



Geotechnical &
Environmental
Consultants

Land South of Sacheverell Way
Groby

**Phase I Desk Study Report
For
Bloor Homes East Midlands**



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| Comments | | | |

1.0 INTRODUCTION

1.1 Introduction

GeoDyne Limited has been appointed by the Client, Bloor Homes East Midlands, to undertake a Phase I Desk Study on a parcel of land off Sacheverell Way, Groby, Leicestershire. A Site Location Plan (Figure No. D44049/01) is included in Appendix I.

1.2 Project Understanding

We understand that the Client requires the completion of a Phase I Desk Study report to provide an initial assessment of the site with respect to potential geotechnical and environmental liabilities.

We further understand that it is proposed to develop the main body of the site with low-rise residential properties with associated private gardens. The proposed development also includes attenuation ponds and areas of public open space. The south-western portion of the site (to the south-west of the existing track, as shown within the blue line) is to remain undeveloped. The initial masterplan has been provided by the Client, a copy of which is included in Appendix II.

The foregoing understanding has formed the basis of our assessment. Where the proposed site end-use is not consistent with our current understanding, it would be necessary to review our assessment to ensure it continues to apply.

1.3 Scope of Works

The scope of the Phase I Desk Study included the following:

- A site walkover.
- Review of available historical and contemporary Ordnance Survey publications relating to the site.
- Review of the sites geology, hydrology, hydrogeology and groundwater vulnerability.
- Review of the sites coal mining status.
- Review of the sites radon status.
- Commission of a full detailed Landmark Envirocheck Report relating to the site.
- Commission of Landmark geological mapping data.
- Initial consideration of unexploded bomb risk (by Zetica Bomb Risk Map).
- Production of a preliminary Conceptual Site Model (pCSM).

1.4 Limitations

The conclusions and recommendations made in this report are limited to those that can be made based on the findings of the investigation. Where comments are made based on information obtained from third parties, GeoDyne Limited assumes that all third-party information is true and correct. No independent action has been undertaken to validate the findings of third parties.

This report has been prepared in accordance with our understanding of current good practice. However, changes to good practice, guidance or legislation may necessitate revision of this report after the date of issue.

The Phase I Desk Study undertaken herein comprises entirely of non-intrusive works and provides a strategic overview of the site from a geotechnical and environmental perspective and attempts to identify any potential abnormal issues with regard to the proposals for the site.

GeoDyne Limited has prepared this report for the sole use and reliance of Bloor Homes East Midlands, in accordance with our standard Conditions & Limitations (included in Appendix IX). This report may not be used or relied upon by any unauthorised third party without the explicit written agreement of GeoDyne Limited. Reliance may not be placed on our report until all invoices associated with the project have been paid.

2.0 SITE DESCRIPTION & HISTORY

2.1 Site Description

The site comprises an irregularly shaped parcel of land situated to the immediate south of Sacheverell Way on the southern periphery of Groby. The site may be located centred around approximate Ordnance Survey National Grid Reference 452560E, 306330N and covers an area of approximately 10.55 hectares.

At the time of our walkover (August 2024), the main body of the site was occupied by a large agricultural field used for arable farming with topsoil exposed at surface, which was accessed via a gate off Sacheverell Way in the north-east corner of the site. A hedgerow was present within the field running from the north-eastern area and terminating within the approximate central area of the field. Overhead electricity cables passed through the approximate centre of the field trending in a north to south direction with five telegraph poles noted to be present within the field. The electrical cables are understood to go to ground beyond the northern telegraph pole and continue northwards beneath Sacheverell Way.

The south-western portion of the site (i.e. the area within the blue line) is separated from the large agricultural field by a track, which was accessed via a metal gate off Sacheverell Way in the north-western corner of the site. It is understood that the track follows the route of a historical railway line. The south-western portion of the site comprised two adjoining undeveloped grassed fields. The larger of the two fields incorporated numerous trees and is indicated on historical mapping to include a Flood Relief Basin. The basin was evident during the walkover with manhole chambers noted around the periphery. The two fields were separated by an overgrown water-filled drainage ditch, which trended in an approximate north-west to south-east direction. Horses were present within the smaller of the two fields at the time of our walkover.

The northern boundary of the site was defined by Sacheverell Way, with residential properties beyond. An embankment to the A46 Leicester Western Bypass formed the eastern boundary of the site with undeveloped fields immediately beyond. Undeveloped fields were also present to the immediate south and west of the site. Several large commercial properties within Mill Lane Industrial Estate were present to the south-east of the site beyond the A46.

A public footpath passed through the southern periphery of the site and appeared to exit the site along the southern site boundary.

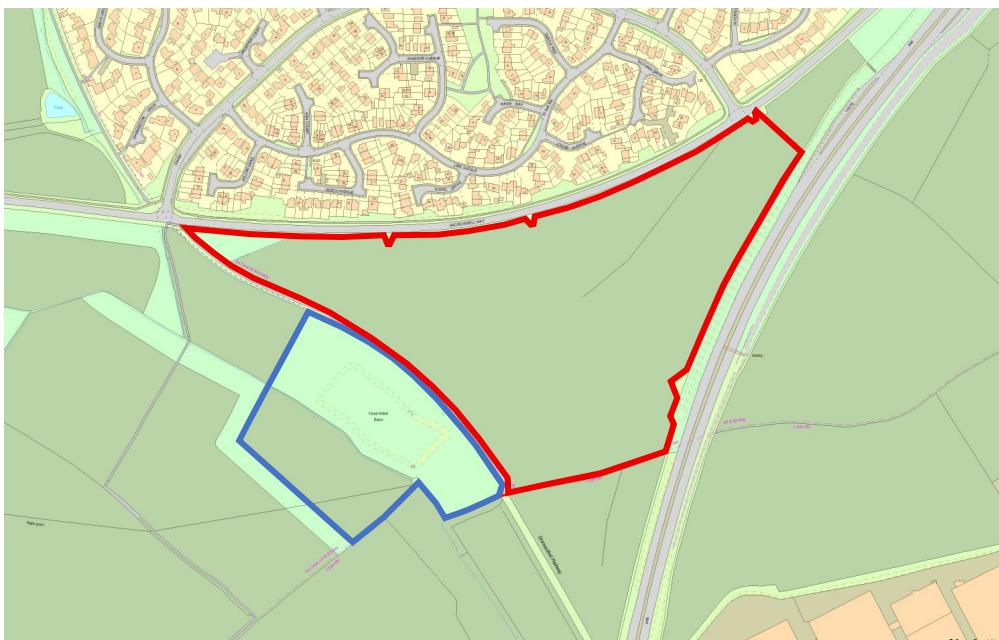
The Annotated Site Plan in Appendix III of this report (Figure No. D44049/02) shows the main features of the site and immediate surrounding area. General views of the site are included on the plans in Appendix IV of this report (Figure Nos. D44049/03a and D44039/03b).

An aerial photograph of the site, obtained from the Landmark Analysis tool commissioned as part of our works, is presented in Figure 1 on the next page, with the current OS mapping plan for the site and surrounding area presented in Figure 2.

Figure 1: Aerial photograph of the site (2023 image)



Figure 2: Current OS Mastermap Plan



2.2 Site History

The historical and contemporary Ordnance Survey publications included within the Landmark Envirocheck Report have been reviewed by GeoDyne to establish the history of the site and its environmental setting.

The historical Ordnance Survey maps are included as Appendix V of this report. We would note that the boundary marked on the historical sheets within the Envirocheck Report appears to 'shift' on several of the maps due to scaling inaccuracies between maps of differing dates. This is a function of Envirocheck transposition algorithms.

The key findings of the historical search are summarised in Table 1.

| TABLE 1 – HISTORICAL PUBLICATION DATA | | |
|---------------------------------------|---|---|
| Date | Features on Site | Features off Site |
| 1880s | <ul style="list-style-type: none"> The site comprises a series of undeveloped fields. A watercourse passes through the south-western portion of the site, trending in an approximate north-west to south-east direction, flowing to the south-east. | <ul style="list-style-type: none"> The area surrounding the site comprises predominantly undeveloped fields. A north to south trending railway line separates the south-western portion of the site from the remainder of the site. The railway runs from Groby to the north of the site and meets the west to east trending '<i>Midland Railway</i>' to the south of the site. |
| 1890s | <ul style="list-style-type: none"> No maps available for viewing. | <ul style="list-style-type: none"> No maps available for viewing. |
| 1900s | <ul style="list-style-type: none"> The site remains essentially unchanged. | <ul style="list-style-type: none"> An excavation (later confirmed to be associated with a Works) is present just within 250m of the south-eastern site boundary. |
| 1910s | <ul style="list-style-type: none"> The site remains essentially unchanged. | <ul style="list-style-type: none"> The surrounding area remains essentially unchanged, although the Works to the south-east of the site is identified as '<i>Premier Brick & Terra Cotta Works</i>' with several excavations present within the works area. |
| 1920s | <ul style="list-style-type: none"> No maps available for viewing. | <ul style="list-style-type: none"> No maps available for viewing. |
| 1930s | <ul style="list-style-type: none"> The site remains essentially unchanged. | <ul style="list-style-type: none"> Excavations associated with the Works to the south-east have expanded and are now present approximately 200m from the site. |
| 1940s | <ul style="list-style-type: none"> No maps available for viewing. | <ul style="list-style-type: none"> No maps available for viewing. |
| 1950s | <ul style="list-style-type: none"> The site remains essentially unchanged. | <ul style="list-style-type: none"> The surrounding area remains essentially unchanged. |
| 1960s | <ul style="list-style-type: none"> The site remains essentially unchanged. | <ul style="list-style-type: none"> The surrounding area remains essentially unchanged, although by the late 1960s the excavations associated with the Works to the south-east of the site appear to have been partially infilled and the area of the former excavations labelled as a '<i>Refuse Tip</i>'. By the late 1960s the railway line is indicated to be dismantled. |
| 1970s | <ul style="list-style-type: none"> The site remains essentially unchanged. | <ul style="list-style-type: none"> The area of the former Works (later a refuse tip) to the south-east of the site has been partially developed with commercial properties (later identified as Mill Lane Industrial Estate). The excavations associated with the former Works are no longer present (presumably infilled). |

TABLE 1 – HISTORICAL PUBLICATION DATA

| Date | Features on Site | Features off Site |
|--------------|--|---|
| 1980s | <ul style="list-style-type: none"> The site remains essentially unchanged, although several of the internal field boundaries within the site are no longer present. By the late 1980s, part of the south-western portion of the site is identified as a 'Flood Relief Basin'. | <ul style="list-style-type: none"> By the mid-1980s, a road (later identified as Sacheverell Way) has been constructed to the immediate north of the site and residential development has commenced to the north of Sacheverell Way. By the late 1980s, further residential development has taken place to the north of the site beyond Sacheverell Way. |
| 1990s | <ul style="list-style-type: none"> The site remains essentially unchanged, although by the late 1990s two further internal field boundaries within the site are no longer present. The aerial photograph of the site dated 1999 shows the main body of the site to comprise an agricultural field. | <ul style="list-style-type: none"> Further residential properties have been constructed to the north of the site beyond Sacheverell Way. By the late 1990s, the A46 main road has been constructed to the immediate east of the site and further commercial properties have been constructed in the area of the former Works to the south-east of the site, beyond the A46. |
| 2000 to 2024 | <ul style="list-style-type: none"> The site remains essentially unchanged, although by 2024 the area of the Flood Relief Basin is no longer labelled. | <ul style="list-style-type: none"> The surrounding area remains essentially unchanged. |

2.3 Aerial Photography & Historical Map Overlays

As part of the commissioned Landmark Report, the use of the Landmark Envirocheck Analysis tool was purchased to provide site specific aerial photographic imagery, and to provide the ability to undertake limited historical map overlay manipulation.

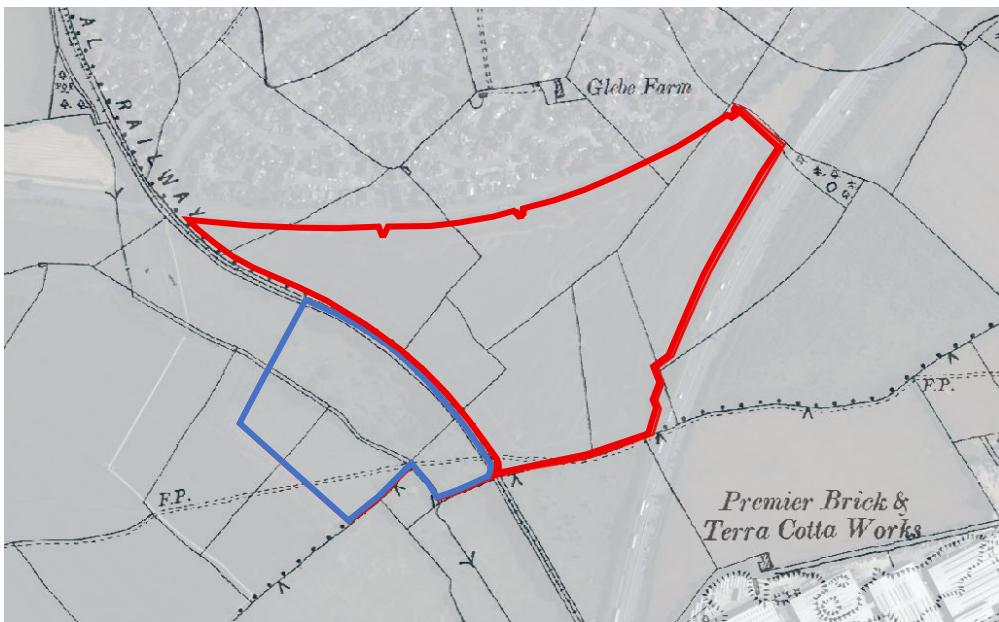
The following pictures (Figures 3 to 6) shows overlays of the historical map publications from 1904, 1930-31, 1973 and 1992, as shown on current aerial imagery.

Figure 3: Current Aerial Imagery Overlain with 1904 Historical Map Data



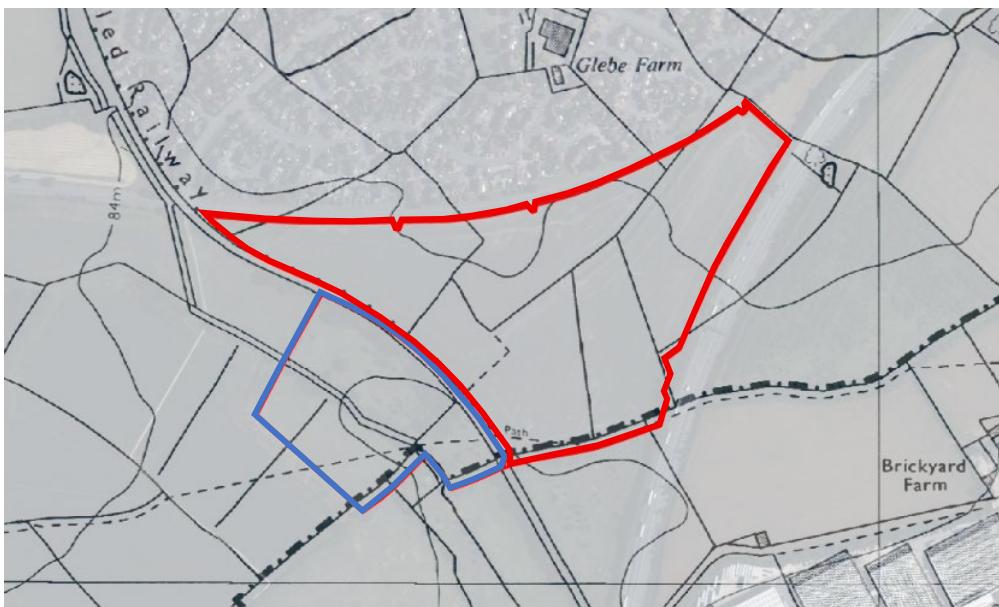
The site comprises a series of undeveloped fields. The south-western portion of the site is separated from the remainder of the site by a railway line. A watercourse passes through the south-western portion of the site. An excavation is present just within 250m of the south-eastern site boundary.

Figure 4: Current Aerial Imagery Overlain with 1930-31 Historical Map Data



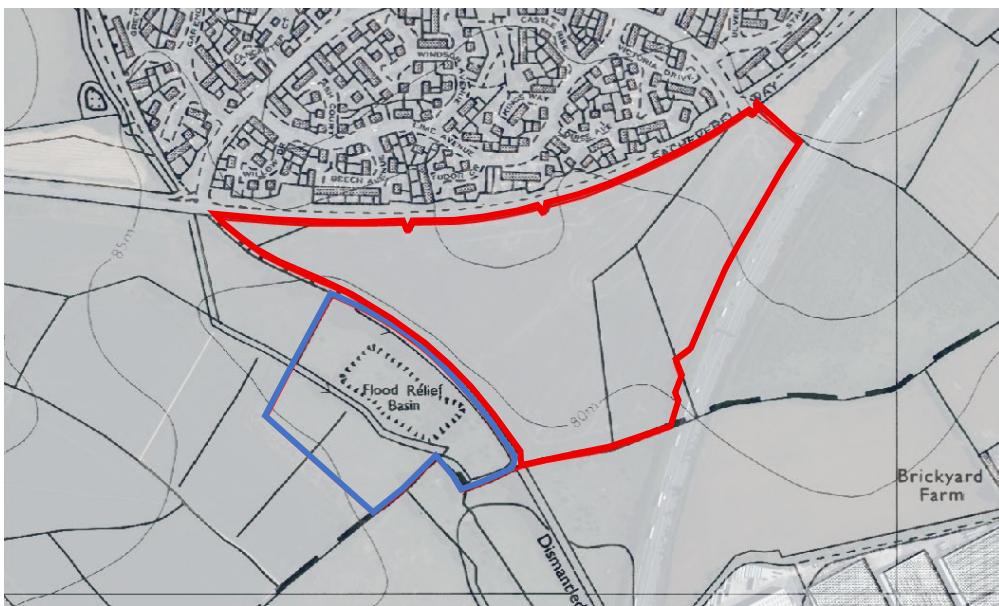
Excavations to the south-east of the site are indicated to be part of a brick and terra cotta works.

Figure 5: Current Aerial Imagery Overlain with 1973 Historical Map Data



The area of the former Works to the south-east of the site has been partially developed with commercial properties (later identified as Mill Lane Industrial Estate). The excavations associated with the former Works are no longer present (presumably infilled).

Figure 6: Current Aerial Imagery Overlain with 1992 Historical Map Data



Several of the field boundaries within the site are no longer present. Residential development has taken place to the north of the site beyond Sacheverell Way. The south-western portion of the site includes a Flood Relief Basin.

3.0 GEOLOGY & ENVIRONMENTAL SETTING

3.1 Geological References

The following geological publications were referred to:

- BGS 1:50000 Series Sheet 155 'Coalville' Bedrock and Superficial Deposits (2010).
- BGS 1:10000 Series Sheet SK50NW 'Groby' (2008).
- Landmark geological map sheets (included in Appendix VI).
- The BGS online interactive map viewer and Lexicon of Named Rock Units.
- The Coal Authority online interactive map viewer.
- Environment Agency website: www.environment-agency.gov.uk.

3.2 Geology

Superficial Drift Deposits

A variety of superficial drift deposits are indicated on the reviewed geological maps to be present across the majority of the site. Glaciofluvial Deposits and Alluvium are shown within the south-western portion of the site, whereas the Thrussington Member and Oadby Member are shown within the central and eastern areas of the site.

The Glaciofluvial Deposits are described on the reviewed mapping as '*Yellow-brown sand and gravel with quartz pebbles and flint*'. The Alluvium is described as '*Clay, silt and sand, commonly underlain by gravel*'. The Thrussington Member is described on the reviewed mapping as '*Mainly reddish brown silty or sandy clay with Triassic and Carboniferous rock fragments*'. The Oadby Member is described as '*Brown and dark grey silty clay with fragments of chalk, flint and Jurassic limestone*'.

We would note that drift deposits have the potential to alter rapidly in character and geotechnical properties both laterally and vertically over relatively short distances and may also be water bearing.

Bedrock Geology

The majority of the site is indicated to be underlain by strata of the Edwalton Formation. Part of the south-western portion of the site is indicated to be underlain by the Gunthorpe Formation with a band of Cotgrave Sandstone Member present between the Edwalton and Gunthorpe Formations.

The Edwalton Formation is described on the reviewed mapping as '*Mudstone, red-brown, with thin beds of grey-green dolomitic siltstone; veinlets and nodules of gypsum*'. The Gunthorpe Member is described as '*Mudstone, red-brown, with numerous thin beds of grey-green dolomitic siltstone; locally gypsiferous*'. The mudstone may weather to clay in the near surface horizons. The Cotgrave Sandstone Member is described as '*Sandstone, grey-green, fine- to medium grained*' and is indicated on the stratigraphical column on the 1:10000 geological map as 2-3m in thickness.

3.3 Faults

No surface faults are indicated to be present within the boundary of the site or within the vicinity of the site on the geological maps viewed.

3.4 Man-Made Deposits

The geological publications do not show the presence of any man-made deposits (i.e. Made Ground, Worked Ground or Landscaped Ground) beneath the site.

A large area of Made Ground is indicated to be present from approximately 200m to the south-east of the site. The area of the Made Ground broadly corresponds to the area of the excavations (now infilled) associated with the former brick and terra cotta works, which were identified on historical maps. Any infill materials to these former excavations may represent a source of potentially harmful ground gas which may affect the subject site.

An elongated area of Worked Ground is indicated to be present to the north-east of the site, which appears to correspond to a cutting along the route of the A46 main road.

3.5 Coal Mining Report

The site does not lie within an area requiring the commission of a coal mining report in accordance with The Coal Authority online interactive map viewer. No specific investigation or mitigation in relation to historical coal mining issues is therefore considered to be necessary at the site.

3.6 Unexploded Ordnance Risk

An initial Unexploded Bomb Risk Map search has been commissioned through ZeticaUXO. The map (presented in Appendix VII of this report) indicates that the site is within a 'Low' risk area with regard to unexploded ordnance.

3.7 Landmark Envirocheck Report

A Landmark Envirocheck Report was commissioned to assist in ascertaining the environmental setting of the site. The full Envirocheck Report is presented in Appendix VIII and has revealed the following key relevant information (details are only listed where they are within potential influencing distance of the site).

No comments have been made in our report with respect to potential flooding issues. Advice from a qualified drainage consultant should be sought by the client with respect to this matter.

3.7.1 Agency and Hydrological

Aquifer Status

The aquifer designation maps are presented in Appendix VIII and are based on geological mapping provided to Landmark by the British Geological Survey. Different aquifer classifications may be applied to superficial (drift) deposits (typically forming shallow perched groundwater units where present) and bedrock aquifers (which may contain regional groundwater units). Possible aquifer designations comprise Principal Aquifers, Secondary (A, B or Undifferentiated) Aquifers and Unproductive Strata.

The drift deposits beneath the site are indicated to be designated as either a Secondary Undifferentiated Aquifer or a Secondary A Aquifer. The underlying bedrock is designated as either a Secondary A Aquifer or a Secondary B Aquifer.

Secondary Undifferentiated Aquifers are described by the Environment Agency as '*...assigned in cases where it has not been possible to attribute either category A or B to a rock type. In most cases, this means that the layer in question has previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type.*

Secondary A Aquifers are described by the Environment Agency as having '*...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*'.

Secondary B Aquifers are described by the Environment Agency 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*'.

Source Protection Zone Status

The site is not shown to lie within a Source Protection Zone (SPZ). SPZs relate to the protection of groundwater resources principally for public drinking water supply.

Surface Water

The nearest surface water feature is indicated to be a watercourse, which trends in an approximate north-west to south-east direction passing through the south-western portion of the site. This watercourse corresponds to the location of the drainage ditch, as evidenced from our site walkover.

Groundwater Abstractions

One entry is listed 5m to the south-west of the site. The operator is indicated to be '*FI Fitchett (Contractors) Ltd*' and the entry is detailed as '*Impounding*', which relates to a man-made structure. No further details are provided within the Envirocheck report. No further entries are listed within 250m of the site boundary.

3.7.2 Waste

There are no waste sites (i.e. current or historic landfills, waste transfer stations etc) identified on the site.

A landfill site is located approximately 190m to the south-east of the site. The landfill is listed as both a Local Authority Recorded Landfill Site and a Historical Landfill Site. The landfill site is indicated to cover approximately the same area and correspond to the location of the former brick and terra works highlighted during the review of historical maps. One of the entries details the landfill site as '*Glenfield Brick and Tile Works*' with the first input date being December 1959. The last input date is not supplied. The specified waste is listed as '*Deposited Waste included Industrial Waste*'.

There is one entry listed under Potentially Infilled Land (Non-Water) located 160m to the south-east of the site. The area covered by the entry incorporates the two landfill sites detailed above and corresponds to the approximate locations of the various excavations within the former brick and terra works highlighted during the review of historical maps.

There is one entry listed under Potentially Infilled Land (Water) located on the site. Following a review of historical maps, it appears that this entry relates to a small former pond in the central northern area of the site. The pond appeared on the maps of the 1880s but was absent on the maps of the 1910s and all subsequent maps. There are three entries listed under Potentially Infilled Land (Water) located between 63m and 248m from the site, which also relate to small former ponds based on the evidence of historical maps.

3.7.3 Hazardous Substances

There are no sites associated with hazardous substances (e.g. sites dealing with explosives etc) identified on the site, or within a 250m radius of the site, in the Landmark Envirocheck Report.

3.7.4 Geological Issues

BGS Soil Chemistry

The BGS has prepared estimated soil concentration maps for several metals (including Arsenic, Lead, Nickel, Chromium and Cadmium), which are extrapolated from records available for use within their assessments.

Whilst potentially useful for the inference of Natural Metal Enrichment (NME) of the natural soils in a general locale, the data should not be used to inform any detailed decisions with regards to the chemistry of a particular site as it does not allow for anthropogenic effects. Estimates of the soil chemistry at the site indicate anticipated concentrations of Arsenic of <15mg/kg, Cadmium of <1.8mg/kg, Chromium of 40-90mg/kg, Lead <100mg/kg and Nickel of <15-30mg/kg.

Based on the information supplied within the Envirocheck report, the site is not shown to be located within an area where significant Natural Metal Enrichment of the underlying natural soils is likely to be present. However, this is only applicable to the specific determinands listed above.

Ground Stability Hazards

No significant ground stability hazards have been identified by the Envirocheck report that relate to the site (including from collapsible, ground dissolution, landslide, running sand and shrinking or swelling clay ground stability hazards). The Hazard Potential for the site in relation to compressible ground is detailed as 'Moderate'.

Radon

The Envirocheck report states that '*The property is in a lower probability radon area (less than 1% of homes are estimated to be at or above the Action Level)*' and '*The property is in an Intermediate probability radon area (1 to 3% of homes are estimated to be at or above the Action Level)*'. The report further states that '*No radon protective measures are necessary in the construction of new dwellings or extensions*' for both the lower and intermediate areas. No specific mitigation in relation to radon issues are therefore required at the site.

BGS Borehole Records

There are no BGS borehole records for the site. There are several BGS borehole records along the route of the A46 main road, which is present to the immediate east of the site. The boreholes were presumably advanced prior to construction of the road but no date is provided on the log records. The ground conditions encountered in the borehole logs advanced along the route of the road generally revealed firm, stiff and very stiff clays with localised granular inclusions, to depths of up to approximately 10m.

Mining and Ground Stability Datasheet

The Landmark Mining & Ground Stability Datasheet (included within Appendix VIII) lists two entries under Extractive Industries or Potential Excavations, which are located 4m to the south and 61m to the east of the site. These entries relate to former small ponds, as evidenced from the reviewed historical mapping. No further details are provided in relation to these features.

The datasheet confirms the former presence of the railway (listed as a Mineral Railway), which used to run in a north-to south direction and separates the south-western portion of the site from the main body of the site.

3.7.5 Industrial Land Use

Contemporary Trade Directory Entries

There are four inactive contemporary trade directory entries listed in the Envirocheck report between 101m and 246m from the site. The entries include a bus / coach operator, tool repair / servicing, door manufacturers and road haulage services. These entries are considered not to be a significant risk driver for investigation works due to the distances from the boundaries of the subject site.

Points of Interest – Commercial Services

Two listings are recorded within the Envirocheck report (210m and 246m from the site), relating to vehicle repair / servicing and transport distribution / haulage. The entries are considered not to be a significant risk driver for investigation works due to the distances from the boundaries of the subject site.

3.7.6 Sensitive Land Use

The site and immediate surrounding area are identified as being within a Nitrate Vulnerable Zone. In our experience the majority of this area of the country is defined as a Nitrate Vulnerable Zone and this classification is considered not to present a potential risk to the site.

3.8 Land Use Assessment

As part of the land use assessment, reference has been made to the '*Desk Reference Guide to potentially Contaminative Land Uses*' produced by Mr P Syms and published jointly by the ISVA (The professional Society for Valuers and Auctioneers) in association with The Royal Institution of Chartered Surveyors (RICS) and the Chartered Institute of Environmental Health (CIEH).

We have also made reference to the Department for Environment, Food and Rural Affairs and the Environment Agency Contaminated Land Report CLR8 '*Potential Contaminants for the Assessment of Land*' (March 2002). Although now formally withdrawn, this document identifies key contaminants which may potentially be present at a site as a result of a given historical land use and is considered useful as a desk based ready reference guide.

3.8.1 On Site Assessment

At the time of our walkover (August 2024), the main body of the site was occupied by a large agricultural field. The south-western portion of the site was separated from the large agricultural field by a track, which follows the route of a historical railway line and is present beyond the proposed developable area.

The south-western portion of the site comprised two adjoining undeveloped grassed fields. The larger of these two fields incorporated numerous trees and is indicated on historical mapping to include a Flood Relief Basin. The two fields were separated by a drainage ditch, which trends in an approximate north-west to south-east direction.

Historically, the site is indicated to have remained essentially undeveloped since the earliest reviewed mapping of the 1880s. The railway line that separated the south-western portion of the site from the main body of the site was present from the 1880s and was dismantled c1960s. The Flood Relief Basin within the south-western portion of the site first appeared on the historical maps of the 1980s.

The site is not identified in any of the land-use categories adopted in the above publications. Based on the information obtained from our desk study enquiries, our walkover of the site and experience of similar sites, potential general soil contamination that may be present could include:

- Metals and metalloids associated with any potential localised Made Ground beneath the site.
- Polycyclic Aromatic Hydrocarbons (PAHs) from any ashy inclusions and / or carbonaceous inclusions in the near surface soils.
- Pesticides associated with the historical (and current) agricultural use of the main body of the site.

As the former railway line (now a track) separates the south-west portion of the site from the main body of the site (i.e. separating the proposed reservoir site from the proposed residential development area) and is likely to remain following completion of development (see proposed initial masterplan in Appendix II), it is considered not appropriate to classify the site under the generic land use of '*Railway Land, including yards and tracks*', in accordance with the Syms and CLR 8 documents. Nevertheless, building railway tracks can involve the use of large quantities of clinker ash from local industries, along with crushed slag which was frequently used as ballast to support the track, as was steam locomotive ash. Therefore, on the basis of the historical and environmental information, the presence of Made Ground should be anticipated along the line of the existing track and potentially in the immediate vicinity of the track, which may potentially be impacted by the following contaminants:

- Pesticides and herbicides.
- Polycyclic Aromatic Hydrocarbons (PAHs) from any ashy inclusions or clinker and / or carbonaceous inclusions in any man-made deposits.
- Volatile Organic Compounds (VOCs) including solvents.
- Petroleum hydrocarbons (TPHs) from any spillages or leakages of fuel oils and lubricating oils.

Any potential infill to the former small pond on the site is considered not to represent a significant source of ground gas (i.e. carbon dioxide and methane). This is due to the limited volume of any potential remaining backfill, together with the small scale and likely shallow nature of this feature, together with the time that has elapsed since the potential infilling.

3.8.2 Off Site Assessment

With regards to potential sources of chemical contamination, based on the findings of the Phase I Desk Study enquiries, there are no significant potentially contaminative land uses known to be present within close proximity to the site.

The Desk Study enquiries have revealed the presence of a former landfill site to the south-east of the site. The infill materials to this feature may be considered to represent a potential source of hazardous ground gas (i.e. methane and carbon dioxide).

Any potential infill to the former small ponds in the vicinity of the site are considered not to represent significant sources of ground gas, for the reason provided in Section 3.8.1 for the former on-site pond.

4.0 PRELIMINARY CONCEPTUAL SITE MODEL

4.1 General

The DEFRA publication '*Environmental Protection Act 1990: Part 2A Contaminated Land Statutory Guidance*' (dated April 2012) states the following with regards to the production of a Conceptual Site Model (CSM) for a site:

'The process of risk assessment involves understanding the risks presented by land, and the associated uncertainties. In practice, this understanding is usually developed and communicated in the form of a "conceptual model"'. The development of a CSM is typically undertaken in an iterative process, reflecting the changes in understanding as more detailed site information becomes available.

In developing a CSM, and specifically in the context of land contamination, consideration needs to be given to three essential elements; which form the basis of any risk present. The statutory guidance sections 3.8 and 3.9 (April 2012) states the following:

- (a) *'A "contaminant" is a substance which is in, on or under the land and which has the potential to cause significant harm to a relevant receptor, or to cause significant pollution of controlled waters.*
- (b) *A "receptor" is something that could be adversely affected by a contaminant, for example a person, an organism, and ecosystem, property, or controlled waters...*
- (c) *A "pathway" is a route by which a receptor is or might be affected by a contaminant.*

The term "contaminant linkage" means the relationship between a contaminant, a pathway and a receptor'. For a contaminant linkage to be plausible, all three elements need to be present.

In undertaking a risk assessment and deriving a CSM for the purposes of the redevelopment of a site (i.e. planning and development control) reference has been made to both the Model Procedures for the Management of Land Contamination, as well as the National Planning Policy Framework (NPPF, dated July 2018). The preliminary CSM should identify the hazards (source of potential contamination) and should set out the potential pollutant linkages with a view to identifying the nature and magnitude of the potential risks to receptors.

In order to undertake the foregoing assessment, consideration is required with respect to the probability or likelihood of the linkage occurring and the severity and significance of the potential consequences; taking account the nature of the pollutant linkage and the potential severity of the hazard and the sensitivity of the receptor within the context of the proposed land use (in consideration of the planning regime).

Consideration of consequence/severity, probability/likelihood and risk has been based on the following guidance documentation:

- CIRIA C552 '*Contaminated Land Risk Assessment, A Guide to Good Practice*', 2001.
- EA R&D publication 66 '*Guidance for the Safe Development of Housing on Land Affected by Contamination*', 2008.

4.2 Classification of Consequences

In order to apply a consequence classification to a particular potential pollutant linkage, it is first necessary to define the terminology used within the classification system. The following terminology and definitions detailed in Table 2 have been adopted within our assessment, based on the guidance referenced in Section 4.1.

TABLE 2 – CLASSIFICATION OF CONSEQUENCES

| Classification | Definition |
|----------------|---|
| Severe | <ul style="list-style-type: none"> • Acute risks to human health. • Short-term risk of pollution of controlled waters or significant impact on controlled waters; e.g. large-scale pollution or very high levels of contamination. • Catastrophic damage to buildings or property (such as building explosion causing collapse). • Ecological system effects – immediate risks of major damage which is likely to result in irreversible substantial adverse changes in the functioning of the ecosystem or harm to a species of special interest that endangers the long-term maintenance of the population. |
| Medium | <ul style="list-style-type: none"> • Chronic risks to human health. • Pollution of sensitive water resources (such as leaching of contaminants into controlled waters) causing a significant effect on water quality. • Ecological system effects – Immediate risks of significant damage which may result in substantial adverse changes to the ecosystems functioning or harm to a species of special interest that may endanger the long-term maintenance of the population. • Significant damage to buildings, structures and services (for example foundation damage or rendering the building unsuitable for habitation). |
| Mild | <ul style="list-style-type: none"> • Non-permanent health effects to human health (i.e. exposure is unlikely to lead to 'significant harm' in the context of Part 2A of the Environmental Protection Act 1990). • Pollution of controlled waters or non-sensitive water resources (for example non-classified groundwater) that results in a short-lived effect to water quality or a marginal effect on amenity value, agriculture or commerce. • Minor damage to buildings, structures and services. • Ecological system effects – Minor or short-term damage which is unlikely to result in substantial adverse changes to the ecosystems functioning or harm to a species of special interest. • Substantial damage to non-sensitive environments (such as arable farmland for example). |
| Minor | <ul style="list-style-type: none"> • No measurable effects on human health including non-permanent health effects to human health that are easily preventable by appropriate use of PPE/RPE. • Minor pollution of controlled waters including non-sensitive water resources with no discernible effects on water quality or ecosystems. • Minor damage to non-sensitive environments (including arable farmland for example). • Easily repairable effects of damage to buildings, structures, services or the environment (for example discolouration of concrete, loss of plants in a landscaping scheme etc.). |

4.3 Classification of Probability

Once the possibility of a pollutant linkage has been established (noting that probability classification does not apply when there is no possibility of a linkage being present), the probability should be classified in accordance with Table 3.

TABLE 3 – CLASSIFICATION OF PROBABILITY

| Classification | Definition | Likelihood |
|-----------------|---|--|
| High Likelihood | There is a pollutant linkage and an event is highly likely to occur in the short-term, and is almost inevitable over the long-term OR there is evidence at the receptor of harm or pollution occurring. | >95% likelihood of Consequence Occurring |
| Likely | There is a pollutant linkage and it is probable that an event will occur. It is not inevitable, but possible in the short-term and likely over the long-term. | 50 – 95% likelihood of Consequence Occurring |
| Low Likelihood | There is a pollutant linkage and circumstances are possible under which an event could occur. It is by no means certain that even over a longer period such an event would take place, and less likely in the short-term. | 5 – 49% likelihood of Consequence Occurring |
| Unlikely | There is a pollutant linkage and it is improbable that an event would occur even in the very long-term. | <5% likelihood of Consequence Occurring |

4.4 Classification of Risk

In order to establish the relevant risk term applicable to the identified pollutant linkage, one of the risk phrases identified within Table 4 must be adopted, with the definitions of each risk term detailed within Table 5.

| | | Consequence of Risk | | | |
|-----------------------------|-----------------|---------------------|--------------|--------------|---------------------------------|
| | | Severe | Medium | Mild | Minor |
| Probability (Likelihood) | High Likelihood | Very High | High | Moderate | Moderate/Low |
| | Likely | High | Moderate | Moderate/Low | Low |
| | Low Likelihood | Moderate | Moderate/Low | Low | Negligible |
| | Unlikely | Moderate/Low | Low | Negligible | Negligible or No Potential Risk |

| Very High | There is a high probability that severe harm will arise to a designated receptor from an identified hazard OR there is evidence that severe harm to a designated receptor is currently happening. This risk, if realised, is likely to result in a substantial liability. Urgent investigation (if not undertaken already) and remediation are likely to be required. |
|-------------------|---|
| High | Harm is likely to arise to a designated receptor from an identified hazard. Realisation of the risk is likely to present a substantial liability. Urgent investigation (if not undertaken already) is required and remedial works may be necessary in the short term and are likely over the longer term. |
| Moderate | It is possible that harm could arise to a designated receptor from an identified hazard. However, there is a low likelihood that such harm would be severe, or if any harm were to occur it is more likely that the harm would be mild. Investigation (if not already undertaken) is normally required to clarify the risk and to determine the potential liability. Some remedial works may be required in the longer term. |
| Moderate/Low | It is possible that harm could arise to a receptor. However, a combination of likelihood and consequence results in a risk that is above low but is not of sufficient concern to be classified as moderate. It can be driven by cases where there is an acute risk which carries a severe consequence, but where the exposure is unlikely. Such harm would at worst normally be mild. The risk is unlikely to present a substantial liability. Some limited further investigation may be required to clarify the risk and any associated liability. If subsequent remediation works are necessary, they are likely to be limited in extent. |
| Low | It is possible that harm could arise to a designated receptor from an identified hazard, but it is likely that this harm, if realised, would at worst normally be mild. |
| Negligible | There is a low possibility that harm could arise to a receptor. In the event of such harm being realised it is unlikely to be any worse than mild. No liability would be associated with such risks. |
| No Potential Risk | There is no potential risk or liability where no pollutant linkage has been established. |

4.5 Contaminant [C] - Pathway [P] - Receptor [R] Considerations

The following CPR assessment has been undertaken based on the assumption that it is proposed to develop the main body of the site with low-rise residential properties with associated private gardens. The proposed development also includes attenuation ponds and areas of public open space. The south-western portion of the site is to remain undeveloped as a flood relief area.

4.6 Consideration of Potential Sources of Contamination [C]

Based on the findings of our desk study works, the potential key sources of contamination at the site that would require consideration for the derivation of a preliminary CSM would be the following:

| TABLE 6 – SUMMARY OF POTENTIAL CONTAMINANT SOURCES | |
|--|---|
| Areas of Potential Concern (APCs) | Associated Contaminants |
| Near Surface Soils (including potential localised Made Ground) | <ul style="list-style-type: none"> Metals & Metalloids PAHs Pesticides and herbicides Volatile Organic Compounds (VOCs) including solvents Petroleum hydrocarbons (TPHs) |
| Off-Site Former Landfill Site. | <ul style="list-style-type: none"> Ground gases (including methane and carbon dioxide) |

4.7 Consideration of Potential Pathways [P]

The potential pathways at the site are primarily:

- Direct ingestion of soil (either directly or as soil particles attached to produce).
- Inhalation of fugitive dust and vapours.
- Direct skin contact with the ground.
- Direct ingestion of home-grown produce.
- Direct ground contact with construction materials (including supply pipes).
- Vertical and lateral migration of contamination.
- Vertical and lateral migration of potentially hazardous ground gases / vapours.

4.8 Consideration of Potential Receptors [R]

The potential receptors at the site are:

- The final end users (residents – typically long term (chronic) exposure) and site visitors – (typically short term (acute) exposure).
- The construction personnel (i.e. site workers) involved with the development of the site (typically short term (acute) exposure).
- Neighbouring properties (off-site receptors).
- Controlled Waters (i.e. underlying groundwater and nearby surface waters).
- Buildings and construction materials (including buried utilities).

In preparing this CSM, it has been assumed that construction personnel involved with the development of the site (typically short term (acute) exposure) will adopt all necessary personal protective equipment (PPE and RPE etc.) and conform to health and safety requirements of their site-specific Risk Assessments and Method Statements (RAMS). Site workers have therefore not been included within the following table, as the adoption of these appropriate mitigation measures will result in an overall low risk of exposure to the C-P-R linkages identified.

4.7 Preliminary Risk Assessment / Conceptual Site Model

Our preliminary conceptual model of possible pollutant linkages, applicable to the proposed site usage and based on our current understanding, is summarised in Table 7.

| TABLE 7 – PRELIMINARY RISK ASSESSMENT SUMMARY TABLE DESK STUDY | | | | | | |
|---|--|-------------------------|----------------------------|----------------------------|------------|---|
| Potential Contaminant Source [C] | Potential Pathway(s) [P] | Potential Receptor [R] | Probability of CPR Linkage | Consequence of CPR Linkage | Risk Level | Comments / Justification |
| Near Surface Soils (including potential localised Made Ground) | Direct contact, ingestion or inhalation of fugitive dust and vapours | End users | Low Likelihood | Mild | Low | <p>No Made Ground is indicated from geological mapping to be present on the site. No potentially significant historical contaminative land uses have been identified at the site, although the route of a former railway line (now a track beyond the proposed developable area) separates the south-western portion of the site from the main body of the site.</p> <p>End users are likely to come into contact with the in-situ soils within gardens and areas of soft landscape.</p> <p>Further consideration of this potential linkage should be provided during the course of the Phase II Exploratory Investigation works.</p> |
| | Plant uptake / soil attached to home grown produce | End users | Low Likelihood | Mild | Low | <p>No Made Ground is indicated from geological mapping to be present on the site. No potentially significant historical contaminative land uses have been identified at the site, although the route of a former railway line (now a track beyond the proposed developable area) separates the south-western portion of the site from the main body of the site.</p> <p>Growing vegetables for private consumption may be anticipated at the site.</p> <p>Further consideration of this potential linkage should be provided during the course of the Phase II Exploratory Investigation works.</p> |
| | Vertical and lateral migration | Neighbouring properties | Low Likelihood | Mild | Low | <p>No Made Ground is indicated from geological mapping to be present on the site. No potentially significant historical contaminative land uses have been identified at the site, although the route of a former railway line (now a track beyond the proposed developable area) separates the south-western portion of the site from the main body of the site.</p> <p>No significant sources of potentially mobile contamination have been identified.</p> <p>Further consideration of this potential linkage should be provided during the course of the Phase II Exploratory Investigation works.</p> |

**TABLE 7 – PRELIMINARY RISK ASSESSMENT SUMMARY TABLE
DESK STUDY**

| Potential Contaminant Source [C] | Potential Pathway(s) [P] | Potential Receptor [R] | Probability of CPR Linkage | Consequence of CPR Linkage | Risk Level | Comments / Justification |
|--|---|---|----------------------------|----------------------------|------------|--|
| Near Surface Soils (including potential Made Ground) | Leaching of contaminants through unsaturated zone and/or vertical and lateral migration | Controlled Waters | Low Likelihood | Mild | Low | <p>No Made Ground is indicated from geological mapping to be present on the site. No potentially significant historical contaminative land uses have been identified at the site, although the route of a former railway line (now a track beyond the proposed developable area) separates the south-western portion of the site from the main body of the site.</p> <p>No significant sources of potentially mobile contamination have been identified. The site does not lie within a SPZ.</p> <p>The drift deposits beneath the site are indicated to be designated as either a Secondary Undifferentiated Aquifer or a Secondary A Aquifer. The underlying bedrock is designated as either a Secondary A Aquifer or a Secondary B Aquifer. Further consideration of this potential linkage should be provided during the course of the Phase II Exploratory Investigation works.</p> |
| | Direct contact or contact with vapours | Plastic buildings products (e.g. water supply pipes) and buried concrete | Low Likelihood | Mild | Low | <p>No Made Ground is indicated from geological mapping to be present on the site. No potentially significant historical contaminative land uses have been identified at the site, although the route of a former railway line (now a track beyond the proposed developable area) separates the south-western portion of the site from the main body of the site.</p> <p>Further consideration of this potential linkage should be provided during the course of the Phase II Exploratory Investigation works.</p> |
| Off-Site Former Landfill Site | Vertical and lateral migration of ground gases to indoor air | End users of new buildings (asphyxiation) or new buildings (damage via explosion) | Low Likelihood | Severe | Moderate | <p>The Desk Study enquiries have revealed the presence of a historical landfill in close proximity to the south-east of the site.</p> <p>Further consideration of this potential linkage (including a programme of ground gas monitoring) should be provided during the course of the Phase II Exploratory Investigation works.</p> |

The foregoing preliminary conceptual model highlights the potential plausible pollutant linkages that may relate to the site and would therefore require addressing by appropriate Phase II Exploratory Works. The information contained within the conceptual model should be confirmed and revised upon completion of an appropriate intrusive investigation.

5.0 CONCLUSIONS

5.1 Site Summary

- At the time of our walkover (August 2024), the main body of the site was occupied by a large agricultural field. The south-western portion of the site (i.e. that within the blue line) was separated from the large agricultural field by a track, which was accessed off Sacheverell Way. The track follows the route of a historical railway line and is present beyond the proposed developable area.
- The south-western portion of the site comprised two adjoining undeveloped grassed fields. The larger of the two fields incorporated numerous trees and is indicated on historical mapping to include a Flood Relief Basin. The two fields were separated by a drainage ditch, which trends in an approximate north-west to south-east direction.
- Historically, the site is indicated to have remained essentially undeveloped since the earliest reviewed mapping of the 1880s. The railway line that separated the south-western portion of the site from the main body of the site was present from the 1880s and was dismantled c1960s. The Flood Relief Basin within the south-western portion of the site first appeared on the historical maps of the 1980s.
- A variety of superficial drift deposits are indicated on geological maps to be present across the majority of the site, including Glaciofluvial Deposits, Alluvium, Thrussington Member and Oadby Member.
- Bedrock of the Edwalton Formation is indicated to underlie the majority of the site. Part of the south-western portion of the site is indicated to be underlain by the Gunthorpe Formation with a band of Cotgrave Sandstone Member present between the Edwalton and Gunthorpe Formations.
- The drift deposits beneath the site are indicated to be designated as either a Secondary Undifferentiated Aquifer or a Secondary A Aquifer. The underlying bedrock is designated as either a Secondary A Aquifer or a Secondary B Aquifer.
- The site is not located within a Source Protection Zone (SPZ).
- An off-site historical landfill is located from approximately 190m to the south-east of the site.

5.2 Geotechnical Assessment

We understand that it is the intention of the Client to develop the main body of the site with low-rise residential properties with associated private gardens. The underlying drift deposits may constitute competent founding strata for shallow foundations although we would note that drift deposits have the potential to alter rapidly in character and geotechnical properties both laterally and vertically over relatively short distances and may also be water bearing.

The underlying bedrock generally constitutes competent founding stratum for shallow foundations.

The foundation design for the site will depend on the results of intrusive geotechnical investigative works. These works should confirm the absence (or presence) of any Made Ground, determine the depth to, and strength of, the Natural Strata, and provide an assessment of the volume change potential of any potentially cohesive soils. The floor slab design is subject to confirmation following the intrusive investigation and programme of ground gas monitoring (see Section 5.4).

An appropriate scope of geotechnical tests should also be included within a suitable Phase II investigation for the purposes of designing foundations (including plasticity index analysis and / or particle size distribution analysis, water soluble sulphate / pH etc).

5.3 Building Near Trees

Foundation designs may need to be locally adjusted when building near existing, recently removed or proposed trees and hedgerows.

Hedgerows and trees are present along the site boundaries, as well as within the site, and it is recommended that these are surveyed and identified by a qualified arborist prior to development, where appropriate, to assist with detailed foundation design.

5.4 Ground Gas

The Desk Study enquiries have revealed the presence of a former landfill site to the south-east of the site. The infill materials to this feature may be considered to represent a potential source of hazardous ground gases (i.e. methane and carbon dioxide) which may, under certain circumstances migrate to the site.

Further consideration of this potential linkage (including a programme of ground gas monitoring) should be provided during the course of the Phase II Exploratory Investigation works. The floor slab design and requirement for ground gas protection measures will be subject to confirmation following the programme of ground gas monitoring.

5.5 Coal Mining

No specific investigation or mitigation in relation to historical coal mining issues are considered to be necessary at the site.

5.6 Radon

No radon protective measures are necessary at the site, in accordance with the Envirocheck report.

5.7 Water

The results of the intrusive investigation and monitoring programme will assist in establishing the groundwater regime beneath the site.

5.8 Surface Water Drainage

The use of soakaways would be subject to the ground conditions encountered during the intrusive works and the results of in-situ permeability testing (if deemed appropriate). However, the site is anticipated to be underlain by relatively impermeable strata and soakaways may not be feasible.

We understand that, based on the current proposed masterplan, attenuation ponds are proposed for the site.

5.9 Contamination Risk

It is considered that the following contaminants represent an appropriate list of determinants for initial assessment with regards to potential contamination risks at the site.

- Metals and metalloids associated with any potential localised Made Ground beneath the site.
- Polycyclic Aromatic Hydrocarbons (PAHs) from any ashy inclusions and / or carbonaceous inclusions in the near surface soils.
- Pesticides associated with the historical (and current) agricultural use of the site.

The presence of Made Ground should be anticipated along the route of the former railway line (now a track beyond the proposed developable area), which may potentially be impacted by the following contaminants:

- Pesticides and herbicides.
- Polycyclic Aromatic Hydrocarbons (PAHs) from any ashy inclusions or clinker and / or carbonaceous inclusions in any man-made deposits.
- Volatile Organic Compounds (VOCs) including solvents.
- Petroleum hydrocarbons (TPHs) from any spillages or leakages of fuel oils and lubricating oils.

The foregoing contaminants have the potential to adversely impact site workers, end users (i.e. residents) and building structures, although it should be noted that the existing track is likely to remain following completion of development.

Detailed Phase II Exploratory Investigation works will be required to attempt to further investigate and resolve the potential contaminant risk. At this stage, we envisage undertaking a contamination assessment for the plausible contaminants identified at the site.

The requirement for water testing would be dependent upon the findings of the intrusive investigation (although is considered to be unlikely).

5.10 Statutory Consultation

We would recommend that a copy of this Phase I Desk Study report is issued (by the Client) to the Local Planning Authority for review and comment as part of the planning application process.

Any comments made by the Local Authority, or their appointed consultees, should be incorporated into the Phase II Exploratory Investigation to ensure that the intrusive investigation is acceptable to all parties.

5.11 Recommended Phase II Exploratory Investigation Works

Proposed Phase II Exploratory Works should be sufficient to investigate the possible issues raised in the Phase I Desk Study and should be undertaken in general accordance with current industry good practice. Based on our current understanding (preliminary Conceptual Site Model), it is recommended that Phase II works comprise the following, as a minimum:

- A programme of exploratory holes (i.e. window sample boreholes and trial pits) across the site to provide an initial inspection of the ground conditions for geotechnical and environmental purposes.
- Appropriate geotechnical soil analysis.
- Contamination testing of soil samples.
- A programme of ground gas monitoring.

5.12 Closing Comment

Based on the evidence of the findings of the Phase I Desk Study enquiries and following the implementation of any necessary remedial measures, the site is considered likely to be suitable for the proposed end-use from a geotechnical and environmental perspective.

APPENDIX I

Site Location Plan
(Figure No. D44049/01)



REPRODUCED FROM THE ORDNANCE SURVEY MAP WITH THE PERMISSION OF THE CONTROLLER OF HIS MAJESTY'S STATIONERY OFFICE. CROWN COPYRIGHT RESERVED. LICENCE NO. LAN 1001274

| | | | | |
|-------------|---|------------|-----------------------|---|
| Project No. | D44049 | Drawn | SJ |  GeoDyne |
| Client | Bloor Homes East Midlands | Checked | PK | |
| Project | Land South of Sacheverell Way, Groby | Approved | PK | |
| | | Scale | NTS | |
| | | Date Drawn | 05/08/2024 | |
| Title | Site Location Plan | Rev. | Rev A - 31/07/2025 | |
| | | Figure No. | D44049/01 | |

APPENDIX II

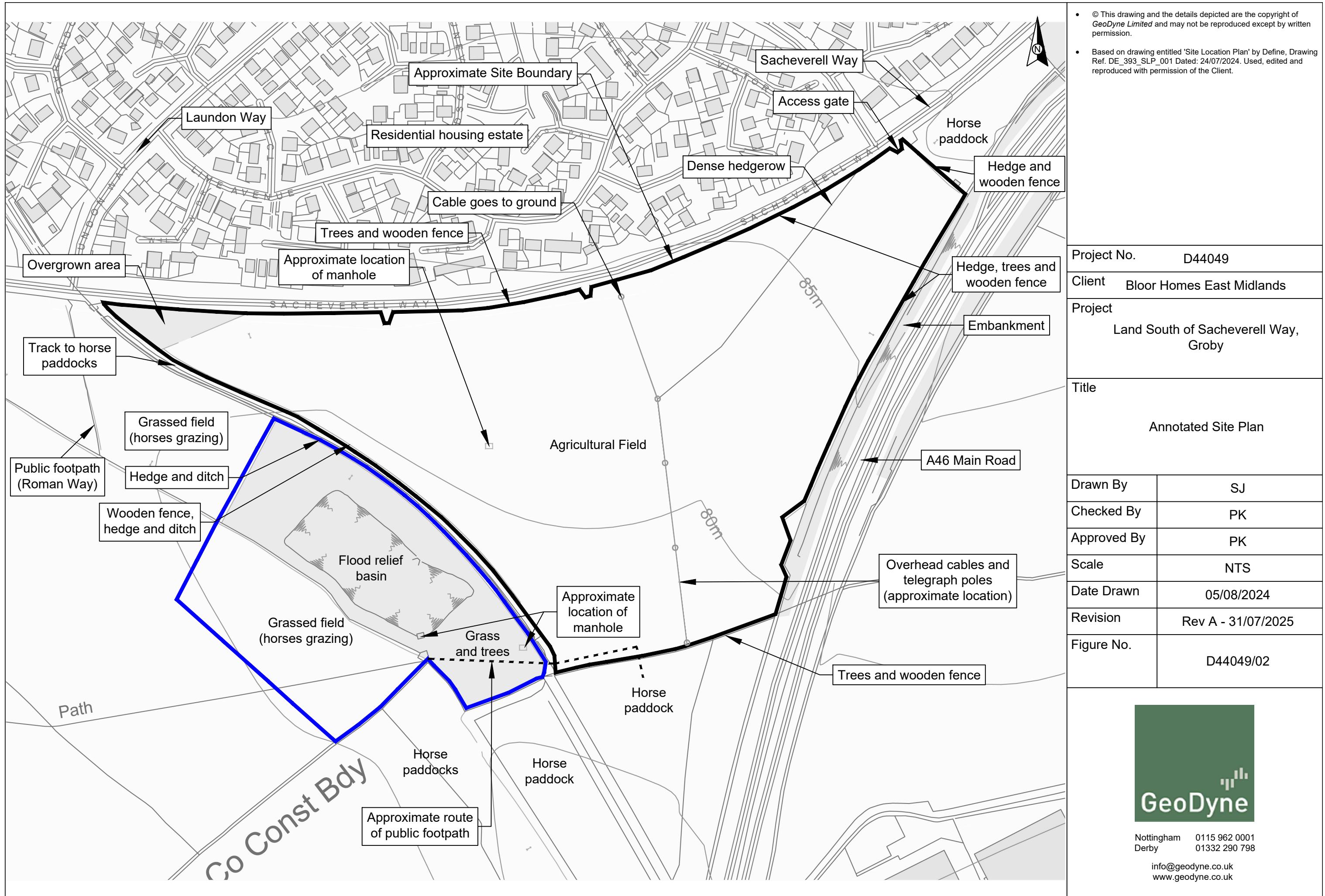
Initial Masterplan



| LEGEND | |
|---|---------------------------------------|
| | Site Boundary |
| | Land in Control of Applicant |
| | Residential |
| | Primary Road |
| | Secondary Street |
| | Tertiary Street |
| | Mews Street |
| | Public Open Space |
| | Pedestrian / Cycle Link |
| | Footpath Link |
| | Public Footpath (route on the ground) |
| | Public Footpath (mapped route) |
| | Permissive Route |
| | Attenuation Basin |
| | Swale Corridor |
| | Existing Ditch / Drain |
| | Existing Tree / Hedgerow / Vegetation |
| | Indicative Proposed Tree Planting |
| | Productive Landscape |
| | Play Area (LEAP) |
| | Entrance Green Space |

APPENDIX III

Annotated Site Plan
(Figure No. D44049/02)



APPENDIX IV

**Site Plans Showing General Site Views
(Figure No. D44049/03a & D44049/03b)**