TONY MORRIS BUILDERS

ST MARY'S COURT
BARWELL LE9 8AY

REPORT ON PRELIMINARY INVESTIGATION

Contract: 20970

Date: October 2012

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REPORT ON PRELIMINARY INVESTIGATION

carried out at

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Prepared for

TONY MORRIS BUILDERS
c/o Hayward Architects
19 Station Road
Hinckley
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LE10 1AW

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EXECUTIVE SUMMARY

On the instructions of Hayward Architects, on behalf of Tony Morris Builders, a Preliminary Investigation in the form of a desk study and site reconnaissance has been carried out in order to assess the potential hazards on and adjacent to the site and prepare a risk assessment for further consideration.

The site is situated at Barwell, approximately 9km to the north east of the town centre of Nuneaton and may be located by Grid Reference SP 442 964.

The geological map indicates the site to be underlain by superficial deposits of Wolston Sand and Gravel. Wolston Clay is indicated to underlie the sites southeastern corner. The superficial deposits are underlain by Mercia Mudstone. Although not indicated as present on the site from the geological maps, there is the possibility that Made Ground may exist on the site.

At the time of a walkover survey, conducted on the 9th October 2012, the site comprised a vacant overgrown parcel of land adjacent to a new small housing development, St Mary's Mews.

The desk based research and historical review identified the following potential hazards which may affect the site:

- Contamination associated with possible Made Ground
- Potential gas associated with historical landfills situated 5m and 15m northeast of the site
- Previous use as site compound for vehicle parking

This study has identified evidence of potential ground contamination on the site, with plausible pathways to possible receptors, and therefore potential pollutant linkages have been established. As such, it is recommended that an intrusive investigation be carried out to identify the presence, nature and extent of any contamination in the ground. A geotechnical assessment incorporating foundation solutions could also be undertaken at this time.

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1.0 INTRODUCTION

1.1 General

1.1.1 On the instructions of Hayward Architects on behalf of Tony Morris Builders, a Preliminary Investigation in the form of a desk study and site reconnaissance has been carried out in order to assess the potential hazards on and adjacent to the site and prepare a risk assessment for further consideration.

1.1.2 It is understood that it is proposed to develop the site for new residential housing with associated gardens, car parking and storm water drainage infrastructure.

1.1.3 This report has been prepared for the sole use of the Client for the purpose described and no extended duty of care to any third party is implied or offered. Third parties using any information contained within this report do so at their own risk.

1.1.4 It is recommended that a copy of this report be submitted to the relevant authorities to enable them to carry out their own site assessment and provide any comments.

1.1.5 The comments given in this report and the opinions expressed herein are based on the information obtained from the desk study and site reconnaissance. No intrusive investigation has been carried out to confirm the actual ground or environmental conditions.

1.1.6 Any risks identified in this report are perceived risks based on information reviewed. Actual risks can only be assessed following a physical investigation of the site.

1.1.7 This report has been based, in part, on information supplied by others. The report has been prepared on the basis of that information being accurate.

1.1.8 The conclusions presented in this report are based on the guidance available at the time of preparation of the report. No liability can be accepted for the retrospective effects of any changes or amendments to legislation or guidance.

1.1.9 This Preliminary Investigation has been conducted in general accordance with CLR 3, ref. 8.1, CLR 11, ref 8.2, BS 10175, ref 8.3, and GPLC 1, ref 8.4.

2.0 SITE

2.1 Site Location

2.1.1 The site is situated at Barwell, approximately 9km to the north east of the town centre of Nuneaton and may be located by Grid Reference SP 442 964. A site location plan and aerial photograph are included in Appendix 1, Figures A1.1 and A1.2.

2.2 Site Walkover and Description

2.2.1 A walkover survey of the site was conducted on the 9th October 2012. The walkover was carried out in general accordance with CLR 2, ref. 8.5.

2.2.2 The site is a small parcel of land adjacent to a new residential development, St Mary's Mews, running off St Mary's Court. The site is roughly rectangular in shape with the north western corner cut away and is approximately 0.08ha in size.

2.2.3 At the time of the walkover survey, the site was open overgrown land not currently in use. The only evidence of any use was scaffolding equipment stored in the north eastern corner.

2.2.4 The site was generally flat, with a gentle slope down towards the south east, similar to that of the surrounding topography.

2.2.5 There were no springs, ponds or watercourses on the site. A large pond is located approximately 70m to the east and between the site and pond, the ground appears to be waterlogged; however, with no access it is difficult to be certain of ground conditions.

2.2.6 The site was heavily vegetated with a mixture of mature trees, predominantly around the periphery, with younger trees, bramble and general scrub towards the centre of the site. Given the locations of the trees and the proposed structures, it is possible they may be impacted by the trees.

2.2.7 There was no previous development evident on site other than immediately to St Mary's Mews where an inspection cover is located 2m from the access road. Utilities have been laid to serve St Mary's Mews; however these appear to run under the access road and not the site.

2.2.8 There were no sources of contamination identified on or in the immediate vicinity of the site. Moat Way Industrial Estate is located approximately 100m to the west of the site; however, there were no activities identified which are likely to significantly impact the site.

2.2.9 The site is at an approximate altitude of 115mAOD.

2.2.10 Photographs from the walkover survey are included within Appendix 2, Figures A2.1 to A2.3. A proposed development layout plan is included in Appendix 1, Figure A1.3.

2.3 Historical Maps

2.3.1 A review of the history of the site has been conducted based on readily available historical maps. Details of the findings are provided in the table below. All maps are provided in Appendix 4.

Map, Date and Scale	Site Description	Regional Setting
Leicestershire 1886-1887 1:10 560	The site comprises part of an agricultural field.	The village of Barwell is located 200m to the north of the site. The surrounding area comprises predominantly agricultural land.
Warwickshire 1887 1:10560	The plan is largely incomplete and has therefore been discounted from the assessment.	The plan is largely incomplete and has therefore been discounted from the assessment.
Leicestershire 1888 1:2500	There are no observable changes to the site since the previously published map.	St Mary's Church, Rectory and Grave yard are located 60m to the northeast of the site. The village of Barwell has undergone residential development to the north of the site.
Leicestershire 1903 1:2500	There are no observable changes to the site since the previously published map.	Minor sporadic residential development has taken place in and around the village of Barwell.
Leicestershire 1904 1:10 560	There are no observable changes to the site since the previously published map.	The larger scale map shows the extent of the agricultural land surrounding the site. Infill development continues to take place in the village of Barwell.
Leicestershire 1919-1931 1:10 560	There are no observable changes to the site since the previously published map.	Significant residential development has taken place 500m to the northeast of the site. A pit, assumed to be for the extraction of either clay or gravel is shown 200m to the east of the site.
Leicestershire 1929 1:2500	The southwestern corner of the site is indicated to be comprised of part of an orchard.	A moat is located 60m to the southeast of the site. Allotment gardens are located 120m to the west of the site. Two structures have been built 140m to the northeast of the site.
Leicestershire 1938 1:10 560	There are no observable changes to the site since the previously published map.	Sporadic development continues to take place in and around the village of Barwell.
Historical Aerial Photography 1950 1:10560	There are no observable changes to the site since the previously published map.	There are no observable changes to the surrounding area since the previously published map.
Ordnance Survey Plan 1955 1:10000	There are no observable changes to the site since the previously published map.	Significant development, both residential and commercial, has taken place between 500-1000m to the northeast of the site.
Ordnance Survey Plan 1964 1:2500	The site is no longer partially occupied by an orchard.	A building has been constructed 8m to the west of the site and a pond is now located 35m to the southeast of the site, with Ivens Farm some 15m beyond. Several factories and depots have been constructed 140m to the northwest.

Map, Date and Scale	Site Description	Regional Setting
Ordnance Survey Plan 1967-1968 1:10000	There are no observable changes to the site since the previously published map.	The larger scale map shows the extent of development which has taken place in the surrounding area. Significant development having occurred to the northeast and southwest.
Ordnance Survey Plan 1972-1989 1:10000	There are no observable changes to the site since the previously published map.	Significant residential development has taken place 150m to the southwest of the site along the newly constructed Wensleydale Avenue, Wensleydale Close, Waterfall Way and Waters End. Garages are shown to be present 180m to the southwest and 230m to the north of the site. An electricity substation is located 175m to the southwest. A benchmark located 90m to the west indicates a level of 113.6m.
Supply of Unpublished Survey Information 1975 1:2500	The plan is largely incomplete and has therefore been discounted from the assessment.	The plan is largely incomplete and has therefore been discounted from the assessment.
Additional SIMs 1978-1979 1:2500	A pond is indicated to lie within the sites southeastern corner however. This is believed to be an overlay issue and may be disregarded.	Residential development has taken place immediately to the north of the site. Further residential development has taken place 140m to the northeast of the site and 250m to the northwest.
Ordnance Survey Plan 1980 1:2500	There are no observable changes to the site since the previously published map.	The residential development immediately to the north of the site is shown as St Mary's Court.
Ordnance Survey Plan 1980 1:10000	There are no observable changes to the site since the previously published map.	The larger scale map shows the extent of development which has taken place in the surrounding area. Significant development continues to take place to the northeast and southwest.
Additional SIMs 1987 1:2500	There are no observable changes to the site since the previously published map.	Infill development continues to take place in the surrounding area. An Industrial Estate has been constructed 230m to the northwest of the site.
Large Scale National Grid Data 1993 1:2500	There are no observable changes to the site since the previously published map.	Infill development continues to take place in the surrounding area.
Large Scale National Grid Data 1995, 1996 and 1994 - 1997 1:2500	There are no observable changes to the site since the previously published map.	Infill development continues to take place in the surrounding area.

Map, Date and Scale	Site Description	Regional Setting
10k Raster Mapping 2006 1:10000	There are no observable changes to the site since the previously published map.	The larger scale map shows the extent of development which has taken place in the surrounding area. Significant development continues to take place to the northeast and southwest.
10k Raster Mapping 2012 1:10000	The most recently published map appears to be substantially accurate in comparison to the current setting.	Residential housing has been constructed immediately to the northwest of the site. The most recently published map appears to be substantially accurate in comparison to the current setting.

2.4 Summary

2.4.1 The site was shown to compromise part of an agricultural field on the first available map dated 1886-1887 map. The site remained in this use until the 1929 map which showed the site to be partially occupied by an Orchard. The site was shown to be vacant ground on the 1964 map. It has remained in this use until the most recently published map.

2.4.2 The surrounding area has undergone significant development with the site having been surrounded by agricultural land in all directions on the 1886-1887 map, and shown on the 2012 map to be bordered by agricultural land only to the southeast.

2.5 Anecdotal Evidence

2.5.1 It was observed from aerial photography available on the internet that during the construction of the adjacent housing development, the site was utilised as a compound for the storage of vehicles and materials.

2.5.2 Since this time and the site walkover, the compound had been removed and the site become heavily vegetated.

3.0 SITE SETTING

3.1 Geological Setting

3.1.1 Details of the geology underlying the site have been obtained from the relevant geological map of the area, ref. 8.6.

3.1.2 The geological map indicates the site to be underlain by superficial deposits of Wolston Sand and Gravel, described as 'sand and gravel, locally with lenses of silt, clay or peat'. Wolston Clay is indicated to underlie the sites southeastern corner, described as 'grey glacial clay and silt'.

3.1.3 The superficial deposits are underlain by Mercia Mudstone, described as 'red, less commonly green-grey, mudstones and subordinate siltstones with thick halite-bearing units. Thin beds of gypsum, anhydrite and sandstones are also present'.

3.1.4 Although not indicated as present on the site from the geological maps, there is the possibility that Made Ground may exist on the site. It is possible that the shallow subsurface strata may be formed from Made Ground associated with the site's use as a compound for the adjacent development.

3.2 Hydrogeological Setting

3.2.1 The hydrogeological records, provided by the Environment Agency, indicate that the site is situated on a Secondary A Aquifer, relating to the variably permeable Wolston Sand and Gravel and an unproductive strata relating to the negligibly permeable Wolston Clay in the southeastern corner of the site. The superficial deposits are underlain by a Secondary B Aquifer, relating to the variably permeable Mercia Mudstone.

3.2.2 The Environment Agency defines Secondary A aquifers as 'permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers'.

3.2.3 The Environment Agency defines Secondary B aquifers as 'predominantly lower permeability layers which may store and yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering'.

3.2.4 The Environment Agency defines unproductive strata as 'rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow'. However, groundwater flow through such rocks, although imperceptible, does take place and will need to be considered in assessing the risk associated with persistent pollutants.

3.2.5 The site is classified as being within an urban setting as designated by the Environment Agency, which therefore means that the soils are classified as having a high leaching potential.

3.2.6 Soils of high leaching potential are soils that readily transmit liquid discharges because they are either shallow or susceptible to rapid by-pass flow directly to rock, gravel or groundwater.

3.2.7 The site is not located within a groundwater source protection zone and there are no groundwater abstraction wells within 500m of the site.

3.3 Hydrological Setting

3.3.1 The nearest surface watercourse is the Tweed River, located approximately 350m to the west of the site at its closest point.

3.3.2 There is a pond located 70m to the east of the site, with the surface water is at approximately 5m below the level of the site.

3.3.3 The site is not situated within an area defined by the Environment Agency as being at risk of flooding from rivers or the sea at the extent of extreme flood

3.3.4 There is no available river quality classification data for the nearest watercourse.

3.3.5 There are no surface water abstractions within 500m of the site.

3.4 Radon

3.4.1 The British Geological Survey, in conjunction with the Radiation Protection Division of the Health Protection Agency, ref. 8.7, indicates the site to lie within an area where there is a probability of <1% of present or future homes being above the action level of 200Bq/m^3. As such, the site is not classified as a Radon Affected Area.

3.4.2 As such, no radon protective measures are deemed necessary for the proposed development. This is confirmed by the Building Research Establishment, Report

3.5 Soil Geochemistry

3.5.1 The British Geological Survey data indicates the following concentrations of naturally occurring metals to be representative of background levels in natural soil underlying the site. The levels are based on those present in rural soils and are not necessarily representative of levels within Made Ground which may be encountered on site:

Element	Concentration (mg/kg)
Arsenic	<15
Cadmium	<1.8
Chromium	40-60
Lead	<150
Nickel	<15

4.0 ASSESSMENT OF GEOTECHNICAL RISK

4.1 Geological Constraints

4.1.1 The following are brief findings relating to factors identified during the research from the Envirocheck data that may have a potential impact upon the engineering of the proposed development.

Potential Hazard	Assessed Risk	Comment
BGS Recorded Mineral Sites	None	
Brine Compensation Area	None	
Coal Mining / Mining Instability	None	
Other shallow mine workings	None	
Quarrying	Very low	A former clay or gravel pit is located 200m to the east of the site. However, no evidence from historical records to suggest this site has been subject to quarrying.
Man-Made or Natural Cavities	None	
Collapsible Ground	Very low	
Compressible Ground	None	
Ground Dissolution	None	
Landslide	Very low	The site is generally flat and level
Running Sand	None to very low	Likelihood will relate to grading of sand strata below the water table.
Shrinking or Swelling Clay	None to moderate	Wolston Clay can be of high plasticity. Wolston Sand and Gravel likely to be non-plastic.
Unconsolidated Made Ground	Low	There is potential for the presence of Made Ground on the site, although anticipated to be minor in thickness.
Aggressive conditions for construction materials	Very low to moderate	Wolston Sand and Gravel and Clay not known to contain potentially high concentrations of sulphates and sulphides. However Mercia Mudstone and any Made Ground may contain high levels of sulphates and/or sulphides.

4.2 Geotechnical Risk Assessment

4.2.1 An assessment of the main hazards associated with the site is detailed below. Unless stated otherwise, the presence of such hazards are based on information from the research or reconnaissance and have not been confirmed by an intrusive investigation.

- Soil Conditions

Should the Wolston Clay be encountered, then it may be of high plasticity, which could result in it being prone to high volume change.

The risk of concrete attack to the proposed structures founded in the Wolston Sand and Gravel or Clay is considered to be low. However, should Made Ground be encountered then significant quantities of sulphates that may cause concrete attack are a potential risk. Likewise, if the Mercia Mudstone is encountered at relatively shallow depths with significant quantities of gypsum present, then again the risk is heightened.

The presence of a significant thickness of Wolston Sand and Gravel, particularly if they are water bearing, may cause instability in excavations for foundations or services trenches.

- Topography

  The Envirocheck data provided indicates only a very low risk of landslip subsidence.

- Previous Use

  Historical mapping does not indicate previous development on the site. Therefore, the presence of buried structures such as services, basements and old foundations is unlikely.

4.3 Conclusions of Geotechnical Risk Assessment

4.3.1 The research has identified evidence of potential hazards associated with underlying ground conditions, either natural or man-made, and therefore it is recommended that further work be carried out to confirm the presence, nature or extent of those hazards anticipated to impact on the site.

5.0 ENVIRONMENTAL SEARCHES

5.1 Potential Sources of Contamination

5.1.1 A search was made of records held by the various regulatory authorities and other statutory bodies to determine the presence or otherwise of past and current activities on or within 500m of the site which have the potential to give rise to the presence on site of contaminants. The findings are given in the table below:

Activity	On Site	Off Site (distance / direction)	Detail
Contaminated Land Register Entries	None	None within 500m	
Discharge Consents	None	Three at up to 500m	Closest at 387m west, of storm sewage overflow discharge to a freshwater stream/river. Remainder also for storm sewage overflow discharge
Integrated and Local Authority Pollution Prevention and Controls	None	None within 500m	
Pollution Incidents to Controlled Waters	None	One between 0-250m, three between 251-500m	Closest at 11m southeast, listed as a Category 3 – Minor Incident, listed as the release of a miscellaneous pollutant to the River Sence.
Prosecutions Relating to Authorised Processes or Controlled Waters	None	None within 500m	
Registered Radioactive Substances	None	None within 500m	
Substantiated Pollution Incident Register	None	None within 500m	
Water Abstractions	None	None within 500m	
BGS Recorded Landfill Sites	None	None within 500m	
Historical Landfill Sites	None	One between 0-250m	Closest at 5m northeast, the type and nature of the material received is unknown.
Licensed Waste Management Facilities	None	None within 500m	
Local Authority Recorded Landfill Sites	None	Two between 0-250m	Closest located 15m northeast, the type of wastes received are listed as unknown.
Registered Landfill Sites	None	None within 500m	
Registered Waste Transfer Sites	None	None within 500m	
Registered Waste Treatment or Disposal Sites	None	None within 500m	
Hazardous Substances	None	None within 500m	

Activity	On Site	Off Site (distance / direction)	Detail
Explosive Sites	None	None within 500m	
Contemporary Trade Entries	None	Fourteen between 0-250m, fifty two between 251-500m	Closest at 168m west is a car body repairers; remainder relate to a wide range of commercial and retail activities commonplace in an urban setting,
Fuel Station Entries	None	One between 0-250m	Closest at 209m west is listed as being obsolete.

5.2 Green Belt Areas

5.2.1 There are no designated areas or as yet un-adopted areas of Green Belt land within 1km of the site.

5.3 Designated Sites

5.3.1 A review of the Natural England website, ref 8.9, was undertaken to assess whether there were any Sites of Special Scientific Interest (SSSI), National Nature Reserves (NNR) or Local Nature Reserves (LNR) which may be impacted by the development.

5.3.2 The enquiries indicated there are no SSSIs, NNRs or LNRs within 1km of the site.

5.4 Nitrate Vulnerable Zone

5.4.1 The site is located within an area designated as a nitrate vulnerable zone.

5.4.2 The Nitrates Directive defines a nitrate vulnerable zone as:

a) Surface freshwater which contains or could contain, if preventative action is not taken, nitrate concentrations greater than 50mg/l.

b) Groundwater which contains or could contain, if preventative action is not taken, nitrate concentrations greater than 50mg/l.

c) Natural freshwater lakes or other freshwater bodies, estuaries, coastal waters and marine waters, which are eutrophic or may become so in the near future if protective action is not taken.

5.5 Contemporary Trade Entries

5.5.1 There are sixty six contemporary trade entries located within 500m of the site.

5.5.2 Most of the businesses in the area of the site appear to be located to the north, northwest and west of the site, on Goose Lane, Mill Street, Moat Way and High Street and consisted of a wide range of enterprises commonplace in an urban setting.

6.0 ASSESSMENT OF GEOENVIRONMENTAL RISK

6.1 General

6.1.1 The definition of 'contaminated land', along with the relevant details on legislation and guidance is set out in Appendix 3.

6.1.2 The assessment of potential risk has been based on the guidelines given in CIRIA report C552, ref 8.10. These guidelines are summarised in Appendix 3.

6.1.3 The assessment of environmental risk is aimed at identifying the possible risk, if any, arising from substances used or deposited on the site, or from any other sources of land contamination, based on the principles of the pollutant linkage.

6.1.4 The assessment is based on the proposed development end use, taking account of present and previous use. It is based only on a review of historical maps, desk based data and site reconnaissance; therefore it contains some elements of conjecture based on professional judgement. A comprehensive risk assessment can only be made following an intrusive investigation and testing regime.

6.1.5 It is understood that it is proposed to develop the site for new residential housing with associated gardens, car parking and storm water drainage infrastructure.

6.2 Potential Sources of Contamination Identified

6.2.1 The research has identified the following potential sources of contamination which may form part of a pollutant linkage:

- Contamination associated with possible Made Ground
- Potential gas associated with historical landfills situated 5m and 15m northeast of the site
- Previous use as site compound for vehicle parking

6.3 Potential Pathways Identified

6.3.1 The research has identified a number of potential pathways which are relevant to the potential sources of contamination identified above and may form part of a pollutant linkage.

6.3.2 Those identified are detailed within the Conceptual Site Model, along with the receptors relevant to the development on a site specific basis.

6.4 Hazard Identification

6.4.1 The research has identified a number of potential sources and pathways which are considered 'likely' to be present which, taking into account the potential receptors identified, form potential pollutant linkages and have been used in the formulation of the Conceptual Site Model.

6.5 Hazard Assessment

6.5.1 An assessment of the main sources of contamination and the potential for unacceptable risk to receptors is detailed below. Unless stated otherwise, it is considered 'likely' that a potential source is present at this stage, in order to provide a preliminary estimation of the risk and therefore determine the need for further work.

- Human Health

  Contamination associated with possible Made Ground is anticipated to be present on site. The main receptor is anticipated to be site end-users and there is considered to be a moderate risk.

  There is the potential for the migration of explosive gases from the nearby historical landfills. Taking into account the underlying geology and distance from the site, there is likely to be a valid pathway, although the sizes shown on the maps would indicate these to be small pockets of infill, since there are no obvious infill features on the historical maps. There is considered to be a low to moderate risk to receptors.

- Construction Material

  The risk of concrete attack to the proposed structures due to sulphates is outlined in Section 4.2.

- Controlled Waters

  The site is located on a Secondary A Aquifer, relating to the variably permeable Wolston Sand and Gravel and an unproductive strata relating to the negligibly permeable Wolston Clay in the southeastern corner of the site. The superficial deposits are underlain by a Secondary B Aquifer, relating to the variably permeable Mercia Mudstone.

  The Envirocheck vulnerability map indicates the soil to be of high leaching potential. The nearest surface watercourse is the Tweed River, located approximately 350m to the west of the site at its closest point.

  The site is not located within a groundwater source protection zone and there are no surface or groundwater abstractions wells within 500m of the site. Therefore, any consequence of contamination to the water environment is considered to be mild, and therefore a low risk level has been assigned.

6.6 Conceptual Site Model

6.6.1 The research has therefore identified the following pollutant linkages that require further consideration and have been used to formulate the Conceptual Site Model.

Potential Contamination Sources	Potential Contaminants of Concern	Potential Pathways	Receptor Group
Possible contamination associated with possible Made Ground and vehicle parking	Inorganic Compounds •Metals •Cyanide Organic Compounds •TPH •PAH Others •pH •Sulphate •Asbestos	• Soil ingestion • Vegetable uptake • Dermal contact • Inhalation of contaminated dust • Vapour inhalation	Human Health • Site occupants • Site users • Construction workers • Maintenance workers • Neighbouring site users/general public
		• Plant uptake and accumulation of contaminants	Ecology • Landscaped areas
		• Infiltration	Controlled Waters • Groundwater
		• Direct contact of contaminants with building materials	Building Materials or Services • Concrete • Plastic pipes and services • Structural iron & steel work
Nearby Landfill	•Carbon dioxide •Methane •Carbon monoxide •Hydrogen sulphide	• Inhalation • Explosion	• Human Health • Property

6.7 Conclusions of Geoenvironmental Risk Assessment

6.7.1 The research has identified evidence of potential sources of contamination on or which may impact on the site, with plausible pathways to the likely receptors, and therefore potential pollutant linkages have been suggested.

6.7.2 It is recommended that further work be carried out to confirm the presence, nature or extent of any contamination which is anticipated to impact on the site.

6.8 Consultation

6.8.1 During development, consultation may be required for a number of reasons with a number of regulatory Authorities. The following provides an indication as to the most likely Authorities with which consultation may be required:

- **Local Authority.** There may be a planning condition regarding contamination and consultation will be required with a designated Contaminated Land Officer within the Environmental Health Department. The Local Authority is generally concerned with human health risks.

- **Environment Agency.** Where a site is within a groundwater protection zone or has been designated as a special site, the Environment Agency is likely to be involved to ensure that controlled waters are protected.

- **National House Building Council, NHBC.** Section 4.1 of the NHBC Standards, ref 8.11, requires land management to be addressed. For a new housing development to be approved by the NHBC, any contamination will require remediation accompanied by a validation report.

6.8.2 Based on the results of any consultation, there may be specific investigation and/or remediation requirements imposed by one or more of the Authorities.

7.0 RECOMMENDATIONS

7.1 Further Work

7.1.1 An intrusive investigation should be undertaken to address the issues raised in Chapter 4.0 and Chapter 6.0.

7.1.2 The following scope of works is suggested in order to collect the required data:

- The sinking of exploratory holes for the recovery of samples for geotechnical and chemical contamination analysis.

- The installation and monitoring of gas and groundwater monitoring standpipes may be required, depending on ground conditions encountered.

7.2 Other Considerations

7.2.1 There are several other areas of research which are beyond the scope of this report. All or none of the following may be applicable to the site, either on the outcome of consultation with a regulatory body or as a result of the research for this Preliminary Investigation. They include:

- **Archaeology.** Should the site be situated on or within an area of archaeological sensitivity, the advisor to the relevant local authority should be consulted. The requirement for an archaeological report may be identified within a planning condition, if appropriate, for the site.

- **Ecology.** There may be a requirement for a detailed ecological report, dependant on the type or size of the development, or due to evidence identified during the site reconnaissance or desk study. This requirement may be identified within a planning condition, or recommended within Section 7.0.

- **Unexploded Ordnance (UXO).** There may be a requirement for a UXO report, dependant on the site location, historical use and surrounding site history, as well as the type or size of the development. This requirement may be identified within a planning condition.

8.0 REFERENCES

8.1 CLR 3, '*Documentary research on industrial sites*', Report by RPS Consultants Ltd, DoE, 1994

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8.3 BS 10175: 2011 '*Investigation of potentially contaminated sites. Code of practice*', British Standards Institute, 2011

8.4 GPLC1, *'Guiding principles for land contamination'*, Environment Agency, 2010

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8.6 British Geological Survey, Sheet No. 169, 'Coventry', solid and drift edition, 1:50,000 scale, published 1994.

8.7 HPA-RPD-033, '*Indicative Atlas of Radon in England and Wales*', Health Protection Agency, 2007

8.8 BR211, '*Radon: Protective measures for new dwellings*'. BRE, 2007

8.9 Natural England, 'Nature on the Map', available from http://www.natureonthemap.org.uk/

8.10 C552, '*Contaminated Land Risk Assessment, A Guide to Good Practice*', CIRIA, 2001

8.11 Standards, *'Land Quality – Managing Ground Conditions'*, Chapter 4, NHBC, 2010

8.12 The Environmental Protection Act, Part IIA, Section 78, 1990

8.13 Environment Act 1995, Section 57, DoE, 1995

8.14 Water Environment and Water Services (Scotland) Act, 2003

8.15 Planning Policy Statement 23: Planning and Pollution Control, ODPM, 2004

8.16 Science Report SC050021/SR2, '*Human health toxicological assessment of contaminants in soil*'. Environment Agency, 2009

8.17 Science Report SC050021/SR3, '*Updated technical background to the CLEA model*'. Environment Agency, 2009

For and on behalf of Ian Farmer Associates (1998) Limited



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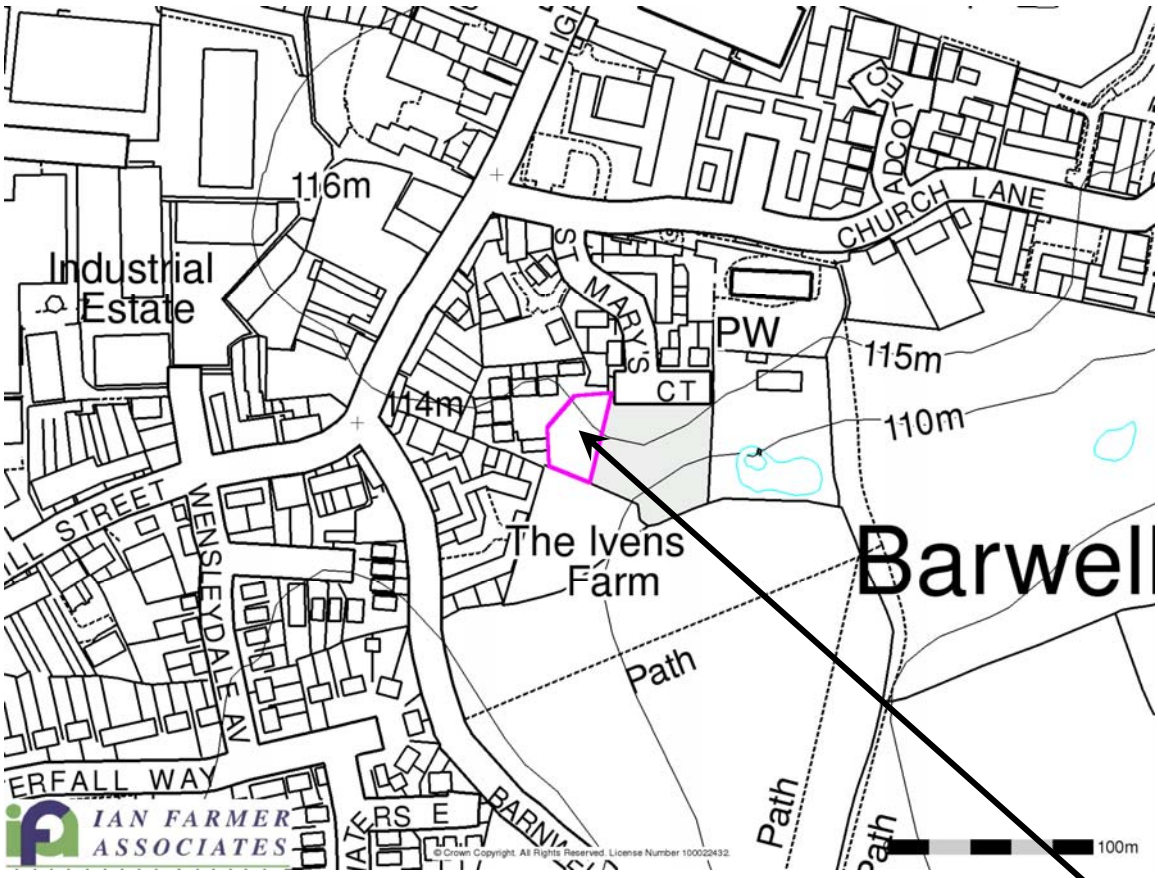


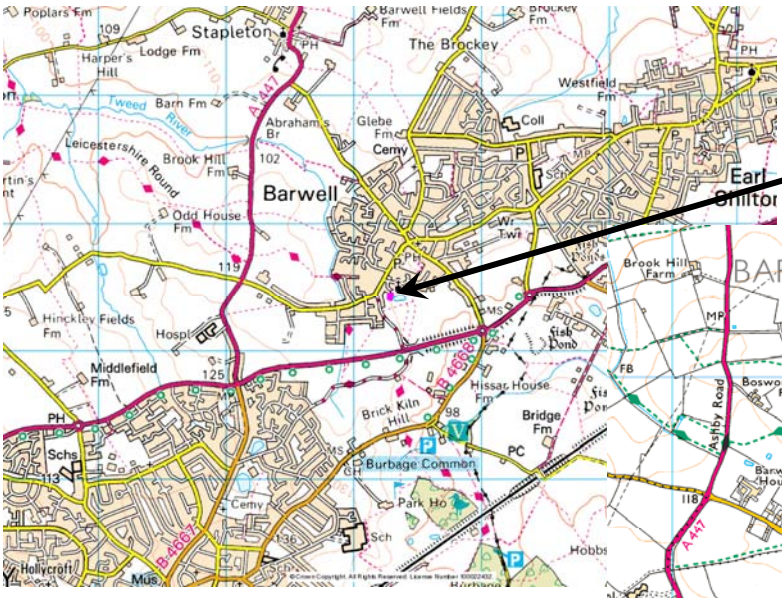
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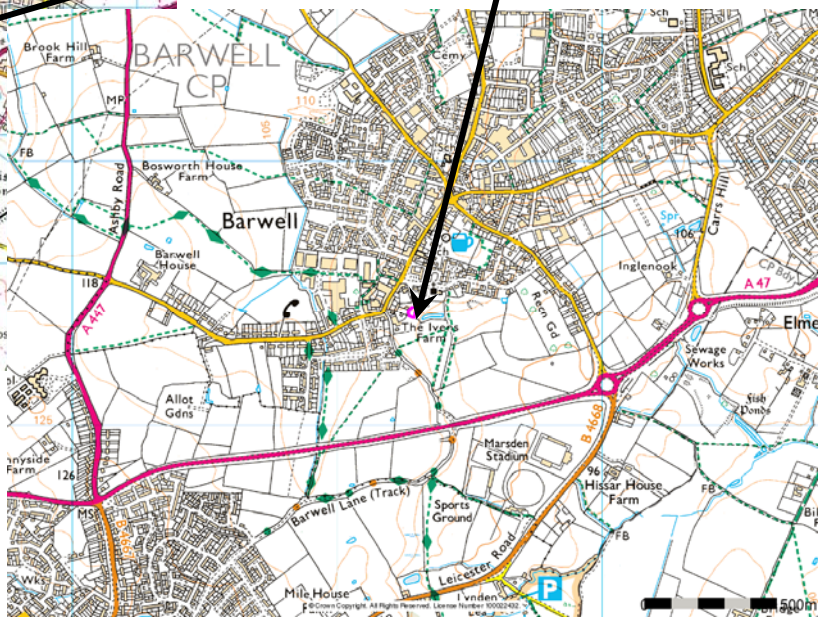
APPENDIX 1

DRAWINGS

20970
St Mary's Court, Barwell







Site Location Plan

Scale: NTS

Figure A1.1

20970
St Mary's Court, Barwell

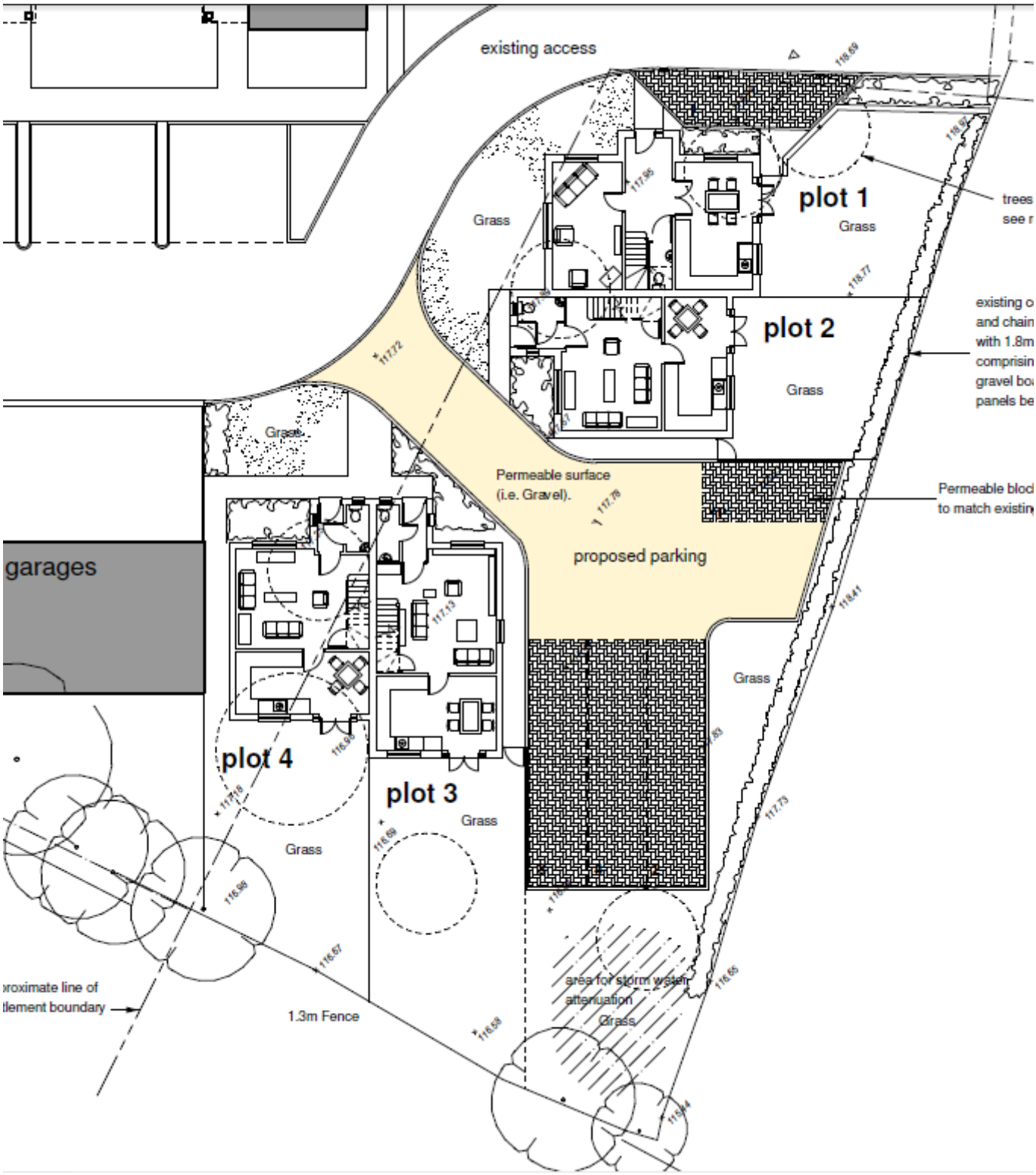


Aerial Photograph

Scale: NTS

Figure A1.2

20970
St Mary's Court, Barwell



Proposed Development Plan

Scale: NTS

Figure A1.3

APPENDIX 2

SITE WALKOVER PHOTOGRAPHS

20970
St Mary's Court, Barwell



Photo 1: Site access from St Mary's Mews

Photo 2: View of the site looking south west from St Mary's Mews



Site Photographs

Scale: NTS

Figure A2.1

20970
St Mary's Court, Barwell



Photo 3: View of the site looking south from St

Mary's Mews

Photo 4: View of the site looking south east from St

Mary's Mews



Site Photographs

Scale: NTS

Figure A2.2

20970
St Mary's Court, Barwell



Photo 5: Scaffolding equipment left on site.

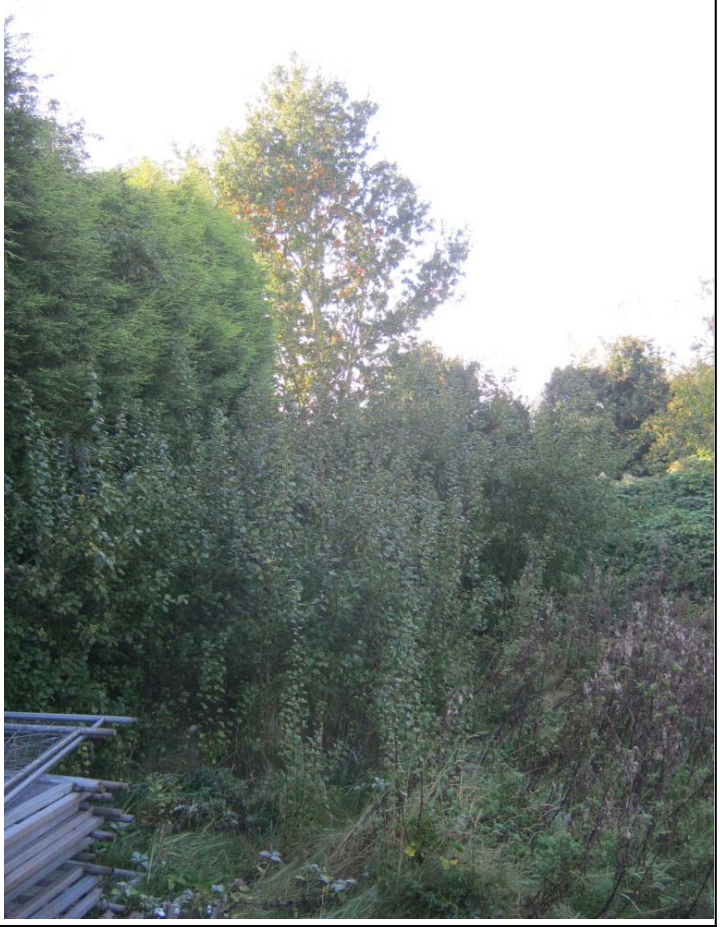


Photo 6: Looking south from north east of site to dense vegetation.

Site Photographs

Scale: NTS

Figure A2.3

APPENDIX 3

ENVIRONMENTAL RISK

APPENDIX 3

ENVIRONMENTAL RISK ASSESSMENT

A3.1 STATUTORY FRAMEWORK AND DEFINITIONS

A3.1.1 The statutory definition of 'contaminated land' is defined in Part IIA of the Environmental Protection Act 1990, ref 8.12, which was inserted by Section 57 of the Environment Act 1995, ref 8.13, and came into force in England in 2000, as;

'any land which appears to the local authority in whose area it is situated to be in such a condition, by reason of substances in, on or under the land, that:

(a) significant harm is being caused or there is a significant possibility of such harm being caused; or

(b) pollution of controlled waters is being, or is likely to be, caused'.

A3.1.2 In Scotland, this has been amended by the Water Environment and Water Services (Scotland) Act 2003, ref 8.14, to '*significant pollution of the water environment is being caused or there is a significant possibility of such pollution being caused'*.

A3.1.3 The purpose of Part IIA was to help address the problems caused by historical contamination, with the voluntary remediation of such land encouraged without the use of the Act. The planning regime assists in this, with Planning Policy Statement 23: Planning and Pollution Control (PPS23), ref 8.15, published in 2004, setting out the minimum requirements for the remediation of land affected by contamination as '*after carrying out the development and commencement of its use, the land should not be capable of being determined as contaminated land under Part IIA of the EPA 1990*'.

A3.1.4 The UK guidance on the assessment of contaminated has developed as a direct result of the introduction of these two Acts. The technical guidance supporting the legislation was originally summarised in a number of key documents collectively known as the Contaminated Land Reports (CLRs), a proposed series of twelve documents. Seven were originally published in March 1994, four more were published in April 2002, while the final guidance document, CLR 11 was published in 2004. CLR7 to 10 were withdrawn in 2008, with CLR 9 and 10 effectively replaced by the Environment Agency in the form of Science Reports SR2, ref 8.16 and SR3, ref 8.17.

A3.1.5 CLR11 remains valid and sets out the framework of the investigation process, with the overall approach one of risk management, with risk given the definition of '*a combination of the probability or frequency, of occurrence of a defined hazard and the magnitude of the consequences of the occurrence*'. In establishing whether a site fulfils the statutory definition of 'contaminated land' it is necessary to identify whether the three essential elements of risk exist. These are defined as:

- A contaminant - a substance which is in, on or under the land and has the potential to cause harm or to cause pollution of controlled waters;

- A receptor - something which could be adversely affected by a contaminant, such as people, an ecological system, property or a water body; and

- A pathway – a route or means by which a receptor can be exposed to, or affected by, a contaminant.

A3.1.6 A *'pollutant linkage'* may be defined as the link between a contaminant *'source'* and a *'receptor'* by means of a *'pathway'*. There may be none, one or many pollutant linkages existing on a site, which may utilise the same or different sources, pathways and receptors, which may change over the passage of time.

A3.1.7 Each pollutant linkage that exists in respect of the land in question must fulfil one or more of the following criteria:

- significant harm is being caused to the receptor in the pollutant linkage,

- there is a significant possibility of significant harm being caused to that receptor,

- there is (significant) pollution of controlled waters (the water environment) which constitute the receptor, or

- pollution of controlled waters is likely to be caused

- (there is a significant possibility of such pollution being caused).

A3.1.8 A pollutant linkage indicates that all three elements have been identified. The site can only be defined as 'Contaminated Land' under Part IIA if a pollutant linkage exists and the criteria above are met.

A3.1.9 The main potential receptors include:

1) Humans – current site occupants, construction workers, future site users and neighbouring site users.

2) Controlled Waters – surface water and groundwater resources

3) Property – including buildings, crops, livestock and pets

4) Ecological systems – including current/future site and neighbouring vegetation

A3.1.10 The main potential pathways to be considered include:

a) Ingestion and/or inhalation.

b) Uptake of contaminants via cultivated vegetables.

c) Dermal contact

d) Migration through permeable strata

e) Drains or services

f) Direct contact with building materials and services

g) Fire and explosion

A3.2 ASSESSMENT METHODOLOGY

A3.2.1 The guidance proposes a four-stage assessment process for identifying potential pollutant linkages on a site. These stages are set out in the table below:

No.	Process	Description
1	Hazard Identification	Establishing contaminant sources, pathways and receptors (the conceptual model).
2	Hazard Assessment	Analysing the potential for unacceptable risks (what linkages may be present and what could be the effects?).
3	Risk Estimation	Trying to establish the magnitude and probability of the possible consequences (what degree of harm might result and to what receptors, and how likely is it).
4	Risk Evaluation	Deciding whether the risk is unacceptable.

A3.2.2 Stages 1 and 2 develop a *'conceptual model'* based upon information collated from desk based studies, and reconnaissance of the site (a walkover survey). The walkover survey should be conducted in general accordance with CLR 2. The formation of a conceptual model is an iterative process and as such, it should be updated and refined throughout each stage of the project to reflect any additional information obtained.

A3.2.3 The extent of the desk based research and enquiries to be conducted should be in general accordance with CLR 3. The information from these enquiries is presented in a preliminary investigation report with recommendations, if necessary, for further work based upon the conceptual model. In the absence of specific information on contamination anticipated to be encountered, specific DoE 'Industry Profiles' provide guidance on the nature of contaminants relating to a variety of industrial processes and should be used as the basis for determining which contaminants are more likely to be present on a site.

A3.2.4 If potential pollutant linkages are identified within the conceptual model, an intrusive ground investigation and report will be recommended. The investigation should be planned in general accordance with CLR 4, and BS10175. The number of exploratory holes and samples collected for analysis should be consistent with the size of the site and the level of risk envisaged. This will enable a generic quantitative risk assessment (GQRA) to be conducted, at which point the conceptual model can be updated and relevant pollutant linkages can be identified.

A3.2.5 A two-stage investigation may be more appropriate where time constraints are less of an issue. The first stage investigation may be conducted as an initial assessment for the presence of potential sources, with the second being more refined in order to delineate or further characterise any contamination or the physical properties of the site.

A3.3 RISK EVALUATION

A3.3.1 The risk evaluation is a qualitative method for interpreting the data from the hazard estimation stage. It involves the classification of the:

- magnitude of the potential 'consequence' (severity) of the risk occurring and:
- magnitude of the 'probability' (likelihood) of the risk occurring.

A3.3.2 These are defined in the following sections:

A3.4 CLASSIFICATION OF CONSEQUENCE

Classification	Definition	Examples
Severe	Short-term (acute) risk to human health likely to result in 'significant harm' as defined by the Environment Protection Act 1990, Part IIA. Short-term risk of pollution (note: Water Resources Act contains no scope for considering significance of pollution) of sensitive water resource. Catastrophic damage to buildings property. A short-term risk to a particular ecosystem, or organism forming part of such ecosystem (note: the definitions of ecological systems within the Draft Circular on Contaminated Land, DETR, 2000).	High Concentrations of cyanide on the surface of an informal recreation area. Major spillage of contaminants from site into controlled water. Explosion, causing building collapse can also equate to a short-term human health risk if buildings are occupied.
Medium	Chronic damage to Human Health ('significant harm' as defined in DETR, 2000). Pollution of sensitive water resources (note: Water Resources Act contains no scope for considering significance of pollution). A significant change in a particular ecosystem, or organism forming part of such ecosystem, (note: the definitions of ecological systems within Draft Circular on Contaminated Land, DETR, 2000).	Concentrations of a contaminant from site exceed the generic, or site-specific assessment criteria. Leaching of contaminants from a site to a major or minor aquifer. Death of a species within a designated nature reserve.
Mild	Pollution of non-sensitive water resources. Significant damage to crops, buildings, structures and services ('significant harm' as defined in the *Draft Circular on Contaminated Land*, DETR 2000). Damage to sensitive buildings/ structures/services or the environment.	Pollution of non-classified ground water. Damage to building rendering it unsafe to occupy (eg foundation damage resulting in instability).
Minor	Harm, although not necessarily significant harm, which may result in a financial loss, or expenditure to resolve. Non-permanent health effects to human health (easily prevented by means such as personal protective clothing etc). Easily repairable effects of damage to buildings, structures and services.	The presence of contaminants at such concentrations that protective equipment is required during site works. The loss of plants in landscaping scheme. Discoloration of concrete

A3.4.1 In theory, both severe and medium classification can result in death. The differential is that severe relates to short term risk while medium relates to long-term risk. Therefore, the classification of severe requires urgent action while medium may require urgent action but usually long term action would be sufficient.

A3.5 CLASSIFICATION OF PROBABILITY

Classification	Definition
High likelihood	There is a pollution linkage and an event that either appears very likely in the short term and almost inevitable over the long term, or there is evidence at the receptor of harm or pollution
Likely	There is a pollution linkage and all the elements are present and in the right place, which means that it is probable that an event will occur. Circumstances are such that an event is not inevitable, but possible in the short term and likely over the long term.
Low likelihood	There is a pollution linkage and circumstances are possible under which an event could occur However, it is by no means certain that even over a longer period such event would take place, and is less likely in the shorter term
Unlikely	There is a pollution linkage but circumstances are such that it is improbable that an event would occur even in the very long term

A3.5.1 For the purposes of this preliminary investigation, any source of contamination that has been identified by professional judgement as potentially impacting on the site has been classified as being 'likely' to be present, unless proven otherwise by intrusive investigation.

A3.6 COMPARISON OF CONSEQUENCE AGAINST PROBABILITY

A3.6.1 These classifications are compared to indicate the risk presented by each pollutant linkage. Once the consequence and probability have been classified they can be used to produce a risk category as below:

		Consequence			
		Severe	**Medium**	**Mild**	**Minor**
Probability	High likelihood	Very high risk	High risk	Moderate risk	Moderate/low risk
	Likely	High risk	Moderate risk	Moderate/low risk	Low risk
	Low likelihood	Moderate risk	Moderate/low risk	Low risk	Very low risk
	Unlikely	Moderate/low risk	Low risk	Very low risk	Very low risk

A3.6.2 The action required for the classified risks are as follows:

Very high risk	There is a high probability that severe harm could a risk to a designated receptor from an identified hazard, OR, there is evidence that severe harm to a designated receptor is currently happening. This risk, if realised, is likely to result in a substantial liability. Urgent investigation (if not undertaken already) and remediation are likely to be required
High risk	Harm is likely to arise to a designated receptor from an identified hazard. Realisation of the risk is likely to present a substantial liability. Urgent investigation (if not undertaken already) is required and remedial works may be necessary in the short term and are likely over the longer term
Moderate risk	It is possible that harm could arise to a designated receptor from an identified hazard. However, it is either relatively unlikely that any such harm would be severe, or if any harm were to occur it is more likely that the harm would be relatively mild Investigation (if not already undertaken) is normally required to clarify the risk and to determine the potential liability. Some remedial works may be required in the longer term
Low risk	It is possible that harm could arise to a designated receptor from an identified hazard, but it is likely that this harm, if realised, would at worst normally be mild.
Very low risk	There is a low possibility that harm could arise to a receptor. In the event of such harm being realised it is not likely to be severe.

APPENDIX 4

ENVIROCHECK REPORT

(On CD)