

1 May 2009

Our Ref: AS121018

Parkview
c/o Karie Bradfield
APP Corporation
Level 6, 53 Berry Street, North Sydney 2060

Dear Karie

Re: Change in Land Use - Former Sunbeam Factory Known as Clempton Park

1 Introduction

As a NSW EPA-Accredited Contaminated Sites Auditor, I undertook a site contamination audit relating to the former Sunbeam Factory at 60 Charlotte Street Campsie (Lot 1 of DP721721 and Lot A DP431356) in 2005.

The 2005 Audit addressed the requirements of a Voluntary Remediation Agreement. Including the suitability of the site for its then current and approved commercial/industrial. It was concluded that residual contamination remaining in-situ would not pose an unacceptable risk to site occupiers or the environment under the existing conditions.

The site layout is shown on Attachment 1. The water tank, pump house and associated hard stand are known to be located over soil containing tetra chloroethene (TCE) and other volatile chlorinated hydrocarbons (VHCs) that could pose a risk to human health under future land use scenarios. Some residual contamination remains following remedial works conducted to address TCE and other VHCs in soil and groundwater in the main excavation area and the former oil-water separator area. There may also be currently unknown residual contamination, for example associated with pipework or former processes such as machining, under the existing concrete surfacing. Further investigation was not considered warranted while the existing buildings remained in place and the residual contamination did not pose a risk.

The site is owned by Parkview Sydney Developments Pty Ltd (Parkview). A master plan for future development of the 5.5 hectare (approximately) site, known as Clempton Park, includes commercial/industrial, residential and potentially some open space uses. Currently, a large warehouse with a complex layout covers the majority of the site. The purpose of this current letter is to discuss contamination issues which may need to be addressed to ensure that the site is suitable for use following the proposed redevelopment.

The current and now disused manufacturing facility was erected in 1954 for the production of consumer items such as irons, frypans and lawnmowers through the use of a number of operations including heat treatment, casting, plating, machining, moulding, finishing and assembly. The main contaminants of concern relate to these operations including the storage and use of chemicals including TCE for degreasing purposes, cutting and lubricating oils and fuels for operating the machinery (petroleum hydrocarbons) and other production specific chemicals such as heavy metals and cyanide. Other potential sources of contamination included fill of unknown source and asbestos which had been used as lagging on pipework.

2 Environmental Quality Criteria

Remediation criteria were previously derived by URS Australia (URS) for the commercial/industrial uses and the existing configuration of the site. The results were reviewed in references to these 'adopted criteria' in the 2005 audit. In this letter they are referred to as the "previous criteria".

Appropriate environmental quality criteria for the proposed development will depend on the land use scenarios proposed. Given that there are no EPA-endorsed criteria for TCE which is the main contaminant of concern and which is volatile, it is likely that assessment of risk would be required to assess site suitability. Where residential or open space uses are proposed, odours and aesthetics will also need to be considered.

Groundwater was remediated to a clean up objective of 10mg/L. This was based on not exceeding ANZECC water quality guidelines at the site boundary, and not presenting a risk to site users under the current and approved site use.

3 Evaluation of Soil Analytical Results

Investigations have been conducted by various consultants including IT Environmental (ITE), URS and Coffey Geosciences (Coffey). The main areas of potential concern in site redevelopment, based on the site history, investigations and conditions following remediation, include the north-east water tank, residual contamination following remedial works and potential impacts from former manufacturing processes.

3.1 Water Tank and Pump Shed

A large water tank which is part of the fire safety system and the associated pump shed are located in the north-west at the western boundary of the site. The pump shed and water tank are linked by a number of pipes and the surrounding area is surfaced with concrete. The site history indicates that concrete sumps for waste oil, lubricants and possibly TCE were previously located in this area.

Shallow soil, generally less than 0.5 m, encountered east of the pump house and water tank were 'heavily stained' with petroleum hydrocarbons. The soil reported TCE (maximum of 1,489 mg/kg) contamination, potentially indicating the presence of free phase TCE. The soil was targeted for remediation, known as the 'water tank excavation'. The extent of the remediation was restricted by the pump shed, water tank and the adjacent warehouse building.

The near surface soil at the edge of the water tank and pump shed was targeted during investigations. The results are tabulated in Table 3.1.

**Table 3.1 – Soil Analytical Results Residual Investigation at Water Tank Area
- Summary Table (mg/kg)**

Analyte	n	Detections	Maximum	n > previous criteria
Trichloroethene (TCE)	32	21	100	1
11 Dichloroethene	32	1	0.7	1
cis-1,2 Dichloroethene	32	17	110	16
Vinyl chloride(11 with PQL of 0.4)	32	7	21	7
Tetrachloroethene	32	3	3	0
All other VHCs	32	0	-	0
TPH C6-C9	26	17	313	3
TPH C10-C36	26	15	32,010	1
Benzene	26	0	-	0
Toluene	26	6	18	0
Ethylbenzene	26	11	15	0
Xylene	26	11	48	1

Hydrocarbon odours, elevated PID readings (>50ppm) and black staining were noted directly under the concrete slab within the vicinity of the pump house and north of the water tank and the eastern validation wall. VHCs were generally detected in association with these field observations. Coffey estimate the impacted area to be approximately 200 m3.

Particularly strong odours and staining were noted in between the pump house and the water tank which coincide with elevated concentrations of TCE, vinyl chloride, other VHCs and petroleum hydrocarbons. The exceedences of criteria were limited to four soil samples collected within 3 m of each other between the water tank and the pump house. The contaminants exceeding the criteria were not consistent, ie. TPH C10-C36 was reported at 32,000 mg/kg in only one sample, TCE was detected at 100 mg/kg in another sample and vinyl chloride was detected at approximately 20 mg/kg within two other samples. 11 DCE, cis 1,2 DCE, PCE, xylene and TPH C6-C9 were also detected at concentrations above the clean-up criteria.

An oily sheen was noted over ponded water in a test pit which Coffey attribute to TPH C10-C36 in near surface soil. The test pit depth was 0.5 m so was not in contact with groundwater. TPH C10-C36 was also detected in groundwater adjacent to the water tank area at a maximum of 21 mg/L although was not detected above PQLs down-gradient of the site.

Coffey note that contamination could potentially extend beneath the water tank. Further south of the water tank, within the warehouse, TCE impact (0.6 mg/kg) is limited to soil at the water table.

No other VHCs were detected above the PQLs. Some minor cis 1,2 DCE concentrations were detected to the immediate south at a maximum concentration of 4.5 mg/kg at 0.2 m that decreased to below criteria by 0.4 m. The adjacent soil only reported cis 1,2 DCE at 1.4 mg/kg at 0.3 m.

The results indicate that the previous storage of TCE, including the concrete sumps, have resulted in some surface TCE impact to soil in the vicinity of the water tank. Demolition of the water tank and the pump house was unlikely in the near future as it was an 'integral part of the site fire management system'.

The Auditor considers that while the pump shed, water tank and the associated infrastructure remain at the site, there is a low risk to human health either in a commercial/industrial context or with nearby residential development. Should these structures be demolished, remediation works would be required to address the risk to human health. Further works including soil validation sampling would be required to confirm the extent and magnitude of the impact under the tanks and the associated pump shed.

Excavations were undertaken in the vicinity of the water tank and pump shed, known as the Water Tank Excavation, to remove the adjacent VHC impacted soil materials. VHC and TPH impacted soil were removed using visual indications as well as PID screening. The excavations were extended to 2.5 m over the northern end and to 'the full depth' over the southern end. Validation samples used to confirm the visual observations are summarised as Table 3.2.

Table 3.2 – Soil Analytical Results Validation of Water Tank Excavation - Summary Table (mg/kg)				
Analyte	n	Detections	Maximum	n > previous criteria
Trichloroethene (TCE)	34	8	14	0
11 Dichloroethene	34	0	-	0
cis-1,2 Dichloroethene	34	2	2	0
Vinyl chloride	34	0	-	0
Tetrachloroethene	34	0	-	0
All other VHCs	34	0	-	0
TPH C6-C9	34	6	35	0
TPH C10-C36	34	0	-	0
Benzene	34	0	-	0
Toluene	34	0	-	0
Ethylbenzene	34	0	-	0
Xylene	34	1	0.5	0

Buried fragments of fibro cement sheeting (5-10 cm) were encountered in shallow fill (0.5 m) at the western end of the excavation adjacent to the water tank and pump shed structures. Envirotech Australia Pty Ltd undertook a site walkover and indicated that visible and accessible asbestos-cement sheeting debris was excavated and removed to a satisfactory standard and no asbestos was detected in the samples.

Coffey concluded that 'the water tank excavation has been adequately remediated and validated, with respect to soil/shale' with the exception of the area immediately adjacent to the water tank and pump shed'.

The Auditor concluded that no further soil or groundwater investigations in this area are required. This was in reference to the current and approved commercial/industrial use. For different commercial uses in terms of potential exposure and for residential uses, an assessment of the potential risk would be required.

Further works to address the potential for fibro cement sheeting remaining under the pump house will be required if it is demolished.

3.2 Main Excavation Area in North West

Investigations indicated that soil in the north-west section of the site extending under the warehouse building to the south-east had been impacted by elevated concentrations of VHCs, particularly TCE. The source was possible leaks and/or spills from the storage of TCE in ASTs and USTs.

Remediation included an excavation which extended up to and beyond Troy Lane to the north, up to the water tank excavation in the west and up to the main warehouse building to the south. Excavations were mostly extended past the estimated extent of source contamination to the pre-determined 10 mg/L contour line for remediation of the groundwater plume. Excavations generally continued until TCE impacted soil, including free phase product, had been removed using visual indications as well as PID screening.

All VHC and petroleum hydrocarbon analytical results for the main excavation, excluding the southern boundary and a sewer line, were reported below the adopted site criteria as summarised in Table 3.3.

Table 3.3 – Soil Analytical Results Validation of Main Area Excavation - Summary Table (mg/kg)				
Analyte	n	Detections	Maximum	n > adopted criteria
Trichloroethene (TCE)	122	15	14	0
1,1 Dichloroethene	122	0	-	0
cis-1,2 Dichloroethene	122	0	-	0
Vinyl chloride	122	0	-	0
Tetrachloroethene	122	0	-	0
All other VHCs	122	0	-	0
TPH C6-C9	122	7	37	0

Table 3.3 – Soil Analytical Results Validation of Main Area Excavation - Summary Table (mg/kg)

Analyte	n	Detections	Maximum	n > adopted criteria
TPH C10-C36	122	2	274	0
Benzene	122	0	-	0
Toluene	122	0	-	0
Ethylbenzene	122	1	0.3	0
Xylene	122	1	1.1	0

The Auditor considers that the main excavation area has been adequately validated, apart from the southern extent discussed below, and that no further assessment is required for changed land use.

3.2.1 Southern extent at warehouse

An elevated PID reading of 1855 ppm and TCE concentrations of 55 mg/kg and 14 mg/kg at 4.5 m bgl were reported at the southern extent of the main excavation. Coffey note that these results may represent a second source of TCE that potentially migrated to depth at a concrete footing where TCE impacted soil had been encountered during remediation works. The Auditor noted that the intra-laboratory duplicates reported TCE at only 19 mg/kg as compared to the primary result of 55 mg/kg. The lower result is more in line with concentrations detected at this southern boundary.

Further soil sampling was undertaken during installation of additional wells within the warehouse building to determine the likely extent of impacted soil immediately south of the excavation. The soil results are summarised in Table 3.4.

Table 3.4 - Evaluation of Soil Analytical Results Investigation South of Main Excavation - Summary Table (mg/kg)

Analyte	n	Detections	Maximum	n > previous criteria
Trichloroethene (TCE)	12	3	55	1
All other VHCs	12	0	-	0
TPH C6-C9	12	0	-	0
TPH C10-C36	12	0	-	0
BTEX	12	0	-	0

Coffey conclude that the results suggest 'with the possible exception of some localised hotspots, that significant soil contamination is not remaining beneath the warehouse in the two areas where TCE has been left in place'.

The Auditor concludes that while the results indicate that some TCE impact to soil has occurred from TCE impacted groundwater, the extent and magnitude is likely to be limited.

Given this, the Auditor considered that no further investigations were required to delineate the impact to soil at the southern extent while the buildings remain in place.

For different commercial uses in terms of potential exposure and for residential uses, an assessment of the potential risk would be required.

3.2.2 Sewer Pipe

A sewer pipe was located at 2 m depth across the northern side of the main excavation. Visual observations indicate that original backfill materials along the pipe and at the points of entry and exit to the excavation were impacted by TCE indicating a potential preferential pathway. This pipe and the associated backfill materials have since been removed from the main excavation and the exit points sealed. Validation sampling at the western end reported only minor TCE impact of 12 mg/kg in the sewer backfill. Validation sampling at the eastern end was restricted as the pipe extended under an existing building. To validate the materials, a test pit was excavated approximately 1.6 m east of the excavation in the backfill materials. TCE was detected at 0.8 mg/kg indicating that only a limited amount of impacted backfill material was retained beneath the building between the sampling location and the excavation edge.

The Auditor considers that TCE impacted backfill materials associated with the sewer pipe in this area have been adequately characterised and that only a minor amount of impacted material was retained. No further assessment is required for changed land use.

3.2.3 Overburden Material

Validation sampling of the 'uncontaminated' overburden material removed during remedial excavations was undertaken prior to use as backfill at the site at a rate of 1 per 200 m³. Given that the soil was screened visually and with a PID during excavations, the density is considered to be appropriate. Approximately 1200m³ was stockpiled temporarily prior to use on site. Samples were submitted for VHC and BTEX analysis. Only one of the four samples reported TCE above the detection limit at 2.5 mg/kg. This sample was submitted for TCLP analysis, where TCE was not detected above the PQLs. These results in conjunction with visual and olfactory observations and low PID readings indicate that there has been minimal VHC impact to the overburden materials.

The Auditor concludes that the materials have been adequately characterised and further assessment is not required for changed land use.

3.2.4 Landfarmed Material

Soil excavated for groundwater plume remediation was landfarmed in the south eastern car park area. The landfarmed plume materials were validated prior to reuse within the main excavation. The results are summarised in Table 3.5.

Table 3.5 -Total, TCLP and Drum Validation Analytical Results Validation Landfarmed Material Summary Table

Analyte	Maximum Total Conc. (mg/kg)	Maximum TCLP Conc. (mg/L)	Maximum Drum Leach Conc. (mg/L)
Trichloroethene (TCE)	4.3	0.045	0.021
Other VHCs	<PQL	<PQL	<PQL
TPH C6-C9	7	<PQL	<PQL
TPH C10-C36	<PQL	<PQL	<PQL
BTEX	<PQL	<PQL	<PQL

Coffey concluded that TCLP and drum validation results indicate that there is a low likelihood that plume material will leach once used as backfill materials and that the material has 'been adequately remediated and validated and are suitable for reuse as backfill material on the site'. The Auditor agreed that there is a low risk of significant leaching of TCE from the material.

Following the use of the landfarmed plume material to backfill the main excavation, three soil gas monitoring wells were installed. Samples were submitted for VHC and BTEX analysis. The results are summarised in Table 3.6.

Table 3.6 - Evaluation of Soil Gas Analytical Results Validation of Backfilled Landfarmed Material Summary Table (mg/m³)

Analyte	n	Detections	Maximum
Trichloroethene (TCE)	3	3	0.04
Dichloromethane	3	3	0.003
1,1 Dichloroethene	3	3	0.002
1,2 Dichloroethene	3	3	0.001
Vinyl chloride	3	3	0.002
Tetrachloroethene	3	1	0.001
Chloroform	3	3	0.03
1,1,2 – Trichloroethane	3	1	0.001
All other VHCs	3	0	-
Benzene	3	0	-
Toluene	3	3	0.007
Ethylbenzene	3	0	-
Xylene	3	0	-

Coffey performed an assessment of risks from the soil gas emissions based on various assumed exposure and toxicity parameters for long term and maintenance workers.

The Auditor considered that the results may be under-reported by 65% as a result of the use of Tedlar bags, but in considering total concentrations obtained during validation and PID screening that there is little risk to human health from vapours from the landfarmed materials used as backfill.

The Auditor considered that the use of the validated landfarmed plume materials was in accordance with the remedial goals of the site. For different commercial uses in terms of potential exposure and for residential uses, an assessment of the potential risk would be required.

3.2.5 Imported Fill (Main Excavation)

Virgin Excavated Natural Material (VENM) and non VENM materials were imported to the site from five sources.

The approval process developed by Coffey included a review of previous reports, site inspections, provision of an approval letter with conditions where required, observation of each truck load by Coffey or the contractor. Coffey provided copies of previous reports, approval letters and a checklist for the imported materials.

Coffey concluded that the imported material had been adequately validated and is suitable to use on site. The Auditor concluded that imported VENM and non-VENM required no further assessment.

The Auditor concludes that the materials were adequately assessed and further assessment is not required for changed land use.

3.3 Former Oil Water Separator

Initial investigations in the area of the former oil water separator reported concentrations of TCE and associated TPH above the adopted criteria. Remedial works included three separate excavations, referred to as the 'Main OWS Excavation', 'OWS5' and 'slot', were excavated within the boundaries of the surrounding walls by chasing elevated PID readings and visual and olfactory evidence rather than to pre-determined validation points.

A summary of VHCs and petroleum hydrocarbons remaining after remediation is shown in Table 3.7.

Table 3.7 - Soil Analytical Results Validation of Oil-Water Separator Excavation Summary Table (mg/kg)				
Analyte	n	Detections	Maximum	n > previous criteria
Trichloroethene (TCE)	61	33	306	12
11 Dichloroethene	61	0	-	0
cis-1,2 Dichloroethene	61	1	0.5	0
Vinyl chloride	61	0	-	0 (PQL > criteria)

**Table 3.7 - Soil Analytical Results Validation of Oil-Water Separator
Excavation Summary Table (mg/kg)**

Analyte	n	Detections	Maximum	n > previous criteria
Tetrachloroethene (PCE)	61	4	15	3
All other VHCs	61	0	-	0
TPH C6-C9	34	13	317	5
TPH C10-C36	34	6	3,138	0
Benzene	34	0	-	0
Toluene	34	1	0.3	0
Ethylbenzene	34	3	0.8	0
Xylene	34	4	3.6	0

These results indicate that there has been impact to soil that has been retained at the site. Coffey consider that the source of the TCE impact could include the oil water separator in the courtyard, the associated pipework and the stormwater pipes due to past practices of disposing of wastes to stormwater.

TCE impact appears to extend within weathered shale along the western boundary of the Basement Area with some evidence of migration under the fire wall area. The horizontal extent appears to be limited with concentrations shown to decrease to the west of the fire wall to less than the PQL. While no validation samples were collected to the north, Coffey traced the pipe to the light well room and therefore indicate that the source of TCE impact is limited. TCE impact also extends south to the outdoor courtyard. Staining and moderate to strong hydrocarbon/TCE odours and high PID readings were noted in these locations. Nine of the twelve failed validation samples, which were generally reported above 88 mg/kg, were detected in this area. TCE was not detected above the PQLs in validation samples collected to the east and south of the impacted areas.

TCE impacted soil has also been retained in the main OWS excavation to the north-east and south-east of the concrete drainage pipe. TCE was reported at a maximum of 188 mg/kg coinciding with a PID reading of 1,800 mg/kg at 1.5 m bgl.

PCE was only detected in this main excavation in association with particularly elevated concentrations of TCE. PCE concentrations were only reported above the criteria where TCE validation samples also failed the criteria.

The slightly elevated concentrations of TPH C6-C9 were also detected in association with the elevated TCE concentrations.

The horizontal extent in this area is likely to be limited as TCE was not generally detected above the PQLs with a maximum of 22 mg/kg within test pits excavated to the south and north of the courtyard area. The vertical extent in these areas has not been defined.

Air sampling and risk assessment were conducted based on the residual contamination and current conditions. The foundation areas and the fire tunnel are not designed for or expected

to have regular or sustained periods of occupation and therefore the risk was considered to be low.

The vertical extent is not well defined with all nine failed validation samples collected at the base or close to the base of the excavations in weathered shale. There are no PID or validation results for the underlying materials as excavations were not continued. Residual material has been retained at the site along the western wall and surrounding areas and at the eastern end of the main excavation. The Auditor considers that the horizontal and vertical extent of impact is likely to be limited given the source of the impact and the tight shale previously encountered at depth.

The TCE impact is not trivial with high concentrations detected in soil. The main risk to human health is through inhalation of vapours indoors. The Auditor concluded that the soils and emissions were adequately characterised and that the risk to human health is low in the current commercial/industrial setting. Should the structure be demolished, remediation works would likely be required. Further works including soil sampling would be required to confirm the extent and magnitude of the impact.

3.4 Remainder of the Site

Further investigation is not warranted while the existing buildings are in place. Residual contamination may be present on site under the existing concrete surfacing, for example in association with pipework or sumps that were part of former processes such as machining. It is noted that some of the previous sampling was undertaken while the plant was still operational and boreholes were excavated in 'proximity' or 'near' the potentially contaminating activities.

Removal of current site surfacing should be conducted under an unexpected finds protocol. This would include inspection of all piping, sumps and subsurface structures, as well as observations for any indicators of contamination, such as discoloured or odorous soil or potential asbestos.

3.4.1 USTs/ASTs

During decommissioning of the facility seven underground storage tanks were removed from three areas of the site. Validation results are summarised below.

UST Area 1

Following pumping and removal of the tanks the 'grossly contaminated materials' were excavated until hydrocarbon staining, odours and PID readings indicated no residual impacted materials. The excavation extended to 4 m bgl. Groundwater was not encountered.

Of the 15 final validation samples submitted for analysis one sample reported TPH C10-C28 at 2,570 mg/kg in excess of the investigation criteria of 1,000 mg/kg. This sample was collected on the southern wall of the excavation, the depth of which was not provided. Only a low concentration of TPH was detected at the base of the excavation in the near vicinity. No sample descriptions or PID results were provided for the individual samples. This material could not be excavated further due to the presence of an underground water main. This indicates that the depth of the sample is likely to be approximately 2 m in depth.

URS indicated that 'the contaminated material generally showed no evidence of major residual contamination'. Given that TPH was only detected in one sample marginally above the criteria in one sample, the Auditor considers that the extent is likely to be limited and the risk to human health, low.

UST Area 2

Following removal of the tanks and the adjacent materials there were no visual indications of hydrocarbon impact and URS note that only low PID concentrations were obtained.

One of the eight validation samples reported TPH C10-C36 at 960 mg/kg below the criteria of 1,000 mg/kg. All others were not detected above the PQLs. URS indicate that it was not possible to excavate further at this location.

Only 20 m³ of material was excavated and TPH was not detected above PQLs within the one sample submitted for analysis. These materials were used to reinstate the excavation.

UST Area 3

Following removal of the tank there were no visual indications of hydrocarbon impacted materials. Excavated material did not exhibit any hydrocarbon impact.

All seven validation samples did not report contaminants above the PQLs.

The stockpiled excavated materials appeared free of contamination. TPH, BTEX and lead were not detected above the PQLs within the two samples submitted for analysis. These materials were used to reinstate the excavation.

Imported Fill

Imported fill materials were sampled at 1 in 100 m³. No documentation was supplied regarding the sources. While it is not ideal that the sources of the fill are unknown URS noted that the materials 'appeared typical of freshly ripped shales with no foreign objects or fill materials' and that they were homogenous. TPH, BTEX, PAH, OCP and OPPs were not detected above PQLs. Inorganics were all less than the SILs. The source of the imported fill is not known however the analytical results are consistent with the material description.

Conclusion

Given the lack of sample descriptions and PID readings and the elevated concentration of TPH at UST 1, inspections during site redevelopment should be conducted to confirm that residual impacts do not remain that would present a risk to human health. This could be managed under an unexpected finds protocol.

3.4.2 Asbestos

Lagging of pipes, roof sheeting and some matting are understood to have been addressed by removal or sealing. In 2002 it was noted by HLA to be in poor condition and HLA noted that asbestos contamination of ground surfaces had occurred in the vicinity of the damaged material in foundation spaces on the north and west sides of the basement level, the exact location of which was not specified. HLA recommended that the asbestos contamination be

removed from the ground surfaces of the foundation areas and the source be repaired or re-sheathed.

It is understood that asbestos removal works have been undertaken, but no further information has been provided to the Auditor regarding this and works undertaken to address the asbestos contamination. The Auditor has therefore not been able to verify the current presence or absence of asbestos contamination on the ground surface beneath the suspended floor. There does not appear to be potential for asbestos to be present on the ground where there is not a suspended slab.

The Auditor considered that under the current and approved use of the site that the risk to human health is low, even if asbestos remains in the foundation areas, due to the limited and controllable access to these areas which are not part of the normally used area of the site. It would be prudent to assume that there may be some asbestos lagging on pipes or the ground until such time as it is demonstrated otherwise, and appropriate Occupational Health and Safety precautions adopted.

For a change in land use, inspections should be undertaken to verify that asbestos has been removed. If not, systematic removal will be required.

3.4.3 First Floor on Ground (Metal Casting)

The factory floor adjacent to Charlotte Street is located directly on ground. The main activities undertaken in this area included injection moulding, comb and cutting heat treatment, comb and cutting fabrication, die casting and the use of lathes and presses in the north (Attachment 1).

Injection Moulding

The western boundary of the factory building was initially targeted due to the former use of machinery for injection moulding activities. The results are summarised in Table 3.9.

Table 3.9 - Soil Analytical Results Investigation Injection Moulding Summary Table (mg/kg)				
Analyte	n	Detections	Maximum	n > previous criteria
BTEX	8	0	-	0
TPH C6-C9	26	1	120	1
TPH C10-C14	26	1	87	NA
TPH C15-C28	26	16	3,770	NA
TPH C29-C36	26	16	6,700	NA
TPH C10-C36	26	17	10,470	0

Elevated concentrations of TPH C15 –C36 generally between 1,300 mg/kg and 4,700 mg/kg were reported in all five boreholes excavated adjacent and parallel to the edge of the warehouse. Only one sample reported TPH C15-C36 above these concentrations, at a maximum of 10,470 mg/kg.

Samples collected further to the east within the warehouse building were generally non-detect for contamination. Given the distribution of contaminants, it appears that the source of the contaminants is related to some linear feature at the edge of the warehouse rather than activities associated with injection moulding. Anecdotal evidence suggests that this could have been a pipe transporting waste cutting oils and lubricating oils from the water tank area to the oil-water separator.

The contamination appears to extend to depth within the weathered clays. Chemical and solvent odours were noted where elevated concentrations of TPH were detected. There was no evidence of staining on the clay soil. The concentrations of TPH tend to decrease with depth.

TPH C6-C9 was detected at 120 mg/kg at 0.5 m bgl slightly east of the main contamination, however was not detected during the subsequent sampling rounds. The extent is therefore considered to be limited. BTEX was not detected in any of the samples.

URS concluded that no remediation was warranted given that concentrations were less than the adopted criteria and as the impact is localised.

The results indicate that there has been some TPH impact along the western boundary of the warehouse most of which is related to heavier fractions. The extent of impact is likely to be limited to this western boundary in a north-south direction. Removal of the material would be impracticable under the current land use configuration without undermining the wall.

If the building is demolished an assessment of risk to the proposed development will be required. This may require further delineation of the extent and magnitude.

Comb and Cutter

Two boreholes were excavated over the remainder of the first floor on ground 'adjacent to comb and cutter heat treatment and adjacent to comb and cutter fabrication area'. One borehole was also placed near to the die casting area.

The sampling density in this area is low at an approximate spacing of 70 m. As these boreholes were excavated in 2001 while the facility was operational, it is likely that the identified contaminating activities were targeted.

Inspections during site redevelopment should be conducted to confirm that residual impacts do not remain that would present a risk to human health. This could be managed under an unexpected finds protocol

Lathes and Industrial Presses

Two boreholes were excavated in the area of the industrial presses and lathes (apparently next to an oil/metal separating machine). TPH and BTEX were not detected above the PQLs within all three samples.

Inspections during site redevelopment should be conducted to confirm that residual impacts do not remain that would present a risk to human health. This could be managed under an unexpected finds protocol

3.4.4 Basement and First Floor over Basement (Machining and Coating)

The basement included two degreasers and machining at the western end and a boiler and paint shop at the eastern end.

The first floor overlying the basement previously contained a press shop over the western end and plating baths, degreasers, pickling baths and electropolishing equipment at the eastern end.

Boreholes were excavated over the western section. This area was formerly a press shop on the first floor and machining and degreasers over the basement level. The results are discussed below.

ITE excavated one borehole targeting the 'basement workshop area'. This may have been positioned under the degreaser on the first floor of the northern section. The sample collected at 0.5 m in clay was not submitted for TCE analysis but was submitted for TPH C6-C9 which was not detected above the PQL. Other organics including TPH C10-C36, BTEX, PAHs, phenolics compounds, PCBs and OCPs were not detected above the PQLs. Only low levels of metals were detected.

URS excavated a borehole directly beneath the former degreaser that had been located in the southern section of the basement. TCE was detected at 22 mg/kg at 0.3 m in fill, 7 mg/kg at 0.7 m in clay and 0.4 mg/kg at 1.3 m in weathered shale. Cis 1,2 DCE was also detected only at 0.3 m at 0.5 mg/kg. These concentrations were all below the adopted criteria.

The results indicate some minor impact from the degreaser has occurred that decreases with depth. The degreasers discussed above are the only two that were located within the basement. The Auditor considers that while the risk of significant TCE impact would be expected to be low. Inspections during site redevelopment should be conducted to confirm that residual impacts do not remain that would present a risk to human health. This could be managed under an unexpected finds protocol.

Boreholes were excavated over the eastern end. This area was formerly the plating room and degreaser on the first floor and paint shop over the basement level. The results have been summarised in Table 3.10.

Table 3.10 – Soil Analytical Results Investigation Coating Area Summary Table (mg/kg)

Analyte	n	Detections	Maximum	n > adopted criteria
Arsenic	14	12	8	0
Cadmium	14	6	6	0
Total Chromium	6	6	118	0
Chromium III	8	8	23	0
Chromium VI	8	0	-	0
Copper	14	14	782	0
Lead	14	14	30	0

Table 3.10 – Soil Analytical Results Investigation Coating Area Summary Table (mg/kg)

Analyte	n	Detections	Maximum	n > adopted criteria
Nickel	14	9	103	0
Zinc	14	14	101	0
Mercury (inorganic)	14	4	0.05	0
Total Cyanide	6	0	-	0
TCE	1	1	0.3	0
Other VHCs	1	0	-	0
BTEX	8	0	-	0
TPH C6-C9	8	0	-	0
TPH C10-C36	8	2	101	0
Total PAHs	8	0	-	0

The Auditor is satisfied that no further intrusive investigations are needed. Inspections during site redevelopment should be conducted to confirm that residual impacts do not remain that would present a risk to human health. This could be managed under an unexpected finds protocol. Copper and nickel concentrations above provisional phytotoxicity levels may need to be considered if materials are not placed under buildings.

3.4.5 Factory/ Warehousing (North-East)

Five boreholes were excavated within the warehouse building. There were no potentially contaminating activities identified for this area. The results are summarised in Table 3.11.

Table 3.11 - Evaluation of Soil Analytical Results Investigation Remaining Warehousing Summary Table (mg/kg)

Analyte	n	Detections	Maximum	n > adopted criteria
Arsenic	8	7	75	0
Cadmium	8	0	-	0
Chromium III	8	8	12	0
Chromium VI	8	0	-	0
Copper	8	8	10	0
Lead	8	8	24	0
Nickel	8	0	-	0
Zinc	8	5	77	0
Mercury (inorganic)	8	6	0.02	0
BTEX	8	0	0	0

Table 3.11 - Evaluation of Soil Analytical Results Investigation Remaining Warehousing Summary Table (mg/kg)

Analyte	n	Detections	Maximum	n > adopted criteria
VHCs	1	0	-	0
TPH C6-C9	8	0	0	0
TPH C10-C36	8	1	29	0
Total PAHs	8	0	0	0

The Auditor is satisfied that no further intrusive investigations are needed. Inspections during site redevelopment should be conducted to confirm that residual impacts do not remain that would present a risk to human health. This could be managed under an unexpected finds protocol. Arsenic concentrations above provisional phytotoxicity levels may need to be considered if materials are not placed under buildings.

3.4.6 Former Water Treatment Plant Area

Ten boreholes were excavated in the area of the former water treatment plant. The results are summarised in Table 3.12.

Table 3.12 – Soil Analytical Results Investigation Water Treatment Plant Summary Table (mg/kg)

Analyte	n	Detections	Maximum	n > adopted criteria
1,1,2 Trichloroethene- 1,1,2-TCE (TCE)	22	1	0.6	0
Other VHCs	22	0	0	0
TPH C6-C9	16	1	120	0
TPH C10-C36	16	2	146	0

Only low levels of the contaminants of concern were detected within the numerous samples submitted for analysis. No odours were reported. Metals and cyanide were not detected above PQLs within the three samples submitted for analysis.

The Auditor considers that this area has been adequately characterised and that no further intrusive investigations are required.

3.4.7 Cyanide Spill Area

Two borehole were excavated and sampled at 0.5 and >2 m in the area of a previous cyanide spill. The location of the spill is not known. Free cyanide was not detected above the PQLs within the four samples while total cyanide was detected in three at a maximum of 0.5 mg/kg well below the criteria of 2500 mg/kg for complex cyanide.

The Auditor is satisfied that no further intrusive investigations are needed.

3.4.8 Car Parks

Soil samples were collected directly (0.1 to 0.25 m) under the asphalt over both the north-eastern and south-eastern car parks and submitted for TPH and VHC analysis. These were collected both prior to and following landfarming of the plume material.

Northeast Car Park

The results of sampling prior to landfarming are summarised in Table 3.13.

Table 3.13 – Soil Analytical Results Investigation Northeast Car park Summary Table (mg/kg)				
Analyte	n	Detections	Maximum	n > adopted criteria
Arsenic	5	5	9	0
Cadmium	5	0	-	0
Chromium III	5	5	26	0
Chromium VI	5	0	-	0
Copper	5	5	31	0
Lead	5	5	68	0
Nickel	5	5	28	0
Zinc	5	5	50	0
Mercury (inorganic)	5	5	0.11	0
VHCs	6	0	-	0
BTEX	11	0	-	0
TPH C6-C9	11	0	-	0
TPH C10-C36	11	0	-	0
Benzo(a)pyrene	5	0	-	0
Total PAHs	5	3	0.6	0

The fill material for one sample consisted of 'black ashy fill' with no odour which is reflected in the detection of PAHs.

The Auditor is satisfied that no further intrusive investigations are needed.

Southeast Car Park Area

Prior to the commencement of landfarming Coffey undertook baseline sampling. The results are summarised in Table 3.14.

**Table 3.14 – Soil Analytical Results Investigation Southeast Car Park
Summary Table (mg/kg)**

Analyte	n	Detections	Maximum	n > adopted criteria
Arsenic	28	25	10	0
Cadmium	28	1	2	0
Chromium III	28	28	71	0
Chromium VI	28	2	-	0
Copper	28	28	240	0
Lead	28	28	50	0
Nickel	28	18	57	0
Zinc	28	27	160	0
Mercury (inorganic)	28	22	0.15	0
VHCs	10	0	-	0
BTEX	34	0	-	0
TPH C6-C9	34	0	-	0
TPH C10-C36	34	7	118	0
Benzo(a)pyrene	28	4	2.3	0
Total PAHs	28	11	19	0
Total Phenolics	28	0	-	0

TPH C15-C36 was detected at low concentrations in fill materials in various different locations at the south-east car park. PAHs were also detected in fill at low concentrations. The only fill material reported as containing 'black ashy silt' did not report PAHs above the PQLs. Other organics were less than the PQLs and metals were reported at low levels below the criteria.

The Auditor is satisfied that no further intrusive investigations are needed.

Northeast and Southeast Car Park Areas

Landfarming of plume material from the north-west corner was undertaken over the asphalt surface of the north-east and south-east car parks. Prior to remediation works the asphalt was broken in places with no visual evidence of previous impact from petroleum hydrocarbons or VHCs. The plastic liner, used as a precaution, was inevitably ripped during mechanical landfarming.

Following removal of the landfarmed soil by excavation, scraping and sweeping there was only minimal evidence of residual soil. Samples were targeted to the roadbase material located directly underlying the areas of cracked asphalt. The results are summarised in Table 3.15.

Table 3.15 – Soil Analytical Results Validation of Car Park Areas Summary Table (mg/kg)

Analyte	n	Detections	Maximum
Trichloroethene	19	3	2.1
1,1 Dichloroethene	19	0	-
cis-1,2 Dichloroethene	19	0	-
Vinyl chloride	19	0	-
Tetrachloroethene	19	0	-
All other VHCs	19	0	-
TPH C6-C9	19	1	5
TPH C10-C36	19	0	-
Benzene	19	0	-
Toluene	19	0	-
Ethylbenzene	19	0	-
Xylene	19	0	-

The Auditor considers that the landfarmed areas have been adequately validated and that no further validation works are required.

4 Groundwater

Groundwater results indicated that main impacts were from TCE and petroleum hydrocarbons that had migrated to the water table and dispersed as a plume down-gradient of the source in the north-west corner. All other contaminants detected in groundwater at this north-west corner were either less than the adopted clean-up or investigation criteria or did not extend to the 10 mg/L remediation line for TCE. Remedial works were undertaken to address groundwater contamination in the main excavation and in the vicinity of the water tank.

Residual impacts to groundwater remained following the remedial works however the concentrations are shown to reduce with distance from the source. It was established that given the substantial removal of the contamination source material that the size of the plume would not be expected to expand and that residual contamination is considered to have stabilised. Consequently, the Auditor considered that ongoing groundwater quality monitoring at the plume fringe or contingency planning in the event that the plume increases was not required.

The Auditor notes that removal of the currently sealed surfaces and replacement with open space could increase infiltration. This would be of concern were residual contaminants in soil have been retained such as the water tank and the oil water separator areas.

The Auditor considered that the impacts had been adequately characterised. Given this and the likely current and future limited extent of the TCE plume and the depth of groundwater at

4m below clay, the risk to human health under the commercial/industrial land use was considered to be low. The potential risk to human health from the volatilisation of TCE from groundwater under an alternate land use scenario has not been assessed.

Following the main excavation in the north-west section, the groundwater results indicate that the TCE plume (>10 mg/L) extends past the northern wall of the warehouse building at the southern extent of the excavation. This 10 mg/L line has been established within approximately 5 m of the southern extent of the excavation.

The Auditor concludes that no further investigations are required are required to address offsite migration provided that the proposed development does not increase the potential for leaching by leaving significant residual contamination in unsealed areas. For different commercial uses in terms of potential exposure and for residential uses, an assessment of the potential risk from volatilisation of contaminants from groundwater would be required. .

5 Conclusions and Recommendations

Some residual contamination remains on the site and needs to be considered in site redevelopment for changed commercial or residential uses. There is also potential for some residual contamination to be encountered beneath the current buildings during redevelopment. The site has undergone extensive remediation to make it suitable for the current and approved use, and I consider that it can be made or verified to be suitable for changed commercial or residential uses by following guidelines endorsed by EPA under the Contaminated Land Management Act and the procedures outlined in SEPP 55 Planning Guidelines.

The activities required to manage contamination issues in the site redevelopment include the following:

- Determine the vertical and horizontal extent, and assess the impact on the proposed development, of contamination that remains following previous remediation works in areas that are currently inaccessible. This applies to the water tank and pump house and the former oil water separator areas, where additional remediation may be required.
- Assess whether there is risk to human health under changed commercial or residential conditions from residual contamination that was assessed as not presenting an unacceptable risk under the current and approved development. This may apply to the volatilisation of TCE from soil and groundwater, the southern extent of the main excavation, the landfarmed material that was used for backfill, and the injection moulding area. Some further data collection may be required to supplement existing data. If it is assessed that there is an unacceptable risk under the proposed land use some additional remediation or management may be required.
- Verification that asbestos has been removed and that there is no asbestos in surface soils after redevelopment.
- Prepare and apply an unexpected finds protocol to be implemented during site redevelopment works. This would apply to areas such as the former underground storage tank areas, and the former operating areas including metals casting and machining and coating areas, but would also apply to all areas where existing surfacing is removed. It will require inspection and assessment of underfloor structures such as

pipes and sumps, and any areas where there are indications of contamination such as discolouration, odours, potential asbestos.

- Consideration of other issues raised in this letter if applicable, such as potential metals phytotoxicity and potential to increase leaching of contaminants to groundwater.

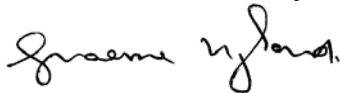
It is recommended that an Evaluation and Assessment Plan that addresses the above issues is prepared by a suitably qualified and experienced Consultant prior to commencement of site redevelopment, to be implemented before and during development. The Consultant should prepare a validation report at the completion of the assessment and of any remediation that is found to be required.

It is recommended that an EPA-Accredited contaminated site Auditor reviews and provides comment on the Evaluation and Assessment Plan. It is recommended that the EPA-Accredited Auditor prepares a Site Audit Report and Site Audit Statement certifying suitability of the site for the proposed uses following successful validation.

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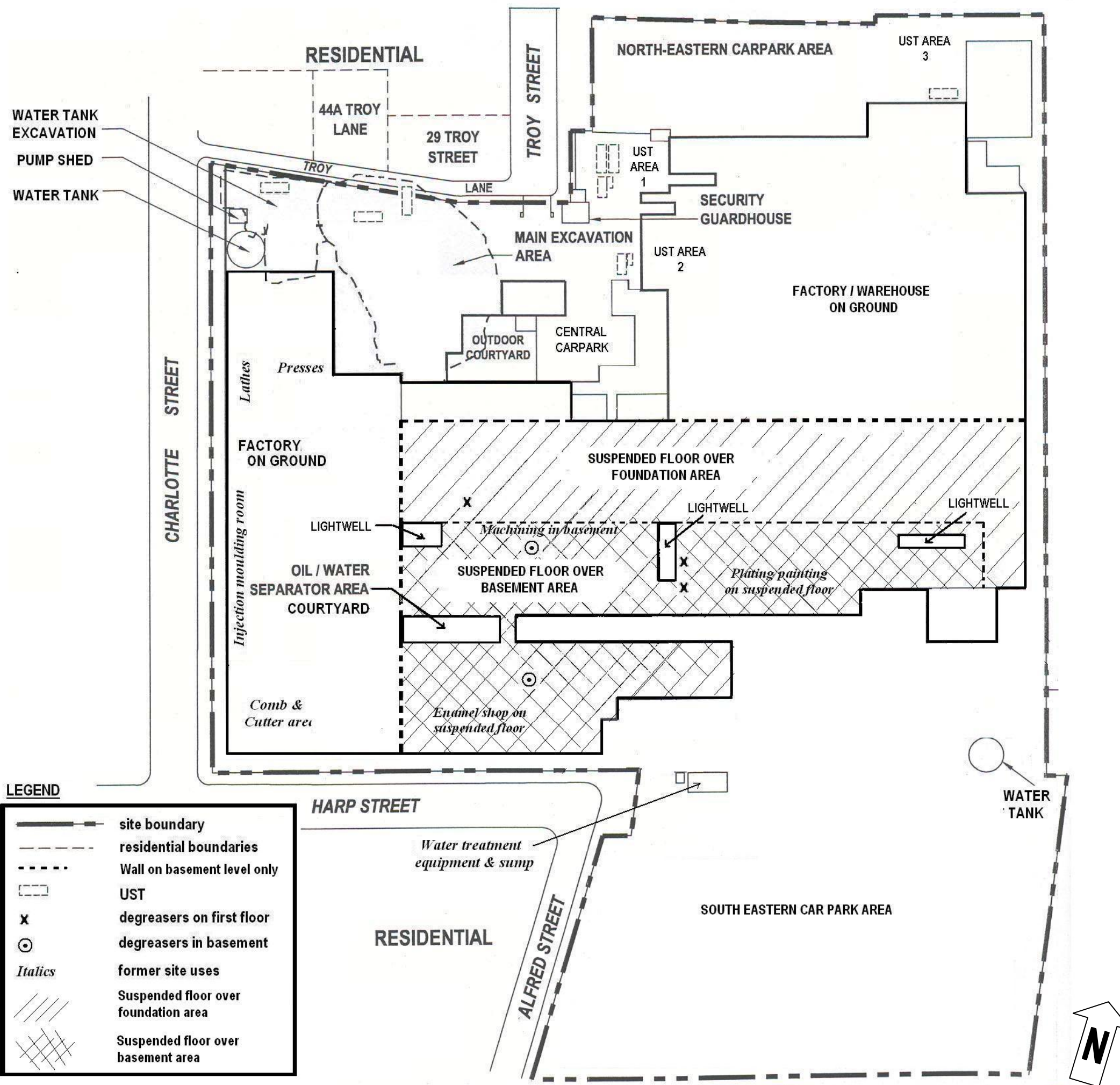
This letter is not a Site Audit Report or Site Audit Statement. It is anticipated that an audit certifying suitability will be a condition of Development Consent and will be prepared following completion of the activities outlined in this letter.

Yours faithfully
ENVIRON Australia Pty Ltd



Graeme Nyland
EPA Accredited Auditor 9808

Attachment: Site Plan



APPROXIMATE SCALE:

0 20 metres

Attachment 1 - Site Plan

Former Sunbeam Factory, Campsie

DATE: 20 April 2009

JOB NO: AS121008

ENVIRON