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PRELIMINARY CONTAMINATION ASSESSMENT SPRING FARM RELEASE AREA

FOR

MIRVAC, CORNISH GROUP &
LANDCOM CONSORTIUM
C/- LEAN & HAYWARD PTY LIMITED

PROJECT NO. 13998/5945A

REPORT NO. 01/1537

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DRAWING NOS. 01/1537/1 : LOCALITY PLAN, SAMPLE & BOREHOLE
LOCATIONS

01/1537/2 : SAMPLE & BOREHOLE LOCATIONS

01/1537/3 : GEOLOGICAL MAP

APPENDIX A : AERIAL PHOTOGRAPHS

APPENDIX B : BOREHOLE LOGS

APPENDIX C : SOIL DESCRIPTIONS

APPENDIX D : LABORATORY TEST RESULTS

1. INTRODUCTION

The following report details the results of a preliminary contamination assessment carried out by SMEC Testing Services Pty Limited (STS) for the Spring Farm Release Area. We understand that the area is to be developed for residential purposes.

The objectives of the assessment included:

- to investigate the potential for contamination by way of a review of available data and an inspection of the site,
- identify potential sources of contamination,
- undertake limited preliminary sampling and testing, and
- prepare a report on the findings including recommendations for further study.

The investigation was carried out at the request of Mr P. McNamara of Lean & Hayward Pty Limited on behalf of the Mirvac, Cornish Group & Landcom Consortium.

The assessment has generally been undertaken in accordance with the requirements given in EPA (1997), "Guidelines for Consultants Reporting on Contaminated Sites".

2. SITE DESCRIPTION

2.1 Location

The Spring Farm area is located on the northern side of the Nepean River about 4 km south east of Camden. The area is located to the south of the township of Elderslie. Drawing No. 01/1537/1 shows the study area.

The Camden Bypass forms the northwestern boundary of the study area. A landfill site operated by the Metropolitan Waste Disposal Authority defines the south eastern extent of the study area where as a Water Board reservoir the north eastern extent. The southern boundary consists of the Nepean River.

2.2 Topography

The site is located south of a ridge line that sweeps in semi circular pattern from the north west to the north east. The highest point in the study area is near the Water Reservoir and has an elevation of about R.L. 130 metres. The lowest point is adjacent to the Nepean River with an elevation of about R.L. 70 metres.

Overall the natural ground surface slopes in the study area are less than 10 degrees. Some localised slopes are between 10 to 15 degrees. Significant areas have slopes less than 5 degrees particularly the southern half of the study area that is located on an elevated terrace adjacent to the Nepean River.

2.3 Drainage

Regional drainage is dominated by the Nepean River, which passes to the south of the site. The topography dictates that in general drainage is towards the south.

Within the study area drainage is dominated by Springs Creek. Most of the on-site gullies and depressions drain towards this creek.

2.4 Geology

Reference to the Wollongong – Port Hacking Geological Series Sheet, reference 9029 – 9129 indicates that regionally the study area is underlain by Triassic Age Bringelly Shales of the Wianamatta Group. In the southern half of the study area Tertiary Age high

level alluvium, known as the Elderslie Sand Deposit overlies the Bringelly Shales. The relevant part of the geological map has been reproduced as Drawing No. 01/1537/3.

The high level alluvial sand is believed to have been deposited when the Nepean River was flowing at a higher level. The deposit consists of silica sand in a high clay content matrix. Examples of the sand deposit can be observed in the active and abandoned extraction pits in the area.

Bringelly Shale, which is the upper most formation of the Wianamatta Group, lithologically consists of claystones, siltstones, shales with some laminites and sandstones. Rock consistent with these can be observed in road cuttings and the excavation carries out for construction of the Water Board reservoir.

3. AERIAL PHOTOGRAPHS

A review of aerial photographs was undertaken to identify past activities that have taken place in the study area. Aerial photographs taken 1947, 1961, 1970, 1984 and 1999 were examined. The following observations were made:

- 1947, Camden Run 16, Photos 54 – 41 to 54 – 44.

The study area has a rural character. There appears to be extensive orchards south of and immediately to the north of Spring Road. These areas are consistent with sand deposits. There are a number of houses connected with the orchards. Further to the north disturbed areas that appear to be market gardening are apparent. Most of the area to the east of Richardson Road is cleared land except adjacent to the road the activity appears to be restricted to grazing.

- **1961, Cumberland Series, Run 48, Photos 5014 to 5016.**

Same as 1947, except agricultural activities are more widespread as are farm dams. There are more houses throughout. The first sand extraction pit appears south of Spring Road. The first elongated buildings consistent with poultry farming have appeared.

- **1970, Cumberland Series, Run 26W, Photo 5017.**

Same as 1961, except agricultural activities are more widespread. More houses present. There is an increase in the number of sand extraction pits. There has been a significant increase in the number and distribution of poultry farm sheds. These are to the north of Spring Road and extend east of Richardson Road as well. The large electricity substation first appears as does the large dam near the Nepean River. The number of small farm dams has increased significantly.

- **1984, Wollongong, 1:16000, Run 4, Photos 146 to 148.**

Same as 1970. Sand extraction activities more widespread including north of Spring Road. A number of ponds are present south of Spring Road. These appear to be associated with sand washing. The Glenlee coal operation first appears as does the adjacent waste disposal facility and the Camden Bypass.

- **1999, Wollongong, 1:50000, Run 2, Photos 138 to 150.**

Same as 1984 except sand extraction activities very prominent. Some of the earlier pits are now disused. The water reservoir to the north east of the study first appears.

Extracts of the aerial photos are given Appendix A.

4. SITE INSPECTION

During the field drilling and reconnaissance, the following observations were made:

- There did not appear to be any commercial orchards and market gardens present at this time.
- The main commercial activities appear to be sand extraction and turf farms.
- There are only isolated sheds containing chickens. Some sheds had been dismantled, only the concrete slabs remain.
- Other than tracks and driveways, there were no undisturbed areas were present where no grass or vegetation was growing or where staining was present.
- In the turf growth areas there was machinery operating and stored in sheds.
- In the sand mining areas there was significant disturbance of the ground, including soil mounds that had to be pushed into place to use as screens. Whilst there were stockpiles of soil present, these appeared to be mainly material stripped while clearing the sites. There did not appear to be any imported filling.
- The farm dam walls all appear to be constructed from material excavated from the water storage area.
- Imported filling is present in a small area adjacent to the Camden Bypass. This is shown on Drawing No. 01/1537/1.
- Imported filling is present in the base of a pit some 100 metres east of the Spring and Macarthur Road intersection. STS undertook testing during backfilling in 1995. The imported fill was sourced from onsite and within the sand extraction area. The site is shown on Drawing No. 01/1537/2.

- There is an old Council tip site at Spring Reserve located south east of where Spring Creek crosses Spring Road as shown on Drawing No. 01/1537/2. This tip has been recently covered with a capping.
- There appears to be some minor filling around some of the poultry sheds. These appear to be from cut and fill operations during compaction rather than imported soil.
- North of Spring Road there is a property where a large number of trucks are parked.
- North of Spring Road there is a number of abandoned trucks and cars scattered throughout the undergrowth.
- There are some stockpiles of building rubble.
- There are a number of existing houses containing asbestos sheeting.

5. AREAS OF ENVIRONMENTAL CONCERN (AOC)

Based on the review carried out, it would appear that except for a small part of the eastern part of the study area north of the sand extraction pits, the whole study area has been subjected to one or more of the potentially contaminating activities noted below. These activities and the potential sources of contaminant are discussed below:

- Poultry farming, market gardens and orchards – pesticides, heavy metals and hydrocarbons associated with machinery use.
- Turf Farms – pesticides, heavy metals and hydrocarbons associated with machinery use.

- Sand Mines – hydrocarbons associated with machinery use.
- Backfilled Sand Mines – depending on source of soil, hydrocarbons, heavy metals, pesticides and others.
- Imported filling and building rubble – heavy metals, hydrocarbons and pesticides.
- Electrical Substation – hydrocarbons, heavy metals and polychlorinated biphenols.
- Buildings – asbestos.
- Abandoned vehicles – heavy metals and hydrocarbons.
- Council tip site.

6. FIELD INVESTIGATION

6.1 Site Drilling

Council indicated that there might be some imported filling in some of the abandoned pits. In order to determine the presence and nature of these materials twenty-nine boreholes, numbered BH201 to BH229 inclusive, were drilled at the locations shown on Drawing No. 01/1537/1.

Detailed borehole logs are given in Appendix B.

6.2 *Soil Sampling*

Targeted sampling was used to collect samples at specific areas used for poultry farming and orchards. The fill area next to the Camden Bypass was also targeted. The samples were retrieved from 0 to 0.15 metres below the ground surface. The samples are numbered S101 to S125. S125 is a duplicate of S113. The sample locations are shown on Drawing No. 01/1537/1 and 01/1537/2.

Field investigations were conducted by STS in November 2001. A description of the soil samples retrieved is presented in Appendix C.

6.3 *Sample Handling and Equipment Decontamination*

All sampling was carried out using a hand auger. Soil samples were transferred from the sampling implement into a stainless steel mixing bowl where, if appropriate, they were mixed. Each sample was placed into a clean glass jar prepared by Australian Laboratory Services (ALS). Where testing included hydrocarbons, no sample mixing occurred. These sample jars were then placed into ice-filled chests and transferred to ALS for testing purposes. Chain of Custody documentation was maintained to record and track the samples. Copies are given in Appendix D.

All sampling equipment was decontaminated between sampling locations by washing with a mixture of water and DECON 90 and rinsing with potable water.

7. **LABORATORY ANALYTICAL PROGRAM**

7.1 *Laboratory Results*

All detailed laboratory test reports are given in Appendix D.

Internal laboratory quality control consisted of reagent blank and spiked sample. No analyte was detected in the reagent blank and spike recoveries were within acceptable limits, which implies that internal QA/QC was maintained during testing.

The difference between the duplicate sample concentrations (samples S113 and S125) is small and considered acceptable considering the very low concentrations of the analytes and the difficulties in producing homogeneous samples:

7.2 Regulatory Criteria

In order to assess the degree of onsite soil contamination the analytical results were compared to the following criteria:

- EPA (1998), "Guidelines for the NSW Site Auditors Scheme," Soil Investigation Levels for Urban Development Sites in NSW.

We have adopted the column 1 criteria "Residential with Gardens and Accessible Soil" (NEHFA).

7.3 Comparison of Results to Soil Criteria

Laboratory results for the samples tested are summarized in relation to soil quality criteria in Table 5.1.

As can be seen in Table 5.1, all analyte concentrations are below the soil quality criteria adopted.

TABLE 5.1 – SUMMARY OF RESULTS
(all concentrations in units of mg/kg)

Sample ID	Analyte											
	As	Cd	Cu	Pb	Zn	Hg	DDE	OCP	TPH		BTEX	PCB
									C ₆ -C ₉	C ₁₀ -C ₃₆		
S101	1	<1	2	4	6	<0.1	<0.05	LOR				
S102	2	<1	3	13	21	<0.1	<0.05	LOR				
S103	4	<1	10	8	25	<0.1	<0.05	LOR				
S104	2	<1	15	10	31	<0.1	<0.05	LOR				
S105	1	<1	3	6	23	<0.1	<0.05	LOR				
S106	3	<1	9	17	21	<0.1	<0.05	LOR				
S107	7	<1	15	15	57	<0.1	0.25	LOR				
S108	3	<1	7	9	41	<0.1	<0.05	LOR				
S109	5	<1	14	16	45	<0.1	<0.05	LOR				
S110	6	<1	16	22	51	<0.1	<0.05	LOR				
S111	5	<1	14	21	67	<0.1	<0.05	LOR				
S112	13	<1	29	19	59	<0.1	<0.05	LOR				
S113	3	<1	6	7	11	<0.1	<0.05	LOR				
S114	7	<1	10	18	63	<0.1	<0.05	LOR				
S115	5	<1	14	14	108	<0.1	<0.05	LOR				
S116	1	<1	2	4	6	<0.1	<0.05	LOR				
S117	7	<1	22	22	48	<0.1	<0.05	LOR				
S118	<1	<1	3	6	11	<0.1	<0.05	LOR				
S119	10	<1	30	13	51	<0.1	<0.05	LOR				
S120	2	<1	5	6	4	<0.1	<0.05	LOR				
S121	6	<1	32	16	61	<0.1	<0.05	LOR	<2	<250	<0.2	<0.1
S122	7	<1	29	17	57	<0.1	<0.05	LOR	<2	<250	<0.2	<0.1
S123	7	<1	28	22	50	<0.1	<0.05	LOR				
S124	6	<1	19	21	58	<0.1	<0.05	LOR				
S125	4	<1	10	7	23	<0.1	<0.05	LOR				
LOR Value	1	1	1	1	1	0.1	0.05	0.05 to 0.2	2	50 & 100	0.2	0.1
Soil Quality Criteria ¹	100	20	1000	300	7000	15	NA	Various	65 ²	1000 ²	Various	10

¹ = EPA (1998), Health-based investigation levels, "Guidelines for NSW Auditors Scheme.

² = EPA (1994), Threshold concentrations for sensitive land use – soils.

LOR = Level of Reporting (ie. lowest concentration detectable).

NA = None Available.

☐ = Soil quality criteria exceeded for open space but no for industrial use.

8. DISCUSSION AND CONCLUSION

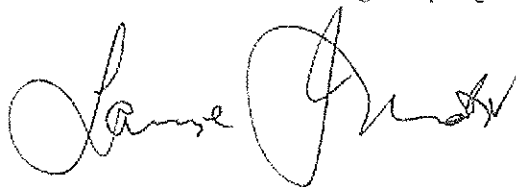
On the basis of the assessment it appears almost the whole study area has been subjected to one or more of the following potentially contaminating activities: poultry farming, orchards, market gardens, turf farms, sand mining, sand mine back filling, use of machinery, imported filling and the electrical substation.

The preliminary testing undertaken indicates that the analyte concentrations are likely to be below the soil quality criteria adopted. Based on the testing carried out to date it is our expectation that contamination will probably not pose a risk to human health and is unlikely to place any significant restrictions on the proposed development.

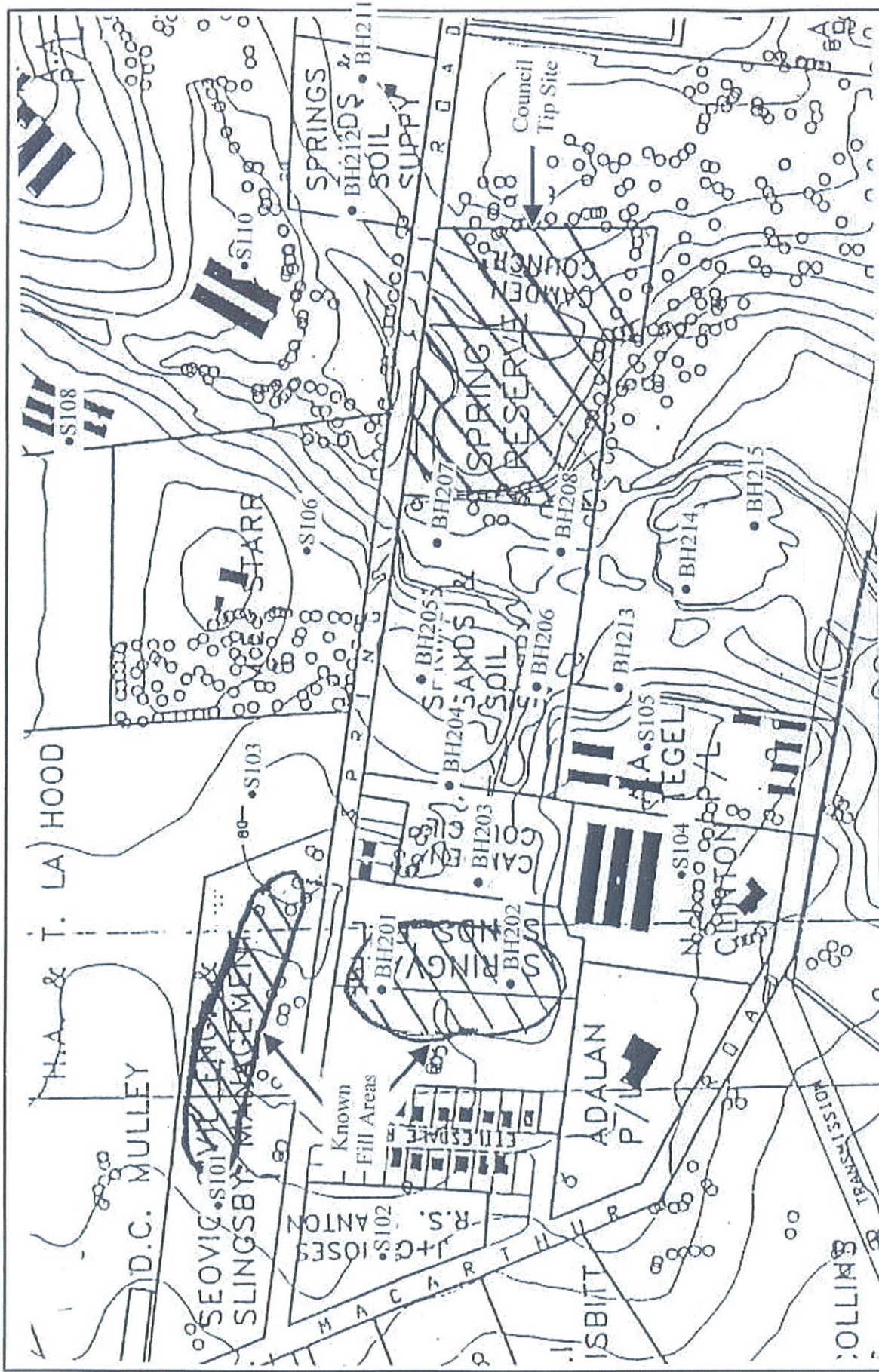
Based on our current knowledge of the site, there does not appear to be any significant amount of imported filling within the study area. It appears that most of the filling present is sandy material sourced from the Spring Farm Area itself. For example, the filling overlying the coalwash in BH201 is indistinguishable from other natural materials observed elsewhere on the site. As noted above, the backfill material tested by STS in 1997 was obtained from within the Spring Farm Area.

We understand that in the past the Council tip was used for the disposal of night soil. Groundwater monitoring wells are currently installed with a view to assessing the impact of this past use on the groundwater and water impounded in the large dam to the south. A separate report will be prepared on this matter.

The above assessment is based on preliminary widespread sampling, which does not meet statutory requirements. At the time of development, each property should be subjected to a detailed assessment including sampling and testing for appropriate analytes.



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CONTAMINATION ASSESSMENT		
SPRING FARM REALEASE AREA		
SAMPLE & BOREHOLE LOCATIONS		
Project No:		13998/5945A
Drawing No:		01/1537/2

