IAN FARMER ASSOCIATES

Geotechnical & Environmental Specialists

MR E GROVE

27 KEATS LANE
EARL SHILTON LE9 7DS

PRELIMINARY INVESTIGATION REPORT

Contract: 21175

Date: January 2014

Ian Farmer Associates (1998) Limited
1 Fairfield Court, Seven Stars Industrial Estate,
Wheler Road, Coventry, CV3 4LJ
Telephone: 024 7630 3422
Email: coventry@ianfarmer.co.uk

PRELIMINARY INVESTIGATION REPORT

carried out at

27 KEATS LANE

EARL SHILTON LE9 7DS

Prepared for

MR E GROVE
c/o Hayward Architects Ltd
19 Station Road
Hinckley
Leicestershire
LE10 1AW

Contract: 21175

Date: January 2014

Ian Farmer Associates (1998) Limited
1 Fairfield Court, Seven Stars Industrial Estate, Wheler Road, Coventry, CV3 4LJ
Telephone: 024 7630 3422
Email: coventry@ianfarmer.co.uk

EXECUTIVE SUMMARY

On the instructions of Hayward Architects Ltd, architects to Mr E Grove, 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.

It is understood that it is proposed to develop the site for residential housing with associated hardstanding for access and parking, landscaping and private gardens.

The site is situated towards the northeast side of Earl Shilton, approximately 10 km to the south west of the town centre of Leicester and may be located by Grid Reference SP467981.

A walkover survey of the site was conducted on 9th January 2014. At the time of the walkover survey, the site comprised a disused, brick built factory which covered the entire site, covering an approximate area of 0.1Ha. It appeared that the site was almost entirely covered by hardstanding. There were no visible signs of contamination at the surface, no standing water and no evidence of invasive plant species.

The historical research indicate the site to have been occupied by workshops and then a factory from the earliest available maps. Whilst the surrounding area is mainly residential, there have been a number of industrial buildings surrounding and adjoining the site, including a boot and hosiery manufacturers to the south.

The geological map indicates the site to be underlain by superficial deposits of the Wigston Member, underlain by the mudstone of the Gunthorpe Member.

The research has identified evidence of potential sources of contamination on or adjacent to the site, with plausible pathways to the likely receptors, and therefore potential pollutant linkages have been suggested. 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. This is proposed to be in the form of a number of trial pits spread across the site.

CONTENTS

EXECUTIVE SUMMARY

1.0 INTRODUCTION 3
1.1 General 3

2.0 SITE 4
2.1 Site Location 4
2.2 Site Walkover and Description 4
2.3 Historical Maps 4
2.4 Summary 6

3.0 SITE SETTING 7
3.1 Geological Setting 7
3.2 Hydrogeological Setting 7
3.3 Hydrological Setting 7
3.4 Radon 8
3.5 Soil Geochemistry 8

4.0 ASSESSMENT OF GEOTECHNICAL RISK 9
4.1 Geological Constraints 9
4.2 Geotechnical Risk Assessment 9
4.3 Conclusions of Geotechnical Risk Assessment 10

5.0 ENVIRONMENTAL SEARCHES 11
5.1 Potential Sources of Contamination 11
5.2 Green Belt Areas 11
5.3 Designated Sites 12
5.4 Nitrate Vulnerable Zone 12
5.5 Contemporary Trade Entries 12

6.0 ASSESSMENT OF GEOENVIRONMENTAL RISK 13
6.1 General 13
6.2 Potential Sources of Contamination Identified 13
6.3 Potential Pathways Identified 13
6.4 Hazard Identification 13
6.5 Hazard Assessment 14
6.6 Conceptual Site Model 14
6.7 Conclusions of Geoenvironmental Risk Assessment 15
6.8 Consultation 15

7.0 RECOMMENDATIONS 17
7.1 Further Work 17
7.2 Other Considerations 17

8.0 REFERENCES 18

APPENDIX 1 - DRAWINGS
Figure A1.1 - Site Location Plan
Figure A1.2 - Aerial Photograph
Figure A1.3 - Site Plan

APPENDIX 2 - PHOTOGRAPHS
Figures A2.1-A2.2 - Site Photographs

APPENDIX 3 - ENVIRONMENTAL RISK
Environmental Risk Assessment iii/i-iii/vi

APPENDIX 4 - ENVIROCHECK REPORT
- Index Map
- Site Sensitivity Maps (1:2 500 and 1:10 000)
- Soil Geochemistry Maps (1:10 000)
- Environmental Context Maps (1:25 000)
- Historical Maps (1:2 500 and 1:10 000)
- Datasheet
- BGS Boreholes Datasheet

1.0 INTRODUCTION

1.1 General

1.1.1 On the instructions of Hayward Architects Ltd, architects to Mr E Grove, 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 residential housing with associated hardstanding for access and parking, landscaping and private gardens.

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 towards the northeast side of Earl Shilton, approximately 10 km to the south west of the town centre of Leicester and may be located by Grid Reference SP467981. 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 9th January 2014. The walkover was carried out in general accordance with CLR 2, ref. 8.5.

2.2.2 At the time of the walkover survey, the site comprised a disused, brick built factory which covered the entire site, covering an approximate area of 0.1Ha. Demolition was in progress and full asbestos removal had been undertaken

2.2.3 It appeared that the site was almost entirely covered by hardstanding. There were no visible signs of contamination at the surface, no standing water and no evidence of invasive plant species.

2.2.4 The site was level and whilst surrounding walls were damaged in places, there was no evidence of structural instability.

2.2.5 Although not evident during the walkover, it is understood that an above-ground storage tank was located in the north eastern corner of the site. Again, there was no evidence of staining or contamination at the surface.

2.2.6 Photographs from the walkover survey are included within Appendix 2, Figures A2.1 to A2.2. A site 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, 1:10,560, 1885-1887	The site contains a building in the northern area of the site.	The area is predominately agricultural fields. The residential area centres on High Street and Church Street.
Leicestershire, 1:2,500, 1888	The site contains a number of small buildings in the northern section. The site is located within a residential area that is intermediately populated.	The area over 100m away from the site is predominately agricultural fields.

Map, Date and Scale	Site Description	Regional Setting
Leicestershire, 1:2,500, 1903 Leicestershire, 1:10,560, 1903-1904	There has been an increase in the volume of buildings contained within the site. The southern and eastern boundaries now contain buildings, a Boot Factory indicated but not clear where it relates to.	The area is predominately agricultural still with the residential buildings continue to spread along Hinckley Road. The 100m radius surrounding the site has increased in volume of buildings to the north east and south. The surrounding area over 100m away is still predominately agricultural fields with a small increase in the amount of buildings along the roads in and out of the area.
Leicestershire, 1:2,500, 1916	There appears to be no change to the site.	The area to the south of the site has increased in the volume of buildings, and is named as a Hosiery manufactory.
Leicestershire, 1:10,560, 1919	No obvious changes to the site.	Slightly increase in the volume of residential dwellings in 1000m radius of the site.
Leicestershire, 1:10,560, 1938	No obvious changes to the site.	Increase in the volume of residential dwellings and the construction of a number of small roads.
Ordnance Survey Plan, 1:10,000, 1955	No obvious changes to the site.	Increase of volume and area of residential buildings. Sewerage works located 1000m south east of the site.
Ordnance Survey Plan, 1:2,500, 1964-1969	The site is now labelled as containing a factory.	The immediate surrounding area is now heavily built up. North of the site, over 100m away is still predominately agricultural fields, however to the west south and east the areas contain dense residential development and industrial developments.
Ordnance Survey Plan, 1:10,000, 1968	No obvious changes to the site.	Increase in the volume and area of Earl Shilton. A large increase approximately 1000m to the south west of the site.
Ordnance Survey Plan, 1:2,500, 1969-1985	No obvious changes to the site.	An electricity sub-station is situated to the north east of the site.
Additional SIMs, 1:2,500, 1977-1979	No obvious changes to the site.	
Ordnance Survey Plan, 1:10,000, 1980	No obvious changes to the site.	Slight increase in the number of buildings within 1000m radius.
Additional SIMs, 1:2,500, 1986-1991	There is no significant change to the site. The southern side of the site is no longer bounded by a factory but now residential properties.	The surrounding area shows no significant change.

Map, Date and Scale	Site Description	Regional Setting
Large Scale National Grid Data, 1:2,500, 1994	No obvious changes to the site.	
10K Raster Mapping, 1:10,000, 2006	No obvious changes to the site.	
10K Raster Mapping, 1:10,000, 2013	No obvious changes to the site.	A47 has been constructed over 1000m to the east. Slight increase in the area of residential buildings. The historical map appears to be substantially accurate in comparison to the current setting.

2.4 Summary

2.4.1 The site appears to have been occupied by workshops and then a factory from the earliest available maps. Whilst the surrounding area is mainly residential, there have been a number of industrial buildings surrounding and adjoining the site, including a boot and hosiery manufacturers to the south.

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 the Wigston Member, comprising of sand and gravel deposited in the Quarternary period in ice age conditions.

3.1.3 The superficial deposits are underlain by the Gunthorpe Member, described as a mudstone deposited in the Triassic period in a hot desert environment.

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 due to the presence of a variety of buildings throughout the sites known history.

3.2 Hydrogeological Setting

3.2.1 The hydrogeological records, provided by the Environment Agency, indicate that the site is situated on Secondary Aquifers, relating to the variably permeable superficial and bedrock strata.

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 Envirocheck vulnerability map indicates the soil to be of high leaching potential.

3.2.5 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.

3.2.6 The site is not located within a groundwater source protection zone.

3.2.7 There is one groundwater abstraction wells within 500m of the site. 37m north east is a single point groundwater abstraction for general farming and domestic purposes.

3.3 Hydrological Setting

3.3.1 The nearest surface watercourse is for Hill Top Farm, located approximately 165m to the north west of the site at its closest point.

3.3.2 There is a pond / lake located 350m to the south west and Normanton Brook some 650m to the north east 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 The available river quality classification for the Normanton Brook (over 600m from the site) is Grade B. The main parameters for this classification are provided below:

GQA Grade	Environmental Quality	Chemical Parameters			Biological Parameters	
		DO (%)	BOD (mg/l)	Ammonia (mgN/l)	EQI for ASPT	EQI for no. of taxa
B	Good	70	4	0.6	0.90	0.70
Ref: Landmark Envirocheck						

3.3.5 There are no surface water abstractions detailed within 1km 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 BR211, ref 8.7.

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	<10
Cadmium	<1
Chromium	20-40
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
Coal Mining / Mining Instability	None	
Compressible Ground	None to low	Assuming sand and gravel is encountered poorly consolidated ground is unlikely to be encountered.
Ground Dissolution	None	
Landslide	None	The site is level
Running Sand	Very low	Likelihood will relate to grading of sand strata below the water table.
Shrinking or Swelling Clay	None	
Unconsolidated Made Ground	Low to moderate	There is potential for poorly consolidated Made Ground following demolition, particularly if cellars or basements may have been infilled.
Aggressive conditions for construction materials	Low to moderate	
Shallow or high groundwater table	Low	

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

  There is the potential for basements and/or cellars to exist on the site, although these are likely to be located and backfilled during the demolition process and are unlikely to represent a significant risk to any development.

  Should the superficial terrace deposits be of a relatively fine nature (i.e. a sand), then a high groundwater table may cause subsidence due to running sand. It is considered the risk associated with this is low.

The underlying mudstone may contain significant quantities of sulphates that may cause concrete attack. Should any proposed structure come into contact with that material, then the associated risk is moderate. However, should the proposed structures be founded in the overlying gravels, then the risk of concrete attack is considered to be low.

- Previous Use

  Historical mapping indicates previous development on the site including structural and infrastructure changes. Therefore, the presence of buried structures such as services, basements and old foundations is a potential risk.

4.3 Conclusions of Geotechnical Risk Assessment

4.3.1 The research has identified evidence of potential hazards, although these may be easily addressed during a limited intrusive exercise proposed to be undertaken at 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	Two at approximately 360m northeast	Both are for effluent to a freshwater stream
Integrated and Local Authority Pollution Prevention and Controls	None	One at 218m south	Revoked – applies to the High Street Service Station
Pollution Incidents to Controlled Waters	None	One 172m north	Relates to a fertiliser fire at a dairy farm; Category 3, minor incident
Prosecutions Relating to Authorised Processes or Controlled Waters	None	Four at 215m south (one location)	Relates to a site at West Street for activities in 1997
Registered Radioactive Substances	None	One at 290m west	Relates to textile processes, current status not given
Water Abstractions		One 37m north east	Groundwater abstraction at Hill Top Farm
Historical Landfill Sites	None	One at 461m north east	Inert, commercial and household waste, no date of last entry supplied
Local Authority Recorded Landfill Sites	None	One at 467m north east	No further information; assumed to be the same location as above
Contemporary Trade Entries	Four	Five further entries within 100m of the site	Four entries located on site are for ceramics and carton manufacturers and electrical engineers. All are inactive
Fuel Station Entries	None	One at 218m south	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 500m of the site.

5.2.2 Green Belt Areas are generally areas that are designated as being under special consideration for development. Local Authorities may restrict the type of development, place particular planning constraints on proposed developments, or potentially restrict any development within a designated Green Belt area.

5.3 Designated Sites

5.3.1 A review of the Natural England website 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 500m 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 four contemporary trade entries located within the site boundaries, and a number of others within 500m of the site.

5.5.2 Those entries registered to the site are all inactive, relating to electrical engineers, carton and box manufacturers and ceramics manufacturers.

5.5.3 The closest entries off-site all relate to the location of the Hilltop Service Station on the High Street, for various automotive purposes.

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 8.8. 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 The proposed development comprises a number of residential properties with associated hardstanding, landscaping and private gardens.

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 former manufacturers (boxes and cartons and ceramics) on-site
- Contamination associated with Made Ground due to previous development on-site, or possible migration from adjoining land
- Historical AST on-site

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

  The most significant risks to human health are from contamination associated with the former land-use and previous tank on site. However, since the site was predominantly covered by hardstanding, this will have afforded the underlying materials a degree of protection. At this time, the risk is deemed low to moderate. The potential for migration of contamination from the adjacent industrial land should also be considered.

  There is not considered to be a significant source of potentially gaseous material which would impact on receptors, although it should be confirmed that there is no significant thickness of Made Ground underlying the site. The risk to receptors is deemed low.

- Construction Material

  There is considered to be a moderate to low risk due to chemical attack on construction materials emplaced within the Made Ground.

- Controlled Waters

  The site is located on Secondary Aquifers and is not within a source protection zone, although there is an abstraction 37m from the site. The nearest surface water body is a considerable distance from the site. For similar reasons detailed for human health from contaminants, at this time, the risk to controlled waters is considered low to moderate.

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 Made Ground and former manufacturing on- and off-site	Inorganic Compounds • Metals • Sulphates Organic Compounds • TPH • PAH • PCB Others • pH • 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
		• Lateral migration Infiltration	Controlled Waters • Groundwater
		• Direct contact of contaminants with building materials	Building Materials or Services • Concrete • Plastic pipes and services • Structural iron & steel work

6.7 Conclusions of Geoenvironmental Risk Assessment

6.7.1 The research has identified evidence of potential sources of contamination on or adjacent to 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 8.9, 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 a number of trial pits across the site in order to ascertain geological ground conditions and for the recovery of samples for laboratory analysis.

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.

8.0 REFERENCES

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

8.2 CLR 11, '*Model Procedures for the Management of Land Contamination*' Report by Defra and the Environment Agency, 2004

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

8.5 CLR 2, '*Guidance on preliminary site inspection of contaminated land*', Report by Applied Environmental, DoE, 1994

8.6 British Geological Survey, Sheet No. 155, 'Coalville', solid and drift edition, 1:50000 scale, published 1982.

8.7 HPA-RPD-033, '*Indicative Atlas of Radon in England and Wales*', Health Protection Agency, 2007 BR211, '*Radon: Protective measures for new dwellings*'. BRE, 2007

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

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

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

8.11 Environment Act 1995, Section 57, DoE, 1995

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

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

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

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

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

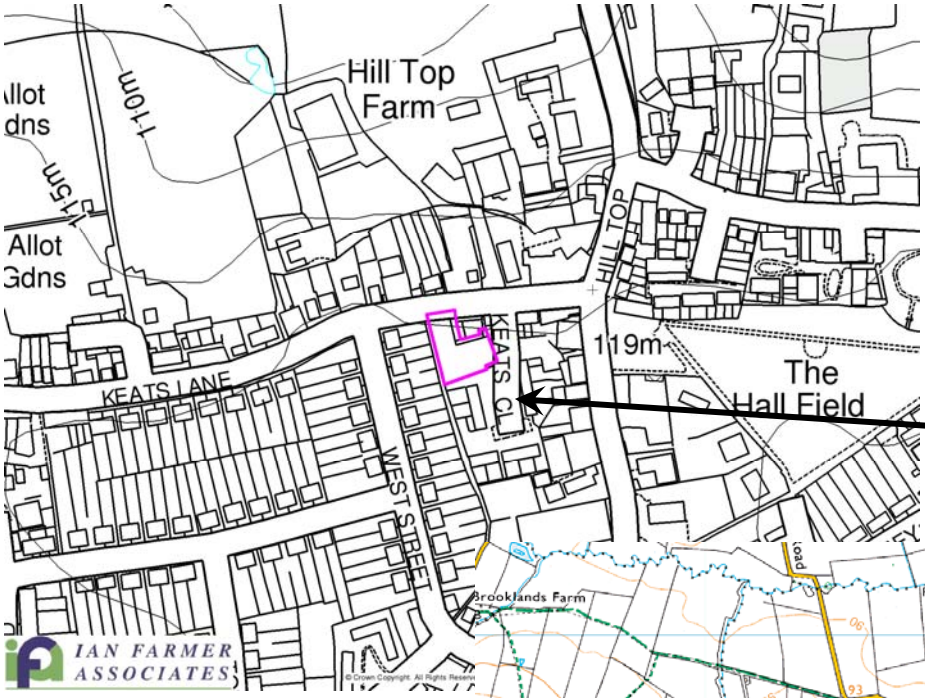
A.C Owen
Principal Environmental Geologist
MESci(Hons.) MRes FGS

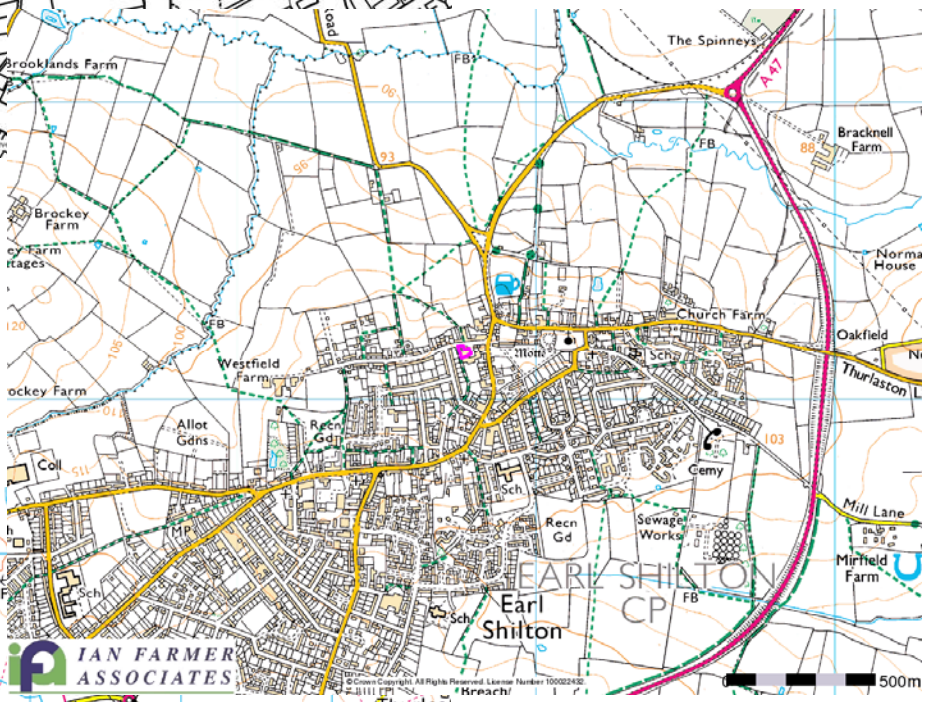
P.C.G Bailey
Principal Engineering Geologist
BEng(Hons.) MSc FGS ACSM

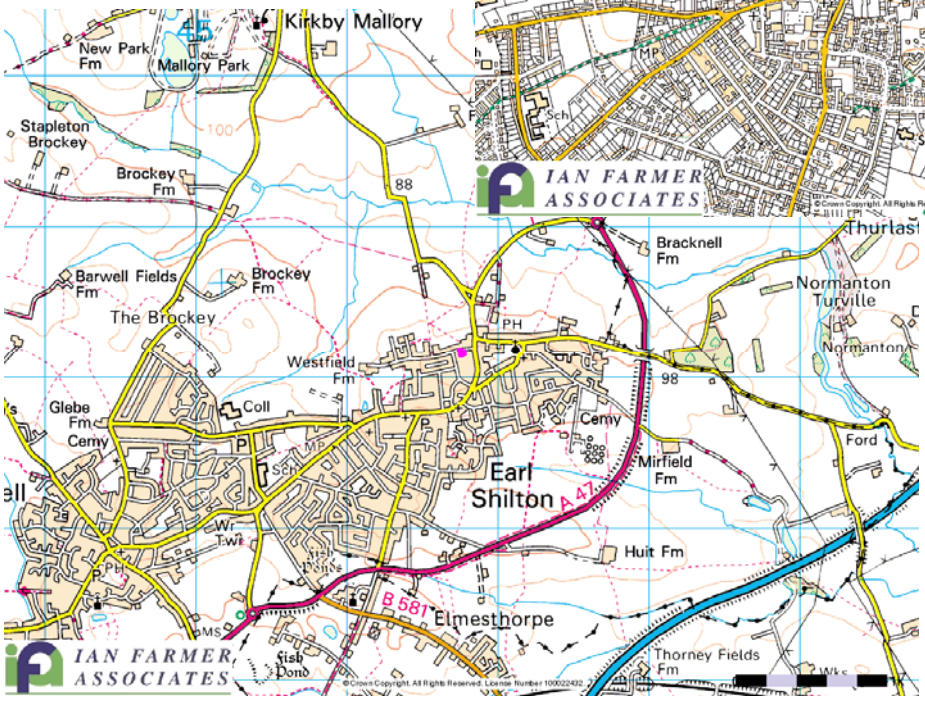
APPENDIX 1

DRAWINGS

21175
27 Keats Lane, Earl Shilton







N

Site Location Plan

Scale: NTS

Figure A1.1

21175
27 Keats Lane, Earl Shilton

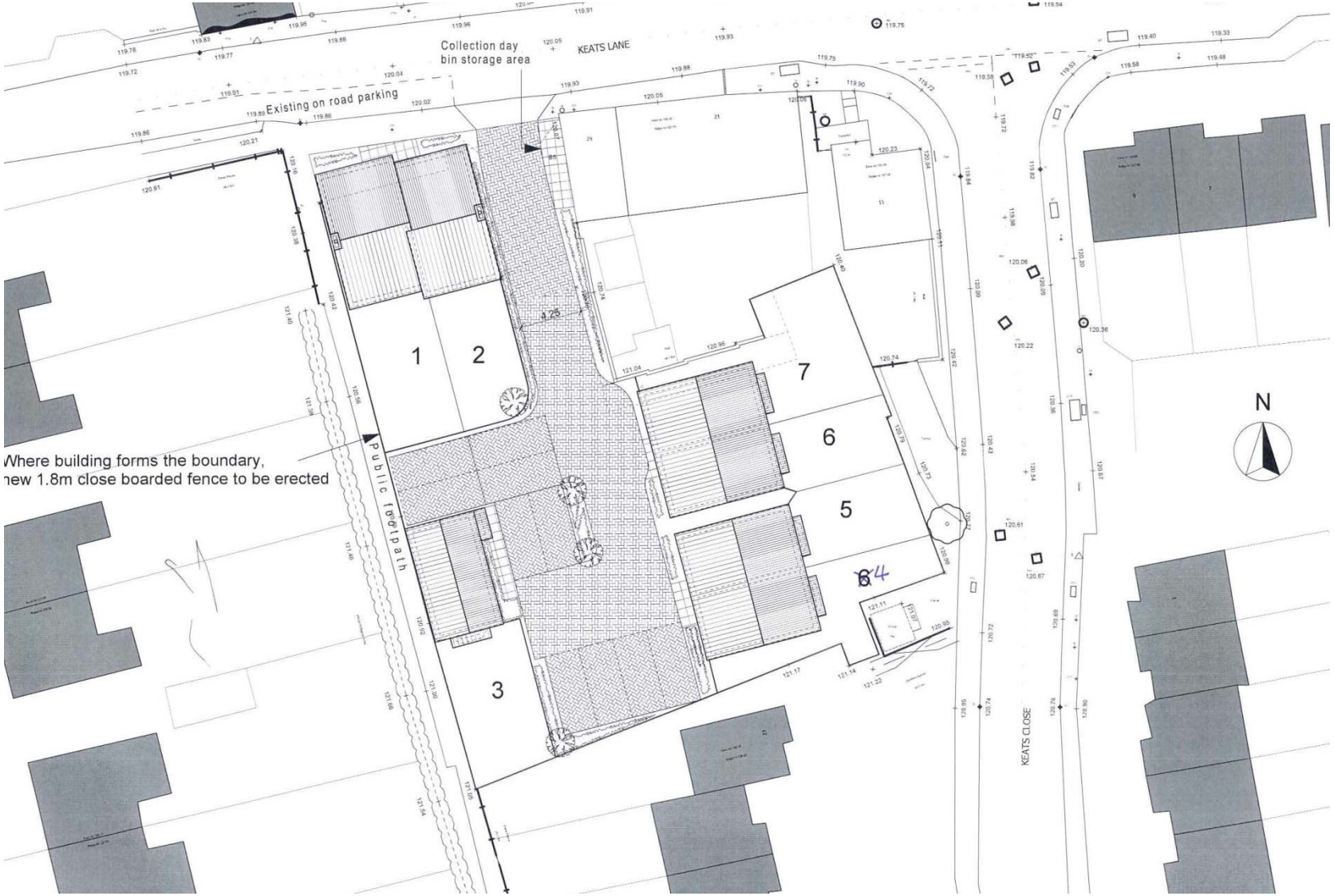


Aerial Photograph

Scale: NTS

Figure A1.2

21175
27 Keats Lane, Earl Shilton



Background drawing provided by Client

Site Plan

Scale: NTS

Figure A1.3

APPENDIX 2

SITE WALKOVER PHOTOGRAPHS

21175
27 Keats Lane, Earl Shilton





Photographs

Scale: NTS

Figure A2.1

21175
27 Keats Lane, Earl Shilton





Photographs

Scale: NTS

Figure A2.2

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 8.10, which was inserted by Section 57 of the Environment Act 1995, ref 8.11, 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 8.12, 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 8.13, 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 8.14 and SR3, ref 8.15.

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.