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Proposed Layout	Hayward Architects Drawing: Proposed Layout

APPENDICES

Appendix A	Site Photographs
Appendix B	Historic Maps
Appendix C	Environmental Insight Report
Appendix D	Limitations

DESK TOP STUDY

23 WOOD STREET, HINCKLEY, LE10 1JQ

1 INTRODUCTION

The Brownfield Consultancy was instructed by Onyxrose Ltd to carry out a Desk Study of a site known as 23 Wood Street, Hinckley, LE10 1JQ (hereinafter referred to as 'the site').

The site currently comprises of a disused clothing factory. It is proposed to demolish the central structure and construct 15 No. flats within two new two and three storey blocks, four new terraced houses with private gardens and convert two existing structures into 16 No. residential units. Public open space and a car park will be constructed

The purpose of the desk top study is to provide an assessment of the likelihood of any soil contamination and any geotechnical constraints at the site. The Desk Study includes a review of geological maps and historical Ordnance Survey maps and inspection and review of environmental data held by the Environment Agency, Local Authority and other statutory bodies. The environmental information was obtained from an Envirocheck Report. The report is subject to limitations which are set out in Appendix D.

2 SITE DESCRIPTION

The site is situated within the centre of the town of Hinckley, Leicestershire and comprises an irregularly shaped plot of 0.29 hectares in size.

Three two-storey buildings are present at the site, comprising a derelict office building in the west of the site, a factory building in the north-centre of the site and a warehouse building in the northeast of the site. An archway connects the central and eastern buildings. The area to the south of these buildings comprises an asphalt surfaced car park.

The eastern building is partly used as a small printer's works.

The western part of the site comprises an area of open ground used as a car park. The surfacing is partly unbound ground, and partly concrete flooring of former buildings on site. Some vegetation including buddleia is present. The two parts of the site are separated by a public right of way, called Cross Keys Yard that runs as an alleyway for part of its length. The western edge of this alleyway is demarcated by a historic wall comprising the rear wall of

former houses on site, prior to being repurposed within a later factory structure. This wall contains a number of fireplace structures and rafter / beam holes.

Drums of unidentified chemicals and tipped waste were observed in proximity to Cross Keys Yard.

The site is bordered to the north by a road, beyond which, housing is located. Housing and a school are located to the east of the site.

Shops with flats above are located to the south of the site, and apartments and offices are located to the west.

Site walkover records and photographs are included in Appendix A.

3 GEOLOGY, HYDROLOGY AND HYDROGEOLOGY

3.1 Geology

Reference to the on line BGS Mapping Index indicates that the site is immediately underlain by the Dunsmore Gravel. The underlying solid geology comprises the Mercia Mudstone Group.

The BGS defines the Dunsmore Gravel as:-

'Red, brown and yellow, commonly ochreous, matrix-supported flinty gravel with lenses of coarse sand. Most deposits are poorly sorted and clay-rich. Sand and gravel, clayey brown and yellow; Late Glacial to Postglacial..

The BGS defines the Mercia Mudstone Group as:-

'Dominantly red, less commonly green-grey, mudstones and subordinate siltstones with thick halite-bearing units in some basinal areas. Thin beds of gypsum/anhydrite widespread; sandstones are also present'.

The following table details the risk of geological hazard potential on or underlying the site as identified in the Envirocheck Report.

Table 1 Geological Hazards

Hazard	Risk
Compressible ground	No hazard
Collapsible Rocks	Very low
Landslide ground	Very low

Shallow mining	No hazard
Running sand	Very low
Swelling clay	No hazard
Ground dissolution	No hazard

The Envirocheck Report identifies no significant geological hazards to development.

The Envirocheck Report identifies no elevated natural background concentrations of metallic contaminants.

3.2 Hydrology

The closest surface water feature is a pond located 118m southwest of the site.

No river quality data is available within 1000m of the site.

The site is not located in an area considered at risk of flooding from rivers.

A single ground water abstraction is recorded within 500m of the site, located 366m northeast of the site at Hinckley Bowling Club. Abstraction of groundwater for the purposes of spray irrigation is permitted.

3.3 Hydrogeology

The Groundwater Vulnerability map contained in the Envirocheck Report indicates that the site is underlain by a Secondary –A Aquifer, referring to the Dunsmore Gravel. The solid geology of the Mercia Mudstone Group is considered a Secondary –B Aquifer.

A ‘Secondary – A Aquifer’ is defined as:-

‘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. These are generally aquifers formerly classified as minor aquifers.

A ‘Secondary – B Aquifer’ is defined as:-

‘predominantly lower permeability layers which may store and yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering. These are generally the water-bearing parts of the former non-aquifers.

The site is not located within, or in proximity to, a groundwater Source Protection Zone.

The site is located within an area considered at limited potential of groundwater flooding.

4 SITE HISTORY

The history of the site and the surrounding area has been determined from historical map extracts that are included in Appendix B. The historical land uses on site and in close proximity to the site are summarised as follows:-

4.1 Onsite

The earliest historical map, dated 1887, denotes the site occupied by numerous adjoining and closely spaced structures. Houses are present in the northeast and western and northwestern parts of the site. Larger structures are present within the central part of the site are denoted as '*Hosiery Manufactory*'.

No significant changes are recorded until 1924, when a new larger structure is recorded in the central part of the site, and denoted '*Hosiery Manufactory*'.

By 1960, the majority of the site has been cleared and redeveloped with new factory buildings, including four new larger structures in the northeast, southeast (two buildings) and the west of the site.

No subsequent changes are denoted.

It was stated by the building owner that the factories to the east side of Cross Key's Yard jitty were sold in 1952 by Arthur R J Davenport to A Davenport & Sons Ltd. Then in 1972 it was sold to the sons Fred, Ronald Arthur and Arthur Charles Davenport who promptly, in 1973 sold it to Stan Lockley. Onyxrose bought the property in 2004.

To the west side of the Cross Key's Yard jitty, very originally were houses. The houses were converted/used as offices to the Flason Hosiery Co Ltd who bought the premises from William Kerr Flavel in 1947. Flason were there until 1973 when they went into liquidation and the premises were sold to Michael Conod and Martin Toone who, in 1977, sold it to Capital Fashions Ltd which changed its name to Capital Leisurewear. Onyxrose Ltd bought the property in Jan 2002. The demolition of this was later in 2009.

4.2 Off-Site

The earliest historical map, dated 1887 denotes houses to the east and north of the site, with a disused burial ground to the northeast. Houses are present to the south, with a hosiery factory to the west and northwest.

By 1903, new shoe and hosiery factories are denoted within 30m north and northwest of the site. A new church is denoted 25m east. A new 'boot factory' was denoted by 1924, located 100m north of the site.

By 1959, new '*factories*' and '*works*' are denoted in proximity to the west, north and northeast of the site.

By 1993, areas of residential development are denoted to the north, replacing former works and factory areas. A factory located immediately west of the site was replaced with a 'hostel' at this time.

No further significant changes are denoted.

5 INFORMATION HELD BY STATUTORY AUTHORITIES

This section details any relevant information held in the registers maintained by statutory bodies as identified in the Envirocheck Report in Appendix C.

5.1 Waste Management Facilities

There are no landfill sites or waste management facilities within 500m of the site.

A small area of potentially infilled land is denoted 230m west of the site.

5.2 Integrated and Local Authority Pollution Prevention and Control Permits

The Envirocheck Report identifies no IPC authorisations, Part A(1) or Part A(2) IPPC authorised activities are recorded within 500m of the site.

A single Part B IPPC authorised activity is recorded 194m north of the site, relating to Leicester Road Filling Station (PG1/14 'Petrol Filling Station').

5.3 Pollution Incidents to Controlled Waters

Records held by the Environment Agency identified one pollution incident to controlled waters located within 500m of the site, located 226m southwest of the site in June 1997,

relating to 50 gallons of diesel spilled during delivery. The receiving water was the 'Trent Catchment' and the severity was classified as 'minor'.

5.4 Discharge Consents

The Envirocheck Report identifies no discharge consents within 500m of the site.

5.5 Fuel Sites and Contaminative Land Use

No active fuel sites are recorded within 500m of the site. A single 'obsolete' fuel site is recorded 194m north of the site.

The site is identified as the following:

- Capital Leisurewear Ltd (Leisure and sportswear manufacturers and wholesalers).
- Barry J Lager (Clothing and fabrics – manufacturers).
- A 'factory' (unspecified).

The following potentially contaminative land uses have been identified in proximity to the site:

- Clarendon Lawnmowers, located 79m south of the site (inactive) – Lawnmower sales and service.
- All Cars Repaired Ltd, located 201m southeast of the site (inactive) – vehicle dealers and garage services.

No other potentially contaminative land uses have been identified within 250m of the site.

5.6 Radon

The Envirocheck Report states that less than 1% of homes are above the action level. The latest BRE guidance on radon protective measures indicates that no radon protection measures are necessary.

5.7 Environmentally Sensitive Areas

The Envirocheck Report indicates that the site is located within a Nitrate Vulnerable Zone (NVZ).

6 UK CONTAMINATED LAND LEGISLATIVE FRAMEWORK

6.1 Legislation on Contaminated Land

Part IIA of the Environmental Protection Act, 1990, enacted by Section 57 of the Environment Act 1995 and the associated Contaminated Land (England) Regulations 2000 (SI 2000/227) was introduced on 1 April 2000.

Part IIA provides a statutory definition of contaminated land:

“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 a 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 to be all groundwaters, inland surface waters and estuarine and coastal waters.

To determine whether land falls under the Part IIA definition of contaminated land the site should be evaluated in the context of a risk based framework. The assessment of contaminated land is typically a two-phase process which is initially based on a qualitative assessment of the likelihood of complete pollution linkages, with a quantitative element which seeks to determine the degree and the significance of the harm. Land is only defined as ‘Contaminated Land’ if a “significant pollutant linkage” is present.

A pollutant linkage must comprise of the following:-

Source - a contaminant or substance which is located in, on or under the land and has potential to cause harm to human health, water resources or the wider environment.

Pathway - the means or route by which a source can migrate;

Receptor - something which could come to harm, including human health, water resources, surface water courses or the wider environment.

The responsible authority then needs to consider whether the identified pollution linkage:

- is resulting in significant harm being caused to the receptor in the pollutant linkage;
- presents a significant possibility of significant harm being caused to that receptor;

- is resulting in the pollution of controlled waters, which constitute the receptor; or is likely to result in such pollution.

If a pollutant linkage is demonstrated, then the Part IIA legislation provides powers for remedial action to be enforced by the Local Authority in whose area the contaminated land is situated.

7 CONCEPTUAL MODEL

7.1 General

This section uses information from historical maps and the site walkover to provide a conceptual model and qualitative assessment of the potential risks posed to human health and environmental receptors from potential on-site and off-site sources of contamination. The assessment is presented as a 'source-pathway-receptor' model in accordance with Part IIA of the Environmental Protection Act 1990.

The following conceptual model has been constructed assuming that the site will be redeveloped with a residential end use with private gardens.

7.2 Potential Sources of Contamination

Potential On-site Sources of Contamination

- Drums of unknown chemicals located adjacent to Cross Keys Yard are considered a potential source of contamination.
- Former boiler located 20m south of the site entrance is considered a source of hydrocarbon contamination
- Historic use of fabric treatment chemicals, potentially dyes and inks are considered a potential source of hydrocarbons, solvents and volatile organic compounds.
- Made Ground associated with the construction and demolition of historic and existing buildings and hardstanding is considered a potential source of metals, hydrocarbons, asbestos and ground gas.
- The yard and car park is a source of hydrocarbons and metals.

Potential Off-Site Sources of Contamination

- No off-site sources of contamination have been identified.

7.3 Receptors

The site will be redeveloped for a residential end use with private gardens. The site overlies a Secondary Undifferentiated Aquifer and unproductive strata and is not located within a SPZ. The closest surface water feature is a 'drain' located 387m northwest of the site. Thus controlled waters are not considered further. The primary receptors, considered to be potentially at risk from any identified contamination are as follows:-

Human Health

- Construction workers during the redevelopment phase.
- Residential end users.

Controlled Waters

- The site is underlain by a Secondary A Aquifer (Dunsmore Gravel) and a Secondary B Aquifer (the Mercia Mudstone Group) hence groundwater immediately underlying the site is considered a receptor to site-derived contamination.
- No surface watercourses are present within 500m of the site. A pond is located 1187m southwest of the site, hence surface controlled waters are not considered a receptor to site-derived contamination.

7.4 Pathways

Potential contaminant migration pathways considered relevant to the site are:-

Human Health

- Ingestion of contaminated soils and dust particles.
- Direct physical contact with near surface soils and contaminated dust particles.
- Inhalation of wind blown contaminated dust.
- Consumption of vegetables cultivated in contaminated soils.
- Inhalation of vapours and gases, migrating vertically into the atmosphere.
- Inhalation of vapours and gases, migrating vertically into buildings and confined spaces.

Controlled Waters

- Migration of groundwater stored in the Lambeth Group to the abstraction point and the stream located adjacent to the southeast boundary of the site.

- Runoff of site-derived contaminants into the stream located adjacent to the southeast boundary of the site.

Infrastructure

- Water supply pipework.

7.5 Pollutant Linkages

A 'pollutant linkage' describes the relationship between a contaminant, a pathway and a receptor, a 'pollutant' being the contaminant in a pollutant linkage. A contaminant, pathway and receptor must all be present for a pollutant linkage to exist, which forms the basis for determination that a piece of land is Contaminated Land. Potential sources, pathways and receptors have been assessed. The following table summarises the significant pollutant linkages potentially active at the site:-

Table 2 Potential Source-Pathway-Receptor Linkages for Human Health Risk Assessment

Source	Pathway	Receptor
Contaminated soils	Ingestion of soil	On site female child: 0 - 6 yrs old
		On site construction worker
	Ingestion of household dust	On site female child: 0 - 6 yrs old
	Ingestion of contaminated vegetables	On site female child: 0 - 6 yrs old
	Ingestion of soil attached to vegetables	On site female child: 0 - 6 yrs old
	Dermal contact	On site female child: 0 - 6 yrs old
		On site construction worker
	Dermal contact with household dust	On site female child: 0 - 6 yrs old
	Inhalation of fugitive soil dust	On site female child: 0 - 6 yrs old
		On site construction worker
	Inhalation of fugitive dust	On site construction worker
	Inhalation of fugitive household dust	On site female child: 0 - 6 yrs old
	Inhalation of vapours in outdoor air	On site female child: 0 - 6 yrs old
		On site construction worker
	Inhalation of vapours in indoor air	On site female child: 0 - 6 yrs old
	Contact with contaminated soils	Water supply pipework

Table 3 Source Pathway Receptor Linkages for Controlled Waters Risk Assessment

Source	Pathway	Receptor
Contaminated soils	Leaching Mechanisms	Groundwater stored in the Dunsmore Gravel and Mercia Mudstone Group
Contaminated groundwater	Lateral and vertical migration	Groundwater stored within aquifer sequence

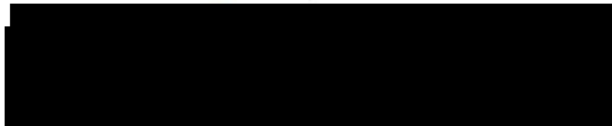
The conceptual model has been refined and the plausible pollutant linkages evaluated against generic criteria in accordance with joint DEFRA / Environment Agency 'Model Procedures for the Management of Land Contamination' (Environment Agency, 2004).

8 CONCLUSIONS AND RECOMMENDATIONS OF THE DESK STUDY

- The site has historically been used as a hosiery factory and more recently a warehouse, trim shop and a small-scale printworks.
- Drums of unknown chemicals located adjacent to Cross Keys Yard are considered a potential source of contamination.
- Historic use of fabric treatment chemicals, potentially dyes and inks are considered a potential source of hydrocarbons, solvents and volatile organic compounds.
- Former boiler located 20m south of the site entrance is considered a source of hydrocarbon contamination
- Made Ground associated with the construction and demolition of historic and existing buildings and hardstanding is considered a potential source of metals, hydrocarbons, asbestos and ground gas.
- The yard and car park is a source of hydrocarbons and metals.
- The primary receptors at risk of impact from ground contamination are groundworkers during the construction phase and residential end-users.
- The site is not located within 250m of a current or historical landfill. Thus monitoring of landfill gases is not considered necessary.
- The site is immediately underlain by the Dunsmore Gravel. The underlying solid geology comprises the Mercia Mudstone Group.
- The site is underlain by a Secondary –A Aquifer, referring to the Dunsmore Gravel. The solid geology of the Mercia Mudstone Group is considered a Secondary –B Aquifer.
- The site is not located in an area considered at risk of flooding from rivers, however a limited potential for groundwater flooding has been identified.
- We would recommend that the following ground investigation works are undertaken:-
 - Two days of borehole investigations to determine the thickness and contamination status of Made Ground and the Dunsmore Gravel.

- The risk of contamination is considered to be moderate. We would recommend laboratory testing of near surface soils for a suite of metals, hydrocarbons, including solvents and volatile organic compounds and asbestos. Leachate testing should be undertaken in proposed areas of soft landscaping and gardens.
- Waste classification testing is also recommended so site derived soils can be correctly classified should landfill disposal of site arisings be envisaged.
- Appropriate geotechnical investigation including ground strength parameters and laboratory testing comprising plasticity of cohesive soils, gradings of granular soils and assessment of aggressive ground conditions is recommended.

Prepared and approved by



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Director

9 REFERENCES

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- BS 10175 : 2013 : Investigation of potentially contaminated sites - code of practice. British Standards Institution, London.
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