



Strategic Land Group

Henthorn Road, Clitheroe

Preliminary risk assessment

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RSK GENERAL NOTES

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Where field investigations have been carried out, these have been restricted to a level of detail required to achieve the stated objectives of the work.

This work has been undertaken in accordance with the quality management system of RSK Environment Ltd.

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APPENDICES

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Appendix B	Summary of legislation and policy relating to contaminated land
Appendix C	Site photographs
Appendix D	Risk assessment methodology
Appendix E	Envirocheck environmental database report (CD)

EXECUTIVE SUMMARY

Site description and proposed development	The site is an area of farmland on the southwestern outskirts of Clitheroe, occupying an area of approximately 5ha. A residential development of about 140 units is proposed.
Purpose of assessment	This preliminary risk assessment was undertaken to develop an initial conceptual site model and provide recommendations for further investigation, if necessary.
PRELIMINARY RISK ASSESSMENT	
Site walkover	The site is currently grazing land, divided into four parcels by hedges. No evidence of likely contamination was observed. The majority of the area slopes gently downwards to the southwest. Much of the site appeared poorly drained and wet. The site is drained by field boundary ditches, draining towards a watercourse shown on recent mapping as the Pendleton Brook. The site is crossed by overhead powerlines.
History of site and surrounding area	As far as can be determined from the available information the site has always remained in agricultural use. The surrounding area is largely agricultural, although there is a 1970's residential development on the northeastern site boundary.
Geology, hydrogeology and hydrology	The superficial deposits comprise glacial till (boulder clay) which is likely to restrict downwards migration of contaminants to the underlying Clitheroe Limestone Formation and Hodder Mudstone Formation, comprising principally mudstones, which are classified by the EA as a secondary "A" aquifer. The low permeability of the clay also leads to waterlogging of the soils. The watercourse crossing the site drains to a brook, which enters the River Ribble approximately 750m southwest of the site.
Potentially contaminative uses on site and in surrounding area	No potentially contaminative on-site land uses have been identified. A waste destructor was present close to the site from the 1930's to the 1950's and a landfill and large sewage treatment works are present to the southwest of the site.
Conceptual model	Some made ground was observed just off site and similar filling may have taken place on site, although no evidence of this was seen. There is a possibility of soil contamination by spreading of sewage waste from the nearby works, and fallout of contaminated particulates from the incinerator. No contamination sources that have significant potential to affect the site have been identified in the surrounding area, other than a consented storm sewage overflow, which is recorded as causing significant pollution to the watercourse crossing the site, on two occasions, the most recent in 2010. During the walkover the stream appeared clean.

CONCLUSIONS AND RECOMMENDATIONS OF PRA	
Conclusions	There appears to be a moderate risk to human health from direct contact of future site occupants with sewage, originating from a consented discharge for storm overflows upstream of the site, migrating downstream via the watercourse crossing the site, and potentially being present in the water, and deposited on the banks of the watercourse. Risks to human health and controlled waters from other contaminants that could possibly affect the site were assessed as low or moderate to low.
Recommendations including issues for further assessment	The issue of sewage discharges to the watercourse crossing the site should be investigated by discussion with the water authority and the EA and, if necessary, taken account of in the design of the development. It is recommended that an intrusive investigation be conducted to confirm the assumptions made in the risk assessment. This should include: • Investigation whether made ground is present on the site, and if so whether the material is contaminated; • Monitoring of the presence of ground gases; and • Analysis of samples of topsoil from shallow depth.
<i>The information given in this summary is necessarily incomplete and is provided for initial briefing purposes only. The summary must not be used as a substitute for the full text of the report.</i>	

1 INTRODUCTION

RSK Environment Limited (RSK) was commissioned by Strategic Land Group to carry out a preliminary risk assessment (PRA) of the land at Henthorn Road, Clitheroe. The site is understood to be under consideration for residential redevelopment.

This report is subject to the RSK service constraints given in Appendix A.

1.1 Objective

An assessment of the environmental setting and development history of the site and the surrounding area has been completed, with the objective of preparing a detailed conceptual model of the site, that will inform subsequent site investigation works.

1.2 Scope

The scope of works for this PRA was according to an agreed brief, as set out in RSK's proposal reference 321124(H)TL01, dated 22 May 2012 and included:

- a site walkover inspection, including the identification of surrounding land use and location of any sensitive environmental receptors in the site vicinity
- a review of the geology and hydrogeology of the site to enable assessments to be made on the migration potential for any contaminants which may be present on the site or in adjacent properties
- a review of a commercially available environmental database in order to determine:

Records of past pollution or other incidents relevant to the site

Information regarding the location of recorded landfill sites within the site vicinity

Details of groundwater abstractions (location, water use, source strata)

Details of surface water quality classification

Information relating to ground stability

- a review of historical maps included with the database report, to identify historical uses of the site and surrounding area
- Preparation of this interpretative PRA report, including development of an initial conceptual site model and recommendations for further investigation, if necessary.

1.3 Existing reports

No previous reports relating to the site were available for review.

2 THE SITE

2.1 Site location

The site is situated to the south of Henthorn Road, on the southwestern outskirts of Clitheroe, Lancashire and can be located by Ordnance Survey⁽¹⁾ National Grid reference 373200, 440800, as shown on Figure 1. The site occupies an area of approximately 5 hectares (12.3 acres) and is situated at an elevation of approximately 60m above Ordnance Datum (AOD).

A site plan is presented as Figure 2.

2.2 Proposed development

The site is being considered for residential redevelopment. The planned layout of the site has not yet been provided to RSK, but it is understood that a development of circa 140 units is proposed.

3 SITE WALKOVER INSPECTION

A geoenvironmental engineer from RSK completed a site walkover inspection on 26 June 2012. Photographs taken during the site walkover are provided in Appendix C.

Currently the area is grazing land, divided into four parcels by hedges. The majority of the area slopes gently downwards to the southwest. The site is drained by field boundary ditches, draining to a watercourse shown on recent mapping as the Pendleton Brook, but which is named on the EA website⁽²⁾ as the Mearley Brook.

The surroundings of the site are summarised in Table 1.

Table 1: Site setting

To the northwest:	Henthorn Road, a lane without footways along most of its length, runs along the full northwestern site boundary, a distance of approximately 300m. The area beyond Henthorn Road is undeveloped farmland, although the buildings of Henthorn Farm are situated opposite the northeastern part of the boundary.
To the northeast:	Gardens of houses on Stirling Close and Kenilworth Drive, part of an existing housing estate, dating from the 1970's.
To the south:	Undeveloped farmland, sloping down to the Pendleton Brook / Mearley Brook, approximately 70m from the site at its closest point.

No potentially contaminative activities were identified during the walkover.

The growth of grass appeared good throughout the site. No evidence of likely contamination was observed.

Potentially significant environmental and geotechnical issues arising from the survey are summarised below.

Much of the site appeared poorly drained and wet. The watercourses flowing southwards across the western part of the site and along part of the southern boundary could provide a possible pathway for contaminants to reach the Pendleton Brook and thence the River Ribble. The watercourse appeared to be clean at the point where it enters the site at Henthorn Road.

Overhead powerlines on wooden poles cross the northern part of the site, running east-west, and would restrict the developable area, unless they could be diverted.

Existing hedges divide the site. There are likely to be planning restrictions on their removal, but if they were to be removed there may be implications on foundation design, depending upon the properties of the underlying clay. There are a number of large trees within the boundary hedges, which may restrict developable area, because of tree

preservation orders, or the presence of protected species such as bats. In addition, deepening of foundations may be required close to the trees, again dependent upon the underlying clay.

At a location approximately 100m southwest of the site there is evidence of uncontrolled placement of small areas of fill materials in areas of lower ground close to the watercourse, perhaps to improve waterlogged areas. It is possible that made ground may also have been placed in similar locations on site, to raise ground levels adjacent to the stream, and the material used could potentially be contaminated, although no evidence of the placement of such materials on site was observed.

It was noted during the walkover that the site benefits from excellent views to the southwest, towards Pendleton Moor.

4 DATA DERIVED FROM DESK STUDY

4.1.1 Geology

Published records indicate the geology of the site to be as recorded in Table 2.

Table 2: Geology at the site

Geological unit	Description	Estimated thickness (m)
Till, Devensian	Diamicton (clay, silt, sand and gravel)	not known
Clitheroe Limestone Formation and Hodder Mudstone Formation (Undifferentiated) Carboniferous Age	Mudstone.	not known
Sources: BGS geology report, based on 1:50,000 digital mapping, included with Envirocheck report ⁽³⁾ and BGS Regional Memoir ⁽⁴⁾ .		

The geological map indicates a fault crossing the site, parallel to Henthorn Road, just within the site boundary but this is unlikely to have any significant effect on the site.

A check on the British Geological Survey (BGS) borehole catalogue showed that there are no publicly-available borehole records likely to provide further information regarding ground conditions in the vicinity of the site.

4.1.2 Radon

The environmental database report⁽³⁾ provides an assessment of radon potential provided by the British Geological Survey. This indicates that part of the site is in a lower probability radon area, as less than 1% of homes area above the action level, and part of the site is in a radon affected area, as between 1% and 3% of homes are above the action level. However, the BGS assessment concludes that no radon protection measures are necessary in the construction of new dwellings at the site.

4.1.3 Mining and quarrying

Based on the historical mapping there is very little mining or quarrying in the vicinity. The closest feature identified is a small quarry 250m north of the site. No recorded mines or quarries have been identified on the site, or within the area likely to affect the site and it is concluded that the presence of unrecorded features on site is unlikely.

4.1.4 Landfills and waste

Evidence has been sought to identify any landfilling, land reclamation or waste operations, past and present, which have taken place in the vicinity of the site.

The environmental database records one contemporary trade directory entry for Sita (Lancashire) Limited, at Henthorn Cottage, Henthorn Road, classified as waste disposal services, status “inactive”, and has located this activity approximately 25m north of the site. The record states that the record was “Manually positioned to the address” but the location shown, at Henthorn Farm opposite the site, appears to be an error. It is presumed that this record refers to the same location as other records of Sita waste management activities, approximately 350m southwest of the site.

There are no other records of landfills or waste management activities within 250m of the site.

The nearest landfill is a historical site, Henthorn Tip, located approximately 350m southwest of the site. The first input of waste is recorded as 31 December 1920. Wastes deposited included commercial waste and liquid sludge. The same site is later recorded as operated by Sita Limited and licensed to accept household, commercial and industrial waste from May 1993. There are subsequent records of licence modifications and the site is still shown on recent maps as a “Household Waste Disposal Centre”. The landfill is downhill from the proposed development site and on the opposite side of the Pendleton Brook.

A second recorded historical landfill is licensed to the Stalwart Dying (sic) Company Limited but no details are recorded, other than a boundary. The address quoted is “off Kemble View” but the boundary is shown on the opposite side of the railway tracks to Kemble View, approximately 375m from the proposed development site. No evidence of a landfill at this location appears on the available historic maps, but the location shown on the map included in the database agrees with that shown on the EA website. The area appears as an open area crossed by a footpath, until 2006 when George Street was developed crossing the landfill boundary area.

No other landfills have been identified within 1km of the site.

Because of the presence of boulder clay likely to be of low water and gas permeability underlying the site, it is considered unlikely that any of the landfills identified present a significant risk from the generation and migration beneath the site of landfill gases and/or leachate. There remains some possibility that odour from the household waste disposal centre could, under some wind directions, affect the proposed development site.

A “Refuse Destructor” located approximately 500m southwest of the site is first shown on the historical map dated 1933 and continues to be shown until 1955, although by 1972 it is no longer shown. Inefficient waste incineration between the 1930’s and 1950’s is likely to have caused airborne pollution and there is a possibility that there could have been fallout of contaminated particulates onto the land in the vicinity of the incinerator.

4.1.5 Ground gas

Given the anticipated ground conditions the risk associated with ground gas is expected to be low, but this will require confirmation.

4.2 Hydrogeology

4.2.1 Vulnerability of groundwater resources

The superficial deposits have been classified by the Environment Agency as unproductive strata:

- 'unproductive' strata: low permeability with negligible significance for water supply or river base flow.

The bedrock has been classified by the Environment Agency as a secondary "A" aquifer:

- secondary "A" aquifer: permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers.

The soils beneath the site are classified as having LOW (L) leaching potential.

- L – soils where pollutants are unlikely to penetrate the soil layer either as a result of largely horizontal water movement or because the soil has the ability to attenuate diffuse pollutants. Lateral flow in these soils may contribute to groundwater recharge elsewhere in the catchment and they generally have a high clay content.

4.2.2 Licensed groundwater abstractions

No groundwater abstractions were identified within a 2km radius of the site.

Information available on the EA website indicates that the site does not lie within a currently designated groundwater Source Protection Zone.

4.3 Hydrology

4.3.1 Surface watercourses

A small stream flowing southwards across the western part of the site and along part of the southern boundary could provide a possible pathway for contaminants to reach the Mearley Brook and thence the River Ribble approximately 750m downstream of the site.

The EA classification of the water quality in the Mearley Brook is grade B, good, and in the stretch of the Ribble nearest to the site is also grade B, good.

No discharge consents are recorded within the site area. The closest recorded consent to the site is for storm sewage discharge to the Pendleton Brook at a location 100m south of the site and is considered not likely to affect the site.

Licence reference RIB0002, held by United Utilities Water plc, for the discharge of storm sewage overflow is recorded in the database, and it appears from the mapping supplied that this discharge is likely to be to the stream that crosses the site, at a location approximately 200m upstream of the site. A significant impact to water by crude sewage is recorded in the substantiated pollution incident register to this watercourse at a location 150m upstream of the site on 24 July 2005 and again at the same location on 28 April 2010. These locations are shown on the site plan, Figure 2. Consequently, it appears that the stream crossing the site is likely to be affected by significant sewage discharges during future storm overflow events.

4.3.2 Surface water abstractions

Fourteen records of surface water abstractions are identified by the environmental database within a 2km radius of the site, the closest being approximately 450m from the site, drawing from the Mearley Brook, upstream of the proposed development site. It is unclear from the database how many distinct abstractions there are, but all of the 8 records that lie within 1km are registered to the same company, Stalwart Dyeing Limited, for industrial/commercial purposes and are located on the same stretch of Mearley Brook upstream of the site. Three other records relate to abstractions by other companies further upstream of the site, again for industrial/commercial purposes. The three remaining records relate to abstractions almost 2km west of the site, beyond the River Ribble. It is considered that none of these abstractions is located in a position that could be affected by development of the site.

4.3.3 Site drainage

Site drainage appears poor, because of the high clay content of the underlying glacial till. Surface drainage from the site appears either to be towards the stream and ditches crossing and bounding the site, or directly southwards to the Pendleton Brook.

4.3.4 Preliminary flood risk assessment

The indicative floodplain map for the area, published by the EA, shows that the site does not lie within an area at risk of flooding from rivers.

4.4 History of site and surrounding area

The history of the land-use and development of the site and surrounding area has been assessed based on the following sources:

- historical maps within the environmental database from 1847 to date; and
- internet search.

A historical Ordnance Survey plan, at a scale of 1:2,500, dated 1886, is reproduced as Figure 3 of this report. Copies of OS and County Series maps are included in the environmental database report provided electronically in Appendix D. Reference to historical maps provides invaluable information regarding the land use history of the site, but historical evidence may be incomplete for the period pre-dating the first edition and between successive maps.

The development history of the site and surrounding area from the above sources is summarised in Table 3 below.

Table 3: Summary of historical development

Date	Land use/features on site	Land use/features in vicinity of site
1847	Site comprises agricultural land divided by hedges. Henthorn Road named as Mill Lane.	Area in vicinity of site is agricultural, with no nearby development, other than Mill Lane House, to the north of the site. Henthorn Corn Mill 500m to southwest. Primrose Print Works 350m to east.
1890	Site comprises agricultural land divided by hedges. Henthorn Road now named as such.	Area around site remains agricultural. Mill Lane House now Henthorn Villa. Filter beds 150m south of site, beyond Pendleton Brook. Henthorn Mill now "(Cotton Waste)". Additional cotton and paper mills 300m east of site.
1914	No change.	Area around site remains agricultural. Additional filter beds and tanks 250m south of site.
1932	Some change in arrangement of field boundary hedges.	No significant change.
1933	No change.	Area around site remains agricultural. Refuse destructor shown 500m southwest of site. Further expansion of water/sewage treatment works.
1972	No change.	Area around site remains agricultural. Refuse destructor no longer shown. Expansion of sewage works.
1977	No change	Residential development northeast of site.
2006	No change	Household Waste Disposal Centre shown 500m southwest of site, to southwest of sewage works.

4.5 Sensitive land uses

No national or internationally designated sensitive land uses such as sites of special scientific interest (SSSI) were identified in the vicinity of the site. A comprehensive evaluation of ecological receptors is outside the scope of this report.

5 INITIAL CONCEPTUAL MODEL

The information presented in the preceding Sections has been used to compile an initial conceptual model. The identified potential sources of contamination, associated contaminants and receptors have been considered with plausible pathways that may link them. The resulting potential pollutant linkages are considered in Section 5.1.5. The risk classification has been estimated in accordance with information in Appendix E.

5.1.1 Summary of potential contaminant sources

As far as can be determined from the available information the site has remained in agricultural use and no potentially contaminative on-site land uses have been identified. However, some made ground was observed adjacent to the watercourse just off the site and similar filling could have taken place on site. In addition, there is some possibility of soil contamination by spreading of sewage from the nearby works, and fallout of contaminated particulates from the nearby refuse destructor (incinerator), which was present close to the site from at least the 1930's to the 1950's. The industry profile which relates to waste incineration⁽⁵⁾ indicates that particulate emissions may contain heavy metals, dioxins and furans.

No contamination sources that have significant potential to affect the site have been identified in the surrounding area, other than the storm sewage overflow, which is recorded as causing significant pollution to the watercourse crossing the site, on two occasions, the most recent in 2010.

These potential sources and the contaminants of concern are summarised in Table 4.

Table 4: Potential contaminant sources

Potential sources	Contaminants of concern
On-site	
S1 - Small areas of made ground (off-site evidence that material may have been placed to raise ground levels close to the watercourse).	Unknown fill material (but potentially including heavy metals, ash, clinker, sulphates, petroleum hydrocarbons (TPH), polycyclic aromatic hydrocarbons (PAH), asbestos etc.) Possible soil gases including methane and carbon dioxide
S2 - Contaminated topsoil (potentially caused by spreading of excess quantities of sewage sludge from nearby works, or fallout of particulates from nearby historic incinerator).	Unknown (but potentially including heavy metals, PAHs, dioxins etc.).

Potential sources	Contaminants of concern
Off-site	
S3 - Storm sewage overflow, located 200m north of site, to watercourse crossing the site.	Sewage.

5.1.2 Sensitive receptors

Sensitive receptors at this site include:

- R1 - future site occupants
- R2 - adjacent site users (residential development immediately to northeast)
- R3 - proposed buildings and infrastructure
- R4 - water supply pipes to proposed development
- R5 - surface waters (on site, leading to River Ribble, 750m downstream)
- R6 - groundwater in bedrock (a secondary “A” aquifer).

Please note that construction workers have not been identified in the conceptual model as receptors because risks are considered to be managed through health and safety procedures according to CDM regulations.

5.1.3 Summary of plausible pathways

The plausible pathways are summarised below:

- P1 - direct contact (soil, dust and vegetable ingestion, dermal contact and dust inhalation)
- P2 - ground gas and vapour migration
- P3 - vertical and lateral migration, including leaching
- P4 – direct chemical attack on buildings, infrastructure and water supply pipes.

5.1.4 Data gaps and uncertainties

No particular data gaps or uncertainties have been identified by RSK.

5.1.5 Potentially complete pollutant linkages

The outline conceptual model and an estimate of the risk associated with each linkage is presented as Table 5. The risk classification has been undertaken in accordance with CIRIA C552⁽⁶⁾, a summary of which is included in Appendix D.

Table 5: Risk estimation for potentially complete pollutant linkages

Potential contaminant	Potential receptor	Possible pathway	Likelihood	Severity	Risk and justification
S1 –unknown contaminants in small areas of made ground (potentially including heavy metals, ash, clinker, sulphates, polycyclic aromatic hydrocarbons (PAHs), ground gases, asbestos etc.)	R1 - future site occupants	P1 - direct contact (soil, dust and vegetable ingestion, dermal contact and dust inhalation)	Low likelihood	Medium	Moderate/Low. – Possible that small areas of contaminated made ground may be present but likelihood of significant effects low.
		P2 - ground gas and vapour migration and inhalation	Unlikely	Severe	Moderate/Low. – Small areas of made ground very unlikely to have significant potential for ground gas generation, unlikely to be significant vapour generation.
	R2 - adjacent site users (residential development immediately to northeast)	P1 - direct contact (dust inhalation)	Unlikely	Medium	Low. – Made ground suspected at west end of site, near stream, remote from adjacent users. Current working practice during construction will limit dust generation.
		P2 - ground gas and vapour migration and inhalation	Unlikely	Severe	Moderate/Low. - Small areas of made ground very unlikely to have significant potential for ground gas generation, unlikely to be significant vapour generation.
	R3 - proposed buildings and infrastructure	P2 - ground gas migration	Unlikely	Severe	Moderate/Low. - Small areas of made ground very unlikely to have significant potential for ground gas generation.
		P4 – direct chemical attack on buildings and infrastructure	Low likelihood	Mild	Low. - Made ground suspected at west end of site, near stream, unlikely build area. Low likelihood of significant concentrations of aggressive chemicals.
	R4 - water supply pipes to proposed development	P4 – direct chemical attack on water supply pipes	Likely	Mild	Moderate/Low. – Water supply pipes sensitive to hydrocarbons and volatiles.
	R5 - surface waters (on site, leading to River Ribble, 750m downstream)	P3 - leaching and lateral migration	Low likelihood	Medium	Moderate/Low. - Possible that small areas of contaminated made ground may be present and contain leachable contaminants, but likelihood of significant effects low
S2 - contaminated topsoil (potentially caused by spreading of excess quantities of sewage sludge from nearby works, or fallout of particulates, possibly including heavy metals, dioxins etc, from nearby historic incinerator).	R6 - groundwater in bedrock (a secondary “A” aquifer)	P3 - leaching and vertical migration	Unlikely	Medium	Low. – The glacial till is likely to act as a barrier to vertical migration to the aquifer.
	R1 - future site occupants	P1 - direct contact (soil, dust and vegetable ingestion, dermal contact and dust inhalation)	Low likelihood	Medium	Moderate/Low. - Possible that contaminants may be present in shallow soils, but fallout from incinerator ceased many years ago so likelihood of significant contaminants remaining low, although some combustion products such as dioxins are very persistent. No evidence for sewage spreading, other than proximity of works, so likelihood low.
	R2 - adjacent site users (residential development immediately to northeast)	P1 - direct contact (dust inhalation)	Unlikely	Medium	Low. - Current working practice during construction will limit dust generation.
	R5 - surface waters (on site, leading to River Ribble, 750m downstream)	P3 - leaching and lateral migration	Low likelihood	Medium	Moderate/Low. - Fallout from incinerator ceased many years ago, so if leachable were present they are likely to have reduced in concentration, and no evidence for sewage spreading, other than proximity of works, so likelihood low.
S3 - sewage overflow (off site) located 200m north of site.	R1 - future site occupants.	P3 - lateral migration, in watercourse crossing the site, then:	Likely	Medium	Moderate. – Two significant incidents of sewage contamination to the brook crossing the site are recorded by the EA at a location just upstream of the site, indicating that it is likely that future incidents will occur and could contaminate the watercourse and its banks within the site area with sewage.
		P1 - direct contact			

The potential pollutant linkages with a risk of moderate or above are:

- direct contact of future site occupants with sewage, originating from a consented discharge for storm overflows upstream of the site, migrating downstream via the watercourse crossing the site, and potentially being present in the water, and deposited on the banks of the watercourse.

Several other linkages were assessed as having a moderate to low risk and it is recommended that an intrusive investigation is completed to confirm these assessments.

6 CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

There appears to be a moderate risk to human health from direct contact of future site occupants with sewage, originating from a consented discharge for storm overflows upstream of the site, migrating downstream via the watercourse crossing the site, and potentially being present in the water, and deposited on the banks of the watercourse. There is no evidence of sewage in the stream at present, but the EA recorded “significant” sewage pollution incidents on this watercourse in 2005 and again in 2010.

There is no evidence of other off-site sources of contamination that might affect the site.

No direct evidence of the presence of contaminated soils on site has been identified, but there is a possibility that small areas of contaminated made ground may be present and there is some potential for contaminants to be present in shallow soils. The risks both to human health and controlled waters from these potential sources have, in the absence of laboratory tests results, been assessed as moderate to low, but this should be confirmed.

6.2 Recommendations

It should be investigated by contact with both the licence holder and the regulator whether discharge consent 01RIB0002, listed in the database as held by United Utilities Water plc, issued 14 April 2009, for the discharge of storm sewage overflows to the watercourse crossing the site is still valid and in use. If so, and if future sewage discharges to this stream are likely, it will be necessary for the design of the development to take this into account, and ensure direct contact between future residents and the watercourse is prevented.

It is recommended that a basic shallow intrusive investigation should be conducted to investigate whether made ground is present on the site, and if so whether the material is contaminated. If made ground is encountered, a broad suite of contaminants should be specified, to include heavy metals, pH, sulphates, TPH, PAH and screening for asbestos. If only natural soils are encountered a reduced suite should be considered.

A full geotechnical appraisal should also be undertaken.

Monitoring of the presence of ground gases should also be completed, to confirm the assumptions made in the risk assessment.

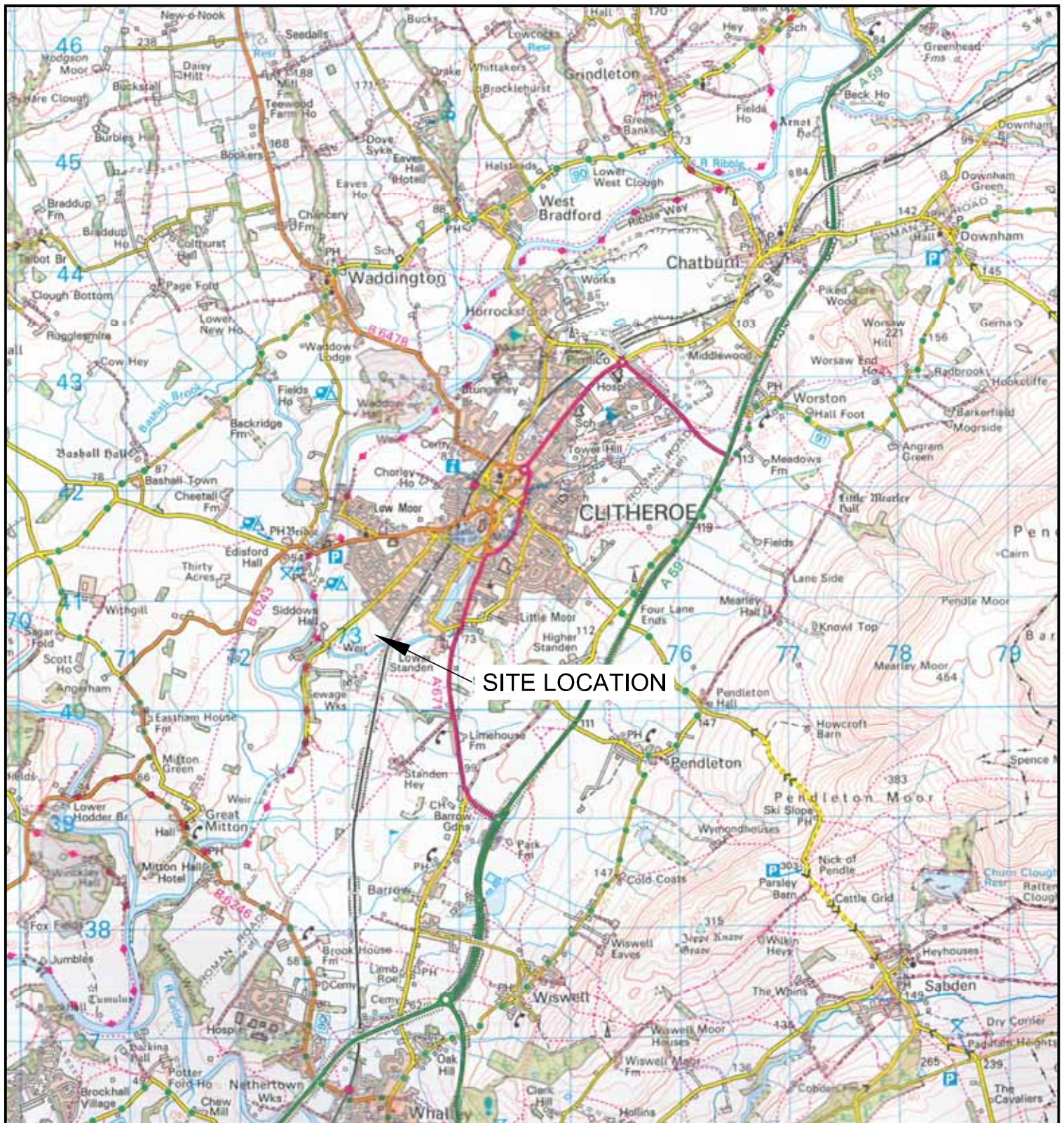
In addition, a few samples of topsoil from shallow depth should be analysed to determine if contaminants are present. A limited suite of contaminants should be specified, to include heavy metals and PAHs. Additionally, it would be prudent to

analyse perhaps two samples for dioxins/furans, to confirm that particulate outfall from the historic incinerator was not significant.

REFERENCES

1. Ordnance Survey, Landranger Map 103, Blackburn, Burnley & surrounding area, scale 1:50,000, 1994.
2. Environment Agency interactive maps
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FIGURES



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Client

STRATEGIC LAND GROUP

Project Title

HENTHORN ROAD, CLITHEROE

Drawing Title

SITE LOCATION PLAN

Drawn	Date	Checked	Date	Approved	Date
HD	20.06.12	PT	20.06.12	SP	20.06.12

Scale	Orig Size	Dimensions
NTS	A4	—

Project No.

321124

Drawing File

321124-R1(00)D001A

Drawing No.

FIGURE 1

Rev.

A

APPENDIX A

SERVICE CONSTRAINTS

1. This report and the preliminary risk assessment carried out in connection with the report (together the "Services") were compiled and carried out by RSK Environment Limited (RSK) for Strategic Land Group (the "client") in accordance with the terms of a contract between RSK and the "client", dated 22 May 2012. The Services were performed by RSK with the skill and care ordinarily exercised by a reasonable environmental consultant at the time the Services were performed. Further, and in particular, the Services were performed by RSK taking into account the limits of the scope of works required by the client, the time scale involved and the resources, including financial and manpower resources, agreed between RSK and the client.
2. Other than that expressly contained in paragraph 1 above, RSK provides no other representation or warranty whether express or implied, in relation to the Services.
3. Unless otherwise agreed the Services were performed by RSK exclusively for the purposes of the client. RSK is not aware of any interest of or reliance by any party other than the client in or on the Services. Unless expressly provided in writing, RSK does not authorise, consent or condone any party other than the client relying upon the Services. Should this report or any part of this report, or otherwise details of the Services or any part of the Services be made known to any such party, and such party relies thereon that party does so wholly at its own and sole risk and RSK disclaims any liability to such parties. **Any such party would be well advised to seek independent advice from a competent environmental consultant and/or lawyer.**
4. It is RSK's understanding that this report is to be used for the purpose described in the introduction to the report. That purpose was a significant factor in determining the scope and level of the Services. Should the purpose for which the report is used, or the proposed use of the site change, this report may no longer be valid and any further use of or reliance upon the report in those circumstances by the client without RSK's review and advice shall be at the client's sole and own risk. Should RSK be requested to review the report after the date hereof, RSK shall be entitled to additional payment at the then existing rates or such other terms as agreed between RSK and the client.
5. The passage of time may result in changes in site conditions, regulatory or other legal provisions, technology or economic conditions which could render the report inaccurate or unreliable. The information and conclusions contained in this report should not be relied upon in the future without the written advice of RSK. In the absence of such written advice of RSK, reliance on the report in the future shall be at the client's own and sole risk. Should RSK be requested to review the report in the future, RSK shall be entitled to additional payment at the then existing rate or such other terms as may be agreed between RSK and the client.
6. The observations and conclusions described in this report are based solely upon the Services which were provided pursuant to the agreement between the client and RSK. RSK has not performed any observations, investigations, studies or testing not specifically set out or required by the contract between the client and RSK. RSK is not liable for the existence of any condition, the discovery of which would require performance of services not otherwise contained in the Services. For the avoidance of doubt, unless otherwise expressly referred to in the introduction to this report, RSK did not seek to evaluate the presence on or off the site of asbestos, electromagnetic fields, lead paint, heavy metals, radon gas or other radioactive or hazardous materials.
7. The Services are based upon RSK's observations of existing physical conditions at the Site gained from a walk-over survey of the site together with RSK's interpretation of information including documentation, obtained from third parties and from the client on the history and usage of the site. The Services are also based on information and/or analysis provided by independent testing and information services or laboratories upon which RSK was reasonably entitled to rely. The Services clearly are limited by the accuracy of the information, including documentation, reviewed by RSK and the observations possible at the time of the walk-over survey. Further RSK was not authorised and did not attempt to independently verify the accuracy or completeness of information, documentation or materials received from the client or third parties, including laboratories and information services, during the performance of the Services. RSK is not liable for any inaccurate information or conclusions, the discovery of which inaccuracies required the doing of any act including the gathering of any information which was not reasonably available to RSK and including the doing of any independent investigation of the information provided to RSK save as otherwise provided in the terms of the contract between the client and RSK.
8. The phase II or intrusive environmental site investigation aspects of the Services is a limited sampling of the site at pre-determined borehole and soil vapour locations based on the operational configuration of the site. The conclusions given in this report are based on information gathered at the specific test locations and can only be extrapolated to an undefined limited area around those locations. The extent of the limited area depends on the soil and groundwater conditions, together with the position of any current structures and underground facilities and natural and other activities on site. In addition chemical analysis was carried out for a limited number of parameters [as stipulated in the contract between the client and RSK] [based on an understanding of the available operational and historical information,] and it should not be inferred that other chemical species are not present.
9. Any site drawing(s) provided in this report is (are) not meant to be an accurate base plan, but is (are) used to present the general relative locations of features on, and surrounding, the site.

APPENDIX B

SUMMARY OF LEGISLATION AND POLICY RELATING TO CONTAMINATED LAND

Part IIA of the Environmental Protection Act 1990 (EPA) and its associated Contaminated Land Regulations 2000 (SI 2000/227), which came into force in England on 1 April 2000, formed the basis for the current regulatory framework and the statutory regime for the identification and remediation of contaminated land. Part IIA of the EPA 1990 defines contaminated land as 'any land which appears to the Local Authority in whose area it is situated to be in such a condition by reason of substances in, on or under the land, that significant harm is being caused, or that there is significant possibility of significant harm being caused, or that pollution of controlled waters is being or is likely to be caused'. Controlled waters are considered all groundwater, inland waters and estuaries.

In August 2006, the Contaminated Land (England) Regulations 2006 (SI 2006/1380) were implemented, which extended the statutory regime to include Part IIA of the EPA as originally introduced on 1 April 2000, together with changes intended chiefly to address land that is contaminated by virtue of radioactivity. These have been replaced subsequently by the Contaminated Land (England) (Amendment) Regulations 2012, which now exclude land that is contaminated by virtue of radioactivity.

The intention of Part IIA of the EPA is to deal with contaminated land issues that are considered to cause significant harm on land that is not undergoing development (see Environmental Protection Act 1990: Part 2A Contaminated Land Statutory Guidance, April 2012). This document replaces Annex III of Defra Circular 01/2006, published in September 2006 (the remainder of this document is now obsolete).

Water Framework Directive (WFD)

The Water Framework Directive 2000/60/EC is designed to:

- enhance the status and prevent further deterioration of aquatic ecosystems and associated wetlands that depend on the aquatic ecosystems
- promote the sustainable use of water
- reduce pollution of water, especially by 'priority' and 'priority hazardous' substances
- ensure progressive reduction of groundwater pollution.

The WFD requires a management plan for each river basin be developed every six years.

Groundwater Directive (GWD)

The 1980 Groundwater Directive 80/68/EEC and the 2006 Groundwater Daughter Directive 2006/118/EC of the WFD are the main European legislation in place to protect groundwater. The 1980 Directive is due to be repealed in December 2013. The European legislation has been transposed into national legislation by regulations and directions to the Environment Agency.

Environmental Permitting Regulations (EPR)

The Environmental Permitting (England and Wales) Regulations 2010 provide a single regulatory framework that streamlines and integrates waste management licensing, pollution prevention and control, water discharge consenting, groundwater authorisations, and radioactive substances regulation. Schedule 22, paragraph 6 of EPR 2010 states: 'the regulator must, in exercising its relevant functions, take all necessary measures - (a) to prevent the input of any hazardous substance to groundwater; and (b) to limit the input of non-hazardous pollutants to groundwater so as to ensure that such inputs do not cause pollution of groundwater.'

Water Resources Act (WRA)

The Water Resources Act 1991 (Amendment) (England and Wales) Regulations 2009 updated the Water Resources Act 1991, which introduced the offence of causing or knowingly permitting pollution of controlled waters. The Act provides the Environment Agency with powers to implement remediation necessary to protect controlled waters and recover all reasonable costs of doing so.

Priority Substances Directive (PSD)

The Priority Substances Directive 2008/105/EC is a 'Daughter' Directive of the WFD, which sets out a priority list of substances posing a threat to or via the aquatic environment. The PSD establishes environmental quality standards for priority substances, which have been set at concentrations that are safe for the aquatic environment and for human health. In addition, there is a further aim of reducing (or eliminating) pollution of surface water (rivers, lakes, estuaries and coastal waters) by pollutants on the list. The WFD requires that countries establish a list of dangerous substances that are being discharged and EQS for them. In England and Wales, this list is provided in the River Basin Districts Typology, Standards and Groundwater threshold values (Water Framework Directive) (England and Wales) Directions 2010. In order to achieve the objectives of the WFD, classification schemes are used to describe where the water environment is of good quality and where it may require improvement.

Contaminated land is often dealt with through planning because of land redevelopment. This approach is documented in Planning Policy Statement: Planning and Pollution Control PPS23, which states that it remains the responsibility of the landowner and developer to identify land affected by contamination and carry out sufficient remediation to render the land suitable for use. The overall aim of the planning and pollution control policy is to promote the sustainable and beneficial use of land (in particular, encouraging reuse of previously developed land in preference



to greenfield sites). Within this aim, polluting activities that are necessary for society and the economy should be so sited and planned, and subject to such planning conditions, that their adverse effects are minimised and contained to within acceptable limits.

APPENDIX C

SITE PHOTOGRAPHS

PHOTOGRAPHIC LOG		
Photo no.	Date:	
1	26/6/12	
Direction photo taken:		
Northeast		
Description:		
Henthorn Road, adjacent to northern part of site. Looking towards existing Henthorn Villa north of site and 1970's housing east of site.		

Photo No. 2	Date: 26/6/12	
Direction photo taken: Southeast		
Description: Site area boggy/wet. Power lines cross site. Sparse dividing hedge in middle distance. Some mature trees in boundary hedges. Views towards Pendleton Moor.		

Photo No. 3	Date: 26/6/12	
Direction Photo Taken: Northeast		
Description: Looking across most of the site, towards the 1970's housing to the northeast. Some mature trees in boundary hedges.		

Photo No. 4	Date: 26/6/12	
Direction Photo Taken: East		
Description: The watercourse crossing the site (flowing from left to right), photograph taken close to southern site boundary.		

APPENDIX D

RISK ASSESSMENT METHODOLOGY

CLR11 outlines the framework to be followed for risk assessment in the UK. The framework is designed to be consistent with UK legislation and policies including planning. Under CLR11, three stages of risk assessment exist: preliminary, generic quantitative and detailed quantitative. An outline conceptual model should be formed at the preliminary risk assessment stage that collates all the existing information pertaining to a site in text, tabular or diagrammatic form. The outline conceptual model identifies potentially complete (termed possible) pollutant linkages (source–pathway–receptor) and is used as the basis for the design of the site investigation. The outline conceptual model is updated as further information becomes available, for example as a result of the site investigation.

Production of a conceptual model requires an assessment of risk to be made. Risk is a combination of the likelihood of an event occurring and the magnitude of its consequences. Therefore, both the likelihood and the consequences of an event must be taken into account when assessing risk. RSK has adopted guidance provided in CIRIA C552 for use in the production of conceptual models.

The likelihood of an event can be classified on a four-point system using the following terms and definitions based on CIRIA C552:

- highly likely: the event appears very likely in the short term and almost inevitable over the long term or there is evidence at the receptor of harm or pollution
- likely: it is probable that an event will occur or circumstances are such that the event is not inevitable, but possible in the short term and likely over the long term
- low likelihood: circumstances are possible under which an event could occur, but it is not certain even in the long term that an event would occur and it is less likely in the short term
- unlikely: circumstances are such that it is improbable the event would occur even in the long term.

The severity can be classified using a similar system also based on CIRIA C552. The terms and definitions relating to severity are:

- severe: short term (acute) risk to human health likely to result in ‘significant harm’ as defined by the Environment Protection Act 1990, Part IIA. Short-term risk of pollution of sensitive water resources. Catastrophic damage to buildings or property. Short-term risk to an ecosystem or organism forming part of that ecosystem (note definition of ecosystem in ‘Draft Circular on Contaminated Land’, DETR 2000)
- medium: chronic damage to human health (‘significant harm’ as defined in ‘Draft Circular on Contaminated Land’, DETR 2000), pollution of sensitive water resources, significant change in an ecosystem or organism forming part of that ecosystem (note definition of ecosystem in ‘Draft Circular on Contaminated Land’, DETR 2000)

- mild: pollution of non-sensitive water resources. Significant damage to crops, buildings, structures and services ('significant harm' as defined in 'Draft Circular on Contaminated Land', DETR 2000). Damage to sensitive buildings, structures or the environment
- minor: harm, not necessarily significant, but that could result in financial loss or expenditure to resolve. Non-permanent human health effects easily prevented by use of personal protective clothing. Easily repairable damage to buildings, structures and services.

Once the likelihood of an event occurring and its severity have been classified, a risk category can be assigned the table below.

		Consequences			
		Severe	Medium	Mild	Minor
Probability	Highly likely	Very high	High	Moderate	Moderate/low
	Likely	High	Moderate	Moderate/low	Low
	Low likelihood	Moderate	Moderate/low	Low	Very low
	Unlikely	Moderate/low	Low	Very low	Very low

Definitions of these risk categories are as follows together with an assessment of the further work that may be required:

- Very high: there is a high probability that severe harm could occur or there is evidence that severe harm is currently happening. This risk, if realised, could result in substantial liability; urgent investigation and remediation are likely to be required.
- High: harm is likely to occur. Realisation of the risk is likely to present a substantial liability. Urgent investigation is required. Remedial works may be necessary in the short term and are likely over the long term.
- Moderate: it is possible that harm could arise, but it is unlikely that the harm would be severe and it is more likely that the harm would be relatively mild. Investigation is normally required to clarify the risk and determine the liability. Some remedial works may be required in the longer term.
- Low: it is possible that harm could occur, but it is likely that if realised this harm would at worst normally be mild.
- Very low: there is a low possibility that harm could occur and if realised the harm is unlikely to be severe.



APPENDIX E

ENVIROCHECK ENVIRONMENTAL DATABASE

REPORT (CD)
