ATTACHMENT 5 – REMEDIATION ACTION PLAN

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Remediation Action Plan

03 July 2020

20 Hely Avenue, Turvey Park NSW 2650

Prepared for Croft Development Pty Ltd

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A short informal video summary of this report will be provided upon approval of the RAP by the auditor.

Table of Contents

1 Executive Summary **7**

2 Introduction **10**

2.1 Project Personnel 10

2.2 Site Information 11

3 Background Information **12**

3.1 Previous Investigations 13

3.2 Objectives of This RAP 14

3.3 Guidelines and Legislative Framework 15

4 Site Conditions and Local Environment **17**

4.1 Site Description and Current Use 17

4.2 Surrounding Land Use and Water Bodies 17

4.3 Topography, Drainage and Groundwater 17

4.4 Regional Geology and Hydrogeology 18

4.4.1 Site Geology 18

4.4.2 Hydrogeology 18

4.5 Areas of Environmental Concern 18

4.6 Conceptual Site Model Summary 21

4.7 Extent of Required Remediation 22

4.7.1 Demolished Building Areas 23

4.7.1.1 Delineation Completed in DSI 23

4.7.1.2 Delineation Uncertainty 23

4.7.2 Residual (Not Demolished) Building Areas 24

4.7.2.1 Delineation Completed in DSI 24

4.7.2.2 Delineation Uncertainty 24

4.7.3 Buried Pipelines and Structures 24

4.7.3.1 Delineation Completed in DSI 24

4.7.3.2 Delineation Uncertainty 24

4.7.4 General Surface Areas (Stage 1 - Northern Area) 24

4.7.4.1 Delineation Completed in DSI 25

4.7.5 General Surface Areas (Stage 2 - Southern Area) 25

4.7.5.1 Delineation Completed in DSI 25

4.7.5.2 Delineation Uncertainty 25

5 Remediation Options 26

5.1 Remediation Goals 26

5.2 Consideration of Remediation Options 26

5.2.1 Preferred Remediation Strategy 28

5.2.2 Justification for Preferred Remediation Strategy 29

5.2.2.1 Social Considerations 29

6 Waste Classification 29

7 Remediation Criteria 29

7.1 National Environment Protection (Assessment of Site Contamination) Measure 2013 (NEPM) 29

7.2 Waste Disposal 30

8 Remediation & Construction Program 31

8.1 Data Gap Close Out 31

8.1.1 Beneath Existing Structures 31

8.1.2 Buried Pipelines and Structures 32

8.2 Pre-Remedial Works and Site Establishment 32

8.2.1 Pre-Remedial Works 33

8.2.2 Site Establishment 34

8.2.3 General Excavation and Plant Movement 35

8.3 Remediation Works 36

8.3.1 Building 503 Fibrous Excavation and Clearance 37

8.4 Construction Phase Material Management 38

8.4.1 Stage 1 & 2 Bonded Asbestos Excavation and Clearance 38

8.4.2 Material Tracking 38

8.4.3 Temporary Stockpiling of Soil 40

8.4.4 Decontamination Procedures 40

9 Remediation Works Contingency Plan 41

9.1 Unexpected Finds Protocol 41

9.2 Excavation Works Fail to Achieve Remediation Criteria 42

9.3 Stockpile Assessment Fail to Achieve Residential Remediation Criteria 43

9.4 Heritage Items 43

10 Roles and Responsibilities 45

11 Validation 46

11.1 Validation Description 46
11.2 Validation Sampling, Analytical and Quality Plan 48
11.2.1 Objectives 48
11.2.1.1 SAQP Objectives 48
11.2.2 Data Quality Objectives 49
11.2.3 Data Quality Indicators 49
11.2.4 Sample Strategy and Methodology 50
11.3 Laboratory Analysis 51
11.4 Quality Analysis / Quality Assurance 52
11.5 Validation Report 52
12 Proposed Remediation Schedule 53
13 Conclusions 56
14 References 57
15 Limitations 59
16 Attachments 62

Abbreviations

Term	Description
AEP	Annual Exceedance Probability
AHD	Australian Height Datum (metres above mean sea level)
ADWG	Australian Drinking Water Guidelines
ANZECC	Australian and New Zealand Environment and Conservation Council
ANZG	Australian and New Zealand Guidelines
ARMCANZ	Agriculture and Resource Management Council of Australia and New Zealand
AS	Australian Standard
DBYD	Dial Before You Dig
DP	Deposited Plan
EIS	Environmental Impact Statement
EMP	Environmental Management Plan
EPA	Environmental Protection Authority
EPL	Environmental Protection License
IBC	intermediate Bulk Container
LPG	Liquefied Petroleum Gas
mAHD	Elevation in metres with respect to the Australian Height Datum
NEPC	National Environment Protection Council
NHMRC	National Health and Medical Research Council
NRMMC	Natural Resource Management Ministerial Council
OEMP	Operational Environmental Management Plan
PPE	Personal Protective Equipment
PVC	Polyvinyl Chloride
TWA	Trade Waste Agreement

Emergency Contacts

Company/Organisation	Number
Construction Project Manager	TBC
Council Site Supervisor	TBC
EPA NSW Griffith Office	02 6640 2500
iEnvironmental Australia (Environmental Consultants)	1300 043 684
Local Police	(02) 4632 4499
Ambulance	000
Wagga Wagga Base Hospital	(02) 5943 1000
Wagga Wagga City Council	1300 292 442 or (02) 6926 9100
WorkCover NSW	13 10 50
Wildlife Information, Rescue and Education Service (WIRES)	1300 094 737

1 Executive Summary

iEnvironmental Australia Pty Ltd (iEnvi) was engaged by Croft Development Pty Ltd (Croft) to prepare a Remediation Action Plan (RAP) to meet the requirements of a non-Statutory Site Audit and development consent conditions for the proposed Stage 1 and Stage 2 redevelopment at 20 Hely Avenue, Turvey Park NSW 2650 (the site). The Site location is illustrated in Figure 1.

Through historical demolition of structures at the site, bonded asbestos debris has been left in surficial soils across the majority of the site. A detailed site investigation (DSI) completed by McMahon Earth Science indicated a portion of fibrous asbestos within the former building 503 footprint. Asbestos within recent buildings at the site had been removed, with asbestos clearance reports provided. These buildings were subsequently demolished due to fire damage occurring after the asbestos removal works, however there is uncertainty regarding the potential presence of asbestos within the building footprints

The surface and near surface inspection identified bonded ACM fragments in 120 of the 1,138 10 m x 10 m grids investigated. Bonded ACM fragments were identified in six and fibrous asbestos was detected in three of the 235 asbestos quantification test pits sampled. Subsequent strip trenching delineated the potential area of fibrous material at the site. The water and stormwater pipes inspected contained no asbestos, however one decommissioned telecommunication box did contain asbestos. Due to the presence of widespread underground services at the site, confirmation and validation of services for potential asbestos is required. Locations of asbestos containing materials, and subsequently the remediation area and construction management area, are provided in Figure 4.

The overarching objective of the RAP is to remediate the site so that it is rendered safe for future low density residential (Health Screening Level A) use with potential garden/accessible soil and the contamination is managed compliantly with NSW regulations.

The objective of the remediation and validation is to render the site soils currently impacted by asbestos, suitable for ongoing residential use in accordance with SEPP 55 and the NEPM (ASC).

The initial remediation of asbestos impacted soil identified in previous investigations will be completed prior to the main construction works, including:

1. an approximate 3,800 m^2 area of fibrous asbestos impacted soil in and around the former building 503 footprint (fill to be removed);
2. stripping and separate stockpiling of the high asbestos-potential building footprints (502, 504, 505, 506, 527 and the area 8 ancillary building) for sampling after demolition of the buildings; and
3. validation of soil in these locations after excavation.

After the works above are completed, construction will continue with defined validation sampling, validation asbestos clearance inspections and certificates, management of an unexpected finds protocol, and underground services and pit removal processes focussed on detecting asbestos containing material and asbestos impacted soils as defined in this RAP.

In summary, iEnvi have selected the following remediation method and validation strategy in relation to asbestos impacted soil discovered at the site during previous investigations:

1. implementation of an accepted Construction Environmental Management Plan (CEMP) during remediation works;
2. begin close out of data gaps through sampling beneath existing structures and underground services;
3. stripping of the area of identified fibrous asbestos impacted soil in and around former building footprint 503, and classification and disposal of soil material offsite;
4. stripping and stockpiling of the high asbestos potential building footprints (502, 504, 505, 506, 527 and the area 8 ancillary building);
5. construction management through supervision by person appropriately trained in asbestos identification of stripping of surface material of bonded asbestos areas within the Stage 1 area (as shown on Figure 4), transport to the Stage 2 area and stockpiling;
6. visual inspection of the residual Stage 1 soils;
7. construction management through supervision by person appropriately trained in asbestos identification of stripping of surface material of bonded asbestos areas within the Stage 2 area (as shown on Figure 4) and stockpiling;
8. sampling of stockpiled soils by the environmental consultant to determine suitability for reuse and subsequent assignment of a material tracking ID;
9. visual inspection of all areas identified as containing asbestos;
10. based on material suitability for reuse, replacement of soils following excavation;
11. after remediation is completed, site-wide (Stage 1 and 2) validation will be required in 10 m x 10 m areas as per Section 11 and the Validation report prepared for the site.

Based on the validation results of remediation, the validation should include a statement of whether the site is considered to be remediated and suitable for the planned use as a retirement housing and community centre.

Roles and responsibilities for the execution of the RAP include:

Table 1: RAP Roles and Responsibilities

Role	Responsibility
Environmental Project Manager	Ensure field personnel are suitably familiar with the requirements of the OH&S Plan before commencing works on site. Ensure subcontractors are suitably qualified and safe work method statements have been supplied and approved prior to commencing works on site. Responsible for the day to day implementation of the health and safety plan in all phases of work. Ensure that any required modifications to the OH&S Plan are noted, communicated to all project staff and are implemented.
Environmental/Civil Contractor Manager	Inductions for remediation personnel and contractors in accordance with the site-specific Induction requirements. Ensure communication and notification of the remediation works to the site owners, leaseholders, Council and operators. Provision of copy of the RWP to site owners, leaseholders and operators. Maintain material tracking records
Environmental Field Manager	Induction of sub-contractors and/or other Field Personnel in accordance with the requirements of this OH&S Plan and the site-specific Induction. Ensure they are personally familiar with the requirements of the OH&S Plan before commencing works on site. Ensure that they appropriately induct sub-contractors and visitors to the site and that all persons inducted sign the acknowledgement form of this OH&S Plan (Appendix A). Ensure the on-site activities and deliverables conform to the OH&S Plan. Ensure that appropriate Personal Protective Equipment (PPE) is worn. Report any incidents or accidents as soon as possible.
Appropriately Trained person / person appropriately trained in asbestos identification	Person who has undergone asbestos identification training from an accredited training body. Oversees all excavation works onsite. Segregates stockpiles based on visual observations for sampling to be undertaken by the environmental consultant.
Environmental consultant	Review and approval of imported material documentation. Sampling and inspection of stockpiles. Sampling and inspection for validation. Preparation of validation reports and material suitability checklists.
Contractors	Site-specific Induction and OH&S Plan before commencing works on site and have signed acknowledgement form of OH&S Plan. Responsible for abiding by the OH&S Plan. Provide H&S P's and/ or SWMS's for work to be undertaken. Ensure they are suitably qualified and trained to complete the tasks required including operation of equipment. Ensure the on-site activities and deliverables conform to the OH&S Plan. Ensure that appropriate PPE is worn. Report any incidents or accidents to the Field Manager as soon as possible. Contractors should demonstrate appropriate OHS knowledge and performance, be able to identify risks associated with the work they are doing and provide suitable work methods to minimize the risks to themselves and others.

2 Introduction

iEnvironmental Australia Pty Ltd (iEnvi) was engaged by Croft Development Pty Ltd (Croft) to prepare a Remediation Action Plan (RAP) to meet the requirements of a non-Statutory Site Audit and development consent conditions for the proposed Stage 1 and Stage 2 redevelopment at 20 Hely Avenue, Turvey Park NSW 2650 (the site). The site location is illustrated in Figure 1.

The Detailed Site Investigation (DSI) report by McMahon Earth Science (McMahon 2019a and 2019b) described the site as currently comprising vacant buildings, car parking and unsealed land that is covered in grass and gravel patches. The vegetation in the area is described as primarily annual and perennial grasses with sparsely scattered Eucalyptus trees that appeared to be in good health. The site plan and development stages are illustrated in Figure 2.

iEnvi understands the client intends to remediate the site to make it suitable for the proposed redevelopment, with asbestos materials observed in Stage 1 and Stage 2 development areas.

Historical demolition of structures and potential minor quantities of imported fill caused asbestos impact to surface soil, and ACM was identified in a small telecommunications pit at the site. Both Fibrous and bonded asbestos is subsequently the primary contaminant of concern for this RAP.

This RAP has been prepared based on a review of historical environmental reports and investigations undertaken at the site, including:

- McMahon Earth Science (2019a), Detailed Site Investigation Report 5901; and
- McMahon Earth Science (2019b), Detailed Site Investigation Report 6459; and
- McMahon Earth Science (2019c), Sampling Analysis Quality Plan.

2.1 Project Personnel

The personnel involved for this project are shown in the table below.

Table 2: Project Personnel Details

Personnel	Company	Position	Project Responsibility
Michael Nicholls - 20 years experience, B Env Sc, MEIANZ, CEnvP (CS Specialist)	iEnvi	Principle Environmental Scientist	Project Director Report review and authorisation
Steven Drysdale, B L&W Sci (Hons), CEnvP	iEnvi	NSW Operations Manager, Senior Environmental Scientist	Report preparation

2.2 Site Information

The site comprises the proposed Stage 1 and Stage 2 development areas located off 20 Hely Avenue, Turvey Park NSW, within the Wagga Wagga City Council local government area.

The site location is presented in Figure 1, with site features presented in Figure 2. The site has recently been predominantly vacant with the exception of buildings on the western boundary which have been used for educational purposes by Charles Sturt University (CSU).

Table 3: Site Identification Details

Site Address:	20 Hely Avenue, Turvey Park NSW 2650
Site Size:	13.32 (total), 3.46 ha (Stage 1), 7.86 ha (Stage 2), 2.00 (subdivision)
Site Owner:	Charles Sturt University
Site Use:	Predominantly disused with some operational education facilities
Site Use Type:	infrastructure
Lot and DP Number:	Lot 2 DP 1183166
Local Government Area:	Wagga Wagga City Council
Current Zoning:	SP2 - Infrastructure
Distance from CBD:	1.5 km south-west of the Wagga Wagga Central Business District
Geographical Coordinates (MGA56 H):	-35.128300, 147.350980

3 Background Information

Based on client supplied information the recent site history is summarised below:

- the site was used for broadacre farming prior to the development of the No. 1 RAAF hospital in 1944;
- the hospital closed in 1946 and reopened as the Wagga Wagga Teachers College, with works including renovations and building demolition;
- the site was further developed in the early 1970's to form the Riverina Murray Institute of Higher Education - Riverina College of Advanced Education (RCAE);
- the RCAE transferred to CSU, with the campus gradually becoming redundant until 2011, when a development application was approved to demolish site structures. Demolition works were undertaken between 2014 and 2016; and
- Saint Mary Mackillop College constructed two demountable classrooms in 2014 which remain operational in the western portion of the site. The college is excluded from the scope of the DSI and this RAP however. Building 514 in the central portion of the site remains operational for the CSU Regional Archives and The Riverina Conservatorium of Music.

The property is proposed to be redeveloped to a retirement housing and community centre facility with the development to be undertaken predominantly within two stages. Stage 1 involves 3.46 ha of land being developed into an retirement housing and community centre facility and assisted living units, with the adjacent 2.0 ha of land occupied by the Riverina Conservatorium of Music, Charles Sturt University (CSU) Regional Archives and Saint Mary McKillop College being subdivided off and outside the footprint of the DSI and this RAP. Stage 2 (7.86 ha) will consist of retirement housing with a community centre on the eastern boundary. The development works are to be carried out under development applications DA18/0175 and DA19/0001. The development applications identified the primary issues consist of tree removal, staging conditions, access and waste management, however state the proposed development is permissible with consent.

Subsequently a Statement of Environmental Effects (SEE) was prepared by Salvestro Planning (SEE 2019). The SEE reviewed the background data for the site with regard to the proposed development, design plans, site history, infrastructure networks and services, relevant planning guidelines and environmental considerations. The SEE reported the potential for asbestos containing material and lead paint at the site associated with hazardous construction materials and building demolition works, however determined the risk to be low under current conditions. The SEE concluded the site is considered suitable for the proposed age car facility based upon the reviewed information.

Asbestos removal works of former buildings at the site identified as containing asbestos were undertaken by Kane's Construction and Riverina Asbestos Removal, with subsequent asbestos clearance reports provided by All Clear Inspections. Asbestos removal works were undertaken at the following buildings including the removed non friable ACM sheeting areas:

- Building C (Building 503), initial 2400 m^2, non friable;
- Buildings A (Building 501) and B (Building 502), 2400 m^2, non friable; and
- Building 503, subsequent 342 m^2, non friable.

All provided asbestos clearance reports reported asbestos had been removed to an appropriate standard. It should be noted, reported for damage to the buildings occurred following removal of asbestos containing materials, and as such non friable removal works were undertaken.

3.1 Previous Investigations

Previous site investigations were undertaken by McMahon and consisted of a Preliminary Site Investigation (PSI), the Stage 1 Detailed Site Investigation (DSI) and subsequent Sampling and Analysis Quality Plan (SAQP) to guide additional sampling requirements and provision of the DSI incorporating Stages 1 and 2.

The previous investigations comprised the following combined scope of work:

- Preliminary Site Investigation (McMahon 2018):
  - review of historical aerial photographs, titles and available NSW public registers regarding the site.
- Stage 1 Detailed Site Investigation (McMahon 2019a):
  - advancement of 22 boreholes to 1 metre below ground level (mBGL) adjacent to the locations of the demolished boiler rooms, operating hut, offices, incinerator and compound and waste disposal area;
  - collection of soil samples and submission for analysis of contaminants of potential concern, including metals, hydrocarbons, pesticides and polychlorinated biphenyls; and
  - advancement of a subsequent 12 boreholes to 1.5 mBGL around two locations of slightly elevated benzo(a)pyrene concentrations.
- Stage 1 and 2 Detailed Site Investigation (McMahon 2019b):
  - inspection of surface and near surface soils on a 10 metre by 10 metre gird for presence of asbestos, comprising a total of 1,138 grids;
  - subsequent sampling for bonded and friable asbestos to a depth of 0.3 mBGL based upon results from the previous inspection, comprising 235 quantification pits;
  - inspection of site services including water/ stormwater infrastructure and telecommunications boxes for the presence of asbestos;

- sampling for heavy metals in areas where structures were identified during the PSI and site inspections;
- sampling for pesticides and phenoxy herbicides in areas of former structures and open grassland;
- advancement of five strip trenches to delineate fibrous asbestos within the former building and demolition footprint of Building 503.

The inspection and laboratory results from the entirety of the investigation program indicated:

- surface soil contained bonded ACM fragments in 120 of the 1,138 10 m x 10 m grid squares investigated across the Stage 1 and Stage 2 areas;
- bonded ACM fragments were found in six of the test pits sampled;
- fibrous asbestos was detected in three of the 235 asbestos quantification pits sampled;·
- water and stormwater pipes inspected contained no ACM; and
- one decommissioned telecommunication box uncovered during sample pit excavation contained ACM.

All 72 previous structures and open space sites sampled for heavy metals, OCP/OPP and phenoxy herbicide analysis returned results below Method Detection Limits (MDLs) and/or the Health Investigation Level (HIL) criteria for Residential 'A' land use.

3.2 Objectives of This RAP

The overarching objective of the RAP is to remediate the site so that it is rendered safe for future low density residential (Health Screening Level A) use with potential garden/accessible soil and the contamination is managed compliantly with NSW regulations.

The objective of the remediation and validation is to render the site soils currently impacted by asbestos, suitable for ongoing residential use in accordance with SEPP 55 and the NEPM (ASC).

The principal elements of this RAP include outlining the following:

- complete/ Lodge & Gain SafeWork NSW Approval to remove asbestos;
- PPE and health and safety requirements for site work;
- waste classification requirements for materials to be disposed off site;
- remediation criteria;
- remediation process including delineation and supervision by a licenced asbestos assessor and asbestos removal contractor; and
- validation requirements.

3.3 Guidelines and Legislative Framework

The RAP incorporates guidance from the following:

- ANZECC (1999). Guidelines for the Assessment of On-Site Containment of Contaminated Soil, September 1999;
- ANZG 2018. Australian and New Zealand Guidelines for Fresh and Marine Water Quality. Australian and New Zealand Governments and Australian state and territory governments, Canberra ACT;
- ASTM (2000) Standard Practice D2488 90 Description and Identification of Soils (Visual-Manual Procedure). American Society for Testing and Materials;
- EnHealth (2012) Environmental Health Risk Assessment: Guidelines for assessing human health risks from environmental hazards, Department of Health and Ageing and EnHealth Council, Commonwealth of Australia (2012);
- National Environmental Protection Council (NEPC) (2013). National Environment Protection(Assessment of Site Contamination) Measure 1999 (as amended April 2013);
- NHMRC & NRMMC (2011). Australian Drinking Water Guidelines (ADWG) - National Health and Medical Research Council & Natural Resource Management Ministerial Council;
- National Environmental Protection Council (NEPC) (2013). National Environment Protection(Assessment of Site Contamination) Measure 1999 (as amended April 2013);
- NHMRC & NRMMC (2011). Australian Drinking Water Guidelines (ADWG) - National Health and Medical Research Council & Natural Resource Management Ministerial Council;
- NSW Department of Urban Affairs and Planning (1998) Managing Land Contamination: Planning Guidelines: SEPP 55 Remediation of Land, August (1998);
- NSW EPA (1995). Sampling Design Guidelines (1995);
- NSW EPA (1996). Protection of the Environment Operations (Waste) Regulation (1996);
- NSW EPA (2014). Technical Note: Investigation of Service Station Sites, NSW EPA, April (2014);
- NSW EPA (2014). Waste Classification Guidelines (November 2014);
- NSW EPA (2015). Guidelines on the Duty to Report Contamination under the Contaminated and Management Act 1997 (July 2015);
- NSW EPA (2017) Guidelines for the NSW Site Auditor Scheme (3rd Ed.) (2017);

- NSW EPA (2019) Consultants reporting on contaminated land. Contaminated land guidelines (Draft).
- NSW OEH (2011). Guidelines for Consultants Reporting on Contaminated Sites (2011). NSW Office of Environment and Heritage;
- NSW Workcover (2014) Managing asbestos in or on soil. March (2014);
- Safe Work Australia (2016) Code of Practice, How to Safely Remove Asbestos. April (2016);
- Standards Australia (1993) AS1726-1993. Geotechnical site investigations Australian Standard;
- Standards Australia (2005). Guide to the investigation and sampling of sites with potentially contaminated soil. Part 1: Non-volatile and semi-volatile compounds AS4482.1 (2005) and Part 2: Volatile substances, AS4482.2 (2005);
- USEPA (2000). Guidance for the Data Quality Objectives Process, EPAC QA/G-4 DEC/600/r- 96/055, United States Environmental Protection Agency Office of Environmental Information, Washington DC;
- Western Australia Department of Health (2009). Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia.

4 Site Conditions and Local Environment

4.1 Site Description and Current Use

Details of the site are outlined in Table 2 – Site identification. Figure 2 presents an approximate site layout and refer to Figure 3 and 4 the locations of identified asbestos at the site.

The site is predominantly disused and vacant with the exception of the Regional Archives and Conservatorium of Music which remain operational. The St Mary Mackillop College will continue operating, and is outside of the scope of the proposed development, and subsequently the DSI and this RAP.

4.2 Surrounding Land Use and Water Bodies

The site is an industrial use and zoned as SP2 - Infrastructure The surrounding land uses are described in Table 3.

Table 4: Surrounding Land Use

Direction	Land Use or Activity
North	Wagga Wagga Veterinary hospital and low density residential developments.
East	Low density residential developments, the Henschke Primary School and churches.
South	The Wagga Wagga NSW Ambulance station beyond which is Fernleigh Road.
West	Open land, beyond which is the Juvenile Justice Centre, a rail line and commercial and light industrial premises including scrap metals, an animal shelter and construction material suppliers
Nearest Surface Water Bodies	Flowerdale Lagoon and the Murrumbidgee River are located approximately 2 to 2.5 km north of the site..

4.3 Topography, Drainage and Groundwater

The site surface elevation is approximately 190 to 220 metres with respect to the Australian Height Datum (mAHD). Slope on the site was reported as relatively consistent with the site generally sloping to the north west. Site surface waters are limited, with overland flows expected to be directed via the onsite and Council stormwater systems, prior to discharge to Flowerdale Lagoon and subsequently the Murrumbidgee River. Rainfall is expected to follow the natural inclines of the site, as well as infiltrate through the relatively permeable site topsoils.

4.4 Regional Geology and Hydrogeology

4.4.1 Site Geology

The site is reported as being underlain by two geological landscapes. The underlying geologies were reported by the DSI (2019b) as undivided Ordovician metasedimentary rocks and colluvium with interbedded siltstone, sandstone, shale, hornfels phyllites, minor schists and quartzite deposits. Ordovician metasediments are considered to be the primary underlying geology beneath the development location, with colluvial clayey sediments overlying the weather zone in the lower elevation areas.

Surface soils at the site were reported as brown silty clays and sandy clays.

4.4.2 Hydrogeology

The Geoscience Australia hydrogeology dataset describes the groundwater beneath the site as highly extensive, porous aquifers of moderate to high productivity. Groundwater is considered likely to be saline based on the regional Wagga Wagga urban salinity. Two registered bores are reported on site, and 23 registered bores are located within 500 metres of the site. Based upon review of the bore data presented in the DSI (2019), a shallow groundwater table between 4 metres and 10 mBGL, underlain by a deeper aquifer at depths exceeding 60 mBGL. Boreholes advanced during the initial McMahon Stage 1 DSI (2019a) reported groundwater at 4.5 mBGL. Anecdotal evidence provided by Wagga Wagga Council through their groundwater monitoring programs reported groundwater at 0.09 mBGL in the lower surface elevation northwest of the site, however this was not identified through site investigations and test pitting works. The saline nature of the groundwater should be considered during future construction and landscaping with regard to aggressivity to concrete and salt stress to vegetation.

4.5 Areas of Environmental Concern

The review of site history and the previous investigations undertaken by McMahon Earth Sciences identified asbestos containing materials on the site surface and within test pits. Asbestos observed during the McMahon investigations was removed at the time of sampling, however subsequent inspection identified asbestos remaining within five locations at the site. These locations include the footprint of building 527 and the central area of rubble/fill within Area 2, asbestos fines within the footprint of former building 503 in Area 3, asbestos fines and fill adjacent to former building 502 in Area 4 and asbestos containing material within the footprint of a historically demolished building in Area 8. Based on the above, the identified impacted areas include:

Table 5: Areas of Environmental Concern

AECs	Observations	Sampling results	Impacted soil depth (mbgl)	Impacted area	Volume (m^3)
Area 1	Current CSU Buildings 525 & 526. Former RAAF buildings. Former CSU Buildings 521, 523 & 534 as well as 5 ancillary buildings. Clearance reports for Buildings 525 & 526. See McMahon PSI (2018).	Surface and near surface ACM noted below HIL A assessment criteria within shallow fill.	<0.1	Former building footprints and potential current building footprints within Area 1. Extent forms part of area of bonded asbestos presented in Figure 4.	n/a
Area 2	No current CSU buildings. Former RAAF buildings. Former CSU Buildings 504, 505, 506, 510 & 527. Clearance reports for Buildings 504, 505, 506 & 527. See McMahon PSI (2018).	Surface and near surface ACM noted. Potential fibrous asbestos in building 504-506 footprint, however quantification not undertaken. Footprint of building 527 contained 1 sample exceeding asbestos criteria.	<0.1	Former building footprints and potential current building footprints within Area 2. Extent forms part of area of bonded asbestos presented in Figure 4.	n/a
Area 3	Current CSU Building 507. No former RAAF buildings. Former CSU Building 503. No clearance reports for buildings. See McMahon PSI (2018).	a. Surface and near surface ACM noted below HIL A assessment criteria. b. Fibrous asbestos detected in pits 4,18 & 347 above assessment criteria.	a. <0.1 b. <0.2 within northern verge, 0.1 within building footprint	a. Former building footprint areas within Area 3. Extent forms part of area of bonded asbestos presented in Figure 4. b. 800m^2 within northern verge (topsoil), 3,000m^2, within building 503 footprint (Fill) 600 m3 (ex situ) to be excavated and disposed offsite.	a. n/a b. 600m^3 based on 1.3 x bulking factor

Area 4	No current CSU buildings. No former RAAF buildings. Former CSU Building 502 (burnt down in 2019). No clearance report for building. See McMahon PSI (2018).	Surface and near surface ACM noted below HIL A assessment criteria, however has not been quantified in the area associated with building 502.	<0.1	Former building footprint areas within Area 4. Extent forms part of area of bonded asbestos presented in Figure 4.	n/a
Area 5	No current CSU buildings. No former RAAF buildings. No former residences. See McMahon PSI (2018).	Surface and near surface ACM noted below HIL A assessment criteria.	<0.1	Former building footprint areas within Area 5. Extent forms part of area of bonded asbestos presented in Figure 4.	n/a
Area 6	No current CSU buildings. No former RAAF buildings. Former residences and sheds. No clearance reports for buildings. See McMahon PSI (2018).	Surface and near surface ACM noted below HIL A assessment criteria.	<0.1	Former building footprint areas within Area 6. Extent forms part of area of bonded asbestos presented in Figure 4.	n/a
Area 7	No current CSU buildings. No former RAAF buildings. Former CSU ancillary building. No clearance report for CSU ancillary building. See McMahon PSI (2018).	Surface and near surface ACM noted below HIL A assessment criteria.	<0.1	Former building footprint areas within Area 7. Extent forms part of area of bonded asbestos presented in Figure 4.	n/a
Area 8	No current CSU buildings. No former RAAF buildings. Former CSU ancillary building. No clearance report for CSU ancillary building. See McMahon PSI (2018).	Surface and near surface ACM noted below HIL A assessment criteria, with the exception of one sample obtained from former ancillary building footprint which contained bonded ACM.	<0.1	Former building footprint areas within Area 8. Extent forms part of area of bonded asbestos presented in Figure 4.	n/a

Area 9	No current CSU buildings. Former RAAF buildings. No clearance report for CSU ancillary building. See McMahon PSI (2018).	Surface and near surface ACM noted below HIL A assessment criteria.	<0.1	Former building footprint areas within Area 9. Extent forms part of area of bonded asbestos presented in Figure 4.	n/a

4.6 Conceptual Site Model Summary

The conceptual site model for the remediation works has been prepared below based on the findings of the DSI. The environmental risk assessment is based on a contaminant (source) - exposure pathway - receptor methodology. This relationship allows an assessment of potential environmental risk to be determined, in accordance with the current national guidelines.

Central to the requirements for the assessment of risk is the development of an initial conceptual site model (CSM), identifying each contaminant source and the associated receptor exposures.

Table 6: CSM Summary

Source Location	Contamination Category	Potential and Confirmed Sources	Potential and Confirmed Pathways	Potential and Confirmed Receptors	Summary
Onsite	Hazardous Materials	**Potential**: Fibrous asbestos surficially in soil materials. **Confirmed**: Yes, in 3 test pits within and adjacent to the former building 503 footprint. Strip trenching and site observations delineated the area to topsoil adjacent to Building 503 and fill within the former building footprint. Source considered to be improper asbestos removal works.	**Potential**: Inhalation. **Confirmed**: Yes.	**Potential**: Current and future site users. Maintenance and construction workers. **Confirmed**: Yes, potential exposure to current grounds staff and construction workers involved in the site redevelopment. Potential transport to unimpacted areas through the construction process and impact to future site users.	Asbestos has been delineated via the initial soil sampling, and the subsequent strip trenching and observations of soil strata. Remediation of the material is required as the risk to current and future users is considered unacceptable.
		Potential: Bonded asbestos surficially in soil materials. **Confirmed**: Yes, throughout the soil surface below assessment criteria. Based on site observations and location of historical buildings, bonded asbestos considered to be due to improper demolition of	**Potential**: Inhalation. **Confirmed**: No, concentrations are below what would be considered a potential risk to human health.	**Potential**: Current and future site users. Maintenance and construction workers. **Confirmed**: Potentially, potential exposure to current grounds staff and construction workers involved in the site redevelopment through disturbance. Potential transport to unimpacted areas through the construction	Bonded asbestos has been identified throughout the development area, however at concentrations below the assessment criteria and are therefore not considered a risk to human health

		structures and confined to areas of former buildings.		process and impact to future site users.	
		Potential: Bonded asbestos in services. **Confirmed**: Partial. Bonded asbestos identified in one communications box at the site. Due to the underground service network being inaccessible, the presence of bonded asbestos is unknown in services.	**Potential**: Inhalation. **Confirmed**: No, the known asbestos containing communications box is in good condition and does not pose a risk in its current state. Additional investigation required to determine potential risk posed by underground services.	**Potential**: Current and future site users. Maintenance and construction workers. **Confirmed**: Potentially, potential exposure to current grounds staff and construction workers involved in the site redevelopment through damage. Potential transport to unimpacted areas through the construction process and impact to future site users.	Identified bonded asbestos within the communications box is in good condition and not considered to pose a risk. Additional investigation is required to close out the current data gap associated with the underground services and determine risk, if any.

Based on the above, there is considered to be a risk to current and future human receptors posed by fibrous asbestos at the site. Due to the low concentrations of bonded asbestos when compared to the assessment criteria, there is not considered a risk to current or future human receptors, however consideration of management of bonded asbestos containing material through the construction process will be required.

4.7 Extent of Required Remediation

Fibrous asbestos was reported in three quantification pits adjacent to former building 503 within the Stage 2 development area. The fibrous asbestos was subsequently delineated through the advancement of strip trenches, and inspection and sampling of soils encountered. An approximate area of remediation based on the sampling undertaken during the DSI is presented in Figure 4.

Remediation of bonded asbestos at the site is not required due to concentrations being below the assessment criteria, and therefore posing minimal risk. As the materials are to be excavated however, soil will need to be managed during the construction process to ensure concentrations remain suitable for the proposed land use, and asbestos is not spread to unimpacted areas. The area requiring management consists of surficial soils within the Stage 1 and Stage 2 development areas, as shown on Figure 4.

Based on the above, remediation works and subsequent validation are required for the identified fibrous asbestos within the development area. Both Stage 1 and Stage 2 development areas require construction stage management of the identified bonded asbestos in areas of former

buildings, which does not pose a current risk to receptors due to concentrations being below the adopted assessment criteria, and therefore does not require remediation.

All buildings have been removed at site with the exception of buildings 501, 507, 510 and 514, which will be removed prior to earthworks commencement. Following removal of existing buildings, the building footprints will require assessment as to remediation requirements, if any. Due to the presence of underground services at the site which have not been assessed, there is the potential for these to contain asbestos, and subsequently require consideration.

4.7.1 Demolished Building Areas

Multiple buildings have been demolished at the site, with some uncertainty to the exact former locations and asbestos/hazardous material removal work quality reported during the DSI. These include buildings 201, 504, 505, 506, 511, 512, 514, 519, 521, 523, 524, 527, 528, 529, 533, 534, 535, 536 and 537. Recently utilised buildings, Blocks A (Building 501), B (Building 502) and Block C (Building 503), were identified as containing non-friable asbestos in building materials, including walls, eaves and flooring. These buildings have subsequently had asbestos removal works undertaken, with clearance reports issued, with the exception of the sub-flooring in building 501 which is scheduled for removal. Following asbestos removal works, buildings 502 and 503 were demolished.

During the McMahon DSI, fibrous asbestos was reported within three quantification pits adjacent to former Building 503. As such, these locations require further delineation and remediation.

The pending asbestos removal works within Building 501 are the outstanding remediation works with regard to structures at the site.

4.7.1.1 Delineation Completed in DSI

During the McMahon DSI, the site, including former building footprints, was divided into 1,138 grid squares for visual inspection of asbestos. Based on this, a further 235 test pits to 0.3m depth were advanced within, and adjacent to the former building footprints, among other potential areas of concern. Following identification of fibrous asbestos in 3 test pits within and adjacent to the former Building 503 footprint, five strip trenches were advanced, soil stratigraphy logged and samples analysed to delineate the impacted area.

4.7.1.2 Delineation Uncertainty

As building 501 is yet to undergo asbestos removal and subsequent demolition, there is uncertainty as to the potential for impacted soil material within the building footprint.

4.7.2 Residual (Not Demolished) Building Areas

In addition to Building 501 which is pending removal, Buildings 507, 510, 525 and 526 remain onsite. The buildings are reported to be constructed of brick walls with corrugated iron roofing.

Carports P61 and P67 also remain onsite, and are constructed of steel truss/brick walls and ceilings with corrugated iron roofing.

Based on the above, with the exception of Building 501, the remaining site structures are not considered to require asbestos removal works.

4.7.2.1 Delineation Completed in DSI

During the McMahon DSI, the site, including adjacent to existing structures, was divided into 1,138 grid squares for visual inspection of asbestos. Based on the observations made during the grid square inspections, quantification pits to 0.3m below ground were advanced in areas of potential concern adjacent to structures.

4.7.2.2 Delineation Uncertainty

Areas beneath existing structures have not been inspected or sampled during the DSI. As such, following demolition of the structures, the soil surface should be inspected and sampled as per the below.

4.7.3 Buried Pipelines and Structures

The site is reported as containing an extensive underground service and drainage network. Where possible, services were inspected during the DSI, however the majority of service pits were found to be sealed, and therefore inaccessible. As a result, there is the potential that this network contains asbestos.

4.7.3.1 Delineation Completed in DSI

Service pits were inspected during the DSI, however underground services were unable to be inspected or sampled, and therefore have the potential to contain asbestos.

4.7.3.2 Delineation Uncertainty

There is uncertainty regarding the underground services and drainage systems at the site, with them considered to have the potential to contain asbestos.

4.7.4 General Surface Areas (Stage 1 - Northern Area)

Surficial asbestos fragments at concentrations below the adopted assessment criteria were identified within grid squares and subsequent sampling in the Stage 1 - Northern area during the DSI. Prior to site validation this area should be included in the site wide inspection and clearance validation requirements.

4.7.4.1 Delineation Completed in DSI

General surface areas within Stage 1 were included in the site wide grid square inspections. These works included tilling to 0.1m below ground surface, and the advancement of soil quantification pits to 0.3m depth.

4.7.4.2 Delineation Uncertainty

While surficial asbestos materials observed during the DSI were removed at the time of sampling, uncertainty regarding the quality of the removal exists, with no documented clearance or validation for the Stage 1 area undertaken. Based on the locations of identified asbestos, and comparison to the former building footprints, it is considered that surficial bonded asbestos is present to some extent within all areas of building footprints.

4.7.5 General Surface Areas (Stage 2 - Southern Area)

Surficial asbestos fragments were identified within grid squares and subsequent sampling in the Stage 2 - Southern area during the DSI. Asbestos was removed at the time of inspection during these works. An asbestos containing communications pit was observed adjacent to Building 502, and will require removal prior to site validation. Based on the locations of identified asbestos, and comparison to the former building footprints, it is considered that surficial bonded asbestos is present to some extent within all areas of building footprints.

Following removal of the asbestos containing communications pit, and prior to site validation general surface areas should be included in the site wide inspection and clearance validation requirements.

4.7.5.1 Delineation Completed in DSI

General surface areas within Stage 2 were included in the site wide grid square inspections. These works included tilling to 0.1m below ground surface , and the advancement of soil quantification pits to 0.3m depth.

4.7.5.2 Delineation Uncertainty

While surficial asbestos materials observed during the DSI were removed at the time of sampling, uncertainty regarding the quality of the removal exists, with no documented clearance or validation for the Stage 2 area undertaken.

5 Remediation Options

Remediation options are based on the identified asbestos contamination at the site as reported by the DSI (2019b). The remediation options are founded on the site's proposed land use as retirement housing and a community centre.

For the purposes of this RAP, remediation is proposed to be undertaken on areas where asbestos has been identified in previous investigations. During remediation, delineation of the identified asbestos shall be undertaken followed by removal works. Additional asbestos clearance and soil sampling works are to be completed to validate residual soils after remediation.

5.1 Remediation Goals

The remediation goals are outlined as follows:

- removal of unacceptable risks to human health and the environment from the identified asbestos contamination at the site, such that the site is suitable for the proposed land use as an aged care facility;
- validate the remedial works in accordance with the relevant NSW EPA Guidelines and with reference to the adopted site criteria, or, install suitable control measures to manage future risks posed by residual asbestos contamination; and
- document the validation and/or management process.

5.2 Consideration of Remediation Options

Remediation options have been considered in accordance with the Guidelines for the NSW Site Auditor Scheme (NSW EPA 2017) with the preferred hierarchy of options for soil remediation and management as follows:

1. delineation and on-site treatment of the soil so that the contaminant is either destroyed or the associated risk is reduced to an acceptable level; and
2. delineation and off-site treatment of excavated soil so that the contaminant is either destroyed or the associated hazard is reduced to an acceptable level, after which the soil is returned to the site; or

If the above options are not practicable:

3. consolidation and isolation of the soil on the site by containment with a properly designed barrier or cell;

4. delineation and offsite disposal of contaminated material to an approved facility or site; and
5. do nothing.

Consideration of the above remediation options is based on aspects of sustainability, including economic, environmental and social, of which an appropriate balance between potential benefits and impacts is considered.

Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia (WA DoH 2009) were adopted to provide guidance when assessing the acceptability of any remediation, considering the minimisation of the following:

- risk to human health;
- disturbance of contaminated material; and
- contaminated material moved to landfill.

The potential remediation options are assessed in Table 5 below. The preferred remediation option(s) is highlighted in **bold**.

Table 7: Remediation Options Matrix

Remediation option	Discussion	Conclusion
Option 1: Delineation and on-site treatment of the soil so that the contaminant is either destroyed or the associated risk is reduced to an acceptable level	On-site treatment options for fibrous asbestos materials are not available which reduce the risk to receptors.	Not a viable option
Option 2: Delineation and off-site treatment of excavated soil so that the contaminant is either destroyed or the associated hazard is reduced to an acceptable level, after which the soil is returned to the site	Off-site treatment options for fibrous asbestos materials are not available which reduce the risk to receptors.	Not a viable option
Option 3: Consolidation and isolation of the soil on the site by containment with a properly designed barrier or cell	**As the Stage 2 works area involve bulk earthworks, over-excavation and disposal of clean material would be required to contain impacted materials. Encapsulation on site is commercially viable when compared to high volume off site disposal costs, however does leave onsite liability and may decrease potential land values. Encapsulation beneath roads and easements, or subdivision as a separate lot and encapsulation under a Section 88b Planning Instrument minimises ongoing liability, Requires consideration to material suitability for future land uses, development of a long term Environmental Management Plan including responsibilities and management requirements, cell locations to be surveyed and clearly delineated and documented, with the cell area included on the council PCLR.**	**Viable option**
Option 4: Delineation and removal of contaminated	**A suitably licensed facility is present in the Wagga Wagga Shire Council area to accept asbestos wastes. Offsite disposal of**	**Viable option**

material to an approved facility or site	**asbestos materials removes the risk to human health and can be incorporated into the development works with regard to required plant and machinery.**	
Option 5: Do nothing	Does not mitigate the risk to human health.	Not a viable option

5.2.1 Preferred Remediation Strategy

Of the possible remediation options presented in Table 4, the preferred remediation strategy for the site is consolidation and isolation of the soil offsite through subdivision of a commercial lot through a Section 88B instrument and subsequent containment with a properly designed barrier or cell.

However a preference of Council as a primary stakeholder and owner of land after development is to not have an onsite containment cell due to ongoing management requirements. Therefore, the next preferred strategy of removal of asbestos impacted soil to an offsite licensed landfill facility has been selected after waste classification in accordance with the NSW EPA (2014) Waste Classification Guidelines.

This remediation method would be undertaken as follows:

1. the stripping of an approximate 3,800 m^2 area of fibrous asbestos containing topsoil and fill materials in the former building 503 area, as presented in Figure 4, followed by stockpiling within the lot boundary and near to the excavation area;
2. classification of the stockpiled fibrous asbestos containing material in accordance with the NSW EPA (2014) Waste Classification Guidelines;
3. disposal of fibrous asbestos containing materials to a landfill licensed to accept fibrous asbestos waste under waste tracking protocols;
4. stripping and separate stockpiling of the high asbestos-potential building footprints (502, 504, 505, 506, 527 and the area 8 ancillary building) for sampling after demolition of the buildings;
5. management of Stage 1 & 2 cut and fill through stripping of the top 100 mm of surface material within the bonded area to be stockpiled and managed, and validation, including identification of services, and reuse (if suitable); and
6. sample and validation of areas previously potentially containing asbestos as shown in Figure 4.

In its current condition, the asbestos conditions may pose a long-term risk to human health at the site, as well as a risk to construction workers involved in the development works. Offsite disposal is considered a viable method to remove the potential risk to human receptors.

5.2.2 Justification for Preferred Remediation Strategy

Of the possible remediation options, offsite disposal is a viable method to meet the project goal of making the site suitable and preferred by key stakeholders to avoid ongoing management requirements.

5.2.2.1 Social Considerations

In specific reference to the remediation of site contamination, social considerations will include community and sustainability and achieving an acceptable balance between the impacts of undertaking remediation activities and the benefits those activities will deliver in terms of the environmental, economic and social indicators relevant to the site.

The overarching social consideration will be the ultimate development of a community aged care facility. The remedial option selected will remove the current risk posed by fibrous asbestos at the site.

6 Waste Classification

If impacted soil is required to be disposed offsite it will require waste classification to facilitate disposal at an appropriately licensed landfill. Soil material should be sampled at a ratio of 1 sample/25 m^3 for waste classification prior to disposal to a licensed facility. Based on the previous sampling data which did not include leachate sampling, the soil would currently be classified as Restricted Solid Waste mixed with Special Waste (asbestos), however this is expected to be reduced to General Solid Waste mixed with Special Waste (asbestos) upon Toxicity Characteristic Leaching Procedure (TCLP) analysis.

7 Remediation Criteria

Based on the DSI (2019a and 2019b), the only contaminant requiring remediation identified at the site is asbestos. Therefore, after remediation, the following soil remediation criteria apply.

7.1 National Environment Protection (Assessment of Site Contamination) Measure 2013 (NEPM)

The NEPM (2013) was updated to include a more scientific, site-specific risk-based assessment. The updated NEPM helps determine the human health and ecological risk more specifically in order to more effectively address site-specific pathways and receptors. The NEPM is legislated in New South Wales under the Environment Protection Act 1970 and contains relevant soil criteria

that have been adopted for residential, public open space and commercial and industrial sites. The relevant criteria for the proposed future land use, and subsequently for the site to be considered suitable following the remediation works is as follows:

- **Asbestos in Soil Health Screening Level (HSL) – A - Residential** (NEPM Schedule B1, Table 7). Health screening levels for asbestos in soil, which are based on scenario-specific likely exposure levels, are adopted from the Guidelines for the Assessment, Remediation and Management of Asbestos- Contaminated Sites in Western Australia (WA DoH 2009) guidelines. Health screening levels for asbestos contamination in soil have been adopted.

Based on the above, Table 6 below presents the Remediation Criteria for the proposed works.

Table 8: Asbestos Remediation Criteria

Form of Asbestos	HSL A (w/w)
Bonded ACM	0.01%
Fibrous Asbestos and Asbestos Fines (friable asbestos)	0.001%
All forms of asbestos	No visible asbestos for soil surface

7.2 Waste Disposal

Following waste classification of material required to be disposed offsite, it should be transported under waste tracking conditions to a facility licensed to accept the class of waste. The nearest facility which accepts asbestos waste is the Gregadoo Waste Management Centre, located at 132 Ashfords Road, Lake Albert NSW 2650, approximately 14 km by road to the south.

Waste disposal dockets should be retained for all materials disposed offsite, and matched with the corresponding waste classification for inclusion in the site validation.

8 Remediation & Construction Program

The proposed remediation strategy incorporates the following elements:

1. implementation of an accepted Construction Environmental Management Plan (CEMP) during remediation works;
2. begin close out of data gaps through sampling beneath existing structures and underground services;
3. stripping of the area of identified fibrous asbestos impacted soil in and around the former building 503 footprint, and stockpiling within the lot boundary near to the excavation area;
4. classification of stockpiled fibrous asbestos containing soil materials in accordance with the NSW EPA (2014) Waste Classification Guidelines and disposal offsite at an appropriately licensed landfill;
5. stripping and stockpiling of the high asbestos potential building footprints (502, 504, 505, 506, 527 and the area 8 ancillary building);
6. construction management through supervision by person appropriately trained in asbestos identification of stripping of surface material of bonded asbestos areas within the Stage 1 area (as shown on Figure 4), transport to the Stage 2 area and stockpiling;
7. visual inspection of the residual Stage 1 soils;
8. construction management through supervision by person appropriately trained in asbestos identification of stripping of surface material of bonded asbestos areas within the Stage 2 area (as shown on Figure 4) and stockpiling;
9. sampling of stockpiled soils by the environmental consultant to determine suitability for reuse and subsequent assignment of a material tracking ID;
10. visual inspection of all areas identified as containing asbestos;
11. based on material suitability for reuse, replacement of soils following excavation;
12. after remediation is completed, site-wide (Stage 1 and 2) validation will be required in 10 m x 10 m areas as per Section 11 and the Validation report prepared for the site.

8.1 Data Gap Close Out

To adequately close out existing data gaps for areas beneath existing structures and underground services the following sample designs are to be applied.

8.1.1 Beneath Existing Structures

1. Undertake a site walkover of the former building footprint by a person appropriately trained in asbestos identification (environmental consultant, licensed asbestos assessor or hygienist);

2. Advancement of five test pits within the former building footprint and inspection for potentially asbestos impacted fill;
3. In the event potential asbestos impacted fill is encountered, continue test pits to base of fill and collect one soil sample per test pit for analysis of asbestos as per NEPM 2013 (including AS4964). Samples of potential asbestos containing material should also be collected and analysed for the presence of asbestos; and
4. Where fill is found to contain asbestos, the remedial and construction management process outlined in Section 8.2 onwards should be implemented for the entirety of the building footprint based upon concentrations identified in soil.

8.1.2 Buried Pipelines and Structures

1. Services should be located prior to excavation and confirmed to be redundant;
2. Excavation should be undertaken with due care so as not to damage the structure, with the final 100mm exposed via hand tools to ensure services are not damaged. If the services are likely to be damaged they should be wetted during excavation;
3. Once exposed, services should be inspected by an appropriately trained person. Services which are visually identified as being either of fibre cement construction, or containing a fibrous lagging, shall be sampled and analysed for the presence of asbestos;
4. HOLD POINT - Services shall not be removed until analytical results are received;
5. Services which are found to not contain asbestos are to be removed as per standard practice. Services containing asbestos shall be removed as per SafeWork guidelines;
6. The identified asbestos containing communications box shall be removed during the service removal process in accordance with SafeWork guidelines; and
7. Inspection reports should be retained for all services. Services containing asbestos shall be validated as per Section 11.

8.2 Pre-Remedial Works and Site Establishment

Initial activities at the site shall involve the establishment of all plant and equipment necessary for the remediation works. Prior to the commencement of any earthmoving activities, it will be necessary to prepare an asbestos removal control plan, provide notification to regulators, and install environmental protection safeguards, as well as site security measures. These measures include:

- Notification to Council in accordance with SEPP 55 - Remediation of Land;
- Development of an asbestos removal control plan to identify the specific control measures the asbestos removal licence holder will use to ensure workers and other persons are not at risk when asbestos removal work is being conducted;

- Notification to the regulator in writing at least five days prior to the proposed remediation works commencing in accordance with the Safe Work Australia Code of Practice (2016);
- Undertaking service clearance to ensure no services will be damaged by the remediation works; and
- Designating stockpile areas, haul routes and decontamination areas for plant and machinery to be used during the works;
- Installation of barricades to limit access and asbestos signage in accordance with the Safe Work Australia Code of Practice (2016).

Pre-remedial and site establishment requirements are detailed in the following subsections.

8.2.1 Pre-Remedial Works

Prior to remedial works commencing notification to regulators will be required.

The proposed remediation works are considered Category 2 remediation works, based on the following assessment of clause 9 of SEPP 55:

- The work is not considered designated development.
- The work is not on land identified as critical habitat.
- The work is not likely to have a significant effect on threatened species, populations, ecological communities or their habitats.
- Is carried out or to be carried out in an area or zone to which any classifications to the following effect apply under an environmental planning instrument:
    - coastal protection;
    - conservation or heritage conservation;
    - habitat area, habitat protection area, habitat or wildlife corridor,
    - environment protection;
    - escarpment, escarpment protection or escarpment preservation;
    - floodway;
    - littoral rainforest;
    - nature reserve;
    - scenic area or scenic protection; and
    - wetland.

- Is not carried out or to be carried out on any land in a manner that does not comply with a policy made under the contaminated land planning guidelines by the council for any local government area in which the land is situated.

Category 2 remediation works require that notice is given to the Wagga Wagga City Council at least 30 days prior to the commencement of the works. A notice complying with the requirements of Clause 16(3) of SEPP 55 should be prepared. Notice of completion of remediation works must also be provided within 30 days after completion of the work, consistent with Clauses 17(2&3) and 18. Furthermore, State Environmental Planning Policy (Housing for Seniors or People with a Disability) 2004, part 1, Clause 16 states development consent is required for the wider development, and development approval is required for the change of use of the site, and therefore the planning control and approval process for the remediation component of this development will be covered under the current project DA. As such an additional DA for the remediation works is not considered necessary. The Wagga Wagga Local Environmental Plan (LEP) (2010) additionally states that development consent is not required if the work is ancillary to other development for which development consent has been given.

An appropriately experienced and licensed Class A asbestos remediation Contractor (the remediation contractor) is required to undertake the works, under the supervision of an appropriately qualified SafeWork NSW (or equivalent) Licensed Asbestos Assessor for areas of fibrous asbestos. For remaining areas, works can be undertaken under the supervision of a Class B asbestos remediation contractor. The licensed contractor must submit a site-specific licence application, including asbestos removal control plan, to SafeWork NSW to undertake friable asbestos works at the site. This licence application must be made at least five working days before any asbestos works are commenced. Remediation works shall not commence until all required approvals, licences and notifications have been granted and/or received.

Furthermore, all required environmental and health and safety documentation must be completed prior to the commencement of remedial works including a health and environmental safety plan and CEMP. The CEMP shall be site specific, prepared in accordance with Guideline for the Preparation of Environmental Management Plans (DIPNR, 2004) and the Consultants Reporting on Contaminated Land (NSW EPA, 2020) and provide details regarding the Principal Contractor responsibilities for RAP implementation during the earthworks. This shall include, but not be limited to, excavation and inspection of surface soils, material tracking, stockpile segregation, unexpected finds protocol, service inspection and validation protocols through reference to the appropriate sections of the RAP.

8.2.2 Site Establishment

Based on the delineation works, the proposed remediation areas shall be established at the site with temporary fencing, or a similarly suitable physical barrier, installed surrounding the asbestos remediation area and proposed isolation area. A summary of the requirements for the

establishment of the asbestos remediation areas prior to asbestos removal works commencing is as follows:

- The asbestos remediation area/s shall be marked out and temporary fencing, or other easily recognisable barriers may be used to demarcate the proposed asbestos removal area;
- Installation of asbestos warning signs to asbestos removal works boundaries for the duration of the asbestos removal works and until final validation and clearance has been provided;
- The remediation contractor shall be responsible for undertaking a pre-start 'toolbox' talk with all personnel involved. No unauthorised/non-inducted personnel may enter any asbestos removal area; and
- Prior to remediation works commencing, undertake a waste classification of material to be disposed off site in accordance with the NSW Waste Classification Guidelines (2014). Appropriate asbestos controls and PPE shall be utilised by workers undertaking the waste classification works;

8.2.3 General Excavation and Plant Movement

Due to the presence of asbestos materials at the site, strict controls for excavation and plant movement are required to ensure asbestos is not tracked from areas containing asbestos to areas where asbestos has not been identified, or has previously been excavated. Furthermore, due to the footprints for Buildings 502, 504, 505, 506, 527 and Area 8 having elevated concentrations of asbestos, management early in the construction program will minimise the risk for improper management through the construction program. These include:

- rumble grids for the removal of soils from tracks and tyres should be installed at the boundaries of excavation zones;
- all plant which have operated in, or travelled through potential asbestos areas will require decontamination prior to exiting the area. Asbestos areas shall have clear entry and exit points;
- in the event movement from staging areas through asbestos impacted areas is required, this shall be via designated haul roads to remove plant contact with potential impacted soils. Haul roads shall be constructed of imported DGB or similar engineered fill. Material should be compacted and of at least 100 mm thickness;
- excavation of surficial soils in areas not under remediation shall be supervised through overseeing/watching the excavation by a person trained in the identification of asbestos. Where asbestos is identified, the area shall be placed under asbestos controls and the material segregated

- if materials are encountered during excavation that contain visual indicators of potential increased risk of asbestos (building rubble, brick, piping), these should be stockpiled separately, the environmental consultant notified and sampled at a higher density if required; and
- areas identified as containing a higher asbestos risk, such as the footprints to buildings 502, 504, 505, 506, 527 and the area 8 ancillary building should be separately stripped and individually stockpiled prior to stripping of the remaining areas of the site, with the exception of Building 503.

8.3 Remediation Works

A general summary of the requirements for the remediation works is as follows:

- the remediation contractor shall have total control of the fibrous asbestos remediation area for the duration of the asbestos remediation works and shall undertake all works in accordance with the requirements of their licence;
- all personnel entering the fibrous asbestos remediation area shall do so with the required personal protective equipment (PPE) at all times, including:
    - Disposable coveralls must be worn (Type 5, Category 3 or better);
    - Disposable gloves – non-disposable gloves must be cleaned within the decontamination unit in accordance with SWA (2016b);
    - P2 class respirator or higher – non-disposable respirators must be cleaned in the decontamination area in accordance with SWA (2016b);
    - Steel capped rubber soled work shoes or gumboots; and
    - PPE in accordance with the development site construction requirements.
- installation of static asbestos air monitors at locations surrounding all fibrous asbestos remediation works, including the proposed isolation area. Air monitoring shall be conducted for the duration of remediation and shall be completed in accordance with the National Occupational Health and Safety Commission's Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres – 2nd Edition [NOHSC: 3003 (2005)];
- the proposed asbestos remediation areas shall be kept damp by water spraying at all times during disturbance to reduce the possibility of dust generation;
- soils shall be excavated in a suitable manner to the required depth as detailed below. Plant operators undertaking intrusive works must close cabin doors and windows and set

air conditioning to recirculate when operating within the asbestos work zone or wear PPE as listed above;

- the asbestos containing communications box shall be removed under bonded asbestos conditions as described in the Safe Work Australia Code of Practice (2016);
- buildings which contain asbestos will have the hazardous material survey (HMS) reviewed prior to being demolished as per the Safe Work Australia Code of Practice (2016), following which the HMS will be updated and clearance certificate issued;
- excavated fibrous asbestos impacted soils and asbestos containing materials shall be stockpiled within the lot boundary, near to the excavation area. Stockpiling shall be on geofabric, wet down and appropriately covered to ensure airborne fibres are not produced and in accordance with Section 8.4.3 and the Landcom (2004) Managing Urban Stormwater: Soils and Construction. Trucks and mobile plant transporting asbestos containing materials will be decontaminated prior to leaving the remediation area, ensuring all soil materials are removed from tyres. Asbestos loads will be covered while underway;
- stockpiled soil materials shall be classified in accordance with the NSW EPA (2014) Waste Classification Guidelines through sampling at a rate of 1 sample per 25 cubic metres, and subsequent preparation of a Waste Classification Report in accordance with NSW EPA requirements; and
- offsite disposal of fibrous asbestos containing materials will be undertaken at a suitably licensed waste facility in accordance with the NSW EPA waste classification guidelines (NSW EPA 2014) and landfill requirements. Asbestos materials shall be tracked and reported to the NSW EPA using WasteLocate. Waste dockets shall be provided by the Class A contractor to the Licensed Asbestos Assessor and environmental consultant to form part of the ground surface clearance report.

8.3.1 Building 503 Fibrous Excavation and Clearance

The following remediation areas within the former Building 503 area are known to require remediation as shown on Figure 4 and detailed below:

1. Northern verge adjacent to building footprint containing DSI Pits 347 and 4 (combined 800 m^2) - excavation to 0.1 m depth based on strip trenching.
2. Former Building 503 footprint containing Pit 18 (3,000 m^2) - excavation to 0.2 m depth based on strip trenching.

The above areas shall have the asbestos impacted surface soils stripped (topsoil within area 1 and compacted fill within area 2 above) under asbestos conditions, with material then covered and transported to an area within the lot boundary and near to the excavation for stockpiling. The area will then be visually cleared, including raking to a depth of 0.1 mbgl to ensure all fill and

topsoil materials have been removed by a licensed asbestos assessor and residual asbestos fragments removed. Based on the above measurements, an in situ volume of approximately 380 m^3 will require containment. Based on a bulking factor of 1.3:1, approximately 500 m^3 of material is expected to require classification.

Following visual inspection, undertake soil validation works in accordance with WA DoH 2009, with 500 ml samples collected for analysis at a rate of one sample per 10 square meters from the excavation floor for the area of fibrous asbestos by the environmental consultant.

8.4 Construction Phase Material Management

8.4.1 Stage 1 & 2 Bonded Asbestos Excavation and Clearance

The following management steps will be undertaken within the Stage 1 and 2 bonded asbestos areas (refer to Figure 4):

- excavation of the surficial 0.1 m of bonded asbestos impacted soil under Class B asbestos conditions;
- transport of excavated material to a designated stockpile area by covered truck, under asbestos conditions;
- Stockpiling of material in accordance with 'blue book' guidance, with stockpiles not to be greater than 500 cubic metres in size;
- subsequent inspection, turning over of stockpiles of stockpiles while test pitting using an excavator to adequately characterise stockpile materials and sampling of soil materials at a rate of 1 500 ml sample per 200 cubic metres and analysis for asbestos. A rate of 1 per 200 cubic metres has been selected based on the site being adequately characterised by the data provided by the DSI and additional resampling of soil to be undertaken during the works;
- upon receipt of analytical results, comparison to the assessment criteria detailed in Section 7 to confirm the material suitability. Stockpiles which are suitable for reuse shall be labelled accordingly and covered to ensure additional soil materials are not added; and
- following the removal of asbestos impacted soils, the environmental consultant shall undertake a visual assessment of the resultant soils to ensure no visible asbestos is present, prior to commencement of further earthworks into natural soils.

8.4.2 Material Tracking

Material tracking is required for soil materials generated during the construction process, with records maintained for the duration of works. Specifically:

- a material tracking register is to be prepared and maintained for the duration of works;
- at a minimum, the following material types are to be tracked during the construction process:
    - asbestos impacted soil materials to be stockpiled for suitability assessment;
    - soils assessed as being suitable for reuse within HIL/HSL A - residential areas;
    - soils assessed as being unsuitable for reuse within residential areas, but suitable for reuse beneath roads;
    - asbestos impacted soil materials to be disposed offsite;
    - unimpacted soil materials (including natural materials encountered following surficial stripping, and those assessed as cleared through validation) recovered and re-used as engineered fill;
    - movement of soil to and from temporary storage/ stockpiled areas;
    - soil materials classified and disposed to landfill;
- material should be separated based on each type above, with impacted materials (asbestos or otherwise) delineated and segregated using a physical barrier (barrier tape, temporary fencing or geofabric) and clearly signposted as to the material type. A colour system should be employed for easy on site identification of stockpiles, with soils suitable for reuse being green, suitable for reuse under roads being orange, and requiring offsite disposall being red;
- for each material, all aspects of the transport operation are to be recorded within the tracking register (Appendix B), including:
    - initial material location;
    - process which disturbed the material;
    - volume of material;
    - name of contractor involved in the material removal;
    - name of transporter, including company name, licensed operator name and license number;
    - placement location;
- for waste material to be disposed of to landfill, a specific material ID shall be designated for each stockpile / in-situ area for waste classification purposes. The material ID shall be entered into the tracking register as well as the waste classification report reference. Prior to disposal, the landfill Environmental Protection Licence shall be reviewed to ensure the

landfill is licensed to accept the specific class of waste. Following disposal, the waste disposal dockets will be retained and entered into the material tracking register;

- upon completion of works, the material tracking register, and supporting waste disposal dockets, will be provided to the environmental consultant for inclusion in the Validation report; and
- material imported to site, inclusive of topsoils, DGB, recycled concrete etc., should be accompanied by a certificate verifying it as subject to an exemption, or ENM/VENM. All imported material documentation will be reviewed by the environmental consultant prior to acceptance of the material. In the event adequate documentation is not provided for material proposed to be imported, it shall not be accepted until appropriate testing has been completed.

A suggested material tracking sheet is provided in Appendix B.

8.4.3 Temporary Stockpiling of Soil

Soil excavated from areas of asbestos impact shall be segregated and stockpiled within a designated stockpile area. In the event material is required to be transported for stockpiling, the plant shall be decontaminated prior to leaving asbestos impacted zones to ensure asbestos is not spread to un-impacted areas. The following steps should be undertaken when temporarily storing potentially contaminated soils:

- segregate potentially contaminated soil from clean materials;
- place stockpile on a plastic liner, or geofabric for potential asbestos impacted stockpiles;
- keep soil moist through periodic wetting once stockpiled, and during excavation; and
- soil to be stored in excess of 30 minutes should be covered by plastic sheeting or geofabric, and securely weighted to minimise wind and weather exposure and signposted as containing asbestos and the material use as per Section 8.3.4.

8.4.4 Decontamination Procedures

The decontamination procedures specified below will be followed whenever personnel, plant or equipment leave the works area.

- wash plant and equipment thoroughly while in the appropriate PPE. Particular attention should be given to areas in contact with soil, such as tyres, tracks and excavator buckets;
- wash boots in clean water;
- remove outer gloves and store for reuse;
- remove overalls and place in the designated asbestos waste bin for disposal to a licensed facility;

- remove respirator and goggles (if used) and store clean for reuse or decontamination, as appropriate; and
- thoroughly wash hands and face.

9 Remediation Works Contingency Plan

The purpose of the Remediation Works Contingency Plan (RWCP) is to outline procedures for the identification and management of unexpected issues or events that may occur during the remediation works
They key risks that have the potential to arise during the remediation works include:

- unexpected finds;
- excavation works fail to achieve the remediation criteria and goals; and to a lesser extent; and
- heritage items.

The contingency measures that will be implemented to ensure that the remediation criteria are met are discussed below.

9.1 Unexpected Finds Protocol

The RAP is developed through a review of the previous investigations and historical activities that have been undertaken at the Site to determine the potential contaminants of concern. However, the possibility remains for unanticipated contamination (i.e. contaminated soil, water or debris) and/or potential source structures such as underground fuel storage tanks to be encountered.

The nature of residual material and the associated hazards are generally detectable through visual or olfactory means such as:

- hydrocarbon impacted materials through staining and odours;
- asbestos containing material (ACM) through visual observation outside of currently known areas of asbestos, or identification of fibrous asbestos in areas outside of the fibrous asbestos works zone;
- construction /demolition waste through visual observation;
- waste material associated with illegal dumping through visual observation; and
- ash or slag contaminated soils through visual observation.

In the event that one or more of the above mentioned substances are encountered, the following steps should be undertaken:

STEP 1: Immediately cease work and contact the Environmental Contractor or Project Manager.

STEP 2: Environmental Contractor personnel to form an exclusion zone through the use of barricading or similar to prevent access and exposure by workers.

STEP 3: Environmental Contractor to contact Environmental Consultant (if not already on Site) to arrange for inspection of encountered material.

STEP 4: Environmental Consultant to undertake detailed inspection and sampling and analysis of unexpected material. The sampling density requirements will be determined on-Site in accordance with the requirements of the NSW EPA (1995) *Sampling Design Guidelines*

STEP 5: Environmental Consultant to assess analytical results against remediation criteria.

STEP 6: Where results exceed the remediation criteria assess the appropriateness of the remediation approach with respect to the unexpected material encountered.

STEP 7: Where the unexpected material is considered suitable for adopted remediation approach, the material should be removed in accordance with the remediation methodology outlined in this RAP.

STEP 8: Undertake an assessment of potential remediation options and develop a separate RAP to address the requirements of remediation for material or classification in accordance with the NSW EPA (2014) Waste Classification Guidelines and disposal offsite to a facility licensed to accept the specific class of waste.

STEP 9: Environmental Consultant to supervise remediation and undertake validation in accordance with the RAP.

STEP 10: Environmental Contractor to remove barricades for exclusion zone.

STEP 11: Environmental Consultant to submit Validation Report to Environmental Contractor.

9.2 Excavation Works Fail to Achieve Remediation Criteria

Where the excavation works result in the validation criteria not being met, the following contingency measures should be implemented:

- review the results of the validation works;
- determine the lateral and vertical extent of contamination which remains on-Site and requires further remediation;
- mark out the spatial boundaries on-Site and communicate the depth boundaries to Environmental Contractor/Civil Contractor for further remediation within the required areas through additional excavations;
- upon completion of the additional remediation works, undertake validation works in accordance with this RAP; and

- where the validation works returns successful results, remediation is considered to have been completed.

9.3 Stockpile Assessment Fail to Achieve Residential Remediation Criteria

Where suitability assessment of material excavated from non-friable areas is found to exceed the HSL A assessment criteria, thereby making it unsuitable for reuse within the aged care development area, the following contingency process should be undertaken:

1. comparison of results to the NEPM (2013) HSL D - Commercial industrial assessment criteria to determine suitability for the material to be placed beneath roads;
2. i.e. due to time or space constraints, classification of the material in accordance with the NSW Waste Classification Guidelines (2014) and disposal off site to a licensed facility.

9.4 Heritage Items

Cultural heritage sites are easily damaged or destroyed by natural processes such as erosion, as well as disturbance. While it is not possible to prevent the slow destruction of cultural heritage sites, it is possible to prevent unnecessary damage by the implementation of careful work practices.

Due to the location and nature of the Site within an industrial and residential area, it is considered unlikely that heritage items will be encountered during the remediation works. However, given the nature of the disturbing activities that will be undertaken during the remediation works, should potential heritage items be encountered unexpectedly, the following contingency measures should be implemented:

STEP 1: Immediately cease all activities that could in any way interfere with or disturb the encountered site and/or object(s).

STEP 2: Promptly report the discovery to the Environmental Contractor where available who will in turn notify the Environmental Consultant, Council and/or the relevant regulatory authorities. Until further instructions are received:

- DO NOT disturb the Site;
- DO NOT collect any artefacts as this may alter the scientific value;
- DO NOT touch or interfere with painted art as this may cause the pigmentation to deteriorate, and similarly; and
- DO NOT touch up painted art or enhance engravings for the purposes of photographs.

STEP 3: Details of the find should be documented including:

- location of find in relation to the project site;
- person(s) whom encountered the find;
- time and date of find;
- description of find including number of objects, shape, colour etc.;
- actions taken; and
- without touching or interfering with the site and/or objects, obtain photographs for record of find.

10 Roles and Responsibilities

Roles and responsibilities during the remediation works are described in Table 7 below.

Table 9: Roles and Responsibilities

Role	Responsibility
Environmental Project Manager	Ensure field personnel are suitably familiar with the requirements of the OH&S Plan before commencing works on site. Ensure subcontractors are suitably qualified and safe work method statements have been supplied and approved prior to commencing works on site. Responsible for the day to day implementation of the health and safety plan in all phases of work. Ensure that any required modifications to the OH&S Plan are noted, communicated to all project staff and are implemented.
Environmental/Civil Contractor Manager	Inductions for remediation personnel and contractors in accordance with the site-specific Induction requirements. Ensure communication and notification of the remediation works to the site owners, leaseholders, Council and operators. Provision of copy of the RWP to site owners, leaseholders and operators. Maintain material tracking records
Environmental Field Manager	Induction of sub-contractors and/or other Field Personnel in accordance with the requirements of this OH&S Plan and the site-specific Induction. Ensure they are personally familiar with the requirements of the OH&S Plan before commencing works on site. Ensure that they appropriately induct sub-contractors and visitors to the site and that all persons inducted sign the acknowledgement form of this OH&S Plan (Appendix A). Ensure the on-site activities and deliverables conform to the OH&S Plan. Ensure that appropriate Personal Protective Equipment (PPE) is worn. Report any incidents or accidents as soon as possible.
Appropriately Trained person / person appropriately trained in asbestos identification	Person who has undergone asbestos identification training from an accredited training body. Oversees all excavation works onsite. Segregates stockpiles based on visual observations for sampling to be undertaken by the environmental consultant.
Environmental consultant	Review and approval of imported material documentation. Sampling and inspection of stockpiles. Sampling and inspection for validation. Classification of materials for offsite disposal. Preparation of validation reports and material suitability checklists.
Contractors	Site-specific Induction and OH&S Plan before commencing works on site and have signed acknowledgement form of OH&S Plan. Responsible for abiding by the OH&S Plan. Provide H&S P's and/ or SWMS's for work to be undertaken. Ensure they are suitably qualified and trained to complete the tasks required including operation of equipment. Ensure the on-site activities and deliverables conform to the OH&S Plan. Ensure that appropriate PPE is worn. Report any incidents or accidents to the Field Manager as soon as possible. Contractors should demonstrate appropriate OHS knowledge and performance, be able to identify risks associated with the work they are doing and provide suitable work methods to minimize the risks to themselves and others.

11 Validation

A validation plan is required to ensure the effectiveness of the remediation works and confirm the final site condition as being suitable for the proposed future use. Validation procedures to be undertaken following remediation works are described in the following subsections.

11.1 Validation Description

Given the widespread nature of asbestos impact at the site, a combination of capping, visual and analytical validation methods are required. Proposed validation methods are presented below:

Table 10: Validation Methods

Method	Item Requiring Validation	Validation Process
1	Service Removal	1. Identify redundant services and locate; 2. Excavate and expose service; 3. Inspection by a person appropriately trained in asbestos identification and completion of an inspection record, including photographs and report; 4. Sampling of services visually suspected of containing asbestos by an environmental consultant, occupational hygienist or licensed asbestos assessor and completion of asbestos inspection report; 5. Following receipt of sample results, removal of service under asbestos conditions if identified as containing asbestos; 6. Visual inspection of the area of removed services involving a grid based walkover of 1 m width and raking of the top 0.1 m using a rake with teeth no greater than 7mm apart to ensure no visible asbestos is present followed by validation sampling by the environmental consultant, occupational hygienist or licensed asbestos assessor in accordance with Table 13. In the event asbestos is identified by the raking, additional passes will be undertaken until clear; 7. Review of disposal documentation to ensure appropriate material disposal; and 8. Inclusion in the site validation report.
2	Stockpiled materials generated onsite	1. Inspection of the stockpiled material through 'flipping' with an excavator; 2. Sampling at a rate of 1 sample per 200 cubic metres as per Section 11.2; 3. If asbestos is present, further quantification using gravimetric analysis; 4. Confirmation of material suitability for use or requirement to be disposed offsite; 5. Assignment of a material tracking ID in accordance with Section 8.4 based on assessment results; 6. Track and document end location of material use; 7. Inclusion of tracking and sample results in the site validation report.
3	Building footprints identified as containing asbestos above assessment criteria (507, 510, 525, 526, 501)	1. Visual inspection of the former building footprint area following removal of surficial material by walking the entire removal footprint in a systematic grid pattern of 1 m width to ensure all residual soils are inspected. During the walkover, a rake with teeth spacing no greater than 7mm shall be used to inspect the top 0.1 m of soil The area should be walked three times at minimum and undertaken by the environmental consultant, occupational hygienist or licensed

		asbestos assessor. In the event asbestos is identified by the raking, additional passes will be undertaken until clear; 2. Collection of soil samples at a rate of 1 per 10 square metres of excavation floor, and 1 per 5 linear metres of wall as per Table 12; 3. Confirmation of appropriate removal of impacted material and review of tracking/disposal documentation; and 4. Inclusion of inspection and sampling results in the site validation report.
4	Fibrous asbestos area (building 503)	1. Visual inspection of the former building footprint following removal of impacted material by walking the entire removal footprint in a systematic grid pattern to ensure all surficial soils are inspected. During the walkover, a rake with teeth spacing no greater than 7mm shall be used to inspect the top 0.1 m of soil. The area should be walked three times at minimum and undertaken by a licensed asbestos assessor. In the event asbestos is identified by the raking, additional passes will be undertaken until clear; 2. Collection of 500 ml soil samples at a rate of 1 per 10 square metres of excavation floor, and 1 per 5 linear metres of wall as per Table 12; 3. Confirmation of appropriate removal of impacted material and review of tracking documentation; 4. Preparation of an interim validation report including the inspection report and sample results by the environmental consultant; 5. Review of tracking and disposal documentation; and 6. Inclusion of inspection and sampling results and disposal documentation in the site validation report.
5	Excavation following removal of 100mm of surficial soil	1. Visual inspection of the excavation area following removal of surficial material by walking the entire removal footprint in a systematic grid pattern to ensure all residual soils are inspected. During the walkover, a rake with teeth spacing no greater than 7mm shall be used to inspect the top 0.1 m of soil. The area should be walked three times at minimum and undertaken the environmental consultant. In the event asbestos is identified by the raking, additional passes will be undertaken until clear; 2. Preparation of an asbestos clearance report for inclusion in the site validation.
6	Imported material	1. Review of documentation for all material proposed to be imported to site to determine suitability for the site use and lawfulness to accept. For documentation to be considered adequate it must include: a. a description of the material source and history; b. material volume; c. description of the material characteristics including colour, material type and photographs to allow onsite comparison to the material once imported; d. adequate chemical testing to satisfy the material is suitable for the site, as well as lawfully acceptable; e. QAQC requirements have been met where appropriate, with appropriate QAQC measures implemented (duplicate/triplicate, laboratory methods etc.); f. a clear statement of the material type. 2. In the event material does not have adequate documentation, or the materials suitability can not be verified from provided documentation, refusal of material or testing in accordance with the relevant guideline for the material type, or material specific density reviewed by the auditor prior to sampling; and

		3. Inclusion of imported material details in the site validation report
7	100 mm of surface soils	1. Undertake a review of site survey plans, imported material tracking documentation and stockpile reuse documentation to determine areas which have not been surficially cleared; 2. Undertake a site walkover of identified areas and advancement of test pits as per item 9 to ensure no visible asbestos is present in surface soils. This shall be undertaken through importation of material proven to be suitable for the site, construction of buildings and hardstand, or by validation of the site surface in accordance with WA DOH (2009).
8	Areas not investigated or excavated during construction	1. Following completion of site earthworks, advancement of 1 test pit per area without previous investigation or earthworks; 2. Visual inspection for the presence of fill or asbestos; 3. Collection of 1 soil sample per test pit in accordance with Table 12 for analysis of asbestos and gravimetric analysis; and 4. Inclusion of findings in the site validation report.

11.2 Validation Sampling, Analytical and Quality Plan

The objective of the SAQP is to describe the sampling, analytical and quality program (if any) undertaken during the validation of the site. This SAQP was developed prior to fieldwork.

11.2.1 Objectives

The objectives of the validation is to assess whether the remediation criteria and objectives have been met, and whether the site is suitable for the proposed use.

11.2.1.1 SAQP Objectives

The objective of this SAQP is to outline the data collection activities to be undertaken to assess remediated soil at the site.

Specifically, this SAQP:

- describes the rationale and data quality objectives for the proposed sampling program;
- specifies the proposed human health, risk and infrastructure criteria;
- outlines the field methodologies for sample collection;
- specifies key analytical considerations;
- specifies the quality assurance and quality control (QA/QC) program; and
- identifies assessment criteria and data quality objectives and indicators that help assess the reliability of the data collected.

11.2.2 Data Quality Objectives

The data quality objectives adopted for the validation are detailed in Table 8. A comprehensive assessment of the data quality indicators relating to both field and laboratory procedures will be undertaken and detailed in this validation report, including aspects detailed in Table 11.

Table 11: Data Quality Objectives – 7 Step Process

	Step	Information
1	State the problem	The client wishes to validate soils within the remediation areas to minimise the identified asbestos risk to human health, potential liability associated with the asbestos and make the site suitable for the proposed use.
2	Identify the decision/ goal of the study	Does any onsite asbestos pose a risk to human health for onsite workers, future construction workers or users of the site once the residential development is complete? Has the asbestos materials been remediated so as to make the site a suitable level of contamination risk to human health? Are additional management measures required during site development? Is the site suitable for ongoing use, or other potential future uses?
3	Identify the information inputs	Previous investigations undertaken by MES. Site observations and discussion with Council, current construction workers or other authorised parties who may provide anecdotal information relating to the history of the site. Site layout plans. Soil sampling across the site and near potential contamination sources at the site.
4	Define the boundaries of the study	The validation boundary is the whole of site. Offsite sources and receptors in the surrounding area will also be considered. The depth boundary will be depth of remediation (between 0.1 and 0.5 m depth) as described in Section 8. There are no constraints for the proposed validation sampling, assuming Section 8.1 - Data Gap Close Out is undertaken.
5	Develop the analytical approach	A data quality review of the soil sample data will be completed to assess the validity of reported analytical results.
6	Specify performance or acceptance criteria	A range of QA/QC procedures and results will be used to evaluate whether the DQOs have been achieved. These procedures assess the usability of the data, particularly with regards to data accuracy and reliability for forming conclusions and are undertaken in accordance with guidance provided within Australian Standards, the NEPM, and by the United States Environmental Protection Agency (USEPA). The potential for significant decision errors is to be minimised by: • completing a robust QA/QC assessment of the field and laboratory data and application of the probability that 95% of data satisfies the DQIs, therefore a limit on the decision error is 5% that a conclusive statement may be incorrect; • assessing whether appropriate sampling and analytical density for the purposes of the assessment has been applied; • ensuring that the criteria set for the assessment works are appropriate for the proposed use of the site; and • a data validation checklist with specific acceptance criteria and discussion of results will be completed and provided within this investigation report.;
7	Develop the plan for obtaining data	The soil will be sampled by hand trowel and excavator bucket

11.2.3 Data Quality Indicators

An assessment of the Data Quality Indicators (DQIs) relating to both field and laboratory procedures has been undertaken with appropriate documentation provided for each

environmental element or media assessed. The DQIs adopted for the SAQP are summarised in Table 9.

Table 12: Data Quality Indicators

DQI	Information
QA Documentation	Provision of appropriate work plans, SAQP and DQO defined for the site and all QA/QC aspects documented.
Bias	Measure of the potential distortion in an analysis which can result in errors in one direction (e.g. one laboratory consistently higher results).
Representativeness	A qualitative measure of the confidence that data is representative of each medium present on the site. Use of appropriate and documented sampling methods, sampling handling, preservation and transport and holding times. Sampling and analytical procedures should be justified as to their appropriateness and effectiveness;
Precision	A quantitative measure of data variability or reproducibility. Precision in DQIs is considered an important assessment in an environmental study. Due to asbestos being inherently heterogeneous and its discrete occurence in soils, quality and reproducibility through duplicate and triplicate samples can be challenging and is therefore not proposed for asbestos validation. However, based onSection 4.5 of the *Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia (WA DOH, 2009),* it can be measured as follows: • use of similar analytical methods and instruments (e.g. for inter-laboratory assessment); • the environmental consultant should have adequate asbestos experience to ensure the quality of recommended visual detection and quantitation methodologies;and • laboratories will be NATA accredited with the Australian Standard Method for the Qualitative Identification of asbestos used all in bulk samples (AS4964-2004).
Accuracy	A quantitative measure of the closeness of data to a 'true value', measured by comparison of laboratory results to field observations and sampling guidances (including NEPC, 2013 and the WA CSMS).
Comparability	A qualitative measure of the confidence that data may be considered to be equivalent for each sampling and analytical event. By use of standard procedures, comparable methods, qualified personnel and review of sample integrity.
Completeness	A measure of the amount of usable data (expressed as a percentage - %) from a data collection activity, based on completeness of test program, overall QA/QC completeness and validity of dataset.

11.2.4 Sample Strategy and Methodology

The scope and method of the work is summarised in Sections 8 through 11. Sample locations will be selected based on a grid and targeted pattern across the remediation areas as described in Section 8 and 11.

Table 13: Soil Investigation Activity Summary

Activity	Information
Areas of fibrous material and building footprints identified as exceeding assessment criteria sample protocol	Following visual inspection, undertake soil validation works in accordance with WA DoH 2009, with surficial 500ml samples collected for analysis at a rate of 1 sample per 5 linear metres of excavation wall and one sample per 10 square meters from the excavation floor for the area of fibrous asbestos. Upon completion of the visual inspection and sampling, undertake clearance air monitoring through the installation of static asbestos air monitors at locations within the fibrous asbestos remediation work area. Air monitoring shall be conducted in accordance with the National Occupational Health and Safety Commission's Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres – 2nd Edition [NOHSC: 3003 (2005)].

Stockpiled Material from areas below assessment criteria sample protocol	Soil stockpiles will be visually screened through turning over of the stockpile by use of an excavator prior to sampling. Stockpiles to be validated as suitable for use on site will be sampled at a rate of 1 500 ml sample per 200 cubic metres of soil and analysed for asbestos. In the event significant, unexpected concentrations of asbestos is identified by the 500ml sample or environmental consultant visually, 10 L gravimetric analysis should be undertaken on the samples collected. An excavator shall be used to advance test pits, with samples obtained directly from the excavator bucket. Soil samples will be stored in zip-lock bags provided by the laboratory. All samples were labelled with an indelible marker pen directly on the bag.
Stockpiled Material from areas above assessment criteria (including high asbestos potential buildings 504-506, 527, 502 and area 8 ancillary footprints) sample protocol	Soil stockpiles will be visually screened through turning over of the stockpile by use of an excavator prior to sampling. Stockpiles to be validated will be sampled at a rate of one 500 ml sample and one gravimetric bulk sample per 50 cubic metres of soil and analysed for asbestos. An excavator shall be used to advance test pits, with samples obtained directly from the excavator bucket. Soil samples will be stored in zip-lock bags provided by the laboratory. All samples were labelled with an indelible marker pen directly on the bag.
Previously Uninvestigated / Unexcavated Areas	A test pit to 0.5 m depth shall be completed within the open space area of each planned subdivided lot in the event previous investigation or excavation and sampling has not occurred. One 500ml asbestos sample shall be collected from each test pit and analysed for asbestos. An excavator shall be used to advance test pits, with samples obtained directly from the excavator bucket. Soil samples will be stored in zip-lock bags provided by the laboratory. All samples were labelled with an indelible marker pen directly on the bag.
Underground services containing asbestos	Following visual inspection, undertake soil validation works in accordance with WA DoH 2009, with surficial 500ml samples collected for analysis at a rate of 1 sample per 5 linear metres of excavation wall and one sample per 10 square meters from the excavation floor for the area of removed asbestos containing services.
Imported Material	The environmental consultant must review documentation relating to the classification and testing of material prior to it coming to site, and also inspect material as it comes to the site as matching the documented quality and description. To ensure that material imported to site is suitable for use on the site a sampling protocol should be implemented to sample the material at a sampling density of not less than 1 sample per truckload unless otherwise determined by the environmental consultant, for analytes/contaminants of concern to be determined by the environmental consultant, and, potentially at the discretion of the environmental consultant, to review the source site and excavation/loading. QAQC samples should be collected at a rate of 1 duplicate and 1 triplicate per 20 primary samples and analysed for contaminants relevant to the material being imported. A rationale for the sampling density, analytes and validation of material should be documented in the validation report.
Decontamination Procedure	Sampling equipment will be decontaminated between each sample location. Fresh sampling disposable gloves will be used for each sample. Asbestos controls will remain in place until the validation results are received, with decontamination occurring prior to removal of controls.
Sample Preservation and Transport	Sample will be stored in a sealed esky (at ambient temperature) while on-site and in transit to the laboratory under Chain of Custody documentation.

11.3 Laboratory Analysis

Soil samples will be submitted to a NATA-accredited laboratory for analysis of asbestos. The selected analyses for each sample is detailed in Table 14 below.

Table 14: Laboratory Testing Program

Location	Primary Sample Nomenclature	Analyses
All Validation Areas	Val01, Val02, ValXX	Asbestos - Quantitation per AS4964 and NEPM 2013 Guidelines
Waste Classification Samples	SP*ID*/01_*depth*, SP*ID*/02_*depth*, SP*ID*/XX_*depth*	TRH, BTEX, PAH, metals 8, asbestos per AS4964, pH, pHfox

The quality control/ quality assurance (QA/QC) of the soil sampling program is discussed below.

11.4 Quality Analysis / Quality Assurance

A critical aspect of a soil investigation is the demonstration of the quality of the data used as the basis for the assessment. This is achieved through a Data Validation process which includes a review of the following aspects of the data collection process:

- project quality objectives and plans;
- data representativeness;
- data precision & accuracy;
- laboratory performance;
- data comparability; and
- data set completeness.

A detailed review of these aspects was undertaken, the results are presented in Section 11.2.4.

11.5 Validation Report

At the completion of remediation works, validation sampling and construction works, a Validation Report shall be completed. The Validation Report should be written in compliance with all relevant guidelines endorsed by the NSW EPA and follow the format set out in *Guidelines for Consultants Reporting on Contaminated Sites (NSW OEH 2011)*. In addition to the matters outlined in NSW OEH 2011, the Validation Report must contain information including, but not limited, to the following:

- details of the remediation works;
- information demonstrating that the objectives of the remediation and validation works have been achieved, in particular the validation results and assessment of the results against both the data quality objectives and the remediation acceptance (validation) criteria;
- information demonstrating compliance with appropriate regulations and guidelines;
- any variations to the strategy undertaken during the implementation of the remedial works and justification for the variation to the strategy;
- results of environmental monitoring undertaken during the course of the remedial works;
- all clearance certificates issued should be included as attachments;
- description of the remediation works undertaken at the remediation site, with drawings showing the locations of all significant works;
- a survey plan showing the locations of:

- the cadastral boundaries of the Remediation site;
- all fences and gates at the remediation site;
- vehicle access tracks to and within the remediation site; and
- the extent remediation completed and any residual contamination.

- descriptions, supported by relevant drawings, cross-sections and as-builts:
- description of the residual impacts requiring management, if any, including the nature and extent of impacted solid waste materials within the site;
- details of any environmental incidents occurring during the course of the remedial works and the actions undertaken in response to these incidents;
- details on waste classification, tracking and off-site disposal, including receipts from a licensed landfill of all materials disposed off-site;
- details on materials imported to the site (if any);
- a clear statement of the suitability of the site for the proposed use and any requirements for a Long Term Environmental Management Plan;
- if an LTEMP is required, it should include at a minimum in compliance with the NSW EPA Consultants reporting on Contaminated Land (NSW EPA 2020) guidelines Section 1.7, including the location and specifications of any waste cells, considerations in relation to other site investigations and proposed uses, who is responsible for ensuring the EMP is implemented in perpetuity (which may include inspections and maintenance of surfaces and capping material, any limitations to intrusion or subterranean services, mechanisms to ensure the areas are protected from unintentional or uncontrolled disturbance that could breach the integrity of any Containment Cell);
- assessment of the reliability of the field and laboratory programs, as appropriate, is required to be addressed in accordance with in accordance with Section 4.1.1 of the NSW EPA Guidelines for the NSW Site Auditor Scheme (3rd Edition), 2017 and Section 18.2 of Schedule B2 of the NEPM (NEPC 2013); and
- the overall suitability of the site is required to be assessed in compliance with the decision-making process for assessing urban development sites as set out in Appendix A of the NSW EPA Guidelines for the NSW Site Auditor Scheme (3rd Edition), 2017.

12 Proposed Remediation Schedule

Based on the remediation works the following schedule is proposed.

Table 15: Remediation Schedule

Construction Staging	Remediation Item	Section of RAP	Timing
Demolition of buildings and known asbestos impact remediation works	1. Site establishment; 2. Stripping of delineated former Building 503 area of fibrous asbestos stockpiling and waste classification;; 3. HOLD POINT - Inspection, sampling and validation of former building 503 footprint; 4. WITNESS POINT - Review of interim area validation; 5. Upon confirmation of validation, removal of asbestos controls for former building 503 remediation area; 6. Stripping of surficial soils in high risk building footprint areas (504-506, 527, 502 and building in area 8); 7. HOLD POINT - Inspection, sampling and validation of former building footprints; 8. WITNESS POINT - Review of interim building footprint validation by site auditor.	8.2 8.3 11.1	1 month
Main Earthworks Stage	1. Designate stockpile area for material to be assessed; 2. Undertake material tracking for all disturbed soils; 3. Commence surficial stripping of Stage 1 and 2 and relocate soils for assessment to stockpile area under the supervision and watch of a person trained in the identification of asbestos; 4. Undertake assessment of stockpiled soils for reuse; 5. HOLD POINT - Provision of asbestos clearance report and visual inspection by environmental consultant prior to commencement of earthworks in unimpacted soils; 6. Over excavation of Stage 2 area and placement of soils deemed suitable for reuse prior to importation of fill layer.	8.4 11.1	4 months
Completion of building works	NIL		12 months
Finalise Civil works, landscaping etc	1. HOLD POINT - Undertake a	11.1	1 month

	site wide validation of the top 100 mm, including review of survey plans, and provision of a Validation Report; 2. WITNESS POINT - Auditor Review and approval of the Validation Report; 3. HOLD POINT - Preparation of Long Term Environmental Management Plan (LTEMP) for the site; 4. WITNESS POINT - Review and approval of LTEMP by the auditor.		
Commissioning of building and provision of Occupancy Permit by Council.	NIL		1 month

13 Conclusions

iEnvi have selected the following remediation method in relation to asbestos impacted materials at the site as reported by the previous investigations undertaken by McMahon Earth Science:

1. implementation of an accepted Construction Environmental Management Plan (CEMP) during remediation works;
2. begin close out of data gaps through sampling beneath existing structures and underground services;
3. stripping of the area of identified fibrous asbestos impacted soil in and around former building footprint 503, and classification and disposal of soil material offsite;
4. stripping and stockpiling of the high asbestos potential building footprints (502, 504, 505, 506, 527 and the area 8 ancillary building);
5. construction management through supervision by person appropriately trained in asbestos identification of stripping of surface material of bonded asbestos areas within the Stage 1 area (as shown on Figure 4), transport to the Stage 2 area and stockpiling;
6. visual inspection of the residual Stage 1 soils;
7. construction management through supervision by person appropriately trained in asbestos identification of stripping of surface material of bonded asbestos areas within the Stage 2 area (as shown on Figure 4) and stockpiling;
8. sampling of stockpiled soils by the environmental consultant to determine suitability for reuse and subsequent assignment of a material tracking ID;
9. visual inspection of all areas identified as containing asbestos;
10. based on material suitability for reuse, replacement of soils following excavation;
11. after remediation is completed, site-wide (Stage 1 and 2) validation will be required in 10 m x 10 m areas as per Section 11 and the Validation report prepared for the site.

The above remediation program is considered to meet the objectives of the RAP by remediating the asbestos impacted site soils which are above assessment criteria through offsite disposal so they do not pose a risk to human health of future site users. Following implementation of the remediation works, fibrous asbestos materials will be removed, with pathways between asbestos materials and site users removed. As such, the site will be considered to have been made suitable with regard to the future residential land use.

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15 Limitations

The conclusions presented in this report are relevant to the conditions of the site and the state of legislation currently enacted as at the date of this report. iEnvironmental Australia Pty Ltd (iEnvi) does not make any representations or warranties of the suitability and applicability of the conclusions in this report in the future, since potential changes in the condition of the site, applicable legislation and/or other future factors may affect the conclusions contained in this report. iEnvi has based this report on data supplied by others, and as such does not warrant the quality of the previous investigations or data provided. In the event the previous data is found to contain errors or omissions, this may alter the conclusions of this report.

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16 Attachments

FIGURES

Figure 1. Regional and Vicinity Map
Figure 2. Site Layout Map
Figure 3. Historical Building and Sample Locations
Figure 4. Areas Containing Asbestos

APPENDICES

Appendix A. Photo Log
Appendix B. Materials Tracking Sheet

FIGURES

Figure 1 Regional and Vicinity Map
Figure 2 Site Layout Map
Figure 3 Historical Building and Sample Locations
Figure 4 Areas Requiring Remediation

COUNTRY

REGION

SITE LOCATION

VER	DATE	AMENDMENTS	DRW	CKD
02	07/05/2020	Boundary Details Updated	SDA	SD
01	17/04/2020	Initial Draft	SDA	SD

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FIGURE 1
SITE LOCATION MAP

Project Ref:	20191001
Project:	Remediation Action Plan - Former Charles Sturt University
Location:	20 Hely Avenue, Turvey Park, NSW, 2650
Client:	Croft Development Pty Ltd

Easting:531810.00	Northing: 6112610.00	Datum mAHD; UTM MGA 55 H	PRINT: A3 (L)

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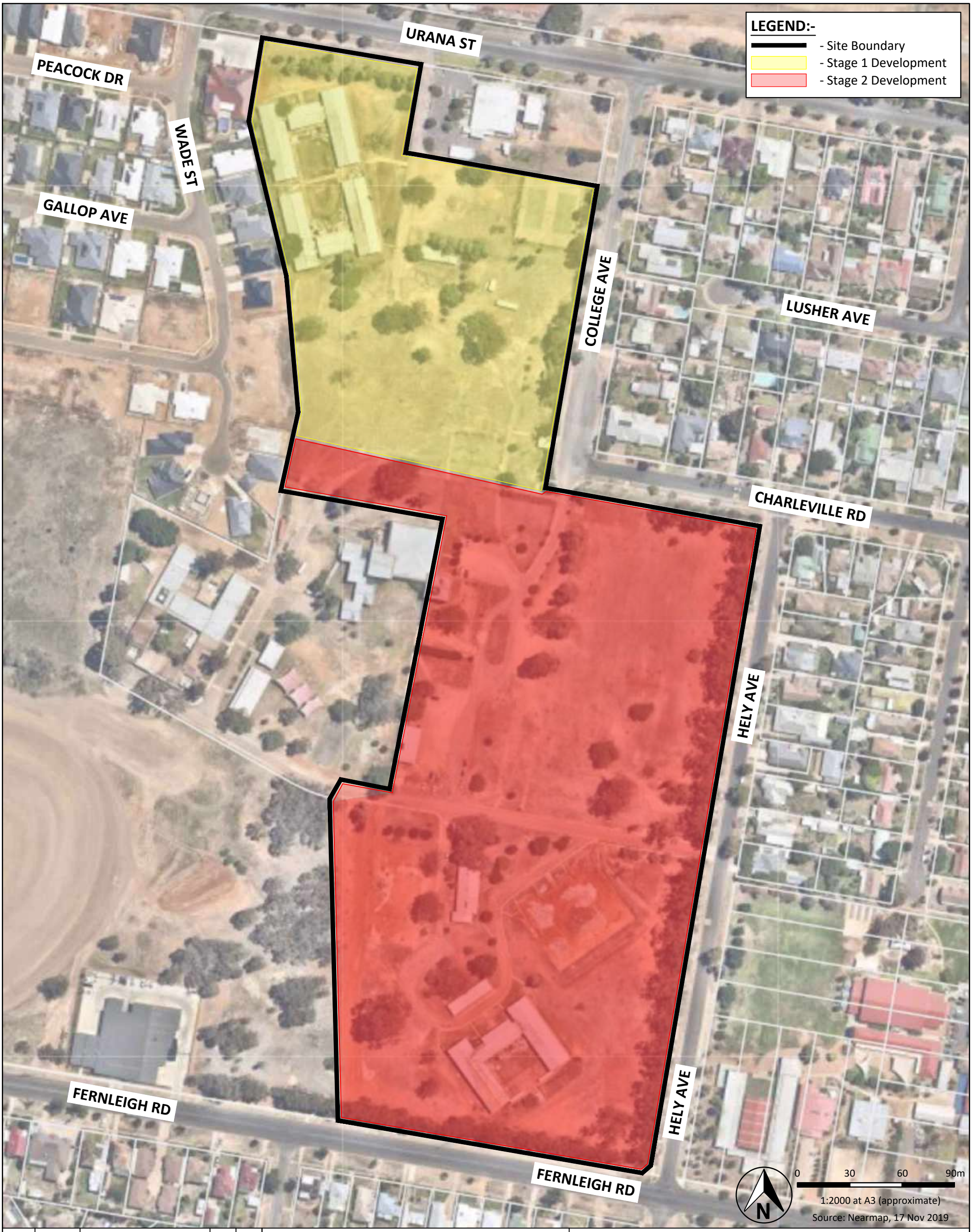

VER	DATE	AMENDMENTS	DRW	CKD
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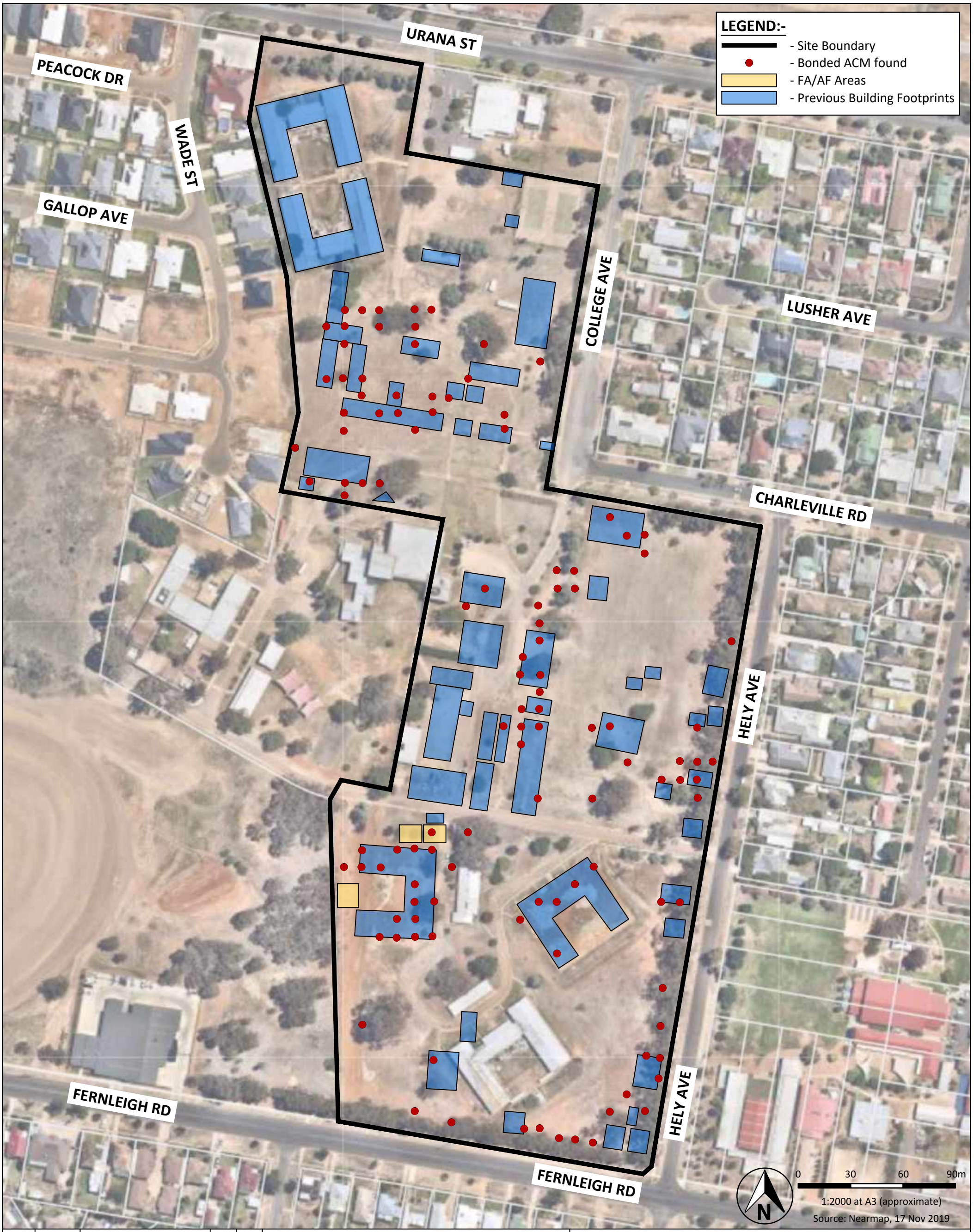
FIGURE 2
SITE LAYOUT

Project Ref:	20191001	
Project:	Remediation Action Plan - Former Charles Sturt University	
Location:	20 Hely Avenue, Turvey Park, NSW, 2650	
Client:	Croft Development Pty Ltd	
Easting: 531810.00	Northing: 6112610.00	Datum mAHD; UTM MGA 55 H

1013-iENVI-20-0002_V2.dwg



VER	DATE	AMENDMENTS	DRW	CKD
02	07/05/20	Boundary Details Updated	SDA	SD
01	17/04/20	Initial draft	SDA	SD

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FIGURE 3
HISTORICAL BUILDING AND SAMPLE LOCATIONS

Project Ref:	20191001		
Project:	Remediation Action Plan - Former Charles Sturt University		
Location:	20 Hely Avenue, Turvey Park, NSW, 2650		
Client:	Croft Development Pty Ltd		
Easting: 531810.00	Northing: 6112610.00	Datum mAHD; UTM MGA 55 H	

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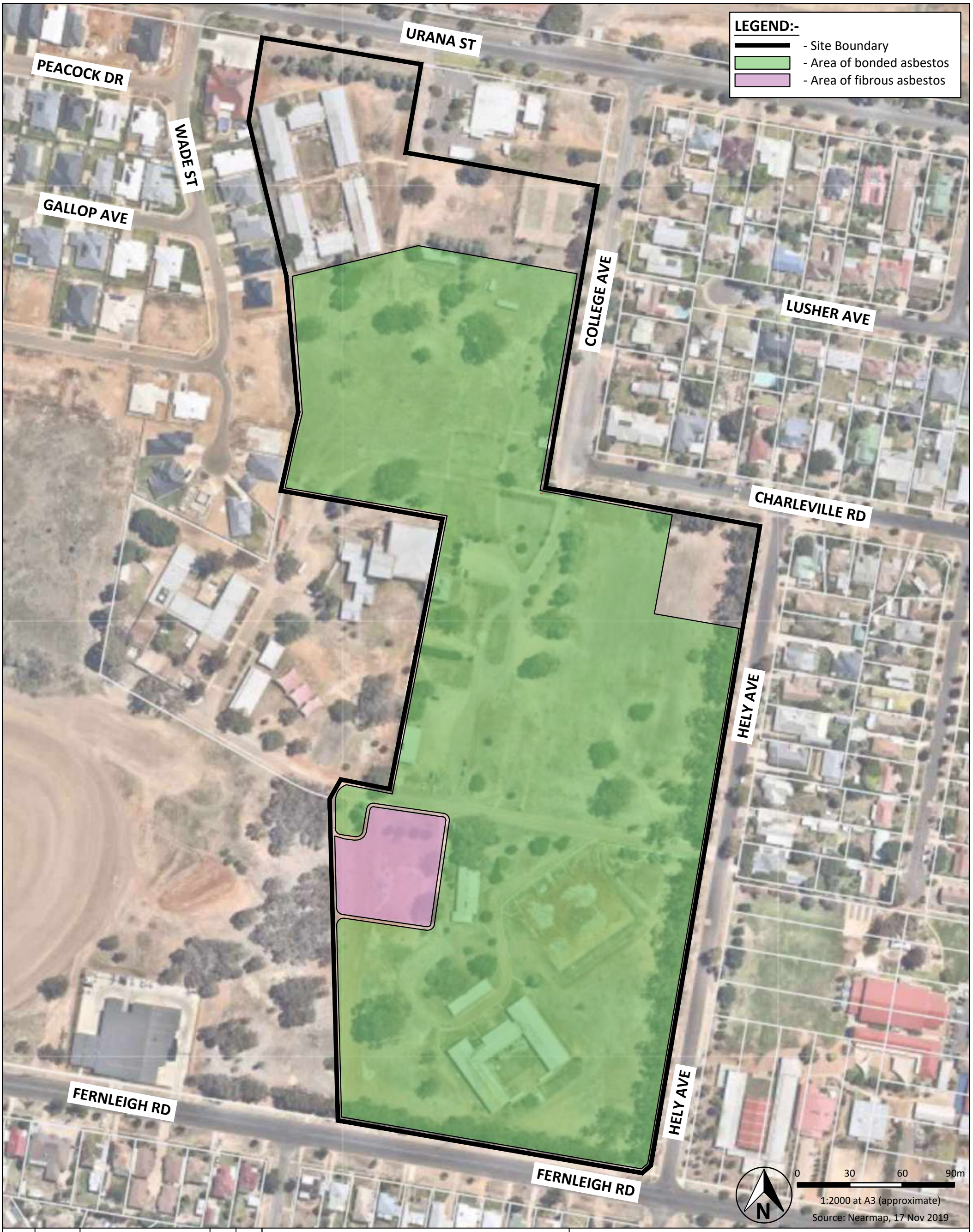

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02	07/05/20	Boundary Details Updated	SDA	SD
01	17/04/20	Initial draft	SDA	SD

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FIGURE 4
AREAS REQUIRING REMEDIATION

Project Ref:	20191001		
Project:	Remediation Action Plan - Former Charles Sturt University		
Location:	20 Hely Avenue, Turvey Park, NSW, 2650		
Client:	Croft Development Pty Ltd		
Easting: 531810.00	Northing: 6112610.00	Datum mAHD; UTM MGA 55 H	

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APPENDICES
Appendix A Photo Log

Photo 1. Fibrous lagging within Pit 347

Photo 2. Typical surficial bonded asbestos material observed at the site.

Photo 3. Pit 347, facing west-south-west.

Appendix B Materials Tracking Sheet

Date	Load Time	Your Initials	Source Location	Destination Location	Estimated Volume (m3)	Describe Material and Contamination