DEPARTMENT OF ENVIRONMENTAL HEALTH
ROTHERHAM METROPOLITAN BOROUGH COUNCIL

Report on the Samples taken from Droppingwell Landfill Site
Friday, 23rd March 1990

AIM

To assess the potential contamination at the Droppingwell Landfill Site, by a process of selective sampling of the surface layer.

METHOD

Samples were taken from the surface layer of the landfill site, by means of a spade/trowel, and placed into a bucket. This was then homogenised before being placed into three number one litre plastic jars, and then numbered and sealed using copper wire and lead bobs.

The samples were not chosen using a grid, but instead a visual observation of the site was undertaken. Areas which had no vegetation growth, or which appeared to be contaminated were sampled, i.e. the sampling regime was based on "hot spot" sampling. The location of the sample points are shown on the attached map.

ANALYTICAL TECHNIQUES

All samples were air dried at room temperature and ground to pass through a 1mm nominal sieve.

Metals

Digested under reflux in aqua regia in a ratio of one part solid : 50 parts dilute in final solution v/v. All determinants by flame atomic absorption. For guidance some samples were initially investigated using DCR spectrography (not reported) - these resulted in the unexpected identification of boron in some samples.

Water Soluble Boron

One gram sample shook with 50cc distilled water, filtered for 30 minutes and analysed by ICP Emission Spectrometry.

pH

Water extraction in ratio 5 parts water : 2 parts solid v/v.

Fluorides

Extracted in dilute sulphuric acid and determination of buffered extract by ion selective electrode. In all cases with significant fluoride identified, analysis rechecked using standards at either side of sample.

Toluene Extractable Matter

By Soxhlet extraction, using AR toluene for at least two hours or until solvent ran clear, which ever was greater. Solvent distilled off and flasks dried at constant rate at 100°C.

Asbestos

Visual sampling for fibrous material. Manual extraction - cleaned in acetone, or acetic acid then acetone. Examined under cross polars with sensitive tint plate. Confirmation by dispersive staining is Cargile Refractive Index Liquids.

RESULTS

Determination: mg/kg dry weight

Sample		Nickel	Cobalt	Manganese	Lead	Vanadium	Chromium	Cadmium
1	Solid	634	64	2159	177	<100	634	<5
2	Solid	1590	75	2237	402	<100	1330	<5
3	Solid	2650	295	2453	556	<100	3480	<5
4	Solid	2560	76	2214	62	<100	1439	<5
5	Solid	1830	88	2795	227	<100	1545	<5
6	Solid	211	28	2194	195	204	240	<5
7	Solid	50	14	177	633	273	514	<5
8	Solid	420	42	1524	22500	<100	288	<5
9	Solid	2840	100	3335	75	<100	1525	<5
10	Solid	23	5	61	574	<100	38	<5
11	Solid	307	40	13853	3029	596	50	<5
12	Solid	1360	159	1840	375	3886	1686	<5
13	Solid	NR						
14	Solid	1200	144	1770	330	3589	1545	<5
15	Solid	1030	34	2549	2667	2108	6961	<5
16	Solid	618	182	9770	344	442	2357	11
17	Solid	18	<5	<5	6297	<100	<10	89
18	Solid	650	29	918	20300	<100	141	52
19	Solid	49	15	482	1539	<100	109	<5
20	Solid	44	<5	207	74	<100	471	<5
21	Solid	72	10	325	131	<100	78	<5
22	Solid	24	5	79	630	<100	35	<5
23	Solid	338	10	1129	1354	981	5397	<5
24	Solid	78	10	404	59	<100	251	<5
25	Solid	59	5	175	6866	<100	463	<5
26	Solid	52	10	7976	197	<100	1331	<5
27	Solid	14	5	891	338	<100	15	<5
28	Solid	4	<5	<5	49	<100	10	<5
29	Solid	9	<5	<5	59	<100	10	<5
30	Solid	13	50	622	12358	<100	5126	<5
31	Liquid	<.1	<5	<5	.2	<2	<.2	-
32	Liquid	<.2	<5	<5	.2	<2	<.2	-

RESULTS

SAMPLE		mg/kg dry weight Fluoride	% toluene extractable matter	mg/kg dry weight water soluble boron	pH	F
1	Solid	< 200	-	-	7.6	
2	Solid	<200	-	-	7.7	
3	Solid	210	2.5	-	7.7	
4	Solid	<200	5.4	-	7.4	
5	Solid	<200	3.1	-	6.6	
6	Solid	<200	-	-	9.3	Ch
7	Solid	< 200	8.2	-	3.6	
8	Solid	<200	-	-	6.1	
9	Solid	< 200	0.2	-	6.6	
10	Solid	10400	-	0.5	5.3	
11	Solid	1300	-	-	7.3	
12	Solid	330	-	-	9.3	
13	Solid	-	-	-	-	
14	Solid	330	-	-	9.1	
15	Solid	380	-	-	8.8	
16	Solid	1100	-	-	9.4	
17	Solid	4400	-	112	8.5	
18	Solid	4400	-	-	9.0	
19	Solid	6700	-	2.3	6.9	
20	Solid	< 200	-	-	8.9	
21	Solid	< 200	1.6	-	7.4	
22	Solid	3300	-	3.4	9.6	
23	Solid	< 200	-	-	9.4	
24	Solid	<200	57.3	-	7.2	
25	Solid	5400	-	<0.5	7.0	
26	Solid	3300	-	-	8.1	
27	Solid	< 200	-	-	9.4	
28	Solid	2500	-	1650	6.6	
29	Solid	< 200	-	-	6.6	
30	Solid	< 200	-	-	7.2	
31	Liquid	-	-	-	6.9	
32	Liquid	-	-	-	7.4	

NOF	natural organic fibres
GF	glass fibres
MMMF	man made mineral fibres

The asbestos found in 6 was in a small lump of asbestos cement sheet.

DISCUSSION

The sampling technique was non-systematic and was undertaken on the basis that, should surface contamination be found on the site, it can be assumed that at least equal levels of contamination will be found within the site. Should contamination not be found on the surface, then a second stage trial pit examination of the site would take place.

From the samples obtained, the following results can be reported:

Maximum contaminant found in solid samples (mg/kg dry weight unless otherwise stated)

Nickel	2840
Cobalt	295
Manganese	13853
Lead	22500
Vanadium	3886
Chromium	6961
Cadmium	89
Water soluble boron	1650
Fluoride	10400
% toluene extractable matter	57.3
pH	9.6

Comparing these results to ICRCL Guidance Notes (ICRCL: Guidance on the Assessment and Redevelopment of Contaminated Land, ICRCL 59/83, Second Edition July 1987) trigger concentrations are as follows:

Contaminant	Planned Use	Threshold Trigger Concentration (mg/kg dry weight)
Cadmium	Parks, Playing Fields, Open Space	15
Total Chromium	Parks, Playing Fields, Open Space	1000
Lead	Parks, Playing Fields, Open Space	2000
Water Soluble boron	Any use where plants are grown	3
Nickel	Any use where plants are grown	70

Cadmium, chromium and lead are considered to be contaminants which may pose a hazard to health, whilst water soluble boron and nickel are considered by ICRCL not normally to be a hazard to health, but phytotoxic.

In all cases the levels found on site are grossly in excess of these trigger concentrations. ICRCL guidelines do not refer specifically to some of the heavy metals reported and there are few other documents to refer to, but their analysis here is useful to give an indication of the nature and range of contamination on the sites and the potential risks associated thus. The analysis revealed the presence of many other heavy metal contaminants with high concentrations of these being noted. The high percentage of toluene extractable matter in one sample indicates high levels of coal tar products.

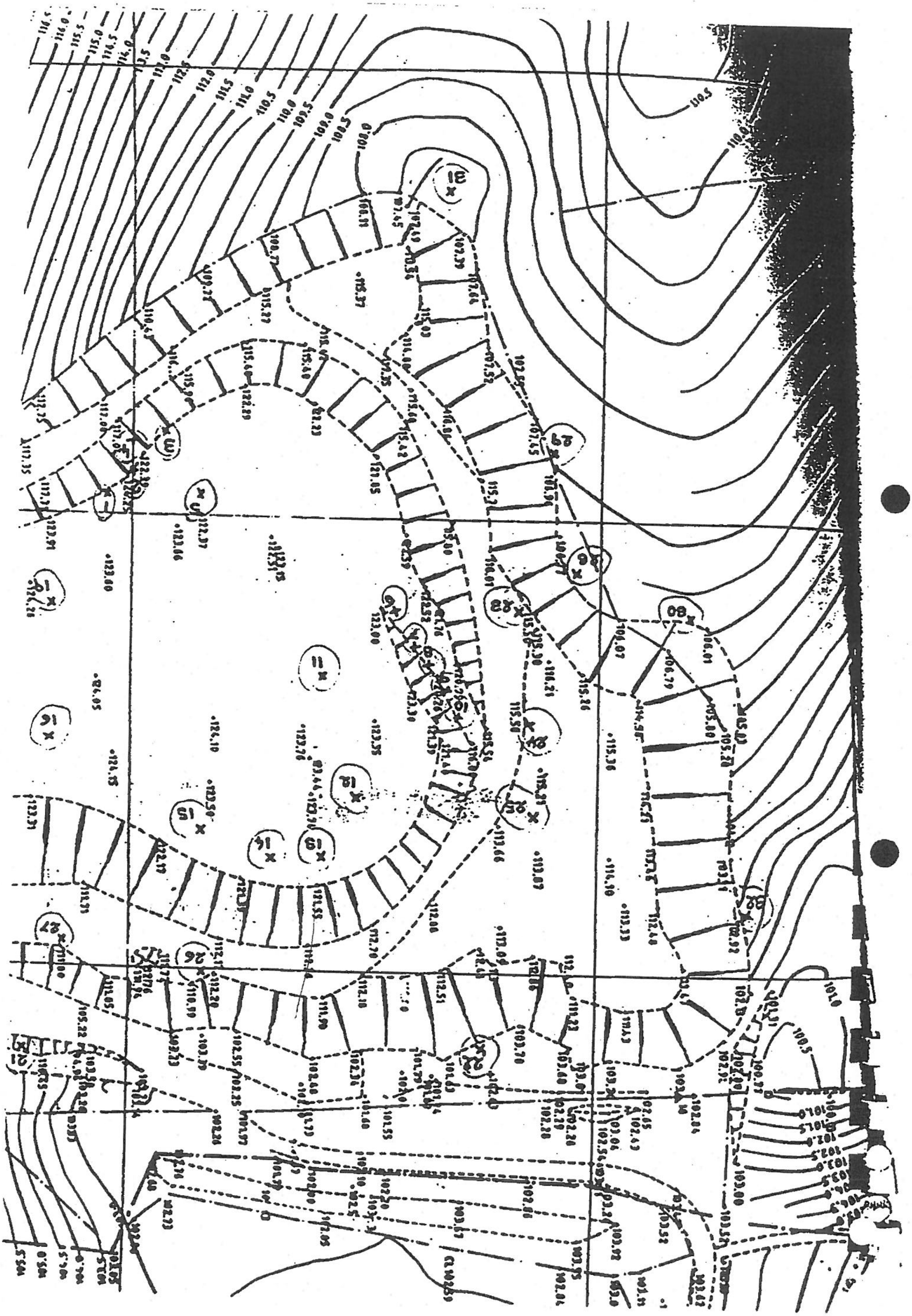
The results show that the site is heavily contaminated with a wide range of materials and will need appropriate treatment to reduce the associated risk. Excavation and removal of the contaminated soil is a major cause for concern due to the potential for the release of large quantities of heavily contaminated dust into the atmosphere, owing to the dry friable state of the site and the current dry weather. Given the prevailing wind conditions (towards areas of housing) unless it can be guaranteed that no dust wil become airborne during the whole of the operations, I feel that this option may present a risk to public health and/or cause phytotoxic effects to nearby gardens. Further, significant precautions will be needed to ensure the health and safety of those carrying out the operations.

Another option available, as discussed by ICRCL is that of isolation of contaminated material by covering it with a suitable thickness of clean inert fill or hard cover. This is usually the preferred method, and given the circumstances of this site, I would feel the best option available, subject to the reservations expressed earlier with regard to dust generation.

REFERENCE

Interdepartmental Committee on the Redevelopment of Contaminated Land 59/83 Guidance on the Assessment and Redevelopment of Contaminated Land, 2nd Edition, July 1987.

TRS/18.5.90
dropping



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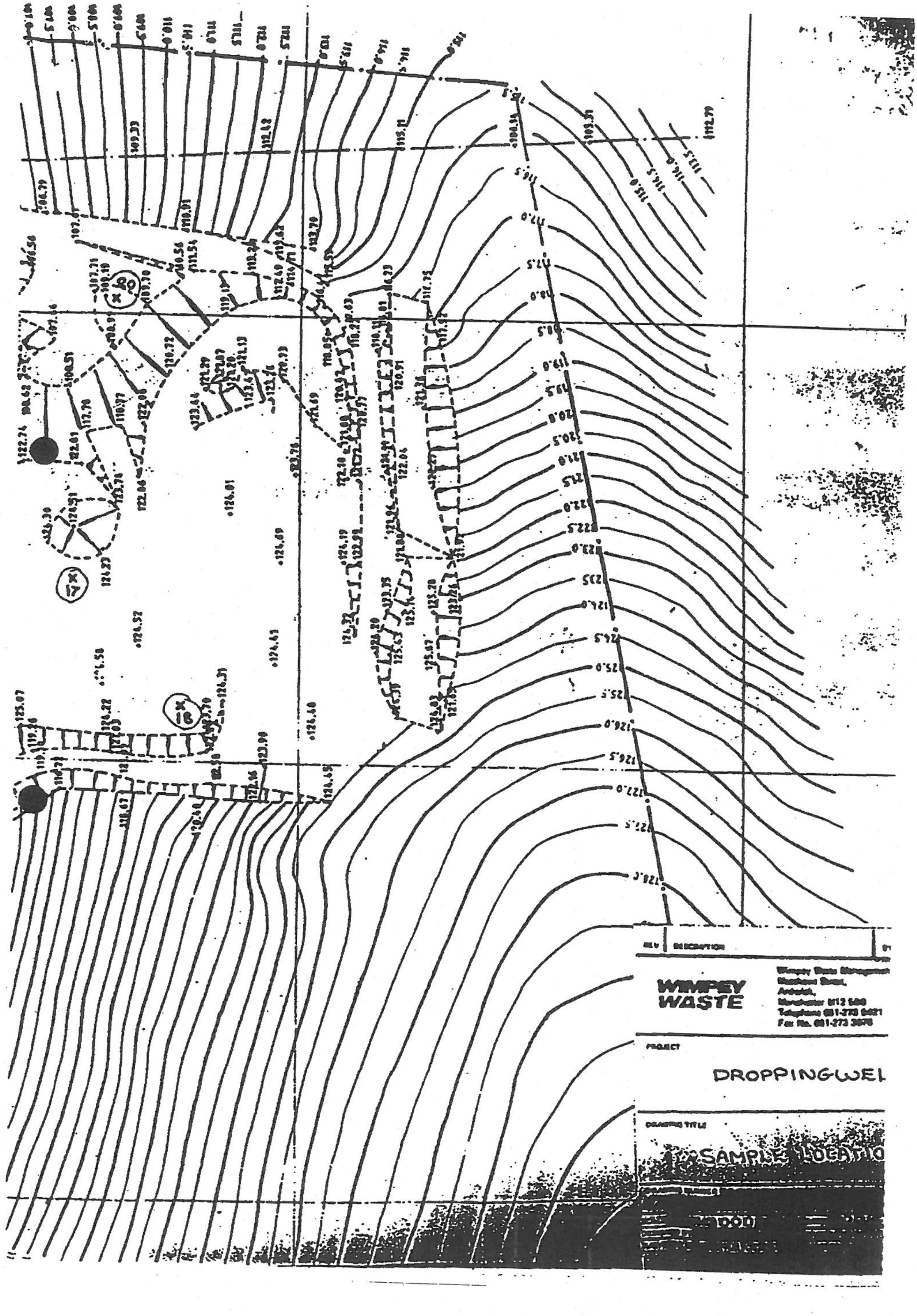

REV | DESCRIPTION

WIMPEY WASTE

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PROJECT

DROPPINGWEL

DRAWING TITLE

SAMPLE LOCATIO

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