

LAND AT BURRS COUNTRY PARK BURY

PHASE 1: PRELIMINARY RISK ASSESSMENT

Job Number: LKC 21 1114
Date: April 2021
Client: Bury MBC



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Contents

1	Introduction.....	1
2	Historical Review	2
3	Environmental Setting.....	4
4	Site Reconnaissance	6
5	Preliminary Conceptual Model.....	8
5.1	Introduction	8
5.2	Potential Contaminants.....	8
5.3	Potential Receptors.....	8
5.4	Potential Pathways	9
5.5	Preliminary Contamination Conceptual Model.....	9
6	Preliminary Geotechnical Risk Assessment.....	12
7	Summary Conclusions and Recommendations	13
7.1	Summary Conclusions	13
7.2	Recommendations	14

Figures

- Figure 1: Site Location and Boundary Plan
Figure 2: Proposed Development Plan

Appendices

- Appendix A: Historical Maps
Appendix B: Envirocheck Report
Appendix C: Zetica UXO Unexploded Bomb Risk Map
Appendix D: Risk Evaluation

1 Introduction

LK Consult Ltd (LKC) has been retained to carry out a Phase 1 Preliminary Risk Assessment (PRA) for land at Burrs Country Park, Bury.

In accordance with current guidance (including LCRM¹ and the National Planning Policy Framework (NPPF)²), the PRA will include a site reconnaissance, site history, geology, hydrogeology, hydrology, mineral search and a landfill search. Information gathered from the desk study and site reconnaissance will be used to develop a contamination conceptual model for the site.

In addition, the information gathered will be used to identify potential geotechnical constraints associated with the redevelopment of the site.

Based on the findings of this report, an appropriate site investigation can be derived, if required.

Site details are provided in Table 1-1. Figure 1 shows the site location and boundary. Figure 2 shows the proposed development plan.

Site Location	Within Burrs Country Park, to the east of Woodhill Road, Bury. Centred at approximate National Grid Reference 379980E 412510N.
Approximate Area	6,800m ² .
Topography	90 metres Above Ordnance Datum (AOD). Site is approximately level.
Current Site Use	Vacant parcel of land within Burrs Country Park.
Purpose of Report	Planning.
Proposed Development	Construction of new car park with access road and pedestrian footpaths.

Table 1-1: Summary of site details

¹ Land Contamination Risk Management (LCRM) <https://www.gov.uk/government/publications/land-contamination-risk-management-lcrm>

² "National Planning Policy Framework." The Ministry of Housing, Communities and Local Government. February 2019.

2 Historical Review

In compiling the site history, LKC consulted Envirocheck historical mapping (Appendix A) and other public domain maps / aerial photography.

Table 2-1 summarises features on site.

Table 2-2 summarises potentially contaminative land uses within approximately 50m and potentially infilled features within approximate 250m.

Site Features	Location on Site	Dates Present		Comments
		From	To	
Undeveloped Land	Whole Site	1891	1910	Building covers the majority of the site with the exception of a strip along the western edge and the northeast corner. Extension in the northwest by 1950s.
Excavation	Whole Site	1929	1986	Assumed to be infilled between 1986 mapping and 1992 mapping.

Table 2-1: Summary of site features. Dates based on available historical map editions.

Surrounding Area Features	Distance (m)	Direction	Dates Present		Comments
			From	To	
Reservoirs	14	E	1891	2021	Now formed into one reservoir.
Waterway	15	S	1891	2021	
River Irwell	24	E	1850	2021	
Mill Goit	33	NE	1893	1956	With aqueduct over River Irwell. Mill goit shown as marshy ground by 1960 mapping. Aqueduct annotated as 'disused' on 1960 mapping.
Glue Works	51	SE	1929	1938	No longer present by 1956 mapping.
Paper Mill	51	SE	1891	1910	Half of building shown as 'disused mill' by 1930 mapping. Western half of building annotated as 'glue works'.
Bleach Works	53	NW	1891	1956	Split into various works buildings by 1959 mapping.
Works	56	NW	1959	1982	No longer present by 1986 mapping.
Settling Tanks	67	NE	1929	1956	No longer present by 1960 mapping.
Sludge Bed	78	E	1929	1956	No longer present by 1960 mapping.
Works	81	NW	1959	1982	No longer present by 1986 mapping.
Tank	82	N	1929	1930	Appears to be water tank linked to River Irwell. Present but not annotated until 1970 mapping.
Old Quarry	210	SE	1891	1894	No longer annotated by 1910 mapping.

Table 2-2: Summary of potentially contaminative features within 50m and potentially infilled features with 250m. Dates are based on available historical map editions.

Plate 2-1 shows the features noted in Table 2-1 and 2-2.

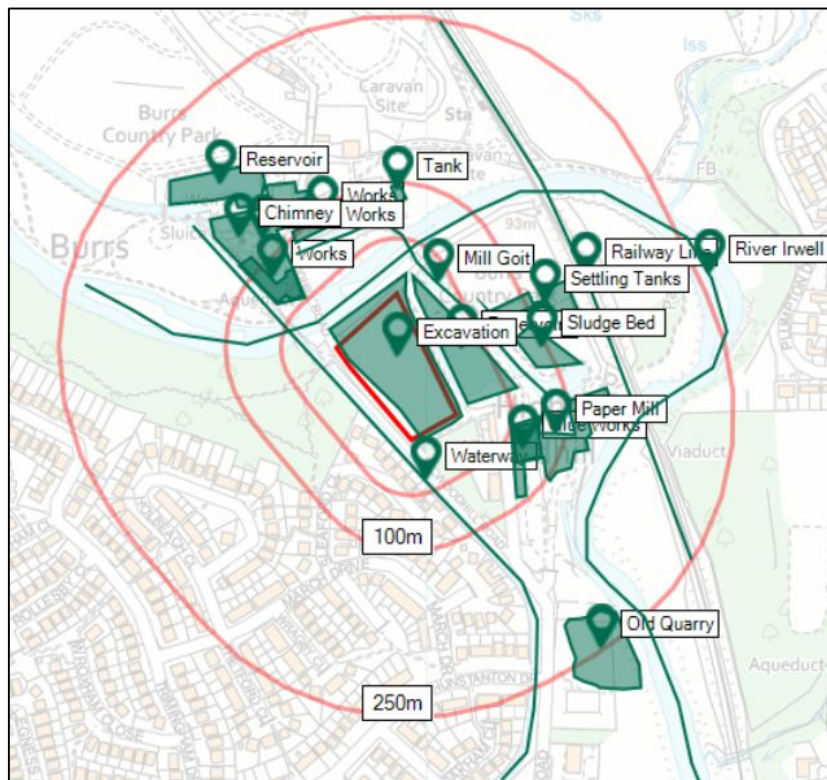


Plate 2-1: Historical features.

The 1930 mapping is shown on Plate 2-2.

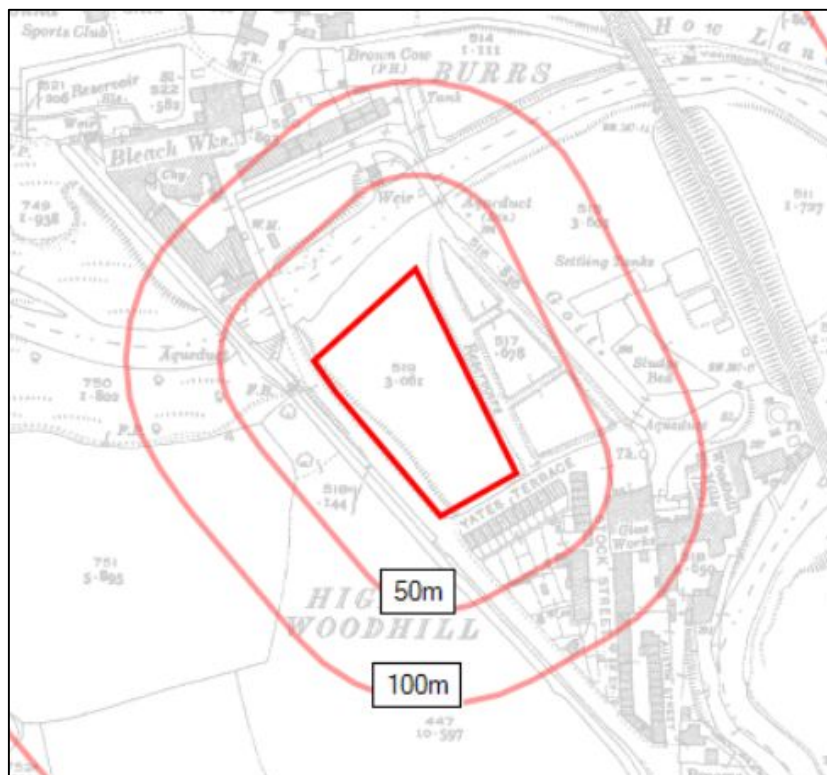


Plate 2-1: Extract from 1930 mapping.

3 Environmental Setting

A summary of environmental settings is presented in Table 3-1, based on a review of available environmental data.

Categories (data sources)		Details
Geology ¹	Artificial	- No artificial ground recorded on BGS mapping.
	Superficial	- Alluvium in north of the site. - River Terrace Deposits (sand and gravel) in the south of the site.
	Bedrock	- Pennine Lower Coal Measures (sandstone, siltstone and mudstone).
	BGS Logs (<50m)	- None.
Hydro-geology ¹	Aquifer Designation	- Superficial - Bedrock
	Source Protection Zone (SPZ)	- Site not within an SPZ.
	Groundwater Abstractions (100m)	- None.
Hydrology ¹	Surface Water Courses (100m)	- Reservoir, 11m NE. - River Irwell, 30m N.
	Flooding risk	- North of the site is within Flood Zone 2.
	Surface Water Abstractions (100m)	- None.
	Discharge Consents	- None within 100m.
	Pollution Incidents	- Recorded onsite. - Year: 1995 - Pollutant: Natural – blue green algae. - Severity: Category 3 Minor Incident. - Receiving water: River Irwell.
Minerals & Mining ^{1,3}	Coal Mining	- Within a Coal Reporting Area. - Not within a Development High Risk Area.
	Surface Mineral Extractions (250m)	- Nearest is 247m SE, Woodlands Quarry, opencast extraction of sandstone, operation now ceased.
	Non-Coal Mining Area	- Not within an area of conclusive metalliferous mining.
Ground Stability ¹	Collapsible Ground	- Very low hazard.
	Compressible Ground	- Moderate to no hazard.
	Ground Dissolution	- No hazard.
	Landslide	- Low to very low hazard.
	Running Sand	- Low to very low hazard.
	Shrinking / Swelling Clay	- Very low to no hazard.

Table 3-1: Summary of the environmental setting.

Notes: Distance in brackets is the distance from site that features are included. Where no distance given, features relate to on site only.

Data Sources:

1 Envirocheck Report (Appendix A & B)

2 BGS GeoIndex <http://mapapps2.bgs.ac.uk/geoindex/home.html>

3 The Coal Authority Web Mapping Services (WMS) /

Interactive Map Viewer <http://coal.decc.gov.uk/en/coal/cms/publications/data/map/map.aspx>

4 Zetica UXO Unexploded Bomb Risk Map (Appendix C)

Categories ^(data sources)		Details
Landfill Sites (250m) ¹	Known / Registered	- Onsite – Land off Woodhill Road, deposited waste included inert waste, input dates between July 1990 and October 1990. - 81m W, Land off Woodhill Road, deposited waste included inert waste, input dates December 1988 to December 1991.
	Potentially Infilled Land (non-water and water), based on Envirocheck Report	- 2no. features: 38m NE and 163m NW.
	Potentially infilled sites, based on LKC historical review	- 4no. features: See Table 2-1.
Radon Potential ¹		- <1% of homes above Action Level. No protective measures are necessary in the construction of new dwellings or extensions.
Designated Sites (50m) ¹		- Within an area of Adopted Green Belt.
Contemporary Trade Directory (50m) ¹		- None.
Fuel Station Entries (50m) ¹		- None.
Unexploded Ordnance Risk (UXO)	Zetica Risk Map ⁶	- Low.

Table 3-1 continued: Summary of the environmental setting.

Notes: Distance in brackets is the distance from site that features are included. Where no distance given, features relate to on site only.

Data Sources:

1 Envirocheck Report (Appendix A & B)

2 BGS GeoIndex <http://mapapps2.bgs.ac.uk/geoindex/home.html>

3 The Coal Authority Web Mapping Services (WMS) /

Interactive Map Viewer <http://coal.decc.gov.uk/en/coal/cms/publications/data/map/map.aspx>

4 Zetica UXO Unexploded Bomb Risk Map (Appendix C)

4 Site Reconnaissance

A site reconnaissance was carried out on 24 March 2021.

Relevant features identified on site are summarised below:

- » The site is an approximate rectangular shaped parcel of land.
- » It is largely flat and the majority of the site is grassland.
- » The site is part of a country park and is regularly used by the public and dog walkers.
- » Vehicle access is gained from two locked gates off Woodhill Road. One of these has a height restriction of approximately 2.5m.
- » Pedestrian access is obtained from numerous locations off Woodhill Road and the track along the northern boundary.
- » The western, southern and northern boundaries are formed by hedges. The eastern boundary is formed by a post and wire fence.
- » The southern boundary is overgrown and undergrowth encroaches approximately 20m onto site.
- » The eastern boundary has a water filled ditch beyond.
- » A public footpath runs alongside the northern boundary beyond the hedge.
- » Woodhill Road runs along the eastern boundary and is a cobbled road with parking restrictions.
- » The River Irwell flows adjacent to the north of the site.
- » No evidence of contamination was identified.

Relevant photographs are provided in [Plate 4-1](#) and a plan showing photograph locations is shown in Plate 4-2.



Photograph 1: Site access from Woodhill Road with height restriction



Photograph 2: Alternative access from Woodhill Road.



Plate 4-1: Site photographs.



5 Preliminary Conceptual Model

5.1 Introduction

The aim of the conceptual model is to provide a preliminary assessment of the likelihood of a pollutant linkage for each potential combination of contaminant, pathway and receptor. A conceptual model can be used to make an informed decision on the contamination risks associated with the site and whether further site investigation work is required.

The Sections below are therefore divided into potential contaminant, potential pathway and potential receptor as described in LCRM³, on the premise that, if there is no pollutant linkage, then there will be no risk to the receptor. The final Section provides an assessment of the potential pollutant linkages that may still be present on the site if redevelopment were to occur.

5.2 Potential Contaminants

Potential viable contamination sources are detailed in Table 5-1. These are split into onsite sources, offsite sources and underlying geology.

Potential Source	Contaminants
On Site	
Deep Made Ground below some or all of the site from previous infilling.	- Infilled material (inert from Bury MBC records): heavy metals, PAHs⁴. - If organic / putrescible material: Hazardous gas (principally carbon dioxide and methane).
Surrounding Area	
Bleach works, paper mill, glue works and later unreferenced works.	- Possible organic and inorganic contamination. - Unlikely to be significant sources of contamination to the site due to distances and intervening River Irwell for bleach works and later works.
Landfills / offsite potentially infilled features within 250m	- Given size, distance and age of features, there is not considered to be a more significant source of hazardous gas than the landfill recorded onsite.

Table 5-1: Potential contamination sources.

5.3 Potential Receptors

Potential receptors are detailed in Table 5-2.

Receptors	
Human Health	- Future site users (including visitors and site workers). - Offsite land users.
Controlled Waters	- Reservoirs, 11m NE. - River Irwell, 30m N. - Secondary A Aquifers.
Flora within future gardens and landscaping.	

Table 5-2: Potential receptors.

³ Land Contamination Risk Management (LCRM) <https://www.gov.uk/government/publications/land-contamination-risk-management-lcrm>

⁴ Defra (2002). "Potential Contaminants for the Assessment of Land". R&D Publication CLR 8.

5.4 Potential Pathways

Potential pathways are detailed in Table 5-3.

Pathways		
Soil	Human Health ⁵ (Car park with public open space).	- Ingestion of soil. - Dermal contact with soil. - Inhalation of soil-derived outdoor dust. - Inhalation of vapours outside.
	- Windblown dust and fibres to adjacent receptors.	
	- Root uptake.	
Water	- Surface run-off over impermeable surfaces.	
	- Infiltration into the ground, through potentially contaminated material (contamination possibly going into solution).	
	- Migration through potentially permeable strata and preferential pathways.	
	- Superficial (alluvium and River Terrace Deposits) likely to be variably permeable.	
	- Bedrock (sandstone, mudstone and siltstone) likely to be variably permeable.	
	- Preferential pathways: services and drains, permeable infilled ground.	

Table 5-3: Potential pathways.

5.5 Preliminary Contamination Conceptual Model

The Preliminary Contamination Conceptual Model is illustrated in Table 5-4 and has identified five generic potential pollutant linkages.

Each linkage is described along with an assessment of the risk based upon guidance on probabilities and consequences outlined in CIRIA C552⁶.

In order to assess the potential risk for each pollutant linkage, an assessment of the magnitude of the potential consequence (severity) of the risk occurring and the magnitude of the probability (likelihood) of the risk occurring has been considered and classified. This is based on the guidance provided in CIRIA C552 and further details including a risk matrix is provided in Appendix E.

Where LKC identified a low to very low risk, targeted or low density intrusive investigation work, a watching brief (during construction work) or no investigation work will be recommended. This will be dependent on the nature of the site and the proposed development.

Where the risk falls into the moderate/low risk, LKC will undertake an assessment to establish what category the pollutant linkage will fall into (i.e. moderate or low risk will be chosen).

Where LKC identifies a moderate or higher risk, intrusive investigation work or precautionary remedial measures will be recommended.

It should be noted that there may be risk from short term exposure from contaminated soil to site workers. The Preliminary Contamination Conceptual Model deals with long term exposure to key receptors. Acute risks can be easily mitigated by good environmental management of the site during site works. Standard health and safety precautions (as per HSE guidance⁷) should be adopted by all workers involved with

⁵ EA (2008). "Updated Technical Background to the CLEA Model". Science Report – SC050021/SR3.

⁶ CIRIA (2001). "Contaminated Land Risk Assessment: A Guide to Good Practice". C552.

⁷ HSE (1991). "Protection of Workers and the General Public During Development of Contaminated Land". London HMSO.

site enabling and construction works. Therefore, this receptor is not considered in the contamination conceptual model.

PL	Pathway	Receptor	Contaminants of Concern (CoC)	Probability	Consequence	Risk	Recommendations
1	- Dermal contact. - Inhalation of soil, fibres and dust. - Ingestion of soils and dust. - Windblown dust.	- Future site users. - Offsite receptors.	- Heavy metals. - PAHs. - Other inorganic and organic contaminants.	Low Likelihood (potential for limited exposure in soft landscaping)	Medium	Moderate / Low (moderate assumed until ground conditions confirmed)	Targeted intrusive investigation required. Soil analysis of CoC, subject to ground conditions encountered.
2	- Inhalation of vapours. - Migration via permeable strata and preferential pathways.	- Future site users. - Offsite receptors.	- Volatile contaminants (TPHCWG, SVOC, VOCs).	Unlikely (no significant source of volatile contamination and only outdoor inhalation pathway)	Medium	Low	No further assessment required.
3	- Inhalation of gas. - Migration via permeable strata and preferential pathways. - Explosion in confined spaces. - Exposure to radon.	- Future site users. - Offsite receptors.	- Ground / hazardous gas (carbon dioxide, methane). - Radon	- No pollutant linkage exists for hazardous gas as no buildings are proposed and therefore, no receptors are considered to be present.			
4	- Surface run-off. - Migration via permeable strata and preferential pathways. - Perched waters migration.	- Groundwater (Secondary A Aquifer). - Surface water (River Irwell).	- Mobile contaminants such as metals, PAHs, hydrocarbons, volatile compounds.	Unlikely (no significant mobile contamination anticipated due to inert waste deposited in landfill onsite)	Medium	Low	No further assessment required.
5	- Sulphate attack on concrete.	- Building structure.	- Sulphate.	Unlikely (given site history, site conditions, and proposed development)	Mild	Low	Confirmatory sulphate testing if any in-ground concrete is proposed.
6	- Ingestion of tainted water supply.	- Future site users. - Water pipes.	- Organic contaminants	No pollutant linkage exists for potable water pipes as no buildings are proposed and therefore, no receptors are considered to be present.			
7	- Direct contact (plant uptake).	- Flora.	- Phytotoxic contaminants such as heavy metals.	Low Likelihood (given site history and current site conditions)	Minor	Low	Targeted intrusive investigation required. Soil analysis of CoC, subject to ground conditions encountered.

Table 5-4: Preliminary Contamination Conceptual Model.

Notes: PL = Pollutant Linkage. Contaminant of Concern (CoC) - See Table 5-1 for contamination sources. Site conditions based on observations during site reconnaissance.

6 Preliminary Geotechnical Risk Assessment

Table 6-1 summarises the possible geotechnical constraints of the site, based on the site history, environmental settings and site reconnaissance. Investigation work will be required to confirm the risks and provide a detailed geotechnical assessment and foundation design.

Coal Mining	Site is not within a Development High Risk Area. No further assessment required.
Slope Stability	Site is relatively flat. No significant slope stability risk anticipated. No further assessment required.
Envirocheck Ground Stability Hazards	Moderate Risk identified for Compressible Ground on site likely to be related to alluvium deposits. No to low hazard identified for others.
Plasticity	Plasticity of clay deposits should be confirmed, particularly where trees are present or proposed, to identify the shrink / swell risk.
Sulphate	Unknown sulphate content of the made ground and natural for any in ground concrete.
Car Park, Road and Footpath Design	Unknown CBR values for car park, footpath and road design.

Table 6-1: Summary of geotechnical constraints.

7 Summary Conclusions and Recommendations

7.1 Summary Conclusions

Table 7-1 summarises the site details, historical review, environmental settings and site reconnaissance.

Current Site Use	Vacant parcel of land within Burrs Country Park.
Proposed Development	Construction of new car park with access road and pedestrian footpaths.
Main Historical Features	Onsite: Excavation, landfill. Surrounding Area: Bleach works, paper mill, glue works, works, landfill.
Geology / Hydrogeology	Artificial: No BGS recorded artificial. Superficial: Alluvium in the north and River Terrace Deposits in the south. Secondary A Aquifer. Bedrock: Pennine Lower Coal Measures (sandstone, siltstone, mudstone). Secondary A Aquifer.
Landfills / Infilled ground	Landfill recorded onsite. Potentially infilled ground identified within 250m.
Site walkover	The site is an approximate rectangular shaped parcel of vacant grassed land anecdotally used as an unofficial overflow car park. No potential significant contamination sources identified from the site reconnaissance.

Table 7-1: Summary of site details, historical review, environmental settings and site reconnaissance.

A preliminary contamination conceptual model has been produced by LKC, which is summarised in Table 7-2.

Pollutant Linkage		Risk	Recommendations
PL1: Contaminants posing a risk to future site users via dermal contact, ingestion and inhalation (of soil, dust, fibres and vegetables).	Heavy metals, PAHs, other organic and inorganic contaminants	Moderate / Low	Targeted intrusive investigation required. Soil analysis of CoC, subject to ground conditions encountered.
PL2: Volatile contaminants posing a risk to future site users via the inhalation of vapours.		Low	No further assessment required.
PL3: Gas posing a risk to buildings and future site users via the migration of gas into building causing explosion and asphyxiation.	Carbon dioxide & methane Radon	No pollutant linkage exists for hazardous gas as no buildings are proposed and therefore, no receptors are considered to be present.	
PL4: Mobile contamination posing a risk to controlled waters via the migration through permeable strata.		Low	No further assessment required.
PL5: Sulphate posing a risk to building via direct contact (sulphate attack).		Low	Confirmatory sulphate testing if any in-ground concrete is proposed.
PL6: Organic contaminants posing a risk to water pipes.		No pollutant linkage exists for potable water pipes as no buildings are proposed and therefore, no receptors are considered to be present.	
PL7: Phytotoxic metals posing a risk to flora via root uptake.		Low	Targeted intrusive investigation required. Soil analysis of CoC, subject to ground conditions encountered.

Table 7-2: Summary risk table.

Where moderate / low risk had been identified, the assumed risk is shown in bold.

7.2 Recommendations

Recommendations are provided in Table 7-4.

Contamination status	There is sufficient information on the potential contaminative status of the site to allow conditional approval of a planning application, based on the proposed end use detailed in the PRA.
Further assessment recommendations	Phase 2 intrusive investigation required. Phase 2 investigation to be carried out in line with current guidance, including BS10175 ⁸ , BS5930 ⁹ CIRIA C665 ¹⁰ , RB17 ¹¹ and BS8485 ¹² . Low density, targeted investigation in areas of proposed soft landscaping. To be agreed with the Local Authority.
Type of investigation work	Trial pits.
PL 1 & 7	Intrusive investigation work recommended to confirm ground conditions in proposed soft landscaping. Testing of contaminants of concern based on preliminary conceptual model and field observations (PID tests and visual / olfactory evidence).
Reporting	Information from the above can be used to carry out a contamination and geotechnical assessment and provide a remediation strategy for the site.
Importation of soils	Any topsoil or subsoil brought on to the site for use in soft landscaping should be suitably chemically validated prior to its use on site, according to Local Authority guidance.

Table 7-4: Recommendations.

Further Considerations are summarised in Table 7-5.

Flood Risk / Sustainable Drainage	As part of the site is in Flood Risk Zone 2, a Flood Risk Assessment (FRA) may be required. NPPF ¹³ requires that an FRA be undertaken to assess the impact of the site on the local drainage system and to assess potential for Sustainable Drainage Systems (SuDS) techniques. LKC have a Flood Risk assessor who would be happy to advise on the requirements of the Flood Risk Assessment.
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Table 7-5: Further considerations.

⁸ British Standard (2017). "Investigation of Potentially Contaminated Sites – Code of Practice". BS10175:2017.

⁹ British Standard (2015). "Code of Practice for Ground Investigations". BS5930:2015.

¹⁰ CIRIA (2007). "Assessing Risks Posed by Hazardous Ground Gases to Buildings". CIRIA C665.

¹¹ CL:AIRE Research Bulletin RB17 (November 2012) "A Pragmatic Approach to Ground Gas Risk Assessment".

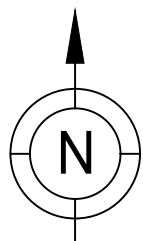
¹² BSI (2015). "Code of Practice for the Design of Protective Measures for Methane and Carbon Dioxide Ground Gases for New Buildings". BS8485:2015.

¹³ DCL (2018) National Planning Policy Framework: Meeting the Challenge of Climate Change, Flooding and Coastal Change. Footnote 50".

Figures



Client: Bury MBC				Title: Site Location & Boundary Plan			
Site: Land at Burrs Country Park, Bury				Scale (see scale bar): 1:25,000 & 1:2,000 @ A4			
Job No.: LKC 21 1114	Drawn By: CH	Checked By: HM	Drawn: Apr 2021	Figure: 1	Revision:		



KEY

 Site Boundary

Sampling Locations and features annotated by LK Consult Ltd are approximate and are based upon observed measurements unless otherwise stated. Do not scale from this drawing and work from marked dimensions only. All dimensions and features should be confirmed on site by the Contractor. Where this drawing includes information provided to LK Consult Ltd by others, LK Consult Ltd gives no warranty, representation or assurance as to the accuracy of such information.



Client: **Bury MBC**

Site: **Land at Burrs Country Park, Bury**

Title: **Proposed Development Layout**

Job No.: LKC 21 1114	Scale (See Scale Bar): See scale Bar	Figure: 2	Revision:
Drawn By: AC	Checked By: CH	Drawn: Apr 2021	

Extract from: Bury Council
Drawing Ref: Proposals For Car Park, No.186/CP01 (11/11/2020)