

2009/515

Geoenvironmental Report

at Site of

Proposed Playing Field Development

at

Pear Tree Lane, Whinny Lane, Euxton

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Site Plan

# **1 INTRODUCTION AND OBJECT**

- 1.1 This report been prepared at the request of Stuart Whittle (Planning and Design) at the site of a proposed playing field development in Euxton.
- 1.2 The proposed 4.9 ha development lies to the east of Pear Tree Lane, west of Whinny Lane (Whinney Lane on some maps) and about 180 m to the south of Euxton Lane as indicated on the enclosed site plan. The approximate National Grid Reference of the site is SD 562 194.
- 1.3 At the time of the investigation the site was an open area of grass land consisting of two large fields with tree lined boundaries. The trees are of mixed varieties, in particular containing some majestic old oak trees. The land is relatively flat with a slight fall to the southwest, generally with minor undulations (see also below). A pond is present on the boundary between the two fields, just to the west of the site centre, the water level lying perhaps 1.4 - 1.0 m below the adjacent site level, the variation being due to undulations in the site surface level. There was no apparent water inlet or outlet for the water in the pond.

A hollow was present in the southern field, to the southeast of the pond. A further elongated hollow ran along the north eastern part of the northern boundary, this possibly being up to about 2 m below the adjacent ground level. This hollow was not waterlogged at the time of our site inspection although a few clumps of rushes (indicative of 'wet' conditions) were present. Ditches ran along the eastern, western and southern site boundaries. The southern part of the ditch on the eastern boundary received gently flowing water from a culvert below Whinny Lane, this arising from a ditch to the east. The eastern ditch turned to run along the southern site boundary with a slow flow to the west where the water discharged into the ditch along the western site boundary, the flow then turning southerly along the ditch adjacent to Pear Tree Lane. Water was standing in the western ditch approximately opposite the Pear Tree Lane/School Lane junction.

Bare areas remaining from tractor tyre marks and below recently removed silage bales and mole hills suggest that the exposed soil appears to be clayey

in nature. Tractor ruts were present in the entrance to the northern field from Whinny Lane, these holding water.

An overhead power line ran along north/south just inside the western edge of the site, with an offshoot line running easterly along the field boundary separating the two fields of the site. The power line comprised conductors supported on wooden poles.

- 1.4 It is proposed to convert the site from agricultural use to playing fields. At present the layout has not been finalised although a proposed layout is appended. We understand that the site access in the northwest corner of the site has been fixed hence the car park and pavilion will probably remain in the general area shown. Detailed foundation loads for the structures have not been made available at this stage.
- 1.5 The object of the investigation is 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 We have obtained an 'Groundsure Report' for the site which contains old maps of the area. The following details are revealed by these maps :

2.1.1 1849 (Map not included, viewed over internet) : The site is shown to be clear of development, lying in two large open fields, the boundary between them running east/west across the approximate centre of the site. A path is shown to run along the southern site boundary. A pond is shown approximately in the centre of the site. Two further ponds lie adjacent to (and possibly encroaching onto) the site. One lies to the northwest, immediately adjacent to the eastern side of Pear Tree Lane, just northeast of the junction of School Lane and Pear Tree Lane, the other immediately northeast of the site on Whinny Lane. These ponds are present at widened sections of the roads, presumably to accommodate the ponds and allow access to them from the roads. A further pond is located to the east of the site, to the east of Whinny Lane.

2.1.2 1893: The site remains clear of development, as the previous map. The pond immediately adjacent to the eastern site boundary is no longer present. The pond on the centre of the site is shown as a pair of ponds, the easterly pond being shown as a marshy area. A ditch is shown running across the southern edge of the site, this apparently being an extension of a ditch to the east of Whinny Lane, being piped below the Lane.

2.1.3 1928 : The site remains clear of development, as the previous map. The pond on the centre of the site is now shown as two discrete ponds within a depression. A small rectangular area is shown on the eastern edge of the site, adjacent to Whinny Lane although it is not clear as to whether this is a field enclosure or possibly a pond.

2.1.4 1938, 1949 : The site remains clear of development, as the previous map. The ditch running across the southern edge of the site runs from the east from where it 'rises'. The small rectangular area formerly on the eastern part of the site is no longer present.

2.1.5 1962 - present : The site remains clear of development, as the previous map. The pond formerly present immediately to the northwest of the site is no longer present. An arrow on the ditch along the southern site boundary

indicates a westerly flow. The note 'Rises' on the ditch to the west of the site is replaced by the note 'Issues'.

### **3 ENVIRONMENTAL DETAILS**

- 3.1 From the 'Groundsure' report for the site the following details may be seen :
- 3.1.1 There is one LAPPC authorisation 207 m N of the site, for a soil remediation combustion unit. There are two licensed discharge consents for sewage effluent 241m & 439m from the site, apparently from private sewage treatment facilities (possibly 'septic tanks'). A COMAH site is noted to lie 193m north of the site. These sites should present little risk to the proposed development providing that they are operated within currently acceptable operating guidelines.
- 3.1.2 There are two recorded pollution incidents 23 m & 185 m Northeast of the site, the closest relating to sewage materials in a final effluent, the other relating to commercial waste.
- 3.1.3 A historic landfill site is recorded to lie 69 m north of the site, this being registered to the Royal Ordnance Factory, to the north, however there does not appear to be any features on the historic mapping to indicate former tipping in this position. The next nearest waste or landfill site lies at least 400 m from the site.
- 3.1.4 Within 250 m of the site there are only two current 'industrial' sites recorded, the Chorley Business and Technology Centre and a Civil Engineering Contractor. The industries should present little risk of producing contamination which could affect the site providing that they operate within currently acceptable operating guidelines.
- 3.1.5 The site is indicated to lie over a Major Aquifer. The soils below the site are classed as being of Low Leaching potential.
- 3.1.6 The nearest surface water features to the site are the pond on the centre of the site and the ditch which runs along the southern site boundary.
- 3.1.7 The site is not recorded to lie within an area considered to be at risk from flooding from surface water. It is noted, however, to lie within 50 m of an area considered to be at risk of flooding due to rising groundwater.
- 3.1.8 Apart from Nitrate Vulnerable zones there are no designated Environmentally Sensitive Sites within 500 m of the site.
- 3.1.9 The ponds on the site and adjacent backfilled former ponds will probably contain weak and compressible 'pond bottom' material and/or poorly

compacted material, although in the report comment is made that the compressible ground hazard rating for the site is 'negligible'.

3.1.10 The site is recorded to lie within 75 m of an identified mining area. The hazard of subsidence related to shallow mining is assessed as 'Negligible'.

3.1.11 Radon Protection measures are not considered to be necessary.

3.1.12 We discuss the published geology and its' implications in Section 4 below.

3.2 We have no details regarding services that may be present below the site.

## 4 SITE GEOLOGY

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

- i) Firm, stiff and very stiff CLAY with sandy zones, variable gravel content, cobbles & boulders and possibly with zones or lenses of SILT, SAND and GRAVEL - Glacial Deposits
- ii) Reddish brown SANDSTONE - Sherwood Sandstone
- iii) Reddish brown and greyish green MUDSTONE - Manchester Marl
- iv) SANDSTONES and MUDSTONES with occasional COAL seams - Millstone Grit Series

4.2 A patch of Glacial Sand and Gravel is indicated on the geology maps to outcrop at the ground surface below the land to the east of Whinny Lane (to the east of the site). The note 'water issues' on the old OS maps to the east of the site appears to arise from this area although it is not clear from the mapping whether the sand and gravel overlies the clays, or vice versa.

4.3 The solid geology below the site is shown on the geology maps to be conjectured. It appears the site may overlie the unconformity between the newer Permo-Triassic rocks (the Sherwood Sandstone and Manchester Marls) and the considerably older underlying Millstone Grit series of rocks with the Coal Measures (which overlie the Millstone Grits) cropping out at rockhead to the southeast of the site, hence not being present below the site. As the site lies off the known coalfield there should therefore be little risk of major ground surface movements affecting the site due to past coal mining activity.

4.4 The geology maps indicate the site to be crossed by a northwest/southeast trending fault in the bedrock, this being shown on the older maps as conjectured. We are of the opinion that this feature is unlikely to present a risk of major ground surface movements affecting the site.

## 5 CONTAMINATION ASSESSMENT

- 5.1 The Groundsure report and historical maps of the area indicate that the site has remained open fields in agricultural use over the last 160 years although ponds have existed close to (and possibly encroaching onto) the site, these now being backfilled. It is also possible that some landfilling may have taken place to infill local hollows, etc.
- 5.2 The consideration of Asbestos being present on the site lies outside the scope of this investigation.
- 5.3 The following potential sources of geochemical contamination have been identified by this investigation :

Sources of potential Geocontamination	
On Site	Off Site
Pockets of Made Ground associated with the infilling of old ponds, ditches, etc. to provide the agricultural working platform - contamination and leachable contamination, soil gases	Made Ground associated with nearby former filling activities in the formerly adjacent valley feature to form the allotment area - contamination, leachable contaminants
Ground gas formation/migration possibly from the Made Ground deposits beneath the site and organic 'pond bottom' materials which may remain in ponds (or former ponds) on or immediately adjacent to the site.	
Agrochemicals, in particular herbicides, pesticides, etc.	

- 5.4 The Potential Receptors of the various contaminants are :

1	Construction personnel
2	End users of the site
3	Controlled Waters
4	Groundwater
5	Flora and Fauna
6	Building Structure/Services

- 5.5 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 Construction personnel	2 End users of the site	3 Controlled Waters	4 Groundwater	5 Flora and Fauna	6 Building Structure/Services
Made Ground / Soil	Ingestion	L	P	NA	NA	P	NA
	Skin/Direct Contact	L	P	NA	NA	P	P
	Inhalation of Dust	L	P	NA	NA	L	NA
	Services	L	P	P	P	P	P
	Surface Water	L	L	NA	L	L	L
Groundwater	Ingestion	P	U	NA	NA	P	L
	Skin/Direct Contact	P	U	P	NA	L	L
Ground Gas	Migration	P	U	NA	NA	P	L

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

5.6 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	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	End users of site	Likely	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	Lateral Migration	Groundwater /Controlled Water	Medium	Medium	Moderate /Low	Measure Soil Contamination and leaching potential leading to appropriate remediation
Ground Gas - Methane and Carbon Dioxide	Migration leading to build up in structures	Construction personnel End Users	Low	Severe	High	On site Ground Gas Monitoring.
Contaminated Soil	Ingestion of soil and inhalation of dust	Flora/Fauna	Low	Medium	Moderate/ Low	Measure Soil Contamination
Contaminated Groundwater	Ingestion	Flora/Fauna	Low	Mild	Low	No Action needed
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					

- 5.7 The proposed development is the conversion of the site from agricultural use to playing fields with changing pavilion, etc.
- 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/Industrial end use.

Initially the SGV for the Residential end use scenario should be utilised to assess the site although if any minor exceedences are measured, less stringent assessment criteria would be used from a set of exposure criteria which are more relevant to the proposed end use. In particular a 'Residential end use scenario without the consumption of home grown vegetables' should be used. Following this, further modelling of an exposure scenario closer to the actual end use could derive even less stringent assessment criteria although these would require detailed data on the proposed end use (end user age ranges, attendance times on site, etc.) which could be difficult to proscribe for the likely life of the proposed facility.

Where SGV for specific contaminants of concern have not yet been published we propose to utilise the relevant 'Atkins AtRisk' values for the chosen exposure scenario.

The consideration of risk to groundwater and controlled waters should be undertaken in discussion with the Environment Agency and the Local Authority.

- 5.9 We suggest that initially chemical contamination testing for the following should be undertaken : Arsenic, Cadmium, Chromium, Lead, Mercury, Selenium, Copper, Nickel, Zinc, Carbon banded Total Petroleum Hydrocarbons, USEPA16 Poly Aromatic Hydrocarbons, pH and water soluble sulphate. It would also be advisable to undertake testing for Agricultural pesticides/herbicides. Leachate testing using the same test suite should also be undertaken on samples of soil in order to check for soluble contamination. A similar test suite should be utilised on samples of groundwater (should any be found) recovered from the standpipes.
- 5.10 Following physical investigation to collect samples and the undertaking of the above chemical contamination testing, an appraisal of the findings should be made to assess the need (or otherwise) for remediation (with regard to chemical contamination) of the site prior to the development proceeding. If physical remediation is required (for example to raise levels or import material to improve drainage, etc.), materials imported onto the site should be tested/certified to ensure that they have chemical contamination levels below the relevant assessment criteria adopted for the site.

Where remediation (chemical or physical) is required a documented strategy should be established followed by documentation of the remediation work as it proceeds and a validation investigation/report including test results, photographs, etc. being compiled to demonstrate that any necessary remediation work has been satisfactorily undertaken.

- 5.11 Although the site does not lie within 250 m of a known landfill, old ponds lie on and close to the site and organic deposits within these could lead to the generation of 'landfill gases'. As the site development is to include the construction of a pavilion it would be advisable to install ground gas wells in the area of the structure and undertaken monitoring for 'landfill gases' in order that appropriate ground gas exclusion measures can be installed into the proposed structure.

## **6**    **COMMENTS**

6.1    This geoenvironmental study has revealed the following :

6.1.1    The Groundsure report and historical maps of the area indicate that the site has remained open fields in agricultural use over the last 160 years although ponds have existed close to (and possibly encroaching onto) the site, these now being backfilled. It is also possible that some landfilling may have taken place to infill local hollows, etc. although some hollows remain.

6.1.2    The site appears to be underlain by a clayey topsoil and a pond is present on the central area of the site. A hollow on the northern boundary contains clumps of rushes indicating 'wet' ground conditions. Drainage ditches run around the east/west and southern site boundaries, the one along the southern boundary carrying westerly flowing water, albeit at a relatively low flow rate. An overhead electricity supply line runs close to the western site boundary and along the northern edge of the site.

6.2    Intrusive investigations to assess the soils below the site with regard to contamination levels which may present risks to end users, etc. and geotechnical properties to assess appropriate foundation design/installation for the pavilion and the construction of the proposed pitches should be undertaken as part of the planning process for the development. In particular the data gathered will assist in the assessment of drainage requirements for the proposed scheme, given the apparently clayey nature of the soils below the site. The intrusive investigation should also include the installation of ground gas wells with monitoring.

We suggest that a series of 20 shallow boreholes (perhaps 3 m deep) are sunk across the site to collect soil samples for both contamination (one per borehole) and geotechnical testing. Three of these positions in the area of the proposed pavilion should have gas well installations with monitoring for groundwater levels and ground gas concentrations being undertaken (6 visits over 12 weeks). One sample of soil per borehole should be tested for the general contamination suite indicated in section 5 with ten samples also being checked for pesticide/herbicide compounds.

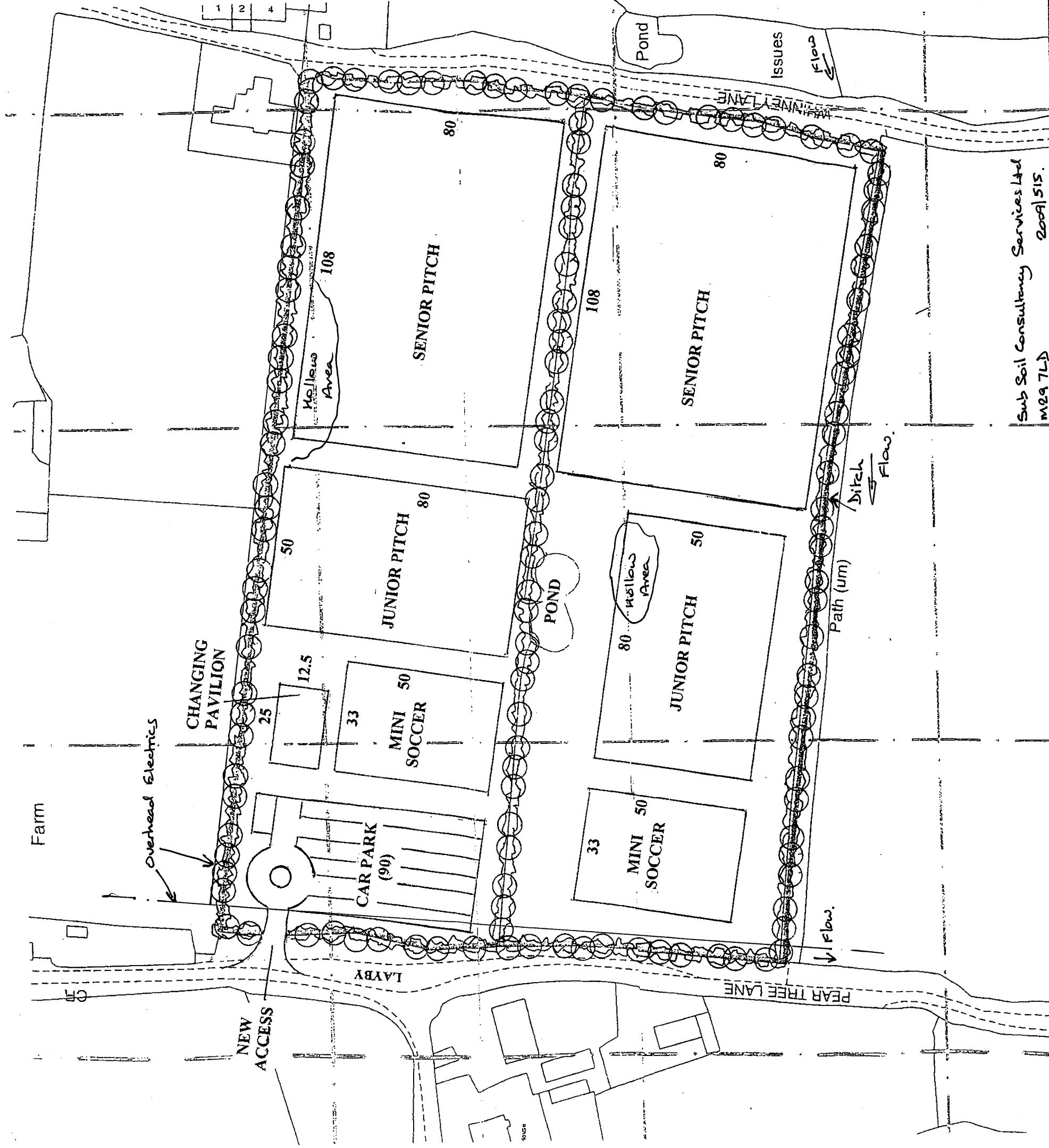
If relatively high levels of the compounds tested for are identified it would then be advisable to undertake leachate testing in order to assess the risks to controlled waters of contamination from the site entering the water environment.

All of this information should then be assessed in order to provide design parameters for the proposed development.

- 6.3 The electricity line on the western part of the site may need to be diverted or raised to allow the safe passage of tall vehicles onto the site via the proposed access.
- 6.4 The proposed access lies close to the area of an old pond and the ditch close this locality was seen to be holding water at the time of our site inspection. It would be advisable to locate an investigation point close to the proposed access to check on the ground conditions in particular as weak 'pond bottom' and 'pond infill' material could be present requiring removal to allow the access crossing to be constructed.
- 6.5 Consideration should be given to land drainage, as noted above. It would be advisable to discuss the outfall of any drainage with the Environment Agency at an early stage if drainage is required (depending on the proved soil conditions) as there may be constraints on the capacity of the ditch system in the area.

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**PROPOSED PLAYING FIELDS,  
CHANGING PAVILION & CAR PARK,**

**SYLVESTER'S FARM, PEAR TREE LANE,  
EUXTON**

SCALE 1:1250    ↑    N    AREA: 4.9 HA