REPORT

CARISBROOK STADIUM TRUST

Preliminary Ground Contamination Investigation Spectator Events and Education Zone - Dunedin: FINAL ISSUE

Report prepared for:

CARISBROOK STADIUM TRUST

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1 Introduction and Scope

Arrow International Limited are project managers for a proposed Zone Change to Spectator Events and Education, to be located in North Dunedin. Tonkin & Taylor have been engaged by Arrow International Limited on behalf of Carisbrook Stadium Trust to carry out a ground contamination investigation for the proposed Spectator Events and Education Zone, which may include such facilities as a multipurpose stadium.

The site history for the area has been investigated in a report prepared by Sinclair Knight Merz (SKM)[1]. The SKM report shows that the proposed zone is located on land reclaimed in the early 20th Century. The SKM assessment indicated the potential presence of contaminants including but not limited to asbestos, metals, solvents, Pentachlorophenols (PCPs), Polycyclic Aromatic Hydrocarbons (PAH) and Total Petroleum Hydrocarbons (TPH).

The following scope of works was undertaken, in accordance with our proposal dated 26 October 2007:

- Review of the full Preliminary Environmental Site Assessment prepared by SKM, to assess the possible nature, extent and locations of potential contaminants.
- Site walkover inspection.
- Preparation of a sampling strategy to provide appropriate site coverage and testing of potential contaminants, based on Ministry for the Environment: Contaminated Land Management Guideline No. 5, Site Investigation and Analysis (July 2003).
- Subsurface soil investigations from 8 to 17 November 2007, comprising sixty test pits, auger holes and surficial samples.
- Collection of 170 soil samples from test pits, auger holes and surficial soil sampling.
- Laboratory analysis of 83 selected samples for the following contaminants:
  - 83 samples for PAH
  - 83 samples for a suite of 7 metals
  - 6 samples for PCP
  - 14 samples for TPH
  - 4 samples for Polychlorinated Biphenyls (PCB)
  - 13 samples for Volatile and semi-volatile organic compounds (VOC and SVOC)
- Review and analysis of the laboratory results.
- Comparison of the laboratory results to published guidelines for the protection of human health, following the hierarchy established by the Ministry for the Environment: Contaminated Land Management Guidelines No. 2, Hierarchy and Application in New Zealand of Environmental Guideline Values (October 2003).
- Identify potentially affected receptors.
- Assess whether any contamination on the site presents a practical risk to human health and ecological receptors.

[1] *Preliminary Environmental Site Assessment, The New Carisbrook Development*, SKM, December 2006

- Preparation of this report outlining the findings of the investigation, in accordance with the Ministry for the Environment "Contaminated Land Management Guidelines 1, Reporting on Contaminated Sites in New Zealand".

2 Site Description

2.1 Site Location

The site is located in North Dunedin, immediately to the northeast of the Water of Leith. The site is approximately 5.9 hectares in size and is of an irregular shape.

The site is bounded by Ravensbourne Road and Anzac Avenue to the north and the Water of Leith to the southwest. Parry Street, Leander Street, Awatea Street and Magnet Street all pass through the site.

2.2 Land Zoning

The site is currently zoned "Industrial Zone 1". Industrial Zone 1 allows for manufacturing industries, transportation, storage and limited retailing.

It is proposed to change the land zoning to a "Spectator Event and Education" zone. The proposed zone may include activities such as a sports stadium, open space, recreational parks, gymnasium and related office accommodation.

2.3 General Site Description

The entire site consists of a number of land parcels, which are discussed separately in section 5.3, below. Generally the site contains occupied buildings (commercial/industrial). The exception to this is 8 Awatea Street, which is a vacant site.

The site is generally level, with no significant slope. An embankment is present on the northern edge of the site adjacent to State Highway 88. It is approximately 2m high at the Icon Transport yard, and reduces to 0m at the western end of the Fletcher Steel Yard.

To the north of the site is Logan Park and Logan Point quarry. The Otago Harbour lies approximately 100m south of the southern boundary of the site.

The remaining surrounding area is predominantly industrial/commercial land use. An Allied Concrete mixing plant is located beside the quarry.

2.4 Geology and Hydrogeology

2.4.1 Geology

Intrusive ground investigations undertaken by Tonkin & Taylor have shown a layer of hard fill (generally silts with sand, gravel, brick, and concrete) overlies hydraulic fill (dredged harbour material) consisting of silt and clayey silt with occasional sand. The hydraulic fill is likely to have been the result of land reclamation taking place from the late 19th Century and early 20th Century, as reported by SKM.

The published geology for the area shows the original underlying natural ground is Holocene in age, and comprises of flood plain, lacustrine and estuarine deposits of the Hawera series[2]. Immediately to the north of the site, at the Logan Point quarry, the geology is described as Phonolitic flows of second main eruptive phase, of the Wanganui series.

2.4.2 Hydrogeology

Groundwater is generally expected to flow southeast towards the Otago Harbour. It is possible that groundwater levels within the site are tidally influenced.

Groundwater was encountered in many test pits, with groundwater levels varying from 1 metre to approximately 3 metres below ground level.

[2] Geological Map of New Zealand, 1:250,000, I.C. McKeller, 1966, Department of Scientific and Industrial Research, Wellington, New Zealand.

3 Summary of Site History

The site history for the area has been investigated in the Preliminary Environmental Site Assessment report prepared by SKM. The following is a summary of that report, and incorporates further information gathered by Tonkin & Taylor whilst on site for intrusive investigations.

3.1 General Site History

The area is generally located on reclaimed land, thought to have been reclaimed since approximately 1872. Reclamation took place over a number of years, and was completed at the site by 1909. Further reclamation of the surrounding area continued until the 1930's.

The SKM report notes that a wide variety of materials were used to reclaim the site, including mine tailings, industrial and domestic waste. The source of any mine tailings was not reported by SKM. It was apparent from subsequent Tonkin & Taylor intrusive investigations that the majority of fill material is hydraulic fill consisting of silts and clayey silts.

Development of individual lots may have occurred prior to 1921, when the first land parcels are identified on a historic map. The only significant development of note visible on the earliest aerial photograph (1941) is the wool store building at 64 Parry Street.

3.2 Individual Land Parcel History

The following sections briefly describe the site history for each lot. These summaries are based on the SKM report. Refer to figure 2 for lot locations.

3.2.1 1 Awatea Street

The earliest available recorded information states the site was used as a "vehicle testing station" from 1954 to at least 1962. A new building was constructed on site in 1982, and used by "Irvine Plumbing and Heating". It is currently occupied by Central Radio Services, who install and service radio communications equipment.

3.2.2 2 Awatea Street

This lot was originally used as a milk supply station, from 1950 to at least 1983. The site may have been used by a fisheries company from 1983-1991. In 1991, consents were issued for use of the site as a tannery and for leatherwork.

The lot was also formerly occupied by the Gourmet Ice-cream Company, who appear to have been the most recent occupiers. Buildings on the site are currently vacant.

3.2.3 5 Awatea Street

The lot was originally used as a "MAF fumigation plant", from 1965. The type of fumigants used is not described in the SKM report. The building is currently occupied by "Biolab" and "Technical Glass", both of whom supply scientific products. Technical Glass manufactures some glassware on site.

3.2.4 8 Awatea Street

The SKM report indicates that this lot was used as "Milk Supply and Treatment Station" in 1948, to at least 1967. Coolrooms, a laboratory, and foundations for a milk silo were added between 1967 and 1978. The lot is currently vacant, with all buildings removed.

3.2.5 9 Awatea Street

The lot appears to have been developed for use in approximately 1950, and was in use as a cool store in 1957. The lot is currently occupied by Fonterra and is used as a cool store predominantly for storing cheese. Discussions with site staff indicate that the present building was constructed in the 1990's, and the foundations are piled to a depth of 14m.

3.2.6 37 Parry Street

The lot was developed with miscellaneous buildings constructed from 1967. Currently one shed on site is being used as a workshop for a screen printer. A domestic dwelling may have once been occupied on the lot. The lot is also used for storage of partially dismantled vehicles.

3.2.7 58 Parry Street

A building was first erected on this lot in 1972, although the use at this time is unclear. The current occupiers indicated that the site was used by previous occupiers as a transport yard and vehicle repair workshop. The lot is currently occupied by "Nitron", a fertiliser manufacturer.

3.2.8 64 Parry Street

The history for this lot indicates it has been in use as a wool store since at least 1949. The lot is still currently being used as a woolstore.

3.2.9 77 Parry Street

The original use of this lot appears to have been a timber storage yard and sawmill from 1948. It is not clear if the lot has been used for the treatment of sawn timber. Otago Regional Council and Dunedin City Council databases were searched by SKM. The Regional Council records indicate the site was used for chemical manufacture (1965-1971) and asbestos manufacture & disposal (1971-1975). The Dunedin City council records however show timber processing occurred at the site until 1980. The consents indicate that the lot was used as a woolscour from 1980. The lot is currently occupied by Fletcher Steel and Icon Logistics. The lot is partially used as a wool store, and partially for constructing reinforcing steel rods and steel mesh.

4 Potential Sources of Contamination

The site history has indicated a wide range of site uses, each with the potential to cause ground contamination. Land uses such as the milk factory, ice-cream factory and cool store may have caused minor contamination from hydrocarbons stored on site or used in any vehicles on the site (eg forklifts). Cleaning agents (eg caustic soda) may also have been stored on the site.

Tanneries, woolscours and other industrial processes have a high potential to have caused widespread contamination on the site. Solvents, hydrocarbons and metals are all used in these industries.

Potential contaminants and their possible distribution have been collated from data presented by SKM and inferred from past Tonkin & Taylor investigations on sites with a similar history. Table 1 summarises this information:

Table 1: Potential Contaminants and Distribution.

Address	Land use	Potential Contaminants	Potential Distribution
1 Awatea	Vehicle testing	Metals, PAH, TPH	Surficial soils. Minor potential for contamination, distributed across the site.
2 Awatea	Milk Treatment Fish processing	TPH, solvents	Surficial soils. Minor potential for contamination, distributed across the site. May be localised around any boilers.
5 Awatea	Fumigation	Pesticides	Surficial soils around any chemical storage areas. Moderate potential for contamination.
8 Awatea	Milk Treatment Leather tanning	VOC, SVOC, TPH	Widespread through fill material. Moderate potential for contamination across the site.
9 Awatea	Cool store	TPH	Surficial soils. Minor potential for contamination, distributed across the site.
58 Parry	Substation, workshop	PCB, TPH, PAH	Surficial soils. Minor potential for contamination, adjacent to and under the substation and workshop/pit areas.
	Fertiliser manufacture	Hydrocarbons, acids, nitrates	Surficial soils. Minor potential for contamination, distributed across the site.
64 Parry	Wool storage,	TPH	Surficial soils. Minor potential for contamination, distributed across the site.
	Possible UST's	TPH, PAH	Potential contamination around and under any UST on the site.

Table 1 continued on next page

Table 1, Continued

Address	Land use	Potential Contaminants	Potential Distribution
77 Parry	Timber treatment,	Metals (Cu, Cr, As), PCP, solvents	Widespread through fill material, and surficial soils where treated timber stood for long periods. Moderate-high potential for contamination across the site.
	Tanning Wool Scour	VOC, SVOC, TPH	Widespread through fill material. Possible hotspots around former storage tanks. Moderate potential for contamination across the site.
	Asbestos production and disposal	Asbestos	Widespread through surficial soils. Possible significant volumes at disposal sites.
	Chemical Manufacture	VOC, SVOC, PAH	Widespread through fill material. Possible hotspots around former storage tanks.
Site-wide		Metals, PAH	Widespread through fill material. Moderate potential for contamination across the site.

5 Intrusive Ground Investigation

5.1 Sampling Strategy

A soil sampling plan was developed in accordance with Ministry for the Environments Contaminated Land Management Guidelines[3]. Soil sample locations were initially selected using a systematic grid pattern. After a site inspection, the pattern was adapted on each lot to incorporate restrictions, such as access and obstructions.

The initial proposal included approximately 110 soil sample locations. Sixty-one soil sample locations were readily accessible for contamination testing on the site during the period 8-17 November 2007. On some individual lots all of the required sample locations were investigated, on others only a small proportion of the specified locations were sampled. This report and its conclusions should therefore be considered to be preliminary until the remaining locations are sampled.

5.2 Sampling Procedure

Soil samples were collected using either a mechanical excavator, an auger, or in the case of some surficial samples, a spade. Samples were collected at a range of depths, generally consisting of 0.0m, 0.5m, 1.0m and every metre thereafter at each location.

Soil samples were collected directly from the test pit wall where possible, or material freshly collected in the excavator bucket or attached to the auger head, using clean nitrile gloves for each sample.

Samples were placed directly into glass jars, and stored in a chillybin with an icepack, or packed with ice. Samples were dispatched to Hills Laboratories in Hamilton in the chilled container with a chain of custody form.

Selected samples were scheduled for analysis based on the potential contaminants thought to exist in the area, and observations of the subsurface. The remainder of the samples were held cold at the laboratory to allow for further analysis if required.

5.3 Site Conditions

The area is underlain by fill at varying depths. Typically, hard fill material is found in the first 1-2 metres. This consists of silt, gravel, sand, brick, metal, concrete and occasionally some refuse. Beneath the hard fill was generally marine "hydraulic fill", consisting of silty clay and silt, with some sand, to at least 4m depth.

Occasional shell layers were encountered between the hard fill and the hydraulic silts. This shell layer contained a large number of conical shells, and often contained perched water. Collapse of this layer resulted in the termination of several test holes.

Historic landfill materials were encountered in several pits in the western end of the site, in the Calder Stewart site and the north western end of the Fonterra coolstore. The depth to this landfill material is approximately 2m, which was below the groundwater table. The landfill contains glass, ceramics, metal and timber. The material is thought to date from the early 20th century, when Lake Logan was filled for land reclamation purposes.

[3] Contaminated Land Management Guideline No. 5, Site Investigation and Analysis, MfE 2003.

Conditions encountered at individual sites are listed below, and full test pit logs are in Appendix C:

5.3.1 1 Awatea Street

The site is approximately 0.05ha in size, and is located on the corner of Parry, Leander and Awatea Streets. The site is occupied by a building consisting of a workshop and office space. A small grass area is present on the northern and eastern sides of the site.

Two auger holes were dug on this site, and a surficial soil sample was also collected at a 3rd location. The location of the holes was limited by the presence of services. Ground conditions encountered were fill, consisting of silt with bricks, glass and concrete, underlain by sand with abundant shells and hydraulic fill (silt and clayey silt).

5.3.2 2 Awatea Street

The site is approximately 0.26ha in size. The site was most recently occupied by the Gourmet Ice-cream Company, and consists of two buildings, both of which appear to be freezers or chillers, as well as office space. The buildings were vacant at the time of the site investigation. A large concrete pad is also present between the two buildings.

A strong solvent smell was observed in test pit TTP 48. Hydraulic fill was encountered less than 1m from the ground surface at this site. The hydraulic fill was overlain by gravelly silt and gravel.

5.3.3 5 Awatea Street

The site is approximately 0.16ha in size, and is dominated by a single building. The building is currently occupied by "Biolab" and "Technical Glass", who make glass products for the industrial and sciences industry.

Permission to access the site had not been granted at the time of this investigation. Ground conditions have therefore not been observed.

5.3.4 8 Awatea Street

The site is approximately 0.5 hectares in size. The site is currently vacant, with all buildings removed.

Ground conditions varied slightly across the site. The site is generally covered by gravel and a layer of concrete approximately 150mm thick. General fill, often consisting of silt, gravel, brick and boulders underlies the surficial strata. Hydraulic fill was encountered in test pits at less than 1m depth in some test pits.

In the western corner, landfill material was encountered at approximately 2.5m depth. The landfill material generally consisted of saturated silt and sand, with glass bottles, ceramics, occasional timber and metal. An odour of putrescible waste was noted in some test pits in this area. The landfill is overlain by hydraulic fill as encountered elsewhere on the site. The landfill material is below the groundwater level, which was typically at 2m below ground level.

5.3.5 9 Awatea Street

The site is currently occupied by Fonterra and is used as a coolstore for storing cheese. Site access was limited to a series of auger holes on the Awatea Street and Anzac Avenue frontage, and 3 test pits on the southern edge of the site.

Ground conditions were generally consistent across the site, with a silt or sandy silt upper horizon, underlain by hydraulic fill. One test pit, TTP 43, encountered what appeared to be natural alluvium at the base of the hole. Landfill material was encountered in two test holes, TTP 36 and TTP 37, at 2.1 and 2.7m respectively.

5.3.6 37 Parry Street

The site is 0.14 ha in size, and is located alongside the Water of Leith. Test pits were advanced adjacent to the channelised wall of the Leith, and slightly further north from the retaining walls. Ground conditions were consistent across the site, consisting of fill (topsoil, silt, gravel, etc) to approximately 1m, underlain by hydraulic fill.

5.3.7 58 Parry Street

The site is currently occupied by "Nitron", a fertiliser manufacturer. Permission to access the site had not been granted at the time of this investigation. Ground conditions have therefore not been observed.

5.3.8 64 Parry Street

The site is currently being used as a woolstore, and this building covers 95% of the site. Two test pits were excavated at the southern end of the woolstore. Hydraulic fill was encountered at approximately 1.3-1.4m depth, above which was general fill consisting of sand, shells and gravels. It appears that a railway siding once ran alongside the woolstore in the vicinity of the test pits. This was evident from railway ballast in the top 0.5m of test pit TTP55.

5.3.9 77 Parry Street

The site is currently occupied by Fletcher Steel and Icon Logistics. For convenience of reporting, it has been divided two areas, as described below:

5.3.9.1 Fletcher Steel Yard

The Fletcher Steel yard comprises the western portion of the site (0.9ha), including all the area north of the former woolscour buildings, and the asphalt area in the south west corner of 77 Parry Street.

Ground conditions on this site were consistent, with hard fill material generally present to approximately 1m depth, underlain by silts, shells and occasional boulders. Hydraulic fill underlies the general fill material.

An underground storage tank was noted at this location. It appears to have an inlet coming from the former wool scour building. It is possible this tank was used to store waste water from the wool scouring process. The UST location is shown on Figure 2, Appendix A.

5.3.9.2 Icon Logistics Yard

The Icon Logistics yard comprises the far eastern end of the site and is 0.3ha in area. It is predominantly unsealed. Ground conditions on this property varied slightly from the remainder of the site. Ground water entered test pits at approximately 1m depth, primarily from a layer of shells and sand encountered at approximately 1m. The sandy shell layer readily collapsed and prevented deeper excavations on this site.

6 Human Health Guideline Values

Analytical results were evaluated by comparison with the relevant soil acceptance criteria referenced in the Ministry for the Environment (MfE), Contaminated Land Management Guidelines No.2: Hierarchy and Application in New Zealand of Environmental Guidelines. Relevant acceptance criteria are provided in the following guidelines:

- Ministry of Health (MoH) (1997): Health and Environmental Guidelines for Selected Timber Treatment Chemicals (TTCG)
- MfE (1999) Guidelines for Assessing and Managing Petroleum Hydrocarbon Sites in New Zealand (GAMPH)
- Guidelines for Assessing and Managing Contaminated Gasworks Sites in New Zealand (MfE, 1997)

Where relevant New Zealand guidelines were not available, the following international risk based guidelines were used;

- Region 6 Human Health Medium - Specific Screening Levels (United States Environmental Protection Agency, 2002)
- Department of Environment, Food and Rural Affairs (DEFRA) and Environment Agency (United Kingdom, 2002) Soil Guideline Values (sandy soils)

Given the proposed zoning, the end use of the site is anticipated to be sports stadiums, educational buildings and will be predominantly capped with buildings or pavement.

Guideline values for industrial/commercial use were considered appropriate to evaluate human health risk for the likely range industrial end uses. Maintenance worker guidelines have also been considered, for the protection of construction and maintenance workers during ground breaking activities.

Published background levels of contaminants in soils from the Dunedin area are not available for comparison.

No significant ecological receptors have been identified at the site. The site is located in an industrialised area, with limited open space. Groundwater beneath the site may be affected, but further investigation has not been included in the scope of this report. No groundwater samples were collected or submitted for analysis. As a consequence, the potential effects on the coastal marine environment have also not been included in this report.

7 Laboratory Results

7.1 Laboratory Testing

Approximately 170 soil samples were submitted to Hills Laboratory in Hamilton and scheduled for analysis as follows:

- 83 samples were tested for a range of metals.
- 83 samples were tested for PAH.
- 14 samples were tested for TPH.
- 13 samples were tested for VOC & SVOC.
- 4 samples were tested for PCB.
- 6 samples were tested for PCP.

The remaining samples were submitted to the laboratory and instructed to be held cold for 6 weeks in the event further testing was required.

7.2 Results of Laboratory Analysis

Laboratory analysis returned a range of results. Metal results varied across the site returned a range from not detected to, in the case of lead, in excess of 10,000 mg/kg.

Three samples at the site exceeded the adopted human health guideline value for lead:

- TTP 05, 3.0m (>10,000mg/kg)
- TTP 07, 3.0m (2,100 mg/kg)
- TTP 22, 2.0m (3,200 mg/kg)

One sample, TTP 19 (0.0m), exceeded the adopted human health guideline for TPH

- C10-C14 (1,900 mg/kg)
- C15-C36 (37,000 mg/kg)

PAH were detected in most samples. Benzo(a) pyrene equivalent was calculated, and ranged from 0.04 mg/kg to 10.06 mg/kg. Benzo(a) pyrene equivalent did not exceed the guideline value in any samples.

Table 2: Range of detected contaminants (mg/kg)

	As	Cd	Cr	Cu	Pb	Ni	Zn	B(a)P equiv	C7-C9	C10-C14	C15-C36
Min.	<2	<0.1	<2	<2	4.4	<2	6	0.04	<8	<20	<30
Max.	240	6.9	150	5800	>10,000	50	5,500	10.06	50	1,900	37,00
Guideline Value[1]	500	563.2	360	210,000	700	500	100,000	11	120	1,500	20,000

1- refer to tables 4-6 for derivation of guideline values

Full laboratory transcripts are shown in Appendix B. Summarised tables of the analytical results are presented in Tables 4-6.

7.3 Quality Assurance

Upon receipt of the laboratory results, the data sets were evaluated against historical site information, and past test results from sites with similar history. Based on this review the analytical data were considered representative of site conditions and suitable for interpretation. Standard laboratory QA/QC reports were not examined as part of this project, but are available from the laboratory on request.

Duplicate samples were collected for 4 sample sets. Three of these duplicates were submitted for laboratory analysis, along with the corresponding soil sample. The results show limited variation between the two data sets, and are displayed in Table 3, below.

Relative percentage differences were calculated for each data set. Ideally these would show variation of less than 30%. The data generally complied with this requirement, with the exception of TTP22/Duplicate C, zinc. It is possible minor variation occurs as samples are never exact duplicates, as the fill material is not homogenous.

Table 3: Duplicate Laboratory Results (mg/kg)

Sample	Arsenic	Cadmium	Chromium	Copper	Lead	Nickel	Zinc
TTP15 0.0M	12	0.7	20	39	60	12	290
Duplicate A	10	0.51	20	31	50	12	230
Relative percentage difference (%)	16.7	27.1	0.0	20.5	16.7	0.0	20.7
TTP23 0.5m	< 2.0	< 0.10	2.1	< 2.0	1.2	< 2.0	6
TTP23 A (Duplicate)	< 2.0	< 0.10	< 2.0	< 2.0	1.1	2.3	6.1
Relative percentage difference (%)	0	0	-	0	-8.3	-	1.7
TTP22 2.0m	19	0.5	31	280	3200	56	400
Duplicate C	20	0.61	30	290	2500	52	690
Relative percentage difference (%)	5.3	22.0	3.2	3.6	21.9	7.1	72.5

Table 4: Metals, All Areas

	Sample/depth	Arsenic	Cadmium	Chromium	Copper	Lead	Nickel	Zinc
Magnet Street	TTP 01 0.0m	15	< 0.10	10	29	23	17	56
	TTP 02 0.0m	8.5	0.33	11	35	100	14	99
	TTP 03 0.0m	14	0.33	29	66	130	21	180
	TTP 04 0.0m	11	0.17	28	63	32	20	110
1 Awatea Street	TTP 56 0.0m	8.3	0.46	23	120	480	15	400
	TTP 57 0.0m	6.5	0.78	13	42	140	13	390
	TTP 58 0.0m	11	0.48	25	49	130	20	290
2 Awatea Street	TTP08 0.0m	5	0.54	< 2.0	6	19	< 2.0	140
	TTP08 0.5m	6.2	0.59	11	14	42	9.1	190
	TTP09 0.5m	5.2	0.75	7.7	14	36	5.7	200
	TTP47 0.5m	6.9	0.2	51	23	33	33	140
	TTP48 0.5m	5.7	0.12	40	13	15	28	76
	TTP48 1.0m	14	0.32	61	34	60	43	190
8 Awatea Street	TTP 05 0.0m	4.6	0.69	< 2.0	6.3	23	< 2.0	140
	TTP 05 0.5m	4.2	0.65	< 2.0	30	26	< 2.0	150
	TTP 05 3.0m	46	6.9	98	5800	> 10000	42	5500
	TTP 06 0.0m	5.4	0.6	< 2.0	7.6	22	< 2.0	150
	TTP 07 0.0m	5.3	0.5	< 2.0	6.4	21	< 2.0	140
	TTP 07 3.0m	27	1.3	28	800	2100	50	1100
	TTP21 0.0m	4.4	1.8	< 2.0	8.3	23	< 2.0	150
	TTP21 0.5m	3.9	0.42	< 2.0	8.2	16	< 2.0	140
	TTP22 0.6m	3	0.17	12	25	45	15	88
	TTP22 2.0m	19	0.5	31	280	3200	56	400
	TTP23 0.5m	< 2.0	< 0.10	2.1	< 2.0	1.2	< 2.0	6
	TTP23 A	< 2.0	< 0.10	< 2.0	< 2.0	1.1	2.3	6.1
	TTP24 0.0m	3.7	0.67	2.7	21	22	< 2.0	170
	TTP24 0.5m	4.9	0.58	12	130	210	10	210
	TTP24 2.0m	5.1	0.14	31	14	20	25	92
	TTP25 0.5m	5.1	0.28	55	25	50	10	190
	TTP26 0.5m	3.5	0.12	15	8.3	30	12	48
	TTP26 1.0m	11	0.21	53	23	30	47	130
	TTP28 0.5m	2.9	0.72	5.1	7.2	14	< 2.0	120
	TTP29 0.5m	5.3	0.18	46	18	21	40	100
	TTP29 1.0m	16	0.34	43	26	40	31	160
	TTP 53 0.0m	11	0.48	25	49	130	20	290
	TTP 61 0.0m	5.4	0.61	9.8	20	40	6.6	270
9 Awatea Street	TTP31 0.0m	7.3	0.58	23	38	120	20	210
	TTP32 0.5m	6	0.21	29	19	45	24	100
	TTP33 0.0m	9.8	0.48	26	51	92	27	190
	TTP34 0.5m	6.5	0.27	35	24	49	29	140
	TTP35 0.0m	9.8	0.47	25	32	120	21	180
	TTP36 0.5m	6.4	0.14	15	8.4	24	17	52
	TTP37 0.0m	6.7	0.4	28	32	110	23	160
	TTP38 0.5m	6.3	0.32	25	150	310	22	200
	TTP42 0.0m	4.8	0.54	74	48	34	26	880
	TTP43 0.0m	3.7	0.8	5.1	15	34	2.8	130
	TTP44 0.5m	10	0.2	36	16	20	25	100

	Sample/depth	Arsenic	Cadmium	Chromium	Copper	Lead	Nickel	Zinc
37 Parry Street	TTP40 0.0m	6.4	0.65	15	120	88	13	390
	TTP41 0.5m	6.7	0.15	24	24	18	16	73
	TTP45 0.5m	7.2	0.28	24	17	83	17	300
	TTP46 0.0m	18	0.86	17	28	61	10	270
64 Parry Street (woolstore)	TTP 54 0.0m	8.8	0.6	35	43	150	28	370
	TTP 55 0.0m	3.9	0.4	14	12	20	8.5	150
77 Parry St (Fletchers Yard)	TTP13 0.5m	8.5	0.61	20	33	170	13	300
	TTP13 0.7m	6	0.25	7.6	9.2	25	6.8	68
	TTP14 0.0m	6.7	0.42	12	18	34	6.9	180
	TTP14 0.5m	11	0.17	12	37	51	8.6	110
	TTP15 0.0m	12	0.7	20	39	60	12	290
	TTP16 0.5m	7.4	0.12	24	120	52	17	100
	TTP16 1.2m	17	0.34	11	400	490	20	170
	TTP17 0.0m	14	0.65	19	36	57	11	280
	TTP18 0.25m	28	0.59	22	32	52	14	1200
	TTP19 0.0m	6.8	0.5	39	120	27	28	720
	TTP20 0.0m	16	0.7	25	83	190	14	290
	TTP27 0.1m	4.7	0.66	2.6	12	26	2.9	180
	TTP27 0.5m	8.8	0.23	14	25	17	18	58
	TTP27 1.4m	7.5	< 0.10	10	4.5	4.4	7.8	27
	TTP39 0.0m	16	0.59	17	29	79	11	170
	TTP49 0.5m	240	0.14	150	210	66	18	80
	TTP50 0.5m	9.7	0.38	32	26	140	19	260
	TTP 51							
	TTP 52 0.0m	20	0.33	38	31	130	3.8	240
77 Parry St (Icon Truck Yard)	TTP10 0.5m	10	0.17	14	94	44	25	37
	TTP11 0.0m	7.3	0.93	10	12	35	6.7	180
	TTP11 0.5m	3.7	0.21	2.2	3.2	8.5	2	37
	TTP12 0.0m	5.3	0.57	4.3	9.8	28	2.8	170
	TTP12 0.5m	5.1	0.26	40	16	28	26	110
	TTP30 0.0m	4.6	0.45	4.1	10	22	3	150
	TTP30 0.5m	6.4	1.5	5.2	11	59	2.2	180
	TTP 59 0.5m	8.8	0.6	35	43	150	28	370
	TTP 60 0.0m	3.9	0.4	14	12	20	8.5	150
Guideline Values (Industrial Land Use)		500[1]	563.3[2]	360[1] (Cr V) NL[1] (Cr III)	210,000[1]	700[3]	500[3]	100,000[2]
Guideline Values (Maintenance)		1200[1]		520[1]	260,000[1]			

Notes

1- Ministry of Health (MoH) (1997): Health and Environmental Guidelines for Selected Timber Treatment Chemicals (TTCG)

2- Region 6 Human Health Medium - Specific Screening Levels (US EPA, 2002)

3 - DEFRA and EA (2002) Soil guideline values

Cells highlighted grey exceed the adopted Human Health Guideline levels.

Table 5: TPH and Benzo(a) Pyrene equivalent.

Site Location	Sample/ Depth	Equivalent B(a)P	C7 – C9	C10 – C14	C15 – C36	Total hydrocarbons (C7 – C36)
Magnet Street	TTP 01 0.0m	-				
	TTP 02 0.0m	0.05				
	TTP 03 0.0m	1.40				
	TTP 04 0.0m	0.19				
2 Awatea St	TTP08 0.0m	-				
	TTP08 0.5m	1.43				
	TTP09 0.5m	0.36				
	TTP47 0.5m	0.82				
	TTP48 0.5m	0.31	< 9.9	< 20	< 30	< 60
	TTP48 1.0m	0.67	45	99	100	250
8 Awatea Street (Calder Stewart)	TTP 05 0.0m	-				
	TTP 05 0.5m	-				
	TTP 05 3.0m	2.81	< 17	< 23	200	200
	TTP 06 0.0m	-				
	TTP 07 0.0m	-				
	TTP 07 3.0m	4.10				
	TTP21 0.0m	-				
	TTP21 0.5m	-				
	TTP22 0.6m	3.09				
	TTP22 2.0m	3.31	< 13	61	160	230
	TTP23 0.5m	-				
	TTP23 A	-				
	TTP24 0.0m	-				
	TTP24 0.5m	2.79				
	TTP24 2.0m	0.16	< 10	< 20	< 30	< 60
	TTP25 0.5m	0.07				
	TTP26 0.5m	0.18	50	530	< 30	600
	TTP26 1.0m	0.46	< 9.1	< 20	< 30	< 60
	TTP28 0.5m	0.07				
	TTP29 0.5m	0.50	< 8.2	< 20	< 30	< 60
	TTP29 1.0m	0.15	< 11	< 20	< 30	< 60
9 Awatea St (Fonterra)	TTP31 0.0m	1.14				
	TTP32 0.5m	0.40				
	TTP33 0.0m	0.58				
	TTP34 0.5m	0.66				
	TTP35 0.0m	1.41				
	TTP36 0.5m	0.25				
	TTP37 0.0m	1.54				
	TTP38 0.5m	2.43				
	TTP42 0.0m	-				
	TTP43 0.0m	0.21				
	TTP44 0.5m	0.09				
37 Parry St	TTP40 0.0m	6.95				
	TTP41 0.5m	0.15				
	TTP45 0.5m	0.40				
	TTP46 0.0m	0.12				

Site Location	Sample/ Depth	Equivalent B(a)P	C7 – C9	C10 – C14	C15 – C36	Total hydrocarbons (C7 – C36)
77 Parry Street (Fletchers Yard)	TTP13 0.5m	10.06				
	TTP13 0.7m	0.19				
	TTP14 0.0m	0.04				
	TTP14 0.5m	0.42				
	TTP15 0.0m	0.04				
	TTP16 0.5m	0.40				
	TTP16 1.2m	0.64				
	TTP17 0.0m	0.14				
	TTP18 0.25m	0.10				
	TTP19 0.0m	-	41	1900	37000	39000
	TTP20 0.0m	0.99				
	TTP27 0.1m	0.01	< 8.0	< 20	44	< 60
	TTP27 0.5m	0.14	< 8.3	< 20	120	140
	TTP27 1.4m	0.03	< 8.4	130	230	360
	TTP39 0.0m	0.27				
	TTP49 0.5m	0.14				
	TTP50 0.5m	1.16				
77 Parry Street (Icon Yard)	TTP10 0.5m	0.07				
	TTP11 0.0m	-				
	TTP11 0.5m	0.065				
	TTP12 0.0m	-				
	TTP12 0.5m	0.23				
	TTP30 0.0m	0.007				
	TTP30 0.5m	-				
Guideline Value (Industrial)		11[1]	120[1]	1500[1]	20,000[1]	
Guideline Value (Maintenance)		25[1]	120[1]	6500[1]	NA[1]	

1 MfE (1999) Guidelines for Assessing and Managing Petroleum Hydrocarbon Sites in New Zealand (GAMPH)

NA= Not applicable

Table 6: VOC, SVOC (detected only)

	m&p-Xylene	n-Propyl-benzene	1,2,4-Trimethyl-benzene	1,3,5-Trimethyl-benzene
TTP48 1.0m	1.5	1.1	5.1	1.7
Guideline (industrial)	68,000[1]	237.09[2]	170.92[2]	69.91[2]
Guideline (Maintenance)	220,000[1]	NA	NA	NA

1- Guidelines for Assessing and Managing Contaminated Gasworks Sites in New Zealand (MfE, 1997)

2- Region 6 Human Health Medium - Specific Screening Levels (US EPA, 2002)

NA= Not available

8 Discussion of Laboratory Results

Soil samples analysed by the laboratory returned a range of results, generally the results were low, although levels of metal contaminants were found that were significantly above the guidelines.

Although no study is available as to background levels of metals in Dunedin soils, laboratory results show metals were often detected at comparatively low levels, which may be indicative of naturally occurring concentrations. Some notable exceptions include samples from historic landfill material encountered at approximately 2m depth at 8 Awatea Street, where lead concentrations in some samples were up to ten times (>10,000mg/kg) the adopted human health guideline values (commercial/industrial and maintenance/excavation land use). The landfill material was also noted in two test pits at 9 Awatea Street at a similar depth, however landfill material samples from these pits were not submitted for laboratory analysis.

PAH were detected in most soil samples tested. Some natural processes may result in PAH contamination, however this is usually at very low or undetectable levels. It is most likely that the PAH levels found at this site are the result of anthropogenic activities, eg combustion of material in boilers. PAH levels did not exceed the adopted human health guidelines in any sample.

TPH, VOC and SVOC were detected in some soil samples. The majority of the samples tested for VOC and SVOC were non-detects, ie below the laboratory limit of detection. With the exception of TPH in TTP 19 (0.0m), all soil samples analysed for TPH, VOC and SVOC are below the adopted human health guideline values (industrial/maintenance land use).

Only four of the 83 scheduled soil samples have returned levels of contaminants above adopted human health guideline values for industrial/commercial and maintenance (excavation) land use. The exceedences are confined to two lots, 8 Awatea Street and 77 Parry Street.

Results for all other lots were below the adopted human health guideline values (industrial/commercial and maintenance), which indicates that the contamination within the soils are unlikely to preclude the use of the site for the activities allowed under the proposed zone (spectator events and education).

8.1 8 Awatea Street

Metal contamination was detected in soils at 8 Awatea Street, from within landfill material encountered at approximately 2-3m depth. The landfill material consisted of saturated silt and sand with abundant glass, ceramic, metal, timber and other organic material.

Lead was detected above human health guideline levels in 3 samples (2100->10,000 mg/kg), all from within refuse material on the site. Levels of other metal contaminants chromium, copper, nickel and zinc were significantly elevated above levels found elsewhere on the site, although below the human health guideline value for industrial/commercial land use.

PAH was detected in soil samples from this site, but detected levels were not above the adopted values for protection of human health (industrial/commercial and maintenance/excavation land use).

8.2 77 Parry Street

8.2.1 Fletcher Construction Yard

TPH was found above human health guideline values in soils on the site. One sample, TTP 19 (0.0m), exceeded the guideline values for C10-C14 and C15-C36 (detected at 1,900 and 37,000 mg/kg respectively). Surficial oil staining was noted in this location, and it is likely the contamination is restricted to surficial soils with the oil staining.

Contaminants including metals and PAH were also detected in other soils on the site. Levels of these contaminants were below the adopted values for protection of human health (industrial/commercial and maintenance/excavation).

A strong solvent-like odour was noted in TTP 27, at the south-western end of this site. The source of the odour was not determined. Soil samples taken from TTP 27 were tested for PAH, TPH and VOC/SVOC. PAH and TPH were detected at low levels from these samples, VOC and SVOC were below the laboratory limit of detection. Soil samples from TTP 27 did not exceed the adopted human health guideline values.

9 Implications for Proposed Development

While a number of exceedences of the human health guidelines were found on the site, the isolated nature of these exceedences, and the depth at which they were found means that they are unlikely to cause adverse human health effects during the long term use of the site for activities allowed under the proposed Spectator events and Education zone. If these contaminated soils are to be exposed during construction, certain precautions, and some targeted remediation may be required.

The need for targeted remediation and a Remediation Action Plan will depend on the location of any new floor slabs, impervious surfaces, final levels of buildings, the foundation options and the presence of open grassland or recreational spaces. If a RAP is required, it should set out the requirements for on site management or off site removal of any contaminated material. The RAP should clearly identify the extents of areas undergoing remedial works, and provide guidance on correct handling and transportation (if any) of contaminated soils. The RAP should also provide targets for remediation (eg removal of contaminated soils above certain levels, thickness of capping layers etc).

Even if a RAP is not required, it is good practise on sites with isolated areas of elevated contaminants to prepare a comprehensive site wide management plan to ensure worker and environmental health is protected during construction and contaminants aren't transported offsite in an uncontrolled manner (via sediment runoff, air discharge or poor handling practices). Such a plan should be incorporated into the general construction management plan that governs any civil works on site.

It is important to note that while the number of sample locations undertaken so far have broadly characterised the site, large areas of the site have not been sampled due to access constraints or the presence of buildings. The main areas of the site that have yet to be sampled are covered in buildings, mainly the large wool-store on 64 Parry Street ,the Fonterra cool-store on 9 Awatere Street, a fertiliser manufacturer (58-60 Parry Street) and the former Ministry of Fisheries fumigation plant (5 Awatea Street). These buildings are founded on concrete slabs and it is unlikely that activities within the buildings would have caused significant contamination of the soils beneath the buildings. It is expected that the fill materials under these buildings will exhibit a similar character to that found within the rest of the site. Some of the Lake Logan landfill materials may extend under the Fonterra cool-store as the lateral extent of this material has not been defined at this stage.

Given the nature of the sites surface soils (basalt boulders etc), we have assumed that any playing fields would be constructed by excavating the required site and then importing soils that would provide the correct drainage and growing conditions. As the constructed turf is likely to be at least 0.5m to allow for drainage systems, players are unlikely to come into contact with any of the fill material. Depending on the location of turf and the construction details, a barrier membrane (such as a geotextile) may be required at the base of the constructed turf. If the turf is to be constructed directly on the existing soils, the results may need to be reassessed against the parkland/recreational guidelines and specific design may be required.

To ensure that hotspots of a size greater than approximately 25m are identified with a 95% confidence level, as suggested by the MfE guidelines, the additional samples should be undertaken post demolition of the buildings. The timeframes for this additional sampling and reporting should be allowed for in the project timeline.

10 Summary

There are two main sources of potential contamination on the site, the fill material used to reclaim the land and the activities that have been carried out post reclamation. Land uses of concern include a landfill, wool scour, tannery, a fumigation facility, and other industrial activities and processes.

The investigations revealed that the reclamation soil primarily consists of hydraulic marine fill (muds and sands dredged form the harbour) overlain by general hardfill consisting of various soils, basalt boulders and some demolition rubble (concrete etc). The reclamation fill which was used to infill the former Lake Logan also intersects the north-western portion of the site. This fill was found to contain waste materials such as bottles, ceramics and metal.

The number and distribution of samples taken thus far has broadly characterised the hydraulic fill materials on the site. Laboratory results reveal that fill generally contains low levels of contaminants, although some elevated metals concentrations were recorded. A minor exceedence of the TPH guidelines were found from a small patch of oil stained ground on surface soils. The area affected was very small and the contamination would be remediated during the course of general site works.

The main exceedences of the relevant guidelines were found in the fill materials used to reclaim Lake Logan early last century. This fill is a different material than used on the rest of the site, and was found at depths greater than 2m in the north western portion of the site. Lead levels in this fill material were over ten times greater than the guidelines in one sample, and 3-5 times in two other samples. The soils above these samples were significantly below the human health guidelines.

Overall, the site has been broadly characterised and due to the small number of exceedences, and the depth at which they were found, the preliminary results suggest the concentration of contamination within the site would not preclude the use of the site for the proposed activity (Spectator Events and Education Zone). A suitably prepared Site Management Plan could be prepared to ensure that contaminants in the soil do not affect worker health during the construction phase, or get transported off site in an unplanned manner. Depending on the construction required, some targeted remediation may be required. It is expected that this would be relatively small scale and could be undertaken using well established and simple techniques.

To provide a 95% confidence that all hotspots with a diameter larger than 25m are detected across the site, the full set of sample locations should be undertaken. Targeted investigation of other potential sources of contamination, including a solvent-like odour and an Underground Storage Tank (UST) on 77 Parry Street are also recommended.

The landfill material at the western end of the site extended below the local groundwater level. As a consequence, groundwater may be affected and the Otago Regional Council may request further investigation to assess the adverse affects on groundwater quality.

11 Recommended Further Investigations

Areas where investigation was not possible due to access constraints include the former woolscour building (77 Parry Street), a fertiliser manufacturer (58-60 Parry Street), the Fonterra Cool-store (9 Awatea Street) and the former Ministry of Fisheries fumigation plant (5 Awatea Street). Roadways were also not investigated, again due to access restrictions. It is possible base course material for roads may contain contaminants, e.g. gasworks waste.

The initial investigations have broadly characterised the site and show that contamination present in the soils should not preclude the use of the site for the proposed zoning. However, to complete the investigations in accordance with the MfE guidelines for hotspot detection, to provide additional information in certain areas of the site we recommend the full investigation is completed. This additional information will aid in identifying any capital costs related to contaminated ground and minimise any financial overruns or construction delays during the development of the zone

It is recommended that these investigations take place once the site has been cleared of any existing buildings, to allow ease of access.

We recommend:

- Approximately 50 further test pits be excavated on the site in areas inaccessible at the time of this report, as shown on Figure 2, Appendix A.
- Associated laboratory sampling of 50-60 soil samples for a range of potential contaminants identified in the Preliminary Environmental Site Assessment to further characterise the remaining areas of the site.
- Further investigations be undertaken around an underground storage tank located at 77 Parry Street. The UST location is shown on Figure 2, Appendix A.
- Intrusive investigations should be undertaken to determine the source of the solvent odour found in test pits TTP 27 and TTP 48.
- Addition sampling should be undertaken to determine the dimensions of the TPH contamination at 77 Parry Street (Fletcher Steel yard)
- An amended report collating all available information be prepared in accordance with the Ministry for the Environment "Contaminated Land Management Guidelines 1, Reporting on Contaminated Sites in New Zealand".

12 Applicability

This report has been prepared for the benefit of Carisbrook Stadium Trust with respect to the particular brief given to us and it may not be relied upon in other contexts or for any other purpose without our prior review and agreement.

The recommendations and opinions in this report are based on limited preliminary near-surface soil samples and limited historical data. The nature and continuity of surficial and subsoil is inferred by it must be appreciated that actual conditions could vary from the assumed model.

TONKIN & TAYLOR LTD

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Appendix A: Site Location Plans

Appendix B: Laboratory Transcripts and Expanded Tables of Results

Table of PAH results

Site	Sample/ Depth	Acenaphthene	Acenaphthylene	Anthracene	Benzo – [a]anthracene	Benzo[a]pyrene (BAP)	Benzo- [j]fluoranthene	Benzo- [g,h,i]perylene	Benzo- [k]fluoranthene	Chrysene	Dibenzo- [a,h]anthracene	Fluoranthene	Fluorene	Indeno(1,2,3- c,d)pyrene	Naphthalene	Phenanthrene	Pyrene	Equivalent Benzo[a]pyrene (BAP)
Magnet St	TTP 01 0.0m	< 0.026	< 0.026	< 0.026	< 0.026	< 0.026	< 0.026	< 0.026	< 0.026	< 0.026	< 0.026	< 0.026	< 0.026	< 0.026	< 0.13	< 0.026	< 0.026	
	TTP 02 0.0m	< 0.024	< 0.024	< 0.024	0.027	0.034	0.091	0.034	< 0.024	0.042	< 0.024	0.054	< 0.024	< 0.024	< 0.12	0.095	0.056	0.04622
	TTP 03 0.0m	< 0.029	0.15	0.21	0.67	0.89	1.7	0.58	0.64	1.1	0.15	1.7	0.069	0.51	< 0.15	1.1	1.5	1.403
	TTP 04 0.0m	< 0.030	0.032	0.03	0.1	0.14	0.25	0.11	0.071	0.16	< 0.030	0.26	< 0.030	0.074	< 0.15	0.13	0.27	0.1911
2 Awatea St	TTP08 0.0m	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.13	< 0.025	< 0.025	
	TTP08 0.5m	0.05	0.11	0.44	0.85	0.95	1.5	0.61	0.54	1.1	0.14	2.5	0.082	0.46	< 0.14	1.7	2.3	1.436
	TTP09 0.5m	< 0.024	< 0.024	0.041	0.15	0.24	0.37	0.17	0.13	0.23	0.04	0.38	< 0.024	0.13	< 0.12	0.14	0.37	0.3603
	TTP47 0.5m	< 0.030	0.06	0.092	0.41	0.52	1.3	0.4	0.3	0.74	0.067	1	< 0.030	0.25	< 0.15	0.31	0.99	0.8204
	TTP48 0.5m	< 0.033	< 0.033	< 0.033	0.15	0.21	0.53	0.19	0.13	0.37	< 0.033	0.37	< 0.033	0.12	< 0.17	0.15	0.43	0.3067
	TTP48 1.0m	< 0.041	0.055	0.078	0.19	0.41	1.2	0.4	0.29	0.4	0.065	0.91	0.075	0.25	1.2	0.38	0.91	0.672
8 Awatea Street (Calder Stewart)	TTP 05 0.0m	< 0.027	< 0.027	< 0.027	< 0.027	< 0.027	< 0.027	< 0.027	< 0.027	< 0.027	< 0.027	< 0.027	< 0.027	< 0.027	< 0.14	< 0.027	< 0.027	
	TTP 05 0.5m	< 0.026	< 0.026	< 0.026	< 0.026	< 0.026	< 0.026	< 0.026	< 0.026	< 0.026	< 0.026	< 0.026	< 0.026	< 0.026	< 0.13	< 0.026	< 0.026	
	TTP 05 3.0m	< 0.055	0.14	0.15	1.1	1.8	3.5	1.5	1.2	1.7	0.3	1.3	< 0.055	1.2	0.57	0.58	1.3	2.817
	TTP 06 0.0m	< 0.026	< 0.026	< 0.026	< 0.026	< 0.026	< 0.026	< 0.026	< 0.026	< 0.026	< 0.026	< 0.026	< 0.026	< 0.026	< 0.13	< 0.026	< 0.026	0
	TTP 07 0.0m	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.13	< 0.025	< 0.025	0
	TTP 07 3.0m	< 0.039	0.29	0.78	2.1	2.7	4.6	1.7	1.8	3.4	0.38	5.9	0.2	1.4	0.23	3.6	5.1	4.104
	TTP21 0.0m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0
	TTP21 0.5m	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.13	< 0.025	< 0.025	0
	TTP22 0.6m	0.11	0.097	0.75	1.7	1.9	4.7	1.7	2	2.8	0.24	4.1	0.17	0.81	< 0.15	2.1	3.8	3.089
	TTP22 2.0m	0.094	0.091	1.3	2.3	2.1	4.8	1.6	2	3.6	0.19	6.7	0.53	0.76	< 0.22	5.4	6.1	3.312
	TTP23 0.5m	< 0.024	< 0.024	< 0.024	< 0.024	< 0.024	< 0.024	< 0.024	< 0.024	< 0.024	< 0.024	< 0.024	< 0.024	< 0.024	< 0.12	< 0.024	< 0.024	
	TTP23 A	< 0.027	< 0.027	< 0.027	< 0.027	< 0.027	< 0.027	< 0.027	< 0.027	< 0.027	< 0.027	< 0.027	< 0.027	< 0.027	< 0.14	< 0.027	< 0.027	
	TTP24 0.0m	< 0.026	< 0.026	< 0.026	< 0.026	< 0.026	< 0.026	< 0.026	< 0.026	< 0.026	< 0.026	< 0.026	< 0.026	< 0.026	< 0.13	< 0.026	< 0.026	
	TTP24 0.5m	< 0.028	< 0.028	0.67	1	2.1	2.2	0.97	1.1	2.2	0.18	3.6	< 0.028	0.61	< 0.14	1.5	3.1	2.793
	TTP24 2.0m	< 0.022	< 0.022	0.032	0.051	0.12	0.2	0.11	0.093	0.15	< 0.022	0.3	< 0.022	0.077	< 0.11	0.073	0.25	0.1636
	TTP25 0.5m	< 0.023	< 0.023	< 0.023	0.026	0.056	0.058	0.051	0.049	0.04	< 0.023	0.12	< 0.023	0.035	< 0.12	0.038	0.094	0.0732
	TTP26 0.5m	< 0.022	< 0.022	< 0.022	0.045	0.15	0.12	0.076	0.076	0.12	< 0.022	0.18	< 0.022	0.04	0.24	0.065	0.16	0.1793
	TTP26 1.0m	< 0.023	< 0.023	< 0.023	0.11	0.31	0.37	0.17	0.19	0.32	0.064	0.63	< 0.023	0.15	< 0.12	0.12	0.5	0.4592
	TTP28 0.5m	< 0.023	< 0.023	< 0.023	0.029	0.056	0.099	0.051	0.052	0.076	< 0.023	0.14	< 0.023	< 0.023	< 0.12	0.09	0.11	0.07476
	TTP29 0.5m	< 0.022	< 0.022	0.029	0.15	0.34	0.41	0.2	0.19	0.45	0.07	0.66	< 0.022	0.15	< 0.11	0.26	0.66	0.5045
	TTP29 1.0m	< 0.022	< 0.022	0.037	0.028	0.12	0.16	0.092	0.09	0.1	< 0.022	0.32	< 0.022	0.033	< 0.11	0.044	0.24	0.1521
9 Awatea Street (Fonterra)	TTP31 0.0m	< 0.026	< 0.026	0.2	0.38	0.85	1.4	0.46	0.59	0.88	< 0.026	1.4	< 0.026	0.42	< 0.13	0.45	1.2	1.1378
	TTP32 0.5m	< 0.028	< 0.028	< 0.028	0.12	0.32	0.39	0.2	0.15	0.4	< 0.028	0.56	< 0.028	0.11	< 0.14	0.25	0.5	0.401
	TTP33 0.0m	< 0.027	< 0.027	0.071	0.14	0.38	0.62	0.26	0.29	0.39	0.073	0.51	< 0.027	0.18	< 0.14	0.15	0.41	0.5799
	TTP34 0.5m	< 0.030	0.037	0.084	0.35	0.44	0.64	0.33	0.24	0.64	0.067	0.87	< 0.030	0.23	< 0.15	0.34	0.99	0.6594
	TTP35 0.0m	< 0.029	0.11	0.21	0.87	0.91	1.6	0.67	0.56	1.2	0.14	2	0.038	0.48	< 0.15	0.86	2	1.413
	TTP36 0.5m	< 0.028	< 0.028	0.037	0.12	0.16	0.25	0.14	0.083	0.23	0.03	0.29	< 0.028	0.093	< 0.14	0.13	0.32	0.2469
	TTP37 0.0m	< 0.029	0.18	0.31	0.89	1	1.6	0.75	0.59	1.3	0.17	2.2	0.089	0.53	< 0.15	1.5	2.3	1.544
	TTP38 0.5m	0.027	0.2	0.52	1.6	1.6	2.4	1.2	0.96	2.1	0.23	4	0.12	0.82	< 0.14	2.3	3.9	2.429
	TTP42 0.0m	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.13	< 0.025	< 0.025	0
	TTP43 0.0m	< 0.029	0.036	0.047	0.12	0.14	0.41	0.13	0.1	0.25	< 0.029	0.38	< 0.029	0.084	< 0.15	0.31	0.42	0.2139
	TTP44 0.5m	< 0.034	< 0.034	< 0.034	0.04	0.067	0.15	0.081	0.047	0.11	< 0.034	0.091	< 0.034	0.035	< 0.17	0.041	0.12	0.0953
37 Parry St	TTP40 0.0m	0.1	0.87	1.8	4.8	4.5	7.2	3.2	2.6	5.6	0.69	12	0.47	2.4	0.36	7.7	12	6.946
	TTP41 0.5m	< 0.031	< 0.031	< 0.031	0.081	0.11	0.17	0.097	0.052	0.14	< 0.031	0.19	< 0.031	0.064	< 0.16	0.097	0.22	0.1481
	TTP45 0.5m	< 0.028	0.035	0.084	0.18	0.25	0.61	0.26	0.15	0.39	0.042	0.46	< 0.028	0.15	< 0.14	0.25	0.54	0.4049
	TTP46 0.0m	< 0.026	< 0.026	< 0.026	0.052	0.08	0.21	0.077	0.054	0.11	< 0.026	0.12	< 0.026	0.036	< 0.13	0.054	0.14	0.1163

Site	Sample/ Depth	Acenaphthene	Acenaphthylene	Anthracene	Benzo – [a]anthracene	Benzo[a]pyrene (BAP)	Benzo-[j]fluoranthene	Benzo-[g,h,i]perylene	Benzo-[k]fluoranthene	Chrysene	Dibenzo-[a,h]anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene	Equivalent Benzo[a]pyrene (BAP)
Fletchers Yard	TTP13 0.5m	6.9	2.5	7.5	6.7	6.6	11	3.4	3.8	7.6	0.93	19	7	3.1	10	26	17	10.066
	TTP13 0.7m	7.9	0.11	0.14	0.12	0.14	0.26	0.11	0.067	0.15	< 0.046	0.45	1.6	0.071	20	0.59	0.34	0.1933
	TTP14 0.0m	< 0.023	< 0.023	< 0.023	< 0.023	0.033	0.079	0.049	< 0.023	< 0.023	< 0.023	0.052	< 0.023	0.03	0.43	< 0.023	0.058	0.0439
	TTP14 0.5m	< 0.028	0.048	0.11	0.26	0.28	0.44	0.16	0.16	0.31	0.041	0.86	< 0.028	0.14	< 0.14	0.47	0.76	0.4241
	TTP15 0.0m	< 0.028	< 0.028	< 0.028	< 0.028	0.035	0.052	< 0.028	< 0.028	< 0.028	< 0.028	0.097	< 0.028	< 0.028	< 0.14	0.073	0.11	0.0402
	TTP16 0.5m	< 0.023	< 0.023	0.051	0.16	0.28	0.36	0.2	0.11	0.25	0.044	0.51	< 0.023	0.15	< 0.12	0.28	0.48	0.4045
	TTP16 1.2Mm	< 0.049	< 0.049	0.063	0.29	0.48	0.73	0.36	0.24	0.4	< 0.049	0.71	< 0.049	0.3	0.27	0.46	0.63	0.64
	TTP17 0.0m	< 0.023	< 0.023	< 0.023	0.084	0.097	0.25	0.2	0.061	0.11	< 0.023	0.18	< 0.023	0.07	< 0.12	0.11	0.46	0.1446
	TTP18 0.25m	< 0.033	< 0.033	< 0.033	0.065	0.072	0.13	0.11	0.045	0.066	< 0.033	0.16	< 0.033	0.044	< 0.17	0.15	0.2	0.10106
	TTP19 0.0m	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.13	< 0.025	1	0
	TTP20 0.0m	0.031	0.12	0.2	0.48	0.64	1	0.44	0.37	0.55	0.12	1.2	0.026	0.37	0.13	0.62	0.99	0.9875
	TTP27 0.1m	< 0.022	< 0.022	< 0.022	< 0.022	< 0.022	0.023	< 0.022	0.026	< 0.022	< 0.022	0.035	< 0.022	< 0.022	< 0.11	0.038	< 0.022	0.0049
	TTP27 0.5m	< 0.022	< 0.022	< 0.022	0.055	0.099	0.21	0.1	0.085	0.16	< 0.022	0.25	< 0.022	0.069	0.5	0.38	0.19	0.1425
	TTP27 1.4m	< 0.022	< 0.022	< 0.022	< 0.022	0.023	0.032	< 0.022	0.021	< 0.022	< 0.022	0.064	0.047	< 0.022	< 0.11	0.15	0.059	0.0283
	TTP39 0.0m	< 0.027	0.03	0.082	0.15	0.17	0.31	0.15	0.081	0.2	0.03	0.32	< 0.027	0.093	< 0.14	0.16	0.33	0.2654
	TTP49 0.5m	< 0.026	< 0.026	0.16	0.04	0.052	0.3	0.15	0.072	0.098	0.037	0.07	< 0.026	0.099	< 0.13	0.057	0.071	0.14108
	TTP50 0.5m	0.049	0.11	0.31	0.61	0.7	1.9	0.55	0.41	0.95	0.12	1.6	0.1	0.4	0.19	1.1	1.5	1.1615
Icon Yard	TTP10 0.5m	< 0.031	0.055	0.043	0.063	0.046	0.14	0.066	< 0.031	0.063	< 0.031	0.18	< 0.031	0.034	0.63	0.53	0.16	0.07033
	TTP11 0.0m	< 0.023	< 0.023	< 0.023	< 0.023	< 0.023	< 0.023	< 0.023	< 0.023	< 0.023	< 0.023	< 0.023	< 0.023	< 0.023	< 0.12	< 0.023	< 0.023	0
	TTP11 0.5m	< 0.024	< 0.024	< 0.024	0.036	0.047	0.085	0.037	0.028	0.04	< 0.024	0.11	< 0.024	0.025	< 0.12	0.045	0.11	0.0648
	TTP12 0.0m	< 0.023	< 0.023	< 0.023	< 0.023	< 0.023	< 0.023	< 0.023	< 0.023	< 0.023	< 0.023	< 0.023	< 0.023	< 0.023	< 0.12	< 0.023	< 0.023	0
	TTP12 0.5m	< 0.028	< 0.028	0.047	0.12	0.16	0.31	0.13	0.11	0.16	< 0.028	0.33	< 0.028	0.095	< 0.14	0.16	0.32	0.2251
	TTP30 0.0m	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	0.043	0.025	0.025	< 0.025	< 0.025	0.065	< 0.025	< 0.025	< 0.13	< 0.025	0.047	0.0068
	TTP30 0.5m	< 0.026	< 0.026	< 0.026	< 0.026	< 0.026	< 0.026	< 0.026	< 0.026	< 0.026	< 0.026	< 0.026	< 0.026	< 0.026	< 0.13	< 0.026	< 0.026	0
	Guideline Value (industrial)	110000[1]	570,00[1]	57000[1]	23.4[2]	25[2]	23.4[2]	-	234.4[2]	2344[2]	2.3[2]	760,00[1]	760,00[1]	23.4	190[3]	57000[1]	NA[3]	110000[1]
	Guideline Value (Maintenance)	150000[1]	770,00[1]	770000[1]								100000[1]	100000[1]		640[3]	77000[1]	NA[3]	150000[1]

Notes

All results are in mg/kg.

Cells highlighted in grey exceed the adopted guideline human health value

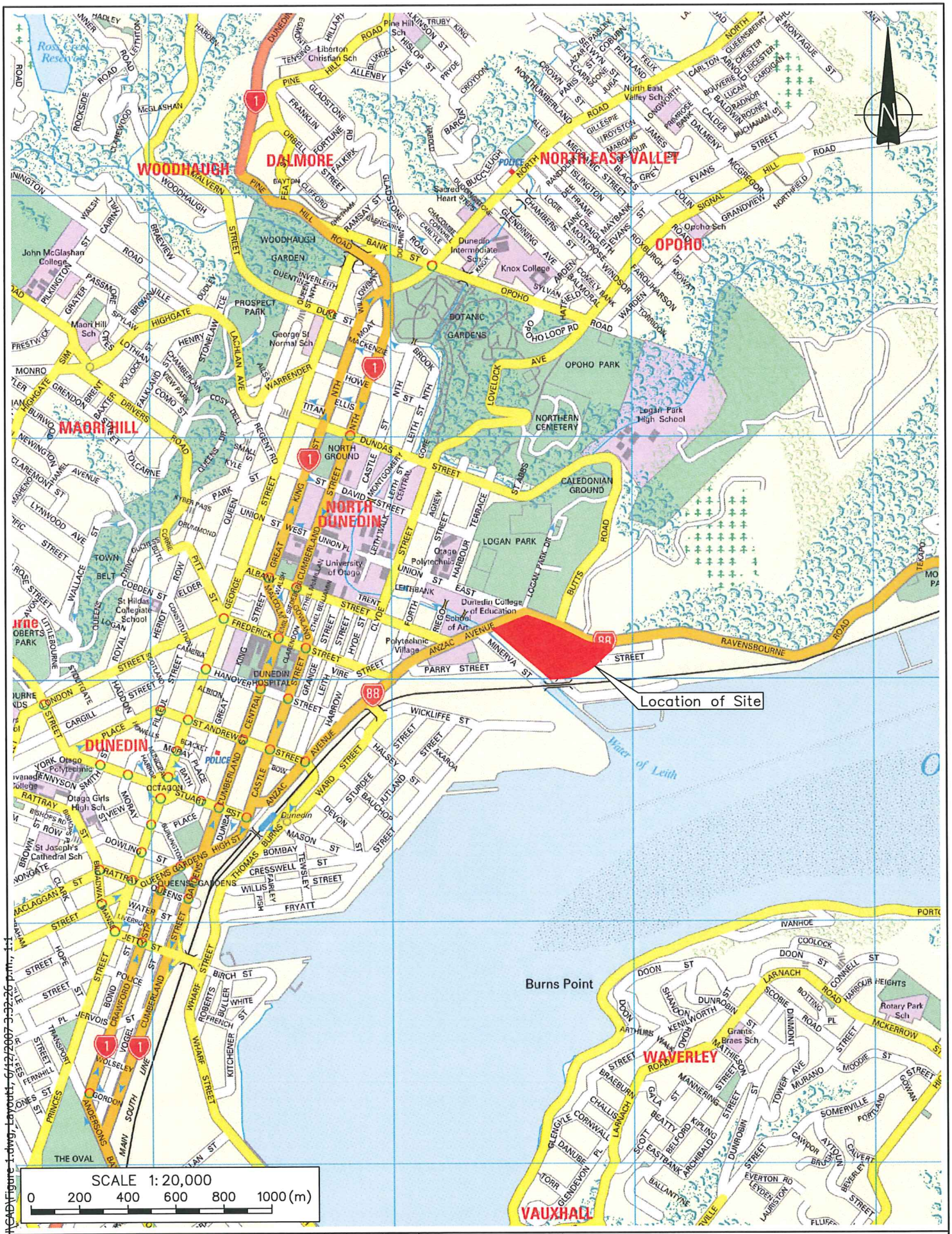
NA- denotes health-based criterion significantly higher than that likely to be encountered on site.

1- Guidelines for Assessing and Managing Contaminated Gasworks Sites in New Zealand (MfE, 1997)

2- Region 6 Human Health Medium - Specific Screening Levels (US EPA, 2002)

3- MfE (1999) Guidelines for Assessing and Managing Petroleum Hydrocarbon Sites in New Zealand

Appendix C: Test Pit Logs



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DRAFTING CHECKED		12.7
APPROVED		12.7
CADFILE : P:\5 12 19\		
SCALES (AT A4 SIZE) 1: 20,000		
PROJECT No. 5 12 19		

Tonkin & Taylor
Environmental & Engineering Consultants
■ Christchurch
□ Auckland □ Hamilton
□ Nelson □ Wellington □ Whangarei

Carisbrook Stadium Trust
Proposed Spectator Events & Education Zone
Dunedin
Site Location Plan

FIG. No. Figure 1

REV. 0

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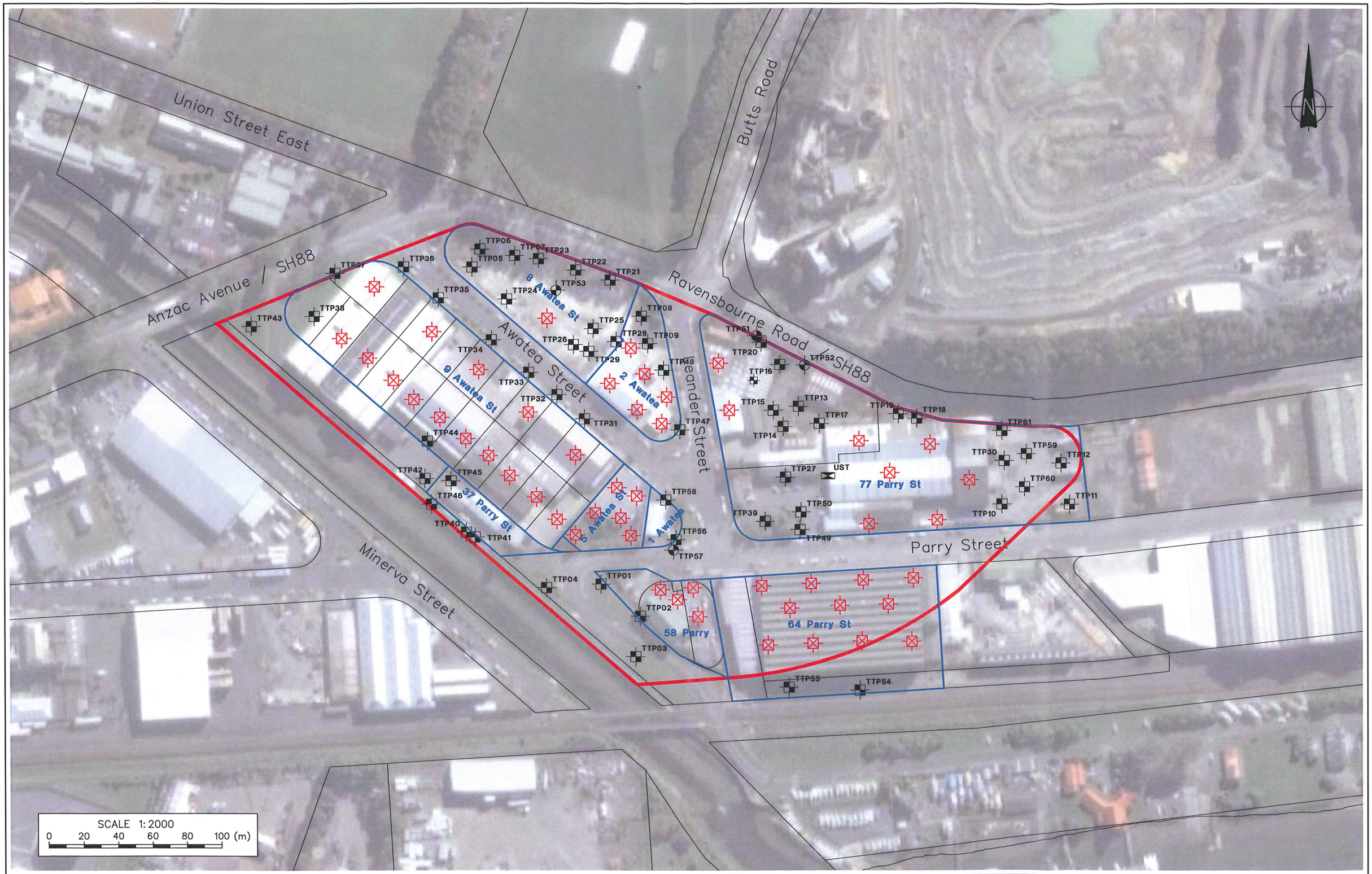

LEGEND

- Completed Test Pit/Auger Hole
- Completed Surface Sample
- Test Pit Still Required
- Proposed Zone Boundary
- UST Underground Storage Tank

Tonkin & Taylor
Environmental & Engineering Consultants
Auckland, Nelson, Christchurch, Wellington, Hamilton, Whangarei

DRAWN	NRM	Nov 07
DRAFTING CHECKED		12.7
APPROVED		12.7
CADFILE : P:\5 12 19\		
SCALES (AT A3 SIZE)	1: 2000	
PROJECT No.	5 12 19	

Carisbrook Stadium Trust

Proposed Spectator Events & Education Zone Dunedin

Locations of Subsurface Investigations

FIG. No. Figure 2 REV. 0

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Appendix B: Laboratory Transcripts and Expanded Tables of Results

Table of PAH results

Site	Sample/ Depth	Acenaphthene	Acenaphthylene	Anthracene	Benzo – [a]anthracene	Benzo[a]pyrene (BAP)	Benzo-[j]fluoranthene	Benzo-[g,h,i]perylene	Benzo-[k]fluoranthene	Chrysene	Dibenzo-[a,h]anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene	Equivalent Benzo[a]pyrene (BAP)
Magnet St	TTP 01 0.0m	< 0.026	< 0.026	< 0.026	< 0.026	< 0.026	< 0.026	< 0.026	< 0.026	< 0.026	< 0.026	< 0.026	< 0.026	< 0.026	< 0.13	< 0.026	< 0.026	
	TTP 02 0.0m	< 0.024	< 0.024	< 0.024	0.027	0.034	0.091	0.034	< 0.024	0.042	< 0.024	0.054	< 0.024	< 0.024	< 0.12	0.095	0.056	0.04622
	TTP 03 0.0m	< 0.029	0.15	0.21	0.67	0.89	1.7	0.58	0.64	1.1	0.15	1.7	0.069	0.51	< 0.15	1.1	1.5	1.403
	TTP 04 0.0m	< 0.030	0.032	0.03	0.1	0.14	0.25	0.11	0.071	0.16	< 0.030	0.26	< 0.030	0.074	< 0.15	0.13	0.27	0.1911
2 Awatea St	TTP08 0.0m	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.13	< 0.025	< 0.025	
	TTP08 0.5m	0.05	0.11	0.44	0.85	0.95	1.5	0.61	0.54	1.1	0.14	2.5	0.082	0.46	< 0.14	1.7	2.3	1.436
	TTP09 0.5m	< 0.024	< 0.024	0.041	0.15	0.24	0.37	0.17	0.13	0.23	0.04	0.38	< 0.024	0.13	< 0.12	0.14	0.37	0.3603
	TTP47 0.5m	< 0.030	0.06	0.092	0.41	0.52	1.3	0.4	0.3	0.74	0.067	1	< 0.030	0.25	< 0.15	0.31	0.99	0.8204
	TTP48 0.5m	< 0.033	< 0.033	< 0.033	0.15	0.21	0.53	0.19	0.13	0.37	< 0.033	0.37	< 0.033	0.12	< 0.17	0.15	0.43	0.3067
	TTP48 1.0m	< 0.041	0.055	0.078	0.19	0.41	1.2	0.4	0.29	0.4	0.065	0.91	0.075	0.25	1.2	0.38	0.91	0.672
8 Awatea Street (Calder Stewart)	TTP 05 0.0m	< 0.027	< 0.027	< 0.027	< 0.027	< 0.027	< 0.027	< 0.027	< 0.027	< 0.027	< 0.027	< 0.027	< 0.027	< 0.027	< 0.14	< 0.027	< 0.027	
	TTP 05 0.5m	< 0.026	< 0.026	< 0.026	< 0.026	< 0.026	< 0.026	< 0.026	< 0.026	< 0.026	< 0.026	< 0.026	< 0.026	< 0.026	< 0.13	< 0.026	< 0.026	
	TTP 05 3.0m	< 0.055	0.14	0.15	1.1	1.8	3.5	1.5	1.2	1.7	0.3	1.3	< 0.055	1.2	0.57	0.58	1.3	2.817
	TTP 06 0.0m	< 0.026	< 0.026	< 0.026	< 0.026	< 0.026	< 0.026	< 0.026	< 0.026	< 0.026	< 0.026	< 0.026	< 0.026	< 0.026	< 0.13	< 0.026	< 0.026	0
	TTP 07 0.0m	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.13	< 0.025	< 0.025	0
	TTP 07 3.0m	< 0.039	0.29	0.78	2.1	2.7	4.6	1.7	1.8	3.4	0.38	5.9	0.2	1.4	0.23	3.6	5.1	4.104
	TTP21 0.0m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0
	TTP21 0.5m	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.13	< 0.025	< 0.025	0
	TTP22 0.6m	0.11	0.097	0.75	1.7	1.9	4.7	1.7	2	2.8	0.24	4.1	0.17	0.81	< 0.15	2.1	3.8	3.089
	TTP22 2.0m	0.094	0.091	1.3	2.3	2.1	4.8	1.6	2	3.6	0.19	6.7	0.53	0.76	< 0.22	5.4	6.1	3.312
	TTP23 0.5m	< 0.024	< 0.024	< 0.024	< 0.024	< 0.024	< 0.024	< 0.024	< 0.024	< 0.024	< 0.024	< 0.024	< 0.024	< 0.024	< 0.12	< 0.024	< 0.024	
	TTP23 A	< 0.027	< 0.027	< 0.027	< 0.027	< 0.027	< 0.027	< 0.027	< 0.027	< 0.027	< 0.027	< 0.027	< 0.027	< 0.027	< 0.14	< 0.027	< 0.027	
	TTP24 0.0m	< 0.026	< 0.026	< 0.026	< 0.026	< 0.026	< 0.026	< 0.026	< 0.026	< 0.026	< 0.026	< 0.026	< 0.026	< 0.026	< 0.13	< 0.026	< 0.026	
	TTP24 0.5m	< 0.028	< 0.028	0.67	1	2.1	2.2	0.97	1.1	2.2	0.18	3.6	< 0.028	0.61	< 0.14	1.5	3.1	2.793
	TTP24 2.0m	< 0.022	< 0.022	0.032	0.051	0.12	0.2	0.11	0.093	0.15	< 0.022	0.3	< 0.022	0.077	< 0.11	0.073	0.25	0.1636
	TTP25 0.5m	< 0.023	< 0.023	< 0.023	0.026	0.056	0.058	0.051	0.049	0.04	< 0.023	0.12	< 0.023	0.035	< 0.12	0.038	0.094	0.0732
	TTP26 0.5m	< 0.022	< 0.022	< 0.022	0.045	0.15	0.12	0.076	0.076	0.12	< 0.022	0.18	< 0.022	0.04	0.24	0.065	0.16	0.1793
	TTP26 1.0m	< 0.023	< 0.023	< 0.023	0.11	0.31	0.37	0.17	0.19	0.32	0.064	0.63	< 0.023	0.15	< 0.12	0.12	0.5	0.4592
	TTP28 0.5m	< 0.023	< 0.023	< 0.023	0.029	0.056	0.099	0.051	0.052	0.076	< 0.023	0.14	< 0.023	< 0.023	< 0.12	0.09	0.11	0.07476
	TTP29 0.5m	< 0.022	< 0.022	0.029	0.15	0.34	0.41	0.2	0.19	0.45	0.07	0.66	< 0.022	0.15	< 0.11	0.26	0.66	0.5045
	TTP29 1.0m	< 0.022	< 0.022	0.037	0.028	0.12	0.16	0.092	0.09	0.1	< 0.022	0.32	< 0.022	0.033	< 0.11	0.044	0.24	0.1521
9 Awatea Street (Fonterra)	TTP31 0.0m	< 0.026	< 0.026	0.2	0.38	0.85	1.4	0.46	0.59	0.88	< 0.026	1.4	< 0.026	0.42	< 0.13	0.45	1.2	1.1378
	TTP32 0.5m	< 0.028	< 0.028	< 0.028	0.12	0.32	0.39	0.2	0.15	0.4	< 0.028	0.56	< 0.028	0.11	< 0.14	0.25	0.5	0.401
	TTP33 0.0m	< 0.027	< 0.027	0.071	0.14	0.38	0.62	0.26	0.29	0.39	0.073	0.51	< 0.027	0.18	< 0.14	0.15	0.41	0.5799
	TTP34 0.5m	< 0.030	0.037	0.084	0.35	0.44	0.64	0.33	0.24	0.64	0.067	0.87	< 0.030	0.23	< 0.15	0.34	0.99	0.6594
	TTP35 0.0m	< 0.029	0.11	0.21	0.87	0.91	1.6	0.67	0.56	1.2	0.14	2	0.038	0.48	< 0.15	0.86	2	1.413
	TTP36 0.5m	< 0.028	< 0.028	0.037	0.12	0.16	0.25	0.14	0.083	0.23	0.03	0.29	< 0.028	0.093	< 0.14	0.13	0.32	0.2469
	TTP37 0.0m	< 0.029	0.18	0.31	0.89	1	1.6	0.75	0.59	1.3	0.17	2.2	0.089	0.53	< 0.15	1.5	2.3	1.544
	TTP38 0.5m	0.027	0.2	0.52	1.6	1.6	2.4	1.2	0.96	2.1	0.23	4	0.12	0.82	< 0.14	2.3	3.9	2.429
	TTP42 0.0m	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.13	< 0.025	< 0.025	0
	TTP43 0.0m	< 0.029	0.036	0.047	0.12	0.14	0.41	0.13	0.1	0.25	< 0.029	0.38	< 0.029	0.084	< 0.15	0.31	0.42	0.2139
	TTP44 0.5m	< 0.034	< 0.034	< 0.034	0.04	0.067	0.15	0.081	0.047	0.11	< 0.034	0.091	< 0.034	0.035	< 0.17	0.041	0.12	0.0953
37 Parry St	TTP40 0.0m	0.1	0.87	1.8	4.8	4.5	7.2	3.2	2.6	5.6	0.69	12	0.47	2.4	0.36	7.7	12	6.946
	TTP41 0.5m	< 0.031	< 0.031	< 0.031	0.081	0.11	0.17	0.097	0.052	0.14	< 0.031	0.19	< 0.031	0.064	< 0.16	0.097	0.22	0.1481
	TTP45 0.5m	< 0.028	0.035	0.084	0.18	0.25	0.61	0.26	0.15	0.39	0.042	0.46	< 0.028	0.15	< 0.14	0.25	0.54	0.4049
	TTP46 0.0m	< 0.026	< 0.026	< 0.026	0.052	0.08	0.21	0.077	0.054	0.11	< 0.026	0.12	< 0.026	0.036	< 0.13	0.054	0.14	0.1163

Site	Sample/ Depth	Acenaphthene	Acenaphthylene	Anthracene	Benzo – [a]anthracene	Benzo[a]pyrene (BAP)	Benzo-[j]fluoranthene	Benzo-[g,h,i]perylene	Benzo-[k]fluoranthene	Chrysene	Dibenzo-[a,h]anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene	Equivalent Benzo[a]pyrene (BAP)
Fletchers Yard	TTP13 0.5m	6.9	2.5	7.5	6.7	6.6	11	3.4	3.8	7.6	0.93	19	7	3.1	10	26	17	10.066
	TTP13 0.7m	7.9	0.11	0.14	0.12	0.14	0.26	0.11	0.067	0.15	< 0.046	0.45	1.6	0.071	20	0.59	0.34	0.1933
	TTP14 0.0m	< 0.023	< 0.023	< 0.023	< 0.023	0.033	0.079	0.049	< 0.023	< 0.023	< 0.023	0.052	< 0.023	0.03	0.43	< 0.023	0.058	0.0439
	TTP14 0.5m	< 0.028	0.048	0.11	0.26	0.28	0.44	0.16	0.16	0.31	0.041	0.86	< 0.028	0.14	< 0.14	0.47	0.76	0.4241
	TTP15 0.0m	< 0.028	< 0.028	< 0.028	< 0.028	0.035	0.052	< 0.028	< 0.028	< 0.028	< 0.028	0.097	< 0.028	< 0.028	< 0.14	0.073	0.11	0.0402
	TTP16 0.5m	< 0.023	< 0.023	0.051	0.16	0.28	0.36	0.2	0.11	0.25	0.044	0.51	< 0.023	0.15	< 0.12	0.28	0.48	0.4045
	TTP16 1.2Mm	< 0.049	< 0.049	0.063	0.29	0.48	0.73	0.36	0.24	0.4	< 0.049	0.71	< 0.049	0.3	0.27	0.46	0.63	0.64
	TTP17 0.0m	< 0.023	< 0.023	< 0.023	0.084	0.097	0.25	0.2	0.061	0.11	< 0.023	0.18	< 0.023	0.07	< 0.12	0.11	0.46	0.1446
	TTP18 0.25m	< 0.033	< 0.033	< 0.033	0.065	0.072	0.13	0.11	0.045	0.066	< 0.033	0.16	< 0.033	0.044	< 0.17	0.15	0.2	0.10106
	TTP19 0.0m	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.13	< 0.025	1	0
	TTP20 0.0m	0.031	0.12	0.2	0.48	0.64	1	0.44	0.37	0.55	0.12	1.2	0.026	0.37	0.13	0.62	0.99	0.9875
	TTP27 0.1m	< 0.022	< 0.022	< 0.022	< 0.022	< 0.022	0.023	< 0.022	0.026	< 0.022	< 0.022	0.035	< 0.022	< 0.022	< 0.11	0.038	< 0.022	0.0049
	TTP27 0.5m	< 0.022	< 0.022	< 0.022	0.055	0.099	0.21	0.1	0.085	0.16	< 0.022	0.25	< 0.022	0.069	0.5	0.38	0.19	0.1425
	TTP27 1.4m	< 0.022	< 0.022	< 0.022	< 0.022	0.023	0.032	< 0.022	0.021	< 0.022	< 0.022	0.064	0.047	< 0.022	< 0.11	0.15	0.059	0.0283
	TTP39 0.0m	< 0.027	0.03	0.082	0.15	0.17	0.31	0.15	0.081	0.2	0.03	0.32	< 0.027	0.093	< 0.14	0.16	0.33	0.2654
	TTP49 0.5m	< 0.026	< 0.026	0.16	0.04	0.052	0.3	0.15	0.072	0.098	0.037	0.07	< 0.026	0.099	< 0.13	0.057	0.071	0.14108
	TTP50 0.5m	0.049	0.11	0.31	0.61	0.7	1.9	0.55	0.41	0.95	0.12	1.6	0.1	0.4	0.19	1.1	1.5	1.1615
Icon Yard	TTP10 0.5m	< 0.031	0.055	0.043	0.063	0.046	0.14	0.066	< 0.031	0.063	< 0.031	0.18	< 0.031	0.034	0.63	0.53	0.16	0.07033
	TTP11 0.0m	< 0.023	< 0.023	< 0.023	< 0.023	< 0.023	< 0.023	< 0.023	< 0.023	< 0.023	< 0.023	< 0.023	< 0.023	< 0.023	< 0.12	< 0.023	< 0.023	0
	TTP11 0.5m	< 0.024	< 0.024	< 0.024	0.036	0.047	0.085	0.037	0.028	0.04	< 0.024	0.11	< 0.024	0.025	< 0.12	0.045	0.11	0.0648
	TTP12 0.0m	< 0.023	< 0.023	< 0.023	< 0.023	< 0.023	< 0.023	< 0.023	< 0.023	< 0.023	< 0.023	< 0.023	< 0.023	< 0.023	< 0.12	< 0.023	< 0.023	0
	TTP12 0.5m	< 0.028	< 0.028	0.047	0.12	0.16	0.31	0.13	0.11	0.16	< 0.028	0.33	< 0.028	0.095	< 0.14	0.16	0.32	0.2251
	TTP30 0.0m	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	0.043	0.025	0.025	< 0.025	< 0.025	0.065	< 0.025	< 0.025	< 0.13	< 0.025	0.047	0.0068
	TTP30 0.5m	< 0.026	< 0.026	< 0.026	< 0.026	< 0.026	< 0.026	< 0.026	< 0.026	< 0.026	< 0.026	< 0.026	< 0.026	< 0.026	< 0.13	< 0.026	< 0.026	0
	Guideline Value (industrial)	110000[1]	570,00[1]	57000[1]	23.4[2]	25[2]	23.4[2]	-	234.4[2]	2344[2]	2.3[2]	760,00[1]	760,00[1]	23.4	190[3]	57000[1]	NA[3]	110000[1]
	Guideline Value (Maintenance)	150000[1]	770,00[1]	770000[1]								100000[1]	100000[1]		640[3]	77000[1]	NA[3]	150000[1]

Notes

All results are in mg/kg.

Cells highlighted in grey exceed the adopted guideline human health value

NA- denotes health-based criterion significantly higher than that likely to be encountered on site.

1- Guidelines for Assessing and Managing Contaminated Gasworks Sites in New Zealand (MfE, 1997)

2- Region 6 Human Health Medium - Specific Screening Levels (US EPA, 2002)

3- MfE (1999) Guidelines for Assessing and Managing Petroleum Hydrocarbon Sites in New Zealand

Appendix C: Test Pit Logs

TONKIN & TAYLOR LTD

EXCAVATION LOG

EXCAVATION No: TTP 01
Location:

SHEET 1 OF 1

PROJECT:	Dunedin Multipurpose Stadium	LOCATION:	Dunedin	JOB No:	51219
CO-ORDINATES	5479051.99 mN 2317636.74 mE	EXPOSURE TYPE:	Test Pit	HOLE STARTED:	08/11/07
		EQUIPMENT:	Excavator	HOLE FINISHED:	08/11/07
R.L.	m	OPERATOR:	DOW EXCAV.	LOGGED BY:	JF
DATUM		DIMENSIONS:	2m x 1m	CHECKED BY:	SCWW

EXCAVATION TESTS						ENGINEERING DESCRIPTION						GEOLOGICAL	
PENETRATION 1 2 3	SUPPORT	WATER	SAMPLES, TESTS	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION / WEATHERING	STRENGTH / DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH 10 25 50 100 200	ORIGIN TYPE, MINERAL COMPOSITION, DEFECTS, STRUCTURE	UNIT
		Seepage/flow			0			GRAVEL, sandy, with minor silt and roots, fine-coarse sand, fine-coarse gravel, sub rounded to sub angular, loose, moist, brown.				FILL	
								ASH with clinker, black.					
								SAND with abundant shell fragments, fine-medium grained, moist, light brown.					
								SILT, clayey, organic content and shell fragments, firm, moist					
								SAND, some gravel, minor silt, abundant shells, loose, moist, light brown.					
					1			SAND, fine-medium grained, some shell frgaments, loose, moist-wet.					
								SILT, slightly plastic, dilatent, soft, moist, brown.					
								GRAVEL, heavily cemented, moist, orange (possible ash).					
								GRAVEL, silty, sandy, some basalt boulders and abundant shells, fine-coarse gravel, fine-coarse sand, boulder size 300mm max, saturated.					
								SILT, some clay, minor shell fragments, slightly plastic, soft, saturated, grey.				HYDRAULIC FILL	
					2			CLAYEY SILT interbedded with SILT with minor clay, occasional beds of sandy silt, very soft, saturated, occasional beds of fine grained sand, grey. Clayey silt moderately plastic, occasionally highly plastic, fine organic content, black. Silt slightly plastic, saturated, dark grey. Sandy silt non plastic. Vertical fissures infilled with fine-medium sand. Thinly bedded (5-20mm layers). Pit walls collapsing.					
			3m (bag)		3								
			3.8m (bag)					**end of Test Pit at 3.8m**					
					4								

TONKIN & TAYLOR LTD

EXCAVATION LOG

EXCAVATION No: TTP 02
Location:

SHEET 1 OF 1

PROJECT:	Dunedin Multipurpose Stadium	LOCATION:	Dunedin	JOB No:	51219
CO-ORDINATES	5479033.57 mN 2317659.39 mE	EXPOSURE TYPE:	Test Pit	HOLE STARTED:	08/11/07
		EQUIPMENT:	Excavator	HOLE FINISHED:	08/11/07
R.L.	m	OPERATOR:	DOW EXCAV.	LOGGED BY:	JF
DATUM		DIMENSIONS:	2m x 1m	CHECKED BY:	SCWW

EXCAVATION TESTS						ENGINEERING DESCRIPTION						GEOLOGICAL	
PENETRATION 1 2 3	SUPPORT	WATER	SAMPLES, TESTS	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION / WEATHERING	STRENGTH / DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH 10 25 50 100 200	ORIGIN TYPE, MINERAL COMPOSITION, DEFECTS, STRUCTURE	UNIT
		Seepage/flow			0			GRAVEL, sandy, with minor silt and roots, fine-coarse sand, fine-coarse gravel, sub rounded to sub angular, loose, moist, brown.				FILL	
								SAND, some gravel, minor silt, abundant shells, loose, moist, light brown.					
					1			SILT, clayey, organic content and shell fragments, firm, moist					
								CLAYEY SILT interbedded with SILT with minor clay, occasional beds of sandy silt, very soft, saturated, occasional beds of fine grained sand, grey. Clayey silt moderately plastic, occasionally highly plastic, fine organic content, black. Silt slightly plastic, saturated, dark grey. Sandy silt non plastic. Vertical fissures infilled with fine-medium sand. Thinly bedded (5-20mm layers). Pit walls collapsing.				HYDRAULIC FILL	
					2								
					3								
					4								
								end of TP at 4.1m					

TONKIN & TAYLOR LTD

EXCAVATION LOG

EXCAVATION No: TTP 03
Location:

SHEET 1 OF 1

PROJECT:	Dunedin Multipurpose Stadium	LOCATION:	Dunedin	JOB No:	51219
CO-ORDINATES	5479010.23 mN 2317656.74 mE	EXPOSURE TYPE:	Test Pit	HOLE STARTED:	08/11/07
		EQUIPMENT:	Excavator	HOLE FINISHED:	08/11/07
R.L.	m	OPERATOR:	DOW EXCAV.	LOGGED BY:	JF
DATUM		DIMENSIONS:	2m x 1m	CHECKED BY:	SCWW

EXCAVATION TESTS						ENGINEERING DESCRIPTION						GEOLOGICAL	
PENETRATION 1 2 3	SUPPORT	WATER	SAMPLES, TESTS	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION / WEATHERING	STRENGTH / DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH 10 25 50 100 200	ORIGIN TYPE, MINERAL COMPOSITION, DEFECTS, STRUCTURE	UNIT
		Seepage			0			SILT TOPSOIL, occasional shells, rootlets, moist.				FILL	
								SILT, rare gravel, rootlets, moist, brown mottled red.					
								SAND, silty, brown, moist.					
					1			CLAYEY SILT interbedded with SILT with minor clay, occasional beds of sandy silt, very soft, saturated, occasional beds of fine grained sand, grey. Clayey silt moderatly plastic, occasionally highly plastic, fine organic content, black. Silt slightly plastic, saturated, dark grey. Sandy silt non plastic. Vertical fissures infilled with fine-medium sand. Thinly bedded (5-20mm layers). Pit walls collapsing.				HYDRAULIC FILL	
					2								
					3								
					3.7			**end of TP at 3.7m**					
					4								

TONKIN & TAYLOR LTD

EXCAVATION LOG

EXCAVATION No: TTP 04
Location:

SHEET 1 OF 1

PROJECT:	Dunedin Multipurpose Stadium	LOCATION:	Dunedin	JOB No:	51219
CO-ORDINATES	5479049.87 mN 2317605.15 mE	EXPOSURE TYPE:	Test Pit	HOLE STARTED:	08/11/07
		EQUIPMENT:	Excavator	HOLE FINISHED:	08/11/07
R.L.	m	OPERATOR:	DOW EXCAV.	LOGGED BY:	JF
DATUM		DIMENSIONS:	2m x 1m	CHECKED BY:	SCWW

EXCAVATION TESTS						ENGINEERING DESCRIPTION						GEOLOGICAL	
PENETRATION 1 2 3	SUPPORT	WATER	SAMPLES, TESTS	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION / WEATHERING	STRENGTH / DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH 10 25 50 100 200	ORIGIN TYPE, MINERAL COMPOSITION, DEFECTS, STRUCTURE	UNIT
								TOPSOIL, silt, some subrounded gravel, some shells, firm, dry.				FILL	
								SILT, sandy, moist, light brown/mottled orange					
								SAND, some gravel, minor silt, abundant shells, loose, moist, light brown.					
		Seepage			1			CLAYEY SILT interbedded with SILT with minor clay, occasional beds of sandy silt, very soft, saturated, occasional beds of fine grained sand, grey. Clayey silt moderately plastic, occasionally highly plastic, fine organic content, black. Silt slightly plastic, saturated, dark grey. Sandy silt non plastic. Vertical fissures infilled with fine-medium sand. Thinly bedded (5-20mm layers). Pit walls collapsing.				HYDRAULIC FILL	
					2								
					3								
					4			**end of test pit at 3.8**					

TONKIN & TAYLOR LTD

EXCAVATION LOG

EXCAVATION No: TTP 05
Location:

SHEET 1 OF 1

PROJECT:	Dunedin Multipurpose Stadium	LOCATION:	Dunedin	JOB No:	51219
CO-ORDINATES	5479234.73 mN 2317562.18 mE	EXPOSURE TYPE:	Test Pit	HOLE STARTED:	08/11/07
		EQUIPMENT:	Excavator	HOLE FINISHED:	08/11/07
R.L.	m	OPERATOR:	DOW EXCAV.	LOGGED BY:	JF
DATUM		DIMENSIONS:	2m x 1m	CHECKED BY:	SCWW

EXCAVATION TESTS						ENGINEERING DESCRIPTION						GEOLOGICAL	
PENETRATION 1 2 3	SUPPORT	WATER	SAMPLES, TESTS	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION / WEATHERING	STRENGTH / DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH 10 25 50 100 200	ORIGIN TYPE, MINERAL COMPOSITION, DEFECTS, STRUCTURE	UNIT
					0			GRAVEL, angular, minor coarse sand, frequent concrete and reinforcing steel, occasional basalt boulders to 0.5m dia, brown.				FILL	
					1			SAND, silty, rare shell fragments, wet, loose					
								CLAYEY SILT interbedded with SILT with minor clay, occasional beds of sandy silt, very soft, saturated, occasional beds of fine grained sand, grey. Clayey silt moderately plastic, occasionally highly plastic, fine organic content, black. Silt slightly plastic, saturated, dark grey. Sandy silt non plastic. Vertical fissures infilled with fine-medium sand. Thinly bedded (5-20mm layers). Pit walls collapsing.				HYDRAULIC FILL	
					2								
					3			REFUSE, sand, silt, timber, glass, ceramic, metal, wet becomes saturated, very soft/loose, odour of decay				REFUSE	
					4								
								End of Test Pit @ 4.3m					

TONKIN & TAYLOR LTD

EXCAVATION LOG

EXCAVATION No: TTP 06
Location:

SHEET 1 OF 1

PROJECT:	Dunedin Multipurpose Stadium	LOCATION:	Dunedin	JOB No:	51219
CO-ORDINATES	5479245.01 mN 2317566.87 mE	EXPOSURE TYPE:	Test Pit	HOLE STARTED:	08/11/07
		EQUIPMENT:	Excavator	HOLE FINISHED:	08/11/07
R.L.	m	OPERATOR:	DOW EXCAV.	LOGGED BY:	JF
DATUM		DIMENSIONS:	2m x 1m	CHECKED BY:	SCWW

EXCAVATION TESTS						ENGINEERING DESCRIPTION						GEOLOGICAL	
PENETRATION 1 2 3	SUPPORT	WATER	SAMPLES, TESTS	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION / WEATHERING	STRENGTH / DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH 10 25 50 100 200	ORIGIN TYPE, MINERAL COMPOSITION, DEFECTS, STRUCTURE	UNIT
								GRAVEL, angular, minor silt and coarse sand, some concrete and reinforcing steel, moist.				FILL	
								Asphalt					
								SILT and GRAVEL, sandy, loose/soft, wet.					
								SILT, occasional brown sandy silt and gravel, slightly plastic, soft, wet, grey.				HYDRAULIC FILL	
					1								
					2								
		▼											
					3			REFUSE, sand, silt, timber, glass, ceramic, metal, wet becomes saturated, very soft/loose, odour of decay				REFUSE	
					4								
								SILT, some shell fragments, soft-firm, wet.				INSITU HARBOUR MUDS	
								End of test pit at 4.4m					

TONKIN & TAYLOR LTD

EXCAVATION LOG

EXCAVATION No: TTP 07
Location:

SHEET 1 OF 1

PROJECT:	Dunedin Multipurpose Stadium	LOCATION:	Dunedin	JOB No:	51219
CO-ORDINATES	5479241.34 mN 2317586.97 mE	EXPOSURE TYPE:	Test Pit	HOLE STARTED:	08/11/07
		EQUIPMENT:	Excavator	HOLE FINISHED:	08/11/07
R.L.	m	OPERATOR:	DOW EXCAV.	LOGGED BY:	JF
DATUM		DIMENSIONS:	2m x 1m	CHECKED BY:	SCWW

EXCAVATION TESTS						ENGINEERING DESCRIPTION						GEOLOGICAL	
PENETRATION 1 2 3	SUPPORT	WATER	SAMPLES, TESTS	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION / WEATHERING	STRENGTH / DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH 10 25 50 100 200	ORIGIN TYPE, MINERAL COMPOSITION, DEFECTS, STRUCTURE	UNIT
					0			GRAVEL, angular, loosley packed, sand matrix.				FILL	
								SAND, medium-coarse, concrete, steel, brick fragments, shelly gravel fill.					
					1								
								SILT, sandy, some gravel, some shells, occasional metal, brick and glass, soft, wet, brown-black					
					2								
		Flow											
								REFUSE, ash, clinker, medium sand, glass, silt, branches, leaves, loose, wet.				REFUSE	
					3								
					4			**end of test pit at 4.1m**					

TONKIN & TAYLOR LTD

EXCAVATION LOG

EXCAVATION No: TTP 08
Location:

SHEET 1 OF 1

PROJECT:	Dunedin Multipurpose Stadium	LOCATION:	Dunedin	JOB No:	51219
CO-ORDINATES	5479206.37 mN 2317660.22 mE	EXPOSURE TYPE:	Test Pit	HOLE STARTED:	09/11/07
		EQUIPMENT:	Excavator	HOLE FINISHED:	09/11/07
R.L.	m	OPERATOR:	DOW EXCAV.	LOGGED BY:	JF
DATUM		DIMENSIONS:	2m x 1m	CHECKED BY:	SCWW

EXCAVATION TESTS						ENGINEERING DESCRIPTION					GEOLOGICAL	
PENETRATION 1 2 3	SUPPORT	WATER	SAMPLES, TESTS	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION / WEATHERING	STRENGTH / DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH 10 25 50 100 200	ORIGIN TYPE, MINERAL COMPOSITION, DEFECTS, STRUCTURE	UNIT
								GRAVEL, angular, poorly graded, grey, with sand, fine-coarse, dry.				FILL	
								ASPHALT					
								SILT, gravelly, coarse angular gravel, stiff, moist, brown.					
								CLAYEY SILT interbedded with SILT with minor clay, occasional beds of sandy silt, very soft, saturated, occasional beds of fine grained sand, grey. Clayey silt moderately plastic, occasionally highly plastic, fine organic content, black. Silt slightly plastic, saturated, dark grey. Sandy silt non plastic. Vertical fissures infilled with fine-medium sand. Thinly bedded (5-20mm layers). Pit walls collapsing.				HYDRAULIC FILL	
					1								
					2								
					3								
					4			SAND, silty, frequent shells, loose,					
								end of test pit at 4.0m					

TONKIN & TAYLOR LTD

EXCAVATION LOG

EXCAVATION No: TTP 09
Location:

SHEET 1 OF 1

PROJECT:	Dunedin Multipurpose Stadium	LOCATION:	Dunedin	JOB No:	51219
CO-ORDINATES	5479190.60 mN 2317663.92 mE	EXPOSURE TYPE:	Test Pit	HOLE STARTED:	09/11/07
		EQUIPMENT:	Excavator	HOLE FINISHED:	09/11/07
R.L.	m	OPERATOR:	DOW EXCAV.	LOGGED BY:	JF
DATUM		DIMENSIONS:	2m x 1m	CHECKED BY:	SCWW

EXCAVATION TESTS						ENGINEERING DESCRIPTION						GEOLOGICAL	
PENETRATION 1 2 3	SUPPORT	WATER	SAMPLES, TESTS	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION / WEATHERING	STRENGTH / DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH 10 25 50 100 200	ORIGIN TYPE, MINERAL COMPOSITION, DEFECTS, STRUCTURE	UNIT
								GRAVEL, angular, graded, grey, with sand, fine-coarse, dry.				FILL	
								SILT, gravelly, coarse angular gravel, stiff, moist, brown.					
		Seepage-flowing			1			CLAYEY SILT interbedded with SILT with minor clay, occasional beds of sandy silt, very soft, saturated, occasional beds of fine grained sand, grey. Clayey silt moderately plastic, occasionally highly plastic, fine organic content, black. Silt slightly plastic, saturated, dark grey. Sandy silt non plastic. Vertical fissures infilled with fine-medium sand. Thinly bedded (5-20mm layers). Pit walls collapsing.				HYDRAULIC FILL	
					2								
					3			Timber and metal pipe @ 3.5m					
					4			**end of TP at 3.9m**					

TONKIN & TAYLOR LTD

EXCAVATION LOG

EXCAVATION No: TTP 10
Location:

SHEET 1 OF 1

PROJECT:	Dunedin Multipurpose Stadium	LOCATION:	Dunedin	JOB No:	51219
CO-ORDINATES	5479098.22 mN 2317868.76 mE	EXPOSURE TYPE:	Test Pit	HOLE STARTED:	09/11/07
		EQUIPMENT:	Excavator	HOLE FINISHED:	09/11/07
R.L.	m	OPERATOR:	DOW EXCAV.	LOGGED BY:	JF
DATUM		DIMENSIONS:	2m x 1m	CHECKED BY:	SCWW

EXCAVATION TESTS						ENGINEERING DESCRIPTION						GEOLOGICAL	
PENETRATION 1 2 3	SUPPORT	WATER	SAMPLES, TESTS	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION / WEATHERING	STRENGTH / DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH 10 25 50 100 200	ORIGIN TYPE, MINERAL COMPOSITION, DEFECTS, STRUCTURE	UNIT
		Flow 15 mins			0.0			GRAVEL, sandy, coarse, angular, dry, grey				FILL	
								FILL, gravel, coarse sand, ash, occasional coal fragments, occasional brick, occasional timber, tightly packed, moist, black.					
					1			SAND, silty, abundant conical shells, loose, wet, grey.					
					2								
					3			**End of test pit at 2.4m (hole collapse)**					
					4								

TONKIN & TAYLOR LTD

EXCAVATION LOG

EXCAVATION No: TTP 11
Location:

SHEET 1 OF 1

PROJECT:	Dunedin Multipurpose Stadium	LOCATION:	Dunedin	JOB No:	51219
CO-ORDINATES	5479098.18 mN 2317907.94 mE	EXPOSURE TYPE:	Test Pit	HOLE STARTED:	09/11/07
		EQUIPMENT:	Excavator	HOLE FINISHED:	09/11/07
R.L.	m	OPERATOR:	DOW EXCAV.	LOGGED BY:	JF
DATUM		DIMENSIONS:	2m x 1m	CHECKED BY:	SCWW

EXCAVATION TESTS						ENGINEERING DESCRIPTION						GEOLOGICAL	
PENETRATION 1 2 3	SUPPORT	WATER	SAMPLES, TESTS	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION / WEATHERING	STRENGTH / DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH 10 25 50 100 200	ORIGIN TYPE, MINERAL COMPOSITION, DEFECTS, STRUCTURE	UNIT
					0			GRAVEL, sandy, angular, fine-coarse sand), dry, brown SAND and basalt boulders				FILL	
					1			SILT, sandy, firm, slightly plastic, wet, grey-brown					
					2			SAND, shelly, fine-coarse grained, loosely compacted, wet, brown.					
					3			CLAYEY SILT interbedded with SILT with minor clay, occasional beds of sandy silt, very soft, saturated, occasional beds of fine grained sand, grey. Clayey silt moderately plastic, occasionally highly plastic, fine organic content, black. Silt slightly plastic, saturated, dark grey. Sandy silt non plastic. Vertical fissures infilled with fine-medium sand. Thinly bedded (5-20mm layers). Pit walls collapsing.				HYDRAULIC FILL	
					4			**End of Borehole at 3.2m (hole collapse)**					

TONKIN & TAYLOR LTD

EXCAVATION LOG

EXCAVATION No: TTP 12
Location:

SHEET 1 OF 1

PROJECT:	Dunedin Multipurpose Stadium	LOCATION:	Dunedin	JOB No:	51219
CO-ORDINATES	5479121.90 mN 2317903.07 mE	EXPOSURE TYPE:	Test Pit	HOLE STARTED:	09/11/07
		EQUIPMENT:	Excavator	HOLE FINISHED:	09/11/07
R.L.	m	OPERATOR:	DOW EXCAV.	LOGGED BY:	JF
DATUM		DIMENSIONS:	2m x 1m	CHECKED BY:	SCWW

EXCAVATION TESTS						ENGINEERING DESCRIPTION						GEOLOGICAL	
PENETRATION 1 2 3	SUPPORT	WATER	SAMPLES, TESTS	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION / WEATHERING	STRENGTH / DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH 10 25 50 100 200	ORIGIN TYPE, MINERAL COMPOSITION, DEFECTS, STRUCTURE	UNIT
		Flow			0			GRAVEL, sandy, angular, fine-coarse sand, dry, brown				FILL	
								SAND and basalt boulders					
					1			SILT, sandy, firm, slightly plastic, wet, grey-brown					
		Water level after 10 mins			2			SAND, shelly, fine-coarse grained, loosely compacted, wet, brown.					
					3			CLAYEY SILT interbedded with SILT with minor clay, occasional beds of sandy silt, very soft, saturated, occasional beds of fine grained sand, grey. Clayey silt moderatly plastic, occasionally highly plastic, fine organic content, black. Silt slightly plastic, saturated, dark grey. Sandy silt non plastic. Vertical fissures infilled with fine-medium sand. Thinly bedded (5-20mm layers). Pit walls collapsing.				HYDRAULIC FILL	
					4								

TONKIN & TAYLOR LTD

EXCAVATION LOG

EXCAVATION No: TTP 13
Location:

SHEET 1 OF 1

PROJECT:	Dunedin Multipurpose Stadium	LOCATION:	Dunedin	JOB No:	51219
CO-ORDINATES	5479154.41 mN 2317751.25 mE	EXPOSURE TYPE:	Test Pit	HOLE STARTED:	10/11/07
		EQUIPMENT:	Excavator	HOLE FINISHED:	10/11/07
R.L.	m	OPERATOR:	DOW EXCAV.	LOGGED BY:	JF
DATUM		DIMENSIONS:	2m x 1m	CHECKED BY:	SCWW

EXCAVATION TESTS						ENGINEERING DESCRIPTION					GEOLOGICAL	
PENETRATION 1 2 3	SUPPORT	WATER	SAMPLES, TESTS	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION / WEATHERING	STRENGTH / DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH 10 25 50 100 200	ORIGIN TYPE, MINERAL COMPOSITION, DEFECTS, STRUCTURE	UNIT
					0			GRAVEL, sandy, angular, fine-medium grained sand, dry, grey				FILL	
								SAND, fine-medium grained, loose, moist, grey with yellow staining					
								FILL, brick, firm grey silt, gravel					
								SAWDUST, loose, wet, black					
								SILT, sandy, firm, wet, grey					
					1								
		Flow						BOULDERS (200mm), many shells, minor sandy silt, loose, saturated, grey.					
					2								
								end of TP at 2.6m (pit collapse)					
					3								
					4								

TONKIN & TAYLOR LTD

EXCAVATION LOG

EXCAVATION No: TTP 14
Location:

SHEET 1 OF 1

PROJECT:	Dunedin Multipurpose Stadium	LOCATION:	Dunedin	JOB No:	51219
CO-ORDINATES	5479142.81 mN 2317742.42 mE	EXPOSURE TYPE:	Test Pit	HOLE STARTED:	10/11/07
		EQUIPMENT:	Excavator	HOLE FINISHED:	10/11/07
R.L.	m	OPERATOR:	DOW EXCAV.	LOGGED BY:	JF
DATUM		DIMENSIONS:	2m x 1m	CHECKED BY:	SCWW

EXCAVATION TESTS						ENGINEERING DESCRIPTION						GEOLOGICAL	
PENETRATION 1 2 3	SUPPORT	WATER	SAMPLES, TESTS	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION / WEATHERING	STRENGTH / DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH 10 25 50 100 200	ORIGIN TYPE, MINERAL COMPOSITION, DEFECTS, STRUCTURE	UNIT
		Flow			0			GRAVEL, sandy, angular, fine-medium grained sand, dry, grey FILL, clay & silt (firm-stiff), brick, sand, gravel, coal fragments, moist.				FILL	
					1			SILT, sandy, firm, dilatent, wet, grey.				HYDRAULIC FILL	
					2			SILT, very sandy, abundant shells, occasional boulders increasing in abundance with depth, loose, saturated, grey					
					3								
					4								

TONKIN & TAYLOR LTD

EXCAVATION LOG

EXCAVATION No: TTP 15
Location:

SHEET 1 OF 1

PROJECT:	Dunedin Multipurpose Stadium	LOCATION:	Dunedin	JOB No:	51219
CO-ORDINATES	5479152.19 mN 2317736.73 mE	EXPOSURE TYPE:	Test Pit	HOLE STARTED:	10/11/07
		EQUIPMENT:	Excavator	HOLE FINISHED:	10/11/07
R.L.	m	OPERATOR:	DOW EXCAV.	LOGGED BY:	JF
DATUM		DIMENSIONS:	2m x 1m	CHECKED BY:	SCWW

EXCAVATION TESTS						ENGINEERING DESCRIPTION						GEOLOGICAL	
PENETRATION 1 2 3	SUPPORT	WATER	SAMPLES, TESTS	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION / WEATHERING	STRENGTH / DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH 10 25 50 100 200	ORIGIN TYPE, MINERAL COMPOSITION, DEFECTS, STRUCTURE	UNIT
								GRAVEL, sandy, angular, fine-medium grained sand, dry, grey FILL, clay & silt (firm-stiff), brick, sand, gravel, coal fragments, moist.				FILL	
					1			**end of TP at 0.55m (services encountered)**					
					2								
					3								
					4								

TONKIN & TAYLOR LTD

EXCAVATION LOG

EXCAVATION No: TTP 16
Location:

SHEET 1 OF 1

PROJECT:	Dunedin Multipurpose Stadium	LOCATION:	Dunedin	JOB No:	51219
CO-ORDINATES	5479178.55 mN 2317740.54 mE	EXPOSURE TYPE:	Test Pit	HOLE STARTED:	10/11/07
		EQUIPMENT:	Excavator	HOLE FINISHED:	10/11/07
R.L.	m	OPERATOR:	DOW EXCAV.	LOGGED BY:	JF
DATUM		DIMENSIONS:	2m x 1m	CHECKED BY:	SCWW

EXCAVATION TESTS						ENGINEERING DESCRIPTION						GEOLOGICAL	
PENETRATION 1 2 3	SUPPORT	WATER	SAMPLES, TESTS	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION / WEATHERING	STRENGTH / DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH 10 25 50 100 200	ORIGIN TYPE, MINERAL COMPOSITION, DEFECTS, STRUCTURE	UNIT
								GRAVEL, sandy, angular, fine-medium grained sand, dry, grey				FILL	
								CONCRETE					
								CLAY, firm, some sandy topsoil, moist					
					1			ASH, medium-coarse grained, loose, black					
								SILT, clayey, many basalt boulders, soft-firm, plastic, wet, brown					
		Seepage			2								
								SILT, soft, wet, grey mottled brown.				HYDRAULIC FILL	
					3								
								end of TP at 3.2m (hole collapse)					
					4								

TONKIN & TAYLOR LTD

EXCAVATION LOG

EXCAVATION No: TTP 17
Location:

SHEET 1 OF 1

PROJECT:	Dunedin Multipurpose Stadium	LOCATION:	Dunedin	JOB No:	51219
CO-ORDINATES	5479144.62 mN 2317763.21 mE	EXPOSURE TYPE:	Test Pit	HOLE STARTED:	10/11/07
		EQUIPMENT:	Excavator	HOLE FINISHED:	10/11/07
R.L.	m	OPERATOR:	DOW EXCAV.	LOGGED BY:	JF
DATUM		DIMENSIONS:	2m x 1m	CHECKED BY:	SCWW

EXCAVATION TESTS						ENGINEERING DESCRIPTION						GEOLOGICAL	
PENETRATION 1 2 3	SUPPORT	WATER	SAMPLES, TESTS	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION / WEATHERING	STRENGTH / DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH 10 25 50 100 200	ORIGIN TYPE, MINERAL COMPOSITION, DEFECTS, STRUCTURE	UNIT
		Seepage-flow			0			GRAVEL, sandy, angular, fine-medium grained sand, dry, grey				FILL	
								FILL, silt, sand and gravel, firm-stiff, compacted, moist, brown.					
								SAND, fine-medium grained, loose, moist, white.					
								FILL, silt, sand, brick, timber, boulders (200mm), compacted, moist					
					1			SILT, sandy, soft, wet, grey.					
								SILT, sandy, abundant shells, loose, brown, becomes grey at 1.4m					
					2								
								end of TP at 2.5m					
					3								
					4								

TONKIN & TAYLOR LTD

EXCAVATION LOG

EXCAVATION No: TTP 18
Location:

SHEET 1 OF 1

PROJECT:	Dunedin Multipurpose Stadium	LOCATION:	Dunedin	JOB No:	51219
CO-ORDINATES	5479147.56 mN 2317819.60 mE	EXPOSURE TYPE:	AUGER	HOLE STARTED:	10/11/07
		EQUIPMENT:	AUGER	HOLE FINISHED:	10/11/07
R.L.	m	OPERATOR:	DOW EXCAV.	LOGGED BY:	JF
DATUM		DIMENSIONS:	450mm dia	CHECKED BY:	SCWW

EXCAVATION TESTS						ENGINEERING DESCRIPTION						GEOLOGICAL	
PENETRATION 1 2 3	SUPPORT	WATER	SAMPLES, TESTS	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION / WEATHERING	STRENGTH / DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH 10 25 50 100 200	ORIGIN TYPE, MINERAL COMPOSITION, DEFECTS, STRUCTURE	UNIT
								TOPSOIL, silty, many grass rootlets, moist.				FILL	
								ASH, some brown silt, coal fragments, moist, black.					
								end of hole at 0.4m (concrete obstruction)					
					1								
					2								
					3								
					4								

TONKIN & TAYLOR LTD

EXCAVATION LOG

EXCAVATION No: TTP 19
Location:

SHEET 1 OF 1

PROJECT:	Dunedin Multipurpose Stadium	LOCATION:	Dunedin	JOB No:	51219
CO-ORDINATES	5479150.14 mN 2317808.89 mE	EXPOSURE TYPE:	AUGER	HOLE STARTED:	10/11/07
		EQUIPMENT:	AUGER	HOLE FINISHED:	10/11/07
R.L.	m	OPERATOR:	DOW EXCAV.	LOGGED BY:	JF
DATUM		DIMENSIONS:	450mm dia	CHECKED BY:	SCWW

EXCAVATION TESTS						ENGINEERING DESCRIPTION						GEOLOGICAL	
PENETRATION 1 2 3	SUPPORT	WATER	SAMPLES, TESTS	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION / WEATHERING	STRENGTH / DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH 10 25 50 100 200	ORIGIN TYPE, MINERAL COMPOSITION, DEFECTS, STRUCTURE	UNIT
		after 10 mins			1			SILT, sandy, bricks, firm, moist, brown. Surficial oil staining noted.				FILL	
					2			SILT, some fine organic material, shells, very soft, wet.				HYDRAULIC FILL	
					3			**Enf of test pit at 3.3m**					
					4								

TONKIN & TAYLOR LTD

EXCAVATION LOG

EXCAVATION No: TTP 20
Location:

SHEET 1 OF 1

PROJECT: Dunedin Multipurpose Stadium		LOCATION: Dunedin	JOB No: 51219
CO-ORDINATES	5479191.36 mN 2317729.74 mE	EXPOSURE TYPE: AUGER	HOLE STARTED: 10/11/07
		EQUIPMENT: AUGER	HOLE FINISHED: 10/11/07
R.L.	m	OPERATOR: DOW EXCAV.	LOGGED BY: JF
DATUM		DIMENSIONS: 450mm dia	CHECKED BY: SCWW

EXCAVATION TESTS					ENGINEERING DESCRIPTION						GEOLOGICAL	
PENETRATION 1 2 3	SUPPORT	WATER	SAMPLES, TESTS	R.L. (m) / DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION / WEATHERING	STRENGTH / DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH 10 25 50 100 200	ORIGIN TYPE, MINERAL COMPOSITION, DEFECTS, STRUCTURE	UNIT
							SILT, sandy, occasional basalt, boulders, firm, moist, brown.				FILL	
				1			CLAY with boulders, non-dilatant, soft, wet, dark grey.					
							end of hole at 1.8m (obstruction)					
				2								
				3								
				4								

TONKIN & TAYLOR LTD

EXCAVATION LOG

EXCAVATION No: TTP 21
Location:

SHEET 1 OF 1

PROJECT:	Dunedin Multipurpose Stadium	LOCATION:	Dunedin	JOB No:	51219
CO-ORDINATES	5479227.16 mN 2317642.33 mE	EXPOSURE TYPE:	Test Pit	HOLE STARTED:	12/11/07
		EQUIPMENT:	Excavator	HOLE FINISHED:	12/11/07
R.L.	m	OPERATOR:	DOW EXCAV.	LOGGED BY:	JF
DATUM		DIMENSIONS:	2m x 1m	CHECKED BY:	SCWW

EXCAVATION TESTS						ENGINEERING DESCRIPTION						GEOLOGICAL	
PENETRATION 1 2 3	SUPPORT	WATER	SAMPLES, TESTS	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION / WEATHERING	STRENGTH / DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH 10 25 50 100 200	ORIGIN TYPE, MINERAL COMPOSITION, DEFECTS, STRUCTURE	UNIT
								GRAVEL, silty, medium-coarse grained, angular, slightly cemented, dry.				FILL	
								CONCRETE					
								GRAVEL, sandy, coarse, angular, moist, brown.					
					1			FILL, silt (firm, wet, grey), gravel (angular, coarse, sand and ash.					
		Seepage			2								
								REFUSE, silt, boulders, glass, timber, ceramics, saturated, very soft.				REFUSE	
					3								
								end of TP at 3.2m					
					4								

TONKIN & TAYLOR LTD

EXCAVATION LOG

EXCAVATION No: TTP 22
Location:

SHEET 1 OF 1

PROJECT:	Dunedin Multipurpose Stadium	LOCATION:	Dunedin	JOB No:	51219
CO-ORDINATES	5479232.88 mN 2317622.38 mE	EXPOSURE TYPE:	Test Pit	HOLE STARTED:	12/11/07
		EQUIPMENT:	Excavator	HOLE FINISHED:	12/11/07
R.L.	m	OPERATOR:	DOW EXCAV.	LOGGED BY:	JF
DATUM		DIMENSIONS:	2m x 1m	CHECKED BY:	SCWW

EXCAVATION TESTS						ENGINEERING DESCRIPTION							GEOLOGICAL	
PENETRATION 1 2 3	SUPPORT	WATER	SAMPLES, TESTS	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION / WEATHERING	STRENGTH / DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH 10 25 50 100 200		ORIGIN TYPE, MINERAL COMPOSITION, DEFECTS, STRUCTURE	UNIT
								GRAVEL, silty, medium-coarse grained, angular, slightly cemented, dry.					FILL	
								CONCRETE						
								ASH, coarse, black						
								FILL, sandy silt, fine-medium grained sand, gravel, boulders, brick, ceramics, firm, wet, grey.						
					1									
								REFUSE, sandy silt, boulders, glass, ceramics, timber, saturated, dark brown becomes grey, very soft, slight odour					REFUSE	
					2									
		Seepage												
					3									
		after 10 mins												
					4									
			4.1m (bag) B					SILT, some sand pockets, rare shells, plastic, very soft, wet, black.					? INSITU HARBOUR MUDS ?	
								end of TP at 4.2m						

TONKIN & TAYLOR LTD

EXCAVATION LOG

EXCAVATION No: TTP 23
Location:

SHEET 1 OF 1

PROJECT:	Dunedin Multipurpose Stadium	LOCATION:	Dunedin	JOB No:	51219
CO-ORDINATES	5479239.45 mN 2317600.79 mE	EXPOSURE TYPE:	Test Pit	HOLE STARTED:	12/11/07
		EQUIPMENT:	Excavator	HOLE FINISHED:	12/11/07
R.L.	m	OPERATOR:	DOW EXCAV.	LOGGED BY:	JF
DATUM		DIMENSIONS:	2m x 1m	CHECKED BY:	SCWW

EXCAVATION TESTS						ENGINEERING DESCRIPTION						GEOLOGICAL	
PENETRATION 1 2 3	SUPPORT	WATER	SAMPLES, TESTS	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION / WEATHERING	STRENGTH / DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH 10 25 50 100 200	ORIGIN TYPE, MINERAL COMPOSITION, DEFECTS, STRUCTURE	UNIT
								GRAVEL, silty, medium-coarse grained, angular, slightly cemented, dry.				FILL	
								CORK fill (old floor level)					
								CONCRETE, reinforced					
								SAND, occasional angular gravel, fine-medium grained, loose, moist.					
					1			FILL, silt, sand, gravel, some boulders, wet, brown.					
		Seepage						GRAVEL, some silt and sand, compacted, dark brown					
								REFUSE, silt, sandy, frequent glass, some metal and timber, some gravel, firm-stiff, becomes soft with depth, wet, grey.				REFUSE	
					2								
					3								
					4								
								end of TP at 4.3m					

TONKIN & TAYLOR LTD

EXCAVATION LOG

EXCAVATION No: TTP 24
Location:

SHEET 1 OF 1

PROJECT:	Dunedin Multipurpose Stadium	LOCATION:	Dunedin	JOB No:	51219
CO-ORDINATES	5479216.23 mN 2317582.31 mE	EXPOSURE TYPE:	Test Pit	HOLE STARTED:	12/11/07
		EQUIPMENT:	Excavator	HOLE FINISHED:	12/11/07
R.L.	m	OPERATOR:	DOW EXCAV.	LOGGED BY:	JF
DATUM		DIMENSIONS:	2m x 1m	CHECKED BY:	SCWW

EXCAVATION TESTS						ENGINEERING DESCRIPTION						GEOLOGICAL	
PENETRATION 1 2 3	SUPPORT	WATER	SAMPLES, TESTS	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION / WEATHERING	STRENGTH / DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH 10 25 50 100 200	ORIGIN TYPE, MINERAL COMPOSITION, DEFECTS, STRUCTURE	UNIT
		inflow @ 2l/s			0			GRAVEL, silty, medium-coarse grained, angular, slightly cemented, dry.				FILL	
								CONCRETE, reinforced					
								SILT, gravel, some boulders and brick, firm, wet, brown.					
					1								
								SILT, sandy, with abundant shells, loose, grey, saturated.					
								SILT, some silty clay layering, occasional thin 2mm sand layers, very soft, wet, grey.				HYDRAULIC FILL	
		15 mins			2								
					3			SILT with boulders (subrounded, 400mm dia.), very soft, saturated. Oil sheen on water.				FILL	
								end of TP at 3.5m					
					4								

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EXCAVATION LOG

EXCAVATION No: TTP 25
Location:

SHEET 1 OF 1

PROJECT:	Dunedin Multipurpose Stadium	LOCATION:	Dunedin	JOB No:	51219
CO-ORDINATES	5479199.22 mN 2317632.41 mE	EXPOSURE TYPE:	Test Pit	HOLE STARTED:	12/11/07
		EQUIPMENT:	Excavator	HOLE FINISHED:	12/11/07
R.L.	m	OPERATOR:	DOW EXCAV.	LOGGED BY:	JF
DATUM		DIMENSIONS:	2m x 1m	CHECKED BY:	SCWW

EXCAVATION TESTS						ENGINEERING DESCRIPTION						GEOLOGICAL	
PENETRATION 1 2 3	SUPPORT	WATER	SAMPLES, TESTS	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION / WEATHERING	STRENGTH / DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH 10 25 50 100 200	ORIGIN TYPE, MINERAL COMPOSITION, DEFECTS, STRUCTURE	UNIT
					0			GRAVEL, silty, medium-coarse grained, angular, slightly cemented, dry.				FILL	
								SILT, gravel, some boulders, brick and timber, firm, wet, brown.					
								CONCRETE, reinforced					
					1			SILT and angular gravel, firm, wet, brown.					
		Seepage						CLAYEY SILT interbedded with SILT with minor clay, occasional beds of sandy silt, very soft, saturated, occasional beds of fine grained sand, grey. Clayey silt moderately plastic, occasionally highly plastic, fine organic content, black. Silt slightly plastic, saturated, dark grey. Sandy silt non plastic. Vertical fissures infilled with fine-medium sand. Thinly bedded (5-20mm layers). Pit walls collapsing.				HYDRAULIC FILL	
					2								
					3								
								SAND, rare shells, fine-medium grained, saturated, loose (running), grey.					
								end of TP at 3.7m					
					4								

TONKIN & TAYLOR LTD

EXCAVATION LOG

EXCAVATION No: TTP 26
Location:

SHEET 1 OF 1

PROJECT:	Dunedin Multipurpose Stadium	LOCATION:	Dunedin	JOB No:	51219
CO-ORDINATES	5479189.93 mN 2317621.01 mE	EXPOSURE TYPE:	Test Pit	HOLE STARTED:	12/11/07
		EQUIPMENT:	Excavator	HOLE FINISHED:	12/11/07
R.L.	m	OPERATOR:	DOW EXCAV.	LOGGED BY:	JF
DATUM		DIMENSIONS:	2m x 1m	CHECKED BY:	SCWW

EXCAVATION TESTS						ENGINEERING DESCRIPTION						GEOLOGICAL	
PENETRATION 1 2 3	SUPPORT	WATER	SAMPLES, TESTS	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION / WEATHERING	STRENGTH / DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH 10 25 50 100 200	ORIGIN TYPE, MINERAL COMPOSITION, DEFECTS, STRUCTURE	UNIT
								GRAVEL, silty, medium-coarse grained, angular, slightly cemented, dry.				FILL	
								CONCRETE, reinforced					
								SILT, sandy, some pumice gravel, fine-coarse grained sand, soft, wet, grey/black, stong diesel odour					
								SILT, sandy, abundant shell fragments, firm, 10mm bedding apparent.					
					1			CLAYEY SILT interbedded with SILT with minor clay, occasional beds of sandy silt, very soft, saturated, occasional beds of fine grained sand, grey. Clayey silt moderately plastic, occasionally highly plastic, fine organic content, black. Silt slightly plastic, saturated, dark grey. Sandy silt non plastic. Vertical fissures infilled with fine-medium sand. Thinly bedded (5-20mm layers). Pit walls collapsing.				HYDRAULIC FILL	
		seepage			2								
								SAND, some shell fragments, predominantly fine grained, loose, wet, grey.					
					3			CLAYEY SILT interbedded with SILT with minor clay, occasional beds of sandy silt, very soft, saturated. Clayey silt moderately plastic, occasionally highly plastic, fine organic content, black. Silt slightly plastic, saturated, dark grey. Sandy silt non plastic. Vertical fissures infilled with fine-medium sand. Thinly bedded (5-20mm layers). Pit walls collapsing.					
								end of TP at 3.5m					
					4								

TONKIN & TAYLOR LTD

EXCAVATION LOG

EXCAVATION No: TTP 27
Location:

SHEET 1 OF 1

PROJECT:	Dunedin Multipurpose Stadium	LOCATION:	Dunedin	JOB No:	51219
CO-ORDINATES	5479113.62 mN 2317743.70 mE	EXPOSURE TYPE:	AUGER	HOLE STARTED:	12/11/07
		EQUIPMENT:	AUGER	HOLE FINISHED:	12/11/07
R.L.	m	OPERATOR:	DOW EXCAV.	LOGGED BY:	JF
DATUM		DIMENSIONS:	450mm dia	CHECKED BY:	SCWW

EXCAVATION TESTS						ENGINEERING DESCRIPTION						GEOLOGICAL	
PENETRATION 1 2 3	SUPPORT	WATER	SAMPLES, TESTS	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION / WEATHERING	STRENGTH / DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH 10 25 50 100 200	ORIGIN TYPE, MINERAL COMPOSITION, DEFECTS, STRUCTURE	UNIT
								Asphalt				FILL	
								SILT, sandy, gravel, firm-stiff, moist, brown					
								ASH, coarse, occasional coal, black					
								SILT, firm-stiff, moist, grey.					
					1			SILT, sandy, with abundant shells, loose, moist, grey. Diesel or solvent odour					
		Seepage						SILT, sandy, very soft, wet, grey.					
					2			CLAYEY SILT interbedded with SILT with minor clay, occasional beds of sandy silt, very soft, saturated, occasional beds of fine grained sand, grey. Clayey silt moderately plastic, occasionally highly plastic, fine organic content, black. Silt slightly plastic, saturated, dark grey. Sandy silt non plastic. Vertical fissures infilled with fine-medium sand. Thinly bedded (5-20mm layers). Pit walls collapsing.				HYDRAULIC FILL	
					3			**end of TP at 2.9m**					
					4								

TONKIN & TAYLOR LTD

EXCAVATION LOG

EXCAVATION No: TTP28
Location:

SHEET 1 OF 1

PROJECT:	Dunedin Multipurpose Stadium	LOCATION:	Dunedin	JOB No:	51219
CO-ORDINATES	5479191.71 mN 2317645.70 mE	EXPOSURE TYPE:	Test Pit	HOLE STARTED:	13/11/07
		EQUIPMENT:	Excavator	HOLE FINISHED:	13/11/07
R.L.	m	OPERATOR:	DOW EXCAV.	LOGGED BY:	JF
DATUM		DIMENSIONS:	2m x 1m	CHECKED BY:	SCWW

EXCAVATION TESTS						ENGINEERING DESCRIPTION						GEOLOGICAL	
PENETRATION 1 2 3	SUPPORT	WATER	SAMPLES, TESTS	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION / WEATHERING	STRENGTH / DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH 10 25 50 100 200	ORIGIN TYPE, MINERAL COMPOSITION, DEFECTS, STRUCTURE	UNIT
					0			GRAVEL, silty, medium-coarse grained, angular, slightly cemented, dry.				FILL	
								SILT fill, angular gravel, firm, moist, brown.					
					1			SILT, sandy, with abundant shells, loose, moist, grey.					
								CLAYEY SILT interbedded with SILT with minor clay, occasional beds of sandy silt, very soft, saturated, occasional beds of fine grained sand, grey. Clayey silt moderately plastic, occasionally highly plastic, fine organic content, black. Silt slightly plastic, saturated, dark grey. Sandy silt non plastic. Vertical fissures infilled with fine-medium sand. Thinly bedded (5-20mm layers). Pit walls collapsing.				HYDRAULIC FILL	
					2								
								SAND, medium-coarse grained, loose, wet, grey.					
					3								
								end of TP at 3.2m					
					4								

TONKIN & TAYLOR LTD

EXCAVATION LOG

EXCAVATION No: TTP29
Location:

SHEET 1 OF 1

PROJECT: Dunedin Multipurpose Stadium		LOCATION: Dunedin	JOB No: 51219
CO-ORDINATES	5479186.02 mN 2317629.88 mE	EXPOSURE TYPE: Test Pit	HOLE STARTED: 13/11/07
		EQUIPMENT: Excavator	HOLE FINISHED: 13/11/07
R.L.	m	OPERATOR: DOW EXCAV.	LOGGED BY: JF
DATUM		DIMENSIONS: 2m x 1m	CHECKED BY: SCWW

EXCAVATION TESTS						ENGINEERING DESCRIPTION						GEOLOGICAL	
PENETRATION 1 2 3	SUPPORT	WATER	SAMPLES, TESTS	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION / WEATHERING	STRENGTH / DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH 10 25 50 100 200	ORIGIN TYPE, MINERAL COMPOSITION, DEFECTS, STRUCTURE	UNIT
		Seepage	0.0m (bag)					GRAVEL, silty, medium-coarse grained, angular, slightly cemented, dry.				FILL	
								CONCRETE					
								GRAVEL, silty sandy, stiff, angular, well compacted, wet					
								SAND, silty, firm, wet, some shell fragments					
					1			CLAYEY SILT interbedded with SILT with minor clay, occasional beds of sandy silt, very soft, saturated, occasional beds of fine grained sand, grey. Clayey silt moderately plastic, occasionally highly plastic, fine organic content, black. Silt slightly plastic, saturated, dark grey. Sandy silt non plastic.				HYDRAULIC FILL	
					2								
								SAND, some shell fragments, predominantly fine grained, loose, wet, grey.					
					3			**end of TP at 3.0m**					
					4								

TONKIN & TAYLOR LTD

EXCAVATION LOG

EXCAVATION No: TTP30
Location:

SHEET 1 OF 1

PROJECT:	Dunedin Multipurpose Stadium	LOCATION:	Dunedin	JOB No:	51219
CO-ORDINATES	5479123.31 mN 2317870.11 mE	EXPOSURE TYPE:	Test Pit	HOLE STARTED:	13/11/07
		EQUIPMENT:	Excavator	HOLE FINISHED:	13/11/07
R.L.	m	OPERATOR:	DOW EXCAV.	LOGGED BY:	JF
DATUM		DIMENSIONS:	2m x 1m	CHECKED BY:	SCWW

EXCAVATION TESTS						ENGINEERING DESCRIPTION						GEOLOGICAL	
PENETRATION 1 2 3	SUPPORT	WATER	SAMPLES, TESTS	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION / WEATHERING	STRENGTH / DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH 10 25 50 100 200	ORIGIN TYPE, MINERAL COMPOSITION, DEFECTS, STRUCTURE	UNIT
			0.4m (bag) B		0			GRAVEL, sandy, coarse, angular FILL, firm SILT, GRAVEL, medium to coarse SAND, timber, wire, grey GRAVEL, sandy, well compacted, coarse, some boulders approx 500mm, moist, brown				FILL	
		Seepage			1			CLAYEY SILT interbedded with SILT with minor clay, occasional beds of sandy silt, very soft, saturated, occasional beds of fine grained sand, grey. Clayey silt moderately plastic, occasionally highly plastic, fine organic content, black. Silt slightly plastic, saturated, dark grey. Sandy silt non plastic.				HYDRAULIC FILL	
					2			SAND, silty, very soft, saturated, grey Some branches					
					3			**end of TP at 3.5m**					
					4								

TONKIN & TAYLOR LTD

EXCAVATION LOG

EXCAVATION No: TTP31
Location:

SHEET 1 OF 1

PROJECT:	Dunedin Multipurpose Stadium	LOCATION:	Dunedin	JOB No:	51219
CO-ORDINATES	5479147.17 mN 2317627.28 mE	EXPOSURE TYPE:	AUGER	HOLE STARTED:	13/11/07
		EQUIPMENT:	AUGER	HOLE FINISHED:	13/11/07
R.L.	m	OPERATOR:	DOW EXCAV.	LOGGED BY:	JF
DATUM		DIMENSIONS:	450mm dia	CHECKED BY:	SCWW

EXCAVATION TESTS						ENGINEERING DESCRIPTION						GEOLOGICAL	
PENETRATION 1 2 3	SUPPORT	WATER	SAMPLES, TESTS	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION / WEATHERING	STRENGTH / DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH 10 25 50 100 200	ORIGIN TYPE, MINERAL COMPOSITION, DEFECTS, STRUCTURE	UNIT
					0			SAND, silty, some gravel and cobbles, firm, fine to medium sand, rounded cobbles, occasional bricks, grass rootlets @ 0.15m, dry becoming moist				FILL	
								SILT, sandy, some gravel and shell fragments, moist to wet					
					1								
								Obstruction (concrete) @ 1.2m					
					2								
					3								
					4								

TONKIN & TAYLOR LTD

EXCAVATION LOG

EXCAVATION No: TTP32
Location:

SHEET 1 OF 1

PROJECT:	Dunedin Multipurpose Stadium	LOCATION:	Dunedin	JOB No:	51219
CO-ORDINATES	5479161.16 mN 2317611.37 mE	EXPOSURE TYPE:	AUGER	HOLE STARTED:	13/11/07
		EQUIPMENT:	AUGER	HOLE FINISHED:	13/11/07
R.L.	m	OPERATOR:	DOW EXCAV.	LOGGED BY:	JF
DATUM		DIMENSIONS:	450mm dia	CHECKED BY:	SCWW

EXCAVATION TESTS						ENGINEERING DESCRIPTION						GEOLOGICAL	
PENETRATION 1 2 3	SUPPORT	WATER	SAMPLES, TESTS	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION / WEATHERING	STRENGTH / DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH 10 25 50 100 200	ORIGIN TYPE, MINERAL COMPOSITION, DEFECTS, STRUCTURE	UNIT
					1			SAND, silty, some gravel and cobbles, firm, fine to medium sand, rounded cobbles, occasional bricks, grass rootlets @ 0.15m, dry becoming moist				FILL	
								SILT, sandy, some gravel and shell fragments, moist to wet					
					2			**Obstruction (concrete) @ 1.2m**					
					3								
					4								

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EXCAVATION LOG

EXCAVATION No: TTP33
Location:

SHEET 1 OF 1

PROJECT: Dunedin Multipurpose Stadium		LOCATION: Dunedin	JOB No: 51219
CO-ORDINATES	5479173.97 mN 2317595.09 mE	EXPOSURE TYPE: AUGER	HOLE STARTED: 13/11/07
		EQUIPMENT: AUGER	HOLE FINISHED: 13/11/07
R.L.	m	OPERATOR: DOW EXCAV.	LOGGED BY: JF
DATUM		DIMENSIONS: 450mm dia	CHECKED BY: SCWW

EXCAVATION TESTS						ENGINEERING DESCRIPTION						GEOLOGICAL	
PENETRATION 1 2 3	SUPPORT	WATER	SAMPLES, TESTS	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION / WEATHERING	STRENGTH / DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH 10 25 50 100 200	ORIGIN TYPE, MINERAL COMPOSITION, DEFECTS, STRUCTURE	UNIT
								SAND, silty, some gravel and cobbles, firm, fine to medium sand, rounded cobbles, occasional bricks, grass rootlets @ 0.15m, dry becoming moist				FILL	
					1			CLAYEY SILT interbedded with SILT with minor clay, occasional beds of sandy silt, very soft, saturated, occasional beds of fine grained sand, grey. Clayey silt moderately plastic, occasionally highly plastic, fine organic content, black. Silt slightly plastic, saturated, dark grey. Sandy silt non plastic. Banding uncertain, some sand.				HYDRAULIC FILL	
					2								
								Some banding observed					
		Seepage			3								
								SAND, some shell fragments, predominantly fine grained, loose, wet, grey.					
					4			**end of TP at 4.0m**					

TONKIN & TAYLOR LTD

EXCAVATION LOG

EXCAVATION No: TTP34
Location:

SHEET 1 OF 1

PROJECT: Dunedin Multipurpose Stadium		LOCATION: Dunedin	JOB No: 51219
CO-ORDINATES	5479192.70 mN 2317573.42 mE	EXPOSURE TYPE: AUGER	HOLE STARTED: 14/11/07
		EQUIPMENT: AUGER	HOLE FINISHED: 14/11/07
R.L.	m	OPERATOR: DOW EXCAV.	LOGGED BY: JF
DATUM		DIMENSIONS: 450mm dia	CHECKED BY: SCWW

EXCAVATION TESTS						ENGINEERING DESCRIPTION						GEOLOGICAL	
PENETRATION 1 2 3	SUPPORT	WATER	SAMPLES, TESTS	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION / WEATHERING	STRENGTH / DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH 10 25 50 100 200	ORIGIN TYPE, MINERAL COMPOSITION, DEFECTS, STRUCTURE	UNIT
			2.5m (bag) D		0			TOPSOIL				FILL	
					1			SILT, sandy, frequent gravel and cobbles, bricks and glass, soft, wet, brown.					
					2			SILT, sandy, very soft, some banding visible with silty clay, wet.				HYDRAULIC FILL	
								SILT, clayey, organic rich, very soft, plastic, black.					
					3			SILT and silty clay, very soft, wet. Some grass/reeds @ 3.5m					
					4			**end of TP at 3.7m**					

TONKIN & TAYLOR LTD

EXCAVATION LOG

EXCAVATION No: TTP35
Location:

SHEET 1 OF 1

PROJECT: Dunedin Multipurpose Stadium		LOCATION: Dunedin	JOB No: 51219
CO-ORDINATES	5479216.85 mN 2317542.70 mE	EXPOSURE TYPE: AUGER	HOLE STARTED: 14/11/07
		EQUIPMENT: AUGER	HOLE FINISHED: 14/11/07
R.L.	m	OPERATOR: DOW EXCAV.	LOGGED BY: JF
DATUM		DIMENSIONS: 450mm dia	CHECKED BY: SCWW

EXCAVATION TESTS						ENGINEERING DESCRIPTION					GEOLOGICAL	
PENETRATION 1 2 3	SUPPORT	WATER	SAMPLES, TESTS	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION / WEATHERING	STRENGTH / DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH 10 25 50 100 200	ORIGIN TYPE, MINERAL COMPOSITION, DEFECTS, STRUCTURE	UNIT
								TOPSOIL				TOPSOIL	
								SILT, firm, frequent bricks, cobbles, metal, moist.				FILL	
								SILT, slightly sandy, soft, moist, mottled grey/orange					
					1			SILT, very sandy, sand pockets, shell fragments, very soft, moist to wet, black/grey.				HYDRAULIC FILL	
					2								
					3								
					4			**end of TP at 4.0m**					

TONKIN & TAYLOR LTD

EXCAVATION LOG

EXCAVATION No: TTP36
Location:

SHEET 1 OF 1

PROJECT:	Dunedin Multipurpose Stadium	LOCATION:	Dunedin	JOB No:	51219
CO-ORDINATES	5479234.74 mN 2317522.75 mE	EXPOSURE TYPE:	AUGER	HOLE STARTED:	14/11/07
		EQUIPMENT:	AUGER	HOLE FINISHED:	14/11/07
R.L.	m	OPERATOR:	DOW EXCAV.	LOGGED BY:	JF
DATUM		DIMENSIONS:	450mm dia	CHECKED BY:	SCWW

EXCAVATION TESTS						ENGINEERING DESCRIPTION						GEOLOGICAL	
PENETRATION 1 2 3	SUPPORT	WATER	SAMPLES, TESTS	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION / WEATHERING	STRENGTH / DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH 10 25 50 100 200	ORIGIN TYPE, MINERAL COMPOSITION, DEFECTS, STRUCTURE	UNIT
								SILT, sandy with abundant shells, some gravel and cobbles, compacted, moist to dry, light brown and grey, subrounded gravels.				FILL	
					1			SILT, slighty sandy, very soft, dilatant, wet, black				HYDRAULIC FILL	
					2			REFUSE, sand, silt, timber, glass, ceramic, metal, wet becomes saturated, very soft/loose, odour of decay				REFUSE	
					3								
					4			**end of TP at 4.0m**					

TONKIN & TAYLOR LTD

EXCAVATION LOG

EXCAVATION No: TTP37
Location:

SHEET 1 OF 1

PROJECT: Dunedin Multipurpose Stadium		LOCATION: Dunedin	JOB No: 51219
CO-ORDINATES	5479231.20 mN 2317483.10 mE	EXPOSURE TYPE: AUGER	HOLE STARTED: 14/11/07
		EQUIPMENT: AUGER	HOLE FINISHED: 14/11/07
R.L.	m	OPERATOR: DOW EXCAV.	LOGGED BY: JF
DATUM		DIMENSIONS: 450mm dia	CHECKED BY: SCWW

EXCAVATION TESTS						ENGINEERING DESCRIPTION					GEOLOGICAL	
PENETRATION 1 2 3	SUPPORT	WATER	SAMPLES, TESTS	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION / WEATHERING	STRENGTH / DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH 10 25 50 100 200	ORIGIN TYPE, MINERAL COMPOSITION, DEFECTS, STRUCTURE	UNIT
			0.5m (bag) B		0			SAND, silty, occasional gravel and shells, well compacted, fine to medium, light brown.				FILL	
					1			SAND, silty, loose, fine to medium, moist to wet, red/brown.					
								SILT, sandy, very soft, wet, grey.				HYDRAULIC FILL	
					2			REFUSE, sand, silt, timber, glass, ceramic, metal, wet becomes saturated, very soft/loose, odour of decay				REFUSE	
					3								
					4			**end of TP at 4.0m**					

TONKIN & TAYLOR LTD

EXCAVATION LOG

EXCAVATION No: TTP38
Location:

SHEET 1 OF 1

PROJECT:	Dunedin Multipurpose Stadium	LOCATION:	Dunedin	JOB No:	51219
CO-ORDINATES	5479206.38 mN 2317470.91 mE	EXPOSURE TYPE:	AUGER	HOLE STARTED:	14/11/07
		EQUIPMENT:	AUGER	HOLE FINISHED:	14/11/07
R.L.	m	OPERATOR:	DOW EXCAV.	LOGGED BY:	JF
DATUM		DIMENSIONS:	450mm dia	CHECKED BY:	SCWW

EXCAVATION TESTS						ENGINEERING DESCRIPTION						GEOLOGICAL	
PENETRATION 1 2 3	SUPPORT	WATER	SAMPLES, TESTS	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION / WEATHERING	STRENGTH / DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH 10 25 50 100 200	ORIGIN TYPE, MINERAL COMPOSITION, DEFECTS, STRUCTURE	UNIT
					1			FILL, sand, silt, gravel, bricks.				FILL	
								SILT, sandy, mottled, some gravel, soft, moist, grey brown					
					2			SILT, clayey, very soft, wet, black.				HYDRAULIC FILL	
					3			CLAYEY SILT interbedded with SILT with minor clay, occasional beds of sandy silt, very soft, saturated, occasional beds of fine grained sand, grey. Clayey silt moderately plastic, occasionally highly plastic, fine organic content, black. Silt slightly plastic, saturated, dark grey. Sandy silt non plastic. Vertical fissures infilled with fine-medium sand. Thinly bedded (5-20mm layers).					
					4			**end of TP at 3.9m**					

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EXCAVATION LOG

EXCAVATION No: TTP39
Location:

SHEET 1 OF 1

PROJECT: Dunedin Multipurpose Stadium		LOCATION: Dunedin	JOB No: 51219
CO-ORDINATES	5479088.21 mN 2317731.95 mE	EXPOSURE TYPE: AUGER	HOLE STARTED: 14/11/07
		EQUIPMENT: AUGER	HOLE FINISHED: 14/11/07
R.L.	m	OPERATOR: DOW EXCAV.	LOGGED BY: JF
DATUM		DIMENSIONS: 450mm dia	CHECKED BY: SCWW

EXCAVATION TESTS						ENGINEERING DESCRIPTION						GEOLOGICAL	
PENETRATION 1 2 3	SUPPORT	WATER	SAMPLES, TESTS	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION / WEATHERING	STRENGTH / DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH 10 25 50 100 200	ORIGIN TYPE, MINERAL COMPOSITION, DEFECTS, STRUCTURE	UNIT
			1.3m (bag) B		0			FILL, silt, sand, gravel, firm, compacted, dry. Sand fine to coarse, gravel up to 100mm, sub angular.				FILL	
					1			Shell layer, sandy with minor silt, loose, fine to medium sand, dry, brown.					
					2			SAND, silty, very soft, fine to medium, grading into clayey silt, soft to very soft, banded layers, grey.				HYDRAULIC FILL	
								end of TP at 2.7m					
					3								
					4								

TONKIN & TAYLOR LTD

EXCAVATION LOG

EXCAVATION No: TTP40
Location:

SHEET 1 OF 1

PROJECT:	Dunedin Multipurpose Stadium	LOCATION:	Dunedin	JOB No:	51219
CO-ORDINATES	5479081.91 mN 2317558.77 mE	EXPOSURE TYPE:	Test Pit	HOLE STARTED:	14/11/07
		EQUIPMENT:	Excavator	HOLE FINISHED:	14/11/07
R.L.	m	OPERATOR:	DOW EXCAV.	LOGGED BY:	JF
DATUM		DIMENSIONS:	2m x 1m	CHECKED BY:	SCWW

EXCAVATION TESTS						ENGINEERING DESCRIPTION						GEOLOGICAL	
PENETRATION 1 2 3	SUPPORT	WATER	SAMPLES, TESTS	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION / WEATHERING	STRENGTH / DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH 10 25 50 100 200	ORIGIN TYPE, MINERAL COMPOSITION, DEFECTS, STRUCTURE	UNIT
								GRAVEL, with some silt, firm, stiff, angular, brown				FILL	
								SILT, some bricks and gravel, firm, moist, grey					
								SAND, loose, medium to coarse, moist, yellow.					
								SILT, sandy, with some gravel and cobbles, firm, grey.					
					1			SAND, with some silt, abundant shells, medium to coarse, grey.					
								CLAYEY SILT interbedded with SILT with minor clay, occasional beds of sandy silt, very soft, saturated, occasional beds of fine grained sand, grey. Clayey silt moderately plastic, occasionally highly plastic, fine organic content, black. Silt slightly plastic, saturated, dark grey. Sandy silt non plastic. Vertical fissures infilled with fine-medium sand. Thinly bedded (5-20mm layers).				HYDRAULIC FILL	
					2								
					3								
					4								
								end of TP at 4.2m					

TONKIN & TAYLOR LTD

EXCAVATION LOG

EXCAVATION No: TTP41
Location:

SHEET 1 OF 1

PROJECT:	Dunedin Multipurpose Stadium	LOCATION:	Dunedin	JOB No:	51219
CO-ORDINATES	5479079.07 mN 2317563.86 mE	EXPOSURE TYPE:	Test Pit	HOLE STARTED:	14/11/07
		EQUIPMENT:	Excavator	HOLE FINISHED:	14/11/07
R.L.	m	OPERATOR:	DOW EXCAV.	LOGGED BY:	JF
DATUM		DIMENSIONS:	2m x 1m	CHECKED BY:	SCWW

EXCAVATION TESTS						ENGINEERING DESCRIPTION						GEOLOGICAL	
PENETRATION 1 2 3	SUPPORT	WATER	SAMPLES, TESTS	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION / WEATHERING	STRENGTH / DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH 10 25 50 100 200	ORIGIN TYPE, MINERAL COMPOSITION, DEFECTS, STRUCTURE	UNIT
								GRAVEL, with some silt, firm, stiff, angular, brown				FILL	
								SILT, some bricks and gravel, firm, moist, grey					
								SAND, loose, medium to coarse, moist, yellow.					
								SILT, sandy, with some gravel and cobbles, firm, grey.					
					1			SAND, with some silt, abundant shells, medium to coarse, grey.					
								CLAYEY SILT interbedded with SILT with minor clay, occasional beds of sandy silt, very soft, saturated, occasional beds of fine grained sand, grey. Clayey silt moderately plastic, occasionally highly plastic, fine organic content, black. Silt slightly plastic, saturated, dark grey. Sandy silt non plastic. Vertical fissures infilled with fine-medium sand. Thinly bedded (5-20mm layers).				HYDRAULIC FILL	
					2								
					3			**end of TP at 3.0m**					
					4								

TONKIN & TAYLOR LTD

EXCAVATION LOG

EXCAVATION No: TTP42
Location:

SHEET 1 OF 1

PROJECT:	Dunedin Multipurpose Stadium	LOCATION:	Dunedin	JOB No:	51219
CO-ORDINATES	5479112.82 mN 2317534.94 mE	EXPOSURE TYPE:	Test Pit	HOLE STARTED:	14/11/07
		EQUIPMENT:	Excavator	HOLE FINISHED:	14/11/07
R.L.	m	OPERATOR:	DOW EXCAV.	LOGGED BY:	JF
DATUM		DIMENSIONS:	2m x 1m	CHECKED BY:	SCWW

EXCAVATION TESTS						ENGINEERING DESCRIPTION						GEOLOGICAL	
PENETRATION 1 2 3	SUPPORT	WATER	SAMPLES, TESTS	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION / WEATHERING	STRENGTH / DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH 10 25 50 100 200	ORIGIN TYPE, MINERAL COMPOSITION, DEFECTS, STRUCTURE	UNIT
			0.7m (bag) D		0			GRAVEL, minor sand, fine to coarse, well graded, angular to subangular.				FILL	
					1			SILT, sandy, firm, moist, grey mottled brown.					
								CLAYEY SILT interbedded with SILT with minor clay, occasional beds of sandy silt, very soft, saturated, occasional beds of fine grained sand, grey. Clayey silt moderately plastic, occasionally highly plastic, fine organic content, black. Silt slightly plastic, saturated, dark grey. Sandy silt non plastic. Vertical fissures infilled with fine-medium sand. Thinly bedded (5-20mm layers).				HYDRAULIC FILL	
					2								
					3								
					4			**end of TP at 4.2m**					

TONKIN & TAYLOR LTD

EXCAVATION LOG

EXCAVATION No: TTP43
Location:

SHEET 1 OF 1

PROJECT: Dunedin Multipurpose Stadium		LOCATION: Dunedin	JOB No: 51219
CO-ORDINATES	5479200.52 mN 2317434.41 mE	EXPOSURE TYPE: Test Pit	HOLE STARTED: 15/11/07
		EQUIPMENT: Excavator	HOLE FINISHED: 15/11/07
R.L.	m	OPERATOR: DOW EXCAV.	LOGGED BY: JF
DATUM		DIMENSIONS: 2m x 1m	CHECKED BY: SCWW

EXCAVATION TESTS						ENGINEERING DESCRIPTION						GEOLOGICAL	
PENETRATION 1 2 3	SUPPORT	WATER	SAMPLES, TESTS	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION / WEATHERING	STRENGTH / DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH 10 25 50 100 200	ORIGIN TYPE, MINERAL COMPOSITION, DEFECTS, STRUCTURE	UNIT
					0			TOPSOIL, silty, many rootlets, dry, brown.				FILL	
								GRAVEL in sandy silt matrix, well compacted, angular, moist to wet, brown					
								SILT, some sand, brick fragments, gravel, branches. Soft to firm, grey.					
					1								
								SAND, silty, compacted, moist, brown/red. Contains silt nodules, soft.					
								Concrete					
			2m (bag)		2			CLAYEY SILT interbedded with SILT with minor clay, occasional beds of sandy silt, sometimes sandy, very soft, saturated. Clayey silt moderately plastic, occasionally highly plastic, fine organic content, black. Silt slightly plastic, saturated, dark grey. Sandy silt non plastic. Vertical fissures infilled with fine-medium sand. Thinly bedded (5-20mm layers).				HYDRAULIC FILL	
					3								
		Seepage											
			3.8m (bag)					COBBLES, boulders, basalt, up to 300mm, rounded to subrounded in sandy matrix, grey.				? ALLUVIUM ?	
					4			**end of TP at 4.0m**					

TONKIN & TAYLOR LTD

EXCAVATION LOG

EXCAVATION No: TTP44
Location:

SHEET 1 OF 1

PROJECT:	Dunedin Multipurpose Stadium	LOCATION:	Dunedin	JOB No:	51219
CO-ORDINATES	5479134.34 mN 2317536.39 mE	EXPOSURE TYPE:	Test Pit	HOLE STARTED:	15/11/07
		EQUIPMENT:	Excavator	HOLE FINISHED:	15/11/07
R.L.	m	OPERATOR:	DOW EXCAV.	LOGGED BY:	JF
DATUM		DIMENSIONS:	2m x 1m	CHECKED BY:	SCWW

EXCAVATION TESTS						ENGINEERING DESCRIPTION						GEOLOGICAL	
PENETRATION 1 2 3	SUPPORT	WATER	SAMPLES, TESTS	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION / WEATHERING	STRENGTH / DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH 10 25 50 100 200	ORIGIN TYPE, MINERAL COMPOSITION, DEFECTS, STRUCTURE	UNIT
					0			GRAVEL, minor sand, fine to coarse, well graded, angular to subangular.				FILL	
								SILT, sandy, firm, moist, grey mottled brown.					
					1								
		▶						SAND, silty, abundant shells, fine-medium grained, loose, wet-saturated (running), grey.				HYDRAULIC FILL	
					2			CLAYEY SILT interbedded with SILT with minor clay, occasional beds of sandy silt, sometimes sandy, soft becomes very soft, saturated. Clayey silt moderately plastic, occasionally highly plastic, fine organic content, black. Silt slightly plastic, saturated, dark grey. Sandy silt non plastic. Vertical fissures infilled with fine-medium sand. Thinly bedded (5-20mm layers).					
					3								
					4			**end of TP at 4.0m**					

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EXCAVATION LOG

EXCAVATION No: TTP45
Location:

SHEET 1 OF 1

PROJECT:	Dunedin Multipurpose Stadium	LOCATION:	Dunedin	JOB No:	51219
CO-ORDINATES	5479111.47 mN 2317549.98 mE	EXPOSURE TYPE:	Test Pit	HOLE STARTED:	15/11/07
		EQUIPMENT:	Excavator	HOLE FINISHED:	15/11/07
R.L.	m	OPERATOR:	DOW EXCAV.	LOGGED BY:	JF
DATUM		DIMENSIONS:	2m x 1m	CHECKED BY:	SCWW

EXCAVATION TESTS						ENGINEERING DESCRIPTION						GEOLOGICAL	
PENETRATION 1 2 3	SUPPORT	WATER	SAMPLES, TESTS	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION / WEATHERING	STRENGTH / DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH 10 25 50 100 200	ORIGIN TYPE, MINERAL COMPOSITION, DEFECTS, STRUCTURE	UNIT
					0			GRAVEL, sandy, loosely compacted, wet.				FILL	
								FILL, gravel (angular), silt (firm), some shells, wire and brick, grey.					
					1			SILT, firm, moist, grey.					
								SAND, slightly silty, abundant shells, wet, loose.					
					2			CLAYEY SILT interbedded with SILT with minor clay, occasional beds of sandy silt, very soft, saturated, occasional beds of fine grained sand, grey. Clayey silt moderately plastic, occasionally highly plastic, fine organic content, black. Silt slightly plastic, saturated, dark grey. Sandy silt non plastic. Vertical fissures infilled with fine-medium sand. Thinly bedded (5-20mm layers).				HYDRAULIC FILL	
					3								
					4			**end of TP at 4.0m**					

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EXCAVATION LOG

EXCAVATION No: TTP46
Location:

SHEET 1 OF 1

PROJECT:	Dunedin Multipurpose Stadium	LOCATION:	Dunedin	JOB No:	51219
CO-ORDINATES	5479098.02 mN 2317538.71 mE	EXPOSURE TYPE:	Test Pit	HOLE STARTED:	15/11/07
		EQUIPMENT:	Excavator	HOLE FINISHED:	15/11/07
R.L.	m	OPERATOR:	DOW EXCAV.	LOGGED BY:	JF
DATUM		DIMENSIONS:	2m x 1m	CHECKED BY:	SCWW

EXCAVATION TESTS						ENGINEERING DESCRIPTION						GEOLOGICAL	
PENETRATION 1 2 3	SUPPORT	WATER	SAMPLES, TESTS	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION / WEATHERING	STRENGTH / DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH 10 25 50 100 200	ORIGIN TYPE, MINERAL COMPOSITION, DEFECTS, STRUCTURE	UNIT
								TOPSOIL, silty, some gravel, soft, moist, dark brown.				FILL	
					1			SILT, sandy,soft, moist-wet, mottled grey/brown.					
		Seepage			2			CLAYEY SILT interbedded with SILT with minor clay, occasional beds of sandy silt, very soft, saturated, occasional beds of fine grained sand, grey. Clayey silt moderately plastic, occasionally highly plastic, fine organic content, black. Silt slightly plastic, saturated, dark grey. Sandy silt non plastic. Vertical fissures infilled with fine-medium sand. Thinly bedded (5-20mm layers).				HYDRAULIC FILL	
					3								
					4			**end of TP at 4.3m**					

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EXCAVATION LOG

EXCAVATION No: TTP47
Location:

SHEET 1 OF 1

PROJECT:	Dunedin Multipurpose Stadium	LOCATION:	Dunedin	JOB No:	51219
CO-ORDINATES	5479141.04 mN 2317682.47 mE	EXPOSURE TYPE:	AUGER	HOLE STARTED:	15/11/07
		EQUIPMENT:	AUGER	HOLE FINISHED:	15/11/07
R.L.	m	OPERATOR:	DOW EXCAV.	LOGGED BY:	JF
DATUM		DIMENSIONS:	450mm dia	CHECKED BY:	SCWW

EXCAVATION TESTS						ENGINEERING DESCRIPTION						GEOLOGICAL	
PENETRATION 1 2 3	SUPPORT	WATER	SAMPLES, TESTS	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION / WEATHERING	STRENGTH / DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH 10 25 50 100 200	ORIGIN TYPE, MINERAL COMPOSITION, DEFECTS, STRUCTURE	UNIT
					0			GRAVEL, medium, angular.				FILL	
								SILT, sandy , abundant shells, soft, grey.					
					1			CLAYEY SILT interbedded with SILT with minor clay, occasional beds of sandy silt, wet, very soft, saturated, shells and shell fragments, grey/black.				HYDRAULIC FILL	
					2			**end of TP at 2.75m**					
					3								
					4								

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EXCAVATION LOG

EXCAVATION No: TTP48
Location:

SHEET 1 OF 1

PROJECT:	Dunedin Multipurpose Stadium	LOCATION:	Dunedin	JOB No:	51219
CO-ORDINATES	5479175.37 mN 2317673.12 mE	EXPOSURE TYPE:	Test Pit	HOLE STARTED:	15/11/07
		EQUIPMENT:	Excavator	HOLE FINISHED:	15/11/07
R.L.	m	OPERATOR:	DOW EXCAV.	LOGGED BY:	JF
DATUM		DIMENSIONS:	2m x 1m	CHECKED BY:	SCWW

EXCAVATION TESTS						ENGINEERING DESCRIPTION						GEOLOGICAL	
PENETRATION 1 2 3	SUPPORT	WATER	SAMPLES, TESTS	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION / WEATHERING	STRENGTH / DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH 10 25 50 100 200	ORIGIN TYPE, MINERAL COMPOSITION, DEFECTS, STRUCTURE	UNIT
								CONCRETE				FILL	
								SILT, sandy, soft-firm, moist, mottled grey/orange. plastic sewer pipe.					
					1			CLAYEY SILT interbedded with SILT with minor clay, occasional beds of sandy silt, very soft, saturated, occasional beds of fine grained sand, grey. Clayey silt moderately plastic, occasionally highly plastic, fine organic content, black. Silt slightly plastic, saturated, dark grey. Sandy silt non plastic. Vertical fissures infilled with fine-medium sand. Thinly bedded (5-20mm layers). Pit walls collapsing.				HYDRAULIC FILL	
					2								
					3			SAND, few shells, medium-fine grained, loose, wet, grey.					
								end of TP at 3.3m					
					4								

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EXCAVATION LOG

EXCAVATION No: TTP49
Location:

SHEET 1 OF 1

PROJECT:	Dunedin Multipurpose Stadium	LOCATION:	Dunedin	JOB No:	51219
CO-ORDINATES	5479083.44 mN 2317752.10 mE	EXPOSURE TYPE:	AUGER	HOLE STARTED:	15/11/07
		EQUIPMENT:	AUGER	HOLE FINISHED:	15/11/07
R.L.	m	OPERATOR:	DOW EXCAV.	LOGGED BY:	JF
DATUM		DIMENSIONS:	450mm dia	CHECKED BY:	SCWW

EXCAVATION TESTS						ENGINEERING DESCRIPTION							GEOLOGICAL	
PENETRATION 1 2 3	SUPPORT	WATER	SAMPLES, TESTS	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION / WEATHERING	STRENGTH / DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH 10 25 50 100 200		ORIGIN TYPE, MINERAL COMPOSITION, DEFECTS, STRUCTURE	UNIT
		Seepage			1			ASPHALT					FILL	
								FILL, gravel, silt, sand, metal, compacted, dark brown.						
								SAND, abundant shells, loose, moist, becomes wet at 1.5m, brown/grey.					HYDARULIC FILL	
		10 mins			2			CLAYEY SILT interbedded with SILT with minor clay, occasional beds of sandy silt, very soft, saturated, occasional beds of fine grained sand, grey. Clayey silt moderately plastic, occasionally highly plastic, fine organic content, black. Silt slightly plastic, saturated, dark grey. Sandy silt non plastic. Vertical fissures infilled with fine-medium sand. Thinly bedded (5-20mm layers). Becomes too saturated to auger.						
					3			**end of TP at 2.9m**						
					4									

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EXCAVATION LOG

EXCAVATION No: TTP50
Location:

SHEET 1 OF 1

PROJECT:	Dunedin Multipurpose Stadium	LOCATION:	Dunedin	JOB No:	51219
CO-ORDINATES	5479093.60 mN 2317752.63 mE	EXPOSURE TYPE:	AUGER	HOLE STARTED:	15/11/07
		EQUIPMENT:	AUGER	HOLE FINISHED:	15/11/07
R.L.	m	OPERATOR:	DOW EXCAV.	LOGGED BY:	JF
DATUM		DIMENSIONS:	450mm dia	CHECKED BY:	SCWW

EXCAVATION TESTS						ENGINEERING DESCRIPTION						GEOLOGICAL	
PENETRATION 1 2 3	SUPPORT	WATER	SAMPLES, TESTS	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION / WEATHERING	STRENGTH / DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH 10 25 50 100 200	ORIGIN TYPE, MINERAL COMPOSITION, DEFECTS, STRUCTURE	UNIT
					0			ASPHALT				FILL	
								FILL, gravel, silt, sand, metal, compacted, dark brown.					
		Seepage			1			SAND, abundant shells, loose, moist, becomes wet at 1.5m, brown/grey.					
								CLAYEY SILT interbedded with SILT with minor clay, occasional beds of sandy silt, very soft, saturated, occasional beds of fine grained sand, grey. Clayey silt moderately plastic, occasionally highly plastic, fine organic content, black. Silt slightly plastic, saturated, dark grey. Sandy silt non plastic. Vertical fissures infilled with fine-medium sand. Thinly bedded (5-20mm layers). Becomes too saturated to auger.				HYDRAULIC FILL	
					2			**end of TP at 2.5m**					
					3								
					4								

TONKIN & TAYLOR LTD

EXCAVATION LOG

EXCAVATION No: TTP51
Location:

SHEET 1 OF 1

PROJECT:	Dunedin Multipurpose Stadium	LOCATION:	Dunedin	JOB No:	51219
CO-ORDINATES	5479195.11 mN 2317727.20 mE	EXPOSURE TYPE:	HAND	HOLE STARTED:	16/11/07
		EQUIPMENT:	HAND	HOLE FINISHED:	16/11/07
R.L.	m	OPERATOR:	DOW EXCAV.	LOGGED BY:	JF
DATUM		DIMENSIONS:		CHECKED BY:	SCWW

EXCAVATION TESTS						ENGINEERING DESCRIPTION						GEOLOGICAL	
PENETRATION 1 2 3	SUPPORT	WATER	SAMPLES, TESTS	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION / WEATHERING	STRENGTH / DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH 10 25 50 100 200	ORIGIN TYPE, MINERAL COMPOSITION, DEFECTS, STRUCTURE	UNIT
								SAWDUST					
								Surficial contamination sample only					
					1								
					2								
					3								
					4								

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EXCAVATION LOG

EXCAVATION No: TTP52
Location:

SHEET 1 OF 1

PROJECT:	Dunedin Multipurpose Stadium	LOCATION:	Dunedin	JOB No:	51219
CO-ORDINATES	5479178.25 mN 2317754.89 mE	EXPOSURE TYPE:	HAND	HOLE STARTED:	16/11/07
		EQUIPMENT:	HAND	HOLE FINISHED:	16/11/07
R.L.	m	OPERATOR:	DOW EXCAV.	LOGGED BY:	JF
DATUM		DIMENSIONS:		CHECKED BY:	SCWW

EXCAVATION TESTS						ENGINEERING DESCRIPTION						GEOLOGICAL	
PENETRATION 1 2 3	SUPPORT	WATER	SAMPLES, TESTS	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION / WEATHERING	STRENGTH / DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH 10 25 50 100 200	ORIGIN TYPE, MINERAL COMPOSITION, DEFECTS, STRUCTURE	UNIT
								SAWDUST					
								Surficial contamination sample only					
					1								
					2								
					3								
					4								

TONKIN & TAYLOR LTD

EXCAVATION LOG

EXCAVATION No: TTP53
Location:

SHEET 1 OF 1

PROJECT:	Dunedin Multipurpose Stadium	LOCATION:	Dunedin	JOB No:	51219
CO-ORDINATES	5479221.25 mN 2317610.92 mE	EXPOSURE TYPE:	HAND	HOLE STARTED:	16/11/07
		EQUIPMENT:	HAND	HOLE FINISHED:	16/11/07
R.L.	m	OPERATOR:	DOW EXCAV.	LOGGED BY:	JF
DATUM		DIMENSIONS:		CHECKED BY:	SCWW

EXCAVATION TESTS						ENGINEERING DESCRIPTION						GEOLOGICAL	
PENETRATION 1 2 3	SUPPORT	WATER	SAMPLES, TESTS	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION / WEATHERING	STRENGTH / DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH 10 25 50 100 200	ORIGIN TYPE, MINERAL COMPOSITION, DEFECTS, STRUCTURE	UNIT
								GRAVEL, silty, medium-coarse grained, angular, slightly cemented, dry.				FILL	
								CONCRETE					
								VOID SPACE					
								CONCRETE **end of TP at 0.8m (obstruction)**					
					1								
					2								
					3								
					4								

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EXCAVATION LOG

EXCAVATION No: TTP54
Location:

SHEET 1 OF 1

PROJECT:	Dunedin Multipurpose Stadium	LOCATION:	Dunedin	JOB No:	51219
CO-ORDINATES	5479205.15 mN 2317605.71 mE	EXPOSURE TYPE:	Test Pit	HOLE STARTED:	16/11/07
		EQUIPMENT:	Excavator	HOLE FINISHED:	16/11/07
R.L.	m	OPERATOR:	DOW EXCAV.	LOGGED BY:	JF
DATUM		DIMENSIONS:	2m x 1m	CHECKED BY:	SCWW

EXCAVATION TESTS						ENGINEERING DESCRIPTION						GEOLOGICAL	
PENETRATION 1 2 3	SUPPORT	WATER	SAMPLES, TESTS	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION / WEATHERING	STRENGTH / DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH 10 25 50 100 200	ORIGIN TYPE, MINERAL COMPOSITION, DEFECTS, STRUCTURE	UNIT
								TOPSOIL, silty, sandy, angular gravel, loose, moist, brown.				FILL	
								SAND, silty, coarse, abundant shells, loose, brown.					
								SAND, fine-medium grained, loose, moist, brown.				HYDRAULIC FILL	
					1			SAND, minor silt, becomes shelly, loose, wet, grey.					
					2			CLAYEY SILT interbedded with SILT with minor clay, occasional beds of sandy silt, very soft, saturated, occasional beds of fine grained sand, grey. Clayey silt moderately plastic, occasionally highly plastic, fine organic content, black. Silt slightly plastic, saturated, dark grey. Sandy silt non plastic. Vertical fissures infilled with fine-medium sand. Thinly bedded (5-20mm layers). Pit walls collapsing.					
					3								
					4			**end of TP at 4.0m**					

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EXCAVATION LOG

EXCAVATION No: TTP55
Location:

SHEET 1 OF 1

PROJECT:	Dunedin Multipurpose Stadium	LOCATION:	Dunedin	JOB No:	51219
CO-ORDINATES	5478992.57 mN 2317745.61 mE	EXPOSURE TYPE:	Test Pit	HOLE STARTED:	16/11/07
		EQUIPMENT:	Excavator	HOLE FINISHED:	16/11/07
R.L.	m	OPERATOR:	DOW EXCAV.	LOGGED BY:	JF
DATUM		DIMENSIONS:	2m x 1m	CHECKED BY:	SCWW

EXCAVATION TESTS						ENGINEERING DESCRIPTION						GEOLOGICAL	
PENETRATION 1 2 3	SUPPORT	WATER	SAMPLES, TESTS	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION / WEATHERING	STRENGTH / DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH 10 25 50 100 200	ORIGIN TYPE, MINERAL COMPOSITION, DEFECTS, STRUCTURE	UNIT
		Seepage			0			GRAVEL, angular, medium-coarse grained (railway ballast).				FILL	
								FILL, silt, firm-stiff, shells, sand (fine), moist, grey.					
					1			SAND, abundant shells, fine grained, wet, light grey.					
								SAND, fine-medium grained, wet, grey.					
								CLAYEY SILT interbedded with SILT with minor clay, occasional beds of sandy silt, firm-stiff, some rootlets visible.				HYDRAULIC FILL	
					2			CLAYEY SILT interbedded with SILT with minor clay, occasional beds of sandy silt, very soft, saturated, occasional beds of fine grained sand, grey. Clayey silt moderately plastic, occasionally highly plastic, fine organic content, black. Silt slightly plastic, saturated, dark grey. Sandy silt non plastic. Vertical fissures infilled with fine-medium sand. Thinly bedded (5-20mm layers). Pit walls collapsing.					
					3								
					4			**End of TP at 4.0m**					

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EXCAVATION LOG

EXCAVATION No: TTP56
Location:

SHEET 1 OF 1

PROJECT:	Dunedin Multipurpose Stadium	LOCATION:	Dunedin	JOB No:	51219
CO-ORDINATES	5479077.74 mN 2317680.17 mE	EXPOSURE TYPE:	AUGER	HOLE STARTED:	16/11/07
		EQUIPMENT:	AUGER	HOLE FINISHED:	16/11/07
R.L.	m	OPERATOR:	DOW EXCAV.	LOGGED BY:	JF
DATUM		DIMENSIONS:	450mm dia	CHECKED BY:	SCWW

EXCAVATION TESTS						ENGINEERING DESCRIPTION						GEOLOGICAL	
PENETRATION 1 2 3	SUPPORT	WATER	SAMPLES, TESTS	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION / WEATHERING	STRENGTH / DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH 10 25 50 100 200	ORIGIN TYPE, MINERAL COMPOSITION, DEFECTS, STRUCTURE	UNIT
								SILT, frequent gravel, cobbles, brick, concrete, glass, ceramics, soft, moist, dark brown.				FILL	
								SAND, shells, loose, wet, brown.					
					1			SILT, sandy, shell fragments, very soft, wet, grey.				HYDRAULIC FILL	
					2			CLAYEY SILT interbedded with SILT with minor clay, occasional beds of sandy silt, very soft, saturated, occasional beds of fine grained sand, grey. Clayey silt moderately plastic, occasionally highly plastic, fine organic content, black. Silt slightly plastic, saturated, dark grey. Sandy silt non plastic.					
								end of hole at 2.5m					
					3								
					4								

TONKIN & TAYLOR LTD

EXCAVATION LOG

EXCAVATION No: TTP57
Location:

SHEET 1 OF 1

PROJECT: Dunedin Multipurpose Stadium		LOCATION: Dunedin	JOB No: 51219
CO-ORDINATES	5479071.73 mN 2317678.68 mE	EXPOSURE TYPE: HAND	HOLE STARTED: 16/11/07
		EQUIPMENT: HAND	HOLE FINISHED: 16/11/07
R.L.	m	OPERATOR: DOW EXCAV.	LOGGED BY: JF
DATUM		DIMENSIONS:	CHECKED BY: SCWW

EXCAVATION TESTS						ENGINEERING DESCRIPTION						GEOLOGICAL	
PENETRATION 1 2 3	SUPPORT	WATER	SAMPLES, TESTS	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION / WEATHERING	STRENGTH / DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH 10 25 50 100 200	ORIGIN TYPE, MINERAL COMPOSITION, DEFECTS, STRUCTURE	UNIT
								GRAVEL.					
					1			**Surficial contamination sample only**					
					2								
					3								
					4								

TONKIN & TAYLOR LTD

EXCAVATION LOG

EXCAVATION No: TTP58
Location:

SHEET 1 OF 1

PROJECT:	Dunedin Multipurpose Stadium	LOCATION:	Dunedin	JOB No:	51219
CO-ORDINATES	5479100.60 mN 2317674.21 mE	EXPOSURE TYPE:	AUGER	HOLE STARTED:	16/11/07
		EQUIPMENT:	AUGER	HOLE FINISHED:	16/11/07
R.L.	m	OPERATOR:	DOW EXCAV.	LOGGED BY:	JF
DATUM		DIMENSIONS:	450mm dia	CHECKED BY:	SCWW

EXCAVATION TESTS						ENGINEERING DESCRIPTION						GEOLOGICAL	
PENETRATION 1 2 3	SUPPORT	WATER	SAMPLES, TESTS	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION / WEATHERING	STRENGTH / DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH 10 25 50 100 200	ORIGIN TYPE, MINERAL COMPOSITION, DEFECTS, STRUCTURE	UNIT
								TOPSOIL, silty, fine gravel, coarse sand, moist, dark brown.				FILL	
								SILT, few bricks, occasional gravel, occasional shells, firm.					
					1			SAND, shells, loose, wet, brown.					
								SAND, silty, loose, moist, grey, some silt nodules.					
								SAND, silty, frequent shells, loose, wet, grey.					
								end of TP at 1.4m					
					2								
					3								
					4								

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EXCAVATION LOG

EXCAVATION No: TTP59
Location:

SHEET 1 OF 1

PROJECT:	Dunedin Multipurpose Stadium	LOCATION:	Dunedin	JOB No:	51219
CO-ORDINATES	5479127.27 mN 2317882.91 mE	EXPOSURE TYPE:	AUGER	HOLE STARTED:	17/11/07
		EQUIPMENT:	AUGER	HOLE FINISHED:	17/11/07
R.L.	m	OPERATOR:	DOW EXCAV.	LOGGED BY:	JF
DATUM		DIMENSIONS:	450mm dia	CHECKED BY:	SCWW

EXCAVATION TESTS						ENGINEERING DESCRIPTION						GEOLOGICAL	
PENETRATION 1 2 3	SUPPORT	WATER	SAMPLES, TESTS	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION / WEATHERING	STRENGTH / DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH 10 25 50 100 200	ORIGIN TYPE, MINERAL COMPOSITION, DEFECTS, STRUCTURE	UNIT
								GRAVEL, sandy, angular-subrounded, dry, grey.				FILL	
								SAND, fine grained, loose, moist, grey.					
								FILL, silt (soft-firm), bricks, gravel, wire, moist.					
					1			CLAYEY SILT interbedded with SILT with minor clay, occasional beds of sandy silt, very soft, saturated, occasional beds of fine grained sand, grey. Clayey silt moderately plastic, occasionally highly plastic, fine organic content, black. Silt slightly plastic, saturated, dark grey. Sandy silt non plastic.				HYDRAULIC FILL	
								becomes sandier					
					2			SAND, silty, fine-medium grained, loose, wet, grey.					
								end of TP at 2.6m					
					3								
					4								

TONKIN & TAYLOR LTD

EXCAVATION LOG

EXCAVATION No: TTP60
Location:

SHEET 1 OF 1

PROJECT: Dunedin Multipurpose Stadium		LOCATION: Dunedin	JOB No: 51219
CO-ORDINATES	5479108.15 mN 2317881.80 mE	EXPOSURE TYPE: AUGER	HOLE STARTED: 17/11/07
		EQUIPMENT: AUGER	HOLE FINISHED: 17/11/07
R.L.	m	OPERATOR: DOW EXCAV.	LOGGED BY: JF
DATUM		DIMENSIONS: 450mm dia	CHECKED BY: SCWW

EXCAVATION TESTS					ENGINEERING DESCRIPTION						GEOLOGICAL	
PENETRATION 1 2 3	SUPPORT	WATER	SAMPLES, TESTS	R.L. (m) / DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION / WEATHERING	STRENGTH / DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH 10 25 50 100 200	ORIGIN TYPE, MINERAL COMPOSITION, DEFECTS, STRUCTURE	UNIT
							GRAVEL, sandy, angular, well compacted, brown.				FILL	
							SAND, medium grained, loose, moist, brown.					
							SILT and SILTY CLAY, firm becomes soft, moist becomes wet, black/grey.				HYDRAULIC FILL	
				1			SAND, silty, some shells, medium grained, loose, wet.					
							SILT, sandy, very soft, becomes sandier with depth.					
				2			SAND, silty with abundant SHELLS, saturated, loose, grey.					
							end of hole at 2.4m					
				3								
				4								