



Provisional Remediation Action Plan

**60-78 Regent Street
Redfern NSW 2016**

Prepared for:

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Executive Summary

DLA Environmental Services (DLA) was commissioned by Iglu Pty Ltd to prepare a Provisional Remediation Action Plan (RAP) for the property identified as:

Lots B-F in DP 108322 and Lots 6-10 of Section 1 in DP 3954 at 60-78 Regent Street, Redfern, NSW 2016 (the Site).

A Provisional RAP has been prepared to address potential localised contamination, in particular, the possible presence of Underground Storage Tanks (USTs), contamination hotspots and asbestos impaction. The Provisional RAP has also been developed in consideration of the potential for unidentified contamination existing on-site due to historical and previous commercial/industrial land uses.

This purpose of this report is to set remediation goals and document the management procedures and environmental safeguards to be implemented to ensure the Site will be rendered suitable for the proposed land use and will pose no unacceptable risk to the human health or the environment generally.

Given the intense knowledge of the Redfern area and the historical usage of the Site for industrial and commercial purposes, DLA is of the opinion that it is probable that not all contamination at the Site has been identified. Proposed excavations at the Site will be performed on a precautionary basis including classification and tracking to isolate any potential areas of unidentified contamination persisting on-site which were not encountered during previous investigations. As a conservative measure, DLA has incorporated a provisional remediation methodology for these materials into the potential preferred remediation strategy for the Site.

The Site strategy selected must be the most cost-effective solution, which does not bring about unacceptable long-term liabilities, and which does not impose unreasonable constraints on future Site developments or present operations. The strategy must also be capable of achieving the technical, environmental and economic objectives outlined in this report.

At the completion of the management and clean-up works, a Validation Report documenting the works as completed will be prepared. The Validation Report will describe the strategic works undertaken at the Site, assess the result of the validation testing, demonstrate that the objectives of this RAP have been achieved and provide justifications for any deviation, statistically confirm

that the managed site complies with the Validation Criteria and include any other information as deemed appropriate.

The Site can be made suitable for the intended land-use through remedial action if contamination is identified as part of the redevelopment works in accordance with *State Environmental Planning Policy No.55 Managing Land Contamination: Planning Guidelines SEPP 55*.

In conclusion this Provisional RAP:

- Has been developed in a manner consistent with current industry practice;
- Has outlined potential remediation strategies (if required) based on the site-specific issues and currently available technologies;
- Has outlined the means of validation for the completed works.

TABLE OF CONTENTS

1.0 INTRODUCTION	3
1.1 General	3
1.2 Objectives	3
1.3 Remediation Guidelines.....	4
2.0 SITE DETAILS.....	5
2.1 Site Identification.....	5
2.2 Environmental Setting	5
2.2.1 Boundaries and Surrounding Land Use	5
2.2.2 Site Topography and Hydrology	5
2.2.3 Acid Sulphate Soils.....	6
2.2.4 Soil Salinity and Aggressivity	6
2.2.5 Site Geology and Soils	6
3.0 SUMMARY OF PREVIOUS INVESTIGATIONS	7
3.1 Preliminary Environmental Site Investigation	7
3.2 Contamination Status	7
4.0 FURTHER INVESTIGATIONS	9
5.0 SELECTION OF POTENTIAL REMEDIATION STRATEGYOVERVIEW.....	10
5.1 Technical Appraisal.....	10
5.2 Preferred Strategy	11
6.0 IMPLEMENTATION OF THE SELECTED STRATEGY.....	12
6.1 Stakeholder Consultation	12
6.2 Implementation of Environmental Management Plan.....	12
6.3 Site Establishment and Pre-Remedial Works	12
6.3.1 Site Establishment	12
6.3.2 Site Pre-Works.....	13
6.4 Remediation Works	13
6.4.1 Designation of Material Reuse Consolidation Areas	13
6.4.2 Remediation of Hotspot Contamination (if required).....	13
6.4.3 Remediation of Identified USTs (if required)	14
6.4.4 Remediation of Identified Asbestos Contamination (if required).....	14
6.4.5 Remediation of Potential Unidentified Contamination	15
6.5 Validation Plan.....	17
6.5.1 Validation Procedure.....	17
6.5.2 Validation Criteria.....	17
6.5.3 Application of Criteria.....	21
6.5.4 Validation Report.....	21

6.5.5	Quality Control	21
6.6	Remediation Contingency.....	22
7.0	CONCLUSION	23
8.0	REFERENCES	24

FIGURES

- | | |
|-----------------|---------------|
| Figure 1 | Site Location |
| Figure 2 | Site Layout |

1.0 INTRODUCTION

1.1 General

DLA Environmental Services (DLA) was commissioned by Iglu Pty Ltd to prepare a Provisional Remediation Action Plan (RAP) for the property identified as:

Lots B-F in DP 108322 and Lots 6-10 of Section 1 in DP 3954 at 60-78 Regent Street, Redfern, NSW, 2016 (the Site).

A Provisional RAP has been prepared to address potential contamination issues identified during preliminary environmental investigations at the Site, in particular, the presence of Underground Storage Tanks (USTs), sub-slab fill materials and potential asbestos impactation. The Provisional RAP has also been developed in consideration of the potential for unidentified contamination existing on-site due to historical and commercial/industrial land uses.

1.2 Objectives

This purpose of this report is to set potential remediation goals and document the management procedures and environmental safeguards to be implemented to ensure the Site will be rendered suitable for the proposed land use and will pose no unacceptable risk to human health or the environment generally.

In achieving this outcome, the report will provide:

- A brief summary of the history and environmental setting of the Site;
- A summary of any previous environmental investigations at the Site;
- A review of the currently available remediation options;
- Details of the potential preferred remediation strategies and an outline of the methodology for the implementation of a potentially strategy;
- Document appropriate procedures for the handling and tracking of materials;
- A brief outline of environmental pollution control, community health and safety, and occupational health and safety measures that should be implemented during remedial works; and,
- An outline of regulatory approvals and licenses which may be required to adopt the preferred remedial strategy.

1.3 Remediation Guidelines

The Provisional RAP has been prepared with consideration to the following guidelines and legislation:

- National Environment Protection (Assessment of Site Contamination) Measure (NEPM) (NEPC, 1999 as amended 2013);
- Managing Land Contamination, Planning guidelines, SEPP 55: Remediation of Land (DUAP, 1998);
- Contamination Sites: Sampling Design Guidelines (EPA, 1995);
- Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites (OEH, 2011);
- Contaminated Sites: Guidelines for the NSW Site Auditor Scheme (DEC, 2006);
- Australian and New Zealand Guidelines for Assessment and Management of Contaminated Sites (ANZECC, 1992);
- Code of Practice for the Safe Removal of Asbestos, 2nd Edition (NOHSC, 2005);
- Work Health and Safety Act 2011 and associated regulations;
- How to Safely Remove Asbestos: Code of Practice (WorkCover, 2011); and,
- Storage and Handling of Dangerous Goods Code of Practice 2005.

2.0 SITE DETAILS

2.1 Site Identification

The Site identification details are summarised in **Table 1** below:

Table 1 – Site Identification Summary

ITEMS	DETAILS
Address	60-78 Regent Street, Redfern, NSW 2016
Local Government Authority	City of Sydney Council
Site Zoning	State Environmental Planning Policy (Major Development) 2005
Current Use (NEPM 2013 Table 1A(1))	Commercial / Industrial
Proposed Use (NEPM 2013 Table 1A(1))	Residential with minimal opportunities for soil access
Site Area (approx.)	1,420m ²
Locality Map	Refer to Figure 1 – Site Location

2.2 Environmental Setting

2.2.1 Boundaries and Surrounding Land Use

The boundary and surrounding landscape features of the Site are summarised in **Table 2** below:

Table 2 – Boundaries and Surrounding Land Use

DIRECTION	DETAILS
North	Commercial properties
East	Regent Street with commercial/residential buildings
South	Commercial properties
West	High rise residential/commercial

2.2.2 Site Topography and Hydrology

The Site slopes slightly south-west towards Botany Road. Surface water in the surrounding area is likely to flow to the south-west, in accordance with the general topography. The water flowing overland is likely to entry local storm water infrastructure prior to discharge into the Alexandria Canal, located approximately 2 km south of the Site.

A search on NSW Natural Resource Atlas identified six groundwater bores within one kilometre of the Site, used for domestic and monitoring purposes. According to the information provided, groundwater was encountered in sandy soils above shale bedrock, with the regional groundwater standing water level generally located between 2.0-2.3m below ground level.

2.2.3 Acid Sulphate Soils

A search of the NSW Natural Resources Atlas does not identify Acid Sulphate Soils to be present in the vicinity of the Site.

2.2.4 Soil Salinity and Aggressivity

The New South Wales Natural Resources Atlas indicated no evidence of salinity hazards or dryland salinity indicators within the Site boundaries or land surrounding the Site.

2.2.5 Site Geology and Soils

The published geological maps (NSW Geological Survey 1:250,000 Sydney geological Series Sheet S1 56-5, 1966, 3rd Edition) indicate the geology at the Site to be underlain by Triassic aged Hawkesbury Sandstone, characterised by the presence of sandstone, quartz and some shale.

The Site is situated in an area of highly disturbed soils and it is considered that little natural soil is still in place within the Site area. In general, the Redfern area includes both the Blacktown and Tuggerah soil landscapes. The Blacktown Landscape is characterised by gently undulating rises on shales of the Wianamatta Group and Hawkesbury shales. Soils are shallow to moderately deep red and brown podzolic soils on crests, upper slopes and well drained areas; deeper Yellow Podzolic Soils and soliths are found on lower slopes and in areas of poor drainage. Limitations for these soil types include the presence of highly plastic subsoil, generally characterised by low soil fertility and poor soil drainage.

The Tuggerah landscape comprises gently undulating to rolling coastal dunefields. Slope gradients are generally low. Dunes are north-south oriented with convex narrow crests. The vegetation consists of extensively cleared open forest and woodland. Deep soils include podzols on dunes and Podzol/Humus Podzol intergrades on swales. Limitations for these soil types include extreme wind erosion hazard, and the presence of non-cohesive, highly permeable soil, very low soil fertility, localized flooding and permanently high water tables.

3.0 SUMMARY OF PREVIOUS INVESTIGATIONS

The previous environmental investigations carried out at the Site are listed and detailed below:

3.1 Stage 1 Preliminary Environmental Site Investigation – 60-78 Regent Street, Redfern, NSW, 2014 (DLA Environmental Services, August 2014, Ref: DL3372_S001954)

The Stage 1 Preliminary Environmental Site Investigation desktop study did not identify any contaminated land or archaeological significant notices. No NSW WorkCover dangerous goods licences had been held for the premises. Aerial photographs and imagery indicated the site had been developed since at least the 1930's, with little change to building structure. From the aerial review no activities could be seen on or within the vicinity of the Site deemed to have the potential to contaminate the Site. A service station was identified 150 m south-west of the Site on Regent Street, however as the station was located down hydraulic gradient to the Site, it was deemed to pose minimal contamination risk to the Site. The title search identified a possible dry cleaner on-site, and therefore a possible contaminant source due to the use of chlorinated solvents associated with dry cleaning services. The storage and use of the chemicals by the dry cleaning business were not confirmed.

An Acid Sulphate search found none to be reported in the vicinity of the Site. A salinity investigation indicated no salinity issues were found to be within the Site or land surrounding the Site. Due to the apparent age of the building, there was potential for PCB's, lead paint or asbestos to be present. It was noted that the Site did not appear elevated relative to neighbouring properties and the local topography, however fill materials may be present beneath the Site.

3.2 Contamination Status

Based on the previous investigation and DLA's observations during the inspection of the Site, the potential areas of environmental concern for the Site are:

- Potential underground storage tanks (USTs) within 74-76 Regent Street (Lots 7 and 8 of Section 1 DP 3954), which were identified in the historical title search as leased to a dry cleaning business between 1961 and 1972;
- Potential chlorinated hydrocarbon contamination of groundwater related to USTs on-site (if present);

- Heavy metal, hydrocarbon, polycyclic aromatic hydrocarbon (PAH) hotspots within sub-slab fill material; and,
- Asbestos containing materials (ACM) within sub-slab fill material.

Given the extensive knowledge of the Redfern area and the historical usage of the Site for both industrial and commercial purposes, DLA is of the opinion that it is probable that potential contamination at the Site has not been identified. Proposed excavations at the Site will be undertaken to identify any potential areas of unidentified contamination on-site which were not encountered during previous investigations. During this investigation materials will be classified in accordance with the NSW EPA Waste Classification Guidelines 2014.

4.0 FURTHER INVESTIGATIONS

It is recommended that prior to demolition of the buildings a Hazardous Materials Assessment be conducted of all existing on-site structures. Due to the age of the buildings across the Site, there is potential for PCB's, lead paint or asbestos to be present.

Following demolition, an assessment of soils across the Site should be undertaken by a contaminated land professional as part of a Stage Two Detailed Site Investigation. Under the Sampling Design Guidelines (EPA, 1995), a site with an area of 1,400m² required a minimum of six sample locations to assess the contamination status of the Site. Samples will be collected from both fill and natural materials. Prior to sampling, the use of a sub-surface locator to identify the location(s) of any potential on-site USTs (particularly across the properties on 74-76 Regent Street) is also recommended.

5.0 SELECTION OF POTENTIAL REMEDIATION STRATEGY OVERVIEW

The *Contaminated Sites: Guidelines for the NSW Site Auditor Scheme* (Second Edition, DEC, 2006) outlines the hierarchical management of wastes as preferred by the EPA. This scheme adopts the *Australian and New Zealand Guidelines for Assessment and Management of Contaminated Sites* (ANZECC, 1992). The Site's potential preferred order of options for management are:

- Excavate and Dispose; and,
- Cap and Contain.

5.1 Technical Appraisal

Important considerations (from a technical perspective) in selecting and effectively implementing one of the available remediation strategies for the Site are provided below in **Table 4**.

Table 4 – Technical Considerations

Technical Considerations	Option 1 Capping & Containment	Option 2 Excavate and Off-Site Disposal
Human Health Risks	Low – contaminants do not generally constitute a significant risk when contained. Limited personal contact. The excavation is part of regular quarrying and involves minimal soil disturbance.	Low – excavation and direct off-site disposal will minimise personal contact.
Reliability	Sound – some potential may exist for contaminant break through if cap breached or not maintained properly. Design and management will ensure minimal access to cap surface is possible.	Excellent – system ensures the removal of all contaminated materials.
Regulatory Approvals	Satisfactory – whilst on-site containment is not the EPA's preferred option; it is often accepted as a feasible option.	Satisfactory – waste will satisfy the 2014 NSW EPA <i>Waste Classification Guidelines</i> . Compliance with Regulatory Authorities
Site Suitability	Poor – widespread basement excavation could limit suitable areas of containment.	Good – Site is accessible by road transport, soils are to be excavated as part of redevelopment works.
Disruption to Site Structures and Activities	N/A.	Moderate – existing site structures require demolition. Remediation areas can be excavated and treated.

Technical Considerations	Option 1	Option 2
	Capping & Containment	Excavate and Off-Site Disposal
Ongoing Liabilities	Moderate – capping system needs to be maintained.	Minimal – all contaminated materials removed.
Contractor Experience	Moderate – contractors available with experience in the implementation of cap and contain systems.	Good – relatively simple strategy involving only basic technologies.
Availability of Disposal Sites	N/A.	Good – landfills available to accept waste.
Implementation Time Frame	Short to moderate.	Short.

Based on the analysis undertaken in **Table 4**, the following salient conclusions are made regarding the technical suitability of the various remediation options available for the Site:

- Excavation and off-site disposal is time effective and offers no constraints on future land use. The option is also highly suitable for the Site as excavation is proposed across the Site as part of redevelopment works;
- Capping and containment method has low health risks as it does not involve a substantial disturbance of the contaminated soils. The option is also a reliable technology and can be implemented on as short time frame; and,
- The major disadvantages associated with this remediation method include maintenance requirements and notation that the Site is regarded as containing contamination and is titled accordingly.

Consideration must also be given to the EPA endorsed remediation hierarchy of the *Australian and New Zealand Guidelines for Assessment and Management of Contaminated Sites* (ANZECC, 1992), where excavation and disposal are preferable to capping and containment.

5.2 Preferred Strategy

The Site strategy selected must be the most cost-effective solution, which does not bring about unacceptable long-term liabilities, and which does not impose unreasonable constraints on future Site developments or present operations. The strategy must also be capable of achieving the technical, environmental and economic objectives outlined in the finalised RAP report.

6.0 IMPLEMENTATION OF THE SELECTED STRATEGY

The 'excavate and dispose' remediation strategy proposed incorporates the following elements:

1. Stakeholder consultation;
2. Implementation of an accepted Site Environmental Management Plan (SEMP);
3. Site Establishment and Pre-Remedial Works;
4. Remediation Works; and,
5. Validation Plan.

6.1 Stakeholder Consultation

On approval of the strategy, the Stakeholders including on-site Management and relevant regulatory bodies will be informed of the intentions and the progress at all stages of the management works.

6.2 Implementation of Environmental Management Plan

A SEMP covering the remedial works will be prepared for the Site. Before work commences it is imperative that all issues relating to potential impacts have been reviewed.

6.3 Site Establishment and Pre-Remedial Works

6.3.1 Site Establishment

Initial activities at the Site shall involve the establishment of all plant and equipment necessary for the remediation works. This shall include:

- Establishment of a Project Manager/Contractor's site office of temporary work sheds and amenities for Site workers;
- Establishment of a car parking area for Site workers and visitors to the Site; and,
- Establish the Site Environmental Monitoring Program.

Prior to the commencement of any earthmoving activities, it will also be necessary to install environmental protection safeguards, as well as Site security measures.

6.3.2 Site Pre-Works

To facilitate the excavation of potential contamination, the following Site preparation is required in the first week:

- Demolition of all existing structures on-site.
- Removal of overlying hardstand.
- Construction of bunded and hardstand Designated Treatment Areas (DTAs) to preclude run-off onto the surrounding Sites:

6.4 Remediation Works

The potential remedial works envisioned at the Site and in the following staging order are:

6.4.1 Designation of Material Reuse Consolidation Areas

A RAP would incorporate the **Reuse** of excavated materials if land use suitability has been demonstrated following excavation and classification. Prior to the performance of any remediation steps outlined below, the reuse consolidation areas will require designation:

1. Designation of proposed Potential Material Reuse Areas.
2. Excavation of soils within the marked areas to the depth of natural soils.
3. Classification and disposal of excavated spoil in accordance with *Waste Classification Guidelines* (NSW EPA 2014).

6.4.2 Remediation of Hotspot Contamination (if required)

For the purposes of a remediation strategy, the main activities to be undertaken during the remediation of contaminated 'hotspot' soils would include:

1. Delineation of excavation areas.
2. Excavation of identified gridded areas to the required depth.
3. Excavated materials will be relocated and consolidated at the DTAs within a separate area.
4. These soils will be sampled for waste classification purposes in accordance with *Waste Classification Guidelines* (NSW EPA 2014) and any NSW WorkCover requirements.

5. If waste characterisation results do not identify chemical contamination in exceedance of the Validation Criteria (refer to **Section 4.5.5**) to be present, the material may be deemed suitable for reuse on-site. These soils will be placed within designated material reuse areas.
6. If contaminants exist at concentrations unsuitable for the proposed land use, the material will be disposed of in accordance with the *Waste Classification Guidelines* (NSW EPA 2014).

6.4.3 Remediation of Identified USTs (if required)

If identified, the removal of USTs will be undertaken by a suitably licensed contractor in accordance with *Storage and Handling of Dangerous Goods Code of Practice 2005* and Australian Standard *AS4976-2008: The removal and disposal of underground petroleum storage tanks*.

6.4.4 Remediation of Identified Asbestos Contamination (if required)

If the Detailed Site Investigation at the property identifies visible asbestos fragments within surface soils onsite, the main activities to be undertaken during the remediation of these soils will include:

1. Hand-picking across the entirety of the Site will be required prior to commencement of earth works. Air Monitoring to be conducted during this process.
2. Hand-picked material will be appropriately bagged, weighed and disposed of to a landfill facility licensed to accept the asbestos waste.

If asbestos fragments are identified in sub-surface soils during the Stage 2 Investigation, they will be treated as a hotspot area and involve the following remediation steps:

1. Following demolition, the excavation area will be delineated by marking a 5m x 5m grid around the contaminated area.
2. Excavation of identified gridded area to the required depth.
3. Excavated materials to be relocated and consolidated at the DTAs within a separate area.
4. These soils will be classified and disposed of for waste characterisation purposes in accordance with *Waste Classification Guidelines* (NSW EPA 2014) and any WorkCover requirements.

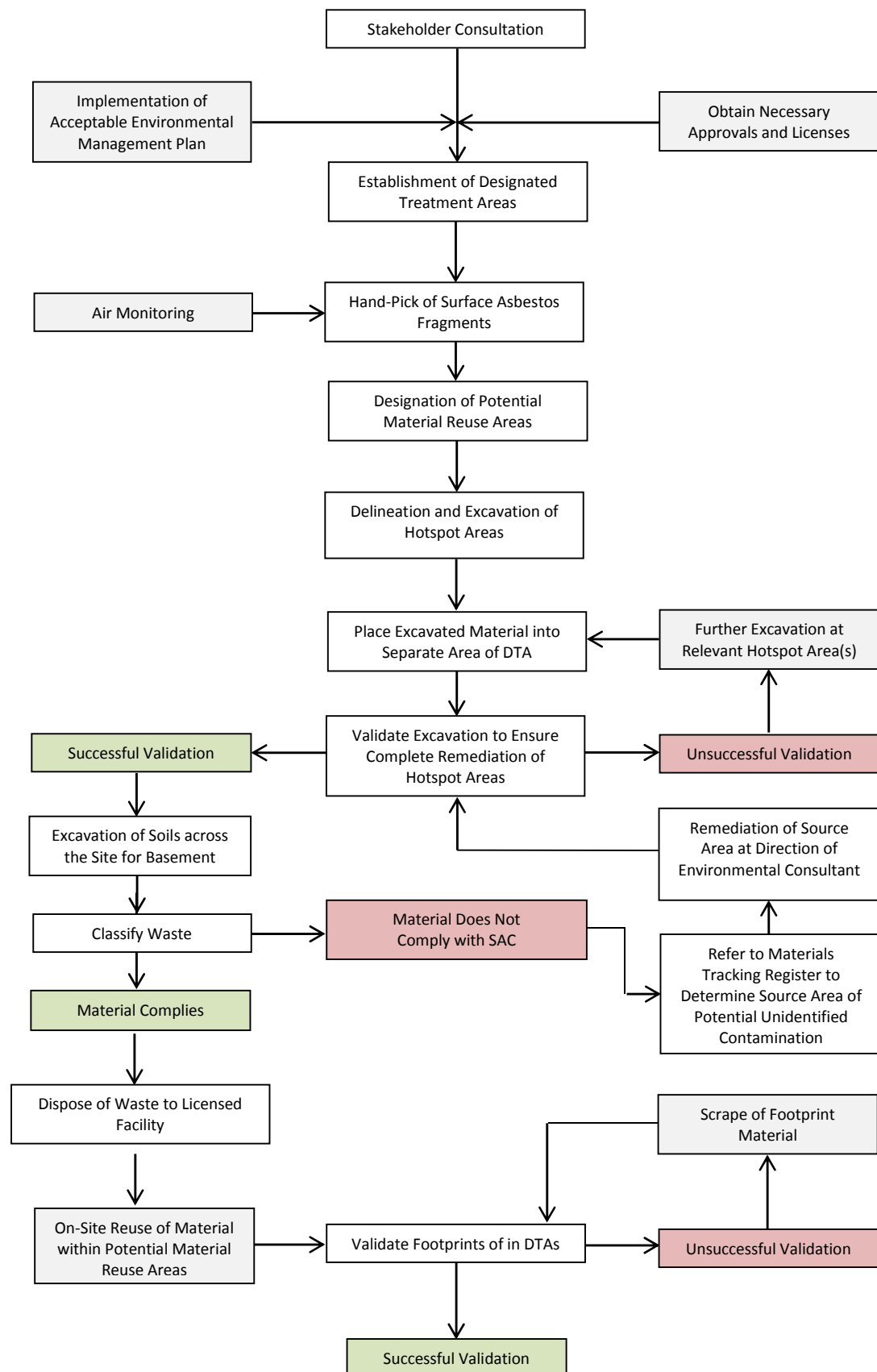
6.4.5 Remediation of Potential Unidentified Contamination

Given the extensive knowledge of the Redfern area and the historical usage of the Site for industrial and chemical purposes, DLA is of the opinion that it is probable that not all contamination at the Site has been identified and managed as per the above processes. As a conservative measure, DLA has developed the following remediation methodology:

1. To ensure remediation works can be tracked, each area requiring excavation will be recorded in a **Materials Tracking Register** which includes:
 - Unique identification name.
 - Time and date.
 - GPS location.
 - Material description.
 - Any other relevant comments.
2. All excavated material will be relocated and consolidated at the DTAs.
3. These soils will be sampled for waste classification purposes in accordance with *Waste Classification Guidelines* (NSW EPA 2014) and any NSW WorkCover requirements.
4. If waste characterisation results do not identify chemical contamination in exceedance of the Validation Criteria to be present, the material may be deemed suitable for reuse on-site. These soils will be placed within designated material reuse areas.
5. If contaminants exist at concentrations unsuitable for the proposed land use, the classified material will be disposed of to a suitably licenced landfill.

The observance of contamination unsuitable for future land use during waste classification may indicate that a potential for unidentified contamination exists on the Site. The preparation and completion of a diligent **Material Tracking Register** (as above) will enable identification of source areas of the observed contamination. These source areas will then undergo remediation at the direction of the Environmental Consultant and will be treated as hotspots for the purposes of this RAP. Given the urban locality of the Site, localised areas of elevated heavy metal concentrations may also be encountered.

A schematic of the **Remediation Process** is shown below:



6.5 Validation Plan

6.5.1 Validation Procedure

A visual clearance would be performed by the Environmental Consultant following the hand-pick of the Site for surface asbestos fragments. The inspection will consist of a DLA hygienist walking slowly in 20m systematic transects across the hand-picked areas. Once this is completed, the hygienist will then reinspect the area with a 90° direction change to enable a representative inspection. If asbestos fragments are identified during the inspection, hand-picking will be carried out again at the impacted area followed by inspection in a similar fashion as described above.

The Validation of any hotspot areas and UST removal would be performed by way of visual inspection and soil sampling. Validation sample collection should include soil samples from the excavation walls and from the base of the excavation, to be analysed for the Contaminants of Concern. Sample numbers and analysis will be dependent on the area and a review of initial assessment data to conform to Australian Standards 4482.1 and 4482.2 and EPA NSW Contaminated Sites: *Sampling Design Guidelines* (EPA, 1995).

The Validation of the DTAs will be conducted in a similar manner to that described above. Where excavations have been identified to contain potential unidentified contamination, validation will consist of soil sampling and visual inspection as above at the direction of the Environmental Consultant.

6.5.2 Validation Criteria

The investigation will be undertaken in consideration of the following documents:

- Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites (NSW OEH, 2011);
- Contaminated Sites: Guidelines for the NSW Site Auditor Scheme, 2nd Edition (NSW EPA, 2006);
- National Environment Protection (Assessment of Site Contamination) Amendment Measure 2013 (No.1) (NEPC, 2013);
- Contaminated Sites: Guidelines on Duty to Report Contamination under the Contamination Land Management Act 1997 (NSW DECC, 2009);
- Guidelines for the Assessment of On-Site Containment of Contaminated Soil (ANZECC, 1999);

- Australia and New Zealand Guidelines for Fresh and Marine Water Quality, ANZECC 2000;
- Australian Drinking Water Guidelines, National Water Quality Management Strategy 2011.

The Validation Criteria for the acceptable concentrations of contaminants at the Site have been derived from the *National Environment Protection (Assessment of Site Contamination) Amendment Measure 2013 (No.1)* (NEPM 2013) Table 1A(1) Column Residential B – *Residential with minimal opportunities for soil access*. The criteria are provided in **Tables 7-11**.

Table 7 – Criteria for Soils (mg/kg)

Analytes	Residential B ¹
Arsenic	500
Cadmium	150
Chromium	500
Copper	30000
Lead	1200
Mercury	120
Nickel	1200
Zinc	60000
BaP TEQ	4
Total PAHs	400
PCB	1
Pesticides:	
(Aldrin/Dieldrin)	10
Chlordane	90
DDT+DDE+DDD	600
Asbestos:	
Bonded ACM²	0.04%
FA³ / AF⁴	0.001%
Surface Asbestos (0.1m)	No Visible
Aesthetic:	No Odours
Upper 1m of soil	No Staining
	<5% Anthropogenic Material

- 1 – Criteria adopted for proposed residential areas of the Site –NEPM 2013 Table 1A(1) and Table 7.
- 2 – Bonded ACM (bonded Asbestos) - asbestos-containing-material which is in sound condition and where the asbestos is bound in a matrix such as cement or resin (e.g. asbestos fencing and vinyl tiles). Bonded ACM refers to, in this instance, material that cannot pass a 7 mm x 7 mm sieve.
- 3 – Fibrous Asbestos - friable asbestos material and includes severely weathered cement sheet, insulation products and woven asbestos material. This material is in a degraded condition such that it can be broken or crumbled by hand pressure.
- 4 – Asbestos Fines - AF includes free fibres, small fibre bundles and also small fragments of bonded ACM that pass through a 7 mm x 7 mm sieve.

Table 8 – Criteria for Total Recoverable Hydrocarbons (mg/kg)

Analytes	HSL-A ¹ (Sand) 0-1.0m	HSL-A ² (Sand) 1-<2.0m
Benzene	0.5	0.5
Toluene	160	220
Ethylbenzene	55	NL
Xylenes	40	60
F1: C₆-C₁₀	45	70
F2: C₁₀-C₁₆	110	240
F3: C₁₆-C₃₄	N/A	N/A
F4: C₃₄-C₄₀	N/A	N/A

NL = Not Limiting (i.e. the soil vapour concentration for a petroleum mixture could not exceed a level that would result in the maximum allowable vapour risk for the given scenario).

N/A = Not applicable as F3 and F4 are non-volatile and hence are not of concern for vapour intrusion.

1 – NEPM 2013 Amendment *Table 1A(3) – Soil HSLs for vapour intrusion – 0-1.0m*

2 – NEPM 2013 Amendment *Table 1A(3) – Soil HSLs for vapour intrusion – 1-<2.0m*

Table 9 – Criteria for Total Recoverable Hydrocarbons (ESL and ML)

Analytes	Ecological Screening Limits ¹ (Coarse*)	Management Limits ² (Coarse*)
Benzene	10	--
Toluene	10	--
Ethylbenzene	1.5	--
Xylenes	10	--
F1: C₆-C₁₀	0.7	700
F2: C₁₀-C₁₆	180	1000
F3: C₁₆-C₃₄	120	2500
F4: C₃₄-C₄₀	300	10000

* 'Coarse refers to the soil texture grading as per NEPM 1999.

1 – NEPM 2013 Amendment *Table 1B(6)* – ESLs for TPH fractions, BTEX and benzo(a)pyrene in soil.

2 – NEPM 2013 Amendment *Table 1B(7)* – Management Limits for TPH fractions F1-F4 in soil

Table 10 – Criteria for Groundwater

Analytes	Service Station Guidelines	NEPM 2013 Fresh Water (µg/L)	NHMRC Drinking Water Guidelines 2011 (µg/L)
Benzene	300	700	1
Toluene	300	--	800
Ethylbenzene	80	80	300
M+P-Xylene	--	75	600
Total Xylene	380	--	
TRH: C10 - C40	600 ¹	7 ²	ID
Arsenic (III)	--	24	--
Arsenic (V)	--	13	7
Cadmium	--	0.2	2
Chromium (III)	--	--	--
Chromium (VI)	--	1	50
Copper	--	1.4	2000
Lead	5	3.4	10
Mercury	--	0.6	1
Nickel	--	11	20
Zinc	--	8	3000 ³
PAH's	--	--	
Napthalene	--	16	
Anthracene	--	0.4*	ID
Phenanthrene	--	2*	
Fluoranthene	--	1.4*	
B(a)P	--	0.2*	0.01
PCB (Total)	--	1-0.001	0.05
Phenolics	--	320	ID

ID=Insufficient Data

- * Low reliability trigger values are provided where possible as an indicative guideline only in the absence of a high reliability 95% value.
- 1 – The NSW EPA Guidelines for Assessing Service Station sites and the ANZECC water quality Guidelines do not provide any reference for TRH levels in groundwater. In the absence of accepted criteria, the Dutch Intervention guidelines have been referenced as a guide only. The Dutch guidelines do not provide criteria for the C6-C9 hydrocarbon fractions, but provide values for mineral oil hydrocarbons (C10-C36 chain). The Dutch Intervention guideline for mineral oil is 600µg/litre. This guideline is health based rather than ecosystem based.
- 2 – The ANZECC threshold criteria of 7µg/L is a low reliability trigger level for protection of aquatic ecosystems and is derived from a study on the effects of petroleum hydrocarbons on tropical marine organisms. This level has not been adopted as it is below the most sensitive detection level of the laboratory.
- 3 – The NHMRC drinking water guideline for Zinc is an aesthetic guideline based on taste rather than risk to human health.

Table 11 – Acid Sulfate Soil Action Criteria¹

Texture	Approx. Clay Content	Sulphur Trail S _{pos} %	Acid Trail TPA Mol H ⁺ /tonne
Coarse Texture	<5.0%	0.03	18

- 1 – Acid Sulfate Soils Assessment Guidelines (NSW ASSMAC August 1998) – Table 4.4: 1-1000 Tonnes Disturbed.

6.5.3 Application of Criteria

Validation for chemically tested soils will be determined when concentrations are reported below the criteria, thereby not posing an unacceptable risk. For chemical analysis, the following statistical criteria shall be adopted with respect to the health-based criteria:

- The 95% Upper Confidence Limit (UCL) of the arithmetic mean for chemical contaminants does not exceed the Validation Criteria;
- The individual contaminant concentration should not exceed the Validation Criteria by more than 250%; and,
- The standard deviation of individual contaminants should not exceed 50% of the Validation Criteria.

6.5.4 Validation Report

At the completion of the management and remediation works, a Validation Report documenting the works as completed will be prepared. The Validation Report will describe the strategic works undertaken at the Site, assess the result of the validation testing, demonstrate that the objectives of the RAP have been achieved and provide justifications for any deviation, statistically confirm that the managed site complies with the Validation Criteria and include any other information as deemed appropriate.

6.5.5 Quality Control

The Quality Assurance (QA) program for the Site will ensure the representativeness and integrity of samples and accuracy and reliability of the analysis results. This includes cleaning of tools before and between sampling, cleaning of containers and delivery of samples to the laboratory within holding times, and in good condition.

The Quality Control (QC) program for the Site will monitor and measure the effectiveness of the QA procedures. This will involve the use of field duplicates, inter and intra laboratory checks, trip blanks, rinsate checks, trip spikes, surrogate spikes, and the use of laboratory internal standards. Duplicate samples will be collected to verify the QA/QC of the soil samples collected at a frequency of 1/10 (10%) intra-laboratory, and 1/20 (5%) inter-laboratory. The samples will be transported in a chilled and security sealed esky to a NATA registered laboratory and analysed for Contaminants of Concern.

6.6 Remediation Contingency

If there are events or unexpected finds made at the Site that would prevent the proposed works complying with the Validation Criteria, or if the selected management strategy is not able to proceed, then the following contingencies are devised and should be discussed with the Site Auditor prior to implementation:

Excavation does not effectively remove all buried / contaminated material

- | | |
|-----------------|---|
| <i>Option A</i> | Continue controlled excavation until validation is achieved. |
| <i>Option B</i> | Reassessment of remedial options for excavated materials, including the feasibility of the Capping and Contain remedial strategy. |

7.0 CONCLUSION

The Site can be made suitable for the intended land-use through remedial action if contamination is identified as part of the redevelopment works in accordance with *State Environmental Planning Policy No.55 Managing Land Contamination: Planning Guidelines SEPP 55*.

In conclusion this Provisional RAP:

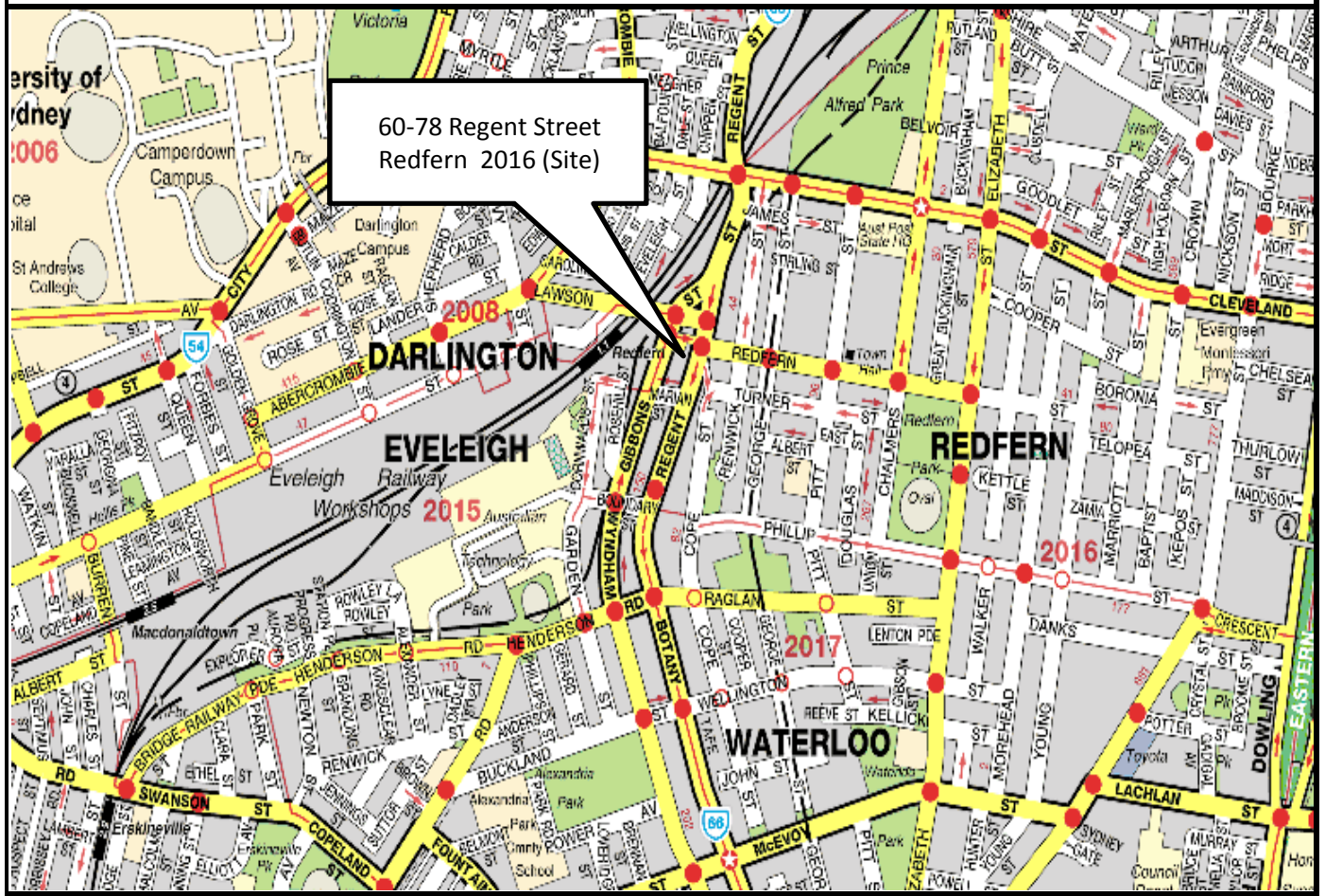
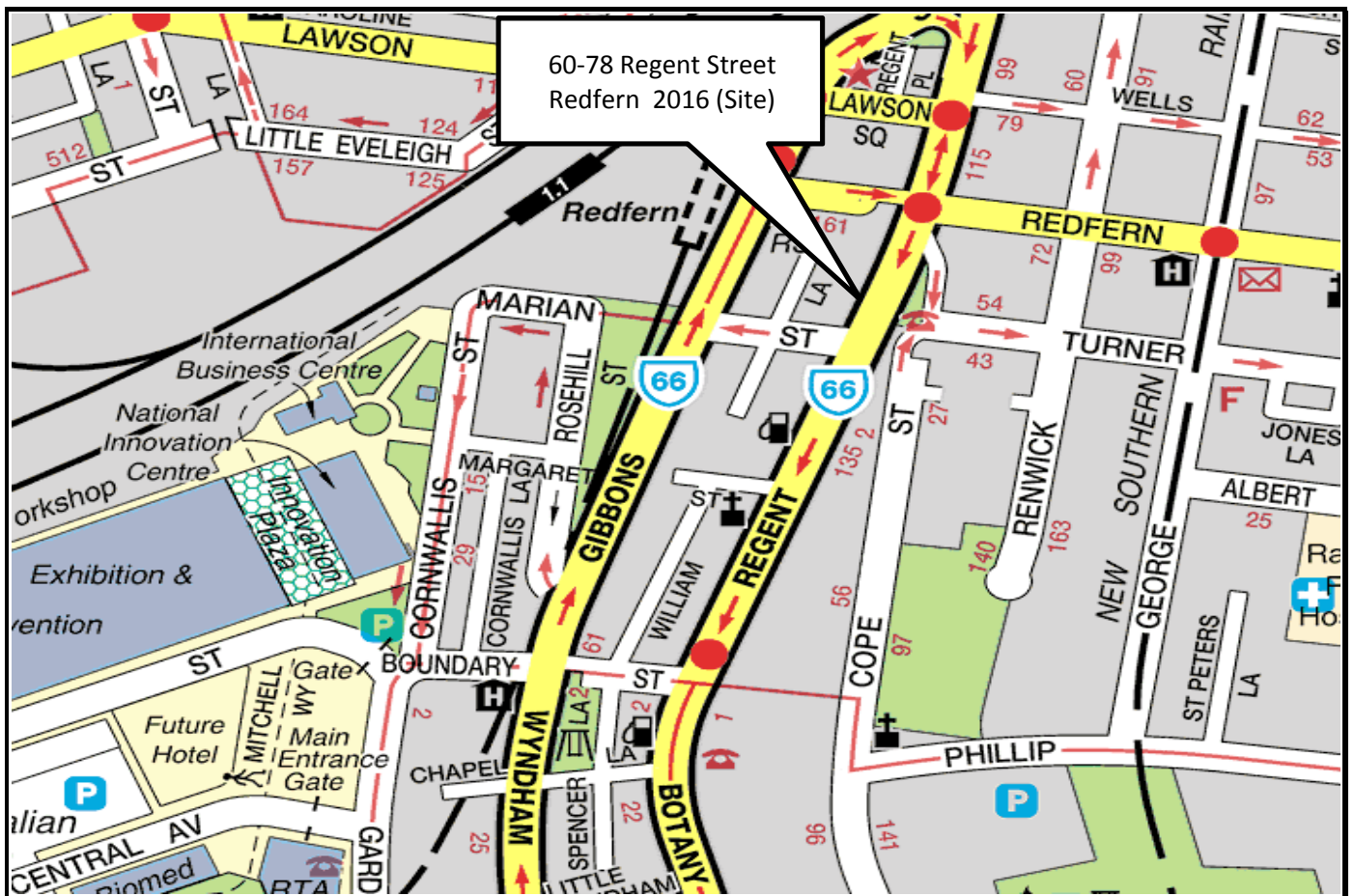
- Has been developed in a manner consistent with current industry practice;
- Has outlined potential remediation strategies (if required) based on site-specific issues and currently available technologies;
- Has outlined the means of validation for the completed works.

8.0 REFERENCES

- Australian and New Zealand Guidelines for the Management of Contaminated Sites, 1992, Australian and New Zealand Environment and Conservation Council and National Health and Medical Research Council (ANZECC/NHMRC 1992).
- Guidelines for the Assessment of On-Site Containment of Contaminated Soil (ANZECC, 1999);
- Australia and New Zealand Guidelines for Fresh and Marine Water Quality, ANZECC 2000;
- Australian Drinking Water Guidelines, National Water Quality Management Strategy 2011;
- National Environment Protection (Assessment of Site Contamination) Measure (NEPM) (NEPC, 1999 as amended 2013);
- Health - Based Soil Investigation Levels, 1998, Imray, P & Langley, A, National Environmental Health Forum Monographs, Soil Series No. 2 (2nd Ed), South Australian Health Commission (NEHF 1998b).
- Contaminated Sites: Sampling Design Guidelines 1995, NSW Environment Protection Authority (NSW EPA 1995).
- Contaminated Sites: Guidelines on Duty to Report Contamination under the Contamination Land Management Act 1997 (NSW DECC, 2009);
- Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites, 1998, NSW Environment Protection Authority (NSW EPA 1998).
- Contaminated Sites: Guidelines for the NSW Site Auditor Scheme, 2nd Edition, 2006,
- Contaminated Sites: Guidelines for the Assessment and Management of Groundwater Contamination (NSW DEC 2007).
- National Environment Protection (Assessment of Site Contamination) Amendment Measure 2013 (NEPM).
- Contaminated Sites: Guidelines on Significant risk of Harm from Contaminated land and the Duty to Report, 1999, NSW Environment Protection Authority (NSW EPA 1999).
- Managing Land Contamination: Planning Guidelines, SEPP 55 - Remediation of Land (1998), Department of Urban Affairs and Planning/ NSW EPA.
- Contaminated Land Management Act (1997), NSW Government, Sydney, NSW.
- Waste Classification Guidelines, NSW EPA 2014;
- Environmental Guidelines: Solid Waste Landfills (1996) NSW EPA.
- Managing Land Contamination, Planning guidelines, SEPP 55: Remediation of Land (DUAP, 1998); and,
- Code of Practice for the Safe Removal of Asbestos, 2nd Edition (NOHSC, 2005).

Figure 1

Site Location




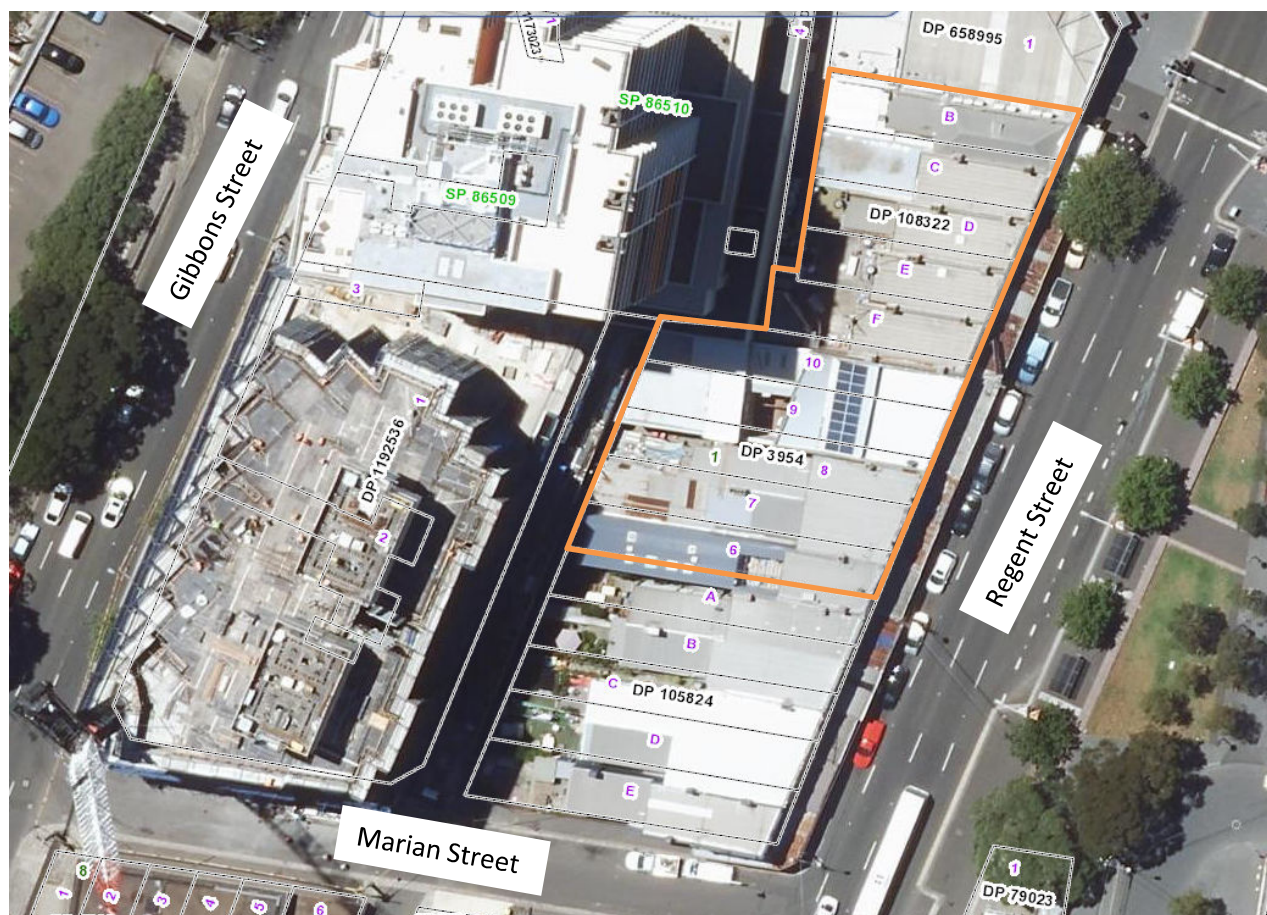
 Unit 2b/30 Leighton Place Hornsby, NSW 2077	DESIGNED: DLA	SITE LOCATION	
	COMPILED: JB	CLIENT: Iglu Pty Limited	DRAWING: 8/08/2014
	PROJ. No. DL3372	LOCATION: 60-78 Regent Street Redfern 2016 NSW	FIGURE: 1

Figure 2

Site Layout



Legend

— Site Boundary



Sydney
Unit 2B/30 Leighton Place
Hornsby NSW 2077
Tel: 02-94761765
Fax: 02-94761557

Maitland
42B Church Street
Maitland NSW 2335
Tel: 02-49330001

Title: Site Layout – 60-78 Regent Street

Figure: 2

Project no.:
DL3372

Date: 8.08.2014

Revision: 0