REDROW HOMES LIMITED

BURBAGE FILEDS FARM

BURBAGE

LE10 2HS

FLOOD RISK ASSESSMENT

DECEMBER 2023

FW2285_FRA_001 V6

REVISION HISTORY

Revision	Reason for Issue	Author	Checker	Approved	Date
DRAFT	Draft Issue for Comment	JR	OP	JD	27.01.2023
DRAFT	Second Draft Issue for Comment	JR	OP	JD	10.02.2023
V1	First Issue	JR	OP	JD	15.03.2023
V2	Appendix B has been updated	JR	JD	JD	04.05.2023
V3	Minor update to foul strategy following client instruction	JD	JR	JD	19.05.2023
V4	Appendices plans updated to suit current layout	JR	JD	JD	19.06.2023
V5	Appendices A, B, J & K have been updated to suit the updated development layout.	JR	EC	JD	15.11.2023
V6	NPPF (2021) has been revised. References to this document have been updated to “NPPF (2023)”	JR	JD	JD	21.12.2023

EXECUTIVE SUMMARY

1. The site is at NO quantifiable risk of flooding from tidal events.

2. The property is identified within the Environment Agency Flood Risk mapping as being at very low risk of flooding from Rivers and Seas.

3. The site is identified by the Environment Agency as having a High and Medium risk of flooding from overland Surface Water.

4. The site is considered to be at a Low quantifiable risk of flooding from groundwater sources.

5. The site is identified by the Environment Agency as being at NO quantifiable risk of flooding from manmade lakes within the topographical catchment of the site.

6. The site is at a negligible risk of flooding from the existing sewerage network in the vicinity of the site.

7. The site is at a negligible risk of flooding from its own private drainage connections, however this can be mitigated by regular maintenance to ensure the ongoing performance of the system.

8. We therefore conclude that the proposed residential development is above the modelled flood level of the local watercourses and sits within Flood Zone 1 as defined in the National Planning Policy Framework September 2023 Table 1.

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1.0 INTRODUCTION

1.1.1 Farrow Walsh Consulting has been engaged by the applicant Redrow Homes Limited to produce a Flood Risk Assessment to accompany the planning application for a proposed residential industrial development to be situated at Burbage Field Farm, Hinckley.

1.1.2 The development proposals include the demolition of two existing residential properties located adjacent to Coventry Road and an existing farm with all the associated buildings and hardstand. A site location plan is included within Appendix A and the development proposals can be found within Appendix B.

1.1.3 This report considers the flood risk associated with a development proposal of this type and considers mitigation measures to ensure user safety.

1.1.4 The Flood Risk Assessment (FRA) report has been informed by the guidance contained within The National Planning Framework (September 2023, Department for Communities and Local Government) (NPPF).

1.1.5 Reference has been made to basic flood maps contained within the Environment Agency websites and the Environment Agency Standing Advice for Local Planning Authorities.

1.1.6 In consulting the Environment Agency website this report examines the following:

- Assessment of Flood risk and the likely sources of flooding
- Managing Residual Flood Risk
- Managing surface water
- Remedial Measures

1.1.7 This FRA examines the flood implications of the proposed development based on the following objectives, set out within the NPPF.

- Appraising risk
- Managing risk
- Reducing risk
- A partnership approach

1.1.8 This report has been prepared using the following policy and guidance documentation:

- National Planning Policy Guidance (NPPG)
- Ciria C753 – The SUDs Manual
- Adapting to Climate Change: Advice for Flood and Coastal Erosion Risk Management Authorities (EA - February 2016)
- Strategic Flood Risk Assessment (JBA – 2019-2020)
- Non-Statutory Technical Standards 2015
- Written Ministerial Statement regarding Sustainable Drainage (HCWS161) 2014
- The Water Framework Directive (2000)
- Building Regulations Part H 2015

1.1.9 In consulting with key stakeholders and policies this report aims to assess the risk of flooding both to the site and the impact of any development on the downstream network.

1.1.10 The flood management strategy, including consideration of safe access and egress from the site and flood resilience measures, is based on relevant British Standards (BS8533), the standing advice provided by the Environment Agency and on best engineering judgement. The approach for the FRA is based on the requirements of the Environment Agency and Hinckley and Bosworth Council.

1.1.11 Any comments and opinions expressed in this report, including any conclusions are based on the information available to Farrow Walsh Consulting Ltd at the time of writing. The conclusions therefore could differ if the information is found to be inaccurate, incomplete or misleading. Farrow Walsh Consulting Ltd. accepts no liability should this be proven to be the case, or, if additional information is made available with respect to this site.

2.0 SITE DETAILS

2.1 SITE LOCATION

2.1.1 The proposed development site is located towards the southern area of Burbage.

2.1.2 The site location is bounded by the M69 motorway to the south. The western and eastern boundaries are formed of existing properties, green fields, existing Bullfurlong Lane and Workhouse Lane. The northern boundary is bounded by Coventry Road.

2.1.3 A site location plan can be found within Appendix A.

2.2 SITE DESCRIPTION

2.2.1 The application site is irregular in shape in orientation north to south and covers a total area of 264,996m^2 or 26.5 hectares.

2.2.2 For the purpose of this report the site is classified as greenfield land, having 2 existing properties to the frontage and existing hardstand and buildings associated with the existing farm.

2.2.3 The site has existing access points already in place along Bullfurlong Lane and Workhouse Lane.

2.3 TOPOGRAPHY

2.3.1 The ground levels on the site are recorded to OS datum as between 126.91 to 103.83mAOD and the site generally slopes in a south-east direction towards the existing ditch.

2.3.2 A copy of the topographical survey can be located within Appendix C.

2.4 HYDROLOGICAL CONTEXT

2.4.1 An existing unnamed watercourse is running through the site and crosses M69 motorway and discharges into Soar Brook. Several sections of the watercourse are culverted. Please refer to Appendix K.

2.4.2 Soar Brook is a tributary of the River Soar and is located 776m south of the development site.

2.4.3 The site lies within the operation catchment of the Soar River operational catchment and the overall catchment of the Humber Basin District.

2.4.4 The site lies within upper reaches of the overall Soar operational catchment area.

2.5 GEOLOGICAL CONTEXT

2.5.1 The British Geological Society (BGS) online mapping indicates that the site geology comprises of:

- Dunsmore Gravel – Sand and gravel. Sedimentary superficial deposit
- Wolston Sand and Gravel – sand and gravel
- Oadby Member – Diamicton Alluvium – Clay, silt, and gravel

2.5.2 The bedrock is identified by the British Geological Society as Mercia Mudstone Group – Mudstone.

2.5.3 A Phase 1 ground investigation has been undertaken by the client, with an extract included within Appendix D.

2.6 GROUNDWATER VULNERABILITY

2.6.1 The bedrock stratum below the site is classified by the Environment Agency as a Secondary B Aquifer

2.6.2 In terms of vulnerability, the ground is classified as Medium Vulnerability, as can be seen in the Ground Investigation in Appendix D.

2.6.3 The site does not lie within a Source Protection Zone.

2.7 EXISTING DRAINAGE

2.7.1 Severn Trent are responsible for maintaining the public sewers within the area of Burbage and the sewer records have been obtained and can be found within Appendix F.

2.7.2 The sewer records confirm existing 355mm combined rising main crossing the development.

2.7.3 An existing Ø225mm foul sewer is located within Westminster Drive and Robinson Way which is discharging into the combined Ø450mm sewer. The combined Ø450mm sewer is crossing then private land and discharges downstream beneath De Havilland Way.

2.7.4 In the developer enquiry response received from STW states that the existing Ø450mm combined sewer doesn't have enough capacity to accommodate the additional foul flows from the new development.

2.7.5 An offline water storage tank has been installed to limit the existing network surcharge and flooding occurrence.

2.7.6 There are existing surface water sewers with a diameter between 225 – 450mm located within Coventry Road, Bull furlong Lane and Robinson Way. Ultimately these are discharging into the unnamed watercourse which crosses the development.

2.7.7 An existing spring has been located outside of the site boundary which ultimately discharges into the existing unnamed watercourse which crosses the development.

2.7.8 An existing 225Ø pipe is crossing the site on the eastern boundary. The pipe is serving the adjacent constructed development and discharges into the existing unnamed watercourse.

2.7.9 An existing unnamed watercourse is crossing the site from northwest to south east, which ultimately is crossing M69 motorway.

2.7.10 In several locations the existing ditch is culverted. Some of the existing culverts are damaged and will require to be replaces, subject to LLFA's comments and OWC technical applications.

2.7.11 Within Appendix L, more information can be found regarding existing ditch, including photos and hydraulic model results.

2.7.12 The existing topographical survey identifies manholes and below ground drainage within the site.

2.7.13 The topographical and drainage surveys can be found contained within Appendix C.

2.8 ARTIFICIAL WATER BODIES

2.8.1 There is an unnamed pond 30 metres to the east of the site. It is assumed that Workhouse Lane is has been constructed recently as part of an adjacent development.

2.8.2 Another 2 unnamed ponds are located 550m and 847m to the southeast of the new development which are assumed to serve the Amazon and DPD industrial parks.

2.8.3 Two more unnamed ponds are located adjacent to the north eastern boundary, in line with the existing watercourse.

2.8.4 Lakeside fishery is located 500m to the southwest of the development.

3.0 ASSESSMENT OF FLOOD RISK

3.1 FLUVIAL

3.1.1 The site lies in the Humber Basin Catchment and Soar Brook is classified as a main river and falls under the administrative jurisdiction of the Environment Agency.

3.1.2 The Environment Agency have derived flood maps of England from which it is possible to initially identify whether a site is located within an area that is at risk of fluvial flooding. The maps, which are available on the Environment Agency's website, categorise land as being within Flood Zone 1, Flood Zone 2 or Flood Zone 3, with Flood Zone 1 being all land falling outside of the flood plain and Flood Zones 2 and 3 being all land within the floodplain. Flood Zone 3 is split into two further categories, namely Flood Zone 3a and Flood Zone 3b with Flood Zone 3b considered to be the functional floodplain.

3.1.3 The definitions of the Flood Zones extracted from the National Planning Policy Framework (NPPF) are described below:

- Flood Zone 1 – low probability. This zone comprises land assessed as having a less than 1 in 1000 annual probability of river or sea flooding (<0.1%).
- Flood Zone 2 – medium probability. This zone comprises land assessed as having between a 1 in 100 and 1 in 1000 annual probability of river flooding (15 – 0.1%) or between a 1 in 200 and 1 in 1000 annual probability of sea flooding (0.5% - 0.1%) in any year.
- Flood Zone 3a – high probability. This zone comprises land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%), or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year.
- Flood Zone 3b – the functional floodplain. This zone comprises land where water has to flow or be stored in times of flood. Typically, land which would flood with an annual probability of 1 in 20 (5%) or greater in any year or is designed to flood in an extreme (0.1%) flood.

3.1.4 The extent of flooding on main rivers is indicated on the Environment Agency web site and an extract from the indicative flood maps can be seen in Figure 1. The areas of dark blue identify flooding probability of 1 percent (1 in 100 year) and the light blue areas are areas of extreme flood between the 1 percent and 0.1 percent (1 in 1000 year) probability.

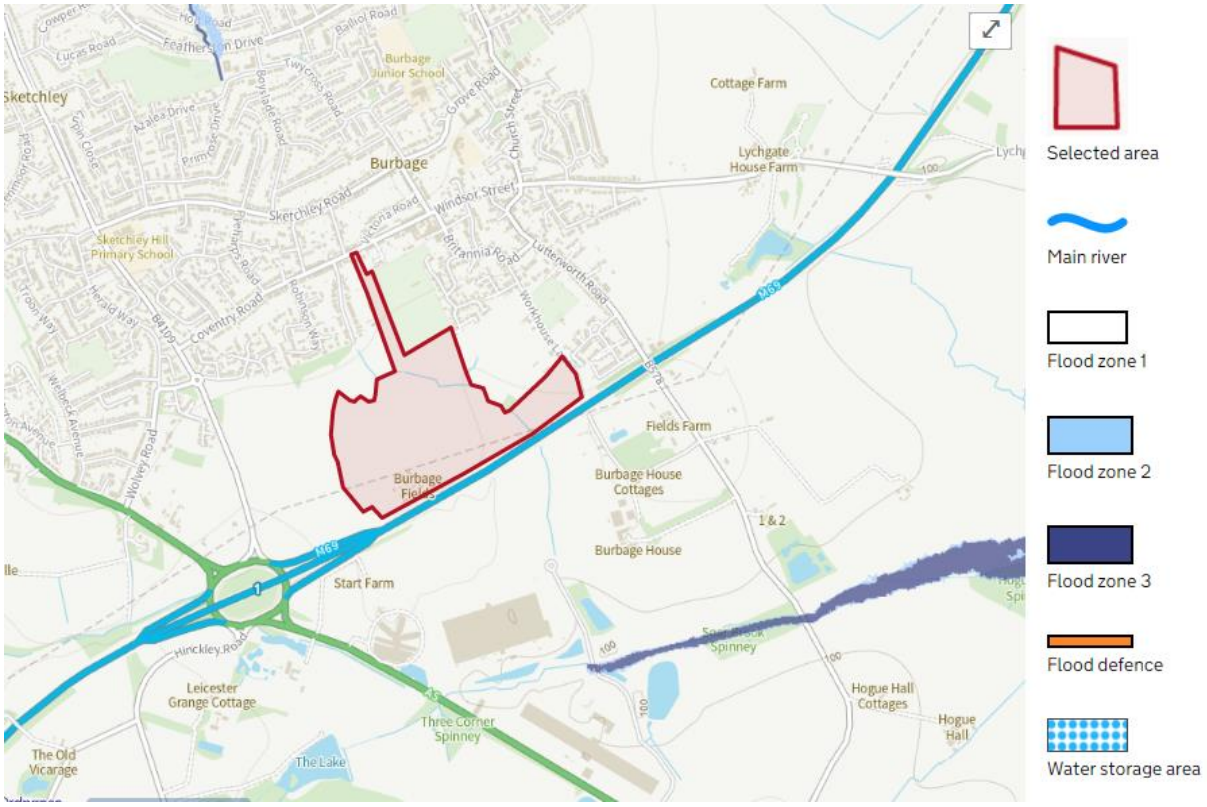


Figure 1 - Extract from EA Flood Map for Planning (January 2023)

3.1.5 It is identified on the EA indicative planning flood mapping the site lies within Flood Zone 1.

3.1.6 Based on Table 1 of the NPPF the site has a low probability of flooding due to main rivers within the extents outlined within Figure 1.

3.1.7 The SFRA indicates that no historic fluvial flood events have been recorded within the vicinity of the site.

3.2 TIDAL OR COASTAL

3.2.1 The ground levels on the site are recorded to OS datum as between 126.91 to 103.83mAOD and the site generally slopes in a south-east direction towards the existing ditch. Topographical survey can be found within Appendix C.

3.2.2 The site lies in the Humber Basin Catchment and Soar Brook is classified as a main river and falls under the administrative jurisdiction of the Environment Agency.

3.2.3 The site is indicated by mapping as being remote from the areas at risk of tidal flooding with the existing coastal defences intact or removed.

3.2.4 The site is therefore considered comprehensively free from risk from tidal or coastal flooding effects, being horizontally and vertically remote from such influences at present, and after consideration of climate change effects.

3.3 GROUNDWATER FLOODING

3.3.1 Groundwater flooding occurs as a result of rising water from underlying aquifers or from water flowing from abnormal springs. This tends to occur after long periods of sustained high rainfall, and the areas at most risk are often low-lying where the water table is more likely to be at a shallow depth. Groundwater flooding is known to occur in areas underlain by major aquifers, although it is increasingly being associated with localised floodplain sand and gravels.

3.3.2 SFRA states that in general, the majority of Hinckley and Bosworth borough is within the <25% susceptible classification, therefore it is at lower risk of groundwater flooding.

3.3.3 LLFA advised previously that high levels of groundwater were encountered on an adjacent site during construction.

3.3.4 As part of the Phase 2 Ground Investigation, groundwater monitoring should be undertaken.

3.4 ARTIFICIAL WATER BODIES FLOODING

3.4.1 All the artificial water bodies within in in the vicinity of the site are described in the paragraph 2.8.

3.4.2 The EA online mapping indicates that there are no areas within the vicinity of the site at risk of flooding from reservoirs.

3.4.3 We conclude that the risk of failure of the water main is remote. It must however be noted that for a failure adjacent to the site the nature of the escape and probable pressurized column of water could itself cause some local flood damage, but this is beyond practical mitigation.

3.4.4 The SFRA indicates there have been no recorded historic incidents of flooding due to artificial sources.

3.5 SURFACE WATER FLOODING

3.5.1 Surface water flooding occurs when natural and engineered systems drainage network capacity is exceeded and thus cannot accommodate the volume of rainfall / runoff. Surface water flooding occurs often in urban areas during extreme, high intensity, low duration rainfall events which overwhelm the local surface water drainage systems. In rural areas this type of flooding can occur during medium intensity, long duration events where saturated ground conditions prevent natural infiltration into the subsoils below the surface. Flood water arising from such events is then conveyed above ground following the topography of the surrounding land.

3.5.2 The site is located within the upper reaches of the overall catchment as on the Environment Agency catchment website. The local catchment tends east to south towards to Soar Brook from source to Soar Water Body.

3.5.3 The Environment Agency have modelled locations along critical flow paths and area situated in topographic depressions, which could flood following an extreme rainfall event when drainage capacity has been exceeded. Figure 3 indicates the predicted surface water flood risk map taken from the Environment Agency's website.

3.5.4 The EA mapping indicates that the existing unnamed watercourse that crosses the development is flooding, with the southern section being at high risk.

3.5.5 The EA Mapping indicates the following risk depth of flooding:

- Low risk depth: between 300 – 900mm
- Medium risk: between 300 and 900mm and higher than 900mm at the outfall point from the development where the ditch is culverted beneath M69 motorway
- High risk: between 300 and 900mm and higher than 900mm at the outfall point from the development where the ditch is culverted beneath M69 motorway.

3.5.6 No flooding information has been found related to this site in the SFRA.

3.5.7 Based on the above, the developer instructed JBA Consulting to undertake a hydraulic modelling study of an unnamed watercourse, which can be found within Appendix K.

3.5.8 The study revealed that the existing culvert located to the south of the boundary, culvert which crosses M69 motorway and location where the major flooding occurs, has enough capacity to accommodate the existing flows.

3.5.9 The majority of the site is considered to be at very low risk from overland flows by the EA with areas at the perimeter of the site to the north and east are noted to be low or medium risk.

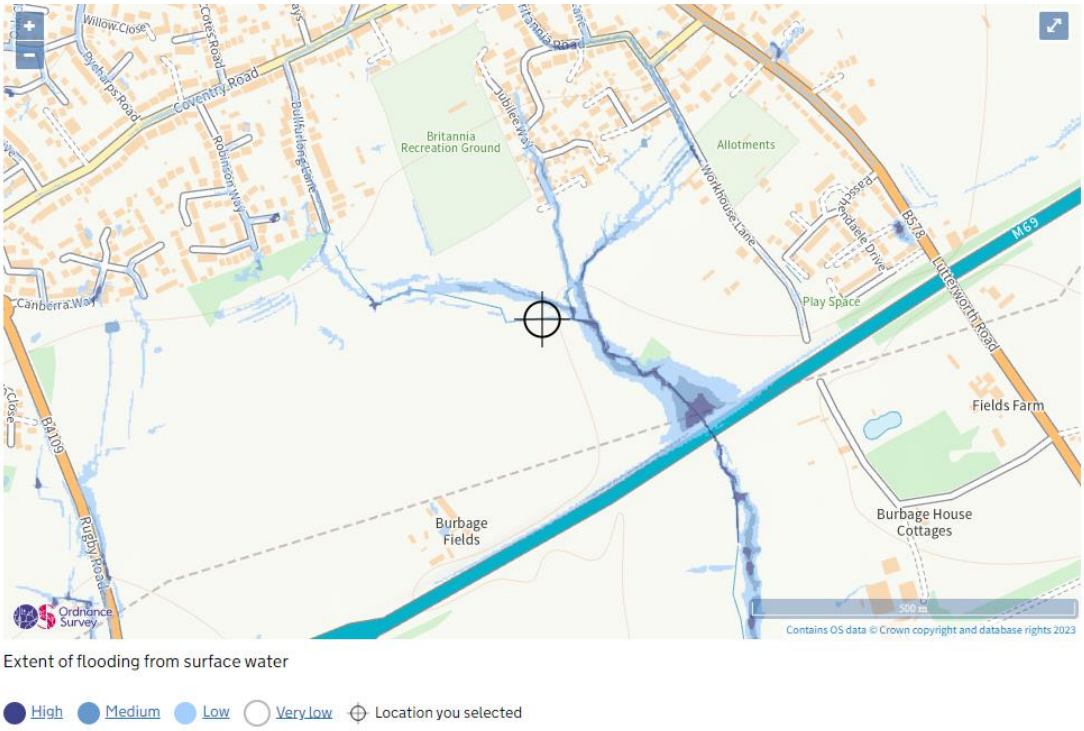


Figure 2 – Extract from the EA Mapping Risk of Surface Water Flooding (January 2023)

3.6 EXISTING SEWER FLOODING

3.6.1 The sewer network surrounding the development is owned and maintained by Severn Trent Water. A copy of the sewer records for the area can be found within Appendix F.

3.6.2 The sewer records confirm existing 355mm combined rising main crossing the development.

3.6.3 An existing Ø225mm foul sewer is located within Westminster Drive and Robinson Way which is discharging into the combined Ø450mm sewer. The combined Ø450mm sewer is crossing then private land and discharges downstream beneath De Havilland Way.

3.6.4 In the developer enquiry response received from STW states that the existing Ø450mm combined sewer doesn't have enough capacity to accommodate the additional foul flows from the new development.

3.6.5 There are existing surface water sewers with a diameter between 225 – 450mm located within Coventry Road, Bull Furlong Lane and Robinson Way. Ultimately these are discharging into the unnamed watercourse which crosses the development.

3.6.6 Generally, due to the site levels and those of the surrounding areas it is considered that any breach of the sewers would follow the natural topography of the land and drain south into the existing unnamed watercourse.

3.6.7 The site is also not recorded as a critical drainage area by the SFRA.

3.6.8 At the time of SFRA study no information was received from STW regarding existing sewer flooding.

3.6.9 The developer enquiry response received from STW states that the existing foul network is surcharged and in order to limit the existing sewer surcharge and flooding an offline tank has been installed. Please refer to Appendix F for the STW correspondence and records.

3.6.10 It should be noted that the sewerage systems are designed to accommodate the 1 in 30-year storm events and thus for storm events above this probability flooding from sewers will occur.

4.0 PROPOSED DEVELOPMENT

4.1 DEVELOPMENT PROPOSALS

4.1.1 The development proposal includes the demolition of the 2 residential properties and farm the construction of a new residential development containing 442 plots. A site location plan is included within Appendix A and the development proposals can be found within Appendix B.

4.1.2 The buildings shall be a minimum 150mm above the final ground levels to ensure that the overland flows do not enter the properties, with the exception of the level thresholds which must be provided with threshold drains to prevent flows entering the properties.

4.1.3 For the purpose of this report the site is classified as greenfield land, having 2 existing properties to the frontage and existing hardstand and buildings associated with the existing farm.

4.1.4 The current use of the application site is classed as greenfield use, with a hardstand area of 6,572m² (2.5%) which currently drains into the existing watercourse.

4.1.5 In accordance with Table 2 of NPPG (2019), a residential land use has a flood vulnerability classification of 'more vulnerable'.

4.1.6 In accordance with Table 3 of NPPG (2019), the more vulnerable development within Flood Zone 1 is appropriate.

5.0 SURFACE WATER MANAGEMENT

5.1 FLOOD RISK FROM THE DEVELOPMENT

5.1.1 In accordance with NPPG site specific flood risk assessments should consider and assess how runoff from the development will be managed and whether it will increase flood risk elsewhere.

5.1.2 The primary flood risk generated by the new development is likely to be the risk posed by overland surface water flooding due to exceedance of the existing drainage network.

5.2 EXISTING SURFACE WATER DISCHARGE

5.2.1 The existing 2 residential properties drainage network it is assumed to be drain into the existing STW located within Coventry Road.

5.2.2 Topographical survey shows existing inspection chamber and tanks which served the Burbage Filed Farm. The outfall of the existing sewers is to be confirmed.

5.2.3 All existing Severn Trent Water sewers can be seen in Appendix F.

5.2.4 For the purpose of this report the site is classified as greenfield, due to the size of the existing hardstand.

5.3 CLIMATE CHANGE

5.3.1 National Planning Policy Guidance requires that climate change be incorporated within the surface water drainage design in accordance with The Environment Agency's 'Adapting to Climate Change: Advice for Flood and Coastal Erosion Risk Management Authorities' February 2016 when assessing flood risk for a development.

5.3.2 The design life of the development is beyond 2070, therefore in accordance with the Environment Agency guidance the development should make allowances for an increase in extreme rainfall intensity of an additional 40% when compared to the 1961-1990 baseline.

5.4 PROPOSED SURFACE WATER DRAINAGE STRATEGY

5.4.1 Surface Water runoff from the proposed development should mimic, as far as possible, the surface flows from an undeveloped greenfield site.

5.4.2 Building Regulations 2010 Part H guidance for disposal of surface water is as follows:

- A soakaway or infiltration system, or where not reasonably practical;
- A surface water ditch or watercourse, or where not reasonably practical;
- A below ground sewer

5.4.3 The ground investigation undertaken on the site has advised that use of soakaways for surface water drainage may be locally feasible where sand and gravel deposits lie (northern extents), however impermeable cohesive soils are anticipated which is likely to make soakaway drainage ineffective and unfeasible.

5.4.4 LLFA advised that that high level of groundwater was encountered on an adjacent site during construction and de-watering works were required to be undertaken.

5.4.5 Based on the above, discharge of surface water using infiltration techniques is not a feasible solution.

5.4.6 Therefore, surface water disposal by the means of treatment and detention prior to controlled release into the existing unnamed watercourse which crosses the site is deemed the most appropriate solution.

5.4.7 Existing greenfield runoff rates have been calculated for the development area and can be found within Appendix I and are also shown below.

Greenfield Runoff Rates	
Storm Event	Site 26.5ha (l/s)
$Q_{BAR,GR}$	115.62
$Q_{1,GR}$	95.97
$Q_{30,GR}$	231.25
$Q_{100,GR}$	297.16

Table 1 - Greenfield Runoff Rates

5.4.8 The development area of the site is 26.5 hectares, and it is proposed that 40.3% (10.69ha) of the development will be impermeable and require collecting and attenuating prior to discharge. The above areas are based on the current site layout available contained within Appendix B.

5.4.9 It is currently proposed that the drains within the proposed access road will be offered for adoption to STW and the plot drainage will remain under private ownership.

5.4.10 It is proposed that the surface water from the development will be controlled using flow controls prior to discharge into the existing unnamed watercourse at the southern boundary, upstream of the existing culvert crossing M69 motorway.

5.4.11 A copy of the Drainage Strategy can be found within Appendix J.

5.5 PROPOSED SURFACE WATER DISCHARGE

5.5.1 Surface water drainage will be provided in new below ground gravity drains constructed around the properties, and in the shared driveways mirroring the existing runoff arrangement with surplus flows being attenuated using attenuation basins. The proposed surface water runoff rates for each parcel will match the existing greenfield runoff rates and are shown below.

Storm Event	(l/s/ha)
$Q_{1,PR}$	4.30
$Q_{30,PR}$	4.30
$Q_{100+40\%cc,PR}$	4.30

Table 2 – Proposed Discharge Rates

5.5.2 This rate is subject to approval from the LLFA.

5.5.3 By controlling the discharge rate from the site for a 1in100 year + 40% storm event the site is offering a betterment to the downstream network by utilising on site flood storage at an earlier stage in the overall river catchment potentially reducing flooding downstream.

5.5.4 All sewers and drainage are to be constructed in accordance with all relevant industry standards, including but not limited to:

- Building Regulations Approved Document Part H 2010
- Sewer Sector Design Guidance

5.5.5 The drawings & schedules of the as-built site drainage system are to be made available to the building occupier to enable drainage maintenance and future works to be undertaken.

5.6 CONSIDERATION OF SUDS

5.6.1 With reference to CIRIA 753 and the surface water treatment process, the provision of filter drains, rain gardens and attenuation basins will aid in the removal of sediment, hydrocarbons and heavy metals.

5.6.2 Rain gardens are small depressions that can act as infiltration points for clean water. These are attractive features, easy to retrofit, maintain which can reduce rate of run and some volume reduction. The rain gardens will be provided with a perforated pipe connected to the drainage system.

5.6.3 Filter drains will be located adjacent to the shared private drives (where possible). Filter drain stone will collect particles and helps to prevent pollutants from entering groundwater.

5.6.4 The Environment Agency and Leicestershire County Council require Sustainable Drainage (SuDS) techniques to be incorporated within new developments where possible.

5.6.5 Consideration should therefore be given to the use of the Sustainable Urban Drainage Systems. Table 2 below gives commentary in relation to the suitability of SuDS techniques for the proposed development.

SUDS Technique	Commentary	Suitability
Green Roof	Due to the large roof size and pitched nature of roof within the development, the option of incorporating a green roof into the development is not suitable for this site.	No
Rain Gardens	Limited, to be used to collect roof clean water and discharged into the drainage network. Final locations subject to detailed drainage design	Potential
Infiltration by Soakaway	LLFA advised previously that high levels of groundwater were encountered on the adjacent site during construction.	No
Water Butt	Storage of roof runoff via the use of water butts has the potential to be utilised.	Potential
Filter Drain	Filter strips to be located where possible adjacent private shared drives	Yes
Infiltration Trench	There is no suitable area within the site for infiltration trenches/filter trenches	No
Swale	Based on the presence of the existing watercourse, topography and proposed site layout, there is no suitable position for this feature	No
Bio-retention	There are limited areas for this to be sited, and concerns over maintenance by the private dwelling owners.	No
Permeable Paving	Permeable paving has potential to be used.	Potential
Infiltration Basin	LLFA advised previously that high levels of groundwater were encountered on the adjacent site during construction.	No
Detention Basin	Detention basins to be located to the south eastern boundary.	Yes

Table 3 – SuDs Consideration Table

5.6.6 The table above identifies that due to site constraints, the most feasible method for providing SuDS is to utilise a detention basin, rainwater gardens and filter drains.

5.7 ATTENUATION PROPOSALS

5.7.1 In accordance with current design guidelines the attenuation volume for a site should be calculated based on a 1 in 100 year + climate change allowance.

5.7.2 It is proposed that some roof areas are to be collected and drained through rain gardens and connected into the drainage system.

5.7.3 Filter drains to be located adjacent with the shared driveways, where possible and connected into the drainage system.

5.7.4 Hydraulic modelling of the drainage network to be undertaken using industry recognised software to confirm the drainage design suitability and calculations to be provided to LLFA.

5.8 MAINTENANCE

5.8.1 At this stage it has been assumed that the dwelling owners will maintain the drainage elements as outlined within this report. Future maintenance schedules for the SuDS features have been provided within Appendix L.

5.8.2 The drawings and schedules of the as built drainage are to be made available to the building owner to enable drainage maintenance and future works to be undertaken.

5.8.3 At this stage, the maintenance company has not yet been appointed and as such the applicant will be responsible until such time as they are appointed. Once appointed the contact details will be provided to the LLFA for records.

5.9 EXCEEDANCE FLOWS

5.9.1 Exceedance flows are to be contained within the site and directed away from buildings towards the areas of driveway and landscaping. The intention is to direct flows away from the building with the FFL being a minimum of 150mm above the external surrounding levels, with the exception of level threshold entrances.

5.9.2 Exceedance flow routes can be seen on the drainage strategy drawing within Appendix J.

5.10 WATER QUALITY

5.10.1 With reference to CIRIA 753 and the surface water treatment process, the provision of filter drains, rain gardens and attenuation basins will aid in the removal of sediment, hydrocarbons and heavy metals.

5.10.2 Rain gardens are small depressions that can act as infiltration points for clean water. These are attractive features, easy to retrofit, maintain which can reduce rate of run and some volume reduction. The rain gardens will be provided with a perforated pipe connected to the drainage system.

5.10.3 Filter drains will be located adjacent to the shared private drives (where possible). Filter drain stone will collect particles and helps to prevent pollutants from entering groundwater.

5.11 CONSTRUCTION SEQUENCING

5.11.1 The main drainage runs and attenuation tanks are to be constructed at the start of the programme to ensure that runoff is controlled from the site throughout the duration of the construction works. This will minimise the impact of the developed at the start of the project potentially lessening the effects of flooding downstream.

5.11.2 Protection is to be provided to the sewer through the lifetime of the works and the drainage outfalls are to have mesh grillage installed during the construction phase to prevent the entry of construction debris entering the sewer network.

5.12 DRAINAGE SUMMARY

5.12.1 The proposed surface water drainage system can be summarised as follows:

- Surface water runoff from the site will be conveyed by pipes, rain gardens and filter drains attenuated within detention basins, then discharged into the existing unnamed watercourse at a controlled rate.
- Use of rain gardens and filter drains in suitable locations.
- Detention ponds to be sized, to store runoff volumes in extreme storm events up to the 1 in 100 year +40% climate change storm event. The 10% urban creep should be considered.
- Use of Flow control to control discharge rate into the existing watercourse.
- The existing watercourse is culverted in several locations. We would recommend replacing the damaged culverts, where required.

6.0 FOUL WATER DRAINAGE STRATEGY

6.1 FOUL WATER DRAINAGE DESIGN

6.1.1 Due to the existing topography and existing STW sewerage, the foul from the development will be pumped into the existing STW network.

6.1.2 In the developer enquiry response received from STW dated December 2022 it states that the existing Ø450mm combined sewer doesn't have sufficient capacity to accommodate the additional foul flows from the new development.

6.1.3 An offline water storage tank has been installed to limit the existing network surcharge and flooding occurrence.

6.1.4 STW advised the preferred connection point into the existing sewer is Manhole 4701. To achieve this connection the proposed rising main will need to cross third party land.

6.1.5 The client to start discussions with the third-party landowner and formally agree the route of the proposed rising main. Subject to the ongoing discussions, a Section 98 application for a sewer requisition may be required to be submitted.

6.1.6 Additionally, an alternative foul discharge point is to be explored potentially discharging into S102 sewers to the east of the site within Flanders Close / Passchendaele Drive.

6.1.7 The pumping station and the sewer located in the public space to be offered for adoption to STW under a S104 agreement

7.0 FLOOD MITIGATION STRATEGY

7.1 PRINCIPLES FOR MITIGATION STRATEGY

7.1.1 In accordance with Table 3 of NPPG (2019), a building used for general industry has a flood vulnerability classification of 'more vulnerable'.

Flood Zones	Flood Risk Vulnerability Classification				
	Essential Infrastructure	Highly Vulnerable	More Vulnerable	Less Vulnerable	Water Compatible
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	Exception Test Required	✓	✓	✓
Zone 3a	Exception Test Required	×	Exception Test Required	✓	✓
Zone 3b	Exception Test Required	×	×	×	✓

Table 4 – Extract from NPPG2019 (Table 3)

✓ Denotes Development is appropriate

× Development should not be permitted

7.1.2 The findings of the FRA indicate that the site is located within FZ1 and thus deemed appropriate for development in accordance with NPPG.

7.1.3 The findings of the FRA indicate that the site may be susceptible to surface water flooding when considering the impacts of climate change. As such the plots have been located outside of the extents of the existing unnamed watercourse and flooding areas.

7.1.4 All the FFL's to be 150mm above the surrounding levels.

7.1.5 The drainage to be designed to accommodate a surcharged outfall such that in extreme storm events the drainage system can accommodate the runoff.

7.1.6 Flood plain compensation area to be designed, not less than the existing one.

7.1.7 The drainage design should account for any residual risk of flooding from surface water as a result of exceedance events.

7.2 SEQUENTIAL APPROACH

7.2.1 The site is located within Flood Zone 1, however surface water flooding is observed to the existing unnamed watercourse which runs through the site. Properties and the attenuation basins have been positioned outside of the existing surface water flood extents to ensure a sequential approach is taken by trying to position buildings as far away from the source of flooding as practical.

7.3 FINISHED FLOOR LEVELS

7.3.1 Floor levels should be set such that they are a minimum of 150mm above the final surrounding ground levels.

7.4 SAFE ACCESS

7.4.1 In accordance with current guidance and DEFRA FD2320 safe access is to be provided for users in the event of flooding. Where safe access cannot be provided measures are to be implemented to ensure the users' safety until the emergency services have been able to reach them.

7.4.2 The EA online mapping indicates that the site access lies within FZ1 have therefore has a low probability of flooding. The access points lie outside the mapped extents of flooding caused by rivers and seas.

7.4.3 The mapping indicates that the main site access will encounter a flood depth between 300 and 900mm with flows over than 0.25m/s. It should be noted that the proposed access road will be designed higher than the existing levels to accommodate for the existing watercourse to be culverted and as such the risk of main road flooding is minimal.

7.4.4 The south eastern parcel of the development access is through Flanders Close. The mapping indicates the flood depths are between 300 – 900mm with flows less than 0.2m/s.

7.4.5 While the emergency vehicles will have access to the residents in extreme events, an alternative route will be available to be used, the 3.0m wide track connecting this parcel with the rest of the development will grant safe egress should extreme events occur.

7.4.6 In accordance with DEFRA FD2320 Table 13.1 shown in Figure 3 a flood depth between 300 and 900mm and a velocity over 0.25m/s would represent a danger to most, meaning the majority of users would be required to maintain a stay put approach.

Table 13.1 Danger to people for different combinations of depth and velocity

Velocity (m/s)	Depth of flooding (m)											
	0.05	0.10	0.20	0.30	0.40	0.50	0.60	0.80	1.00	1.50	2.00	2.50
0.00												
0.10												
0.25												
0.50												
1.00												
1.50												
2.00												
2.50												
3.00												
3.50												
4.00												
4.50												
5.00												

Key:
- Danger for some
- Danger for most
- Danger for all

Figure 3 - Extract from DEFRA FD2320 showing Table 13.1

7.4.7 In extreme flood events above the 1 in 1000-year (0.1%) storm event the development would operate a 'stay put' approach in extreme flooding events for residents. They would be advised to stay within the development and await assistance from emergency services.

7.5 FLOOD WARNING & EVACUATION

7.5.1 Whilst the site is considered to have a low probability of flooding from all sources, and a stay put approach can be adopted, access and egress from the site in storm events above the 1 in 100 year probability will impact on the ability of some users to be able to access / egress the site. Therefore, it is important that all users of the development are made aware of the flood warning procedures

7.5.2 By utilising the flood warning systems available it is anticipated that the residents will be able to egress from the site in a safe manner in advance of an extreme (1.0 – 0.1 percent probability) storm event occurring.

7.5.3 Flood warnings are published by the Met Office can be found here:

https://flood-warning-information.service.gov.uk/warnings

7.5.4 The Met Office Flood Forecasting Centre in conjunction with the Environment Agency publishes Flood Guidance Statements containing:

- General overview of the flood risk
- Assessment of the flood risk
- Weather warnings and flood warnings
- Specific area of concern map

7.5.5 The Met Office uses a Flood Risk Matrix (see Figure 4) to assess the likelihood against the potential impact and assigns a risk colour and level.

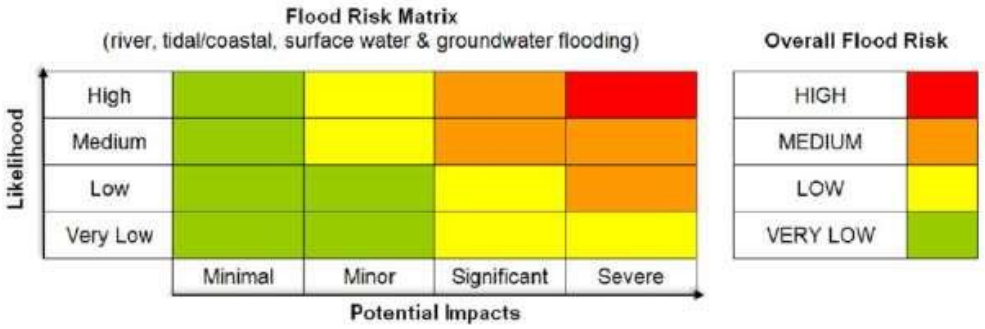


Figure 4 - Flood Risk Matrix

7.5.6 Typical examples of impacts from flooding aligned with the flood risk matrix are shown in Table 4.

Flood Impacts Table			
Minimal Impacts	Minor Impacts	Significant Impacts	Severe Impacts
Generally, no impact, however there may still be Isolated and minor flooding of low-lying land and roads Isolated instances of spray/wave overtopping on coastal promenades Little or no disruption to travel although wet road surfaces could lead to difficult driving conditions	Localised flooding of land and roads – risk of aquaplaning Localised flooding could affect individual properties Individual properties in coastal location affected by spray and/or wave overtopping Localised disruption to key sites identified in flood plans (e.g. Railways, utilities) Local disruption to travel – longer journey times	Flooding affecting properties and parts of communities Damage to buildings/structures is possible Possible danger to life due to fast flowing/deep water/wave overtopping/wave inundation Disruption to key sites identified in flood plains (e.g. railways, utilities, hospitals) Disruption to travel is expected. A number of roads are likely to be closed	Widespread flooding affecting significant numbers of properties and whole communities Collapse of buildings/structures is possible Danger to life due to fat flowing/deep water/wave overtopping/wave inundation Widespread disruption or loss of infrastructure identified in flood plans (e.g. railways, utilities, hospitals) Large scale evacuation of properties may be required Severe disruption to travel. Risk of motorists becoming stranded.

Table 5 - Flood Impact Table

7.5.7 The Environment Agency constantly monitors rainfall, river levels and sea conditions to forecast the possibility of flooding. If necessary, the Environment Agency can be contacted:

Incident hotline 0800 80 70 60 (24hrs)

Floodline 0345 988 1188

7.5.8 The Environment Agency Flood Warning Levels:

Warning type		Meaning	When it is used
	**Flood Alert**	Flooding is possible. Be prepared.	Two hours to two days in advance of flooding
	**Flood Warning**	Flooding is expected. Immediate action required	Half an hour to one day in advance of flooding
	**Severe Flood Warning**	Severe Flooding. Danger to life.	When flooding poses a significant threat to life.

Table 6 – Environment Agency Flood Warning Levels

8.0 SEQUENTIAL AND EXCEPTION TESTS

8.1 SEQUENTIAL TEST

8.1.1 For clarity the aim of the sequential test is to steer new development to areas with the lowest probability of flooding. Furthermore, approval of the Sequential Test lies with the Local Planning Authority.

8.1.2 The NPPF indicates that for a less vulnerable land use within Flood Zone 1, development is appropriate. Environment Agency mapping and the SFRA both indicate that the entirety of the site lies within Flood Zone 1.

8.1.3 The site is in an existing green land with 2 existing properties adjacent Coventry Road and an existing farm to the south western boundary.

8.1.4 In view of the facts as identified the applicant does not own other sites considered to be more suitable for use for residential development in the immediate vicinity.

8.1.5 The above clearly demonstrates that the sequential test would be satisfied provided it can be demonstrated that flood water will not pose excessive risk to the development, safe ingress and egress can be created and the development will not increase risk of flooding elsewhere.

8.1.6 The NPPF defines what type of development is appropriate in an individual location and seeks to guide development generally away from areas of flood risk. It nevertheless accepts implicitly that some development in areas of higher potential risk may be appropriate or indeed essential, and seeks to classify zones of risk, types of development and development suitability.

8.2 EXCEPTION TEST

8.2.1 Table 3 within the NPPF indicates that the site is appropriate for use as a more vulnerable land use due to the site being within Flood Zone 1.

8.2.2 Wider sustainable benefits to the community include:

- Potential for reduced risk of flooding elsewhere by increasing flood storage volume within the site
- Reduction in surface water runoff when compared to the existing situation delaying discharge into the watercourse and potentially providing a betterment downstream

8.2.3 The FRA demonstrates safety and flooding sustainability by:

- Maintaining floor level 150mm proud of surrounding ground level to reduce opportunity for surface water flows to run towards building.
- Controlling runoff on site to greenfield runoff rates to delay the discharge into the watercourse network.
- Safe and dry ingress and egress routes for pedestrians being available from the property to the surrounding highways.

8.2.4 There will be a significant reduction in the level of surface water runoff rate over the current land use.

8.2.5 In view of the above the exception test is deemed to have passed.

9.0 MITIGATION

9.1 FLOOD PLAIN COMPENSATION

9.1.1 The existing unnamed watercourse is flooding during extreme flood events.

9.1.2 In order to protect the proposed housing against the risks of flooding in the future climate change scenarios, the plots and associated structures have been located outside of the flooding zones associated with the existing unnamed watercourse.

9.1.3 As a future mitigation solution, it is being proposed to increase the existing flood compensation area adjacent to the outfall (culvert running beneath M69), at the source of the flooding.

9.1.4 The Developer instructed JBA Consulting to undertake a hydraulic modelling study of an unnamed watercourse, which can be found within Appendix K.

9.1.5 The report states that the maximum flood depth outside of the river channel during the 100 year with 50% climate change event is approximately 0.1m.

9.1.6 It is considered that the construction of the new development, regular maintenance of the existing ditch, increased flood compensation area to the south and controlled discharge rate into the unnamed watercourse will reduce the flooding depths in the future.

10.0 CONCLUSIONS

10.1 CONCLUSIONS

10.1.1 The site proposed for development is free of potential risk of flooding from tidal events.

10.1.2 The site is outside the extents of the mapped flood plain of main river systems while being classified as a very low risk area.

10.1.3 The site is at medium and high risk of flooding from overland flow routing from surface water.

10.1.4 The site is at a low susceptibility of flooding from groundwater sources.

10.1.5 The site is at no risk of flooding from manmade lakes.

10.1.6 The escape flow route from the strategic water mains has also been considered. In the unlikely event of failure of the mains the flows would not reach the properties.

10.1.7 The site is at no risk of flooding from existing sewerage systems for the same reason as the water mains issue.

10.1.8 The proposed surface water discharge rate matches the undeveloped greenfield runoff rates for the 1in100 year + 40% climate change combined with the use of above ground SUDS will treat and delay runoff entering the watercourse network. The hydraulic models of the proposed drainage systems have been checked using a surcharged outfall to confirm the performance of the system for extreme events.

10.1.9 The site is at a negligible risk of flooding from its own private drainage systems; however, this can be mitigated against by regular maintenance in accordance with the maintenance strategy provided within this report and channelling of flows within the development away from the properties.

10.1.10 We therefore conclude the application site lies within Flood Zone 1 as defined in the NPPF Table 1 and since the exception test for this has been passed more vulnerable development uses should be permitted.

APPENDICES

APPENDIX A – SITE LOCATION PLAN

SAFETY, HEALTH AND ENVIRONMENTAL HAZARD INFORMATION BOX

THE HAZARDS NOTED BELOW ARE IN ADDITION TO THE NORMAL HAZARDS AND RISKS FACED BY A COMPETENT CONTRACTOR WHEN DEALING WITH THE TYPES OF WORKS DETAILED ON THIS DRAWING.

CONSTRUCTION RISKS

NONE RELEVANT TO THIS DRAWING.

MAINTENANCE / CLEANING RISKS

NONE RELEVANT TO THIS DRAWING.

DEMOLITION RISKS

NONE RELEVANT TO THIS DRAWING.



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4. Until technical approval has been obtained from the relevant Authority, it should be understood that all drawings issued are Preliminary and NOT for construction. Should the Contractor commence site work prior to such approval being given it is entirely at their own risk.
5. Sketch proposals are for illustrative purposes only and as such are subject to detailed site investigation including ground conditions / contaminants, drainage, design and planning / density negotiations.
6. All dimensions are in millimetres unless otherwise stated.
7. The Farrow Walsh Consulting Designers Risk Assessments for this project must be reviewed PRIOR to the commencement of any works on site.

NOTES

1. This drawing to be read in conjunction with all other relevant Engineers and Architect's details.
2. All work is to be carried out in accordance with the current British Standards, codes of practice and building regulations.
3. The design of any temporary works required shall be the responsibility of the Contractor.
4. Do not scale this drawing. All dimensions are in millimetres unless noted otherwise. Any discrepancies are to be recorded and reported to the Engineers immediately.
5. All work is to be to the satisfaction of the Engineer.
6. The Contractor is responsible for and must take all necessary precautions to ensure the stability of the works at all times during construction.
7. All workmanship and materials are to be to current British A15s.
8. All services are to be located and protected as necessary by the Contractor prior to the commencement of the works.
9. Any existing details which are shown on this drawing are for guidance only and are to be checked on site by the Contractor. Any variations are to be recorded and reported to the Engineer immediately.

LEGEND

Development Area

Rev	Description of updates	Drawn	Check'd	App'd	Date
A2	Plan has been updated to suit the revised plans received from Redrow Homes on 08.11.2023.	JR	EC	JD	15.11.23
A1	Issued for Approval	JR	OP	JD	15.03.23

Revision Schedule

farrow walsh
62 Highcross Street, Leicester LE1 4NN
321 Bradford Street, Birmingham B5 6ET
☎ 0330 100 0363
www.farrowwalsh.com

FOR APPROVAL

Client:
Redrow Homes Limited

Project:
Burbage Field Farm,
Bullfurlong Lane, Hinckley

Title:
Site Location Plan

Drawn:	Checked:	Approved:	Date:	Scale:
JR	OP	JD	March 2023	1:5000 @ A1

Drawing No.: **FW2285-C-000**

Revision: **A2**

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CONSTRUCTION RISKS

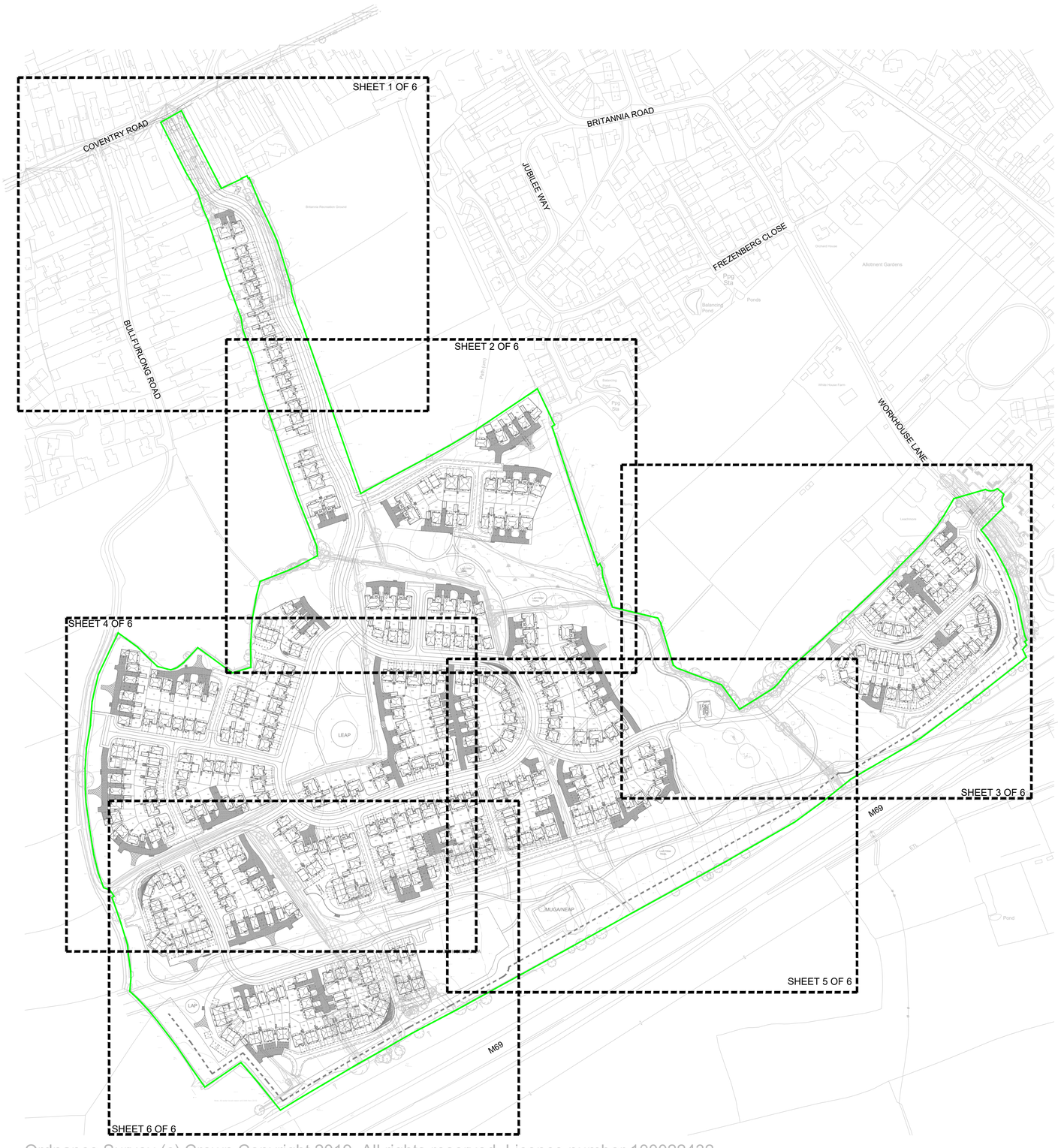
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MAINTENANCE / CLEANING RISKS

NONE RELEVANT TO THIS DRAWING.

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LEGEND

Development Area

Rev	Description of updates	Drawn	Check'd	App'd	Date
A2	Plan has been updated to suit the revised plans received from Redrow Homes on 08.11.2023.	JR	EC	JD	15.11.23
A1	Issued for Approval	JR	OP	JD	15.03.23

Revision Schedule

farrow walsh
62 Highcross Street, Leicester LE1 4NN
321 Bradford Street, Birmingham B5 6ET
☎ 0330 100 0363
www.farrowwalsh.com

FOR APPROVAL

Client: Redrow Homes Limited

Project: Burbage Field Farm, Bullfurlong Lane, Hinckley

Title: Sheet Location Plan

Drawn:	Checked:	Approved:	Date:	Scale:
JR	OP	JD	March 2023	1:5000 @ A1

Drawing No.: **FW2285-C-001**

Revision: **A2**

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APPENDIX B – DEVELOPMENT PROPOSALS

LAND SOUTH OF BURBAGE, BURBAGE - SITE LAYOUT

SELF BUILD HOUSE MIX (PHASE 3)					
HOUSE NAME	DESCRIPTION	ABBREVIATION	QUANTITY	FLOOR AREA (sqft)	TOTAL AREA (sqft)
AMERTON	3b / 2 storey	AMER	2	1144	2288
SHERBORNE	3b / 2 storey	SHER	1	1211	1211
BEMBRIDGE	3b / 2 storey	BEMB	2	1389	2778
SALISBURY	3b / 2 storey	SALI	1	1423	1423
HENLEY	4b / 2 storey	HENL	2	1768	3536
HAMPSTEAD	5b / 2 storey	HAMP	2	1850	3700
RICHMOND	4b / 2 storey	RICH	1	2030	2030
		TOTAL	11		16966
Net site area (acres)	1.15				
Coverage (ft²/net acre)	14,753				
Average unit size (ft²)	1,542				

KEY

- Indicates brindle block paviors
- Indicates green screeding
- Indicates sewer pipe easement
- Application boundary
- Public Right of Way
- Indicates affordable housing
- Additional window
- Plot handing
- Removable ballard
- Road central line
- Service margine
- Tree line verge
- 5m acoustic barrier
- Wall and Fence
- Closed Board Fence
- Metal Estate Railings
- Timber Knee Rail
- Post and Rail

PRIVATE HOUSE MIX (OVERALL EXC. SELFBUILD)							
HOUSE NAME	DESCRIPTION	INC. STUDY	M4(2)	ABBREVIATION	QUANTITY	FLOOR AREA (sqft)	TOTAL AREA (sqft)
BUXTON	2b / 2 storey			BUXT	18	716	12888
BASLOW	2b / 2 storey		X	BASL	42	716	30072
FAIRFORD	2b / 1 storey			FAIR	4	948	3792
BLACKWELL LS	2b / 2 storey	X		BLAQ	34	832	28288
WARWICK	3b / 2 storey			WARW	18	1075	19350
AMBERLEY	3b / 2 storey		X	AMBY	8	1144	9152
AMERTON	3b / 2 storey			AMER	5	1144	5720
SHERBORNE	3b / 2 storey	X		SHER	23	1211	27853
SOMERTON	3b / 2 storey	X		SOME	12	1159	13908
OXHILL	3b / 2 storey	X	X	OXHL	33	1316	43428
CALVERTON	3b / 2 storey	X	X	CALV	10	1482	14820
BEMBRIDGE	3b / 2 storey	X	X	BEMB	36	1389	50004
OAKLEY	3b / 2 storey	X	X	OAKL	13	1392	18096
SALISBURY	3b / 2 storey	X		SALI	13	1423	18499
HENLEY	4b / 2 storey		X	HENL	18	1768	31824
HAMPSTEAD	5b / 2 storey		X	HAMP	31	1850	57350
RICHMOND	4b / 2 storey		X	RICH	20	2030	40600
				TOTAL	338		425644
AFFORDABLE HOUSE MIX (20%)							
SPEY	1b / 2 storey			**MAIS G**	14	546	7644
	1b / 2 storey			**MAIS F**	14	592	8288
BUNG	2b / 1 storey			BUNG	3	665	1995
TAVY	2b / 2 storey			TAVY	28	823	23044
DART	3b / 2 storey			DART	17	896	15232
TWEED	4b / 2 storey		X	TWEE	8	1024	8192
				TOTAL	84		64395
				GRAND TOTAL	422		490039

Gross site area (acres)	65.48						
Net site area (acres)	32.45						
POS area (acres)	0.00						
Coverage (ft²/net acre)	15,101						
Average unit size (ft²)	1,161						

Revision	Date	Amendment	Initials

Drawing Status: PRELIMINARY / PLANNING / CONSTRUCTION ✓

Development	LAND SOUTH OF BURBAGE
Location	BURBAGE
Marketing Name	
Drawing Title	SITE LAYOUT
Drawing Number	1693-08-02-100
Revision	
Scale @A0	1:1000
Drawn By	DL
Date Started	OCT 23
Checked by	
Date	

Redrow Homes Midlands
Redrow House, Kinsall Green, Wilnecote, Tamworth
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Legal Disclaimer TBC

This layout has been designed after due consideration of our Context & Constraints Plan

APPENDIX C – TOPOGRAPHICAL SURVEY

A0 SHEET SIZE 1189 x 841 mm



STANDARD ABBREVIATIONS

AV	AIR VALVE	PGM	PERMANENT GROUND MARKER
BOL	BOLLARD	PRF	POST & RAIL FENCE
BS	BUS STOP	PS	PAVING SLABS
BT	BRITISH TELECOM IC	PWF	POST & WIRE FENCE
BW	BRICK WALL	RE	RODDING EYE
BWF	BARBED WIRE FENCE	RL	RIDGE LEVEL
CATV	CABLE TV IC	RP	REFLECTOR POST
CBF	CLOSE BOARDED FENCE	RS	ROAD SIGN
CL	COVER LEVEL	RSJ	ROLLED STEEL JOIST
CLF	CHAIN LINK FENCE	RW	RETAINING WALL
CM	CABLE MARKER	RWP	RAIN WATER PIPE
CONC.	CONCRETE	SAP.	SAPLING
CP	CATCH PIT	SFL	SOFFIT LEVEL
CPF	CONCRETE PANEL FENCE	SL	SILT LEVEL
CSL	COVER SLAB LEVEL	SMH	SURFACE MANHOLE
(dilap)	DILAPIDATED	SNP	STREET NAME PLATE
(dis)	DISUSED	SP	SIGN POST
DK	DROP KERB	ST	STAY(S)
DPC	DAMP PROOF COURSE	STCH.	STANCHION
DSW	DWARF STONE WALL	SV	STOP VALVE
EL	EAVES LEVEL	SVP	SOIL & VENT PIPE
ELEC.	ELECTRICITY	SW	STONE WALL
EP	ELECTRICITY POLE	TCB	TELEPHONE CALL BOX
FB	FLOWER BED	TEL	TELEPHONE
FFL	FINISHED FLOOR LEVEL	TL	TRAFFIC LIGHTS
FH	FIRE HYDRANT	TM	TARMAC
FL	FLOOR LEVEL	TP	TELEGRAPH POLE
FMH	FOUL MAN HOLE	TR	TRANSFORMER
FP	FLAG POLE	U/S	UNDERSIDE
GY	GULLY	UTL	UNABLE TO LIFT
GAS	GAS VALVE	VP	VENT PIPE
HW	HEAD WALL	WM	WATER METER
IC	INSPECTION COVER	WO	WASH OUT
IL	INVERT LEVEL	WT	WATER TAP
IRF	IRON RAIL FENCE	WV	WATER VALVE
KO	KERB OUTLET	F/Cr	FLOOR TO CROWN HEIGHT
LB	LETTER BOX	F/H	FLOOR TO HEAD HEIGHT
LP	LAMP POST	F/S	FLOOR TO SILL HEIGHT
MH	MAN HOLE	F/Sp	FLOOR TO SPRINGING
OH	OVERHEAD	S/Cr	SILL TO CROWN HEIGHT
PO	POST/POLE	S/H	SILL TO HEAD HEIGHT
PF	PANEL FENCE	S/Sp	SILL TO SPRINGING
CB	CONTROL BOX	Tac	TACTILE PAVING
FRL	FLAT ROOF LEVEL		
	PEG/MARKER	STN 2	SURVEY STATION
+12.34	SPOT LEVEL	—11.50—	CONTOUR VALUE

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Redrow Homes Ltd

Project:
Coventry Road
Burbage

Title:
Site Survey
Sheet 1 of 4

Date: Nov 2019 **Scale:** 1:500 @ A0
Drawn by: ICP **Checked by:** XXX

Job No.	Drg No.	Rev.
S 219	1067	A

Scale Check:
1:1250 - 0 10m 20m 30m 40m 50m 60m 70m 80m
1:100 - 0 1m 2m 3m 4m 5m 6m 7m
1:50 - 0 1m 2m 3m
1:500 - 0 10m 20m 30m

A0 SHEET SIZE
1189 x 841 mm

291750 N
447200 E
291700 N
447200 E
291650 N
447200 E
291600 N
447200 E
291550 N
447200 E
291500 N
447200 E
291450 N
447200 E
291400 N
447200 E

Note: All water levels taken w/b 04th Nov 2019

STANDARD ABBREVIATIONS

AV	AIR VALVE
BO	BOLLARD
BR	BRICK WALL
BRT	BRICK TELEGRAPH 'C'
BW	BARBED WIRE FENCE
CBF	CHAIN LINK FENCE
CBW	CHAIN BOARDED FENCE
CH	CHIMNEY
CLF	CLOSE LINK FENCE
CW	CHAIN WIRE
CP	CONCRETE POST
CPF	CLOSE POST & PANEL FENCE
CT	CENTRE TUBE LEVEL
D	DRAIN
DF	DRAIN FLOOR
DP	DRAIN INSPECT COVER
DW	DRAIN WATER PIPE
EB	ELECTRIC BOX
EP	ELECTRIC POLE
FB	FLOWER BED
FC	FLOOR CLOSING
FL	FLOOR LEVEL
FP	FLOOR PANEL
GP	GUARDPOST WINDOLE
GT	GUARDPOST WOOD SUPP.
HH	HOSE HYDRANT
HT	HYDRANT
IC	INSPECTION CHAMBER
IL	INVERT LEVEL
LP	LAMP POST
MH	MANHOLE
NF	NEW FENCE
OF	OPEN FENCE
OH	OVERHEAD WIRES
PC	PEDESTRIAN CALL BOX
PH	PUBLIC PHONE
PO	POST
RB	RAILING
RP	REMOVABLE POLE
RW	RAINWATER
SP	SIGN POST
TB	TRIANGLE TO LEFT
TC	TRIANGLE
TP	WATER TAP
WC	WATER COCK
WT	WATER TANK
FCOV	FLOOR TO CROWN HEIGHT
FCR	FLOOR TO HEAD HEIGHT
FSC	FLOOR TO SOFFIT
FTC	FLOOR TO STRINGER
ECH	EAVES TO HEAD HEIGHT
ECV	EAVES TO CROWN HEIGHT
OP	OUTLET PIPING

STN 2 SURVEY STATION
11.50 CONTOUR VALUE
108.45 SPOT LEVEL

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Project:
Coventry Road
Burbage

Title:
Site Survey
Sheet 2 of 4

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Job No.	Drg No.	Rev.
S 219	1067	A

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1:1250 0 10m 20m 30m 40m 50m 60m 70m 80m
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1:50 0 1m 2m 3m
1:500 0 10m 20m 30m

A0 SHEET SIZE
1189 x 841 mm

Note: All water levels taken w/b 04th Nov 2019

STANDARD ABBREVIATIONS

AV	AIR VALVE	PFM	PERMANENT GROUND MARKER
BH	BOX HEDGE	PF	POST & RAIL FENCE
BT	BRITISH TELECOM 'A'	PWF	POST & WIRE FENCE
BW	BRICK WALL	RE	RAILWAY LINE
CBW	BRICK/ BLOCK WALL	RB	RODDING EYE
CPW	CABLE BOUNDRY FENCE	RS	REFLECTOR POST
CP	CABLE POLE	RW	RETAINING WALL
CTW	CABLE LINK TOWER	RWF	RETAINING WALL JOINT
CW	CABLE MARKER	SWI	SAN WATER PIPE
CL	CABLE TV	SL	SIGN
CH	CATCH PIT	SP	SPOT LEVEL
CWF	CHAIN LINK FENCE	SW	STORM WATER
CBL	CENTRE SUB LEVEL	SMH	SURFACE MANHOLE
CF	CHAIN FENCE	SVP	SURFACE WATER PIPE
DW	DRAINS	TP	TEE POST
DMH	DRAIN MANHOLE	TEL	TELEPHONE
DP	DRAIN POINT SOURCE	TC	TOP OF CHIMNEY
EW	ELECTRICITY WALL	TK	TOP OF KERB
EBL	ELECTRICITY	TM	TOP OF MANHOLE
EP	ELECTRICITY POLE	TSB	TOP OF SMALL BOX
FL	FLORENCE FLOOR LEVEL	TT	TELEPHONE
FH	FIRE HYDRANT	TW	TELEPHONE CANTI
GP	GAS PIPE	TB	TIMBER
GV	GAS VALVE	TP	TRANSFORMER POLE
GW	GATE WAY	TRANS	TRANSFORMER
GT	GULLY	UP	UNDERGROUND
HV	HIGH VOLT	VL	VARIABLE 'L' LEFT
HOL	HOUSE LEVEL	VR	VARIABLE 'R'
HW	HOUSE NUMBER	WV	WATER VALVE
IC	INSPECTION COVER	WT	WATER TANK
IL	INVERT LEVEL	WT	WATER TROUGH
LP	LAMP POST	FCW	FLOOR TO CEILING HEIGHT
LB	LETTER BOX	FCW	FLOOR TO HEAD HEIGHT
LV	LOW VOLT	FCW	FLOOR TO SILL HEIGHT
MH	MAN HOLE	CW	CILL TO CEILING
PO	POST/POLE	SCW	SILL TO HEAD HEIGHT
PB	POST BOX	HW	HEAD TO HEAD
CB	CONTROL BOX	TW	OUTLE PIPING
FRL	FLAT ROOF LEVEL		
	RELNUMBER	⚓STN 2	SURVEY STATION
12.34	SPOT LEVEL	11.50	CONTOUR VALUE

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Client: Redrow Homes Ltd

Project: Coventry Road Burbage

Title: Site Survey Sheet 3 of 4

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APPENDIX D – PHASE 1 GEO-ENVIRONMENTAL DESK STUDY

RLRE Consulting Engineers

Burbage Fields, Burbage

Phase 1

Geo-environmental

Desk Study

BURBAGE FIELDS, BURBAGE

PHASE 1 GEO-ENVIRONMENTAL DESK STUDY

For

REDROW HOMES LTD.

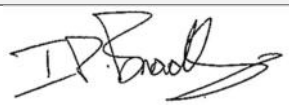
DATE: 30th September 2020

REV: P01

P20-291

Document Reference & Control

Project Name:	**Burbage Fields, Burbage**
Project Reference:	**P20-291**
Report Title:	**Phase 1 Geo-environmental Desk Study**
Client:	**Redrow Homes Ltd.**
Document Reference:	**20291-RLE-20-XX-RP-O-0002**
Report Status:	**Final**

Approval Status	Name & Position	Signature
Prepared by:	Ian Bradley IEng MICE	
Reviewed by:	James Bee MSci PDip FGS Principal Engineer	
Approved by:	James Bee MSci PDip FGS Principal Engineer	

Revision Status	Date	Summary of Revision
P01	30/09/20	First issue to client

Executive Summary

This summary presents the salient points of the report and should not be referred to in isolation.

Instruction	In September 2020 Redrow Homes Ltd commissioned Rodgers Leask Environmental (RLE) Ltd to compile a Phase One Desk Study for a site at Burbage Fields, Burbage, Leicestershire.
Site Location and Description	The site is located between the M69 Motorway (to the south) and the village of Burbage (to the north) in Leicestershire. The site comprises 7 No. grass pasture fields which are generally separated by hedgerow, trees and post and rail fencing. A farm and associated barns are present in the south and 2 No. residential properties are in the far northern extemes. A high voltage electricity line crosses the southern extents and a stream/unnamed river crosses the site.
History	The site has generally remained greenfield for much of its history. Burbage Fields Farm has existed in the southern site area from before 1886. Fieldgate Pit existed in the far northern site area, from before 1886 to about the 1920s. Residential properties were constructed by 1938 and remain on this area. Allotment gardens occupied the northern site area from about 1920s to the 1990s. An overhead electricity line was constructed across the southern site extents in the 1930s with additional lines added and subsequently rerouted and or removed in subsequent years. The original line remains to date.
Geology	Superficial deposits – Oadby Member (Glacial Till) beneath majority of the site. Alluvium along the far eastern boundary. Wolston Sand & Gravel Member mapped beneath the northern area. Dunsmore Gravel - Sand & Gravel mapped in the far northern extents. Bedrock comprises the Mercia Mudstone Group.
Hydrogeology	Alluvium and Sand & Gravel Members – Secondary A Aquifers. Oadby Member – Secondary Undifferentiated. Mercia Mudstone Group – Secondary B Aquifer.
Mining	Negligible risk.
Hydrology	Unnamed Inland River recorded crosses the northern half of the site then following the eastern/south eastern boundary.
Ecology and Wildlife	The site is within a SSSI impact assessment zone but is not itself within a SSSI.
Archaeology	Heritage Gateway website indicates that there are medieval records on the site itself with medieval and roman activity in the locality. Early consultation with the Local Authority is recommended to confirm the requirements for surveys.

UXB Risk	Regional Unexploded Bomb Risk maps obtained from Zetica indicates that the site is in a low risk area for Unexploded Bombs (UXB).
Flood Risk	Available information would suggest that there is a low risk of flooding. However, this preliminary risk assessment should be confirmed by carrying out a Flood Risk Assessment (FRA) for the site.
Public Register Information	No records on site and limited records within surrounding area. Site is not classed as contaminated land under the Environmental Protection Act 1990.
Potential Contamination Issues	Moderate/ Low risk to human health receptors. Moderate/ Low risk to controlled waters. Moderate gassing risk associated with Alluvium, Fieldgate Pit and M69 motorway embankment. Ground investigation required to confirm the contamination/gas risk.
Foundations and Geotechnical issues	Intrusive works shall be required in order to identify ground conditions and provide foundation recommendations for the site. The geology suggests that traditional strip/trenchfill foundations are likely to be appropriate across the majority of the site, subject to verification by intrusive investigation. Deepened strip/trenchfill foundations or piled foundations may be required where Alluvium is mapped in the east, and where foundations are within the influence of trees (adjacent trees and hedgerows); a tree survey is recommended. A medium VCP is anticipated for cohesive strata. Instability and groundwater may be encountered within the Alluvium and Sand and Gravel deposits; allowance for shoring and localised dewatering should be made.
Drainage	The geology suggests use of soakaways for surface water drainage may be locally feasible where sand and gravel deposits lie (northern site extents). Generally however, impermeable cohesive soils are anticipated which is likely to make soakaway drainage ineffective and unfeasible. Alternative solutions should be considered, such as on site attenuation and positive discharge to an appropriate outfall (the on site unnamed river may be an option).

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Appendix F: CLR 11 Terminology

1.0 Introduction

1.1. Terms of Reference

In September 2020, Redrow Homes Ltd commissioned Rodgers Leask Environmental (RLE) Ltd to compile a Phase One Desk Study (DTS) for a site at Burbage Fields, Burbage, Leicestershire LE10 3AS.

1.2. Proposed Development

No specific development plans were available at the time of writing however, It is understood that the site will be redeveloped into a new residential development with associated infrastructure.

1.3. Objectives

The objectives of the investigation were to:

- Obtain desktop study information to assist in the assessment of potential environmental and ground related issues that may have implications for proposed development.
- Produce a conceptual model for the site using the findings of the desktop study.

1.4. Scope

In order to achieve the outlined objectives, the scope of the study encompassed:

- A site walkover survey.
- A study of historical maps.
- Review of geological and mining information.
- An examination of regulatory authority information.
- A screen for unexploded bombs (UXB).
- Production of a conceptual model.

Mineral rights assessment is outside the scope of this study.

1.5. Pernicious Plants

No assessment has been made for the presence of pernicious plant species e.g. Japanese Knotweed, Giant Hogweed, within the remit of this investigation.

1.6. Limitations and Confidentiality

All conclusions and recommendations made within this report are based upon and limited to the factual information obtained as part of this investigation. No responsibility can be taken by RLE Ltd for information obtained by third parties and it has been assumed that all third-party information provided is true and correct.

RLE Ltd has undertaken the work in accordance with our understanding of current best practice at the time of undertaking the report. Further assessment and revision of the report may be required should new information come to light or legislation/changes to best practice be introduced after the date of issue of the report.

RLE Ltd has prepared the report for the sole use and reliance of the Client. The report may not be used or relied upon by any unauthorised third party without the explicit written agreement of RLE Ltd.

The interpretive work undertaken within this report remains the intellectual property of RLE Ltd and must not be divulged to any commercial third-party without prior written agreement of RLE Ltd.

2.0 Site Location and Description

2.1. Site Location

The site is located between the M69 Motorway (to the south) and the village of Burbage (to the north) in Leicestershire, and is approximately centred on National Grid Reference 444031E, 291670N.

The site location and extents plan is given in Appendix A.

The land within the red line boundary will henceforth be referred to as the "site".

2.2. Site Description

A site walkover was undertaken by RLE on 24th September 2020. The purpose of the site walkover was to provide a general description of the site. Detailed surveys such as wildlife or tree surveys were outside the scope of this report.

The site has an irregular outline and covers an area of approximately 21.8 hectares (ha). The site was accessed from Workhouse Lane to the east and Bullfurlong Lane to the west. Vehicular access is feasible from Bullfurlong Lane but not Workhouse Lane. Site levels generally fall towards the centre, where a ditch and small stream flows approximately northwest to southeast.

The site comprises 7 No. grass pasture fields which are generally separated by hedgerows, trees and post and rail fencing. A farm and associated barns and outbuildings are present in the south of the site at the southern end of Bullfurlong Lane. At the time of the walkover the fields were grazed by a small herd of cattle. 2 No. houses and gardens are also located in the far northern site extents, off Coventry Road.

Pertinent features of the site comprise:

- Overhead electric power cables (assumed 132kV) pass over the site at approximately 20-30m height, trending east to west through the southern site extents.
- Overhead electric power cables (assumed 11kV) pass over the site at approximately 6-10m height, trending east to west through the centre of the site. This cable terminates with a transformer at a wooden pole close to the farm in the south-centre of the site and is assumed to continue underground.
- Several soil and rubble mounds are present in the south of the site, to the east of the farm. Several stockpiles appear recent whilst others are grassed over.

- Farm machinery including trailers, spreaders and cultivators was noted in the southwest of the site adjacent to the farm.
- A public footpath crosses the west of the site from north to south, from Bullfurlong Lane (near to the farm) towards Burbage in the north. Several users of this right of way were noted during the walkover.
- A ditch with a small stream runs from northwest to southeast through the centre of the site. An area of waterlogged ground with reeds was noted in the north of the site close to this stream, possibly indicating a spring.
- A possible animal burrow (likely fox or rabbit) was noted in a hedgerow along the western boundary with Bullfurlong Lane.

Photographs and a site features plan are located in Appendix B.

2.3. Site Boundaries

The site boundaries generally comprise the following:

- Hedgerows to the west (with Bull Furlong Lane beyond) and eastern perimeter.
- Residential fencing/properties to the north leading to Coventry Road.
- Timber post and rail fencing along the southern boundary with the M69 motorway beyond.

2.4. Site Access

Vehicular access to the site is gained from Bullfurlong Lane situated adjacent to the western site boundary. There are however numerous field boundaries across the site, predominantly comprising hedgerows.

2.5. Surrounding Area

The land use beyond the site boundaries consists of:

- M69 motorway to the south with fields/agricultural land beyond.
- Agricultural land to the west, northwest and northeast.
- Residential land to the north and northwest.

3.0 Historical Review

3.1. Ordnance Survey Maps

Historical Ordnance Survey Maps at various scales have been obtained via an Emapsite MapInsight Report in order to review the historical land use on the site. These maps are presented within Appendix C.

A summary of the historical features is as follows:

Map Date	Site Feature	Adjacent Features
1886 1:10,000	Site comprises greenfield land devided by numerous fields. A stream flows ~west to east across the northern extents. Burbage Fields Farm lies to the south. Fieldgate Pit (possibly shown as a pond) in the far northern extents on/adjacent Three Pots Lane. Two footpaths are shown. One runs ~north to south the other ~northwest to south east.	Burbage village is located to the northeast. Surrounding land is predominantly agricultural.
1888 1:2,500	Three small ponds in the western extents.	No significant change.
1901 1:10,00	No significant change.	A hosiery manufactury is located at about 250m to the northeast.
1923 1:10,000	Fieldgate Pit is no longer shown. Allotment gardens occupy the far northern extents.	Allotment gardens to the west of the northern site extents. Three Posts Road has been renamed Coventry Road.
1938 1:10,00 1:2,500	An electricity line (with three pylons) crossing ~west to east. A small building (likely house) is located in the far northern extents (off Coventry road).	An additional hosiery factory is located at about 200m to the west.
1950-55 1:10,000	No significant change.	No significant change.
1959-60 1:1,250	Some small rectangular buildings are shown within the northern area of the site associated with the allotment gardens.	

Map Date	Site Feature	Adjacent Features
1963-68 1:10,000	An additional overhead electricity line is shown in the far southwest extents heading south and connected tangentally to the existing line.	A spring is shown adjacent the site to the east.
1977-79 1:10,000	An additional building (probable house) is shown in the far northern extents. Alterations to the overhead electricity line evident. The electricity pylons appear to have been replaced and now comprise two pylons. The additional electricity line (shown in 1968) is no longer shown. Three additional lines fan out (off site) from the southwest marginally encroaching the far southwest extents.	A cutting associated with the construction of the M69 motorway is shown adjacent the site to the south.
1986 1:2,500	A pond has been constructed within the south eastern site area. Further alterations to the overhead electricity line are evident with the three additional lines (shown in 1977) relocated ~40m south off site.	No significant change.
1993	A pond is shown in the western site area. The allotments are no longer shown and the associated buildings/sheds removed.	No significant change.
2010 1:10,000	No significant change.	No significant change.
2020 1:10,000	The ponds are no longer indicated.	No significant change.

3.2. Summary

The site has generally remained greenfield for much of its history. Burbage Fields Farm has existed in the southern site area from before 1886. Fieldgate Pit existed, in the far northern site area, from before 1886 to about the 1920s. Residential properties were constructed by 1938 and remain on this area. Allotment gardens occupied the northern site area from about 1920s to the 1990s.

An overhead electricity line was constructed across the southern site extents in the 1930s with additional lines added and subsequently rerouted and or removed in subsequent years. The original line remains to date.

The surrounding area has predominantly comprised agricultural land with residential properties to the north. The M69 Motorway was constructed adjacent to the south of the site by about 1980 and included an embankment close to the site boundary. Several off site hosiery works were located within the vicinity of the northern site area from the 1900s.

4.0 Geology, Hydrology, Hydrogeology and Mining

Information regarding the geological and associated conditions at the site has been obtained via a GroundSure Enviro + Geo Insight report, a copy of which has been included within Appendix D.

4.1. Geology and Hydrogeology

Information considered pertinent to the site is presented below.

	Geological Unit	Permeability	Aquifer status
Made Ground	None recorded.	N/A	N/A
Superficial Deposits	Oadby Member - Diamicton – covers majority of the site.	Mixed flow– low to moderate	Secondary Undifferentiated: Assigned where it is not possible to attribute either category A or B to a rock type. In general, these layers have previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type
	Wolston Sand & Gravel Member – mapped beneath northern corner of site only.	Intergranular – high to very high	Secondary A: 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
	Alluvium – Sand with Clay and Gravel – mapped along far eastern boundary only.	Intergranular – high to very high	Secondary A
	Dunsmore Gravel - Sand & Gravel – mapped in the far northern extents.	Intergranular – very low to high	Secondary A
Bedrock Geology	Mercia Mudstone Group	Fracture flow type- low.	Secondary B: Predominantly lower permeability layers which may store/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.

4.1.1. Structure

No linear bedrock features are mapped on site or within the site vicinity.

4.1.2. BGS Borehole Records

There is 1 No. BGS borehole recorded on site and 4No. within close proximity of the site. All boreholes run on or adjacent to the southern site boundary and are likely associated with the construction of the M69 motorway. These are summarised below and presented in Appendix E:

BGS Borehole Reference	Depth	Strata Encountered	Comments
On site SP49SW32	9.0m	GL-0.3m: Topsoil 0.3-2.4m: Brown silty clayey sand and sandy clay with stones 2.4-4.60m: Gravel and brown silty clayey sand. 4.6-6.0m: Soft grey sandy boulder clay with traces of marl and chalk 6.0-9.0m: Firm grey sandy very silty clay with bands of silty calcareous sand, small stones and traces of chalk.	
Off site SP49SW30 SP49SW31 SP49SW33 SP49SW34	1.0m – 8.5m	Generally initial topsoil 0.2m to 0.45m thick, underlain by Stiff (soft in places) boulder clay with occasional silty/sandy bands.	Generally dry with seepages 2-4m depth.

4.1.3. Groundwater Body

The site lies within the Soar and Tame Anker Mease - Secondary Combined water bodies (GB40402G990600 and GB40402G990800 respectively). These are indicated to have a good chemical rating in 2015.

4.1.4. Groundwater Abstractions

There are 7 No. historical groundwater abstraction licenses between 201m-640m from the site related to general farming and domestic use.

There are 4 No. active licenses between 556m and 661m from the site for spray irrigation storage.

4.1.5. Source Protection Zone

There are no Source Protection Zones within 500m of the site boundary.

4.1.6. Groundwater Vulnerability and Soil Leaching Potential

The underlying superficial Secondary Aquifer is classified as Medium Vulnerability (intermediate between high and low vulnerability).

The underlying bedrock Secondary Aquifer is classified as Low Vulnerability; areas that provide the greatest protection from pollution. They are likely to be characterised by low leaching soils.

4.1.7. Soluble rock risk

Significant soluble rocks are not recorded on site.

4.2. Hydrology and Flooding

	Summary	
Surface Water Features	On-Site: Unnamed Inland River recorded crossing the northern half of the site then following the eastern/south eastern boundary flowing approximately east across the site and then south along the site boundary. 10No. water features listed as inland river, lake, loch or reservoir are recorded, one of which is recorded as underground. Off-Site: The Unnamed Inland River heads north and south respectively as it leaves the site. 3No. off-site records for water features within 250m of the site boundary are associated with the river.	
Surface Water Body catchment	Soar Brook from Source to Soar water body ID GB104028042590.	
Biological & Chemical Data	No biological or chemical data is available on site. The Soar Brook from Source to Source water body had a good chemical and poor ecological rating in 2016 at 1448m northeast of the site (upstream).	
Surface Water Abstractions	1 No. active record at 983m south east from the site related to spray irrigation storage.	
Flood Risk	*Risk of Flooding from Rivers and Seas (RoFRaS)*	On-site: No records 0-50m: No records
	Historical Flood Events	No records
	Flood Zones	On-site: No records
	Surface Water Flooding	Highest risk on site: 1 in 30 year, 0.3- 1.0m depth in the northern site extents and along the eastern boundary (associated with the inland river). Highest risk within 50m: 1 in 30 year, 0.3- 1.0m depth

	Summary	
	Groundwater Flooding	Highest risk on site: Moderate associated with Wolston Sand and Gravel in northern extents. Low risk elsewhere. Highest risk within 50m: Moderate

4.3. Radon

The site is not in a radon affected area, as less than 1% of properties are above the action level. Therefore, radon protective measures are not required for new developments.

4.4. Mining and Ground Workings

	Summary
Ground Workings Map	*Historical:* *On-site* 8No. records including 4No. ponds (mapped 1938), 2 No. unspecified pits (mapped 1886 and 1901 and likely associated with the Fieldgate Pit) and 2 No. cuttings (mapped 1977 and 1983 associated with the M69 motorway, which are not actually on the site but abut the southern site boundary). *Off-site* 16No. records within 250m of the site. These include 2 No. cuttings (associated with the M69) and 14 No. ponds.
Underground Workings	No records on site.
Mining and Extraction	No records on site.
Coal Mining	The site is not located within a Coal Mining Area.
Non-Coal Mining / Mineral Extraction	No records on site.
Non-Coal Mining Cavities / Natural Cavities	No records on or within 500m of the site boundary.
Brine / Gypsum Extraction	No records on or within close proximity to the site.
Clay Mining	No records on or within close proximity to the site.

4.5. Potential for Natural Ground Subsidence

Hazard	Hazard Rating	Comments
Shrink -Swell Clays	Low across majority of site. Negligible in the northern extents associated with recorded sand and gravel deposits and very low along the eastern boundary associated with alluvium deposits.	Ground conditions predominantly medium plasticity. Non-plastic where sand and gravel is present. Low plasticity where alluvium is present.
Running Sands	Very low across the vast majority of the site. Low associated with Alluvium along the eastern boundary.	Running sand conditions may be present along the eastern boundary and unlikely elsewhere.
Compressible deposits	Moderate associated with Alluvium along the eastern boundary. Negligible elsewhere.	Compressibility and uneven settlement hazards are probably present associated with the alluvium. Land use should consider specifically the compressibility and variability. Elsewhere, accorss the majority of the site, compressible strata are not thought to occur.
Collapsible deposits	Negligible across the vast majority of the site. Very low associated with Alluvium along the eastern boundary.	Deposits with potential to collapse when loaded and saturated are believed not to be present over the vast majority of the site and unlikely to be present associated with alluvim deposits along the eastern site boundary.
Landslides	Very low	Slope instability problems are not likely to occur
Ground dissolution of soluble rocks	Negligible	Soluble rocks are either not thought to be present within the ground, or not prone to dissolution. Dissolution features are unlikely to be present.

4.6. Estimated background soil chemistry

The following estimates are provided for the site based upon Rural soil:

Arsenic mg/kg	Cadmium mg/kg	Chromium mg/kg	Nickel mg/kg	Lead mg/kg
15	1.8	60-90	15-30	100

4.7. Railways and Tunnels

4.7.1. Tunnels

No records of tunnels are identified within or within 250m of, the site boundary.

4.7.2. Historical Railways

3 No. records of tunnels are identified 92m northeast of the site.

4.7.3. Active Railways

No records of active railways are identified within the site boundary, or within 250m of the site.

4.7.4. HS2

The site does not lie within 500m of HS2.

4.8. Coal Authority records

The site does not lie within a Coal Authority Reporting area and hence there are no records of coal mining activities for the site.

5.0 Environmental Database records and UXO

5.1. Regulatory data

Data regarding Environment Agency and Local Authority regulatory information has been obtained via an Emapsite Enviro + Geo Insight report, a copy of this is contained within Appendix D.

The EnviroInsight report contains factual information which is produced from a database of records which have been obtained from various sources including; Local Authorities, Environment Agency, National Radiological Protection Board and English Nature. Only the information considered pertinent to the site has been included below.

Category		Summary
Historical Industrial Sites From 1:10,000 Mapping	*Potentially contaminative land use within 250m*	*On-site* 4 No. records; 2No. of Unspecified Pits (in the far northern extents) likely associated with the Fieldgate Pit and 2 No. of Cuttings adjacent the southern boundary associated with the M69 motorway. *Off-site* 20 No. between 67m to 250m of the site. Including, Unspecified Works (closest 67m west) and Factory (closest 113m west), Nursery (closest 90m west), Hosiery Manufactory (closest 106m southwest), Cuttings (closest 126m northeast) and Unspecified Tanks (183m northeast).
	Historical Tank Database	*On-site* No records. *Off-site* 7 No. records between 12m to 250m. 6 No. Unspecified Tanks and 1 No. Tank.
	Historical Energy Features	None on or within 250m of the site.
	Potentially infilled Land within 250m	*On-site* No records. *Off-site* No records.
Environmental Permits,	*Part IIA EPA 1990*	The site is not determined as Contaminated Land.

Category		Summary
Incidents and Authorisations	*Records of List 1 and 2 Dangerous Substance Inventory Sites*	No records within 500m of the site.
	Licensed Discharge Consents	3No. off-site records within 500m of the site; all between 86m and 97m west of the site for Sewage Discharges.
	Pollution Incidents	No records within 500m of the site.
Landfills and other Waste Disposal Sites	*EA registered, BGS survey, Local Authority and Historical Mapping*	No on-site records. 24 No. waste exemptions within 500m generally related to agriculture.
Current land Use	*Current Industrial Sites*	3No. on site in the southern extents. 2 No. pylons and 1 No. silo. 7No. off-site between 68m and 250m of the site. These include a Telecom Mast, Medals and Trophies Goods, 2 No. Electrical Features, Business Park, Aviation Engineers and Published Goods.
Designated Environmentally Sensitive Sites	SSSI's, NNR's, AONB's	None on site. 2No. Designated Ancient Woodlands 964m south and 1990m northeast respectively. 1 No. Local Nature Reserve 1989m northeast 1 No. SSSI 1990m northeast 1 No. Greenbelt at 469m southwest named Birmingham. None of the above are considered likely to be unduly impacted by the site.

5.2. Unexploded Bombs (UXB)

Regional Unexploded Bomb Risk maps obtained from Zetica indicates that the site is in a low risk area for Unexploded Bombs (UXB).

Zetica state that low-risk regions are those with a bombing density of up to 15 bombs per 1000 acres or less. These areas are considered to have significant but low UXB risk. In general, further action to mitigate the risk is considered prudent, although not essential. Care is required when assessing the risk for specific sites where the risk may be higher because of local wartime activity.

Given that the site has historically remained greenfield land and that the historical maps do not show any obvious signs of wartime activity within the site locality, the risk of encountering UXB is therefore considered low. No further risk assessment is therefore considered to be required in this regard.

5.3. Archaeology

A preliminary search of the Heritage Gateway archaeological database (www.heritagegateway.org.uk, accessed September 2020) indicates that there are records on the site itself and in the locality, a summary is given below:

HER Ref and location	Details
On site MLE24420 Grid Reference: SP 4397 9134	FARMSTEAD (Late Post-medieval to Modern - 1840 AD to 2050 AD)
On site MLE22160 Grid Reference: SP 4383 9181	DITCH (Unknown date) GULLY (Unknown date)
Off site	Several records to the northwest and northeast of the site relating to medieval and roman archaeology.

6.0 Conceptual Site Model (CSM)

This section provides a qualitative risk assessment of the risk posed from potential on and off-site contamination sources, identified by the information presented in the previous sections.

The conceptual model below has been developed based on the commonly adopted source-pathway-receptor model as recommended within CLR11 Model Procedures for the Management of Land Contamination.'

6.1. Proposed Development

It is proposed to redevelop the site into residential dwellings with gardens, landscaped areas and an area of public open space.

6.2. Potential Sources of Soil Contamination related to the sites past and current use

6.3. On-site

The site has remained almost entirely undeveloped throughout its history with records indicating it has been used for largely agricultural purposes. Other historical and current potential sources of soil contamination identified are as follows:

- The former Fieldgate Pit, located in the far northern tip (adjacent Coventry Road). This pit appears to have been filled in ~1923 with 2No. houses (present today) subsequently built on the locality. Given the predominant geology (Clay) and existence of clay pits in the Hinkley area it is considered most likely that Fieldgate Pit was a clay pit for brick and tile manufacture.

- Burbage Fields Farm located in the southern site extents.

- Any historic electrical transformers associated with the historic electricity lines. Current transformers complying to modern standards are not considered a potential source.

- Soil / rubble mounds identified during the site walkover.

- Although the emap data identifies cuttings (associated with the adjacent M69 motorway to the south) to be on site the site walkover has confirmed that the top of the cutting forms the boundary to the site and does not encroach into the site. Although some localised on-site ground

disturbance/reprofiling may have occurred historically during the construction of the embankment.

Based on the above the following potential contaminants have been identified:

Locality/Source	Inorganic Contaminants	Organic Contaminants
Site wide agricultural land	Heavy metals	PAH, Fuel/Oils, Pesticides
Burbage Fields Farm	Heavy metals	PAH, Fuel/Oils, Pesticides, Asbestos
Former pylon locations where transformers may have been located.		PCB's
Former Fieldgate Pit	Heavy metals	PAH, Fuel/Oils, Asbestos
Any made ground materials placed during the M69 motorway embankment construction along with soil / rubble mounds to the west of Burbage Fields Farm.	Heavy metals	PAH, Fuel/Oils, Asbestos

6.4. Off-site

The surrounding area has predominantly been used for agriculture along with residential use. Some historical industrial uses have been identified however they are not considered likely to have impacted the site with any additional contaminants not already being considered for site wide agricultural use.

6.5. Ground Gassing

The following potential sources of soil gas have been identified:

Source	Distance from Site	Source Generation Potential
Alluvium	On-site	Generally low (dependant on nature and organic content within Alluvium)
Any made ground used to fill in the former Fieldgate Pit.	On-site	Dependant on the content of organic material used.
Any made ground used to raise ground levels associated with the M69 motorway embankment.	Adjacent to and possibly on site	Dependant on the content of organic material used. Generally low however as construction was relatively recent and good practices are likely to have been adopted.

6.6. Potential Pathways

With regard to the assessment of risk to human health, the following pathways are considered to be potential exposure routes based on residential end-use, in accordance with the CLEA Documentation:

- Dermal contact.
- Direct ingestion of soil.
- Inhalation and ingestion of soil dust.
- Inhalation of gases.
- Ingestion of contaminated water via plastic pipes.

With regard to Controlled Waters, the following pathways are considered applicable:

- Overland flow into unnamed river.
- Downward infiltration through soils and bedrock
- Lateral migration through soils and bedrock towards the nearest surface feature
- Newly created preferential pathways associated with the redevelopment of the site e.g. deep boreholes/piles/sewers.

6.7. Potential Receptors

The following are considered to be potential receptors for contamination:

Receptor		Additional information
Human Health	Site end users Construction/maintenance workers	A female child will be regarded as the critical receptor.
Controlled Waters	Secondary Aquifers	Low sensitivity with respect to groundwater Moderate sensitivity to surface waters.
	Unnamed River on site.	
Other	Neighbouring buildings	Residential properties adjacent the site to the north. Overhead power lines cross southern site area.
	Underground structures	
	Flora and fauna	

6.8. Pollutant linkages

Based on the information above, the following potential pollutant linkages are considered applicable to the site. The risk classification has been qualitatively derived in accordance with CLR 11 Model Procedures for the Management of Land Contamination. The terminology used is taken from CLR 11, and a summary of the principal terms are provided in Appendix F.

Pollutant Linkage	Source	Pathway	Receptor	Probability	Consequence	Risk
1	Contaminated Soils	Ingestion of soil, dermal contact, inhalation of dust	Site end users Construction workers; maintenance workers	Low likelihood	Medium	Moderate/ low
2	Contaminated Soils	Inhalation of soil dust	Members of the public adjacent to the site during construction	Low likelihood	Medium	Moderate/ low
3	Contaminated Water Supplies	Ingestion of water, Migration of organic contaminants via plastic pipes	Humans – Site End Users	Low likelihood	Medium	Moderate/ low
4	Contaminated Soils and Groundwater	Overland flow Leaching and groundwater flow to surface water	Unnamed River on site.	Low likelihood	Medium	Moderate/ low
5	Contaminated Soils and Groundwater	Downward migration into groundwater.	Secondary Aquifers	Unlikely	Medium	Low
6	Contaminated Soils and Groundwater	Leaching of sulphate and corrosive contaminants	Buried concrete structures and services	Low likelihood	Mild	Low
7	Ground gasses from potential infilled land associated with Fieldgate Pit and M69 motorway embankment and natural Alluvial deposits.	Migration of asphyxiant and explosive gasses into confined spaces	Site end users, construction/ maintenance workers in trenches.	Low likelihood	Severe	Moderate

7.0 Conclusions and Recommendations

7.1. Site Setting and Historical Development

The site largely comprises agricultural farmland/fields segregated by hedgerows within a semi-rural setting. A farm and high voltage electricity line occupy the southern extents with 2No. residential properties located in the far northern extents.

The majority of the site has remained greenfield throughout its history with the exception of the far northern extents where a pit (likely clay pit) is documented.

The surrounding area has predominantly comprised agricultural land with residential properties to the north and the M69 Motorway to the south.

The site is underlain predominantly by the Oadby Member (Glacial Till). Alluvium is mapped in the eastern extents with sand and gravel in the northern extents. The bedrock geology underlying the site is the Mercia Mudstone Group.

7.2. Planning/Enabling Works Considerations

Any clearance of existing hedgerows and trees required to facilitate some of the development should be undertaken outside of bird nesting season.

A survey should be undertaken prior to removal of any trees/hedges in order to enable foundation design with respect to tree influence should new structures be proposed. The survey should include boundary vegetation and extend beyond the site boundary to cover any trees that may influence the foundations of proposed structures.

Ecological surveys are likely to be required given the undeveloped nature of the site.

There are overhead powerlines across the southern corner of the site; a development standoff zone is likely to be required. Safe passing points will need to be established for plant.

It is anticipated that the main access to the site will be via the strip of land abutting Coventry Road to the north. Demolition of the existing houses will be required if this is the case.

Records indicate that the existing farm may be of archaeological interest and Roman finds have also been identified close to the site.

A pre-demolition asbestos survey is recommended for buildings to be demolished/renovated on the site.

7.3. Flood Risk

The site is not located on a flood zone nor are there records of 'Risk of Flooding from Rivers and Seas' on site. The highest risk on site from surface water flooding is a 1 in 30 year event with flood levels 0.3 - 1.0m depth. The highest risk on site for groundwater flooding is moderate.

As such, available information would suggest that there is a low risk of flooding. However, this preliminary risk assessment should be confirmed by carrying out a Flood Risk Assessment (FRA) for the site.

7.4. Access

Vehicular access to the site is currently gained from Workhouse Lane.

7.5. Qualitative Contamination Risk Assessment

The site is predominantly agricultural land of greenfield status. The main sources of contamination are likely to be associated with farming activities and the risk of contamination is generally considered to be low. Pesticides may have also been used and PAHs may be resultant from the burning of crops. In addition, small areas of potentially infilled/disturbed ground have been identified associated with a probable clay pit in the north and construction of the M69 motorway immediately to the south. Localised surface soil/rubble mounds have also been identified and a farmyard with outbuildings are present.

It is therefore considered there is a low to moderate risk of contamination existing from the past land use and taking into account the surrounding area. This should be confirmed through testing of soils at the ground investigation stage prior to construction.

The risk to Controlled Waters from on-site soils and groundwater is considered low to moderate on the basis of current information and given the presence of a watercourse on site. Should contaminants be present within soils, the risk that they will affect groundwater and subsequent surface waters shall be related to the mobility of the contaminants, the permeability of strata and distance to receptor. The sensitivity of the site with respect to the identified controlled water receptors is considered Low to moderate at this stage.

7.6. Ground Gas

The CSM has indicated the on-site gas generation potential is generally considered to be very low, with potential on site sources limited to naturally occurring alluvium and localised areas of potentially disturbed/filled ground.

The sensitivity of the proposed development in accordance with CIRIA C665 is considered to be high given the intended residential end use and would equate to building type 'A' in accordance with British Standard BS8485:2015+A1:2019.

Based on the findings of the conceptual model, it is generally considered unlikely that gas protection measures will be required however a moderate risk is attributable to the localised potential made ground identified, which increases the likelihood of some gas protection measures being required. This should be confirmed by an appropriate intrusive investigation.

During construction works, entry into deep trenches should be avoided, gas may accumulate within the confined space created. Permit to work systems and personal gas monitors may be required for such works.

No radon protection measures are necessary for new structures.

7.7. Surface Water Drainage

The geology suggests use of soakaways for surface water drainage may be locally feasible where sand and gravel deposits lie (northern site extents). Generally however, impermeable cohesive soils are anticipated which is likely to make soakaway drainage ineffective and unfeasible. Alternative solutions should be considered, such as on-site attenuation and positive discharge to an appropriate outfall (the on-site unnamed river may be an option).

Infiltration testing should be undertaken across the site to confirm the viability of soakaways if proposed.

7.8. Foundation Design and Geotechnical Issues for Construction

Intrusive works shall be required in order to identify ground conditions and provide foundation recommendations for the site.

The BGS have indicated the majority of the site to be considered negligible to very low hazard ratings for natural subsidence. There is a moderate risk of compressible deposits associated with Alluvium along the eastern extents; this may affect the foundation solution within this area of the site elsewhere the rating is negligible.

Overall, geology suggests that traditional strip/trenchfill foundations are likely to be appropriate, subject to verification by intrusive investigation. The near surface strength of the Glacial Till will dictate foundation depths together with proposed levels, soil volume change potential (VCP) and tree influence.

A tree survey may be required which extends beyond the site boundaries for use in foundation design; Trees and hedges are currently indicated around the perimeter of the site and forming field boundaries within the site. Plots proposed within the influence of these trees/hedges may require deepening or piled foundations. Medium plasticity is indicated for cohesive strata by the BGS.

Significant problems with groundwater are not anticipated across the majority of the site. However,. where granular deposits are expected within the northern extents. Shoring and localised pumping may be required. Instability may also be possible with the Alluvium in the east.

7.9. Mining and Geological Issues

There are no known mining issues within the site.

7.10. Radon

No radon protection measures are required.

7.11. Ecology and Wildlife Issues

The site is within a SSSI impact assessment zone but is not itself within a SSSI.

7.12. Archaeological Issues

A preliminary search of the Heritage Gateway archaeological database (www.heritagegateway.org.uk, accessed September 2020) indicates that there are medieval records on the site itself with medieval and roman activity in the locality.

It is recommended that the Local Authority is consulted at an early stage to confirm the requirements for any archaeological surveys.

7.13. UXB

Regional Unexploded Bomb Risk maps obtained from Zetica indicates that the site is in a low risk area for Unexploded Bombs (UXB). Given that the site has historically remained undeveloped, and that the historical maps do not show any obvious signs of wartime activity within the site locality, the risk of encountering UXB is therefore considered low. No further risk assessment is therefore considered to be required in that regard.

7.14. Geo-environmental Abnormal Risk Register

The following table presents a summary of the main risks identified by the CSM. The table should be read in conjunction with the main body of the report and not in isolation.

Hazard/ Risk	Cause	Risk Rating	Recommendations
Soil & groundwater contamination	Agricultural land and potentially infilled land	Moderate/ Low	Intrusive ground investigation required.
Asbestos	Demolition of existing and former structures/sub-structures. Buried waste	Moderate/ Low	Intrusive ground investigation required. Ensure removal of asbestos in accordance with Control of Asbestos Regulations (2012).
Soil Gas	Potential infilled land associacted with Fieldgate Pit and M69 motorway embankment and natural Alluvial deposits.	Moderate	Intrusive ground investigation required. Low level (e.g. CS-2/Amber 1) gas protection may be required in some areas.
UXO	WWII	Low	No further action considered necessary.
Archaeology	Preliminary screen suggests medieval activity on the site and roman activity to the north	Moderate/ Low	Consult with LA with regards requirements for surveys.
Flooding	Not within flood zone. No records of RoFRaS	Low	Undertake Flood Risk Assessment. Minimum FFLs may be stipulated by planning.
Foundation Design / Geotechnical issues	Medium plasticity Tree influence on site. Softening of clays near surface Instability where Alluvium/sand and gravel mapped.	Moderate/ Low	Intrusive ground investigation required Deepening of foundations due to soft ground and /or tree influence. Possible Piled foundations required in close proximity to trees/hedgerows. Allow for shoring/localised dewatering.
Surplus topsoil	Site is field.	Low	Characterise topsoil. Re-use of topsoil on-site where possible under Materials Management Plan (MMP).

Hazard/ Risk	Cause	Risk Rating	Recommendations
Earthworks	Unsuitable materials may require stabilisation to ensure geotechnically suitable for use.	Low	Intrusive investigation required. Importation of material may be required to meet minimum FFLs. Place fill material in accordance with an Engineers Specification.
Drainage	Impermeable cohesive strata covering the majority of the site. Soakaway drainage generally unlikely feasible.	Moderate	Intrusive investigation required. Drainage assessment required.

7.15. Recommendations for Site Investigation Works

The following works are recommended as part of an intrusive investigation:

- Trial pits across the site to provide a visual appreciation of the ground conditions and to assess stability of excavations.
- Boreholes with in-situ testing to determine the strength and settlement characteristics of the underlying soil profile to assist with foundation design.
- Chemical laboratory testing of soils samples for contaminants identified within the CSM to enable a contamination risk assessment for the site.
- Geotechnical laboratory testing to determine geotechnical soil properties. This should include plasticity index tests to determine the volume change potential, particularly where foundations are proposed within proximity to trees/hedgerows. Where significant earthworks are proposed, moisture content and compaction testing should be undertaken to assess the suitability of soils for re-use in earthworks.
- It would be prudent to undertake soil gas monitoring to determine the soil gas regime. Alluvium deposit and any deep made ground identified should be targeted.
- Infiltration testing to determine surface water drainage solutions.

References

1. British Standards Institution. BS 5930:2015. Code of practice for ground investigations. 2015.

2. British Standards Institution. BS 10175:2015. Investigation of potentially contaminated sites – Code of practice. 2015.

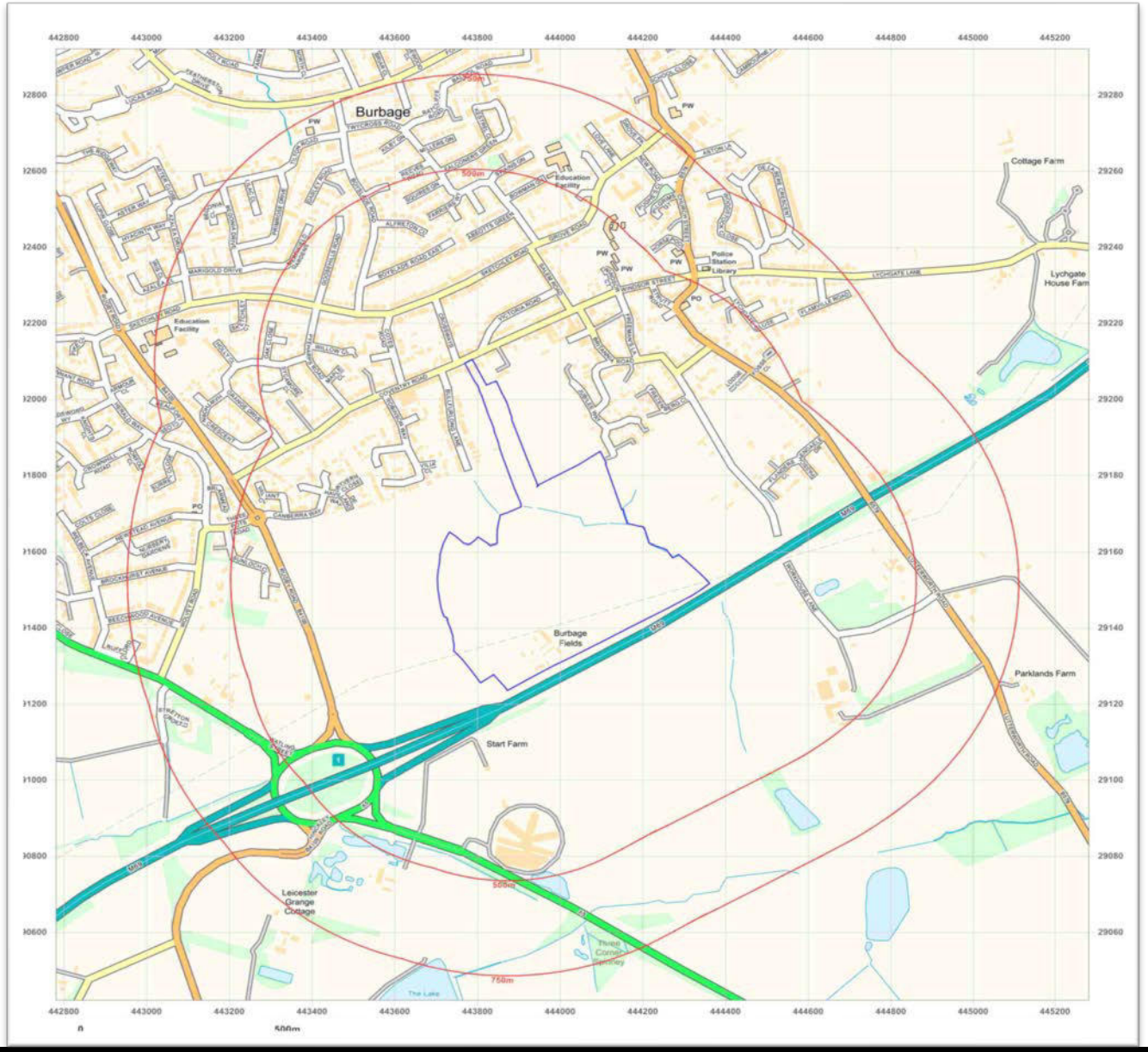
3. CL:AIRE Industry Profile 'Ceramics, cement and asphalt manufacturing works'

4. British Standards Institution. BS 8485:2015+A1:2019. Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings.

5. Construction Industry Research and Information Association. 2008. Assessing the risk posed by hazardous gases to buildings. C665.

Appendices

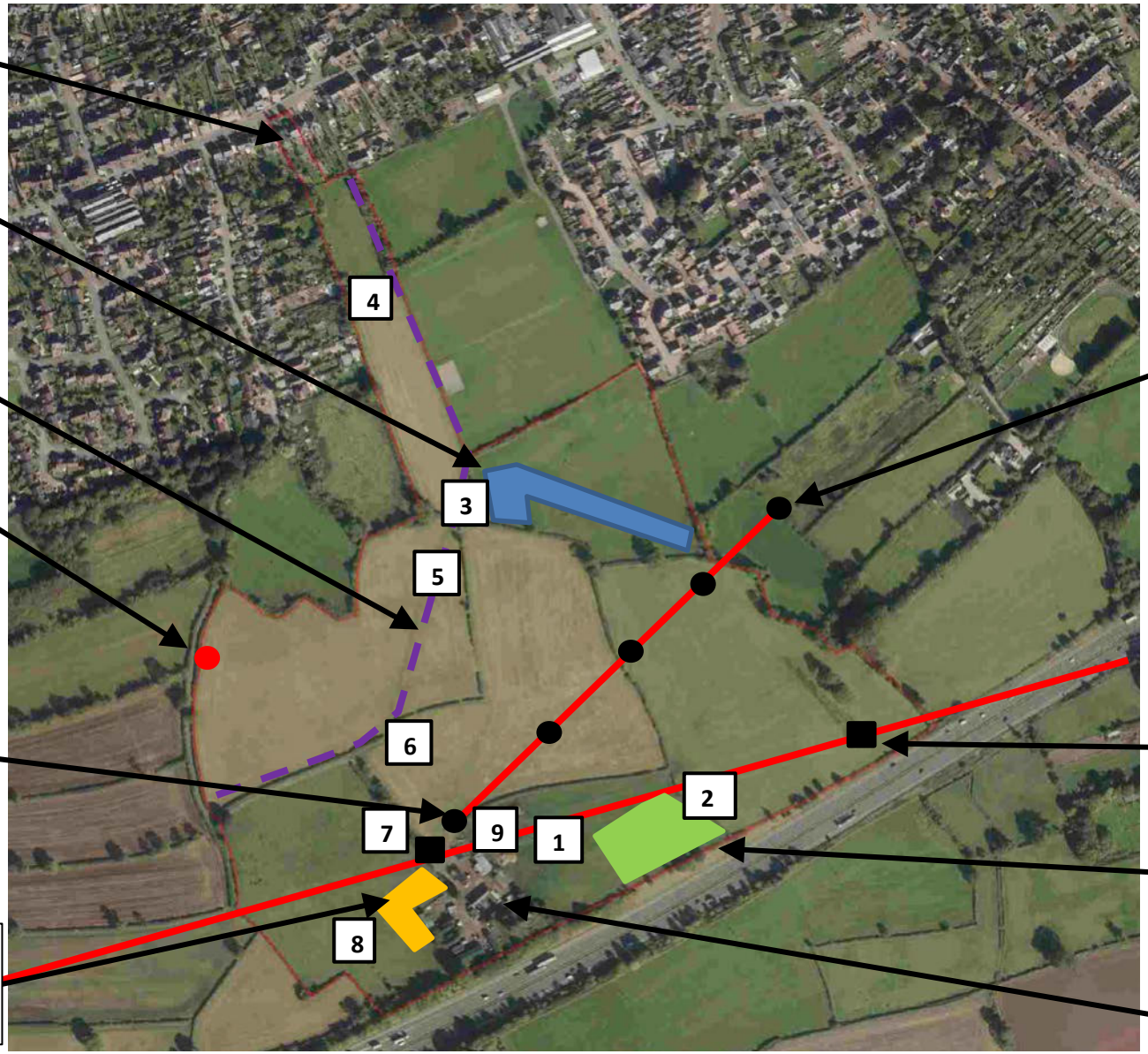
Appendix A: Site Extents Plan



North

Project No.	P20-291	Title	Site Location and Extents Plan	Drawn	AT
Client	Redrow Homes			Checked	IB
Project	Burbage Fields			Approved	SF
		Scale	N/A		
		Revision	0		

Appendix B: Site Walkover Photos



Project No.	P20-291	Title	Site Features Plan	Drawn	AT
Client	Redrow Homes			Checked	IB
Project	Burbage Fields			Approved	SF
		Scale	N/A		
		Revision	0		



Project No.	P20-291			Title	Walkover Photographs	Drawn	AT
Client	Redrow Homes					Checked	JB
Project	Burbage Fields				Photo 1	Approved	SF
Page No.	1	of	11	Scale	N/A		
				Revision	0		



Project No.	P20-291			Title	Walkover Photographs	Drawn	AT
Client	Redrow Homes					Checked	JB
Project	Burbage Fields				Photo 2	Approved	SF
Page No.	2	of	11	Scale	N/A		
				Revision	0		



Project No.	P20-291			Title	Walkover Photographs	Drawn	AT
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Project	Burbage Fields				Photo 3	Approved	SF
Page No.	3	of	11	Scale	N/A		
				Revision	0		



Project No.	P20-291			Title	Walkover Photographs	Drawn	AT
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Project	Burbage Fields				Photo 4	Approved	SF
Page No.	4	of	11	Scale	N/A		
				Revision	0		



Project No.	P20-291			Title	Walkover Photographs	Drawn	AT
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Project	Burbage Fields				Photo 5	Approved	SF
Page No.	5	of	11	Scale	N/A		
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Project No.	P20-291			Title	Walkover Photographs	Drawn	AT
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Project	Burbage Fields				Photo 6	Approved	SF
Page No.	6	of	11	Scale	N/A		
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Project No.	P20-291			Title	Walkover Photographs	Drawn	AT
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Page No.	7	of	11	Scale	N/A		
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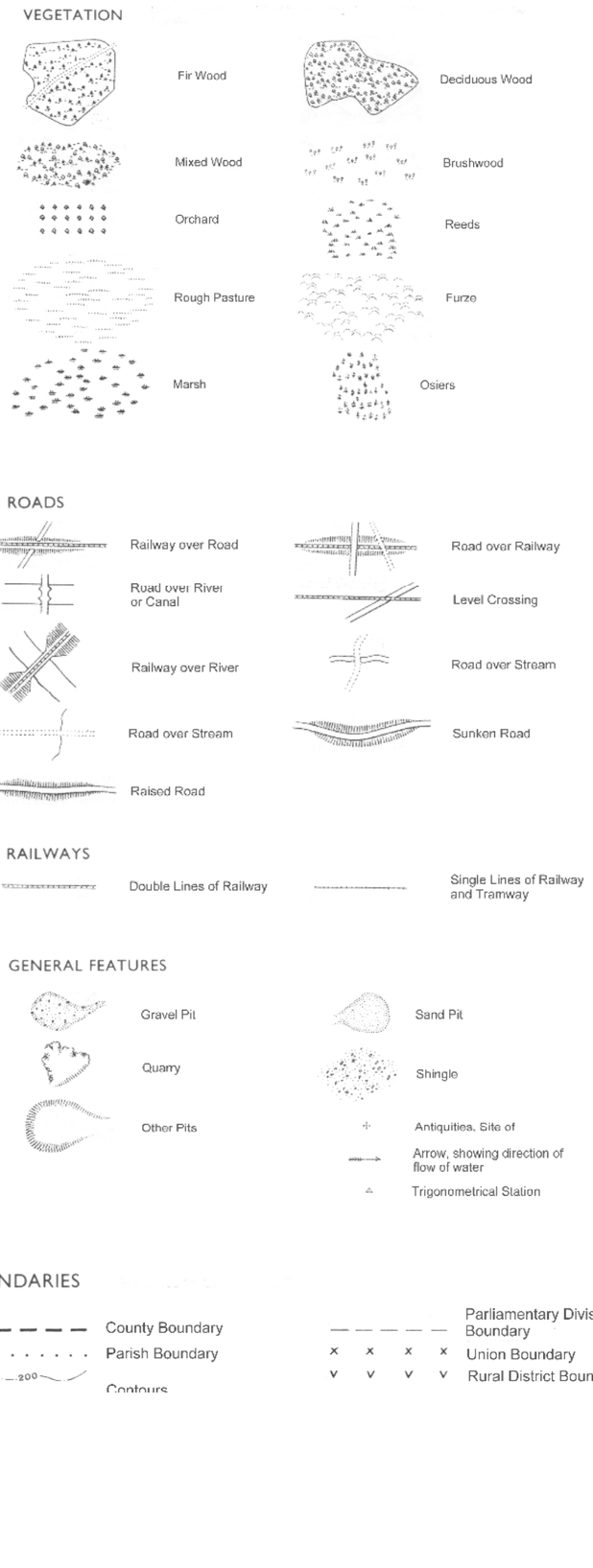
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Project No.	P20-291			Title	Walkover Photographs	Drawn	AT
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Appendix C: OS Historic Maps

County Series 1:10,560 scale



National Grid 1:10,000 scale



GroundSure

Historical Map Pack Legend

County Series & National Grid

1:10,560 scale

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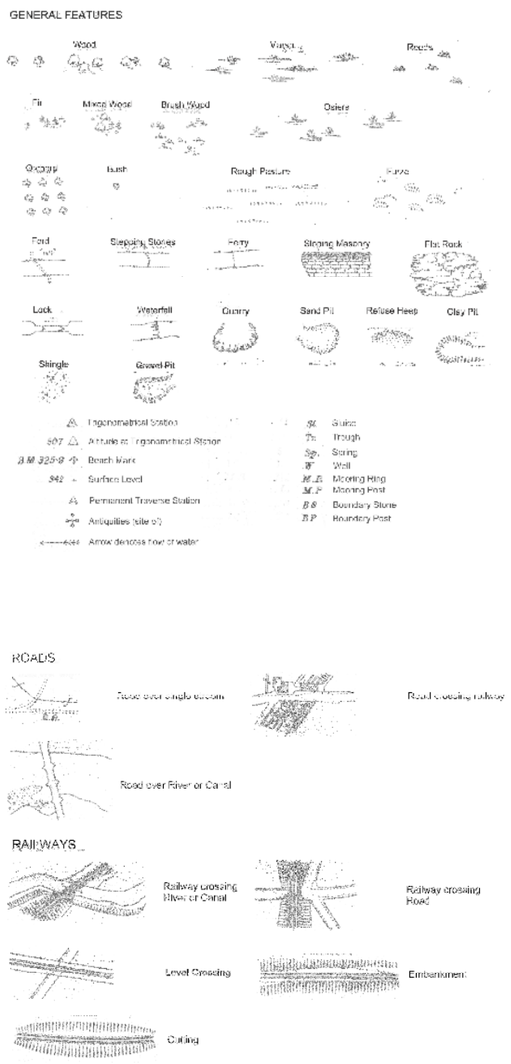
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Technical Helpline

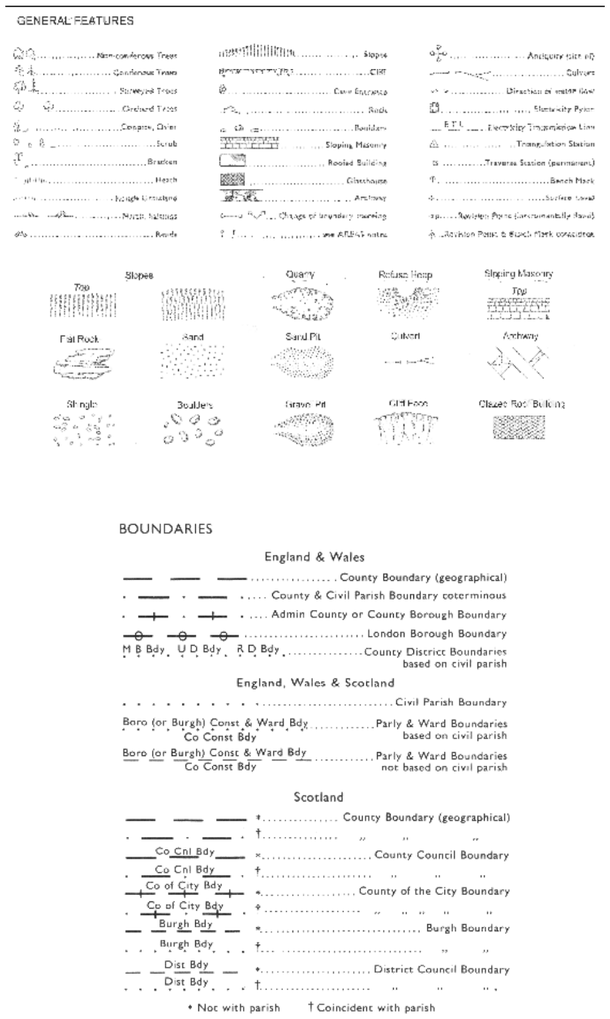
Tel 08444159000

groundsureinsight@groundsure.com
www.groundsure.com

County Series 1:2,500 scale



National Grid 1:2,500 / 1:1,250 scale



GroundSure

Historical Map Pack Legend

County Series

1:1,250 scale

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County Series & National Grid

1:2,500 scale

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10 2EX

Client Ref: EMS_632820_841667
Report Ref: EMS-632820_841667
Grid Ref: 444031, 291670

Map Name: County Series

Map date: **1886**

Scale: 1:10,560

Printed at: 1:10,560

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Surveyed 1886
Revised 1886
Edition N/A
Copyright N/A
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Revised N/A
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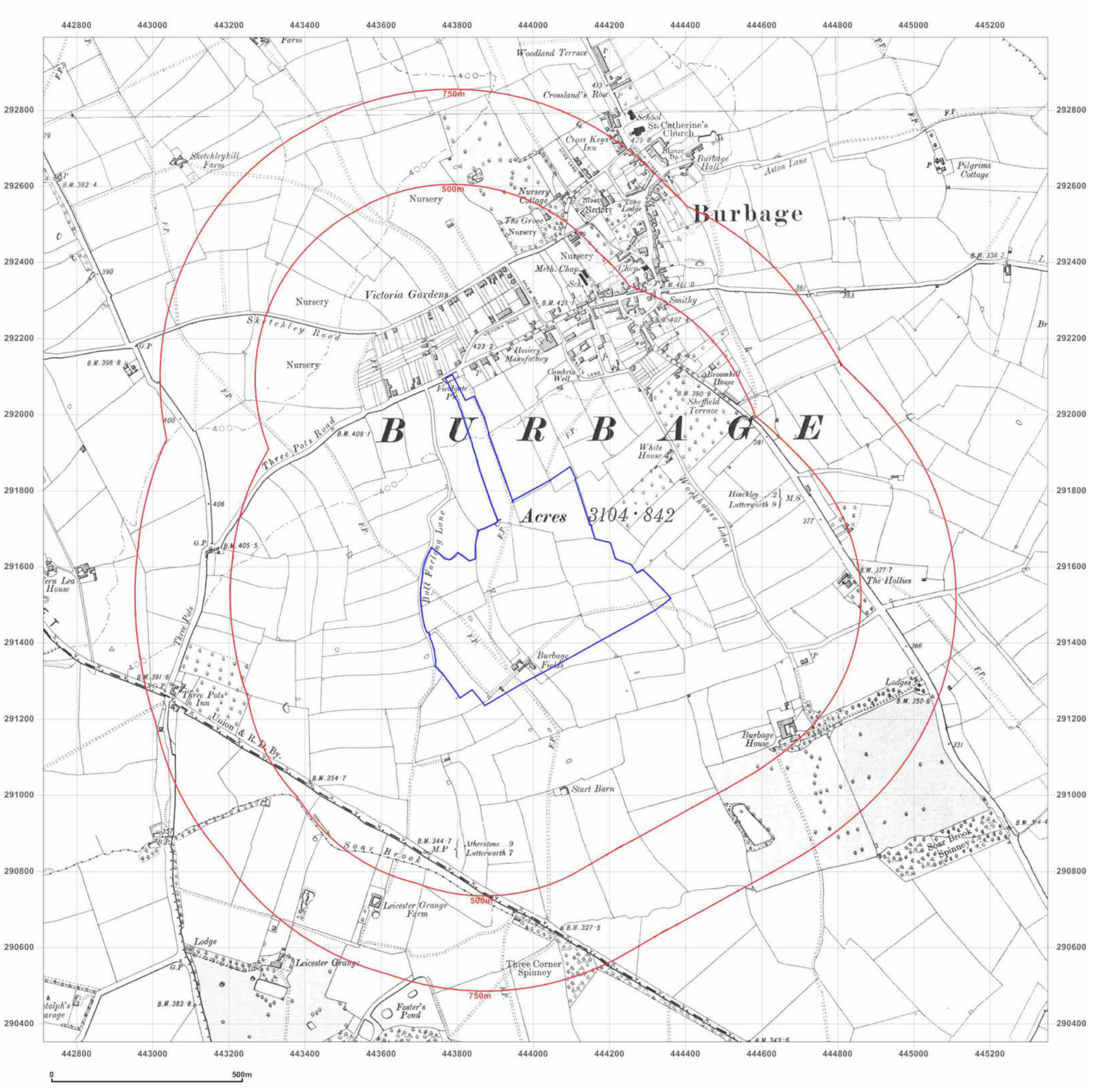
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Grid Ref: 444031, 291670

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Map date: **1901-1904**

Scale: 1:10,560

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Surveyed 1887
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Surveyed 1886
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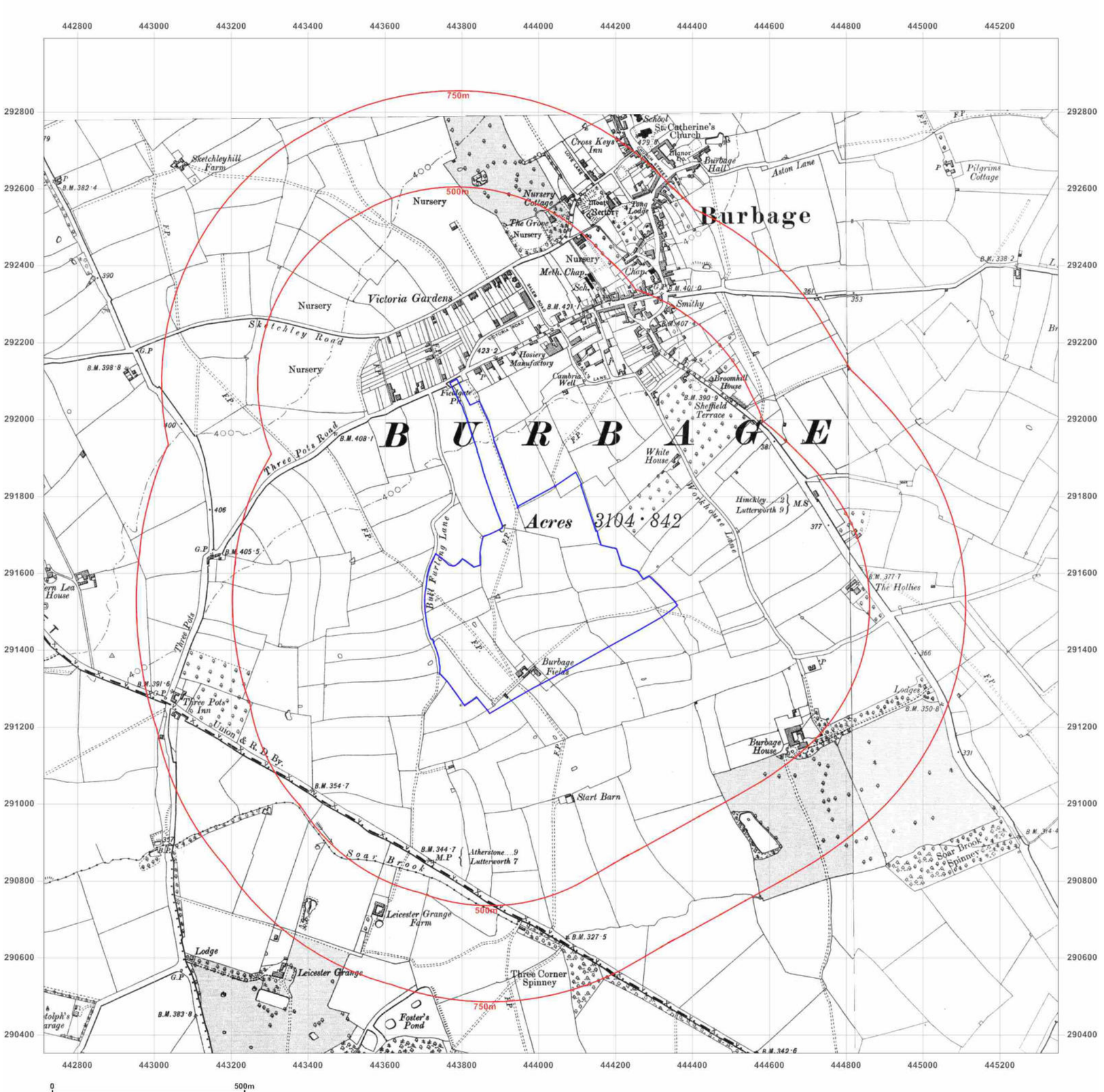
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Grid Ref: 444031, 291670

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Surveyed N/A
Revised N/A
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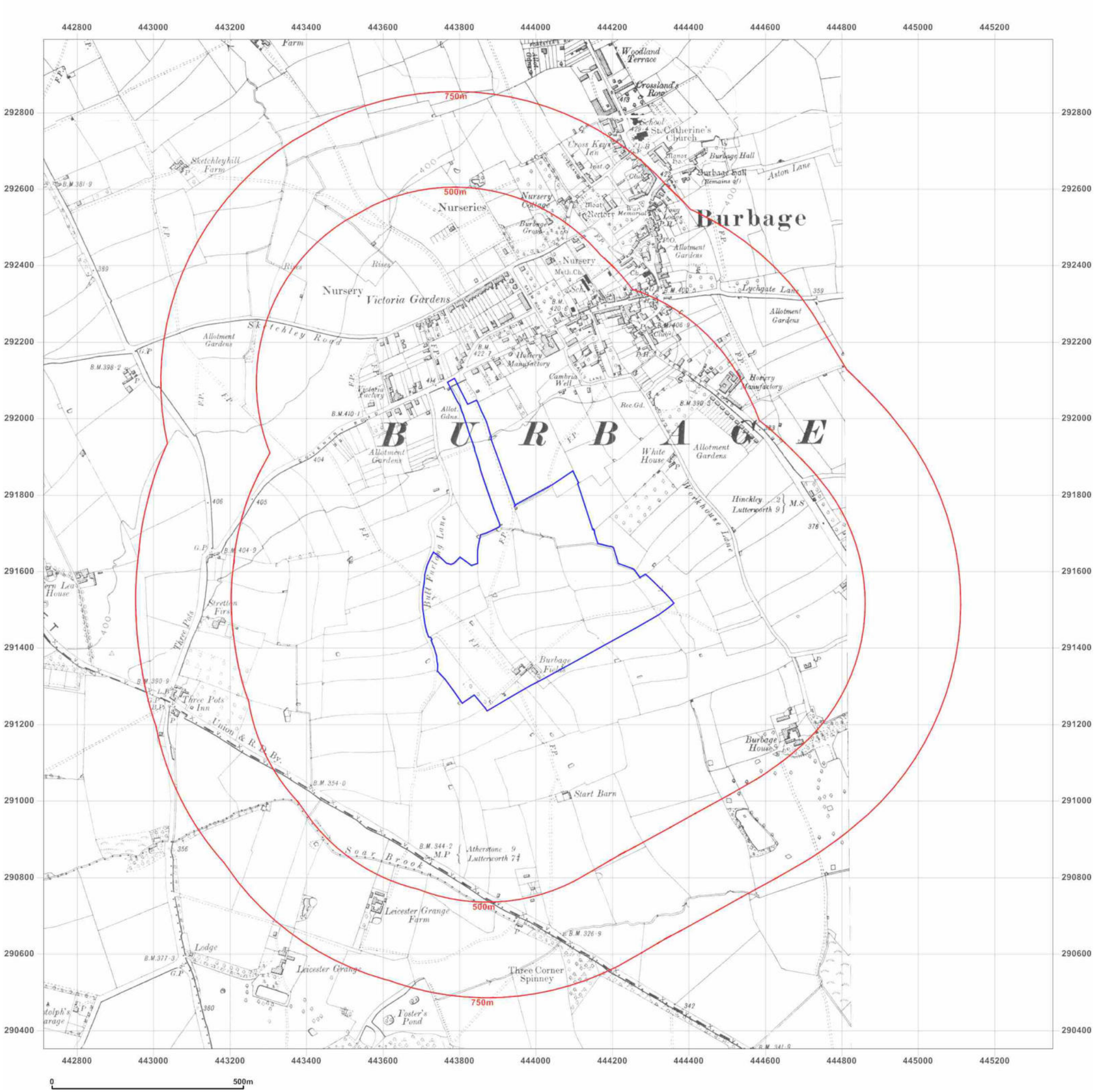
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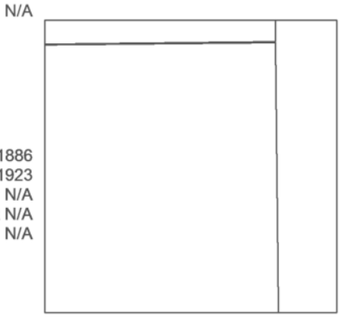
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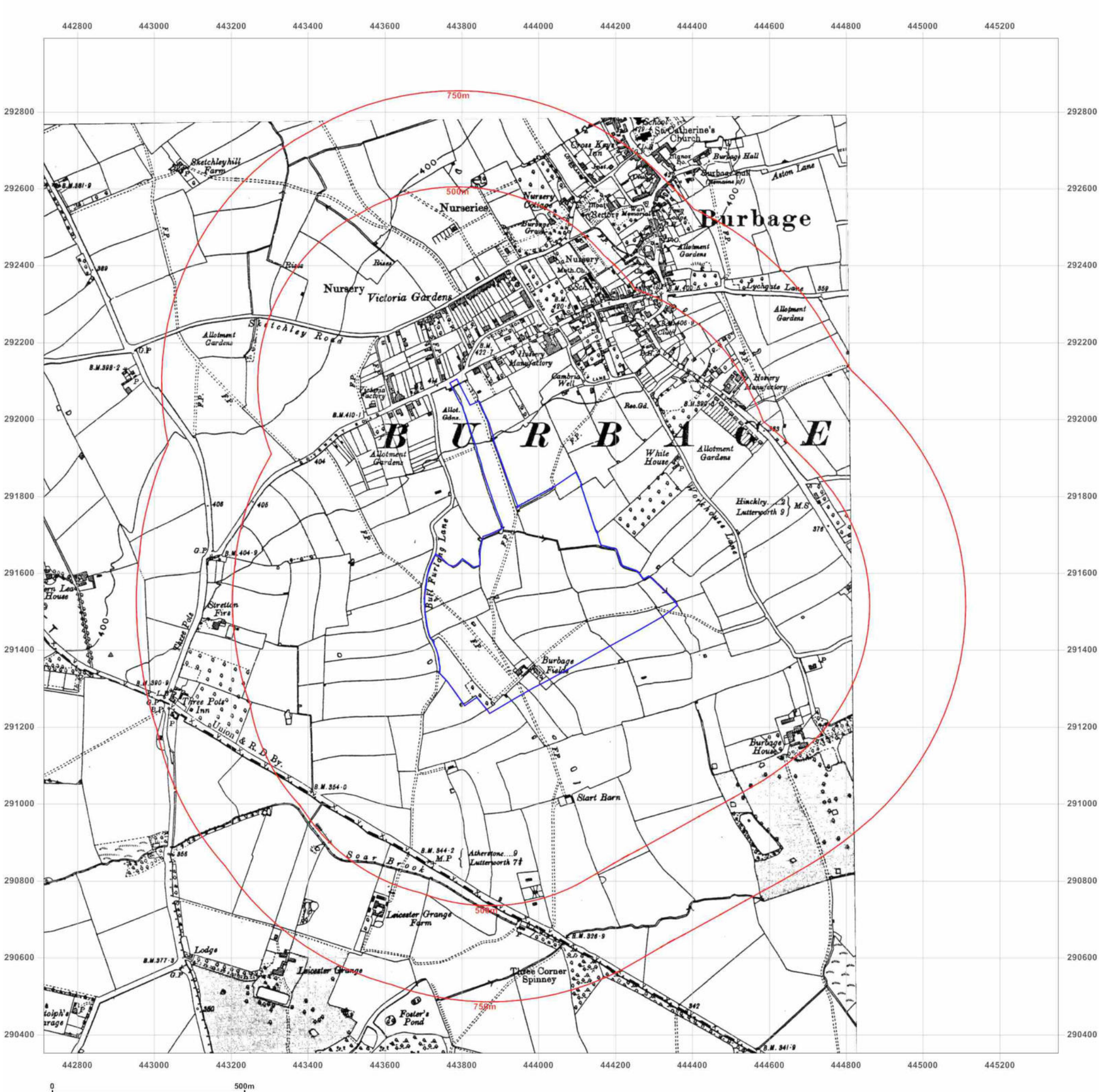
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Report Ref: EMS-632820_841667
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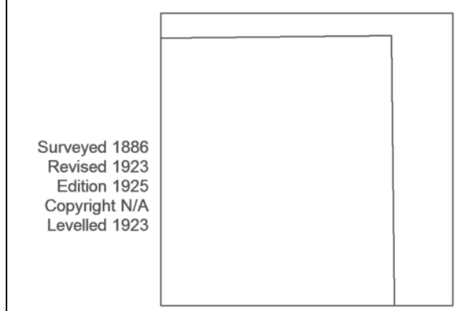
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