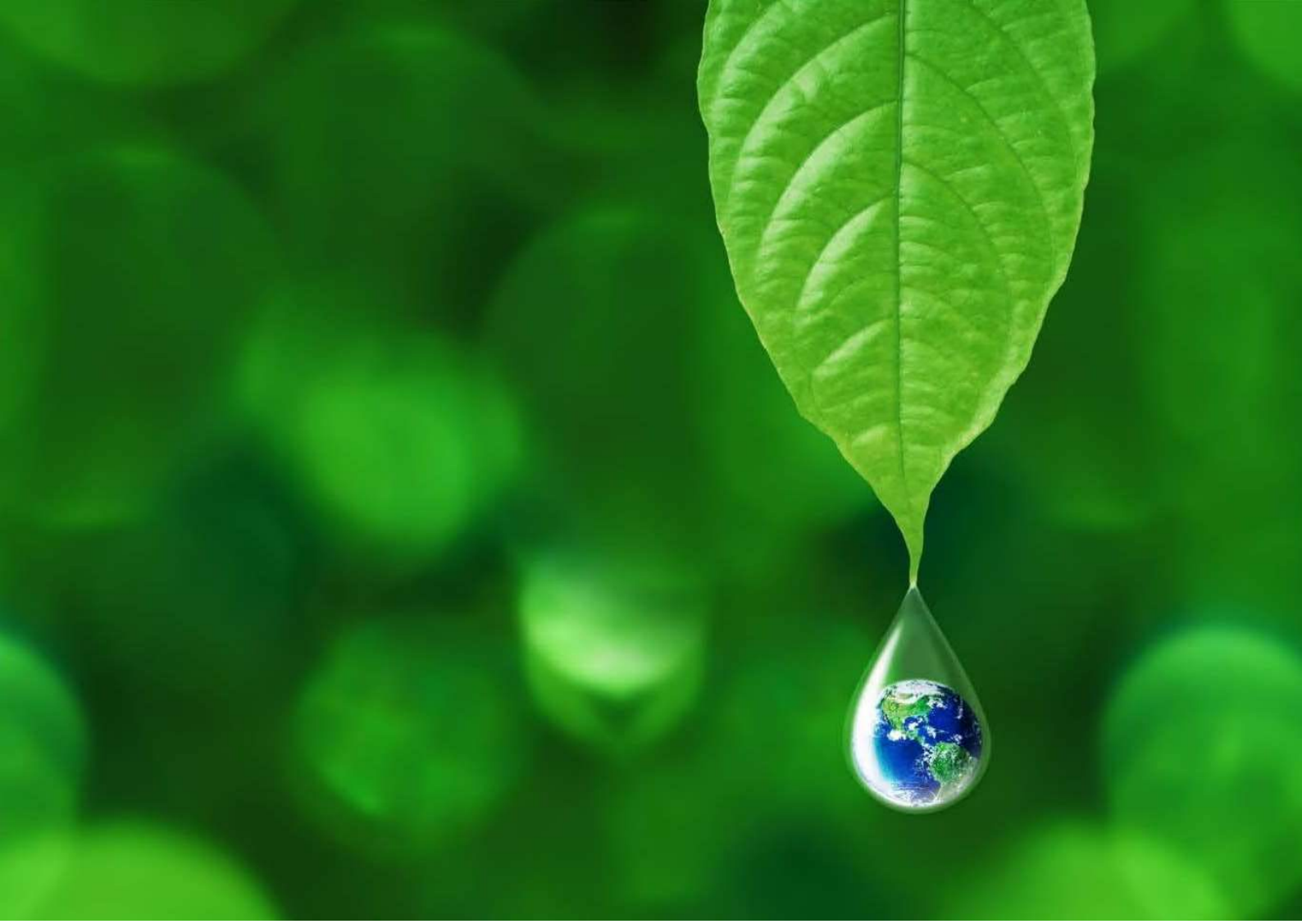

JOHN HOLLAND

# Remediation Action Plan

## Upper South Creek Advanced Water Recycling Centre

29 August 2023

Project No.: 0677828

*The business of sustainability*

ERM

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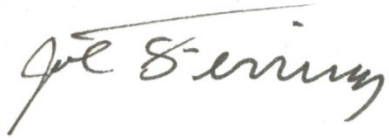
**Signature Page**

29 August 2023

# Remediation Action Plan

## Upper South Creek Advanced Water Recycling Centre

Sam Campbell
Senior Consultant



Joe Ferring
Principal Consultant

Ian Batterley
Partner

Peter Lavelle
Partner – CEnvP-SC

Environmental Resources Management Australia Pty Ltd
Level 14, 207 Kent Street
Sydney NSW 2000

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## Acronyms and Abbreviations

| Acronym | Definition |
|---|---|
| ACM | Asbestos Containing Materials |
| AEC | Areas of Environmental Concern |
| AF / FA | Asbestos Fines / Fibrous Asbestos |
| AFFF | Aqueous Film Forming Foam |
| AHD | Australian Height Datum |
| AMG | Australian Map Grid |
| AMP | Asbestos Management Plan |
| AS | Australian Standard |
| ASS | Acid Sulfate Soils |
| BTEX | Benzene, Toluene, Ethylbenzene and Xylene |
| CEMP | Construction Environmental Management Plan |
| CLM Act | Contaminated Land Management Act |
| COC | Chain of Custody |
| CoPC | Contaminant of Potential Concern |
| CSIRO | Commonwealth Scientific and Industrial Research Organisation |
| CSM | Conceptual Site Model |
| DP | Deposited Plan |
| DQI | Data Quality Indicator |
| DQO | Data Quality Objectives |
| DSI | Detailed Site Investigation |
| EIL | Ecological Investigation Level |
| EIS | Environmental Impact Statement |
| ENM | Excavated Natural Material |
| EPA | Environment Protection Authority (NSW) |
| ERM | Environmental Resources Management Australia Pty Ltd |
| ESL | Ecological Screening Level |
| GSW | General Solid Waste |
| GPS | Global Positioning System |
| ha | Hectare |
| HAZMAT | Hazardous Materials |
| HASP | Health and Safety Plan |
| HDPE | High-Density Polyethylene |
| HIL | Health-Based Investigation Level |
| HSL | Health Screening Level |
| IAA | Interim Audit Advice |
| LAA | Licenced Asbestos Assessor |
| LOR | Limit of Reporting |
| LTEMP | Long Term Environmental Management Plan |
| m | Metre |
| m AHD | Metres relative to Australian Height Datum |

| Acronym | Definition |
|---|---|
| m bgl | Metres Below Ground Level |
| M BTOC | Metres Below Top of Case |
| MGA | Map Grid of Australia |
| NATA | National Association of Testing Authorities |
| NEPC | National Environment Protection Council |
| NEPM | National Environment Protection Measure |
| NOHSC | National Occupational Health and Safety Commission |
| NSW | New South Wales |
| PCBs | Polychlorinated Biphenyls |
| PFAS | Per- and Poly-Fluoroalkyl Substances |
| POEO Act | Protection of the Environment Operations Act |
| PPE | Personal Protective Equipment |
| QA / QC | Quality Assurance / Quality Control |
| RAC | Remediation Acceptance Criteria |
| RAP | Remediation Action Plan |
| ROA | Remedial Options Assessment |
| SAQP | Sampling and Analysis Quality Plan |
| SCLI | Soil and Contaminated Land Impact |
| SVR | Site Validation Report |
| SWMS | Safe Work Method Statement |
| TP | Test Pit |
| UCL | Upper Confidence Limit |
| USC AWRC | Upper South Creek Advanced Water Recycling Centre |
| VENM | Virgin Excavated Natural Material |
| VSAQP | Validation Sampling and Analysis Quality Plan |

# EXECUTIVE SUMMARY

ERM was engaged by John Holland to prepare a Remediation Action Plan (RAP) for asbestos containing fill material at the site identified as the future Upper South Creek Advanced Water Recycling Centre (USC AWRC), which is located in Kemps Creek, New South Wales (the Site).

Sydney Water is constructing a new water recycling plant known as the USC AWRC at the Site. The USC AWRC is being built to service the South West and Western Aerotropolis Growth Areas of Sydney. John Holland has been engaged as the principal contractor to deliver the construction of the USC AWRC.

Due to the identified potential contamination within the Site, the project Conditions of Approval (Conditions E77, E78 and E80) required Areas of Environmental Concern (AECs) identified as moderate and high risk to be investigated to assess the suitability of the Site for the planned future commercial / industrial land use.

To investigate these areas, a Detailed Site Investigation (DSI) was undertaken by ERM (ERM, 2023b) to assess the nature and extent of contamination at the Site and subsequently, inform future remedial requirements prior to the Site's future redevelopment as a water recycling centre.

Results from the DSI returned concentrations of Contaminants of Potential Concern (CoPC) less than the laboratory limit of reporting (LOR) and / or the adopted assessment criteria with the exception of bonded asbestos which was identified within shallow fill material within the Site.

The primary objective of this RAP is to detail the required remedial processes and procedures to be implemented at the Site to enable the Site to be suitable for the proposed USC AWRC development.

To achieve the specific objectives of the RAP, ERM completed the following scope of works:

- Reviewed previous investigations undertaken within the Site, which detailed site specific environmental conditions and the nature and extent of contamination within the Site;
- Defined remedial goals based on the conceptual site model (CSM) and proposed future land use scenarios;
- Undertook an assessment of potential remedial options against the criteria of effectiveness, timeframes, health and safety, sustainability and cost and in consideration of relevant regulatory guidance relating to remedial hierarchy;
- Outlined the preferred remedial strategy based upon information presented within the assessment of options; and
- Prepared this RAP, which outlines the specific requirements of the recommended remedial approach.

Based on a review of information presented within previous investigations and in consideration of the benefits and disadvantages of the presented options, ERM considers that excavation and onsite containment of contaminated fill materials with encapsulation under a constructed soil capping layer to be the most pragmatic and cost-effective approach to mitigating potential environmental and human health risks.

A Long-Term Environmental Management Plan (LTEMP) will be required to document residual impacts and control works that have the potential to disturb managed material.

This RAP was therefore developed to provide a working plan detailing the excavation, soil stockpiling, validation and occupational health and safety and environment management strategies associated with the remediation of impacted fill material at the Site.

Based on the data currently available, ERM considers the impacted portion of the Site identified within previous site investigations could be rendered suitable for the proposed USC AWRC development following completion of remedial / validation works outlined within this RAP.

# 1. INTRODUCTION AND BACKGROUND

Environmental Resources Management Australia Pty Ltd (ERM) was engaged by John Holland Group (John Holland) to prepare a Remediation Action Plan (RAP) for asbestos containing fill material at the site identified as the future Upper South Creek Advanced Water Recycling Centre (USC AWRC), which is located in Kemps Creek, New South Wales (NSW) (the Site).

The Site, subject to this RAP, is defined as the following land parcels:

- Lot 211 Deposited Plan (DP) 1272676;
- Part of Lot 21 DP258414; and
- Part of Lot 104 DP1271336.

The Site location is presented on **Appendix A – Figure 1** and the current site layout and proposed development on **Appendix A – Figure 2**.

## 1.1 Background

Sydney Water is constructing a new water recycling plant known as the USC AWRC at the Site. The USC AWRC is being built to service the South West and Western Aerotropolis Growth Areas of Sydney. John Holland has been engaged as the principal contractor to deliver the construction of the USC AWRC.

Previous investigations (summarised in **Section 3.3** below) undertaken during preparation of the Environmental Impact Statements (EIS) identified several Areas of Environmental Concern (AEC) associated with historical land use practices undertaken within and surrounding the planned construction footprint.

Due to the identified potential contamination within the Site, the project Conditions of Approval (Conditions E77, E78 and E80) required AECs identified as moderate and high risk to be investigated to assess the suitability of the Site for the planned future commercial / industrial land use.

As required under the project Conditions of Approval (Conditions E74, E75, E76, E81 and E84), a NSW EPA accredited Site Auditor (Mr. Andrew Lau) (the Site Auditor) has been engaged by Sydney Water to review the Site's contamination assessment, remediation and site management works.

The Detailed Site Investigation (DSI) was undertaken by ERM (ERM, 2023b) to assess the nature and extent of contamination at the Site and subsequently, inform future remedial requirements prior to the Site's future redevelopment as a water recycling centre.

- Soil conditions were reported to comprise topsoil fill with an average depth of 0.3 metres below ground level (m bgl) overlying natural high plasticity yellow / orange / red mottled clay, with the exception of a disturbed / deeply filled area which was reported in the south-western portion of the Site near test pit investigation location TP155, with the fill observed to extend to between 0.2 and 0.8 m bgl;
- Analytical results of collected samples returned concentrations of contaminants of potential concern (COPCs) less than the laboratory limit of reporting (LOR) with the exception of heavy metals. Heavy metal concentrations were reported above the laboratory LOR but below the adopted human health and ecological criteria with the exception of arsenic, copper, nickel and zinc. However, the 95% Upper Confidence Limit (UCL) concentration calculated for arsenic, nickel and zinc was reported below the adopted the Ecological Investigation Level (EIL) and the copper exceedance was located within Asbestos Delineation Area D. ERM therefore noted that based on proposed future land uses, the minor exceedances of EILs were not considered to pose a risk to identified ecological receptors.

Based on the outcomes of the DSI (ERM, 2023b), ERM identified the requirement for remediation of asbestos in fill material and asbestos on ground surface in several areas of the Site as illustrated on **Appendix A - Figure 3**.

In addition to the identification of asbestos in fill materials and on the ground surface at the Site, asbestos material in site structures has also been identified during previous investigations. ERM notes that management and disposal of ACM in aboveground infrastructure will be completed prior to remediation works at the Site and does not form part of the scope of work for this RAP.

ERM notes that information relating to the demolition, disposal and confirmation of removal of all asbestos structures within the Site will be included within the Site Validation Report (SVR).

## 1.2 Objectives

The primary objective of this RAP is to detail the required remedial processes and procedures to be implemented at the Site to enable the Site to be made suitable for the proposed USC AWRC development.

Specific remedial objectives are presented within **Section 4**.

## 1.3 Scope of Work

To achieve the specific objectives of the RAP, ERM completed the following scope of works:

- Reviewed previous investigations undertaken within the Site, which detailed site specific environmental conditions and the nature and extent of contamination within the Site;
- Defined remedial goals based on the CSM and proposed future land use scenarios;
- Undertook an assessment of potential remedial options against the criteria of effectiveness, timeframes, health and safety, sustainability and cost and in consideration of relevant regulatory guidance relating to remedial hierarchy;
- Outlined the preferred remedial strategy based upon information presented within the assessment of options; and
- Prepared this RAP, which outlines the specific requirements of the recommended remedial approach.

## 1.4 Regulatory Framework

This RAP was developed with consideration to the relevant elements of the following regulatory guidelines and standards.

- National Environment Protection Council (2013). National Environment Protection (Assessment of Site Contamination) Measure 1999. This is hereafter referred to as ‘the ASC NEPM’;
- NSW Environment Protection Authority (EPA) (2017) Guidelines for the NSW Site Auditor Scheme (3rd edition);
- NSW EPA (2020) Consultants reporting on contaminated land, contaminated land guidelines; and
- Western Australia Department of Health (WA DoH) (2021). Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia.

# 2. KEY PROJECT STAKEHOLDERS

The stakeholders involved with the remediation project are as follows:

## Table 2-1 Key Project Stakeholders

| Role | Organisation | Contact Name | Contact Phone Number |
|---|---|---|---|
| Client | John Holland | ■ Alyce Harrington | ■ +61 409 633 908 |
| Site Auditor | Andrew Lau (JBS&G) | ■ Andrew Lau | ■ +61 412 512 614 |
| Site Owner | Sydney Water | ■ Cheryl Cahill | ■ +61 456 666 573 |
| Remediation Contractor | John Holland | ■ Alyce Harrington | ■ +61 409 633 908 |
| Environmental Consultant | Environmental Resources Management | ■ Joseph Ferring | ■ +61 424 970 468 |

# 3. SITE IDENTIFICATION

Site identification information is presented within **Table 3-1** below.

## Table 3-1 Site Identification Details

| Item | Description |
|---|---|
| **Site Address** | Kemps Creek, NSW |
| **Lot and Deposited Plan** | Lot 211 in DP 1272676<br>Part Lot 21 in DP 258414<br>Part Lot 104 in DP1271336 |
| **Site Ownership** | Sydney Water |
| **Local Government Area** | Penrith City Council |
| **Site Area** | Approximately 83.39 Hectare (ha) (833,875 $m^2$) |
| **Zoning** | The Site is currently comprised of the following zoning under the Penrith Local Environmental Plan 2010:<br>■ ENZ – Environment and Recreation<br>■ RU2 – Rural Landscape |
| **Geographic Co-ordinates** | -33.856112, 150.773235 (approximate centre of the Site) |
| **Site Location and Layout** | Appendix A – Figure 1 and Figure 2 |

## 3.1 Site History

Information provided within previous reports indicated that the Site was initially settled by Europeans in the early part of the 19th century and used for wheat farming before being almost comprehensively cleared and divided into fenced paddocks with unspecified farm infrastructure built.

The land was used for cattle grazing prior to being acquired by the Commonwealth Scientific and Industrial Research Organisation (CSIRO) in 1936 to construct a radio telescope, with others added during subsequent years.

The Site was transferred to the University of Sydney in 1963 and used as the University of Sydney Fleurs Radio telescope site. The station was closed in 1991; in 2005, two of the dish antennae were relocated and most of the remaining improvements at the Site were demolished or left in place.

## 3.2 Site Condition and Surrounding Environment

The following sections summarise the information obtained during the Site background and history review obtained from previous investigations undertaken and as presented within the ERM DSI (ERM, 2023b).

### Table 3-2 Site Environmental Setting and Background Details

| Item | Description |
|---|---|
| **Current Land Use** | ■ The Site is currently disused in preparation for AWRC construction, however, comprises several sheds, buildings and other remnant structures scattered across the Site. These structures are proposed to be demolished and appropriately disposed of off-site during the construction phase of the project.<br>■ The current Site condition and Site layout are provided within figures Appendix A – Figure 1 and Figure 2. |
| **Surrounding Land Use** | The land uses surrounding the Site include:<br>■ **North:** Vacant land including Kemps Creek.<br>■ **South:** Vacant land including farming areas.<br>■ **West:** South Creek followed by vacant land.<br>■ **East**: Kemps Creek followed farming areas including large sheds. |
| **Site Elevation** | ■ The elevation of the Site ranges from approximately 35 m Australian Height Datum (AHD) to 40 m AHD based on available light detection and ranging (LiDAR) data. |
| **Topography** | ■ The Site lies within a regional alluvial plain associated with the South Creek and Kemps Creek surface water courses. The overall site topography is generally flat with a slight slope to the north. |
| **Hydrology** | ■ The Site is located within the Hawkesbury-Nepean catchment area.<br>■ The AWRC is located within a floodplain bordered by South Creek, which follows the western boundary of the Site, and Kemps Creek, which follows the eastern boundary of the Site.<br>■ Surface water is anticipated to flow consistently outward towards the two creeks. |
| **Geology and Acid Sulfate Soils** | ■ Geology mapping (NSW Department of Minerals and Energy 1991, Penrith 1:100,000) indicates the Site is underlain by Quaternary Alluvium consisting of loose, unconsolidated fine to medium grained sand, silt and clay.<br>■ Soils within the Site were described as being of the Blacktown and South Creek landscapes (Alluvial Soils).<br>■ Acid Sulfate Soils (ASS) were assessed during the Soil and Contaminated Land Impact (SCLI) Assessment (Aurecon Arup, 2021). The assessment found that while many soil samples exceeded the NSW Acid Sulfate Soils Management Advisory Committee (ASSMAC) (1998) action criteria of 0.03 %S / 18 mol H+/t, the acidity present is from actual acidity which is considered to be natural and not from sulfidic sources. ASS was considered to be highly unlikely by Aurecon / ARUP to be present in the shallow soils (0.0 to 0.2m bgl). Therefore, for the AWRC site, no ASS management plans are considered to be required for construction.<br>■ Previous investigations noted the geology at the Site as red/brown reworked natural clay used for filling. Observations of surficial anthropogenic materials including brick, concrete, metal wire / metal buildings materials and fragments of asbestos containing material (ACM) were noted. |
| **Hydrogeology** | ■ Information from NSW Government Soil and Land Information (eSPADE) online mapping indicated the soils within the Site having very slow infiltration rates when thoroughly wetted and consisting chiefly of clay soils with a high swelling potential, soils with a permanent high-water table, soils with a claypan or clay layer at or near the surface, and shallow soils over nearly impervious material. These soils have a very slow rate of water transmission. |
| **Contaminated Land** | ■ The Site was not listed as contaminated under the Contaminated Land Management Act (CLM Act) 1997. |

| Item | Description |
|---|---|
| | ■ As of 10 June 2023, the Site was not listed on the NSW EPA Record for Contaminated Sites notified to the NSW EPA in accordance with the CLM Act 1997.<br>■ Sites listed as contaminated under the CLM Act 1997 or on the NSW Record for Contaminated Sites notified to the NSW EPA were not identified within 200 m of the Site. |
| **PFAS Investigation Programs** | ■ A search of the NSW EPA Per- and Poly-Fluoroalkyl Substances (PFAS) Investigation Program returned no sites under investigation within a 1 km search buffer.<br>■ A previous investigation identified an airfield located along the eastern border of the AWRC as a potential historical source of PFAS contamination given the use of fire-fighting chemicals at the airfield. However, this was considered unlikely as the airfield was historically used during the Second World War, which is prior to the introduction of Aqueous Film Forming Foam (AFFF) containing PFAS, which is noted to have occurred in the late 1960s. Sampling which was undertaken by JBS&G (2018) near the runway to the east of AWRC did not report detectable concentrations of PFAS.<br>■ A water analysis undertaken by Sydney Water in 2020, also did not report concentrations of PFAS above the adopted PFAS (NEMP 2020) guidelines. Thus, the likelihood of the airfield and use of AFFF prior to WWII as a potential source of PFAS is low. The Site Auditor, Andrew Lau, provided an Interim Audit Advice (IAA) for the Site (JBS&G, 2023) and has provided comment agreeing with this low risk rating. |
| **Licensed Activities under the POEO Act 1997** | ■ One (1) licenced activity under the Protection of the Environment Operations (POEO) Act, 1997 was identified 500 metres (m) south west of the Site – 'SUEZ Recycling and Recovery Pty Ltd, SUEZ Advanced Waste Treatment Facility'.<br>■ As part of the works undertaken for the EIS, an investigation by Aurecon ARUP (2021) assigned a risk rating of 'Moderate' to this activity. However, stated the following:<br>▪ "There is potential for contaminated groundwater to migrate to the AWRC site as topography indicates that groundwater is expected to flow from west to east. However, the presence of South Creek between the two sites will act as a barrier or hydrogeological divide to the migration of groundwater and landfill gas. The impact significance for migration of contaminated groundwater is moderate. Landfill gas is deemed to have a low impact significance to the project due to the distance between the two sites (400 m)."<br>■ The IAA provided by Andrew Lau agreed with the risk rating of moderate *"considering that groundwater is not anticipated to be used by human health or ecological receptors at the AWRC site as indicated in the CSM as presented in the DSI. Further, it is noted that the EPL for the landfill includes the generation of electrical power from gas, so there is a landfill gas collection system at the landfill premises which would be anticipated to mitigate the off-site migration of landfill gas."* |

## 3.3 Previous Investigations

In developing this RAP, ERM undertook a review of the following previous investigations relevant to the Site:

- Aurecon ARUP (2021), Upper South Creek Advanced Water Recycling Centre – Soils and Contaminated Land Impact Assessment, 27 July 2021 ("the SCLI Assessment");
- JBS&G Australia Pty Ltd (2023), Interim Audit Advice (IAA) (0503-2307-03) – Sydney Water Corporation – Upper South Creek Advanced Water Recycling Centre – Review of the Upper South Creek Advanced Water Recycling Centre - Soils and Contaminated Land Impact Assessment, 17 March 2023 ("IAA03");
- ERM (2023), Sampling and Analysis Quality Plan, Upper South Creek Advanced Water Recycling Centre, 06 June 2023 (ERM, 2023);

- ERM (2023a), Hazardous Material Survey, Upper South Creek Advanced Water Recycling Centre (DRAFT); and
- ERM (2023b), Detailed Site Investigation, Upper South Creek Advanced Water Recycling Centre (DRAFT).

Several other investigations have previously been undertaken at the Site however, were not available for ERM's review at the time of preparation of this RAP. The relevant additional documents referenced are as follows:

- JBS&G (2018), University of Sydney Preliminary Site Investigation – Badgerys Creek NSW, 2018;
- Pells Sullivan and Meynick (2018), Badgerys Creek Development – Elizabeth Drive Geotechnical Investigation, 2018;
- Aurecon (2019), Upper South Creek Wastewater Treatment Plant Options Assessment, Preliminary Site Investigation (Contamination), 2019;
- Aurecon ARUP (2020), Upper South Creek Advanced Water Recycling Centre Reference Design, Geotechnical Desk Study – Advanced Water Recycling Centre, 2020;
- Aurecon ARUP (2021a), Upper South Creek Advanced Water Recycling Centre and Pipelines Detailed Site Investigation, 12 March 2021; and
- Aurecon ARUP (2021b), Memorandum re Hazardous Materials Survey – Upper South Creek Advanced Water Recycling Centre, Aurecon to Sydney Water, 18 May 2021 (ERM notes a partial component of the report comprising of only Figure 6-3 was available for review).

A summary of previous investigations available to ERM are provided in **Table 3-3** below.

## Table 3-3 Summary of Previous Investigations

| Report | Summary Information |
|---|---|
| Aurecon ARUP SCLI Assessment (2021) | Aurecon and ARUP were engaged by Sydney Water to undertake a contamination assessment of the Site (the SCLI Assessment) to aid in development of the EIS.<br>The scope of works relevant to this report included a desktop review of existing information, review and assessment of existing asbestos related reports, a site walkover and site inspection. The Site walkover informed the DSI (Aurecon ARUP, 2021a) and additional soil testing requirements. The scope of works also included assessment of soil laboratory results from the associated DSI (Aurecon ARUP, 2021a) and development of a Conceptual Site Model (CSM) for the Site.<br>The Aurecon and ARUP report (2021) provided the following summary:<br>■ The JBS&G (2018) preliminary site investigation included collection of soil samples from test pits and boreholes from 12 locations within the proposed AWRC footprint within the Site. The investigation observed:<br>■ reworked natural material used as filling at locations surrounding existing or historical structures and noted anthropogenic materials including construction / demolition waste and ACM in the form of sheet board fragments ("*friable and non-friable*") to a maximum depth of 0.1 m below ground level (bgl). Asbestos fines (AF) and/or fibrous asbestos (FA) was noted to exceed adopted health screening levels within surface soils at some locations;<br>■ Soil analytical results reported concentrations of heavy metals and minor total recoverable hydrocarbons (TRH) exceeding adopted ecological criteria for public open space land use;<br>■ Soil samples were screened for per- and polyfluoroalkyl substances (PFAS) and reported concentrations below adopted human health criteria;<br>■ Aurecon ARUP (2019) investigation included site inspections of the impact assessment areas as part of the preliminary site investigation for the AWRC. Observations were made pertaining to site condition, disused structures present, topography and identification of anthropogenic material including ACM;<br>■ PSM (2018) geotechnical investigation observed groundwater within one test pit progressed at 3.6 m bgl;<br>■ Aurecon ARUP (2020) geotechnical investigation constructed groundwater boreholes as part of the M12 Motorway concept design and EIS and groundwater was expected between 34 and 36 m AHD;<br>■ Aurecon ARUP (2021a) detailed site investigation included collection of soil samples from test pits and boreholes within the proposed AWRC footprint within the Site. Concentrations of chemical contaminants of concern (COPC) were reported at levels below the adopted investigation criteria. The investigation concluded that overall potential for hazards to cause harm to human health (exposure to onsite construction worker) was considered to be low risk; and<br>■ Aurecon ARUP (2021b) investigation included a hazardous material survey undertaken by licensed asbestos assessors (LAA) in July 2020, which identified structures, buildings and areas of ground with likely asbestos present.<br>Aurecon ARUP (2021) concluded that while incidental impacts have been identified in localised areas (or AECs), existing contamination is not a significant constraint to the AWRC Site for construction or operational phases of the project. Construction earthworks and importation of engineering fill can be used to manage existing contamination risks by civil engineering design and environmental management.<br>Aurecon ARUP (2021) recommended the following mitigation measures:<br>■ A Supplemental DSI be undertaken across the project areas, as part of the detailed design phase of the project, to analyse for the COPCs an AECs identified within the SCLI Assessment. Soil samples should be collected for laboratory analysis to inform contamination and waste characterisation and sampling to be undertaken in accordance with ASC NEPM and applicable NSW EPA guidelines;<br>■ A Construction and Environmental Management Plan (CEMP) should be prepared and implemented prior to construction commencing; and<br>■ A destructive hazardous materials (HAZMAT) survey and remedial protocol for clearing or certifying the project impact area is of asbestos should be conducted prior to commencing constriction activities for the project. |
| JBS&G IAA (2023) | Andrew Lau of JBS&G Australia Pty Ltd (JBS&G), was engaged by Sydney Water as the EPA accredited Site Auditor for the Project to ensure that any Works required in relation to contamination and remediation are appropriately managed and the land is suitable for the final intended land use.<br>Based on a review of the information provided, the Site Auditor provided the following advice:<br>■ The auditor agreed with the risk ratings (Aurecon ARUP, 2021) that have been determined for the AWRC site;<br>■ The Site history did not include a title search nor commentary on the potential for ASTs/USTs for the storage of agricultural chemicals/hydrocarbons as fuel. The auditor considers the risk to be very low and the auditor notes that it is being managed by an unexpected finds protocol that the auditor has already reviewed.;<br>■ The auditor noted that material will be imported to the Site for site levelling purposes and requested that the protocol for sampling and analysis and material tracking be approved by the auditor prior to the importation of materials to the AWRC site;<br>■ It is proposed that impacted material from the pipeline excavations be imported to the AWRC site if the materials are considered suitable. These must be subjected to the importation protocol; and<br>■ A draft of the CEMP has been provided to the auditor and will be reviewed prior to construction commencing. The auditor noted that as a result of this review, consideration will need to be given to risk to workers from hazardous building materials, such as ACM, lead and polychlorinated biphenyls (PCBs) at the AWRC site. |
| ERM SAQP (2023) | ERM was engaged by John Holland to prepare a Sampling and Analysis Quality Plan (SAQP) for the Site. The objective of the SAQP was to develop a site-specific CSM, to describe the Data Quality Objectives (DQOs) and required investigation methodology for undertaking the recommended Supplemental DSI including sampling, analytical and reporting requirements.<br>Based on a review of desktop investigation, the SAQP concluded that there was moderate potential for contamination to be associated with the following AECs:<br>**AEC 1**<br>■ Former and current agricultural land and structures such as farm sheds and radio telescopes containing ACM and heavy metals;<br>■ Based on the nature of potential contamination identified within the AECs above and the construction requirements (i.e., requiring all top soils to be stripped), ERM recommended that further assessment be undertaken at the Site to assess the nature and extent of potential contamination associated with AEC 1 within soils; and<br>■ John Holland indicated that the long-term onsite management of asbestos contaminated soils is being considered in conjunction with Sydney Water, therefore the proposed investigation methodology was developed to enable assessment of soils for onsite management and/or offsite disposal (where required) and to minimise the potential for unexpected finds of contamination that may impact construction staging / timing.<br>**AEC 2**<br>■ SUEZ Kemps Creek Resource Recovery Park (now Cleanaway).<br>■ Based on information provided within previous investigations, further assessment of groundwater and landfill gas associated with the offsite Kemps Creek Resource Recovery Park is not required. |

| Report | Summary Information |
|---|---|
| ERM Hazardous Materials Survey (2023a) – DRAFT | ERM was engaged by John Holland to conduct a hazardous materials survey for multiple disused structures located within the proposed AWRC footprint.<br>ACM in the form of fibre cement sheeting and vinyl floor tiles were visually observed and subsequently collected and analysed at a National Association of Testing Authorities (NATA) accredited laboratory for asbestos identification. Chrysotile (white), amosite (brown) and crocidolite (blue) asbestos was identified at the laboratory within samples obtained from exterior walls, roof, eave and utility pits and scattered ACM collected from the ground surface and/or stockpiled material.<br><br>The following areas of the Site were identified as areas with asbestos impacted soils:<br>■ Location 2 – Soils located within the former building footprint in Location 2 included several small, suspected ACM fibre-cement sheet fragments;<br>■ Location 4 – Approximately 1,000 $m^2$, which includes Building A, Telstra utility pit, surface ACM fragments and stockpiled building materials in weathered / poor condition; and<br>■ Location 5 – Approximately 50 $m^2$, which includes a collapsed roof structure and surface ACM fragments in weathered / poor condition. |
| ERM DSI (2023b) – DRAFT | ERM was engaged by John Holland to conduct a DSI at the Site following on from the SAQP (ERM, 2023) to assess the nature and extent of contamination at the Site and to inform future remedial requirements in the context of the Site's proposed water recycling facility redevelopment.<br>The scope of work for the DSI included the advancement of 148 test pits and collection of 149 soil samples from fill material and 148 soil samples from natural material and collection of one fragments of ACM from the ground surface at one location.<br>The DSI works completed by ERM identified the following:<br>■ Soil conditions were generally observed to comprise topsoil fill with an average depth of 0.3 m bgl overlying natural high plasticity yellow / orange / red mottled clay, with the exception of a disturbed / deep filled area which was observed in the south-western portion of the Site near TP155, with depths between 0.2 and 0.8m bgl;<br>■ Analytical results of collected samples returned concentrations of COPCs less than the laboratory LOR with the exception of heavy metals. Heavy metal concentrations were reported above the laboratory LOR but below the adopted human health and ecological criteria with the exception of arsenic, copper, nickel and zinc. However, the 95% UCL concentration calculated for arsenic, nickel and zinc was below the adopted the EIL and the copper exceedance was located within Asbestos Delineation Area D. ERM therefore noted that based on proposed future land uses, the minor exceedances of EILs were not considered to pose a risk to identified ecological receptors;<br>■ Several fragments of ACM were observed on the ground surface during the initial Site inspection within the vicinity of TP128 and TP131 located within the central portion of the Site. Sample ACM_TP128 was analysed for asbestos identification and reported the presence of chrysotile (white) and amosite (brown) asbestos;<br>■ ERM noted that laboratory analysis of collected soil samples from test pitting works did not identify asbestos within any of the collected samples;<br>■ Asbestos Delineation Areas were refined based on the soil investigation and 10 Asbestos Delineation Areas (A – J) were identified that required management and/or offsite disposal. The total estimated volume of asbestos containing fill within these areas that were deemed to require management and/or offsite disposal was approximately 8,436 $m^3$ (unbulked);<br>ERM concluded that the Site can be made suitable for the proposed commercial/industrial land use and comply with the Conditions of Approval, provided the following recommendations are implemented;<br>■ Following vegetation removal, a site walkover is required to visually assess the ground surface for signs of potential contamination. The findings of the Site walkover are to be submitted to the Site Auditor as an addendum to the DSI report;<br>■ Preparation and implementation of a Remediation Action Plan (RAP) detailing the preferred method of remediation for the Asbestos Delineation Areas, validation sampling procedures and validation reporting requirements;<br>■ The DSI concluded that based on the nature of asbestos contamination identified at the Site the methods of remediation and management may include:<br>▪ Excavation and off-site disposal of asbestos containing soil off-site at a landfill legally allowed to accept the waste; OR<br>▪ Development of an onsite encapsulation area and the development of a Site management Plan for the long-term management of the onsite encapsulation.<br>■ Remediation and / or management of other contaminants was not considered necessary given the lack of risk to identified receptors from other contaminants identified in the DSI. |

## 3.4 Summary of Identified Contamination

Results of laboratory analysis from soil samples collected during previous investigations returned concentrations of all CoPCs less than LOR and / or the adopted assessment criteria with the exception of asbestos within identified within shallow fill.

The extent of asbestos impacted fill identified within the ERM DSI (ERM, 2023b) requiring remediation is illustrated on **Appendix A – Figure 3**.

Table 3 provides the estimated areas and volumes of anticipated asbestos containing fill material, that require remediation. Due to variability in fill material encountered, an average of 0.3m bgl (metres below ground level) of fill material has been used for the purposes of calculations to inform the estimated volumes of asbestos impacted material requiring remediation.

If additional areas requiring remediation are identified when addressing the data gaps provided in **Section 3.5**, these additional areas will be managed as an unexpected find with reference to relevant sections of this RAP. The details of the nature and extent of the additional areas requiring remediation, the estimated area size and volumes, and the remedial requirements are to be reviewed and approved by the Site Auditor before proceeding with remediation of any additional areas. As per **Section 3.5**, the additional areas may include areas beneath aboveground infrastructure, areas beneath vegetation and the inaccessible area to the south of the Site.

The areas subject to remediation, in accordance with this RAP, have been provided as **Appendix A – Figure 3.**

### Table 3-4 Areas Requiring Remediation

| Areas Requiring Remediation (A – J) | Area ($m^2$) | Volume[1] ($m^3$) |
|---|---|---|
| **A** | 2,066 | 619.8 |
| **B** | 1,368 | 410.4 |
| **C** | 3,159 | 947.7 |
| **D** | 6,250 | 1875 |
| **E** | 1,835 | 550.5 |
| **F** | 4,102 | 1230.6 |
| **G** | 3,205 | 961.5 |
| **H** | 1,496 | 448.8 |
| **I** | 1,542 | 462.6 |
| **J[2]** | 3,096 | 928.8 |
| **Total Anticipated Volume ($m^3$)** | | **8,436** |

1 An average depth of 0.3m has been used to calculate the anticipated volumes of asbestos containing fill material.

2 Includes area defined as 'Disturbed Fill Area' – See **Figure 3, Appendix A**.

## 3.5 Identified Data Gaps

Following a review of the previous investigations and information obtained in ERM's DSI (ERM, 2023b), the following data gaps and suggested mitigations summarised in **Table 3-5** below were identified.

### Table 3-5 Data Gaps

| Data Gap | Suggested Mitigation |
|---|---|
| Given some areas of the Site were inaccessible during the DSI including an area in the southern portion of the Site (see **Appendix A – Figure 3**), areas directly beneath aboveground structures and areas beneath vegetation, there is potential that asbestos impacted fill materials exist in these inaccessible areas of the Site.<br><br>The inaccessible areas (i.e. the areas where data is not available and therefore a data-gap exists) are provided on **Figure 4, Appendix A.** | ■ ERM notes that a site walkover will be undertaken following vegetation, stockpile and building removal to visually assess the ground surface for signs of potential contamination including for the presence of asbestos in these currently inaccessible areas of the Site.<br>■ The additional site walkover will be undertaken as a visual inspection on a grid using transects spaced by 100m.<br>■ The additional site walkover will account for the potential for various types of contamination to exist and not be limited to potential asbestos materials only. Any signs of potential contamination are to be documented, such as evidence of fly tipping, staining, evidence of buried foreign materials or odours.<br>■ Sampling for laboratory analysis may be undertaken if potential asbestos fragments, or other evidence of potential contamination, are identified in these areas. If additional contamination is identified, the unexpected finds protocol set out in **Section 10.1** should be followed.<br>■ ERM notes that where asbestos is identified within these areas, it will be managed as an unexpected find as per the requirements detailed within **Section 11.1** of this RAP. |

## 3.6 Conceptual Site Model

The Site's Conceptual Site Model (CSM) is presented in **Table 3-6** below.

### Table 3-6 Conceptual Site Model

| Potential Sources | CoPCs | Pathways | Potential Receptors | Risk of Potentially Complete Pollutant Linkage | Comment |
|---|---|---|---|---|---|
| Hazardous Materials Associated with Current and Former Site Structures and Conduits | ■ Asbestos, heavy metals and PCBs | ■ Dermal contact, inhalation, and / or incidental ingestion with contaminated surface waters / soils. | ■ Current and future site users; and<br>■ Workers carrying out development, installation or maintenance works within the Site. | ■ Asbestos – High<br>■ All other CoPCs - Low | ■ Previous investigations have identified asbestos within various portions of the Site likely to be associated with existing and former site structures.<br>■ Asbestos conduits have been identified within the Site boundary.<br>■ Due to the age of service pits, it is the opinion of ERM that the potential for hazardous materials (asbestos etc.) should be considered as a potential within all onsite pits and conduits.<br>■ Laboratory analysis of soil samples collected during this investigation returned concentrations of all CoPCs less than LOR / adopted assessment criteria with the exception of various heavy metals, which exceeded the adopted EILs in several locations and scattered ACM within surface fill materials.<br>■ Isolated locations reported elevated metal concentrations above the adopted ecological criteria, however, the 95% UCL avg values were calculated to be below the adopted criteria, with the exception of copper<br>■ Based on the nature of the proposed future land uses (i.e operational water recycling facility), it is the opinion of ERM that the identified minor exceedances of EILs are unlikely to pose a risk of harm to current or future receptors within / surrounding the Site.<br>■ Scattered ACM was observed during this investigation on the ground surface and observed within the disused buildings onsite.<br>■ Based on the Site observations of ACM across the Site, Asbestos delineation areas have been delineated following the works of this supplemental DSI. ERM recommends the fill material within these areas be removed or encapsulated to mitigate the potentially complete pathway of asbestos in soils and building materials being inhaled by current/future site workers and visitors.<br>■ ERM notes that during future construction works, an Asbestos Management Plan (AMP) should be implemented to manage the fill materials identified as likely to contain asbestos. |
| | ■ Asbestos, heavy metals and PCBs | ■ Transport of contamination through surface water flows and windblown dust. | ■ Adjacent sensitive receptors including ecological receptors at the two receiving creek environments;<br>■ Current and future site users; and<br>■ Current and future workers carrying out development, installation or maintenance works within the Site. | ■ Asbestos – High<br>■ All other CoPCs - Low | |
| | ■ Asbestos, heavy metals and PCBs | ■ Transport of contamination to underlying groundwater aquifers | ■ Adjacent sensitive receptors including ecological receptors at the two receiving creek environments; and<br>■ Future potential on-site users of groundwater. | ■ Low | |
| | ■ Asbestos, heavy metals and PCBs | ■ Transport of contamination through mechanical means | ■ Current and future workers carrying out development, installation or maintenance works within the Site. | ■ Asbestos – High<br>■ All other CoPCs - Low | |

| Potential Sources | CoPCs | Pathways | Potential Receptors | Risk of Potentially Complete Pollutant Linkage | Comment |
|---|---|---|---|---|---|
| | ■ Heavy metals and PCBs | ■ Uptake of contaminants within soil by flora and fauna | ■ Ecological receptors on Site. | ■ Low | |
| On-site Uncontrolled Fill Materials | ■ Asbestos, TRH, BTEX, heavy metals, PAHs, PCBs and OCP / OPP | ■ Dermal contact, inhalation, and / or incidental ingestion with contaminated surface waters / soils. | ■ Current and future site users; and<br>■ Current and future workers carrying out development, installation or maintenance works within the Site. | ■ Asbestos – High<br>■ All other CoPCs - Low | |
| | ■ Asbestos, TRH, BTEX, heavy metals, PAHs, PCBs and OCP / OPP | ■ Transport of contamination through surface water flows and windblown dust. | ■ Adjacent sensitive receptors;<br>■ Current and future site users; and<br>■ Current and future workers carrying out development, installation or maintenance works within the Site. | ■ Asbestos – High<br>■ All other CoPCs - Low | |
| | ■ Asbestos, TRH, BTEX, heavy metals, PAHs, PCBs and OCP / OPP | ■ Transport of contamination to underlying groundwater aquifers | ■ Adjacent sensitive receptors; and<br>■ Future potential on-site users of groundwater. | ■ Low | |
| | ■ TRH, BTEX, heavy metals, PAHs, PCBs and OCP / OPP | ■ Uptake of contaminants within soil by flora and fauna | ■ Ecological receptors on Site. | ■ Moderate | |
| | ■ Asbestos, TRH, BTEX, heavy metals, PAHs, PCBs and OCP / OPP | ■ Transport of contamination through mechanical means | ■ Current and future workers carrying out development, installation or maintenance works within the Site. | ■ Asbestos – High<br>■ All other CoPCs - Low | |

# 4. REMEDIAL OBJECTIVES

The overall remedial objective is to effectively manage the identified asbestos impacts in fill and on the ground surface to render the Site suitable for the proposed USC AWRC development (commercial/industrial land use).

Based on results of previous investigations outlined within **Section 3.3,** the remedial objectives for the proposed asbestos remediation activities are provided below:

- Undertake remediation activities to mitigate potential risks to future commercial / industrial human health receptors of the proposed USC AWRC development;
- Manage potential human health and/or environmental impacts during and following the remedial works; and
- Validate the completed remedial works through the implementation of a validation sampling program to satisfactorily verify that remedial works have been undertaken in accordance with the RAP and all targeted areas have been successfully remediated.

# 5. REMEDIAL OPTIONS ASSESSMENT

Based on information provided within the previous assessments, it is understood that asbestos contaminated fill materials are present within the Site as illustrated within **Appendix A – Figure 3**. To enable development of the Site, in consideration of the results of previous investigations and the remedial objectives detailed within **Section 4**, ERM undertook an assessment of remedial options.

The purpose of the Remedial Options Assessment (ROA) is to consider the identified risks from contamination within the Site requiring management / remediation (refer to **Section 3.4**) and assess the suitability of potential remediation / site management options to support ongoing and potential future commercial / industrial land uses.

Information from the ROA is summarised within **Table 5-1** below.

## Table 5-1 Remedial Options Assessment

| Remedial Option | Indicative Cost Estimate | Comments |
|---|---|---|
| **Onsite Containment** | ■ Incorporated into construction costs | ■ **Below ground, partial enclosure** - Remediation would involve excavation of asbestos impacted fill materials and placement within a location identified to require filling for construction purposes or an area excavated for placement of fill. Where a suitable location can be identified within the Site, a single placement location may be excavated to contain all asbestos impacted fill material. The impacted area cover comprises of a constructed capping layer placed over impacted fill with no requirement for a liner at the base of waste material. Where residual fill material remains in situ upon reaching construction RLs, fill material should be treated as potentially impacted and covered with a capping layer as per placed materials. This method is viewed as potentially suitable due to proposed construction methodology and low likelihood of contact with contaminated materials following placement and capping within the Site; however the footprint of the placement location may be prohibitively large.<br>■ **Below ground, complete encapsulation** - A below ground High-Density Polyethylene (HDPE) and integrated clay/soil cap and base liners used to encapsulate all contaminated material within the Site. This method is viewed as unsuitable due to no leachable contaminants being identified within previous investigations requiring complete encapsulation.<br>■ **Above ground and below ground partial encapsulation** - Remediation would involve placement of asbestos impacted fill materials in an excavated shallow pit or a location which requires filling. The placed contaminated material would form a low mound (approximately 2 metres in height or less), resulting in contaminated material being located partially above ground and partially below ground. The impacted area cover comprises of a constructed capping layer placed over impacted fill with no requirement for a liner at the base of waste material. This method is viewed as potentially suitable due to a low likelihood of contact with contaminated materials following placement and capping within the Site and a reduced footprint; however, management under a Long Term |

| Remedial Option | Indicative Cost Estimate | Comments |
|---|---|---|
| | | Environmental Management Plan (LTEMP) would be required.<br>**Above ground complete encapsulation** - Above ground cell would be comprised of a HDPE cap with soil/clay cover and a HDPE base liner. This method is viewed as being unsuitable due to no leachable contaminants being identified within previous investigations requiring complete encapsulation.<br><br>ERM notes that all the above methods would require a stakeholder agreed Long-Term Environmental Management Plan being in place.<br><br>The proposed onsite placement location is provided on **Figure 5, Appendix A.** |
| **Offsite Beneficial Reuse** | ■ No estimate provided, see comments | ■ Due to presence of asbestos within the contaminated waste material, it is not suitable for offsite re-use within developable sites in NSW.<br>■ Once leaving the Site, asbestos contaminated material would become waste and would need to be disposed of at a suitably licensed landfill. |
| **Offsite disposal to a licensed landfill facility** | ■ $400 / tonne (General Solid Waste / asbestos) | ■ Offsite disposal of materials is not required, excluding materials associated with the demolition of aboveground structures with ACM, as onsite placement within selected areas of the Site can mitigate the risk to human health.<br>■ Offsite disposal of materials will involve significant truck movements of asbestos contaminated waste materials through residential areas.<br>■ Offsite disposal is viewed as prohibitively expensive. |

Based on the analysis undertaken in previous sections, the preferred remediation strategy comprises:

## *SOIL: ABOVEGROUND AND BELOWGROUND PARTIAL ENCAPSULATION*

Considering the reduced footprint when compared to the belowground partial encapsulation approach, the **aboveground and belowground partial encapsulation** methodology was considered to be the most suitable for the Site and the planned AWRC construction program. ERM understands that John Holland and Sydney Water have recently agreed this approach.

## *GROUNDWATER: REMEDIATION NOT REQUIRED*

Groundwater quality does not exceed screening criteria applicable to the Site and the proposed USC AWRC development and therefore remediation is not required.

# 6. PREFERRED REMEDIATION STRATEGY

Based on a review of information presented within the previous investigations summarised within **Section 3.3** and with consideration of the benefits and disadvantages of the presented options, ERM considers that **excavation and onsite containment of contaminated fill materials within a below ground and above ground encapsulation** under a constructed soil capping layer to be the most pragmatic and cost-effective approach to mitigating potential environmental and human health risks.

A Long-Term Environmental Management Plan (LTEMP) will be required to document residual impacts and control works that have the potential to disturb managed material.

Based on the proposed construction methodology, the following range of remedial approaches will be implemented:

## Table 6-1 Preferred Remedial Approach

| Remediation Approach | Comments |
|---|---|
| **Excavation of asbestos impacted fill and placement in consolidated placement location** | ■ Asbestos impacted fill materials will be excavated meet the requirements of the Remediation Validation Criteria specified in this RAP (**Table 7-2**).<br>■ Excavated asbestos impacted materials are to be placed within the consolidated aboveground encapsulation location once preparation works within this location are completed.<br>■ The proposed placement location is provided on **Figure 5, Appendix A.** |
| **Cover of asbestos impacted fill materials and management under a LTEMP.** | ■ Asbestos impacted fill materials within the consolidated placement location, are to be covered to provide physical separation between impacted materials and future site users.<br>■ Cover will comprise capping with a minimum of 0.5 m of approved imported material, with a marker layer, and managed under a LTEMP.<br>■ Where material is to be placed / retained within landscaped areas, the contractor is to ensure that the root zone of all trees / shrubs and other ornamental plantings is free from asbestos impacted materials. |
| **Offsite disposal** | ■ Where excess asbestos impacted material is encountered, offsite disposal of ACM impacted fill to a suitably licenced receiving facility may be undertaken.<br>■ ERM notes that prior to disposal, appropriate waste classification documentation must be created in accordance with relevant NSW EPA requirements.<br>■ ERM further notes that where all ACM impacted material is disposed offsite, long-term management of the Site under a LTEMP will not be required. |

# 7. PROPOSED REMEDIATION STRATEGY

This section provides specific details relating to implementing the proposed remedial works. The remedial implementation sequence will include the following programme of works:

- Stage 1 – Address Data Gaps
- Stage 2 – Engagement of Environmental Consultant
- Stage 3 – Planning, Permitting, Approvals and Procurement
- Stage 4 – Site Establishment including Environmental Controls
- Stage 5 – Preparation and Excavation of Designated Placement Location
- Stage 6 – ACM Impacted Fill Excavation Works (Areas A-J)
- Stage 7 – Construction of Capping layer
- Stage 8 – Validation and Clearance Activities
- Stage 9 – Demobilisation

These stages are described in more detail below.

## 7.1 Stage 1 – Address Data-Gaps

As per **Section 3.5**, additional visual assessment of the areas located beneath the inaccessible portions of the Site as illustrated on **Appendix A - Figure 4** (building structures, stockpiles and vegetated areas) are to be undertaken.

The visual assessment will include a site walkover by a suitably qualified and Licensed Asbestos Assessor to assess for the potential presence of ACM on the ground surface. Where additional ACM, or other evidence of potential contamination, is identified, the areas are to be managed as per the unexpected finds procedure detailed within **Section 11.1**.

## 7.2 Stage 2 – Engagement of Environmental Consultant

An Environmental Consultant, which is suitably qualified and experienced in accordance with the requirements of the ASC NEPM, is to be engaged to advise, provide oversight and undertake all validation requirements specified within this RAP.

The Environmental Consultant is to undertake the following:

- Oversight of all remediation requirements specified within this RAP;
- Conduct remediation validation, including observations of the materials encountered, undertake sampling and analysis of materials as deemed necessary;
- Make an evaluation of potential risks to human health and the environment posed by the materials and ensure the risk to health and the environment are acceptable (if required); and
- Provide guidance to assist with the appropriate re-use and/or disposal of material.

## 7.3 Stage 3 – Planning, Permitting, Approvals and Procurement

The following documentation is to be prepared prior to commencement of the remedial works:

- Site-Specific Health and Safety Plan (HASP), including Safe Work Method Statements (SWMS);
- Construction Environmental Management Plan (CEMP) (including a sediment and erosion control plan);
- Asbestos Management Plan (AMP) meeting NSW regulatory requirements in relation to working with asbestos (including Code of Practice: How to Safely Remove Asbestos (SafeWork NSW, 2016)). The AMP may form part of the CEMP;
- Landowner consent for the proposed encapsulation strategy;
- Obtain any necessary local planning approvals, if required beyond the existing CSSI and Commonwealth project approvals); and
- SafeWork NSW authority notifications.

## 7.4 Stage 4 – Site Establishment and Environmental Controls

Prior to the commencement of remedial works, the environmental and asbestos management controls documented in the CEMP and AMP are to be implemented.

Controls should include, but are not limited to, the following:

- Asbestos works notification and management controls;
- Sediment/erosion management;
- Identification of temporary stockpiling locations;
- Dust and fugitive fibre emission controls;
- Reference to health and safety management including provisions for personal protective equipment;
- Stockpile management;
- Material tracking and disposal;
- Limits on site access to remediation/ encapsulation areas and managing access tracks;
- Noise, odour and vibration controls; and
- Monitoring requirements.

## 7.5 Stage 5 – Preparation and Excavation of Designated Placement Location

The proposed placement location, as illustrated on **Appendix A - Figure 5,** will be excavated to the required depth (expected to be approximately 0.5 to 1m bgl). This will also enable the location to be used as a borrow pit prior to it being used for onsite encapsulation. Based on information provided to ERM by John Holland, ERM understands that the proposed placement location, is situated outside the 1 per 100 year flood zone. During excavation works, all materials are to be managed as per the requirements outlined within the CEMP. Information provided to ERM indicates that the proposed placement area will be free from future site services (i.e., stormwater, power, etc.).

Information provided to ERM also indicates that materials excavated from the proposed placement location will be retained onsite; however where offsite disposal is required, excavated material must be classified in accordance with NSW EPA waste classification requirements prior to transport to an approved receiving facility.

## 7.6 Stage 6 – ACM Impacted Fill Excavation Works (Areas A-J)

### Table 7-1 ACM Impacted Fill Excavation Requirements

| Excavation Staging | Required Scope of Works / Methodology |
|---|---|
| Pre-Excavation Works | ■ Prior to the commencement of remedial works, the areas requiring remediation will be clearly demarcated as detailed on **Figure 3, Appendix A.**<br>■ The following air monitoring and other health and safety / environmental controls as specified within the HASP, CEMP and AMP shall be prepared for the works:<br>– Background air monitoring will be conducted to assess levels of airborne asbestos fibres and dust prior to any soil disturbing works or asbestos removal activities at the Site to determine the concentration of background airborne asbestos and dust.<br>– Control air monitoring will be conducted to assess the effectiveness of controls adopted at the Site to prevent the liberation of asbestos and dust into the air during soil disturbing works and asbestos removal activities.<br>– Asbestos air monitoring will be carried out in accordance with Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres 2nd Edition (National Occupational Health and Safety Commission (NOHSC), 2005). Air monitoring should also be undertaken by a suitably qualified environmental consultant or occupational hygienist. |
| Excavation Works | The following should be undertaken during excavation works:<br>■ Carefully excavate impacted materials using appropriate equipment (e.g. excavators / backhoes) from the areas requiring remediation as per **Figure 3, Appendix A** (and any other areas identified when addressing identified data-gaps). Works are to be conducted in accordance with the HASP and CEMP. Asbestos works are to be conducted in accordance with the AMP, prepared for that activity.<br>■ To reduce the area of disturbed material, the number of areas subject to excavation works at any one time should be minimised.<br>■ Materials should be excavated and placed directly into a truck for transport to the placement location onsite. Direct transportation from the areas requiring remediation to the placement location minimises the requirements for double handling of impacted material at the Site. It may be necessary from time to time during the remediation program to utilise temporary stockpiling areas outside of the placement location; however this should be limited to the extent practicable.<br>■ If offsite disposal of asbestos impacted material is required during the remediation event, materials should be excavated and placed directly into a truck and trailer, and subsequently transported offsite immediately to the identified licensed waste receiving facility. All off-site transportation of asbestos impacted materials is to be undertaken in accordance with all relevant regulatory requirements, including material tracking and notification to relevant authorities. |
| Temporary Stockpiling | ■ To the extent practicable, excavated material will be immediately taken to the containment location following excavation activities in each of the areas requiring remediation.<br>■ Asbestos impacted material will be temporarily stockpiled in the placement location footprint in a dedicated temporary stockpiling area. The proposed placement location is provided on **Figure 5, Appendix A.**<br>■ Environmental controls, as per the AMP, should be implemented to minimise potential asbestos exposure risks to site workers during temporary stockpiling activities. Controls may include, but not limited to, wetting stockpiles with water using a water cart and covering temporary stockpiles with HDPE liner. Temporary stockpiles should (where practicable) also be positioned within the |

| Excavation Staging | Required Scope of Works / Methodology |
|---|---|
| | excavation areas (i.e. within the areas requiring remediation) or on impermeable membranes (i.e. plastic sheeting) in order to minimise the likelihood of impacted material contaminating other areas of the Site.<br>■ Temporary stockpiling of asbestos impacted material on the Site outside of the placement location may also be required at times during the remediation program for logistical reasons. Where temporary stockpiles are required, all relevant management controls detailed within Section 9.0 should be implemented. Following removal of temporary stockpiles, validation of stockpile footprints is to be undertaken as per Section 7.8.2. |
| Material Placement Within Placement Location | ■ Based on the preferred remediation strategy specified, excavated contaminated materials will be placed within the designated aboveground placement locations. Excavated impacted fill materials will be transported from the excavation area via truck to the designated placement location.<br>■ Following placement of the fill material by truck within the designated placement area, the material should be immediately wet-down, spread and compacted to reduce the area of disturbed (uncompacted) material and seal the placed material. Placed impacted material will require compaction or other controls to reduce the potential for dust and airborne fibre generation.<br>■ Following completion of placement works, the surface of the placement area should be surveyed by a registered surveyor. The survey will provide details of the location of the impacted materials for documentation in the LTEMP.<br>■ Health, safety and environmental requirements to mitigate potential asbestos impacts to the Site from remediation activities will be provided in the preliminary documentation, such as the Asbestos Management Plan. This includes any requirements related to controls for trucks and truck movements across the Site. |

## 7.7 Stage 7 - Construction of Marker Layer and Capping Layer

### *7.7.1 Construction of Marker Layer*

A marker layer shall be placed over the impacted material within the designated placement locations (i.e., in between the impacted material and capping layer) to ensure that, should future intrusive works occur, workers can be made aware of the potential underlying asbestos impacted materials.

The marker layer shall comprise a distinct coloured geotextile placed over the impacted material and underlying the capping layer.

While there is no specific Australian Standard for geotextile membranes, consideration should be given to international guidelines (AASHTOM228-96) when selecting the appropriate geotextile membrane.

### *7.7.2 Capping Layer*

Impacted fill materials within designated placement locations will be covered by a capping layer. The capping layer will comprise a layer of approved imported material with a minimum thickness of 0.5 m appropriate to provide physical separation between future site users and impacted materials and to facilitate long-term management under a LTEMP with minimal management requirements.

The following considerations for the capping material are noted:

- Road / building slabs or pavement subgrade and / or construction materials are also appropriate as capping material, providing a minimum 0.5 m thickness is maintained (inclusive of the overlying hard standing).

- Where landscaping is completed in capped areas, a cover layer of sufficient thickness must be used so that the root zone of all trees / shrubs and other ornamental plantings are free from impacted materials and do not penetrate the capping layer. All material utilised within the root zone of plantings is to be validated in accordance with the requirements specified within the validation sampling plan. Based on information provided by John Holland regarding root zone depth for planned landscaping, it is expected that landscaping materials placed above the capped areas will have a minimum thickness of 1 metre.

All capping materials are to meet any engineering / geotechnical requirements to facilitate the development of the USC AWRC.

The materials to be utilised for capping will be required to be environmentally suitable for human and / or ecological exposure (as appropriate), including material excavated from the Site and validated for reuse, certified Virgin Excavated Natural Material (VENM), certified Excavated Natural Material (ENM) or other material certified in accordance with a Resource Recovery Order and Exemption issued by the NSW EPA. The capping material and depth is to be reviewed and approved by the Site Auditor. Requirements for verifying the appropriateness and suitability of the proposed imported material including VENM, ENM and recycled material is provided in **Section 7.9.1**.

## 7.8 Stage 8 - Offsite Disposal of Excavated Material

If offsite disposal of excavated ACM impacted materials or materials excavated during construction of the containment cell area is required, this will be undertaken in accordance with the NSW EPA (2014) Waste Classification Guidelines: Part 1: Classifying Waste. This includes the specific sampling and analysis requirements for classifying the waste.

- The Environmental Consultant should prepare a Waste Classification Letter for any soils requiring offsite disposal indicating the waste classification and volumes of the relevant excavated materials.
- Disposal dockets from the landfill facility should be obtained and provided in the Site Validation Report as evidence of appropriate disposal.

A material tracking register is required to be maintained to ensure an audit trail for the movement of materials around the Site and offsite.

All other requirements of the NSW EPA (2014) Waste Classification Guidelines: Part 1: Classifying Waste apply.

## 7.9 Stage 9 – Validation

### *7.9.1 Imported Materials*

Where imported fill is required at the Site for reinstatement of excavations, only material certified by John Holland (with the involvement of the Environmental Consultant) as VENM, ENM or natural quarried product will be imported to the Site for this purpose.

It is expected that other materials may be required for specific engineering/landscaping purposes from time to time, including ballast, aggregates and landscape growing media. These materials may be classified as VENM, ENM or under the NSW EPA's resource recovery framework (i.e., Resource Recovery Orders and Exemptions).

#### *7.9.1.1 Requirements for All Imported Materials*

The Environmental Consultant is required to observe all materials as they are imported to the Site and document such observations for inclusion in the SVR. The observations will include visual assessment to confirm that the imported material is consistent with the documentation provided by the source site and that the material does not contain the following:

- building waste or other foreign materials (unless specifically allowed under a Resource Recovery Order and Exemption);
- asbestos;
- staining and/or discoloration;
- odours;
- evidence of potential or actual acid sulfate soils; and
- other evidence of contamination.

In the event that imported material is not consistent with the documentation provided from the source site or there is evidence of acid sulfate soils or contamination, the material should be immediately rejected and treated as an unexpected find and managed in accordance with **Section 11.1**.

#### *7.9.1.2 VENM Import Requirements*

Material proposed to be imported to the Site as VENM is required to be accompanied by an appropriate VENM report which meets NSW EPA requirements for VENM classification. If appropriate documentation is available for a proposed VENM source, a source site inspection and additional sampling and laboratory analysis will not be required prior to import.

The VENM certificate should include a summary of the history of the source site, a review of the site setting in relation to potential migration of contamination onto the source site from surrounding areas, the findings of any environmental site investigations undertaken at that site and the results of any laboratory analyses undertaken.

If the VENM certificate does not meet these requirements, or if otherwise required by John Holland (in consultation with the Environmental Consultant), the source site is required to be visited by the Environmental Consultant for inspection and to enable collection and analysis of soil samples as described in **Section 8.2.**

Regardless of whether additional source site inspection and/or sampling and laboratory analysis is required, the John Holland/Environmental Consultant review of the proposed source documentation must be recorded and kept for inclusion in the SVR at the completion of the remediation program.

#### *7.9.1.3 ENM Import Requirements*

Material proposed to be imported to the Site as ENM is required to be accompanied by an appropriate ENM report which meets NSW EPA requirements for ENM classification, including the requirements set out in the Excavated Natural Material Order 2014. If appropriate documentation is available for a proposed ENM source, a source site inspection and additional sampling and laboratory analysis will not be required prior to import.

If the ENM documentation does not meet these requirements, the source site is required to be visited by the Environmental Consultant for inspection and to enable collection and analysis of samples, as described in **Section 8.2.**

Regardless of whether additional source site inspection and/or sampling and laboratory analysis is required, the John Holland/Environmental Consultant review of the proposed source documentation must be recorded and kept for inclusion in the SVR at the completion of the remediation program.

#### *7.9.1.4 Recycled Material Import Requirements*

If fill material other than VENM or ENM is proposed to be imported to the Site for the purposes of backfilling, it will require a Resource Recovery Order and Exemption issued by the NSW EPA. Any recycled materials proposed to be imported will be subject to the following requirements:

- the recycled material must be provided by a facility licensed by the NSW EPA to process and provide such material, the source of the material must be well understood and a product report/certificate must be provided by the facility clearly stating that the material complies with the relevant Resource Recovery Order, including sampling and laboratory analysis at a NATA-accredited laboratory in accordance with the Resource Recovery Order; and
- regardless of the requirements of applicable Resource Recovery Orders, asbestos analysis must be undertaken on the material by a NATA-accredited laboratory at a frequency that sufficiently demonstrates that the material does not contain asbestos (this is expected to be reviewed by the Environmental Consultant on a case-by-case basis).

In the event that recycled material is not accompanied by appropriate documentation from the supplier as summarised above, the source of the material is not well understood, or the results of sampling and laboratory analysis are insufficient, the material may be rejected or subjected to additional inspection and laboratory analysis prior to importation to the Site. If this occurs, samples are to be collected at a rate of 1 sample per 25 m³ and submitted for laboratory analysis for a range of potential contaminants, as described in **Section 8.2.**

### *7.9.2 Material Tracking*

During proposed remediation works, materials will be handled during excavation and placement of impacted materials, offsite waste disposal, and importation (where necessary) of cover materials.

A Material Tracking Register will be maintained onsite which will provide information regarding the source, characteristics, destination and quantities of material placed within the placement location, disposed offsite or imported to the Site for capping / backfilling purposes.

### *7.9.3 Remediation Validation*

To confirm the completion of remediation works detailed above, remediation validation activities will be required. The Validation Sampling and Analysis Quality Plan (VSAQP) for remediation validation activities is provided within **Section 8** of this RAP.

In order to avoid re-excavation of imported materials from the excavation area, excavations should not be backfilled until validation / clearance inspections have been undertaken to confirm the successful removal of asbestos impacted soils.

### *7.9.4 Validation Reporting*

The SVR will be compiled by the Environmental Consultant on completion of the remediation and validation program. The SVR will include the scope, methods, results and conclusions of the remedial works.

This report will contain an overview of the remediation activities conducted at the Site and the details of the following:

- Material tracking:
  - Volumes and characterisation of excavated material and location of excavations. The Environmental Consultant will describe and document the nature of the material being excavated during excavation activities;
  - Volumes and locations of stockpiled material; and
  - Volumes of soil reinstated into excavations and disposed offsite.
- Plan of sampling locations for each analyte;
- Analytical results of validation soil samples (where required);
- Survey details;
- Plan drawings of placed impacted materials and cover; and

- A statement that the remediated areas have been rendered suitable for the proposed development.

Supporting factual evidence will be included in the report inclusive of illustrative figures. This will include surveys of excavation areas and placement locations etc., NATA-registered laboratory analysis certificates, landfill disposal certificates (if material is transported offsite), interpretative summary tables and an overview of the works carried out during the remediation process.

The SVR will be prepared in accordance with relevant NSW EPA guidelines for reporting on contaminated sites and any project-specific approval condition requirements. The conclusion regarding site suitability will apply to both the remediated (excavated) areas and also the containment areas, along with any other areas used for temporary stockpiling (if any). The SVR will also document the scope, methodology and findings of the data gap works, including whether remediation was required and completed to address any data-gaps including the details of the outcomes obtained from the data-gaps site walkover.

## 7.10 Stage 10 – Demobilisation

Following completion of remediation and validation works, all plant, machinery and amenities that were utilised for the purposes of the remediation and validation works will be removed.

Environmental controls such as silt fencing and any other general rubbish will also be removed from the Site.

The Environmental Consultant will inspect the Site following completion of the remediation and validation works and subsequent demobilisation.

# 8. VALIDATION SAMPLING AND ANALYSIS QUALITY PLAN

## 8.1 Extent of Validation

In accordance with **Table 8-1** provided below, validation activities will be required for the following areas:

- ACM Impacted Fill Materials;
- Containment (Fill Placement Area, Geofabric Marker Layer, Capping / Cover Materials);
- Imported Materials;
- Waste; and
- Areas Beneath Temporary Stockpiled Asbestos Containing Materials (Outside of the Placement Location).

## 8.2 Validation Requirements

The requirements for validating each area will be undertaken as summarised in **Table 8.1** below.

### Table 8-1 Validation Requirements

| Area / Material | Remediation Approach | Validation Approach | Required Analysis | Sample Frequency Requirements |
|---|---|---|---|---|
| ACM Impacted Fill Materials | ■ Complete excavation exposing natural materials | ■ Visual assessment of excavation surface on a systematic basis for asbestos by the Environmental Consultant and licenced asbestos assessor. | ■ Not Applicable (NA) -where natural material is confirmed at the base of excavation works. | ■ NA |
| | ■ Excavation with residual fill remaining in-situ | ■ Residual fill materials will be assumed to be impacted by asbestos unless validated as otherwise. | ■ Asbestos - Asbestos sampling and analysis will be undertaken in accordance with NEPC 2013/DoH 2009 requirements and includes gravimetric analysis for asbestos. | ■ Validation sampling from the excavations at a density of 1 sample per 10m x 10m grid. |
| Fill Placement Area | ■ NA | ■ Survey of the vertical / lateral extent of fill placement area | ■ NA | ■ NA |
| Geofabric Marker Layer | ■ NA | ■ Survey of the vertical / lateral extent of marker layer | ■ NA | ■ NA |
| Fill Capping / Cover Materials | ■ NA | ■ Survey of lateral extent and thickness of placed materials and cover surface to confirm appropriate cover has been achieved. | ■ NA | ■ NA |
| Imported Materials | ■ NA | ■ VENM as defined under the Protection of the Environment Operations (POEO) Act 1997.<br>■ ENM as defined under the NSW EPA (2014) Excavated Natural Material Order 2014.<br>■ Recycled material meeting the requirements of the applicable Resources Recovery Order | As per the requirements in **Section 7.9.1**, if appropriate supporting documentation to verify the classification of proposed imported material (VENM, ENM or Recycled Material), source inspections, sampling and laboratory analysis will be required as summarised below:<br>■ **VENM:** In the absence of appropriate supporting documentation to verify the material is VENM, material proposed as VENM is to be sampled and analysed for the following potential contaminants: Total | If sampling is considered necessary based on the requirements previously mentioned, the following sampling frequencies are to be adhered to:<br>■ **VENM:** one sample per 250 $m^3$ of material, with a minimum of two |

| Area / Material | Remediation Approach | Validation Approach | Required Analysis | Sample Frequency Requirements |
|---|---|---|---|---|
| | | | Recoverable Hydrocarbons (TRH) $C_6$-$C_{40}$, Benzene, Toluene, Ethylbenzene, Xylene (BTEX), polycyclic aromatic hydrocarbons (PAHs), Phenols, Heavy Metals (8), Organochlorine and Organophosphorus Pesticides (OCPs/OPPs), Polychlorinated Biphenyls (PCBs) and Asbestos (presence/absence).<br>■ **ENM:** In the absence of appropriate supporting documentation to verify the material is ENM including analytical results from the supplier, ENM is to be sampled and analysed for the following potential contaminants: TRH $C_6$-$C_{40}$, BTEX, PAHs, Phenols, Heavy Metals (8), OCPs and OPPs, PCBs, Asbestos (presence/absence), pH, Electrical Conductivity and foreign materials (rubber, plastic, bitumen, paper, cloth, paint and wood).<br>■ **Recycled Material:** In the absence of appropriate supporting documentation to verify the Recycled Material including analytical results, the material is to be sampled and analysed for the following potential contaminants: TRH $C_6$-$C_{40}$, BTEX, PAHs, Phenols, Heavy Metals (8), OCPs and OPPs, PCBs, Asbestos (presence/absence), pH, Electrical Conductivity and foreign materials (rubber, plastic, bitumen, paper, cloth, paint and wood). | samples collected for analysis.<br>■ **ENM:** Per NSW EPA (2014) Excavated Natural Material Order 2014.<br>■ **Recycled Material:** one sample per 25m³ of material, with a minimum of two samples collected for analysis. |
| Waste | ■ NA | ■ If offsite disposal of excavated materials is required, this will be undertaken in accordance with the NSW EPA (2014) Waste Classification Guidelines: Part 1: Classifying Waste. | ■ As required. | ■ In accordance with NSW EPA (2014) Waste Classification Guidelines: Part 1: Classifying Waste. |
| Areas Beneath Temporary Stockpiled Asbestos Containing Materials | ■ Removal of stockpiled materials, exposing natural materials | ■ Visual assessment of excavation surface on a systematic basis for asbestos by the Environmental Consultant and licenced asbestos assessor. | ■ Not Applicable (NA) - where natural material is confirmed at the base of excavation works. | ■ NA |

| Area / Material | Remediation Approach | Validation Approach | Required Analysis | Sample Frequency Requirements |
|---|---|---|---|---|
| (Outside of the Placement Location)<br>And Haul Roads | ■ Removal of stockpiled materials, exposing fill materials | ■ Residual fill materials will be assumed to be impacted by asbestos unless validated as otherwise. | ■ Asbestos - Asbestos sampling and analysis will be undertaken in accordance with NEPC 2013/DoH 2009 requirements, and includes gravimetric analysis for asbestos. | ■ Validation sampling from the stockpile footprint at a density of 1 sample per 50 m². |
| All Excavated and Placed Impacted Materials, Imported Materials, and Waste | ■ NA | ■ Material Tracking Register | ■ NA | ■ NA |

Note: the requirements, including sampling and analysis requirements, for validating any additional areas scheduled for remediation based on the data gaps site walkover will be decided in consultation with the Site Auditor following completion of the data gaps work.

## 8.3 Validation Sampling Methodology

In the event fill material remains in the excavation areas, collection and laboratory analysis of samples are required as per **Table 8-1** above. The methodology to be adopted for sample collection is summarised in **Table 8-2** below.

### Table 8-2 Validation Sampling Methodology

| Media | Sample Collection Methodology | Analytical Suite | Sample Container |
|---|---|---|---|
| Soil | ■ Grab sample from excavator bucket or grab sample directly from excavation face / base. | ■ Asbestos - sampling and analysis will be undertaken in accordance with NEPC 2013/DoH 2009 requirements and includes gravimetric analysis for asbestos. | ■ Laboratory supplied asbestos sample bags (500ml)<br>■ No sample container preservative requirements<br>■ No special requirements for storage / transport however, sample bags should be air-tight and labelled for asbestos analysis so the laboratory is aware the samples may contain asbestos<br>■ Appropriate sample and project information recorded on each sample with unique sample identifiers assigned |

*Note: the requirements, including sampling and analysis requirements, for validating any additional areas scheduled for remediation based on the data gaps site walkover will be decided in consultation with the Site Auditor following completion of the data gaps work.*

Waste classification, VENM, ENM, Other Fill Material and/or Recycled Material sampling methodologies will be undertaking in accordance with the relevant guidelines and laboratory analysis outlined in **Table 8-** further above.

Validation sampling and analysis will be performed with reference to the Data Quality Objectives (DQOs) presented in **Appendix B**.

# 9. REMEDIATION ACCEPTANCE CRITERIA

To assist with assessing whether the remediation goal has been achieved, Remediation Acceptance Criteria (RAC) will be adopted for the works. These RAC were developed, considering the potential future land use scenarios, and in consideration of the regulatory requirements listed in Section 1.3.

## 9.1 Soil Remediation Criteria – Asbestos

Due to the nature of the identified contamination within the Site, the primary criterion for determination of a defined remediation end-point for soils is ensuring that ACM impacted fill excavation areas are excavated to the occurrence of confirmed natural materials and that the placement location of impacted fill materials is surveyed and appropriately capped.

Upon removal of fill materials from areas identified to contain asbestos impacted fill material, the surface of the excavation area will be inspected by the Environmental Consultant to determine if the area is visually cleared of fill materials (and asbestos).

Validation will be considered complete within a fill excavation area when a suitably experienced and qualified SafeWork NSW Licensed Asbestos Assessor has inspected each area requiring remediation (Areas A-J) upon completion of final remediation excavation activities and an asbestos clearance certificate for all areas (Areas A – J) has subsequently been issued by the Licensed Asbestos Assessor.

ERM notes that due to the construction methodology, the potential for staged validation of remedial areas may be required.

If soil samples are required to be collected for validation purposes (i.e., excavation is terminated within fill materials), collected soil samples are to be analysed in accordance with the ASC NEPM and WA DoH (2021) guidelines, including gravimetric analysis, to provide confirmation of successful removal. Sampling and laboratory analysis for asbestos is not required in the event that natural materials are encountered in the excavation walls / base. Asbestos sampling and laboratory analysis is only required in the event fill material remains present in the excavation area.

Collected soil samples will be assessed against the ASC NEPM / WA DoH soil asbestos criteria summarised in Table 9-1.

### Table 9-1 Remediation Acceptance Criteria – Residual Fill Materials

| Land Use | Asbestos Group | % w/w asbestos |
|---|---|---|
| All land uses | FA and AF | 0.001 |
| Parks, public open space, playing fields etc. | ACM | 0.02 |

**Note: While ERM notes the Site will be a commercial industrial facility, due to the unknown nature of how non-operational portions of the Site will be utilised, ERM has considered the open space criteria as a more conservative remedial acceptance criteria.**

Areas beneath temporary stockpiles of asbestos impacted material where residual fill materials remain will be subject to the Remediation Acceptance Criteria summarised above. This is with an objective to validate that impacts from the stockpiled asbestos impacted material to the underlying area, beneath the stockpiles, did not occur during temporary stockpiling activities undertaken.

## 9.2 Soils – Aesthetic Criteria

It is noted that the ASC NEPM requires that “soils should not be discoloured, malodorous (including when dug over or wet) nor of abnormal consistency”, and that “the natural state of the soil should be considered”.

Olfactory or visual evidence of contamination was not identified during the recent ground investigation. As such, discoloured or odorous materials are not expected during the works. An unexpected finds protocol is presented in **Section 11.1** should aesthetically limited materials be encountered during remediation works.

## 9.3 Soils – Offsite Disposal Criteria

If offsite disposal of excavated materials is required, this will be undertaken in accordance with the NSW EPA (2014) Waste Classification Guidelines: Part 1: Classifying Waste.

## 9.4 Imported Material Criteria

Imported material assessment criteria will be in accordance with the appropriate NSW EPA approved exemptions (for recycled materials), NSW EPA (2014) Waste Classification Guidelines: Part 1: Classifying Waste (for VENM) or the NSW EPA (2014) Excavated Natural Material Order 2014 (for ENM).

VENM, ENM, Other Fill Material and/or Recycled Material sampling will be undertaking in accordance with the above guidelines and laboratory analysis outlined in **Table 8-1.**

The imported VENM material would be considered appropriate for import based on the following acceptance criteria based on the analytical results obtained for the material:

- Metals are representative of natural background conditions (if detected);
- Organic contaminants are below the laboratory limit of reporting.

The imported ENM material and Other Fill Material would be considered appropriate for import based on the ENM / Other Fill Material analytical results adhering to the criteria outlined in Table 4 of the NSW EPA Excavated Natural Material Order 2014 Maximum Average Concentration for Characterisation limits.

As previously mentioned in **Section 7.7**, all imported material is to be reviewed and approved by the Site Auditor prior to importing such material. The Environmental Consultant are to prepare a document, such as a VENM / ENM Suitability Letter, which indicates that the Environmental Consultant are satisfied that the imported material is suitable for use at the Site, prior to submitting evidence to the Site Auditor.

## 9.5 Validation of Capping Layer Requirements

Validation of the appropriateness of the capping layer requirements in accordance with the RAP will be undertaken as follows:

- **Capping layer thickness:** The capping layer is to be installed to a minimum thickness of 0.5m. A survey of the top of the placed impacted material and a survey of the surface of the capping layer is to be undertaken by a registered surveyor to confirm the required thickness have been achieved.
- **Capping layer lateral extent:** Following completion of placement and capping works, the lateral extent of the capping layer is to be surveyed by a registered surveyor. The survey will provide details of the location of the impacted materials and the capping layer's spatial location for documentation in the LTEMP and to confirm the capping layer is appropriately situated above all underlying material required to be capped.
- **Marker layer extent:** Similar to the capping layer extent, the marker layer is to be surveyed by a registered surveyor. The survey will provide details of the marker layer location for documentation in the LTEMP and to confirm the lateral extent and elevation of the marker layer.

Photographs of the capping layer and marker layer being installed are to be included within the SVR.

## 9.6 Soil Remediation Criteria - Unexpected Finds

In the event unexpected finds are encountered and/or previously unidentified impacts at the Site are identified during the data gaps site walkover, appropriate alternate Remediation Validation Criteria will need to be applied in this instance. Remediation Validation Criteria for validating the remediation of any unexpected finds or chemical contamination identified during the site walk-over (if any) shall be criteria relevant for continued commercia/industrial land use, as provided below:

- **NEPM:**
  - Health Investigation Level (HIL) D – Commercial / Industrial;
  - Soil Health Screening Level (HSL) D – Commercial / Industrial;
  - Management Limits – D – Commercial / Industrial;
  - Site-specific Ecological Investigation Levels (EIL) – for aged contamination for commercial / industrial; and
  - Ecological Screening Levels (ESL) – D – Commercial / Industrial.
- **CRC CARE (2011):**
  - Soil HSLs for Direct Contact: HSL D – Commercial / Industrial; and
  - Soil HSL – Intrusive maintenance worker (shallow trench).

Although no specific numerical aesthetic guideline values are provided, the NEPM requires the consideration of aesthetic issues (as a result of contamination) arising from soils. The following remediation criteria may be required for unexpected finds when considering soil aesthetics:

- No highly malodourous soils, taking into consideration the natural state of the soil; and
- No staining or discolouration in soils, taking into consideration the natural state of the soil.

ERM notes that in the event exceedances of the above criteria are reported during potential unexpected finds investigation and/or remediation activities, a risk-based approach via the development of a conceptual site model may be applied to adequately assess potentially complete source-pathway-receptor linkages. If exceedances of the adopted criteria are reported during unexpected finds investigation and/or remediation works and a complete source-pathway-receptor linkage has been demonstrated to not be present such that a risk of harm to human health and/or environmental receptors is unlikely, remediation to the abovementioned validation criteria would not be necessary (subject to review and approval from the Site Auditor).

# 10. SITE MANAGEMENT REQUIREMENTS

This section discusses the Site management provisions to be implemented during remediation and validation works.

## 10.1 Asbestos Management Plan

Prior to the commencement of works, an Asbestos Management Plan (AMP) for the remediation works is to be prepared by the Environmental Consultant and reviewed / endorsed by the Site Auditor. The AMP shall meet requirements of NSW SafeWork codes of practice for working with and removing asbestos.

The AMP should be developed in consideration of site-specific risks and proposed development works, but should consider the following:

- The location and extent of asbestos within the Site;
- Asbestos register;
- Site specific risks;
- Site specific control measures and safe work method statements;
- Procedures for the stockpiling, transport and handling of asbestos impacted materials;
- Monitoring requirements;
- Roles and responsibilities;
- Emergency response procedures; and
- Training requirements.

## 10.2 Occupational Health, Safety and Environment

Prior to the commencement of site remediation, a Health and Safety Plan (HASP) will be developed by the onsite Environmental Consultant outlining the required safety procedures to be adopted during remedial works.

The remediation works at the Site will be undertaken in accordance with the requirements specified within the HASP. All personnel undertaking work on the Site will have undergone training relevant to the handling and management of contaminated materials, including asbestos.

### *10.2.1 Personal Protective Equipment*

While additional PPE requirements may be identified during preparation of the HASP, during remediation works, the following Personal Protective Equipment (PPE) should be considered for all works:

- All workers involved in excavation activities are required to wear long sleeve shirts and trousers whilst onsite;
- Gloves and safety glasses shall be worn by all workers involved in handling of excavated materials;
- All workers involved in excavation activities should be attired with hard hats, protective footwear, safety vests and hearing protection (when working in the vicinity of heavy plant/machinery);
- Due to the presence of asbestos fragments within the waste material, asbestos rated dust masks and appropriate decontamination procedures will be required during all works within areas identified as containing asbestos product; and

- Excavation equipment should be capable of maintaining a “closed door” environment to mitigate dust entering the cab including measures such as HEPA filters.

### *10.2.2 Hazard Controls*

Prior to remediation works commencing, the following hazard controls should be noted within the HASP and enforced for all areas requiring remediation:

- Areas identified as containing asbestos should be wetted down during excavation works to minimise the potential for airborne fibres;
- Undertake underground and overhead services location for the area in the immediate vicinity of the proposed excavation areas;
- Limit unauthorised access by ensuring that site security gates at the Site entrance are locked at the completion of each day’s work or sufficient temporary fencing is erected around the works site with appropriate signage;
- All open excavations to be barricaded in accordance with SafeWork NSW requirements; and
- Consideration should be given to restricting access to open excavations.

### *10.2.3 Site Access*

All heavy vehicle access and egress from the Site should follow a designated heavy vehicle route specified by the EC and Remediation Contractor. As a minimum, the following traffic control measures will be implemented:

- All streets along the designated heavy vehicle route will be kept free from detritus material sourced from the Site during the course of the project. A representative of the Remediation Contractor will, on a daily basis, monitor the roadways leading to and from the Site, and take steps to clean any adversely impacted pavements;
- Materials such as soil, mud, earth or similar tracked onto the driveways will be removed by means such as sweeping and shovelling, but not washing; and
- Vehicles carrying impacted materials and travelling along onsite haul roads from the excavation areas to the placement location shall have covered loads and adhere to the relevant speed limits. Washdown of trucks carrying ACM impacted soils should be undertaken prior to trucks departing the Site (i.e. driving on public roads following site works).

### *10.2.4 Dust Control*

All practicable measures will be taken to ensure that dust emanating from the Site is minimised. Measures to minimise the potential for dust generation may include:

- Where practicable minimising the excavation area and total number of stockpiles of impacted materials present within the Site;
- Any asbestos material which may be encountered during the excavation works will be kept wetted at all times or otherwise covered;
- Use of water sprays over unsealed or bare surfaces, which are generating unacceptable amounts of dust;
- Covering of excavation faces and stockpiles, where necessary (if unacceptable amounts of dust are generated or if weather forecasts predict strong winds);
- Maintenance of all dust control measures to ensure good operating condition; and
- All vehicles having had access to unpaved areas of the Site shall exit via a wheel wash facility to prevent mud and sediment from being deposited on public roadways.

### *10.2.5 Odour Control*

While odour is not considered to be a significant risk, all activities conducted at the Site will be controlled such that all equipment used is designed and operated to control the emission of smoke, fumes and vapour into the atmosphere and any possible odours arising from the excavation or stockpiled material is controlled.

Control measures may include:

- Maintenance of construction equipment so that exhaust emissions comply with the relevant NSW legislation; and
- Use of covers (if required, i.e. HDPE).

### *10.2.6 Soil Erosion and Surface Water Runoff*

During remediation works, sediment and surface water controls should be implemented. While the specific controls to be implemented will be documented within contractor site management plans, the following should be considered:

- Sediment control;
- Clean water diversions; and
- Stormwater drain protection.

Sediment and clean water diversion control measures (i.e. silt fencing, hay bales, gravel bags etc.) should be strategically placed at the following locations:

- Down-gradient of temporary stockpiles;
- Up-gradient of temporary stockpiles to redirect water; and
- Down-gradient of any surrounding stormwater channels that flow within / through the Site as a contingency against overflow into bunded stockpile locations.

Stormwater drain protection may comprise:

- Installation of sediment controls in any identified stormwater drains located down-gradient of any temporary stockpile areas.

During remediation works, all sediment and surface water controls will be routinely inspected. Should any control measure be damaged or defective, the issue will be reported to the Remediation Contractor to arrange for repair or modification.

### *10.2.7 Site Signage*

A sign displaying the contact details of the Remediation Contractor will be displayed on the Site works area fencing. In addition, signage should also include details notifying site users of the asbestos removal activities being undertaken.

The sign/s will be displayed throughout the duration of the remediation works in accordance with NSW regulatory requirements.

### *10.2.8 Site Security*

The Site shall be secured by means of an appropriate fence to guard against unauthorised access if required.

## 10.3 Reporting

### *10.3.1 Non-conformance and Corrective Action Reports*

Non-conformances will be recorded within the Remediation Contractor's Non-Conformance and Corrective Action Report (or equivalent).

Details of the non-conformance, including any immediate corrective actions undertaken, are to be recorded by the onsite project team.

It is the responsibility of the project team to immediately initiate corrective actions, if required. Once completed, the project team will provide details of the actions undertaken on the Non-Conformance Report and sign, date and file the report.

### *10.3.2 Incident Management Reports*

Reporting of environmental incidents will be undertaken in accordance with the John Holland and Sydney Water incident reporting procedures and timelines.

Records will be kept of any environmental incidents, accidents, hazardous situations, unusual events and unsafe health exposures and the corrective action taken.

The project team will investigate the cause of any emergency so that necessary changes in work practices can be made to prevent the incident recurring.

### *10.3.3 Complaint Reporting*

The project team will maintain a register of complaints, which will include a record of any action taken with respect to the complaints.

If a complaint identifies a non-conformance, a Non-Conformance & Corrective Action report is to be initiated.

Nature of the complaint is to be documented in the Site's Complaints and Environmental Incidences Register (or equivalent).

# 11. CONTINGENCY PLAN

## 11.1 General

The purpose of the contingency plan is to:

- identify unexpected situations that could occur;
- specify procedures that can be implemented to manage such situations; and
- prevent adverse impacts to the environment and human health should these situations occur.

The conditions that may be encountered during excavation are uncertain. As unknown and variable sub-surface conditions impose a degree of uncertainty for the project, a set of anticipated conditions has been assumed in developing the excavation plan. However, because field conditions may vary, flexibility has been built into the excavation plan to adapt to differing conditions.

The conditions that can reasonably be expected, the resulting problems they may cause, and how these problems may be resolved within the context of the remediation program have been summarised in Table 11-1 below.

### Table 11-1 Potential Project Risks

| Anticipated Project Risks | Corrective Action |
|---|---|
| **Increased volumes of contaminated material** | ■ The Site has a number of areas that can be utilised for placement of additional contaminated materials. |
| **Volume of impacted material exceeding site containment capacity** | ■ The development approach incorporates flexibility in design such that increases in volumes of placed material can be accommodated due to filling requirements to achieve design levels underlying and/or via over-excavation of natural materials.<br>■ On this basis, while considered unlikely, where the volume of contaminated materials is found to exceed the Site containment capacity the following contingency options are available:<br>▪ Over-excavation of placement area(s) to account for additional volumes.<br>▪ Offsite disposal of contaminated materials to a suitably licenced waste receiving facility in accordance with NSW EPA waste classification requirements. |
| **Chemical spill / exposure** | ■ Stop work, refer to Health and Safety Plan and immediately contact the Site Supervisor. |
| **Excessive rain** | ■ Cover those working areas not located under cover, where possible, with plastic during off-shifts. Inspect and maintain erosion and sediment controls. |
| **Excessive drainage** | ■ Minimise active/contaminated work area; or improve diversion of clean run-on; or maintain sufficient onsite wastewater storage capacity; or mobilise additional storage and/or treatment systems as needed. |
| **Excessive dust** | ■ Use water sprays, biodegradable dust sprays, cease dust-generating activity until better dust control is achieved, or apply interim capping systems.<br>■ If necessary, install dust deposition gauges prior to and during works to monitor the effectiveness of dust controls implemented onsite. |
| **Excessively wet materials** | ■ Stockpile and dewater onsite or add absorbents. |
| **Equipment failures** | ■ Maintain spare equipment or parts, maintain alternative rental options; or shut down affected operations until repairs are made. |

| Anticipated Project Risks | Corrective Action |
|---|---|
| **Release of fuel/oil from machinery** | ■ Remove source, use absorbent booms to remove oil and make any repairs and clean-up as required. If necessary, implement temporary measures until booms can be deployed; (e.g. earth embankments) to prevent movement of spill into water courses.<br>■ Appropriate numbers of suitable spill kits are to be located in the work zone. |
| **Sediment and erosion controls fail** | ■ Stop work and repair controls to specifications. |
| **Excessive noise** | ■ Identify source and review noise attenuation equipment and, as necessary, provide silencers on noisy equipment. Use of alternative equipment should also be considered, where practicable. |

## 11.2 Unexpected Finds

In addition to the above listed contingencies, the following steps are required to be undertaken should unexpected finds such as stained or odorous materials, buried drums or tanks, or suspected impacted materials (other than impacts identified in this RAP) be discovered during the remediation works.

In the event that unexpected finds of impacted materials or items are encountered, the Unexpected Finds Procedure for Contamination outlined in the existing Construction Environment Management Plan (CEMP) for the Site is to be followed. This procedure is provided in **Appendix C** of this RAP.

Additional environmental and occupational safety controls may be required in the event of unexpected finds as follows:

- Upgrade of personal protective equipment (PPE), for workers within the active work zone, in accordance with the HASP;
- Segregation and bunding of impacted material/items;
- Use of odour suppressants (where appropriate);
- Covering of the impacted material/items with plastic sheeting (where appropriate/possible);
- Appropriate sampling and analysis to assess potential contaminants; and
- Appropriate treatment and/or disposal of the materials/items following receipt of laboratory analytical results and any associated regulatory approvals required.

Discussion with key project stakeholders, such as the Site Auditor and Sydney Water, should be undertaken in accordance with the Unexpected Finds Procedure.

# 12. LONG TERM ENVIRONMENTAL MANAGEMENT PLAN

A LTEMP is required to detail the necessary controls in order to manage any potential human health exposure risks associated with the contained asbestos material onsite.

ERM notes that the LTEMP needs to be practical and legally enforceable.

The LTEMP will document: the expected limitations on Site use; relevant environmental and health and safety processes and procedures; management processes, procedures and responsibilities to be adopted by future site users within the Site; and include details on the location and extent of placed or residual asbestos contaminated fill materials, capping layers and marker barriers within the Site boundary.

The LTEMP must be prepared by the Environmental Consultant and be reviewed and approved by the Site Auditor.

# 13. CONCLUSION

This RAP was developed to provide a working plan detailing the excavation, soil stockpiling, validation and occupational health and safety and environment management strategies associated with the remediation of impacted fill material at the Site.

Based on the data currently available, ERM considers the impacted portion of the Site identified within previous site investigations could be rendered suitable for the proposed Upper South Creek Advanced Water Recycling Centre development following completion of remedial / validation works outlined within this RAP.

# 14. REFERENCES


- Aurecon ARUP (2021), Upper South Creek Advanced Water Recycling Centre – Soils and Contaminated Land Impact Assessment, 27 July 2021 (“the SCLI Assessment”) (Aurecon ARUP, 2021);
- ERM (2023), Sampling and Analysis Quality Plan, Upper South Creek Advanced Water Recycling Centre, 06 June 2023 (ERM, 2023);
- ERM (2023a), Hazardous Material Survey, Upper South Creek Advanced Water Recycling Centre (DRAFT) (ERM, 2023a);
- ERM (2023b), Detailed Site Investigation, Upper South Creek Advanced Water Recycling Centre (DRAFT) (ERM, 2023b);
- JBS&G Australia Pty Ltd (2023), Interim Audit Advice (IAA) (0503-2307-03) – Sydney Water Corporation – Upper South Creek Advanced Water Recycling Centre – Review of the Upper South Creek Advanced Water Recycling Centre - Soils and Contaminated Land Impact Assessment, 17 March 2023 (“IAA03”) (JBS&G, 2023);
- National Environment Protection Council (NEPC) (2013). National Environment Protection (Assessment of Site Contamination) Measure 1999 (ASC NEPM);
- NSW EPA (2017), Guidelines for the NSW Site Auditor Scheme 3rd edition (NSW EPA, 2017);
- NSW EPA (2020), Consultants reporting on contaminated land - Contaminated Land Guidelines (NSW EPA, 2020);
- NSW Government (2022), Upper South Creek Advanced Water Recycling Centre – Concept and Stage 1, Conditions of Approval (NSW Government, 2022);
- National Occupational Health and Safety Commission (2005), Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres 2nd Edition (NOHSC, 2005);
- WA Department of Health (2021). Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia (WA DoH, 2021).

# 15. STATEMENT OF LIMITATIONS

1. This report is based solely on the scope of work as described within this RAP report dated 29 August 2023 and performed by ERM Environmental Resources Management Australia Pty Ltd (ERM) for John Holland Pty Ltd (the Client). The Scope of Work was governed by a contract between ERM and the Client (Contract).
2. No limitation, qualification or caveat set out below is intended to derogate from the rights and obligations of ERM and the Client under the Contract.
3. The findings of this report are solely based on, and the information provided in this report is strictly limited to that required by, the Scope of Work. Except to the extent stated otherwise, in preparing this report ERM has not considered any question, nor provides any information, beyond that required by the Scope of Work.
4. This report was prepared in August 2023 based in information collected during investigations undertaken between May 2023 to July 2023 as detailed within **Section 3.3** and is based on conditions encountered and information reviewed at the time of preparation. The report does not, and cannot, take into account changes in law, factual circumstances, applicable regulatory instruments or any other future matter. ERM does not, and will not, provide any on-going advice on the impact of any future matters unless it has agreed with the Client to amend the Scope of Work or has entered into a new engagement to provide a further report.
5. Unless this report expressly states to the contrary, ERM's Scope of Work was limited strictly to identifying typical environmental conditions associated with the subject site(s) and does not evaluate the condition of any structure on the subject site nor any other issues. Although normal standards of professional practice have been applied, the absence of any identified hazardous or toxic materials or any identified impacted soil or groundwater on the Site(s) should not be interpreted as a guarantee that such materials or impacts do not exist.
6. This report is based on one or more site inspections conducted by ERM personnel, the sampling and analyses described in the report, and information provided by the Client or third parties (including regulatory agencies). All conclusions and recommendations made in the report are the professional opinions of the ERM personnel involved. Whilst normal checking of data accuracy was undertaken, except to the extent expressly set out in this report ERM:
    a. did not, nor was able to, make further enquiries to assess the reliability of the information or independently verify information provided by;
    b. assumes no responsibility or liability for errors in data obtained from, the Client, any third parties or external sources (including regulatory agencies).
7. Although the data that has been used in compiling this report is generally based on actual circumstances, if the report refers to hypothetical examples those examples may, or may not, represent actual existing circumstances.
8. Only the environmental conditions and or potential contaminants specifically referred to in this report have been considered. To the extent permitted by law and except as is specifically stated in this report, ERM makes no warranty or representation about:
    a. the suitability of the Site(s) for any purpose or the permissibility of any use;
    b. the presence, absence or otherwise of any environmental conditions or contaminants at the Site(s) or elsewhere; or
    c. the presence, absence or otherwise of asbestos, asbestos containing materials or any hazardous materials on the Site(s).

9. Use of the Site for any purpose may require planning and other approvals and, in some cases, environmental regulator and accredited Site Auditor approvals. ERM offers no opinion as to the likelihood of obtaining any such approvals, or the conditions and obligations which such approvals may impose, which may include the requirement for additional environment works.
10. The ongoing use of the Site or use of the Site for a different purpose may require the management of or remediation of site conditions, such as contamination and other conditions, including but not limited to conditions referred to in this report.
11. This report should be read in full and no excerpts are to be taken as representative of the whole report. To ensure its contextual integrity, the report is not to be copied, distributed or referred to in part only. No responsibility or liability is accepted by ERM for use of any part of this report in any other context.
12. Except to the extent that ERM has agreed otherwise with the Client in the Scope of Work or the Contract, this report:
    a. has been prepared and is intended only for the exclusive use of the Client;
    b. must not to be relied upon or used by any other party;
    c. has not been prepared nor is intended for the purpose of advertising, sales, promoting or endorsing any Client interests including raising investment capital, recommending investment decisions, or other publicity purposes;
    d. does not purport to recommend or induce a decision to make (or not make) any purchase, disposal, investment, divestment, financial commitment or otherwise in or in relation to the Site(s); and
    e. does not purport to provide, nor should be construed as, legal advice.

# APPENDIX A FIGURES


## Site Location

F1

| | | | |
|---|---|---|---|
| Drawing No: | 0677828_RAP_G001_R0.mxd | | Remedial Action Plan – Upper South Creek Advanced Water Recycling Centre, Kemps Creek, NSW |
| Date: | 22/06/2023 | Drawing Size: A4 | |
| Drawn By: | CB | Reviewed By: MB | Client: John Holland Group |

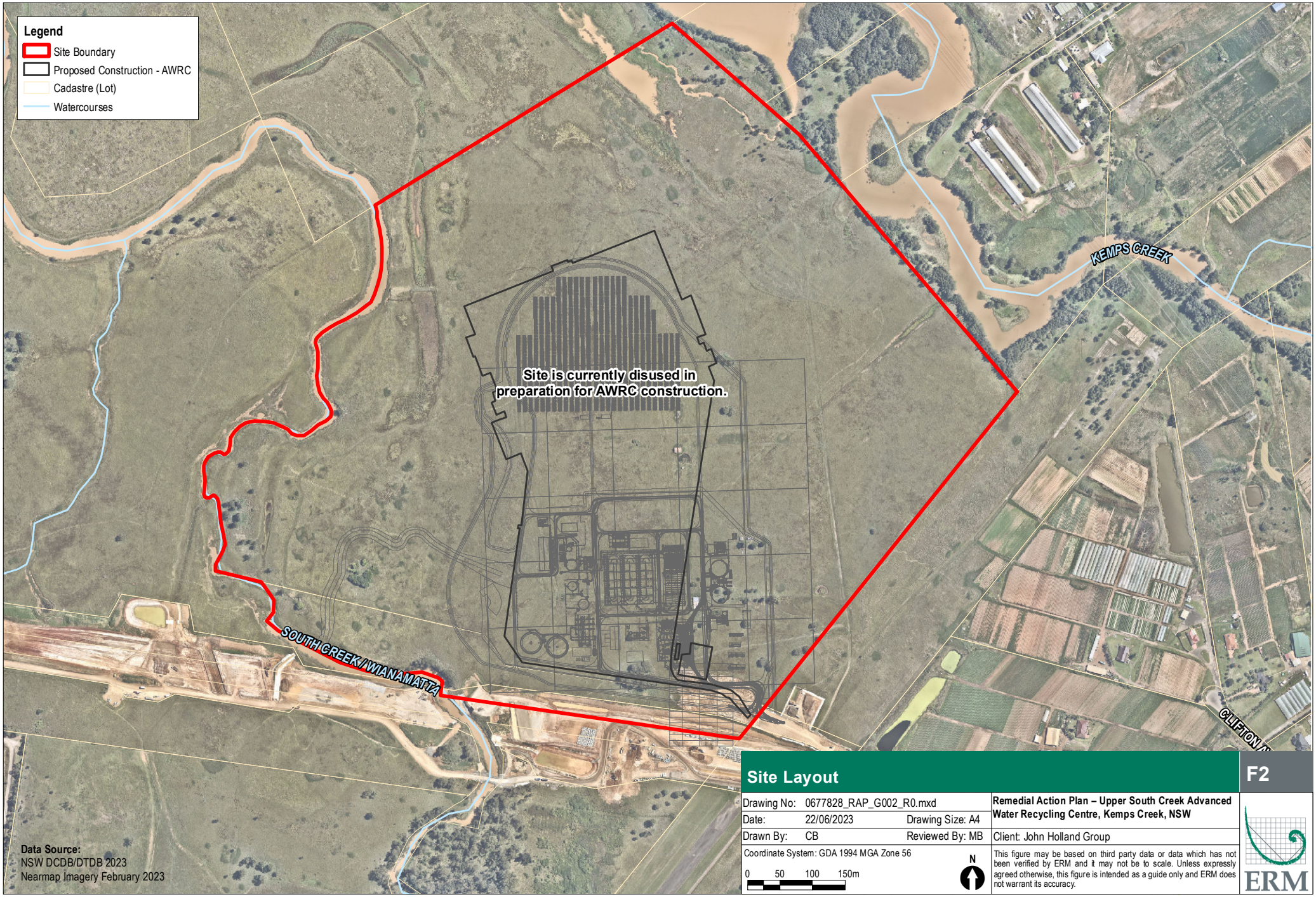
Coordinate System: GDA 1994 MGA Zone 56

0 100 200 300m

N

This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.

ERM




## Site Layout

F2

| | | | |
|---|---|---|---|
| Drawing No: | 0677828_RAP_G002_R0.mxd | | **Remedial Action Plan – Upper South Creek Advanced Water Recycling Centre, Kemps Creek, NSW** |
| Date: | 22/06/2023 | Drawing Size: A4 | |
| Drawn By: | CB | Reviewed By: MB | Client: John Holland Group |

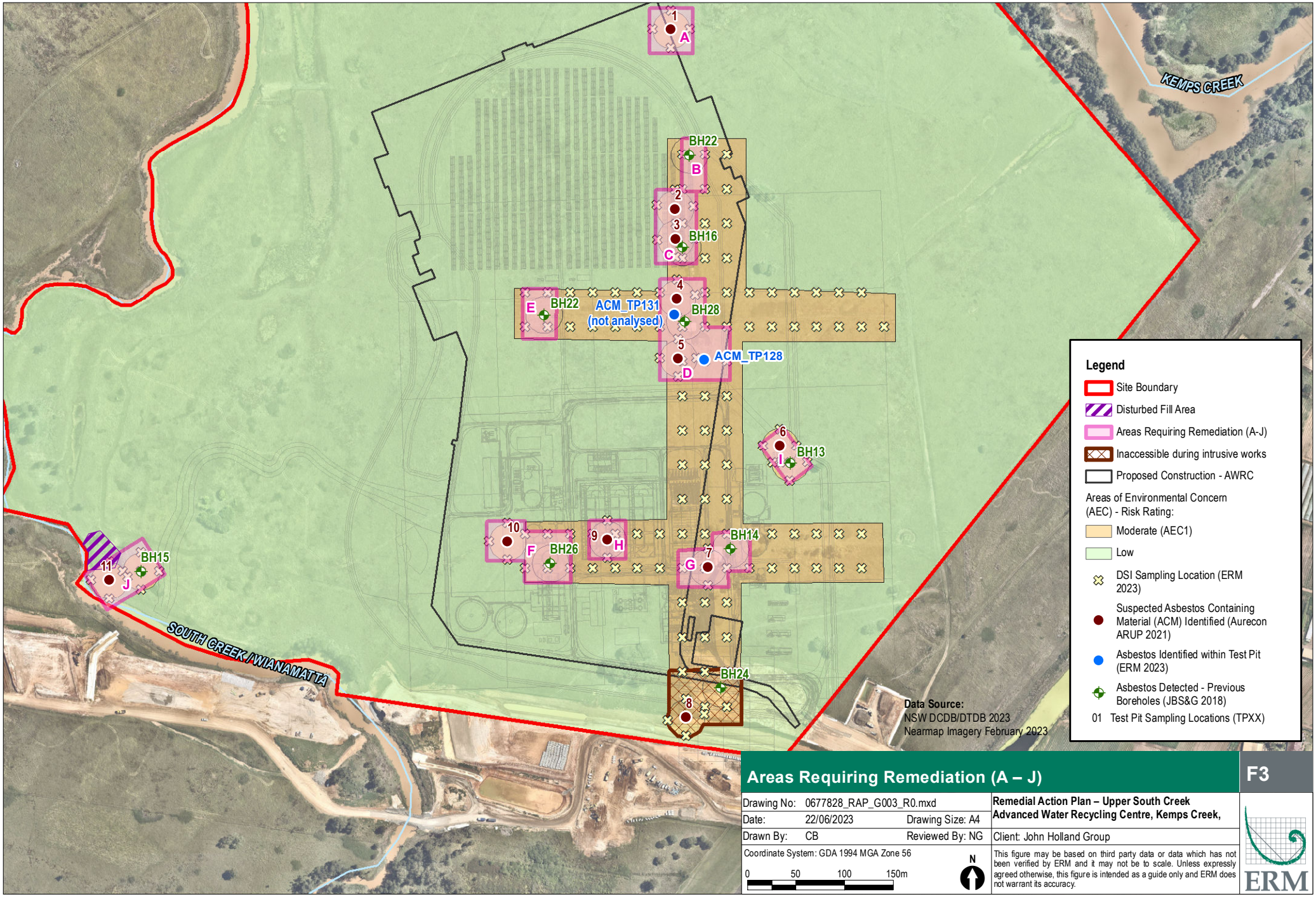
Coordinate System: GDA 1994 MGA Zone 56

0 50 100 150m

N



ERM




## Areas Requiring Remediation (A – J)

F3

| | | |
|---|---|---|
| Drawing No: | 0677828_RAP_G003_R0.mxd | |
| Date: | 22/06/2023 | Drawing Size: A4 |
| Drawn By: | CB | Reviewed By: NG |

Coordinate System: GDA 1994 MGA Zone 56

0 50 100 150m

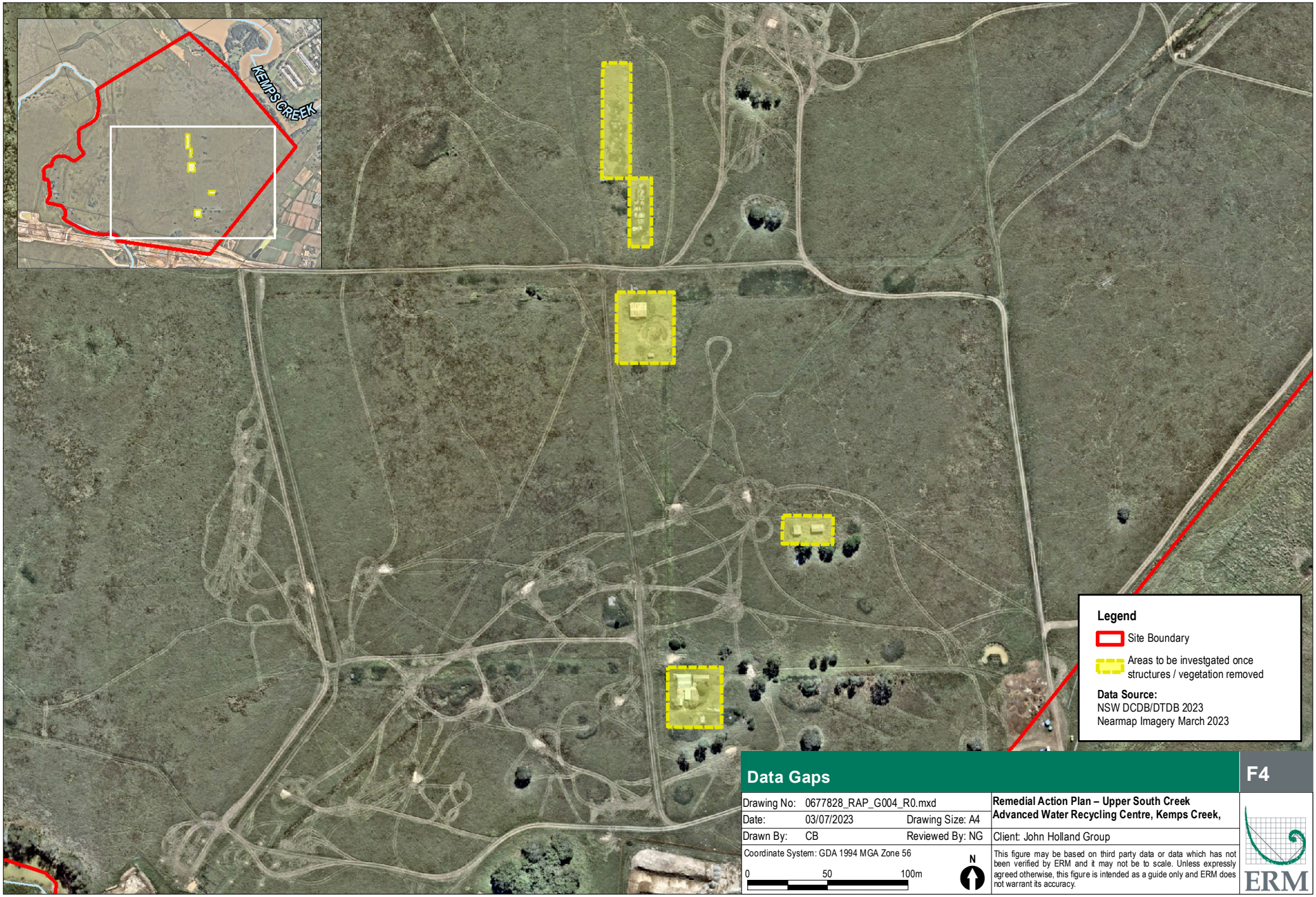
N

**Remedial Action Plan – Upper South Creek Advanced Water Recycling Centre, Kemps Creek,**

Client: John Holland Group



ERM




# Data Gaps

F4

| | | |
|---|---|---|
| Drawing No: | 0677828_RAP_G004_R0.mxd | |
| Date: | 03/07/2023 | Drawing Size: A4 |
| Drawn By: | CB | Reviewed By: NG |

Coordinate System: GDA 1994 MGA Zone 56

0 50 100m

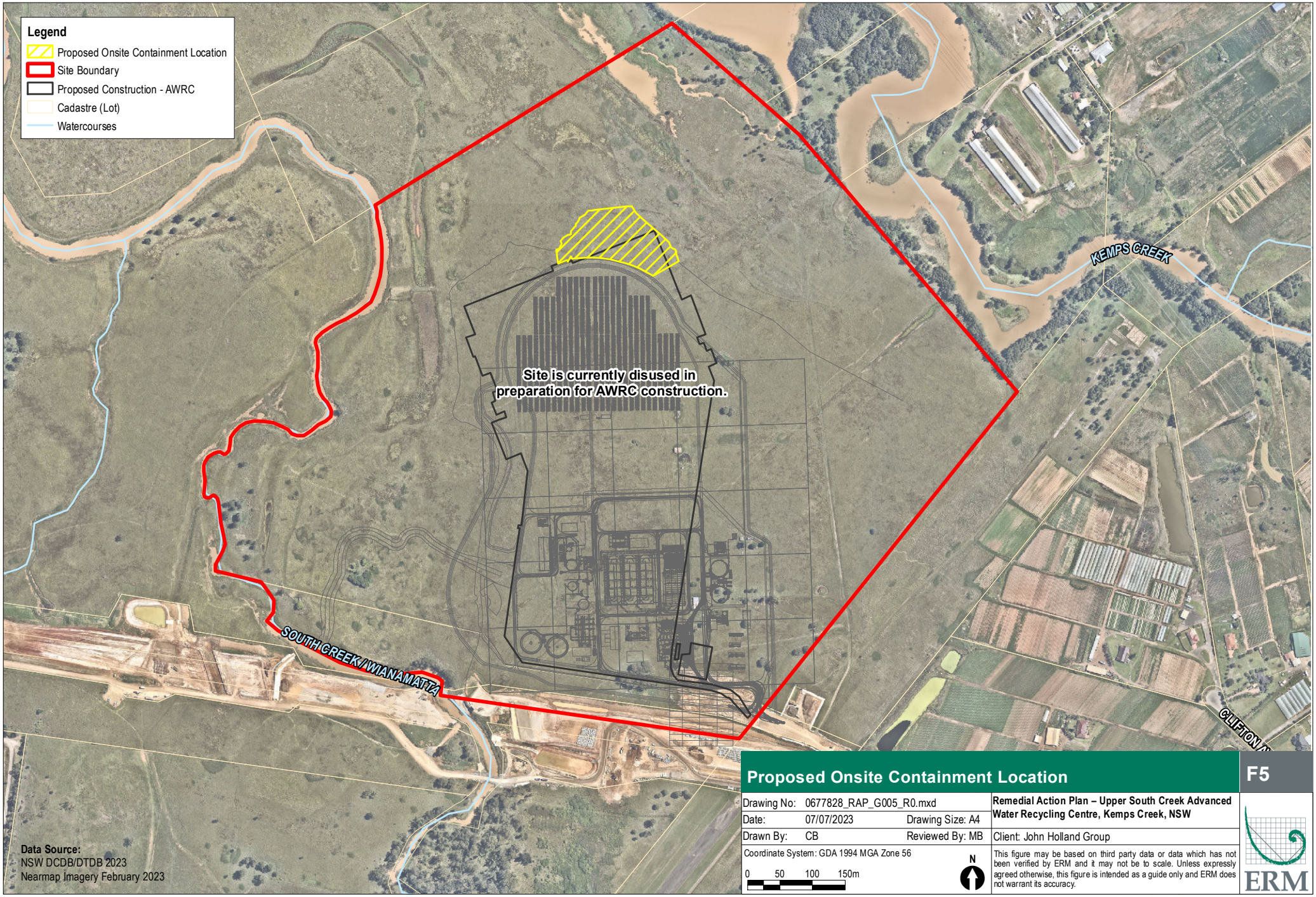
N

**Remedial Action Plan – Upper South Creek Advanced Water Recycling Centre, Kemps Creek,**

Client: John Holland Group



ERM




## Proposed Onsite Containment Location

F5

| | | | |
|---|---|---|---|
| Drawing No: | 0677828_RAP_G005_R0.mxd | | Remedial Action Plan – Upper South Creek Advanced Water Recycling Centre, Kemps Creek, NSW |
| Date: | 07/07/2023 | Drawing Size: A4 | |
| Drawn By: | CB | Reviewed By: MB | Client: John Holland Group |

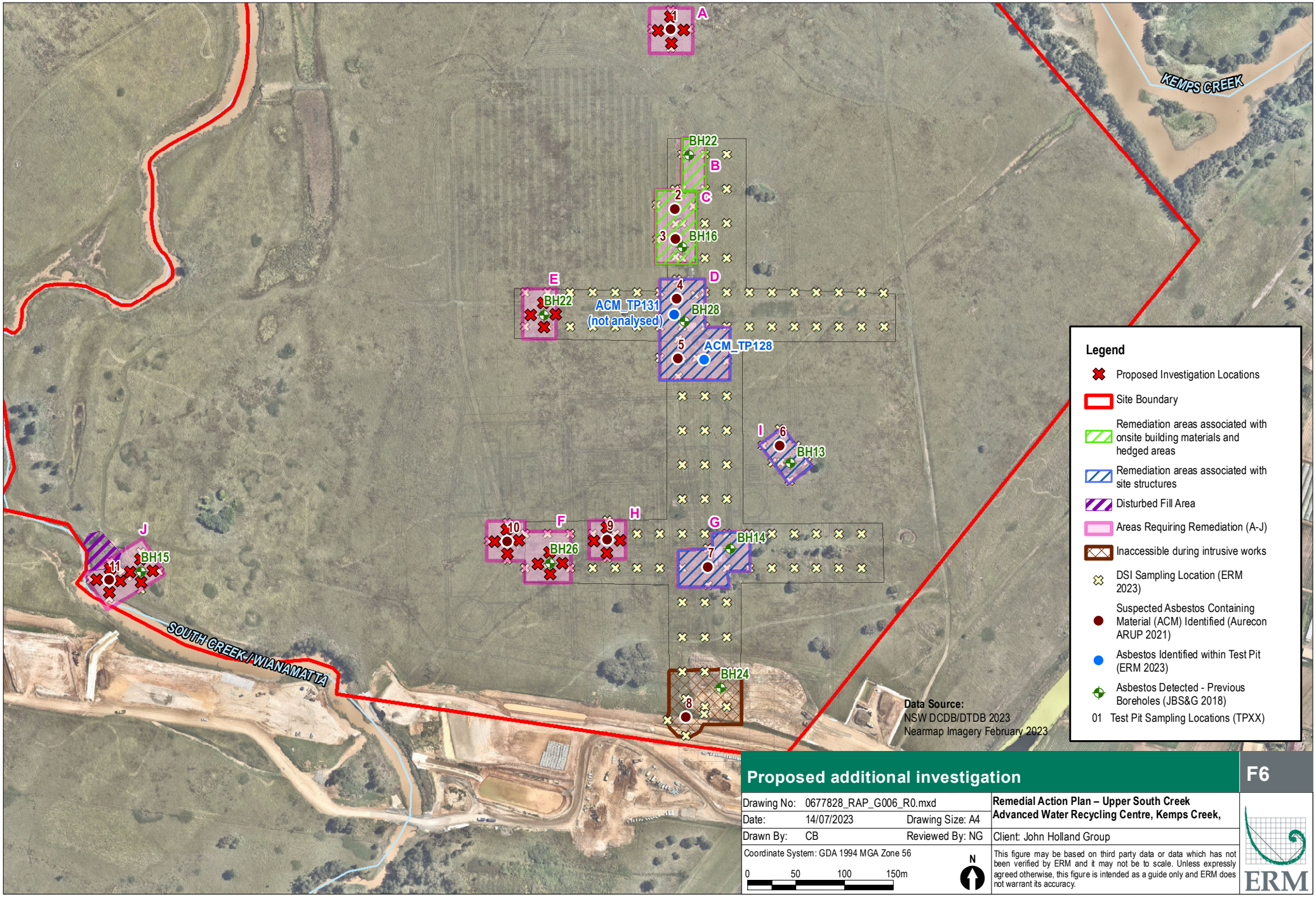
Coordinate System: GDA 1994 MGA Zone 56

0 50 100 150m

N



ERM


KEMPS CREEK
SOUTH CREEK / WIANAMATTA
A
1
B
BH22
C
2
3
BH16
D
4
BH28
5
ACM_TP128
E
BH22
ACM_TP131
(not analysed)
F
10
BH26
H
9
G
BH14
7
I
6
BH13
J
11
BH15
BH24
8
Data Source:
NSW DCDB/DTDB 2023
Nearmap Imagery February 2023
Legend
Proposed Investigation Locations
Site Boundary
Remediation areas associated with onsite building materials and hedged areas
Remediation areas associated with site structures
Disturbed Fill Area
Areas Requiring Remediation (A-J)
Inaccessible during intrusive works
DSI Sampling Location (ERM 2023)
Suspected Asbestos Containing Material (ACM) Identified (Aurecon ARUP 2021)
Asbestos Identified within Test Pit (ERM 2023)
Asbestos Detected - Previous Boreholes (JBS&G 2018)
01 Test Pit Sampling Locations (TPXX)
Proposed additional investigation
F6
Drawing No: 0677828_RAP_G006_R0.mxd
Date: 14/07/2023
Drawing Size: A4
Drawn By: CB
Reviewed By: NG
Coordinate System: GDA 1994 MGA Zone 56
0 50 100 150m
N
Remedial Action Plan – Upper South Creek Advanced Water Recycling Centre, Kemps Creek,
Client: John Holland Group
This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.
ERM

# APPENDIX B DATA QUALITY OBJECTIVES

## *Data Quality Objectives (DQOs)*

Data Quality Objectives (DQOs) have been developed to define the type and quality of data required to achieve the project objectives. The DQOs have been prepared in line with the DQO process outlined in the ASC NEPM. The seven-step DQO approach identified in ASC NEPM as it applies to validation of the Site is described below.

The DQOs have been prepared in line with the DQO process outlined in ASC NEPM (Section 5.2 of Schedule B2) which recommends that DQOs be implemented during the assessment of potentially contaminated sites. The DQO process described in the ASC NEPM outlines seven distinct steps to establish the project goals, decisions, constraints and an assessment of the project uncertainties and how to address these when they arise.

A description of the seven-step DQO approach identified in the ASC NEPM as applied to validation of the site is presented in the following sections.

## *STEP 1: STATE THE PROBLEM*

The objective of the validation assessment will be to assess whether the Site has been sufficiently remediated to render the Site suitable for the proposed Upper South Creek Advanced Water Recycling Centre (commercial/industrial land use).

## *STEP 2: IDENTIFY THE DECISION*

The principal decision statement that will need to be considered is whether or not the RAP and its subsequent implementation have been executed in a way that adequately mitigates potential ongoing risks to the identified receptors from contamination present on-site. Therefore, the decisions will include the following:

- Have the identified asbestos impacts at the Site been satisfactorily excavated and contained onsite in accordance with the objectives of the RAP?
- Have unexpected finds, if any, been appropriately remediated and/or managed in accordance with the RAP?

## *STEP 3: IDENTIFY INPUTS TO DECISION*

The inputs required to make the above decisions are as follows:

- Background information from previous reports prepared for the Site, including previous investigations;
- Direct measurement and observation of environmental variables including soil type and visual/olfactory observations;
- Laboratory measurement of soil samples for the identified COPCs, specifically asbestos (where the validation surface comprises fill materials);
- Field and laboratory quality assurance/quality control data;
- The relevant soil validation criteria;
- Location and distance to potential receptors;
- Assessment of whether the validation criteria requirements have been met; and
- Feedback received from the Client, Sydney Water and the Site Auditor.

## *STEP 4: DEFINE THE STUDY BOUNDARIES*

The site layout and spatial boundaries of the validation program are displayed in figures provided in **Appendix A.**

Temporal boundaries include when the remediation program described in this RAP commences and end when the validation report is approved by the Site Auditor.

## *STEP 5: DEVELOP A DECISION RULE*

The DQOs have been developed to facilitate the collection of adequate field data and soil analytical data (if required) to address the decisions outlined in Step Two of the DQO process.

In order to ensure the representativeness and integrity of samples collected from the site, and the accuracy and reliability of analytical data, a robust quality assurance / quality control (QA/QC) program will be implemented. This includes cleaning of sampling equipment before and between sampling locations and delivery of samples to the laboratory in good condition.

Given asbestos is the only analyte scheduled for analysis based on the validation requirements, intra-laboratory field duplicate samples, inter-laboratory field triplicate samples, trip blank samples, trip spike samples and/or rinsate samples will not be required. However, if chemical analysis is required due to unexpected finds and subsequent investigation, remediation and/or management of such unexpected finds, a revised DQO program suitable for the unexpected finds contamination may be required to be prepared and approved by the Site Auditor.

With reference to the QA/QC program, field data and the analytical results, the decision rules for validation purposes are summarised in Table B1.

### Table B1: Decision Rules

| Decision Required To Be Made | Decision Rule |
|---|---|
| 1. Is data acquired of acceptable quality for interpretive purposes? | Have appropriate controls and operating procedures been used, specifically:<br>■ Consistent validation methods, including sampling and laboratory analysis for fill materials; and<br>■ Analytical techniques (if required), both standardised method and detection limits appropriate to investigation criteria for different laboratories and for the same laboratories over time.<br>If the criteria stated above are satisfied, the decision is Yes. If the criteria are not satisfied, the decision is No. In the case that the criteria are not satisfied, implications on the suitability of the dataset to achieve the project objectives will be assessed and resampling / reanalysis undertaken if required. |
| 2. Is there sufficient data (quantity and distribution) to assess success of remediation strategies? | Does the data set allow adequate assessment of the data and results against the identified validation criteria in accordance with the requirements of this RAP?<br>If yes, the decision is Yes. Otherwise, the decision is No. If the decision is No, investigations should be carried out to further understand the relevant impacts, exposure pathways and receptors, thereby allowing detailed assessment of exceedances. |
| 3. Has remediation been successful? | Has the remediation strategy resulted in the mitigation of previously identified potential risks to identified receptors to a degree sufficient to satisfy the remediation objective?<br>If yes, then then no further action is required. If no, then additional actions may need to be implemented (i.e. further remediation, management, etc.). |

## *STEP 6: SPECIFY LIMITS ON DECISION ERRORS*

The acceptable limits on decision errors applied during the review of the results were based on the Data Quality Indicators (DQIs) of Precision, Accuracy, Representativeness, Comparability and Completeness (PARCC) in accordance with the ASC NEPM, *Schedule B(3) - Guidelines on Laboratory Analysis*.

The laboratories selected for the project are to be NATA-accredited for the methods and analysis to be undertaken.

Data Quality indicators for the project are summarised in **Table B2** below.

## Table B2: Data Quality Indicators

| | |
|---|---|
| **DATA PRECISION AND ACCURACY** | |
| Relative Percentage Difference (RPD) Between Duplicate Samples | N/A – not required for asbestos analysis. |
| Laboratory Performance | Use of analytical laboratories with adequately trained and experienced testing staff experienced in the analyses undertaken, with appropriate NATA certification. |
| Fieldwork Performance | Use of trained and qualified field staff; including Licensed Asbestos Assessors for visual validation of excavated surfaces, consistent sampling methods used.<br>Appropriate sampling methods used, minimising the opportunity for cross-contamination. |
| **DATA REPRESENTATIVENESS** | |
| Sample Coverage | Representative coverage of potential contaminants, based on site history, site activities and site features. |
| Sample and Analysis Selection | Representativeness of all contaminants of potential concern. |
| Trip Blanks | NA – not required for asbestos analysis. |
| Trip Spikes | NA – not required for asbestos analysis. |
| Laboratory Selection | Adequate laboratory internal quality control and quality assurance methods, complying with the ASC NEPM. |
| **DOCUMENTATION COMPLETENESS** | |
| Documentation Review | Review of acquired documented information pertaining to site history. |
| Fieldwork Observations | Preparation of test pit/borehole logs, groundwater field data sheets, sample location plans. |
| Chain of Custody Records | Laboratory sample receipt information received confirming receipt of samples in a good condition and appropriate chain of custody. |
| | NATA registered laboratory certificates or analysis provided. |
| **DATA COMPLETENESS** | |
| | Analysis for all required contaminants of potential concern. |
| | Validation requirements meant as per details in this RAP. |
| **COMPARABILITY** | |
| Fieldwork Performance | Use of consistent analytical methods for each sample. |
| | Using appropriate techniques for field sample recovery. |
| | Using trained and experienced samplers. |
| Laboratory Performance | Use of NATA registered laboratories. |
| | Analytical methods are comparable between primary and secondary laboratory. |

## *STEP 7: DEVELOP (OPTIMISE) THE PLAN FOR COMPLETING THE WORKS*

The DQOs have been developed based on a review of existing data and discussions with John Holland and the Site Auditor. The scope of works to complete the outlined objective described herein was assessed as the most efficient from both a technical and cost perspective.

# APPENDIX C UNEXPECTED FINDS PROTOCOL

# Unexpected Finds Procedure for Contamination

Scope: This Procedure has been prepared in accordance with Environmental Planning and Assessment Act 1979 (EP&A Act), Protection of the Environment Operations Act 1997 and the Contaminated Land Management Act 1997 (CLM Act) for the management of unexpected contamination finds on the Upper South Creek Advanced Water Recycling Centre Project (USC).

| KEY STEPS AND RESPONSIBILITIES | ROLES |
|---|---|

### INDUCTION AND TOOLBOX TALKS

All USC personnel are to be inducted and receive ongoing training and awareness via toolbox talks and pre-start meetings regarding unexpected finds related to contamination. JH Environment Manager to provide relevant content for the induction and other relevant training and awareness material.

JH Environment Manager

### OBSERVATION OF SOIL / GROUND DURING EXCAVATION WORK

JH Site Supervisor and Construction Team to observe and document in site diary records, soil during excavations for any indicators of contamination. Indicators of potential contamination include:

1. Fibre cement or other asbestos containing materials
2. Discolouration of the soil including staining
3. Odorous soil or groundwater (including seepage)
4. Buried chemical drums or containers

JH Site Supervisor

JH Construction Team

**Has any indication of contamination been observed?**

**NO**

**YES**

### STOP WORK

Notify the JH Site Supervisor and JH Environment Manager and advise all personnel to stay clear of the area. Do not touch or disturb the item / material. JH Site Supervisor to establish and communicate to relevant personnel, a 'no-go zone' at the site of the find. The JH Construction Team will cover, bund or contain the contaminated material (may be stockpiled or in-situ).

The JH Construction Team will provide the following details to the Environment Team (including Sydney Water Leads):

- The location of the potential contamination
- Visual appearance
- Odour (if any)
- Depth
- Surrounding material and mode of discovering the material
- Containment method

JH Environment Manager

JH Site Supervisor

JH Construction Team

JH Safety Team

### ASSESSMENT VIA EXTERNAL PERSONNEL

The JH Construction Manager / Environment Manager is to obtain assistance from a suitably qualified Contamination Consultant, in consultation with EPA accredited Site Auditor and Sydney Water Environment Leads (as required) to identify the potential hazard to human health or the environment in accordance with legislative requirements. This may include sampling and laboratory analysis.

JH Construction Manager/ Environment Manager

Contamination Consultant

EPA Accredited Site Auditor

SWC Environment Lead

JH Safety Team

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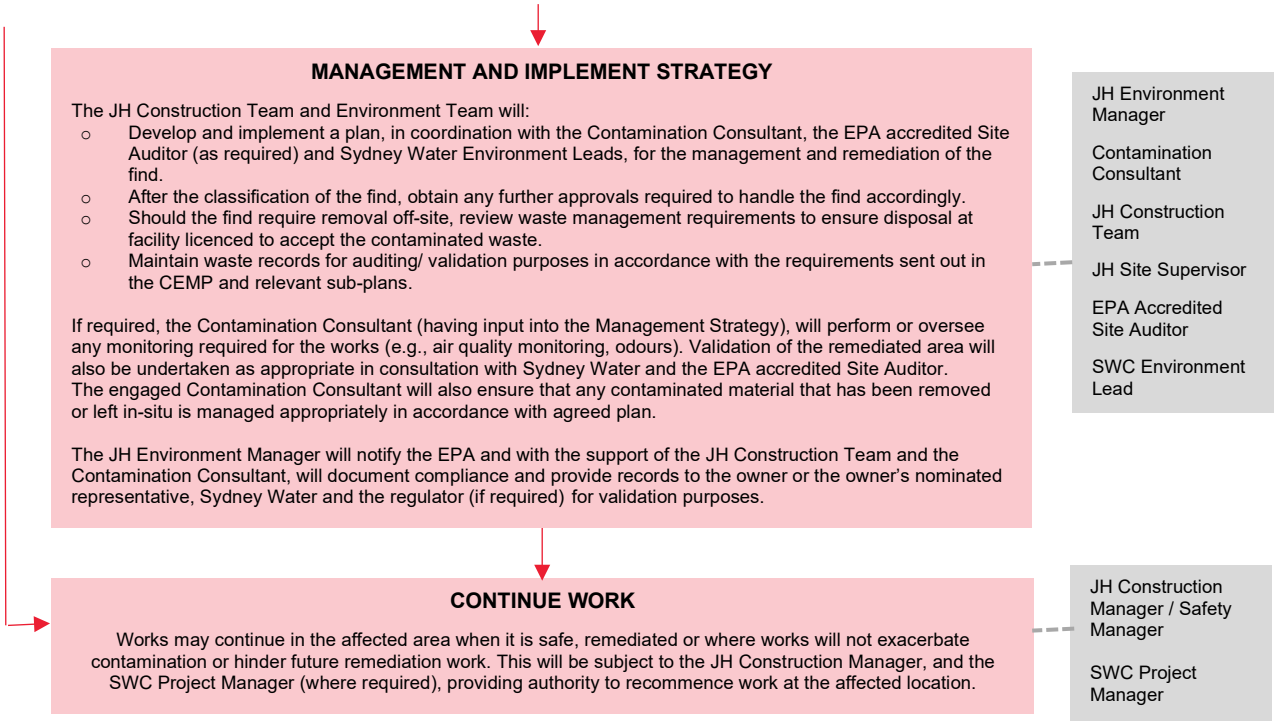
# Unexpected Finds Procedure for Contamination

Scope: This Procedure has been prepared in accordance with Environmental Planning and Assessment Act 1979 (EP&A Act), Protection of the Environment Operations Act 1997 and the Contaminated Land Management Act 1997 (CLM Act).



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**ERM's Sydney Office**
Level 14
207 Kent Street
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