



Historic Environment Desk-Based Assessment

New House Farm BESS

YLEM Energy Ltd

Prepared by:

SLR Consulting Limited

35 Dale Street
Manchester
M1 2HF

SLR Project No.: 415.064529.00001

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Basis of Report

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Executive Summary

SLR Consulting Ltd was commissioned by YLEM Energy Ltd to produce an Historic Environment Desk-Based Assessment for a Battery Energy Storage System (BESS) on a parcel of land west of New House Farm, Luzlow Lane, Bagnall, Staffordshire. The Site currently comprises agricultural fields.

This assessment considers the known and potential heritage assets within the Site and the surrounding area which may be affected by the proposed development, including the potential for archaeological remains. The report assesses the significance of any identified heritage assets, including a consideration of the contribution that setting makes to that significance. The report sets out how the Site's development will affect that significance.

The Site does not contain any designated heritage assets, or non-designated heritage assets, nor does it contribute to any aspects of setting which contribute positively to the significance of the designated heritage assets within the study area. and the proposed development is not anticipated to result in any harm any heritage assets outside of the Site area as a result of a change to setting.

Neither have any potential archaeological remains been identified as having to require preservation in-situ or otherwise preclude development within the Site.

Overall, the proposals are considered to be consistent with the provisions of the Scheduled Monuments and Archaeological Areas Act (1979), the Planning (Listed Buildings and Conservation Areas) Act (1990), Section 66(i), the NPPF (2023), paragraphs 200-209, as well as the relevant provisions of the *Staffordshire Moorlands Local Plan* (Adopted September 2020).



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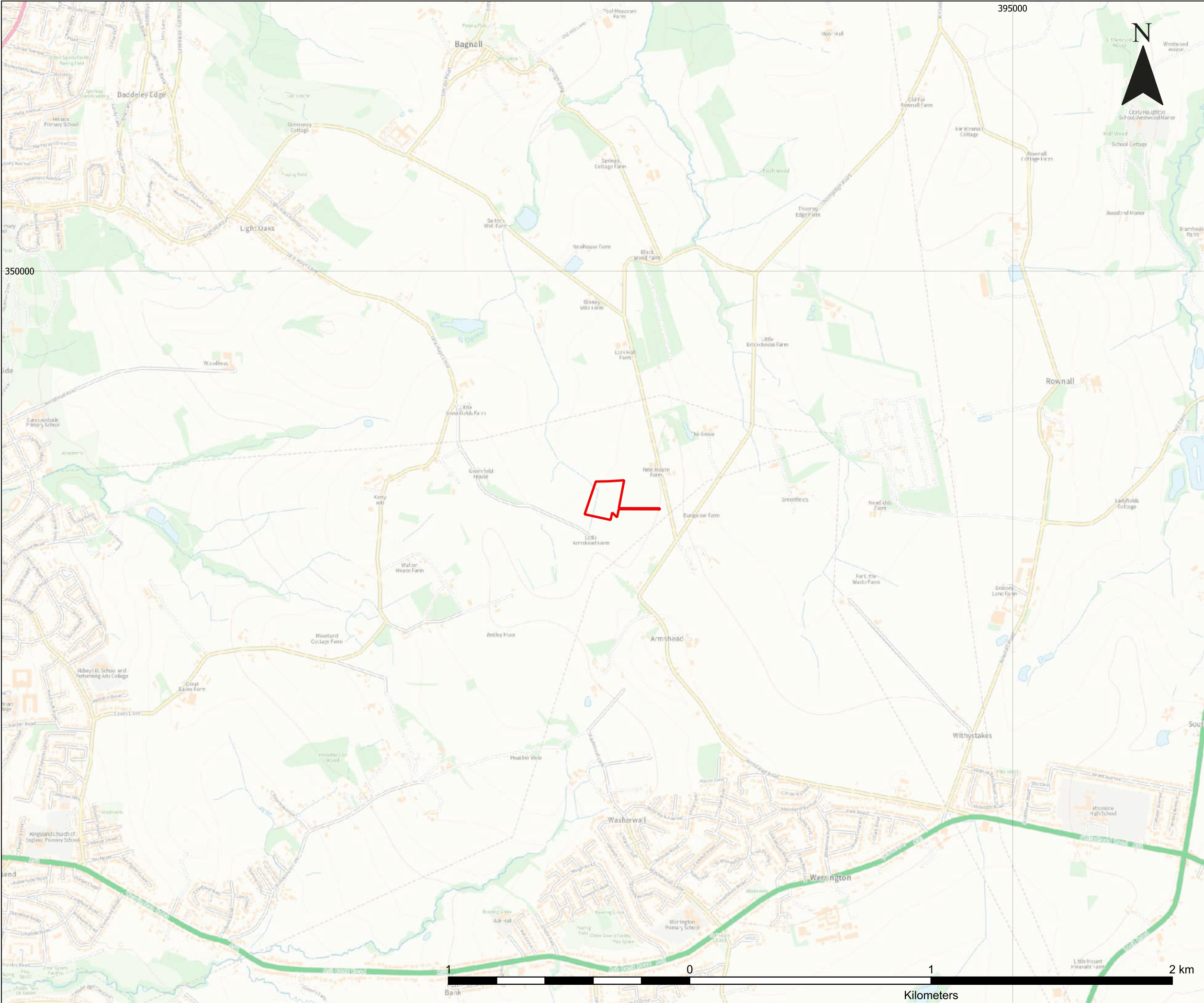
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LEGEND

Site Boundary

35 DALE STREET
MANCHESTER
M1 2HF
T: +44 (0) 1743 239 250
www.slrconsulting.com

NEW HOUSE FARM BESS
HERITAGE DESK-BASED ASSESSMENT

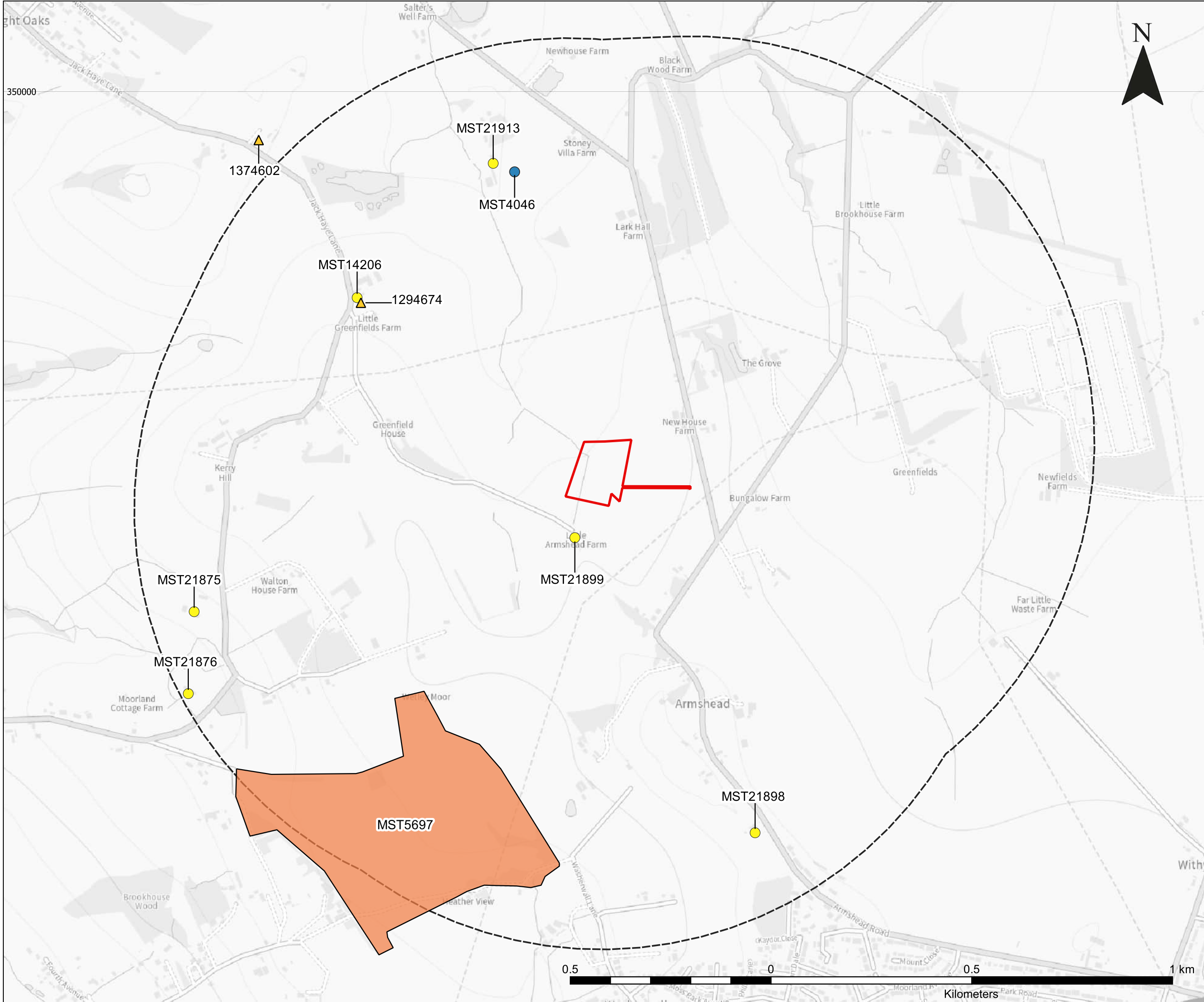
SITE LOCATION

FIGURE 1

Scale
1:15,000 @ A3

Date
NOVEMBER 2024

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LEGEND

Site Boundary

Study Area 1km

Designated Heritage Assets

Grade II Listed Building

Non-Designated Heritage Assets

Prehistoric

Post-medieval

Modern

35 DALE STREET
MANCHESTER
M1 2HF
T: +44 (0) 1743 239 250
www.slrconsulting.com

NEW HOUSE FARM BESS
HERITAGE DESK-BASED ASSESSMENT

HERITAGE ASSETS

FIGURE 2

Scale1:9,000 @ A3

DateNOVEMBER 2024

00000.00000_Figure2_HeritageAssets

1.0 Introduction

1.1 Project Background

SLR Consulting Ltd was commissioned by YLEM Energy Ltd (hereafter 'the Client') to produce an Historic Environment Desk-Based Assessment for a Battery Energy Storage System (BESS) on a parcel of land west of New House Farm, Luzlow Lane, Bagnall, Staffordshire, centred at NGR SJ 93261 49022 (hereafter 'the Site') (**Figure 1**).

The Site currently comprises a roughly trapezoidal parcel of grassed land, bounded by part hedgerow to the north and part sandstone wall to the west. A hedged field boundary is aligned through the centre-east of the Site. Access to the Site is from the east by an opening in the hedgerow from the neighbouring field which is adjacent to Luzlow Lane. Historically, this parcel of land was likely part of the wider lowland heathland, brought into agricultural use during the later post-medieval period.

The Proposed Development comprises a BESS, including:

- 24no Battery Clusters;
- 12no Transformer and Invertors;
- 33kV/415V Site Supply Transformer;
- 2no 33kV BESS Switchroom;
- 132/33kV Substation Transformer;
- 1no Site Welfare and LV Switchroom;
- 2no Water Tanks; and
- 2no 132KV Substation Switchrooms

This assessment has been prepared in compliance with the National Planning Policy Framework (NPPF) (2023), the *Staffordshire Moorlands Local Plan* (Adopted September 2020), Historic England guidance, and with full regard to the ethical standards of the Institute for Historic Building Conservation (IHBC) and the Chartered Institute for Archaeologists (CIfA). Relevant local plan policies are included at the back of this report (**Appendix A**).

The methodology employed during this assessment was based upon relevant professional guidance, including CIfA's *Standard and guidance for Historic Environment Desk-based Assessment* (2020), and relevant technical guidance issued by Historic England, including *Statements of Heritage Significance: Analysing Significance in Heritage Assets* (2019). A methodology and glossary of key terms is included at the back of this report (**Appendix B**).



2.0 Site Description and Overview

2.1 Site Description

The Site comprises a 1.9 hectare parcel of land that is roughly trapezoidal in shape, and comprising three grassed fields (**Photo 1-Photo 6**). The three fields are separated by a low sandstone wall, aligned north-south through the centre of the Site, which is c.50-70cm in height and has collapsed in places (**Photo 2** and **Photo 5**) as well as a hedgerow, aligned north-south (**Photo 4**). To the north and part of the west of the Site, the boundaries of the fields consist of mature hedgerow and to the west the boundaries are part hedgerow and also partly a low sandstone wall, which has also seen sporadic collapse. The Site is currently accessed from the east through an opening in the hedgerow of the neighbouring field, which in turn is accessed from the east via Luzlow Lane.

To the west, north and east of the Site, the surrounding landscape is characterised by further large, regular agricultural fields, used variably for pasture and arable purposes, separated by hedged field boundaries and in areas also contain mature trees. Little Armshead Farm, a former 19th-century farmstead which has been recently redeveloped into a modern dwelling, is located immediately to the south of the Site, along with its associated gardens and an access track aligned east-west adjacent to the southern Site boundary. To the south of this farmstead is a large (c.70 hectare) area of lowland heathland known as Wetley Moor Common.

2.2 Geology and Topography

The Site is recorded within the British Geological Survey Data as underlain by bands of bedrock of the Millstone Grit Group, comprising mudstone, siltstone, sandstone, and bands of Rough Sandstone. Superficial deposits are present over the Millstone Grit Group bedrock only, comprising glacial till deposits.

The soils within the Site are recorded by Cranfield University as slowly permeable, seasonally wet, acidic loamy and clayey soils, which have impeded drainage and are of low fertility. Such habitats are naturally conducive to seasonally wet pastures and woodlands.

The Site gently slopes from a highest point of c.245m above Ordnance Datum (aOD) at the southeastern corner and northwest to a lowest point of c.239m aOD at its northwestern corner. A small watercourse springs from the middle of the southern boundary of the Site, directly north of Little Armshead Farm, and is aligned northwards through the centre of the Site, exiting at the northwestern corner of the Site boundary. This stream is a tributary of the Stanley Pools, located c.2.5km to the north.

In relation to the surrounding landscape, the Site is located within a small valley on the north-facing slopes of an area of high ground known as Wetley Moor (still considered as 'lowland' heath) (**Plate 1**). The highest point within the local landscape of c.270m aOD is located c.1.5km to the south, around which the historic small settlement of Werrington grew.

No borehole data was available within the Site.





Photo 1: Looking southwest across the Site from the northeastern corner



Photo 2: Looking southeast from center of the northern Site boundary, central dividing sandstone wall in foreground





Photo 3: Looking northwest at the turn in the watercourse at the southern edge of the Site



Photo 4: Looking north from the southeastern part of the Site – central hedged field boundary to right of shot



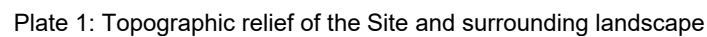


Photo 5: Looking north from center of the southern Site boundary, central dividing sandstone wall in foreground



Photo 6: Looking northwest across the Site





Digital surface model (DSM) LiDAR data, at 1m resolution, was processed using GIS software. Multiple hill-shade and shaded-relief models were created, principally via adjustment of the following variables: azimuth, height, and 'z-factor' or exaggeration. The models created were then colourised using pre-defined ramps to reveal the micro-topography and allow for analysis. **Plate 2** presents this data, which is annotated with coloured interpretation in **Plate 3**, for ease of reference within the below discussion of the results.

A network of connected linear features with a regular form and definition, and with trajectories leading towards the central watercourse, may represent a system of drainage for the surrounding fields (**Plate 3**; green linear features). These linear features were also largely identified within the geophysical survey (see Section 3.2 and **Appendix E**). A likely natural, gently-sloping ridge is identifiable within the southwestern corner of the most westerly field (outside of the Site boundary) (**Plate 3**; pink linear feature).

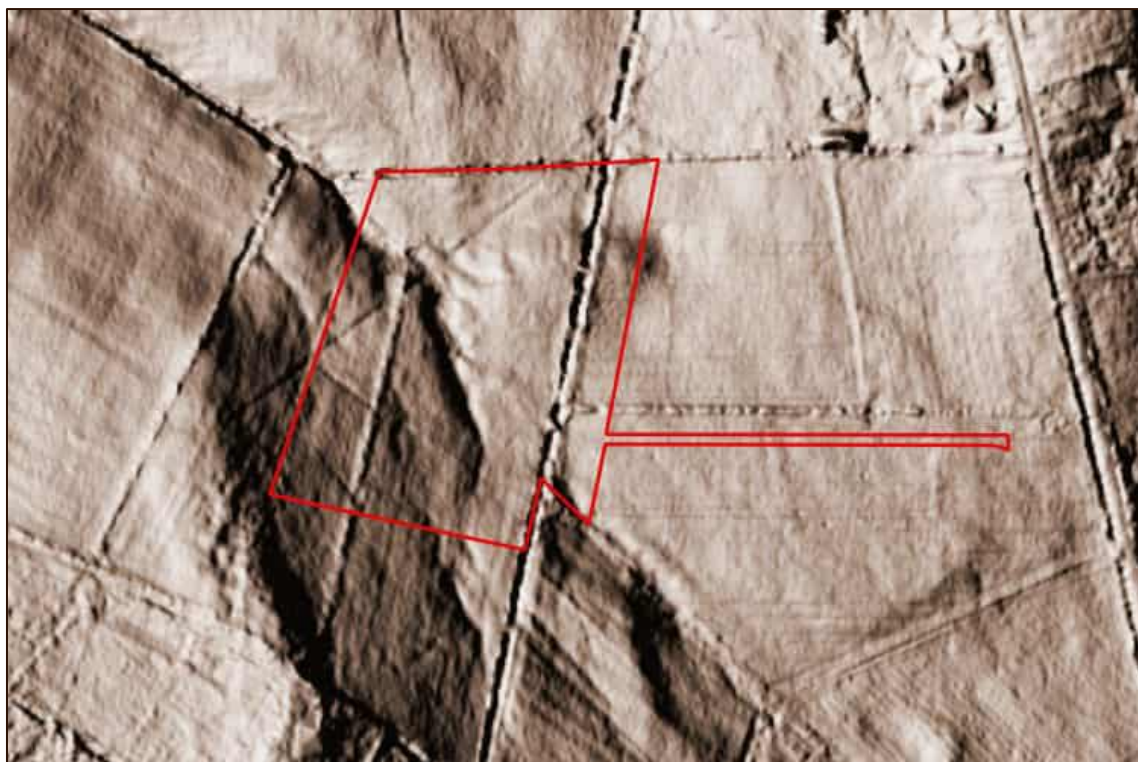


Plate 2: LiDAR DSM Data (National LIDAR Program Environment Agency survey data; 1m resolution). Retrieved from DEFRA, 06/03/2024

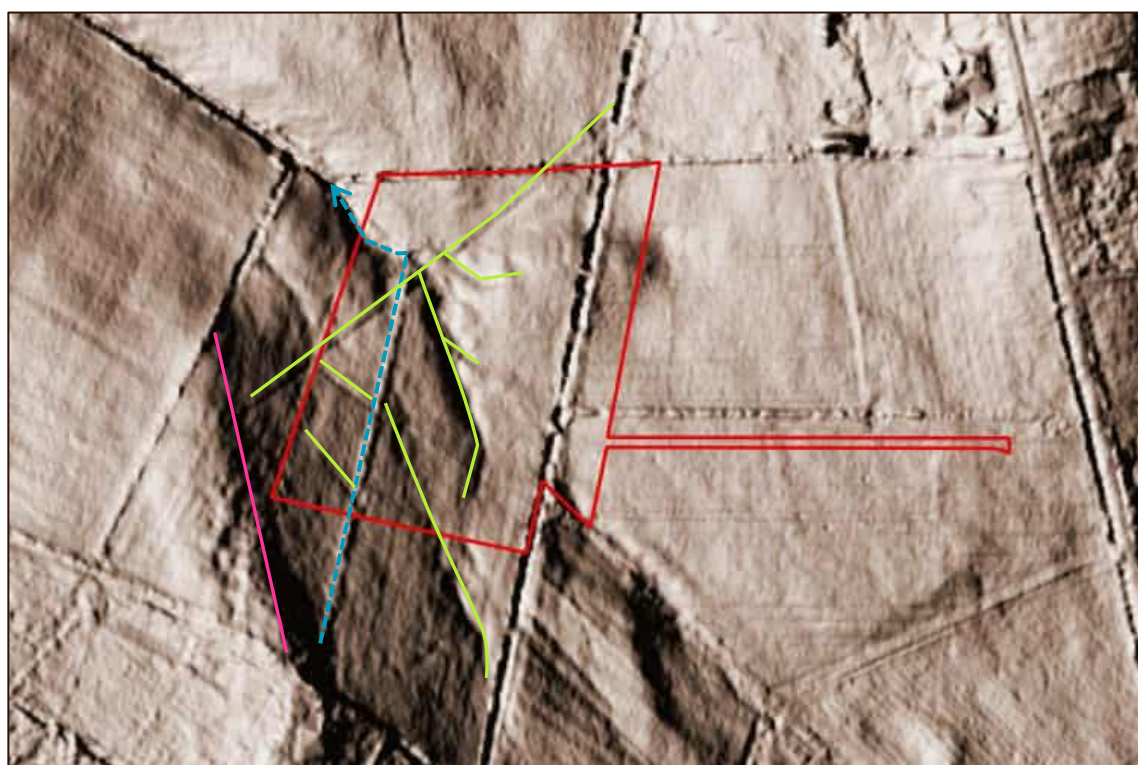


Plate 3: LiDAR DSM Data annotated. Retrieved from DEFRA, 06/03/2024



3.0 Historical Background

3.1 Introduction

The following section provides an overview of the Site's historical development, based on an assessment of the designated heritage asset data, as recorded by the National Heritage List for England (NHLE), Staffordshire Historic Environment Record (HER), relevant historic mapping, and online data sources.

Designated and non-designated heritage asset data is presented in **Figure 2**. Data is presented on the figures within a 1-kilometre study area, incorporating data from beyond the study area within the assessment below, where relevant. Heritage assets are referred to within the text by their unique reference numbers, as annotated within the figures.

No designated heritage assets of an archaeological nature (i.e. Scheduled monuments) are located within the Site. No HER (non-designated) assets are recorded within the Site.

3.2 Geophysical Survey

Geophysical survey was undertaken within the Site in July 2024. The results of the survey are presented in **Appendix E**.

A series of positive, interconnected linear anomalies traversing main site area were interpreted as likely to be a network of land drains (labelled '1' in the interpretation plot in **Appendix E**). These features are also visible within the LiDAR data (see Section 2.3). Several smaller anomalies also interpreted as land drains were noted within the area of the proposed access track (labelled '3' in the interpretation plot in **Appendix E**).

Ferrous disturbance was noted throughout the survey area, which has been interpreted as 'modern' and may potentially relate to material distributed during agricultural spreading or lost machinery parts.

No anomalies were identified within the survey data which were interpreted as having the potential to relate to archaeological remains.

3.3 Events

No other heritage events (i.e. investigations) of relevance to the archaeological potential of the Site were recorded within the Staffordshire HER data.

3.4 Summary of Archaeological Potential

3.4.1 Prehistoric

There are no prehistoric (pre-43 AD) heritage assets recorded within the Site. One prehistoric HER record is located within the 1km study area, comprising a findspot of a possible Neolithic (c.4000-2200 BC) flint scraper (**Figure 2; MST4046**). Such chance finds of prehistoric stone tools are relatively common and are more likely to be the result of casual loss/discard when found in isolation, rather than evidence of localised settlement activity.

Analysis of historic satellite imagery via Google Earth (not reproduced within this report) identified no evidence of cropmarks that may relate to prehistoric activity within the Site.

Given the above, there is considered to be a very low potential for prehistoric archaeological remains within the Site and none would be anticipated at this stage.

3.4.2 Roman

No Romano-British (43 AD-c.410 AD) heritage assets have been recorded within the Site (**Figure 2**) and, as such, there is a low to nil potential for Roman archaeological remains within the Site. Vast amounts of material culture were produced during the Romano-British period, and its presence is usually readily identifiable within the HER.

Therefore, the absence of recorded Roman findspots and assets within the study area likely genuinely is evidence of absence of such remains within the Site.



3.4.3 Early English and Medieval

No heritage assets of early English date (c.410-1065) are recorded within the HER, either in the Site or study area (**Figure 2**). **Such remains are nationally rare and, given the lack of surrounding archaeological evidence corresponding to such dates, none would be anticipated within the Site at this stage.**

There are also no medieval (1066-c.1539) heritage assets recorded within the HER in the Site or study area (**Figure 2**). The closest recorded settlement within Domesday Book (1086) was the small hamlet of Hulton, located c.1.7km to the southwest of the Site, which was recorded as having three households. Other proximate settlements recorded within Domesday Book include Rownall (c.2.4 km east of the Site), Bucknall (c.3km southwest of the Site) and Consall (c.4.4km east of the Site), which are all documented as having no households at the time of the survey. This may indicate that these settlements had been deserted.

A Cistercian abbey (Hulton Abbey) was later founded at Hulton in 1223. The abbey has been described as being very 'poor and small' in comparison to most other Cistercian abbeys and was disbanded in 1538 during the Dissolution.¹

Taking the evidence as a whole, it is most likely that the Site and the study area were located within a very sparsely populated area during the early English and medieval period and were part of the wider lowland health of Wetley Moor. Some larger-scale settlement was later established within the wider area with the founding of Hulton Abbey; however, there is no evidence of settlement or agricultural activity within the Site or study area.

As such, no archaeological remains dating to the medieval period would be anticipated to be present within the Site.

3.4.4 Post-medieval to Modern

No heritage assets of post-medieval date (c.1540-1800) are recorded within the HER in the Site area (**Figure 2**). Six heritage assets of post-medieval date, comprising farmsteads, are recorded within the 1km study area. The closest of these farmsteads to the Site is Little Armshead Farm, located c.15m to the southwest of the Site boundary (**Figure 2; MST21899**). The historical development of the Site itself from the mid-19th century onwards is best described through a cartographic regression (**Plate 4-Plate 7**).

The Tithe Map (1846) illustrates that the Site largely consisted of three parcels of land, labelled as plots 436, 441 and 511, with the proposed route of the Site access track aligned through plot 512 to the east (**Plate 4**). These three fields have the same shape and boundaries as today, with the central watercourse within the Site separating plots 436 and 411 and following an identical trajectory as today.

The land to the south of the Site was depicted as unenclosed at this time and labelled as 'common land' (out of frame in **Plate 4**). Plots 436, 441, 511 and 512 are all also recorded as having the name 'Common Piece', suggesting all were formerly part of this common land within the heath prior to their enclosure. The regularity of the field shapes, along with their shared names, may indicate that the fields were relatively 'recently' enclosed as a result of the Inclosure Act (1773). It is therefore also possible that the dividing sandstone walls identified during the Site visit along the western and northern Site boundaries, and the central dividing field boundary, date to the period of the late 18th or early 19th century. Plot 436 and 441 was recorded as being within arable use within the associated apportionments, whilst 511 and 512 were pasture.

The most westerly plot, 436, was documented in the apportionment as owned by Richard Dean and leased by Joseph Brown. The same landowner and tenant were recorded for Moorside farmstead, located c.880m to the southwest of the Site on the far southwestern side of the heath (**Figure 2; MST21875**).

The most easterly plot, 441 was documented within the apportionment as owned by Samuel Worthington and leased by Joseph Brown. The same landowner and tenant were recorded for an unnamed farmstead located c.720m to the northwest of the asset. This farmstead is not named on any subsequent historic maps and is not recorded as a heritage asset; however, it is still in existence today as part of Kerry Hill Nurseries.

Plots 511 and 512 were both owned by Miss Sparrow Baronet and Sir George Chetwynd Baronet and let to Daniel Basnett. The Baronets owned a large amount of land and property within the area, and Basnett also

¹ Houses of Cistercian monks: The abbey of Hulton', in A History of the County of Stafford: Volume 3, (London, 1970) pp. 235-237. British History Online <https://www.british-history.ac.uk/vch/staffs/vol3/pp235-237> [accessed 13 May 2024].



rented a house from these same landowners, which is today Grade II Listed Bank Farmhouse located c.1.7km to the north of the Site within the village of Bagnall (NHLE 1038119, not depicted on figures).

No material changes are visible within the Site on subsequent historic mapping (**Plate 5-Plate 8**). The most notable changes to the surrounding landscape comprise the partial enclosure of the land to the south of the Site throughout the second half of the 19th century for use as plant nurseries, the construction of Little Armshead Farm to the immediate south between 1877 and 1898, and the construction of New House Farm to the north of the proposed access road route during the mid-20th century. Otherwise, the general landscape use of agricultural fields and farmsteads to the west, north and east of the Site, and heathland/plant nurseries to the south, has remained consistent until the present day. No notable changes are evident from historic satellite imagery over the past two decades (**Plate 9**).

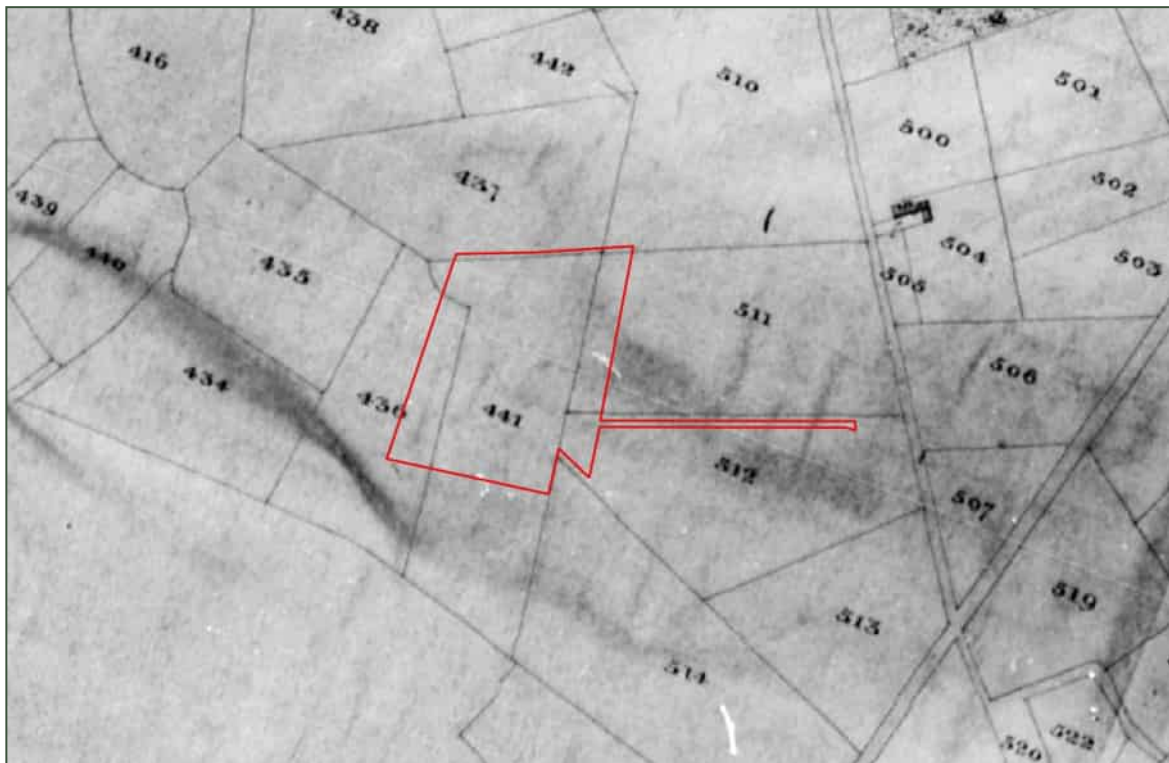


Plate 4: Tithe map of Bucknall and Bagnall. 1846. Retrieved from The Genealogist Online, 08/05/2024





Plate 5: OS Map of Staffordshire XII.11 & 12, 1877. Retrieved from NLS online, 08/05/2024



Plate 6: OS map of Staffordshire Sheet XII.SE, 1898. Retrieved from NLS online, 08/05/2024.





Plate 7: OS Map of Staffordshire Sheet XII.SE, 1922. Retrieved from NLS online, 08/05/2024

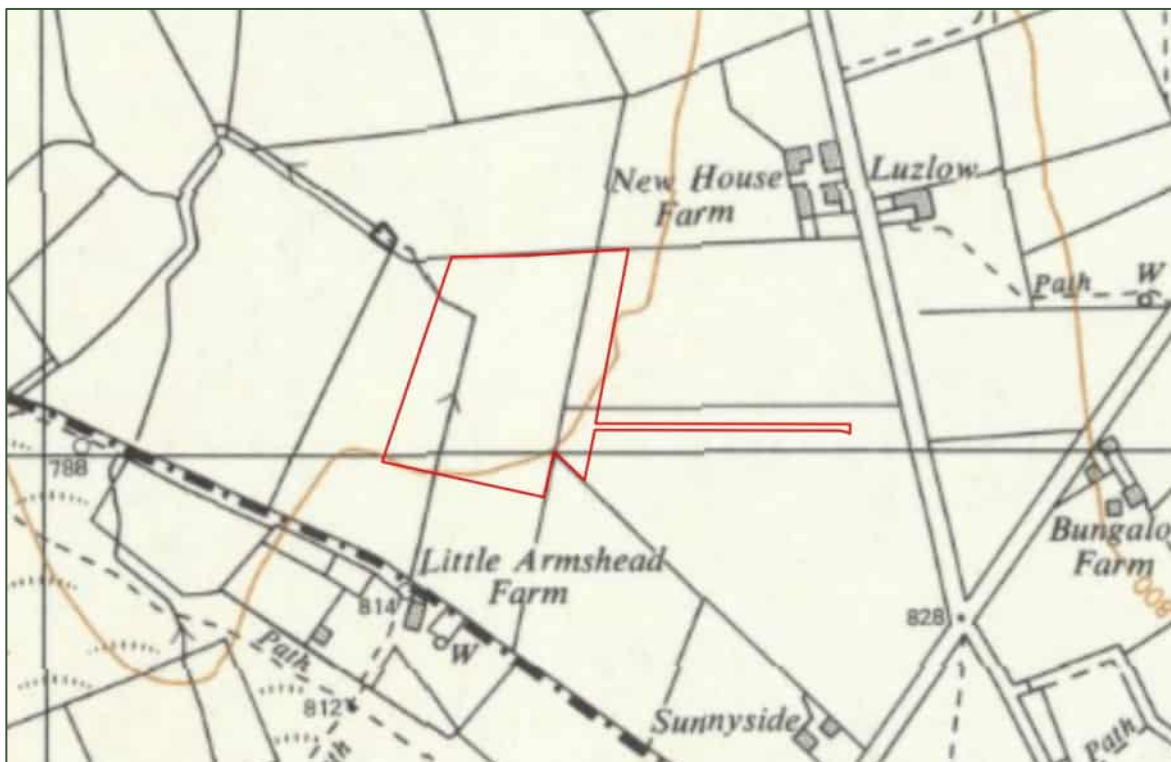


Plate 8: OS Map SJ94NW – A, 1967. Retrieved from NLS online, 08/05/2024





Plate 9: Satellite Image of the Site and surroundings, c.2003. Retrieved from Google Earth Pro, 14/05/2023

3.5 Past Impacts

Based on a review of the historical baseline, it is likely that the Site was part of the common heathland up until the later post-medieval period (mid-18th century onwards). Historic mapping demonstrates that the Site was definitely within agricultural use from at least the mid-19th century onwards. Earlier archaeological remains, if present, therefore, may have been truncated by activities such as the implementation/removal of field boundaries or through the potential creation of drainage within the Site as identified within the LiDAR data (**Plate 3**). **However, the overall physical severity of such impacts on any potential earlier buried remains, in comparison to the wider Site area, would be anticipated to be fairly low.**



4.0 Scoping

4.1 Introduction

This section considers which heritage assets have the potential to be affected by the Proposed Development, through either direct physical change or a change to setting. Assets which may have the potential to be affected are taken forwards to an assessment of significance and impact within Section 5.0.

4.2 Designated heritage assets

There are no designated heritage assets within the Site. No designated heritage assets would therefore be physically impacted by the Proposed Development (**Figure 2**).

4.2.1 Grade II Listed Greenfields Farmhouse

There is one Listed building located within 1km of the Site, comprising the Grade II Listed Greenfields Farmhouse, located c.620m to the northwest of the Site (**Figure 2; 1294674**). This asset was visited during the Site inspection (**Appendix E; Photo 7**). It was determined that there was no intervisibility between the farmhouse and the Site due to landscape topography, with the asset being located on the gentle lower slopes of the higher ground, which contributes towards screening the Site from view (**Appendix E; Photo 8**). Furthermore, it was established that there is dense mature vegetation in the intervening distance between the asset and the Site which provides a screening effect. There is also an alignment of electricity pylons and associated cables which are routed east-west across the landscape within the intervening distance, located c.250m to the southeast and c.400m to the northwest of the asset. As such, **the Site does not form part of the setting of this asset and there would be no impact on its significance as a result of the Proposed Development.**

4.2.2 Grade II Listed Jack Hayes Farm

One listed building is located just outside of the 1km study area, comprising the Grade II Listed Jack Hayes Farm, located c.1.1km to the northwest (**Figure 2; 1374602**). This asset was also visited during the Site inspection; however, it was found that there was no intervisibility with the Site due to distance, topography and dense vegetation (**Appendix E; Photo 9 and Photo 10**). Again, **the Site does not form part of the setting of this asset and there would be no impact on its significance as a result of the Proposed Development.**

4.2.3 Grade II Listed Bank Farmhouse

Grade II Listed Bank Farmhouse is located c.1.7km to the north of the Site within the village of Bagnall (NHLE 1038119, not depicted on figures) and potentially may share an historic landownership link with the eastern fields within the Site, according to the Tithe apportionment records (see 3.4.4). However, the Site shares no intervisibility with the heritage asset due to the large intervening space between the two. The tenant of plots 511 and 512, as recorded within the Tithe apportionment, also leased 25 other plots from the same landowners, many of which are dispersed across the landscape to the north and south of Bagnall, few of which sharing any visibility or physical relationship with the house.

Intervisibility between the asset and the Site is therefore not a factor which contributes towards the significance of the asset nor the understanding of the asset within its modern setting within Bagnall village. For these reasons, the proposed change in use of this small parcel of land within the Site from agricultural to energy storage **would not be anticipated to impact the intelligibility, and as such the heritage significance, of this asset.** This asset is therefore not taken forwards for further assessment within this report.

4.2.4 Summary

No other designated heritage assets are located within the 1km study area. For these reasons, no designated heritage assets are taken forwards for further significance or impact assessment within this report.

4.3 Non-Designated Assets

Six non-designated heritage assets are located within the study area, all comprising farmsteads with construction dates between the 17th and 19th centuries.



4.3.1 Little Armshead Farm

Little Armshead Farm is recorded as being located to the immediate southwest of the Site boundary (**Figure 2; MST21899**). This is recorded as an 'L' shaped farmstead of mid to late 19th century date. The HER record states that the 'farmstead is still extant'.

The Staffordshire Moorlands Planning Portal documents a successful 2013 planning application to entirely replace the former dwelling with a new build at Little Armshead Farm (application reference SMD/2010/0334). The total demolition of the farmhouse can be seen in historic satellite imagery from 2017 onwards on Google Earth (not reproduced within this report). The new dwelling was observed in the location of the former heritage asset during the Site visit (**Appendix E; Photo 11**). No traces of the former farmhouse or any associated outbuildings were identified as being in existence during the Site visit.

As such, it can be concluded that there has been a **total loss of significance** of this heritage asset; nothing remains of its physical fabric or the farmstead plan. As such, **the Proposed Development would have no impact on this heritage asset.**

4.3.2 Moorside Farm

Moorside Farm shares an historic land ownership connection with the most westerly parcel of land within the Site as demonstrated by the Tithe Map and apportionment and outlined in Section 3.4.4 (**Figure 2; MST21875**).

The Site shares no intervisibility with the non-designated asset (**Appendix E; Photo 12 and Photo 13**). The intervening space between the asset and the Site comprises c.880m of heath, which is now interspersed with private residences and mature tree growth. The asset is also located on the lower western slopes of the moorland, further visually separating the asset from the Site. Intervisibility between the asset and the Site is therefore not a factor which contributes towards the significance of the asset nor the understanding of the asset within its modern agricultural setting.

The tenant of plot 436, as recorded within the Tithe apportionment, also leased over 20 other plots from the same landowner, many of which currently surround the Moorside Farm and are intact as working agricultural land. These plots therefore are an aspect of historic setting which contributes to the significance of the non-designated asset, increasing its intelligibility as a farmstead within its functional setting. However, all parcels of land which formed part of the historic landholdings of the farm, *and* which share intervisibility with the asset, would be unaffected by the Proposals.

For these reasons, the proposed change in use of this small parcel of land within the Site from agricultural to energy storage **would not be anticipated to impact the intelligibility, and as such the heritage significance, of this asset.** This asset is therefore not taken forwards for further assessment within this report.

4.3.3 Other Non-Designated Heritage Assets

During the Site visit, it was established that none of the other non-designated farmsteads share any intervisibility with the Site. In all cases, views towards the Site from the assets, and vice versa from the Site towards the assets, are screened by distance, topography, existing built form and the dense vegetation.

In summary, no non-designated built heritage assets are taken forwards for an assessment of significance and impact within this report.

4.4 Archaeological Remains

As outlined within the baseline section, no archaeological remains are recorded within the Site within the HER.

Some pre-c.1840s hedgerow and some denudated sandstone field boundary walls within the centre of the Site, and to the west and south of the Site boundary, were identified during the site visit. There is also a moderate potential for other buried post-medieval agricultural remains, such as remains of historic strip cultivation or unmapped field boundaries.

The presence of other unknown archaeological remains cannot be entirely ruled out at this stage; however, based on surrounding HER data, topographic and geological data, aerial photography, LiDAR, historical mapping and geophysical survey, the probability is considered to be low to nil and none would be anticipated.



4.5 Scoping Summary

In Statements of Heritage Significance, Historic England confirm that '*an analysis of the setting of the heritage asset is only needed where changes to the setting by the proposal would affect the significance of the heritage asset or how that significance is appreciated*' (2019; 15).

As such, no heritage assets are taken forwards for an analysis in relation to their significance nor any impact to their setting within this report.

The only assets taken forwards for further significance and impact assessment are the potential archaeological remains outlined in Section 4.4, owing to the potential for physical impact as a result of the Proposed Development.



5.0 Archaeological Remains Impact Assessment

5.1 Introduction

The heritage interests pertaining to the assets identified in Section 4.4, and the contribution of those interests to the assets' significance, are described below.

In Statements of Heritage Significance, Historic England confirm that it is *'important that the level of detail given in a statement of heritage significance is proportionate to the impact of the proposal'* (Historic England 2019: 11.)

The following assessment is proportionate, in line with the requirements of Paragraph 200 of the NPPF (2023), with the significance of any identified heritage assets and the likely impact of the proposed development.

5.2 Significance Statement

5.2.1 Post-Medieval Agricultural Remains

As outlined within the baseline section, upstanding remains within the Site comprise the c.1800s field boundary treatments, which consist of hedgerow and denudated sandstone walls. If present, other buried agricultural remains could comprise features such as field boundary ditches, the remains of drainage systems and strip cultivation.

These remains would be considered to have low to nil archaeological interest, and as such, corresponding low heritage significance. Such remains would be unlikely to contribute materially to furthering the understanding of agricultural methods during these periods. At most, the remains could make a minor contribution towards the understanding of localised land use during the periods, which is already documented within the Tithe records.

Again, it is very unlikely that such remains would be considered heritage assets of the highest significance under the terms of the NPPF. They would be unlikely to require preservation in situ or otherwise preclude development.

5.2.2 Unknown Archaeological Remains

As outlined in Section 4.4, the presence of archaeological remains of any other nature than that outlined above cannot be discounted. However, extrapolating from the baseline data it is considered improbable that other archaeological remains would be present within the Site.

If extant, there is nothing to indicate that any remains within the Site would be of greater than low or medium heritage significance. It is unlikely they would be considered heritage assets of the highest significance under the terms of the NPPF and would therefore also not require preservation in situ.

5.3 Impact Assessment

5.3.1 Proposed Development

The Proposed Development comprises:

- 24no Battery Clusters;
- 12no Transformer and Invertors;
- 33kV/415V Site Supply Transformer;
- 2no 33kV BESS Switchroom;
- 132/33kV Substation Transformer;
- 1no Site Welfare and LV Switchroom;
- 2no Water Tanks; and
- 2no 132KV Substation Switchrooms



A plan of the Proposed Development is presented in **Appendix C**.

5.3.2 Impact

5.3.2.1 Boundary Impacts

The development plan indicates that the central dividing sandstone wall within the centre of the Site would be partially removed at its northern end, with c.95m of walling to be eliminated. A c.130m length of hedgerow within the northeastern part of the Site would also be removed.

The central sandstone wall is in a poor condition and given its low heritage significance, it is anticipated that the impact caused by its partial removal could be somewhat offset by a brief photographic record documenting its condition and form (as provided within Section 2.1 of this report).

The removal of a section of hedgerow in the northwestern corner of the Site would not be anticipated to comprise an impact that requires consideration within the planning process, given that the hedgerow is likely the product of a post-enclosure (post-1800) landscape and that the majority of the fields' boundaries (more than 80%) would be unaffected by the Proposals.

5.3.2.2 Buried Remains Impacts

Potential impact to any underlying archaeological remains within the Site might result from the following construction activities:

- site investigation works, including geotechnical test-pitting and borehole sampling;
- topsoil and subsoil stripping, and any other ground preparation works, e.g., site levelling, ground reduction and/or 'cut and fill';
- excavation of building foundation trenches, road trenches, and service trenches.

The assumption would have to be that the above activities would, in combination, likely result in the truncation of any buried archaeological remains within the development footprint. This would have a negative impact upon the significance of the remains, as it would impact the ability to appreciate, understand and/or interpret them.

It may be possible to mitigate potential physical impacts to any archaeological remains through the design of the scheme and preserve them in situ. However, in areas where this is not possible, the harm may be somewhat offset by a proportionate programme of evaluation, recording and analysis of any remains within the footprint of the groundworks.



6.0 Conclusion

The Site does not contain any designated heritage assets, and no designated heritage assets will be physically affected by the Proposed Development.

No non-designated heritage assets are recorded within the Site in the Staffordshire HER. Some pre-c.1840s hedgerow and some denudated sandstone field boundary walls were identified within the Site during the site visit. There is also a moderate potential for buried post-medieval agricultural remains, such as field boundary ditches, drainage systems and strip cultivation.

These remains have been identified as likely holding nil to medium archaeological interest, and therefore corresponding nil to medium heritage significance. As such, **none of the remains have been identified as having the potential to be heritage assets of the highest significance and would be unlikely to require preservation in-situ or otherwise preclude development within the Site.**

The removal of part of the central sandstone field boundary and part of a hedgerow within the Site and the truncation or total removal of potential underlying archaeological remains as a result of groundworks relating to construction works within the Site have been identified as potential impacts, which would reduce the significance of these remains. Any harm to such remains ought to be weighed in the balance, as per paragraph 209 of the NPPF.

The removal of part of the sandstone wall may be offset by a brief photographic record of the feature as provided within Section 2.1. If buried remains are present, a proportionate programme of (if necessary) evaluation, recording and analysis, may be an appropriate method of offsetting some of the harm, through preservation by record.

Following the site inspection in May 2024, it is confirmed that the Site does not form part of the setting of any extant heritage assets, and therefore contributes nothing to the significance of any heritage assets within proximity. **No heritage assets have any potential to be affected by development within the Site through a change to setting.**

Overall, the proposals are considered to be consistent with the provisions of the Scheduled Monuments and Archaeological Areas Act (1979), the Planning (Listed Buildings and Conservation Areas) Act (1990), Section 66(i), the NPPF, paragraphs 200-209, as well as the relevant provisions of the *Staffordshire Moorlands Local Plan* (Adopted September 2020).



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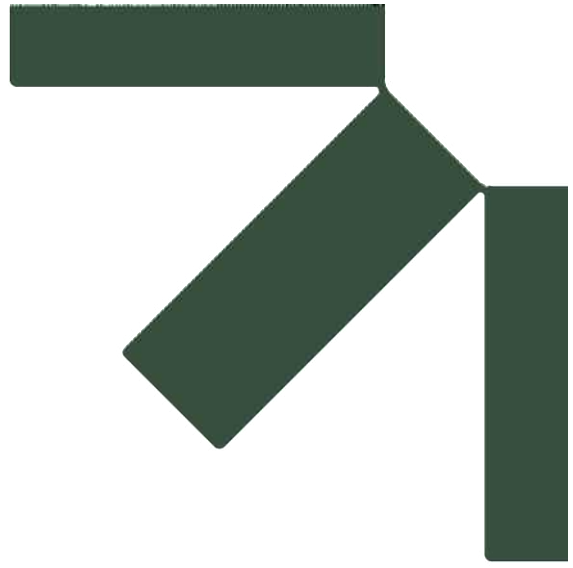
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Appendix A Relevant local planning policy

Staffordshire Moorlands Local Plan (Adopted September 2020)

The following policies referring to the historic environment and relevant to this report are as follows:

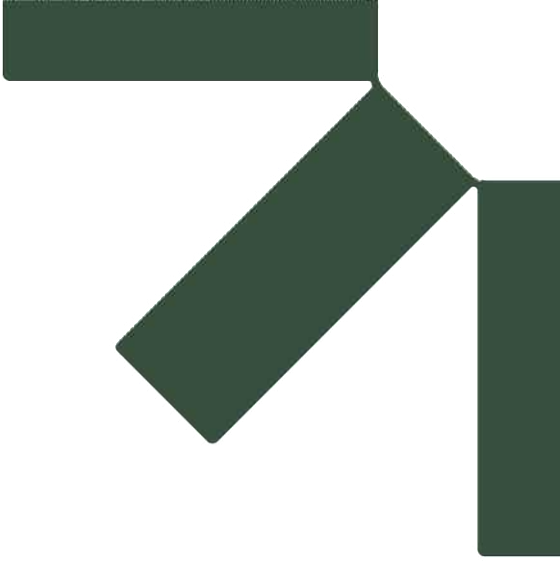
Policy DC 2 The Historic Environment

- 1 The Council will conserve and where possible enhance heritage assets, including their setting in a manner appropriate to their significance. This will take into account the desirability of maintaining and enhancing their significance and will ensure that development proposals contribute positively to the character of the built and historic environment.
- 2 Protection will be given to designated heritage assets and their settings and non-designated heritage assets as set out in the NPPF.
- 3 All applications likely to affect heritage assets will require the submission of a heritage statement, including a qualitative visual assessment where appropriate.
- 4 Where development is likely to affect archaeology, both designated and undesignated, the Council requires the submission of a desk based assessment, and where appropriate, field surveys and trench evaluation by a qualified professional.
- 5 Where the loss of significance is unavoidable, recording should take place and this should be added to the Historic Environment Record as a minimum, held by Staffordshire County Council.
- 6 The Council will continue its proactive approach to heritage assets at risk and welcomes development proposals which would result in the sympathetic reuse of these assets in line with NPPF policy.
- 7 The Council will promote development which sustains, respects or enhances buildings and features which contribute to the character or heritage of an area and those interests of acknowledged importance through the use of Conservation Area Appraisals, Design Guidance and Statements, Archaeological Assessments, Characterisation Studies and Masterplanning.

Policy SD 2 Renewable/Low-Carbon Energy

The Council will strive to meet part of the District's future energy demand through renewable or low-carbon energy sources (which could be through a variety of technologies, for example solar energy, biomass etc), in line with current evidence which identifies the feasibility of these forms of energy across the District. The Council will assess wind turbine schemes in line with the Government's specific policy on wind turbines. For all other forms of renewable energy the Council will support small- and large- scale stand alone renewable or low-carbon energy schemes subject to the following considerations:

- ... the impact on the amenity of residents and other interests of acknowledged importance, including the historic environment;...



Appendix B Methodology and Glossary of Key Terms

Methodology

Standards

The assessment has been undertaken in accordance with all relevant statute, policy, and guidance. The assessment has been undertaken by Lauren O'Toole, Senior Heritage Consultant, MSc., ACIfA.

The assessment was signed off by Dr Emma Wells, Technical Director - Historic Buildings (MCIfA, FSA).

Site visit

A site inspection was undertaken on 13th May 2024 to assess the Site within its wider landscape context. A settings assessment was undertaken during the site visit, including visits to all nearby heritage assets.

Study area

A 1-kilometre study area was used to create a baseline for assessment, factoring any heritage assets beyond the study area where any meaningful visual, spatial, thematic, or historical functional association was identified. HER data was acquired out to 1 kilometre to inform the assessment.

Sources

The Staffordshire Historic Environment Record (HER), and relevant map and document resources were consulted during the preparation of this report. The National Heritage List for England (NHLE) was consulted to provide information on scheduled monuments, registered parks and gardens, registered battlefields, and listed buildings. Available published and unpublished documents were consulted, and historic land-use has been reconstructed. Sources consulted are listed in the Bibliography section at the end of the report.

Key Terms

Heritage assets

The National Planning Policy Framework (NPPF) 2023 defines heritage assets as: ...a building, monument, site, place, area or landscape identified as having a degree of significance meriting consideration in planning decisions, because of its heritage interest. It includes designated heritage assets and assets identified by the local planning authority (including local listing).

Significance

The NPPF defines significance as: the value of a heritage asset to this and future generations because of its heritage interest. The interest may be archaeological, architectural, artistic, or historic. Significance derives not only from a heritage asset's physical presence, but also from its setting. For World Heritage sites, the cultural value described within each site's Statement of Outstanding Universal Value forms part of its significance.

Current national guidance for the assessment of the significance of heritage assets expresses significance in terms of 'interests', as used within this report, and as per the NPPF definition (see *Statements of Heritage Significance: Analysing Significance in Heritage Assets*, Historic England 2019). Interests are analogous with 'special interest' as used within the Planning (Listed Buildings and Conservation Areas) Act 1990, and with the 'values' as set out in Historic England's *Conservation Principles, Policies and Guidance* (English Heritage 2008). The interests set out under the NPPF include:

- *Archaeological Interest: there will be archaeological interest in a heritage asset if it holds, or potentially holds, evidence of past human activity worthy of expert investigation at some point.*
- *Architectural and Artistic Interest: these are interests in the design and general aesthetics of a place. They can arise from conscious design or fortuitously from the way the heritage asset has evolved. More specifically, architectural interest is an interest in the art or science of the design, construction, craftsmanship and decoration of buildings and structures of all types. Artistic interest is an interest in other human creative skill, like sculpture.*
- *Historic Interest: An interest in past lives and events (including pre-historic). Heritage assets can illustrate or be associated with them. Heritage assets with historic interest not only provide a material record of our nation's history but can also provide meaning for communities derived from their collective experience of a place and can symbolise wider values such as faith and cultural identity.*

These interests should not be seen as prescriptive, but rather as a guide for understanding the significance of a heritage asset; for example, a heritage asset may have interests beyond the scope of archaeological, architectural, or historic interest – they may have communal value or may be significant for their group value, etc.

This assessment was also informed by the advice published by Historic England in the document entitled *Managing Significance in Decision-Taking in the Historic Environment: Good Practice Advice in Planning Note 2* (2015) and *Local Heritage Listing: Identifying and Conserving Local Heritage* (2021).

Setting

The NPPF defines setting as: the surroundings in which a heritage asset is experienced. Its extent is not fixed and may change as the asset and its surroundings evolve. Elements of a setting may make a positive or negative contribution to the significance of an asset, may affect the ability to appreciate that significance or may be neutral.

The setting assessment within this report was guided by the recommendations outlined in *The Setting of Heritage Assets: Historic Environment Good Practice Advice in Planning. Note 3* (Historic England 2017), which align with the general EIA process. The guidance advocates a staged approach to the assessment of the effects of development on the significance of heritage assets due to a change within their setting, using a five-step process:

- Step 1: Identify which heritage assets and their settings are affected by the proposed development
- Step 2: Assess the degree to which these settings make a contribution to the significance of the heritage asset(s) or allow their significance to be appreciated
- Step 3: Assess the effects of the proposed development, whether beneficial or harmful, on the significance of the identified heritage assets, or on the ability to appreciate it
- Step 4: Explore ways to maximise enhancement and avoid or minimise harm to that significance
- Step 5: Make and document the decision and monitor outcomes

Harm

Potential development effects (impacts) to heritage assets are discussed in terms of 'harm', with reference to the NPPF (2023). Harm, in heritage terms, relates to a negative effect stemming from a change which results in a diminishment of the significance of a heritage asset, or the ability to appreciate that significance. The NPPF allows that harm may be either substantial or less than substantial and may vary within each category. How harm is assigned will trigger differing tests under the NPPF. Where harm to a designated heritage asset, or a non-designated heritage asset of equivalent significance, is identified, it must be given great weight in the planning decision. While it is up to the decision maker to determine the nature and degree of harm, they must take into account necessary expertise, and the particular significance of any heritage asset which may be affected (NPPF paragraph 201).

- *Substantial harm (or total loss of significance)*

An impact which results in a '*...total loss of significance...*' (NPPF paragraph 207). The National Planning Policy Guidance sets out that substantial harm... '*...is a high test, so it may not arise in many cases. For example, in determining whether works to a listed building constitute substantial harm, an important consideration would be whether the adverse impact seriously affects a key element of its special architectural or historic interest. It is the degree of harm to the asset's significance rather than the scale of the development that is to be assessed. The harm may arise from works to the asset or from development within its setting*'. Substantial harm can be defined as having '*...such a serious impact on the significance of the asset that its significance was either vitiated altogether or very much reduced*'²; and

- *Less than substantial harm*

Being any lesser level of harm than that defined above; recent case law has confirmed that this includes any level of harm (not considered substantial) regardless of its quantification, e.g., the finding

² Bedford Borough Council v Secretary of State for Communities & Local Government & Anor [2008] EWHC 2304 (Admin).

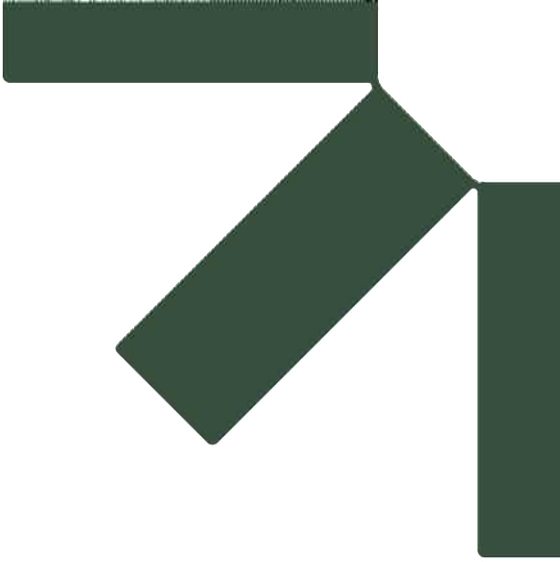
of a 'negligible' level of harm to a designated heritage asset must still be treated as less than substantial harm and be weighed in the balance under paragraph 208.

The PPG provides that the category of harm identified for any given asset be 'explicitly identified', and that the extent of that harm be 'clearly articulated'. For purposes of this assessment, this is done with reference to a 'spectrum', e.g., at the lower/upper end of the spectrum of less than substantial.

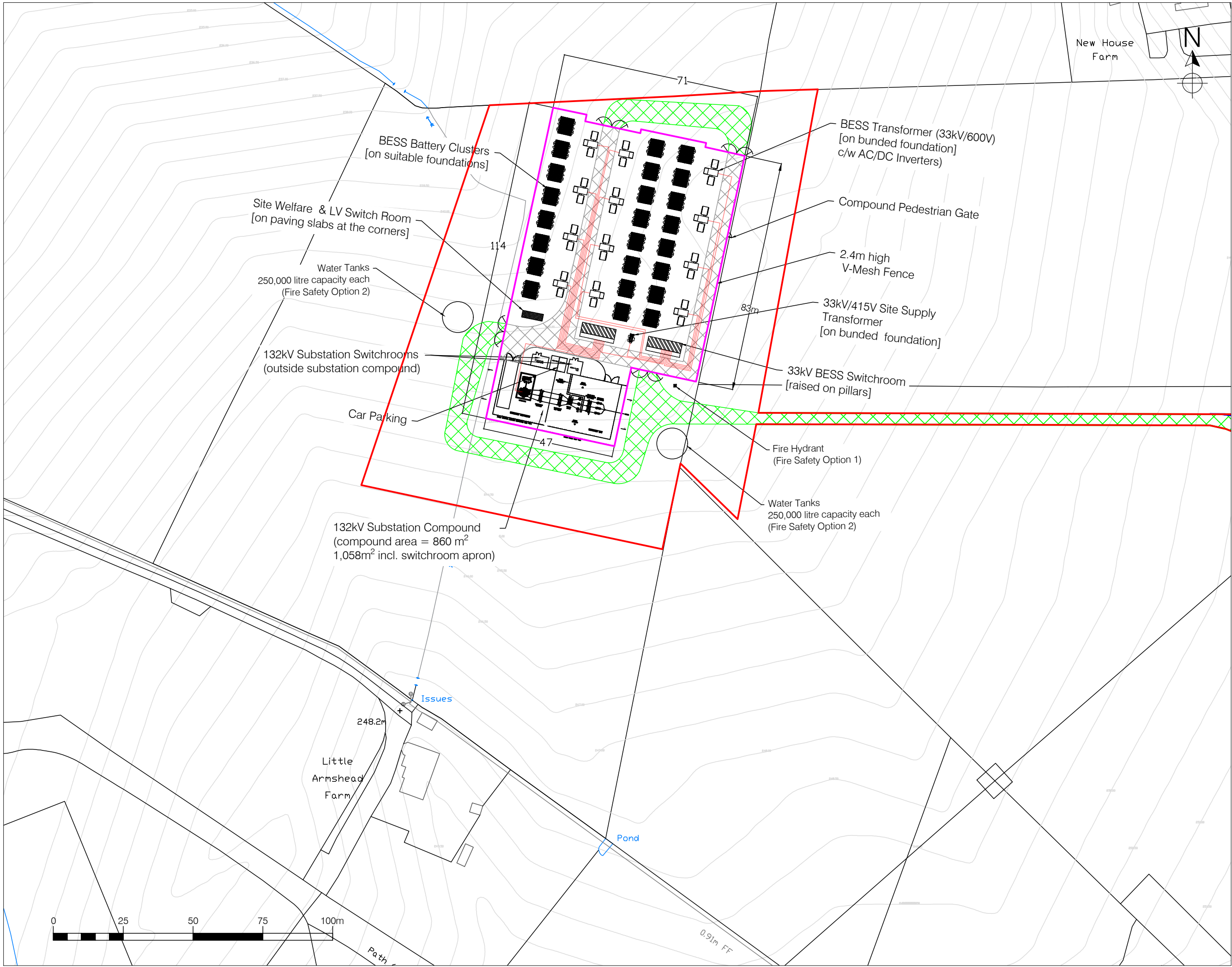
Where an impact, or harm to, the significance of a non-designated heritage asset is identified, a balanced judgement will be required having regard to the scale of any harm or loss and the significance of the heritage asset.

Where there is no harm to a heritage asset, an impact may be neutral or may enhance its significance. Statute and the NPPF indicate that great weight should be afforded any development or aspect of a development that would preserve or enhance the significance of a designated heritage asset. As of the adoption in October 2023 of the Levelling-up and Regeneration Bill 2023, and its revisions to the Planning (Listed Buildings and Conservation Areas) Act 1990 and the Town and Country Planning Act 1990, this includes enhancements to listed buildings, and preservation or enhancements to Scheduled Monuments, Registered Parks and Gardens, and World Heritage Sites, in addition to conservation areas.

As clarified in the High Court, preservation does not mean that change is not possible; it specifically means no harm. This is echoed in *Managing Significance in Decision-Taking in the Historic Environment: Historic Environment Good Practice Advice in Planning 2* (GPA 2), which states that '*Change to heritage assets is inevitable but it is only harmful when significance is damaged*'. The Levelling-up and Regeneration Bill 2023 stipulates that preserving or enhancing means '*preserving or enhancing a relevant asset or its setting includes preserving or enhancing any feature, quality or characteristic of the asset or setting that contributes to the significance of the asset*'.



Appendix C Proposed Development Plan

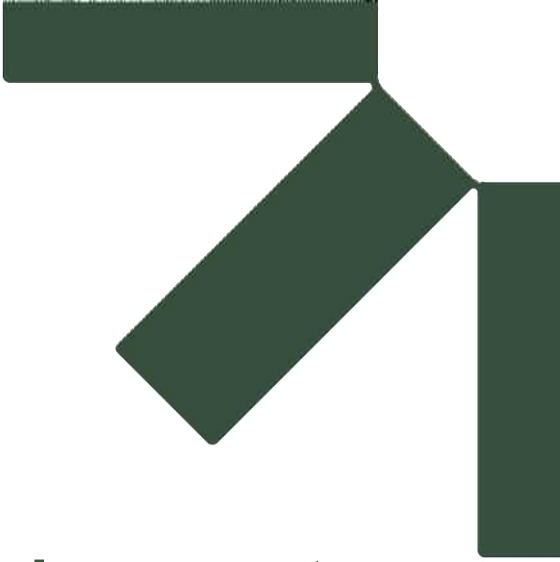


LEGEND

- Planning Boundary (area = 20,282m²)
- Compound Boundary (area = 7,265m²)
- Site access from Bagnall Road (length ~255m)

GIA (Gross Internal Area)
= 1,746m²

1	26/09/24	Compound layout changed to accommodate increased battery spacing.
Rev. Suffix	Date	Details
SITE Land Adjoining New House Farm Luzlow, Bagnall, Stoke-On-Trent ST9 9JZ		
TITLE 99MW BESS Layout Plan with Access Road		
DWS. No. LZL-BESS-001.5		REV 2
SCALE 1:1,250 @ A3		DATE 26/09/24
DRAWN KN		STATUS Planning
ROOT POWER		



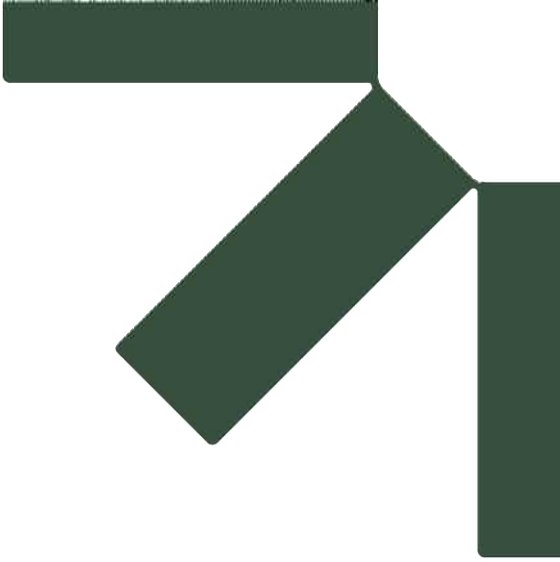
Appendix D Historic Environment Record Gazetteer

Designated Heritage Assets

Listing Number	Name
Grade II Listed Buildings	
1294674	Greenfields Farmhouse
1374602	Jack Hayes Farmhouse

Non-designated Heritage Assets

Ref. No	Name
MST4046	Flint End Scraper Findspot, Bagnall
MST14206	Lower Greenfields Farm, Jack Haye Lane, Bagnall
MST21875	Moorside Farm, Wetley Moor, Werrington
MST21876	Yew Tree Farm, Eaves Lane, Wetley Moor, Werrington
MST21898	Armshead Farm, Armshead Road, Armshead, Werrington
MST21899	Little Armshead Farm, Wetley Moor, Werrington
MST21913	Hedgecroft Farm, Wetley Moor, Bagnall
MST5697	Mine, Wetley Moor



Appendix E Geophysical Survey Report (2024)

New House Farm, Luzlow, Stoke-on-Trent

Geophysical Survey Report for SLR Consulting

July 2024

Ecus Ltd

Report to: SLR Consulting

Report Title: New House Farm, Luzlow, Stoke-on-Trent –
Geophysical Survey Report

Version: V1.0

Issue Date: July 2024

Report Ref: 23866

Originated By:



Daniel Yates
Senior Project Supervisor

Date: 05/07/2024

Approved By:



Alex Schmidt
Associate Director

Date: 08/07/2024

Prepared by:
Brook Holt, 3 Blackburn Road, Sheffield, S61 2DW
01142 669 292

Version	Author	Description	Date
0.1	DY	First draft	05/07/2024
1.0	AS	QA2	08/07/2024

The report and the site assessments carried out by Ecus on behalf of the client in accordance with the agreed terms of contract and/or written agreement form the agreed Services. The Services were performed by Ecus with the skill and care ordinarily exercised by a reasonable Environmental Consultant at the time the Services were performed. Further, and in particular, the Services were performed by Ecus taking into account the limits of the scope of works required by the client, the time scale involved and the resources, including financial and manpower resources, agreed between Ecus and the client.

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Ecus accepts no responsibility for the accuracy of third party data used in this report.

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Figure 1 – Site Location

Figure 2 – Greyscale Plot

Figure 3 – Interpretation Plot

1. Summary

- 1.1.1 Ecus Ltd were commissioned to carry out an archaeological geophysical survey for SLR Consulting Ltd at New House Farm, Luzlow, Stoke-on-Trent, in July 2024. A total of five linear areas within four agricultural fields were surveyed, measuring a combined area of c. 2 ha. The Site is situated on the west side of Luzlow Lane, 1.2 km north-northwest of Werrington and 2.2 km northeast of the periphery of Stoke-on-Trent.
- 1.1.2 The geophysical survey produced good data and highlighted several anomalies that are interpreted as modern in origin. A series of positive, interconnected linear anomalies have been identified traversing the survey area predominantly in the west. These are likely to be a network of land drains. Several smaller anomalies also interpreted as land drains are noted to the southeast.
- 1.1.3 Elsewhere, modern ferrous disturbance is noted throughout the survey area, including to the north surrounding a probable underground service such as a pipe or cable, as well as to the southeast under the overhead powerlines.

2. Introduction

2.1 Project Background

- 2.1.1 Ecus Ltd were commissioned by SLR Consulting to undertake a programme of archaeological geophysical survey ahead of a proposed development on land at New House Farm, Luzlow, Stoke-on-Trent (hereafter 'the Site'), centred on National Grid Reference (NGR) 393320 349080 (SJ 93320 49080) (Figure 1).

2.2 Location, Topography and Geology

- 2.2.1 The Site was located immediately to the west of Luzlow Lane, 1.2 km north-northwest of Werrington and 2.2 km northeast of the periphery of Stoke-on-Trent. The survey area was c. 2 ha in size and comprises five generally linear portions across four agricultural fields. The immediate field boundaries were demarcated by hedgerows, trees and ditches.
- 2.2.1 The survey area was on a west-facing slope, falling from approximately 251 m above Ordnance Datum (aOD) to the east of the linear corridor to the southeast, to approximately 241 m aOD at the western boundary.
- 2.2.2 The underlying geology is recorded as Mudstone, Siltstone and Sandstone of the Millstone Grit Group throughout the majority of the Site. An area of Rough Rock (Sandstone) is noted to the west and Chatsworth Grit (Sandstone) to the east. The superficial deposits are recorded as Till, Devensian – Diamicton (British Geological Survey, 2024).

3. Archaeological and Historical Background

3.1 Introduction

- 3.1.1 The following historical and archaeological background has been compiled using publicly available online resources within an approximate 2 km search radius. While not exhaustive, the below aims to present a summary of the known archaeological and historical resource considered relevant to the interpretation of the geophysical survey data.
- 3.1.2 No archaeological investigations have taken place within the survey area.

3.2 Summary of Archaeological and Historical Resource

Prehistoric

- 3.2.1 An axe head believed to be Neolithic or Bronze-Age in date, was discovered at Moore Hill Farm located c. 1.24 km northeast of the Site in 1964. A second axe head of similar date was also found at Bank Hill Farm located c. 1.48 km northwest of the Site.
- 3.2.2 A probable Neolithic end scrapper was found c. 220 m southwest from the Site. The scrapper was heavily abraded and retouched at the distal end.

Medieval

- 3.2.3 The nearby village of Bagnall located c. 1.84 km northeast of the Site and is believed to be an old medieval settlement. The local church is thought to be of medieval origin.
- 3.2.4 Evidence of medieval ridge and furrow cultivation is visible in aerial photography c. 1.56 km northeast of the Site. An earthwork bank in the shape of a crescent is also visible within the same area (Hunting Surveys Ltd. 1963).
- 3.2.5 Remnants of ridge and furrow are also evident c. 1.9 km North of the Site at Bagnall Golf Course. Though these have mostly degraded due to modern use of the course.

Post medieval to modern

- 3.2.6 There are several Grade II listed buildings within the search radius of the Site. Specifically, within the nearby village of Bagnall. These are comprised of dwellings and farm buildings originating in the 18th to early 20th centuries.
- 3.2.7 In 1890, an infectious disease hospital was constructed c. 1.7 km northwest of the Site. Originally a timber structure, it was rebuilt in brick 1906. Bagnall Heights Retirement Home now sits on the original site.

- 3.2.8 In August 1944, an American P-47 Thunderbolt fighter-bomber crashed during a training exercise at Greenway Hall Golf Course c. 2.24 km northwest of the Site. The wreckage of the plane was excavated in the 1980's and is marked by a depression in the ground.

4. Geophysical Survey Methodology

- 4.1.1 All survey work was completed to appropriate standards, as outlined by existing guidance (ClfA 2020a; 2020b, 2022; Schmidt *et al.* 2015).
- 4.1.2 The gradiometer survey was completed using Sensys FGM650/3 dual magnetic gradiometer system with data logger mounted on a non-magnetic cart-system and towed behind an All-Terrain Vehicle at a suitable distance. Readings were recorded at a resolution of 0.01 nT and data collected with a traverse interval of 0.75 m and a sample interval of between 0.20–0.25 m (further details are available in Appendix A).
- 4.1.3 Data was collected by traversing the survey area in 4.5 m increments with the gradiometer systems mounted on a carbon fibre hand-pushed cart to achieve the best possible results. Real Time Kinematic (RTK) differential GPS equipment was used to accurately determine the position of the survey equipment and monitor data.
- 4.1.4 The processing of survey data was undertaken using TerraSurveyor64 software and consisted of standard processing procedures. The accompanying figures were created using QGIS software and support the findings of the survey as described in Section 6 and 7 below.
- 4.1.5 Interpretation of identified anomalies was achieved through analysis of anomaly patterning and increases in magnetic response and was aided by examining the available supporting information. The interpretations follow Ecus' colour coding and categorisations of anomalies and attempt, where possible, to suggest the nature of buried features (see Appendix A).

5. Mitigating Factors

- 5.1.1 At the time of the survey, Site conditions were dry with all survey areas comprised of harvested grassland. This did not have a negative effect on the quality of the survey data. However, haybales were present across the survey area which has resulted in small gaps in the survey data where obstacles were avoided.
- 5.1.2 Field boundaries comprised hedgerows and wire fencing. Where necessary, a 2 m-buffer was maintained along the wire fencing and other obstacles to minimise the effects of magnetic interference on the survey data and to help to reduce, as far as reasonably practicable, any non-detection of potential buried features.
- 5.1.3 The results of the geophysical survey may not reveal all potential archaeology within a survey area, and geological, agricultural and modern features may limit the detection of weaker archaeological responses.

6. Results of Interpretation

6.1.1 Anomalies found within the survey data are listed in Table 1 and shown on Figure 3.

Table 1: Survey Anomalies

Anomaly Number	Anomaly Type	Description	Interpretation
1.	Land Drains	Weak, interconnected positive linear anomalies on various alignments to the west of the survey area.	These anomalies represent a modern field drainage system.
2.	Modern Service	Strong, dipolar linear anomaly noted traversing the northeast linear portion of the survey area on a northwest to southeast alignment.	This anomaly indicates an underlying service such as a pipe or cable.
3.	Ferrous Disturbance	A series of irregular shaped, dipolar anomalies predominantly noted at the periphery of the survey area as well as surrounding anomaly (2), as well as to the southeast at (3)	These anomalies are likely caused by proximity to boundary fencing and as well as the underlying service to the northeast (2). Anomaly (3) is caused by an overhead powerline traversing this portion of the survey area.
N/A	Ferrous Spike	Circular dipolar anomalies located throughout the Site.	These anomalies most likely indicate sporadic agricultural waste or other ferrous materials as a result of modern agricultural practice.

7. Discussion

- 7.1.1 The geophysical survey produced good data and highlighted several anomalies that are interpreted as modern in origin. A series of positive, interconnected linear anomalies have been identified traversing the survey area predominantly in the west. These are likely to be a network of land drains.
- 7.1.2 Elsewhere, modern ferrous disturbance is noted throughout the survey area, including to the north surrounding a likely underground service such as a pipe or cable, as well as to the south under the overhead powerlines.
- 7.1.3 While anomalies associated with recent agricultural land use are prevalent in the survey data, these are not likely to be of medieval or earlier origin, such as those identified in the surrounding landscape. No further anomalies indicating archaeological features have been identified.

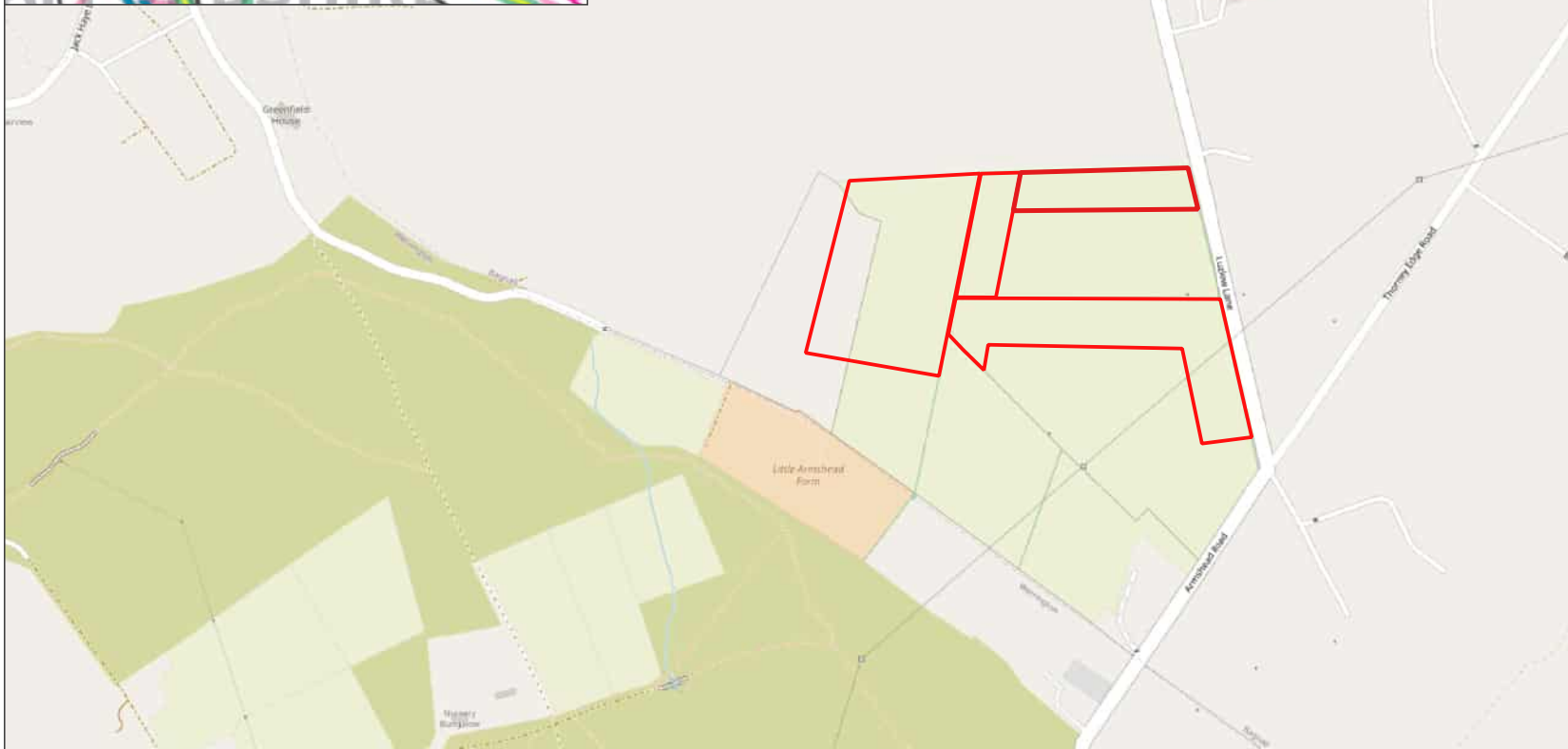
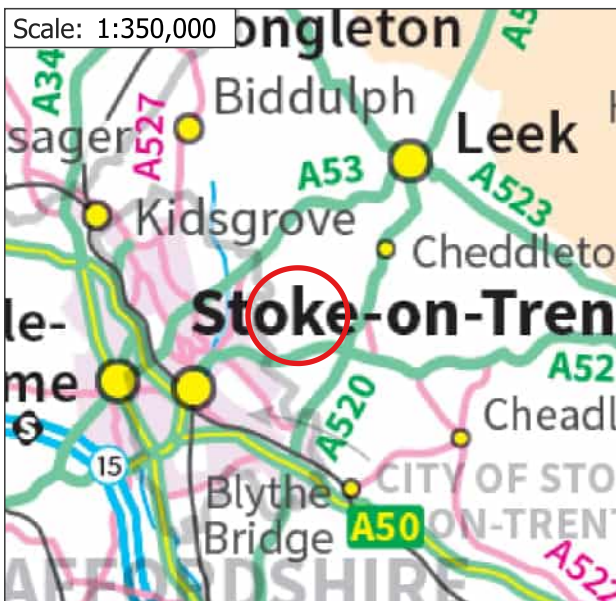
8. Storage and Curation

- 8.1.1 The archive will be prepared in accordance with national guidelines (ClfA 2020b). The integrity of the primary field record will be preserved. Security copies will be maintained where appropriate. Digital records of the geophysical survey will be held by Ecus.
- 8.1.2 An OASIS form has been created on the results of the works under the reference number (ecusltd1-526677). Following approval, a pdf version of the final version of this report will be submitted within three months to the Archaeology Data Service via the OASIS form.

References

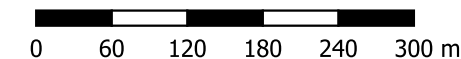
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Scale: 1:350,000



Key

Site Boundary



SLR Consulting
New House Farm, Luzlow,
Stoke-on-Trent

Figure 1
Site Location

A	17.06.24	PFP	-
Rev	Date	Drawn by	Checked by
Site centred on:		SJ 93363 49110	



Key

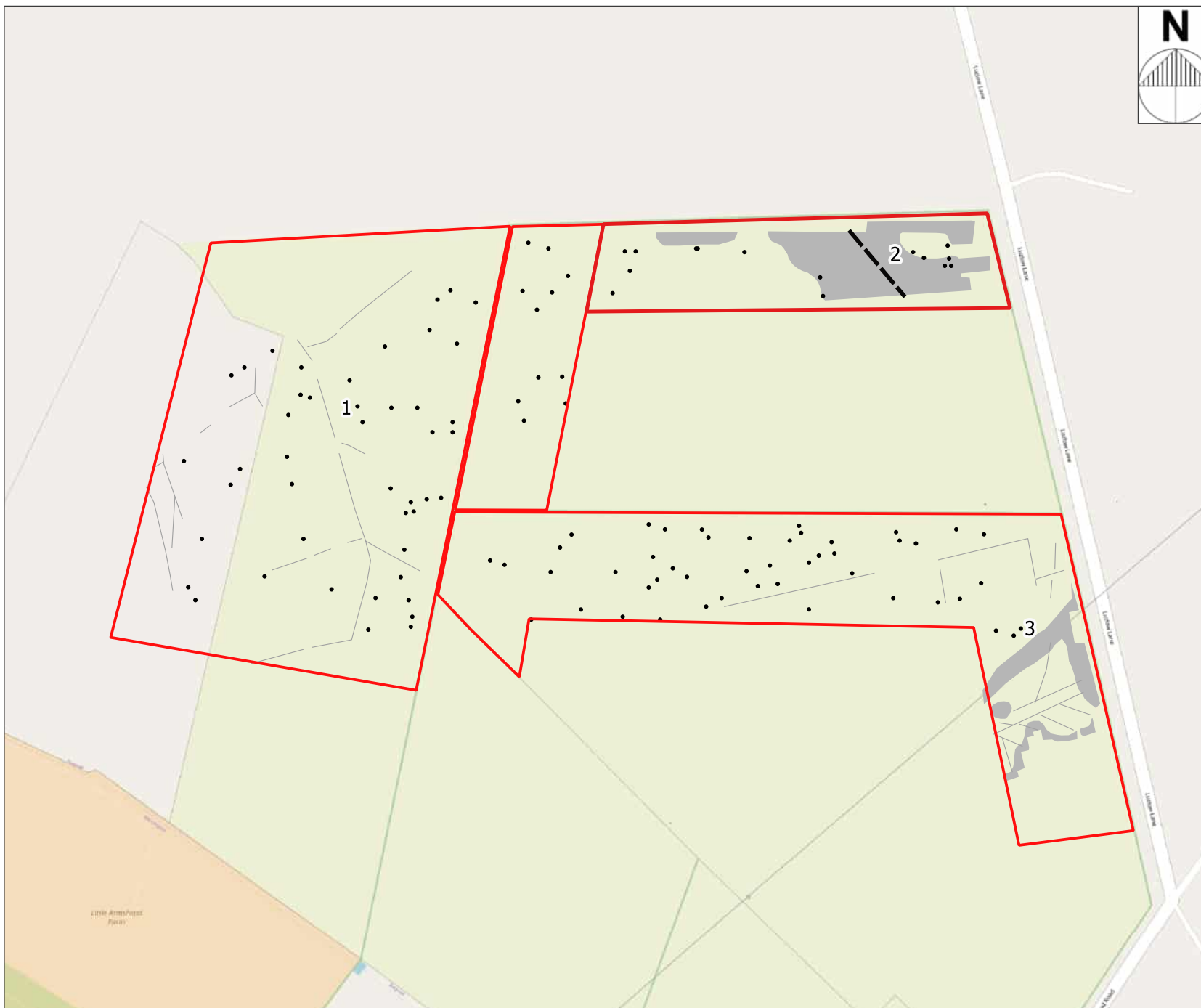
Site Boundary



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Stoke-on-Trent

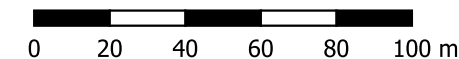
Figure 2
Greyscale Plot

A	18.06.24	PFP	-
Rev	Date	Drawn by	Checked by
Site centred on:		SJ 93363 49110	



Key

- Site Boundary
- Drainage
- Service
- Ferrous spike
- Ferrous Disturbance



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Stoke-on-Trent

Figure 3
Interpretation Plot

A	18.06.24	PFP	-
Rev	Date	Drawn by	Checked by
Site centred on:		SJ 93363 49110	

Appendix 1: Technical Information

Gradiometer Survey

Magnetic surveys measure distortions in the earth's magnetic field caused by small magnetic fields associated with buried features (Gaffney and Gater 2003, 36) that have either remnant or induced magnetic properties (Aspinal *et al.* 2008, 21–26). Human activity and inhabitation often alter the magnetic properties of materials (Aspinal *et al.* 2008, 21) resulting in the ability for numerous archaeological features to be detected through magnetic surveys. Intensive burning or heating can result in materials attaining a thermoremanent magnetisation; examples of which include kilns, ovens, hearths, and brick structures (Aspinal *et al.* 2008, 27; Gaffney and Gater, 2003, 37). When topsoil-rich with iron oxides, fills a man-made depression in the subsoil, it creates an infilled feature, such as a pit or ditch, with a higher magnetic susceptibility compared to the surrounding soil (Aspinal *et al.* 2008, 37–41; Gaffney and Gater 2003, 22–26). Magnetic surveys can also detect features with a lower magnetic susceptibility than the surrounding soil, an example of which is a stone wall.

Limitations

Poor results can be due to several factors including short lived archaeological occupation/use or sites with minimal cut or built features. Results can also be limited in areas with soils naturally deficient in iron compounds or in areas with soils overlying naturally magnetic geology, which will produce strong responses masking archaeological features.

Overlying layers, such as demolition rubble or layers of made ground, can hide any earlier archaeological features. The presence of above ground structures and underground services containing ferrous material can distort or mask nearby features.

Particularly uneven or steep ground can increase the processing required or distort results beyond the capabilities of processing. It is also possible in areas containing dramatic topographical changes that natural weathering, such as hill wash, often in combination with intensive modern ploughing, will reduce the topsoil on slopes and towards the peaks of hills and possibly destroy or truncate potential archaeological features. Conversely features at the bottom of slopes may be covered by a greater layer of topsoil and so if buried features are present, they appear faint within the results, if at all.

Over-processing of data can also obscure or remove features, especially if there are on the same orientation as the direction of data collection. Consequently, where possible, attempts are made to ensure data is not collected on the same orientation as known potential features and that data quality is sufficient to minimise the required data processing.

Instrumentation

The data was collected using Bartington Grad 601-2 fluxgate gradiometers, either in a cart configuration with four sensors arranged at one metre intervals or as handheld pairs of sensors. The Bartington 601-2 is a single axis, vertical component fluxgate gradiometer comprising a data logger battery cassette and two sensors. The sensors are Grad-01-1000L cylindrical gradiometer sensors mounted on a rigid carrying frame; each sensor contains two fluxgate magnetometers with 1 m vertical separation.

The difference in the magnetic field between the two fluxgates in each sensor is measured in nano Tesla (nT). The gradiometer data is recorded with a range of $\pm 100\text{nT}$, which equates to a resolution of 0.01nT . It should be noted that the actual resolution is limited to 0.03nT because of internal instrumental noise (Bartington Instruments Ltd, n.d., 23). The gradiometers are calibrated at the start of every day and recalibrated whenever necessary.

The data was collected using SENSYS FGM650/3 magnetometer in a cart configuration with five sensors arranged at 1 m intervals. This gradiometer data is recorded with a range of $\pm 1000\text{nT}$, which equates to a resolution of 0.01nT . It should be noted that the actual resolution is limited to 0.03nT because of internal instrumental noise.

The gradiometer records five lines of data on each traverse, with traverses walked in a zig-zag pattern until all the survey is covered.

Appendix 2: Data Visualisation Information

The data was used to produce a series of images to demonstrate the results of surveys, detailed below:

Greyscale/colour scale plot – This visualised the results as a shaded drawing with highest readings showing as black, running through different shades to lowest showing as white.

Interpreted plot – Through detailed analysis, anomalies have been interpreted and possible features identified. Interpretation drawings are used to show potential features and to reinforce and clarify the written interpretation of the data. Anomalies have been characterised using the terminology detailed in the following section and have been assigned colour coding, which is outlined in keys on figures associated with this report.

Magnetic Anomalies and Terminology

Table 2: Lexicon of Terminology

Terminology	Detail
Anomaly	Any outstanding high or low readings forming a particular shape or covering a specific area with the survey results.
Feature	A man-made or naturally created object or material that has been detected through investigation works and has sufficient characteristics or supporting evidence for positive identification.
Magnetic susceptibility	The ability of a buried feature to be magnetically induced when a magnetic field is applied.
Magnetic response	The strength of the changes in magnetic values caused by a buried feature with either a greater or lesser ability to be magnetised compared with the soil around it. Anomalies are considered to either have strong/weak or positive/negative responses. The strength of magnetic response (along with patterning) can be essential in determining the nature of an anomaly, but it should be noted that the size or strength of the magnetic response does not correlate with the size of the buried feature.

Patterning of an anomaly	The shape or form of an individual anomaly.
Thermoremanence	The affect caused when a material has been magnetically altered through a process of heating. Thermoremanent magnetisation occurs when an object or material is heated passed the Curie Point and acquires a permanent magnetisation that is associated with the magnetic field that they cooled within (Gaffney and Gater 2003, 37).

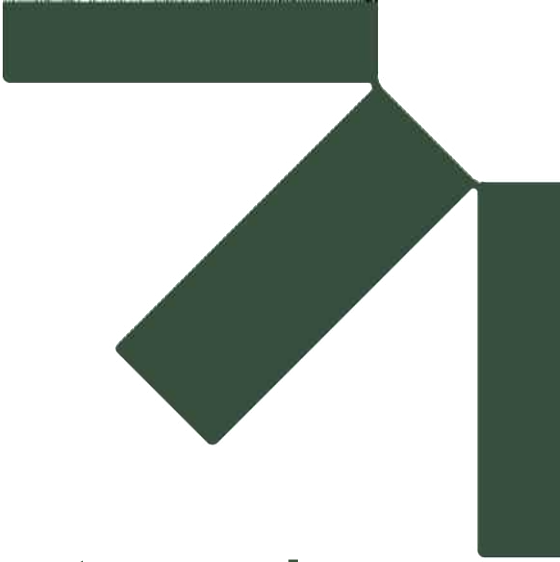
Different anomalies can represent different features created by human occupation, agricultural or modern activity, or natural pedological or geological changes in the substrata. Anomalies interpreted as 'greater' are considered more likely to be of the interpreted characterisation; whereas a 'lesser' categorisation represents a more tentative interpretation applied to those anomalies with weaker increases in magnetic response or if the anomaly has incomplete patterning or irregular form. The strength and size of anomalies can vary depending on the magnetic properties of the feature, the magnetic susceptibility of the soil, the depth at which the feature is buried, and the state of preservation.

Table 3: Characterisation of anomalies

Characterisation	Detail
Archaeology and probable archaeology	Linear anomalies with a positive or negative magnetic responses and composed of a patterning or shape that is suggestive of a buried archaeological feature. These are often indicative of structural remains or infilled features such as ditches. The strength of anomaly signal can be suggestive of the properties of the feature. Negative linear anomalies represent upstanding or infilled features that are less magnetically susceptible than background readings, for example structures or ditches composed of a non-igneous stone material. Bipolar linear anomalies considered to be of an archaeological nature are indicative of material with a high magnetic susceptibility, such as a brick wall. Isolated anomalies or anomalies with a more amorphous form possibly represent infilled features or thermomagnetic features such as areas of heating/burning of an archaeological origin. Unless

	associated with conclusively identified archaeological remains, such as linear anomalies, absolute identification of positive responses can be problematic as it is often not possible to decipher if they are of an archaeological, modern, or agricultural origin. Consequently, isolated positive responses are not shown within the interpretation unless composed of a broad form or belonging to a series of isolated positive responses. Bipolar responses considered likely to be of an archaeological origin are also interpreted as isolated anomaly (archaeology). These are considered to relate to material with a very strong magnetic susceptibility or thermoremanent magnetisation.
Possible archaeology	Weak and diffuse anomalies with an uncertain origin are denoted by trends. It is possible that these belong to archaeological features but given their weak signatures or incomplete patterning it is equally plausible that they relate to agricultural features or natural soil formations.
Historic Feature	Linear anomalies, sub/irregular-rectilinear either with positive or negative magnetic responses, that correspond with the location of field boundaries, ponds or buildings recorded on historic maps, Aerial photos or LiDAR coverage of the site.
Ridge and furrow	Broadly spaced linear anomalies that are likely to be indicative of earlier forms of agriculture, such as ridge and furrow. These often correspond with the location of earthworks visible on the ground or identified on aerial photos or LiDAR survey coverage.
Masking anomalies	
Strongly magnetic bipolar or dipolar.	Positive anomalies with associated negative 'halo' (bipolar) denote features with a strong magnetic response are likely to be of a modern origin.
Service	Isolated bipolar responses of a modern nature are likely to relate to buried ferrous material or objects, such as

	metallic agricultural debris. If a trend is noted in the alignment or spacing of isolated bipolar responses, it is possible that they are indicative of ferrous fittings or connectors used on buried non-magnetic buried utilities.
Increased magnetic response / ferrous disturbance	Areas of magnetic disturbance, often along the edges of survey areas are caused by standing metal structures such as fencing and buildings. Also, areas of increased magnetic response denote areas of disturbance containing a high concentration of dipolar or bipolar responses. These are generally considered to be caused by modern debris in the topsoil, although it is possible that the disturbance is in part also caused by isolated archaeological material or geological or pedological changes in the substrata.
Modern Agriculture	
Ploughing trend, land drain	Ploughing trend tends to be regularly spaced linear anomalies, often with a narrower spacing, that conform with ploughing regime at the time of survey, or a recent regime recorded on aerial photos of the site. The response and distribution of land drains varies depending on the composition of the land drain and associated ditch or channel. Consequently, land drains can be composed of weak / strong positive / negative magnetic responses and are identified as a product of either their variance in magnetic values or positioning compared with regularly spaced linear anomalies considered to relate to modern ploughing. Land drains can be located within former agricultural regimes, such as ridge and furrow.



Appendix F Site Visit Photographs



Photo 7: Looking north from Jack Haye Lane towards Grade II Listed Greenfields Farmhouse (1294674)



Photo 8: Looking southeast from Grade II Listed Greenfields Farmhouse (1294674) towards the Site



Photo 9: Looking east at Grade II Listed Jack Hayes Farmhouse (1374602)



Photo 10: Looking southeast towards the Site from Grade II Listed Jack Hayes Farmhouse (1374602)



Photo 11: Looking north from within the Site towards new dwelling in the former location of Little Armshead Farmhouse (MST21899)



Photo 12: Looking west towards Moorside Farmhouse (MST21875)



Photo 13: Looking northeast towards the Site from Moorside Farmhouse



Making Sustainability Happen