

Fragrance Oils (International) Ltd

Eton Hill Industrial Estate

Eton Hill Road

Radcliffe

Manchester

M26 2FR

Desk Top Study (Phase 1 Investigation)

for Site of

Proposed Development

at

Fragrance Oils (International) Ltd

Eton Hill Road

Radcliffe

Manchester

22 December 2010

**Sub Soil Surveys Ltd.
Manchester**

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1 INTRODUCTION AND OBJECT

- 1.1 This report has been prepared at the request of Fragrance Oils (International) Ltd at the site of a proposed development at Fragrance Oils (International) Ltd, Eton Hill Industrial Estate, Eton Hill Road, Radcliffe, Manchester, M26 2FR.
- 1.2 The 2.0ha Fragrance Oils (International) site lies to the south of Eton Road South, to the east of Eton Hill Road, on the Eton Hill Industrial Estate. The site is located to the east of Radcliffe at approximate National Grid Reference SD 796 081. The compound is shown on the appended site plan.
- 1.3 At the time of the site walkover on 15th November 2010 the existing structure consisted of a single storey masonry building. The area of the proposed factory extension was a slightly undulating tarmaced car park which sloped down slightly to the south. A soil strip was being undertaken on the proposed car park site, with the soils being transported for disposal. Site staff indicated that this area of the site was previously a roughly grassed, fenced area of wasteland.

A north-south trending watercourse (Hutchinson's Goit) was present directly adjacent to the eastern border of the site. The watercourse was inaccessible.

A number of service manholes were observed across the site. Numerous drums and IBC's (Intermediate Bulk Containers) were present along the western and northern edges of the site and along the central southern area of the site. The western section of the factory site was also used as a refuse collection area with skips, empty drums and metal storage containers present in this area. A small chimney was also present in this area for disposal of classified documents.

A neighbouring structure on the western border of the site had a number of full height cracks observable on the masonry. The structure had also undergone lateral movement, notable on the southeastern corner of the structure. Large above ground tanks were present on the northern elevation of the southern factory building which were observed to contain glycol, acetate and alcohol based substances. Discussions with site staff indicated that no underground tanks were utilised by the facility.

Chimneys were present on the northern elevation of the northern factory structure and southwestern corner of the southern factory structure. Discussions with site staff indicated that the factory boiler rooms were powered by gas and no oil tanks were present on the facility.

- 1.4 It is proposed to construct a two storey extension onto the southern elevation of the southern factory unit with associated car parking and landscaping on the southern area of the development. Further details of foundation loadings and design have not been made available at this time.
- 1.5 The object of the investigation was to undertake a geoenvironmental study of published information of the area of the site and comment on the implications for the proposed development.

2 SITE HISTORY

- 2.1 The history of the site has been assessed by a study of old OS maps provided by 'GroundSure' which are appended on CD. A web search and review of pre 1890 mapping has also been undertaken but the source data is not included on the CD due to copyright restrictions. From these maps the following details may be seen:

Date	On Site	Surrounding Area
1848	The general factory and proposed extension and car park site is undeveloped open land.	A north-south trending southerly flowing watercourse (Hutchinson's Goit) is present immediately adjacent to the eastern factory site border. A further north-south trending southerly flowing watercourse (Bealey's Goit) is present to the east of Hutchinson's Goit 10m east of the factory site. Eton Hill Cotton Mill is present 25m west of the factory site. A large reservoir and gasometer are shown 10m west of the northwestern corner of the factory site, approximately 50m northwest of the extension site. A Bleach Works is shown from 230m southeast of the factory site. The River Irwell is present approximately 400m east of the site.
1893-1908	The general factory and proposed extension and car park site remains undeveloped open land. An NE-SW trending field boundary/track is shown crossing the central section of the factory site, and possibly encroaching onto the western area of the proposed extension site.	Broad Dumers Works (Paper) is present 50m east of the factory site, east of the two watercourses. Bealey's Goit appears to have been dammed (forming a wider waterbody opposite the site) and controlled by sluices for use by the adjacent paper works. The reservoir to the west of the site is indicated to have steeply sloping sides along the eastern (adjacent to the site) and northern edges. Further reservoirs are present from approximately 75m to the east and southeast of the extension site. Filter beds with associated weighing machine are shown from 75m east of the factory site. Radcliffe Bleach and Chemical Works with associated tanks are present from 230m southeast of the factory site with further chemical works from 300m east of the factory site.
1910	The site is unchanged from previous mapping.	Eton Hill Mill present 25m west of the factory site is noted as a dyeing works. Broad Dumers Paper Works east of the factory site notes two chimneys on the site. Gasometers are now noted on Radcliffe Bleach and Chemical Works southeast of the factory site.
1932	The site is unchanged from previous mapping.	Tanks are shown on Eton Hill Mill (Dyeing) and Broad Dumers Paper Works.
1937-1950	The southern area of the factory site, including the proposed extension and car parking site, is noted as a cricket ground.	

Date	On Site	Surrounding Area
	The cricket ground is no longer noted across the southern area of the factory site on the 1950 1:10,560 mapping.	
1956	The cricket ground is no longer noted across the southern area of the factory site on the 1956 1:2,500 mapping.	A works structure is present on the central western border of the factory site, possibly associated with Eton Hill Mill (now noted as dyeing and finishing). Allotment gardens are shown 75m to the south of the factory site.
1975-1977	A structure noted as an engineering works is present on the northern area of the factory site. A further structure is shown on the central eastern border of the site.	The works structure on the central western border is noted as a cotton mill with the Eton Hill Mill structure also noted as a cotton mill. Works structures are present directly to the north and northeast of the factory site.
1985-1988	A second structure is present on the central section of the factory site, directly to the north of the extension site. The structure to the north is noted as a works. Works structures are present on the northeastern corner of the factory site.	Further works structures are present to the north and east of the factory site as part of the Eton Hill Industrial Estate. Broad Dumers Paper Works has been demolished. Works structures remain in this area (Bealey Industrial Estate) with associated tanks. The open channel section of Bealey's Goit now terminates to the east of the factory site.
1991-2002	Further works structures are present on the northeastern corner of the factory site.	The section of Bealey's Goit to the south has been culverted/infilled. Residential development is present to the south of the factory site. The reservoir formerly present just to the west of the site is backfilled by the 1992 map
2010	The second structure on the central section of the factory site has been demolished and a replacement structure constructed across this area, directly to the north of the proposed extension site. The proposed car park site is shown as undeveloped grassed land. Tanks are shown on the northern elevation of the southern factory unit. A chimney is noted on the northern elevation of the main northern factory unit.	

3 **ENVIRONMENTAL DETAILS**

- 3.1 We have obtained a 'GroundSure' report incorporating an EnviroInsight and GeoInsight for the site and a copy on CD is appended. From these the following details may be seen:

EnviroInsight	No. of entries recorded within GroundSure EnviroInsight	Distance from Site (m)	Details
1. Environmental Permits, Incidents and Registers			
Industrial Sites holding Environmental Permits and/or Authorisations (within 500m of the site)			
Historic IPC authorisations	-	-	-
Part A(1) and IPPC authorised activities	5	From 233m	Processes include Surface treating metals and plastics; Electrolytic/Chemical, Solvent emissions directive; Activities exceeding solvent threshold, and Coating, printing and textiles; Pretreating by washing, etc.
Water industry referrals (potentially harmful discharges to public sewer)	-	-	-
Red list discharge consents (potentially harmful discharges to controlled waters)	2	479m SE	United Utilities - sewage disposal works (sewage discharges of final/treated effluent)
List 1 dangerous substances inventory sites	4	From 437m SW & SE	Colour Anodising Ltd; Mercury Bury Sewage Treatment Works; Pentachlorophenol Bridgehall Dyeing and Finishing Company Ltd; Pentachlorophenol Receiving water; River Irwell, Manchester Ship Canal
List 2 dangerous substances inventory sites	2	From 231m	Bep Surface Technologies; Chromium, Copper Bury Waste Water Treatment Works; Chromium, Copper, Iron, Lead, Nickel, pH, Zinc, Atrazine, Simazine Receiving water; River Irwell
Part A(2) and Part B activities and enforcements	3	From 296m	Coating and Enamelling Process Coating Processes
Category 3/4 radioactive substance authorisations	2	From 314m	Keeping and use of radioactive materials - Both entries revoked/cancelled
Licensed discharge consents	22	From 394m E & SE	Sewage and Miscellaneous Discharges - Sewer Storm Overflow, Emergency Discharges and Final/Treated Effluent
Planning hazardous substance consents and enforcements	-	-	-
COMAH/NIHHS sites (within 500m of the site)	-	-	-

EnviroInsight	No. of entries recorded within GroundSure EnviroInsight	Distance from Site (m)	Details
Environment Agency recorded pollution incidents (National Incidents Recording System, List 2) within 250m of the site	1	72m E	Pollutant: Inert Materials and Wastes; Category 3 (minor) land impact
	1	114SE	Pollutant: Oils and Fuels; Category 3 (minor) water impact
Environment Agency recorded pollution incidents (National Incidents Recording System, List 1) within 250m of the site	-	-	-
Sites determined as contaminated land under Part IIA EPA 1990 (within 500m of the site)	-	-	-
2. Landfill and Waste Sites			
Environment Agency registered landfill sites (within 1000m of the site)	-	-	-
Operational landfill sites sourced from Landmark (within 1000m of the site)	1	922m S	Church Street East, Radcliffe Waste Type: Difficult
Environment Agency historic landfill sites (within 1500m of the site)	1	16m SE	Land off Dumers Lane, Radcliffe Waste Type: Inert
	15	From 450m	-
Non-operational landfill sites sourced from Landmark (within 1000m of the site)	5	From 681m	-
BGS/DoE non-operational landfill sites (within 1500m of the site)	3	From 681m	No risk to aquifer
Local Authority landfill sites (Groundsure) within 1500m of the site	14	From 530m	Refuse tips
Operational waste treatment, transfer or disposal sites (within 500m of the site)	-	-	-
Non-operational waste treatment, transfer or disposal sites (within 500m of the site)	-	-	-
Environment agency licensed waste sites	13	From 674m	-
3. Current Land Uses			
Potentially contaminative industrial sites (within 250m)	1	On Site	Chimney
	21	From 31m	Includes office and shop equipment, rubber and plastics, cooling and refrigeration, unspecified works or factories, packaging, business parks and industrial estates, tanks, electricity substations, etc.
Petrol and fuel sites (within 500m)	-	-	-
Underground high pressure oil and gas pipeline (within 500m)	-	-	-
4. Geology			
Artificial Ground and Made Ground	-	-	-
Superficial ground and drift geology	2	On site	River Terrace Deposits (Sand and Gravel) Alluvium (Clay, Silt Sand and Gravel)
Bedrock and solid geology	2	On site	Pennine Middle Coal Measures Formation (Mudstone, Siltstone and Sandstone)

EnviroInsight	No. of entries recorded within GroundSure EnviroInsight	Distance from Site (m)	Details
			Peel Hall Rock (Sandstone)
5. Hydrogeology and Hydrology			
Aquifer and soil classification	1	On site	Minor Aquifer/High leaching potential
Groundwater abstraction licences (within 1000m of the site)	-	-	-
Surface water abstraction licences (within 1000m of the site)	13	From 683m	Includes general cooling, boiler feeds and process water from the River Irwell, Manchester Bolton and Bury Canal and a reservoir fed by surface drainage
Potable water abstraction licences (within 2000m of the site)	2	1838m SE	Commercial/Industrial/ Public Services - from Groundwater source
Source protection zones (within 500m of site)	-	-	-
River quality (within 1500m of the site)	3	From 899m SE	Stretches of the River Irwell and River Roch Biological Quality D and E (2008) - Fair and Poor
	6	From 899m	Stretches of the River Irwell, River Roch and Whittle Brook Chemical Quality A, B and E (2008) - Good and Poor
Detailed river network (within 500m of the site)	21	From 5m	Hutchinson's Goit, Bealey's Goit, River Irwell, Manchester, Bolton and Bury Canal and Crow Trees Farm Brook Classed as primary, secondary and tertiary rivers with extended culverts also recorded
Surface water features (within 250m of the site)	Surface water features (including watercourses and reservoirs) recorded from 0-250m from the site		
6. Flooding			
Environment Agency Zone 2 fluvial/tidal floodplain (within 250m of the site) Annual probability ≥0.1% and <1% from rivers ≥0.1% and <0.5% from the sea	1	107m E	-
Environment Agency Zone 3 fluvial/tidal floodplain (within 250m of the site) Annual probability ≥1% from rivers ≥0.5% from the sea	1	125m NE	-
Flood defences & areas used for flood storage (within 250m of site)	-	-	-
Areas benefiting from flood defences (within 250m of site)	Areas benefiting from flood defences within 250m of the site		
Groundwater flooding susceptibility areas (defined as 'the emergence of groundwater at the ground surface or the rising of groundwater into man-made ground under conditions where the	Groundwater flooding susceptibility flood areas recorded within 50m of the boundary of the site		Susceptibility to groundwater flooding is not applicable to the site of moderately low confidence

EnviroInsight	No. of entries recorded within GroundSure EnviroInsight	Distance from Site (m)	Details
normal range of groundwater levels is exceeded')			
7. Designated Environmentally Sensitive Sites			
Designated Environmentally Sensitive Sites (within 500m of the site)	-	-	-
8. Natural Hazards Findings			
Shrink-swell, landslides, soluble rocks, compressible rocks, running sand (within 50m of the site)	Very low, null-negligible and negligible hazards		
Compressible ground (within 50m of the site)	Moderate hazard; 'Significant potential for compressibility problems. Avoid large differential loadings of ground. Do not drain or de-water ground near the property without technical advice. For new build consider possibility of compressible ground in ground investigation, construction and building design. Consider effects of groundwater changes. Extra construction costs are likely. For existing property possible increase in insurance risk from compressibility, especially if water conditions or loading of the ground change significantly'.		
9. Mining			
Coal mining (within 75m of the site)	Site is located within an identified coal mining area. Further details can be obtained from the Coal Authority.		
Shallow mining (within 150m of the site)	Negligible subsidence hazard relating to shallow mining on site		
Brine affected areas (within 75m of the site)	No brine affected areas within 75m of site		

GeoInsight	No. of entries recorded within GroundSure GeoInsight	Distance from Site (m)	Details
1. Geology			
Artificial Ground and Made Ground (within 500m of site)	-	-	-
Permeability of Artificial Ground	-	-	-
Superficial deposits and drift geology	2	On site	River Terrace Deposits (Sand and Gravel) Alluvium (Clay, Silt, Sand and Gravel)
	1	462m W	GlacioFluvial Deposits (Sand and Gravel)
Permeability of superficial ground	2	On site	Of variable permeability (Intergranular very low to very high permeability)
Landslip and landslip permeability (within 500m of site)	-	-	-
Bedrock and solid geology	1	On site	Pennine Middle Coal Measures Formation (Mudstone, Siltstone and Sandstone)
	7	From 20m	Pennine Middle Coal Measures Formation

GeoInsight	No. of entries recorded within GroundSure GeoInsight	Distance from Site (m)	Details
			(Mudstone, Siltstone and Sandstone) Peel Hall Rock (Sandstone)
Permeability of bedrock ground	1	On site	Of low to moderate permeability Fracture flow type
	1	20m NE	Of moderate to high permeability Fracture flow type
Faults (within 500m)	1	On site	Coal seam, inferred
	9	From 20m	Normal fault, inferred Coal seam, inferred
Radon affected areas	The property is not within a radon affected area, as less than 1% of homes are above the Action Level		
Radon protection	No radon protection measures are necessary		
2. Ground Workings			
Historical surface ground working features	5	On site	Includes reservoir, pond and a waterbody. NB. A number of these features i.e. the reservoir, pond and waterbody appear to refer to the same feature - the Eton Hill Mill reservoir which is directly adjacent to the northwestern border of the site.
	42	From 1m	Includes reservoirs, waterbodies, ponds, filter beds, refuse heaps and unspecified ground workings
Historical underground working features (within 1000m of the site)	5	From 427m N & W	Includes collieries, a tunnel and air shafts
BGS Current Ground Workings (within 1000m of the site)	2	From 596m S & SW	Sand and Gravel Surface Extraction (Ceased)
3. Mining, Extraction and Natural Cavities			
Historical mining areas within 1km of site	4	From 427m N & W	Includes collieries and air shafts
Coal mining areas within 1km of site	The site is located within an identified coal mining area. Further details can be obtained from the Coal Authority.		
JPB Mining areas within 1km of site	JPB are recorded as having information such as mining plans and maps in this area.		
Non-coal mining	1	On site	Vein mineral - infrequent minor mining may have occurred but restricted in extent
	1	From 364m E	
Non-coal mining cavities, natural cavities, brine extraction, gypsum extraction, tin mining, clay mining within 1km of site	-	-	-
4. Natural Ground Subsidence			
Shrink-swell clays, landslides, soluble rocks, collapsible rocks	Very low, null-negligible and negligible hazards		
Compressible ground	Moderate hazard on eastern section of site; 'Significant		

GeoInsight	No. of entries recorded within GroundSure GeoInsight	Distance from Site (m)	Details
			potential for compressibility problems. Avoid large differential loadings of ground. Do not drain or de-water ground near the property without technical advice. For new build consider possibility of compressible ground in ground investigation, construction and building design. Consider effects of groundwater changes. Extra construction costs are likely. For existing property possible increase in insurance risk from compressibility, especially if water conditions or loading of the ground change significantly'.
Running sands			Low hazard on eastern section of site; 'Possibility of running sand problems after major changes in ground conditions. Normal maintenance to avoid leakage of water-bearing services or waterbodies (ponds, swimming pools) should reduce likelihood of problems due to running sand. For new build consider possibility of running sand into trenches or excavations if water table is high or sandy strata are exposed to water. Avoid concentrated water inputs to site. Unlikely to be an increase in construction costs due to potential for running sand. For existing property no significant increase in insurance risk due to running sand problems is likely'.
5. Borehole Records (within 250m of site)	12	From 42m W, SE and S	-
6. Estimated Background Soil Chemistry	2	On site	As - <15 & 15 - 25mg/kg Cd - <1.8mg/kg Cr - 40 - 60 & 60 - 90mg/kg Ni - 15 - 30 & 30 - 45mg/kg Pb - <150 & 150 - 300mg/kg
	3	From 6m	As - <15 & 15 - 25mg/kg Cd - <1.8mg/kg Cr - 40 - 60 & 60 - 90mg/kg Ni - 15 - 30 & 30 - 45mg/kg Pb - <150 & 150 - 300mg/kg

4 SITE GEOLOGY

4.1 The site is situated in an area where the geological succession is estimated to be as follows:

- i) Soft clays, silts, sands and possibly peat - Alluvium
- ii) Sand and Gravel - River Terrace Deposits
- iii) Firm, stiff and very stiff CLAY with sandy zones, variable gravel content, cobbles & boulders possibly with zones or lenses of SILT, SAND and GRAVEL - Glacial Deposits
- iv) SANDSTONE and MUDSTONE with coal seams - Middle Coal Measures

4.2 The geological maps of the area indicate the eastern section of the proposed extension site and northeastern section of the proposed car parking development site to be underlain by Alluvium.

The western section of the site is shown to be underlain by River Terrace deposits.

4.3 The site is underlain by Middle Coal Measures which are indicated to dip to the east and ESE in the general area. Dips of 1 in 4.5 (13°) and 1 in 5 (11°) in underground workings in the Hell Hole Mine coal seam are recorded 1.1km and 1.2km west/northwest of the site.

The conjectured NE-SW trending outcrop at rockhead of the Two Yards Mine coal seam is shown to cross the northwestern corner of the site, to the northwest of the extension site. Further deeper coal seams are shown to outcrop at rockhead from 400m west of the site.

A northwest-southeast trending fault is shown to surface at rockhead 100m north of the site. A further NE-SW trending fault present directly to the east of the site was proved from the northeast within old underground workings in the Cannel Mine.

Assuming that the geological mapping is correct and accurate the shallowest named coal seam, the Two Yards Mine coal seam, could lie at a very shallow depth below rockhead below the extension site.

If any coal seams are present at very shallow depths below the extension site and have been worked there would be a risk of major ground surface movements affecting the extension site due to the future collapse of the workings. We are of the opinion, therefore, that the very shallow coal seam geology below the site should be investigated by rotary drilling to check the depth and thickness of the shallow coal seams. If the seams are sufficiently shallow any workings would require infilling with grout to prevent major ground movements developing due to their future collapse.

- 4.4 A Coal Authority Report for the site has been obtained and is appended, it states that *‘The property is in the likely zone of influence from workings in 3 seams of coal at 190m to 360m depth, and last worked in 1894. Any ground movement from these coal workings should have stopped by now. In addition the property is in an area where the Coal Authority believe there is coal at or close to the surface. This coal may have been worked at some time in the past’.*

‘The property is not in the likely zone of influence of any present underground coal workings or in an area that is likely to be affected at the surface from any planned future workings. However reserves of coal exist in the local area which could be worked at some time in the future’.

‘No notice of the land being affected by subsidence has been given under section 46 of the Coal Mining Subsidence Act 1991’.

The Coal Authority Report also notes that *‘There are no known coal mine entries within, or within 20 metres of, the boundary of the property’.*

‘Records may be incomplete. Consequently, there may exist in the local area mine entries of which the Coal Authority has no knowledge’.

- 4.5 Although no mine entries are recorded on the development site within the Coal Authority report or on the geology/old O.S Maps, there are a number of old mine entries in the surrounding area. In these old mining areas there are also many unrecorded old mine entries hence all excavations on the site should be carefully inspected for signs of old mine entries, etc. and if any are suspected they should be carefully investigated and stabilised prior to the development proceeding.
- 4.6 Previous ground investigations have been undertaken on the factory site by this company. A single rotary borehole was sunk on the northeastern section of the

Fragrance Oils site to the NNE of the extension site. The borehole proved a 2.0m thick sand and gravel, onto sandy clay, overlying clayey gravel proved below 11.50m below ground level (m bgl). A red and grey sandstone and sandy mudstone was proved below 17.80m bgl with a 0.2m thick coal seam proved at 26.40m. It appears that the flush return was normal throughout the sinking of the borehole.

Further light cable percussion boreholes sunk on the factory site proved Made Ground up to 1.70m thick overlying 3.8-4.05m thick medium dense clayey Sand and Gravels onto firm/stiff Clay proved below 5.50m bgl.

5 GEOCHEMICAL RISK ASSESSMENT

- 5.1 The general factory and proposed extension and car park site were initially undeveloped open land. Later a field boundary/track was shown crossing the central section of the factory site, possibly encroaching onto the western area of the proposed extension site. A north-south trending watercourse (Hutchinson's Goit) was and remains present immediately adjacent to the eastern factory site border. A further north-south trending southerly flowing watercourse (Bealey's Goit) was present to the east of Hutchinson's Goit 10m east of the factory site. Mills, reservoirs, paper, dyeing and bleach works (with associated tanks), filter beds and gasometer were present in the surrounding area.

By the 1937 mapping the southern area of the factory site including the proposed extension and car parking site was noted as a cricket ground. The cricket ground was no longer noted on the 1950 1:10,560 and 1956 1:2,500 mapping.

By the 1975 mapping a structure noted as an engineering works was present on the northern area of the factory site. A further structure was present on the central eastern border of the factory site. Works structures were present directly to the north and northeast of the factory site.

By the 1985 mapping a second structure was present on the central section of the factory site, directly to the north of the extension site. Further works structures were present to the north and east of the factory site as part of the Eton Hill Industrial Estate.

By the 1991 mapping further works structures were present on the northeastern corner of the factory site. Residential development was present to the south of the factory site.

By the 2010 mapping the southern structure on central section of the factory has been demolished and a replacement structure constructed across this area directly to the north of the proposed extension site. The proposed car park site is shown as undeveloped grassed land. Tanks are present on the northern elevation of the southern factory unit. A chimney is noted on the northern elevation of the main northern factory unit.

The River Irwell is present approximately 400m east of the site. The closest recorded landfill site lies 16m southeast of the site.

- 5.2 A detailed asbestos survey on the site lies outside the scope of this investigation although any samples suspected of containing such materials during any physical investigation or groundwork on the site should be subjected to appropriate analysis/appraisal.
- 5.3 The following potential sources of geochemical contamination have been identified by this investigation:

Sources of potential Geocontamination	
On Site	Off Site
- Made Ground (associated with old foundations, service trenches, general filling and levelling materials, etc.) - Mobile contaminants that may have been spilt, dumped or leaked (associated with the historical and contemporary use of the site as a works) - Potential Contaminants: Asbestos, Metals, PAH and Oils	- Made Ground - Possible leaching of mobile contaminants that may have been spilt, dumped or leaked (from surrounding works, etc.) - The presence of the former gasometer to the west indicates that gas works residues may have been dumped in the area, possibly on the site. - Potential Contaminants: Metals, PAH and Oils
Possible ground gas formation/migration from underlying Made Ground, organic deposits, Coal Measures, etc.	Possible ground gas formation/migration from landfill site within 250m, infilled land in surrounding area (ponds, reservoirs, etc.), Coal Measures, etc.

- 5.4 The potential contamination which we have identified from the site history and knowledge of the area as being of greatest concern are Asbestos, Metals, Sulphates, pH, Polyaromatic Hydrocarbons (PAH) and Oils (Petroleum Hydrocarbons). Analysis should include speciated PAH and banded TPH suites.
- 5.5 The Potential Receptors of the various contaminants are :

1	Present site users and construction personnel
2	End users of the site
3	Controlled Waters (including Hutchinson's Goit, River Irwell, etc.)
4	Groundwater and Minor Aquifer
5	Flora and Fauna

6	Building Structure/Services
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- 5.6 In order for there to be a risk to a potential receptor from the identified sources of potential geocontamination there has to be a pathway linking them. We present below a table of possible pathways which also indicates their likelihood of occurrence:

Geocontamination Source	Pathway	Receptor - from Table 5.5					
		1	2	3	4	5	6
Made Ground / Soil	Ingestion	L	L	NA	NA	P	NA
	Skin/Direct Contact	L	P	NA	NA	P	P
	Inhalation of Dust	L	L	NA	NA	L	NA
	Services	L	P	P	P	P	P
	Surface Water	L	P	NA	L	L	L
Groundwater	Ingestion	P	U	NA	NA	P	L
	Skin/Direct Contact	P	P	P	NA	L	L
Ground Gas	Migration	L	L	NA	NA	P	L

Key to pathways : L - Likely P - Possible U - Unlikely NA - Not Applicable

- 5.7 We present below a further table which develops conceptual ground model implicit in the above pathways table and assesses the risk presented by each of the links to the potential receptors :

Source	Pathway	Receptor	Probability	Consequence	Risk	Action for further assessment
Contaminated Soil/ groundwater	Ingestion of soil and inhalation of dust and vapours	Construction personnel	Likely	Medium	Moderate	Measure Soil contamination and feed results to contractor/designer for his risk assessment
Contaminated Soil/ groundwater	Ingestion of soil and inhalation of dust and vapours	End users of site	Low	Medium	Moderate	Measure Soil contamination, undertake remediation as required to mitigate risk
Contaminated Soil/ Groundwater via services	Via service pipes	End users Structures	Low	Medium	Moderate /Low	Measure soil contamination Ensure good construction
Contaminated soil/ groundwater	Downward Migration	Groundwater and Minor Aquifer	Likely	Medium	Moderate	Measure Soil Contamination
Ground Gas - Methane and Carbon Dioxide	Migration leading to build up in structures (if present)	Construction personnel End Users	Low	Severe	Moderate	To monitor for ground gases

Source	Pathway	Receptor	Probability	Consequence	Risk	Action for further assessment
Contaminated Soil	Ingestion of soil and inhalation of dust and vapours	Flora/Fauna	Low	Medium	Moderate /Low	Measure Soil Contamination
Contaminated Groundwater	Ingestion	Flora/Fauna	Low	Mild	Low	No Action needed
Contaminated Soil/Ground water	Direct Contact	Buildings	Likely	Medium	Moderate	Measure Soil Contamination Ensure adequate waterproofing/construct ion
Key to risk terms:						
Severe	Acute risks to human health Catastrophic damage to buildings/property (e.g. by explosion) Major pollution of controlled waters (watercourses or groundwater)					
Medium	Chronic (long-term) risk to human health Pollution of sensitive controlled waters Significant effects on sensitive ecosystems or species					
Mild	Pollution of non-sensitive waters Significant damage to buildings or structures PPE requirement to reduce health risk					
Minor	Damage to non-sensitive ecosystems or species Minor damage to buildings or structures					
High Likelihood	Pollutant linkage may be present, and risk is almost certain to occur in the long term, or there is evidence of harm to the receptor					
Likely	Pollutant linkage may be present, and it is probable that the risk will occur over the long term					
Low Likelihood	Pollutant linkage may be present and there is a possibility of the risk occurring, although there is no certainty that it will do so					
Unlikely	Pollutant linkage may be present but the circumstances under which harm would occur are improbable					

5.8 The results of soil contamination testing should be compared to relevant risk assessment criteria for soils derived using the CLEA model. The CLEA documentation presents Soil Guideline Values for commonly occurring contaminants that are known to cause risks to human health, the Soil Guideline values being sufficiently low to give adequate freedom of significant risk of significant harm to human health for three 'standard' exposure scenarios. The three 'standard' scenarios are Residential end use (including the consumption of home grown vegetables), Allotment end use and Commercial end use.

We believe the 'Commercial' scenario to be appropriate for the factory extension and car park development as detailed to date. Where SGV for specific contaminants of concern have not yet been published we propose to utilise the relevant 'Atkins AtRisk' SSV values for the chosen exposure scenario.

6 COMMENTS

6.1 It is proposed to construct a two storey extension onto the southern elevation of the southern factory unit with associated car parking and landscaping on the southern area of the factory site. Further details of foundation loadings and design have not been made available at this time.

6.2 This geoenvironmental study has revealed the following:

6.2.1 Our assessment of the historical maps of the area indicates that the site was initially undeveloped open land. A north-south trending watercourse (Hutchinson's Goit) was and remains present immediately adjacent to the eastern factory site border.

By the 1937 mapping the southern area of the factory site including the proposed extension and car parking site were noted as a cricket ground. From the 1975 mapping to the present a number of works structures were constructed and demolished on the factory site. Tanks are present on the northern elevation of the southern factory unit. The River Irwell is present approximately 400m east of the site. The closest recorded landfill site lies 16m southeast of the site.

6.2.2 It is possible that Made Ground may be present below the site, some of which could include materials associated with old foundations, service trenches, general filling and levelling materials, etc.

6.2.3 Elevated levels of contamination could be present below the site due to the historical and contemporary site usage as a works. A contamination assessment should be undertaken by retrieving samples from varying depths on the site for chemical analysis. A risk assessment should then be carried out in order to determine the effects on the proposed site end use and possible waste disposal. See section 5.4 for possible contaminants on the site.

6.2.4 The closest recorded landfill site lies 16m from the site. We are of the opinion, therefore, that it would be advisable to install and monitor ground gas wells in the area of the proposed extension.

6.3 Geotechnical investigation of the site should be undertaken in order to allow suitable and economic foundations to be designed for the proposed structure.

We advise that, as a minimum, the following physical investigation should be undertaken to establish the relevant geotechnical and geochemical parameters of the site for future redevelopment:

- Five 10m and 18m deep light cable percussion boreholes

- One 40m deep rotary borehole (to check for underlying shallow coal seams)
- Five 3m deep windowless sampler boreholes
- Three ground gas monitoring wells
- Chemical testing as described in section 5, to include testing of groundwater from standpipes and samples from the adjacent Hutchinson's Goit watercourse
- Geotechnical testing for determination of soil parameters and strength

The results should be appraised during and after the physical investigation period with any further works/testing being undertaken as appropriate to prepare a full report on the findings.

.....
Claire L Capes
Engineering Geologist

.....
K J Alderman
Principal Engineer

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Person dealing with this matter: **Eric Fretwell**
Our reference: **00050447-10**
Your reference: **33095951**
Electronic Ref: **EME_00014920720001_005**
RRUID: **005.00014920720001**
Date of your enquiry: **12 November 2010**
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EX2 7HY

This report is for the property described in the address below and the attached plan.

Non-Residential Coal and Brine Report

Site At, Fragrance Oils International Ltd, Eton Hill Road, Radcliffe, Manchester, Lancashire

This report is based on and limited to the records held by, the Coal Authority, and the Cheshire Brine Subsidence Compensation Board's records, at the time we answer the search.

Coal mining	Yes
Brine Compensation District	No

Information from the Coal Authority

Underground Coal Mining

Past

The property is in the likely zone of influence from workings in 3 seams of coal at 190m to 360m depth, and last worked in 1894.

Any ground movement from these coal workings should have stopped by now.

In addition the property is in an area where the Coal Authority believe there is coal at or close to the surface. This coal may have been worked at some time in the past.

Present

The property is not in the likely zone of influence of any present underground coal workings.

Future

The property is not in an area for which the Coal Authority is determining whether to grant a licence to remove coal using underground methods.

The property is not in an area for which a licence has been granted to remove coal using underground methods.

The property is not in an area that is likely to be affected at the surface from any planned future workings.

However reserves of coal exist in the local area which could be worked at some time in the future.

No notice of the risk of the land being affected by subsidence has been given under section 46 of the Coal Mining Subsidence Act 1991.

Mine entries

There are no known coal mine entries within, or within 20 metres of, the boundary of the property.

Records may be incomplete. Consequently, there may exist in the local area mine entries of which the Coal Authority has no knowledge.

Coal-mining geology

The Authority is not aware of any evidence of damage arising due to geological faults or other lines of weakness that have been affected by coal mining.

Opencast Coal Mining

Past

The property is not within the boundary of an opencast site from which coal has been removed by opencast methods.

Present

The property does not lie within 200 metres of the boundary of an opencast site from which coal is being removed by opencast methods.

Future

The property is not within 800 metres of the boundary of an opencast site for which the Coal Authority is determining whether to grant a licence to remove coal by opencast methods.

The property is not within 800 metres of the boundary of an opencast site for which a licence to remove coal by opencast methods has been granted.

Coal-mining subsidence

The Coal Authority has not received a damage notice or claim for the property since 1 January 1984. There is no current Stop Notice delaying the start of remedial works or repairs to the property.

The Authority is not aware of any request having been made to carry out preventive works before coal is worked under section 33 of the Coal Mining Subsidence Act 1991.

Mine gas

There is no record of a mine gas emission requiring action by the Coal Authority within the boundary of the property.

Hazards related to coal mining

The property has not been subject to remedial works, by or on behalf of the Authority, under its Emergency Surface Hazard Call Out procedures.

Withdrawal of Support

The property is not in an area for which a notice of entitlement to withdraw support has been published.

The property is not in an area for which a notice has been given under section 41 of the Coal Industry Act 1994, revoking the entitlement to withdraw support.

Working Facilities Orders

The property is not in an area for which an Order has been made under the provisions of the Mines (Working Facilities and Support) Acts 1923 and 1966 or any statutory modification or amendment thereof.

Payments to Owners of Former Copyhold Land

The property is not in an area for which a relevant notice has been published under the Coal Industry Act 1975/Coal Industry Act 1994.

Comments on Coal Authority information

In view of the mining circumstances a prudent developer would seek appropriate technical advice before any works are undertaken.

Therefore if development proposals are being considered, technical advice relating to both the investigation of coal and former coal mines and their treatment should be obtained before beginning work on site. All proposals should apply good engineering practice developed for mining areas. No development should be undertaken that intersects, disturbs or interferes with any coal or mines of coal without the permission of the Coal Authority. Developers should be aware that the investigation of coal seams/ former mines of coal may have the potential to generate and/or displace underground gases and these risks both under and adjacent to the development should be fully considered in developing any proposals. The need for effective measures to prevent gases entering into public properties either during investigation or after development also needs to be assessed and properly addressed. This is necessary due to the public safety implications of any development in these circumstances.

Information from the Cheshire Brine Subsidence Compensation Board

The property lies outside the Cheshire Brine Compensation District.

Additional remarks

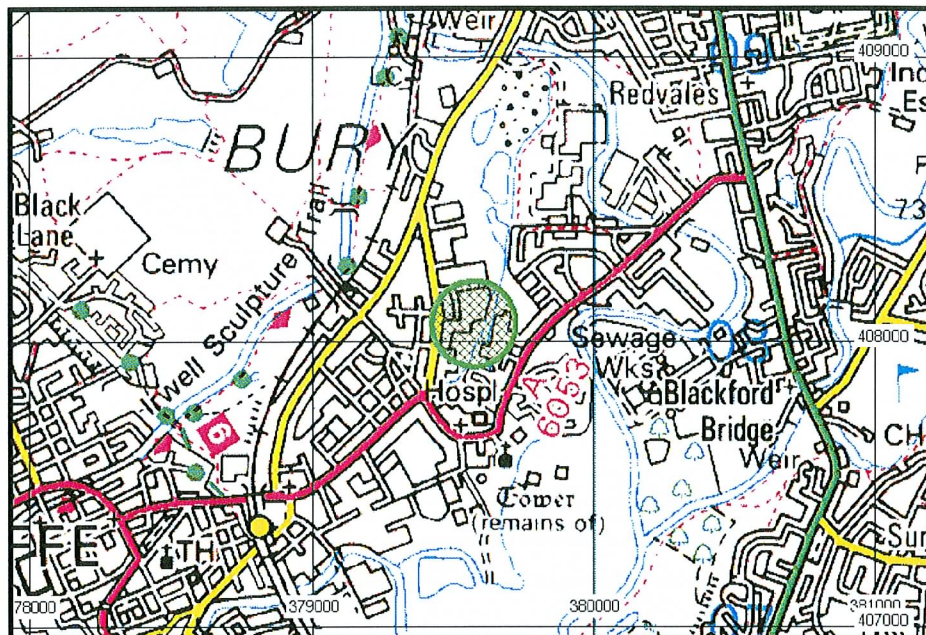
This report is prepared in accordance with the Law Society's Guidance Notes 2006, the User Guide 2006 and the Coal Authority and Cheshire Brine Board's Terms and Conditions 2006. The report is compliant with Home Information Pack requirements.

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Location map



Approximate
position
of property

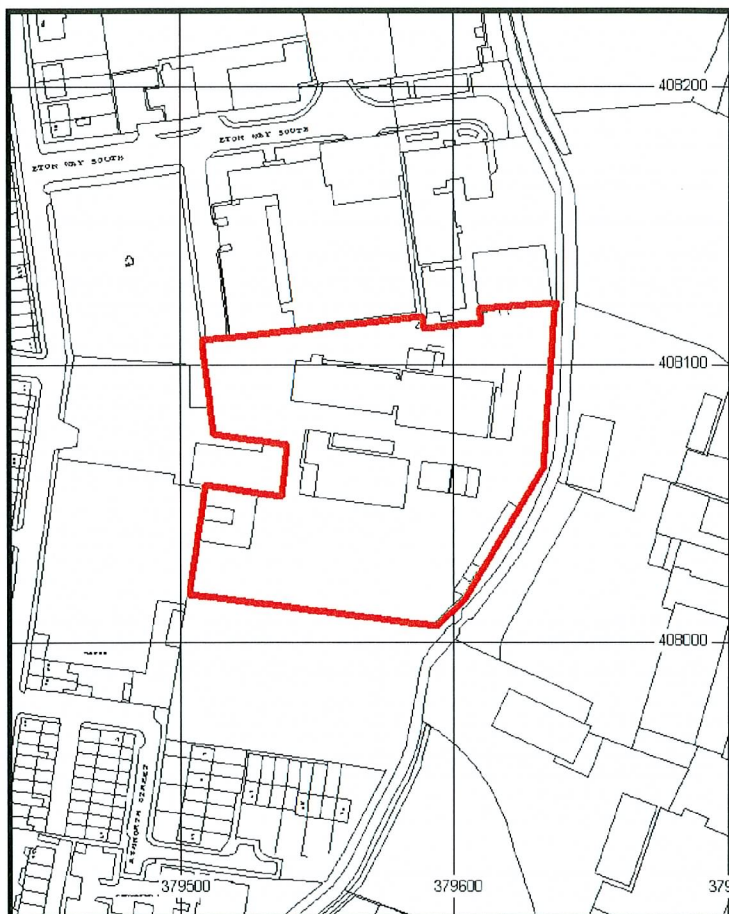


Enquiry boundary

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Key

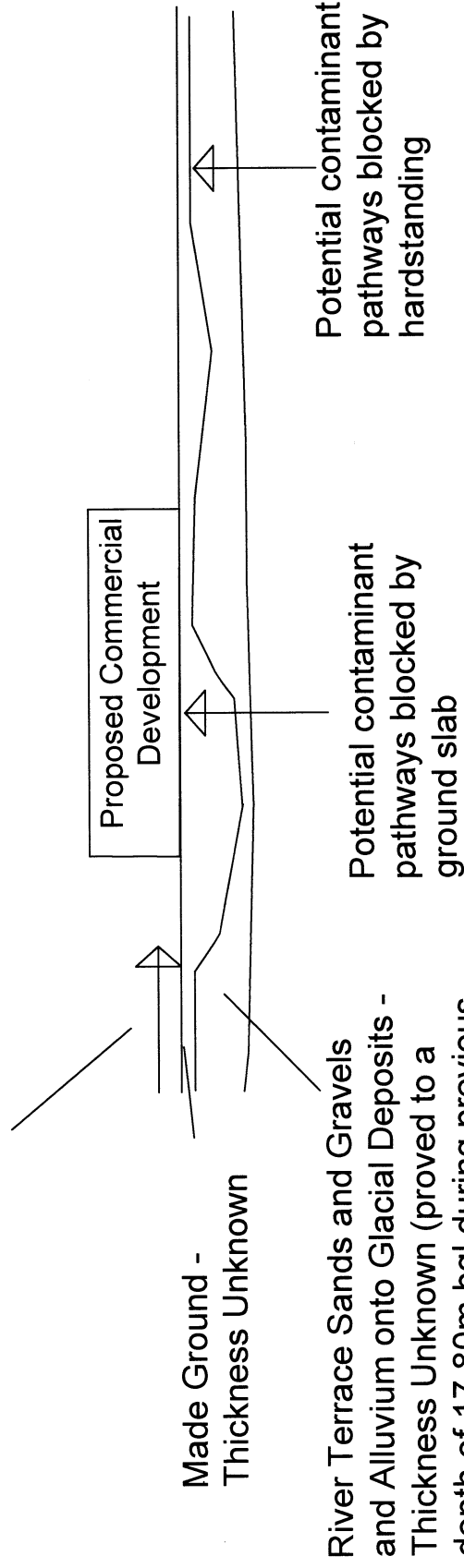
Approximate position of enquiry boundary shown



Receptors - End Users of Site (i.e.
office/factory workers)
Construction Personnel

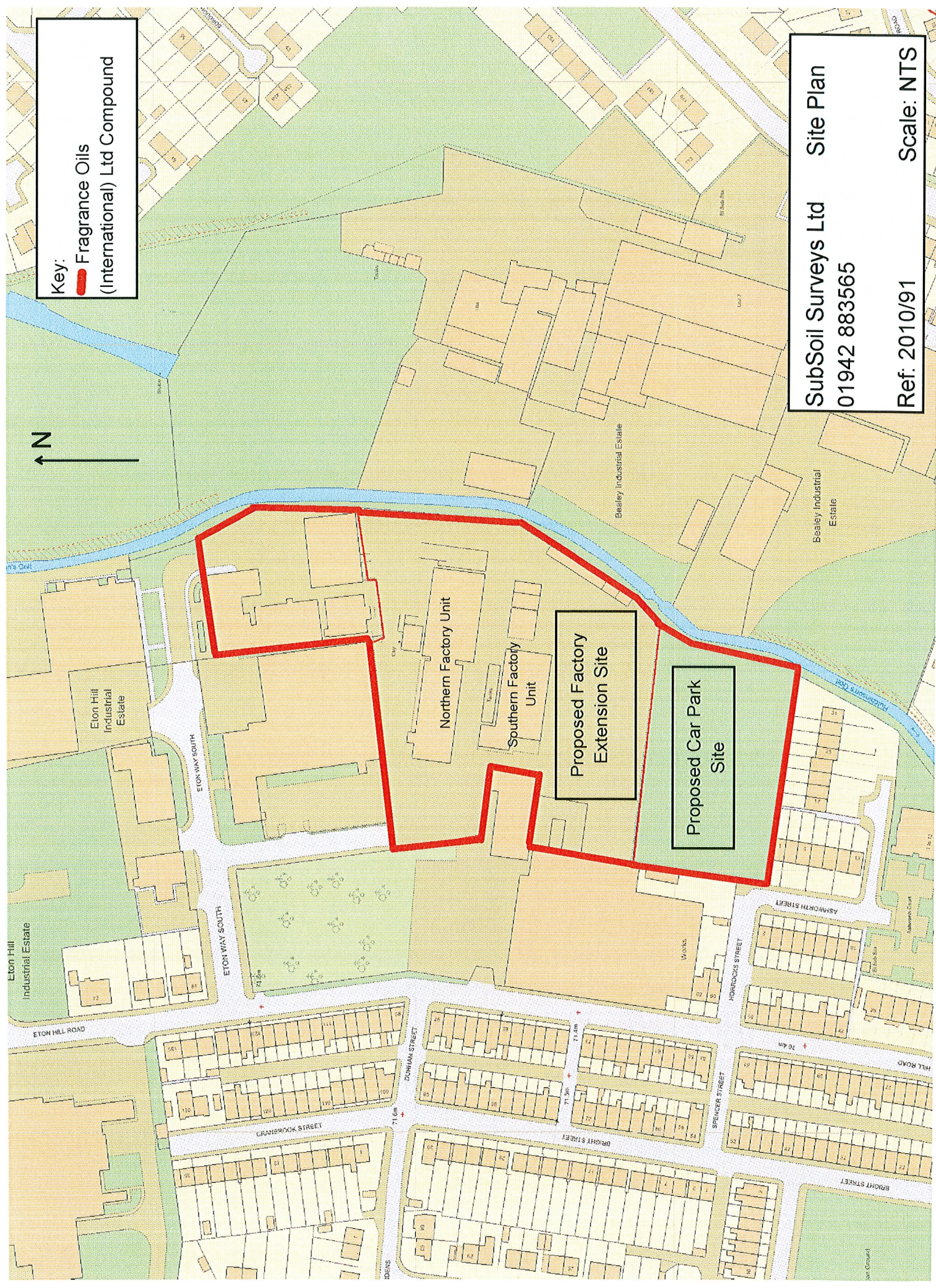
Potential contaminant sources:
Made Ground on site (associated with
old foundations, service trenches,
general levelling and filling, etc.) or
below adjacent land

Potential contaminant pathway:
migration of soils into building (on
clothes, shoes, etc.) blocked by
hardstanding

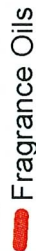


Radcliffe - Conceptual Model

Scale	Ref
SUB SOIL	N.T.S
01942 883565	2010/91



Key:



Fragrance Oils
(International) Ltd Compound

SubSoil Surveys Ltd Site Plan
01942 883565

Ref: 2010/91

Scale: NTS

