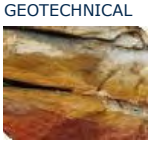
BCM Property Pty Ltd

Preliminary Site Investigation:

Tallowood Stage 2, Proposed Residential Development

21 Vincents Road, Kurrajong, NSW



P2007700JR05V01
September 2020

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Document and Distribution Status							
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Revision No.	**Description**	**Status**	**Release Date**	**Distribution**			
				File Copy	BCM Property Pty Ltd		
1	Draft for Client comment	Draft	18.12.2020	1E 1P	1P		
1	Final	Final	10.02.2021	1E 1P	1P		

Distribution Types: F = fax, H = hard copy, P = PDF document, E = other electronic format. Digits indicate number of document copies.

All enquiries regarding this project are to be directed to the Project Manager.

Contents

Attachments

Tables

General Abbreviations

AASS	Actual acid sulfate soil
ABC	Ambient background concentrations
ACM	Asbestos containing material
AEC	Area of environmental concern
AF	Asbestos fines
AMP	Asbestos Management Plan
ANZECC	Australia and New Zealand Environment Conservation Council
ANZG	Australian and New Zealand Governments
ASC NEPM	National Environmental Protection (Assessment of Site Contamination) Measure (2013)
ASS	Acid sulfate soil
ASSMAC	Acid Sulfate Soils Management Advisory Committee
AST	Above ground storage tank
BGL	Below ground level
BH	Borehole
BTEXN	Benzene, toluene, ethylbenzene, xylene, naphthalene
CEMP	Construction Environmental Management Plan
COC	Chain of custody
COPC	Contaminants of potential concern
DA	Development application
DBT	Dibutyltin
DEC	Department of Environment and Conservation
DECC	Department of Environment and Climate Change
DNAPL	Dense non aqueous phase liquid
DP	Deposited Plan
DPI	NSW Department of Primary Industry
DPIW	NSW Department of Primary Industry – Water
DQI	Data quality indicators
DQO	Data quality objectives
DSI	Detailed Site Investigation
EAC	Ecological assessment criteria
EIL	Ecological investigation level
EMP	Environmental Management Plan
EPA	NSW Environmental Protection Authority
EQL	Estimated quantitation limit (interchangeable with PQL and LOR)
ESA	Environmental Site Assessment
ESL	Ecological screening level
FA	Fibrous asbestos
GIL	Groundwater investigation level
HIL	Health investigation level
HM	Heavy metals
HSL	Health screening level
IA	Investigation area
ISQG	Interim Sediment Quality Guideline
ITP	Inspection Testing Plan
LGA	Local government area
LNAPL	Light non aqueous phase liquid
LOR	Limit of reporting (interchangeable with EQL and PQL)
MA	Martens & Associates Pty Ltd
mAHD	Metres, Australian Height Datum
mbgl	Metres below ground level
MBT	Monobutyltin
MNA	Monitored natural attenuation
MPE	Multi phase extraction
NAPL	Non aqueous phase liquid
NATA	National Association of Testing Authorities
ND	No data
NEPC	National Environment Protection Council
NEPM	National Environment Protection Measure
OCP	Organochloride pesticides
OEH	NSW Office of Environment and Heritage
OPP	Organophosphorus pesticides
PACM	Potential asbestos containing material
PAH	Polycyclic aromatic hydrocarbons
PASS	Potential acid sulfate soil
PCB	Polychlorinated biphenyl
PCEMP	Post Construction Environmental Management Plan
PESA	Preliminary Environmental Site Assessment
PFAS	Per- and polyfluoroalkyl substances
PID	Photoionisation detector
ppb	Parts per billion
ppm	Parts per million
PQL	Practical quantitative limit (interchangeable with EQL and LOR)
PSI	Preliminary Site Investigation
QA/QC	Quality assurance / quality control
RAC	Remediation acceptance criteria
RAP	Remedial Action Plan
HHRA	Human Health Risk Assessment
RPD	Relative percentage difference
SAC	Site assessment criteria
SAQP	Sampling and Analysis Quality Plan
SEPP	State Environmental Planning Policy
SIL	Soil investigation level
SOP	Standard operating procedure
SWL	Standing water level
SWMS	Safe Work Method Statement
TB	Trip blank
TBT	Tributyl tin
TCLP	Toxicity characteristics leaching procedure
TEQ	Toxic equivalency factor
TP	Test pit
TPH	Total petroleum hydrocarbons
TRH	Total recoverable hydrocarbons
TS	Trip spike
UCL	Upper confidence limit
UPSS	Underground petroleum storage system
UST	Underground storage tank
VHC	Volatile halogenated compounds
VOC	Volatile organic compounds
WHS	Work health and safety
WHSP	Work Health and Safety Plan

1 Introduction

1.1 Overview

This report, prepared by Martens and Associates (MA), documents a Preliminary Site Investigation (PSI) for potentially contaminating activities, to support a development application (DA) to Hawkesbury City Council (Council) for a residential development at 21 Vincents Road, Kurrajong, NSW (Lot 6 DP 270827) ('the site').

The investigation area (IA) for this PSI is shown in Attachment A.

1.2 Proposed Development

The proposed site development of 'Tallowood – Stage 2' involves seniors living residential development and parklands.

1.3 Objectives

Investigation objectives include:

- Identification of historic and current potentially contaminating site activities.
- Evaluation of areas of environmental concern (AEC) and associated contaminants of potential concern (COPC).
- Provision of comment on the suitability of the site for the future use, and where required, provide recommendations for additional investigations to assess any contamination issues.

1.4 Project Scope

The scope of work included:

- Walkover inspection to review current land use, potential contaminating activities and neighbouring land use.
- Site history review using aerial photographs and available historic records.
- Review of NSW EPA notices under the Contaminated Land Management Act (1997).
- Preparation of a report in general accordance with the relevant sections of ASC NEPM (2013), EPA (2017) and NSW EPA (2020).

1.5 Reference Documents

- ASC NEPC (1999, amended 2013) National Environmental Protection (Assessment of Site Contamination) Measure. Referred to as ASC NEPM (2013).
- NSW EPA (2017) 3rd Ed. Contaminated Land Management: Guidelines for the NSW Site Auditor Scheme.
- NSW EPA (2020) Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites.

2 Site Description

2.1 Site Details

Site information is summarised in Table 1, with site location and general surrounds shown in Attachment A.

Table 1: Site background information.

Item	Description / Detail
Site address	21 Vincents Road, Kurrajong, NSW
Legal Identifier	Lot 6 DP 270827
Approximate area	5.4 ha (SIX Maps, 2020)
Local Government Area	Hawkesbury City Council
Current zoning and land use	Zoned RU1 – Primary Production (Hawkesbury LEP, 2012). Site is currently used for rural purposes.
Proposed land use	Residential seniors living development.
Site description	At the time of preparing this report, the property contained a wooden shed, small metal shed, chicken coop and an animal pen in the south, a memorial garden and three concrete tanks in the northwest, two dams and a pump house in the central, formal orchards and a small dam in the east of the site.
Surrounding land uses	The site is bounded by: o Vincents Road to the southwest. o Old Bells Line of Road to the west. o Low-density residential properties and pasture land to the north, east and south.
Topography	The site contains slopes 50% in the western part of the site and 15% to 20% in the central and eastern part. The site aspect is generally east and southeast. Site elevation ranges between 171 mAHD in the northwest and 120 mAHD in the southeast (Environa Studio, 2020).
Expected geology	The *Penrith 1:100,000 Geological Sheet 9030* describes site geology as Bringelly Shale, Ashfield Shale and Minchinbury Sandstone Formation within the Wianamatta Group. The NSW Environment and Heritage eSPADE website identifies the site as having soils of the Luddenham landscape consisting of shallow dark podzolic soils on upper slopes.
Surface hydrology	Drainage of the site is via overland flow to the south east, primarily to a natural drainage channel close to the northern boundary, flows to the northern most dam (there are currently two dams on the site) then towards to an unnamed water course and afterwards to Redbank Creek nearly located 3 km to the south east of the site.

2.2 Hydrogeology

Review of WaterNSW Real-time Water Database, indicated four groundwater bores within 500 m of the site, with groundwater bores summarised in Table 2.

Table 2: Available hydrogeological information.

Bore Identification	Record Date	Intended Use	Standing Water Level (mbgl)	First Water Bearing Zone (mbgl) and Substrate	Distance and Direction from Site
GW104396	1982	Stock, domestic	Not available	Not available	On site
GW100708	1996	Stock, industrial, domestic, irrigation	38	3 – 55 Shale	98 m north
GW107452	2005	Household	2	0 - 6 Clay, brown shale	126 m south west
GW111034	2010	Household	30	15 - 84 Clay	267 m south west

Groundwater inflow was not encountered during the drilling of boreholes to 5.5 mbgl which were completed as part of a supplementary geotechnical investigation completed by MA in June 2020 (MA, 2020).

No springs were listed within 500 m of the site in the NSW Government Hydrography Spatial Data (SEED, 2020).

Should further information on permanent site groundwater conditions be required, an additional assessment would need to be carried out (i.e. installation of groundwater monitoring bores / ongoing groundwater monitoring).

3 Site Contamination Assessment

3.1 Council Historical Site Records

Historic development and / or building records held by Council for the site were requested as part of an information search, however were not available prior to the release of this report.

3.2 NSW EPA Records

No sites were listed on the NSW contaminated sites register, within 500m of the site.

No sites were listed on the EPA public register, within 500m of the site.

3.3 External Potentially Contaminating Activities

No potentially contaminating activities were identified within 500m of the site.

3.4 Aerial Photograph Review

Aerial photographs taken of the site during between 1966 and 2020, were reviewed to investigate historic site land uses (Table 3). Copies of aerial photographs are provided in Attachment C.

The aerials indicated that the land has been used for orchards and rural purposes and the current site condition has been established from 2010.

Table 3: Aerial photograph observations from 1966 to 2020.

Year (Source)	Site Activity	Surrounding Land Use
1966 [1] – 1970 (NSW Government)	Orchards in the north, west and south of the site. The current central dam is visible. No other site infrastructure is visible.	Orchards and rural residential lands in all direction. A dwelling to the northeast of the site.
1978 (NSW Government)	The northern most dam has now been established. Small galvanised steel pump house constructed adjacent to central dam. Little other changes.	A dwelling to the south of the site.
1984 [1] – 1986 (NSW Government)	Most orchards have been removed and are no longer visible.	Removal of orchards from adjacent lands. Additional shed to the south of the site. Extension of a pool to the existing dwelling to the south side.

Year (Source)	Site Activity	Surrounding Land Use
1994 – 1998 (NSW Government)	New orchards observed in the central and eastern portions of the site.	A large dam constructed to the southeast. More construction to the northeast of the site.
2002 – 2005 (NSW Government)	Two sheds (the current large wooden and metal) have been established.	Little to no change from the previous.
2010 (NSW Government)	Vegetation clearing and establishment of the memorial garden along the north west site boundary.	Little to no change from the previous.
2016 – 2020 (NSW Government)	The small shed and chicken coop in south of site adjacent to dwelling are now visible. Row of trees observed on east and northern central areas of the site.	Additional dwellings and earth works to the south of the site.

Notes
[1.] Denotes poor image quality.

3.5 Site Walkover Inspection

A site walkover was completed by an MA engineer on 31 July 2020 and is summarised in Table 4 below.

Table 4: Summary of site walkover.

Site Area	Walkover Observations
Western portion	• Thickly vegetated along boundary. • Concrete water tanks.
Northern portion	• Rows of trees and a formal memorial garden. • Cut and fill activities (small pad) south of the formal memorial garden. • Natural drainage depression close to the northern boundary.
Southern portion	• Large wooden shed with upper floor maybe a small residence. • Small metal shed (access was not possible) which may contain oils and fuels. • A wooden chicken coop which was empty at the time of inspection. • Cut and fill retaining walls to the west of the chicken coop. • An animal pen with fill pad from levelling. Minor building waste (fragments of tile, glass and pipe) was observed next to the pen on the surface.
Central and eastern portion	• An area of burnt rubbish. • Three dams and a galvanised steel pump house. Potential filling on the dam walls.

3.6 Areas of Environmental Concern / Contaminants of Potential Concern

Potential areas of environmental concern (AEC) and associated contaminants of potential concern (COPC) (Table 5) for the site have been identified on the basis of available site history, aerial photograph interpretation and site walkover observations. A figure showing locations of identified AEC, is provided in Attachment B.

Table 5: Areas of environmental concern and contaminants of potential concern.

AEC	Potential for Contamination	COPC
AEC A Sheds including 1 m curtilage	Pesticides and heavy metals may have been used underneath existing sheds for pest control. Building construction may include PACM, zinc treated (galvanised) metals, and lead based paints. Sheds may have previously stored fuels, oils and chemicals.	HM, TRH, BTEXN, PAH, OCP / OPP and asbestos
AEC B Former and existing orchard use	Application of agricultural chemicals, use of pesticides and heavy metals for pest control during site use as rural uses.	HM and OCP / OPP
AEC C Potential filling	Site walkover observations have identified areas where cut and fill activities may have occurred. This process may have introduced fill from unknown origins.	HM, TRH, BTEXN, PAH, OCP / OPP and asbestos
AEC D Burnt areas	Areas where timber, rubbish and other materials may have been burnt may have introduced contamination to the soil.	HM, TRH, BTEXN and PAH

3.7 Conceptual Site Model

A conceptual site model based on the COPC identified in this PSI, and the associated exposure pathways to potential receptors, is summarised in Table 6.

Table 6: Conceptual site model.

COPC	Pathway	Exposure Route	Receptor
HM PAH OCP / OPP	Leaching of contaminants through the soil profile. Transport of contaminants via air (dust). Transport of contaminants by mechanical disturbance (e.g. earthworks). Transport of contaminants via surface water (runoff). Biomagnification and / or bioaccumulation along food chains.	Direct contact with contaminants. Ingestion of contaminants. Ingestion of food grown or reared in contaminated areas. Inhalation of contaminated media (e.g. vapour, dust).	<u>Possible Human Receptors</u> Current or future site users such as residents, visitors and workers. On and offsite construction or maintenance workers. Current or future users of surrounding residences, reserves, and commercial or industrial premises. <u>Possible Environmental Receptors</u> Flora and fauna that may inhabit or migrate through the site. Drainage channel located on the site.
TRH / BTEXN	As above plus: Volatilisation to air (vapour).		
Asbestos	Transport of contaminants via air and inhalation of particles. Transport of contaminants by mechanical disturbance (e.g. earthworks). Transport of particles on clothing.	Inhalation of contaminated media (e.g. dust).	<u>Possible Human Receptors</u> Current or future site users. On and offsite construction or maintenance workers. Current or future users of surrounding residences, reserves, and commercial or industrial premises.

4 Conclusion

Site history information indicates that the site has primarily consisted of rural land use with a sustained period of agricultural use (orchards) in the northern and western portions of the site. Generally, the site has remained largely undeveloped. The current site structures have been present from at least 2010 (based on aerial photographs) and no evidence of additional significant development occurring during this time.

Potential contamination sources are summarised as:

- Existing shed construction could have introduced asbestos (possible construction material), pesticides (pest control) and heavy metals (paints, galvanised metals, and pest control). The potential storage of fuels in sheds may have introduced hydrocarbons into the soil.
- Former and current orchard use may have introduced heavy metals or OCP / OPP into the soil.
- Fill material from unknown origin may have been imported to site during cut and fill activities, primarily in the eastern portion of the site.
- Areas of burnt rubbish may have introduced contamination to the site soil.

Overall, the site is considered to generally have a low risk of contamination. However, the identified AECs will require further investigation prior to development to determine potential risk of harm to human health and environment under the proposed development conditions.

5 Recommendations

To address potential identified AEC and associated COPC, a Detailed Site Investigation (DSI) including intrusive soil sampling and analysis of COPC is recommended.

The DSI is to be developed in accordance with NSW EPA (1995) *Sampling Design Guidelines* and a risk based assessment. Assessment shall address each of the identified AEC and associated COPC identified in Table 5. Results of the site testing shall be assessed against site acceptance criteria (SAC) developed with reference to ASC NEPM (2013).

If any soil material is removed from site, a formal waste classification assessment shall be required in accordance with the NSW EPA Waste Classification Guidelines (2014).

6 Limitations Statement

The PSI was undertaken in line with current industry standards.

It is important, however, to note that no land contamination study can be considered to be a complete and exhaustive characterisation of a site nor can it be guaranteed that any assessment shall identify and characterise all areas of potential contamination or all past potentially contaminating land uses. Therefore, this report should not be read as a guarantee that no contamination shall be found on the site. Should material be exposed in future which appears to be contaminated or inconsistent with natural site soils, additional testing may be required to determine the implications for the site.

Martens & Associates Pty Ltd has undertaken this assessment for the purposes of the current development proposal. No reliance on this report should be made for any other investigation or proposal. Martens & Associates Pty Ltd accepts no responsibility and provides no guarantee regarding the characteristics of areas of the site not specifically studied in this investigation.

7 References

ASC NEPM (1999, amended 2013) *National Environmental Protection (Assessment of Site Contamination) Measure, 2013.*

Martens & Associates (2020) Preliminary Geotechnical Assessment, Rep No. P2007700JR03V01.

NSW Department of Environment & Heritage (eSPADE, NSW soil and land information), www.environment.nsw.gov.au.

NSW Department of Mineral Resources (1991) *Penrith 1:100,000 Geological Sheet 9030*.

NSW EPA (2017) 3rd Ed. *Contaminated Land Management: Guidelines for the NSW Site Auditor Scheme.*

NSW EPA (2020) *Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites.*

NSW Government – Aerial photographs (1966 - 2020).

NSW SIX – *Spatial Information Exchange – Land & Property Information* Aerial photograph (2020). h*ttps://six.nsw.gov.au/wps/portal/*

State Environmental Planning Policy No. *55 – Remediation of Contaminated Land*.

WaterNSW Real-Time Water Database, accessed 31 July, 2020, https://realtimedata.waternsw.com.au/water.stm.

Attachment A: Figures

Legend

Site Boundary

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0 20 40 60 80 100 m

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Map Title / Figure:

Site Overview

Map 13	Map
21 VINCENTS ROAD, KURRAJONG	Site
PROPOSED RESIDENTIAL DEVELOPMENT	Project
PRELIMINARY SITE INVESTIGATION	Sub-Project
BCM PROPERTY PTY LTD	Client
05/08/2020	Date

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Project No: P2007700 Map Set: MS06-R01 EPSG: 28356

Attachment B: Areas of Environmental Concern

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Map Title / Figure:

AEC Map

Map 14	Map
21 VINCENTS ROAD, KURRAJONG	Site
PROPOSED RESIDENTIAL DEVELOPMENT	Project
PRELIMINARY SITE INVESTIGATION	Sub-Project
BCM PROPERTY PTY LTD	Client
05/08/2020	Date

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Project No: P2007700 Map Set: MS06-R01 EPSG: 28356

Attachment C: Aerial Photography

Legend

Site Boundary

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Project No: P2007700 Map Set: MS06-R01 EPSG: 28356

Map Title / Figure:

HISTORICAL AERIAL 1966

Map 01	Map
21 VINCENTS ROAD, KURRAJONG	Site
PROPOSED RESIDENTIAL DEVELOPMENT	Project
PRELIMINARY SITE INVESTIGATION	Sub-Project
BCM PROPERTY PTY LTD	Client
05/08/2020	Date

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Map Title / Figure:
HISTORICAL AERIAL 1970

Map 02	Map
21 VINCENTS ROAD, KURRAJONG	Site
PROPOSED RESIDENTIAL DEVELOPMENT	Project
PRELIMINARY SITE INVESTIGATION	Sub-Project
BCM PROPERTY PTY LTD	Client
05/08/2020	Date

Project No: P2007700 Map Set: MS06-R01 EPSG: 28356

Legend

Site Boundary

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Map Title / Figure:

HISTORICAL AERIAL 1978

Map 03	Map
21 VINCENTS ROAD, KURRAJONG	Site
PROPOSED RESIDENTIAL DEVELOPMENT	Project
PRELIMINARY SITE INVESTIGATION	Sub-Project
BCM PROPERTY PTY LTD	Client
05/08/2020	Date

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Project No: P2007700 Map Set: MS06-R01 EPSG: 28356

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Map Title / Figure:

HISTORICAL AERIAL 1984

Map 04	Map
21 VINCENTS ROAD, KURRAJONG	Site
PROPOSED RESIDENTIAL DEVELOPMENT	Project
PRELIMINARY SITE INVESTIGATION	Sub-Project
BCM PROPERTY PTY LTD	Client
05/08/2020	Date

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Map Title / Figure:
HISTORICAL AERIAL 1986

Map 05	Map
21 VINCENTS ROAD, KURRAJONG	Site
PROPOSED RESIDENTIAL DEVELOPMENT	Project
PRELIMINARY SITE INVESTIGATION	Sub-Project
BCM PROPERTY PTY LTD	Client
05/08/2020	Date

Project No: P2007700 Map Set: MS06-R01 EPSG: 28356

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Site Boundary

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Map Title / Figure:

HISTORICAL AERIAL 1994

Map 06	Map
21 VINCENTS ROAD, KURRAJONG	Site
PROPOSED RESIDENTIAL DEVELOPMENT	Project
PRELIMINARY SITE INVESTIGATION	Sub-Project
BCM PROPERTY PTY LTD	Client
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Project No: P2007700 Map Set: MS06-R01 EPSG: 28356

Map Title / Figure:

HISTORICAL AERIAL 1998

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Map 07	Map
21 VINCENTS ROAD, KURRAJONG	Site
PROPOSED RESIDENTIAL DEVELOPMENT	Project
PRELIMINARY SITE INVESTIGATION	Sub-Project
BCM PROPERTY PTY LTD	Client
05/08/2020	Date

Legend

Site Boundary

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Map Title / Figure:

HISTORICAL AERIAL 2002

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Map 08	Map
21 VINCENTS ROAD, KURRAJONG	Site
PROPOSED RESIDENTIAL DEVELOPMENT	Project
PRELIMINARY SITE INVESTIGATION	Sub-Project
BCM PROPERTY PTY LTD	Client
05/08/2020	Date

Project No: P2007700 Map Set: MS06-R01 EPSG: 28356

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Project No: P2007700 Map Set: MS06-R01 EPSG: 28356

Map Title / Figure:

HISTORICAL AERIAL 2005

Map 09	Map
21 VINCENTS ROAD, KURRAJONG	Site
PROPOSED RESIDENTIAL DEVELOPMENT	Project
PRELIMINARY SITE INVESTIGATION	Sub-Project
BCM PROPERTY PTY LTD	Client
05/08/2020	Date

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Map Title / Figure:

HISTORICAL AERIAL 2010

Map 10	Map
21 VINCENTS ROAD, KURRAJONG	Site
PROPOSED RESIDENTIAL DEVELOPMENT	Project
PRELIMINARY SITE INVESTIGATION	Sub-Project
BCM PROPERTY PTY LTD	Client
05/08/2020	Date

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Project No: P2007700 Map Set: MS06-R01 EPSG: 28356

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Project No: P2007700 Map Set: MS06-R01 EPSG: 28356

Map Title / Figure:

HISTORICAL AERIAL 2016

Map 11	Map
21 VINCENTS ROAD, KURRAJONG	Site
PROPOSED RESIDENTIAL DEVELOPMENT	Project
PRELIMINARY SITE INVESTIGATION	Sub-Project
BCM PROPERTY PTY LTD	Client
05/08/2020	Date

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Environment | Water | Geotechnics | Civil | Projects

Legend

Site Boundary

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0 20 40 60 80 100 m

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Map Title / Figure:

HISTORICAL AERIAL 2020

Map 12	Map
21 VINCENTS ROAD, KURRAJONG	Site
PROPOSED RESIDENTIAL DEVELOPMENT	Project
PRELIMINARY SITE INVESTIGATION	Sub-Project
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