



Verification Plan

Portugal Street East, Manchester

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Version History & Foreword

This report has been prepared by Apex Consulting Engineers with reasonable skill, care and diligence, within the best practice and guidance current at the time of issue, within the scope of works which have been agreed with the client.

This report is confidential to the client and Apex Consulting Engineers accepts no responsibility whatsoever to third parties to whom this report, or any part thereof is presented, unless this is formally agreed in writing by a Director of Apex Consulting Engineers before any reliance is made. Any such party relies upon the information at their own risk. Apex Consulting Engineers disclaims any responsibility to the client and others in respect of any matters outside the agreed scope of the work.

The report is written in the context of the development proposals submitted to Apex by the Client as part of the appointment. Any changes to the development proposals may necessitate significant revisions to this report.

The report (including appendices) should be read in its entirety. Apex cannot be held responsible for any sections of this report being taken out of context. This includes information submitted separately via download link (i.e. full copies of environmental search data from Envirocheck) which are not included as part of the main PDF due to their file size.

Apex reserve the right to amend this Report in the light of further information that may become available.

Revision	Date	Notes	Prepared by	Checked by	Approved by
001	2022/05/16	First Issue	M Thompson	GECL	M Thompson

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1. INTRODUCTION

1.1 Background & context

This report has been prepared for Portugal Street East Limited for their proposed development site at Portugal Street East, Manchester. Its purpose is to:

- provide details of the data that will be collected to confirm remediation has been completed
- set out the arrangements for contingency action
- identify any requirements for longer-term monitoring
- confirm that the site will not qualify as contaminated land after remediation

1.2 Previous reports

Apex have already issued the following reports in relation to this site:

- Supplementary Ground Appraisal Report, Portugal Street East, Manchester (Ref 1007-GEO-GAR-001, dated 27th April 2022)
- Remediation Strategy, Portugal Street East, Manchester (Ref 1007-GEO-RS-002, dated 16th May 2022)

In addition, Apex have been provided with copies of the following reports relating to this site, carried out by 3rd parties:

- Phase 1 Desktop Study, Portugal Street East, Manchester (ref. MN/AS/p I 3633 R I) dated April 2017 issued by RoC Consulting
- Phase 2 Site Investigation Report, Portugal Street East (ref. LD/AS/p2 3633) dated April 2018 issued by RoC Consulting

The above reports should be read in conjunction within this Verification Plan.

1.3 Development proposals

It is understood that proposals include development of two residential tower blocks of 30 storeys (west) and 24 storeys (east). A basement car park will span beneath both blocks, the base of which will be c. 4m below current ground levels. Externally, areas of green space, pedestrian routes and cobbled streets are proposed. Sections of Betley Street, Churchgate Buildings, Heyrod Street and Portugal Street East are to be stopped up and incorporated into the development.

1.4 Planning

The proposed development has planning consent (application no. 121099/FO/2018). With reference to ground, the application includes the following conditions:

- 9) (a) which refers to the need for a Preliminary Risk Assessment (desk study)

- 9) (b) which states that, in the event of potential contamination being identified in the Preliminary Risk Assessment, an intrusive Site Investigation Report is required along with a Remediation Strategy.
- 9) (c) which requires the development to commence in line with the Remediation Strategy, evidenced by a Completion/Verification Report for the specified remediation.
- 9) (d) which refers to the required procedure in the event of any previously unidentified contamination is encountered during construction.

This report, together with previous reports, is designed to address Condition 9 (b).

2. DATA COLLECTION

2.1 Introduction

The remediation requirements are set out in Apex's Remediation Strategy report referenced above. The following sections detail the data to be collected and the criteria against which to validate the remedial work.

2.2 Placement of clean soil cover (surface level)

Areas of soft landscaping at ground level require the placement of 600mm clean soil cover, comprising at least 150mm topsoil.

Where soil is imported to site for use in clean cover, the source and supplier of the material shall be recorded for inclusion in the Verification Report.

Sampling and analysis of imported material shall be done independently; certificates from soil suppliers are not acceptable.

Imported soil shall be sampled at the frequencies set out below:

Source	No. samples required (up to 1,000m ³)	No. sample per additional 1,000m ³
Greenfield	Minimum 3 and at least 1 per 250m ³	2
Brownfield	Minimum 6 and at least 1 per 100m ³	
Crushed Product	Minimum 3 and at least 1 per 500m ³	

The materials shall be scheduled for the following chemical analysis:

- pH & metals
- Soil organic matter
- Speciated PAH
- Speciated TPH
- Asbestos ID

Results of the above analysis shall be compared to screening values set out in Appendix B; a POS_{resi} end-use shall be assumed.

The depth of soil cover placed shall be verified by means of visual inspection via inspection pits within areas of proposed landscaping. One inspection pit per individual parcel of landscaping shall suffice. Each inspection pit shall be photographed to provide evidence of the soil thickness.

Suggested locations of inspection pits are shown on Drawing 008 in Appendix A.

2.3 Organic contamination hotspots

To date, areas of grossly contaminated soils have not been identified.

Should visual/olfactory evidence of organic contamination be noted, all grossly contaminated soil shall be excavated and placed in a designated stockpile awaiting treatment/disposal.

In order to validate removal of contaminated material, samples shall be taken from the base and 4 side walls of the excavation.

For larger excavations, sampling of the base and side walls shall continue every 10m until all grossly contaminated material has been 'chased out'.

Samples taken shall be subjected to chemical analysis for speciated TPH and screened against values presented in Appendix B; a POS_{resi} land use should be assumed.

Where samples yield results above the screening criteria, excavation shall continue until all contaminated material has been excavated (as determined by additional validation samples).

2.4 Excavation of Scrap Metal Deposits

Scrap metal deposits are present in the east (PA Metals premises) and require careful excavation and removal.

Validation of the removal of the Scrap Metal Deposits shall be confirmed via site records, photographs and testing of the material at the base of the excavation. The Scrap Metal Deposits shall be disposed off site.

Samples of the ground below the excavated area shall be scheduled for chemical analysis and screened against values presented in Appendix B; a POS_{resi} land use should be assumed.

2.5 Excavation of made ground for basement structures

In order to confirm the absence of any residual risks of volatile contamination remaining beneath the proposed basement floor slabs, once the basement excavations (or phases of excavation) are at finished level, the Engineer shall inspect, photograph and sample the formation level on a 20m grid (c. 8 no.

samples). Samples of the ground below the excavated area shall be scheduled for chemical analysis and screened against values presented in Appendix B; a residential end use without home grown produce (RwoHP) should be assumed. Results are to be included in the Verification Report.

3. ARRANGEMENTS FOR CONTINGENCY ACTION

A Supervising Engineer shall be appointed for the duration of the remediation works.

Supervision is to be full time during critical remediation activities and part time on less critical activities.

In the event that unforeseen contamination or unusual/unanticipated ground conditions are encountered at any time when carrying out the remediation, it must be reported immediately to the Supervising Engineer.

Work in the affected area should then cease until an assessment has been undertaken by the Supervising Engineer. Supplementary sampling, analysis and risk assessment may be required, and it may be necessary to revise the approved strategy to include remediation of the unforeseen conditions.

The Local Authority should be informed of the unforeseen conditions, the results of the assessment carried out by the Supervising Engineer and any changes to the remediation strategy.

The Local Authority should be asked to approve any changes.

4. LONGER-TERM MONITORING

Provided the remediation is carried out in line with the strategy and validation plan there will be no requirements for longer term monitoring.

5. CONTAMINATED LAND STATUS

On completion of the remediation, the site will not qualify as contaminated land with respect to its proposed end use.

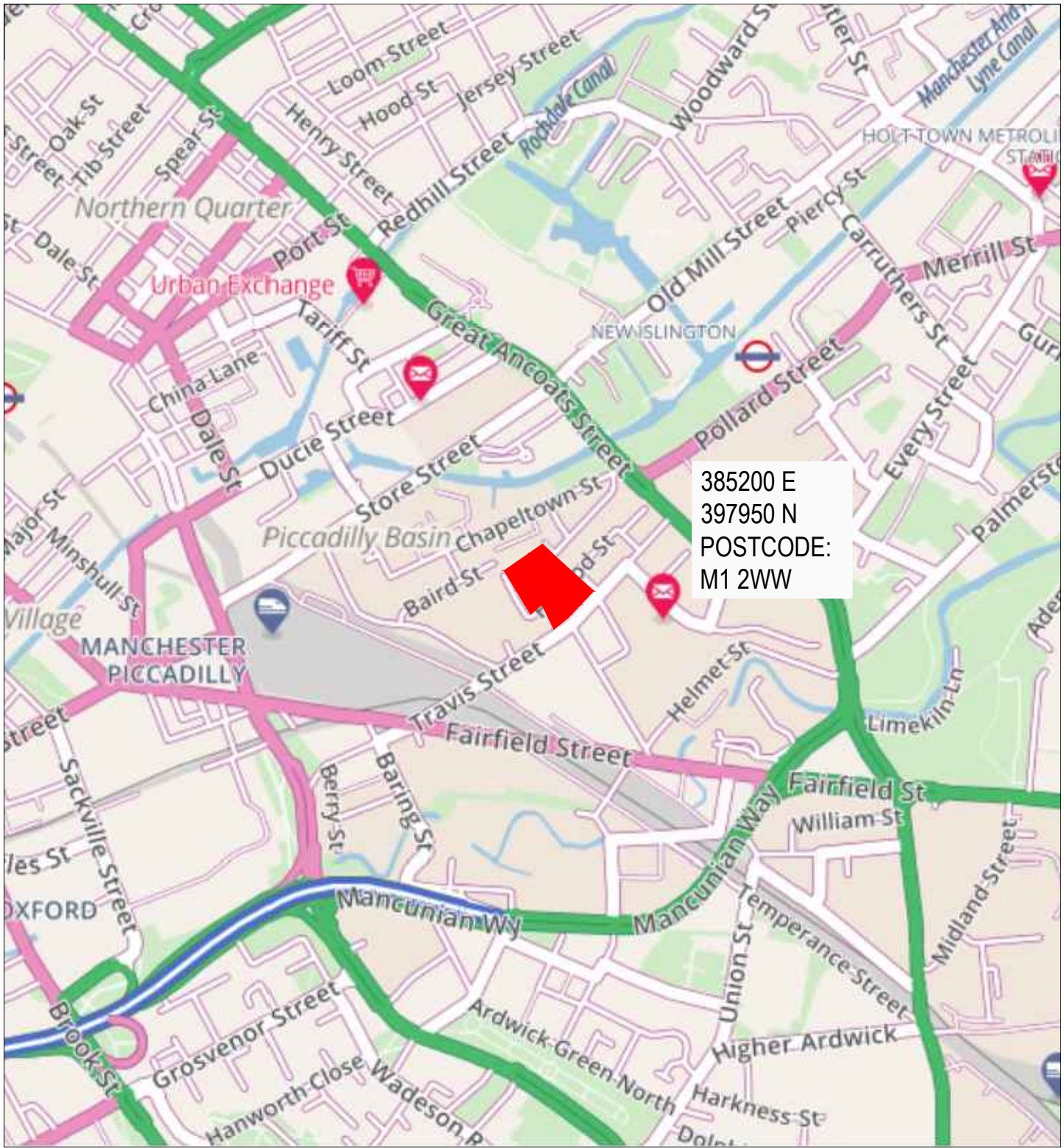


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Appendix A – Drawings

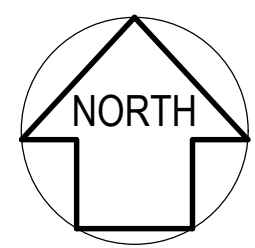
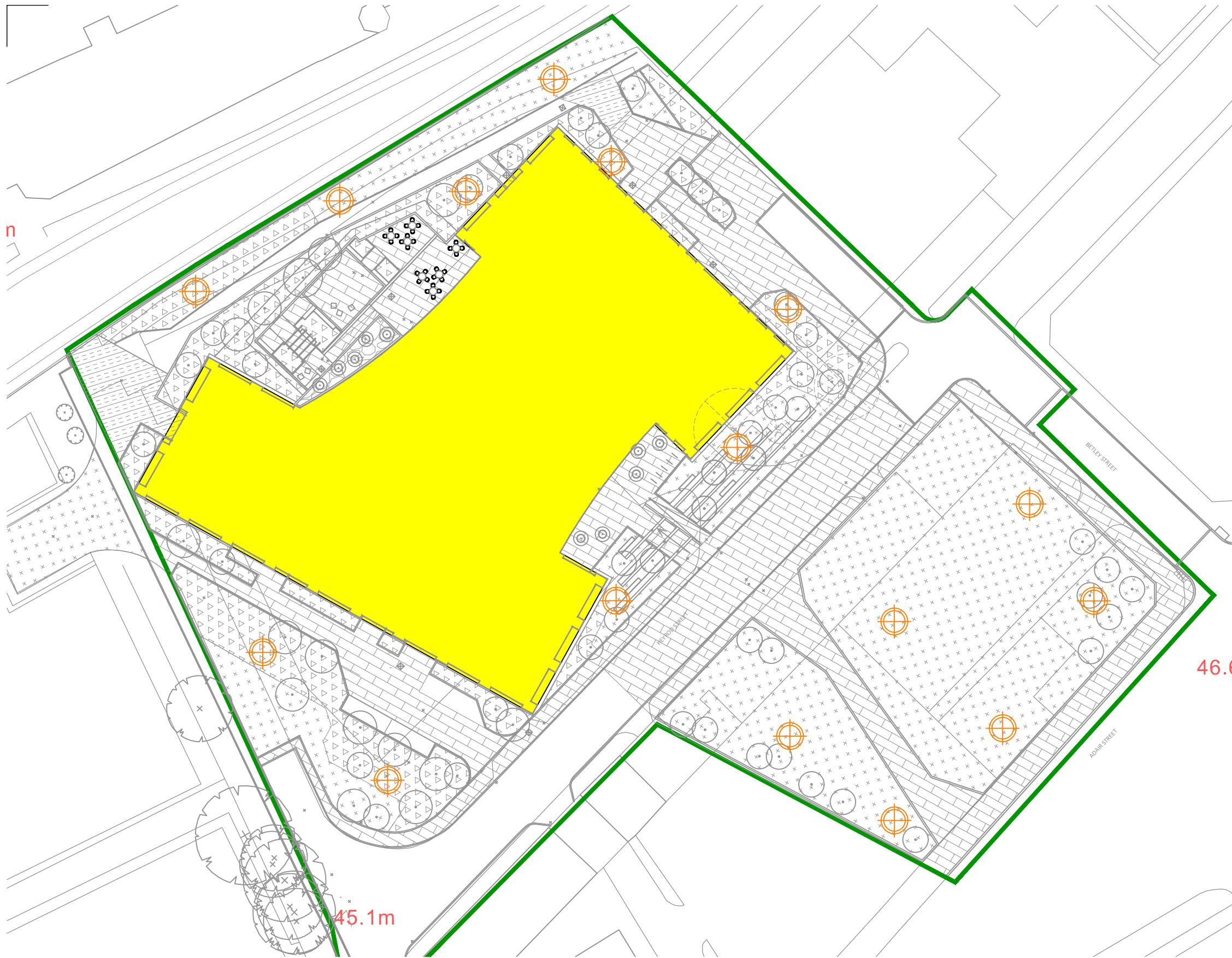


Client	_____
PORTUGAL STREET EAST LIMITED	
Project	_____
PORTUGAL STREET EAST	
Title	_____
001 - SITE LOCATION PLAN	
Job No.	_____
1007	
A4	



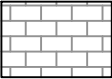
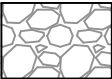
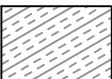
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 SITE BOUNDARY

KEY

-  PROPOSED BUILDINGS
-  BLOCK PAVING
-  GRAVEL
-  GRASS TURF SURFACE
-  HERBAL TURF SURFACE
-  TACTILE PAVING
-  PROPOSED SOIL COVER VALIDATION LOCATION

Client PORTUGAL STREET EAST LIMITED	Project PORTUGAL STREET EAST, MANCHESTER	Scale 1:500 @ A3 Date MAY 2022
A3	Title 008 - PROPOSED SOIL COVER VALIDATON LOCATIONS	1007



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Appendix B – Screening values

Notes	
Definitions for the various land-use scenarios are given in SP1010 ¹ and SR3 ² ; a summary is below:	
RwHP	Residential end-use with private garden and home-grown produce
RwoHP	Residential end-use with private garden and no home-grown produce
Allotments	Plot of open space for growing of produce for human consumption
Commercial	Commercial/light industrial property, 3 storeys and employees based indoors
POS _{resi}	Public Open Space in close proximity to residential housing
POS _{park}	Public park for recreational use (picnics, playground, sports, dog walking)

References

- 1 - SP1010 - Development of Category 4 Screening Values for Assessment of Land Affected by Contamination - CL:AIRE (2014)
- 2 - Science Report; SC050021/SR3 Updated technical background to the CLEA model - Environment Agency (2009)

Contaminant	Screening Values (soils) - inorganics					
	RwHP	RwoHP	Allotments	Commercial	POS _{resi}	POS _{park}
Arsenic	37	40	43	654	79	170
Berlyllium	1.7	1.7	35	12	2.2	63
Boron	290	11000	45	240000	21000	46000
Cadmium	11	85	1.9	190	120	532
Chromium III	910	910	18000	8600	1500	33000
Chromium VI	6	6	1.8	33	7.7	220
Copper	2400	7100	520	68000	12000	44000
Lead	200	310	80	2300	630	1300
Mercury (inorganic)	40	56	19	1100	120	240
Nickel	180	180	230	980	230	3400
Selenium	250	430	88	12000	1100	1800
Vanadium	410	1200	91	9000	2000	5000
Zinc	3700	40000	620	730000	81000	170000
Asbestos	Detected	Detected	Detected	Detected	Detected	Detected

Contaminant	Screening Values (soils) - organics		
	RwHP		
	1% SOM (0.6% TOC)	2.5% SOM (1.5% TOC)	6% SOM (3.5% TOC)
Benzene	0.087	22	880
Toluene	130	290	660
Ethylbenzene	47	110	260
o-xylene	60	140	330
m-xylene	59	1410	320
p-xylene	56	130	310
Aliphatic 5-6	42	78	160
Aliphatic >6-8	100	230	530
Aliphatic >8-10	27	65	150
Aliphatic >10-12	130 (48) ^{vap}	330 (118) ^{vap}	760 (283) ^{vap}
Aliphatic >12-16	1100 (24) ^{sol}	2400 (59) ^{sol}	4300 (142) ^{sol}
Aliphatic >16-35	65000 (8.48) ^{sol}	92000 (21) ^{sol}	110000
Aliphatic >35-44	65000 (8.48) ^{sol}	92000 (21) ^{sol}	110000
Aromatic 5-7	70	140	300
Aromatic >7-8	130	290	660
Aromatic >8-10	34	83	190
Aromatic >10-12	74	180	380
Aromatic >12-16	140	330	660
Aromatic >16-21	260	540	930
Aromatic >21-35	1100	1500	1700
Aromatic >35-44	1100	1500	1700
Aliphatic & Aromatic >44-70	1600	1800	1900
Acenaphthene	210	510	1100
Acenaphthylene	170	420	920
Anthracene	2400	5400	11000
Benz[a]anthracene	7.2	11	13
Benzo[a]pyrene	2.2	2.7	3
Benzo[b]fluoranthene	2.6	3.3	3.7
Benzo[ghi]perylene	320	340	350
Benzo[k]fluoranthene	77	93	100
Chrysene	15	22	27
Dibenz[ah]anthracene	0.24	0.28	0.3
Fluoranthene	280	560	890
Fluorene	170	400	860
Ideno[12-cd]pyrene	27	36	41
Naphthalene	2.3	5.6	13
Phenanthrene	95	220	440
Pyrene	620	1200	2000
Coal tar	0.79	0.98	1.1

Contaminant	Screening Values (soils) - organics		
	RwoHP		
	1% SOM (0.6% TOC)	2.5% SOM (1.5% TOC)	6% SOM (3.5% TOC)
Benzene	0.38	0.7	1.4
Toluene	880 ^{vap} (869)	1900	3900
Ethylbenzene	83	190	440
o-xylene	88	210	480
m-xylene	82	190	450
p-xylene	79	180	430
Aliphatic 5-6	42	78	160
Aliphatic >6-8	100	230	530
Aliphatic >8-10	27	65	150
Aliphatic >10-12	130 (48) ^{vap}	330 (118) ^{vap}	770 (283) ^{vap}
Aliphatic >12-16	1,100 (24) ^{sol}	2400 (59) ^{sol}	4400 (142) ^{sol}
Aliphatic >16-35	65000 (8.48) ^{sol}	92000 (21) ^{sol}	110000
Aliphatic >35-44	65000 (8.48) ^{sol}	92000 (21) ^{sol}	110000
Aromatic 5-7	370	690	1400
Aromatic >7-8	860	1800	3900
Aromatic >8-10	47	110	270
Aromatic >10-12	250	590	1200
Aromatic >12-16	1800	2300 (419) ^{sol}	2500
Aromatic >16-21	1900	1900	1900
Aromatic >21-35	1900	1900	1900
Aromatic >35-44	1900	1900	1900
Aliphatic & Aromatic >44-70	1900	1900	1900
Acenaphthene	3000 (57) ^{sol}	4700 (141) ^{sol}	6000 (336) ^{sol}
Acenaphthylene	2900 (86.1) ^{sol}	4600 (212) ^{sol}	6000 (506) ^{sol}
Anthracene	31000 (1.17) ^{vap}	35000	37000
Benz[a]anthracene	11	14	15
Benzo[a]pyrene	3.2	3.2	3.2
Benzo[b]fluoranthene	3.9	4	4
Benzo[ghi]perylene	360	360	360
Benzo[k]fluoranthene	110	110	110
Chrysene	30	31	32
Dibenz[ah]anthracene	0.31	0.32	0.32
Fluoranthene	1500	1600	1600
Fluorene	2800 (30.9) ^{sol}	3800 (76.5) ^{sol}	4500 (183) ^{sol}
Ideno[12-cd]pyrene	45	46	46
Naphthalene	2.3	5.6	13
Phenanthrene	1300 (36.0) ^{sol}	1500	1500
Pyrene	3700	3800	3800
Coal tar	1.2	1.2	1.2

Contaminant	Screening Values (soils) - organics		
	Allotments		
	1% SOM (0.6% TOC)	2.5% SOM (1.5% TOC)	6% SOM (3.5% TOC)
Benzene	0.017	0.034	0.075
Toluene	22	51	120
Ethylbenzene	16	39	91
o-xylene	28	67	160
m-xylene	31	74	170
p-xylene	29	69	160
Aliphatic 5-6	730	1700	3900
Aliphatic >6-8	2300	5600	13000
Aliphatic >8-10	320	770	1700
Aliphatic >10-12	2200	4400	7300
Aliphatic >12-16	11000	13000	13000
Aliphatic >16-35	260000	270000	270000
Aliphatic >35-44	260000	270000	27000
Aromatic 5-7	13	27	57
Aromatic >7-8	22	51	120
Aromatic >8-10	8.6	21	51
Aromatic >10-12	13	31	74
Aromatic >12-16	23	57	130
Aromatic >16-21	46	110	260
Aromatic >21-35	370	820	1600
Aromatic >35-44	370	820	1600
Aliphatic & Aromatic >44-70	1200	2100	3000
Acenaphthene	34	85	200
Acenaphthylene	28	69	160
Anthracene	380	950	2200
Benz[a]anthracene	2.9	6.5	13
Benzo[a]pyrene	0.97	2	3.5
Benzo[b]fluoranthene	0.99	2.1	3.9
Benzo[ghi]perylene	290	470	640
Benzo[k]fluoranthene	37	75	130
Chrysene	4.1	9.4	19
Dibenz[ah]anthracene	0.14	0.27	0.43
Fluoranthene	52	130	290
Fluorene	27	67	160
Ideno[12-cd]pyrene	9.5	21	39
Naphthalene	4.1	10	2.4
Phenanthrene	15	38	90
Pyrene	110	270	620
Coal tar	0.32	0.67	1.2

Contaminant	Screening Values (soils) - organics		
	Commercial		
	1% SOM (0.6% TOC)	2.5% SOM (1.5% TOC)	6% SOM (3.5% TOC)
Benzene	27	47	90
Toluene	5600 ^{vap} (869)	110000 ^{vap} (1920)	180000 ^{vap} (4360)
Ethylbenzene	5700 ^{vap} (518)	13000 ^{vap} (1220)	27000 ^{vap} (2840)
o-xylene	6600 ^{sol} (478)	15000 ^{sol} (1120)	33000 ^{sol} (2620)
m-xylene	6200 ^{vap} (625)	14000 ^{vap} (1470)	31000 ^{vap} (3460)
p-xylene	5900 ^{sol} (576)	14000 ^{sol} (1350)	30000 ^{sol} (3170)
Aliphatic 5-6	3200 (304) ^{sol}	5900 (558) ^{sol}	12000 (1150) ^{sol}
Aliphatic >6-8	7800 (144) ^{sol}	17000 (322) ^{sol}	40000 (736) ^{sol}
Aliphatic >8-10	2000 (78) ^{sol}	4800 (190) ^{vap}	11000 (451) ^{vap}
Aliphatic >10-12	9700 (48) ^{sol}	23000 (118) ^{vap}	47000 (283) ^{vap}
Aliphatic >12-16	59000 (24) ^{sol}	82000 (59) ^{sol}	90000 (142) ^{sol}
Aliphatic >16-35	1600000	1700000	1800000
Aliphatic >35-44	1600000	1700000	1800000
Aromatic 5-7	26000 (1220) ^{sol}	46000 (2260) ^{sol}	86000 (4710) ^{sol}
Aromatic >7-8	56000 (869) ^{vap}	110000 (1920) ^{sol}	180000 (4360) ^{vap}
Aromatic >8-10	3500 (613) ^{vap}	8100 (1500) ^{vap}	17000 (3850) ^{vap}
Aromatic >10-12	16000 (364) ^{sol}	28000 (899) ^{sol}	34000 (2150) ^{sol}
Aromatic >12-16	36000 (169) ^{sol}	37000	38000
Aromatic >16-21	28000	28000	28000
Aromatic >21-35	28000	28000	28000
Aromatic >35-44	28000	28000	28000
Aliphatic & Aromatic >44-70	28000	28000	28000
Acenaphthene	84000 (57) ^{sol}	97000 (141) ^{sol}	100000
Acenaphthylene	83000 (86.1) ^{sol}	97000 (212) ^{sol}	100000
Anthracene	520000	540000	540000
Benz[a]anthracene	170	170	180
Benzo[a]pyrene	35	35	36
Benzo[b]fluoranthene	44	44	45
Benzo[ghi]perylene	3900	4000	4000
Benzo[k]fluoranthene	1200	1200	1200
Chrysene	350	350	350
Dibenz[ah]anthracene	3.5	3.6	3.6
Fluoranthene	23000	23000	23000
Fluorene	63000 (30.9) ^{sol}	68000	71000
Ideno[12-cd]pyrene	500	510	510
Naphthalene	190 (76.4) ^{sol}	460 (183) ^{sol}	1100 (432) ^{sol}
Phenanthrene	22000	22000	23000
Pyrene	54000	54000	54000
Coal tar	15	15	15

Contaminant	Screening Values (soils) - organics		
	POS _{resi}		
	1% SOM (0.6% TOC)	2.5% SOM (1.5% TOC)	6% SOM (3.5% TOC)
Benzene	72	72	73
Toluene	56000	56000	56000
Ethylbenzene	24000	24000	25000
o-xylene	41000	42000	43000
m-xylene	41000	42000	43000
p-xylene	41000	42000	43000
Aliphatic 5-6	570000 (304) ^{sol}	590000	60000
Aliphatic >6-8	600000	610000	620000
Aliphatic >8-10	13000	13000	13000
Aliphatic >10-12	13000	13000	13000
Aliphatic >12-16	13000	13000	13000
Aliphatic >16-35	250000	250000	250000
Aliphatic >35-44	250000	250000	250000
Aromatic 5-7	56000	56000	56000
Aromatic >7-8	56000	56000	56000
Aromatic >8-10	5000	5000	5000
Aromatic >10-12	5000	5000	5000
Aromatic >12-16	5100	5100	5000
Aromatic >16-21	3800	3800	3800
Aromatic >21-35	3800	3800	3800
Aromatic >35-44	3800	3800	3800
Aliphatic & Aromatic >44-70	3800	3800	3800
Acenaphthene	15000	15000	15000
Acenaphthylene	15000	15000	15000
Anthracene	74000	74000	74000
Benz[a]anthracene	29	29	29
Benzo[a]pyrene	5.7	5.7	5.7
Benzo[b]fluoranthene	7.1	7.2	7.2
Benzo[ghi]perylene	640	640	640
Benzo[k]fluoranthene	190	190	190
Chrysene	57	57	75
Dibenz[ah]anthracene	0.57	0.57	0.58
Fluoranthene	3100	3100	3100
Fluorene	9900	9900	9900
Ideno[12-cd]pyrene	82	82	82
Naphthalene	4900	4900	4900
Phenanthrene	3100	3100	3100
Pyrene	7400	7400	7400
Coal tar	2.2	2.2	2.2

Contaminant	Screening Values (soils) - organics		
	POS _{park}		
	1% SOM (0.6% TOC)	2.5% SOM (1.5% TOC)	6% SOM (3.5% TOC)
Benzene	90	100	110
Toluene	87000 ^{vap} (869)	95,000 ^{vap} (1920)	100000 ^{vap} (4360)
Ethylbenzene	17000 ^{vap} (518)	22000 ^{vap} (1220)	27000 ^{vap} (2840)
o-xylene	17000 ^{sol} (478)	24000 ^{sol} (1120)	33000 ^{sol} (2620)
m-xylene	17000 ^{vap} (625)	24000 ^{vap} (1470)	32000 ^{vap} (3460)
p-xylene	17000 ^{sol} (576)	23000 ^{sol} (1350)	31000 ^{sol} (3170)
Aliphatic 5-6	95000 (304) ^{sol}	130000 (558) ^{sol}	180000 (1150) ^{sol}
Aliphatic >6-8	150000 (144) ^{sol}	220000 (322) ^{sol}	320000 (736) ^{sol}
Aliphatic >8-10	14000 (78) ^{sol}	18000 (190) ^{vap}	21000 (451) ^{vap}
Aliphatic >10-12	21000 (48) ^{sol}	23000 (118) ^{vap}	24000 (283) ^{vap}
Aliphatic >12-16	25000 (24) ^{sol}	25000 (59) ^{sol}	26000 (142) ^{sol}
Aliphatic >16-35	450000	480000	490000
Aliphatic >35-44	450000	480000	490000
Aromatic 5-7	76000 (1220) ^{sol}	84000 (2260) ^{sol}	92000 (4710) ^{sol}
Aromatic >7-8	87000 (869) ^{vap}	95000 (1920) ^{sol}	100000 (4360) ^{vap}
Aromatic >8-10	7200 (613) ^{vap}	8500 (1500) ^{vap}	9300 (3850) ^{vap}
Aromatic >10-12	9200	9700	10000
Aromatic >12-16	10000	10000	10000
Aromatic >16-21	7600	7700	7800
Aromatic >21-35	7800	7800	7900
Aromatic >35-44	7800	7800	7900
Aliphatic & Aromatic >44-70	7800	7800	7900
Acenaphthene	29000	30000	30000
Acenaphthylene	29000	30000	30000
Anthracene	150000	150000	150000
Benz[a]anthracene	49	56	62
Benzo[a]pyrene	11	12	13
Benzo[b]fluoranthene	13	15	16
Benzo[ghi]perylene	1400	1500	1600
Benzo[k]fluoranthene	370	410	440
Chrysene	93	110	120
Dibenz[ah]anthracene	1.1	1.3	1.4
Fluoranthene	6300	6300	6400
Fluorene	20000	20000	20000
Ideno[12-cd]pyrene	150	170	180
Naphthalene	1200 (76.4) ^{sol}	1900 (183) ^{sol}	3000
Phenanthrene	6200	6200	6300
Pyrene	15000	15000	15000
Coal tar	4.4	4.7	4.8