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CONTAMINATED LAND
PRELIMINARY RISK ASSESSMENT
PHASE 1 DESK STUDY

Land at Eldon Street, Barnsley

Eldon Street, Barnsley S70 2JL

CLIENT	DOCUMENT REF	REVISION	DATE	SITE AREA	HIGHEST RISK
Pennine Living Ltd	FA-CLD-0103	P01	9 September 2025	0.28 ha	High

Contents

Document control

PROJECT	Land at Eldon Street, Barnsley
REPORT	Contaminated Land - Preliminary Risk Assessment (Phase 1 Desk Study)
SITE	Eldon Street, Barnsley S70 2JL
CLIENT	Pennine Living Ltd
DOCUMENT REF	FA-CLD-0103
REVISION	P01
DATE	9 September 2025
PLANNING REFERENCE	2025/0784/FUL
REPORT STATUS	Final
LPA CONSULTATION	Consulted - records provided, 5 August 2025
DATA PACK	Landmark Envirocheck - Envirocheck 305911042_1_1, 4 August 2025
WALKOVER	6 August 2025 by A. Moyle
PREPARED BY	Fortress Associates

This report has been prepared for the sole use of the named client for the purposes of the planning application described. It is a desk study and preliminary risk assessment; it establishes the potential for contamination and scopes the intrusive investigation, and does not confirm the presence or absence of contamination. Environmental information derives from datasets listed in the Data Sources section as at the date of access; conditions may change. No liability is accepted to third parties.

Executive summary

Site address	Eldon Street, Barnsley S70 2JL
Site description	A cleared town-centre plot last occupied by a two-storey retail unit with a rear service yard, demolished to slab level. The slab, a brick boundary wall and an area of broken tarmac remain, with self-set vegetation across the northern half.
Site history	The historical map record covers 8 editions from 1892 to 2024.
Proposed end use	Residential with private gardens; the critical receptor is young children resident on the site.
Landfill & waste	No landfill or waste management facility is recorded within 250 m of the site.
Regulated industries	2 contemporary trade directory entries are recorded within the search radius.
Geology	The bedrock is mapped as Mudstone and Strong Sandstone (Coal-bearing) 2:1.
Hydrogeology	PENNINE MIDDLE COAL MEASURES FORMATION AND SOUTH WALES MIDDLE COAL MEASURES FORMATION (UNDIFFERENTIATED) - Moderately productive aquifer. The site does not lie within a Source Protection Zone.
Hydrology	No surface water feature is recorded immediately adjoining the site.
Flooding	The site lies in Flood Zone 2.
Radon	The maximum radon potential within this 1 km grid square is 5-10% of homes at or above the Action Level. The site lies within a radon Affected Area. Basic radon protection is required in the construction of new buildings.
Preliminary mining assessment	The site lies within a Development High Risk Area defined by the Mining Remediation Authority, with probable shallow coal mine workings and coal seam outcrop recorded at the site. A mining report is obtained and the intrusive investigation addresses the recorded workings.
Preliminary geotechnical assessment	Reinforced raft foundation. This is appropriate where there is variable or compressible near-surface deposits where differential settlement is the governing concern.
Preliminary contamination assessment	The desk study has identified 34 pollutant linkages requiring assessment, the highest classified as high risk. The site may therefore have been exposed to contamination associated with made ground, construction and demolition waste, former industrial use, roads, yards and parking areas, mining and mineral extraction. An intrusive investigation is undertaken to characterise the ground and confirm the classification.
Potential sources of ground gas	Ground gas may be generated by made ground and former industrial use and mining and mineral extraction. Monitoring is undertaken over twelve visits over six months.
Phase 2 recommendations	- 10 no. hand dug inspection pits - 4 no. percussive boreholes - 6 no. machine excavated trial pits - 4 no. window sample holes - 4 no. combined gas and groundwater monitoring wells - chemical testing suite - asbestos screening - geotechnical testing suite - 2 no. in-situ soakaway and CBR testing - groundwater quality sampling

Introduction and scope

Purpose, scope and the phased framework

This Phase 1 Desk Study and Preliminary Risk Assessment accompanies the planning application for redevelopment to provide 14 apartments in a four-storey block, with communal amenity space, refuse and cycle stores, and eight parking spaces off the existing service access at Eldon Street, Barnsley S70 2JL. It establishes the environmental setting and the documented history of the site, develops the preliminary conceptual site model, and classifies each pollutant linkage identified so that the intrusive

investigation is scoped to the risks that matter.

Objectives of this desk study

The objectives of this desk study are to determine the land use history of the site from the historical map record; to establish the environmental setting from the published datasets; to determine whether past mining has influenced the site; to establish whether the site has been put to uses capable of giving rise to ground contamination; and to define the scope of the intrusive investigation that follows.

Standards and guidance followed

The assessment is undertaken in accordance with the Environment Agency's Land Contamination Risk Management framework, and with BS 10175 Investigation of potentially contaminated sites and BS 5930 Code of practice for ground investigations. The qualitative risk classification follows CIRIA C552, Contaminated Land Risk Assessment - A Guide to Good Practice, Tables 6.3 to 6.6.

The phased framework

The assessment of land affected by contamination follows a phased process. Phase 1 is this desk study and preliminary risk assessment, which establishes the environmental setting and the history of the site, develops the conceptual site model and identifies the pollutant linkages that require assessment. Phase 2 is the intrusive investigation, which characterises the ground and tests the linkages carried forward. Phase 3 is the remediation strategy; and Phase 4 the validation of the works undertaken. This report is Phase 1 and its purpose is to establish the potential for contamination and to scope Phase 2.

Standards and guidance

Reference	Application
Land Contamination Risk Management (LCRM) (Environment Agency)	The current framework for assessing and managing land contamination risk, replacing CLR11. This report is the preliminary risk assessment - the first tier. Cited undated: LCRM is living guidance maintained on GOV.UK.
BS 10175:2011+A2:2017 (BSI)	Investigation of potentially contaminated sites - Code of practice.
BS 5930:2015+A1:2020 (BSI)	Code of practice for ground investigations.
CIRIA C552 (2001); Tables 6.3 to 6.6 (CIRIA)	Contaminated Land Risk Assessment - A Guide to Good Practice. The source of the qualitative consequence (Table 6.3), probability (Table 6.4), risk matrix (Table 6.5) and risk category (Table 6.6) classifications used in this report.
CIRIA C665 (2007) (CIRIA)	Assessing risks posed by hazardous ground gases to buildings.
BS 8485:2015+A1:2019 (BSI)	Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings.
BR 211 (2023) (BRE)	Radon: guidance on protective measures for new buildings.
Environmental Protection Act 1990, Part 2A (HMSO)	The statutory contaminated land regime.
National Planning Policy Framework (MHCLG)	Requires that a site is suitable for its proposed use, taking account of ground conditions and any risks arising from land contamination.

The site and the proposed development

Site address	Eldon Street, Barnsley S70 2JL
National grid reference	SE 34610 06464
Local planning authority	Barnsley
Site area	0.28 ha
Current use	A cleared town-centre plot last occupied by a two-storey retail unit with a rear service yard, demolished to slab level. The slab, a brick boundary wall and an area of broken tarmac remain, with self-set vegetation across the northern half
Proposed development	Redevelopment to provide 14 apartments in a four-storey block, with communal amenity space, refuse and cycle stores, and eight parking spaces off the existing service access
Proposed end use	Residential with private gardens
Surrounding land use	Retail and commercial frontages to Eldon Street and Regent Street; a public car park to the east; residential apartments to the north
Topography	Broadly level, falling gently to the south-east across the former yard
Site access	From the existing service access off Regent Street; adequate for a small percussive rig

Site location, area and description

The site covers approximately 0.28 hectares and is centred on national grid reference SE 34610 06464, within Barnsley. Broadly level, falling gently to the south-east across the former yard.

The proposed development and end use

The development comprises redevelopment to provide 14 apartments in a four-storey block, with communal amenity space, refuse and cycle stores, and eight parking spaces off the existing service access. The end use assessed is residential with private gardens, for which the critical human receptor is young children resident on the site.

Off-site features and surrounding land use

Retail and commercial frontages to Eldon Street and Regent Street; a public car park to the east; residential apartments to the north.

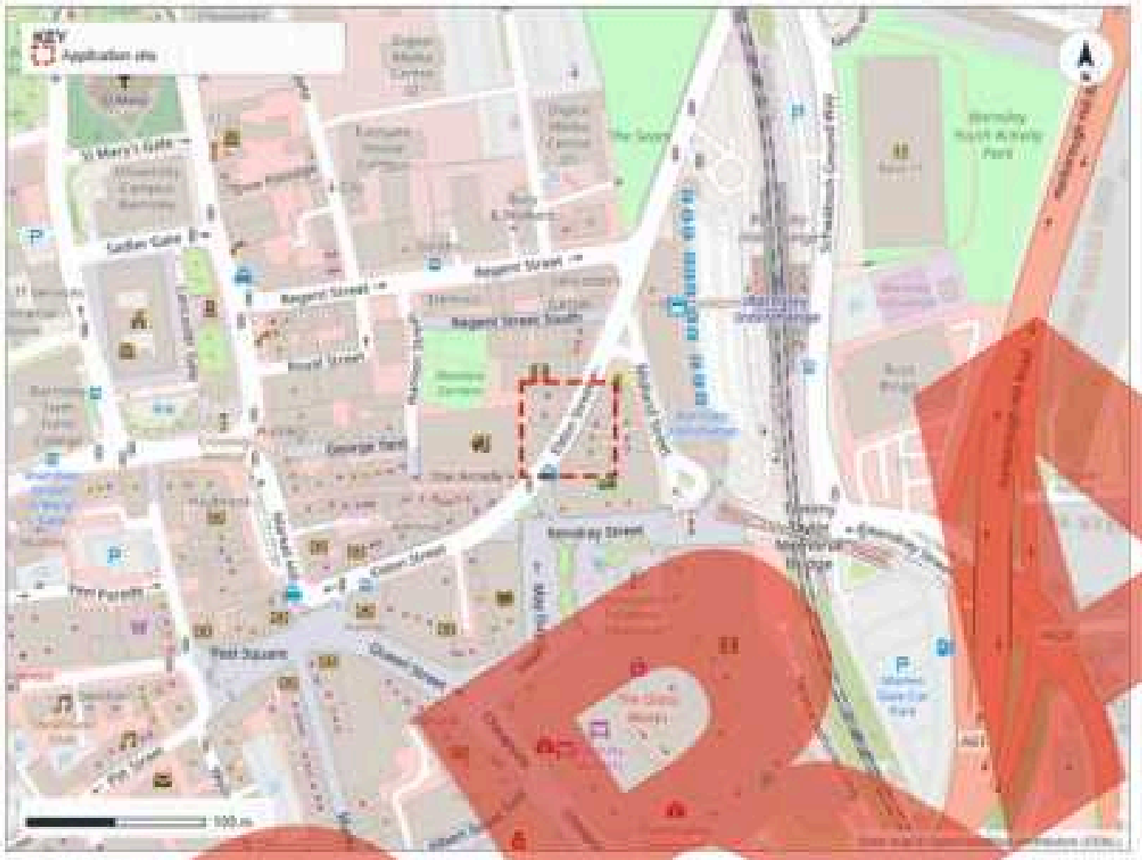

Figure 1 - Site location

Site walkover

A site walkover was undertaken on 6 August 2025 by A. Moyle. The observations recorded during the walkover are set out below and the photographic record is appended.

The site was walked in full on 6 August 2025 in dry conditions. The former retail unit has been demolished to slab level; the concrete slab is intact over the southern two thirds of the plot. The northern third is broken tarmac over granular fill with self-set buddleia. No staining, odour, drums or tanks were seen. A brick boundary wall to the east is in poor condition. No evidence of a fuel interceptor or tank fill points was found, and no ground gas or vapour was detectable by nose.

Photographic schedule

Photo	Subject
1	General view north across the retained slab from the Regent Street access
2	Broken tarmac and granular fill on the northern third of the site
3	Eastern boundary wall and the adjoining public car park
4	Southern slab edge showing made ground in section

Site history

The history of the site and of the surrounding area has been established from the historical Ordnance Survey map series contained in the Landmark Envirocheck (Envirocheck 305911042_1_1, 4 August 2025). Distances are approximate and measured from the nearest site boundary.

OS map edition	Scale	On-site features	Off-site features
1892	1:2,500	Buildings fronting Eldon Street with a smithy to the rear yard	Dense terraced housing and commercial frontages; a colliery railway 300 m south
1908	1:2,500	As 1892; the rear yard enlarged	Additional commercial buildings to the north
1938	1:2,500	The smithy replaced by a motor garage; the yard surfaced	Unchanged
1961	1:2,500	Motor garage retained; a fuel pump shown to the yard	Clearance of terraced housing to the north
1975	1:1,250	Garage removed; the site in retail use with a rear service yard	Redevelopment of the northern block
1993	1:1,250	As 1975	Public car park laid out to the east
2010	1:1,250	As 1975	Unchanged
2024	1:1,250	The retail unit demolished to slab level	Unchanged

Historical development of the site

The historical Ordnance Survey record for the site spans 8 editions from 1892 to 2024. The changes relevant to the proposed end use are tabulated below.

Potential contamination sources identified from the historical record

The historical record and the walkover identify the following potential sources of contamination: made ground; construction and demolition waste; former industrial use; roads, yards and parking areas; mining and mineral extraction. Each is carried into the conceptual site model with the contaminants associated with it.

Potential contamination sources identified from the historical record

Source	Potential contaminants
Made ground	Brick, concrete, timber, ash, slag, coal and metals; associated metals, PAHs, sulphates and, where ash is present, phenols
Construction and demolition waste	Brick, concrete, timber, metals and ASBESTOS
Former industrial use	Determined by the trade - metals, cyanides, acids, solvents, PAHs, asbestos
Roads, yards and parking areas	PAHs and phenols from coal tar bound surfacing; PAHs from ash used as sub-base; hydrocarbons from vehicle drips
Mining and mineral extraction	Metals and metalloids from spoil; mine gas including carbon dioxide and methane; acid mine drainage

Environmental setting

Bedrock	Mudstone and Strong Sandstone (Coal-bearing) 2:1
Hydrogeological unit	PENNINE MIDDLE COAL MEASURES FORMATION AND SOUTH WALES MIDDLE COAL MEASURES FORMATION (UNDIFFERENTIATED) (class 28)
Aquifer character	Moderately productive aquifer. Regional, cyclic multi-layered aquifer with moderate yields from sandstones and many springs. Mine water quality poor but elsewhere reasonable.
Source Protection Zone	The site does not lie within a Source Protection Zone.
Historic landfill	No historic landfill site is recorded within 250 m.
Permitted waste sites	No permitted waste site is recorded within 250 m.
Flood risk	Flood Zone 2
Recorded mines and quarries	No mine or quarry is recorded within approximately 250 m.
Environmental permits	4 permitted sites within 250 m and 26 within 1 km, scheduled below.
Brownfield land register	The site is not entered on the local planning authority's brownfield land register.
Recorded landslides	No landslide is recorded within 500 m.
BGS borehole records	199 records are held within 250 m of the site.

Figure 2 - Environmental constraints in the vicinity of the site

Solid and drift geology

The bedrock is mapped as Mudstone and Strong Sandstone (Coal-bearing) 2:1.

Hydrogeology, aquifer designation and source protection

The site is underlain by the PENNINE MIDDLE COAL MEASURES FORMATION AND SOUTH WALES MIDDLE COAL MEASURES FORMATION (UNDIFFERENTIATED), classified as moderately productive aquifer. Regional, cyclic multi-layered aquifer with moderate yields from sandstones and many springs. Mine water quality poor but elsewhere reasonable. The site does not lie within a Source Protection Zone.

Hydrology, surface water and flooding

The site lies in Flood Zone 2. Flood risk is addressed by the flood risk assessment accompanying the application.

Abstractions and discharge consents

10 consented discharges are recorded within one kilometre of the site, the nearest REGENT STREET BARNSLEY CSO at 96 metres, for storm tank/cso on sewerage network (water company). Abstraction licences are not published in a form that can be searched by location on the open register; licensed abstractions within the search radius are established from the environmental data pack and from the Source Protection Zone status recorded in this chapter.

Radon

The maximum radon potential within this 1 km grid square is 5-10% of homes at or above the Action Level. The site lies within a radon Affected Area, defined as an area where 1% or more of homes are at or above the Action Level. Basic radon protection is required: a radon-resistant barrier continuous with the damp-proof membranes in the floors and the damp-proof courses in the walls, with joints in the membrane sealed and service penetrations sealed.

The Action Level is 200 becquerels per cubic metre, BRE Report BR 211, applied to the British Geological Survey and UK Health Security Agency Radon Indicative Atlas GB v3.

Radon potential is mapped on a one kilometre grid and the value carried is the maximum band within that square, so it is indicative and conservative. The address-level determination is made against the UKHSA record.

Preliminary mining assessment

The site lies within a Development High Risk Area defined by the Mining Remediation Authority. A mining report is obtained and the intrusive investigation is designed to prove the recorded workings and mine entries beneath the development footprint.

The following mining features are recorded at or immediately beside the site.

- Probable shallow coal mine workings - *recorded at the site*
- Coal seam outcrop - *recorded at the site*

The site lies within a surface coal resource area, which is a minerals safeguarding consideration for the local planning authority as well as a ground stability one.

Figure 3 - Mining constraints recorded by the Mining Remediation Authority

The mining screens are read from the Mining Remediation Authority planning constraints and specific risk datasets. These layers are published as mapping only and carry no shaft reference or depth. The recorded features resolve to approximately 6.6 metres and the hatched area designations to approximately 40 metres. A formal mining report is the definitive record and is obtained where the screens identify a constraint.

Regulated sites and environmental permits

Permits and consents held on the Environment Agency public register within one kilometre of the site, nearest first. A permitted process is a regulated activity rather than evidence of contamination, and is carried into the conceptual site model where it lies within the search radius and the ground and groundwater gradient allow migration onto the site.

Distance	Site or operator	Permitted activity	Reference
69 m	LP SD EIGHTY LIMITED	Sort and denature controlled drugs for disposal	WEX384030
96 m	REGENT STREET BARNSLEY CSO	Storm Tank/CSO on Sewerage Network (water company)	NE/EPRBB3148KH/001

Distance	Site or operator	Permitted activity	Reference
96 m	REGENT STREET	Combined Sewer Overflow	NE/YWU/CO2/4/001
194 m	SUPERDRUG STORES PLC	Sort and denature controlled drugs for disposal	WEX483689-00144
272 m	LK REMEDIATE LIMITED	Use of waste in construction	WEX452429
272 m	LK REMEDIATE LIMITED	Screening and blending waste	WEX452431
290 m	LK REMEDIATE LIMITED	Screening and blending waste; Use of waste in construction	WEX448788
346 m	Darren Ingham	Storing waste in secure containers	WEX379908
425 m	Leeds Community Healthcare NHS Trust	Sort and denature controlled drugs for disposal	WEX388792
435 m	Wayfitrough	Sort and denature controlled drugs for disposal	WEX480925
435 m	Wayfitrough	Sort and denature controlled drugs for disposal	WEX480152
554 m	LAMBRA ROAD CSO	Combined Sewer Overflow	NE/WRA7491/001
554 m	LAMBRA ROAD CSO	Combined Sewer Overflow	NE/WRA7491/002
574 m	INSPIRING VET CARE LIMITED	Sort and denature controlled drugs for disposal	WEX484892-00604
622 m	LO'S PHARMACY LIMITED	Sort and denature controlled drugs for disposal	WEX476459
648 m	BARNSLEY ENTERPRISES LTD	Sort and denature controlled drugs for disposal	WEX410372
696 m	GOODISON	Extraction of crude petroleum and natural gas	NE/22/001
780 m	LO'S PHARMACY LIMITED	Sort and denature controlled drugs for disposal	WEX476451
795 m	PETREPAIR LTD	Sort and denature controlled drugs for disposal	WEX489334
822 m	BALFOUR BEATTY GROUP LIMITED	Treating waste aerosol cans	WEX402838
883 m	OLD MILL LANE CSO	Combined Sewer Overflow	NE/WRA9206/001
883 m	OLD MILL LANE CSO	Combined Sewer Overflow	NE/WRA9206/002
884 m	BARNSLEY MFI CSO	Combined Sewer Overflow	NE/3671/001
884 m	BARNSLEY MFI CSO	Combined Sewer Overflow	NE/3671/002

A further 2 permitted sites lie between 884 metres and one kilometre of the site.

Background soil chemistry

The national soil survey gives the following estimated concentrations for the area around the site. These are background values interpolated from survey sample points across the region. They are not measurements at the site, they are not assessment criteria, and they do not establish whether the site is contaminated. They are carried so that what is normal for the area is distinguished from what a past use may have added, and so that the determinand suite of the chemical testing is directed to the elements that matter here.

Element	Estimated background (mg/kg)
Arsenic (As)	26
Cadmium (Cd)	0.38
Chromium (Cr)	90
Copper (Cu)	67
Nickel (Ni)	24
Lead (Pb)	136
Zinc (Zn)	154

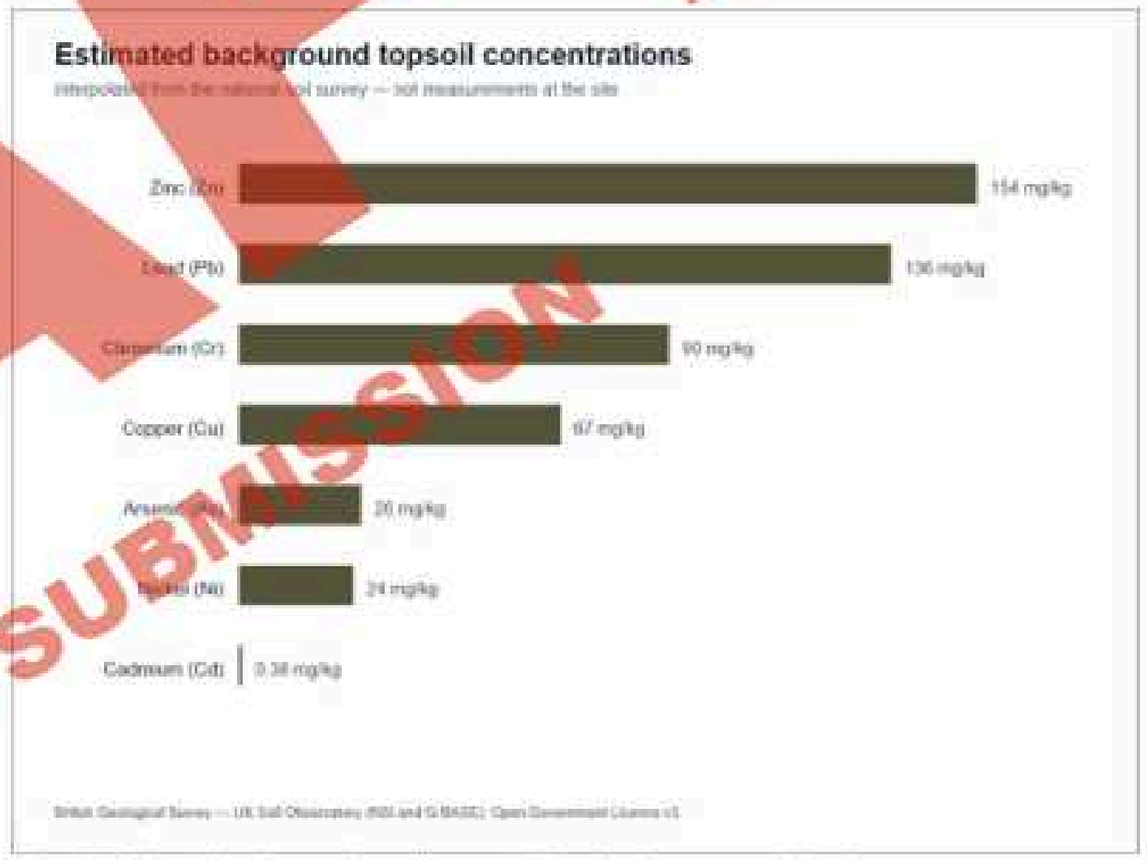

Figure 4 - Estimated background topsoil concentrations for the area around the site

Landfill, waste management and infilled land

No landfill, waste management facility or area of infilled land is recorded within 250 metres of the site.

Regulated industries and trade directory entries

2 contemporary trade directory entries are recorded within the search radius and are carried into the conceptual site model. The Environment Agency public register records 26 permitted sites within one kilometre of the site, of which 4 lie within 250 metres. The nearest is LP SD EIGHTY LIMITED at 69 metres, permitted for sort and denature controlled drugs for disposal.

Preliminary conceptual site model

A pollutant linkage requires a source, a pathway and a receptor. Where any one of the three is absent there is no linkage, and therefore no risk. Each linkage identified below is classified for the consequence of the event and the probability of it occurring, and the resulting risk is read from the CIRIA C552 matrix reproduced in this chapter.

Basis of the conceptual site model

The conceptual site model sets out the potential sources of contamination, the pathways by which they could reach a receptor, and the receptors present once the development is complete. A pollutant linkage exists only where a source, a pathway and a receptor are all present. Where any one of the three is absent the linkage does not exist, the likelihood is zero, and so is the risk.

Potential sources

The potential sources carried into the model are made ground, construction and demolition waste, former industrial use, roads, yards and parking areas, mining and mineral extraction.

Potential pathways

The pathways considered are direct ingestion of and dermal contact with soil, inhalation of soil-derived dust and of vapour, ground gas ingress into buildings, uptake by home-grown produce, leaching and lateral migration to controlled waters, direct contact with buried structures and services, and direct contact during construction.

Potential receptors

The receptors identified are future site users, construction and groundworkers, neighbouring site occupiers, buildings, foundations and buried services, young children resident on the site, maintenance and landscape workers, pennine middle coal measures formation and south wales middle coal measures formation (undifferentiated) (secondary aquifer), landscape and garden planting.

Linkages discounted, and why

The following linkages have been discounted because the pathway is not present: inhalation of vapour (this source is not associated with volatile contaminants); ground gas ingress into buildings (exposure of the construction workforce is assessed under the construction-phase pathway); ground gas ingress into buildings (this source does not generate hazardous ground gas); inhalation of vapour (exposure of the construction workforce is assessed under the construction-phase pathway).

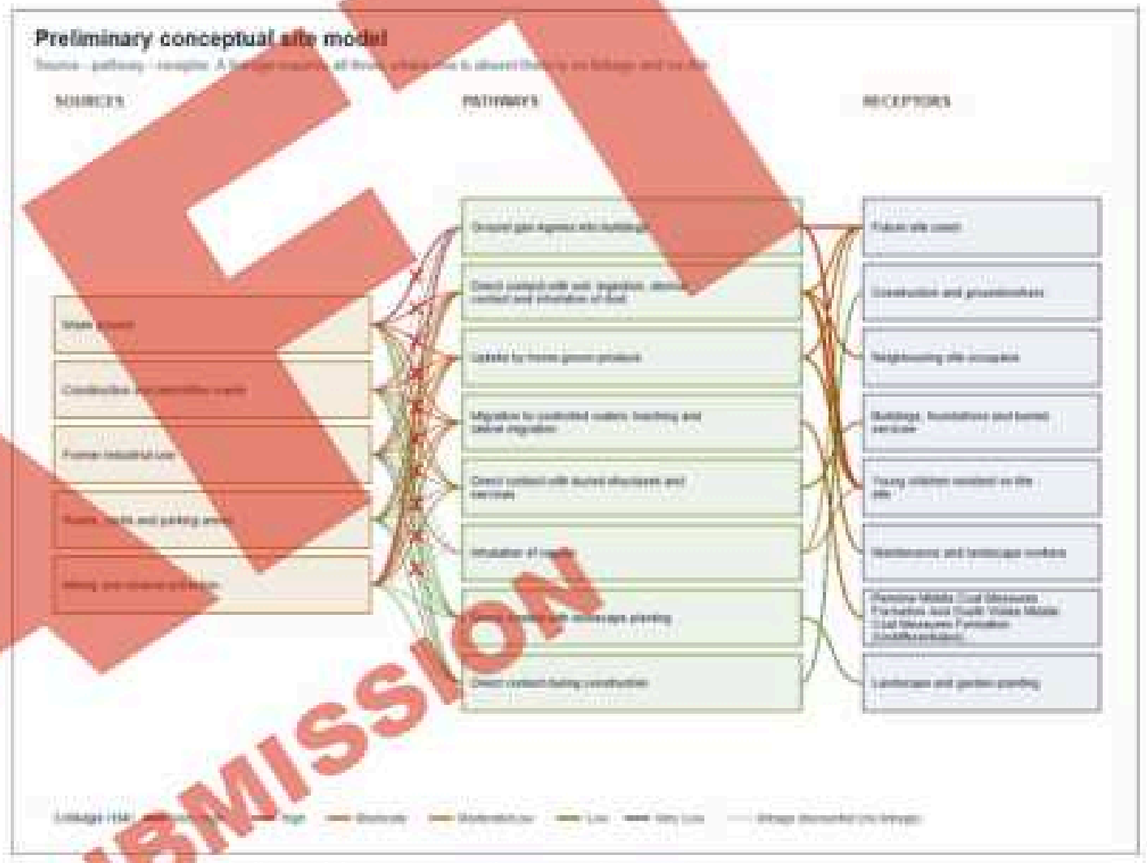

Figure 3 - Conceptual site model - sources, pathways and receptors

Sources

Potential source	Potential contaminants	Basis
Made ground	Brick, concrete, timber, ash, slag, coal and metals; associated metals, PAHs, sulphates and, where ash is present, phenols	Historical record and walkover
Construction and demolition waste	Brick, concrete, timber, metals and ASBESTOS	Historical record and walkover
Former industrial use	Determined by the trade - metals, cyanides, acids, solvents, PAHs, asbestos	Historical record and walkover
Roads, yards and parking areas	PAHs and phenols from coal tar bound surfacing; PAHs from ash used as sub-base; hydrocarbons from vehicle drips	Historical record and walkover
Mining and mineral extraction	Metals and metalloids from spoil; mine gas including carbon dioxide and methane; acid mine drainage	Published dataset

Receptors

- Future site users - The occupiers and users of the completed development. The critical human receptor is set by the proposed end use.

- Construction and groundworkers - Short-term, controlled exposure during the construction phase, managed under CDM and CAR.
- Neighbouring site occupiers - Occupiers of adjoining land, principally exposed to dust and vapour during construction.
- Buildings, foundations and buried services - Below-ground concrete and potable water supply pipes, susceptible to chemical attack and permeation.
- Young children resident on the site - The most sensitive human receptor for a residential end use with gardens, and the basis of the standard residential land-use scenario.
- Maintenance and landscape workers - Periodic exposure during grounds maintenance and landscaping over the life of the development.
- Pennine Middle Coal Measures Formation And South Wales Middle Coal Measures Formation (Undifferentiated) (secondary aquifer) - A permeable stratum capable of supporting local water supply and baseflow to watercourses.
- Landscape and garden planting - Vegetation established as part of the development.

Risk assessment methodology

The classification follows CIRIA C552, Contaminated Land Risk Assessment - A Guide to Good Practice, Tables 6.3 to 6.6. The consequence of an event and the probability of it occurring are each classified, and the risk follows from the matrix.

Consequence	Definition
Severe	Short-term (acute) risks to human health; short term risk of pollution of a sensitive water resource or ecosystem; catastrophic damage to crops, buildings, property or infrastructure including off-site soils.
Medium	Long-term (chronic) risks to human health, long-term pollution of a sensitive water resource; significant change in an ecosystem or contamination of off-site soils.
Mild	Pollution of a non-sensitive water resource; significant damage to crops, buildings, property or infrastructure; damage to an ecosystem or to sensitive buildings, structures or services.
Minor	Easily preventable, non-permanent health effects; harm which may result in financial loss or expenditure to resolve; easily repairable damage to buildings, structures or services.

Probability	Definition
High likelihood	There is a pollutant linkage and an event that either appears very likely in the short term and almost inevitable in the long term, or there is evidence at the receptor that an event has occurred.
Likely	There is a pollutant linkage and all the elements are present and in the right place, which means that it is probable that an event will occur. Circumstances are such that an event is not inevitable, but is possible in the short term and likely over the long term.
Low likelihood	There is a pollutant linkage and circumstances are possible under which an event could occur. However, it is by no means certain that even over a longer period such an event would take place, and it is less likely in the short term.
Unlikely	There is a pollutant linkage but circumstances are such that it is improbable that an event would occur even in the very long term.

Probability \ Consequence	Severe	Medium	Mild	Minor
High likelihood	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

Pollutant linkage table

Nr	Type	Source	Pathway	Receptor	Consequence	Probability	Risk	Comments
1	HH	Made ground	Ground gas ingress into buildings	Future site users: Young children resident on the site	Severe	Likely	High	Ground gas can accumulate in the voids and enclosed spaces of the proposed buildings, so the consequence is assessed as severe even where the probability is low. The classification is confirmed by the monitoring programme and the resulting Characteristic Situation.
2	HH	Mining and mineral extraction	Ground gas ingress into buildings	Future site users: Young children resident on the site	Severe	Likely	High	Ground gas can accumulate in the voids and enclosed spaces of the proposed buildings, so the consequence is assessed as severe even where the probability is low. The classification is confirmed by the monitoring programme and the resulting Characteristic Situation.
3	HH	Made ground	Direct contact with soil: ingestion, dermal contact and inhalation of dust	Future site users: Young children resident on the site; Neighbouring site occupiers; Maintenance and landscape workers	Medium	Likely	Moderate	Soft landscaping and garden areas give routine access to the underlying soils, which is the governing exposure route for this end use. Hardstanding over part of the site reduces, but does not remove, the exposed area.
4	HH	Made ground	Uptake by home-grown produce	Future site users: Young children resident on the site	Medium	Likely	Moderate	Home-grown produce is the most conservative residential exposure route and is assessed on the standard land-use scenario.
5	CW	Made ground	Migration to controlled waters: leaching and lateral migration	Pennine Middle Coal Measures Formation And South Wales Middle Coal Measures Formation (Undifferentiated) (secondary aquifer)	Medium	Likely	Moderate	Infiltration through permeable ground provides a route for soluble contaminants to reach the underlying stratum.
6	HH	Construction and demolition waste	Direct contact with soil: ingestion, dermal contact and inhalation of dust	Future site users: Young children resident on the site; Neighbouring site occupiers; Maintenance and landscape workers	Medium	Likely	Moderate	Soft landscaping and garden areas give routine access to the underlying soils, which is the governing exposure route for this end use. Hardstanding over part of the site reduces, but does not remove, the exposed area. Asbestos in made ground is screened on every sample recovered.
7	HH	Construction and demolition waste	Uptake by home-grown produce	Future site users: Young children resident on the site	Medium	Likely	Moderate	Home-grown produce is the most conservative residential exposure route and is assessed on the standard land-use scenario. Asbestos in made ground is screened on every sample recovered.
8	CW	Construction and demolition waste	Migration to controlled waters: leaching and lateral migration	Pennine Middle Coal Measures Formation And South Wales Middle Coal Measures Formation (Undifferentiated) (secondary aquifer)	Medium	Likely	Moderate	Infiltration through permeable ground provides a route for soluble contaminants to reach the underlying stratum. Asbestos in made ground is screened on every sample recovered.
9	HH	Former industrial use	Ground gas ingress into buildings	Future site users: Young children resident on the site	Severe	Low likelihood	Moderate	Ground gas can accumulate in the voids and enclosed spaces of the proposed buildings, so the consequence is assessed as severe even where the probability is low. The classification is confirmed by the monitoring programme and the resulting Characteristic Situation.
10	HH	Mining and mineral extraction	Direct contact with soil: ingestion, dermal contact and inhalation of dust	Future site users: Young children resident on the site; Neighbouring site occupiers; Maintenance and landscape workers	Medium	Likely	Moderate	Soft landscaping and garden areas give routine access to the underlying soils, which is the governing exposure route for this end use. Hardstanding over part of the site reduces, but does not remove, the exposed area.
11	HH	Mining and mineral extraction	Uptake by home-grown produce	Future site users: Young children resident on the site	Medium	Likely	Moderate	Home-grown produce is the most conservative residential exposure route and is assessed on the standard land-use scenario.
12	CW	Mining and mineral extraction	Migration to controlled waters: leaching and lateral migration	Pennine Middle Coal Measures Formation And South Wales Middle Coal Measures Formation (Undifferentiated) (secondary aquifer)	Medium	Likely	Moderate	Infiltration through permeable ground provides a route for soluble contaminants to reach the underlying stratum.
13	PROP	Made ground	Direct contact with buried structures and services	Buildings, foundations and buried services	Mild	Likely	Moderate/Low	Aggressive ground conditions attack buried concrete and permeable potable supply pipework; the design sulphate class is confirmed by testing.

Nr	Type	Source	Pathway	Receptor	Consequence	Probability	Risk	Comments
14	PROP	Construction and demolition waste	Direct contact with buried structures and services	Buildings, foundations and buried services	Mild	Likely	Moderate/Low	Aggressive ground conditions attack buried concrete and permeate potable supply pipework; the design sulphate class is confirmed by testing. Asbestos in made ground is screened on every sample recovered.
15	HH	Former industrial use	Direct contact with soil: ingestion, dermal contact and inhalation of dust	Future site users; Young children resident on the site; Neighbouring site occupiers; Maintenance and landscape workers	Medium	Low likelihood	Moderate/Low	Soft landscaping and garden areas give routine access to the underlying soils, which is the governing exposure route for this end use. Hardstanding over part of the site reduces, but does not remove, the exposed area.
16	HH	Former industrial use	Inhalation of vapour	Future site users; Young children resident on the site	Medium	Low likelihood	Moderate/Low	Volatile contaminants migrate through the ground and into buildings irrespective of hardstanding; so the pathway is not broken by the surfacing.
17	HH	Former industrial use	Uptake by home-grown produce	Future site users; Young children resident on the site	Medium	Low likelihood	Moderate/Low	Home-grown produce is the most conservative residential exposure route and is assessed on the standard land-use scenario.
18	GW	Former industrial use	Migration to controlled waters: leaching and lateral migration	Pennine Middle Coal Measures Formation And South Wales Middle Coal Measures Formation (Undifferentiated) (secondary aquifer)	Medium	Low likelihood	Moderate/Low	Infiltration through permeable ground provides a route for soluble contaminants to reach the underlying stratum.
19	HH	Roads, yards and parking areas	Direct contact with soil: ingestion, dermal contact and inhalation of dust	Future site users; Young children resident on the site; Neighbouring site occupiers; Maintenance and landscape workers	Medium	Low likelihood	Moderate/Low	Soft landscaping and garden areas give routine access to the underlying soils, which is the governing exposure route for this end use. Hardstanding over part of the site reduces, but does not remove, the exposed area.
20	HH	Roads, yards and parking areas	Uptake by home-grown produce	Future site users; Young children resident on the site	Medium	Low likelihood	Moderate/Low	Home-grown produce is the most conservative residential exposure route and is assessed on the standard land-use scenario.
21	GW	Roads, yards and parking areas	Migration to controlled waters: leaching and lateral migration	Pennine Middle Coal Measures Formation And South Wales Middle Coal Measures Formation (Undifferentiated) (secondary aquifer)	Medium	Low likelihood	Moderate/Low	Infiltration through permeable ground provides a route for soluble contaminants to reach the underlying stratum.
22	PROP	Mining and mineral extraction	Direct contact with buried structures and services	Buildings, foundations and buried services	Mild	Likely	Moderate/Low	Aggressive ground conditions attack buried concrete and permeate potable supply pipework; the design sulphate class is confirmed by testing.
23	PROP	Made ground	Direct contact with landscape planting	Landscape and garden planting	Minor	Likely	Low	Phytotoxic effects are addressed by the depth and quality of the imported rooting medium.
24	HH	Made ground	Direct contact during construction	Construction and groundworkers	Minor	Likely	Low	Exposure of the construction workforce is short term and controlled under CDM and the Control of Asbestos Regulations, which is why the consequence is assessed as minor.
25	PROP	Construction and demolition waste	Direct contact with landscape planting	Landscape and garden planting	Minor	Likely	Low	Phytotoxic effects are addressed by the depth and quality of the imported rooting medium. Asbestos in made ground is screened on every sample recovered.
26	HH	Construction and demolition waste	Direct contact during construction	Construction and groundworkers	Minor	Likely	Low	Exposure of the construction workforce is short term and controlled under CDM and the Control of Asbestos Regulations, which is why the consequence is assessed as minor. Asbestos in made ground is screened on every sample recovered.
27	PROP	Former industrial use	Direct contact with buried structures and services	Buildings, foundations and buried services	Mild	Low likelihood	Low	Aggressive ground conditions attack buried concrete and permeate potable supply pipework; the design sulphate class is confirmed by testing.
28	PROP	Roads, yards and parking areas	Direct contact with buried structures and services	Buildings, foundations and buried services	Mild	Low likelihood	Low	Aggressive ground conditions attack buried concrete and permeate potable supply pipework; the design sulphate class is confirmed by testing.
29	PROP	Mining and mineral extraction	Direct contact with landscape planting	Landscape and garden planting	Minor	Likely	Low	Phytotoxic effects are addressed by the depth and quality of the imported rooting medium.
30	HH	Mining and mineral extraction	Direct contact during construction	Construction and groundworkers	Minor	Likely	Low	Exposure of the construction workforce is short term and controlled under CDM and the Control of Asbestos Regulations, which is why the consequence is assessed as minor.

Nr	Type	Source	Pathway	Receptor	Consequence	Probability	Risk	Comments
31	PROP	Former industrial use	Direct contact with landscape planting	Landscape and garden planting	Minor	Low likelihood	Very Low	Phytotoxic effects are addressed by the depth and quality of the imported rooting medium.
32	HH	Former industrial use	Direct contact during construction	Construction and groundworkers	Minor	Low likelihood	Very Low	Exposure of the construction workforce is short term and controlled under CDM and the Control of Asbestos Regulations, which is why the consequence is assessed as minor.
33	PROP	Roads, yards and parking areas	Direct contact with landscape planting	Landscape and garden planting	Minor	Low likelihood	Very Low	Phytotoxic effects are addressed by the depth and quality of the imported rooting medium.
34	HH	Roads, yards and parking areas	Direct contact during construction	Construction and groundworkers	Minor	Low likelihood	Very Low	Exposure of the construction workforce is short term and controlled under CDM and the Control of Asbestos Regulations, which is why the consequence is assessed as minor.

Type: HH human health - CW controlled waters - PROP property, buildings and services. Consequence and probability follow C552 Table 6.3 and 6.4; the risk is read from Table 6.5.

Linkages discounted

The following combinations were considered and discounted. Where a pollutant linkage does not exist the likelihood is zero, and so is the risk - this is a different finding from a low risk, and it is recorded so that the basis for discounting is auditable and can be revisited if the scheme changes.

Pathway	Source(s)	Reason the linkage does not exist
Inhalation of vapour	Made ground; Construction and demolition waste; Roads, yards and parking areas; Mining and mineral extraction	This source is not associated with volatile contaminants.
Ground gas ingress into buildings	Made ground; Former industrial use; Mining and mineral extraction	Exposure of the construction workforce is assessed under the construction-phase pathway.
Ground gas ingress into buildings	Construction and demolition waste; Roads, yards and parking areas	This source does not generate hazardous ground gas.
Inhalation of vapour	Former industrial use	Exposure of the construction workforce is assessed under the construction-phase pathway.

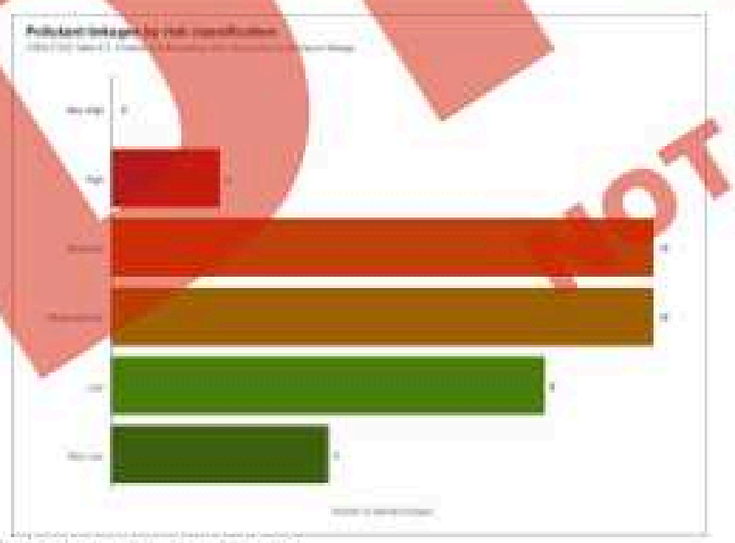

Figure 6 - Pollutant linkages by risk classification

Risk summary by receptor class

Human health	The highest classification is high, arising from made ground by ground gas ingress into buildings.
Controlled waters	The highest classification is moderate, arising from made ground.
Buildings, services and planting	The highest classification is moderate/low.

Assessment of the identified linkages

The assessment identifies 34 pollutant linkages requiring assessment, with a further 4 combinations discounted as having no linkage. The highest classification is high risk, arising from made ground reaching future site users by ground gas ingress into buildings.

Ground gas regime

Ground gas may be generated by made ground and former industrial use and mining and mineral extraction. A monitoring programme comprising twelve visits over six months is undertaken as part of the intrusive investigation, across a range of falling and low barometric pressure.

A Characteristic Situation cannot be assigned from desk study information. It is derived from measured gas screening values once the monitoring programme is complete, and the protective measures follow from it under BS 8485:2015+A1:2019.

The development is a BS 8485 Type A building. Once the Characteristic Situation is established from the measured gas screening values, the minimum gas protection score follows from Table 4 of that standard and the protective measures are designed accordingly.

Preliminary geotechnical assessment

The assessment below is preliminary and is made from the published geological record. The foundation solution and the design parameters are confirmed by the intrusive investigation.

Anticipated foundation solution	Reinforced raft foundation. This is appropriate where there is variable or compressible near-surface deposits where differential-settlement is the governing concern.
Bedrock	Mudstone and Strong Sandstone (Coal-bearing) 2:1

Geotechnical risk register

Hazard	What is at risk	Consequence	Risk level	Action
Made ground of variable lateral and vertical extent	Buildings, pavements, services	Differential settlement on unsuitable founding stratum; obstructions to excavation.	Moderate	Density of exploratory holes set to characterise the true extent and composition of the made ground.
Recorded or probable shallow mine workings	Buildings, ground stability	Subsidence and crown-hole formation.	High	Rotary drilling to prove the workings, with the investigation informed by a mining report obtained from the Mining Remediation Authority.
Aggressive ground conditions	Buried concrete	Chemical attack on buried concrete and permeation of potable water pipes.	Moderate	Water-soluble sulphate and pH testing to inform the concrete design sulphate class.
Existing foundations and buried obstructions	Excavation and piling operations	Obstruction to piling and excavation; requirement for grubbing up.	Moderate	Foundation exposure pits to establish the depth, thickness and condition of the retained and former foundations.

Conclusions and Phase 2 investigation

The desk study has identified 34 pollutant linkages requiring assessment, the highest classified as high risk. The site may therefore have been exposed to contamination associated with made ground, construction and demolition waste, former industrial use, roads, yards and parking areas, mining and mineral extraction. An intrusive investigation is undertaken to characterise the ground and confirm the classification.

Summary of the preliminary risk assessment

The preliminary risk assessment classifies 34 pollutant linkages, the highest as high risk. The classifications rest on the documented history of the site, the published environmental setting and the

observations made during the walkover.

Planning and regulatory position

The National Planning Policy Framework requires that a site is suitable for its proposed use, taking account of ground conditions and any risks arising from land contamination. This report establishes the potential for contamination and defines the investigation that characterises it. The findings of that investigation, and any remediation shown to be necessary, are reported at Phase 2 and discharge the contaminated land condition.

Scope of the intrusive investigation

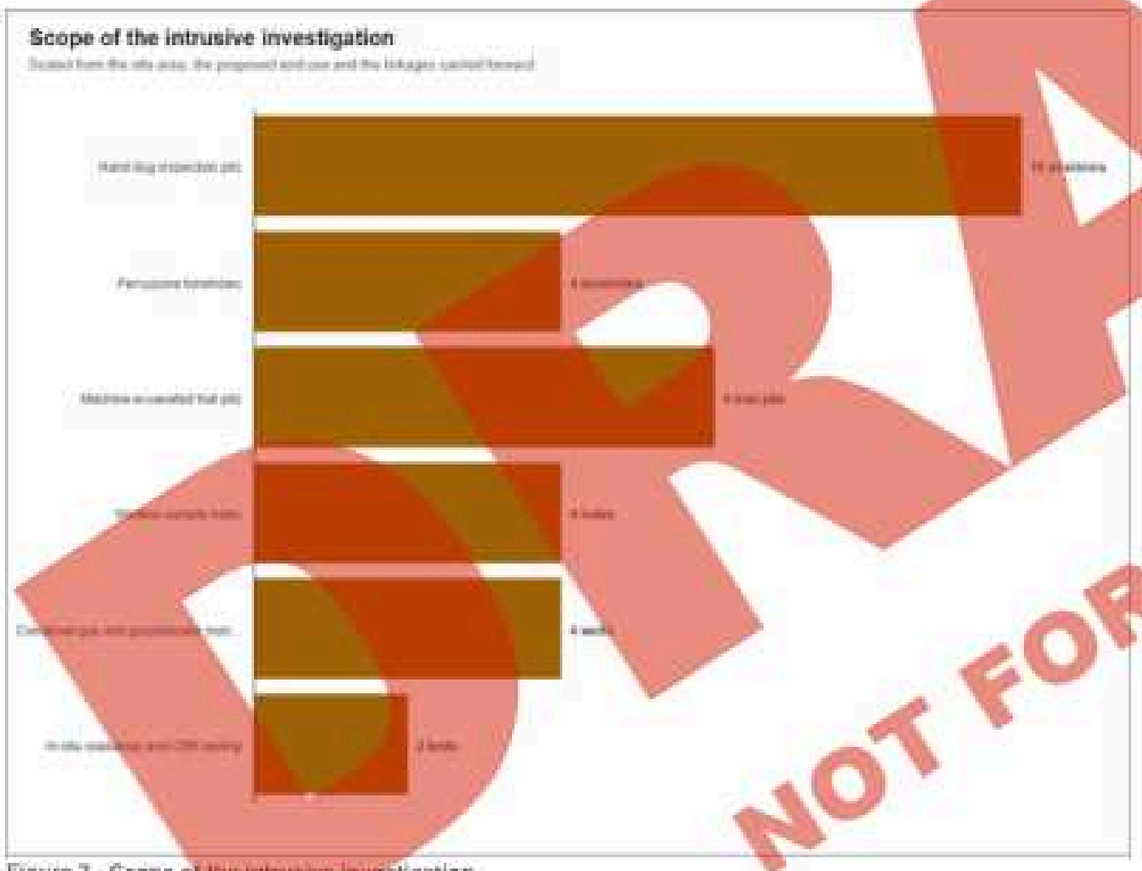

Figure 7 - Scope of the intrusive investigation

Method	Number	Purpose	Comments
Hand dug inspection pits	10 positions	To prove each exploratory position clear of buried services before mechanical excavation.	Undertaken following CAT scanning and inspection of the statutory undertakers' service plans.
Percussive boreholes	4 boreholes	To determine the ground conditions at depth, recover samples for geotechnical and chemical testing, and log the soil profile, lateral variation and groundwater.	Advanced to approximately 8.00 m below ground level or refusal, whichever is the shallower. Standard penetration tests in granular strata and at rockhead; disturbed and tub samples recovered for chemical testing.
Machine excavated trial pits	6 trial pits	To assess the shallow ground conditions, recover samples for chemical testing, and carry out in-situ hand shear vane, soakaway and CBR testing.	Positions CAT scanned and service plans inspected before excavation.
Window sample holes	4 holes	To extend the coverage of shallow sampling across the development footprint and confirm the lateral extent of made ground.	Positioned to give even coverage of the proposed building footprints and garden areas.
Combined gas and groundwater monitoring wells	4 wells	To record standing groundwater levels and to measure ground gas concentrations and flow rates.	Monitored on twelve visits over six months following installation, across a range of falling and low barometric pressure.
Chemical testing suite	-	To address the pollutant linkages identified in the conceptual site model.	Suite selected to address the contaminants identified in the conceptual site model: Brick, concrete, timber, ash, slag, coal and metals; associated metals, PAHs, sulphates and, where ash is present, phenols; Brick, concrete, timber, metals and ASBESTOS; Determined by the trade - metals, cyanides, acids, solvents, PAHs, asbestos; PAHs and phenols from coal tar bound surfacing; PAHs from ash used as sub-base; hydrocarbons from vehicle drips; Metals and metalloids from spoil; mine gas including carbon dioxide and methane; acid mine drainage.
Asbestos screening	-	To identify asbestos in soil, in accordance with the requirements for asbestos in made ground.	Asbestos screen and quantification on all made ground samples, with fibre identification where a positive screen is returned.
Geotechnical testing suite	-	To confirm the engineering properties of the strata and classify the ground for concrete design.	Water-soluble sulphate and pH, moisture content, Atterberg limits, particle size distribution and, where cohesive strata are load bearing, triaxial testing.
In-situ soakaway and CBR testing	2 tests	To establish the infiltration characteristics of the ground and the formation-level bearing capacity for pavement design.	-
Groundwater quality sampling	-	To characterise groundwater quality beneath the site against the identified controlled-waters images.	Sampled from the monitoring wells once installed and developed.

Scope of the intrusive investigation

The intrusive investigation comprises 10 no. hand dug inspection pits, 4 no. percussive boreholes, 6 no. machine excavated trial pits, 4 no. window sample holes, 4 no. combined gas and groundwater monitoring wells, chemical testing suite, asbestos screening, geotechnical testing suite, 2 no. in-situ soakaway and CBR testing, groundwater quality sampling. The scope is scaled from the site area (0.28 ha), the proposed end use and the pollutant linkages carried forward from the conceptual site model.

Ground gas and groundwater monitoring

Combined gas and groundwater monitoring wells are installed and monitored over twelve visits over six months, recording standing groundwater levels, gas concentrations and flow rates. The Characteristic Situation and the resulting gas protection score follow from those measurements under BS 8485.

Chemical and geotechnical testing

The chemical testing suite addresses the contaminants identified in the conceptual site model. The geotechnical suite confirms the engineering properties of the strata and classifies the ground for concrete design, and includes water-soluble sulphate and pH, moisture content, Atterberg limits and particle size distribution.

Managing the works

Unexpected contamination - discovery strategy

The intrusive investigation is designed around the linkages identified in this report. Where contamination not anticipated by this assessment is encountered during the enabling works, work in the affected area stops, the material is left undisturbed and the extent is recorded. The find is reported to the local planning authority, characterised by sampling and analysis, and a remediation strategy for it is agreed before work in that area resumes. This is the sequence the standard contaminated land condition requires.

Watching brief during the enabling works

A watching brief is maintained throughout the enabling works and the excavation for foundations and services. Groundworkers are briefed at induction on the sources identified in this report, on what unexpected contamination looks like - staining, odour, fibrous material, buried containers, made ground of unrecorded composition - and on the procedure for reporting it. Asbestos in made ground is

treated as reasonably foreseeable and is managed under the Control of Asbestos Regulations.

Discharging the planning condition

This report is the preliminary risk assessment required by the first limb of the standard contaminated land condition. The intrusive investigation scoped in the preceding section discharges the second, and the verification report following any remediation discharges the third. Draft wording for each limb is set out in this chapter so that the authority and the applicant are working from the same text. The contaminated land team at Barnsley was consulted on 5 August 2025, and the response is reflected in this assessment.

Draft planning conditions

The wording below is offered so that the applicant and the local planning authority are working from the same text. It follows the sequence the National Planning Policy Framework and Land Contamination Risk Management set out.

Condition	Suggested wording
Site investigation	No development shall commence until a scheme of intrusive site investigation, based on the conceptual site model and preliminary risk assessment in this report, has been submitted to and approved in writing by the Local Planning Authority. The investigation shall be undertaken in accordance with Land Contamination Risk Management and BS 10175.
Remediation scheme	Where the intrusive investigation identifies unacceptable risk, a remediation scheme to bring the site to a condition suitable for the intended use shall be submitted to and approved in writing by the Local Planning Authority before development commences.
Verification	The approved remediation scheme shall be carried out in full and a verification report demonstrating its completion shall be submitted to and approved in writing by the Local Planning Authority before any part of the development is occupied.
Unexpected contamination	If, during development, contamination not previously identified is found to be present, no further development shall be carried out until a remediation strategy detailing how that contamination will be dealt with has been submitted to and approved in writing by the Local Planning Authority, and the strategy has been implemented.

Limitations and uncertainties

- This report is a desk study and preliminary risk assessment. It establishes the potential for contamination from the documented history and setting of the site; it does not confirm the presence or absence of contamination, which is established by the intrusive investigation scoped in this report.
- The site history rests on the historical Ordnance Survey map series and the environmental data contained in the Landmark Envirocheck. Features not recorded on those maps, and uses that left no cartographic trace, cannot be identified by a desk study.
- No Generic Assessment Criteria screening is presented. Comparison against generic or site-specific assessment criteria requires the soil analysis undertaken at Phase 2 and is reported at that stage.
- A ground gas Characteristic Situation is not assigned. It follows from measured gas screening values once the monitoring programme is complete.
- The radon determination is made on a one kilometre grid and reports the maximum band within that square.
- The coal mining constraint is read at a resolution of approximately 6.5 metres for the recorded features and approximately 40 metres for the hatched area designations; a formal mining report is the definitive record.
- The aquifer designation published by the Environment Agency is not available as a machine-readable dataset. The aquifer character carried in this report is the British Geological Survey hydrogeological classification, which describes productivity and flow mechanism; the formal Principal, Secondary A, Secondary B or Unproductive designation is confirmed from the environmental data pack.
- The soil chemistry reported is an estimated regional background interpolated from the national soil survey. It is not a measurement at the site and does not substitute for the chemical testing scoped in this report.
- The environmental permit schedule covers the registers the Environment Agency publishes. Sites regulated by the local authority alone, and processes that ceased before the registers began, are not on it and are established from the historical map series and the environmental data pack.

Basis and reliance

The assessment rests on the historical Ordnance Survey map series and the environmental data contained in the Landmark Envirocheck (Envirocheck 305911042_1_1, 4 August 2025), on the published geological, hydrogeological, radon and coal mining datasets listed in the Data Sources section, and on the site walkover.

Data sources and guidance

Dataset	Source	Licence
Postcode geocoding, region & local authority lookup	postcodes.io (ONS/OS open data)	OGL v3
Address geocoding	OpenStreetMap Nominatim	ODbL
Base mapping	OpenStreetMap contributors	ODbL
Bedrock & superficial engineering geology (1:1M)	British Geological Survey - GeoIndex Onshore	OGL v3
Hydrogeology & aquifer character	British Geological Survey - Hydrogeology UK & IoM v5	OGL v3
Radon potential (Radon Indicative Atlas GB v3, 1 km grid)	British Geological Survey & UK Health Security Agency	OGL v3
Coal mining planning constraints - Development High Risk Area, Coal Mining Reporting Area, past and current surface mining, surface coal resource areas	Mining Remediation Authority (formerly The Coal Authority), served by BGS	OGL v3
Coal mining specific risk - mine entries and their zones of influence, recorded and probable shallow workings, coal outcrops, fissures	Mining Remediation Authority (formerly The Coal Authority), served by BGS	OGL v3
Recorded mines and quarries (non-coal)	British Geological Survey - GeoIndex Onshore minerals	OGL v3

Dataset	Source	Licence
Estimated background topsoil chemistry (NSI and G-BASE, mg/kg)	British Geological Survey - UK Soil Observatory	OGL v3
Recorded landslides	British Geological Survey - GeoIndex Onshore hazards	OGL v3
Clay shrink-swell climate susceptibility (GeoClimate)	British Geological Survey	OGL v3
Environmental permits - industrial installations, waste operations, waste exemptions, discharges to water and groundwater, scrap metal dealers	Environment Agency public register	Environment Agency Conditional Licence
Brownfield land registers	Local planning authorities via planning.data.gov.uk	OGL v3
Source Protection Zones	Environment Agency	OGL v3
Historic landfill sites	Environment Agency	OGL v3
Permitted waste sites - authorised landfill site boundaries	Environment Agency	OGL v3
Flood Map for Planning & risk of flooding from surface water	Environment Agency	OGL v3
Statutory designations & conservation areas	Natural England / MHCLG planning.data.gov.uk	OGL v3

Statement of competence

This report has been prepared, checked and approved by the persons named below. It is issued on the basis that the assessment and the conclusions drawn from it are the professional judgement of a competent person as required by the National Planning Policy Framework and by Land Contamination Risk Management.

Prepared by	A. Moyle MSci FGS
Checked by	J. Vickers MSc FGS
Approved by	J. Smithson BSc MSc FGS CGeol

FA-CLD-0103 | 4 September 2026