Sydney Environmental Group

Long-term Environmental Management Plan

M12 (West) Alignment, Badgerys Creek NSW

CPB Contractors Pty Ltd and Georgiou Group Pty Ltd Joint Venture (CPBGGJV)

Report No: 1850-EMP-01-120525.v2f

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Document Title:	Long-Term Environmental Management Plan, M12 (West) Alignment, Badgerys Creek NSW
Site Address:	M12 (West) Motorway Alignment, Badgerys Creek NSW
Client Name:	CPB Contractors Georgiou Group Joint Venture
Alignment Size:	≈ 130.7 ha
Encapsulation Cell Areas:	Encapsulation Pit 1: 469 m^2 Encapsulation Pit 2: 452 m^2 Encapsulation Pit 3: 705 m^2 Encapsulation Pit 4: 2,555 m^2 Encapsulation Pit 5: 133 m^2
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1. PURPOSE

1.1. Background

Sydney Environmental Group Pty Ltd (SE) was engaged by CPB Contractors Pty Ltd and Georgiou Group Pty Ltd Joint Venture (CPBGGJV) (the client) to prepare an Environmental Management Plan (EMP) for asbestos, heavy metal and polycyclic aromatic hydrocarbon (PAH) impacted soils that have been capped and contained within the M12 (West) Motorway alignment, Badgerys Creek NSW (refer to **Figure 1** with the 'site' boundaries outlined in **Figure 2**).

Non-friable and friable asbestos, heavy metal and PAH impacted soils were transported to five (5) encapsulation cells as part of the remedial works undertaken between September 2022 and August 2024. Impacted soils were remediated via a 'cap and contain' strategy. The containment strategy is a passive system comprised of an orange high-visibility marker layer, overlain by a capping layer comprising site-won virgin materials, overlain by a hardstand roadway. Impacted soil materials are buried beneath the capping system within an encapsulation cell.

This EMP describes conditions of the site and details passive management strategies to manage contained impacted soils. The protocols outlined in this EMP must be considered in future works that may result in a breach of the capping layer covering the impacted soils encapsulation cell on-site (refer to **Figures 2, 3** & **4** and **Attachment A – Encapsulation Cell Surveys**).

1.2. Objectives

The key objective of this EMP is to outline the maintenance of the capping layers within the placement cells and prevent any unplanned breaches of the capping layer and encapsulation cells. To achieve the objective, this EMP documents:

- Detail the known extent and construction of the impacted soils within the encapsulation cells;
- Define responsibilities and safe work procedures for working with the impacted soils;
- Define incident response and reporting requirements;
- Define the roles and responsibilities of relevant stakeholders to ensure the safe, long-term management of the site; and
- Detail the mechanism to make this EMP legally enforceable and the parties responsible for the ongoing management of the encapsulation cells within the project boundary.

1.3. Supporting Documentation

This EMP has been developed based on the findings of the following previous investigations, and remediation and validation works undertaken:

- JBS&G (2020a), 'Preliminary Site Investigation, 1953-2109 Elizabeth Drive, Badgerys Creek, NSW, Lot 101 DP848215', dated 6 May, report ref: 57919/127,486 (Rev 0);
- JBS&G (2020b), 'Preliminary Site Investigation, McGarvie Smith Farm and Fleurs Farm, Kemps Creek, NSW, Lot 62-63 DP1087838, Lot 3 DP164242, Lot 1 DP74574, Lot 1 DP88836, Lot 21 DP258414', dated 6 May, report ref: 57919/127412 (Rev 0);
- JBS&G (2020c), 'Preliminary Site Investigation, 765 Luddenham Road, Luddenham, Lot 25 DP604586', dated 15 May, report ref: 57919/127693 (Rev 0);
- JBS&G (2020d), 'Preliminary Site Investigation, 777-819 Luddenham Road, Luddenham, Lot 1 DP228498, Lot 26 DP604586', dated 15 May, report ref: 57919/127682 (Rev 0);
- JBS&G (2020e), 'Preliminary Site Investigation, 2594 The Northern Road, Luddenham, NSW, Lot 1 DP1240402', dated 15 May, report ref: 57919/127631 (Rev 0);
- Coffey (2020), 'Phase 1 Preliminary Site Investigation, Portion of 821-849 Luddenham Rd, Luddenham, NSW', dated 2 June, report ref: 754-SYDEN274592-R01;
- JBS&G (2020f), 'Stockpile Material Assessment – 777-819 Luddenham Road, Luddenham NSW', dated 30 June, report ref: 57919-130384 (Rev 0);

- JBS&G (2020g), 'Detailed Site Investigation, 1953-2109 Elizabeth Drive, Kemps Creek, NSW, Lot 101 DP848215', dated 4 December, report ref: 57919/131936 (Rev 0);
- SE (2023a), 'Detailed Site Investigation, M12 (West) Motorway Alignment, Badgerys Creek NSW', dated 4 December 2023, report ref: 1850-DSI-01-100323.v2f;
- SE (2023b), 'Remedial Action Plan, M12 (West) Motorway Alignment, Badgerys Creek NSW', dated 26 June 2024, report ref: 1850-RAP-01-130323.v4f; and
- SE (2025), 'Site Validation Report, M12 (West) Motorway Alignment, Badgerys Creek NSW' dated 29 April 2025, report ref: 1850-SVR-01-290425.v1d.

1.4. Legal Enforceability

All operations and activities conducted on the site must fully comply with the provisions of relevant NSW environmental legislation and WHS legislation, as well as any further requirements imposed by the relevant authorities, e.g. NSW EPA under the *Contaminated Land Management Act, 1997*, *Work Health and Safety Act, 2011*, and the *Protection of the Environment Operations Act, 1997* and associated Regulations.

In NSW, Long-Term Environmental Management Plans (LTEMPs) become legally enforceable when they are required as conditions of development consent under the *Environmental Planning and Assessment Act 1979* or included in Environment Protection Licences under the *Protection of the Environment Operations Act 1997*. Once approved, these conditions are binding, and non-compliance can lead to penalties, stop-work orders, or court action. Enforcement is carried out by agencies like the NSW EPA, the Department of Planning, and the Land and Environment Court, ensuring ongoing environmental protection through monitoring, reporting, and legal oversight.

Transport NSW utilises Sydney Road Asset Performance Contracts (SRAP Contract) to carry out operation and maintenance for all operational road assets under its management.

The M12 (West) Motorway is located within the Greater Sydney Region (Parklands Zone) SRAP Contract. The SRAP Contract for the Parklands Zone awarded in 2020 identified the M12 Motorway as a future asset to be managed by Ventia.

As steward of the Parklands Zone, the SRAP Contractor (SRAPC) is responsible for asset management services, reactive, proactive and programmed road maintenance, minor capital works, safety upgrades, and disaster recovery and repair. At this stage, the appointed SRAPC is Ventia.

All Transport operations and maintenance activities are conducted by the SRAPC in accordance with Ventia Business Environmental Management Plan (Ventia BEMP) and Transport QA Specification G36SRAPC requirements. The Ventia BEMP details environmental aspects, potential impacts and risks associated with planned, routine, tactical, and emergency and incident response activities. The BEMP also provides information on key roles and responsibilities required to deliver agreed environmental outcomes and meet Transport expectations. The Ventia BEMP consolidates processes to manage compliance, working out of hours, communications, assurance, operational control and GIS systems for the SRAP contract works.

While the EMS provides a framework to guide operational decision making, the BEMP identifies and documents the specific requirements of the SRAP Contract, including G36SRAPC and is updated where required to integrate a new scope of works or site-specific requirements.

Via this pathway, all aspects of M12 Motorway operational environmental management undertaken on behalf of Transport, as detailed in this OEMP, is integrated into and managed in accordance with the Parklands Zone SRAP contract, EMS and associated BEMP.

This Long-Term EMP will be included in the Operational Environmental Management Plan that is required under planning approval (SSI9364). There is no Environmental Protection Licence (EPL) for the operation of the M12 (West) motorway.

1.5. Public Disclosure

The public disclosure of the impacted soils retained on-site within the on-site encapsulation cells will be via the following instruments:

- Section 10.7 certificate and Land Titles
- Section 88B Covenant (Refer to Appendix B)
- Site Audit Statement

The Site Owner is to register a covenant on title of the land (S88B) binding the owners and future owners to the following:

- Responsibility for ongoing maintenance of the encapsulation cells in accordance with the EMP; and
- Responsibility for any future management of site contamination that may be required by NSW Environment Protection Authority to ensure that the site remains suitable for present or proposed land uses and to ensure risks to human health remain low and acceptable.

Penrith City Council and Liverpool City Council is to amend the Section 10.7 (2) Planning Certificate to include the following notations:

- The site is identified as Contaminated Land; and
- The existence of the Site Audit Statement and Environmental Management Plan.

1.6. Key Stakeholders and Responsibilities

The key stakeholders and their contact details are listed in **Table 1.6.1**. The responsibilities of the key stakeholders is provided in **Table 1.6.2**.

Table 1.6.1 Stakeholder Contact Details

Stakeholder	Organisation	Address	Contact Number
Council	Penrith City Council Liverpool City Council	601 High Street, Penrith NSW 52 Scott Street, Liverpool NSW	4732 7777 8711 7000
Site Owner	Transport for NSW (TfNSW)	231 Elizabeth Street, Sydney NSW	131 500
Site Operator	Transport for NSW (TfNSW)	231 Elizabeth Street, Sydney NSW	131 500

Table 1.6.2 Key Stakeholders and Responsibilities

Stakeholder	Organisation	Responsibility
Council	Penrith City Council & Liverpool City Council	Identify the existence of this EMP.
Site Owner / Operator	TfNSW	Ensure the EMP is readily available, up to date, and relevant for those who operate the site. If there is a material change to the EMP (remediation) provide Council with updated EMP.
Maintenance Contractor	Ventia and its subcontractors	Implement and maintain EMP

Stakeholder	Organisation	Responsibility
		Engage its subcontractors, induct sub-surface workers to EMP and ensure all changes to the LTEMP are communicated to all relevant personnel / workers onsite Ensure EMP is on file and that the EMP remains relevant, as well as review and update the EMP if site conditions change (for example change of land use or there is a breach of the EMP. Keep records of any permitted entry / closure of the encapsulation cells Review any proposed works and documentation from its subcontractors against the requirements of this EMP. This includes any intrusive works which may damage the pavement, cap and / or the marker layer. Undertake inspections of the pavement overlying the encapsulation cells across the alignment and document the findings of the assessment. The contamination specialist (engaged or from TfNSW) must be consulted prior to any subsurface works proposed by the Maintenance Contractor (or subconsultant), in accordance with **Section 4.3**. Ensure the surveyed location for all encapsulation cells is uploaded to Before You Dig Australia. Maintain records of the site induction and maintenance records for maintenance contractor and sub-contractor. These records are to be retained for as long as required and in accordance with approved retention and disposal schedules. Respond to any WH&S or environmental incident.
Third Party Proponent	(e.g. Telecommunications)	Maintain records of the signed site induction records for third party proponent and its sub-contractor/s. These records are to be retained for as long as required and in accordance with approved retention and disposal schedules. Respond and notify the Maintenance Contractor of any WH&S or environmental incidents that occur within the alignment. Conduct inductions for sub-surface workers on this LTEMP before undertaking intrusive works at the site, and maintain an induction register. Ensure its contractors are aware of the LTEMP requirements, will conduct intrusive works as per this LTEMP, have prepared a WHS plan for the works, are suitably qualified/licensed to undertake the works and have undertaken an induction to the site. Inspect the working area at the completion of intrusive works, ensuring the area has been appropriately reinstated. Maintain the inspection and works registers (as applicable). These documents are to be retained for as long as required and in accordance with approved retention and disposal schedules.
Environmental Consultant	Engaged as required	An appropriately qualified Environmental Consultant may be consulted prior to any sub-surface works proposed, in accordance with **Section 4.3**, at the discretion of the contamination specialist from TfNSW Update EMP as engaged by the Maintenance Contractor
Class A Licensed	Engaged as required	A SafeWork NSW Class A Licensed Asbestos Removalist must be engaged by the Maintenance Contractor or third-party proponent to supervise any

Stakeholder	Organisation	Responsibility
Asbestos Removalist		sub-surface works that require or may involve disturbing or removing asbestos contaminated materials.
Licensed Asbestos Assessor	Engaged as required	A SafeWork NSW Licensed Asbestos Assessor must be engaged by the Maintenance Contractor to undertake airborne asbestos monitoring during any sub-surface works that require or may involve disturbing or removing asbestos contaminated materials and issue a clearance certificate at the successful completion of those works.
Site Auditor	Engaged as required	An auditor may be engaged by the Maintenance Contractor to review EMP after material change to the EMP which may impact the use or suitability of the land, as required, at the discretion of TfNSW. Issue Site Audit Statement (SAS)
Site Visitors	Public	Access to the encapsulation cells is limited via the M12 (West) motorway. Maintenance will be associated with road upgrade and/or maintenance works.

2. SITE IDENTIFICATION

2.1. Extent of M12 (West) Alignment Boundary

The alignment identification details and associated information are presented in **Table 2.1.1.**

Table 2.1.1 Site Identification Information

Attribute	Description
Street Address	M12 (West) Motorway Alignment, Badgerys Creek NSW
Current Owner / Occupier	Transport for NSW
Trigger for Assessment	Land-Use Change, Condition E88 (SSI9364)
Lot and Deposited Plan (DP)	Lot 1 DP1238606 Lot 8 DP1270586 Lot 7 DP1270586 Lot 9 DP1270586 Lot 1 DP235124 Lot 16 DP1271571 Lot 2 DP1274964 Lot 4 DP1274964 Lot 17 DP1274964 Lot 107 DP1271336 Lot 6 DP1270586 Lot 11 DP1270586 Lot 12 DP1270586 Lot 10 DP1270586 Lot 21 DP1276633 Lot 20 DP1271571 Lot 3 DP1274964 Lot 18 DP1271571 Lot 104 DP1271336 Lot 108 DP1271336
Geographical Coordinates	-33.861514 S, 150.741899 E (Centre of Site)
Site Area	≈ 130.7 ha
Local Government Area (LGA)	Penrith City Council & Liverpool City Council
Consent Authority	Department of Planning, Housing and Infrastructure
Zoning	ENT Enterprise (across majority of the alignment) ENZ Environment and Recreation *State Environmental Planning Policy (Precincts – Western Parkland City) 2021*

2.2. Extent of Encapsulation Cell Locations

This LTEMP has been prepared to discuss the encapsulation cells present across the M12 (West) Alignment to meet the objectives outlined within **Section 1.2**. Areas within the M12 (West) Alignment not referenced within **Table 2.2.1** are outside the scope of this EMP.

EGA note Encapsulation Pit 5 is located within the Liverpool City Council government area and Encapsulation Pits 1 to 4 are located within the Penrith City Council government area.

Table 2.2.1 Encapsulation Cell Information

Attribute	Description
Street Address	M12 (West) Motorway Alignment, Badgerys Creek NSW
Current Owner / Occupier	Transport for NSW
Lot and Deposited Plan (DP)	Encapsulation Pit 1: Lot 16 DP1271571 Encapsulation Pit 2: Lot 16 DP1271571 Encapsulation Pit 3: Lot 16 DP1271571 Encapsulation Pit 4: Lot 16 DP1271571 Encapsulation Pit 5: N/A – beneath roadway south of Lot 2 DP1274964
Geographical Coordinates	Encapsulation Pit 1: -33.862613, 150.742670 Encapsulation Pit 2: -33.862459, 150.741645 Encapsulation Pit 3: -33.859893, 150.739667 Encapsulation Pit 4: -33.859539, 150.739991 Encapsulation Pit 5: -33.872205, 150.741661
Encapsulation Cell Areas	Encapsulation Pit 1: 469 m^2 Encapsulation Pit 2: 452 m^2 Encapsulation Pit 3: 705 m^2 Encapsulation Pit 4: 2,555 m^2 Encapsulation Pit 5: 133 m^2
Local Government Area (LGA)	Penrith City Council & Liverpool City Council
Zoning	ENT Enterprise (across majority of the alignment) ENZ Environment and Recreation *State Environmental Planning Policy (Precincts – Western Parkland City) 2021*

3. Site History Summary

3.1. Site History Summary

The extent of the project alignment appeared to be predominantly utilised for rural residential and grazing land uses prior to redevelopment comprising the M12 (West) Motorway. Several contamination assessments were undertaken across the alignment prior to acquisition for the motorway by JBS&G, Coffey and SE. Unexpected finds identified during redevelopment works across the project alignment were characterised and outlined within the Site Validation Report prepared by SE.

Contamination identified within the alignment during the previous non-intrusive assessments undertaken, comprised several stockpiles of unknown origin [1,2,5], wood processing areas[1,2], chemical storage areas, staining[1], market garden activities[1,2,3], agricultural activities[3,4], hazardous building materials within existing structures[1,2], asbestos containing materials (ACM)[2,5], potential contamination as a result of the adjacent SUEZ Waste Management Facility to the east of the project[1]. Several stockpiles had appeared to have been removed and relocated to an undisclosed location at the time of the investigation undertaken by Coffey (2020)[6].

An intrusive assessment was undertaken across several stockpiles within the stockpiling area located within 717-819 Luddenham Road[7] by JBS&G. Asbestos containing materials were identified within several stockpiles located within the stockpiling area, requiring further remediation/management.

An intrusive assessment was undertaken within 1953-2109 Elizabeth Drive[8] by JBS&G. Eighteen (18) stockpiles were identified across the subject area and identified isolated asbestos containing material fragments, lead and zinc impacts, benzene impacts and low-leachability PAH impacts across several of the stockpiles assessed.

Further intrusive assessment was undertaken across both areas addressed by JBS&G[7,8] by SE in 2022 and 2023[9]. The assessment undertaken identified asbestos containing material impacts within stockpiles located within 717-819 Luddenham Road, not previously identified to contain ACM during the JBS&G assessment[7]. ACM contamination was identified within stockpiles assessed within 1953-2109 Elizabeth Drive in-line with the ACM identified within JBS&G[8], however, appeared to be widespread. Ecological impacts were identified across both subject areas within stockpiled soil materials. No unacceptable risks to human health with the exception of the asbestos containing materials, were identified during the investigation. No unacceptable petroleum hydrocarbon management risks were identified during the investigation. No significant surface water / groundwater receptor risks were identified within the area during the investigation.

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[1] JBS&G (2020a), 'Preliminary Site Investigation, 1953-2109 Elizabeth Drive, Badgerys Creek NSW, Lot 101 DP848215', dated 6 May, report ref: 57919/127,486 (Rev 0).
[2] JBS&G (2020b), 'Preliminary Site Investigation, McGarvie Smith Farm and Fleurs Farm, Kemps Creek, NSW, Lot 62-63 DP1087838, Lot 3 DP164242, Lot 1 DP74574, Lot 1 DP88836, Lot 21 DP258414', dated 6 May, report ref: 57919/127412 (Rev 0)
[3] JBS&G (2020e), 'Preliminary Site Investigation, 2594 The Northern Road, Luddenham, NSW, Lot 1 DP1240402', dated 15 May, report ref: 57919/127631 (Rev 0)
[4] JBS&G (2020c), 'Preliminary Site Investigation, 765 Luddenham Road, Luddenham, Lot 25 DP604586', dated 15 May, report ref: 57919/127693 (Rev 0)
[5] JBS&G (2020d), 'Preliminary Site Investigation, 777-819 Luddenham Road, Luddenham, Lot 1 DP228498, Lot 26 DP604586', dated 15 May, report ref: 57919/127682 (Rev 0)
[6] Coffey (2020), 'Phase 1 Preliminary Site Investigation, Portion of 821-849 Luddenham Rd, Luddenham, NSW', dated 2 June, report ref: 754-SYDEN274592-R01
[7] JBS&G (2020f), 'Stockpile Material Assessment – 777-819 Luddenham Road, Luddenham NSW', dated 30 June, report ref: 57919-130384 (Rev 0)
[8] JBS&G (2020g), 'Detailed Site Investigation, 1953-2109 Elizabeth Drive, Kemps Creek, NSW, Lot 101 DP848215', dated 4 December, report ref: 57919/131936 (Rev 0)
[9] SE (2023a), 'Detailed Site Investigation, M12 (West) Motorway Alignment, Badgerys Creek NSW', dated 4 December 2023, report ref: 1850-DSI-01-100323.v2f

A Remedial Action Plan[10] was prepared by SE to address the contamination identified during the intrusive investigation undertaken by SE[9], incorporating a cap and containment methodology for the contamination previously identified. Contamination requiring cap and containment was understood to contain unacceptable human health inhalation and aesthetic risks related to ACM, and heavy metal and PAH contamination posing unacceptable ecological risks. The remediation activities were generally constrained to general earthworks activities (i.e. excavation, transport of soil, burial, and compaction). Resultant physical changes to the alignment were understood to be relatively minor and in-line with the Motorway development. Post remediation, it was expected that only areas with buried contamination (i.e. containment cells beneath the roadway) would have restrictions on future land-use and require management in perpetuity through the long-term environmental management plan

As part of the remedial works undertaken and outlined within the Site Validation Report[11], additional unexpected finds were encountered across the project alignment during the redevelopment works. All unexpected finds were characterised and were identified to contain unacceptable inhalation risks related to ACM contamination, unacceptable ecological risks related to heavy metal contamination and unacceptable petroleum hydrocarbon risks related to Total Recoverable Hydrocarbons. As a result of the contamination assessments and remedial works undertaken, all unacceptable human health inhalation, ecological risk and petroleum hydrocarbon risks were cap and contained beneath portions of the M12 (West) motorway alignment and potential contamination pathways were considered to be incomplete.

As a result of the remedial works undertaken, contamination is present within five (5) encapsulation cells within the project alignment and future works comprising excavation and subsequent exposure to soil materials within the containment cells at the site may result in completion of the pathway. As such, this EMP has been prepared to outline management and controls required if access to the encapsulation cells is required.

Groundwater will continue to be assessed per the 'Operational Water Quality Monitoring Program' for an additional year following completion of the motorway construction works per TfNSW requirements.

3.2. Encapsulation Cell Details

Five encapsulation cells are situated within the project alignment. The encapsulation cells cover an approximate area of approximately 4,314 m^2 within the project alignment.

A summary of the encapsulation cell details, and construction are provided below in **Table 3.2.1** to **Table 3.2.5**. Refer to **Appendix A** for a copy of the containment cell surveys.

[10] SE (2023b), 'Remedial Action Plan, M12 (West) Motorway Alignment, Badgerys Creek NSW', dated 26 June 2024, report ref: 1850-RAP-01-130323.v4f
[11] SE (2025), 'Site Validation Report, M12 (West) Alignment, Badgerys Creek NSW', dated 29 April 2025, report ref: 1850-SVR-01-290425.v1f

Table 3.2.1 Encapsulation Cell Construction Details – Encapsulation Cell 1

Layer	Average Thickness (m)	Description
Subgrade	0.7	Site-won virgin clay followed by imported sandstone and asphalt
Site-Won Virgin Material (Capping)	2.949 – 6.517	CLAY, medium to high plasticity, orange/red with yellow mottle, dry to moist, no foreign materials
Orange Geotextile Marker Layer	0.1	Orange geotextile marker layer
Encapsulation Cell	0.664 – 1.013	Silty CLAY, medium plasticity, medium to dark brown, dry to moist, foreign materials including brick, metal, tile and plastic. Contains friable and non-friable asbestos fibre cement fragments.
Orange Geotextile Marker Layer	0.1	Orange geotextile marker layer
Beneath Encapsulation Cell (Virgin Soil)	N/A	CLAY, medium/high plasticity, orange/red with yellow mottle, dry to moist, no foreign materials

Table 3.2.2 Encapsulation Cell Construction Details – Encapsulation Cell 2

Layer	Average Thickness (m)	Description
Subgrade	0.7	Site-won virgin clay followed by imported sandstone and asphalt
Site-Won Virgin Material (Capping)	1.111 – 5.255	CLAY, medium to high plasticity, orange/red with yellow mottle, dry to moist, no foreign materials
Orange Geotextile Marker Layer	Orange Geotextile Marker Layer	Orange Geotextile Marker Layer
Encapsulation Cell	0.778 – 7.258	Silty CLAY, medium plasticity, medium to dark brown, dry to moist, foreign materials including brick, metal, tile and plastic. Contains friable and non-friable asbestos fibre cement fragments.
Orange Geotextile Marker Layer	0.1	Orange geotextile marker layer
Beneath Encapsulation Cell (Virgin Soil)	N/A	CLAY, medium/high plasticity, orange/red with yellow mottle, dry to moist, no foreign materials

Table 3.2.3 Encapsulation Cell Construction Details – Encapsulation Cell 3

Layer	Average Thickness (m)	Description
Subgrade	0.7	Site-won virgin clay followed by imported sandstone and asphalt
Site-Won Virgin Material (Capping)	1.704 – 5.053	CLAY, medium to high plasticity, orange/red with yellow mottle, dry to moist, no foreign materials
Orange Geotextile Marker Layer	0.1	Orange geotextile marker layer
Encapsulation Cell	1.073 – 3.020	Silty CLAY, medium plasticity, medium to dark brown, dry to moist, foreign materials including brick, metal, tile and plastic. Contains friable and non-friable asbestos fibre cement fragments.
Orange Geotextile Marker Layer	0.1	Orange geotextile marker layer
Beneath Encapsulation Cell (Virgin Soil)	N/A	CLAY, medium/high plasticity, orange/red with yellow mottle, dry to moist, no foreign materials

Table 3.2.4 Encapsulation Cell Construction Details – Encapsulation Cell 4

Layer	Average Thickness (m)	Description
Subgrade	0.7	Site-won virgin clay followed by imported sandstone and asphalt
Site-Won Virgin Material (Capping)	3.455 – 4.808	CLAY, medium to high plasticity, orange/red with yellow mottle, dry to moist, no foreign materials
Orange Geotextile Marker Layer	0.1	Orange geotextile marker layer
Encapsulation Cell	2.438 – 3.017	Silty CLAY, medium plasticity, medium to dark brown, dry to moist, foreign materials including brick, metal, tile and plastic. Contains friable and non-friable asbestos fibre cement fragments.
Orange Geotextile Marker Layer	0.1	Orange geotextile marker layer
Beneath Encapsulation Cell (Virgin Soil)	N/A	CLAY, medium/high plasticity, orange/red with yellow mottle, dry to moist, no foreign materials

Table 3.2.5 Encapsulation Cell Construction Details – Encapsulation Cell 5

Layer	Average Thickness (m)	Description
Subgrade	0.7	Site-won virgin clay followed by imported sandstone and asphalt
Site-Won Virgin Material (Capping)	2.451 – 3.585	CLAY, medium to high plasticity, orange/red with yellow mottle, dry to moist, no foreign materials
Orange Geotextile Marker Layer	0.1	Orange geotextile marker layer
Encapsulation Cell	1.762 – 2.871	Silty CLAY, medium plasticity, medium to dark brown, dry to moist, foreign materials including brick, metal, tile and plastic. Contains friable and non-friable asbestos fibre cement fragments.
Orange Geotextile Marker Layer	0.1	Orange geotextile marker layer
Beneath Encapsulation Cell (Virgin Soil)	N/A	CLAY, medium/high plasticity, orange/red with yellow mottle, dry to moist, no foreign materials

3.3. Asbestos Health Risks

Asbestos is the generic term for a number of fibrous silicate minerals. There are two major groups of asbestos: the serpentine group (i.e. chrysotile) and the amphibole group (i.e. amosite, crocidolite, tremolite, actinolite and anthophyllite). Asbestos has widely been used in building products due to its insulation and fire-resistant properties. The toxic effects of asbestos are well recognised and primarily result from the inhalation of free fibres. If fibres are inhaled into the lungs, they can initiate diseases that take many years to produce major health effects. These effects include asbestosis, lung cancer and mesothelioma.

The National Environmental Protection Council (NEPC) recognises the following forms of asbestos contamination:

- Asbestos-containing material (ACM) which is in sound condition and the asbestos is bound in a matrix (cement sheeting, tiles). This is also restricted to ACM that cannot pass through a 7mm x 7mm sieve. ACM represents a low human health risk;
- Fibrous Asbestos (FA) encompasses asbestos in the form of loose fibrous material such as insulation and severely weathered ACM defined by its crumbly nature under hand pressure; and
- Asbestos Fines (AF) includes free fibres of asbestos, small fibre bundles and ACM fragments that pass through a 7mm x 7mm sieve.

Both FA and AF have the potential to generate airborne fibres and can pose a considerable inhalation risk if made airborne.

Asbestos presents a hazard only if fibres of respirable size become airborne, and there is a potential for site users to inhale them. The release of asbestos fibres from materials and substrates is dependent on the amount of disturbance impacted upon by these materials. The danger of the airborne asbestos is that fibres are not visible to the naked eye, and the long duration required between exposure to asbestos and the onset of the disease associated.

The cap and contain methodology removes the pathway between the asbestos source (contained asbestos impacted fill soils) and receptors (on-site users, maintenance and construction workers, and persons off-site). If the containment is removed or penetrated, then a pathway may be generated, leading to a complete source – pathway – receptor link.

The presence of asbestos beneath the capping layer at the site does not affect the present safe use of the site under the current land use scenario whilst the existing surface coverings are undisturbed. If however these surface coverings are disturbed, a risk of exposure may result. In order to develop appropriate measures to control this potential exposure, it is necessary to understand the potential exposure pathways.

3.4. Chemical Contaminants in Soil and Health Risks

Remediation and validation of chemical contaminants in the soil has been completed in accordance with the RAP (SE 2023b) and are documented within the Site Validation Report (SE 2025). To achieve the remedial goal for the site, fill soils that were known to exceed the site adopted criteria were buried at depth within containment cells at the site.

Contaminants of concern that are known to be present within the soils are listed below.

- Heavy Metals (Zinc); and
- Polycyclic Aromatic Hydrocarbons.

The potential contamination pathways are considered to be the direct contact of dust and soils during any intrusive works. The cap and contain methodology removes the pathway between the contaminated source (impacted fill soils) and receptors (ecological receptors). If the containment is removed or penetrated, then a pathway may be generated, leading to a complete source – pathway – receptor link.

The presence of chemically impacted fill soils beneath the capping layer at the site does not affect the present safe use of the site under the current land use scenario whilst the existing capping layers are undisturbed. If, however, these capping layers are disturbed, a risk of exposure may result.

The following ecological receptors have been considered as potential receptors of contamination present within the encapsulation cells, during intrusive works:

- Biota supporting ecological processes, including microorganisms and soil invertebrates;
- Native flora and fauna;
- Introduced flora and fauna; and
- Wildlife, i.e. secondary poisoning in birds and small rodents.

Zinc does not biomagnify within tissues of organisms and therefore the biomagnification route of exposure does not need to be considered for zinc. As such, considerations of zinc exposure are understood to only comprise direct toxicity via exposure from soil, soil pore water or air in soil pores. Excessive zinc uptake can cause stunted growth, chlorosis (yellowing of leaves), reduced biomass, can impact photosynthesis, impair root and stem elongation, and cause death in plant systems. Excessive zinc intake can cause zinc toxicosis, red blood cell destruction, and various organ damage within organisms.

Polycyclic Aromatic Hydrocarbons (PAH) comprise a large group of organic compounds that are formed from incomplete combustion of organic materials such as the processing of coal, crude oil, combustion of natural gas, refuse, vehicle emissions, heating, cooking and tobacco smoking, as well as natural processes including carbonisation and as a result are present almost everywhere. PAH uptake can cause difficulty absorbing other essential nutrients, can delay flowering and reproductive organ development within plant systems. Excessive PAH intake can cause developmental issues, cancer, skin irritations and can cause birth defects within organisms.

3.5. Residual Contamination Source-Pathway-Receptor Assessment

Based on the remediation and validation works undertaken and summarised in SE (2025), the identified remaining AECs and associated COC are summarised in **Table 3.5.1**.

Table 3.5.1 Revised AEC and COC

AEC ID	Area of Environmental Concern	Land Use Activity	Contaminants of Potential Concern	Affected mediums	Exposure risk
AEC01	On-site Containment Cells	'Cap & Contain' Remedial Filling	Benzo(a)pyrene	Soil	Ecological
			Zinc		Ecological
			PAH		Ecological
			Asbestos		Human Health

The potential contamination pathways were considered to be via inhalation/ingestion and uptake of contaminants released in dust during future development and maintenance works. Following the remediation works undertaken within SE (2025), the potential contamination pathways are now considered to be incomplete. The following future works at the site may result in completion of the pathways:

- Excavation and subsequent exposure to soil materials retained within the containment cells at the site; and
- Under-boring for utilities or similar infrastructure.

SE note ecological risks present within the soil materials associated with the containment cell will likely not pose a risk during future excavation works as materials must be retained within the on-site containment cells and will have limited exposure to future ecological receptors. As such, the risk to ecological receptors is considered to be very low due to the inaccessibility to soils for ecological receptors.

4. MANAGEMENT PROCEDURES

The encapsulation cells present within the project alignment are covered by a road base hardstand and are inaccessible to human and ecological receptors. All operations and activities conducted on the site must fully comply with the provisions of relevant NSW environmental legislation and WHS legislation, as well as any further requirements imposed by the relevant authorities, e.g. NSW EPA under the *Contaminated Land Management Act, 1997*, *Work Health and Safety Act, 2011*, and the *Protection of the Environment Operations Act, 1997* and associated Regulations.

Surface inspections of the pavement overlying the encapsulation cells should be inspected yearly and following significant motorway breaches to ensure no breaches to the containment cell are present. These inspections should be undertaken as required by the Maintenance Contractor. This EMP is applicable for as long as the encapsulation cells within the M12 (West) alignment are present.

4.1. Induction

Subsurface works comprising breach of the roadway, are not anticipated to be undertaken at the site unless significant redevelopment works are proposed. Any subsurface works should be prevented and/or minimised as far as is reasonably practicable. Should significant redevelopment be proposed, an LAA, and a Safework NSW Class A licensed asbestos removalist, and/or environmental consultant will need to be notified/engaged.

The Maintenance Contractor is to ensure all contractors undertaking subsurface works on the site have completed a site-specific induction in relation to the on-site encapsulated contaminated soils.

The induction program is to include the following:

- Information about the nature of the hazards arising from exposure to the relevant contaminants of concern;
- Identification of the location of contained impacted soils;
- Composition of capping materials for visual reference, including the orange marker layer;
- Procedures to be followed if subsurface works are planned within the encapsulation cell areas;
- Procedures to be followed for accidental breach of capping layer;
- Exposure monitoring that may be required for working with asbestos;
- Development of SWMS with the requirement for Personal Protective Equipment (PPE) identified/required for excavation works across the encapsulation cells; and
- Incident reporting.

An induction record should be kept as outlined in **Appendix D**. The Maintenance Contractor must keep records of all inductions for 5 years after the day the worker stops carrying out the subsurface works. These records must also be made available for inspection by SafeWork NSW as required.

4.2. Requirements for Intrusive Works

Where intrusive works are proposed at the site, the following management measures must be followed:

- Prior to any intrusive works commencing within the site, approval for the works must be sought from the person responsible for the management of the LTEMP (Maintenance Contractor and/or Third Party Proponents);
- Site personnel, contractors and/or maintenance personnel involved in the works must be inducted per **Section 4.1**, undertake asbestos awareness training and be aware of their responsibilities with regards to health and safety and the protection of the environment; and
- All repairs to cover layers must be documented by the Maintenance Contractor and any changes must be detailed and kept on record, refer to **Appendix B** for documentation pertaining to capping inspection following repair.

As part of the approval for works to occur, TfNSW or delegate must make an assessment of the likelihood of capping layer breach by considering the proposed depth of works compared to the depth of capping in the proposed works location. If works are proposed below the capping layer at the site, asbestos management measures are to be applied and the relevant approvals obtained prior to works starting as described herein.

Asbestos-related controls do not apply for works within capping layers located above the marker layer.

4.2.1. Licensing

A SafeWork NSW Licensed Asbestos Assessor must be engaged prior to any subsurface works involving the breach of capping materials. All asbestos related works relating to the containment cell must be supervised by:

- A SafeWork NSW Licensed Asbestos Assessor; and
- A SafeWork Class A Asbestos Removalist.

A notification to SafeWork NSW must be submitted and approved prior to any asbestos related works commencing on-site.

4.2.2. Preparation of Management Documentation Related to Asbestos

Works conducted below the capping layer in asbestos contaminated soils, must be undertaken by an appropriately licensed contractor meeting the current NSW Work Health and Safety (WHS) and SafeWork requirements. All contractors are required to show compliance with the Work Health and Safety Act, 2011, including the preparation of a Site Safety Management Plan, Safe Work Method Statements and Asbestos Removal Control Plan. An Asbestos Management Plan will require preparation and implementation prior to disturbance of the capping layer including outlining the personnel protective equipment (PPE) required.

The following details the minimum PPE required to be worn in addition to standard construction site PPE requirements:

- Disposable coveralls;
- Disposable Gloves;
- Disposable boot covers; and
- P2 class respirator or higher.

All work shall be undertaken with due regard to the minimisation of environmental effects and to meet all statutory requirements and as such that work on the site complies with all relevant legislation and guidelines

4.2.3. Spoil Management

Where temporary stockpiling of contaminated soils is required, additional measures such as wetting down soils, covering stockpiles etc will be required.

Appropriate dust, sediment and erosion controls must be implemented and maintained for the duration of the soil management works, consistent with Landcom (2004) Managing Urban Stormwater: Soils and Construction guide and other relevant guidelines/standards.

All materials excavated from within the containment cells must either be placed beneath capping layer prior to closing or must be removed off-site. If materials are proposed for temporary stockpiling, they must be placed atop black plastic to keep materials separated and avoid cross contamination. No materials are to be removed from the containment cells and retained on-site outside of the containment cell. All soil materials excavated from within the containment cell must be tracked within the Material Tracking Sheet presented in Appendix E.

Where required, contaminated soil materials to be removed from the site will require classification in accordance with NSW EPA Waste Classification Guidelines: Part 1: Classifying waste, November 2014 (NSW EPA 2014).

4.3. Sub-Surface Works Within the Encapsulation Cell Footprint

Prior to any works that may breach the capping layers above the containment cell footprint, a SafeWork NSW Licensed Asbestos Assessor must be engaged to review the proposed scope of works and provide a specific works methodology. As the asbestos contained within the containment cell is classified as friable, only a SafeWork NSW Licensed Asbestos Assessor can undertake airborne asbestos monitoring and issue clearance reports. Additionally, a SafeWork Class A licensed asbestos removalist must be engaged to supervise asbestos handling works.

Remediation works were validated within SE (2025) to ensure site suitability for the future commercial/industrial land use within the site. However, COPC in soils are known to remain within the containment cells at the site and may be encountered if the capping layer is breached. Requirements outlined in **Section 4.2** must be followed if disturbing materials within the encapsulation cells.

Following completion of the works, the capping layer must be re-instated in accordance with the requirements of this EMP. Refer to **Table 4.3.1** for an outline of works required beneath the capping layer. As the materials are buried at depths significantly below the road base hardstand layer, the likelihood of an accidental breach of the encapsulation is considered to be low.

Table 4.3.1 Planned Works Beneath the Capping Layer

Action	Due to the potential risk of interacting with impacted soils during excavations beneath the capping layer within the containment cell area. When conducting works below the capping layer, the following procedures must be adopted prior to works commencing: 1. Notify TfNSW and the Maintenance Contractor prior to undertaking any disturbance beneath the capping layer; 2. Engage a Licenced Asbestos Assessor (LAA) / environmental consultant prior to commencement of works below the capping layer; 3. Engage a SafeWork NSW Class A licensed asbestos removalist to undertake and supervise asbestos handling works; 4. SafeWork NSW Class A licensed asbestos removalist must submit a notification to SafeWork NSW; 5. Prior to commencement of soil disturbance, the work area is to be barricaded to restrict entry of unauthorised personnel and to minimise the potential for tracking impacted soil beyond the work area; 6. Placement of an adequate number of indelibly labelled warning signs at the boundary of the area of asbestos removal works, which comply with AS 1319 Safety Signs for Occupational Environment; and 7. Prohibit access to all personnel unless wearing PPE that is appropriate for protection against airborne asbestos fibres. The following procedure must be adopted for handling asbestos impacted soils: • A NSW Licensed Asbestos Assessor (LAA) or appropriately experienced / competent occupational hygienist and Class A licensed asbestos removalist will be present onsite to manage and supervise works. • Keep potentially asbestos impacted soils lightly wetted at all times (without generating free water); • If asbestos contaminated soils are to be stockpiled on site, stockpiles should be placed on plastic lining or hard stand surfaces (i.e. bitumen/concrete) to avoid cross contamination of underlying soils; • Disposal (if required) of asbestos impacted soil will require assessment, in accordance with the appropriate guidelines, prior to disposal; • During transport, all asbestos impacted wastes must be placed in a sealed truck, with appropriate cover, then transported to an appropriately licensed waste receiving facility; • Cover stockpiled soils with plastic sheeting or geofabric, during dry and windy conditions whilst awaiting disposal; and • At the completion of any works, the marker layer and capping layer must be re-instated to the original condition and levels. Any deviation from this will require input from the environmental consultant.
Frequency	• As required
Responsibility	• Environmental Consultant; • Licensed Asbestos Assessor; • Class A Licensed Asbestos Removalist; • Appointed contractor; • Maintenance Contractor; and • TfNSW (if required).

4.3.1. Airborne Asbestos Monitoring

A NSW Licensed Asbestos Assessor (LAA) must be engaged to carry out air monitoring during all earthworks conducted within the encapsulation cells. Air monitoring involves sampling airborne asbestos fibres to assist in assessing exposure to asbestos and the effectiveness of implemented control measures. It must be conducted in accordance with the *Guidance Note on the Mebrane filter [NOHSC3003:2005]*.

4.4. Record Keeping

All planned or unexpected works involving a breach of the capping layer must be documented and records kept by the Maintenance Contractor. Refer to **Appendix B** for the inspection forms to be completed if damage is observed to the capping layer and following re-instatement of the capping layer. Records are also required to be kept for incidents (Appendix C), inductions (Appendix D) and general inspections (Appendix B).

4.5. Reporting of Complaints and Incidents

If a complaint is made by a member of the public or by any other person with respect to any environmental management or control issue, appropriate corrective action is required to be undertaken as soon as practicable. The Maintenance Contractor is responsible for ensuring the corrective action is undertaken.

Similarly, if an environmental incident occurs that has given or may give rise to pollution of soil, air or waters, appropriate corrective action is required to be undertaken as soon as practicable.

In addition to the above, complaints and environmental incidents are required to be notified to TfNSW as soon as practicable after a complaint has been made or an environmental incident has occurred. If appropriate, and following the TfNSW's instructions, notification may need to be made to the applicable regulatory authority.

Records of complaints and incidents are required to be entered into a register to be developed for the Site, but only after corrective action has been taken and TfNSW has been notified. Refer to **Appendix C** for the environmental incident report form to be completed or where possible, Transport's nominated incident reporting system will be completed following an incident.

4.6. Routine Inspection

A routine inspection of the pavement overlying the encapsulation cells at the site must be undertaken annually by the Maintenance Contractor to ensure capping materials at the site are maintained and upkept (refer to Appendix B). Copies of these routine inspections must be retained by the Maintenance Contractor. Inspections must also be undertaken as required following any intrusive site works by the Maintenance Contractor and/or Licensed Asbestos Assessor and/or Environmental Consultant. In the event the capping layer has been compromised, the Maintenance Contractor must ensure the capping layer is re-instated and document the observation in the Capping Inspection Record form provided in **Appendix B.**

4.7. Emergency Response and Reporting

All unplanned events, irrespective of how minor the event, shall at the first opportunity be reported to TfNSW and relevant stakeholders and/or government agencies as necessary. All unplanned events shall be investigated. The degree and level of investigation shall depend on the outcome of the actual event and outcome of a similar event if not assessed and controlled.

Any release of contamination to the land, surface, groundwater and/or air must be reported immediately to TfNSW. Any occurrence which does or may result in exposure to site users or the public should be reported immediately to TfNSW and to emergency services if necessary.

If an occurrence is deemed to be reportable to the NSW EPA, it should be reported at the earliest opportunity.

4.8. Audit, Review and Revision of the Long-Term EMP

Audit of the LTEMP implementation must be undertaken by the contamination specialist at TfNSW every two years to check that records are being kept, including if the cap over the cell is damaged or if the containment cell has been breached. A check of changes to site conditions that may impact on the relevance of the LTEMP should also be undertaken.

Every ten (10) years, TfNSW or the Maintenance Contractor must engage a suitably qualified environmental consultant to undertake an independent audit of the LTEMP implementation.

Revisions to this LTEMP may be necessary from time to time to ensure the document is relevant and up to date with regards to changes in legislation, changes to site conditions, if further controls are required and if/when there are improvements in technologies or knowledge.

In the event that a change to land use activities and/or redevelopment works are proposed for the site, the LTEMP will require revision immediately following these changes to ensure that the new site conditions are captured within the revised document and to address aspects of the development that may not be reflected in this existing version of the LTEMP.

Any revisions of the LTEMP must be prepared by an appropriately qualified and experienced environmental consultant. It is advised that the updated LTEMP be reviewed and approved by a NSW Contaminated Site Auditor accredited under the CLM Act 1997.

The Maintenance Contractor may engage a suitably qualified environmental consultant to revise the LTEMP based on the outcomes of the annual internal audit. Every ten (10) years, in conjunction with the independent audit, a suitably qualified environmental consultant must be engaged to review the LTEMP to ensure relevancy; check for changes to the site ownership, condition or management; check for changes in relevant legislation and make updates as required.

Any revisions of the LTEMP must be provided to Penrith City Council and Liverpool City Council to ensure adherence with the document is maintained and on-going implementation is achieved.

5. REFERENCES

CLM Act, 1997 — Contaminated Lands Management Act 1997.

POEO Act, 1997 — Protection of Environment Operations Act 1997.

WHS Act, 2011 — NSW Work Health and Safety Act 2011.

NOHSC, 2005 — Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres, 2nd Edition, (NOHSC: 3003 (2005)).

NEPC, 2013 — *National Environmental Protection (Assessment of Site Contamination) Measure, 1999, Volume 3: Schedule B2, Guidelines on Site Characterisation*, as amended May 2013, National Environment Protection Council (NEPC).

WHS Reg, 2017 — NSW Work Health and Safety Regulation 2017

NSW EPA, 2022 — *Sampling Design Guidelines*, September 2020, NSW Environmental Protection Authority (EPA).

NSW EPA, 2020 — *Guidelines for Consultants Reporting on Contaminated Sites*, 2020, NSW EPA

SafeWork, 2022a — SafeWork NSW Code of Practice: *How to Safely Remove Asbestos*, 2022.

SafeWork, 2022b — SafeWork NSW Code of Practice: *How to Manage and Control Asbestos in the Workplace*, 2022.

WA DOH, 2021 — Guidelines for the Assessment, Remediation and Management of Asbestos Contaminated Sites in Western Australia, 2021.

JBS&G (2020a) — 'Preliminary Site Investigation, 1953-2109 Elizabeth Drive, Badgerys Creek, NSW, Lot 101 DP848215', dated 6 May, report ref: 57919/127,486 (Rev 0).

JBS&G (2020b) — 'Preliminary Site Investigation, McGarvie Smith Farm and Fleurs Farm, Kemps Creek, NSW, Lot 62-63 DP1087838, Lot 3 DP164242, Lot 1 DP74574, Lot 1 DP88836, Lot 21 DP258414', dated 6 May, report ref: 57919/127412 (Rev 0).

JBS&G (2020c) — 'Preliminary Site Investigation, 765 Luddenham Road, Luddenham, Lot 25 DP604586', dated 15 May, report ref: 57919/127693 (Rev 0).

JBS&G (2020d) — 'Preliminary Site Investigation, 777-819 Luddenham Road, Luddenham, Lot 1 DP228498, Lot 26 DP604586', dated 15 May, report ref: 57919/127682 (Rev 0).

JBS&G (2020e) — 'Preliminary Site Investigation, 2594 The Northern Road, Luddenham, NSW, Lot 1 DP1240402', dated 15 May, report ref: 57919/127631 (Rev 0).

Coffey (2020) — 'Phase 1 Preliminary Site Investigation, Portion of 821-849 Luddenham Rd, Luddenham, NSW', dated 2 June, report ref: 754-SYDEN274592-R01.

JBS&G (2020f) — 'Stockpile Material Assessment – 777-819 Luddenham Road, Luddenham NSW', dated 30 June, report ref: 57919-130384 (Rev 0).

JBS&G (2020g) — 'Detailed Site Investigation, 1953-2109 Elizabeth Drive, Kemps Creek, NSW, Lot 101 DP848215', dated 4 December, report ref: 57919/131936 (Rev 0).

SE (2023a) — 'Detailed Site Investigation, M12 (West) Motorway Alignment, Badgerys Creek NSW', dated 4 December 2023, report ref: 1850-DSI-01-100323.v2f.

SE (2023b) 'Remedial Action Plan, M12 (West) Motorway Alignment, Badgerys Creek NSW', dated 26 June 2024, report ref: 1850-RAP-01-130323.v4f.

SE (2025) 'Site Validation Report, M12 (West) Motorway Alignment, Badgerys Creek NSW', dated 29 April 2025, report ref: 1850-SVR-01-290525.v1d.

6. STATEMENT OF LIMITATIONS

The findings presented in this report are based on specific searches of relevant, government historical databases and anecdotal information that were made available during the course of this investigation. To the best of our knowledge, these observations represent a reasonable interpretation of the general condition of the site at the time of report completion.

This report has been prepared solely for the use of the client to whom it is addressed and no other party is entitled to rely on its findings.

No warranties are made as to the information provided in this report. All conclusions and recommendations made in this report are of the professional opinions of personnel involved with the project and while normal checking of the accuracy of data has been conducted, any circumstances outside the scope of this report or which are not made known to personnel and which may impact on those opinions is not the responsibility of Sydney Environmental Group Pty Ltd. Should information become available regarding conditions at the site including previously unknown sources of contamination, SE reserves the right to review the report in the context of the additional information.

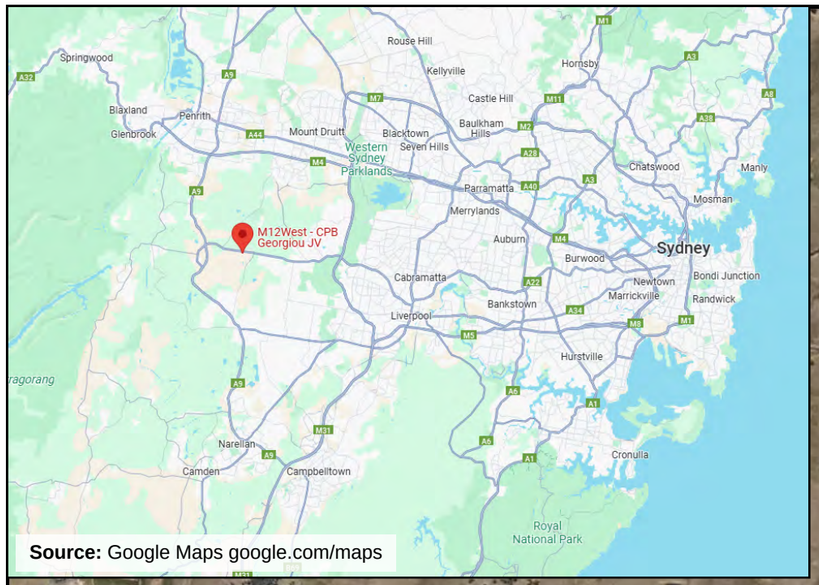
This report must be reviewed in its entirety and in conjunction with the objectives, scope and terms applicable to SE's engagement. The report must not be used for any purpose other than the purpose specified at the time SE was engaged to prepare the report.

Logs, figures, and drawings are generated for this report based on individual SE consultant interpretations of nominated data, as well as observations made at the time site walkover/s were completed.

Data and/or information presented in this report must not be redrawn for its inclusion in other reports, plans or documents, nor should that data and/or information be separated from this report in any way.

Should additional information that may impact on the findings of this report be encountered or site conditions change, SE reserves the right to review and amend this report.

FIGURES



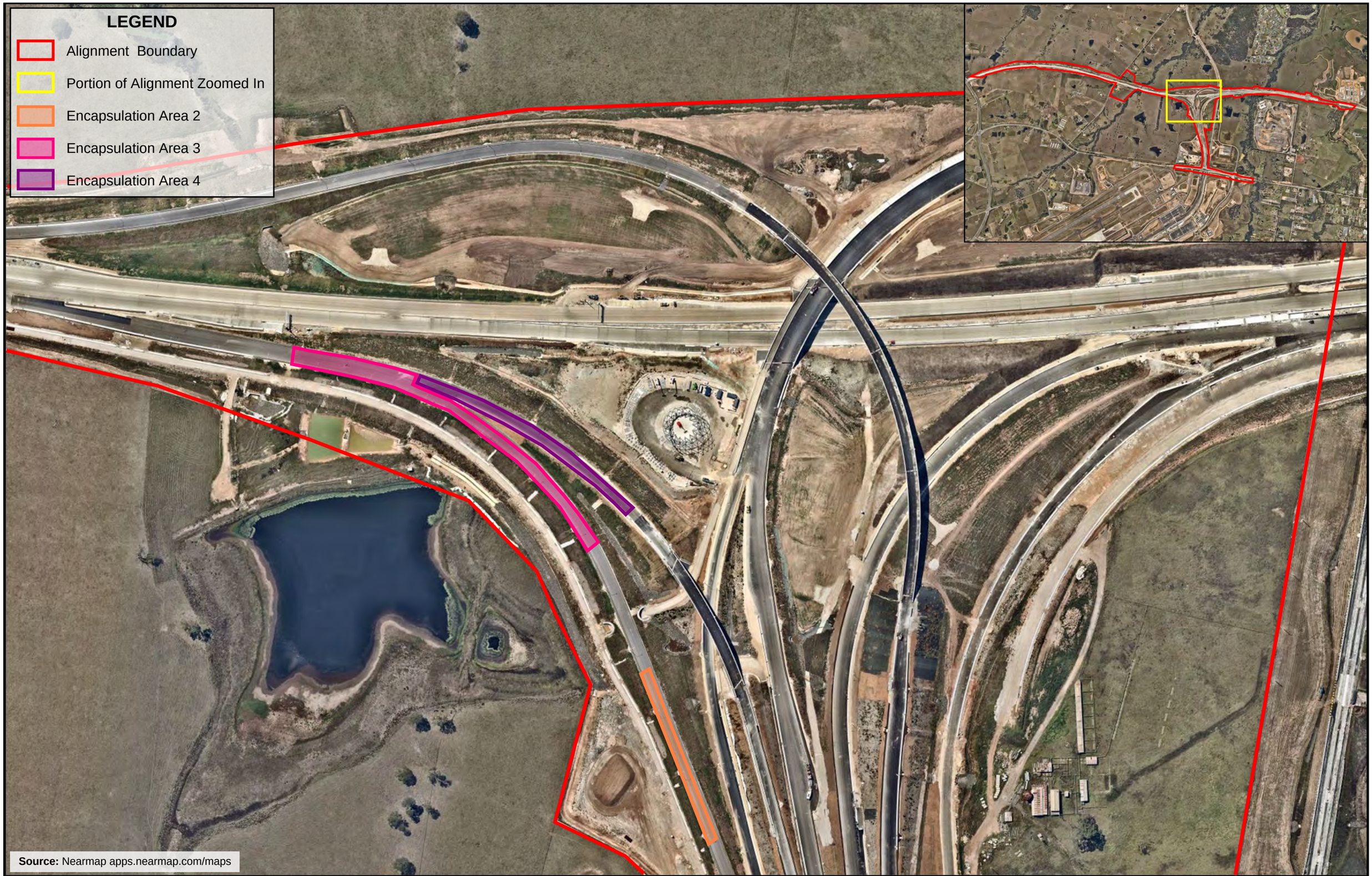
Source: Google Maps google.com/maps

Alignment Boundary
M12 (West) Motorway Alignment, Badgerys Creek NSW

Source: Nearmap apps.nearmap.com/maps

Sydney Environmental Group

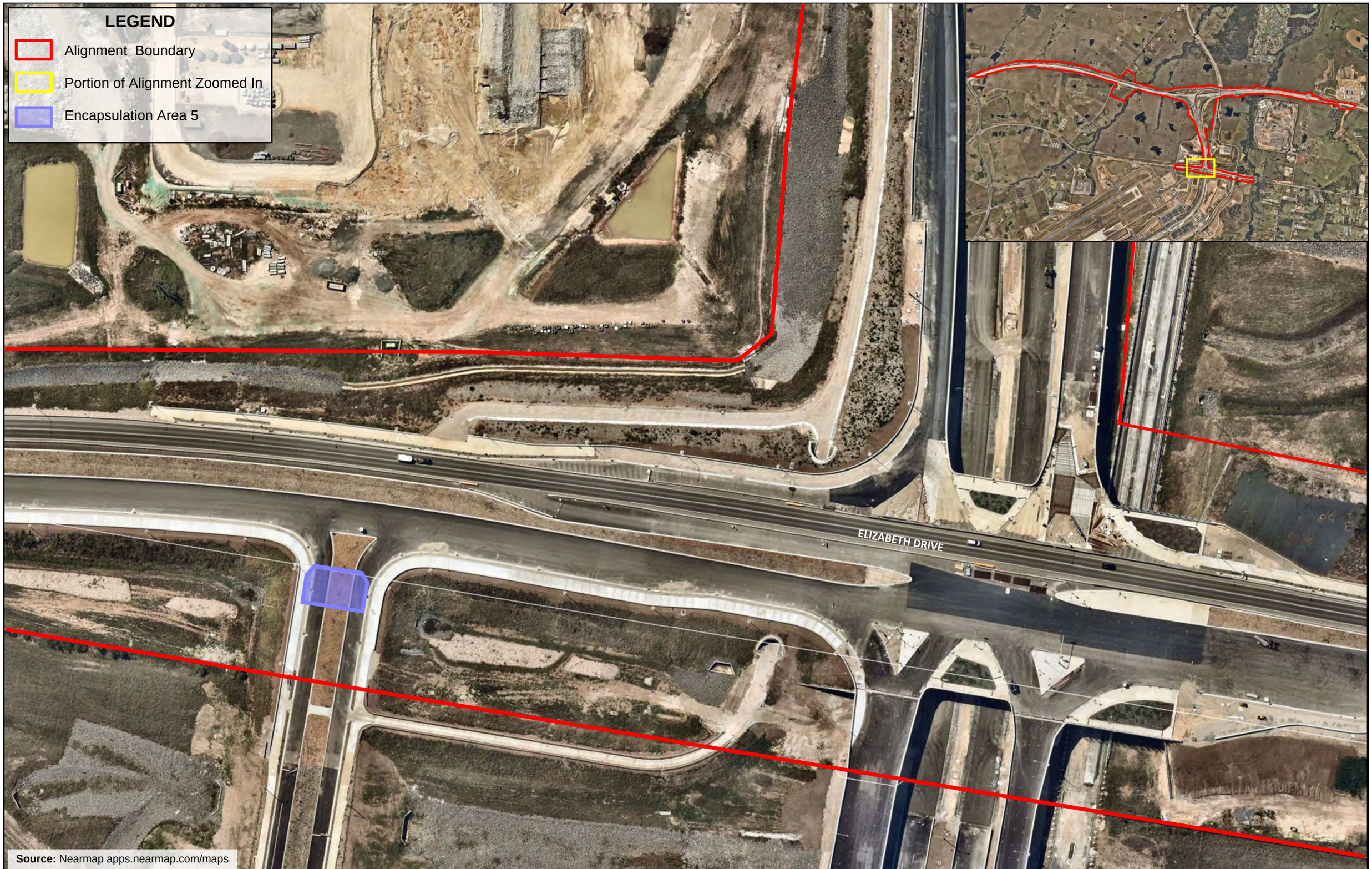
Scale: ← 450 m →	**Site Locality**			
Client Name:		N	**Figure Number:**	
Project Name:	**Long-Term Environmental Management Plan**		**Figure Date:**	
Project Location:			**Report Number:**	**1850-EMP-01-120525.v2f**



Sydney Environmental Group	Scale: 45 m	Encapsulation Areas 1	
	Client Name:	CPB Contractors Pty Ltd & Georgiou Group Pty Ltd	Figure Number: 2
	Project Name:	Long-Term Environmental Management Plan	Figure Date: 13 March 2025
	Project Location:	M12 (West) Motorway Alignment, Badgerys Creek NSW	Report Number: 1850-EMP-01-120525.v2f

Scale: 45 m	Encapsulation Areas 2	N	
Client Name:	CPB Contractors Pty Ltd & Georgiou Group Pty Ltd		Figure Number: 3
Project Name:	Long-Term Environmental Management Plan		Figure Date: 13 March 2025
Project Location:	M12 (West) Motorway Alignment, Badgerys Creek NSW		Report Number: 1850-EMP-01-120525.v2f

Sydney Environmental Group



Scale:	30 m	Figure Number:	4
Client Name:	CPB Contractors Pty Ltd & Georgiou Group Pty Ltd	Figure Date:	13 March 2025
Project Name:	Long-Term Environmental Management Plan	Report Number:	1850-EMP-01-120525.v2f
Project Location:	M12 (West) Motorway Alignment, Badgerys Creek NSW		

Sydney Environmental Group

Encapsulation Areas 3

N

APPENDIX A

ENCAPSULATION CELL SURVEYS

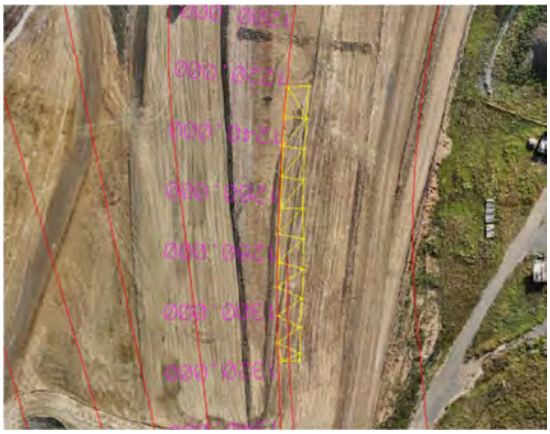
QUANTITY REPORT

Area/Structure: AAR Encapsulation Pit 1
MC/Chainage: MCF0 CH1220 – CH1320

Project: M12
User: TASKEY
Organization: CPB Contractors Pty Ltd
Survey Date: 11/07/2023
Report File: D:\12d\M12WEST\Reports\Encapsulation Pit 1 Volume.rpt
Volumes from tin "Encapsulation Pit 1 Base" to tin "Encapsulation Pit 1 Top"

Total fill: 603.371 m3
Area: 720 m2

Surveyed By: [redacted]
Equipment: GS14 SN:2811773
Reported By: [redacted]



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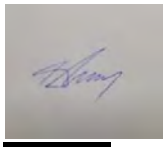


[redacted]
Surveyor

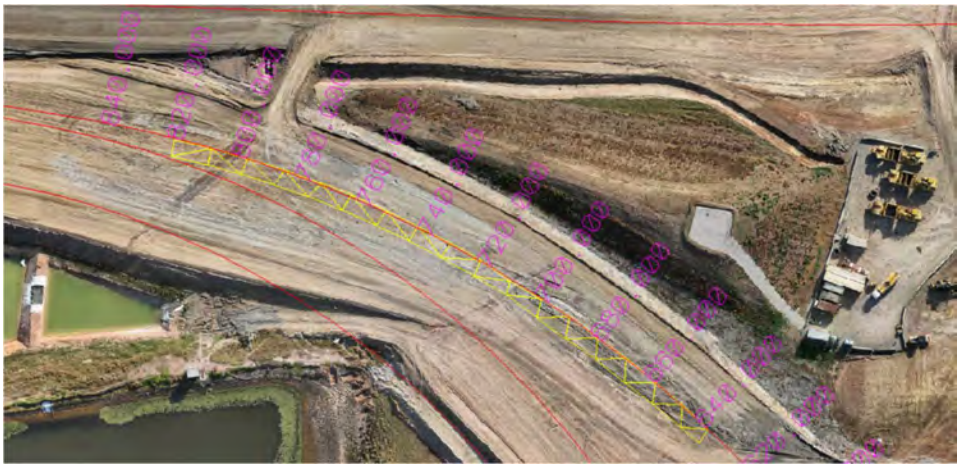
QUANTITY REPORT

Area/Structure: AAR Encapsulation Pit 3
MC/Chainage: MC30 CH640 – CH820

Project: M12
User: TASKEY
Organization: CPB Contractors Pty Ltd
Survey Date: 18/07/2023
Report File: D:\12d\M12WEST\Reports\Encapsulation Pit 3 Volume.rpt
Volumes from tin "Encapsulation Pit 3 Base" to tin "Encapsulation Pit 3 Top"

Total fill: 1341.404 m3
Area: 910 m2

Surveyed By: [redacted]
Equipment: GS14 SN:2811773
Reported By: [redacted]



Signed

[redacted]
Surveyor

QUANTITY REPORT

Project: M12W Office
User: [redacted]
Organization: Jurovich Surveying
Date: Mon Aug 28 16:17:19 2023
Report File: D:\12d\M12WEST\Reports\230828TA2AARABEW Encapsulation pit 3 and 4 Top Pit Volume.rpt

Volumes from tin "230802TA4AARABEW Encapsulation Pit 3 and 4 Base After Fill" to tin "230828TA2AARABEW Encapsulation pit TOP" - (with no plan polygon)

cut volumes are negative
fill volumes are positive

Total cut	0.000
Total fill	1512.509
Total balance	1512.509
ie excess of fill over cut	1512.509

Signed: T.Askey

Mon 28-Aug-2023 16:30:00

Surveyed By: [redacted]
Equipment: GS14 SN:2811773
Reported By: [redacted]

Signed

[redacted]
Surveyor

QUANTITY REPORT

Area/Structure: ACM Encapsulation Pit
EDR West MC/Chainage: MC31 CH386-424
SR/HP Number:

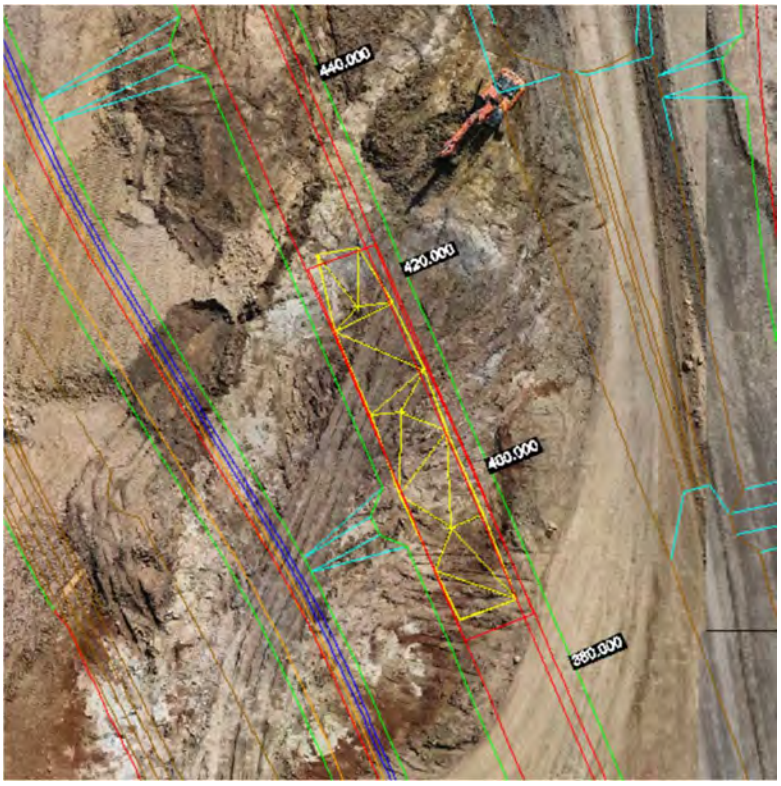
Project: M12W Office
User: Tom Askey
Organization: Jurovich Surveying
Date: Mon Oct 9 14:58:20 2023
Report File: D:\12d\M12WEST\Reports\230927TA2AARSOEW Encapsulation Pit.rpt

Volumes from tin "230927TA2AARSOEW Encapsulation Pit" to tin "231004TA1AARABEW encapsulation TOP" - (with no plan polygon)

cut volumes are negative
fill volumes are positive

Total cut	0.000
Total fill	259.275
Total balance	259.275
ie excess of fill over cut	259.275³

Surveyed By: [redacted]
Date: 27/09/2023
Instrument Serial Number: 2811773
Reported By: [redacted]



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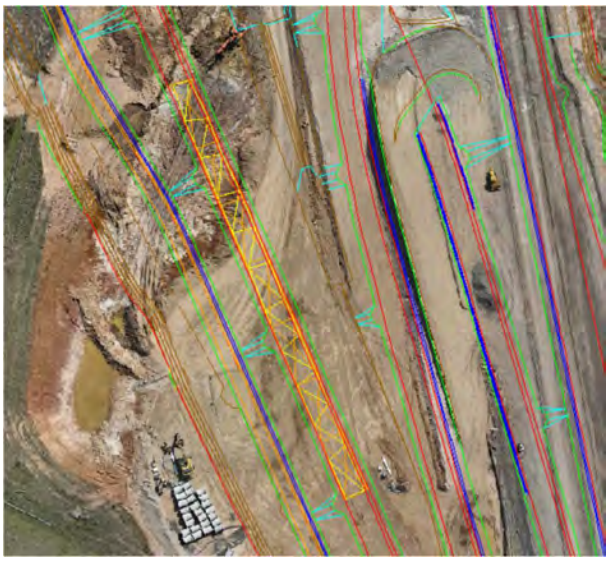
Project: M12W Office
User: [redacted]
Organization: Jurovich Surveying
Date: Mon Oct 16 16:16:45 2023
Report File: D:\12d\M12WEST\Reports\231016TA2AARABEW ACM Encapsulation Volume Pit.rpt

Volumes from tin "231011TA1AARSOEW ACM encapsulation base" to tin "231016TA2AARABEW ACM Encapsulation Top" - (with no plan polygon)

cut volumes are negative
fill volumes are positive

Total cut	0.000
Total fill	633.473
Total balance	633.473
ie excess of fill over cut	633.473m³

Surveyed By: [redacted]
Equipment: GS14 SN:2811773
Reported By: [redacted]



QUANTITY REPORT

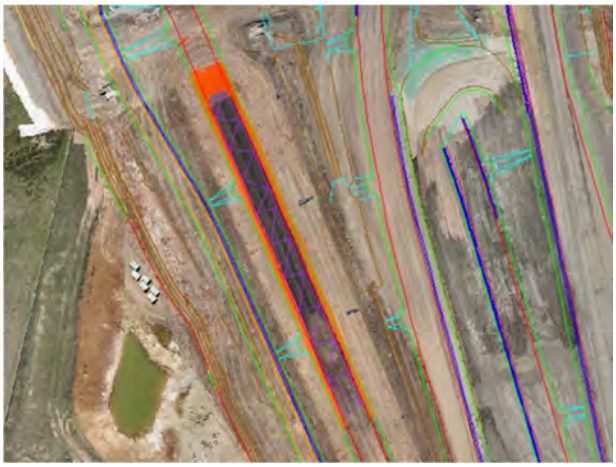
Project: M12W Office
User: [redacted]
Organization: Jurovich Surveying
Date: Mon Oct 30 17:04:38 2023
Report File: D:\12d\M12WEST\Reports\231025TA3AARABEW Encapsulation Top.rpt

Volumes from tin "231019TA4AARABEW Encapsulation Base" to tin "231025TA3AARABEW Encapsulation Top" - (with no plan polygon)

cut volumes are negative
fill volumes are positive

Total cut	0.000
Total fill	722.133
Total balance	722.133
ie excess of fill over cut	722.133 m^3

Surveyed By: [redacted]
Equipment: GS14 SN:2811773
Reported By: [redacted]



Volumes from tin "231019TA4AARABEW Encapsulation Base" to tin "231025TA3AARABEW Encapsulation Top" - (with no plan polygon)

cut volumes are negative
fill volumes are positive

Total cut	0.000
Total fill	722.133
Total balance	722.133
ie excess of fill over cut	722.133³

QUANTITY REPORT

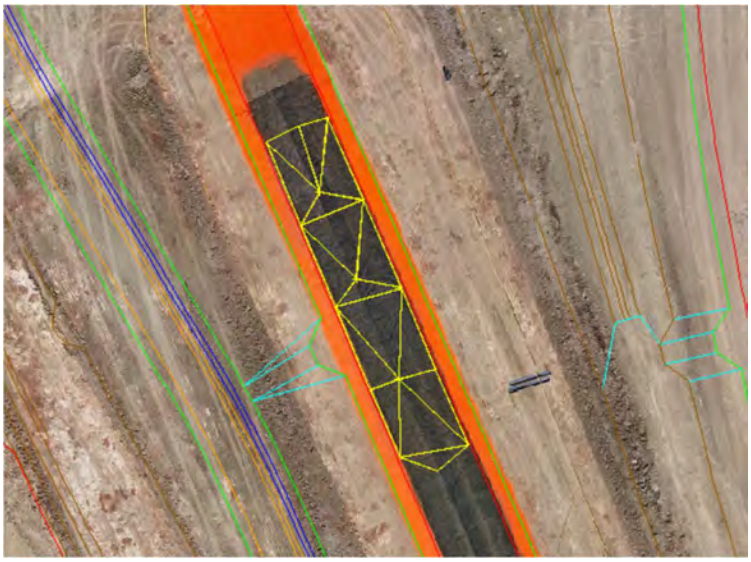
Project: M12W Office
User: [redacted]
Organization: Jurovich Surveying
Date: Thu Nov 2 15:58:21 2023
Report File: D:\12d\M12WEST\Reports\231102TA4AARABEW Encapsulation Pit Volume.rpt

Volumes from tin "231101TA3AARABEW Encapsulation Pit Base" to tin "231102TA4AARABEW Encapsulation Pit Top" - (with no plan polygon)

cut volumes are negative
fill volumes are positive

Total cut	0.000
Total fill	135.689
Total balance	135.689
ie excess of fill over cut	135.689m³

Surveyed By: [redacted]
Equipment: GS14 SN:2811773
Reported By: [redacted]



QUANTITY REPORT

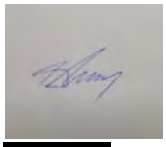
Area/Structure: AAR Encapsulation Pit 3 & 4 Combined
MC/Chainage: MC30 CH600-900 Pit 3
MC31 CH550-700 Pit 4

Project: M12W Office Tom
User: Jurovich Surveying
Organization: Jurovich Surveying
Date: Tue Aug 1 11:37:24 2023
Report File: D:\12d\M12WEST\Reports\Encapsulation Pit 3 & 4 Combined rev2.rpt
Volumes from tin "Encapsulation Pit 3 and 4 Base" to tin "Encapsulation Pit 3 and 4 Top

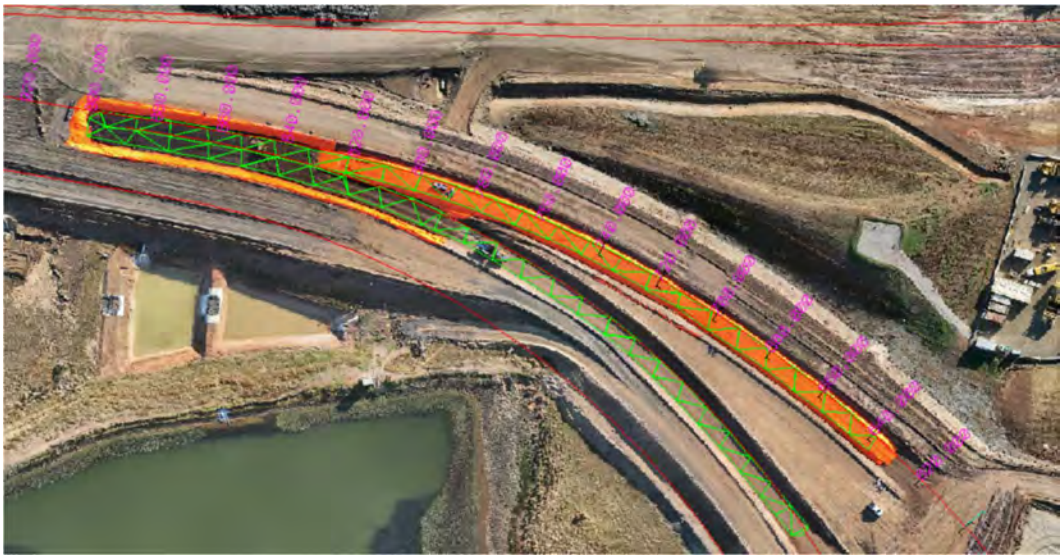
Total fill: 3699.990 m3
Area: 2660 m2

Surveyed By: [redacted]
Equipment: GS14 SN:2811773
Reported By: [redacted]

Signed



[redacted]
Surveyor



M12 Motorway West
Contamination Capping Locations

CPB CONTRACTORS | Georgiou

Point ID	Easting	Northing
1	291221.73	6250833.32
2	291231.18	6250834.25
3	291229.69	6250803.53
4	291227.56	6250763.34
5	291226.90	6250741.94
6	291219.66	6250741.52
7	291219.66	6250752.24
8	291219.73	6250783.00
9	291219.64	6250804.03
10	291221.73	6250833.32
11	291065.61	6250832.37
12	291070.57	6250820.65
13	291077.53	6250804.36
14	291084.41	6250788.37
15	291090.86	6250773.25
16	291097.49	6250757.75
17	291091.44	6250755.15
18	291084.85	6250770.61
19	291078.14	6250786.24
20	291071.40	6250801.94
21	291064.32	6250818.43
22	291059.40	6250829.94
23	291059.11	6250830.39
24	291056.91	6250835.39
25	291052.69	6250845.24
26	291048.62	6250855.04
27	291044.29	6250865.20
28	291050.60	6250867.46
29	291054.14	6250858.96
30	291058.04	6250850.33
31	291062.58	6250839.87
32	291065.54	6250832.99
33	291044.22	6250865.32
34	291043.52	6250866.95
35	291050.06	6250868.72
36	291050.48	6250867.73
37	291011.55	6250961.78
38	291003.91	6250955.39
39	290998.27	6250964.17
40	290992.36	6250973.19
41	290986.03	6250981.63
42	290978.68	6250990.78
43	290971.82	6250999.02
44	290964.17	6251007.28
45	290956.27	6251015.63
46	290948.15	6251022.32
47	290939.35	6251029.43
48	290930.74	6251035.68
49	290922.22	6251041.42
50	290913.04	6251047.36
51	290903.67	6251052.75
52	290894.03	6251057.78
53	290884.03	6251062.36
54	290874.94	6251066.13
55	290864.58	6251070.08
56	290854.07	6251073.56
57	290842.81	6251077.15
58	290831.29	6251079.88
59	290819.76	6251082.12
60	290808.37	6251084.08
61	290797.99	6251085.97
62	290786.45	6251087.53
63	290787.47	6251097.30
64	290798.26	6251095.54
65	290808.55	6251094.03
66	290818.47	6251092.43
67	290828.92	6251090.77
68	290839.34	6251088.76
69	290849.94	6251086.64
70	290860.20	6251084.25
71	290870.49	6251081.82
72	290880.79	6251079.07
73	290890.15	6251076.23
74	290899.62	6251073.25
75	290910.16	6251069.43
76	290919.94	6251065.31
77	290929.57	6251060.83
78	290938.94	6251056.22
79	290948.38	6251051.32
80	290957.72	6251046.13
81	290966.81	6251040.77
82	290975.56	6251035.00
83	290984.30	6251029.12
84	290992.96	6251022.85
85	291001.12	6251016.76
86	291009.47	6251010.18
87	291017.35	6251003.63
88	291025.58	6250996.58
89	291034.03	6250988.85
90	291028.93	6250983.87
91	291021.08	6250991.28
92	291013.15	6250998.66
93	291005.02	6251005.59
94	290996.96	6251012.08
95	290988.57	6251018.42
96	290979.79	6251024.69
97	290970.54	6251030.79
98	290961.54	6251036.31
99	290952.42	6251041.52
100	290942.60	6251046.96
101	290932.86	6251052.46
102	290922.84	6251057.27
103	290912.81	6251061.70
104	290902.55	6251065.73
105	290892.01	6251069.49
106	290859.46	6251079.26
107	290870.48	6251075.53
108	290883.55	6251069.57
109	290892.91	6251064.80
110	290902.74	6251060.04
111	290912.27	6251054.66
112	290920.50	6251049.92
113	290929.75	6251044.21
114	290938.77	6251037.86
115	290947.01	6251031.53
116	290955.69	6251024.02
117	290963.43	6251016.67
118	290970.64	6251009.47
119	290977.50	6251001.50
120	290984.20	6250993.54
121	290990.69	6250985.60
122	290997.16	6250977.54
123	291004.15	6250969.19
124	291011.55	6250961.78
125	291103.32	6249747.36
126	291116.89	6249744.66
127	291118.37	6249741.61
128	291116.91	6249736.12
129	291101.44	6249739.02
130	291101.16	6249745.97

M12 Motorway West
Contamination Capping Locations

CPB CONTRACTORS | Georgiou

Point ID	Easting	Northing
1	291221.73	6250833.32
2	291231.18	6250834.25
3	291229.69	6250803.53
4	291227.56	6250763.34
5	291226.90	6250741.94
6	291219.66	6250741.52
7	291219.66	6250752.24
8	291219.73	6250783.00
9	291219.64	6250804.03
10	291221.73	6250833.32
11	291065.61	6250832.37
12	291070.57	6250820.65
13	291077.53	6250804.36
14	291084.41	6250788.37
15	291090.86	6250773.25
16	291097.49	6250757.75
17	291091.44	6250755.15
18	291084.85	6250770.61
19	291078.14	6250786.24
20	291071.40	6250801.94
21	291064.32	6250818.43
22	291059.40	6250829.94
23	291059.11	6250830.39
24	291056.91	6250835.39
25	291052.69	6250845.24
26	291048.62	6250855.04
27	291044.29	6250865.20
28	291050.60	6250867.46
29	291054.14	6250858.96
30	291058.04	6250850.33
31	291062.58	6250839.87
32	291065.54	6250832.99
33	291044.22	6250865.32
34	291043.52	6250866.95
35	291050.06	6250868.72
36	291050.48	6250867.73
37	291011.55	6250961.78
38	291003.91	6250955.39
39	290998.27	6250964.17
40	290992.36	6250973.19
41	290986.03	6250981.63
42	290978.68	6250990.78
43	290971.82	6250999.02
44	290964.17	6251007.28
45	290956.27	6251015.63
46	290948.15	6251022.32
47	290939.35	6251029.43
48	290930.74	6251035.68
49	290922.22	6251041.42
50	290913.04	6251047.36
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55	290864.58	6251070.08
56	290854.07	6251073.56
57	290842.81	6251077.15
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59	290819.76	6251082.12
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61	290797.99	6251085.97
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65	290808.55	6251094.03
66	290818.47	6251092.43
67	290828.92	6251090.77
68	290839.34	6251088.76
69	290849.94	6251086.64
70	290860.20	6251084.25
71	290870.49	6251081.82
72	290880.79	6251079.07
73	290890.15	6251076.23
74	290899.62	6251073.25
75	290910.16	6251069.43
76	290919.94	6251065.31
77	290929.57	6251060.83
78	290938.94	6251056.22
79	290948.38	6251051.32
80	290957.72	6251046.13
81	290966.81	6251040.77
82	290975.56	6251035.00
83	290984.30	6251029.12
84	290992.96	6251022.85
85	291001.12	6251016.76
86	291009.47	6251010.18
87	291017.35	6251003.63
88	291025.58	6250996.58
89	291034.03	6250988.85
90	291028.93	6250983.87
91	291021.08	6250991.28
92	291013.15	6250998.66
93	291005.02	6251005.59
94	290996.96	6251012.08
95	290988.57	6251018.42
96	290979.79	6251024.69
97	290970.54	6251030.79
98	290961.54	6251036.31
99	290952.42	6251041.52
100	290942.60	6251046.96
101	290932.86	6251052.46
102	290922.84	6251057.27
103	290912.81	6251061.70
104	290902.55	6251065.73
105	290892.01	6251069.49
106	290859.46	6251079.26
107	290870.48	6251075.53
108	290883.55	6251069.57
109	290892.91	6251064.80
110	290902.74	6251060.04
111	290912.27	6251054.66
112	290920.50	6251049.92
113	290929.75	6251044.21
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123	291004.15	6250969.19
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125	291103.32	6249747.36
126	291116.89	6249744.66
127	291118.37	6249741.61
128	291116.91	6249736.12
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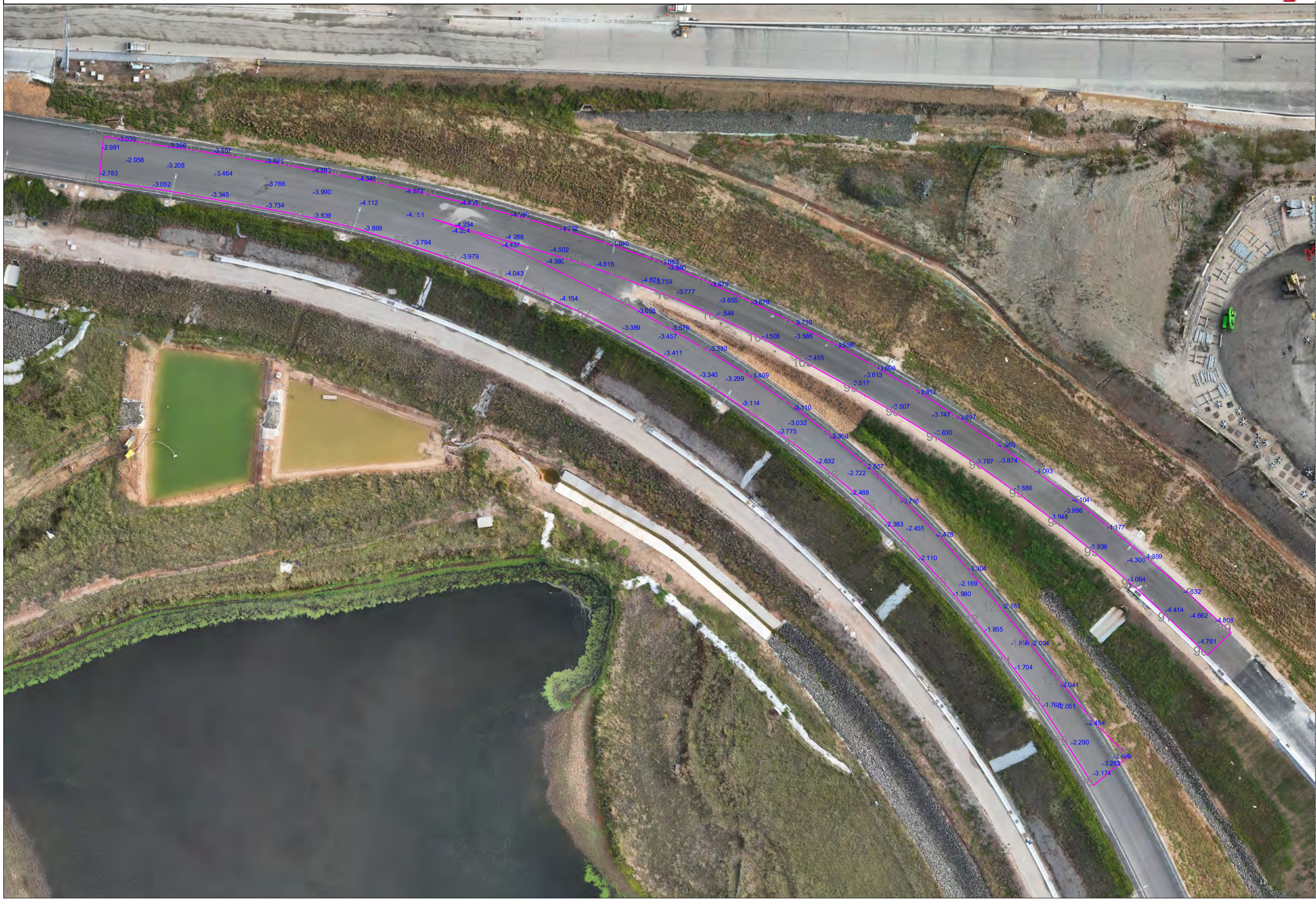
M12 Motorway West
Contamination Capping Locations

CPB CONTRACTORS | Georgiou



Point ID	Easting	Northing
1	291221.73	6250803.32
2	291231.18	6250834.25
3	291229.69	6250803.53
4	291227.56	6250763.34
5	291226.90	6250741.94
6	291219.66	6250741.52
7	291219.66	6250752.24
8	291219.73	6250783.00
9	291219.64	6250804.03
10	291221.73	6250803.32
11	291065.61	6250832.37
12	291070.57	6250820.65
13	291077.53	6250804.36
14	291084.41	6250788.37
15	291090.86	6250773.25
16	291097.48	6250757.75
17	291091.44	6250755.15
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19	291078.14	6250786.24
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24	291056.91	6250835.39
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29	291054.14	6250858.99
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31	291062.58	6250839.87
32	291065.54	6250832.99
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35	291050.09	6250868.72
36	291050.48	6250867.73
37	291011.55	6250961.78
38	291003.91	6250976.39
39	290998.27	6250984.17
40	290992.36	6250973.19
41	290986.03	6250981.63
42	290978.68	6250990.78
43	290971.82	6250999.02
44	290964.17	6251007.28
45	290956.27	6251015.63
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47	290939.35	6251029.43
48	290930.74	6251035.68
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50	290913.04	6251047.36
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71	290870.49	6251081.82
72	290880.79	6251078.07
73	290890.15	6251076.23
74	290899.62	6251073.25
75	290910.16	6251069.43
76	290919.94	6251065.31
77	290929.57	6251060.83
78	290938.94	6251056.22
79	290948.38	6251051.32
80	290957.72	6251046.13
81	290966.81	6251040.77
82	290975.56	6251035.00
83	290984.30	6251029.12
84	290992.96	6251022.85
85	291001.12	6251016.76
86	291009.47	6251010.18
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88	291025.56	6250996.58
89	291034.03	6250988.85
90	291028.93	6250983.87
91	291021.08	6250991.28
92	291013.15	6250998.66
93	291005.02	6251005.59
94	290996.96	6251012.08
95	290986.57	6251018.42
96	290979.79	6251024.69
97	290970.54	6251030.79
98	290961.54	6251036.31
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100	290942.60	6251046.99
101	290932.86	6251052.46
102	290922.84	6251057.27
103	290912.81	6251061.70
104	290902.55	6251065.73
105	290892.01	6251069.49
106	290859.46	6251079.26
107	290870.48	6251075.53
108	290883.55	6251069.57
109	290882.91	6251064.80
110	290902.74	6251060.04
111	290912.27	6251054.66
112	290920.50	6251049.92
113	290929.75	6251044.21
114	290938.77	6251037.86
115	290947.01	6251031.53
116	290955.69	6251024.02
117	290963.43	6251016.67
118	290970.64	6251009.47
119	290977.50	6251001.50
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122	290997.16	6250977.54
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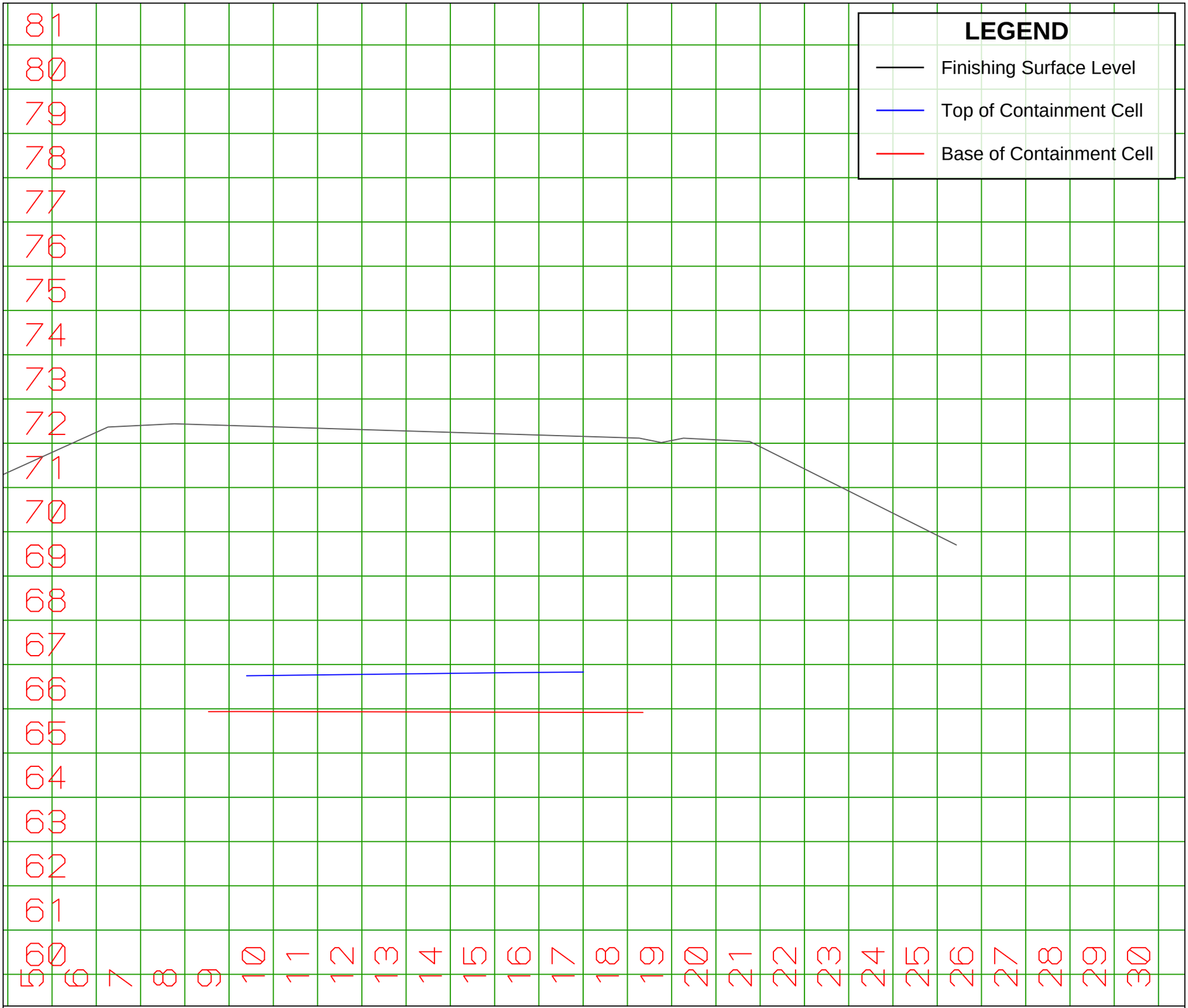
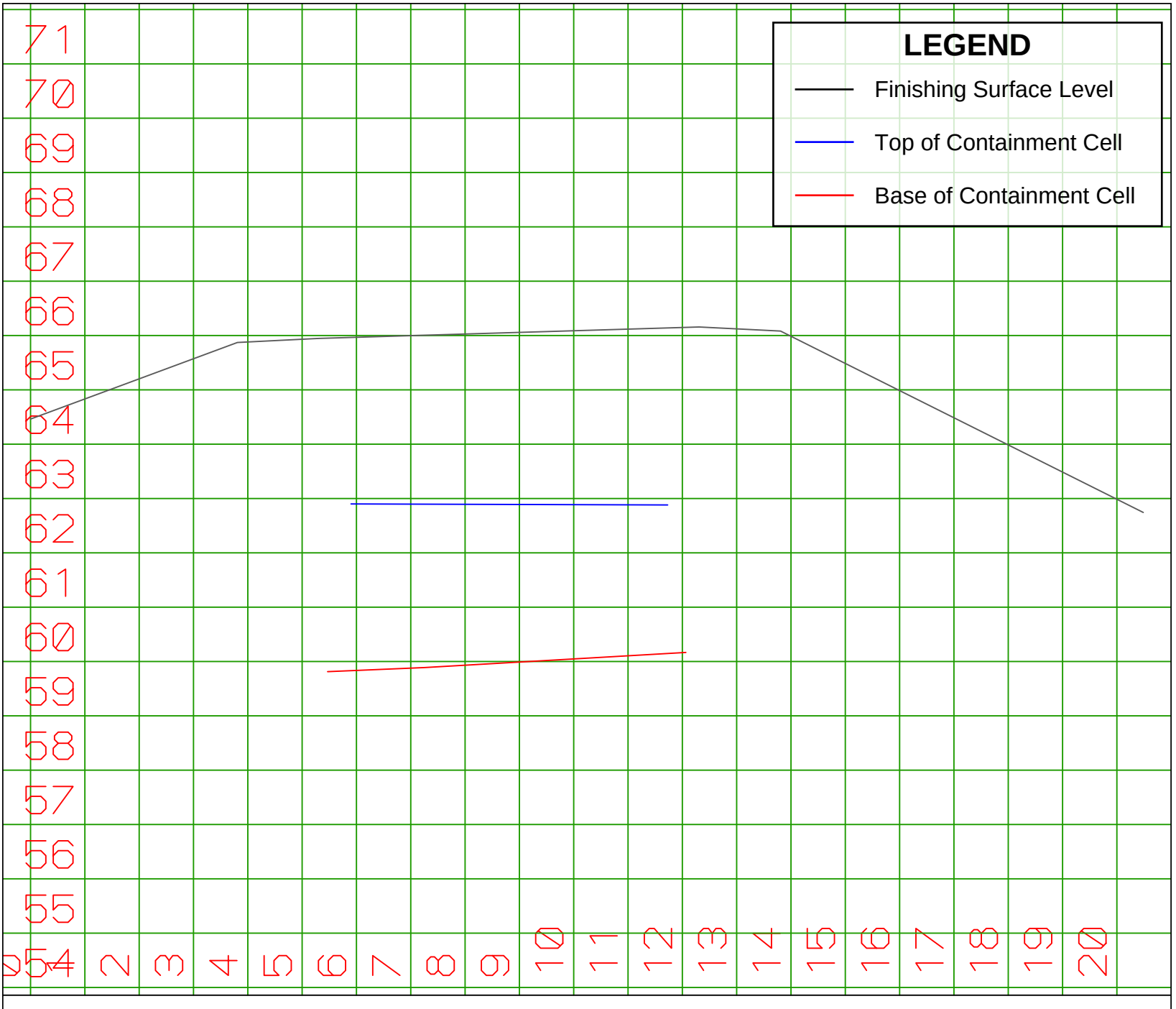


MCF0 XS

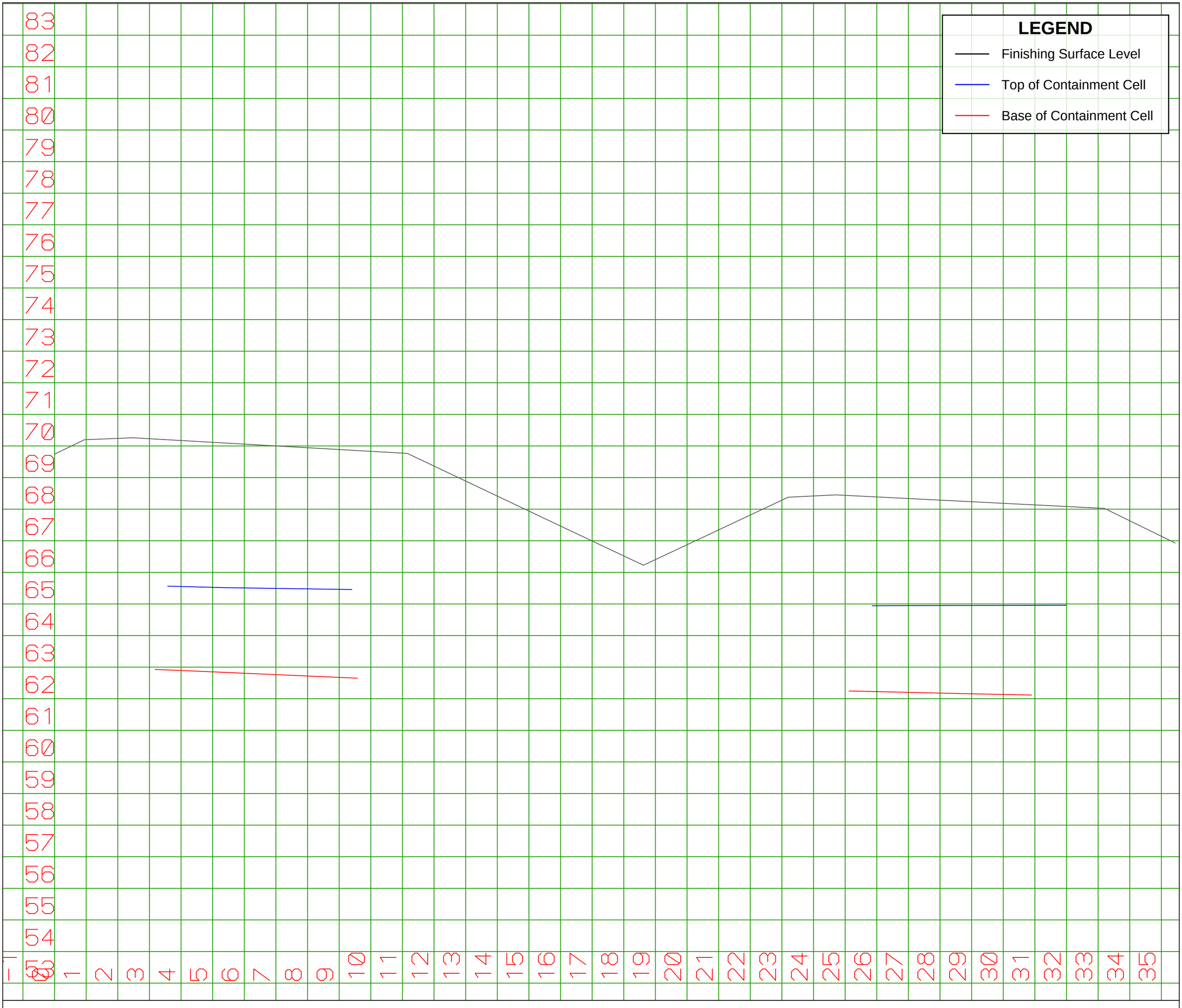
12d Model
Horizontal Scale 1:100
Vertical Scale 1:100
Fri Jun 6 07:53:25 2025

Encapsulation Cell 1



MC31 XS 12d Model
Horizontal Scale 1:100
Vertical Scale 1:100
Fri Jun 6 07:53:55 2025

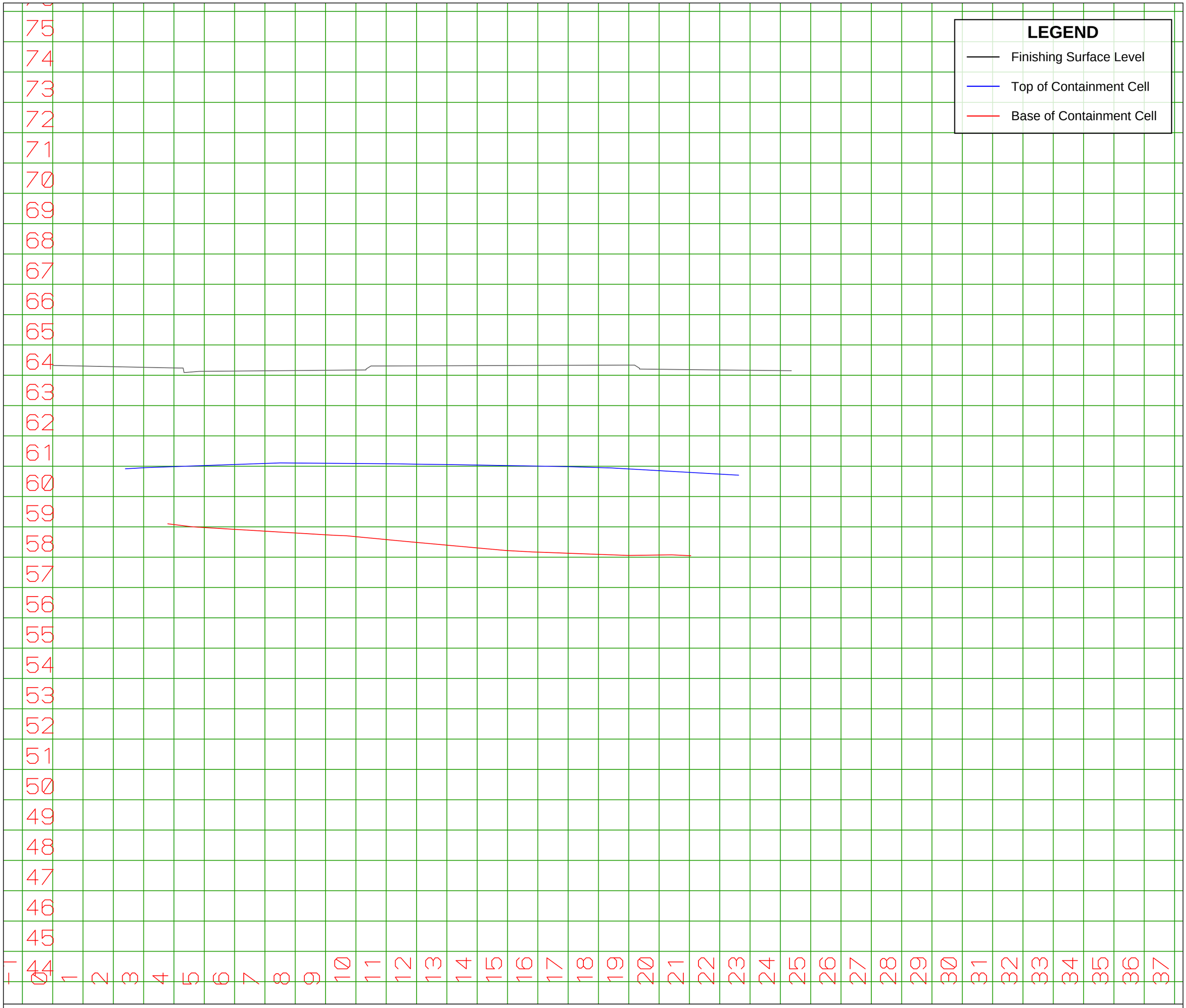
Encapsulation Cell 2



MC31×MC30 XS

12d Model
Horizontal Scale 1:100
Vertical Scale 1:100
Fri Jun 6 07:55:13 2025

Encapsulation Cells 3 & 4



XS LILO

Encapsulation Cell 5

12d Model
Horizontal Scale 1:100
Vertical Scale 1:100
Fri Jun 6 07:49:50 2025

APPENDIX B

INSPECTION RECORD FORM

Capping Inspection Record

M12 (West) Motorway Alignment, Badgerys Creek NSW	
Is there any evidence of damage to the capping?	
If yes, describe the location and depth of the damage of the capping.	
Have photographs of damage of the capping been collected.	
Is there any disturbance / erosion of soil in the capping area?	
If yes, describe the location and depth of the disturbance.	
Have photographs of the disturbance in the capping area been collected.	
Are there any areas of exposed marker layer?	
If yes, have contingency measures been implemented?	
Have photographs of the exposed areas been collected?	

Person Completing Inspection_____

Date Submitted to Site Owner_____

APPENDIX C

INCIDENT REPORTING FORM

Environmental Incident Report Form

M12 (West) Motorway Alignment, Badgerys Creek NSW	
Date:	
Time:	
Reported by:	
Persons involved or in the vicinity:	
Type of Incident:	
Severity of Incident:	
Description & Cause of Incident:	
Remedial Actions Required:	

Approved By: _____

Date Submitted to Site Owner: _____

APPENDIX D

INDUCTION RECORD

Induction Record

M12 (West) Motorway Alignment, Badgerys Creek NSW					
Full Name	Date of Induction	Signature	Full Name	Date of Induction	Signature

APPENDIX E

MATERIAL TRACKING SHEET

Material Tracking Sheet

Source Location (Encapsulation Cell ID)	Date Generated	Description of Works	Stockpile ID	Contamination Present? (Y/N) (e.g. asbestos, hydrocarbon odours/sheens etc)	Placement Location	Date of Placement	Comments