CETEC
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Soil and Groundwater
Phase III: Risk Assessment
- External and Internal
61 Mobbs Lane, Epping, NSW

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Prepared By

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1. EXECUTIVE SUMMARY

McLachlan Lister Pty Ltd, as Project Manager on behalf of Sydney Broadcast Property Pty Ltd, engaged CETEC Pty Ltd (Consulting Enterprises in Technology) to conduct an Environmental Site Risk Assessment (ESRA) following Golder Associates' Phase I, II and CETEC's Phase III External and Internal soil and groundwater Environmental Site Assessments (ESA's) at 61 Mobbs Lane Epping, NSW.

The objectives of this assessment are to:

- Review and assess the risks associated with findings from previous soil and groundwater assessments.
- Determine the likely extent of the plume of previously identified contaminants, and
- Determine the need for any potential remediation activities at the Mobbs Lane site, prior to its redevelopment for residential purposes by Sydney Broadcast Property Pty Ltd, so as to meet Class A of the Schedule B (7A) Guidelines on the Investigation Levels for Soil and Groundwater under the NEPC Assessment of Site Contamination Measures 1999.

This report assesses the risk on these findings with respect to regulatory guidelines.

The site is to be redeveloped to National Environmental Protection Council Guideline Level A.

Phase I assessment by Golders Associates Pty Ltd Report dated June 2003 consisted of a walk-through assessment with the purpose of identifying operations at the time that may affect soil and groundwater at the site.

Phase II assessment by Golders Associates Pty Ltd Report of June 2005 consisted of the collection of twenty four (24) soil samples from twenty boreholes and six (6) primary groundwater samples from six monitoring wells, with the purpose of a general assessment of the soil and groundwater to demonstrate the suitability of the Site for ongoing and future land use.

Phase III assessment by CETEC Pty Ltd undertaken in June 2008 was divided into external drilling and then internal drilling. For Phase III External, CETEC consultants attended the site from 17th to 24th June 2008 with Macquarie Drilling Pty Ltd, providing push tube soil recovery from chosen areas and trenching on the tennis court. The soil tubes were extracted, sub-sampled, the residuals stored in an on-site freezer and the samples transported to the analytical chemical laboratory under the full supervision of CETEC staff.

The second part of Phase III involved drilling locations within the building. This was conducted on 15th November 2008 with Cutaway Concrete Cutting Services, drilling concrete core holes and CETEC sampling the soil at varying depths. The soil samples were analysed using the comprehensive National Environmental Protection Council (NEPC) Guideline on Data Collection, Sample Design and Reporting (Schedule B (2)).

Findings and Risk Assessment

The majority of chemical contaminants found on-site Phase II and III assessments, were below the required Investigation limits, with reference to Class A of the Schedule B (7A) Guidelines on the Investigation Levels for Soil and Groundwater under the NEPC Assessment of Site Contamination Measures 1999. This report adequately assesses the site contamination for the purposes allowing commencement of planning and commencement of site development for construction.

As in all site assessments of this nature, not all site areas are able to be sampled due to access, infrastructure, services or occupation. Also, since statistically and knowledge based representative sampling is used, the areas between samples have not been tested. However, on this site, sufficient locations were tested to indicate that there is a very low probability that any contamination additional to that found and described below will be encountered. As is the case in all construction projects of this nature, CETEC has recommended (a) liaison during design and (b) observation during groundworks for any new indications of potential contamination, as part of prudent risk management.

Petroleum Spirits in the proximity of the bowsers were identified in the Phase II assessments. CETEC's Phase III assessment showed the extent of this plume was minimal however, at the time of works in this part of the site, upon removal of the underground storage tanks (USTs), removal of approximately 150 cubic metres of surrounding contaminated soil by an approved contractor will be required, to one (1) metre beyond the UST pit walls and floor. Then a further five (5) composite samples will be required to be taken from the pit walls and floor and analysed for Total Petroleum Hydrocarbons (TPH). This further sampling and assessment is only required so as to determine any additional soil removal/disposal scope or enable clearance certification.

Trichloroethylene, adjacent to the Tennis Court was identified in the Phase II assessment. No further trichloroethylene was found in the Phase III assessment, therefore it is to be treated as an isolated 'hot-spot' that will require soil removal. The extent of soil removal

required, as determined by linear extrapolation between the Phase II and III results, is a one (4) cubic metre hole, centred on Golder's location BH9, to a depth of approximately four (4) metres or could remain if the proposed development of the 'spot' is complementary to the NEPC Guidelines Land Use Categories (Table 3a). This could be established upon finalisation of detailed redevelopment plans.

A fragment of asbestos was discovered in Borehole #5 during Phase III External, however the surrounding soil was found to be free of asbestos fragments. This area of the site does not require remediation as a result of this finding; however, excavation works during the proposed site development works should require workers to use appropriate PPE and have present an appropriate consultant present to visually assess the excavated soil for any further asbestos contamination.

A suspect localised object, thought to be a battery, in the North West corner of the Tennis Court was found to contain higher levels of Heavy Metals, particularly Arsenic, Cadmium, Lead, Mercury and Zinc. This sample however was unlikely to be representative of the surrounding soil and was taken to determine the properties of this specific object. The tennis court trench soil was found to be below required contaminant investigation limits. The tennis court does not require remediation as a result of this finding; however, excavation works during the proposed site development works will require workers to use appropriate PPE and have present an appropriate consultant present to visually assess the excavated soil for any further isolated suspect items that may have been dumped.

Arising from drilling within the building, several areas below the building footprint reported proportionally higher results when compared to other results on the site. The TPH, conductivity and acidity at internal boreholes 4 and 7 may indicate a source nearby. The area surrounding boreholes 8A and 8B is known to have been previously contaminated by film-processing activities before being remediated in the 1980s. Contaminants at internal borehole 11 are most likely to have originated from car exhaust and car run-off due to the proximity to car parking. Despite these results being below limits and the contaminant traces being residual, there is a small chance of being indicative of a more prominent source of contamination in the vicinity. For this reason, CETEC again recommends consultant supervision and observation of the soil if it is to be excavated during proposed development.

Secondary issues, as identified in Phase I, included the need for assessment and possible consequent risk management of hazardous materials used on site or part of the construction such transformer PCBs, overflow of wastewater from wash-bay area, stored hazardous chemicals bunding and MSDS documentation. These issues can be managed by the current site facility managers (Channel 7).

Based on the results obtained from the locations sampled, CETEC's assessment is that the site could be brought up to a Level A classification according to National Environment Protection Council or Environmental Protection Agency NSW guidelines with respect to these contaminants, by the removal and appropriate disposal of approximately 150m^3 of soil. There are four additional areas identified that require supervision and clearance testing during excavation. These areas may yield additional contamination but based on the data to hand, this is not likely to be major.

CETEC Pty Ltd understands that this report is likely to be utilised in future development planning for the site and the conditions of this report should be noted. Naturally, CETEC will provide further assistance in the risk management strategy should it be required.

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2. INTRODUCTION

McLachlan Lister, on behalf of Sydney Broadcast Property Pty Ltd, engaged CETEC Pty Ltd to conduct an Environmental Site Risk Assessment (ESRA) following Phase I, II and III soil and groundwater Environmental Site Assessments (ESA's) at 61 Mobbs Lane Epping, NSW. The objectives of this assessment are to:

- Review and assess the risks associated with findings from previous soil and groundwater assessments.
- Determine the plume extent of the previously identified contaminants
- Determine the need for any potential remediation activities at the Mobbs Lane site, prior to its redevelopment for residential housing by Sydney Broadcast Property Pty Ltd.

This report assesses the risk on these findings with respect to regulatory guidelines.

The site is to be redeveloped to National Environmental Protection Council Guideline Level A.

Channel 7 has occupied the site for approximately 30 years and there was no history found of previously contaminating activities.

3. METHOD

A detailed methodology of the Phase I and II ESAs is outlined in the Golder Associates Pty Ltd report, *Limited Phase I ESA* and *Phase II ESA*. In summary, the Phase I assessment by Golders Associates Pty Ltd of June 2003 consisted of a walk-through assessment with the purpose of identifying operations at the time that may affect soil and groundwater at the site.

Phase II assessment by Golders Associates Pty Ltd of June 2005 consisted of the collection of twenty four (24) soil samples from twenty boreholes and six (6) primary groundwater samples from six monitoring wells, with the purpose of a general assessment of the soil and groundwater to demonstrate the suitability of the Site for ongoing and future land use.

After consideration of the Phase I and Phase II external reports and interviews with Channel 7 staff for historical and access information, CETEC's Phase III assessment included a total of 22 bore hole locations **externally**, 12 locations beneath the building footprint and a trench across the tennis court which were strategically chosen across the Channel 7 site for soil sampling as per the attached map, (in Appendix 1, 1A, 1B). Each of the designated sites contained a further three sub-sites (A, B, C). Where possible the 'A' sub-site was chosen as the primary drilling position and sub-sites 'B' and 'C' acted as backup sites. These backup sites would be used if the drill met resistance such as impenetrable rock substrate or came into contact with uncharted or unidentified underground services, for example gas or water mains. Initially, the intention was to drill each site to 5m-7m, however due to the subterranean site conditions (underlying solid or fractured rock) the depth of the soil sampling became individual to each of the 22 locations and was logged accordingly.

Drilling was carried out by Macquarie Drilling Pty Ltd and was completed using a GEOPROBE 70579C rig, which took samples from the 22 outdoor sites using a process known as push tube sampling. This technique involves a plastic sample tube (40mm in diameter) that lies within a metal push tube (1160mm in length). The plastic sample tube collects a column of material as the metal push tube penetrates the soil. Extension rods are able to be connected to the push tube, enabling a greater soil depth to be sampled. After each push-drill the plastic tube was removed sealed and labelled with site and sub-site information, corresponding to its length and orientation. All soil cores were stored in sub-zero conditions until analysis samples could be taken.

To inspect, classify and sub-sample to Australian Standard AS4482.1-2005, "Guide to sampling and investigation of potentially contaminated soil", the plastic tubes on the soil cores were dual cut lengthways such that a section 1cm x 1m of the tube could be removed and the soil inspected. The samples were visually screened for soil type, discoloration, staining, debris, volatile organic compound emissions and odour. Detailed photographs were taken of the soil, which can be found in Appendix 5. A log of changes in soil types detailing the characteristics of the samples was created (see soil analysis on page 9). Using a clean stainless steel trowel, half of the core was removed from the tube and mixed to create an homogenised sample. This sample was stored in a glass jar with a layer of Aluminium foil between the jar and the cleaned lid to prevent contamination from the plastic lid and potential escape of any volatile contaminants.

Composite soil samples representing selected depth intervals of interest were prepared from each tube. Composite samples are used as a preliminary assessment tool. Should significant contamination be found (as indicated by the National Environment Protection Measure for the Assessment of Site Contamination), further specific sampling and analysis would be performed if more information on the precise depth interval was required. The process of composite soil sampling involves taking multiple samples over the desired depth interval and combining them to form a single sample, so that it is fully representative of that interval. Composite sampling has two main advantages: (i) as a means of reducing inter-sample variance, (ii) helping to reduce the laboratory analytical costs and (iii) reduced analysis time.

The samples were sampled and analysed in accordance with the Australian Standard 4482.1-2005 "Guide to the investigation and sampling of sites with potentially contaminated soil – Non-volatile and semi-volatile compounds", and Australian Standard 4482.2-1999 "Guide to the sampling and investigation of potentially contaminated soil – Volatile substances".

The second part of Cetec's Phase III involved **internal** sampling under the building footprint through floors at strategic and available locations within the building. After several site visits and discussions with senior long-standing Channel 7 staff, careful and operational arrangements were made within this operating broadcast facility to conduct safe sampling on 15th November 2008 with Cutaway Concrete Cutting Services, drilling concrete core access holes and the soil being sampled at varying depths by CETEC. The locations were the best available to be able to represent the building floor footprint. A total of eleven **internal**

sampling locations were strategically chosen inside the Channel 7 studios for soil sampling. The sampling technique involved the use of diamond core drills to be drilled to a concrete slab depth of 150-200 mm. Once the concrete slab was removed a visual inspection of the drill hole was done to examine the situation beneath the floor. Since motorised auger drilling was not allowed by Channel 7 internally, hand tools were used to collect soil samples into labelled sample jars to varying depths as indicated in the appendix tables. These labelled sample jars were stored on iced coolers and transported promptly to the laboratory for analysis. No samples were collected where rocks were encountered.

The total number of samples taken across Phases II and III was as representative as possible of the entire site, for the purpose of assessing the contamination risk.

External and Internal samples were analysed soon after their respective samplings for a selected EPA NSW list of contaminants. A selection of samples were also analysed for Asbestos, Organochlorine Pesticides, and Hydrocarbons (refer to Appendix 6 for a full list of contaminants tested). These sites were specifically selected based on their location to a known (from Phase II) or potential sources of the contaminant. For example, some boreholes were chosen based on their close proximity to TAFE College and petrol bowsers. NEPM guidelines were used to assess the risk from the laboratory analytical soil results.

Since the majority of chemical contaminants found on-site Phase II and III assessments, were below the required investigation limits, with reference to Class A of the Schedule B (7A) Guidelines on the Investigation Levels for Soil and Groundwater under the NEPC Assessment of Site Contamination Measure 1999, further analysis of the composite sample component were not required.

Not included in this report are site areas not able to be sampled, such as the tennis court embankment seating and inaccessible areas under the building footprint.

The extent of soil removal recommended was determined by linear interpolation between the Phase II and III result with a cut-off when the interpolated result over the depth interval exceeded the NEPC Guidelines Land Use Categories (Table 3a). For example, if the Phase II result was 1000 units at 4-5 meters depth and the Phase III result 10 meters away at the equivalent 4-5m depth horizon showed no contamination, to meet a NEPC of 500 units, a radial plume is assumed to be 5 meters radius at a depth of 4-5 meters, or 15.7m^3. The angular dispersion of the plume is controlled by the results from surrounding bore hole

results and the estimate is adjusted accordingly. Naturally, overburden must first be removed to access the plume horizon. The amount and cost of overburden removed will be subject to depth, rock and geotechnical stability requirements. In most cases the above linear approximation of plume volume is an overestimate since dispersion mostly reduces more rapidly from a finite point source and is influenced by fissures, permeability, clay retention, contaminant type, aquifers and many other factors unless it is continuously fed such as from a leaking pipe, tank or replenishing spill. The final recommendation on remediation and likely costs is established upon conclusion of the detailed redevelopment plans.

Since CETEC's Phase III inaugural assessment of eleven **internal** sampling locations were chosen inside the Channel 7 studios restricted by building structure, services, sensitive internal activities and likely underfloor services, extrapolation of these first results was not applicable. Instead, NEPM guidelines, historical information from Channel 7 staff, best assessments of background concentrations, soil condition and site observation criteria only were used to assess the risk from the laboratory analytical soil results. As a prudent and conservative approach, if any one of the criteria showed even a suggestion of abnormality without being exceeded, a cautionary comment suggesting a likely source and expert observation during excavation was included in this report. This approach was also required since the internal sampling could not be readily repeated within this active major broadcasting facility.

Since all chemical contaminants found for the III internal assessments, were below the required investigation limits, with reference to Class A of the Schedule B (7A) Guidelines on the Investigation Levels for Soil and Groundwater under the NEPC Assessment of Site Contamination Measure 1999, further analysis of the samples or re-sampling were not required.

3.1 Soil Analysis – Phase III External ESA

Since some areas of contamination were found in Phase II, for easy reference, Tables 1 and 2 are presented to provide a description of the drilling horizons, trenching, soil types and samples submitted for analysis, following the Phase III external site assessment in this section of the report rather than the appendix.

Table 1: Description of samples

Site Number	Sample	Depth (m)	Description	Laboratory Identifier Number
1	A	0.8-2.4m	Clay, Brown to grey, weathered grey shale	162185
2	A	0.8-2.4m	Clay loam, dark brown	162186
3	A	0.0 - 1.08m	Gravel, clay loam, clay.	162187
4	A	0.0-1.79m	Loam, clay and shale, Brown to grey	162189
5	A1	0.0 – 1.2m	Loose brown/black soil	162191
	A2	1.2-2.80m	Clay/shale	162192
6	A1	0.0 - 1.6m	Brown soil, Red Clay, Brown/grey weathered shale	162193
	A2	2.6-3.15	Brown/grey weathered shale	162194
	A3	3.15-3.35	Wood/dark brown clay	162195
	A4	3.35-4.3	Grey/brown shale	162196
7	A1	0.0 - 1.2m	Pale brown, sandy loam	162197
	A2	2.4-3.6m	Grey weathered clay	162198
	A3	6.0-7.2m	Grey shale	162199
8	A	0.8-1.2m	Light brown clay, grey shale	162215
9	A	0.55-1.7m	Light brown shale/dry clay	162212
10	A1	0.9 - 2.95m	Brown clay, weathered shale	162200
	A2	2.95-3.10m	Weathered/pink shale	162201
	A3	2.95-4.0	Weathered/pink shale	162202

Site Number	Sample	Depth (m)	Description	Laboratory Identifier Number
11	A	1.0-1.2m	Light brown/grey clay	162220
12	A1	1.0-2.4	Light brown clay	162213
	A2	2.4-4.0	Grey/red clay, shale	162214
13	A1	1.0-1.2m	Light brown clay	162216
	A2	2.4-3.6m	Grey/red clay	162218
	A3	3.6-4.5	Light brown clay	162219
14	A1	1.0-2.2m	Brown clay	162205
	A2	2.2-3.1m	Red clay, grey weathered shale	162206
15	A1	0.8-2.1m	Wet clay brown/grey	162203
	A2	2.1-3.05m	Grey wet clay, weathered shale	162204
16	A	0.7-2.0m	Brown/red clay	162209
17	A1	0.85-2.4m	Moist brown clay	162207
	A2	2.4-3.2m	Moist/wet grey clay	162208
18	A	1.2-2.4m	Light brown/grey clay	162222
19	A	1.2-2.4m	Light brown/grey clay	162223
20	A	1.2-2.4m	Light brown/grey shale	162224
21	A1	0.0-1.2m	Brown soil	162225
	A2	1.2-2.4m	Brown/black clay,	162226
	A3	2.4-3.1m	Grey shale	162227
22	A1	0.95-2.4m	Grey/brown clay, black shale	162210
	A2	2.4-4.0m	Brown/grey weathered shale	162211

Table 2: Description of tennis court trench samples

Location	Sample Depth (m)	Description	Laboratory Identification Number
Trench Top Soil	0.3m	Speckled brown and black sand and gravel sized particles	163362
Trench North End	1.5m	Pale brown sand and gravel sized particles	163363
Trench South End	1.0m	Pale brown sand and gravel sized particles	163364
Trench North End	0.5m	Black silt and sand sized particles with a dull, earthly lustre	163365
Trench South End	1.0m	Pale brown sand and gravel sized particles and orange clay lumps	163366
Trench at nets	1.0-1.5m	Pale brown sand and gravel sized particles and orange and white clay lumps	163367
Trench Middle South End	0.0-1.5m	Pale brown sand and gravel sized particles	163368

Sample information for the samples taken beneath the building footprint can be found in the appendix since no samples had contaminants over the NEPC Investigation limits.

Field quality control included decontamination procedures and sample documentation. Laboratory quality assurance / quality control consisted of sample spikes for organic analysis and certified reference sampling for inorganics.

The samples were analysed as per a NSW EPA Method full soil screen for the contaminants as summarised in Table 3.

Table 3: Methods for Soil Analysis

Contaminant	Method
Volatile Organics	USEPA 8260B
Phenols	USEPA 8270C
Polychlorinated Biphenyls (PCBs)	US EPA 8082
Organochlorine Pesticides	USEPA 8081A
Polycyclic Aromatic Hydrocarbons	USEPA 8270C
Monocyclic Aromatic Hydrocarbons	USEPA 8260B
Total Recoverable Hydrocarbons	MGT 100A
Heavy Metals	USEPA 6010B
Mercury	USEPA 7470/71

Quality assurance / quality control details and detailed laboratory analytical data for the soil samples are presented in Appendix 3.

Interpretation of the laboratory analytical results for soil samples was based upon the Schedule B1 Guidelines on the Investigation Levels for Soil and Groundwater under National Environment Protection Council (NEPC) - Assessment of Site Contamination Measure 1999.

4. RESULTS – PHASE III ESA

Detailed analytical data for Phase III soil samples is presented in Appendix 3.

The results were analysed in accordance with the Health Investigation Limits set out by the National Environment Protection Council (NEPC). The results for Organochlorine Pesticides, Polychlorinated Biphenyls, Total Recoverable Hydrocarbons, Monocyclic Aromatic Hydrocarbons, Polycyclic Aromatic Hydrocarbons, and Volatile Organics were generally low. These contaminants complied with the requirements of National Environment Protection Council (NEPC) Health Investigation Levels Class "A" as outlined in Tables 3A and 3B.

Table 3A: Health Investigation Level Categories according to NEPC Guidelines

HIL	Land Use Recommendations
A	**'Standard' residential with garden/accessible soil (home-grown produce contributing less than 10% of vegetable and fruit intake; no poultry): this category includes children's day-care centres, kindergartens, preschools and primary schools.**
B	Residential with substantial vegetable garden (contributing 10% or more of vegetable and fruit intake) and/or poultry providing any egg or poultry meat dietary intake.
C	Residential with substantial vegetable garden (contributing 10% or more of vegetable and fruit intake); poultry excluded.
D	Residential with minimal opportunities for soil access: includes dwellings with fully and permanently paved yard space such as high-rise apartments and flats.
E	Parks, recreational open space and playing fields: includes secondary schools.
F	Commercial / Industrial: includes premises such as shops and offices as well as factories and industrial sites.

Table 3B: Health Investigation Levels according to the NEPC Guidelines (in Table 3A).

Substances	Health Investigation Levels (HILs) in mg/Kg or PPM
	Category A
METALS/METALLOIDS	
Arsenic (total)	**100**
Barium	
Beryllium	**20**
Cadmium	**20**
Chromium (III)	**12%**
Chromium (VI)	**100**
Chromium (total)	
Cobalt	**100**
Copper	**1000**
Lead	**300**
Manganese	**1500**
Methyl Mercury	**10**
Mercury (inorganic)	**15**
Nickel	**600**
Vanadium	
Zinc	**7000**
ORGANICS	
Aldrin + Dieldrin	**10**
Chlordane	**50**
DDT + DDD + DDE	**200**
Heptachlor	**10**
Polycyclic aromatic Hydrocarbons (PAHs)	**20**
Benzo(a)pyrene	**1**
Phenol	**8500**
PCBs (Total)	**10**
Petroleum Hydrocarbon Components (constituents):>C16-C35 Aromatics	**90**
>C16 – C35 Aliphatics	**5600**
>C35 Aliphatics	**56000**
OTHER	
Boron	**3000**
Cyanides (Complexed)	**500**
Cyanides (Free)	**250**
Phosphorous	
Sulphur	
Sulphate	

4.1 Phase III External Results

Heavy Metals results as summarised in Table 4 complied with the requirements of National Environment Protection Council (NEPC) Health Investigation Levels Class "A".

Table 4: Heavy Metals results across the 22 samples from external locations.

SITE NUMBER	Chromium (mg/kg)	Zinc (mg/kg)	Mercury (mg/kg)	Lead (mg/kg)	Copper (mg/kg)	Cadmium (mg/kg)	Nickel (mg/kg)	Arsenic (mg/kg)
Lab Detection Limits	*1*	*5*	*0.05*	*2*	*2*	*0.1*	*1*	*1*
1A	12	65	0.11	42	21	<0.1	6	17
2A	13	23	0.07	9	20	<0.1	4	18
3A	5	17	<0.05	5	8	<0.1	2	2
4A	5	14	<0.05	9	10	<0.1	1	6
5A1	11	12	<0.05	11	10	<0.1	3	9
5A2	2	7	<0.05	3	7	<0.1	<1	<1
6A1	29	10	<0.05	13	2	<0.1	1	15
6 A2	16	<5	<0.05	10	2	<0.1	1	15
6 A3	9	57	0.19	13	16	0.1	6	7
6 A4	7	17	<0.05	8	17	<0.1	2	6
7 A1	17	21	0.05	17	12	<0.1	7	6
7 A2	3	<5	<0.05	11	3	<0.1	<1	4
7 A3	17	23	0.08	27	16	<0.1	7	7
8 A	3	54	0.10	11	18	<0.1	3	5
9 A	9	32	0.08	13	18	<0.1	6	<1
10 A1	7	26	<0.05	15	20	0.3	5	9
10 A2	19	<5	<0.05	3	2	<0.1	<1	<1
10 A3	23	`27	0.12	20	13	<0.1	3	4
11 A	4	32	<0.05	8	10	0.1	8	9
12 A1	4	29	0.06	22	11	0.1	6	5
12 A2	3	40	<0.05	14	15	0.2	4	6
13 A1	11	32	0.08	23	27	<0.1	3	2
13 A2	7	19	0.05	11	17	<0.1	<1	3
13 A3	3	18	<0.05	7	15	<0.1	3	4
14 A1	14	53	0.11	29	16	<0.1	7	8
14 A2	13	46	0.06	24	16	<0.1	5	7
15 A1	<1	<5	<0.05	<2	<2	<0.1	3	3
15 A2	5	35	0.05	8	30	<0.1	3	3
16 A	4	<5	<0.05	10	10	<0.1	3	5
17 A1	14	36	0.07	25	14	<0.1	5	8
17 A2	4	30	<0.05	7	27	<0.1	2	9
18 A	5	10	<0.05	11	-	<0.1	1	3
19 A	3	16	<0.05	8	-	<0.1	3	3
20 A	5	9	<0.05	17	-	<0.1	1	4
21 A1	9	18	<0.05	16	-	<0.1	2	4
21 A2	21	24	0.1	27	-	<0.1	2	4
21 A3	6	12	0.08	12	-	<0.1	4	6
22 A1	7	7	0.08	9	-	<0.1	15	7
22 A2	9	69	<0.05	22	-	<0.1	2	3

A fragment of asbestos cement sheet (chrysotile, crocidolite, amosite) was visually observed in borehole #5 push-tube sample, however the surrounding soil was found to be free of asbestos fibres following analysis. This does not deem this area as contaminated.

Soil samples were analysed for BTEX (Benzene, Toluene, Ethylbenzene and Xylenes), TPH (Total Petroleum Hydrocarbons), Heavy metals and Pesticides. The results from the external borehole locations all were below detection limits however results from internal boreholes 4, 7 and 11, showed contaminants at low concentrations.

4.2 Phase III Internal Results

All internal samples, as in Appendix 3, showed low levels of contamination, well below the NEPC investigation guidelines and hence are not tabulated in the body of the report. Despite all results from below the building footprint indicating that remediation is not required, there were some samples that showed results above the general background for the area. These are discussed individually as they are mildly anomalous, and should be considered in the site management plan.

Internal borehole #4 reported total TPH (C10-C36) at 330mg/kg, elevated conductivity of 3320uS/cm when compared to other results on the site and a pH of 4.4 which is unusually acid for soils on this site. However these results are below NEPC Guidelines.

Internal borehole #7 showed TPH (C10-C36) at 270mg/kg, which could be described as residual and is below any action limits. However these results are below NEPC Guidelines.

Internal borehole #8B was also shown to a have pH of 4.4 which is unusually acid for soils on this site and converse to the samples taken from nearby borehole #8A which were found to be basic at pH 10.4. However these results are below NEPC Guidelines.

Internal borehole #11 reported TPH (C10-C36) at 4400mg/kg, p-isopropyltoluene at 14mg/kg, zinc at 175mg/kg and the highest sulphate levels discovered on site, 720mg/kg. This result is clearly anomalous for the area. However all results were below NEPC Guidelines.

PCBs (Polychlorinated Biphenyls) and OCPs (Organo-chlorine Pesticides) were tested at all sites. All results were below detection limits for these contaminants.

Tables showing results for all contaminants and all sites are provided in the Appendix.

4.3 Discussion of Results

Externally, Petroleum Hydrocarbons in the proximity of the bowsers were identified in the Phase II assessments. CETEC's Phase III assessment showed the dispersion extent of this plume was minimal. However, at the time of works in this part of the site, upon removal of the underground storage tanks (USTs), removal of approximately 150 cubic metres of surrounding contaminated soil by an approved contractor will be required, to one (1) metre beyond the UST pit walls and floor. After excavation, a further five (5) composite samples will be required to be taken from the pit walls and floor and analysed for Total Petroleum Hydrocarbons (TPH). This further sampling and assessment is only required so as to determine any additional soil removal/disposal scope or enable clearance certification.

External Trichloroethylene, adjacent to the Tennis Court was identified in the Phase II assessment. No further trichloroethylene was found in the Phase III external assessment, therefore it is to be treated as an isolated 'hot-spot' that will require soil removal. The extent of soil removal required, as determined by linear extrapolation between the Phase II and III result, is a one (1) cubic metre core, centred on Golder's location BH9, to a depth of approximately four (4) metres or could remain if the proposed development of the 'spot' is complementary to the NEPC Guidelines Land Use Categories (Table 3a). This could be established upon finalisation of detailed redevelopment plans.

A fragment of asbestos was discovered in external Borehole #5 during Phase III, however the surrounding soil was found to be free of identified asbestos. This area of the site does not require remediation as a result of this finding. However, excavation works during the proposed site development works with require workers to use appropriate PPE and have present an appropriate consultant present to visually assess the excavated soil for any further asbestos fragments.

An intersected suspect localised buried object, thought to be a battery, in the North West corner of the Tennis Court was found to contain higher levels of Heavy Metals, particularly Arsenic, Cadmium, Lead, Mercury and Zinc. This sample however was not representative of the surrounding soil and was taken to be restricted only to this specific object. The tennis court trench soil generally was found to be below required contaminant reporting limits. The tennis court should not require remediation as a result of this finding. However, excavation works during the proposed site development works will require workers to use appropriate PPE and have present an appropriate consultant present to visually assess the excavated soil for any further suspect items.

Several **internal** areas below the building footprint reported relatively higher results when compared to other results on the site. The slightly elevated TPH, conductivity and acidity at internal borehole #4 and #7 (TPH at 270mg/kg) may indicate a source nearby but could be described as residual and is below action limits.

Internal borehole #8B was also shown to a have pH of 4.4 which is unusually acid for soils on this site and converse to the samples taken from nearby borehole #8A which were found to be basic at pH 10.4.The area surrounding borehole #8A and 8B is known to have been previously contaminated by film-processing activities before being remediated in the 1980s.

Internal borehole #11 reported TPH (C10-C36) at 4400mg/kg, p-isopropyltoluene at 14mg/kg, zinc at 175mg/kg and the highest sulphate levels discovered on site, 720mg/kg. These are most likely to have originated from car exhaust and car wash related run-off due to the proximity to car parking. Despite these results being below limits and the contaminate traces being residual, it may be indicative of a more prominent source of contamination in the vicinity. For this reason, CETEC again recommends consultant supervision and observation of the soil if it is to be excavated during proposed development.

Secondary internal issues, as identified in Phase I, included the need for assessment and management of transformer PCBs, overflow of wastewater from wash-bay area, stored hazardous chemicals bunding and MSDS documentation. These issues can be managed by the current site facility managers (Channel 7) with expert assistance requested if required.

The majority of chemical contaminants found on-site Phase II and III assessments, were below the required reporting limits, based on Class A of the Schedule B (7A) Guidelines on the Investigation Levels for Soil and Groundwater under the NEPC Assessment of Site Contamination Measure 1999. However, clearly not possible to be included in this report are site areas not sampled due to inaccessibility, such as tennis court embankment seating and inaccessible areas under the building foot-print. However the number and distribution of samples externally and underneath the building footprint is believed to be representative of that area of the site.

Based on the results obtained from the locations sampled, CETEC's assessment is that the site could be brought up to a Level A classification according to National Environment Protection Council or Environmental Protection Agency NSW guidelines with respect to these contaminants, by the removal, appropriate disposal of approximately 150m^3 of soil and clearance sampling.

There are four additional areas identified that require supervision and clearance testing during excavation. These areas may yield additional contamination but based on the data to hand, this is not likely to be major.

5. CONCLUSIONS AND RECOMMENDATIONS

The majority of contaminants in all three assessments were below detection limits and complied with Class A of the Schedule B (1-6) Guidelines on the Investigation Levels for Soil and Groundwater under the National Environment Protection Council (NEPC) Assessment of Site Contamination Measure 1999. Some borehole samples showed low contaminant levels, in particular Chromium and Zinc in soil at locations 5, 6, and 10 and to a depth of at least 2.8, 4.3 and 4.0 meters respectively and asbestos was found at borehole 5, however these levels were still below Class A limit levels.

Petroleum Spirits in the proximity of the bowsers were identified in the Phase II assessments. CETEC's Phase III assessment showed the dispersion of this plume was minimal.

Trichloroethylene, adjacent to the Tennis Court was identified in the Phase II assessment. No further trichloroethylene was found in the Phase III assessment. A suspect localised object, thought to be a battery, in the North West corner of the Tennis Court was found to contain higher levels of Heavy Metals, particularly Arsenic, Cadmium, Lead, Mercury and Zinc. This sample however was not representative of the surrounding soil and was taken to determine the properties of this specific object. The tennis court trench soil was found to be below required contaminant reporting limits.

It is recommended that prior to commencement of any altered or unanticipated site development works in untested and inaccessible areas of the site, supervision and clearances during works is required.

Any construction or similar works that may disturb the soil on the site must be subject to Risk Assessment and Safe Working Method Statements (SWMS) and supervised to minimise or prevent the risk of disturbance and secondary contamination of the soil. These assessments should consider management techniques such as monitoring for airborne, relocated and run-off contaminants if present.

The site will require some remediation in light of the proposed redevelopment and the findings from Phase I, II and III ESAs. Based on the assessment and the supplied development plans, the level of remediation required is estimated at about 150m^3 of TPH contaminated soil be excavated, tested and allocated for on-site treatment or disposal to an

approved facility. It would also be prudent to allow for supervision during excavation and clearance testing in other areas where residual levels of contaminants were identified.

CETEC Pty Ltd understands that this report is likely to be utilised in future development planning for the site and the conditions of this report should be noted.

CETEC can provide further assistance in clarification, discussions and the risk management strategy should it be required.

On behalf of CETEC staff and subcontractors,

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6. GLOSSARY OF TERMS USED

EPA – Environmental Protection Agency
NEPC – National Environmental Protection Council
SWMS – Safe Working Method Statement
USEPA – United States Environmental Protection Agency
PCB's – Polychlorinated Biphenyls
APHA – American Public Health Association
PAH's – Polycyclic Aromatic Hydrocarbons
DDT – Dichlorodiphenyltrichloroethane
DDD – Dichlorodiphenyldichloroethane
DDE – Dichlorodiphenyldichloroethylene
pH – Acidity or alkalinity
TPAH – Total Polycyclic Aromatic Hydrocarbons
VOC's – Volatile Organic Compounds
BTEX – Benzene, Toluene, Ethylbenzene and Xylenes
TPH – Total Petroleum Hydrocarbons
OCP's – Organochlorine Pesticides
NOAEL – No Observed Adverse Effect Level
ICRCL – Interdepartmental Committee on the Redevelopment of Contaminated Land
NICNAS – National Industrial Chemicals Notification and Assessment
NOHSC – National Occupational Health and Safety Commission
PPE – Personal Protective Equipment
HIL's – Health Investigation Levels
PPM's – Parts Per Million
EQL- Estimated Quantification Limit
ESRA- Environmental Site Risk kAssessment
ESA- Environmental Site Assessment

7. APPENDICES

Refer to the separately attached document:

Soil and Groundwater Phase III: Risk Assessment – External and Internal

The Parklands, 61 Mobbs Lane Epping, NSW

Section 7: Appendices (1.1 - 1.6)

8. APPENDIX: DISCLAIMER AND COPYRIGHT

8.1 Disclaimer

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