicate samples, with isolated nitrogen derivatives and TRH fractions split duplicates. Based on heterogeneity in the soil samples, and the fact that none of the recorded results (primary or duplicate) exceeded the adopted health-based criteria, these elevated RPDs are not considered to affect the validity or quality of the sampling program.</p>	<p>field duplicates/triplicates completed by NAA (2013) and JBS&G (2017).</p> <p>The Auditor agrees with JBS&G (2018a) that a representative trip blank/spike and field blank was analysed from the investigation. The reduced frequency of trip spikes /blanks is not considered to affect the reliability of the data. No DQIs were set for field blanks, however one sample was collected as part of the investigation.</p> <p>The Auditor notes that an elevated RPD for zinc for TTP20_0.0_0.1/QC08a was reported. The primary sample was above the site EILs. Reference should be made that the higher concentration (primary) was used for site assessment.</p> <p>Overall, in the context of the dataset reported, the elevated RPD results are not considered significant and the field quality control results are acceptable.</p>

Field and Lab QA/QC	Auditor's Opinion
<p>NATA registered laboratory and NATA endorsed methods</p> <p>Laboratories used included: Eurofins mgt and Envirolab. Laboratory certificates were NATA stamped. Thermotolerant Coliforms (JBS&G 2018a) NATA accreditation does not cover the performance of this service in soil matrices.</p> <p>Analytical methods</p> <p>NAA (2013) Analytical methods were included in the laboratory test certificates. Eurofins MGT provided brief method summaries of in-house NATA accredited methods used based on USEPA and/or APHA methods (excluding asbestos) for extraction and analysis in accordance with the NEPM (2013).</p> <p>Asbestos identification was conducted by LRM Global using Stereo Microscope and selected fibres were analysed by Polarized Light Microscopy in conjunction with Dispersion Staining Method.</p> <p>JBS&G (2017) No field QA/QC samples were collected.</p> <p>JBS&G (2018a) Analytical methods were included in the laboratory test certificates. Eurofins MGT provided brief method summaries of in-house NATA accredited methods used based on USEPA and/or APHA methods for extraction and analysis in accordance with the NEPM (2013). Envirolab provide brief method summaries for each analysis.</p> <p>Asbestos identification was conducted by Eurofins MGT using Stereo Microscope and selected fibres were analysed by Polarized Light Microscopy in conjunction with Dispersion Staining Method in accordance with AS4964-2004, Western Australia Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia, 2009 and the NEPM (2013).</p> <p>Holding times</p> <p>NAA (2013) Review of the COCs and laboratory certificates indicate that the holding times had been met.</p> <p>JBS&G (2017) Total coliforms - Microbiological Testing performed outside the recommended holding time</p> <p>JBS&G (2018a) state that the DQI requirement met, with the exception of some microbiological testing which was outside holding time by between 2 days. Review of the COCs and laboratory certificates indicate that the holding times had been met.</p> <p>Practical Quantitation Limits (PQLs)</p> <p><i>Soil:</i> PQLs (except asbestos) were less than the threshold criteria for the contaminants of concern.</p> <p><i>Asbestos:</i> The limit of detection for asbestos in soil was 0.01% w/w.</p> <p><i>Groundwater:</i> The following trigger values were less than the PQLs:</p> <p>Anthracene 0.01µg/L, trigger value 0.01 µg/L</p>	<p>Acceptable</p> <p>The analytical methods are considered acceptable for the purposes of the site audit, noting that the AS4964-2004 is currently the only available method in Australia for analysing asbestos. DOH (2009) and enHealth (2005) state that "until an alternative analytical technique is developed and validated the AS4964-2004 is recommended for use".</p> <p>Acceptable</p> <p><i>Soil (except asbestos):</i> Overall the soil PQLs are acceptable.</p> <p><i>Asbestos:</i> In the absence of any other validated analytical method, the detection limit for asbestos is considered acceptable. A positive result would be considered to exceed the "no asbestos detected in soil" criteria, providing this is applied within a weight of evidence approach to assess the significance of the exceedance,</p>

Field and Lab QA/QC	Auditor's Opinion
<p>Laboratory quality control samples</p> <p>NAA (2013) Laboratory quality control samples including laboratory control samples, matrix spikes, surrogate spikes, blanks, internal standards and duplicates were undertaken by the laboratory.</p> <p>JBS&G (2017) Laboratory quality control samples including laboratory control samples, matrix spikes, surrogate spikes, blanks, internal standards and duplicates were undertaken by the laboratory.</p> <p>JBS&G (2018a) Laboratory quality control samples including laboratory control samples, matrix spikes, surrogate spikes, blanks, internal standards and duplicates were undertaken by the laboratory. JBS&G (2018a) state that surrogate spikes were not completed for this analysis. Based on the analytes of concern this is deemed acceptable and does not pose a risk to the quality of the analysis.</p> <p>Laboratory quality control results</p> <p>NAA (2013) The results of laboratory quality control samples were generally within appropriate limits, with the following exceptions:</p> <p>RPDs for some metals were above the 30% RPD. The RPD reported passes Eurofins mgt's Acceptance Criteria as stipulated in SOP 05.</p> <p>Surrogate recoveries for twenty two PAHs - p-Terphenyl-d14 (surr.) were below 70%. Remaining matrix spikes were within control limits.</p> <p>JBS&G (2017) No QA/QC assessment was completed.</p> <p>JBS&G (2018a) The results of laboratory quality control samples were generally within appropriate limits, with the following exceptions:</p> <p>Surrogate spikes were not performed for this analysis.</p> <p>Method blank results were below laboratory reporting limits.</p> <p>No potentially significant recovery issues were identified for LCS.</p> <p>All matrix spike recoveries were within the acceptable range, with the exception of chromium (127%) (in report 609429-S), chromium (132%) and zinc (179%) (in report 609672-S). As these samples met the LCS requirement, it was attributed to matrix interference, and does not pose a risk to the quality of the analysis.</p> <p>DQI requirement generally met. RPDs were within acceptable limits,</p> <p>with the exception of:</p>	<p>accounting for the history of the site and frequency of the occurrence.</p> <p><i>Groundwater:</i> The PQL equalled the trigger value and does not materially affect the outcome of the audit.</p> <p>Acceptable.</p> <p>The Auditor notes that the laboratory completed surrogate spikes for the analysis which have not been detailed by JBS&G (2018a).</p> <p>The under-recovery of PAH surrogates is not considered to affect the usability of the data for NAA (2013).</p> <p>Review of the surrogate recoveries for JBS&G (2017) indicated the recoveries are within the DQI limits with the exception of the following:</p> <p>Eight samples reported under recovery of 4-Bromofluorobenzene (BTEx). The under recovery of the BTEx surrogate is not considered to affect the usability of the data.</p> <p>Review of the surrogate recoveries for JBS&G (2018a) indicated the recoveries are within the DQI limits with the exception of the following:</p> <p>23 samples reported under or over recovery for 4-Bromofluorobenzene (surr.)</p> <p>11 samples reported under or over recovery for p-Terphenyl-d14 (surr.)</p> <p>2 samples reported under or over recovery for Dibutylchlorendate (surr.)</p> <p>2 samples reported under or over recovery for Tetrachloro-m-xylene (surr.)</p> <p>25 samples reported under or over recovery for 2-Fluorobiphenyl (surr.)</p> <p>5 samples reported under or over recovery for Dibutylchlorendate (surr.)</p> <p>1 sample reported under or over recovery for Tetrachloro-m-xylene (surr.) 1</p>

Field and Lab QA/QC	Auditor's Opinion
<p>Arsenic and TRH C29-C36 duplicates in lab report 609672-S. These exceedances were found to be within the Eurofins acceptance criteria, or were found to be caused by heterogeneity within the material tested.</p> <p>TRH C10-C14, Anthracene, Benz(a)anthracene, Benzo(a)pyrene, Chrysene, Fluoranthene, Fluorene, Phenanthrene, and Pyrene duplicates in lab report 611092-S. These exceedances were found to be within the Eurofins acceptance criteria</p> <p>Data Quality Indicators (DQI) and Data Evaluation (completeness, comparability, representativeness, precision, accuracy)</p> <p>NAA (2013) DQIs were set for sampling methods and standard operating procedures with regard to the five category areas. Predetermined data quality indicators (DQIs) were set for laboratory analyses including blanks, replicates, duplicates, laboratory control samples, matrix spikes, surrogate spikes and internal standards.</p> <p>JBS&G (2017) did not define DQIs and did not undertake a formal QA/QC data evaluation against the five category areas.</p> <p>JBS&G (2018a) DQIs were set for sampling methods and standard operating procedures with regard to the five category areas. Predetermined data quality indicators (DQIs) were set for laboratory analyses including blanks, replicates, duplicates, laboratory control samples, matrix spikes, surrogate spikes and internal standards.</p>	<p>1 sample reported under or over recovery for Surrogate aaa-Trifluorotoluene from Envirolab</p> <p>The Auditor considers that the majority of the surrogate recoveries were only marginally outside the DQI limits and is unlikely to have significantly affected the quality of the data. The Auditor considers the data is reliable for the purpose of the assessment.</p> <p>An assessment of the data quality with respect to the five category areas has been undertaken by the auditor and is summarised below.</p>

6.1 Auditor's Opinion

In considering the data as a whole the Auditor concludes that:

- While data is likely to be representative of the overall conditions NAA (2013) and JBS&G (2017) there is some uncertainty in the data set due to an absence of supporting information. Descriptions of sampling methods are not provided, calibration certificates are not provided and there is no discussion on how PID results were used.
- There is limited degree of confidence that data is comparable for each sampling and analytical event, based on the limited QA/QC assessment completed by NAA (2013) and lack of any QA/QC assessment completed by JBS&G (2017).
- While most of the data is likely to be accurate, there is some doubt regarding possible loss of volatiles from sampling by NAA (2013) and JBS&G (2017). This is because no trip spikes were used, although samples were recorded as having been received at the primary laboratory in good (chilled) condition and within holding times for these analytes.
- However, there is a high degree of confidence from the JBS&G (2018a) report that the data provided sufficient information to conclude that data is of sufficient precision and accuracy.

The Auditor considers that data collected prior to 2018 is considered to have some uncertainty due to an absence of information supporting the quality assurance and controls completed. This uncertainty has been considered by the Auditor when considering the data set and conceptual site model.

7. ASSESSMENT CRITERIA

Assessment criteria are the concentrations of a contaminant above which further appropriate investigation and evaluation will be required, and provide the basis of a Tier 1 risk assessment. As defined in NEPC (2013), a Tier 1 risk assessment is a risk-based analysis comparing site data against generic assessment criteria for various land uses to determine the need for further assessment or development of an appropriate management strategy.

Assessment criteria are developed for the protection of human health and ecological receptors, for a range of media including soil, groundwater and soil gas. It is important to understand the methodology and assumptions used to derive the criteria to ensure they are applied correctly and are sufficiently protective of either human health or ecological receptors under the site's specific use.

7.1 Site Land Use and Assessment Criteria

When choosing the most appropriate human health assessment criteria for the site, the Auditor has considered the form of the proposed development and the zoning areas of the site (Section 2.2). The human health assessment criteria adopted for this Audit are therefore considered to be protective of 'commercial/industrial and recreational' land use.

Although the protection of human health often drives the first stages of a site assessment, NEPC (2013) requires that all site assessments considers the protection of the environment (terrestrial and aquatic receptors). Given the proposed area zoned Environmental Conservation Zone (E2), it is considered that the site contains receptors of 'ecological significance'. Therefore, the Auditor adopted ecological assessment criteria appropriate for 'areas for ecological significance' for the area zoned Environmental Conservation Zone (E2) and 'commercial/industrial' land use for the area zoned light industrial (IN2).

The assessment criteria adopted for the protection of human health and ecological receptors are outlined in **Section 7.2** and **Section 7.3**, respectively.

7.2 Human Health Assessment Criteria

7.2.1 Soil Assessment Criteria – Human Health

The Auditor has adopted soil assessment criteria protective of human health from the following Australian sources:

- NEPM (2013) Health Investigation Levels (HILs) for non-volatile soil compounds for 'Recreational' / 'Commercial/Industrial' (HIL- C/D) land use.
- NEPM (2013) Health Screening Levels (HSLs) for TRH, BTEX and naphthalene compounds for 'Recreational' / 'Commercial/Industrial' (HIL-/C/D) land use, for the vapour inhalation pathway. The HSLs assumed a sand soil type.
- NEPM (2013) Management Limits for Petroleum Hydrocarbons for 'Commercial/Industrial' land use and assuming coarse soil texture. Criteria are relevant for operating sites where significant sub-surface leakage of petroleum hydrocarbons has occurred and when decommissioning industrial and commercial sites.
- NEPM (2013) HSLs for Asbestos Contamination in Soil. Criteria applicable for 'Recreational' / 'Commercial/Industrial' (HSL- C/D) land use were adopted. Or presence/absence of asbestos.
- Friebe & Nadebaum (2011) HSLs for direct contact for all land use categories, and vapour inhalation/direct contact pathways for intrusive maintenance workers.
- NSW EPA (2000) Environmental Guidelines: Use and Disposal of Biosolids Products.

Soil Aesthetic Considerations

The Auditor has considered the need for soil remediation based on 'aesthetic' contamination as outlined in *Section 3.6 Aesthetic Considerations* of NEPM (2013) Schedule B1, which acknowledges that there are no chemical-specific numerical aesthetic guidelines. Instead, site

assessment requires a balanced consideration of the quantity, type and distribution of foreign material or odours in relation to the specific land use and its sensitivity.

7.2.2 Groundwater Assessment Criteria – Human Health

NEPM (2013) recognises drinking-water guidelines as relevant groundwater investigation levels for the assessment of human health issues at the point of abstraction. Relevant drinking-water guidelines include:

- NHMRC (2011) *National Water Quality Management Strategy, Australian Drinking-Water Guidelines 6, Version 3.4 Updated October 2017*.
- WHO (2017) *Guidelines for Drinking-water Quality, Fourth Edition*, incorporating the 1st addendum.
- WHO (2008) *Petroleum Products in Drinking-water. Background document of WHO Guidelines for Drinking-water Quality* (adopted in absence of health-based criteria in WHO (2017) because the taste and odour of petroleum products will in most cases be detectable at concentrations below those of health concern).
- USEPA RSLs Residential Tap Water Criteria. Online database of assessment criteria that are current as of May 2018. Tap water assessment criteria derived for carcinogenic compounds were multiplied by a factor of 10 to adjust the target cancer risk level from 1:1,000,000 to 1:100,000 to be consistent with Australia's recommended target cancer risk level. For some chemicals, where a criteria has been derived using both non-cancer and cancer toxicity data, the lower criteria was adopted.

The above drinking water guidelines were derived assuming a human will ingest 2 L of water per day. Therefore, application of these drinking-water guidelines are overly conservative when groundwater is not used as the primary source of drinking-water, and exposure is assumed to occur incidentally during activities such as irrigation, swimming and/or maintenance of sumps/pipelines. In these situations, the Auditor adjusted the drinking-water guideline by a factor of 10 to account for incidental ingestion in accordance with NHMRC (2008) recommendations provided in Section 9.3.2 of the *Guidelines for Managing Risks in Recreational Water*. This adjustment only accounts for a reduced intake of groundwater, and therefore can only be applied to criteria derived based on health considerations and cannot be applied to criteria derived for aesthetic reasons (e.g. copper). The adjustment should also not be applied to volatile compounds (e.g. benzene) where inhalation is the primary pathway of concern. Where a 'health-based' and an 'aesthetic-based' criteria is provided, the 'health-based' criteria was adopted.

Table 7-1 presents the groundwater assessment criteria that were adopted by the Auditor for consideration of the potential human health risks.

Table 7-1: Groundwater Assessment Criteria – Human Health (Incidental Ingestion)

Chemical of Concern in Groundwater	Assessment Criteria (mg/L)	Source
Petroleum Hydrocarbons		
Benzene	0.001	NHMRC (2011)
Toluene	0.8	NHMRC (2011)
Ethylbenzene	0.3	NHMRC (2011)
Xylenes (total)	0.6	NHMRC (2011)
Naphthalene	0.0061	USEPA RSL (2018), threshold value adopted
1,2,4-trimethylbenzene	0.056	USEPA RSL (2018)
1,3,5-trimethylbenzene	0.06	USEPA RSL (2018)
Phenanthrene	0.12	USEPA RSL (2018)
Fluorene	0.29	USEPA RSL (2018)

TPH C ₆ -C ₉ aliphatic	15	WHO (2017)
TPH C ₆ -C ₉ aromatic	0.001	WHO (2017), value for benzene
TPH >C ₁₀ -C ₁₆ aliphatic	0.3	WHO (2017)
TPH C ₁₀ -C ₁₆ aromatic	0.09	WHO (2017)
TPH >C ₁₆ -C ₄₀ aliphatic	30	WHO (2017), adjusted for incidental ingestion (non-volatile)
TPH >C ₁₆ -C ₄₀ aromatic	9	WHO (2017), adjusted for incidental ingestion (non-volatile)
Metals		
Arsenic (V)	0.1	NHMRC (2011)
Cadmium ^K	0.02	NHMRC (2011)
Chromium (VI) ^J	0.5	NHMRC (2011)
Copper	20	NHMRC (2011)
Lead	0.1	NHMRC (2011)
Nickel	0.2	NHMRC (2011)
Zinc		NHMRC (2011)
OCPs		
Heptachlor	0.003	NHMRC (2011)
Endosulfan sulfate	0.2	NHMRC (2011)
4,4' -DDT	0.09	NHMRC (2011)
Methoxychlor	3	NHMRC (2011)
^ Total Chlordane (sum)	0.02	NHMRC (2011)
^ Sum of Aldrin + Dieldrin	0.003	NHMRC (2011)
PAHs		
Benzo(a)pyrene	0.0001	NHMRC (2011)
Nutrients		
Ammonia	0.5 ^I	NHMRC (2011) adjusted for incidental ingestion (aesthetic)
Nitrate	500	NHMRC (2011)
Nitrite	30	NHMRC (2011)
Total Phosphorous	-	

7.3 Ecological Assessment Criteria

7.3.1 Soil Assessment Criteria – Ecological

The Auditor has adopted ecological soil assessment criteria from the following Australian sources:

- NEPM (2013) Ecological Screening Levels (ESLs) for 'Areas of Ecological Significance' / 'Commercial/Industrial' land use, assuming coarse soil except for xylenes as fine soil was adopted (the lowest of the two soil textures).
- NEPM (2013) Ecological Investigation Levels (EILs) for 'Areas of Ecological Significance' / 'Commercial/Industrial' land use. Site specific EILs have been derived using the Interactive (Excel) Calculation Spreadsheet provided in the ASC NEPM Toolbox assuming the contamination is "aged", no lead background concentrations, low traffic volume and using site specific % clay content, pH and cation exchange capacity (CEC) values. The pH, % clay content and CEC values adopted for the upper soil layers were an average pH of 5.1 (range 4 to 5.8), CEC of 21 cmolc/kg (range 11 to 47), and % clay of 19% (range 2.5 to 30).

7.3.2 Groundwater Assessment Criteria – Ecological

The Auditor has adopted ecological groundwater assessment criteria from the following Australian sources:

- ANZECC (2000) *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*. Trigger values (TVs) provided are concentrations that, if exceeded, indicate a potential

environmental problem at the point of use and 'trigger' further investigation. The fresh water 95% level of protection was adopted. Where the chemical is considered to bioaccumulate, the 99% level of protection was adopted.

7.4 Sediments

The Auditor has assessed the sediment data against the ANZECC (2000) sediment quality guidelines in accordance with the decision tree in Figure 3.5.1 of these guidelines. ANZECC (2000) provides Interim Sediment Quality Guideline (ISQG)-Low (less than 10% probability of effects) and ISQG-High concentrations (> 50% probability of effects). The criteria apply to 'slightly to moderately' and highly disturbed ecosystems.

The ANZECC (2000) assessment uses a decision process where:

- the concentrations are initially compared to the ISQG low concentrations; if above these
- the concentrations are compared to background sediment concentrations; if above these
- factors controlling bioavailability need to be considered before the process continues (factors include solid phase speciation and pore water concentration).

Given that bioavailability studies have not been completed, where the concentrations detected are above the ISQG-low values, it is not possible to reach a conclusion about the risk to the ecosystem using the ANZECC (2000) guidelines.

7.5 Consultants Assessment Criteria

The environmental quality criteria referenced by the Auditor are consistent with those adopted in previous investigations with the exception of the following:

- NAA (2013) reference the ANZECC (2000) TV for mercury of 0.6 µg/L (95% protection of freshwater ecosystems) rather than 0.06 µg/L (99 % protection due to the potential for bio-accumulation or acute toxicity to particular species).
- NAA (2013) reference the ANZECC (2000) TV for arsenic of 37µg/L (III + V) (95% protection of freshwater ecosystems) rather than the lowest of the two TVs.
- JBS&G (2018a) do not include consideration of EILs for the E2 zoned land or HILs for recreational land use in the E2 land.
- JBS&G (2018a) calculated EILs for commercial and industrial land use that were different to those calculated by the Auditor.

Given the results obtained and comparison of the guidelines used, the Auditor considers that these discrepancies do not affect the overall conclusions reached in the ESA and by the Auditor.

8. EVALUATION OF SOIL ANALYTICAL RESULTS

Soil samples were analysed for a variety of contaminants including petroleum hydrocarbons, PAHs, total PCBs, OCPs, nitrogen species, e.coli, total coliforms, asbestos and heavy metals. The results have been assessed against the environmental quality criteria and are summarised in **Table 8-1**.

Table 8-1: Evaluation of Soil Analytical Results – Summary Table (mg/kg) Commercial/Industrial

Analyte	N	Detections	Maximum	n > Human Health Screening Criteria (NEPM, 2013)	n > Terrestrial Ecological Screening Criteria (NEPM, 2013)
Asbestos	78	45	0	19	0
As	132	124	35	0	0
Cd	132	19	1.1	0	0
Cr	132	116	68	0	0
Cu	132	106	190	0	3
Pb	132	128	54	0	0
Hg	132	5	2.8	0	0
Ni	132	111	220	0	1
Zn	132	129	2300	0	18
TPH C6-C9	72	0	<PQL	0	0
TPH C10-C36	132	86	737	0	0
F1	132	0	<PQL	0	0
F2	132	60	640	0	2
F3	132	79	4900	0	1
F4	132	58	290	0	0
Benzene	132	0	<PQL	0	0
Toluene	132	0	<PQL	0	0
ethylbenzene	132	2	0.2	0	0
Xylenes	132	6	2.1	0	0
PAHs	132	4	7.4	0	0
B(a)P	132	0	<PQL	0	0
TOTAL PCBs	8	0	<PQL	0	0
OCPs	41	0	<PQL	0	0
Ammonia	9	7	3400	0	0
Nitrate	9	6	0.3	0	0
Nitrite	9	0	<PQL	0	0
Nitrate + Nitrite	41	8	49	0	0
Phosphorous	9	6	19000	0	0
TKN	50	50	11000	0	0
TN	44	44	11000	0	0
E.Coli	47	13	170	0	0
Total Coliforms	52	31	24000	11	0
n	number of samples				
-	No criteria available/used				
NL	Non-limiting				
<PQL	Less than the practical quantitation limit				

Table 8-2: Evaluation of Soil Analytical Results – Summary Table (mg/kg) Recreational and Areas of Ecological Significance

Analyte	N	Detections	Maximum	n > Human Health Screening Criteria (NEPM, 2013)	n > Terrestrial Ecological Screening Criteria (NEPM, 2013)
Asbestos	78	45	0	19	0
As	132	124	35	0	0
Cd	132	19	1.1	0	0
Cr	132	116	68	0	1
Cu	132	106	190	0	8
Pb	132	128	54	0	0
Hg	132	5	2.8	0	0
Ni	132	111	220	0	7
Zn	132	129	2300	0	24
TPH C6-C9	72	0	<PQL	0	0
TPH C10-C36	132	86	737	0	0
F1	132	0	<PQL	0	0
F2	132	60	640	0	4
F3	132	79	4900	0	0
F4	132	58	290	0	0
Benzene	132	0	<PQL	0	0
Toluene	132	0	<PQL	0	0
ethylbenzene	132	2	0.2	0	0
Xylenes	132	6	2.1	0	0
PAHs	132	4	7.4	0	0
B(a)P	132	0	<PQL	0	0
TOTAL PCBS	8	0	<PQL	0	0
OCPs	41	0	<PQL	0	0
Ammonia	9	7	3400	0	0
Nitrate	9	6	0.3	0	0
Nitrite	9	0	<PQL	0	0
Nitrate + Nitrite	41	8	49	0	0
Phosphorous	9	6	19000	0	0
TKN	50	50	11000	0	0
TN	44	44	11000	0	0
E.Coli	47	13	170	0	0
Total Coliforms	52	31	24000	11	0

n number of samples
- No criteria available/used
NL Non-limiting
<PQL Less than the practical quantitation limit

Table 8-3: Evaluation of Sediment Analytical Results – Summary Table (mg/kg)

Analyte	N	Detections	Maximum	n > ANZECC/ARMCANZ (ISQG-Low) Sediment Guidelines
TRH C6-C10 less BTEX (F1)	5	0	<20	0
TRH >C10-C16 less naphthalene (F2)	5	0	<50	0
TRH >C16-C34	5	0	<100	0
TRH >C34-C40	5	0	<100	0
Benzene	5	0	<0.1	0
Toluene	5	0	<0.1	0
Ethylbenzene	5	0	<0.1	0
m-p xylene	5	0	<0.2	0
o-xylene	5	0	<0.1	0
Total xylene	5	0	<0.3	0
Naphthalene	5	0	<0.5	0
Benzo(a)pyrene	5	0	<0.5	0
Total PAHs	5	0	<0.5	0
Anthracene	5	0	<0.5	0
Fluoranthene	5	0	<0.5	0
Phenanthrene	5	0	<0.5	0
Ammonia				
Nitrite				
Total Nitrogen	3	3	1600	0
Total Phosphorous	3	3	1500	0
Arsenic	5	5	15	0
Cadmium	5	0	<0.4	0
Chromium	5	5	42	0
Copper	5	5	23	0
Lead	5	5	28	0
Mercury	5	0	<0.1	0
Nickel	5	5	34	5
Zinc	5	5	75	0
TRH C6-C10 less BTEX (F1)	5	0	<20	0
TRH >C10-C16 less naphthalene (F2)	5	0	<50	0
TRH >C16-C34	5	0	<100	0

8.1 Auditor's Opinion

In the Auditor's opinion, the soil and sediment analytical results are consistent with the site history and field observations. **Table 8-1,**

Table 8-2 and

Table 8-3 shows that soil impacts are limited to some exceedences of the human health criteria for asbestos and total coliforms and the ecological criteria for hydrocarbons and metals. Other potential contaminants of concern were low and below site acceptable criteria.

9. EVALUATION OF GROUNDWATER ANALYTICAL RESULTS

9.1 Groundwater Analytical Results

Three groundwater samples and eight surface water samples were collected during the site investigation completed by NAA (2013). The analytical results are summarised below in **Table 9-1**.

Table 9-1: Summary of Maximum Groundwater Investigation Analytical Results (mg/L)

Analyte	n	Detections	Maximum	n > HSL C or D sand, 2-<4 m NEPM (2013)	n > GILs Fresh NEPM (2013) or ANZECC Fresh (2000)
TRH C6-C10 less BTEX (F1)	7	2	30	0	0
TRH >C10-C16 less naphthalene (F2)	7	0	0	0	0
TRH >C16-C34	7	1	100	0	0
TRH >C34-C40	7	0	0	0	0
Benzene	7	0	0	0	0
Toluene	7	2	2	0	0
Ethylbenzene	7	0	0	0	0
m-p xylene	7	0	0	0	0
o-xylene	7	0	0	0	0
Total xylene	7	0	0	0	0
Naphthalene	7	0	0	0	0
Benzo(a)pyrene	7	0	0	0	0
Total PAHs	7	0	0	0	0
Anthracene	7	0	0	0	0
Fluoranthene	7	0	0	0	0
Phenanthrene	7	0	0	0	0
Ammonia	11	9	3500	0	0
Nitrite	11	3	1700	0	0
Total Nitrogen	11	11	32000	0	0
Total Phosphorous	11	11	34000	0	0
Arsenic	7	6	5	0	0
Cadmium	7	0	0	0	0
Chromium	7	0	0	0	0
Copper	7	2	4	2	0
Lead	7	0	0	0	0
Mercury	7	3	0.4	0	0
Nickel	7	7	14	1	0
Zinc	7	6	47	6	0

n number of samples
- No criteria available/used

9.2 Auditor's opinion

In the Auditor's opinion surface water and groundwater data is consistent with the soil analytical data and the historical site information. The Auditor notes that the investigation of soil and groundwater is limited and further evaluation of the significance is presented in **Section 10**.

10. EVALUATION OF CONCEPTUAL SITE MODEL

A conceptual site model (CSM) is a representation of the source, pathway and receptor linkages at a site. JBS&G has developed a CSM and has used the CSM iteratively throughout the site assessment to inform decisions around investigation and management requirements. The CSM was initially developed following the preliminary investigations and was revised following those investigations. **Table 10-1** provides the Auditors review of the final CSM used by JBS&G to inform further investigation and remediation options.

Table 10-1: Review of the Conceptual Site Model

Element of CSM	Consultant	Auditor Opinion
Contaminant source and mechanism	Fill material used for levelling and backfilling, demolition materials, burial pits for animal carcass, petroleum storage and use, transpiration areas and runoff, dam sediments, operation of the incinerator and the spreading of ash, timber pole preservation, use of diesel and formaldehyde as a disinfectant	The auditor agrees with the contaminant source and mechanisms for transport identified
Affected media	Fill, natural soils, sediment in dams, surface water and groundwater	The auditor agrees with the affected media identified.
Receptor identification	Future site workers and temporary occupants of the site; construction and maintenance workers; current and potential future mining workers below and surrounding the site; surrounding users of groundwater; terrestrial and aquatic flora and fauna	The auditor agrees with the receptors identified.
Exposure pathways	Dermal, ingestion and inhalation are identified as the exposure pathways	
Presence of preferential pathways for contaminant movement	Lower permeability backfill materials and trenching for services have been identified as potential preferential pathways. Perched groundwater over bedrock was also identified.	The auditor agrees with the preferential pathways identified The potential for ground gas is noted in the remediation strategy and addressed through evaluation of malodorous materials
Evaluation of data gaps	JBS&G identified a number of data gaps associated with the density of sampling undertaken at the site. 196 test pits have been completed on the 220 Ha site, representing 8% of the required systematic sampling density. JBS&G identified data gaps that were critical to inform the RAP, and data gaps that could be resolved prior to remediation. These gaps were identified based on a combination of historical site	The Auditor agrees that all data gaps critical to information the RAP have been addressed. The Auditor considers that the remaining data gaps represent variability in the extent of remediation, however are not related to uncertainty as the likely location and nature of contaminants is sufficiently known. JBS&G has outlined subsequent sampling programs for further works

Element of CSM	Consultant	Auditor Opinion
	information, existing sampling, and the sampling density proposed.	to be completed prior to remediation stages commencing.

10.1 Auditor's Opinion

The Auditor is of the opinion that the CSM is a reasonable representation of the contamination at the site. The CSM developed is considered an adequate basis for assessing remedial requirements. The Auditor notes that the presence of contamination, and in particular asbestos containing materials, may be randomly distributed and that sampling in accordance with sampling design guidelines on a site of this size and history is unlikely to provide greater clarity on the extent of remediation. The Auditor considers this data gap to be related to variability in the extent of contamination, rather than uncertainty on the type of contamination or the suitability of the remediation design.

The Auditor also notes that sampling of surface water and groundwater is limited. The Auditor considered that the risk of contamination to surface water and groundwater is low based on the soil analytical results. However, notes that groundwater contamination could occur coincident with deep biological burial pits. The Auditor is satisfied that this data gap can be addressed as part of remediation works in the event that deep burial pits are encountered.

Further data gap sampling is proposed by the consultant prior to remediation. The Auditor agrees with the detailed sampling proposed however notes that remediation is to be undertaken in five development stages that are likely to occur over several years. The Auditor should review each SAQP for subsequent land parcels prior to sampling and ensure that the sampling plan incorporates any relevant observations from preceding remediation works thereby allowing for continual improvement of investigation and remediation methods.

11. EVALUATION OF REMEDIATION

11.1 Remediation Required

Based on the investigations previously completed the contaminants of concern that require remediation have been summarised in **Table 11-1**.

Remedial works are proposed following removal demolition of the remainder of the buildings. Remedial works will be undertaken concurrent with site development which involves tree removal and significant cut to fill. The remediation strategy is excavation and consolidation of asbestos impacted materials and soils within an onsite containment cell combined with treatment of odorous and biologically impacted materials followed by their re-use or containment. Non-contaminated building rubble will be exported from the site to a recycling facility. To facilitate site development, dams will be dewatered and sediment may be removed. The containment cell will comprise a hardstand or 0.5m of clean imported fill underlain with a marker layer. A materials management plan incorporating material segregation is proposed during remediation works to manage contaminants encountered and minimise risk of cross-contamination.

An unexpected finds protocol and a program of sampling to address data gaps is included in the RAP that will address soil and groundwater underlying current buildings and structures. These are discussed in **Table 11-2**.

Table 11-1: Remediation Required and Preferred Options

Description	Extent of Remediation Required	Preferred Options
Asbestos Containment Materials within soils	Lateral: associated with former building footprints Vertical: near surface however could occur in isolated burial areas	Containment cell
Possible hydrocarbon, nutrient and bacterial impacted and malodorous soils	Lateral: Not identified Vertical: potentially buried at depth	Treatment and on-site reuse or containment
Waste material and aesthetic impacts	Lateral: varied Vertical: shallow however could occur in isolated burial areas	Excavation and transport off site for recycling

The Auditor has assessed the RAP by comparison with the checklist included in OEH (2011) *Guidelines for Consultants Reporting on Contaminated Sites*. The RAP was found to address the required information, as detailed in **Table 11-2**, below.

Table 11-2: Evaluation of Remedial Action Plan

Remedial Action Plan	Auditor Comments
<p><i>Remedial Goal</i> That the site is suitable for the proposed development of commercial/industrial land and ecological zone.</p> <p><i>Discussion of the extent of remediation required</i> Remediation required for each area was discussed within the RAP (See Table above)</p> <p><i>Remedial Options</i> Remedial options were assessed and included on site and offsite treatment, removal to an offsite containment cell, or retain onsite in an onsite containment cell.</p> <p><i>Selected Preferred Option</i> Preferred option was discussed within the RAP (refer sections above)</p> <p><i>Rationale</i> JBS&G provided justification for the selection of the preferred option.</p>	<p>In the Auditor's opinion, this goal is considered appropriate.</p> <p>The remediation extent applies to all E2 and IN2 land, however excludes the E4 land.</p> <p>The Auditor considers that a range of options were considered.</p> <p>The Auditor considers the preferred option and the rationale provided to be appropriate. The Auditor notes that the preferred strategy may not be directly applicable to the E2 land where large scale excavation is not proposed for development.</p>

Remedial Action Plan	Auditor Comments
<p>Containment</p> <p>The requirement for long term management of an onsite containment cell is included.</p> <p>Proposed Validation Criteria</p> <p>Validation criteria comprise NEPM for industrial/commercial land use and EILs for areas of ecological significance in E2 land; NSW EPA <i>Use and Disposal of Biosolid Products</i> for bacterial constituents. Criteria for surface water and groundwater may be included if contamination is identified in subsequent testing.</p> <p>Proposed Validation Testing</p> <p>Excavation: samples will be collected at a rate of 1 per 25 m² across each excavation floor, 1/5m from each soil horizon on walls</p> <p>Imported Material: to be demonstrated as VENM</p> <p>Waste Classification for offsite disposal: 1 per 25m³ with a minimum 3 samples per stockpile where the stockpile is less than 75 m³</p> <p>Sampling and Analytical Quality Plan</p> <p>The RAP outlines a SAQP to be implemented to further investigation site conditions in order to refine the remediation requirements. The SAQP includes a DQO process.</p> <p>Interim Site Management Plan (before remediation)</p> <p>JBS&G to not include discussion on interim management requirements.</p> <p>Unexpected Finds</p> <p>JBS&G provides a protocol for management of unexpected finds and includes a list of possible finds that could be encountered.</p> <p>Site Management Plan (operation phase) including stormwater, soil, noise, dust, odour and OH&S</p> <p>JBS&G includes a site management plan for the management of works. The plan includes handling of contaminated material, protection of onsite water features from contaminated soil management and stockpiling.</p> <p>Contingency Plan if Selected Remedial Strategy Fails</p> <p>Several options have been provided for specific potential problems.</p> <p>The remedial strategy has a low risk of failure, as validation failure would lead to further excavation. Contingencies are included for increased volumes requiring containment.</p> <p>Contingency Plans to Respond to site Incidents</p> <p>JBS&G include a contingency to respond to emissions complaints</p> <p>Remediation Schedule and Hours of Operation</p> <p>Indicative project duration is not provided. Hours of operation are listed as Monday to Friday 7.30am to 5.30pm; Saturday 7.30am to 3.30pm, with the exception of noise activities which are limited to shorter timeframes.</p> <p>Licence and Approvals</p> <p>Details regulatory requirements and approvals, licences to be held by the Contractor (i.e. Class B asbestos license from SafeWork NSW) and other requirements for the disposal of asbestos and contaminated waste are provide.</p> <p>JBS&G stated that an appropriately licensed landfill should be selected and the material tracked from the Site to the landfill for any materials disposed offsite.</p>	<p>The Auditor agrees with the remediation criteria adopted. The auditor notes that dam dewatering is proposed and that Council will be consulted on the appropriate criteria for the assessing suitability for discharge however ANZECC (2000) fresh water criteria have been proposed.</p> <p>The Auditor notes that imported material must either be VENM, ENM or be classified under a Resource Recovery Exemption. The density of testing would need to be commensurate with the documentation provided and the consistency of the results.</p> <p>The density of testing proposed of excavations and waste classification of materials is considered appropriate.</p> <p>The Auditor agrees with the DQO and DQI process outlined within the SAQP and considers that a review of the SAQP relevant for each remediation stage be reviewed by the Auditor prior to implementation of sampling. Findings from investigation and remediation of previous stages should be incorporated to allow for continual improvement of the SAQP.</p> <p>The Auditor considers that interim management is not required as the site is not currently in use. However, as the remediation is proposed to be undertaken in stages, the Long Term EMP applicable to the site following completion of the first stage should incorporate interim management requirements for the surrounding un-remediated stages.</p> <p>The Auditor considers the unexpected finds protocols to be adequate. In the Auditor's opinion, the procedure for handling unexpected finds, which includes stopping work and identification of materials is appropriate and practical and can be implemented within the proposed remediation strategy. The plan includes a trigger for revision following identification of an unexpected find.</p> <p>The Auditor considers the site management plan to be adequate.</p> <p>The Auditor notes that the RAP provides management and contingency plans that are directly applicable for the proposed works.</p> <p>The Auditor notes other complaints or incidents may occur that require contingency management.</p> <p>Operating hours will be consistent with the development consent conditions.</p>

Remedial Action Plan	Auditor Comments
<p><i>Contacts/Community Relations</i></p> <p>A community relations plan will be developed and will make reference to the specific requirements of the development approval.</p> <p><i>Staged Progress Reporting</i></p> <p>No comment is provided by JBS&G</p> <p><i>Long term site management plan</i></p> <p>A Site Management Plan (SMP) has been proposed which will identify capped asbestos-impacted areas, require excavations within the capping layer, require appropriate OH&S at and beneath the marker layer and recommend that any workplans in the future consider the potential for the contaminants of concern. It is not stated who will be responsible for ensuring implementation of the SMP</p>	<p>A long term management plan structure is detailed in Appendix E of the RAP. The Auditor agrees with the structure of the LTEMP outlined and additionally notes that the LTEMP should consider interim management for adjacent sites until the site is fully remediated.</p>

11.2 Auditors Opinion

In the Auditors' opinion, the remediation approach recommended in the RAP is appropriate. The proposed remediation works should be able to ensure that the site is suitable for the proposed land uses through the removal of soils impacted by asbestos containing material and aesthetically impacted and treatment of hydrocarbon, biological or malodourous materials. Successful validation of both E2 and IN2 land will be required to confirm this.

The Auditor notes that further investigation is to be completed prior to commencement of remediation in each stage. Auditor review of the SAQP should be undertaken prior to sampling commencing to ensure that the SAQP is representative of stage specific issues and that and findings during investigation and remediation of previous stages are incorporated within the SAQP.

12. CONTAMINATION MIGRATION POTENTIAL

No significant levels of contaminants were detected over the site. Asbestos has been documented to be bound and there is little potential for fibres to occur in surface water runoff or dust. Burial pits are located on the site however contamination has been found to be localised in perched water and widespread impacts to groundwater and surface water are not expected. Sampling of infilled historical dams has not identified sediment contamination, further supporting an absence of widespread contamination of surface water.

In the Auditor's opinion, there is no evidence of significant migration of contamination and little potential for future migration given the remedial works proposed.

13. ASSESSMENT OF RISK

Based on assessment of results against relevant guidelines and consideration of the overall site history, site investigations and proposed remediation, it is the Auditor's opinion that risk to human health could occur from asbestos contamination, and to a lesser extent, biological contamination, should the site be occupied. Ecological impacts may occur from metals however given the industrial/commercial developments proposed these risks are considered acceptable. Minor elevated metals could represent ecological risks in the E2 land however the Auditor notes that vegetation in the E2 area appeared healthy and therefore risks are considered to be low.

Risk of groundwater impact to underground mine workings is considered low based on the absence of soil impacts and the presence of low permeability bedrock. The RAP allows for additional investigations to assess groundwater quality.

The remediation proposed will address the risks to human health through the onsite containment of asbestos and treatment of biological/hydrocarbon and odourous soils.

Extensive cut to fill is proposed for the site and therefore it is unlikely that contamination will remain undetected at the completion of development.

14. ONGOING SITE MANAGEMENT

JBS&G propose ongoing management of remnant contamination at the site through a Long Term Environmental Management Plan. An outline of the LTMP proposed contents is provided in Appendix E of the RAP.

14.1 Auditor's Opinion

Based on the Auditors review of the high level LTEMP structure, the Auditor considers that the EMP will provide an adequate framework for the management of contained contaminants at the site. Further auditor review of the LTEMP will be required at the completion of validation. The LTEMP should include interim management requirements for parts of the site that are not remediated, noting that remediation will be undertaken in stages over several years.

15. COMPLIANCE WITH REGULATORY GUIDELINES AND DIRECTIONS

The Auditor has used guidelines currently approved by the EPA under section 105 of the NSW *Contaminated Land Management Act 1997*.

The investigation was generally conducted in accordance with SEPP 55 Planning Guidelines and reported in accordance with the OEH (2011) *Guidelines for Consultants Reporting on Contaminated Sites*. The checklist included in that document has been referred to. The EPA's *Checklist for Site Auditors using the EPA Guidelines for the NSW Site Auditor Scheme 1998* (December 1999) has also been referred to.

15.1 Approvals

JBS&G indicated that the remediation works were classified 'Category 1' Remediation Works requiring consent and a planning application for the works is being sought.

15.2 Licenses

Excavation, onsite remediation and offsite removal of ACM contaminated soils are required to be conducted by at least a Class B licensed contractor.

JBS&G does not state whether well licences were obtained from NSW Office of Water.

The site remediation works constitutes a scheduled activity pursuant to s.48 of the POEO Act. As a result, an Environmental Protection Licence will need to be obtained prior to the commencement of 'Contaminated Soil Treatment'.

15.3 Legislation

The site has not been notified to the NSW EPA under Section 60 of the CLM Act.

16. CONCLUSIONS AND RECOMMENDATIONS

Based on the information presented in the ESA and observations made on site, and following the Decision-making process for assessing urban redevelopment sites in NSW EPA (2017) *Guidelines for the NSW Site Auditor Scheme (3rd Edition)*, the Auditor concludes that the site can be made suitable for the purposes of 'commercial/industrial' land use for the area zoned as Industrial (IN2) and 'recreational' and 'areas of ecological significance' for the area zoned as E2 Environmental Conservation Zone, if remediated in accordance with the following remedial action plan 'Former Black Hill Steggles Poultry Farm - Remedial Action Plan – Stage 2 Civil Works, John Renshaw Drive, Black Hill, NSW', 14 August 2018, JBS&G'.

The Auditor considers that sufficient information was provided to determine that the implementation of the plan is feasible and can enable the specified use of the site in the future.

The Auditor considers that further investigations proposed in the SAQP prior to staged remediation will inform the variability in the remediation extent. Following these works development drawings should be updated to incorporate the proposed location of containment cells. Auditor review of this documentation should be completed for each stage prior to the commencement of remediation.

Following remediation and validation, a Site Audit Statement certifying suitability for the proposed use should be prepared. The validation report should include a long term environmental management plan (LTEMP) for the appropriate management of retained contamination within containment cells. The LTEMP should include as-built drawings for the containment cell construction.

Based on the likelihood of remediation occurring in stages over several years, staged site audit statements would be appropriate.

17. OTHER RELEVANT INFORMATION

This Audit was conducted on the behalf of Broaden Management for the purpose of assessing the suitability and appropriateness of a remedial action plan (RAP), i.e. a "Site Audit" as defined in Section 4 (definition of a 'site audit' (b)(v)) of the CLM Act.

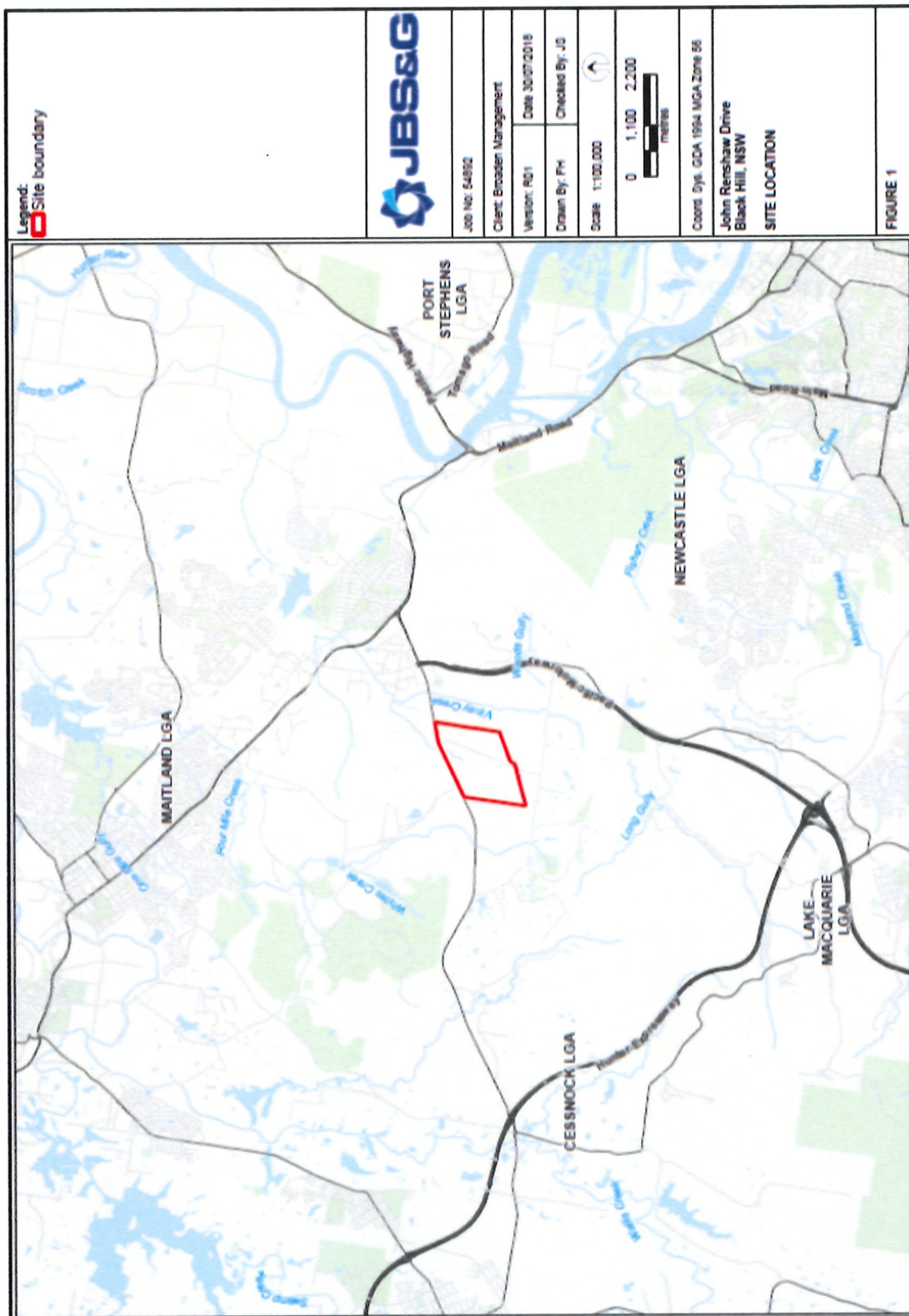
This summary report may not be suitable for other uses. JBS&G Pty Ltd included limitations in their reports. The Audit must also be subject to those limitations. The Auditor has prepared this document in good faith, but is unable to provide certification outside of areas over which the Auditor had some control or is reasonably able to check.

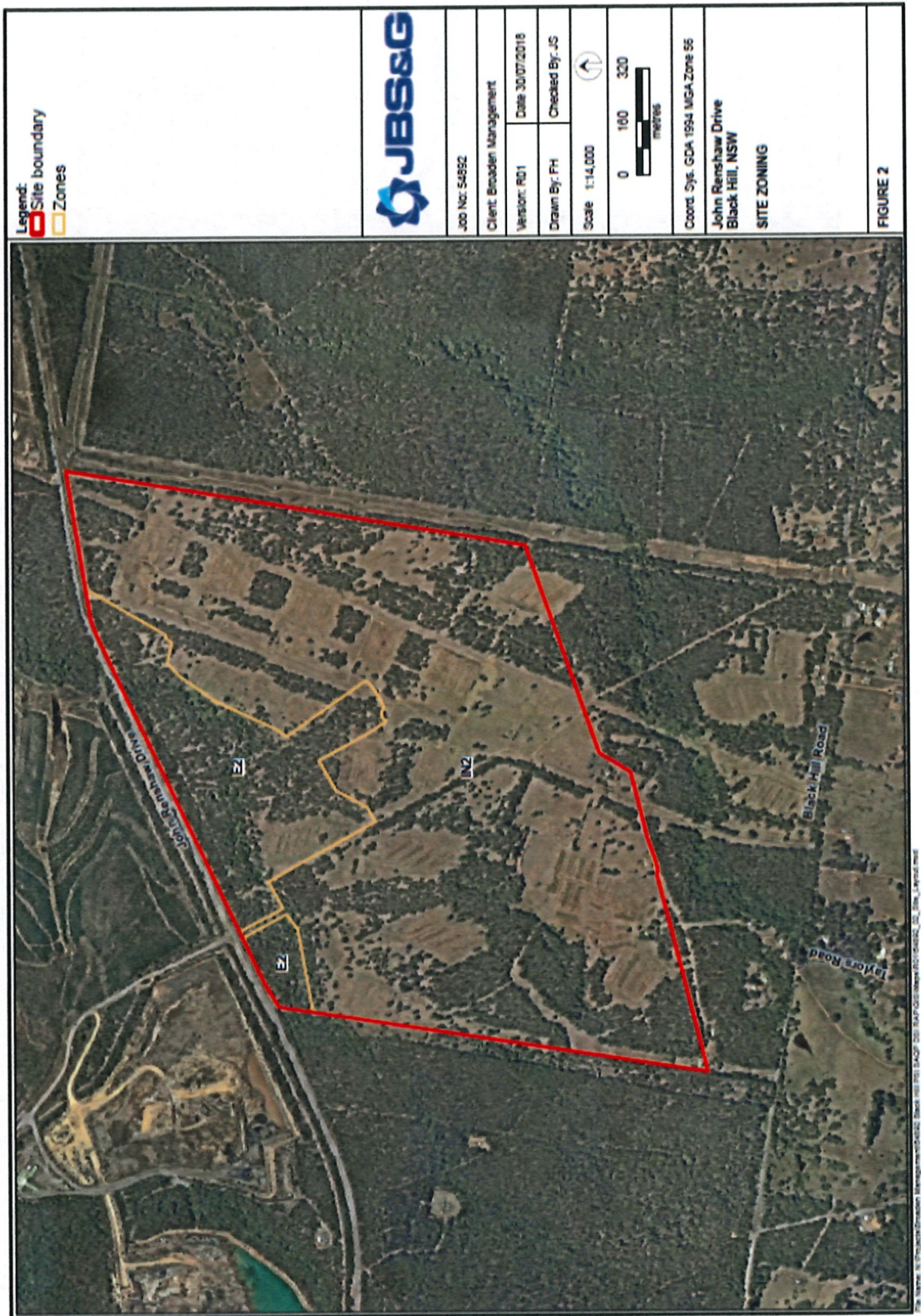
The Auditor has relied on the documents referenced in Section 1 of the Site Audit Report in preparing the Auditors' opinion. If the Auditor is unable to rely on any of those documents, the conclusions of the audit could change.

It is not possible in a Site Audit Report to present all data which could be of interest to all readers of this report. Readers are referred to the referenced reports for further data. Users of this document should satisfy themselves concerning its application to, and where necessary seek expert advice in respect to, their situation.

APPENDIX A ATTACHMENTS

Attachment 1: Site Location
Attachment 2: Site Survey
Attachment 3: Site Layout







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APPENDIX B SITE AUDIT STATEMENT



NSW Site Auditor Scheme

Site Audit Statement

A site audit statement summarises the findings of a site audit. For full details of the site auditor's findings, evaluations and conclusions, refer to the associated site audit report.

This form was approved under the *Contaminated Land Management Act 1997* on 12 October 2017.

For information about completing this form, go to Part IV.

Part I: Site audit identification

Site audit statement no. FR020

This site audit is a:

- ☐ statutory audit
- ☒ non-statutory audit

within the meaning of the *Contaminated Land Management Act 1997*.

Site auditor details

(As accredited under the *Contaminated Land Management Act 1997*)

Name	Fiona Robinson		
Company	Ramboll Australia Pty Ltd		
Address	Level 2, Suite 18 50 Glebe Road The Junction		
	Postcode	2291	
Phone	02 49625444		
Email	frobinson@ramboll.com		

Site details

Address	John Renshaw Drive Black Hill NSW
	Postcode 2322

Property description

(Attach a separate list if several properties are included in the site audit.)

Part Lot 1131 DP 1057179

Local government area - Cessnock City Council

Area of site (include units, e.g. hectares) - 220 ha

Current zoning – IN2 Light Industrial and E2 Environmental Conservation

Regulation and notification

To the best of my knowledge:

- ☐ **the site is** the subject of a declaration, order, agreement, proposal or notice under the *Contaminated Land Management Act 1997* or the *Environmentally Hazardous Chemicals Act 1985*, as follows: (provide the no. if applicable)

☐ Declaration no.

☐ Order no.

☐ Proposal no.

☐ Notice no.

- ☒ **the site is not** the subject of a declaration, order, proposal or notice under the *Contaminated Land Management Act 1997* or the *Environmentally Hazardous Chemicals Act 1985*.

To the best of my knowledge:

- ☐ the site **has** been notified to the EPA under section 60 of the *Contaminated Land Management Act 1997*
- ☒ the site **has not** been notified to the EPA under section 60 of the *Contaminated Land Management Act 1997*.

Site audit commissioned by

Name - Mark Griesse

Company – Broaden Management Pty Ltd

Address – Suite 11.02/205 Pacific Highway St Leonards

Postcode 2065

Phone - 0427370737

Email – mark@broaden.com.au

Contact details for contact person (if different from above)

Name – Liam Buxton

Phone – 0401 266 777

Email – lbuxton@barrpandp.com.au

Nature of statutory requirements (not applicable for non-statutory audits)

- ☐ Requirements under the *Contaminated Land Management Act 1997*
(e.g. management order; please specify, including date of issue)

- ☐ Requirements imposed by an environmental planning instrument
(please specify, including date of issue)

- ☐ Development consent requirements under the *Environmental Planning and Assessment Act 1979* (please specify consent authority and date of issue)

- ☐ Requirements under other legislation (please specify, including date of issue)

Purpose of site audit

- ☐ **A1** To determine land use suitability

Intended uses of the land: _____

OR

- ☐ **A2** To determine land use suitability subject to compliance with either an active or passive environmental management plan

Intended uses of the land: _____

OR

(Tick all that apply)

- ☐ **B1** To determine the nature and extent of contamination

- ☐ **B2** To determine the appropriateness of:

- ☐ an investigation plan
- ☐ a remediation plan
- ☐ a management plan

- ☐ **B3** To determine the appropriateness of a **site testing plan** to determine if groundwater is safe and suitable for its intended use as required by the *Temporary Water Restrictions Order for the Botany Sands Groundwater Resource 2017*

- ☐ **B4** To determine the compliance with an approved:

- ☐ **voluntary management proposal** or
- ☐ **management order** under the *Contaminated Land Management Act 1997*

- ☒ **B5** To determine if the land can be made suitable for a particular use (or uses) if the site is remediated or managed in accordance with a specified plan.

Intended uses of the land: commercial/industrial or environmental conservation

Information sources for site audit

Consultancies which conducted the site investigations and/or remediation:

JBS&G Pty Ltd

Titles of reports reviewed:

Environmental Site Assessment, Part Lot 1131 DP1057179, John Renshaw Drive, Black Hill, NSW, 14 August 2018, JBS&G

Former Black Hill Steggles Poultry Farm - Remedial Action Plan – Stage 2 Civil Works, John Renshaw Drive, Black Hill, NSW, 14 August 2018, JBS&G

Site Audit Statement FR020

Other information reviewed, including previous site audit reports and statements relating to the site:

A number of other reports were reviewed to inform the background information for the site as referenced in the site audit report.

Site audit report details

Title - Site Audit Report, Remedial Action Plan, Former Steggles Poultry Farm, John Renshaw Drive, Black Hill

Report no. 318000485

Date 20 August 2018

Part II: Auditor's findings

Please complete either Section A1, Section A2 or Section B, not more than one section.
(Strike out the irrelevant sections.)

- Use **Section A1** where site investigation and/or remediation has been completed and a conclusion can be drawn on the suitability of land uses **without the implementation** of an environmental management plan.
- Use **Section A2** where site investigation and/or remediation has been completed and a conclusion can be drawn on the suitability of land uses **with the implementation** of an active or passive environmental management plan.
- Use **Section B** where the audit is to determine:
 - (B1) the nature and extent of contamination, and/or
 - (B2) the appropriateness of an investigation, remediation or management plan¹, and/or
 - (B3) the appropriateness of a site testing plan in accordance with the *Temporary Water Restrictions Order for the Botany Sands Groundwater Source 2017*, and/or
 - (B4) whether the terms of the approved voluntary management proposal or management order have been complied with, and/or
 - (B5) whether the site can be made suitable for a specified land use (or uses) if the site is remediated or managed in accordance with the implementation of a specified plan.

¹ For simplicity, this statement uses the term 'plan' to refer to both plans and reports.

Section A1

I certify that, in my opinion:

The **site is suitable** for the following uses:

(Tick all appropriate uses and strike out those not applicable.)

- ☐ Residential, including substantial vegetable garden and poultry
- ☐ Residential, including substantial vegetable garden, excluding poultry
- ☐ Residential with accessible soil, including garden (minimal home-grown produce contributing less than 10% fruit and vegetable intake), excluding poultry
- ☐ Day care centre, preschool, primary school
- ☐ Residential with minimal opportunity for soil access, including units
- ☐ Secondary school
- ☐ Park, recreational open space, playing field
- ☐ Commercial/industrial
- ☐ Other (please specify):

OR

- ☐ I certify that, in my opinion, the **site is not suitable** for any use due to the risk of harm from contamination.

Overall comments:

Section A2

I certify that, in my opinion:

Subject to compliance with the **attached** environmental management plan² (EMP), the site is suitable for the following uses:

(Tick all appropriate uses and strike out those not applicable.)

- ☐ Residential, including substantial vegetable garden and poultry
- ☐ Residential, including substantial vegetable garden, excluding poultry
- ☐ Residential with accessible soil, including garden (minimal home-grown produce contributing less than 10% fruit and vegetable intake), excluding poultry
- ☐ Day care centre, preschool, primary school
- ☐ Residential with minimal opportunity for soil access, including units
- ☐ Secondary school
- ☐ Park, recreational open space, playing field
- ☐ Commercial/industrial
- ☐ Other (please specify):

EMP details

Title

Author

Date

No. of pages

EMP summary

This EMP (attached) is required to be implemented to address residual contamination on the site.

The EMP: (Tick appropriate box and strike out the other option.)

- ☐ requires operation and/or maintenance of **active** control systems³
- ☐ requires maintenance of **passive** control systems only³.

² Refer to Part IV for an explanation of an environmental management plan.

³ Refer to Part IV for definitions of active and passive control systems.

Purpose of the EMP:

Description of the nature of the residual contamination:

Summary of the actions required by the EMP:

How the EMP can reasonably be made to be legally enforceable:

How there will be appropriate public notification:

Overall comments:

Section B

Purpose of the plan⁴ which is the subject of this audit:

Describes the extent of contamination and the remediation required to render the site
suitable for the proposed commercial/industrial and environmental conservation land uses.

I certify that, in my opinion:

(B1)

- ☐ ~~The nature and extent of the contamination has been appropriately determined~~
☐ ~~The nature and extent of the contamination has not been appropriately determined~~

AND/OR (B2)

- ☐ ~~The investigation, remediation or management plan is appropriate for the purpose stated above~~
☐ ~~The investigation, remediation or management plan is not appropriate for the purpose stated above~~

AND/OR (B3)

- ☐ ~~The site testing plan:~~
☐ ~~is appropriate to determine~~
☐ ~~is not appropriate to determine~~
~~if groundwater is safe and suitable for its intended use as required by the Temporary Water Restrictions Order for the Botany Sands Groundwater Resource 2017~~

AND/OR (B4)

- ☐ ~~The terms of the approved voluntary management proposal* or management order**~~
~~(strike out as appropriate):~~
☐ ~~have been complied with~~
☐ ~~have not been complied with.~~
~~*voluntary management proposal no. _____~~
~~**management order no. _____~~

AND/OR (B5)

- ☒ The site can be made suitable for the following uses:
(Tick all appropriate uses and strike out those not applicable.)
☐ ~~Residential, including substantial vegetable garden and poultry~~
☐ ~~Residential, including substantial vegetable garden, excluding poultry~~
☐ ~~Residential with accessible soil, including garden (minimal home-grown produce contributing less than 10% fruit and vegetable intake), excluding poultry~~

⁴ For simplicity, this statement uses the term 'plan' to refer to both plans and reports.

- ☐ ~~Day care centre, preschool, primary school~~
- ☐ ~~Residential with minimal opportunity for soil access, including units~~
- ☐ ~~Secondary school~~
- ☐ ~~Park, recreational open space, playing field~~
- ☐ ~~Commercial/industrial~~

Other (please specify):

Commercial/Industrial and environmental conservation in accordance with the zoning

IF the site is remediated/~~managed~~* in accordance with the following plan (attached):

*Strike out as appropriate

Plan title - Former Black Hill Steggles Poultry Farm - Remedial Action Plan – Stage 2 Civil Works, John Renshaw Drive, Black Hill, NSW'

Plan author - JBS&G Pty Ltd

Plan date - 14 August 2018

No. of pages 124

SUBJECT to compliance with the following condition(s):

Further detailed investigations are completed to confirm remediation extent prior to commencing remediation works. Development plans for the site are revised to incorporate the containment cell locations. Auditor review of these subsequent investigations is undertaken.

A final validation report is prepared demonstrated successful remediation. The final validation report includes a long term environmental management plan (LTEMP) that outlines the management requirements for retained contaminated materials. The LTEMP considers risks to and from parts of the site that are not yet remediated and any interim management requirements to manage these risks.

A site audit statement is prepared at the completion of remediation works to verify the site is suitable for the land use.

Staged site audit statements be considered given the length of time expected for completing site development including remediation works

Overall comments:

The John Renshaw Drive, Black Hill site is a former poultry farm with demolition of most structures occurring prior to the commencement of site investigations. Limited information is available on the demolition and verification process. Sufficient historical site information describing the site operations as a poultry farm is available to understand the potential for contamination and potential areas of environmental concern.

The proposed site development includes 170 ha of industrial subdivision comprising vegetation removal and extensive cut and fill. A further 50 ha of land is to be retained as environmental conservation.

Significant sampling and inspection of the site has been undertaken. Investigations have identified the presence of asbestos in building materials and some total coliform concentrations in soils above human health criteria. Metals and some hydrocarbons are also present in soil at concentrations above ecological criteria. The site is impacted by building rubble which represents an aesthetic impact.

Remediation of the site is necessary to address these risks and a remedial action plan (RAP) has been developed by JBS&G. The RAP incorporates the following elements: onsite containment of asbestos impacted soils and materials; treatment and reuse or onsite containment of biological, hydrocarbon or malodourous materials; offsite disposal of building rubble when suitable for recycling. The plan includes an unexpected finds protocol to be implemented should contaminants be found that are not contemplated in the RAP.

Remediation, and site development, is proposed in stages occurring over a period of many years. Prior to commencing remediation, each stage will be subject to a detail investigation to confirm the extent of remediation required and inform detailed design on the containment cell location.

At the completion of remediation, a validation report will be produced detailing the remediation works completed and including a long term environmental management plan for the site.

Part III: Auditor's declaration

I am accredited as a site auditor by the NSW Environment Protection Authority (EPA) under the *Contaminated Land Management Act 1997*.

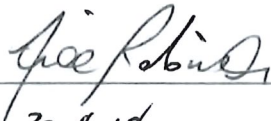
Accreditation no. 1506

I certify that:

- I have completed the site audit free of any conflicts of interest as defined in the *Contaminated Land Management Act 1997*, and
- with due regard to relevant laws and guidelines, I have examined and am familiar with the reports and information referred to in Part I of this site audit, and
- on the basis of inquiries I have made of those individuals immediately responsible for making those reports and obtaining the information referred to in this statement, those reports and that information are, to the best of my knowledge, true, accurate and complete, and
- this statement is, to the best of my knowledge, true, accurate and complete.

I am aware that there are penalties under the *Contaminated Land Management Act 1997* for wilfully making false or misleading statements.

Signed



Date

20.8.18

Part IV: Explanatory notes

To be complete, a site audit statement form must be issued with all four parts.

How to complete this form

Part I

Part I identifies the auditor, the site, the purpose of the audit and the information used by the auditor in making the site audit findings.

Part II

Part II contains the auditor's opinion of the suitability of the site for specified uses or of the appropriateness of an investigation, or remediation plan or management plan which may enable a particular use. It sets out succinct and definitive information to assist decision-making about the use or uses of the site or a plan or proposal to manage or remediate the site.

The auditor is to complete either Section A1 or Section A2 or Section B of Part II, **not** more than one section.

Section A1

In Section A1 the auditor may conclude that the land is *suitable* for a specified use or uses OR *not suitable* for any beneficial use due to the risk of harm from contamination.

By certifying that the site is *suitable*, an auditor declares that, at the time of completion of the site audit, no further investigation or remediation or management of the site was needed to render the site fit for the specified use(s). **Conditions must not be** imposed on a Section A1 site audit statement. Auditors may include **comments** which are key observations in light of the audit which are not directly related to the suitability of the site for the use(s). These observations may cover aspects relating to the broader environmental context to aid decision-making in relation to the site.

Section A2

In Section A2 the auditor may conclude that the land is *suitable* for a specified use(s) subject to a condition for implementation of an environmental management plan (EMP).

Environmental management plan

Within the context of contaminated sites management, an EMP (sometimes also called a 'site management plan') means a plan which addresses the integration of environmental mitigation and monitoring measures for soil, groundwater and/or hazardous ground gases throughout an existing or proposed land use. An EMP succinctly describes the nature and location of contamination remaining on site and states what the objectives of the plan are, how contaminants will be managed, who will be responsible for the plan's implementation and over what time frame actions specified in the plan will take place.

By certifying that the site is suitable subject to implementation of an EMP, an auditor declares that, at the time of completion of the site audit, there was sufficient information satisfying guidelines made or approved under the *Contaminated Land Management Act 1997*

(CLM Act) to determine that implementation of the EMP was feasible and would enable the specified use(s) of the site and no further investigation or remediation of the site was needed to render the site fit for the specified use(s).

Implementation of an EMP is required to ensure the site remains suitable for the specified use(s). The plan should be legally enforceable: for example, a requirement of a notice under the CLM Act or a development consent condition issued by a planning authority. There should also be appropriate public notification of the plan, e.g. on a certificate issued under s.149 of the *Environmental Planning and Assessment Act 1979*.

Active or passive control systems

Auditors must specify whether the EMP requires operation and/or maintenance of active control systems or requires maintenance of passive control systems only. Active management systems usually incorporate mechanical components and/or require monitoring and, because of this, regular maintenance and inspection are necessary. Most active management systems are applied at sites where if the systems are not implemented an unacceptable risk may occur. Passive management systems usually require minimal management and maintenance and do not usually incorporate mechanical components.

Auditor's comments

Auditors may also include **comments** which are key observations in light of the audit which are not directly related to the suitability of the site for the use(s). These observations may cover aspects relating to the broader environmental context to aid decision-making in relation to the site.

Section B

In Section B the auditor draws conclusions on the nature and extent of contamination, and/or suitability of plans relating to the investigation, remediation or management of the land, and/or the appropriateness of a site testing plan in accordance with the *Temporary Water Restrictions Order for the Botany Sands Groundwater Source 2017*, and/or whether the terms of an approved voluntary management proposal or management order made under the CLM Act have been complied with, and/or whether the site can be made suitable for a specified land use or uses if the site is remediated or managed in accordance with the implementation of a specified plan.

By certifying that a site *can be made suitable* for a use or uses if remediated or managed in accordance with a specified plan, the auditor declares that, at the time the audit was completed, there was sufficient information satisfying guidelines made or approved under the CLM Act to determine that implementation of the plan was feasible and would enable the specified use(s) of the site in the future.

For a site that *can be made suitable*, any **conditions** specified by the auditor in Section B should be limited to minor modifications or additions to the specified plan. However, if the auditor considers that further audits of the site (e.g. to validate remediation) are required, the auditor must note this as a condition in the site audit statement. The condition must not specify an individual auditor, only that further audits are required.

Auditors may also include **comments** which are observations in light of the audit which provide a more complete understanding of the environmental context to aid decision-making in relation to the site.

Part III

In **Part III** the auditor certifies their standing as an accredited auditor under the CLM Act and makes other relevant declarations.

Where to send completed forms

In addition to furnishing a copy of the audit statement to the person(s) who commissioned the site audit, statutory site audit statements must be sent to

- the **NSW Environment Protection Authority**:
nswauditors@epa.nsw.gov.au or as specified by the EPA

AND

- the **local council** for the land which is the subject of the audit.

