Lancashire Central

Ground Conditions: Preliminary Risk Assessment

July 2022

Application for Outline Planning Permission

On behalf of Maple Grove Developments and Lancashire County Council

Lancashire County Council

MAPLE GROVE DEVELOPMENTS

Ground Conditions - Preliminary Risk Assessment

Lancashire Central, South Ribble, Lancashire

June 2022

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This document has been prepared and checked in accordance with
Waterman Group's IMS (BS EN ISO 9001: 2015, BS EN ISO 14001: 2015 and BS EN ISO 45001: 2018)

Issue	Date	Prepared by	Checked by	Approved by
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Comments

Third Issue updated with Design Team & Legal Review

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Objectives

Waterman Infrastructure & Environment Limited (hereafter referred to as “Waterman”) was instructed by Maple Grove Developments Limited & Lancashire County Council to undertake a Preliminary Risk Assessment (PRA) of ground conditions to accompany an outline planning application for a commercial-led development of allocated land, known as Lancashire Central, located to the south-west of the M65 (Junction 1A), Cuerden (hereafter termed “the Site”).

The objective of this assessment is to establish the potential for ground contamination at the Site, the potential implications on ground conditions associated with the proposed development, and to inform the geotechnical design.

Site Setting

Current Use	The Site currently comprises agricultural land with a number of residential properties, farm-houses and outbuildings located immediately adjacent to the Site.
History	Historically, the Site has remained within agricultural use. There is some potential for localised contamination where a former landfill has been identified, and where former ponds may have been infilled. A small sand pit was located in the centre-east part of the Site.
Geology	Geology beneath the Site comprises Glacial Till across much of the Site, with Glaciofluvial Deposits in the south-east of the Site, and a thin band of Head Deposits present in the north-east of the Site. Bedrock largely comprises Sidmouth Mudstone Formation, with Hambleton Mudstone Member within the east part of the Site.
Controlled Waters	A number of ponds and ditches are present across the Site. The Glaciofluvial Deposits, Sidmouth Mudstone Formation and Hambleton Mudstone Member beneath the Site are classified as Secondary B Aquifers; the Glacial Till and Head strata are classified as Secondary B Aquifers (undifferentiated).
Ground Gas and Vapour	An updated Landmark Envirocheck Report (**Appendix C**) was obtained for the Site. Updated consultation responses have been sought from South Ribble Borough Council and are pending at the time of this report issue.

Preliminary Conceptual Model

A Preliminary Conceptual Model has been developed, which considers each of the Zones within the Site. On the basis of the above information, the Site is considered to present a Low - Medium risk.

Recommendations

- A review of the previous intrusive investigation works completed to date should be undertaken when the detailed development plans for each Development Zone are known. The review will identify if further ground investigation is needed for foundation design or to confirm ground conditions within previously inaccessible areas;
- It is understood ground investigation has been completed on a number of the Zones by third parties. The Client should gain reliance on the existing ground investigation reports prior to planning further ground investigation;
- If any unexpected contamination or infilled ground is identified during the course of the developments, works shall be halted and a suitably qualified person shall be consulted to provide further assessment to guide mitigative and remediating works if required;
- Sediment traps should be used during redevelopment works to prevent the excessive discharge of sediment to the tributaries of the river Lostock;
- In the event that materials are to be excavated for re-use on Site or off-site disposal, a preliminary waste classification assessment should be undertaken. Waste acceptance criteria (WAC) testing may then be necessary, where off-site disposal is proposed; and,
- Soakaways are considered unlikely to be suitable drainage option at the Site.

1. Introduction

1.1 Objectives

Waterman Infrastructure & Environment Limited (hereafter referred to as “Waterman”) was instructed by Maple Grove Developments Limited to undertake a Preliminary Risk Assessment in relation to ground conditions. This report has been prepared to support an outline planning application by Lancashire County Council and Maple Grove Developments Limited (‘the Applicant’) for a commercial led development of land at Cuerden, near Preston (hereafter termed “the Site”). The land forms part of a site allocated for development within the South Ribble Local Plan, known as the Cuerden Strategic Site. The Site extends to 51.30 hectares and comprises land to the south of the M65, to the west of A49 Wigan Road, and east of Stanifield Lane.

The objective of the assessment is to establish the potential for ground contamination to be present at the Site, and the potential implications associated with the proposed commercial-led development of the Site.

1.2 Proposed Development

The Proposed Development is a multi-stage mixed end use development consisting of the following:

- Zone A Development for retail, commercial, hotel, health and employment uses plus soft landscaping and green infrastructure, highways infrastructure, servicing and associated hardstanding;
- Zone B Development for mainly employment uses plus green infrastructure and highways infrastructure;
- Zone C Development for employment/ business and leisure uses, green infrastructure and highways infrastructure;
- Zone D Development for employment/ business and leisure uses, green infrastructure and highways infrastructure; and
- Zone E for residential development with associated highways, hardstanding and soft landscaping).

A planning application is being made for an Outline Planning Permission (with all matters reserved save for access from the public highway and strategic green infrastructure/landscaping) for a mixed-use development including the provision of Employment use (Use Classes B2/B8/E(g)); retail (use Class E(a)); food, drink and drive-through restaurant use (Use Class E(b)/Sui Generis Drive-Through); hotel use (Use Class C1); health, fitness and leisure use (Use Classes E(d)/F(e)/F2(b)); creche/nursery (Class E(f)); car showrooms (Use Class Sui Generis Car Showroom); Residential use (C3) the provision of associated car parking, access, public open space, landscaping and drainage.

Full details of the proposed land usage, including breakdown of land usage by type and area are included in the Fletcher Rae Drawings included in **Appendix A**. The Future Development Phases shown on this plan are not included within the outline planning application.

1.3 Limitations and Constraints

The assessment was undertaken in accordance with the scope agreed between Waterman and Maple Grove Developments Limited. The benefit of this report is made to Maple Grove Developments Limited and Lancashire County Council.

The information contained in this report is based on a web-based research, review of available historical, geological and hydrogeological sources, consultation with the regulatory authorities and observations made during site walkovers on the 18th January 2022 and 21st June 2016.

Access was not gained to existing and occupied farm houses, farm buildings or outbuildings during the site walkover as these lay outside the Site Boundary.

Waterman has endeavoured to assess all information provided to them during this investigation but makes no guarantees or warranties as to the accuracy or completeness of this information.

The scope of this investigation does not include an assessment for the presence of asbestos containing materials within or below buildings at the Site. No buildings or private property was entered during the Site walkover.

The conclusions resulting from this study are not necessarily indicative of future conditions or operating practices at or adjacent to the Site.

2. Methodology

This Preliminary Risk Assessment has been undertaken in general accordance with the 2020 LCRM Guidance. Land Contamination: Risk Management Guidance (LCRM: Environment Agency, 8 October 2020). **Appendix E** provide the relevant Regulatory Context.

The report includes the following:

- Collation of available documentary information;
- Review of site walkover information collected on the 21st June 2016 and 18th January 2022;
- Hazard identification;
- Consultation with relevant regulatory bodies including South Ribble Borough Council (Environmental Health, Building Control and Planning) and the Environment Agency;
- Formulation of a Preliminary Conceptual Model for the Site (identifying the risk for each Zone);
- Hazard assessment for the identification of potentially unacceptable risks; and,
- Recommendations for further action.

For the purpose of the site walkover, site description; site surroundings; site history; previous assessment and concept site model sections of this assessment, the Site has been split into Zones, as described in **Section 1.2**, and shown in **Appendix A**. All other topic areas are considered for the Site as a whole.

3. Hazard Identification

3.1 Site Location & Description

The Site is located at National Grid Reference 355468, 424624 (OS Ref. SD553246) bound by A5083 Stanifield Lane to the west, the A582 Lostock Lane / M65 Junction 1A roundabout to the north; and A49 Wigan Road to the east, in the Cuerden area of Preston. A Site Location plan is included in **Appendix A**.

The Site covers an area of approximately 61 hectares (ha). Generally, the Site comprises agricultural land, predominantly rough grassland (pasture), some of which is in use for grazing animals. Field boundaries are formed by trees, tree belts and drainage ditches. A number of isolated residential properties are located immediately outside the Site Boundary adjacent to Old School Lane and Stoney Lane with a farm and associated farm buildings.

Part of the Site is designated as a Minerals Safeguarding Area[1]. For further details please refer to the Mineral Impact Assessment submitted as part of the application.

The northern boundary of the Site comprises hedgerows, adjacent to the A582 Lostock Lane, and a bank which slopes upwards towards the link road and the M65 Junction 1A roundabout. The eastern, southern and western boundaries of the Site are formed by hedgerows.

An initial site walkover was undertaken on 21st June 2016 (as part of a previous application), with an updated visit undertaken on the 18th January 2022; photographs taken as part of the most recent site walkover are presented within **Appendix B** of this report. Observations made during the site walkover are included below in **Table 1**.

Table 1: Observations Made During the Site Walkover

Site Wide Observations	
• Predominantly agricultural land, much of which is rough grassland mostly in use for animal grazing; • The topography of the Site is generally flat, with some undulation and pockets of depressed ground across the Site; • During the visit it was noted that the ground was soft, with some particularly boggy / marshy areas - however the visit was undertaken during a prolonged period of rain, which may explain the ground conditions; • There was significant rutting across some areas of the Site; • The Site is well vegetated, with fields comprising rough grassland bounded by mature trees and ditches; • Some trees and areas of the Site were protected by Heras fencing; • Access is possible into most fields via a series of gates located on Stanifield Lane, Old School Lane, Stoney Lane, and Wigan Road; • The presence of a number of ditches and ponds were noted, which were found to correspond with historical plans; and • No visual or olfactory evidence of contamination was noted on the ground surface.	
Zone Specific Observations	
Zone A	• Road cuttings, subbase and marker posts for the proposed highways infrastructure were observed. • Significant areas of land enclosed by Heras fencing. • Several raised covers for gas monitoring installations were noted. • Some stockpiled material, presumed to be topsoil observed to the west of the M65 roundabout.

[1] Lancashire County Council (2013) Joint Lancashire Minerals and Waste Development Framework: Site Allocation and Development Management Policies DPD http://www.lancashire.gov.uk/media/305791/Proposals-Map-2-MSA-A0.pdf (accessed 24.06.2016)

Zone Specific Observations	
	• An area of hardstanding, presumed to be a former works compound, was noted in the southwest of Zone A. • An electricity pylon and high voltage overhead line is located within the northern portion of the Zone. • The Stoney Lane Farm complex, on Stoney Lane immediately adjacent to the Zone, appears to contain a number of above ground fuel tanks (the nature of which was not known) and there was some evidence of informal tipping / dumping of wood, possibly the location of a bonfire pit. Caravans, old vehicles and farm vehicles were being stored within the farm complex, on areas of hardstanding and soft ground.
Zone B	• A significant quantity of crushed aggregate, including crushed sandstone, granite and in some places brick was noted in the north of this Zone, running east-west. The nature of the material suggest it is part of a proposed road construction or has been used as a temporary access road for plant. • An area of plantation previously recorded, adjacent to the M65 Junction 1A roundabout is no longer present and has been replaced by heavily rutted grassland and extensive marshland with deep drainage ditches. The isolated raised ground level (possibly made ground) is now clearer to see and extends towards the Quarry to the south of the Site. • Grassland in the southeast of Zone B was very boggy and rutted during the 2022 Site walkover. • Two bathtubs, presumed to be watering troughs for grazing animals were noted in the south of the Site.
Housing Development Zone	• The north-western most field (adjacent to Stanifield Lane and Lostock Hall Lane) is a gated compound, accessed via a padlocked gate. • There was evidence of building foundations close to the entrance of the compound, a series of wooden platforms and cleared ground throughout the compound, and some former animal enclosures and small sheds. It was observed that there had been some recent ground disturbance, close to the compound entrance. • An Electricity substation (No: 4151670) was recorded in the west of the Zone in a small compound adjacent to Stanifield Lane. • Informal tipping recorded during the 2016 Walkover was not noted at the time of the 2022 walkover.
Zone C Development Zone	• A high voltage overhead line is located within the Southern portion of this Zone.
Zone D Development Zone	• No specific observations were made in this area of the Site.

Current potentially contaminative site uses were identified during the site walkovers and are summarised **Table 2**.

Table 2: Summary of Potentially Contaminative Activities within each Zone

Potential Issue	Development Zone				
	Zone A	**Zone B**	**Zone C**	**Zone D**	**Housing Development**
Aboveground Storage Tanks (and fuel lines)	Two tanks within the yard at Stoney Lane Farm, immediately adjacent to the Zone – contents unknown. Observed, but inspection not possible. No visual of olfactory evidence of contamination was noted.	n/a	n/a	n/a	n/a
Drainage					
Hazardous Materials	Possible storage of chemicals at Stoney Lane Farm, immediately adjacent to the Site. Observed, but close inspection not possible. No visual of olfactory evidence of contamination was noted. Stockpiled material, inferred to be earthworks bunds comprising of primarily topsoil, were recorded to the west of the M65 roundabout.	n/a	n/a	n/a	Informal tipping and waste disposal observed within north-west portion of the site as part of the 2016 walkover.
Solid and Liquid Waste Storage	Possible septic tanks at Stoney Lane Farm, immediately adjacent to the Zone. Observed, but close inspection not possible. No visual of olfactory evidence of contamination was noted.	n/a	n/a	n/a	n/a

3.1.1 Site Surroundings

The Site is located in a predominately arable area. A summary of the current surrounding land uses for each Zone is shown in Error! Reference source not found..

Table 3: Summary of Surrounding Land Uses

Location	Description				
	Zone B	**Zone A**	**Housing Development**	**Zone C**	**Zone D**
North	The northern boundary is formed by a vegetated slope leading up to the M65 Junction 1A roundabout, beyond which is a light industrial / retail park 'South Rings Business Park' which includes retail and offices premises, leisure facilities and a hotel. Some parts of the estate are not built out and are currently areas of scrub land. An area of undeveloped open space is located to the north-east (bound by the A49 Wigan Road, A6 Lostock Lane, the M6 and M65).	Agricultural land (**Zone C**).	The A582 Lostock Lane road forms the northern boundary, with fields and residential properties beyond.	The A582 Lostock Lane road forms the northern boundary, with fields and residential properties beyond.	Existing residential dwellings on Stanifield Lane and Stoney Lane, and agricultural land (**Zone A**).
East	The eastern boundary is formed by the A49 Wigan Road, adjacent to which are fields, a car park and woodland associated with the Cuerden Valley Park beyond, together with the M6/ M65 Junction 1 slip road.	Agricultural land (**Zone B**).	Existing residential dwellings, adjacent to Old School Lane, and agricultural land (**Zone A**).	The eastern boundary is formed by a wooded slope leading up to the M65 Junction 1A beyond which is a light industrial / retail park 'South Rings Business Park' which includes retail and offices premises, leisure facilities and a hotel. Some parts of the	The eastern boundary is formed by agricultural land. Beyond this is the A49 Wigan Road, adjacent to which are fields, a car park and woodland associated with the Cuerden Valley Park beyond, together with the M6/ M65 Junction 1 slip road.

Location	Description				
	Zone B	Zone A	Housing Development	Zone C	Zone D
				estate are not built out and are currently areas of scrub land.	
South	The south-eastern boundary is formed by Stoney Lane (track) and woodland belt, beyond which is agricultural land and the M6. The south-west boundary is formed by agricultural land (**Employment Zone (South)**). Beyond the southern boundary is the Lydiate Lane Quarry - an active open cast sand and gravel extraction site and Licenced Waste Management Facility.	Agricultural land (**Zone D**).	Existing residential dwellings, adjacent to Stanifield Lane, and agricultural land (**Employment Zone (South)**).	Agricultural land (**Mixed Use Zone**).	Agricultural land (pasture) is located to the south of the site, together with Lydiate Lane Quarry – an active open cast sand and gravel extraction site and Licenced Waste Management Facility. Further south, beyond the quarry is a residential estate.
West	Agricultural land (**Mixed Use Zone**).	The western boundary is formed by Old School Lane, beyond which is agricultural land (**Residential Zone**), Stanifield Lane and fields and business parks further west.	The western boundary is formed by Stanifield Lane, beyond which are isolated residential dwellings and farm premises surrounded by fields. Leyland Business Park and Lancashire Business Park are located to the south-west of the site.	Existing residential dwellings, adjacent to Old School Lane, and agricultural land (**Residential Zone**).	The western boundary is formed by Stanifield Lane. Beyond this are isolated residential dwellings and farm premises surrounded by fields. Leyland Business Park and Lancashire Business Park are located to the south-west.

3.1.2 Environmental Permits

As detailed in the Groundsure Report the following Environmental Permits (EP) are identified on-site and within 250m of the Site Boundary;

On-site

- No Environmental Permits are recorded on Site.

Surrounding Area

- A Historic Storm/Emergency overflow Discharge Consent is recorded 5m southeast of the Site.
- A Discharge Consent for the release of Final/Treated Effluent Sewage is recorded 113m southwest of the Site. It is recorded as “Lapsed” under the Environment Act 1995, Schedule 23.
- A Historic Discharge Consent for the release of Final/Treated Effluent Sewage is recorded 91m north of the Site.
- A Historic Discharge Consent for the release of Final/Treated Effluent Sewage is recorded 80m northeast of the Site. This was applied to landholders at Hook Farm, which has since been redeveloped.

3.1.3 Ecological Systems

The Landmark Envirocheck Report (**Appendix C**) identified an area of Adopted Green Belt is recorded immediately south, east and west of the Site, and is recorded as Adopted by South Ribble Borough Council in 2015. In addition, a Local Nature Reserve, referred to as Preston Junction, is located approximately 600m north of the Site.

These are locally designated sites and do not fall under a definition of an Ecological System under Part IIA, therefore the above are not considered further within this report.

4. Previous Environmental Assessments and Consultations

4.1 Previous Environmental Assessments

The following environmental reports included in **Table 4** were provided by the Applicant for review with respect to the Site.

Table 4: Previous Environmental Reports Reviewed

Author	Title	Date and Reference
Waterman	Preliminary Environmental Risk Assessment, Cuerden Strategic Site	December 2016 WIE11556-101-R-1.2.4-VW
	Geo-Environmental Assessment, Report 1 – Retail Area	January 2017 WIE11556-102-R-1.2.2-MB
	Geo-Environmental Assessment, Report 2 – Mixed Use Area	January 2017 WIE11556-102-R-2.2.2-MB
Waterman	Drawing – Overall Site Plan – In Progress Plan indicating areas of Ground investigation	24th September 2022. Ref. LCO-WSL-ZZ-ZZ-DR-S-02004-P01

4.1.1 Waterman: Preliminary Environmental Risk Assessment Waterman: Geo-Environmental Assessment – Retail End Use

In 2017, Waterman prepared a Geo-Environmental Assessment for Zone B at the Site, referred to at the time as the Retail Zone.

The following works were undertaken:

- 18No. cable percussion boreholes;
- 3No. window sample boreholes;
- 7No. trial pits; and,
- 16No. monitoring installations with six monitoring visits.

Ground conditions generally confirmed the published geology. A thickness of topsoil was recorded overlying Glacial Till and Glaciofluvial Deposits. These consisted of firm and stiff clays, underlain by clays sands and gravels proven to a maximum depth of 30m below ground level (bgl). Localised thicknesses of Made Ground were also recorded across the Site.

Concentrations of recorded contamination in Site soils and groundwater were considered to present a low risk to the proposed end-users and no further assessment was considered to be required. A ground gas risk assessment indicated that the Site would be classified as Characteristic Situation 2 and therefore ground gas protection measures would be required within proposed structures.

4.1.2 Waterman: Geo-Environmental Assessment – Mixed End Use

In 2017, Waterman prepared a Geo-Environmental Assessment for the Zone A at the Site, referred to at the time as the Mixed End Use Zone.

The following works were undertaken:

- 5No. cable percussion boreholes;
- 2No. window sample boreholes;

- 11 No. trial pits; and,
- 5No. monitoring installations with six monitoring visits.

Ground conditions generally confirmed the published geology. A thickness of topsoil was recorded overlying Glacial Till and Glaciofluvial Deposits. These consisted of firm and stiff clays, underlain by clays sands and gravels proven to a maximum depth of 30m bgl. A small thickness of Made Ground was recorded across the Site.

Concentrations of recorded contamination in Site soils were considered to present a low risk to the proposed end-users as no exceedances were recorded. Laboratory testing completed on groundwater samples identified slightly elevated concentrations of heavy metals in a number of samples tested, however the concentrations detected were considered to be a result of natural groundwater quality and required no further assessment.

Assessment of the ground gas regime indicated that the Site would be classified as Characteristic Situation 2 and therefore ground gas protection measures would be required.

4.2 Consultations

4.2.1 Environmental Health

A response to consultation was received as part of the initial 2016 issue of this report, however, as good practice, update consultation has been sought by Waterman.

For completion, results of the 2016 consultation search are included in this report and are as follows:

- The Authority is of the opinion that the only potential sources of contamination identified on Site are the unknown fill (at Brookhouse Farm, formerly known as Woodcock & Blackhurst Farm) in the west of the Site, and the old sand pit in the east of the Site.
- No records of any tanks on Site are held.
- No records of made ground or any ground gassing issues are held.
- No ground gas or radon protection measures installed in nearby properties and the area has been identified as below the radon action level.
- The data base in relation to nuisance complaints is difficult to interrogate due to the large size of the area and non-specific address. With the exception of some noise complaints linked to the existing properties on School Lane, The Authority is not aware of any complaints.
- No records of any Part B or Part A2 authorised processes held.
- No records of any designated sites of contaminated land on or near to the Site.
- No records held of any site investigations having been undertaken.

Publicly available information indicates the Site is not within South Ribble Borough Council's Contaminated Land Register. Further information has been requested from the Environmental Health Officer (EHO) but a response is currently pending.

4.2.2 Planning Department

A response to consultation was received as part of the initial 2016 issue of this report, however, as good practice, update consultation has been sought by Waterman, the response is pending.

For completion, results of the 2016 consultation search are included in **Appendix D** of this report.

The Planning Department reported a total of 4 applications of environmental relevance to the Site in

addition to the 14 reported in the 2016 Preliminary Environmental Risk Assessment undertaken by Waterman. Details of these are presented in **Appendix D**.

4.2.3 Building Control Department

A response to consultation was received as part of the initial 2016 issue of this report, however, as good practice, update consultation has been sought by Waterman.

For completion, results of the 2016 consultation search are included in this report and are as follows:

- Information held for the Site is limited owing to a lack of development / records not being current.
- In some areas of South Ribble, the ground conditions can change within metres. The ground, within the area of the Site, is predominantly clay with some areas of sand, but both are suitable for building with standard foundations.
- Radon protection measures would not be required.

Updated information has been requested as part of consultation for this report.

5. Environmental Site Setting

5.1 History

A summary of the historical potential contamination sources at the Site and surrounding areas obtained from the Landmark Envirocheck Report (**Appendix C**) historical maps is included in **Table 5**.

Table 5: Site History (including Zones)

Source	Zone [a]					
	Zone A	**Zone B**	**Housing Zone**	**Zone C**	**Zone D**	**Surrounding Site [a]**
Lancashire and Furness 1848 (1:10,560)	Stoney Lane House is denoted within the centre of this Zone close to the western boundary of the Site. Stoney Lane is shown east to west along the southern boundary of the Zone.	Comprised largely of fields, boundaries are denoted by trees. Four ponds are denoted (one in the north, two in the east and one in the south). Stoney Lane forms the southern boundary, with Lower Road (now known as A49 Wigan Road) denoting the eastern boundary. A tributary of the River Lostock is denoted in the north-east, forming a field	Comprised largely of fields; Lostock Lane forms the northern boundary, with Lower Green (now known as Old School Lane) to the east, Stoney Lane to the south, and Stanifield Lane to the west. Two ponds are denoted in the south - adjacent to Lower Green (now known as Old School Lane).	Comprised largely of fields, boundaries are denoted by trees. Tributaries of the River Lostock are denoted entering from the north, which form field boundaries (as a ditch). Pinfold House is denoted in the north-east. A footpath is denoted as connecting to Lower Green Lane (now known as Old School Lane) in	Comprised largely of fields, boundaries are denoted by trees. Four ponds are present (three in the centre and one to the west). Stanifield Lane denotes the western boundary.	Within the Site, but outwith the Zones, there are properties and buildings, including a school, along Lower Green (now known as Old School Lane) and Stoney Lane. In general, the area surrounding the Site is relatively undeveloped and comprises mostly of fields. A small pond is denoted to the south of Stoney Lane / east of Stanifield Lane. To the north of the Site is the River Lostock (c.70m at the closest point), roadways and isolated buildings and dwellinghouses (Worshaw House (adjacent) and Woodcock Hall (c.60m)). There are a two cotton mills within the area surrounding the Site, however the closest of these is the Walton Factory located approximately 300m north-west of the Site, and adjacent to the River Lostock. Lower Road (presently known as A49 Wigan Road) denotes the eastern boundary of the Site; beyond this is a woodland plantation (Wigan Lodge Wood) and Cuerden Hall (c.580m). There are a number of isolated dwellings and buildings and woodland blocks, including orchards and ponds nearby. To the immediate south of the Site a ***sand pit*** is denoted. Beyond the western boundary is the London and North Western Railway line (c.645m).

Source	Zone [a]					
	Zone A	Zone B	Housing Zone	Zone C	Zone D	Surrounding Site [a]
		boundary (as a ditch). A footpath is denoted at the north-west corner in a north-south alignment.		an east-west alignment.		
Lancashire and Furness 1893 (1:2,500) **Lancashire and Furness 1893 – 1894 (1:2,500)**	Of the two ponds previously denoted, the northernmost pond is no longer shown and may have been ***infilled***.	The one pond in the north now appears as three connected ponds. An additional pond is denoted in the north-west corner. The pond in the south is denoted as being located within a new plantation deciduous woodland. A new pond is denoted, together with an '***Old Sand Pit***', within the south-west corner.	No significant changes.	Pinfold House is no longer denoted, however a pond adjacent to the former house and Lower Green Lane (presently known as Old School Lane). An area of 'marsh' is denoted to the north-east of the school.	Two additional ponds are denoted adjacent to Stanifield Lane. The northernmost pond is located in the corner of a field, and the other pond is located to the east of an existing pond.	Worshaw House in no longer denoted, however 'Worshaw Well' and 'Pound' are denoted adjacent to the northern boundary, together with an additional 'well' (unnamed) adjacent to the north-west corner of the Site.
Lancashire and Furness 1894 – 1895 (1:10,560)	No significant changes.	No significant changes.	No significant changes.	No significant changes.	No significant changes.	The 'well' (unnamed) and 'pound', previously denoted adjacent to the north-west corner and north of the Site, are no longer shown.

Source	Zone [a]					
	Zone A	Zone B	Housing Zone	Zone C	Zone D	Surrounding Site [a]
						The ***sand pit*** to the south of the Site is now denoted as an 'old sand pit'. Walton Factory is now denoted as 'Cuerden Green Mills' which has been expanded. Increased development around Farington, to the south-west of the Site (c.1km), including the expansion of Farington and Leyland railway stations (c.1km north-west and c.1.5km south-west respectively).
Lancashire and Furness 1911 (1:2,500) **Lancashire and Furness 1912 – 1914 (1:10,560)**	A rectangular shaped pond is denoted in the centre, which aligns with the field boundary.	The previously three, connected ponds, along the northern boundary are now denoted as two separate ponds, the others may have been ***infilled***. The pond and sand pit is no-longer denoted – both may have been ***infilled***. An area of depressed ground is denoted, adjacent to the dog-leg in Stoney Lane.	No significant changes.	No significant changes.	Of the southernmost ponds, adjacent to Stanifield Lane, one is no longer denoted, whilst the other is denoted as 'marsh', these areas may have been ***infilled***. The triangular shaped pond, within the centre, is denoted as 'marsh', which may be ***infilled***.	No significant changes. Further expansion of Curden Green Mills to the north-west of the Site. Increase development of Farington to the south of the Site.
Lancashire and Furness 1931 (1:2,500) **Lancashire and Furness**	No significant changes.	The two ponds on the northern boundary are both denoted as	No significant changes.	The area of 'marsh' is no longer denoted and may be ***infilled***.	No significant changes.	No significant changes. 'Woodcocks & Blackhursts Farm' denoted adjacent to Stanifield Lane and Stoney Lane.

Source	Zone [a]					
	Zone A	Zone B	Housing Zone	Zone C	Zone D	Surrounding Site [a]
1931 – 1932 (1:10,560)		'marsh', which may be ***infilled***. The two ponds in the east are denoted as 'marsh' and may be ***infilled***.				
Lancashire and Furness 1938 (1:10,560) **Ordnance Survey 1955 – 1956 (1:10,000)**	No significant changes.	No significant changes.	No significant changes.	No significant changes.	No significant changes.	No significant changes.
Ordnance Survey 1961 – 1964 (1:1,250) **Ordnance Survey 1965 (1:2,500)** **Ordnance Survey 1964 - 1965 (1:2,500)** **Ordnance Survey 1962 – 1968 (1:10,000)**	No significant changes.	The two areas of 'marsh' in the east are denoted as 'pond' and 'marsh', which suggests seasonal variation in water level. The area of depressed ground, adjacent to the dog-leg in Stoney Lane is denoted as a 'pond'.	The pond in the south is no longer denoted and may have been ***infilled***.	The Worshaw Well is now denoted as a 'sink'. The triangular pond adjacent to Old School Lane (formerly Lower Green Lane) is no longer denoted and may be **infilled**. An electricity pylon Is denoted to the rear of the former school on Old School Lane.	One of the ponds in the centre is no longer denoted and may have been ***infilled***. The area of 'marsh' is now denoted as 'pond', which suggests seasonal variation in water level.	The route of the M6 (under construction) is shown to the south and east of the Site (c.40m at the closest point), which passes through land associated with Cuerden Hall. There has been significant development to the south-west of the Site, with 'Works' adjacent to the railway (c.730m).

Source	Zone [a]					
	Zone A	Zone B	Housing Zone	Zone C	Zone D	Surrounding Site [a]
Ordnance Survey – 1973 – 1974 (1:10,000)	No significant changes.	No significant changes.	No significant changes.	No significant changes.	No significant changes.	The pond located to the north of Woodcocks & Blackhursts Farm is no longer denoted and may have been ***infilled***.
Ordnance Survey – 1983 – 1988 (1:10,000)	No significant changes.	The pond adjacent to the dog-leg in Stoney Lane is no-longer denoted and may have been ***infilled***.	The pond adjacent to School Lane (presently known as Old School Lane) is no-longer denoted and may have been ***infilled***.	No significant changes	Two ponds are no-longer denoted and may have been ***infilled***. A new pond is denoted to the south of an existing pond, adjacent to Stanifield Lane.	No significant changes. The Farington Road ***dual carriageway*** is under construction, adjacent to the north-west corner of the Site (c.85m). The M6 is denoted as being complete to the south-east. There is significant residential development to the south of the Site (c.300m). The 'Woodcock Estate' is denoted to the west of the Site (c.160m).
Ordnance Survey – 1990 – 1992 (1:10,000)	No significant changes.	No significant changes.	No significant changes.	No significant changes.	No significant changes.	No significant changes.
10k Raster Mapping – 2001 (1:10,000)	No significant changes.	A new pond is denoted, adjacent to the dog-leg in Stoney Lane. The footpath is no longer noted.	No significant changes.	The electricity pylons have been relocated and are now denoted further north within the Site. The footpath is no longer noted.	A new pond is denoted to the south-east of Stoney Lane Farm.	The Lostock Lane, ***dual carriageway***, is shown as being complete (c.5m). A raised banking for the ***M65 Junction 1 extension***, including associated ***roundabout*** and ***link road*** to Lostock Lane, is shown to the north of the Site (c.10m at the closest point). Beyond Lostock Lane, there is an increase in development. Woodcocks & Blackhursts Farm is now denoted as 'Brookhouse Farm'.
Historical Aerial Photography - 2001	No significant changes.	No significant changes.	No significant changes.	No significant changes.	No significant changes.	The development, beyond Lostock Lane, appears to include a significant area for car parking (c.320m north-east at the closest point). Immediately adjacent to the southern boundary, one of the fields appears to be a ***sand quarry / minerals working*** site.

Source	Zone [a]					
	Zone A	Zone B	Housing Zone	Zone C	Zone D	Surrounding Site [a]
10k Raster Mapping – 2006 (1:10,000)	No significant changes.	No significant changes.	No significant changes.	No significant changes.	One of the ponds, adjacent to Stanifield Lane is no-longer denoted and may have been ***infilled***. Two new ponds are denoted, one immediately south of Brookhouse Farm, and one in the centre of this Zone.	A 'Superstore' is denoted to the north of the Site (c.320m north-east at the closest point) between the M65 extension and Lostock Lane. The field, previously identified as a ***sand and gravel pit*** is no longer denoted, but the adjacent southern field is denoted as ***a sand and gravel pit*** (c.100m south at the closest point); this suggests that there is some discrepancy between the 2001 aerial image and 2006 mapping.
VectorMap Local – 2016 (1:10,000)	No significant changes.	No significant changes.	No significant changes.	No significant changes.	No significant changes.	A 'hotel' and further development is denoted to the north of the Site (c.65m east at the closest point) between the M65 Junction 1A extension and Lostock Lane. The ***sand and gravel pit***, to the south of the Site, has been extended north, and is denoted as being located adjacent to the southern boundary of the Site.

5.2 Unexploded Ordnance

During World War 2 (WW2), the Site was situated within the Preston and Chorley Rural Districts, both of which recorded a low level of bombing. Leyland, located approximately 1.6km to the south of the Site, was a target for bombing during WW2. Anecdotal accounts online indicate that in 1940, the village of Lostock Hall[2] was subject to bomb damage following the disposal of unused bombs during a raid, and that the area around Cuerden Green Mills[3] (off Watkin Lane) was bombed.

According to the Zetica Unexploded Ordnance Risk Map, presented in **Appendix B**, indicates the Site is at Low Risk of encountering UXO.

Previous UXO Risk Assessments undertaken by Landmark indicate there were a number of secondary bombing targets within 1km of the Site, these being: two mills (located approximately 275m north-west and 340m north-east); railway sidings (located approximately 680m west); and engineering works (located approximately 960m north-east).

As there was no bombing or bomb damage recorded in the Site's vicinity during WW2, the Landmark report indicates that there is a low / medium probability of encountering UXO. It indicates that that there is no evidence to suggest that further investigation into UXO is warranted. This information should be passed to the relevant contractors during site clearance and earthworks. The UXO risk will not be covered further within this report.

5.3 Geology

The Site's geology as established from previous ground investigations, British Geological Survey (BGS) mapping and boreholes is summarised in **Table 6**.

In general, superficial deposits across the Site are recorded to comprise mostly of Glacial Deposits, with the bedrock anticipated to be the Sidmouth Mudstone Formation.

Table 6: Site Geology

Stratum	Area Covered	Estimated Thickness	Typical Description
Superficial Geology			
Glacial Till	Site Wide	Up to 7m	Boulder Clay: slightly gravelly sandy clay with fine and medium, occasionally coarse, sand.
Glaciofluvial Deposits	Zone A, Zone B and Zone D Developments.	Up to 31m	Sand and Gravel: sandy and slightly gravelly clay with stiff clay, sand and silt pockets.
Head Deposits	Zone B Development	Unknown	Clay, Gravelly, Silty, Sandy.
Bedrock			
Sidmouth Mudstone Formation	Zone A, Zone B, Zone C and Zone D Developments	120m to 1.6km	Mudstone and Halite-stone.
Hambleton Mudstone Member	Zone B Development	30m to 37m	Mudstone.

[2] Fairclough, C. (2003) 'They've All Gone': Bombing of a Small Village in Lancashire, BBC Article ID A2037115 http://www.bbc.co.uk/history/ww2peopleswar/stories/15/a2037115.shtml (accessed 22.07.16)

[3] South Ribble Museum & Exhibition Centre (Date Unknown) The Victorians: Directory of the Cotton Mills of South Ribble http://south-ribble.co.uk/srmuseum/pages/schools/05_directory_of_mills.pdf (accessed 22.07.16)

Stratum thickness has been estimated using depth information held on the BGS website, previous ground investigations and borehole data provided by the Applicant.

The Landmark Envirocheck Report (**Appendix C**) geology sheets indicate a series of small regular areas denoted as worked ground, these align with ponds marked on historic mapping and so are not considered to present a risk to the Site.

In addition, a large section of Made Ground is denoted to the north and east associated with the embankment area of the M65 junction. This is raised above the current ground level.

The Site is largely in agricultural use therefore it is unlikely that there is a significant amount of Made Ground within the Site, however there is some potential for Made Ground in the areas around farm buildings and areas of potential infilled ponds.

5.3.1 Ground Stability

The BGS mapping reveals a geological boundary that passes through the north-east corner of the Site (Zone B) and which divides the Sidmouth Mudstone Formation and Hambleton Mudstone Formation. The Site, in the main, is underlain by Sidmouth Mudstone Formation, proven to 289m bgl, with Hambleton Mudstone Formation in the north-east part of the Site.

The Sidmouth Mudstone Formation contains halite (salt) which is subject to solution; however, according to the information presented within the Landmark Envirocheck Report (**Appendix C**), the Site does not fall within a brine subsidence solution area. The Landmark Envirocheck Report indicates that the Site has very low / no potential stability hazards for: collapsible ground; compressible ground; ground dissolution; landslide ground; running sand; or shrinking or swelling clay. There are no further structural, geomorphological or geochemical features on or near the Site.

The Site is not in an area that could be affected by coal mining activity.

5.4 Radon

According to information contained within the Landmark Envirocheck Report (**Appendix C**), the Site is not located in an area of elevated radon gas levels (a naturally occurring gas). Discussions within the industry, centre around the possibility that radon protection measures should be considered in all new buildings whether located in a radon affected area or not. However, as part of 2016 consultation the Environmental Health Officer and Building Control Officers at SRBC have confirmed that the Site is below the radon action level and that radon protection measures would not be required in the development of new buildings or extensions (**Appendix D**).

5.5 Ground Gas and Vapour

There is a record of an historic landfill site 37m north of the Site Boundary (Ref. EAHLD07263), and potential infilled pond to the north of Brookhouse Farm, within the existing residential area.

According to the Landmark Envirocheck Report (**Appendix C**), within the Site there is one local authority recorded landfill located to the south of Brookhouse Farm (Ref. 7/018), within Zone D; however, a landfill was not observed during the site walkover. Details regarding the nature of the landfill have been requested from the Environmental Health Department at SRBC; a response is currently pending. No further licences or discharge consents are registered within the Site.

There is one licensed waste management facility within 500m of the Site; the site, which is adjacent to the southern boundary of the Site, is operated by J.A. Jackson Contractors (Leyland) Limited for the acceptance of inert landfill materials (EA Licence No. 104817).

The Landmark Envirocheck Report does not record any pollution incidents relating to oils or fuels within 250m of the Site.

Considering the distance from the Site and assessed impact of identified sources, there is not considered a significant vapour risk to the Site.

5.6 Controlled Waters

5.6.1 Surface Waters

The nearest surface water to the Site is the River Lostock, approximately 70m to the north and flowing in a westerly direction towards the coast. According to the Landmark Envirocheck Report (**Appendix C**), the water quality of the River Lostock has been classified as Grade C (Biology), at the nearest monitoring location, approximately 4.4km south-west of the Site. There are 10 current surface water discharge consents within a 1km radius of the Site, the closest of which is located approximately 80m east of the Site, licenced to discharge treated effluent to a tributary of the River Lostock.

Within the Site, there are several 'ponds', and numerous smaller surface water features, the majority of which flow towards the River Lostock and are denoted as 'Drains' and 'Issues' within the Landmark Envirocheck Report.

The Landmark Envirocheck Report lists 15No. pollution incidents to controlled waters (surface water) within 500m of the Site. The closest of which was in 1995, approximately 10m to the north of the Site, where there was a release of inert suspended solids to a tributary of the River Lostock, classified as a 'Category 2 - Significant Incident'.

5.6.2 Groundwater

The EA has classified the geological deposits on-site as having the following classification **Table 7**.

Table 7: Summary of Hydrogeological Properties of the Main Geological Strata

Stratum	EA Classification	Hydrogeological Significance
Glacial Till	Secondary B Aquifer (undifferentiated)	May be important in supporting local abstractions or in providing baseflow to rivers and streams.
Glaciofluvial Deposits	Secondary A Aquifer	May be important in supporting local abstractions or in providing baseflow to rivers and streams.
Head Deposits	Secondary B Aquifer (undifferentiated)	May be important in supporting local abstractions or in providing baseflow to rivers and streams.
Sidmouth Mudstone Formation	Secondary B Aquifer	May be important in supporting local abstractions or in providing baseflow to rivers and streams.
Hambleton Mudstone Member		
Hambleton Mudstone Member	Secondary B Aquifer	

Based on available information, it is anticipated that groundwater flow will be in a north-westerly direction towards the River Lostock.

As noted previously, an area at the south of the Site is within a Mineral Safeguard Area and adjacent to the Lydiate Lane open cast sand and gravel quarry. During the 2016 site walkover, water was observed at the bottom of the quarry void; the depth of the quarry was estimated to be approximately 15 – 20m deep. There are four recorded groundwater abstractions within a 1km radius of the Site, the closest of

which is located approximately 250m south of the Site, and is licensed to J.A. Jackson Contractors (Leyland) Limited for mineral washing.

The Landmark Envirocheck Report (**Appendix C**) does not report details of any recorded pollution incidents to groundwater within 1km of the Site.

Overall, therefore, data suggests that underlying groundwater quality is likely to be of a good quality.

5.6.3 Flood Risk

The Site is not located within an area of fluvial and surface water flooding; Waterman has prepared a separate Flood Risk Assessment report in support of this planning application.

According to the EA's indicative flooding data, the Site is not located in an area of fluvial flooding / on a flood plain. There are no recorded flood defences in the area.

6. Hazard Assessment and Preliminary Conceptual Model

The Preliminary Conceptual Model for the Site is presented in **Table 9**. The risk rating included in **Table 9** has been assessed qualitatively using the criteria presented in **Appendix F** and the potential receptors identified using the criteria presented in **Appendix G**.

6.1 Contaminants of Concern

In general, the current use of the Site is not considered to present a significant contamination risk, however localised contamination may be present within the Site where fly-tipping was observed during the 2016 walkover, and in areas associated with some of the historical features identified (former landfill and infilled ponds). Land use surrounding the Site is not considered to present a significant potential source of contamination. **Table 8** below outlines the sources and associated contaminants considered.

Table 8: Contaminants of Concern

Source	Associated Contaminants
On-site (current)	
Pasture / farmland	None identified
Infilled ponds	Unknown fill materials used to backfill ponds. Hazardous ground gases.
Informal tipping etc in north-west corner	Unknown tipped materials may include asbestos, putrescible waste and fuels previously recorded. Not noted during 2022 walkover.
Local Authority Landfill	Unknown landfill materials – no evidence observed. Hazardous ground gases.
On-site (historic)	
Infilled ponds	Unknown fill materials used to backfill ponds. Hazardous ground gases
Sand pit	Potential spillages of fuels and oils used for plant and machinery. Unknown fill materials used to backfill sand pit. Hazardous ground gases.
Off-site (current)	
Sand and gravel quarry	Potential spillages of fuels and oils used by mobile plant and machinery
Inert Landfill	Potential lateral movement of leachate from inert fill material.
Waste Transfer Station	Surface runoff of fuels and oils from site.
Stoney Lane Farm	Potential spillages of fuels and oils used upon the farms
Mineral Processing	Potential spillages of fuels and oils used by mobile plant and machinery.
Farmland, storage of above ground tanks, outbuildings etc.	Potential spillages of fuels and oils used for machinery, stored in tanks. Potential for asbestos.
Petrol Filling Station including vehicle washing areas	Potential spillages of fuels and oils during refuelling. Acids / alkalis and detergents used for vehicle washing.
Rubber Processing	Metals, solvents, oils, acids / alkalis used in rubber processing.
Roadways	Surface runoff of fuels and oils from highway.
Off-site (historic)	
Landfill	Unknown landfill materials.

Source	Associated Contaminants
	Hazardous ground gases.
Infilled ponds	Unknown fill materials used to backfill ponds. Hazardous ground gases

Table 9: Outline Conceptual Site Model

Potential Sources	Pathways	Receptor	Risk	Justification / Mitigation	Residual Risk
Human Health					
Contamination in soil or shallow groundwater associated with historical use of the Site	Direct Contact, Ingestion, Vapour Inhalation	Future Site Users	Low	The majority of the Site has remained in agricultural use throughout the identifiable history and the potential for widespread contamination is considered to be Low. However, it is noted that localised contamination may be present in the vicinity of current and former farm buildings (Made Ground) and infilled ponds, around residential plots and areas of landfill (current or historic). **Zones affected: Zone A, B, Housing, Zone D.**	Low
		Off site land users	Low	The potential for contamination at the Site is considered to be Low. The area surrounding the Site comprises predominantly agricultural land. Dusts/ vapours are unlikely to be generated at significant concentrations to migrate off-site and cause harm. Construction works shall be managed in order to minimise dust generation. **Zones affected: All.**	Low
		Construction Workers	Low	Risks during the construction phase can be managed through use of appropriate working practices. **Zones affected: All.**	Low
Ground Gas	Inhalation	Future Site Users	Low - Medium	A number of infilled ponds are present at the Site that may present a source of ground gas in addition to licenced landfill areas within the existing residential areas. Ground conditions in this area will require assessment as part of geotechnical ground investigation and consideration should be given to the completion of a programme of ground gas monitoring with the incorporation of gas protection measures into proposed buildings, where necessary. **Zones affected: Zone A, B, Housing, Zone D.**	Low
Property					
Contamination in soil or shallow groundwater associated with historical use of the Site.	Direct Contact	On-site structures and services	Low	Levels of contamination unlikely to be present at concentrations capable of adversely impacting below ground structures and services. Geotechnical ground investigation to be carried out with buried concrete and structures designed accordingly on the basis of findings. **Zones affected: All.**	Low

Potential Sources	Pathways	Receptor	Risk	Justification / Mitigation	Residual Risk
Controlled Waters					
Contamination in soil or shallow groundwater associated with historical use of the Site.	Leaching, Migration and Preferential Pathways	Secondary B Aquifers	Low	The risk of potential soil and groundwater contamination at the Site is considered to be Low. The Site is anticipated to be underlain by a thickness of low permeability Glacial Till, which will prevent the vertical migration of potential contamination. The risk to the underlying aquifers is considered to be low. Some areas are underlain by sand and gravel, thereby allowing some permeability. **Zones affected: All.**	Low
		Tributaries of the River Lostock	Low	The risk of potential soil and groundwater contamination at the Site is considered to be Low. The underlying deposits are of low permeability and therefore the migration of potential contaminants to the surface waters is considered to be low. Some areas are underlain by sand and gravel, thereby allowing some permeability. Following development, Site drainage will be controlled limiting water available for leaching/ run-off. Sediment run-off during the construction works should be controlled to prevent excessive discharge to the tributaries of the River Lostock. **Zones affected: All.**	Low

7. Conclusions

Waterman has undertaken a Preliminary Risk Assessment for the proposed development of allocated land, known as Cuerden Strategic Site, located to the south-west of the M65 (Junction 1A), Cuerden. An outline planning application will be submitted for the Site, which comprises five development Zones: Zones A, B, C, D and the Housing Development Zone E. The potential ground conditions and potential contamination has been considered for each Zone, where appropriate.

Historically, the majority of the Site has remained undeveloped and in use as agricultural land, therefore the potential for contamination is considered to be limited. However, there is potential for localised contamination with regard to the offsite farm buildings, infilled ponds, a landfill area and areas of informal tipping, which are present within the Site.

Geology underlying the Site is anticipated to comprise a thickness of topsoil over Glacial Till, which extends beneath the Site. An area of Glaciofluvial Deposits is also present in the south of the Site, together with Head Deposits present in the north-east part of the Site. Underlying the superficial deposits, the bedrock comprises Sidmouth Mudstone Formation across the majority of the Site, with Hambleton Mudstone Member in the east of the Site.

The Preliminary Conceptual Site Model indicates that, primarily as a result of the continued agricultural use at the Site, the risk of potential pollutant linkages is low. Given the commercial and residential end uses of the proposed development, the overall risk rating for the Site, and each of the development Zones, is considered to be Low to Medium.

The recommendations of this report outline preliminary remedial and mitigation measures that require confirmation through additional works. However, once successfully implemented the residual risks are anticipated to be Low. Therefore, the NPPF requirement that on completion, the Site can no longer be captured under the Part IIA regime is expected to be met.

8. Recommendations

On the basis of the information contained within this report, there is potential for localised historic ground contamination at the Site. It is therefore recommended that the following actions are undertaken to address the potentially unacceptable risks identified:

- A review of the previous intrusive investigation works completed to date should be undertaken when the detailed development plans for each Development Zone are known. The review will identify if further ground investigation is needed for foundation design or to confirm ground conditions within previously inaccessible areas;
- It is understood ground investigation has been completed on a number of the Zones by third parties. The Client should gain reliance on the existing ground investigation reports prior to planning further ground investigation;
- If any unexpected contamination or infilled ground is identified during the course of the developments, works shall be halted and a suitably qualified person shall be consulted to provide further assessment to guide mitigative and remediating works if required;
- Sediment traps should be used during redevelopment works to prevent the excessive discharge of sediment to the tributaries of the river Lostock;
- In the event that materials are to be excavated for re-use on Site or off-site disposal, a preliminary waste classification assessment should be undertaken. Waste acceptance criteria (WAC) testing may then be necessary, where off-site disposal is proposed; and,
- Soakaways are considered unlikely to be suitable drainage option at the Site.

APPENDICES

A. Site Plans

B. Site Photographs

C. Landmark Envirocheck Report

D. Consultation Information

E. Regulatory Context

The National Planning Policy Framework (NPPF) 2019 sets out Government planning policy for England and how this is expected to be applied to development. Paragraph 118 of Section 11 – Making effective use of land and paragraphs 170, 178, 179 and 183 of Section 15 – Conserving and enhancing the natural environment of the NPPF relate to contaminated land matters and state the following:

118. Planning policies and decisions should:

c) give substantial weight to the value of using suitable brownfield land within settlements for homes and other identified needs, and support appropriate opportunities to remediate despoiled, degraded, derelict, contaminated or unstable land;

170. Planning policies and decisions should contribute to and enhance the natural and local environment by:

e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans; and

f) remediating and mitigating despoiled, degraded, derelict, contaminated and unstable land, where appropriate.

178. Planning policies and decisions should ensure that:

a) a site is suitable for its proposed use taking account of ground conditions and any risks arising from land instability and contamination. This includes risks arising from natural hazards or former activities such as mining, and any proposals for mitigation including land remediation (as well as potential impacts on the natural environment arising from that remediation);

b) after remediation, as a minimum, land should not be capable of being determined as contaminated land under Part IIA of the Environmental Protection Act 1990; and

c) adequate site investigation information, prepared by a competent person, is available to inform these assessments.

179. Where a site is affected by contamination or land stability issues, responsibility for securing a safe development rests with the developer and/or landowner.

183. The focus of planning policies and decisions should be on whether proposed development is an acceptable use of land, rather than the control of processes or emissions (where these are subject to separate pollution control regimes). Planning decisions should assume that these regimes will operate effectively. Equally, where a planning decision has been made on a particular development, the planning issues should not be revisited through the permitting regimes operated by pollution control authorities.

In order to assess the contamination status of the Site, with respect to the proposed end use, it is necessary to assess whether the Site could potentially be classified as “Contaminated Land”, as defined in Part IIA of the Environmental Protection Act 1990 and Contaminated Land Statutory Guidance 2012. This is assessed by the identification and assessment of potential pollutant linkages. The linkage between the potential sources and potential receptors identified needs to be established and evaluated.

To fall within this definition, it is necessary that, as a result of the condition of the land, substances

may be present in, on or under the land such that:

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

b) significant pollution of controlled waters is being caused, or there is significant possibility of such pollution being caused.

It should be noted that DEFRA has advised (Ref. Section 4, DEFRA Contaminated Land Statutory Guidance 2012) Local Authorities that land should not be designated as “Contaminated Land” where:

a) the relevant substance(s) are already present in controlled waters;

b) entry into controlled waters of the substance(s) from land has ceased; and

c) it is not likely that that further entry will take place.

These exclusions do not necessarily preclude regulatory action under the Environmental Permitting (England and Wales) Regulations 2016, which make it a criminal offence to cause or knowingly permit a water discharge of any poisonous, noxious or polluting matter to controlled waters. In England and Wales, under The Water Resources Act 1991 (Amendment) (England and Wales) Regulations 2009, a works notice may be served by the regulator requiring appropriate investigation and clean-up.

F. Risk Rating Matrix

Table G.1: Risk rating for contaminated land qualitative risk assessment

Level of Severity	Likelihood		
	Most Likely	Reasonably Foreseeable	Unlikely
Acute harm or severe chronic harm. Direct pollution of sensitive water receptors or serious pollution of other water bodies.	High	High	Low
Harm from long-term exposure. Slight pollution of sensitive receptors or pollution of other water bodies.	Medium	Medium	Low
No significant harm in either short or long term. No pollution of water that is likely to affect sensitive receptors. No more than slight pollution of other water bodies.	Low	Low	Low

G. Environmental Receptors

The Contaminated Land Statutory Guidance has a four category system that considers harm to human health, controlled waters, flora and fauna, property, livestock and crops. The Categories are broadly defined as follows:

1 Contaminated Land – similar to land where it is known that significant harm has been caused or significant harm is being caused

2 Contaminated Land – no significant harm being caused but there is a significant possibility for significant harm to be caused in the future

3 Not Contaminated Land – there may be harm being caused but no significant possibility for significant harm to be caused in the future

4 Not Contaminated Land – no pollutant linkage, normal levels of contaminants and no significant harm being caused and no significant possibility for significant harm to be caused in the future.

Table H.1: Significant pollution to controlled waters

Pollution of controlled waters
Under Section 78A(9) of Part 2A the term "pollution of controlled waters means the entry into controlled waters of any poisonous, noxious or polluting matter or any solid waste matter. The term "controlled waters" in relation to England has the same meaning as in Part 3 of the Water Resources Act 1991, except that "ground waters" does not include water contained in underground strata but above the saturation zones. (Paragraph 4.36)
Given that the Part 2A regime seeks to identify and deal with significant pollution (rather than lesser levels of pollution), the local authority should seek to focus on pollution which: (i) may be harmful to human health or the quality of aquatic ecosystems or terrestrial ecosystems directly depending on aquatic ecosystems; (ii) which may result in damage to material property; or (iii) which may impair or interfere with amenities and other legitimate uses of the environment. (Paragraph 4.37)
Significant pollution of controlled waters
Paragraph 4.38 states that "The following types of pollution should be considered to constitute significant pollution of controlled waters: (a) Pollution equivalent to "environmental damage" to surface water or groundwater as defined by The Environmental Damage (Prevention and Remediation) Regulations 2009, but which cannot be dealt with under those Regulations. (b) Inputs resulting in deterioration of the quality of water abstracted, or intended to be used in the future, for human consumption such that additional treatment would be required to enable that use. (c) A breach of a statutory surface water Environment Quality Standard, either directly or via a groundwater pathway. (d) Input of a substance into groundwater resulting in a significant and sustained upward trend in concentration of contaminants (as defined in Article 2(3) of the Groundwater Daughter Directive (2006/118/EC)5)". Paragraph 4.39 states that "In some circumstances, the local authority may consider that the following types of pollution may constitute significant pollution: (a) significant concentrations6 of hazardous substances or non-hazardous pollutants in groundwater; or (b) significant concentrations of priority hazardous substances, priority substances or other specific polluting substances in surface water; at an appropriate, risk based compliance point. The local authority should only conclude that pollution is significant if it considers that treating the land as contaminated land would be in accordance with the broad objectives of the regime as described in Section 1 (of the Contaminated Land Statutory Guidance). This would normally mean that the authority should conclude that less serious forms of pollution are not significant. In such cases the authority should consult the Environment Agency". The following types of circumstance should not be considered to be contaminated land on water pollution grounds: (a) The fact that substances are merely entering water and none of the conditions for considering that significant pollution is being caused set out in paragraphs 4.38 and 4.39 above are being met.

Significant pollution of controlled waters

(b) The fact that land is causing a discharge that is not discernible at a location immediately downstream or down-gradient of the land (when compared to upstream or up-gradient concentrations).

(c) Substances entering water in compliance with a discharge authorised under the Environmental Permitting Regulations.

Significant pollution of controlled waters is being caused

In deciding whether significant pollution of controlled waters is being caused, the local authority should consider that this test is only met where it is satisfied that the substances in question are continuing to enter controlled waters; or that they have already entered the waters and are likely to do so again in such a manner that past and likely future entry in effect constitutes ongoing pollution. For these purposes, the local authority should:

(a) Regard substances as having entered controlled waters where they are dissolved or suspended in those waters, or (if they are immiscible with water) they have direct contact with those waters on or beneath the surface of the water.

(b) Take the term “continuing to enter” to mean any measurable entry of the substance(s) into controlled waters additional to any which has already occurred.

(c) Take the term “likely to do so again” to mean more likely than not to occur again.

Land should not be determined as contaminated land on grounds that significant pollution of controlled waters is being caused where: (a) the relevant substance(s) are already present in controlled waters; (b) entry into controlled waters of the substance(s) from land has ceased; and (c) it is not likely that further entry will take place.

Significant Possibility of Significant Pollution of Controlled Waters

In deciding whether or not a significant possibility of significant pollution of controlled waters exists, the local authority should first understand the possibility of significant pollution of controlled waters posed by the land, and the levels of certainty/uncertainty attached to that understanding, before it goes on to decide whether or not that possibility is significant. The term “possibility of significant pollution of controlled waters” means the estimated likelihood that significant pollution of controlled waters might occur. In assessing the possibility of significant pollution of controlled waters from land, the local authority should act in accordance with the advice on risk assessment in Section 3 and the guidance in this sub-section.

In deciding whether the possibility of significant pollution of controlled waters is significant the local authority should bear in mind that Part 2A makes the decision a positive legal test. In other words, for particular land to meet the test the authority needs reasonably to believe that there is a significant possibility of such pollution, rather than to demonstrate that there is not.

Before making its decision on whether a given possibility of significant pollution of controlled waters is significant, the local authority should consider:

(a) The estimated likelihood that the potential significant pollution of controlled waters would become manifest; the strength of evidence underlying the estimate; and the level of uncertainty underlying the estimate.

(b) The estimated impact of the potential significant pollution if it did occur. This should include consideration of whether the pollution would be likely to cause a breach of European water legislation, or make a major contribution to such a breach.

(c) The estimated timescale over which the significant pollution might become manifest.

(d) The authority’s initial estimate of whether remediation is feasible, and if so what it would involve and the extent to which it might provide a solution to the problem; how long it would take; what benefit it would be likely to bring; and whether the benefits would outweigh the costs and any impacts on local society or the environment from taking action.

Reproduced from DEFRA (2012) Contaminated Land Statutory Guidance pursuant to section 78YA of the Environmental Protection Act 1990 as amended by Section 57 of the Environment Act 1995.

Table H.2: Significant harm to human health, ecological systems and property

Relevant types of receptor	Significant harm	Significant possibility of significant harm
Human beings	The following health effects should always be considered to constitute significant harm to human health: death; life threatening diseases (eg cancers); other diseases likely to have serious impacts on health; serious injury; birth defects; and impairment of reproductive functions. Other health effects may be considered by the local authority to constitute significant harm. For example, a wide range of conditions may or may not constitute significant harm (alone or in combination) including: physical injury; gastrointestinal disturbances; respiratory tract effects; cardio-vascular effects; central nervous system effects; skin ailments; effects on organs such as the liver or kidneys; or a wide range of other health impacts. In deciding whether or not a particular form of harm is significant harm, the local authority should consider the seriousness of the harm in question: including the impact on the health, and quality of life, of any person suffering the harm; and the scale of the harm. The authority should only conclude that harm is significant if it considers that treating the land as contaminated land would be in accordance with the broad objectives of the regime as described in Section 1 of the Contaminated Land Statutory Guidance.	The risk posed by one or more relevant contaminant linkage(s) relating to the land comprises: (a) The estimated likelihood that significant harm might occur to an identified receptor, taking account of the current use of the land in question. (b) The estimated impact if the significant harm did occur – i.e. the nature of the harm, the seriousness of the harm to any person who might suffer it, and (where relevant) the extent of the harm in terms of how many people might suffer it. In estimating the likelihood that a specific form of significant harm might occur the local authority should, among other things, consider: (a) The estimated probability that the significant harm might occur: (i) if the land continues to be used as it is currently being used; and (ii) where relevant, if the land were to be used in a different way (or ways) in the future having regard to the guidance on “current use” in Section 3 of the Contaminated Land Statutory Guidance. (b) The strength of evidence underlying the risk estimate. It should also consider the key assumptions on which the estimate of likelihood is based, and the level of uncertainty underlying the estimate.
Any ecological system, or living organism forming part of such a system, within a location which is: • a site of special scientific interest (under section 28 of the Wildlife and Countryside Act (WCA) 1981 (as amended) and Part 4 of the Natural Environment and Rural Communities Act 2006 (as amended)); •	The following types of harm should be considered to be significant harm: • harm which results in an irreversible adverse change, or in some other substantial adverse change, in the functioning of the ecological system within any substantial part of that location; or • harm which significantly affects any species of special interest within that location and which	Conditions would exist for considering that a significant possibility of significant harm exists to a relevant ecological receptor where the local authority considers that: • significant harm of that description is more likely than not to result from the contaminant linkage in question; or

Relevant types of receptor	Significant harm	Significant possibility of significant harm
• a national nature reserve (under Section 35 of the WCA 1981 (as amended)); • a marine nature reserve (under Section 36 of the WCA 1981 (as amended)); • an area of special protection for birds (under Section 3 of the WCA 1981 (as amended)); • a "European site" within the meaning of regulation 8 of the Conservation of Habitats and Species Regulations 2010 (as amended); • any habitat or site afforded policy protection under Section 15 of The National Planning Policy Framework (NPPF) on conserving and enhancing the natural environment (i.e. possible Special Areas of Conservation, potential Special Protection Areas and listed or proposed Ramsar sites); or • any nature reserve established under Section 21 of the National Parks and Access to the Countryside Act 1949.	endangers the long-term maintenance of the population of that species at that location. In the case of European sites, harm should also be considered to be significant harm if it endangers the favourable conservation status of natural habitats at such locations or species typically found there. In deciding what constitutes such harm, the local authority should have regard to the advice of Natural England and to the requirements of the Conservation of Habitats and Species Regulations 2010 (as amended).	• there is a reasonable possibility of significant harm of that description being caused, and if that harm were to occur, it would result in such a degree of damage to features of special interest at the location in question that they would be beyond any practicable possibility of restoration. Any assessment made for these purposes should take into account relevant information for that type of contaminant linkage, particularly in relation to the ecotoxicological effects of the contaminant.
Property in the form of: • crops, including timber • produce grown domestically, or on allotments, for consumption • livestock • other owned or domesticated animals; • wild animals which are the subject of shooting or fishing rights.	For crops, a substantial diminution in yield or other substantial loss in their value resulting from death, disease or other physical damage. For domestic pets, death, serious disease or serious physical damage. For other property in this category, a substantial loss in its value resulting from death, disease or other serious physical damage. The local authority should regard a substantial loss in value as occurring only when a substantial proportion of the animals or crops are dead or otherwise no longer fit for their intended purpose. Food should be regarded as being no longer fit for purpose when it fails to comply with the provisions of the Food Safety Act 1990. Where a diminution in yield or loss in value is caused by a pollutant linkage, a 20% diminution or loss should be regarded as a benchmark for what constitutes a substantial diminution or loss. In the Guidance states that this description of significant harm is referred to as an "animal or crop effect".	Conditions would exist for considering that a significant possibility of significant harm exists to the relevant types of receptor where the local authority considers that significant harm is more likely than not to result from the contaminant linkage in question, taking into account relevant information for that type of contaminant linkage, particularly in relation to the ecotoxicological effects of the contaminant.
Property in the form of buildings.	Structural failure, substantial	Conditions would exist for

Relevant types of receptor	Significant harm	Significant possibility of significant harm
For this purpose 'building' means any structure or erection and any part of a building, including any part below ground level, but does not include plant or machinery comprised in a building, or buried services such as sewers, water pipes or electricity cables.	damage or substantial interference with any right of occupation. The local authority should regard substantial damage or substantial interference as occurring when any part of the building ceases to be capable of being used for the purpose for which it is or was intended. In the case of a scheduled Ancient Monument, substantial damage should be regarded as occurring when the damage significantly impairs the historic, architectural, traditional, artistic or archaeological interest by reason of which the monument was scheduled. The Guidance states that this description of significant harm is referred to as a 'building effect'.	considering that a significant possibility of significant harm exists to the relevant types of receptor where the local authority considers that significant harm is more likely than not to result from the contaminant linkage in question during the expected economic life of the building (or in the case of a scheduled Ancient Monument the foreseeable future), taking into account relevant information for that type of contaminant linkage.

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