



**PROPOSED MIXED-USE DEVELOPMENT  
WOOLFOX GARDEN VILLAGE, RUTLAND**

**GEO-ENVIRONMENTAL DESK STUDY**

**MARCH 2019**

**REPORT REF: 24785-04-DS-01**



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**EXECUTIVE SUMMARY**

<b>Site Address</b>	Woolfox Garden Village, Rutland	
<b>Proposed Development</b>	The site has the capacity of up to 10,000 units. Phase 1 in the south-east of the site comprises 2,500 residential dwellings with employment, secondary and primary school, public open space and new infrastructure.	
<b>Site Description and Setting</b>	<p>The site is irregular in shape and has been split into three areas for the purpose of this report. Area A comprises agricultural land and Osbonall Wood in the north. Area B comprises the remains of a disused airfield, agricultural fields, Woolfox Wood, Hardwick Wood and The Coppice in the south. Area C comprises an agricultural field in the east.</p> <p>The A1 lies to the west of the site, a road connecting the villages of Clipsham and Stretton lies to the north, Clipsham Quarry lies to the east, and Hardwick Farm and Rutland Golf Course lies to the south.</p>	
<b>Published Geology, Hydrogeology and Hydrology</b>	<p>Information published by the BGS indicates the majority of the site is underlain by superficial glacial till deposits, with a tract of head in the south of Area A (Secondary 'undifferentiated' Aquifers), and glaciofluvial deposits in the east and west of Area C (Secondary 'A' Aquifer). Areas where superficial deposits are not recorded lie in the north of Area A and in the centre of Area C. The bedrock comprises limestone of the Upper and Lower Lincolnshire Member (Principal Aquifer), with mudstone of the Rutland Formation recorded in the east of Area B and across Area C.</p> <p>An unnamed watercourse lies in the north of Area A, and drainage ditches and ponds are located across the site. Shake holes and swallow hole located in the south-west of Area A, the east of Area B and the centre of Area C also hold water. Organic deposits are anticipated associated with these features.</p>	
<b>Site History</b>	The historical mapping reviewed indicates that Area A and Area C have been used for predominantly agricultural purposes. Area B was used as an airfield from 1940, but recorded as disused by 1950. Development associated with this airfield extended into the south of Area A. Infrastructure remains associated with the airfield and is still present across Area B and in the south of Area A. The surrounding area has been dominated by agriculture and limestone quarrying since at least 1884.	
<b>Environmental Appraisal</b>	CSM	Potential sources of contamination have been identified on-site including agricultural use, previous airfield use and quarrying, Made Ground associated with historical developments and existing temporary structures, dumped farm machinery and waste materials and organic deposits.
	Ground gas and radon	Potential sources of ground gases and volatile vapours have been identified (organic deposits, extensive infilled ground on and off site and Made Ground). Full radon protection measures are required on this site.
	Risk Assessment	Potential sources of contamination have been identified on and off-site which are considered to pose a variable but potentially high risk to human health and controlled waters receptors. Remediation and/or capping may be required in areas of the former airfield.
<b>Geotechnical Setting</b>	Likely foundations	A traditional strip/trench fill foundation solution is likely be suitable for a significant proportion of the site. Alternative foundation solutions may be required where significant thicknesses of Made Ground and organic deposits are encountered. Further consideration and detailed assessment of solution features will be required to provide a risk profiling for the site.
	Drainage	Soakaway drainage may be feasible for selected areas of the site subject to confirmation through infiltration testing. This may be restricted by the potential for the development of solution features.
	Earthworks	Due to the variable site topography, earthworks may be required in order to establish an appropriate development platform.
	Hazards	An appropriate methodology should be developed for treatment of buried structures in Area B, taking into account the potential risk to future site construction and occupation. There is a risk for ground dissolution of the limestone bedrock evidenced by Shake Holes and Swallow Holes across the site.
<b>Recommendations</b>	A ground investigation is recommended to quantify the contamination risk and collect ground information to support detailed design.	
This summary should be read in conjunction with the full report and reflects an assessment of the site based on information received by M-EC at the time of production.		

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## ACCRONYMS

ACM – ASBESTOS CONTAINING MATERIALS

BGL – BELOW GROUND LEVEL

BTEX – BENZENE, TOLUENE, ETHYLBENZENE & XYLENE

EA – ENVIRONMENT AGENCY

MTBE – METHYL TERT-BUTYL ETHER

PAH – POLYCYCLIC AROMATIC HYDROCARBONS

PCB – POLYCHLORINATED BIPHENYLS

PID – PHOTOIONISATION DETECTOR

TPH – TOTAL PETROLEUM HYDROCARBONS

TPH CWG – TOTAL PETROLEUM HYDROCARBONS (CRITERIA WORKING GROUP)

UXO – UNEXPLODED ORDNANCE

## 1.0 INTRODUCTION

1.1 This Geo-environmental Desk Study has been prepared by Mewies Engineering Consultants Ltd (M-EC) for a site south of Clipsham, Rutland, referred to as Woolfox Garden Village. M-EC has produced this report for the benefit of Mr PJSR Hill and Pikerace Limited.

1.2 A concept masterplan and phasing plan have been prepared by Pegasus Group and copies are presented in Appendix A. The Concept Masterplan indicates that the site is to be developed with up to 10,000 residential units with designated areas for employment use, educational facilities and recreational areas. However, it has been proposed the development will be phased, with Phase 1 lying in the south-east of the site comprising 2,500 residential dwellings with employment, secondary and primary school, public open space and new infrastructure.

1.3 No third-party liability or duty of care is extended. Third parties using information contained in this report do so at their own risk.

### **Objectives**

1.4 This report has been completed to present pertinent information regarding the geotechnical and environmental risks and liabilities associated with the site. It has been completed to fulfil the requirements of a preliminary risk assessment in accordance with BS10175: 2011 'Investigation of Potentially Contaminated Sites Code of Practice' and CLR11 'Model Procedures for the Management of Contaminated Land'.

1.5 The specific objectives of the report are:

- To assess historical activities at the site with respect to their potential impact on the site environment;
- To characterise the environmental setting of the site, identify migration pathways and vulnerable receptors for contamination, focusing on potential soil and groundwater liabilities;
- To assess historical and current surrounding land use in relation to known or potential off-site contamination issues that may impact the subject property;
- To review existing site investigation and remediation information available for the site;
- To develop a preliminary Conceptual Site Model (CSM);
- To assess potential environmental liabilities associated with the site; and
- To assess potential geotechnical constraints to proposed development.

## 2.0 SITE AND SETTING

- 2.1 The site is located east of the A1 and south of the villages of Clipsham and Stretton, Rutland centred on Ordnance Survey National Grid Reference 496278, 313510. The site is approximately 486.45 hectares in area, and comprises several agricultural fields, areas of woodland and the disused RAF Woolfox Lodge Airfield. At the time of the investigation, access to the site was gained off Bidwell Lane to the east of the site.
- 2.2 For the purposes of this report, for clarity and ease of reference, the site has been split into three areas. A site location plan, which illustrates the three areas described in the report, is included in Appendix B.

### Site Description

- 2.3 A site walkover of external areas was completed by a representative of M-EC on 12th March 2019. A site features summary plan and selected photographs are included in Appendix C.

#### Area A

- 2.4 Area A comprises the northern section of the site. The area consists of seven open fields, all of which are laid to crop, and Osbonall Wood. The area is bordered to the north by Stretton Road, to the east by Bidwell Lane, to the south by agricultural fields and Woolfox Wood, and to the west by Greetham Wood and agricultural fields.
- 2.5 Trackways border the majority of the fields and dilapidated barns, believed to have been used as camps for the airfield to the south (Photograph 16), lie east of Osbonall Wood in the centre of the area. A concrete track links the western site boundary to the camp. Abandoned farm machinery and waste materials are observed in Osbonall Wood and along the western site boundaries.
- 2.6 Erosional features associated with limestone bedrock, such as Shake Holes and Swallow Holes, are recorded in the south-west of the area (Photographs 24 – 27). An unnamed watercourse, flowing south-east across the north east of the area, is culverted beneath Bidwell Lane (Photograph 7). A pond lies in the south-west of the area (Photograph 14) and drainage ditches border the majority of fields (Photograph 21). The OS map indicates a ruin south of Osbonall Wood, and this position is now occupied by a pond (Photograph 22).
- 2.7 Topographically, the elevation slopes down towards the east, falling by approximately 30m across the area. The northern section is defined by a valley which is oriented east-west.
- 2.8 A gas main runs south from Stretton Road beneath the area to the south eastern corner of Area A. Gas markers were observed on each field boundary indicating the line of the main (Photograph 9).

### Area B

- 2.9 Area B comprises the southern section of the site. The area predominantly comprises the disused airfield, with Woolfox Wood and agricultural fields in the north. Two further areas of woodland are also present in the east of the area, The Coppice in the east and Hardwick Wood in the south-east.
- 2.10 Some of the infrastructure associated with the former airfield remains, including concrete runways and/or tracks, ruins of buildings (see Photographs 46 and 47), with buried structures also observed in the east (Photographs 31 and 35). The majority of the area, however, is used for agriculture, with cropped fields sandwiched between trackways. Sheep fields lies in the west and a sheep pen was observed in the south-east close to Hardwick Farm (Photograph 43). Abandoned farm equipment, including tankers, trailers and combine harvesters, was observed in the east and centre of the area, generally on the trackways (see Photograph 41).
- 2.11 The area is bordered to the north by a dry drainage ditch, trackway and agricultural fields, to the east by Rutland County Golf Club, to the south-west by the A1 and Woolfox Depot (Photograph 45), and to the west by a disused quarry. Satellite imagery highlights the remains of the airfield which lie beneath the cropped fields.
- 2.12 Topographically elevations slope down towards the south-east, falling by approximately 20m across the area. An unmapped Shake Hole was observed in the east of the site during the site walkover, shown in Photograph 36.
- 2.13 A manhole and drain cover were observed in the east of the area, indicating a drainage system underlying the site (Photograph 39).

### Area C

- 2.14 Area C lies in the east of the main site area and consists of a single cropped field, with a wooded area, named little Sutie, in the south eastern corner. The area is bordered to the north by Clipsham Quarry, an active limestone quarry (see Photograph 52), to the east by a public footpath and disused quarry, to the south by a public footpath and to the west by a disused limestone quarry (Photograph 54). A Shake Hole is present in the south of the area (Photograph 50) and a small pond lies in the north-west (Photograph 53).
- 2.15 Topographically, the area is generally evenly graded with a slight slope towards the east, falling by approximately.
- 2.16 Two markers for a buried gas main were observed in the west and east of the area.

### 3.0 GEO-ENVIRONMENTAL DESK STUDY

#### Sources of Information

3.1 The following sources of information have been consulted as part of the desk study for the site:

- Historical Ordnance Survey Mapping (reference 5866510);
- Groundsure Reports (reference 5866508 and 5866509);
- British Geological Survey (BGS) exploratory hole records ([www.bgs.co.uk](http://www.bgs.co.uk));
- British Geological Survey mapping 1:50 000 Scale, Bourne, Sheet 143, Solid and Drift, dated 1971;
- British Geological Survey mapping 1:50 000 Scale, Stamford, Sheet 157, Solid and Drift, dated 1978;
- Zetica – regional unexploded bomb risk maps ([www.zetica.com](http://www.zetica.com)); and
- Magic Map website ([www.magic.defra.gov.uk/MagicMap](http://www.magic.defra.gov.uk/MagicMap));

#### Site History

3.2 The site history has been assessed by review of the 1:2500 and 1:10,000 scale historical Ordnance Survey maps provided by Groundsure, and presented in Appendix D. A summary of the history of the three areas and their surroundings is summarised in Table 1 below.

**Table 1: Historical Summary of the Site and Surroundings**

AREA A		
Map Dates Shown	Location	Pertinent Features
1884–1888 – 1:10,560	On-site	Area A is formed of several fields, Osbonall Wood in the east, an unnamed watercourse running eastwards in the north of the area, and a small wooded area in the north. Buildings and a small pond, labelled as Bidwells Lodge, are present to the south-east of Osbonall Wood. A larger pond is recorded close to the south western boundary, and further small ponds are recorded across the site, in the centre of fields and along field boundaries.
	Off-site	The area surrounding Area A is dominated by agricultural fields, quarries and wooded areas. Greetham Wood Far is recorded adjacent to the western boundary, with the Great North Road approximately 600m to the west. An old quarry is also recorded approximately 700m to the west.  To the north of the area, three old quarries lie within 500m of the site, the village of Stretton lies approximately 650m to the north-west, and the village of Clipsham is approximately 250m to the north-east. A road forms the northern site boundary, connecting the two villages. A

		lane forms the eastern border, with three limestone quarries (active and disused) recorded within 50m of the boundary.
1904–1905 – 1:10,560	On-site	No significant changes noted.
	Off-site	Two plantations are recorded within 500m of the northern area boundary. Another quarry is mapped adjacent to the eastern site boundary.
1950 – 1:10,560	On-site	The south of Area A has undergone partial development, associated with the airfield in Area B. Trackways, runways and small buildings are recorded close to the southern boundary, and camp buildings lie to the west of Osbonall Wood.  The remaining parts of Area A undergo no significant change.
	Off-site	Development has increased to the west with infrastructure recorded within Greetham Wood Far and adjacent to the site boundary. Quarrying to the east of the area increases, with large quarries sandwiched between Area A and Area C.
1980–1982 – 1:10,000	On-site	The wooded area in the north has been removed, and field boundaries have altered to form fewer but larger fields. Much of the development in the south of the area has been removed, leaving a cluster of buildings to the west of Osbonall Wood which are labelled as a disused campsite. Bidwell lodge is also no longer present.  In the south-west of Area A, two Shake Holes and two Swallow Holes are recorded, and a drainage ditch runs southwards from the south eastern corner of Osbonall Wood.
	Off-site	The lane adjacent to the eastern boundary is labelled Bidwell Lane, paralleled by a drain, and Bidwell Farm is now present next to the site. The quarries sandwiched between Area A and Area C are recorded as disused. The Great North Road has expanded and is now labelled as the A1. The road along the northern site boundary is labelled Clipsham Road in the west and Stretton Road in the east. The infrastructure to the west has reduced, with many of the buildings within Greetham Wood Far removed.
2002 – 1:10,000	On-site	A drain is recorded along the southern boundary, and more of the trackways in the south of the area, associated with the airfield, have been removed.
	Off-site	No significant changes shown.
2010–2014 – 1:10,000  2000 to 2018 - Google Satellite Imagery	On-site	A drainage ditch is recorded in the south-east of the area, connecting Osbonall Wood with Bidwell Lane.
	Off-site	From 2014, roads are recorded leading from Bidwell Lane to the quarries lying east of the area. No further significant changes are shown.

AREA B			
Map Shown	Dates	Location	Pertinent Features
1884–1888 1:10,560	–	On-site	Area B is formed of several fields and woodlands. Woolfox Wood lies in the north-east of the area, Ash Wood is recorded in the centre, The Coppice lies in the east and Hardwick Wood lies in the south-east. Buildings and a small pond, labelled as Woolfox Lodge, are present to the south-east of Woolfox Wood. A number of additional ponds are recorded across the area, generally close to field boundaries. Two Old Quarries are recorded in the west of the area.
		Off-site	The land surrounding Area B is predominantly formed of agricultural fields and woodland, and the Great North Road lies adjacent to the south-west boundary.  To the south of the area, two clusters of buildings, associated with Hardwick Lodge and Hardwick Farm, and an old quarry are recorded within 100m of the site. To the west of the area, three limestone pits (indicated as active and disused) lie within 300m of the boundary, and North Road Spinney and Horn Lane Spinney are recorded within 500m of the boundary. An old quarry is also recorded approximately 250m to the east.
1904–1905 1:10,560	–	On-site	No significant changes.
		Off-site	Hardwick Lodge to the south of the area is labelled Hardwick Cottages.
1950 – 1:10,560	–	On-site	The area now comprises the runways and infrastructure of RAF Woolfox Lodge, which opened in 1940, but is recorded as disused in 1950. Buildings are recorded across the site, particularly along the southern and western boundaries, in the area around Woolfox Lodge, and within Woolfox Wood, and close to the eastern boundary. Hardwick Wood has reduced in size from the north.  Ash Wood has been removed, the two quarries in the west have been backfilled, and some of the ponds in the centre and west of Area B have been infilled.
		Off-site	The Old Quarry located within 100m of the southern boundary is now recorded as an archaeological site of Harwick Village. Hardwick Farm has expanded. Development to the west of the site has increased, with a cluster of buildings recorded approximately 400m to the west. Quarrying to the west of the area has increased, with three additional sites identified.
1980–1982 1:10,000	–	On-site	The network of runways and tracks has partially been removed across the site, along with the majority of buildings. This has left areas of land between the trackways, likely used for agriculture. Woolfox Lodge is no longer present. The buildings which remain are located close to the

		eastern and western boundaries, and to the south of Woolfox Wood. The majority of ponds located across the site have been infilled, with the exception of one within The Coppice in the south-east. A drain is recorded along the south eastern boundary of Woolfox Wood.	
	Off-site	The Great North Road lying to the west of the site has expanded and is also labelled as the A1. The buildings to the south of the area associated with Hardwick Cottages are not present, however Hardwick Farm has expanded northwards. The site of Hardwick Village is no longer labelled. Two of the quarries to the west of the area are disused, with one backfilled. The other quarry is active and has been labelled as Woolfox Limestone Quarry. Woolfox Depot is recorded adjacent to the south-west boundary, with a police office, depot and Woolfox Lodge recorded. Horn Lane Spinney to the west of the area is now labelled Toll Bar Spinney.	
2002 – 1:10,000	On-site	Less infrastructure is recorded in the south of the area.	
	Off-site	Woolfox Quarry has expanded westwards. Hardwick Farm has expanded west towards the A1. A golf course is recorded approximately 250m south of the area.	
2010–2014 – 1:10,000  2000 to 2018 - Google Satellite Imagery	On-site	From 2014, the pond in The Coppice has been backfilled. No further significant changes are observed.	
	Off-site	From 2014, a wooded area is recorded adjacent to the north eastern area boundary. Woolfox Depot has expanded and no longer houses a police station. Satellite imagery shows Woolfox Quarry to the west of the area as still active.	
<b>AREA C</b>			
<b>Map Shown</b>	<b>Dates</b>	<b>Location</b>	<b>Pertinent Features</b>
1884–1888 – 1:10,560	On-site		Area C comprises a number of agricultural fields, with wooded areas named Big Sutie in the south-west and Little Sutie in the south-east. Ten ponds are mapped across the area, the one in the north-west is present today. A trackway borders the site to the south and runs south through the east of the site.
	Off-site		Area C is predominantly surrounded by agricultural fields to the north, south and west, with Pickworth Great Wood to the east, and Big Pits Wood to the north-west.  Small quarries lie within 500m of the site boundary, with an old quarry mapped 200m west of Area B and an active quarry 200m to the north-west.
1904–1905 – 1:10,560	On-site		No significant changes shown.
	Off-site		No significant changes shown.
1950 – 1:10,560	On-site		The field boundaries have changed, with the area now formed of four larger fields. The majority of the Little Sutie wooded area in the south-east has been deforested, with the western tip remaining.

	Off-site	The quarrying in the surrounding area has increased by 1950. Three quarries are recorded adjacent to the western boundary of Area C, surrounding Big Pits Wood; one is recorded adjacent to the northern site boundary; and a sequence of multiple quarries lie adjacent to the north eastern corner, extending to approximately 750m north-east of the site.
1980 – 1982 – 1:10,000	On-site	By 1980, the site is formed of a single agricultural field, with the wooded area, Little Sutie, in the south-east corner of the site. Big Sutie has been deforested, and all ponds previously recorded are no longer present, with exception of the existing pond in the north-east of the site. A Shake Hole is recorded in the south-east of the site where Big Sutie had previously been.
	Off-site	The largest quarry lying to the east of Area C is now recorded as disused, with the two other quarries indicated to have been infilled and ponds developed. The quarry adjacent to the northern site boundary is also indicated to be infilled. The sequence of quarries to the north-east of the area, named Clipsham Quarries, has expanded to the west with an active quarry approximately 250m north of the area. The remaining quarries are recorded as disused or indicated to have been infilled, with the exception of the largest quarry in the east which is recorded as a disused tip.
2002 – 1:10,000	On-site	No significant changes noted.
	Off-site	By 2002, the Clipsham Quarries are all recorded as disused or infilled, with Pickworth Great Wood extending over the majority of this area. A limestone quarry is now recorded north of the site, which is present today.
2010 – 2014 – 1:10,000  2000 to 2018 - Google Satellite Imagery	On-site	No significant changes shown.
	Off-site	The east, south and west of Area C do not undergo significant change. The quarry north of the site continues to extend westwards, with the eastern portion gradually becoming backfilled. A track is constructed to the north of the quarry between 2010 and 2011.

### Geology

- 3.3 Information published by the BGS indicates superficial glacial till deposits to underly the majority of the site, with regions in each area shown to have no superficial cover. The underlying solid strata comprises limestone of the Upper and Lower Lincolnshire Limestone Members, and argillaceous rocks of the Rutland Formation. The distribution of these strata is summarised below.

#### Area A

- 3.4 Superficial Glacial Till Deposits are shown to underly the southern half of Area A, with a band of Head deposits mapped in the south western corner. The northern half of Area A is shown to

be directly underlain by limestone of the Upper Lincolnshire Limestone Member. Limestone of the Lower Lincolnshire Limestone Member is mapped in the valley located in the north of the area, and mudstone with subordinate sandstone and limestone beds of the Rutland Formation is mapped in the east and south-east of the area.

- 3.5 BGS exploratory hole records show the superficial glacial deposits have a recorded thickness of between 1m and 5m. The limestone bedrock in the north extends to a depth of approximately 17m, and in the south to approximately 27m. The borehole information records the Rutland Formation beneath the Lower Lincolnshire Limestone to depths in excess of 40m bgl.

#### Area B

- 3.6 The majority of Area B is shown to be underlain by superficial Glacial Till Deposits, with nearby historic boreholes recording boulder clay to approximately 5m bgl. Superficial deposits are not mapped along the eastern border or in the south of the area. The eastern half of Area B is shown to be underlain by solid strata of the Rutland Formation, and the western half by limestone of the Upper Lincolnshire Limestone Member. Nearby boreholes record the limestone bedrock extending to 31m bgl, with the underlying Rutland Formation to depths greater than 40m.

#### Area C

- 3.7 The BGS records indicate superficial glacial deposits (Till and Glaciofluvial) lie along the eastern and western boundaries of Area C, with a thickness of between 3m and 6m. The remainder of Area C is indicated to be directly underlain by mudstone, with subordinate sandstone and limestone beds, of the Rutland Formation, with the north western corner underlain by the Upper Lincolnshire Limestone Member. The available BGS borehole records show the Upper Lincolnshire Limestone Member recorded to depths of between 6m and 29m overlying the Rutland Formation, which extends to depths in excess of 35m.
- 3.8 A thickness of Topsoil and subsoil is anticipated across the majority of the site, based on the predominant agricultural usage. Localised areas of Made Ground are anticipated in Area A, where the concrete track is recorded in the south, and in the location of the building remains in the centre of the site. Extensive Made Ground is anticipated across Area B, associated with the remains of the disused airfield, including the concrete tracks and building remains.
- 3.9 Organic deposits are anticipated locally in the areas of the ditches and ponds located across the site.
- 3.10 A number of normal faults are recorded in the surrounding area, one is inferred to extend into the east of Area A, however now displacement information is not recorded.

### **Hydrogeology**

- 3.11 The superficial Glacial Till deposits and Head deposits are classed as Secondary Aquifers – undifferentiated, and the Glaciofluvial deposits in Area C are classed as a Secondary ‘A’ Aquifer. The Limestone bedrock of the Upper and Lower Lincolnshire Limestone Members are classed as Principal Aquifers and the Rutland Formation is classed as a Secondary ‘B’ Aquifer.
- 3.12 The majority of the site is situated in a groundwater Source Protection Zone 2 (outer catchment), with the northern boundary within a groundwater Source Protection Zone 3 (total catchment). These zones are for the protection of groundwater quality as defined by the Environmental Agency. An area approximately 240m west of the site is situated within a groundwater Source Protection Zone 1 (inner catchment).
- 3.13 The Groundsure report indicates there are no recorded groundwater abstractions located within 250m of the site.
- 3.14 The BGS indicate there is potential for Clearwater Flooding below ground level. Therefore, there is a risk of flooding to any structures constructed below ground level (e.g. basements, swimming pools). In addition, this indicates that groundwater may be shallow and will potentially impact on the use of soakaways. The presence of a Swallow Hole in the south-west of Area A indicates the groundwater is shallow, however the BGS borehole records show groundwater at depths of between 15m and 30m.

### **Hydrology**

- 3.15 The environmental data presented in the Groundsure report and the site walkover highlight several surface water features within the site area. An unnamed watercourse flows eastwards across the north of Area A. There are also several field drains/ditches which were observed on the site walkover. A number of ponds are also recorded, with one in the west of Area A and one in the north-west of Area C, both of which have no recorded inlets or outlets. Poned water is recorded within the Shake Holes across the site, with inlets from land drains.
- 3.16 The majority of the site is located within Flood Zone 1 and is considered to be at a very low risk of fluvial flooding. However, areas either side of the unnamed watercourse in the north of Area A is within Flood Zone 2 and Flood Zone 3, which is considered to be at a low to high risk of fluvial flooding.
- 3.17 No surface water discharge consents and no licensed surface water abstractions are recorded within 250m of the site boundary.

### **Mining, mineral extraction and natural cavities**

- 3.18 The Groundsure report indicates the site does not lie within an area of mining. However, there are Johnson Poole and Bloomer mining areas recorded within 1km of the site boundary. This

is not provided by Groundsure, however a request for information has been sent and if relevant information is received it shall be appended to this report in due course.

- 3.19 The OS maps, site walkover and historic plans record the presence of natural cavities across the site, including swallow holes and shake holes in the south-west of Area A, a shake hole in the south-east of Area B, and a shake hole in the centre of Area C. The Peter Brett Associates natural cavities database indicate sinkholes, solution pipes and swallow holes should be expected in the south of Area A and north of Area B, and indicates gulls and fissures caused by cambering should also be expected in the south-west of Area B.
- 3.20 The site lies within an area where extensive limestone quarrying has taken place since at least 1884. The historical map review above details the changes in quarrying activity on-site and in the surrounding area. There are currently no active quarries on-site. Clipsham Quarry is located north of Area C and was active at the site of the site walkover.

### Regulatory Information

- 3.21 A summary of pertinent information from the Groundsure Report (Appendix E) is provided in Table 2 below.

**Table 2: Regulatory Information**

<b>Infilled Land</b>	<p>There are 33 records of potentially infilled land on-site, relating to old quarries, pits, ponds, shake holes and heaps. Generally, these areas are located along the site boundaries where the quarrying and ground works have marginally extended into the site.</p> <p>In Area A, two records of infilled land are shown in the south-west, and refer to Shake Holes and unspecified holes. In Area B, three regions of infilled land are recorded, with the two in the north corresponding to unspecified heaps and the one in the south-west corresponding to an unspecified quarry recorded in 1950. One area of infilled land is recorded in the south-west of Area C, referring to a Shake Hole.</p> <p>In addition to these records, a review of the available historical mapping of the site has indicated a number of ponds have been infilled in Area C.</p> <p>There are 99 records of potentially infilled land within 500m of the site, all of which correspond to infilled quarries, natural cavities, pits, ponds, heaps and groundworkings.</p>
<b>Tanks</b>	<p>Historically, one unspecified tank is recorded approximately 15m west of the site between 1950 and 1979, and three unspecified tanks are recorded within 250m west and south-west of the site, dated 1977.</p> <p>The current industrial data records three generic tanks within 250m of the site, one at 172m to the west, one 214m to the south-east and one 242m to the south-west.</p> <p>It is considered likely that fuel storage tanks will have existed associated with the former airfield although there are no readily available records.</p>

<b>Electricity Substation</b>	The closest electricity substation is recorded 47m north-west of the site.
<b>Historical Industrial Sites</b>	<p>There are 35 records of historical industrial sites within the site. The most significant historical industrial site record is for the disused airfield located in Area B, which was open from 1940 until 1965. Area B also contains an unspecified quarry in the south-west of the site, which was recorded between 1884 and 1905. Groundworkings are also recorded in the north-west of Area B, adjacent to Woolfox Wood. The records predominantly refer to quarry works which occurred close to the site boundaries, and which may have extended marginally into the site.</p> <p>Within 250m of the site there are 77 recorded historical industrial sites. These mostly refer to the quarrying which has occurred in the area since at least 1884.</p>
<b>Current Industrial Sites</b>	<p>There are no industrial sites currently recorded on-site.</p> <p>Sixteen industrial sites are recorded within 250m of the site, including three disused limestone quarries; a Hoppers and Silos centre at Hardwick Farm, adjacent to the southern boundary of Area B; the active quarry north of Area C; and, Woolfox Depot which comprises centres for storage, haulage, agricultural contracting, industrial engineering and animal feeds.</p>
<b>Ecology</b>	<p>Area C lies adjacent to Pickworth Great Wood and Clipsham Old Quarry, a designated Site of Special Scientific Interest (SSSI).</p> <p>Five ancient woodlands are recorded within the site, as designated by Natural England. These refer to Osbonall Wood in the centre of Area A, Woolfox Wood in the north-west of Area B, The Coppice in the east of Area B, Hardwick Wood in the south-east of Area B, and Holywell Wood in the south-east of Area C.</p> <p>During the site walkover, possible badger setts were identified across Area A, generally close to wooded regions. It is recommended that a specialist ecological survey is carried out before any site work is undertaken.</p>
<b>Permitted Landfills and Waste Sites</b>	<p>The Environment Agency record one landfill taking non-biodegradable waste approximately 58m west of the site. The EA also record a historical landfill 170m north-west of the site which was licenced until 2009.</p> <p>A waste transfer station is recorded 236m west of the site and the EA records show two further waste licenced sites within 250m west of the site.</p>
<b>Nitrate Vulnerable Zone</b>	The site is located within a Nitrate Vulnerable Zone relating to surface water.
<b>UXO Risk</b>	Based on a review of freely available information, the site is considered to be at a low risk of unexploded ordnance (UXO). However, the disused airfield in Area B is indicated to have been a Luftwaffe target. A detailed UXO risk assessment has been ordered, and will be reviewed and appended to this report once it becomes available.

### **Consultation**

- 3.22 The Environmental Health Office (EHO) for Rutland County Council hold a register of contaminated site. As of 16<sup>th</sup> March 2019, no sites have been added to the register.
- 3.23 The Planning Portal for Rutland County Council was reviewed on 16<sup>th</sup> March 2019 and there are no relevant applications available for the site or surrounding area.

### **Ground gases**

- 3.24 Potential sources of ground gases have been identified on-site and include the following.
- Made Ground associated with the concrete tracks and building remains in the south of Area A, and the remains of the former airfield in Area B;
  - Potential organic deposits associated with the drainage ditches and ponds on-site; and
  - Potentially infilled land, including backfilled ponds, quarries, shake holes, pits and heaps.
- 3.25 Potential sources of ground gases identified off-site include the following.
- Made Ground associated with adjacent development;
  - Potential organic deposits associated with nearby ponds and drainage ditches;
  - Potentially infilled land within 250m of the site, including infilled quarries, pits, ponds and groundworkings;
  - Two landfill sites recorded within 200m of the site boundary; and
  - The two licenced waste sites recorded within 250m of the site.
- 3.26 The site is within an area where between 10% and 30% of properties are above the radon action level. Accordingly, full radon protection measures are required for new properties.

## 4.0 PRELIMINARY GEOTECHNICAL ASSESSMENT

- 4.1 The information sources noted in Section 3.0 have been reviewed in order to provide a summary of potential ground constraints and opportunities presented below. The following comments and recommendations are based on the qualitative findings of this Geo-environmental Desk Study, and may not be representative of actual engineering properties of on-site soils (e.g. stability, mass of structure etc.).

**Table 3: Preliminary Geotechnical Appraisal**

<b>Made Ground</b>	In Area A, localised areas of Made Ground of unknown depth and quality are anticipated in the south where a concrete track and building remains are present. Made Ground is anticipated to be more extensive in Area B due to the previous industrial use as an airfield. During the site walkover, evidence of Made Ground was seen with a concrete track network and building remains distributed across the area. Buried obstructions were observed in the north and east of Area B, indicating localised areas of deep Made Ground. Localised Made Ground may also be present in Area C where a gas main runs eastwards across the south of the area. Made Ground is not suitable as a founding stratum and therefore may require removal or localised deepening of foundations.
<b>Topsoil</b>	A topsoil strip of the site will be required to enable development of the site. Subject to appropriate assessment, the topsoil material may be suitable for reuse in garden or landscaped areas.
<b>Organic-Rich Deposits</b>	Localised areas of organic deposits of unknown depth are anticipated, associated with the unnamed watercourse in the north of Area A, the drainage ditches across the site, and the ponds and shake holes in the south of Area A and in the centre of Area C. Organic deposits are not suitable as a founding stratum and should be fully penetrated.
<b>Preliminary Foundation Solution</b>	<p>Based on the anticipated presence of cohesive glacial till and head deposits across the majority of the site, and the underlying limestone and mudstone bedrock, a traditional strip/trench fill foundation solution is likely to be acceptable for many areas.</p> <p>Careful consideration will need to be given, however, to the potential for development of solution features within the Lincolnshire Limestone and indeed to the various existing such features that have been identified. A tailored ground investigation and risk profiling will be required, incorporating both intrusive and geophysical methods, across the site area.</p> <p>The anticipated presence of organic deposits in the area of the watercourse, ditches and ponds may require consideration of an alternative foundation solution (for example piles) in these areas.</p>

	The anticipated Made Ground in Area B, in particular the observed buried structures in the north and east, may also result in alternative foundation designs.
<b>Buried Obstructions</b>	Buried obstructions such as land drains and underground services should be decommissioned and removed during enabling works. The buried structures observed in Area B should be investigated and an appropriate methodology developed for treatment, taking into account the detailed development proposals.
<b>Trees</b>	Due to the suspected presence of cohesive strata across the majority of the site, and the presence of mature trees and hedgerows, an allowance should be made for adjustment of foundation and floor slab designs for the proposed development taking into account the significant influence of trees (along field boundaries and near wooded areas) in addition to any proposed planting.
<b>Pyritic Geology</b>	The superficial and solid strata are unlikely to be pyritic, however laboratory testing should be carried out to determine the concrete specification for the site.
<b>Earthworks</b>	<p>Due to the undulating topography of Area A, large-scale earthworks are likely to be required. Area B and Area C are relatively level, and large-scale earthworks are unlikely to be required, although some local areas of cut and fill will be required to create level working platforms.</p> <p>If the ponds, shake holes, swallow hole and drainage ditches are infilled as part of the development, any organic deposits should be removed prior to backfilling with a suitable inert engineered fill. An ecological survey will also be required in the pond areas.</p>
<b>Drainage and Soakaways</b>	<p>Soakaway drainage is unlikely to be viable due to the anticipated cohesive nature of the superficial deposits and the potential risks associated with initiating development of solution features within the anticipated Limestone bedrock, where present.</p> <p>The feasibility of soakaways will need to be assessed further as part of the proposed risk profiling of solution features.</p>
<b>Ground Stability Hazards</b>	<p>The Groundsure report indicates that the site is at a negligible to low risk of shrinking/swelling clay associated with the superficial deposits. There is a very low to low risk of landslides on site, a very low risk of collapsible deposits, and a very low to negligible risk of running sands.</p> <p>The Groundsure report confirms a variable (low to high) risk of ground dissolution of soluble rocks with the variability relating to the prevailing superficial and bedrock geology.</p>

## 5.0 PRELIMINARY ENVIRONMENTAL RISK ASSESSMENT

- 5.1 This section assesses the significance of the environmental issues that have been identified on-site or in the surrounding area in previous sections of this report by developing a preliminary Conceptual Site Model (CSM).
- 5.2 The objective of the CSM is to identify potential contaminant sources, pathways and receptors relating to the site and surrounding area to evaluate the potential for a pollution event to occur using a risk classification tool. The level of risk is assessed by comparing the likelihood of a pollution event to occur, versus the consequence of a pollution occurrence. The consequence is essentially a measurement of the severity of a hazard (or source) and sensitivity of the receptor (controlled waters and human health).
- 5.3 The risk assessment methodology detailing the classes of significance is given in Section 8.0. The risks associated with each potential pollutant/contaminant linkage are evaluated in Table 4.
- 5.4 Based on our experience of similar sites, it is considered likely that some form of remediation will be required locally within the former airfield. This may take the form of excavation and re-location of contaminated soils and/or potentially the placement of a suitable thickness of capping over contaminated soils.
- 5.5 The site is located in a Radon affected area and protection will be required for all new dwellings. This is likely to take the form of provision of a gas impermeable membrane and ventilation of sub-floor voids. A detailed assessment of methane and carbon dioxide ground gases will also be required although the level of radon protection is also likely to be sufficient to protect against other ground gases.

**Table 4: Preliminary Conceptual Site Model**

Source	Pathway	Receptor	Consequence	Likelihood	Risk
<p><b>On-site</b></p> <p><u>Previous agricultural site use</u> Potential contaminants may include heavy metals, polycyclic aromatic hydrocarbons and asbestos.</p> <p><u>Previous industrial site use – airfield</u> Potential contaminants may include TPH, VOC's, heavy metals, polycyclic aromatic hydrocarbons and asbestos.</p> <p><u>Dumped waste materials and agricultural machinery</u> Potential contaminants may include heavy metals, polycyclic aromatic hydrocarbons, TPH and asbestos.</p> <p><u>Potentially infilled land associated with quarries, ponds and shake holes</u> Potential for generating ground gases.</p> <p><u>Localised Made Ground associated with former buildings and existing ruins</u> Potential contaminants may include heavy metals, polycyclic aromatic hydrocarbons and asbestos. Thick Made Ground is a potential source of ground gas.</p> <p><u>Organic Rich Deposits associated with surface water</u> Potential for generating ground gases</p> <p><u>Radon generated by Lincolnshire Limestone</u></p>	Direct contact, ingestion and/or inhalation of contaminated soil particulates	Ground and construction workers	Sv	Li	H
		Future site users	Md	Lw	M/L
		Foundations and water utility pipes	Md	UI	L
	Outdoor and indoor inhalation of ground gases – risk of asphyxiation and explosion	Future site users, ground and construction workers	Sv	Lw	M
		Long term exposure to Radon	Future site users	Sv	Lw
	Leaching of contaminants and vertical migration to the groundwater	Secondary undifferentiated Aquifer within the Glacial Till and Head deposits, Secondary 'A' Aquifer within the Glaciofluvial deposits, Secondary 'B' Aquifer within the Rutland Formation and the Principal Aquifer within the limestone bedrock.	Sv	Li	H
			Md	Lw	M/L
	Migration of sediments via surface runoff and migration of contaminants via groundwater base flow	Watercourse in the north of Area A, drainage ditches across the site and the ponds in the south of Area A and north-west of Area C.	Md	Li	M
			Md	UI	L
			Mi	UI	VL
<p><b>Off-site:</b></p> <p>Made Ground associated with development adjacent to the site and backfilled ponds and quarries in the surrounding area.</p> <p>Off-site electricity substation located 47m to the north-west.</p> <p>Off site landfill sites 58m to the west and 170m to the north of the site, and waste transfer and treatments sites within 250m west of the site.</p> <p>Potential contaminants may include heavy metals, petroleum hydrocarbons, polycyclic aromatic hydrocarbons, asbestos containing materials, TPH, VOCs, vapours and ground gases.</p>	Direct contact, ingestion and/or inhalation of contaminated soil particulates	Ground and construction workers	Md	Li	M
		Future site users	Md	UI	L
		Water utility pipes	Mi	UI	VL
	Leaching of contaminants and vertical migration to the groundwater	Secondary undifferentiated Aquifer within the Glacial Till and Head deposits, Secondary 'A' Aquifer within the Glaciofluvial deposits, Secondary 'B' Aquifer within the Rutland Formation and the Principal Aquifer within the limestone bedrock.	Md	Lw	M/L
Md			Li	L	

VH = Very High, H = High, M = Moderate, M/L = Moderate/Low, L = Low, VL = Very Low

KEY: Sv = Severe, Md = Medium, Mi = Mild, Mr = Minor Hi = High, Li = Likely, Lw = Low Likelihood, UI = Unlikely

## 6.0 RECOMMENDATIONS

- 6.7 It is recommended that a copy of this report is submitted to the Local Planning Authority to support the ongoing promotion of the site and any future planning applications. Review of this report will enable the contaminated land or environmental health officer to review the findings and give comment as consultee to the Local Planning Officer. Future ground investigation will likely be conditioned as part of a planning permission.
- 6.8 A site-specific ground investigation is recommended to confirm the risks posed to human health and controlled waters receptors from potential sources of contamination and to determine the geotechnical conditions for civil engineering and infrastructure works for the proposed development. The investigation should also include a detailed risk profiling in relation to potential solution features.
- 6.9 An appropriate methodology should be developed for treatment of buried structures in Area B, taking into account the potential risk to future site construction and occupation.
- 6.10 It is recommended that a specialist asbestos survey is carried out prior to demolition of any building remains and any potential ACMs removed by a suitably qualified professional.
- 6.11 It is recommended that a specialist ecological survey is carried out before any site work is undertaken due to the observed badger setts in Area A.

## 7.0 REFERENCES

7.1 This report has been prepared, where possible, with regard to the following sources of reference and guidance, supplemented with experience of similar sites.

1. British Standards Institute, (BSI), BS 8485:2015, Code of Practice for the characterization and remediation from ground gas in affected developments
2. British Standards Institute, (BSI), BS 8576:2013, Guidance on investigations for ground gas – Permanent gases and Volatile Organic Compounds (VOCs)
3. British Standards Institute, (BSI), BS 10175:2011+A2:2017, Investigation of Contaminated Sites – Code of Practice
4. British Standards Institute, (BSI), BS5930:2015) Code of practice for ground investigations
5. British Standards Institute, (BSI), BS EN 1997-1:2004 Incorporating corrigendum February 2009, Eurocode 7 – Geotechnical Design – Part 1: General rules
6. British Standards Institute, (BSI), BS EN 1997-2:2007 Incorporating corrigendum June 2010, Eurocode 7 – Geotechnical Design – Part 2: Ground Investigation and testing
7. Building Research Establishment Special Digest 1 Third Edition. Concrete in Aggressive Ground (2005)
8. Building Research Establishment (BRE) BR211, Radon; Guidance on Protective Measures for New Buildings (2015)
9. Construction Industry Research and Information Association (CIRIA), Report 132, A Guide to Safe working on Contaminated Sites (1996)
10. Construction Industry Research and Information Association (CIRIA). 2001, C522 Contaminated land risk assessment, A guide to good practice
11. Construction Industry Research and Information Association (CIRIA). 2007, Report C665, Assessing Risk Posed by on Hazardous Ground Gases to Buildings
12. Department for Communities and Local Government (DCLG), 2012, National Planning Policy Framework
13. Department for Environment Food and Rural Affairs (DEFRA), 2012, Environmental Protection Act 1990: Part 2A Contaminated Land Statutory Guidance
14. Environment Agency report CLR11 'Model Procedures for the Management of Land Contamination'
15. Environment Agency 2008, Updated technical background to the CLEA model Science Report – SC050021/SR3
16. Environment Agency, 2006, Remedial Targets Methodology, Hydrogeological Risk Assessment for Land Contamination
17. Health and Safety Executive (HSE) 'Protection of workers and the general public during the Development of Contaminated Land (1991)

18. NHBC Guidance for the Safe Development of Housing on Land Affected by Contamination, R&D Publication 66: 2008
19. Coal Authority 'Risk Based Approach to Development Management: Guidance for Developers Version 4 – 2017'.

## **8.0 APPROACH TO RISK ASSESSMENT**

### **Land Use**

- 8.1 This report establishes the former and current land uses that may have caused contamination or given rise to environmental concerns on the site. An inspection has been undertaken where possible to provide further details of the site and neighbouring activities and to observe environmental conditions.

### Historical Maps

- 8.2 Information about the history of the site has been obtained primarily through an inspection of historical Ordnance Survey maps, which can be important in assessing potential liabilities. Historical maps can show past potentially contaminative uses at a site that would not necessarily be obvious during a site inspection, for example storage tanks or previous usage such as a gas works or quarry.

### Public Record Information

- 8.3 Information concerning environmental regulations relating to the site has been obtained from a public register which has been accessed from a commercial database (e.g. Landmark Information Group or Groundsure). This is the quickest means of gathering publicly available information. The data is supplied from within a 1km radius of a given National Grid reference of a site. The database contains information from the Environment Agency (EA) and other statutory authorities responsible for monitoring environmental protection measures within the area of a site under existing legislation.
- 8.4 Supplementary information has also been obtained directly from the environmental regulators, where possible in order to gauge the environmental characteristics of the site in more detail and to establish whether there have been any breaches of environmental regulations or pollution incidents associated with the site.

### Environmental Legislation

- 8.5 The principal environmental legislation in England consists of the Environmental Protection Act 1990 (EPA 90), the Water Resources Act 1991 and the Environment Act 1995 (EA 95). These Acts prescribe protection measures for all the environmental media (land, water and air) and are regulated by the EA and the Local Authority. Part 1 of the EPA 1990 sets out the statutory framework for Integrated Pollution Control (IPC) and Air Pollution Control (APC).

### **Environmental Setting**

- 8.6 This report assesses the environmental sensitivity of the site location to contamination/pollution. The sensitivity of the environmental setting aids in assessment of environmental liability and is evaluated using British Geological Survey (BGS) information and data from the EA on groundwater and surface water. Data on abstractions have been obtained from the purchased

database information. The vulnerability of surface waters and groundwater is based on sensitivity to pollution, distance from abstractions, type and nature of groundwater and type of overlying strata. The EA have classified aquifers into three types - Principal Aquifers, Secondary Aquifers and Unproductive Strata - depending upon the hydrogeological sensitivity, permeability and whether they support large abstractions for drinking water supplies.

Principal Aquifers (high permeability)

- 8.7 These are highly permeable formations usually with a known or probable presence of significant fracturing. They may be highly productive and able to support large abstractions for public supply and other purposes.

Secondary Aquifers (variable permeability)

- 8.8 These can be fractured or potentially fractured rocks which do not have a high primary permeability, or other formations of variable permeability including unconsolidated deposits. Although these aquifers will seldom produce large quantities of water for abstraction, they are important both for local supplies and in supplying base flow to rivers. Secondary Aquifers are sub-classified into Secondary A Aquifers, Secondary B Aquifers and Undifferentiated Secondary Aquifers. Principal Aquifers may occur beneath Secondary Aquifers.

Unproductive Strata (low permeability)

- 8.9 Formations which are generally regarded as having negligible significance for water supply or river base flow form a third group. However, groundwater flow through such rocks, although imperceptible, does take place and needs to be considered in assessing the risk associated with persistent pollutants. Some Unproductive Strata can yield water in sufficient quantities for domestic use. Principal or Secondary Aquifers may occur beneath Unproductive Strata.

**Environmental Risk Assessment**

- 8.10 This report assesses the potential for the site to give rise to environmental risks and whether or not the risks are acceptable or if further assessment and/or remedial action is required.
- 8.11 The qualitative risk assessment firstly considers the source of contamination (and extent, concentration and availability of contaminants) and potential contaminants associated with the source(s) (or hazards).
- 8.12 The effect of a hazard on an identified receptor is largely governed by the sensitivity of a receptor. Receptors may typically include people, buildings, animals, plants and local resources (such as groundwater, surface waters, mines etc). A change in the receptor should be considered if the end use of the site changes.
- 8.13 The presence of contamination (as a potential hazard), exposure pathway and the quantity of contamination that reaches the receptor that may determine the risk and effect on a receptor (such as the integrity of a barrier between a contamination source and receptor).

- 8.14 The risk classifications for both likelihood and consequence are based on methodology presented in Contaminated Land Risk Assessment, A Guide to Good Practice (CIRIA C552, 2001). The guidance states that the designation of risk is based upon a consideration of both: the magnitude of the potential consequence (severity) of risk occurring, which takes into account both the potential severity of the hazard and the sensitivity of the receptor; and the likelihood of an event occurring (probability), which takes into account the both the presence of the hazard and receptor and the integrity of the pathway.
- 8.15 The magnitude of consequence (severity) and likelihood (probability) is defined in the CIRIA guidance, together with examples. The two classifications are then compared (as shown on Table 5 to obtain an estimation of risk for each pollutant linkage, ranging from very high risk to very low risk.
- 8.16 A description of the risks and likely actions required is presented in Table 6 The benefit of estimating the risk in this way is that it can be revised after each investigation phase as the conceptual model and corresponding contaminant linkages are refined.

**Table 5: Comparison of consequence against probability**

		Consequence			
		Severe	Medium	Mild	Minor
Likelihood	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

**Table 6: Description of the classified risks and likely action required**

Level of Risk	Description of Classification
Very High Risk	<p>There is a high probability that severe harm could arise to a designated receptor from an identified hazard, or there is evidence that severe harm to a designated receptor is currently happening.</p> <p>If this risk is realised, it is likely to result in significant environmental and financial liability to current and/or future site owners/occupiers. Urgent investigation (if not already undertaken) and remediation is likely to be required.</p>
High Risk	<p>Harm is likely to arise to a designated receptor from an identified hazard.</p> <p>If risk is realised, it is likely to present a sizeable environmental and financial liability to current and/or future site owners/occupiers. Urgent investigation is required and remediation work may be necessary in the short term and likely over the longer term.</p>

Level of Risk	Description of Classification
Moderate Risk	<p>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 the harm would be relatively mild.</p> <p>Investigation is normally required to clarify the risk and determine the potential environmental liability. Some remedial works may be required over the longer term.</p>
Low Risk	<p>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.</p> <p>Limited investigation may be recommended to clarify the risk, dependent on the sensitivity of the receptor and view point of those of interest. Any remedial works are likely to be fairly limited.</p>
Very Low Risk	<p>There is a low possibility that harm could arise to a receptor. In the event of such harm being realised, it is likely to be mild or minor.</p>

8.17 The acceptability of risk will always depend upon the view point of those of interest, whether it is an occupier of a site, a regulator or stakeholder. As a result, it could be that action will be required to deal with a level of risk even if it is classified as very low.

## 9.0 NOTES ON LIMITATIONS

### General

- 9.1 Mewies Engineering Consultants Ltd (M-EC) has completed the attached report for the use of the Client detailed on the front cover and those parties with whom a warranty agreement has been executed, or with whom an assignment has been agreed.
- 9.2 Third parties should not use or rely upon the contents of the report unless written approval has been gained from M-EC; (due to legal requirements, a charge may be levied against such approval).
- 9.3 M-EC accepts no responsibility or liability for:
- a) the consequences of this documentation being used for any purpose or project other than that for which it was commissioned, and
  - b) this document to any third party with whom approval for use has not been agreed.

### Phase I Environmental Risk Assessments, Desk Studies and Site Audits

- 9.4 The work completed and utilised to provide this report comprises a study of available documentation. The opinions and results presented in this report have been arrived at by utilising the finite amount of data available at the time of writing and are relevant only to the purpose for which the report was commissioned. The data which has been reviewed should not be considered exhaustive and has been accepted in good faith as providing true and representative information pertaining to site conditions. Should additional information become available which may affect the opinions expressed in this report, M-EC reserves the right to review this information and, if warranted, to modify the opinions presented in the report accordingly.
- 9.5 It should be noted that the risks which are identified in this report are perceived risks based on the available information at the time of writing and that the actual risks associated can only be assessed following a physical investigation of the site.