



Preliminary

LOGOS Development Management Pty Ltd
Long Term Environmental Management Plan

Sydney Flight Training Centre
28-30 Burrows Road,
St Peters, NSW

30 September 2022
62126/146186 (Rev 0)
JBS&G Australia Pty Ltd

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Abbreviations

Term	Definition
ACM	Asbestos Containing Material
AF	Asbestos Fines
AMP	Asbestos Management Plan
DP	Deposited Plan
EPA	Environment Protection Authority
FA	Fibrous Asbestos
JBS&G	JBS&G Australia Pty Ltd
JSRA	Job Safety Risk Assessment
LAA	Licensed Asbestos Assessor
LTEMP	Long Term Environmental Management Plan
NOHSC	National Occupational Health and Safety Commission
NSW	New South Wales
PAHs	Polycyclic Aromatic Hydrocarbons
PCC	Penrith City Council
PPE	Personal Protective Equipment
RAP	Remedial Action Plan
SWMS	Safe Work Method Statement
WHS	Work Health and Safety

1. Introduction

1.1 Background

JBS&G Australia Pty Ltd (JBS&G) has been commissioned by LOGOS Development Management Pty Ltd to prepare this report in accordance with the technical requirements of the Secretary's Environmental Assessment Requirements (SEARs), and in support of the State Significant Development Application (SSD 47601708) for the proposed flight training centre at 28-30 Burrows Road, St Peters (the site). The site is legally identified as Lot 2 in Deposited Plan (DP) 212652 and Lot 15 in DP 32332 and occupies a total area of 7,961 m². The site location and layout are shown in **Figure 1** and **Figure 2**.

This report comprises a Long Term Environmental Management Plan (LTEMP) for the future management of the environmentally impacted soils at the site.

The site will be remediated as part of the redevelopment works. As documented in the Remedial Action Plan (RAP) (JBS&G 2022b¹), the site is situated within an industrial area that has contained factories, foundries, workshops and mills from circa 1920. Based on available information, the site has historically been used for various commercial / industrial purposes including vehicle maintenance and storage, including spray booths and a truck wash from approximately 1955.

Contamination had been identified within the extent of the site prior to the redevelopment at 28-30 Burrows Road, St Peters. This has included asbestos containing materials (ACM) and polychlorinated biphenyls (PCBs) as present within the fill material and petroleum hydrocarbon impact associated with historical petroleum infrastructure, including underground petroleum storage system (UPSS), an oil/water separator system and a sewer pump.

The TRH source material was removed via removal of an underground petroleum storage system (UPSS). Secondary source removal was undertaken to the extent practicable via excavation and bioremediation of TRH contaminated soils during site redevelopment, however some TRH impacts to groundwater remain on-site. PCB impacted soils were excavated and disposal off-site to landfill, and ACM (bonded and friable) impacted soils were capped and contained on-site and require in-going management. A marker and capping later were placed over the ACM impacted soils to control potential human and ecological exposures in the future. The marker and capping layer arrangements were different across the site depending on surface cover, such as pavement or whether asbestos impacted materials were located within landscaped areas.

The site is considered suitable for commercial/industrial land use subject to implementation of this LTEMP. This LTEMP is required to ensure that the environmentally impacted soils (including asbestos and petroleum hydrocarbon impacted soils and groundwater) are appropriately managed to ensure continued protection of human health for future site workers, occupiers, visitors and contractors engaged to undertake works at the site.

Through the presence of asbestos as a known contaminant in the soils this LTEMP has been prepared specifically in accordance with Clause 429 of the *Work Health and Safety Regulation (2017)* that states, "If asbestos or ACM is identified at a workplace under clause 422, or likely to be present at a work place from time to time, a person with management or control of the workplace must ensure a written plan (an asbestos management plan) for the workplace is prepared".

This LTEMP applies only to the environmentally impacted soils present within the fill material at the site, as shown in **Figure 2**, and does not apply to the greater site area. It is not intended to apply to

¹ Remedial Action Plan, 28-30 Burrows Road, St Peters, JBS&G Australia Pty Ltd, 17 June 2022 (JBS&G 2022b)

major excavations, earthworks or construction activities. A specific management plan should be prepared in the event that any major works are proposed for the impacted area.

1.2 Objectives

The objectives of this LTEMP are to:

- Protect the health of site occupants, contractors and visitors from the residual environmental hazards (specifically inclusive of asbestos) during the future operation of the site;
- Outline ongoing management requirements to ensure that the risk posed by environmentally impacted soils and groundwater identified at the site is properly managed and maintained;
- Provide guidance on the responsibilities of maintaining the requirements of this LTEMP;
- Provide guidance on the appropriate control measures to be implemented in the event that the capping and/or marker layer requires to be breached; and
- Provide guidance on the appropriate procedures to manage works within environmentally impacted materials (specifically inclusive of asbestos as per requirements of the *Work Health and Safety Regulation 2017*).

It is expected that this LTEMP will be incorporated into the overall maintenance and environmental management procedures for the ongoing operation of the site.

2. Summary of Site Conditions

2.1 Site Details

The site location is shown on **Figure 1**. The extent of the site and associated cadastral boundaries are shown on **Figure 2**. The site details are summarised in **Table 2.1** and described in detail in the following sections.

Table 2.1: Summary Site Details

Lot / DP	Lot 2 DP 212652 and Lot 15 DP 32332
Address	28-30 Burrows Road, St Peters NSW
Local Government Authority	City of Sydney Council
Approximate MGA Coordinates (MGA 56)	Easting: 332131 Northing: 6245552
Previous Use	Various industrial uses
Proposed Use	Flight training centre (Industrial Training Facility)
Site Zoning	IN1 General Industrial
Site Area	7,961 m ²

2.2 Site Description

The site is a large three-level warehouse building for the purposes of a flight training centre.

2.3 Extent of Environmentally Impacted Material Remaining Onsite

Environmentally impacted soil material as affected with ACM have been retained in the fill material across the site. Fill material containing hotspot petroleum hydrocarbon contamination was bioremediated / landfarmed and retained onsite. Fill material across the site contains anthropogenic inclusions with a depth range of 0.3 to 0.9 m bgs.

Petroleum hydrocarbon impacted groundwater remains beneath the site undergoing biodegradation and is subject to on-going management requirements as part of monitored natural attenuation (MNA). Routine groundwater monitoring events (GMEs) are required on a biannual basis and have been detailed in the validation report for the site. The extent of the retained contaminated area, inclusive of the groundwater monitoring well network is shown on **Figure 2** and defined by surveys provided as **Appendix A**.

2.4 Summary of Identified Environmental Contamination Issues

Contaminated soils, inclusive of friable and non-friable asbestos remains in the ground beneath the capping and marker layer and needs to be managed.

2.4.1 Asbestos

Friable asbestos is defined in the Safe Work Australia *Code of Practice How to Manage and Control Asbestos in the Workplace* (SWA 2020a) as being “...material that is in a powder form or that can be crumbled, pulverised or reduced to a powder by hand pressure when dry, and contains asbestos”.

Non-friable ACM is defined by SWA (2020a) as being “...material containing asbestos that is not friable asbestos. Including materials containing asbestos fibres reinforced with a bonding compound”.

Mechanical disturbance of ACM fragments and disturbance of soils may result in the release of fibres and therefore, such activities should be managed to prevent any fibres becoming airborne. Similarly, the same activities can potentially give rise to release of soil particulates affected by chemical contaminants. The health effects of (specifically) asbestos are detailed in enHealth (2005) *Management of Asbestos in the Non-Occupational Environment*.

The primary issue associated with the asbestos remaining beneath the site capping and marker layer is managing the risk of inhalation of respirable fibres if the underlying asbestos impacted materials were to be disturbed.

A secondary issue with the presence of the environmentally contaminated soils remaining at the site is disposal of excess spoil that may be impacted with asbestos in the event that excavation of materials beneath the capping and marker layer is required.

A description of the marker layer used to identify the boundary between the capping and potentially impacted materials is provided in **Section 2.5**. Management measures to deal with these materials in the event that it becomes necessary for the capping and marker layer to be breached are provided in **Section 4**.

2.4.2 Petroleum Hydrocarbons

Petroleum hydrocarbon contamination in soils were not found to pose a risk via vapour intrusion to potential future buildings constructed on the site and basements / existing buildings in proximity of the site. All petroleum infrastructure has been removed and surrounding impacted soils have undergone bioremediation for onsite reuse.

Residual petroleum hydrocarbon impacted groundwater retained beneath the site was identified to have potentially complete ecological exposure pathways, comprising of migration from the site into the adjacent marine/estuarine environment of Alexandria Canal and uptake by ecological receptors. Impacted groundwater was not found to pose a risk via vapour intrusion to potential future buildings constructed on the site and basements / existing buildings in proximity of the site.

A Groundwater Management Plan, which forms part of this EMP, is provided in **Appendix F** and has been prepared to outline the groundwater monitoring requirements to monitor the residual groundwater contamination.

2.5 Site Cover Layers

2.5.1 Requirements

The requirements for the capping and marker layers were specified in JBS&G (2022b²). Distinct requirements were provided for landscaped / non-paved areas, permanent hardstand, areas in tree pit zones and pile foundations of the site. In summary, the requirements for landscaped and non-paved area were:

- Placement of a visual marker layer overlying the environmentally impacted soils consisting of a bright orange coloured non-woven polyester continuous filament or PET (such as nonwoven geotextiles) or similar with a minimum density of greater than 140 grams per square metre (or equivalent); and
- Placement of a capping layer of at least 0.5 m of non-impacted soils overlying the marker layer and across the extent of impacted soils.

For areas of permanent concrete floor/ground slabs, the following requirements were provided:

- Placement of a visual marker layer overlying the environmentally impacted soils consisting of a bright orange coloured non-woven polyester continuous filament or PET (such as nonwoven geotextiles) or similar with a minimum density of greater than 140 grams per square metre (or equivalent), underlying buildings, roads and pathways.

² Remedial Action Plan, 28 to 30 Burrows Road, St Peters, 17 June 2022, JBS&G Australia Pty Ltd (JBS&G 2022b)

For tree pit zones, the following requirements were provided:

- Placement of a visual marker layer overlying the environmentally impacted soils consisting of a bright orange coloured non-woven polyester continuous filament or PET (such as nonwoven geotextiles) or similar with a minimum density of approximately 150 grams per square metre (or equivalent); and
- Placement of a capping layer of at least 1.5 m of non-impacted soils overlying the marker layer and across the extent of the tree pit zone.

The physical capping is required to prevent ready access to soils contaminated with asbestos. The physical barrier layer installed at the site is shown on the survey diagrams provided in **Appendix A**.

2.5.2 Extent of Marker Layers and Capping

The extent of the impacted soils across the site is covered by a marker layer and capping (consisting of pavement or non-impacted soils), which must be maintained to prevent future site users, occupiers, visitors and contractors from being potentially exposed to the retained environmentally impacted soils. The precise extent is shown on **Appendix A**. Photographs of the installation of the capping and marker layer are provided in **Appendix B**.

Providing the marker layer and capping are maintained and control measures herein are successfully implemented in accordance with this LTEMP, there will be no health risks associated with contaminated soils remaining on the site, since there will be no direct pathways for site occupants to be exposed to the retained contamination.

2.6 Requirements and Frequency of Groundwater and Surface Water Monitoring

Groundwater Monitoring required as part of site management is outlined in **Appendix F**.

3. Application and Enforcement of LTEMP and Responsibilities

3.1 Application of LTEMP

This LTEMP will apply indefinitely for future site operations.

The requirements of this LTEMP are intended to apply to any routine activities within the site which could involve disturbance or exposure of retained contaminated soil beneath the capping and marker layer but not limited to:

- Underground utility installation, maintenance or removal; or
- Excavations (e.g., dug, cut, piled or bored).

It is not intended that the LTEMP apply to major excavations, earthworks or construction activities.

Section 4.2 provides requirements for shallow and deep intrusive works, however, disturbance of the marker layer should be avoided, if possible. As noted in **Section 4.2.2**, approval for deep intrusive works must be sought from the person/s with management or control of the workplace who is responsible for the enforcement of the LTEMP (**Section 3.3**). The person responsible for enforcement of the LTEMP will assess whether the works are necessary or if there is an alternative that will not result in exposure of environmentally impacted soil.

3.2 Site Owner

It is the responsibility of the Site Owner to ensure that:

- A copy of this LTEMP is provided to all persons acquiring ownership of all or part of the site (Site Owners).
- A site owner must provide a copy of this LTEMP to any successor in Title.
- A site owner must ensure that a copy of this LTEMP is provided to all persons with management or control of a workplace at the site.
- A person/s with management or control of the workplace (specifically referred to the area of contaminated soils) is made responsible for the implementation and maintenance of the provisions of this LTEMP.
- A person in a senior management position in the organisation is appointed as Site Environmental Manager and given the responsibility for ensuring the maintenance of the provisions of this LTEMP. The Site Environmental Manager may appoint appropriate personnel to implement the LTEMP day to day but will remain the responsible manager to whom the appointed personnel must report.
- Site personnel or contractors that must conduct intrusive works at the site are inducted into the LTEMP and are aware of their responsibilities with regard to health and safety and protection of the environment.
- A copy of this LTEMP is supplied to anyone conducting intrusive works on the site.
- The integrity of the marker layer and capping and/or hardstand is maintained by application of the procedures outlined in this LTEMP.
- The health and safety and environmental requirements specific to the contamination issues on the site, as outlined in this LTEMP, are complied with.
- Environmental incidents are reported in a timely manner to the appropriate statutory authorities, as necessary in accordance with legislation.

3.3 Persons with Management or Control of the Workplace

The person/s with management or control of the workplace shall be responsible for the implementation and maintenance of the provisions of this LTEMP for the contaminated soils.

Specifically, the persons/s with management or control of the workplace shall be responsible for:

- Ensuring the required routine inspections of the surface hardstand areas are completed and accurate records maintained;
- Organising appropriate works in the event that unexpected breaches of the capping and/or marker layers are encountered;
- Inducting relevant personnel, contractors and visitors into the requirements of this LTEMP. Detailed records of personnel inducted into the conditions of this LTEMP shall be kept **(Appendix C)**;
- Ensuring any personnel or engaged contractors undertaking work that penetrates the depth of the capping and marker layer are aware of their responsibilities in relation to the chemical-based contaminants potentially present and friable asbestos impacted materials known to be present;
- Ensuring any disturbance to the capping and marker layer are appropriately reinstated in accordance with the requirements of this LTEMP; and
- Documenting and updating records to reflect any works completed within the area that may have extended below the depth of the capping and/or marker layer **(Appendix E)**.

3.4 Summary of Provisions of this LTEMP

The provisions of this LTEMP are summarised as follows:

- Site personnel or contractors required to conduct intrusive works at the site must be inducted into the LTEMP and must be aware of their responsibilities with regard to health and safety and protection of the environment;
- A copy of this LTEMP is to be supplied to all persons conducting intrusive works on the site;
- The integrity of the capping and marker layers must be maintained by application of the procedures outlined in this LTEMP; and
- The health and safety and environmental requirements specific to the potential chemical constituent and friable asbestos hazards within the encapsulated area as outlined in this LTEMP must be complied with.

4. Contaminated Soil and Asbestos Management Strategy

It is expected that this LTEMP will be incorporated into the overall maintenance and environmental management procedures for all workplaces at the site.

4.1 General

The management procedures provided in the following sections have been primarily based on control of potential hazards that occur from asbestos contaminated soils / asbestos hazards. The nature of the potential co-occurring chemical hazards is that management procedures designed for asbestos hazards will be sufficient to control potential risks as will occur with potential co-occurring chemical hazards (typically including petroleum hydrocarbons).

4.2 Potential Future Earthworks

The management procedures (provided in the following sections) are to be implemented during all routine intrusive works at the site including any potential future small-scale earthworks on the site (e.g. excavation for service installation or maintenance, tree planting). Major works within the area will require specific management controls.

There are two types of intrusions that may be undertaken at the site that would require management:

- Disturbance of the capping soils (shallow intrusive works); or
- Breach of the marker layer generally comprising excavations undertaken beyond a depth of 0.5 m below the ground surface.

Because activities breaching the marker layer entail greater risk than activities that simply disturb the upper depth of capping soils, different procedures apply to shallow and deep intrusive works, as outlined in the following sections.

4.2.1 Shallow Intrusive Works

These provisions for shallow intrusive works apply to works above the marker layer (i.e. works within the capping soils).

Where shallow intrusive works are required, the following management measures will apply:

- Approval for the works must be sought from the person/s with management or control of the workplace who is responsible for the enforcement of this LTEMP. A standing / long-term approval would be appropriate for persons engaged as gardeners / maintenance workers within the site;
- Site personnel or contractors required to conduct intrusive works at the site must be inducted into the LTEMP and must be aware of their responsibilities with regard to health and safety.
- A copy of this LTEMP is to be supplied to all persons conducting intrusive works on the site.
- Workers are not required to wear additional personal protective equipment (PPE) beyond normal site requirements for shallow intrusive works.
- Air monitoring is not required provided the environmentally impacted material beneath the marker layer is not disturbed.
- The marker layer shall not be disturbed, and any capping materials disturbed should be reinstated consistent with the description in **Section 2.5.2** of this LTEMP. Where disturbed, the capping materials should be separately stockpiled, managed and reinstated consistent

with this LTEMP (as applicable and appropriate). This shall include re-instatement of any areas of hardstand where hardstand is required to be removed.

- Any repairs to the capping and/or pavement (i.e. hardstand) overlying the marker layer shall be recorded as outlined in **Section 4.8** and changes should be detailed in an updated survey plan (**Appendix A**), if required.

4.2.2 Deep Intrusive Works

These provisions for deep intrusive works apply to works that will extend below the marker layer (i.e. within environmentally impacted materials). This is below the capping soils and marker layer in the site areas underlying paved / hardstand areas, or otherwise underlying the capping layer and marker layer in non-paved / landscaped / gardens areas of the site.

Where deep intrusive works are required, the following management measures will apply:

- Prior to any deep intrusive work commencing, approval for the works must be sought from the person/s with management or control of the workplace who is responsible for the enforcement of the LTEMP (**Section 3**) who will assess whether the works are necessary or if there is an alternative that will not result in exposure of environmentally impacted soil and whether the works are required to be carried out by a specialist contractor. The person/s with management or control of the workplace must also review and approve the Job Safety Risk Assessment (JSRA) and Safe Work Method Statement (SWMS) for the works and ensure that site personnel and/or contractors who will undertake the works understand the requirements of the LTEMP.
- Site personnel or contractors required to conduct deep intrusive works at the site must be inducted into the LTEMP and must be aware of their responsibilities with regard to health and safety, including those noted in **Section 4.3** following.
- A copy of this LTEMP is to be supplied to all persons conducting deep intrusive works on the site.
- The works area must be isolated from casual entry using temporary barriers and only personnel inducted in the requirements of the site LTEMP will be permitted to enter the works area.
- Sufficient space must be provided within the works area to allow stockpiling of spoil from excavations, in accordance with **Section 4.4** and **Section 4.5** and the RAP (JBS&G 2022b).
- In the event that materials from under the marker layer must be excavated, a water supply must be provided to the works area for the purpose of maintaining potential environmentally impacted soil in the excavations and stockpiles in a moist state.
- Personnel entering the works area must wear appropriate PPE in accordance with **Section 4.3**.
- Decontamination procedures must be undertaken in accordance with **Section 4.3**.
- Stockpiles of excavated spoil must be managed in accordance with **Section 4.4**.
- Air monitoring to be undertaken in accordance with **Section 4.3**.
- Once the works are complete, the capping and marker layer shall be reinstated with materials of similar nature as were originally present, as described in this LTEMP. Where materials are imported for use in the capping layer, if required, they must be validated as suitable for the site use.
- Areas of removal of hardstand / paving must be replaced with hardstand / paving in the reinstatement of the site.

- Any repairs to the capping and/or pavement shall be recorded as outlined in **Section 4.8** and changes should be detailed in an updated survey plan (**Appendix A**), if required.

4.2.3 Reinstatement of Capping

Following potential works as completed as per **Section 4.2.1** or **4.2.2**, there may be a requirement to supply new 'capping material' to the site to replace existing capping material as consumed by the works. Capping material is to consist of virgin excavated natural material (VENM) or excavated natural material (ENM) and pavement meeting the requirements of **Section 2.5.1** where removed during the works.

Where pavement is used a minimum thickness of 50 mm is required.

Where VENM or ENM are used, then appropriate validation assessment, inclusive sampling and analysis must be available as consistent with relevant NSW EPA guidelines or otherwise resource recovery exemptions. The person responsible for the implementation of the LTEMP must be provided with all relevant copies of documentation certifying the suitability of capping material.

4.3 Specific Requirements for Those Working with Asbestos Impacted Material

Asbestos-containing materials (bonded and friable) are present in soil underlying the marker layer. Work involving any breaches of the capping and marker layer, (i.e. deep intrusive works exceeding a depth of 0.5 m) will require supervision by a Class A licensed asbestos contractor. The works will be undertaken using the procedures described in the *SWA Code of Practice How To Safely Remove Asbestos (SWA 2020b)* and the following site-specific procedures:

- All site workers shall be inducted to the site and made aware of the procedures outlined in this LTEMP.
- Workers and visitors to the site area will be made aware of the friable asbestos contamination during site inductions and tool box meetings and only authorised people shall enter the work area, which must contain a perimeter barrier to restrict entry.
- An asbestos work area shall be defined and clearly marked.
- All personnel working within the asbestos work area shall wear P2 (or higher) class half face respirators, disposable gloves and coveralls made from materials which provide adequate protection against fibre penetration whilst completing works and whilst within the asbestos work area.
- A 10 m wide exclusion zone shall be established around the perimeter of the asbestos work area. The dimensions of the exclusion zone may be varied by the person/s with management or control of the workplace, or by the Class A licensed asbestos contractor, if necessary to ensure the day to day operation of the Huntingwood East or otherwise significant infrastructure.
- Asbestos warning signs shall be placed surrounding the asbestos work area and at entry/egress points.
- A decontamination area shall be marked out within the asbestos work area for the removal and disposal of PPE before site workers leave the asbestos work area. Personal decontamination must be undertaken each time a site worker leaves the asbestos works area and at the completion of the works. All disposable PPE shall be disposed of as asbestos waste.
- Static air monitoring at a minimum of four locations surrounding each asbestos work area and with consideration to neighbouring receptors shall be undertaken in accordance with the *Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres*

2nd Edition [NOHSC: 3003(2005)] for the duration of the work. The monitoring locations shall be assigned by a Licensed Asbestos Assessor (LAA).

- At the completion of the works the capping and marker layer are to be re-instated in accordance with the requirements of this LTEMP. The changes should be detailed in an updated register of site works as included as **Appendix E**.

4.4 Soil Management

Any environmentally impacted soil/fill (including asbestos impacted materials and anthropogenic material) excavated during deep intrusive works must be securely stockpiled separately from the capping / marker layer material. Capping and marker layer materials should also be separately stockpiled. Stockpiles must be placed on a sealed surface or on plastic sheeting to prevent cross contamination of unsealed surfaces.

Stockpiles must be placed in a secure location onsite and covered if they are to remain for more than 24 hours.

Spoil generated from on-site excavations may be re-used on-site, noting that any material excavated from below the marker layer must be re-used below the marker layer. Capping material cross contaminated with soil from below the marker layer must be re-used below the marker layer.

Alternatively, excavated environmentally impacted soils / materials shall be disposed off-site following appropriate waste classification in accordance with **Section 4.7**.

4.5 Dust Management

During any deep intrusive works that will penetrate the marker layer, excavations and stockpiles of spoil should be kept damp to prevent the generation of dust from these sources. Care should be taken to not over-wet excavations and/or stockpiles such that excess runoff is generated.

4.6 Off-Site Disposal and Waste Management

If any material is to be excavated for off-site disposal it should be classified in accordance with EPA waste classification guidelines (NSW EPA 2014) or guidelines that may be in force at that time. Waste must be managed in accordance with the provisions of the *Protection of the Environment Operations (Waste) Regulation 2014* or successor instruments.

4.7 Emergency Preparedness and Response

The following procedure will be followed in the event that the capping and marker layer are breached unintentionally such that the underlying environmentally impacted soil is exposed:

- Stop the activity or process that has exposed the impacted soil;
- Assess the hazards associated with the exposure of the impacted material and implement appropriate procedures to address the hazards;
- Repair the capping and marker layers such that the impacted soil is once again isolated beneath the capping / barrier;
- Collect and secure any impacted soil that may remain exposed and stockpile securely so that it is protected from casual access;
- Review the activity or process that led to the exposure of the impacted soil and revise procedures or actions accordingly to prevent a re-occurrence;
- Complete an environmental incident/corrective action report in accordance with the current quality procedure; and
- Review and revise the LTEMP to reflect any changes that have been made to prevent a reoccurrence.

In the event of an emergency, then the following persons / organisations shall be available to provide assistance.

Table 4.1: Emergency Contacts

Person	Organisation	Role	Contact Details

4.8 Capping Inspections

Routine inspection of the capping integrity shall be conducted at the following times throughout the future operation of the site (**Table 4.2**).

Table 4.2: Capping Inspections

Inspection Time	Inspection Frequency
Following an accidental breach/penetration of the capping or marker layer	Following incident
Following break / repair of capping and/or pavement underlying rail lines	Upon completion
Routine inspection of capping across site	Annually

Records of the inspection shall be retained for a minimum period of four years (**Appendix E**).

5. Health and Safety Management

It is the responsibility of persons with management or control of workplaces at the site to ensure that comprehensive health and safety programmes that comply with the requirements of the WHS Regulation and are appropriate for the activities undertaken at the site are implemented. Given the presence of asbestos at the site, additional protocols and procedures that address the specific hazards posed by the asbestos must be included in the overall health and safety plans implemented.

The only significant exposure pathway that can lead to health effects from asbestos fibres is inhalation of respirable fibres. Consequently, workers who may be exposed to dust that has the potential to contain asbestos fibres must wear appropriate respiratory protection. Furthermore, measures must be taken to ensure that dust or other material that may contain asbestos fibres is not carried out of the work area to areas where breathing protection would not ordinarily be considered a requirement.

Potential risks to other co-occurring contaminants can be similarly managed by precluding the potential exposure of the impacted materials or direct contact to the impacted soils otherwise. The measures as implemented to control potential asbestos hazards will be similarly effective to control risks from other chemical contaminants that may potentially be present.

With regard to the site, there is a risk that soil underlying the capping and marker layer may release asbestos fibres if disturbed. Consequently, in areas where intrusive works are expected to breach the capping and marker layer, work should be supervised by a person holding a Class A licence who should prepare Job Safety Risk Assessments (JSRA) and Safe Work Method Statements (SWMS) relating to the potential for asbestos to be present. The JSRA and SWMS should be submitted to the Responsible Person, who should ensure that the intrusive works are carried out in accordance with the JSRAs and SWMS and requirements identified in **Sections 3 and 4** of this LTEMP.

6. Revision of the LTEMP

It may, from time to time, be necessary to revise this LTEMP to reflect changes to legislation, changes on site and/or improvements in technologies or knowledge.

Revision of the LTEMP should be undertaken by an appropriately qualified and experienced environmental consultant or Occupational Hygienist. Any amendments to the LTEMP will need to be reviewed by the Auditor. Copies of the revised LTEMP should be distributed to the current site owners, person/s with management or control of the workplace and regular site workers for on-going implementation.

7. Limitations

This report has been prepared for use by the client who has commissioned the works in accordance with the project brief only, and has been based in part on information obtained from the client and other parties.

The advice herein relates only to this project and all results conclusions and recommendations made should be reviewed by a competent person with experience in environmental investigations, before being used for any other purpose.

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Sampling and chemical analysis of environmental media is based on appropriate guidance documents made and approved by the relevant regulatory authorities. Conclusions arising from the review and assessment of environmental data are based on the sampling and analysis considered appropriate based on the regulatory requirements.

Limited sampling and laboratory analyses were undertaken as part of the investigations undertaken, as described herein. Ground conditions between sampling locations and media may vary, and this should be considered when extrapolating between sampling points. Chemical analytes are based on the information detailed in the site history. Further chemicals or categories of chemicals may exist at the site, which were not identified in the site history and which may not be expected at the site.

Changes to the subsurface conditions may occur subsequent to the investigations described herein, through natural processes or through the intentional or accidental addition of contaminants. The conclusions and recommendations reached in this report are based on the information obtained at the time of the investigations.

This report does not provide a complete assessment of the environmental status of the site, and it is limited to the scope defined herein. Should information become available regarding conditions at the site including previously unknown sources of contamination, JBS&G reserves the right to review the report in the context of the additional information.

Figures



Legend

 Approximate Site Boundary



Job No: 63126

Client: Logos

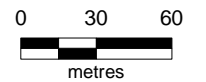
Version: R01 Rev A

Date 24/05/2022

Drawn By: AB

Checked By: RH

Scale 1:3,000



Coord. Sys. GDA 1994 MGA Zone 56

**28-30 Burrows Rd,
St Peters, NSW**

SITE LOCATION

FIGURE 1



- Legend**
- Approximate Site Boundary
 - Site Features
 - Oil Staining
 - Probable UST
 - Shipping Containers - Storage
 - Site Features



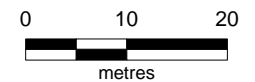
Job No: 62110

Client: Logos

Version: R01 Rev A Date 29/11/2021

Drawn By: RH/JZ Checked By: MN

Scale 1:750



Coord. Sys. GDA 1994 MGA Zone 56

**28-30 Burrows Rd,
St Peters, NSW**

SITE LAYOUT

FIGURE 2

Appendix A Survey Plans

Appendix B Photographs

(To be completed at conclusion of Remediation Works)

Appendix C LTEMP Record of Induction Form

Date	Name	Signature

Date	Name	Signature

Appendix D Capping Reinspection Register

DATE	AREA INSPECTED	COMMENTS	INSPECTING COMPANY AND PERSONNEL DETAILS	SITE LTEMP MANAGER SIGNATURE

DATE	AREA INSPECTED	COMMENTS	INSPECTING COMPANY AND PERSONNEL DETAILS	SITE LTEMP MANAGER SIGNATURE

Appendix E Asbestos Related Works Record

DATE	LOCATION OF WORKS	WORKS COMPLETED	ASBESTOS RELATED WORKS COMPLETED BY	CLEARANCE INSPECTION AND CERTIFICATE ISSUED?	ISSUER OF CLEARANCE CERTIFICATE	SITE LTEMP MANAGER SIGNATURE

DATE	LOCATION OF WORKS	WORKS COMPLETED	ASBESTOS RELATED WORKS COMPLETED BY	CLEARANCE INSPECTION AND CERTIFICATE ISSUED?	ISSUER OF CLEARANCE CERTIFICATE	SITE LTEMP MANAGER SIGNATURE

Appendix F Groundwater Monitoring Plan

Requirement and Frequency of Groundwater Monitoring

Groundwater monitoring wells installed on the site shall be sampled on a quarterly (first year) then biannual (i.e. six monthly) basis. Monitoring frequency will be reduced as per guidance provided in *Use of monitored natural attenuation (MNA) for groundwater clean-up*, November 2021, Western Australian Department of Water and Environmental Regulation (DWER 2021). Monitoring is required to assess whether natural attenuation processes are effective in maintaining the current extent and levels of petroleum hydrocarbons within the site.

Monitoring Wells and Analytes Required for Environmental Monitoring

The monitoring wells to be included in the environmental monitoring and the analytes required to be assessed are summarised following in **Table F1**.

Table F1: Summary of Groundwater Monitoring Requirements

Monitoring Well	Frequency	Required Analytes ¹
MW	Quarterly for the first year then biannual or annually as recommended in DWER 2021	Gauging
MW		Field parameters, TPH / TRH, BTEX and naphthalene – Quarterly for the first year then reduced monitoring as per WA DWER 2021
MW		
MW		MNA parameters (Fe ²⁺ , sulfate, nitrate, methane) annually

Notes:

1. MNA parameters to be included for another four rounds of biannual monitoring. At that stage it is recommended that the need for these analytes in the routine monitoring program be assessed.

TPH – total petroleum hydrocarbons; TRH – total recoverable hydrocarbons; BTEXN – benzene, toluene, ethylbenzene, xylene and naphthalene; BTEX – benzene, toluene, ethylbenzene and xylene; Field parameters – pH, electrical conductivity, dissolved oxygen, redox potential and total dissolved solids.

A figure showing the location of each monitoring well is provided as **Figure XX** in **Attachment 2**.

Groundwater Sampling

A peristaltic pump with small diameter tubing shall be used for groundwater sampling. It is noted in the Murray-Darling Basin Groundwater Sampling Guidelines as referenced in *National Environment Protection (Assessment of Site Contamination) Measure, 2013*, National Environment Protection Council (NEPC 2013) that air bubbles may potentially be formed in peristaltic pump tubing which may cause volatilisation of volatile constituents. Small diameter tubing shall be used with peristaltic pump to prevent this from occurring.

Monitoring wells shall be purged at the highest possible flowrate while ensuring that minimal fluctuations in depth to water occur. A flow cell shall be used to continuously monitor water quality parameters of: Electrical conductivity (EC); Redox potential (Eh); pH; Dissolved oxygen (DO); and Temperature. The groundwater sample shall be collected as per the sampling guidance provided to Vic EPA (April 2022) 'Groundwater Sampling Guidelines Publication 669.1':

- Consecutive EC readings were within 3%;
- Consecutive Eh readings were within 10mV;
- Consecutive DO readings were within 10%; and
- Consecutive pH readings were within 0.5.

Groundwater samples shall be transferred directly to laboratory supplied sample bottles. Sample bottles shall be clearly marked with sample identification details and transferred to an esky chilled with loose ice.

Groundwater Sample Analysis

All analysis of groundwater samples shall be undertaken by NATA accredited laboratories. Naphthalene may be reported from the volatiles scan undertaken to quantify levels of monocyclic aromatic hydrocarbons, consistent with a BTEXN scan.

Surface Water Sampling and Analysis

Two surface water samples shall be collected directly from surface seepage water into Alexandra Canal along the site's retaining wall adjoining Alexandra Canal or directly adjacent the wall where seepage water has been previously observed. Samples shall be collected on a six-monthly basis.

Field parameters including pH, conductivity, redox potential and temperature will be measured using a water quality meter and the results recorded. Features such as discolouration, odours and other indications of contamination will be noted if apparent. The samples will be collected by direct filling of new laboratory prepared and appropriately preserved bottles.

Surface water samples shall be collected by direct filling of laboratory supplied bottles from surface water sampling locations.

The surface water samples shall be analysed for TRH, BTEXN and PAHs.

Quality Assurance / Quality Control

The pre-determined Data Quality Indicators (DQIs) established for the EMP are discussed below in relation to precision, accuracy, representativeness, comparability and completeness (PARCC parameters), and are shown in **Table F2**.

- **Precision** - measures the reproducibility of measurements under a given set of conditions. The precision of the laboratory data and sampling techniques is assessed by calculating the Relative Percent Difference (RPD)³ of duplicate samples.
- **Accuracy** - measures the bias in a measurement system. The accuracy of the laboratory data that is generated during this study is a measure of the closeness of the analytical results obtained by a method to the 'true' value. Accuracy is assessed by reference to the analytical results of laboratory control samples, laboratory spikes and analyses against reference standards.
- **Representativeness** –expresses the degree which sample data accurately and precisely represents a characteristic of a population or an environmental condition. Representativeness is achieved by collecting samples on a representative basis across the site, and by using an adequate number of sample locations to characterise the site to the required accuracy.
- **Comparability** - expresses the confidence with which one data set can be compared with another. This is achieved through maintaining a level of consistency in techniques used to collect samples; ensuring analysing laboratories use consistent analysis techniques and reporting methods.
- **Completeness** – is defined as the percentage of measurements made which are judged to be valid measurements. The completeness goal is set at there being sufficient valid data generated during the study.

$$^3 RPD(\%) = \frac{|C_o - C_d|}{C_o + C_d} \times 200$$

Where C_o is the analyte concentration of the original sample
 C_d is the analyte concentration of the duplicate sample

Table F2: Summary of Quality Assurance / Quality Control Program

Data Quality Objective	Frequency	Data Quality Indicator
<i>Precision</i>		
Blind duplicates (intra laboratory) – groundwater	1 / 20 samples	<50% RPD ¹
Split duplicates (inter laboratory) – groundwater	1 / 20 samples	<50% RPD ¹
Laboratory duplicates	1 / 20 samples	<50% RPD ¹
Trip blank – groundwater and surface water	1 / media	<LOR
Trip spike – groundwater and surface water	1 / media	70-130%
<i>Accuracy</i>		
Surrogate spikes	All organic samples	70-130%
Laboratory control samples	1 per lab batch	70-130%
Matrix spikes	1 per lab batch	70-130%
<i>Representativeness</i>		
Sampling appropriate for media and analytes		-
Laboratory blanks	1 per lab batch	<LOR
Samples extracted and analysed within holding times.	-	14 days for COPC's
<i>Comparability</i>		
Standard operating procedures for sample collection & handling	All Samples	All samples
Standard analytical methods used for all analyses	All Samples	All samples
Consistent field conditions, sampling staff and laboratory analysis	All Samples	All samples
Limits of reporting appropriate and consistent	All Samples	All samples
<i>Completeness</i>		
Sample description and COCs completed and appropriate	All Samples	All samples
Appropriate documentation	All Samples	All samples
Satisfactory frequency and result for QC samples	All QA/QC samples	-
Data from critical samples is considered valid	-	Critical samples valid

(1) If the RPD between duplicates is greater than the pre-determined data quality indicator, a judgement will be made as to whether the excess is critical in relation to the validation of the data set or unacceptable sampling error is occurring in the field.

All data generated by the EMP requires to comply with the DQI's.

Reporting

A report shall be prepared at the completion of each groundwater monitoring event. The report shall detail:

- The sampling undertaken including provision of all field forms (comprising sampling forms and calibration records);
- An assessment of QA/QC of the generated data and a statement as to usability of the data;
- A summary of the environmental results achieved for each monitoring well or surface water monitoring location provided in Summary Tables detailing all historical results;
- Copies of laboratory reports;
- Assessment of the data set generated during the monitoring event in light of the relevant groundwater assessment criteria; and
- Any recommendations including the cessation or reduction in the monitoring rate and addition or removal of monitoring wells from the GMP;
- Where sufficient data is available, a trend analysis of the historical constituent of potential concern (COPC) data available for groundwater on the site, including the results of the newly completed monitoring event; and
- Any recommendations including removal of monitoring wells from the LTEMP or recommendations to control potential exposure to increases in contamination levels and

risks to off-site receptors, based on environmental consultant assessment of the surface water and groundwater monitoring data.

Cessation or Changes to the Groundwater Monitoring Plan

Each monitoring well shall be removed from the requirements of the EMP where:

- The principal COPCs (TRH, benzene, toluene, ethylbenzene and xylene) are found to reduce in three consecutive monitoring rounds by a statistically justified downward trend and the concentrations of all constituents reported in the most recent round are within an order of magnitude of the adopted assessment criteria; or
- Three consecutive rounds of monitoring report the level of the principal COPCs as below the adopted site assessment criteria; and
- Three consecutive rounds of pore / surface water sampling and analysis report levels of COPCs below the adopted site assessment criteria.

In assessing statistically significant trends, groundwater data shall be assessed by Mann-Kendall Analysis, in accordance with guidance provided in *Use of monitored natural attenuation (MNA) for groundwater clean-up*, November 2021, Western Australian Department of Water and Environmental Regulation. Alternately, where sufficient data is available, statistical analysis of Mann-Kendall trends may be undertaken using ProUCL v5.0. ProUCL will report whether a statistically significant trend is present in the data. The decision to remove a monitoring well from the network may also require additional supporting documentation.

The groundwater and surface water monitoring requirement of the EMP shall be ceased where all groundwater monitoring wells are found to meet these criteria. The frequency of groundwater and surface water monitoring shall be reduced to annual monitoring where two years of data is available that shows no significant increases in levels (groundwater data) or extent of groundwater impact.

Potential conditions where contingency actions may require to be undertaken in addition to the EMP include:

- Appearance of PSH in a monitoring well not previously affected by PSH;
- Statistically significant upward trend of levels of analytes in a monitoring well at the extent of hydrocarbon impact and presence of constituents exceeding the adopted assessment criteria;
- Measurement of levels of petroleum hydrocarbons in a surface water sample at a level that exceeds the adopted assessment criteria.

Revision of the EMP

Any revisions / amendments to the EMP require to be approved by Site Auditor.

Replacement of Monitoring Wells

The potential exists that monitoring wells may be destroyed or damaged in the future. Alternately, the current location of monitoring wells may become inaccessible by future site development. It is a requirement of the EMP that the groundwater monitoring wells are maintained in proper functioning condition. In the case of a well being damaged or destroyed then the monitoring well shall be replaced as close as possible to the current location and installed in an identical manner to the formerly existing well.

Contingency Plan

DEC (2007) requires an assessment of contingencies for the event where natural attenuation is found to be ineffective in the control of the extent of groundwater impact. Contingencies will also be required where conditions relating to occurrence of PSH in an historically impacted monitoring well,

expansion of the extent of hydrocarbon impact in groundwater and/or occurrence of significant levels of hydrocarbons in surface water are recorded.

Actions that are proposed to be undertaken in either event are summarised following:

- Source removal works shall be undertaken where measurable PSH is present in monitoring wells (i.e. passive skimming in affected wells, active skimming in affected wells, MPE in affected wells and in proximity etc); or
- Enhancement of on-site natural attenuation processes by addition of reagents to the sub-surface that will enhance natural attenuation processes. To this extent, the sub-surface infrastructure associated with these systems should not be disturbed by future development works or otherwise.

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		Name	Name	Signature	Date
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