Land South of Barnsley Road
West Melton
South Yorkshire

Archaeological Evaluation by Trial Trenching

Planning Reference- **RB2022/0259**

MAP Site **Code-** 05.02.21

OASIS Id: maparcha1-509636

maparch

MAP Archaeological Practice

Land South of Barnsley Road
West Melton
South Yorkshire

Archaeological Evaluation by Trial Trenching

Version	Written/Revision by:	Date:	Checked by:	Date:
A	Owain Wells	26.09.22	Charlie Puntorno & Max Stubbings	04.10.22
B	Charlie Puntorno	12.10.22	Max Stubbings	12.10.22
C	Charlie Puntorno	21.06.23	Sophie Coy	21.06.23
D	Charlie Puntorno	19.07.23	Sophie Coy	03.08
E	Charlie Puntorno	06.09.23	Sophie Coy	06.09.23

Land South of Barnsley Road
West Melton
South Yorkshire

Archaeological Evaluation by Trial Trenching

Planning Application RB2022/0295
MAP Site Code- 05.02.21
OASIS Id: maparcha1-509636

Contents | Page

Figure List | Page

Plate List | Page

Appendices | Page

Land South of Barnsley Road
West Melton
South Yorkshire

Archaeological Evaluation by Trial Trenching

Planning Application RB2022/0295
MAP Site Code- 05.02.21
OASIS Id: maparcha1-509636

Non-technical Summary

An Archaeological Evaluation by Trial Trenching was carried out by MAP Archaeological Practice Ltd., on land South of Barnsley Road, West Melton, South Yorkshire between July and August 2022. The Trial Trenching, which followed a Desk Based Assessment and Geophysical Survey, was undertaken to inform South Yorkshire Archaeology Service of the archaeological potential of the site and to allow a reasoned decision to be made regarding the need for further archaeological work. Following the excavation of features, and following discussion with South Yorkshire Archaeology Service, five Optically Stimulated Luminescence samples were sent to the University of Gloucestershire for processing and analysis, with the aim of achieving dates for the archaeological features.

The work was undertaken on behalf of Persimmon Homes South Yorkshire

The Evaluation by Trial Trenching, which consisted of twenty-three trenches, revealed a total of twelve archaeological features. The evaluation had shown that trackway diches likely formed the earliest phase of this site followed by the addition of at least one appending enclosure. Dates derived from Optically Stimulated Luminescence samples suggest the establishment of the trackway likely took place during the Bronze Age, with the addition of appending enclosures occurring during the late Iron Age and Romano-British period.

1. Introduction

1.1 This report sets out the results of an Archaeological Evaluation by Trial Trenching that was carried out by MAP Archaeological Practice Ltd. on land south of Barnsley Road, West Melton, South Yorkshire (centred SE 41857 01604) between July and August 2022.

1.2 Planning permission has been granted, subject to conditions, by Rotherham Metropolitan Borough Council, for the erection of 311 dwellings, with associated access, infrastructure and open space (planning reference RB2022/0295). The evaluation was undertaken in advance of the applications determination, in order to inform South Yorkshire Archaeological Service (SYAS), of the archaeological potential of the site, and to allow a reasoned decision to be made regarding the need for further archaeological work. Following discussion with SYAS the production of an Updated Project Design (appendix 8), submission of OSL samples and a subsequent update of the evaluation report was carried out in accordance with condition 30 attached to the planning permission which states that;

No development, including any demolition and groundworks, shall take place until the applicant, or their agent or successor in title, has submitted a Written Scheme of Investigation (WSI) that sets out a strategy for archaeological investigation and this has been approved in writing by the Local Planning Authority. The WSI shall include:

- *The programme and method of site investigation and recording.*
- *The requirement to seek preservation in situ of identified features of importance.*
- *The programme for post-investigation assessment.*
- *The provision to be made for analysis and reporting.*
- *The provision to be made for publication and dissemination of the results.*
- *The provision to be made for deposition of the archive created.*
- *Nomination of a competent person/persons or organisation to undertake the works.*
- *The timetable for completion of all site investigation and post-investigation works..*

Part B (pre-occupation/use)

Thereafter the development shall only take place in accordance with the approved WSI and the development shall not be brought into use until the Local Planning Authority has confirmed in writing that the requirements of the WSI have been fulfilled or alternative timescales agreed.

Reason

To ensure that any archaeological remains present, whether buried or part of a standing building, are investigated and a proper understanding of their nature, date, extent and significance gained, before those remains are damaged or destroyed and that knowledge gained is then disseminated.

1.3 The work was carried out in accordance with the recommendations of the National Planning Policy Framework (2021) on 'Archaeology and Planning' and according to the Written Scheme of Investigation that was prepared by MAP Archaeological Practice Ltd.

1.4 MAP adhered to the general principles of both the CIfA '*Code of Conduct*' (2021) and '*Standard and Guidance for Archaeological Field Evaluation*' (2020) throughout the project.

1.5 The site code for the project was MAP 05.02.2021.

1.6 All maps within this report have been produced with permission of the Controller of His Majesty's Stationary Office (© Crown copyright. License AL50453A). With additional mapping data derived from OpenStreetMap. (https://www.openstreetmap.org/copyright).

1.7 All work was funded by Persimmon Homes South Yorkshire.

2. Site Description

2.1 The site is located immediately south of Barnsley Road and west of Pontefract Road, West Melton, approximately 8km south-east of Barnsley and 15km south-west of Doncaster (centred at SE 41857 01604. Fig. 1).

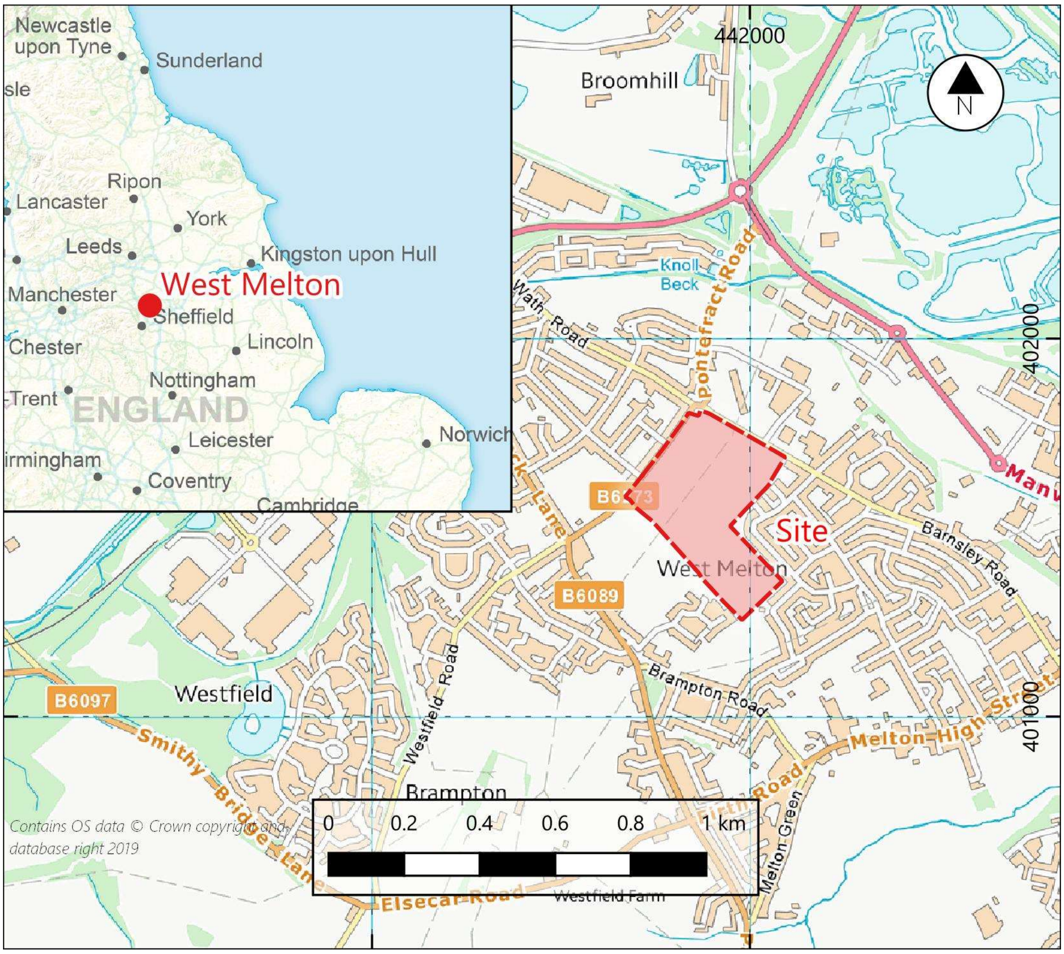


Figure 1. Site Location.

2.2 The Proposed Development Area, which measures approximately 11.73ha, at time of evaluation consisted of a large arable field bounded to the north and west by mature vegetation, and Barnsley Road and Pontefract Road respectively, to the east by vegetation and residential properties and to the south by a football field and residential properties.

2.3 The Proposed Development Area lies on sandstone bedrock of the Oak Rocks (British Geological Society, 2022).

3. Archaeological and Historical Background

3.1 Although no prehistoric material has been recovered from the vicinity, cropmarks of, possible Iron Age or Romano British, enclosures and features have been recorded by the SMR as being present within the Proposed Development Area (SMR ID's MSYY 5459 and MSY 5524). Two ditches were recorded during a Watching Brief carried out during work associated with a pipeline (Network Archaeology, 2002). The ditches contained no dating evidence but are believed to correspond with the recorded cropmarks.

3.2 The area has historically been heavily utilised for agricultural purposes since at least the Medieval period with areas of well-preserved ridge and furrow being identified in the area (SMR ID MSY12635).

3.3 Winterwell Field, the area in which the Proposed Development Area is located, is recorded in a local deed dating to 1507 as 'Wyntrewell' and is labelled as 'Witerwell Field' on the 1820 Enclosure Award map. The name 'Winterwell' is likely to refer to 'a spring that operated chiefly in winter' (Smith, 1961).

3.4 An Archaeological Desk Based Assessment (MAP, 2021) concluded that archaeological potential of the site is considered to be moderate and of local to regional significance. Archaeological deposits dating to the late prehistoric and Romano-British periods are likely to be encountered. Evaluation in the form of a Geophysical Survey and Trial Trenching was recommended.

3.5 A Geophysical Survey (Phase Site Investigations, 2021) identified archaeological remains across the site including trackways which meet at a crossroads and anomalies suggestive of field boundaries or enclosures. These anomalies correspond with cropmark data within the site and with features identified during archaeological work in the vicinity of the site.

4. Aims and Objectives

4.1 The aim of the Archaeological Trial Trenching is to determine the presence/absence, nature, date, quality of survival and importance of archaeological deposits to enable an assessment of the potential and significance of archaeology to be made.

4.2 Based on the archaeological deposits which may be encountered during evaluation the site has the potential to inform the following research questions regarding the Iron Age and Romano-British periods in South Yorkshire.

- Can we characterise different types of Iron Age and Romano-British field systems in different landscapes zones?
- What were the economic, social, or political roles of Iron-Age and Romano-British field systems?
- Can the dates of Iron Age and Romano-British field system inception and disuse/abandonment, be established with any greater accuracy?
- What were the economic, social, or political roles of linear trackways?

5. Methodology

5.1 Excavation

5.1.1 Twenty-three trial trenches measuring 40m x 2m, were located (Fig. 2) and levelled using a Trimble R12 GPS Rover. The trenches were positioned across the site to investigate geophysical anomalies but also areas of the site considered be devoid of anomalies.

5.1.2 Once positioned the trenches were excavated using a wheeled mechanical excavator, fitted with a 2m wide toothless bucket. In each trench, topsoil and subsoil was excavated down to the level of buried archaeological features or natural geology, operating under close archaeological supervision. The exposed surfaces were cleaned appropriately, and any subsequent excavation was carried out by hand.

5.2 Recording

5.2.1 All archaeological deposits were recorded according to correct principles of stratigraphic excavation using Diggit Archaeology, a digital recording system which is compatible with the MOLA recording system. All indices were produced using MAP's pro forma sheets. A total of one hundred separate contexts were recorded.

5.2.2 The full extent of all archaeological deposits was recorded in plan on drawing film at an appropriate scale (generally 1:20 or 1:50 for plans and 1:10 for sections). All drawings include an AOD height, and their locations were plotted using a Trimble R12 GPS rover, in order to tie to the Ordnance Survey National Grid. There was a total of twenty-six drawings.

5.2.3 Forty-four black and white film photographs formed the basis of the photographic archive with a supplementary digital photographic archive consisting of seventy-four high-resolutions digital images taken in both RAW and JPEG formats, recording all archaeological features and deposits encountered.

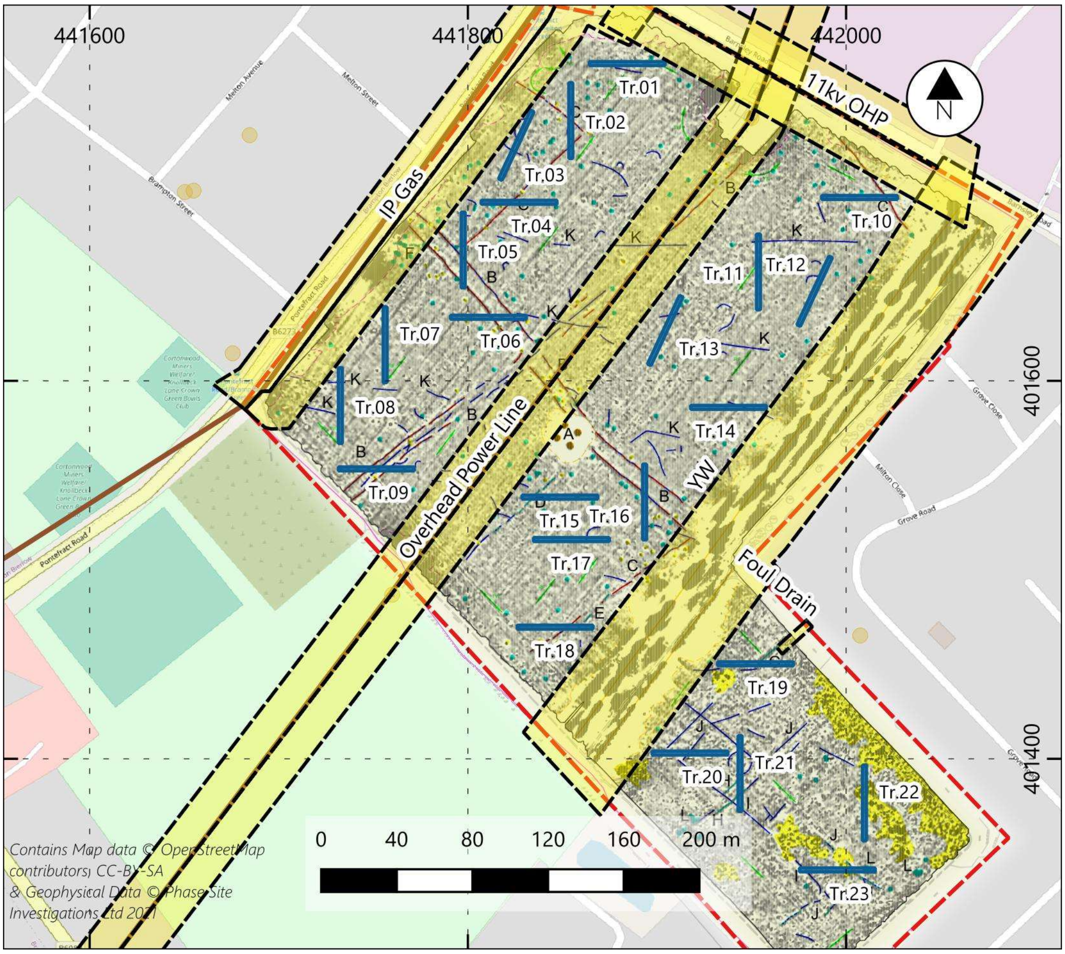


Figure 2. Trench Location.

6. Results

6.1 Excavation of the twenty-three trenches revealed a deposit of topsoil that consisted of a mid-grey-brown, sandy silt. A subsoil of mid-orange-brown, fine silty sand was observed in all but trenches 21 and 22. This deposit overlaid a light-orangey-yellow or light-yellowy-orange, coarse sandy natural, seen in all the trenches. The total depths of excavation, depths of the topsoil and elevations of all twenty-three trial trenches are displayed in the below table along with their orientation within the site.

Trench	*Elevation*	*Depth of Excavation*	*Depth of Topsoil*	*Depth of Subsoil*
Tr.1	East – 37.29m AOD West – 38.85m AOD	0.36m-0.46m	0.27m-0.32m	0.09m-0.11m
Tr.2	North – 39.32m AOD South – 40.37m AOD	0.30m-0.45m	0.30m-0.35m	0.09m-0.12m

Trench	*Elevation*	*Depth of Excavation*	*Depth of Topsoil*	*Depth of Subsoil*
Tr.3	North-East – 40.15m AOD South-West – 41.78m AOD	0.35m- 0.70m	0.25m- 0.50m	0.10m- 0.20m
Tr.4	East – 41.06m AOD West – 42.43m AOD	0.50m- 0.55m	0.34m- 0.40m	0.15m- 0.16m
Tr.5	North – 44.78m AOD South – 43.82m AOD	0.45m- 0.55m	0.25m- 0.35m	0.15m- 0.20m
Tr.6	East – 42.90m AOD West – 44.41m AOD	0.50m- 0.65m	0.40m- 0.55m	0.10m- 0.15m
Tr.7	North – 45.16m AOD South – 46.04m AOD	0.56m- 0.63m	0.34m- 0.45m	0.18m- 0.22m
Tr.8	North – 46.35m AOD South – 47.23m AOD	0.61m- 0.67m	0.41m- 0.45m	0.16m- 0.26m
Tr.9	East – 46.57m AOD West – 47.65m AOD	0.39m- 0.43m	0.28m- 0.33m	0.10m- 0.11m
Tr.10	East – 36.43m AOD West – 37.00m AOD	0.40m- 0.50m	0.22m- 0.25m	0.15m- 0.25m
Tr.11	North – 38.42m AOD South – 39.57m AOD	0.48m- 0.49m	0.29m- 0.31m	0.18m- 0.19m
Tr.12	North-East – 37.94m AOD South-West – 39.60m AOD	0.40m- 0.50m	0.30m- 0.35m	0.05m- 0.20m
Tr.13	North-East – 40.69m AOD South-West – 42.15m AOD	0.52m- 0.65m	0.30m- 0.35m	0.22m- 0.25m
Tr.14	East – 42.04m AOD West – 42.49m AOD	0.47m- 0.53m	0.24m- 0.25m	0.23m- 0.28m
Tr.15	East – 44.53m AOD West – 45.13m AOD	0.42m- 0.47m	0.33m- 0.36m	0.06m- 0.14m
Tr.16	North – 43.78m AOD South – 44.30m AOD	0.45m- 0.65m	0.27m- 0.28m	0.18m- 0.28m
Tr.17	East – 44.50m AOD West – 45.40m AOD	0.36m- 0.44m	0.29m- 0.36m	0.15m- 0.20m
Tr.18	East – 45.07m AOD West – 46.27m AOD	0.56m- 0.62m	0.42m- 0.44m	0.12m- 0.20m
Tr.19	East – 41.89m AOD West – 43.12m AOD	0.30m- 0.33m	0.22m- 0.27m	0.04m- 0.11m
Tr.20	East – 43.93m AOD West – 45.43m AOD	0.45m -	0.22m- 0.40m	0.05m- 0.23m
Tr.21	North – 43.48m AOD South – 44.76m AOD	0.46m- 0.52m	0.46m- 0.52m	- -
Tr.22	North – 42.03m AOD South – 42.97m AOD	0.30m- 0.34m	0.30m- 0.34m	- -

Trench	*Elevation*	*Depth of Excavation*	*Depth of Topsoil*	*Depth of Subsoil*
Tr.23	East – 43.24m AOD West – 44.63m AOD	0.45m -	0.30m- 0.35m	0.05m- 0.10m

6.2 Trenches 1, 3, 7, 8, 11-15, and 17-22 were observed to have no archaeological features, deposits or finds present within them however, trenches 1, 7, 8 and 11-15 had north-east south-west aligned furrows within them, corresponding to the Geophysical Survey.

6.3 Trench 2, located in the northern part of Proposed Development Area, contained two individual ditches: [205] and [207] with wide shallow profiles. Ditch segment [205] was aligned north-east south-west, measured 1.05m wide and 0.33m deep and was filled by a single fill (204) of mid-brown sandy silt. An environmental sample taken from context (204) contained trace charred detritus with nothing identifiable. No datable material was identified within the feature. Ditch segment [207] was aligned north-west south-east, measured 0.70m wide and 0.20m deep and was filled by a single fill (206) of mid-brown sandy silt. An environmental sample taken from context (206) contained a small deposit of clinker and coal. No other datable material was identified within the feature.

6.4 Trench 4, located just south-west for Trench 2, contained a single ditch segment: [405] with a wide shallow profile. Ditch segment [405] was aligned north-east south-west, measured 1.20m wide and 0.25m deep and was filled by two fills (404) and (406). Fill (404) consisted of a light-brown sandy silt and (406) a light-yellowish-brown sandy silt. An environmental sample taken from context (404) a small deposit of crushed *Quercus* (oak) charcoal fragments together with clinker and a 1.0cm fragment of slag. No datable material was identified within the feature.

6.5 Trench 5, located centrally along the north-western edge of Proposed Development Area, contained three individual ditch segments: [506], [509] and [511]. Ditch segment [506] was aligned north-west south-east, measured 1.83m wide and 0.67m deep and was filled by two fills (504) and (505). Fill (504), the main fill of the feature consisted of a mid-orangey-brown silty sand. An OSL sample (lab code GL22166), taken from close to the base of the feature, returned a date of between 4570 BC and AD 2870. Fill (505) a mid-pinkish-brown sandy silt. Ditch segment [509] aligned northwest south-east, measured between 0.90m and 1.24m wide and 0.42m deep and was filled by two fills (507) and (508). Fill (507), the main fill of the ditch, consisted of a mid-orangey-brown sandy silt and (508) a light-brownish-yellow coarse sand. An OSL sample (lab code

GL22165) returned a date of between 220 BC and AD 160. Ditch segment [511] aligned north-east south-west measured 1.45m wide and 0.28m deep and was filled by a single fill (510) of mid-orangey-brown sandy silt. An OSL sample (lab code GL22164) returned a date of between 110 BC and AD 220. All ditch segments had different profiles, [506] a deep V-shaped profile with a stepped north-east side, [509] a slightly shallower V-shaped cut with a flat base and [511] a very wide and shallow profile. Environmental samples were taken from all three features within Trench 5; (504), (507) and (510) and all contained trace levels of charred detritus. No other datable material was identified within these three features.

6.6 Trench 6, located south of Trench 4 and south-east Trench 5, contained two ditch segments: [605] and [610] both aligned north-west south-east. Ditch segment [605] had a deep V-shaped profile, measured 1.25m wide and 0.63m and was filled by a single fill (604) of mid-orangey-brown sandy silt. An environmental sample taken from (604) contained crushed fragments of clinker and coal. No datable find were identified within the feature. Ditch segment [610] had a deep V-shaped profile with a stepped north-east side, measured 1.70m wide and 0.66m deep and contained four separate fills; (606), (607), (608) and (609). Fill (606) consisted of a mid-brown silty sand, (607) a light-brown sandy silt, (608) a mid-brown silty sand and (609) a light-yellowish-brown silty sand. The environmental sample taken from the basal fill of ditch segment [610], (609), contained crushed fragments of clinker and coal with two hammerscale spheres.

6.7 Trench 9, located in the south-western corner of Proposed Development Area, contained two ditch segments: [905] and [907], aligned north-east south-west and both with wide shallow profiles. Ditch segment [905] measured 1.15m wide and 0.0.24m and was filled by a single fill (904) of mid-orangey-brown silty sand. An environmental sample taken from (904) produced trace slivers of oak charcoal. No datable find were identified within the feature. Ditch segment [907] measured 1.40m wide and 0.50m deep and contained a single fill (906) of light-brown sandy silt, which contained no datable material.

6.8 Trench 10, was located in the north-eastern part of Proposed Development Area and contained a single ditch segment [1005], aligned north-west south-east. Ditch segment [1005] measured 1.21m wide and 0.42m deep and contained a single fill (1004) of mid-reddish-brown sandy silt. The environmental sample taken from (1004) contained a few fragments of charred detritus with nothing identifiable.

6.9 Trench 16, located centrally with the Proposed Development Area, contained two ditch segments [1606] and [1611], aligned north-west south-east. Ditch segment [1606] had a V-shaped profile, measured 0.85m and 0.50m deep and contained three separate fills; (1604), (1605) and (1607). Fill (1604) consisted of a mid-brown sandy silt, (1605) a light-orangey-brown sandy clay, and (1607) a light-yellowish-brown sandy silt. The environmental sample taken from the ditch segment [1606] contained a small amount of charcoal fragments including a 0.5cm fragment of *Alnus* (alder). An OSL sample (lab code GL22167), taken from (1605), the basal fill of the ditch, produced dates of between 1140 BC and 460 BC. Ditch segment [1611] had a V-shaped profile with a stepped north-east side, measured 3.14m and 0.67m deep and contained three separate fills; (1608), (1609) and (1610). Fill (1608) consisted of a light-brown sandy silt, (1609) a light-brown sandy clay, and (1610) a light-brown sandy clay. The environmental sample taken from the ditch segment [1611] contained a small amount of charcoal fragments including a 1.0cm fragment of *Corylus* (hazel). An OSL sample from (1610), lab code GL22168, achieved dates of between 2080 BC and 1220 BC.

6.10 Trench 23, positioned in the south-eastern corner of the site, did not contain any archaeology but contained a deposit of a light-brown-grey sandy silt, measuring approximately 30m in length and 0.62m in depth, located towards the western end of the trench. This deposit was partially excavated by mechanical excavator and revealed modern material.

7. Discussion

7.1 The archaeological evaluation has observed that the features present align to those identified within the Geophysical Survey at land south of Barnsley Road, West Melton (Phase Site Investigations, 2021), however in the absence of archaeological finds or other datable material five OSL samples were retrieved, the results of which are contained within, and appended to, this report.

7.2 The results of the OSL sampling presented a complex range of dates and as such caution should be exercised when using the results to assign a definitive date to excavated features, particularly when the lack of other means of relative dating is considered. Samples taken from the fill of ditch [506] (lab code GL22166) and the control sample (lab code GL22169) returned dates in the Mesolithic and Neolithic periods, significantly earlier than expected, when based on sites of a similar nature. It is possible that the material sampled in both cases may be derived from redeposited natural deposits, rather than fill of archaeological origin, or in the case of the control sample, un-disturbed natural deposits which otherwise would have been expected to return a geological date.

7.3 At the time of writing Prof. Toms has been contacted for his thoughts regarding the reliability of the samples which were described during their analysis as having ‘relatively weak OSL signals’ and the potential for this to have an impact on the reliability of the results. Consultation has also taken place with SYAS and the Regional Science Advisor at Historic England with regards to the results of the OSL samples, particularly those which appear to be outliers. There is a common consensus that, although the application of Optically

Stimulated Luminescence in an archaeological context is in its infancy, a wider consideration of an appropriate sampling strategy is needed within the discipline in order to ensure the highest confidence in the results and their ability to aid the interpretation of archaeological features. The now retired '*Luminescence Dating, Guidelines on using Luminescence Dating in Archaeology* (English Heritage. 2008) outlines sampling considerations and states that 'it is essential that the strategy is driven by a clear idea of the archaeological question that is being asked' (Ibid) although also states that where possible the technique should be used in conjunction with other chronological information. Where other chronological information is not available, for example at West Melton, the reliability and security of the OSL samples taken should be carefully considered and the laboratory should be consulted, to discuss site specific strategies and collaboration where necessary. Samples should not be taken from any archaeological context which may have been the subject of bioturbation or any other recognised disturbance, nor from material which is considered to be of natural origin, for example episodes of natural weathering or redeposited natural. It is likely that more reliable results could be achieved from sampling only deposits which are visibly secure and also through the recovery of multiple samples from the same material, particularly in linear features. Where other dating techniques could be applied, for example if material suitable for AMS dating was identified within a feature, OSL samples should be taken to allow for a more reliable chronology to be achieved.

7.4 The results of the evaluation, which are broadly substantiated by the results of OSL samples suggest that the earliest features on the site is consisted of two parallel ditches, which appear to form a trackway and which ran on north-west to south-east orientation across the site. OSL results suggest that the routeway may have its origins in the Bronze Age, with later modification during the Iron Age and Romano-British periods when at least one appending enclosure was added.

7.5 This phasing is consistent with evidence derived from other sites in the wider South Yorkshire region, where linear features which can be interpreted as principal routeways are shown to be the earliest archaeological activity on the site. Such evidence was identified at Ravenfield, some 10km to the north (MAP. 2023), where Trial Trenching and subsequent Targeted Excavation identified a trackway which had its origins in the Bronze Age, with the addition of appending enclosures which dated to the late Iron Age or Romano-British period. Work carried out by WYAS in 2018 at Hatfield, north-east of Doncaster, identified a trackway and appending brickwork-style enclosure system which could not be dated using material culture (WYAS. 2019). Three OSL samples taken from one of the trackway ditches returned dates of between 2071 BC and 1091 BC, between 2131 and 1251BC, and between 321 and 41 BC (Ibid). These dates suggest that the trackway was established and saw periods of maintenance during the Bronze Age with activity continuing into the Iron Age.

7.6 A further comparable site is located ta Dinnington St. John, to the south-east of Rotherham. As with the Ravenfield and Hatfield sites, a trackway and appending enclosure system, which had been assumed during earlier phases of work to be of Iron Age or Romano-British date was identified. Although no Bronze Age material culture was identified OSL samples returned a date range of between 3,690 ± 250 BP to 1,810 ± 80 BP (PCAS. 2023). PCAS (Ibid) state that a Bronze Age ditch ran across the site which appears to have been maintained, or at least are likely to have been visible in the landscape into the early Iron Age when it was established into a double ditched trackway with associated enclosures.

7.7 An enclosure identified in the results of the Geophysical Survey and examined in trenches 2, 4 and 5, and also during the 2002 Watching Brief, appears to have been added during the Iron Age or Romano-British period with dates of between 220 BC and AD 160. It is likely that the ditch identified in Trench 10 relates to a second enclosure on the site, which may have appended off a south-west to north-east ditch identified in the results of the Geophysical Survey, although further trenches to target both features were not possible due to the presence of overhead and buried services along the northern and eastern boundaries of the site.

7.8 Ditch segments [905] and [907] correspond to the linear anomalies highlighted in the results of the Geophysical Survey and suggest a ditched north-east to south-west aligned trackway that potentially intersects with the north-west south-east aligned trackway, and potentially continued north, however investigation of any possible relationship or continuation of the features was hampered by overhead services.

7.9 The lack of archaeological material on the site may be suggestive of a lack of domestic or industrial activity within the site boundary, with features likely being utilised for livestock management, given the lack of features or environmental material which may otherwise have suggested arable activity. Comparable features are well recognised within the wider South Yorkshire region with many, particularly to the east of the site, having been identified though cropmark data which was the subject of a detailed study of cropmarks on the Magnesian Limestone (Roberts *et al*. 2010). Field systems are described by Roberts as being the product of *'incremental evolution, over a period of time, in patterns that have most certainly been influenced by a combination of the natural topography and the rate of previously uncleared land'*.

7.10 The environmental samples produced some evidence of industrial burning activity, identified from ditches [207], [405] and [610], with the identification of slag, hammerscale, clinker and coal and suggested a possible Post Medieval date (Alldritt. 2022, appendix 6). Although coal and clinker deposits have been recognised in late Prehistoric/ Romano-British deposits (Travis. 2008), due to the nature of the features being more akin to that of late Iron Age or Romano-British field and trackway systems which are widely recognised within the vicinity of the site, it is considered that this material can be accounted for by possible spread of industrial waste as a result of agricultural manuring activity and subsequent ploughing, and bioturbation into already filled archaeological features.

7.11 This lack of archaeological material to date the establishment of the features substantiates the problem of dating field systems discussed within the South Yorkshire Historic Environment Research Framework (South Yorkshire Archaeological Service & Historic England, 2021), which also states that 'even where Romano-British pottery is found in upper ditch fills, this may only date the silting up of ditches, not their original digging. Trying to rigidly separate 'Iron Age' field systems from 'Roman'-period fields is probably futile'. The results of OSL samples taken during excavation, have however gone some way to aiding the phasing and potential establishment of features within the site boundary, which otherwise would not have been possible.

8. Conclusion

8.1 The Archaeological Evaluation by Trial Trenching has been successful in determining the presence, nature and date of archaeological features within the site boundary. OSL samples taken from excavated features have been somewhat successful in achieving close to absolute dates for the fills of the features, in the absence of other archaeological or environmental material, although their results should be not be seen as definitive when considering the chronology of the site.

8.2 The excavated features produced little material evidence to aid the identification of the 'economic, social, or political roles of Iron Age and Romano-British field systems and trackways' as outlined in the South Yorkshire Historic Environment Research framework. This lack of material may however be suggestive of a landscape utilised primarily for the control and movement of livestock, rather than supporting arable, industrial or domestic activity. When taking into consideration the earlier than expected establishment of the north-west to south-east aligned trackway ditches, the results of the evaluation has the potential to inform the following research question within the South Yorkshire Research framework.

"How can we establish a higher resolution chronological framework to the Neolithic and Bronze Age? "

8.3 The results of the OSL samples taken from the site, when considered against others achieved from comparable sites, have identified an emerging theme in the relationship between trackways and appending enclosure systems, and the potential for the Bronze Age establishment of principal routeways across landscapes which are later utilised during the late Iron Age and/or Romano-British period. This information also has the potential to inform the South Yorkshire Research framework and could pose a wider emerging research question with regard these routeways. The use of OSL to date such features and potentially wider landscapes, and the creation of a recognised sampling strategy may also inform future research questions.

8.4 With regard to the land being depicted as 'Winterwell Field' on the 1820 Enclosure Map, no evidence of a well being present within the site boundary was identified in the results of the Geophysical Survey or the Trial Trenching.

8.5 Clifton Park Museum have been contacted regarding the deposition of the archive. Archive deposition will be carried out in line with the '*Archive Preparation and Dissemination*' section of the Written Scheme of Investigation. The digital archive will be deposited to the Archaeological Data Service.

9. Bibliography

British Geological Society. Geology of Britain Viewer. Available at; http://mapapps.bgs.ac.uk/geologyofbritain/home.html [accessed 23.09.2022]

Chartered Institute for Archaeologists. 2021. Code of Conduct: professional ethics in archaeology. Available at; https://www.archaeologists.net/sites/default/files/Code%20of%20conduct.pdf [accessed 23.09.2022]

Chartered Institute for Archaeologists. 2020. Standards and Guidance for Archaeological Field Evaluation. Available at; https://www.archaeologists.net/sites/default/files/CIfAS%26GFieldevaluation_3.pdf [accessed 23.09.2022]

MAP Archaeological Practice Ltd. 2021. Land South of Barnsley Road, West Melton, South Yorkshire. Archaeology and Heritage Desk Based Assessment.

MAP Archaeological Practice Ltd. 2023. Land East of Moor Lane South, Ravenfield, Rotherham, South Yorkshire. Targeted Strip, Map and Record Excavation

National Planning Policy Framework. 2021. Available at; https://www.gov.uk/government/publications/national-planning-policy-framework--2 [accessed 23.09.2022]

Network Archaeology. 2002. Wentworth to Brampton Gas Pipeline: Archaeological Watching Brief.

PCAS. 2023. Land South of Oldcotes Road, Throapham, Dinington St. John, Rotherham, South Yorkshire. Report on a Scheme of Archaeological Mitigation

Phase Site Investigations. 2021. Land South of Barnsley Road, West Melton, South Yorkshire, Archaeological Geophysical Survey.

Smith A. H. 1961. The Place-Names of the West Riding of Yorkshire, English Place Name Society Volume XXX, Part 1 Lower & Upper Strafforth and Staincross Wapentakes

South Yorkshire Archaeology Service & Historic England. South Yorkshire Historic Environment Research Framework. Web Resource. Available at;
https://researchframeworks.org/syrf/iron-age-and-romano-british/#section-32

Toms. P.S. 2023. Optical dating of sediments: Barnsley Road excavations, UK

Travis, J.R. 2008. Coal in Roman Britain. Oxford: BAR, British Series 468

West Yorkshire Archaeology Service. 2019. Doncaster Road, Hatfield, South Yorkshire. Archaeological Excavation

10. List of Contributors

Excavation Team:	Owain Wells (Project Officer), Robert Blackburn (Supervisor), Charley Porter and Brennen Reeves
Report Text:	Owain Wells & Charlie Puntorno
Appendices:	Owain Wells
Illustrations:	Max Stubbings
Editor:	Charlie Puntorno & Max Stubbings
Administration:	Sophie Coy

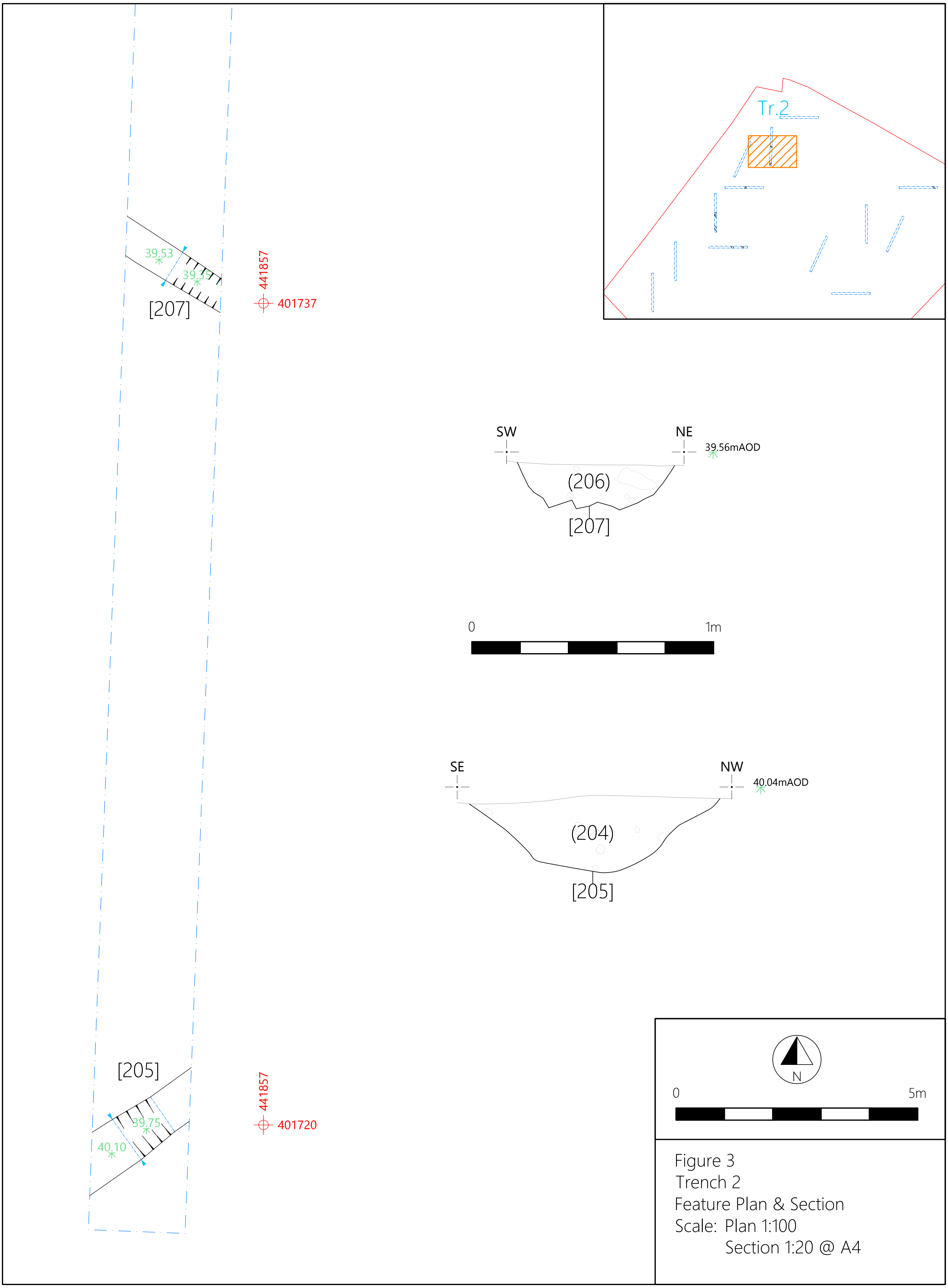
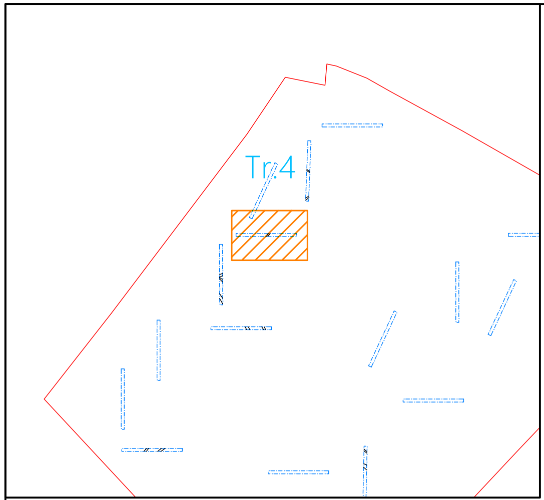
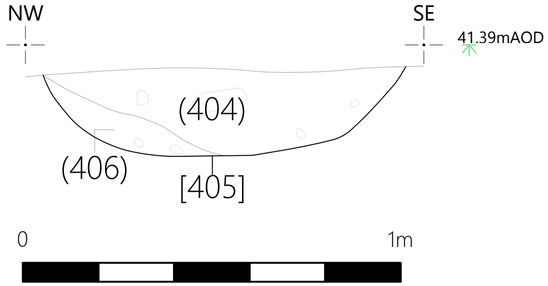


Figure 3
Trench 2
Feature Plan & Section
Scale: Plan 1:100
Section 1:20 @ A4





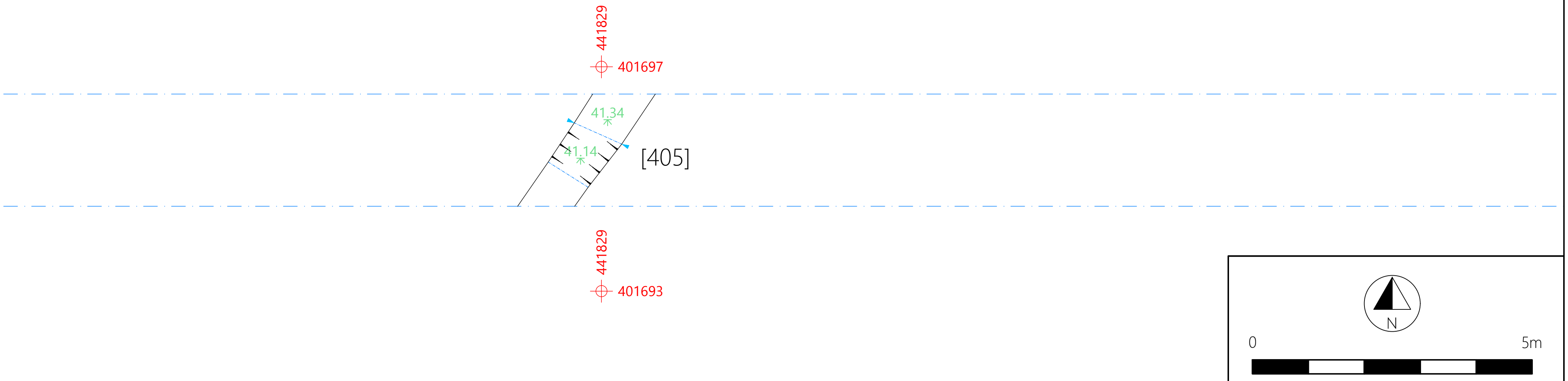


Figure 4
Trench 4
Feature Plan & Section
Scale: Plan 1:100
Section 1:20 @ A4

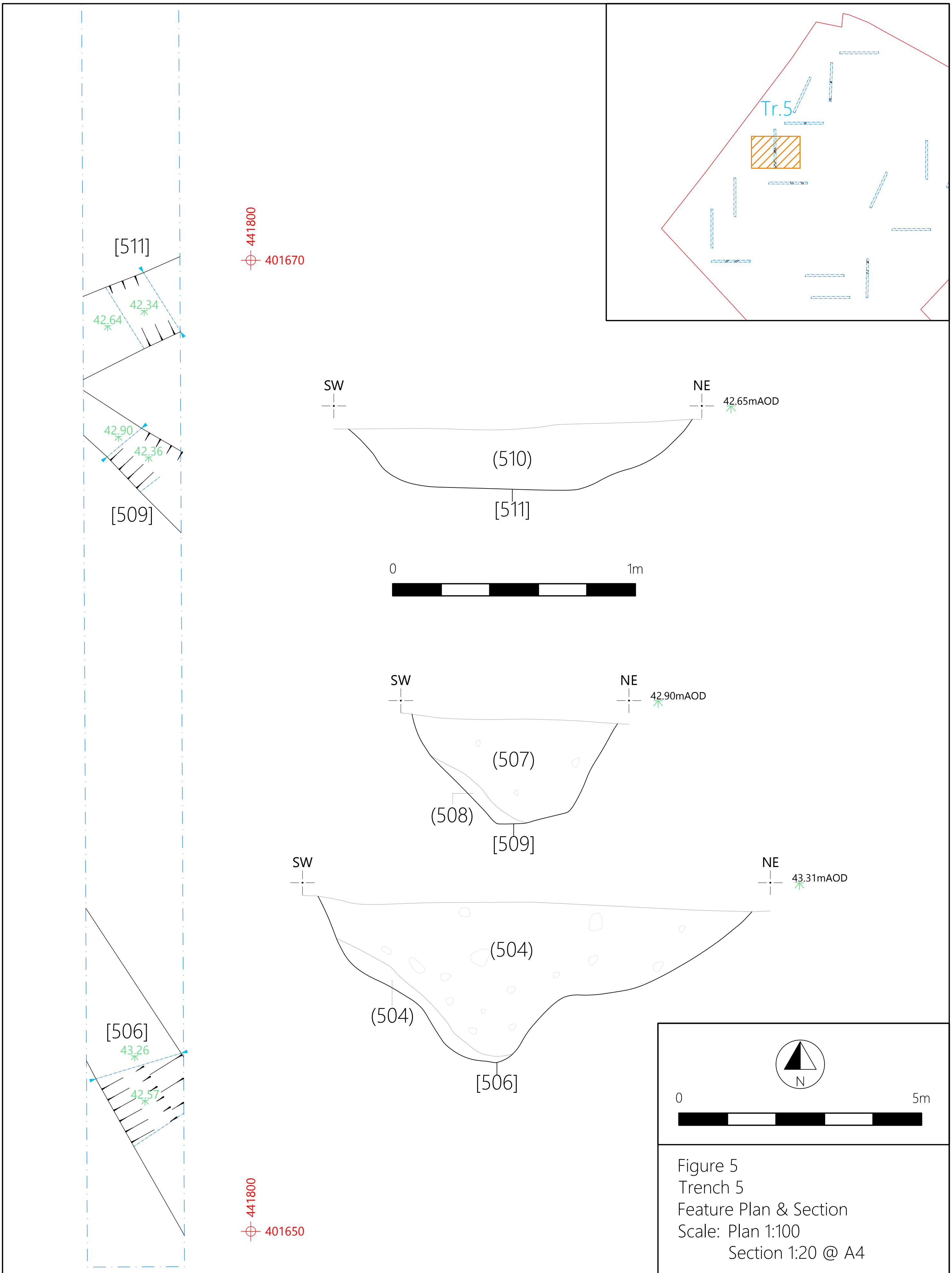


Figure 5
Trench 5
Feature Plan & Section
Scale: Plan 1:100
Section 1:20 @ A4

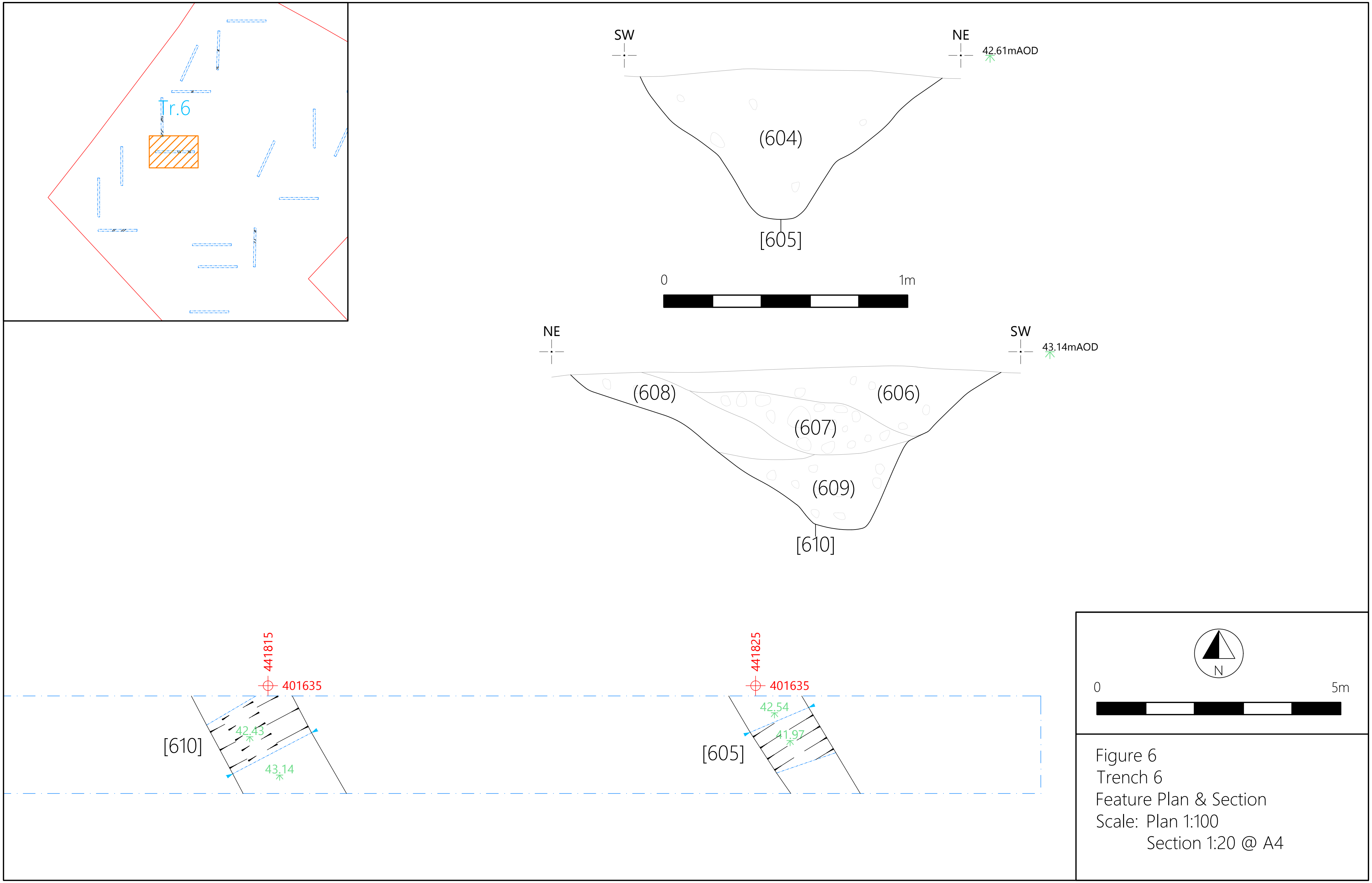
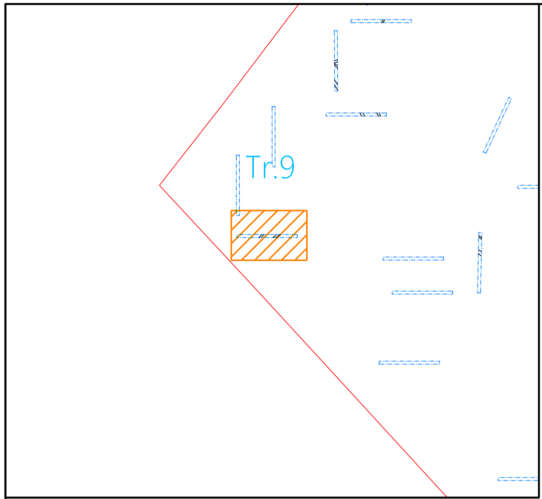
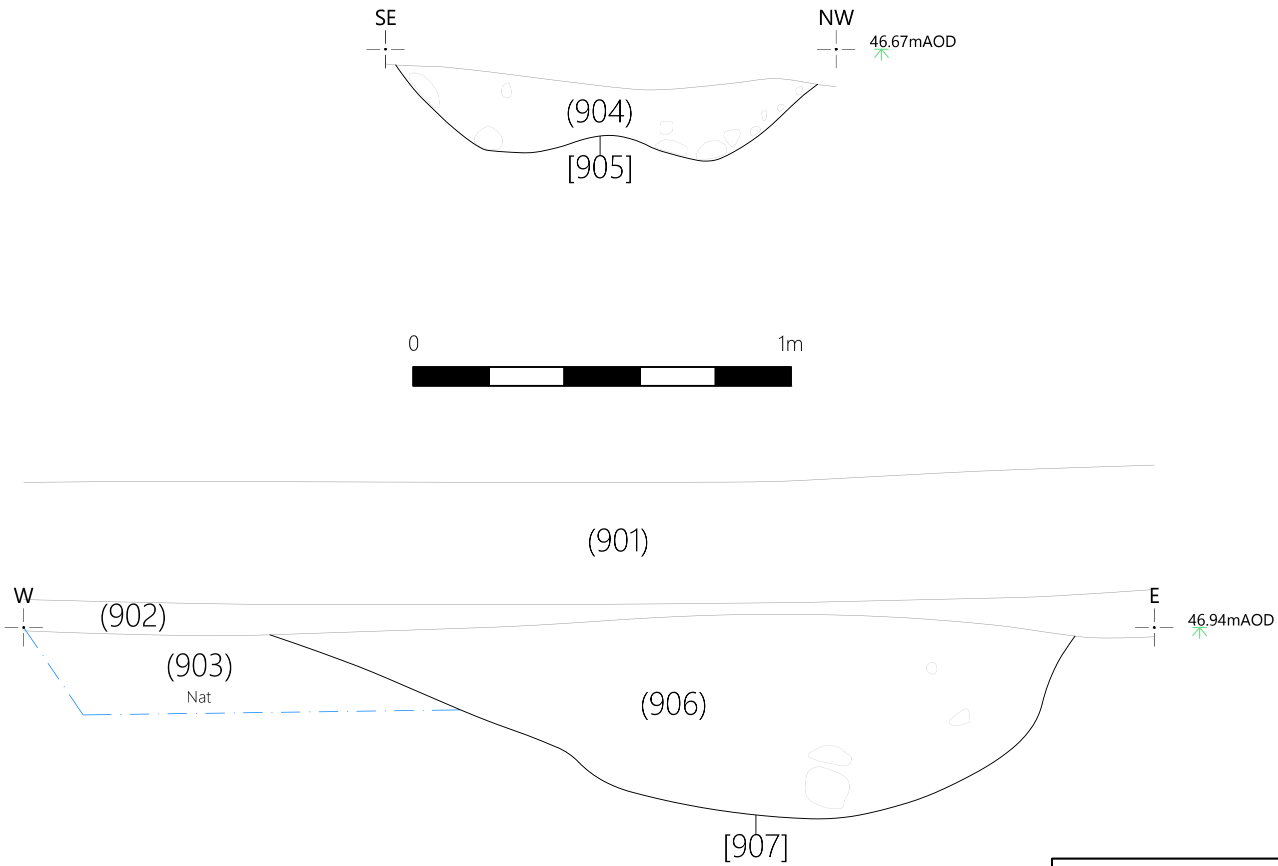
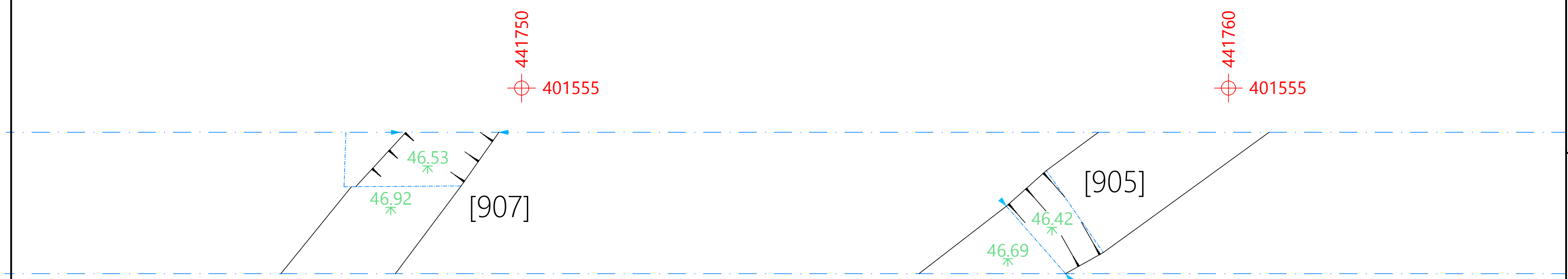


Figure 6
Trench 6
Feature Plan & Section
Scale: Plan 1:100
Section 1:20 @ A4

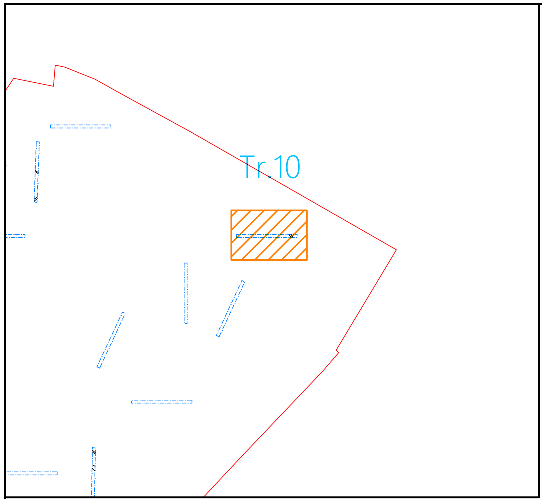


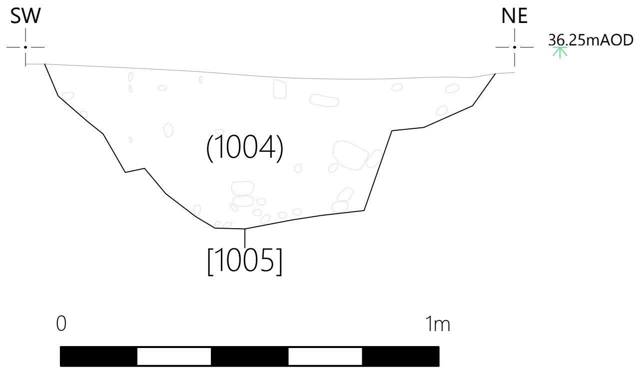


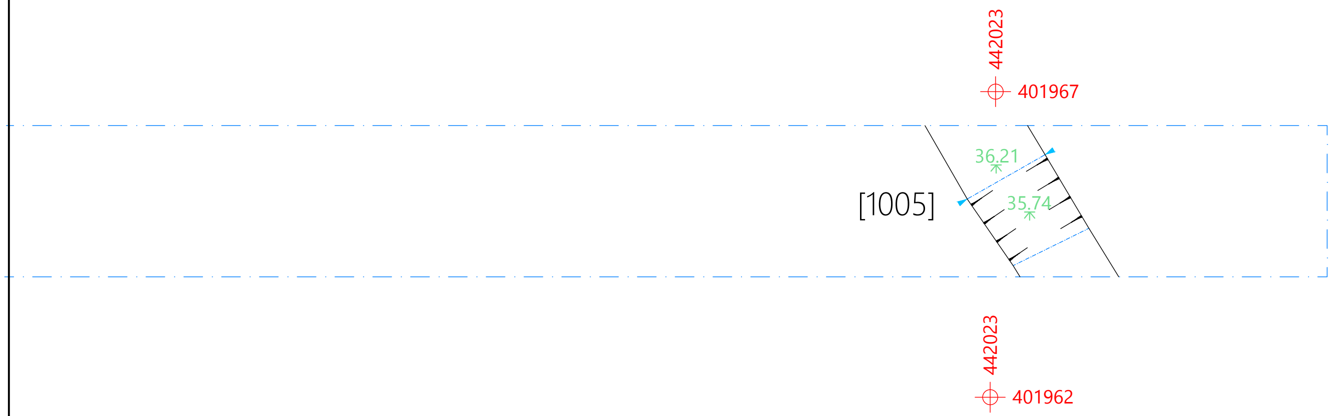


N
0
5m

Figure 7
Trench 9
Feature Plan & Section
Scale: Plan 1:100
Section 1:20 @ A4







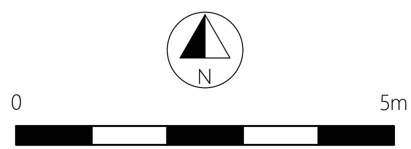
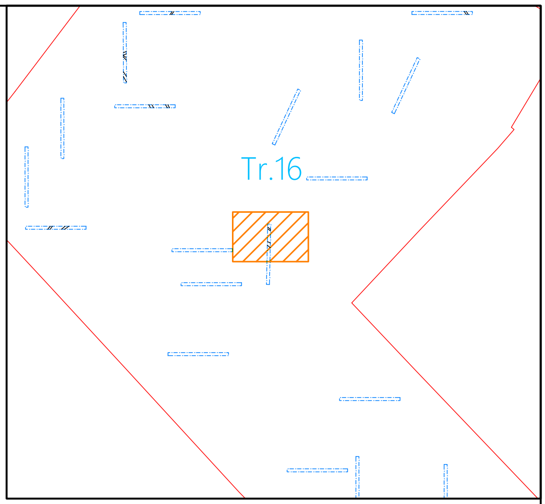
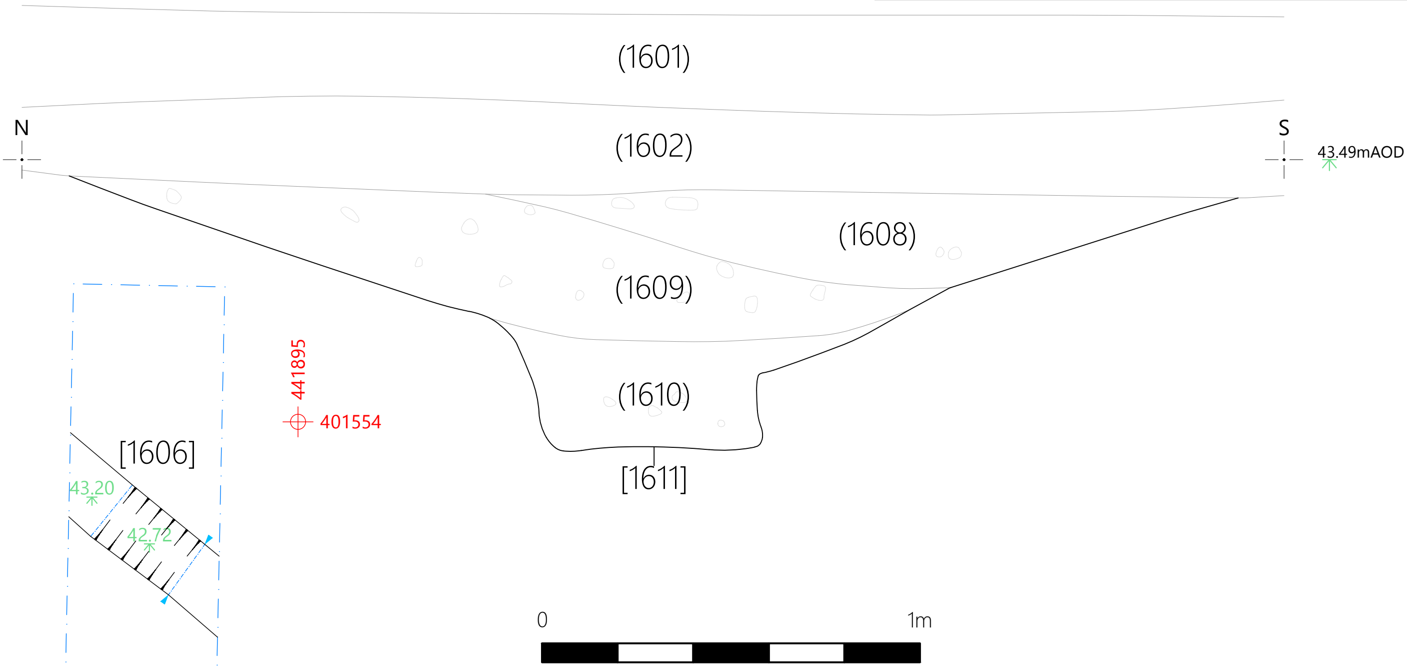
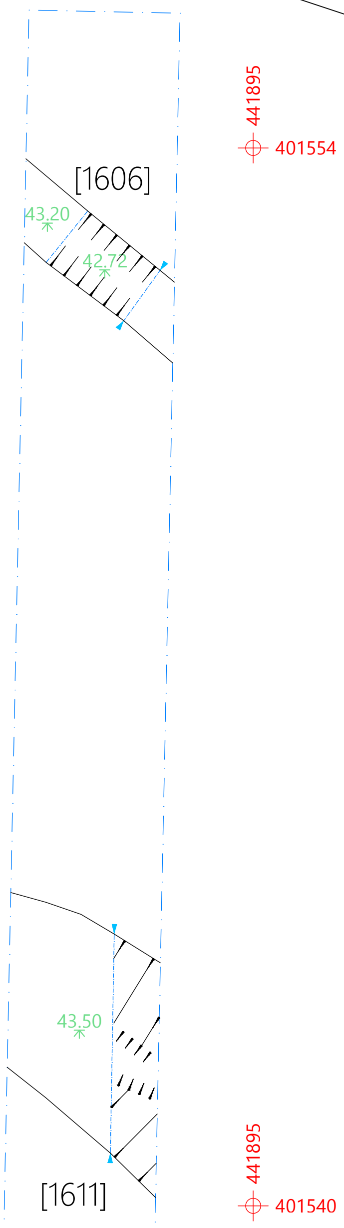
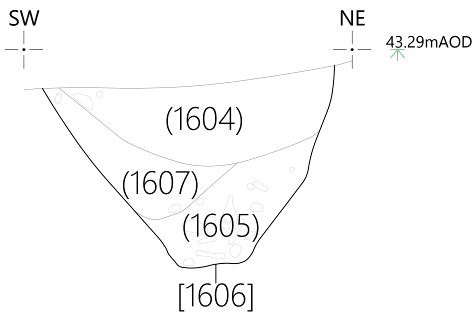


Figure 8
Trench 10
Feature Plan & Section
Scale: Plan 1:100
Section 1:20 @ A4









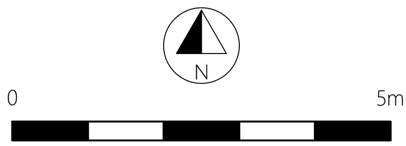


Figure 9
Trench 16
Feature Plan & Section
Scale: Plan 1:100
Section 1:20 @ A4

Plate 1: General view of Site, facing South-west.

Plate 2: General view of Site, facing South-east

Plate 3: General view of Trench 1, facing West.

Plate 4: General view of Trench 11, facing North.

Plate 5: General view of Trench 13, facing South-east.

Plate 6: General view of Trench 2, facing South.

Plate 7: North-east facing section of Enclosures Ditch [205], facing South-west.

Plate 8: South-east facing section of Enclosures Ditch [207], facing North-west.

Plate 9: General view of Trench 4, facing West.

Plate 10: South facing section of Enclosures Ditch [405], facing North.

Plate 11: General view of Trench 5, facing North.

Plate 12: South-east facing section of Trackway Ditch [506], facing North-west.

Plate 13: South-east facing section of Enclosures/Trackway Ditch [509], facing North-west.

Plate 14: South-west facing section of Enclosures Ditch [511], facing North-east.

Plate 15: General view of Trench 6, facing East.

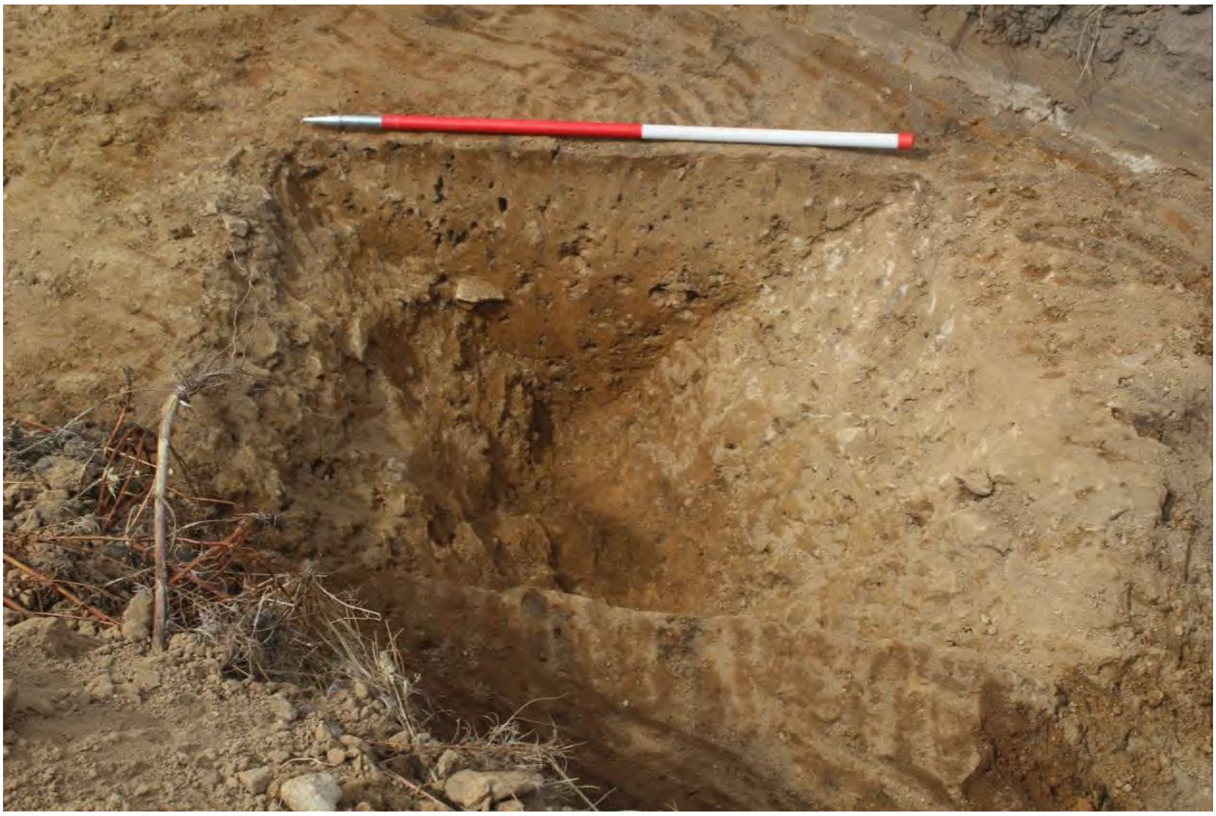


Plate 16: South facing section of Trackway Ditch [605], facing North.

Plate 17: North facing section of Trackway Ditch [610], facing South.

Plate 18: General view of Trench 9, facing West.

Plate 19: North-east facing section of Trackway Ditch [905], facing South-west.

Plate 20: General view of Trench 10, facing East.

Plate 21: South-east facing section of Ditch [1005], facing North-west.

Plate 22: General view of Trench 16, facing North.

Plate 23: West facing section of Trackway Ditch [1606], facing East.

Plate 24: General view of Trench 23 showing modern spread, facing East.

APPENDIX 1

Context Listing

Context no.	Trench	Type	Description	Interpretation
101	1	Layer	Topsoil of trench 1. Colour: greyish brown. Composition: sandy silt. Compaction: dry, friable. Inclusions: none. Reliability: good.	Topsoil of trench 1
102	1	Layer	Subsoil of trench 1. Colour: mid orange. Composition: coarse silty sand. Compaction: dry, loose. Inclusions: none. Reliability: good.	Sub soil of trench 1
103	1	Layer	Natural of trench 1. Colour: light orange. Composition: coarse sand. Compaction: dry, loose. Inclusions: frequent large sub-angular platy sandstone, evenly distributed. Reliability: good.	Natural of trench 11
201	2	Layer	Topsoil of trench 2. Colour: mid greyish brown. Composition: sandy silt. Inclusions: none. Reliability: good.	Topsoil of trench 2
202	2	Layer	Subsoil of trench 2. Colour: light brown. Composition: sandy silt. Compaction: dry, loose. Inclusions: moderate small sub-angular inclusion, evenly distributed. Reliability: good.	Sub soil of trench 2
203	2	Layer	Natural of trench 2. Colour: light orangey yellow. Composition: coarse sand. Compaction: dry, friable. Inclusions: frequent large sub-angular platy sandstone, evenly distributed. Reliability: good.	Natural of trench 2
204	2	Fill	Fill of ditch. Colour: mid brown. Composition: sandy silt. Compaction: moist, friable. Inclusions: moderate medium angular inclusion, concentrated towards centre. Reliability: good.	Fill of enclosure ditch. Quite stoney suggesting deliberate backgill
205	2	Cut	Cut of NE-SW ditch. Shape in plan: irregular, linear. Break at top: gradual. Sides: shallow, convex. Break at base: imperceptible.	Cut of enclosure ditch. Forming se side of enclosure
206	2	Fill	Fill of ditch. Colour: mid brown. Composition: sandy silt. Compaction: dry, friable. Inclusions: occasional large sub-rounded spheroidal sandstone, concentrated towards north-east edge. Reliability: good.	Single fill of ditch. Natural accumulation of fill after feature was abandoned.

Context no.	Trench	Type	Description	Interpretation
207	2	Cut	Cut of NW-SE ditch. Shape in plan: regular, linear. Break at top: sharp. Sides: steep, concave. Break at base: sharp. Base: uneven.	Cut of north-eastern enclosure ditch.
301	3	Layer	Topsoil of trench 3. Colour: mid greyish brown. Composition: sandy silt. Compaction: dry, friable. Inclusions: none. Reliability: good.	Topsoil of trench 3
302	3	Layer	Subsoil of trench 3. Colour: mid orange. Composition: coarse sand. Compaction: dry, loose. Inclusions: none. Reliability: good.	Sub soil of trench 3
303	3	Layer	Natural of trench 3. Colour: light yellowish orange. Composition: coarse sand. Compaction: dry, friable. Inclusions: frequent large sub-angular platy sandstone.	Natural of trench 3
401	4	Layer	Topsoil of trench 4. Colour: mid greyish brown. Composition: sandy silt. Compaction: dry, friable. Inclusions: none. Reliability: good.	Topsoil of trench 4
402	4	Layer	Subsoil of trench 4. Colour: mid orangey brown. Composition: sandy silt. Compaction: dry, friable. Inclusions: none. Reliability: good.	Sub soil of trench 4
403	4	Layer	Natural of trench 4. Colour: light yellowish brown. Composition: coarse sand. Compaction: dry, friable. Inclusions: frequent large sub-angular platy sandstone, evenly distributed. Reliability: good.	Natural of trench 4
404	4	Fill	Fill of ditch. Colour: light brown. Composition: sandy silt. Compaction: dry, friable. Inclusions: moderate angular sandstone, concentrated towards centre. Reliability: good.	Fill of enclosure ditch. Slightly stoney fill suggesting deliberate backfill.
405	4	Cut	Cut of N-S ditch. Shape in plan: linear. Break at top: sharp. Sides: concave. Break at base: imperceptible. Base: rounded.	Probable enclosure ditch, boundary.
406	4	Fill	Fill of ditch. Colour: light yellowish brown. Composition: sandy silt. Compaction: moist, friable. Inclusions: moderate small angular stones, concentrated towards base. Reliability: good.	Weathering deposit from side of ditch.
501	5	Layer	Topsoil of trench 5. Colour: mid greyish brown. Composition: sandy silt. Compaction: dry, loose. Inclusions: none. Reliability: good.	Topsoil of trench 5
502	5	Layer	Subsoil of trench 5. Colour: mid orange. Composition: sandy silt. Compaction: dry, loose. Inclusions: none. Reliability: good.	Sub soil of trench 5

Context no.	Trench	Type	Description	Interpretation
503	5	Layer	Natural of trench 5. Colour: light orangey yellow. Composition: coarse sand. Compaction: dry, friable. Inclusions: frequent large sub-angular platy sandstone, evenly distributed. Reliability: good.	Natural of trench 5
504	5	Fill	Fill of ditch. Colour: mid orangey brown. Composition: medium silty sand. Compaction: dry, firm. Inclusions: frequent medium sub-rounded spheroidal sandstone, concentrated towards base. Reliability: good.	Most substantial fill of a northwest-southeast trackway ditch, possibly the result of deliberate back filling due to it's high stone content.
505	5	Fill	Fill of ditch. Colour: mid pinkish brown. Composition: sandy silt. Compaction: dry, malleable. Inclusions: none. Reliability: good.	Slump material on the southwestern edge of a trackway ditch, formed by a natural accumulation of silting whilst the ditch was open
506	5	Cut	Cut of NW-SE ditch. Shape in plan: curvi-linear. Break at top: sharp. Sides: steep, convex. Break at base: gradual. Base: rounded, sloping towards NE.	Cut of moderately deep nw-se trackway ditch, showing no sign of secondary use. Adjacent to linear enclosure ditches [506 & 511]. No finds nor, suggested period of use.
507	5	Fill	Fill of ditch. Colour: mid orangey brown. Composition: sandy silt. Compaction: dry, friable. Inclusions: moderate small sub-rounded spheroidal sandstone, evenly distributed. Reliability: good.	The most substantial fill of a northwest-southeast enclosure ditch, possibly formed by natural accumulation after the ditch was abandoned
508	5	Fill	Fill of ditch. Colour: light brownish yellow. Composition: coarse sand. Compaction: dry, friable. Inclusions: none. Reliability: good.	Slump of naturally accumulated material on the southwestern side of an enclosure ditch, likely formed over time whilst the ditch was open
509	5	Cut	Cut of NW-SE ditch. Shape in plan: irregular, curvi-linear. Break at top: sharp. Sides: steep, straight. Break at base: sharp. Base: uneven.	Cut of northwest-southeast enclosure ditch, representing single use. Possibly relates to northeast-southwest enclosure ditch [511]. The northeast side shows variation in the shape in plan, possibly due to plough disturbance or variation in the natural geology.
510	5	Fill	Fill of ditch. Colour: mid orangey brown. Composition: sandy silt. Compaction: dry, friable. Inclusions: none. Reliability: good.	Single fill of northeast-southwest enclosure ditch, the contents arefairly sterile suggesting it was formed over time naturally.

Context no.	Trench	Type	Description	Interpretation
511	5	Cut	Cut of NE-SW ditch. Shape in plan: linear. Break at top: gradual. Sides: shallow, straight. Break at base: imperceptible. Base: flat.	Cut of a shallow northeast-southwest enclosure ditch, possibly interacts with [509]. Represents primary use. Unknown period of use
601	6	Layer	Topsoil of trench 6. Colour: mid greyish brown. Composition: sandy silt. Compaction: dry, friable. Inclusions: none. Reliability: good.	Topsoil of trench 6
602	6	Layer	Subsoil of trench 6. Colour: light yellow. Composition: coarse sand. Compaction: dry, friable. Inclusions: none. Reliability: good.	Sub soil of trench 6
603	6	Layer	Natural of trench 6. Colour: light yellowish orange. Composition: coarse sand. Compaction: dry, friable. Inclusions: frequent large sub-angular platy sandstone, evenly distributed. Reliability: good.	Natural of trench 6
604	6	Fill	Fill of ditch. Colour: mid orangey brown. Composition: sandy silt. Compaction: dry, friable. Inclusions: occasional small sub-rounded spheroidal sandstone, evenly distributed. Reliability: good.	Single fill of northwest-southeast linear enclosure ditch, possibly formed by natural accumulation over time after ditch abandonment
605	6	Cut	Cut of NW-SE ditch. Shape in plan: linear. Break at top: sharp. Sides: steep, convex. Break at base: sharp. Base: rounded.	Cut of northwest-southeast enclosure ditch, representing single use.
606	6	Fill	Fill of ditch. Colour: mid brown. Composition: medium silty sand. Compaction: dry, friable. Inclusions: rare small sub-rounded spheroidal sandstone, evenly distributed. Reliability: fair.	Latest fill of a possible north-south trackway ditch, the deposit is fairly clean, suggesting a possible formation of natural accumulation
607	6	Fill	Fill of ditch. Colour: light brown. Composition: sandy silt. Compaction: dry, malleable. Inclusions: frequent large sub-rounded spheroidal sandstone, evenly distributed. Reliability: good.	Stoney deposit of north-south possible trackway ditch. Likely formed by deliberate backfilling a northwest-southeast after the ditch was abandoned
608	6	Fill	Fill of ditch. Colour: mid brown. Composition: silty sand. Compaction: dry, firm. Inclusions: rare small sub-rounded pebbles, evenly distributed. Reliability: good.	Relatively clean material deposited on the eastern edge of a possible north-south trackway ditch. Possibly formed by natural silting
609	6	Fill	Fill of ditch. Colour: light yellowish brown. Composition: medium silty sand. Compaction: dry, friable. Inclusions: sub-rounded spheroidal sandstone, evenly distributed. Reliability: good.	Primary fill of north-south possible trackway ditch. Possibly formed by backfilling

Context no.	Trench	Type	Description	Interpretation
610	6	Cut	Cut of N-S ditch. Shape in plan: linear. Break at top: gradual. Sides: steep, convex. Break at base: gradual. Base: flat.	Cut of north south possible trackway ditch. The fills are disimilar to other parts of the same trackway (?) further north, containing multiple deliberate fills.
701	7	Layer	Topsoil of trench 7. Colour: mid greyish brown. Composition: sandy silt. Compaction: dry, friable. Inclusions: none. Reliability: good.	Topsoil of trench 7
702	7	Layer	Subsoil of trench 7. Colour: light yellow. Composition: medium sand. Compaction: dry, friable. Inclusions: none. Reliability: good.	Sub soil trench 7
703	7	Layer	Natural of trench 7. Colour: light yellowish orange. Composition: coarse sand. Compaction: dry, friable. Inclusions: none. Reliability: good.	Natural of trench 7
801	8	Layer	Topsoil of trench 8. Colour: mid greyish brown. Composition: sandy silt. Compaction: dry, friable. Inclusions: none. Reliability: good.	Topsoil of trench 8
802	8	Layer	Subsoil of trench 8. Colour: light orangey yellow. Composition: medium silty sand. Compaction: dry, friable. Inclusions: none. Reliability: good.	Sub soil of trench 8
803	8	Layer	Natural of trench 8. Colour: light yellowish orange. Composition: coarse sand. Compaction: dry, friable. Inclusions: none. Reliability: good.	Natural of trench 8
901	9	Layer	Topsoil of trench 9. Colour: mid greyish brown. Composition: sandy silt. Compaction: dry, friable. Inclusions: none. Reliability: good.	Topsoil of trench 9
902	9	Layer	Subsoil of trench 9. Colour: mid orangey brown. Composition: sandy silt. Compaction: dry, friable. Inclusions: none. Reliability: good.	Sub soil of trench 9
903	9	Layer	Natural of trench 9. Colour: mid brownish yellow. Composition: coarse silty sand. Compaction: dry, friable. Inclusions: frequent large platy sandstone, evenly distributed. Reliability: good.	Natural of trench 9
904	9	Fill	Fill of ditch. Colour: mid orangey brown. Composition: silty sand. Compaction: dry, firm. Inclusions: occasional medium sub-rounded spheroidal sandstone, evenly distributed. Reliability: fair.	Possible single fill of shallow northeast- southwest ditch. This feature could also be modern.

Context no.	Trench	Type	Description	Interpretation
905	9	Cut	Cut of NE-SW ditch. Shape in plan: linear. Break at top: sharp. Sides: shallow, straight. Break at base: gradual. Base: uneven.	Cut of possible northeast-southwest shallow ditch, no function or date ascertained. Possibly a modern feature
906	9	Fill	Fill of ditch. Colour: light brown. Composition: sandy silt. Compaction: dry, friable. Inclusions: 1) occasional large sub-angular limestone, concentrated towards east side 2) occasional small sub-angular limestone, concentrated towards east edge. Reliability: good.	Fill of possible rb ditch. Deliberate backfilling
907	9	Cut	Cut of NE-SW ditch. Shape in plan: linear. Break at top: gradual. Sides: shallow, concave. Break at base: imperceptible. Base: rounded.	Corresponds to geophysics plot and may be part of shallow track running north south across site.
1001	10	Layer	Topsoil of trench 10. Colour: mid greyish brown. Composition: sandy silt. Compaction: dry, friable. Inclusions: none. Reliability: good.	Top soil of trench 10
1002	10	Layer	Subsoil of trench 10. Colour: light yellowish brown. Composition: sandy silt. Compaction: dry, malleable. Inclusions: frequent medium sub-angular spheroidal sandstone, evenly distributed. Reliability: good.	Sub soil of trench 10
1003	10	Layer	Natural of trench 10. Colour: mid orangey yellow. Composition: coarse sand. Compaction: dry, friable. Inclusions: frequent large sub-angular platy sandstone, evenly distributed. Reliability: good.	Natural for trench 10
1004	10	Fill	Fill of ditch. Colour: mid reddish brown. Composition: sandy silt. Compaction: dry, malleable. Inclusions: frequent large sub-angular platy sandstone, evenly distributed. Reliability: good.	Single fill of NW to SE ditch, possibly back filled.
1005	10	Cut	Cut of NW-SE ditch. Shape in plan: linear. Break at top: sharp. Sides: 1) NE: stepped, convex 2) SW: steep, straight. Break at base: 1) NE: sharp 2) SW: gradual. Base: flat.	Cut of NW to SE possible enclosure ditch. Shows single use, no finds.
1101	11	Layer	Topsoil of trench 11. Colour: mid greyish brown. Composition: sandy silt. Compaction: dry. Inclusions: none. Reliability: good.	Top soil of trench 11
1102	11	Layer	Subsoil of trench 11. Colour: mid orange. Composition: sandy silt. Compaction: dry, friable. Inclusions: occasional small sub-rounded platy sandstone, evenly distributed. Reliability: good.	Subsoil of trench 11

Context no.	Trench	Type	Description	Interpretation
1103	11	Layer	Natural of trench 11. Colour: light yellowish orange. Composition: coarse sand. Compaction: dry, friable. Inclusions: frequent large sub-angular platy sandstone, evenly distributed. Reliability: good.	Natural of trench 11
1201	12	Layer	Topsoil of trench 12. Colour: mid greyish brown. Composition: sandy silt. Compaction: dry, friable. Inclusions: none. Reliability: good.	Top soil of trench 12
1202	12	Layer	Subsoil of trench 12. Colour: mid orange. Composition: medium silty sand. Compaction: dry, loose. Inclusions: none. Reliability: good.	Sub soil of trench 12
1203	12	Layer	Natural of trench 12. Colour: light yellowish orange. Composition: coarse sand. Compaction: dry, friable. Inclusions: frequent large sub-angular platy sandstone, evenly distributed. Reliability: good.	Natural of trench 12
1301	13	Layer	Topsoil of trench 13. Colour: mid greyish brown. Composition: sandy silt. Compaction: dry, friable. Inclusions: none. Reliability: good.	Topsoil of trench 13
1302	13	Layer	Subsoil of trench 13. Colour: mid orangey brown. Composition: fine silty sand. Compaction: dry, firm. Inclusions: frequent large sub-angular spheroidal sandstone, evenly distributed. Reliability: good.	Subsoil of trench 13
1303	13	Layer	Natural of trench 13. Colour: very light yellowish orange. Composition: fine sand. Compaction: dry, friable. Inclusions: frequent large sub-angular spheroidal sandstone, evenly distributed. Reliability: good.	Natural of trench 13.
1401	14	Layer	Topsoil of trench 14. Colour: mid greyish brown. Composition: fine silty sand. Compaction: dry, friable. Inclusions: none. Reliability: good.	Top soil of trench 14
1402	14	Layer	Subsoil of trench 14. Colour: mid orange. Composition: medium silty sand. Compaction: dry, friable. Inclusions: none. Reliability: good.	Sub soil of trench 14
1403	14	Layer	Natural of trench 14. Colour: light orangey yellow. Composition: coarse cobbly sand. Compaction: very dry, friable. Inclusions: frequent large sub-angular elongate sandstone, evenly distributed. Reliability: good.	Natural of trench 14

Context no.	Trench	Type	Description	Interpretation
1501	15	Layer	Topsoil of trench 15. Colour: mid greyish brown. Composition: sandy silt. Compaction: dry, friable. Inclusions: none. Reliability: good.	Top soil of trench 15
1502	15	Layer	Subsoil of trench 15. Colour: light yellowish brown. Composition: sand. Inclusions: none. Reliability: good.	Sub soil of trench 15
1503	15	Layer	Natural of trench 15. Colour: light yellowish orange. Composition: coarse sand. Compaction: dry, friable. Inclusions: none. Reliability: good.	Natural of trench 15
1601	16	Layer	Topsoil of trench 16. Colour: mid greyish brown. Composition: sandy silt. Compaction: dry, friable. Inclusions: none. Reliability: good.	Topsoil of trench 16
1602	16	Layer	Subsoil of trench 16. Colour: mid yellowish brown. Composition: medium silty sand. Compaction: dry, friable. Inclusions: none. Reliability: good.	Sub soil of trench 16
1603	16	Layer	Natural of trench 16. Colour: light yellowish orange. Composition: coarse sand. Compaction: dry, friable. Inclusions: none. Reliability: good.	Natural of trench 16
1604	16	Fill	Fill of ditch. Colour: mid brown. Composition: sandy silt. Compaction: moist, loose. Inclusions: occasional small angular sanstone, concentrated towards edge. Reliability: good.	Top fill of trackway ditch. Resulting from silting up primarly
1605	16	Fill	Fill of ditch. Colour: light orangey brown. Composition: sandy clay. Compaction: moist, loose. Inclusions: frequent medium angular sandstone, evenly distributed. Reliability: good.	Lower deliberate backfill of trackway ditch. May have eroded from ditch sides
1606	16	Cut	Cut of NW-SE ditch. Shape in plan: regular, linear. Break at top: sharp. Sides: steep, straight. Break at base: sharp. Base: flat.	Northern arm of trackway ditch. More regular than southern arm. Associated with ditch [1611]
1607	16	Fill	Fill of ditch. Colour: light yellowish grey. Composition: sandy silt. Compaction: moist, loose. Inclusions: moderate small angular sandsyone, evenly distributed. Reliability: good.	Backfill of trackway ditch. Includes eroded pices of bedrock from sides of ditch

Context no.	Trench	Type	Description	Interpretation
1608	16	Fill	Fill of ditch. Colour: light brown. Composition: sandy silt. Compaction: dry, loose. Inclusions: occasional small sub-angular sandstone, evenly distributed. Reliability: good.	Upper fill of ditch, formed by gradual deposition
1609	16	Fill	Fill of ditch. Colour: light brown. Composition: sandy clay. Compaction: dry, loose. Inclusions: frequent medium sub-rounded sandstone, evenly distributed. Reliability: good.	Middle fill of ditch, likely purposely deposited material
1610	16	Fill	Fill of ditch. Colour: light brown. Composition: sandy clay. Compaction: dry, loose. Inclusions: moderate small sub-rounded sandstone, evenly distributed. Reliability: good.	Lower fill of ditch, gradual deposition of material post abandonment?
1611	16	Cut	Cut of ditch. Shape in plan: regular, linear. Break at top: gradual. Sides: stepped, convex. Break at base: sharp. Base: flat.	One of two parallel ditches, associated with [1606]
1701	17	Layer	Topsoil of trench 17. Colour: mid greyish brown. Composition: sandy silt. Compaction: dry, friable. Inclusions: none. Reliability: good.	Topsoil of trench 17
1702	17	Layer	Subsoil of trench 17. Colour: mid orangey brown. Composition: medium silty sand. Compaction: dry, friable. Inclusions: none.	Sub soil of trench 17
1703	17	Layer	Natural of trench 17. Colour: mid yellowish orange. Composition: coarse sand. Compaction: dry, friable. Inclusions: none. Reliability: good.	Natural of trench 17
1801	18	Layer	Topsoil of trench 18. Colour: dark greyish brown. Composition: sandy silt. Compaction: dry, loose. Inclusions: moderate small sub-angular sandstone, evenly distributed. Reliability: good.	Topsoil
1802	18	Layer	Subsoil of trench 18. Colour: mid orangey brown. Composition: silty sand. Compaction: dry, loose. Inclusions: moderate small sub-rounded stones, evenly distributed. Reliability: good.	Lower ploughsoil
1803	18	Layer	Natural of trench 18. Composition: sandy clay. Compaction: dry, loose. Inclusions: sub-rounded inclusion.	Natural sand and gravel, bedrock
1901	19	Layer	Topsoil of trench 19. Colour: mid greyish brown. Composition: sandy silt. Compaction: dry, friable. Inclusions: none. Reliability: good.	Top soil of trench 19

Context no.	Trench	Type	Description	Interpretation
1902	19	Layer	Subsoil of trench 19. Colour: mid brownish orange. Composition: coarse silty sand. Compaction: dry, friable. Inclusions: none. Reliability: good.	Sub soil of trench 19
1903	19	Layer	Natural of trench 19. Colour: light orangey brown. Composition: coarse sand. Compaction: dry, malleable. Inclusions: frequent large sub-rounded platy sandstone, evenly distributed. Reliability: good.	Natural of trench 19
2001	20	Layer	Topsoil of trench 20. Colour: mid greyish brown. Composition: sandy silt. Compaction: dry, friable. Inclusions: none. Reliability: good.	Topsoil for trench 20
2002	20	Layer	Subsoil of trench 20. Colour: mid orangey brown. Composition: medium silty sand. Compaction: dry, friable. Inclusions: none. Reliability: good.	Sub soil of trench 20
2003	20	Layer	Natural of trench 20. Colour: light orangey yellow. Composition: coarse sand. Compaction: dry, firm. Inclusions: none.	Natural of trench 20
2101	21	Layer	Topsoil of trench 21. Colour: mid greyish brown. Composition: sandy silt. Compaction: dry, friable. Inclusions: none. Reliability: good.	Topsoil of trench 21
2102	21	Layer	Natural of trench 21. Colour: light brownish yellow. Composition: coarse sand. Compaction: dry, malleable. Inclusions: frequent large sub-angular platy sandstone, evenly distributed. Reliability: good.	Natural of trench 21
2201	22	Layer	Topsoil of trench 22. Colour: mid greyish brown. Composition: sandy silt. Compaction: dry, friable. Inclusions: none. Reliability: good.	Topsoil of trench 22
2202	22	Layer	Natural of trench 22. Colour: dark brownish yellow. Composition: coarse sand. Compaction: dry, friable. Inclusions: frequent large sub-angular platy sandstone, evenly distributed. Reliability: good.	Natural of trench 22
2301	23	Layer	Topsoil of trench 23. Colour: mid greyish brown. Composition: sandy silt. Compaction: dry, friable. Inclusions: none. Reliability: good.	Topsoil of trench 23
2302	23	Layer	Subsoil of trench 23. Colour: mid orangey brown. Composition: coarse silty sand. Compaction: dry, friable. Inclusions: none. Reliability: good.	Sub soil of trench 23

Context no.	Trench	Type	Description	Interpretation
2303	23	Layer	Natural of trench 23. Colour: light yellow. Composition: coarse sand. Compaction: dry, malleable. Inclusions: frequent large sub-angular platy sandstone, evenly distributed. Reliability: good.	Natural of trench 23

APPENDIX 2

Black and White Photographic Archive Listing

Frame	Film	Context	Scale	Facing	Description
008	1	-	1m	South-east	Trench shot of trench 13
009	1	-	1m	East	Trench shot of trench 14
010	1	-	1m	South-west	Trench shot of trench 12
011	1	-	1m	South	Trench shot of trench 11
012	1	-	1m	East	Trench shot of trench 10
013	1	-	1m	West	Trench shot of trench 1
014	1	-	1m	South	Trench shot of trench 2
015	1	-	1m	South-west	Trench shot of trench 3
016	1	-	1m	East	Trench shot of trench 4
017	1	-	1m	South	Trench shot of trench 5
018	1	-	1m	West	Trench shot of trench 6
019	1	(507)-[509]	1m	South-east	Ditch [509]
020	1	(504)-[506]	1m	North-west	Ditch [506]
021	1	(404)-[405]	1m	North	Ditch [405]
022	1	(404)-[405]	1m	East	Ditch [405]
023	1	(204)-[205]	1m	South-west	Ditch [205]
024	1	(204)-[205]	1m	South	Ditch [205]
025	1	(206)-[207]	1m	North-west	Ditch [207]
026	1	(206)-[207]	1m	North	Ditch [207]
027	1	(510)-[511]	1m	West	Ditch [511]
028	1	(1004)-[1005]	1m	North-west	Ditch [1005]
029	1	(1004)-[1005]	1m	West	Ditch [1005]
030	1	(604)-[605]	1m	North-west	Ditch [605]
031	1	(606)-[610]	1m	South	Ditch [610]
032	1	-	1m	East	Trench shot of trench 18
033	1	-	1m	West	Trench shot of trench 18
034	1	(1604)-[1606]	1m	East	Ditch [1606]
035	1	(1604)-[1606]	1m	East	Ditch [1606]
036	1	(1604)-[1606]	1m	South-east	Ditch [1606]
001	2	-	-	-	I.D. shot
002	2	-	-	-	I.D. shot
003	2	(1608)-[1611]	1m	North-east	Ditch [1611]
004	2	(1608)-[1611]	1m	North	Ditch [1611]
005	2	(1608)-[1611]	1m	East	Ditch [1611]
006	2	(1608)-[1611]	1m	South-east	Ditch [1611]
007	2	(904)-[905]	1m	South-west	Ditch [905]
008	2	-	1m	East	Trench shot of trench 19
009	2	-	1m	West	Trench shot of trench 19
010	2	-	2 x 1m	North	Trench shot of trench 22
011	2	-	2 x 1m	South	Trench shot of trench 22

Frame	Film	Context	Scale	Facing	Description
012	2	-	2 x 1m	West	Trench shot of trench 20
013	2	-	2 x 1m	East	Trench shot of trench 20
014	2	-	2 x 1m	South	Trench shot of trench 21
015	2	-	2 x 1m	North	Trench shot of trench 21
016	2	-	2 x 1m	East	Trench shot of trench 23
017	2	-	2 x 1m	West	Trench shot of trench 23
018	2	-	2 x 1m	North	Trench shot of trench 16
019	2	-	2 x 1m	South	Trench shot of trench 16
020	2	-	2 x 1m	South	Trench shot of trench 16
021	2	-	2 x 1m	West	Trench shot of trench 15
022	2	-	2 x 1m	East	Trench shot of trench 15
023	2	-	2 x 1m	East	Trench shot of trench 17
024	2	-	2 x 1m	West	Trench shot of trench 17
025	2	(906)-[907]	1m	North-east	Ditch [907]
026	2	(906)-[907]	1m	North-east	Ditch [907]
027	2	-	2 x 1m	East	Trench shot of trench 23
028	2	-	2 x 1m	West	Trench shot of trench 23
029	2	(1604)-[1606]	1m	South	Ditch [1606]
030	2	(1604)-[1606]	1m	South-east	Ditch [1606]
031	2	-	1m	South-east	Trench shot of trench 23
032	2	-	1m	South	Trench shot of trench 23
033	2	-	2 x 1m	East	Trench shot of trench 09
034	2	-	2 x 1m	West	Trench shot of trench 09

APPENDIX 3

Digital Photographic Archive Listing

Frame	Context	Scale	Facing	Description
0149	-	-	South-east	General shot of site
0150	-	-	South	General shot of site
0151	-	-	South-west	General shot of site
0152	-	-	North-west	General shot of site
0153	-	-	South-east	General shot of site
0154	-	1m	South-east	Trench shot of trench 13
0155	-	1m	North-west	Trench shot of trench 13
0156	-	1m	East	Trench shot of trench 14
0157	-	1m	East	Trench shot of trench 14
0158	-	1m	West	Trench shot of trench 14
0159	-	1m	South-west	Trench shot of trench 12
0160	-	1m	North-east	Trench shot of trench 12
0161	-	1m	South	Trench shot of trench 11
0162	-	1m	North	Trench shot of trench 11
0163	-	1m	East	Trench shot of trench 10
0164	-	1m	West	Trench shot of trench 10
0165	-	1m	West	Trench shot of trench 1
0166	-	1m	East	Trench shot of trench 1
0167	-	1m	South	Trench shot of trench 2
0168	-	1m	North	Trench shot of trench 2
0169	-	1m	South-west	Trench shot of trench 3
0170	-	1m	North-east	Trench shot of trench 3
0171	-	1m	East	Trench shot of trench 4
0172	-	1m	West	Trench shot of trench 4
0173	-	1m	South	Trench shot of trench 5
0174	-	1m	North	Trench shot of trench 5
0175	-	1m	East	Trench shot of trench 6
0176	-	1m	West	Trench shot of trench 6
3493	(507)-[509]	1m	South-east	Ditch [509]
3494	(507)-[509]	1m	South-east	Ditch [509]
3495	(507)-[509]	1m	North-west	Ditch [509]
3496	(504)-[506]	1m	North-west	Ditch [506]
3497	(504)-[506]	1m	North-west	Ditch [506]
3498	(404)-[405]	1m	North	Ditch [405]
3499	(404)-[405]	1m	East	Ditch [405]
3500	(204)-[205]	1m	South-west	Ditch [205]
3501	(204)-[205]	1m	South	Ditch [205]
3502	(206)-[207]	1m	North-west	Ditch [207]
3503	(206)-[207]	1m	North	Ditch [207]
3504	(510)-[511]	1m	North	Ditch [511]

Frame	Context	Scale	Facing	Description
3505	(510)-[511]	1m	North-east	Ditch [511]
3506	(1004)-[1005]	1m	North-west	Ditch [1005]
3507	(1004)-[1005]	1m	West	Ditch [1005]
3508	(604)-[605]	1m	North-west	Ditch [605]
3509	(604)-[605]	1m	North	Ditch [605]
3510	(606)-[610]	1m	South	Ditch [610]
3511	(606)-[610]	1m	East	Ditch [610]
3512	-	1m	West	Trench shot of trench 18
3513	-	1m	East	Trench shot of trench 18
3514	(1604)-[1606]	1m	East	Ditch [1606]
3515	(1604)-[1606]	1m	East	Ditch [1606]
3516	(1604)-[1606]	1m	South-east	Ditch [1606]
3517	-	1m	West	Trench shot of trench 9
3518	-	1m	East	Trench shot of trench 9
3519	(1608)-[1611]	1m	North-east	Ditch [1611]
3520	(1608)-[1611]	1m	North	Ditch [1611]
3521	(1608)-[1611]	1m	East	Ditch [1611]
3522	(1608)-[1611]	1m	South-east	Ditch [1611]
3523	(904)-[905]	1m	South-west	Ditch [905]
3524	(904)-[905]	1m	South-west	Ditch [905]
3525	-	1m	East	Trench shot of trench 19
3526	-	1m	West	Trench shot of trench 19
3527	-	1m	South	Trench shot of trench 22
3528	-	1m	North	Trench shot of trench 22
3529	-	-	North-west	Ditch [511] OSL
3530	-	-	South-east	Ditch [509] OSL
3531	-	-	North-west	Ditch [506] OSL
3532	-	-	North-west	Ditch [1606] OSL
3533	-	-	North-east	Ditch [1611] OSL
3534	-	2 x 1m	West	Trench shot of trench 20
3535	-	2 x 1m	East	Trench shot of trench 20
3536	-	2 x 1m	South	Trench shot of trench 21
3537	-	2 x 1m	North	Trench shot of trench 21
3538	-	2 x 1m	East	Trench shot of trench 23
3539	-	2 x 1m	West	Trench shot of trench 23
3540	-	2 x 1m	North	Trench shot of trench 16
3541	-	2 x 1m	South	Trench shot of trench 16
3542	-	2 x 1m	South	Trench shot of trench 16
3543	-	2 x 1m	South-west	Trench shot of trench 15
3544	-	2 x 1m	North-east	Trench shot of trench 15
3545	-	2 x 1m	North-east	Trench shot of trench 17
3546	-	2 x 1m	South-west	Trench shot of trench 17
3547	(906)-[907]	1m	South	Ditch [907]
3548	(906)-[907]	1m	East	Ditch [907]
3549	(906)-[907]	1m	North	Ditch [907]

Frame	Context	Scale	Facing	Description
3550	-	1m	South-east	Trench shot of trench 23
3551	-	1m	South-east	Trench shot of trench 23
3552	(1604)-[1606]	1m	East	Ditch [1606]
3553	(1604)-[1606]	1m	South-east	Ditch [1606]


IMG_0149


IMG_0150


IMG_0151


IMG_0152


IMG_0153


IMG_0154


IMG_0155


IMG_0156


IMG_0157


IMG_0158


IMG_0159


IMG_0160


IMG_0161


IMG_0162


IMG_0163


IMG_0164


IMG_0165


IMG_0166


IMG_0167


IMG_0168


IMG_0169


IMG_0170


IMG_0171


IMG_0172


IMG_0173


IMG_0174


IMG_0175


IMG_0176


IMG_3493


IMG_3494


IMG_3495


IMG_3496


IMG_3497


IMG_3498


IMG_3499


IMG_3500

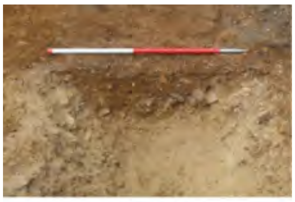

IMG_3501


IMG_3502


IMG_3503


IMG_3504


IMG_3505


IMG_3506


IMG_3507


IMG_3508


IMG_3509


IMG_3510


IMG_3511


IMG_3512


IMG_3513


IMG_3514


IMG_3515


IMG_3516


IMG_3517


IMG_3518


IMG_3519


IMG_3520


IMG_3521


IMG_3522


IMG_3523


IMG_3524


IMG_3525


IMG_3526


IMG_3527


IMG_3528


IMG_3529


IMG_3530


IMG_3531


IMG_3532


IMG_3533


IMG_3534


IMG_3535


IMG_3536


IMG_3537


IMG_3538


IMG_3539


IMG_3540


IMG_3541


IMG_3542


IMG_3543

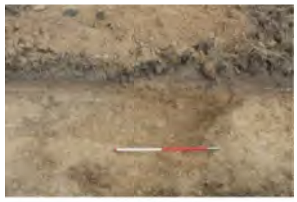

IMG_3544


IMG_3545


IMG_3546


IMG_3547


IMG_3548


IMG_3549


IMG_3550


IMG_3551


IMG_3552


IMG_3553

APPENDIX 4

Drawing Listing

Drawing	Sheet No.	Scale	Context	Description
001	01	1:10	(404)-[405]	South Facing Section of Enclosure Ditch [405]
002	01	1:20	(404)-[405]	Plan of Enclosure Ditch [405]
003	01	1:10	(204)-[205]	North-east Facing Section of Enclosure Ditch [205]
004	01	1:20	(204)-[205]	Plan of Enclosure Ditch [205]
005	01	1:10	(206)-[207]	South-east Facing Section of Enclosure Ditch [207]
006	01	1:20	(206)-[207]	Plan of Enclosure Ditch [207]
007	02	1:10	(504)-[506]	South-east Facing Section of Trackway Ditch [506]
008	02	1:20	(504)-[506]	Plan of Trackway Ditch [506]
009	02	1:10	(507)-[509]	South-east Facing Section of Enclosure Ditch [509]
010	02	1:20	(507)-[509]	Plan of Enclosure Ditch [509]
011	02	1:10	(510)-[511]	North-east Facing Section of Enclosure Ditch [511]
012	02	1:20	(510)-[511]	Plan of Enclosure Ditch [511]
013	03	1:10	(604)-[605]	South-east Facing Section of Enclosure Ditch [605]
014	03	1:20	(604)-[605]	Plan of Enclosure Ditch [605]
015	04	1:10	(1004)-[1005]	South-east Facing section of Ditch [1005]
016	04	1:20	(1004)-[1005]	Plan of Ditch [1005]
017	01	1:10	(1604)-[1606]	North-west Facing Section of Trackway Ditch [1606]
018	01	1:20	(1604)-[1606]	Plan of Trackway Ditch [1606]
019	03	1:20	(606)-[610]	Plan of Trackway Ditch [610]
020	03	1:10	(606)-[610]	North Facing Section of Trackway Ditch [610]
021	04	1:20	(1608)-[1611]	West Facing Section of Trackway Ditch [1611]
022	04	1:20	(1608)-[1611]	Plan of Trackway Ditch [1611]
023	05	1:10	(904)-[905]	North-east Facing Section of Possible Trackway Ditch [905]
024	05	1:20	(904)-[905]	Plan of Possible Trackway Ditch [905]
025	05	1:20	(906)-[907]	South-west Facing Section of Possible Trackway Ditch [907]
026	05	1:20	(906)-[907]	Plan of Possible Trackway Ditch [907]

APPENDIX 5

Sample Listing

Sample	Context	Cut	Type	Volume (L)	Description	Finds	Flot
001	(504)	[506]	Bulk	40	Mid-orangey-brown, silty sand. Main fill of Trackway Ditch.	No	Yes
002	(507)	[509]	Bulk	40	Mid-orangey-brown, sandy silt. Main fill of Trackway Ditch.	No	Yes
003	(404)	[405]	Bulk	40	Light-brown, sandy silt. Main fill of Enclosure Ditch.	No	Yes
004	(204)	[205]	Bulk	40	Mid-brown, sandy silt. Single fill of Enclosure Ditch.	No	Yes
005	(206)	[207]	Bulk	40	Mid-brown, sandy silt. Single fill of Enclosure Ditch.	No	Yes
006	(510)	[511]	Bulk	40	Mid-orangey-brown, sandy silt. Single fill of Enclosure Ditch.	No	Yes
007	(604)	[605]	Bulk	40	Mid-orangey-brown, sandy silt. Single fill of Trackway Ditch.	No	Yes
008	(1004)	[1005]	Bulk	40	Mid-reddish-brown, sandy silt. Single fill of Ditch.	No	Yes
009	(1604)	[1606]	Bulk	40	Mid-brown, sandy silt. Upper fill of Trackway Ditch.	No	Yes
010	(609)	[610]	Bulk	40	Light-yellowish-brown, silty sand. Basal fill of Trackway Ditch.	No	Yes
011	(1609)	[1611]	Bulk	40	Light-brown, sandy clay. Main fill of Trackway Ditch.	No	Yes
012	(904)	[905]	Bulk	40	Mid-orangey-brown, silty sand. Single fill of Trackway Ditch.	No	Yes

Barnsley Road, West Melton 05-02-21

Carbonised Plant Macrofossils and Charcoal

Diane Alldritt

1: Introduction

Twelve environmental sample flots taken during trial trenching evaluation on land at Barnsley Road, West Melton (MAP 05-02-21), were examined for carbonised plant macrofossils and charcoal. Samples were taken from a series of ditch features recorded in trenches 2, 5, 6, 9, 10 and 16 and a possible enclosure ditch in trench 4. Trace quantities of carbonised remains were recovered indicating limited burning activity taking place in the vicinity of the deposits.

2: Methodology

The bulk environmental samples were processed by MAP using a Siraf style water flotation system (French 1971). The flots were dried before examination under a low power binocular microscope typically at x10 magnification. All identified plant remains including charcoal were removed and bagged separately by type.

Wood charcoal was examined using a high powered Vickers M10 metallurgical microscope at magnifications up to x200. The reference photographs of Schweingruber (1990) were consulted for charcoal identification. Plant nomenclature utilised in the text follows Stace (1997) for all vascular plants apart from cereals, which follow Zohary and Hopf (2000).

3: Results

The environmental samples produced trace quantities of carbonised remains <2.5ml in volume consisting of rare finds of charcoal fragments <0.5cm to 1.0cm in size in amongst crushed charred detritus below the level of identification. Modern material was also recorded in amounts <2.5ml, mostly root detritus with scarce finds of modern seeds indicating bioturbation was taking place through the deposits. Clinker and coal were recorded from seven samples and probably originated from Post Medieval activity and disturbance.

Results are given in table 1 and discussed below.

4: Discussion

Trench 2

Ditch [205] fill 204 contained trace charred detritus with nothing identifiable, whilst ditch [207] fill 206 held a small deposit of clinker and coal. These features may have been Post Medieval field boundaries or other divisions.

Trench 4

Enclosure ditch [405] fill 404 contained a small deposit of crushed *Quercus* (oak) charcoal fragments together with clinker and a 1.0cm fragment of slag suggesting possible industrial burning activity occurring nearby. These may have been mixed hearth remains spread as a result of later manuring activity.

Trench 5

Three samples taken from ditch features [506] fill 504, [509] fill 507 and [511] fill 510 all contained trace levels of charred detritus with nothing identifiable suggesting crushed, trampled and bioturbated remains from nearby burning.

Trench 6

Ditches [605] fill 604 and [610] fill 609 both contained crushed fragments of clinker and coal with two hammerscale spheres present in fill 609 indicating remains from smithing activity, possibly Post Medieval given the frequency of clinker and coal present.

Trench 9

Ditch [905] fill 904 produced trace slivers of oak charcoal, probably trampled and bioturbated residual remains.

Trench 10

Ditch [1005] fill 1004 contained a few fragments of charred detritus with nothing identifiable.

Trench 16

Two ditch deposits in trench 16 both contained small quantities of charcoal fragments. Trackway ditch [1606] fill 1604 had a 0.5cm fragment of *Alnus* (alder) whilst ditch [1611] fill 1609 had a better preserved 1.0cm fragment of *Corylus* (hazel). The charcoal from both suggested low levels of burning activity occurring nearby although the remains are likely to be trampled residual scatters.

5: Conclusion

The samples produced trace quantities of carbonised remains indicating low levels of burning activity taking place in the vicinity of the deposits. Industrial burning activity was suggested by finds of slag and hammerscale in trench 4 enclosure ditch [405] and trench 6 ditch [610], although these were possibly mixed residual remains from later activity. Trench 16 contained small amounts of alder and hazel charcoal, whilst trenches 4 and 9 had traces of oak charcoal providing limited evidence for any settlement related burning to be occurring.

Further excavation work has a low potential to produce any significant finds of carbonised plant remains.

References

French, D. H., 1971, 'An Experiment in Water Sieving'. *Anatolian Studies 21* 59-64.

Schweingruber, F. H., 1990, *Anatomy of European Woods*. Paul Haupt Publishers Berne and Stuttgart.

Stace, C., 1997, *New Flora of the British Isles*. 2nd Edition Cambridge University Press.

Zohary, D. and Hopf, M., 2000, *Domestication of Plants in the Old World*. 3rd Edition Oxford University Press.

Table 1: MAP 05-02-21 Barnsley Road, West Melton: Charcoal and Other Remains:

Barnsley Road, West Melton	Context	204	206	404	504	507	510	604	609	904	1004	1604	1609
MAP 05-02-21	Sample	4	5	3	1	2	6	7	10	12	8	9	11
	Feature	ditch [205]	ditch [207]	enc ditch [405]	ditch [506]	ditch [509]	ditch [511]	ditch [605]	ditch [610]	ditch [905]	ditch [1005]	ditch [1606]	ditch [1611]
	Trench	Tr.2	Tr.2	Tr.4	Tr.5	Tr.5	Tr.5	Tr.6	Tr.6	Tr.9	Tr.10	Tr.16	Tr.16
	Radiocarbon Y/N	N	N	N	N	N	N	N	N	N	N	Y ch	Y ch
	Sample Volume (litres)												
	Total CV	<2.5ml	<2.5ml	<2.5ml	<2.5ml	<2.5ml	<2.5ml	<2.5ml	0	<2.5ml	<2.5ml	<2.5ml	<2.5ml
	Modern	<2.5ml	<2.5ml	<2.5ml	<2.5ml	<2.5ml	<2.5ml	<2.5ml	<2.5ml	<2.5ml	<2.5ml	<2.5ml	<2.5ml
Charcoal	Common Name												
Quercus	oak			1 (0.08g)						2 (0.08g)			
Corylus	hazel												1 (0.16g)
Alnus	alder											1 (0.13g)	
Other Remains													
Clinker			5+	5+	10+		5+	5+	10+				20+
Coal			10+		5+		5+	5+	5+				20+
Slag / Industrial waste				1 (0.30g)									
Hammerscale									2 (0.02g)				
Modern seeds								5+			1	1	

University of Gloucestershire

Luminescence dating laboratory

Optical dating of sediments: Barnsley Road excavations, UK

to

Sophie Coy and Charlie Puntorno

MAP Archaeological Practice Ltd

Analysis & Reporting, Prof. P.S. Toms
Sample Preparation & Measurement, Dr J.C. Wood
07 June 2023

Contents

Scope of Report

This is a standard report of the Luminescence dating laboratory, University of Gloucestershire. In large part, the document summarises the processes, diagnostics and data drawn upon to deliver Table 1. A conclusion on the analytical validity of each sample's optical age estimate is expressed in Table 2; where there are caveats, the reader is directed to the relevant section of the report that explains the issue further in general terms.

Copyright Notice

Field Code/ Context	Lab Code	Overburden (m)	Grain size (μm)	Moisture content (%)	Ge γ-spectrometry (*ex situ*)			β D_r (Gy.ka^{-1})	γ D_r (Gy.ka^{-1})	Cosmic D_r (Gy.ka^{-1})	Preheat (°C for 10s)	Low Dose Repeat Ratio	High Dose Repeat Ratio	Post-IR OSL Ratio
					K (%)	Th (ppm)	U (ppm)							
Sample 013 (510)	GL22164	0.53	125-180	10	1.32 ± 0.09	7.98 ± 0.53	2.05 ± 0.14	1.25 ± 0.12	0.83 ± 0.10	0.19 ± 0.02	200	0.96 ± 0.04	0.96 ± 0.04	0.92 ± 0.04
Sample 014 (507)	GL22165	0.78	125-180	12	1.38 ± 0.09	8.04 ± 0.54	1.90 ± 0.14	1.24 ± 0.12	0.81 ± 0.10	0.18 ± 0.02	180	0.96 ± 0.05	0.95 ± 0.05	0.91 ± 0.05
Sample 015 (504)	GL22166	0.95	125-180	11	1.18 ± 0.09	8.25 ± 0.53	1.77 ± 0.14	1.12 ± 0.11	0.77 ± 0.10	0.18 ± 0.02	160	0.97 ± 0.06	0.96 ± 0.06	0.93 ± 0.06
Sample 016 (1605)	GL22167	0.85	180-250	8	1.27 ± 0.09	6.56 ± 0.47	1.08 ± 0.12	1.08 ± 0.12	0.68 ± 0.10	0.18 ± 0.02	160	1.00 ± 0.07	0.98 ± 0.06	0.96 ± 0.06
Sample 017 (1610)	GL22168	1.00	180-250	6	1.09 ± 0.08	5.98 ± 0.45	0.97 ± 0.11	0.96 ± 0.11	0.61 ± 0.09	0.18 ± 0.02	160	1.01 ± 0.06	0.96 ± 0.06	0.97 ± 0.06
Sample 018 (503)	GL22169	0.45	125-180	11	1.36 ± 0.09	9.05 ± 0.61	2.73 ± 0.16	1.36 ± 0.13	0.94 ± 0.11	0.20 ± 0.02	200	0.95 ± 0.5	0.98 ± 0.04	0.93 ± 0.04

Field Code/ Context	Lab Code	Total D_r (Gy.ka^{-1})	D_e (Gy)	Age (ka)	Date
Sample 013 (510)	GL22164	2.27 ± 0.14	4.47 ± 0.24	1.97 ± 0.17 (0.14)	110 BC – AD 220
Sample 014 (507)	GL22165	2.23 ± 0.14	4.58 ± 0.31	2.05 ± 0.19 (0.17)	220 BC – AD 160
Sample 015 (504)	GL22166	2.07 ± 0.13	11.89 ± 1.59	5.74 ± 0.85 (0.81)	4570 BC – 2870 BC
Sample 016 (1605)	GL22167	1.94 ± 0.13	5.48 ± 0.55	2.82 ± 0.34 (0.31)	1140 BC – 460 BC
Sample 017 (1610)	GL22168	1.75 ± 0.12	6.43 ± 0.60	3.67 ± 0.43 (0.39)	2080 BC – 1220 BC
Sample 018 (503)	GL22169	2.50 ± 0.15	15.31 ± 1.83	6.12 ± 0.82 (0.78)	4920 BC – 3270 BC

Table 1 D_r, D_e and Age data of submitted samples located at c. 53°N, 1°W, 42-43m. Age estimates expressed relative to year of sampling. Uncertainties in age are quoted at 1σ confidence, are based on analytical errors and reflect combined systematic and experimental variability and (in parenthesis) experimental variability alone (see 6.0). **Blue** indicates samples with accepted age estimates, **red**, age estimates with caveats (see Table 2).

Generic considerations	Field Code	Lab Code	Sample specific considerations
Absence of *in situ* γ spectrometry data (see section 4.0)	Sample 013	GL22164	None
	Sample 014	GL22165	None
	Sample 015	GL22166	None
	Sample 016	GL22167	None
	Sample 017	GL22168	None
	Sample 018	GL22169	None

Table 2 Analytical validity of sample suite age estimates and caveats for consideration

1.0 Mechanisms and principles

Upon exposure to ionising radiation, electrons within the crystal lattice of insulating minerals are displaced from their atomic orbits. Whilst this dislocation is momentary for most electrons, a portion of charge is redistributed to meta-stable sites (traps) within the crystal lattice. In the absence of significant optical and thermal stimuli, this charge can be stored for extensive periods. The quantity of charge relocation and storage relates to the magnitude and period of irradiation. When the lattice is optically or thermally stimulated, charge is evicted from traps and may return to a vacant orbit position (hole). Upon recombination with a hole, an electron's energy can be dissipated in the form of light generating crystal luminescence providing a measure of dose absorption.

Herein, quartz is segregated for dating. The utility of this minerogenic dosimeter lies in the stability of its datable signal over the mid to late Quaternary period, predicted through isothermal decay studies (e.g. Smith *et al*., 1990; retention lifetime 630 Ma at 20°C) and evidenced by optical age estimates concordant with independent chronological controls (e.g. Murray and Olley, 2002). This stability is in contrast to the anomalous fading of comparable signals commonly observed for other ubiquitous sedimentary minerals such as feldspar and zircon (Wintle, 1973; Templer, 1985; Spooner, 1993)

Optical age estimates of sedimentation (Huntley *et al*., 1985) are premised upon reduction of the minerogenic time dependent signal (Optically Stimulated Luminescence, OSL) to zero through exposure to sunlight and, once buried, signal reformulation by absorption of litho- and cosmogenic radiation. The signal accumulated post burial acts as a dosimeter recording total dose absorption, converting to a chronometer by estimating the rate of dose absorption quantified through the assay of radioactivity in the surrounding lithology and streaming from the cosmos.

$$\text{Age} = \frac{\text{Mean Equivalent Dose } (D_e, \text{Gy})}{\text{Mean Dose Rate } (D_r, \text{Gy.ka}^{-1})}$$

Aitken (1998) and Bøtter-Jensen *et al*. (2003) offer a detailed review of optical dating.

2.0 Sample Preparation

Six sediment samples were collected within opaque tubing and submitted for Optical dating. To preclude optical erosion of the datable signal prior to measurement, all samples were opened and prepared under controlled laboratory illumination provided by Encapsulite RB-10 (red) filters. To isolate that material potentially exposed to daylight during sampling, sediment located within 20 mm of each tube-end was removed.

The remaining sample was dried and then sieved. The fine sand fraction was segregated and subjected to acid and alkaline digestion (10% HCl, 15% H_2O_2) to attain removal of carbonate and organic components respectively. Aa further acid digestion in HF (40%, 60 mins) was used to etch the outer 10-15 μm layer affected by α radiation and degrade each samples' feldspar content. During HF treatment, continuous magnetic stirring was used to effect isotropic etching of grains. 10% HCl was then added to remove acid soluble fluorides. Each sample was dried, resieved and quartz isolated from the remaining heavy mineral fraction using a sodium polytungstate density separation at 2.68g.cm^{-3}. Twelve 6 mm multi-grain aliquots (*c*. 3-6 mg) of quartz from each sample were then mounted on stainless steel cups for determination of D_e values.

All drying was conducted at 40°C to prevent thermal erosion of the signal. All acids and alkalis were Analar grade. All dilutions (removing toxic-corrosive and non-minerogenic luminescence-bearing substances) were conducted with distilled water to prevent signal contamination by extraneous particles.

3.0 Acquisition and accuracy of D_e value

All minerals naturally exhibit marked inter-sample variability in luminescence per unit dose (sensitivity). Therefore, the estimation of D_e acquired since burial requires calibration of the natural signal using known amounts of laboratory dose. D_e values were quantified using a single-aliquot regenerative-dose (SAR) protocol (Murray and Wintle 2000; 2003) facilitated by a Freiberg Instruments Lexsyg Smart irradiation-stimulation-detection system (Richter *et al*., 2015). Within this apparatus, optical signal stimulation is provided by an assembly of blue laser diodes, filtered to 445±3 nm conveying 50 mW.cm^{-2} using a 3 mm Schott GG420 and HC448/20 positioned in front of each laser diode. Infrared (IR) stimulation, provided by IR laser diodes stimulating at 850±3nm filtered by 3 mm RG 715 and delivering ~200 mW.cm^{-2}, was used to indicate the presence of contaminant feldspars (Hütt *et al*., 1988). Stimulated photon emissions from quartz aliquots are in the ultraviolet (UV) range. These were divided from stimulating photons by 2.5 mm Hoya U-340 glass filters, and a Delta BP 365/50 interference filter, then detected by a Hamamatsu UV-VIS (300-650 nm) bi-alkaline cathode photomultiplier. Aliquot irradiation was conducted using a 1.85 GBq $^{90}Sr/^{90}Y$ β source calibrated for multi-grain aliquots of 125-180 and 180-250 μm quartz against the 'Hotspot 800' ^{60}Co γ source located at the National Physical Laboratory (NPL), UK.

SAR by definition evaluates D_e through measuring the natural signal (Fig. 1) of a single aliquot and then regenerating that aliquot's signal by using known laboratory doses to enable calibration. For each aliquot, five different regenerative-doses were administered so as to image dose response. D_e values for each aliquot were then interpolated, and associated counting and fitting errors calculated, by way of exponential plus linear regression (Fig. 1). Weighted (geometric) mean D_e values were calculated from 12 aliquots using the central age model outlined by Galbraith *et al*. (1999) and are quoted at 1σ confidence (Table 1). The accuracy with which D_e equates to total absorbed dose and that dose absorbed since burial was assessed. The former can be considered a function of laboratory factors, the latter, one of environmental issues. Diagnostics were deployed to estimate the influence of these factors and criteria instituted to optimise the accuracy of D_e values.

3.1 Laboratory Factors

3.1.1 Feldspar contamination

The propensity of feldspar signals to fade and underestimate age, coupled with their higher sensitivity relative to quartz makes it imperative to quantify feldspar contamination. At room temperature, feldspars generate a signal (IRSL; Fig. 1) upon exposure to IR whereas quartz does not. The signal from feldspars contributing to OSL can be depleted by prior exposure to IR. For all aliquots the contribution of any remaining feldspars was estimated from the OSL IR depletion ratio (Duller, 2003). The influence of IR depletion on the OSL signal can be illustrated by comparing the regenerated post-IR OSL D_e with the applied regenerative-dose. If the addition to OSL by feldspars is insignificant, then the repeat dose ratio of OSL to post-IR OSL should be statistically consistent with unity (Table 1). If any aliquots do not fulfil this criterion, then the sample age estimate should be accepted tentatively. The source of feldspar contamination is rarely rooted in sample preparation; it predominantly results from the occurrence of feldspars as inclusions within quartz.

3.1.2 Preheating

Preheating aliquots between irradiation and optical stimulation is necessary to ensure comparability between natural and laboratory-induced signals. However, the multiple irradiation and preheating steps that are required to define single-aliquot regenerative-dose response leads to signal sensitisation, rendering calibration of the natural signal inaccurate. The SAR protocol (Murray and Wintle, 2000; 2003) enables this sensitisation to be monitored and corrected using a test dose, here set at 5 Gy preheated to 160°C for 10s, to track signal sensitivity between irradiation-preheat steps. However, the accuracy of sensitisation correction for both natural and laboratory signals can be preheat dependent.

The Dose Recovery test was used to assess the optimal preheat temperature for accurate correction and calibration of the time dependent signal. Dose Recovery (Fig. 2) attempts to quantify the combined effects of thermal transfer and sensitisation on the natural signal, using a precise lab dose to simulate natural dose. The ratio between the applied dose and recovered D_e value should be statistically concordant with unity. For this diagnostic, 6 aliquots were each assigned a 10 s preheat between 140°C and 240°C.

That preheat treatment fulfilling the criterion of accuracy within the Dose Recovery test was selected to generate the final D_e value from a further 12 aliquots. Further thermal treatments, prescribed by Murray and Wintle (2000; 2003), were applied to optimise accuracy and precision. Optical stimulation occurred at 105ºC in order to minimise effects associated with photo-transferred thermoluminescence and maximise signal to noise ratios. Inter-cycle optical stimulation was conducted at 240ºC to minimise recuperation.

3.1.3 Irradiation

For all samples having D_e values in excess of 100 Gy, matters of signal saturation and laboratory irradiation effects are of concern. With regards the former, the rate of signal accumulation generally adheres to a saturating exponential form and it is this that limits the precision and accuracy of D_e values for samples having absorbed large doses. For such samples, the functional range of D_e interpolation by SAR has been verified up to 600 Gy by Pawley *et al*. (2010). Age estimates based on D_e values exceeding this value should be accepted tentatively.

3.1.4 Internal consistency

Abanico plots (Dietze *et al*., 2016) are used to illustrate inter-aliquot D_e variability (Fig. 3). D_e values are standardised relative to the central D_e value for natural signals and are described as overdispersed when >5% lie beyond $\pm$ 2σ of the standardising value; resulting from a heterogeneous absorption of burial dose and/or response to the SAR protocol. For multi-grain aliquots, overdispersion of natural signals does not necessarily imply inaccuracy. However where overdispersion is observed for regenerated signals, the efficacy of sensitivity correction may be problematic. Murray and Wintle (2000; 2003) suggest repeat dose ratios (Table 1) offer a measure of SAR protocol success, whereby ratios ranging across 0.9-1.1 represent effective sensitivity correction. However, this variation of repeat dose ratios in the high-dose region can have a significant impact on D_e interpolation.

3.2 Environmental factors

3.2.1 Incomplete zeroing

Post-burial OSL signals residual of pre-burial dose absorption can result where pre-burial sunlight exposure is limited in spectrum, intensity and/or period, leading to age overestimation. This effect is particularly acute for material eroded and redeposited sub-aqueously (Olley *et al*., 1998, 1999; Wallinga, 2002) and exposed to a burial dose of <20 Gy (e.g. Olley *et al*., 2004), has some influence in sub-aerial contexts but is rarely of consequence where aerial transport has occurred. Within single-aliquot regenerative-dose optical dating there are two diagnostics of partial resetting (or bleaching); signal analysis (Agersnap-Larsen *et al*., 2000; Bailey *et al*., 2003) and inter-aliquot D_e distribution studies (Murray *et al*., 1995).

Within this study, signal analysis was used to quantify the change in D_e value with respect to optical stimulation time for multi-grain aliquots. This exploits the existence of traps within minerogenic dosimeters that bleach with different efficiency for a given wavelength of light to verify partial bleaching. D_e (t) plots (Fig. 4; Bailey *et al*., 2003) are constructed from separate integrals of signal decay as laboratory optical stimulation progresses. A statistically significant increase in natural D_e (t) is indicative of partial bleaching assuming three conditions are fulfilled. Firstly, that a statistically significant increase in D_e (t) is observed when partial bleaching is simulated within the laboratory. Secondly, that there is no significant rise in D_e (t) when full bleaching is simulated. Finally, there should be no significant augmentation in D_e (t) when zero dose is simulated. Where partial bleaching is detected, the age derived from the sample should be considered a maximum estimate only. However, the utility of signal analysis is strongly dependent upon a samples pre-burial experience of sunlight's spectrum and its residual to post-burial signal ratio. Given in the majority of cases, the spectral exposure history of a deposit is uncertain, the absence of an increase in natural D_e (t) does not necessarily testify to the absence of partial bleaching.

Where requested and feasible, the insensitivities of multi-grain single-aliquot signal analysis may be circumvented by inter-aliquot D_e distribution studies. This analysis uses aliquots of single sand grains to quantify inter-grain D_e distribution. At present, it is contended that asymmetric inter-grain D_e distributions are symptomatic of partial bleaching and/or pedoturbation (Murray *et al*., 1995; Olley *et al*., 1999; Olley *et al*., 2004; Bateman *et al*., 2003). For partial bleaching at least, it is further contended that the D_e acquired during burial is located in the minimum region of such ranges. The mean and breadth of this minimum region is the subject of current debate, as it is additionally influenced by heterogeneity in microdosimetry, variable inter-grain response to SAR and residual to post-burial signal ratios.

3.2.2 Turbation

As noted in section 3.1.1, the accuracy of sedimentation ages can further be controlled by post-burial trans-strata grain movements forced by pedo- or cryoturbation. Berger (2003) contends pedogenesis prompts a reduction in the apparent sedimentation age of parent material through bioturbation and illuviation of younger material from above and/or by biological recycling and resetting of the datable signal of surface material. Berger (2003) proposes that the chronological products of this remobilisation are A-horizon age estimates reflecting the cessation of pedogenic activity, Bc/C-horizon ages delimiting the maximum age for the initiation of pedogenesis with estimates obtained from Bt-horizons providing an intermediate age 'close to the age of cessation of soil development'. Singhvi et al. (2001), in contrast, suggest that B and C-horizons closely approximate the age of the parent material, the A-horizon, that of the 'soil forming episode'. Recent analyses of inter-aliquot D_e distributions have reinforced this complexity of interpreting burial age from pedoturbated deposits (Lombard *et al*., 2011; Gliganic *et al*., 2015; Jacobs *et al*., 2008; Bateman *et al*., 2007; Gliganic *et al*., 2016). At present there is no definitive post-sampling mechanism for the direct detection of and correction for post-burial sediment remobilisation. However, intervals of palaeosol evolution can be delimited by a maximum age derived from parent material and a minimum age obtained from a unit overlying the palaeosol. Inaccuracy forced by cryoturbation may be bidirectional, heaving older material upwards or drawing younger material downwards into the level to be dated. Cryogenic deformation of matrix-supported material is, typically, visible; sampling of such cryogenically-disturbed sediments can be avoided.

4.0 Acquisition and accuracy of D_r value

Lithogenic D_r values were defined through measurement of U, Th and K radionuclide concentration and conversion of these quantities into β and γ D_r values (Table 1). β contributions were estimated from sub-samples by laboratory-based γ spectrometry using an Ortec GEM-S high purity Ge coaxial detector system, calibrated using certified reference materials supplied by CANMET. γ dose rates can be estimated from *in situ* NaI gamma spectrometry or, where direct measurements are unavailable as in the present case, from laboratory-based Ge γ spectrometry. *In situ* measurements reduce uncertainty relating to potential heterogeneity in the γ dose field surrounding each sample. The level of U disequilibrium was estimated by laboratory-based Ge γ spectrometry. Estimates of radionuclide concentration were converted into D_r values (Adamiec and Aitken, 1998), accounting for D_r modulation forced by grain size (Mejdahl, 1979) and present moisture content (Zimmerman, 1971). Cosmogenic D_r values were calculated on the basis of sample depth, geographical position and matrix density (Prescott and Hutton, 1994).

The spatiotemporal validity of D_r values can be considered a function of five variables. Firstly, age estimates devoid of *in situ* γ spectrometry data should be accepted tentatively if the sampled unit is heterogeneous in texture or if the sample is located within 300 mm of strata consisting of differing texture and/or mineralogy. However, where samples are obtained throughout a vertical profile, consistent values of γ D_r based solely on laboratory measurements may evidence the homogeneity of the γ field and hence accuracy of γ D_r values. Secondly, disequilibrium can force temporal instability in U and Th emissions. The impact of this infrequent phenomenon (Olley *et al*., 1996) upon age estimates is usually insignificant given their associated margins of error. However, for samples where this effect is pronounced (>50% disequilibrium between ^{238}U and ^{226}Ra; Fig. 5), the resulting age estimates should be accepted tentatively. Thirdly, pedogenically-induced variations in matrix composition of B and C-horizons, such as radionuclide and/or mineral remobilisation, may alter the rate of energy emission and/or absorption. If D_r is invariant through a dated profile and samples encompass primary parent material, then element mobility is likely limited in effect. Fourthly, spatiotemporal detractions from present moisture content are difficult to assess directly, requiring knowledge of the magnitude and timing of differing contents. However, the maximum influence of moisture content variations can be delimited by recalculating D_r for minimum (zero) and maximum (saturation) content. Finally, temporal alteration in the thickness of overburden alters cosmic D_r values. Cosmic D_r often forms a negligible portion of total D_r. It is possible to quantify the maximum influence of overburden flux by recalculating D_r for minimum (zero) and maximum (surface sample) cosmic D_r.

5.0 Estimation of Age

Ages reported in Table 1 provide an estimate of sediment burial period based on mean D_e and D_r values and their associated analytical uncertainties. Uncertainty in age estimates is reported as a product of systematic and experimental errors, with the magnitude of experimental errors alone shown in parenthesis (Table 1). Cumulative frequency plots indicate the inter-aliquot variability in age (Fig. 6). The maximum influence of temporal variations in D_r forced by minima-maxima in moisture content and overburden thickness is also illustrated in Fig. 6. Where uncertainty in these parameters exists this age range may prove instructive, however the combined extremes represented should not be construed as preferred age estimates. The analytical validity of each sample is presented in Table 2.

6.0 Analytical uncertainty

All errors are based upon analytical uncertainty and quoted at 1σ confidence. Error calculations account for the propagation of systematic and/or experimental (random) errors associated with D_e and D_r values.

For D_e values, systematic errors are confined to laboratory β source calibration. Uncertainty in this respect is that combined from the delivery of the calibrating γ dose (1.2%; NPL, pers. comm.), the conversion of this dose for SiO_2 using the respective mass energy-absorption coefficient (2%; Hubbell, 1982) and experimental error, totalling 3.5%. Mass attenuation and bremsstrahlung losses during γ dose delivery are considered negligible. Experimental errors relate to D_e interpolation using sensitisation corrected dose responses. Natural and regenerated sensitisation corrected dose points (S_i) were quantified by,

$$S_i = (D_i - x.L_i) / (d_i - x.L_i) \qquad \textbf{Eq.1}$$

where D_i = Natural or regenerated OSL, initial 0.2 s

L_i = Background natural or regenerated OSL, final 5 s

d_i = Test dose OSL, initial 0.2 s

x = Scaling factor, 0.08

The error on each signal parameter is based on counting statistics, reflected by the square-root of measured values. The propagation of these errors within Eq. 1 generating σS_i follows the general formula given in Eq. 2. σS_i were then used to define fitting and interpolation errors within exponential plus linear regressions.

For D_r values, systematic errors accommodate uncertainty in radionuclide conversion factors (5%), β attenuation coefficients (5%), matrix density (0.20 g.cm^{-3}), vertical thickness of sampled section (specific to sample collection device), saturation moisture content (3%), moisture content attenuation (2%) and burial moisture content (2.5%, unless direct evidence exists of the magnitude and period of differing content). Experimental errors are associated with radionuclide quantification for each sample by Ge gamma spectrometry.

The propagation of these errors through to age calculation was quantified using the expression,

$$\sigma y\ (\delta y/\delta x) = (\Sigma\ ((\delta y/\delta x_n).\sigma x_n)^2)^{1/2} \qquad \textbf{Eq. 2}$$

where y is a value equivalent to that function comprising terms x_n and where σy and σx_n are associated uncertainties.

Errors on age estimates are presented as combined systematic and experimental errors and experimental errors alone. The former (combined) error should be considered when comparing luminescence ages herein with independent chronometric controls. The latter assumes systematic errors are common to luminescence age estimates generated by means identical to those detailed herein and enable direct comparison with those estimates.

Fig. 1 Signal Calibration

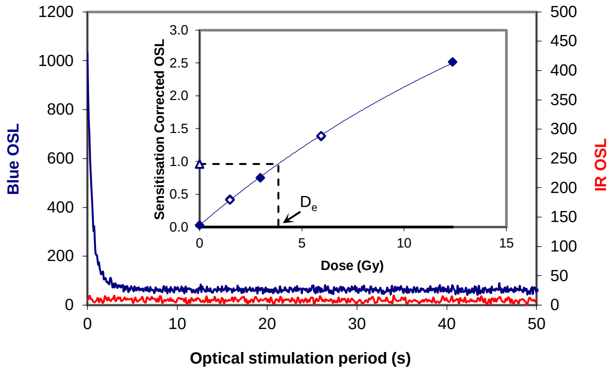


Fig. 2 Dose Recovery

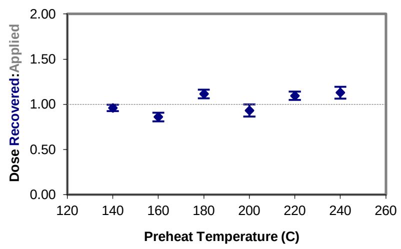


Fig. 4 Signal Analysis

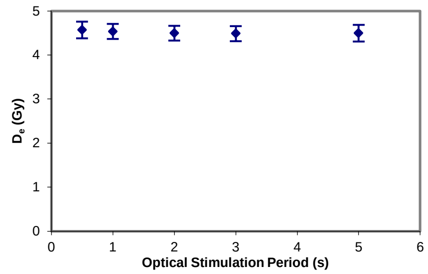


Fig. 3 Inter-aliquot D_e distribution

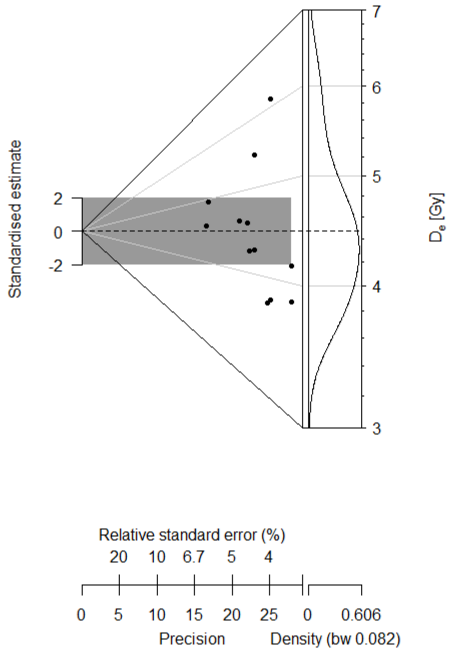


Fig. 5 U Decay Activity

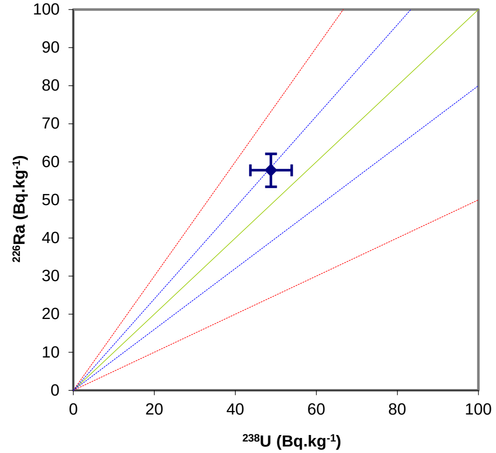


Fig. 6 Age Range

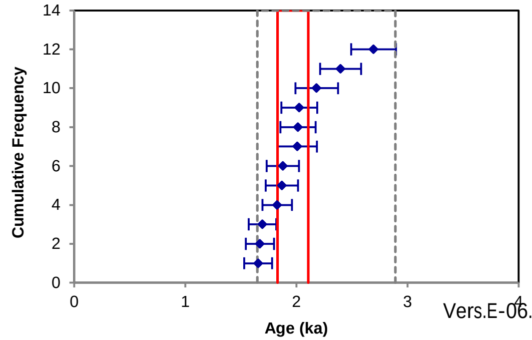


Fig. 1 Signal Calibration Natural blue and laboratory-induced infrared (IR) OSL signals. Detectable IR signal decays are diagnostic of feldspar contamination. Inset, the natural blue OSL signal (open triangle) of each aliquot is calibrated against known laboratory doses to yield equivalent dose (D_e) values. Repeats of low and high doses (open diamonds) illustrate the success of sensitivity correction.

Fig. 2 Dose Recovery The acquisition of D_e values is necessarily predicated upon thermal treatment of aliquots succeeding environmental and laboratory irradiation. The Dose Recovery test quantifies the combined effects of thermal transfer and sensitisation on the natural signal using a precise lab dose to simulate natural dose. Based on this an appropriate thermal treatment is selected to generate the final D_e value.

Fig. 3 Inter-aliquot D_e distribution Abanico plot of inter-aliquot statistical concordance in D_e values derived from **natural** irradiation. Discordant data (those points lying beyond **±2 standardised ln D_e**) reflect heterogeneous dose absorption and/or inaccuracies in calibration.

Fig. 4 Signal Analysis Statistically significant increase in **natural** D_e value with signal stimulation period is indicative of a partially-bleached signal, provided a significant increase in D_e results from **simulated partial bleaching** followed by insignificant adjustment in D_e for simulated **zero** and **full bleach** conditions. Ages from such samples are considered maximum estimates. In the absence of a significant rise in D_e with stimulation time, simulated partial bleaching and zero/full bleach tests are not assessed.

Fig. 5 U Activity Statistical concordance (equilibrium) in the activities of the daughter radioisotope ^{226}Ra with its parent ^{238}U may signify the temporal stability of D_r emissions from these chains. Significant differences (disequilibrium; >50%) in activity indicate addition or removal of isotopes creating a time-dependent shift in D_r values and increased uncertainty in the accuracy of age estimates. A 20% disequilibrium marker is also shown.

Fig. 6 Age Range The Cumulative frequency plot indicates the inter-aliquot variability in age. It also shows the **mean age range**; an estimate of sediment burial period based on mean D_e and D_r values with associated analytical uncertainties. The **maximum influence** of temporal variations in D_r forced by minima-maxima variation in moisture content and overburden thickness is outlined and may prove instructive where there is uncertainty in these parameters. However the combined extremes represented should not be construed as preferred age estimates.

Sample: GL22164

Fig. 1 Signal Calibration

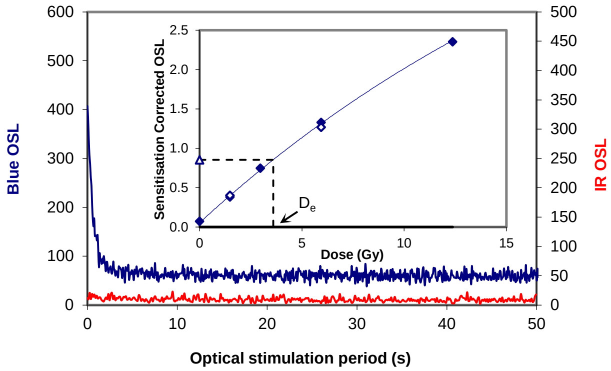


Fig. 2 Dose Recovery

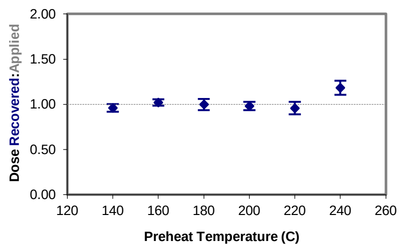


Fig. 4 Signal Analysis

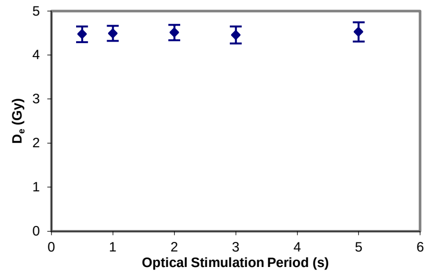


Fig. 3 Inter-aliquot D_e distribution

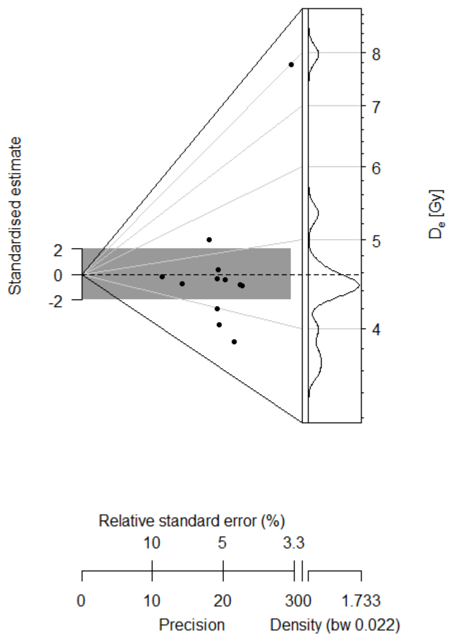


Fig. 5 U Decay Activity

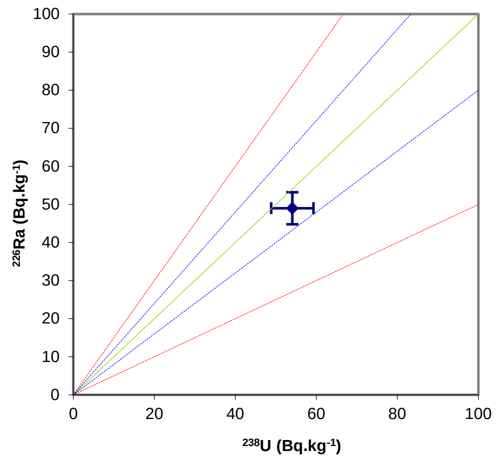


Fig. 6 Age Range

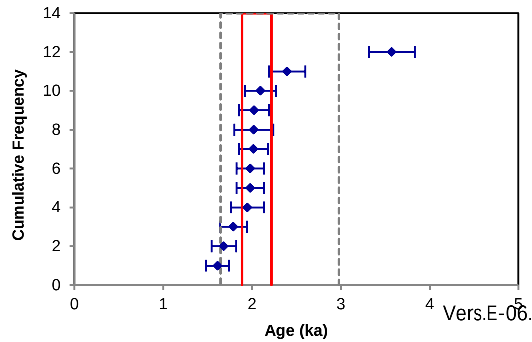


Fig. 1 Signal Calibration Natural blue and laboratory-induced infrared (IR) OSL signals. Detectable IR signal decays are diagnostic of feldspar contamination. Inset, the natural blue OSL signal (open triangle) of each aliquot is calibrated against known laboratory doses to yield equivalent dose (D_e) values. Repeats of low and high doses (open diamonds) illustrate the success of sensitivity correction.

Fig. 2 Dose Recovery The acquisition of D_e values is necessarily predicated upon thermal treatment of aliquots succeeding environmental and laboratory irradiation. The Dose Recovery test quantifies the combined effects of thermal transfer and sensitisation on the natural signal using a precise lab dose to simulate natural dose. Based on this an appropriate thermal treatment is selected to generate the final D_e value.

Fig. 3 Inter-aliquot D_e distribution Abanico plot of inter-aliquot statistical concordance in D_e values derived from **natural** irradiation. Discordant data (those points lying beyond **±2 standardised ln D_e**) reflect heterogeneous dose absorption and/or inaccuracies in calibration.

Fig. 4 Signal Analysis Statistically significant increase in **natural** D_e value with signal stimulation period is indicative of a partially-bleached signal, provided a significant increase in D_e results from **simulated partial bleaching** followed by insignificant adjustment in D_e for simulated **zero** and **full bleach** conditions. Ages from such samples are considered maximum estimates. In the absence of a significant rise in D_e with stimulation time, simulated partial bleaching and zero/full bleach tests are not assessed.

Fig. 5 U Activity Statistical concordance (equilibrium) in the activities of the daughter radioisotope ^{226}Ra with its parent ^{238}U may signify the temporal stability of D_r emissions from these chains. Significant differences (disequilibrium; >50%) in activity indicate addition or removal of isotopes creating a time-dependent shift in D_r values and increased uncertainty in the accuracy of age estimates. A 20% disequilibrium marker is also shown.

Fig. 6 Age Range The Cumulative frequency plot indicates the inter-aliquot variability in age. It also shows the **mean age range**; an estimate of sediment burial period based on mean D_e and D_r values with associated analytical uncertainties. The **maximum influence** of temporal variations in D_r forced by minima-maxima variation in moisture content and overburden thickness is outlined and may prove instructive where there is uncertainty in these parameters. However the combined extremes represented should not be construed as preferred age estimates.

Sample: GL22165

Fig. 1 Signal Calibration

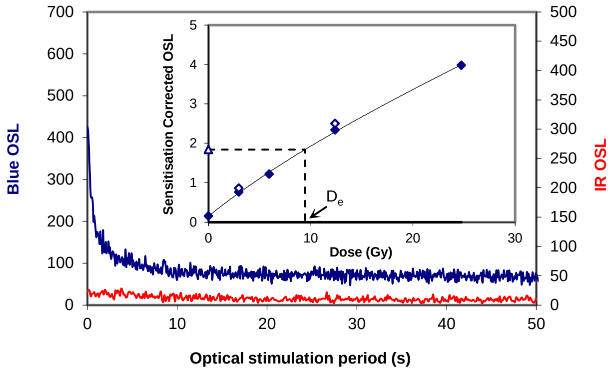


Fig. 2 Dose Recovery

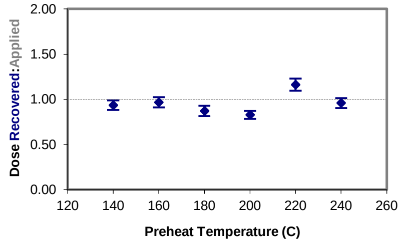


Fig. 4 Signal Analysis

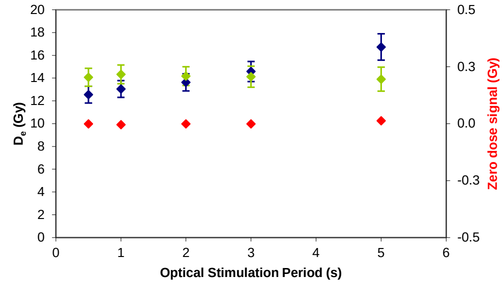


Fig. 3 Inter-aliquot D_e distribution

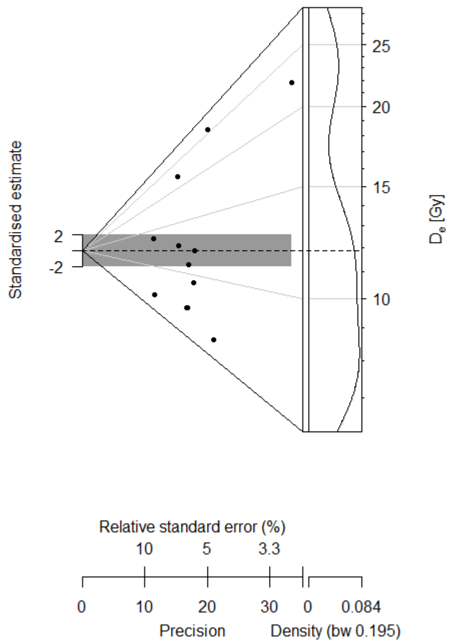


Fig. 5 U Decay Activity

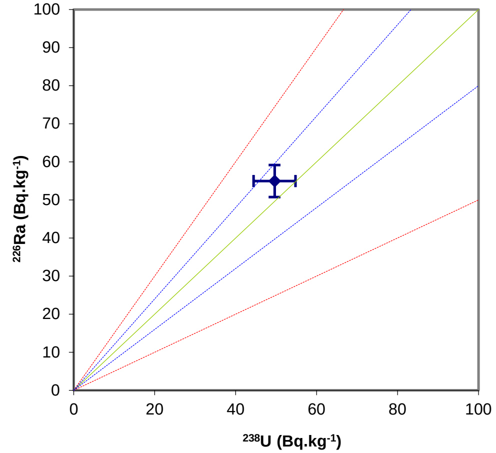


Fig. 6 Age Range

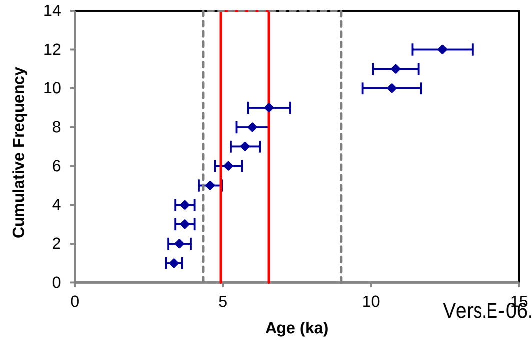


Fig. 1 Signal Calibration Natural blue and laboratory-induced infrared (IR) OSL signals. Detectable IR signal decays are diagnostic of feldspar contamination. Inset, the natural blue OSL signal (open triangle) of each aliquot is calibrated against known laboratory doses to yield equivalent dose (D_e) values. Repeats of low and high doses (open diamonds) illustrate the success of sensitivity correction.

Fig. 2 Dose Recovery The acquisition of D_e values is necessarily predicated upon thermal treatment of aliquots succeeding environmental and laboratory irradiation. The Dose Recovery test quantifies the combined effects of thermal transfer and sensitisation on the natural signal using a precise lab dose to simulate natural dose. Based on this an appropriate thermal treatment is selected to generate the final D_e value.

Fig. 3 Inter-aliquot D_e distribution Abanico plot of inter-aliquot statistical concordance in D_e values derived from **natural** irradiation. Discordant data (those points lying beyond **±2 standardised ln D_e**) reflect heterogeneous dose absorption and/or inaccuracies in calibration.

Fig. 4 Signal Analysis Statistically significant increase in **natural** D_e value with signal stimulation period is indicative of a partially-bleached signal, provided a significant increase in D_e results from **simulated partial bleaching** followed by insignificant adjustment in D_e for simulated **zero** and **full bleach** conditions. Ages from such samples are considered maximum estimates. In the absence of a significant rise in D_e with stimulation time, simulated partial bleaching and zero/full bleach tests are not assessed.

Fig. 5 U Activity Statistical concordance (equilibrium) in the activities of the daughter radioisotope ^{226}Ra with its parent ^{238}U may signify the temporal stability of D_r emissions from these chains. Significant differences (disequilibrium; >50%) in activity indicate addition or removal of isotopes creating a time-dependent shift in D_r values and increased uncertainty in the accuracy of age estimates. A 20% disequilibrium marker is also shown.

Fig. 6 Age Range The Cumulative frequency plot indicates the inter-aliquot variability in age. It also shows the **mean age range**; an estimate of sediment burial period based on mean D_e and D_r values with associated analytical uncertainties. The **maximum influence** of temporal variations in D_r forced by minima-maxima variation in moisture content and overburden thickness is outlined and may prove instructive where there is uncertainty in these parameters. However the combined extremes represented should not be construed as preferred age estimates.

Sample: GL22166

Fig. 1 Signal Calibration

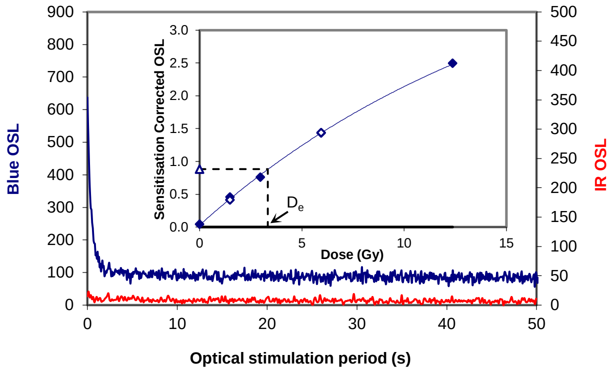


Fig. 2 Dose Recovery

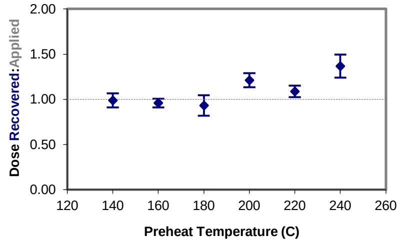


Fig. 4 Signal Analysis

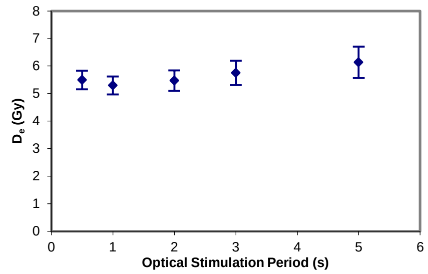


Fig. 3 Inter-aliquot D_e distribution

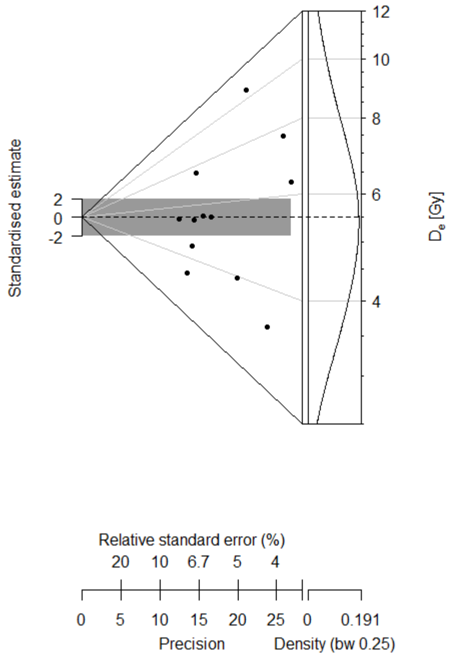


Fig. 5 U Decay Activity

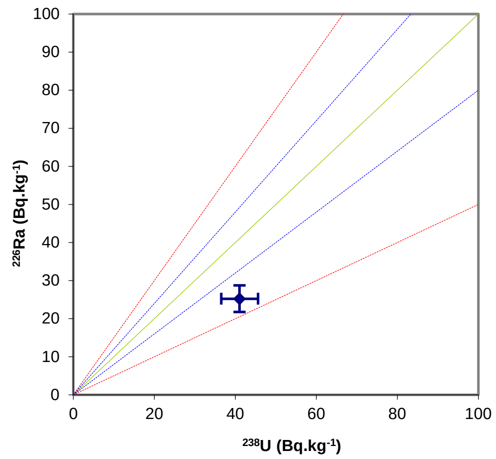


Fig. 6 Age Range

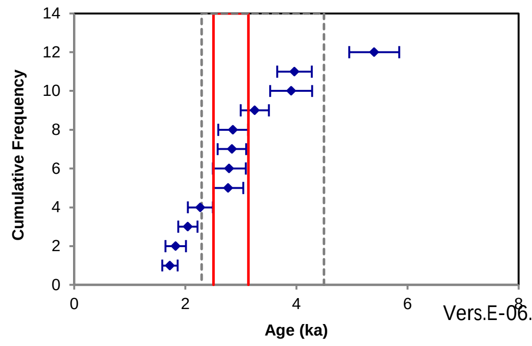


Fig. 1 Signal Calibration Natural blue and laboratory-induced infrared (IR) OSL signals. Detectable IR signal decays are diagnostic of feldspar contamination. Inset, the natural blue OSL signal (open triangle) of each aliquot is calibrated against known laboratory doses to yield equivalent dose (D_e) values. Repeats of low and high doses (open diamonds) illustrate the success of sensitivity correction.

Fig. 2 Dose Recovery The acquisition of D_e values is necessarily predicated upon thermal treatment of aliquots succeeding environmental and laboratory irradiation. The Dose Recovery test quantifies the combined effects of thermal transfer and sensitisation on the natural signal using a precise lab dose to simulate natural dose. Based on this an appropriate thermal treatment is selected to generate the final D_e value.

Fig. 3 Inter-aliquot D_e distribution Abanico plot of inter-aliquot statistical concordance in D_e values derived from **natural** irradiation. Discordant data (those points lying beyond **±2 standardised ln D_e**) reflect heterogeneous dose absorption and/or inaccuracies in calibration.

Fig. 4 Signal Analysis Statistically significant increase in **natural** D_e value with signal stimulation period is indicative of a partially-bleached signal, provided a significant increase in D_e results from **simulated partial bleaching** followed by insignificant adjustment in D_e for simulated **zero** and **full bleach** conditions. Ages from such samples are considered maximum estimates. In the absence of a significant rise in D_e with stimulation time, simulated partial bleaching and zero/full bleach tests are not assessed.

Fig. 5 U Activity Statistical concordance (equilibrium) in the activities of the daughter radioisotope ^{226}Ra with its parent ^{238}U may signify the temporal stability of D_r emissions from these chains. Significant differences (disequilibrium; >50%) in activity indicate addition or removal of isotopes creating a time-dependent shift in D_r values and increased uncertainty in the accuracy of age estimates. A 20% disequilibrium marker is also shown.

Fig. 6 Age Range The Cumulative frequency plot indicates the inter-aliquot variability in age. It also shows the **mean age range**; an estimate of sediment burial period based on mean D_e and D_r values with associated analytical uncertainties. The **maximum influence** of temporal variations in D_r forced by minima-maxima variation in moisture content and overburden thickness is outlined and may prove instructive where there is uncertainty in these parameters. However the combined extremes represented should not be construed as preferred age estimates.

Sample: GL22167

Fig. 1 Signal Calibration

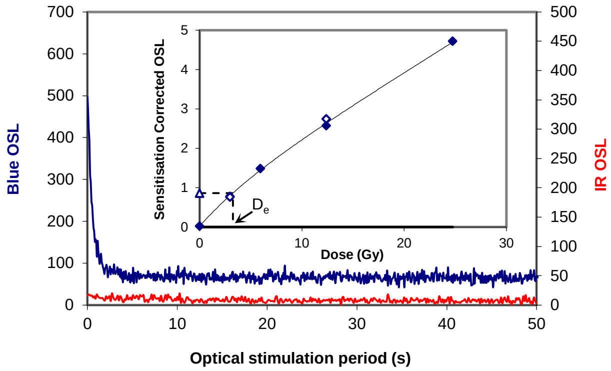


Fig. 2 Dose Recovery

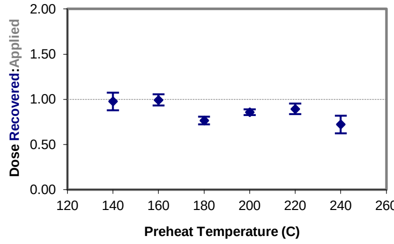


Fig. 4 Signal Analysis

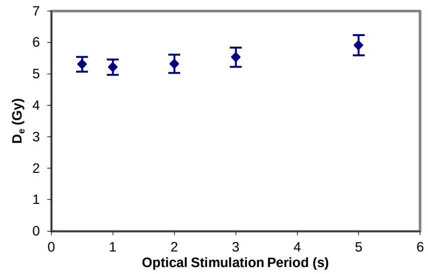


Fig. 3 Inter-aliquot D_e distribution

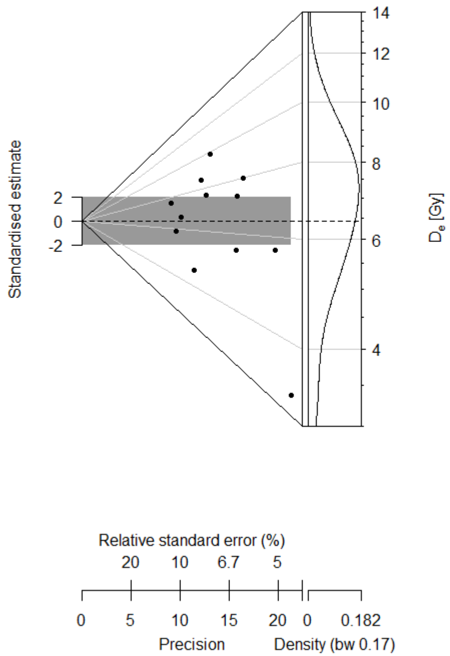


Fig. 5 U Decay Activity

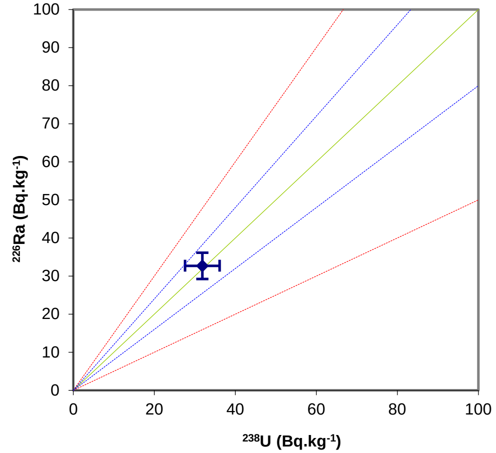


Fig. 6 Age Range

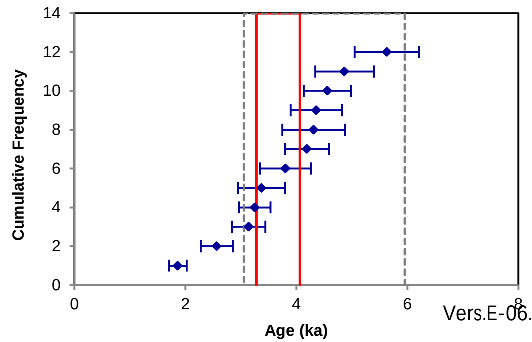


Fig. 1 Signal Calibration Natural blue and laboratory-induced infrared (IR) OSL signals. Detectable IR signal decays are diagnostic of feldspar contamination. Inset, the natural blue OSL signal (open triangle) of each aliquot is calibrated against known laboratory doses to yield equivalent dose (D_e) values. Repeats of low and high doses (open diamonds) illustrate the success of sensitivity correction.

Fig. 2 Dose Recovery The acquisition of D_e values is necessarily predicated upon thermal treatment of aliquots succeeding environmental and laboratory irradiation. The Dose Recovery test quantifies the combined effects of thermal transfer and sensitisation on the natural signal using a precise lab dose to simulate natural dose. Based on this an appropriate thermal treatment is selected to generate the final D_e value.

Fig. 3 Inter-aliquot D_e distribution Abanico plot of inter-aliquot statistical concordance in D_e values derived from **natural** irradiation. Discordant data (those points lying beyond **±2 standardised ln D_e**) reflect heterogeneous dose absorption and/or inaccuracies in calibration.

Fig. 4 Signal Analysis Statistically significant increase in **natural** D_e value with signal stimulation period is indicative of a partially-bleached signal, provided a significant increase in D_e results from **simulated partial bleaching** followed by insignificant adjustment in D_e for simulated **zero** and **full bleach** conditions. Ages from such samples are considered maximum estimates. In the absence of a significant rise in D_e with stimulation time, simulated partial bleaching and zero/full bleach tests are not assessed.

Fig. 5 U Activity Statistical concordance (equilibrium) in the activities of the daughter radioisotope ^{226}Ra with its parent ^{238}U may signify the temporal stability of D_r emissions from these chains. Significant differences (disequilibrium; >50%) in activity indicate addition or removal of isotopes creating a time-dependent shift in D_r values and increased uncertainty in the accuracy of age estimates. A 20% disequilibrium marker is also shown.

Fig. 6 Age Range The Cumulative frequency plot indicates the inter-aliquot variability in age. It also shows the **mean age range**; an estimate of sediment burial period based on mean D_e and D_r values with associated analytical uncertainties. The **maximum influence** of temporal variations in D_r forced by minima-maxima variation in moisture content and overburden thickness is outlined and may prove instructive where there is uncertainty in these parameters. However the combined extremes represented should not be construed as preferred age estimates.

Sample: GL22168

Fig. 1 Signal Calibration

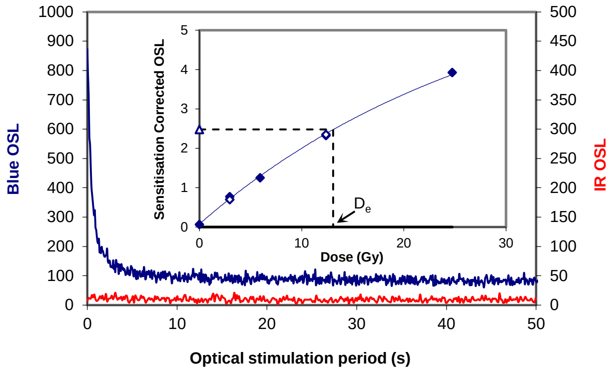


Fig. 2 Dose Recovery

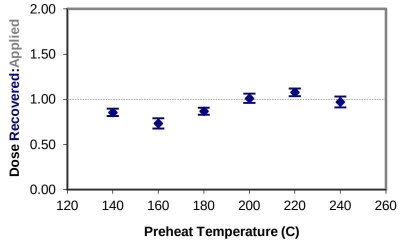


Fig. 4 Signal Analysis

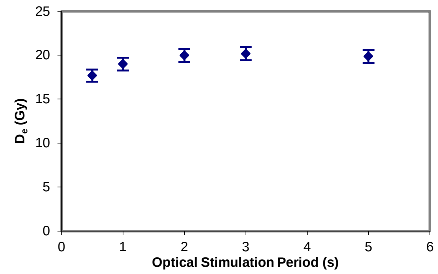


Fig. 3 Inter-aliquot D_e distribution

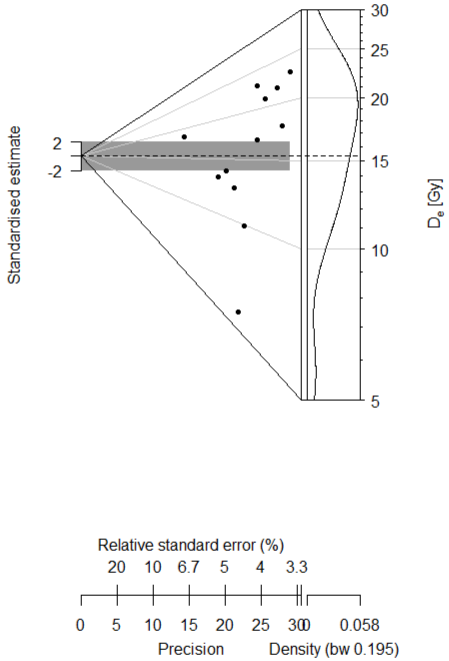


Fig. 5 U Decay Activity

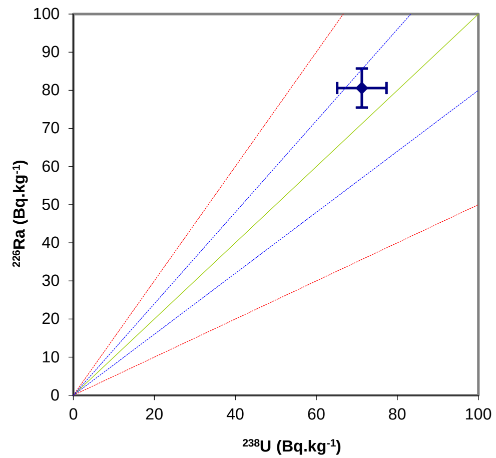


Fig. 6 Age Range

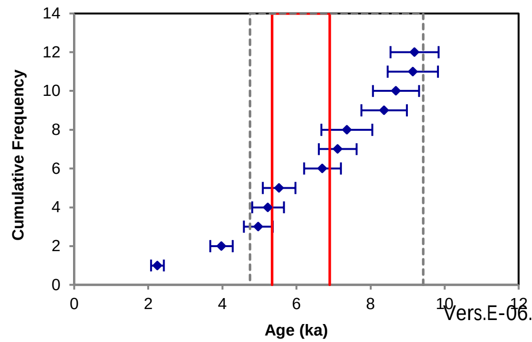


Fig. 1 Signal Calibration Natural blue and laboratory-induced infrared (IR) OSL signals. Detectable IR signal decays are diagnostic of feldspar contamination. Inset, the natural blue OSL signal (open triangle) of each aliquot is calibrated against known laboratory doses to yield equivalent dose (D_e) values. Repeats of low and high doses (open diamonds) illustrate the success of sensitivity correction.

Fig. 2 Dose Recovery The acquisition of D_e values is necessarily predicated upon thermal treatment of aliquots succeeding environmental and laboratory irradiation. The Dose Recovery test quantifies the combined effects of thermal transfer and sensitisation on the natural signal using a precise lab dose to simulate natural dose. Based on this an appropriate thermal treatment is selected to generate the final D_e value.

Fig. 3 Inter-aliquot D_e distribution Abanico plot of inter-aliquot statistical concordance in D_e values derived from **natural** irradiation. Discordant data (those points lying beyond **±2 standardised ln D_e**) reflect heterogeneous dose absorption and/or inaccuracies in calibration.

Fig. 4 Signal Analysis Statistically significant increase in **natural** D_e value with signal stimulation period is indicative of a partially-bleached signal, provided a significant increase in D_e results from **simulated partial bleaching** followed by insignificant adjustment in D_e for simulated **zero** and **full bleach** conditions. Ages from such samples are considered maximum estimates. In the absence of a significant rise in D_e with stimulation time, simulated partial bleaching and zero/full bleach tests are not assessed.

Fig. 5 U Activity Statistical concordance (equilibrium) in the activities of the daughter radioisotope ^{226}Ra with its parent ^{238}U may signify the temporal stability of D_r emissions from these chains. Significant differences (disequilibrium; >50%) in activity indicate addition or removal of isotopes creating a time-dependent shift in D_r values and increased uncertainty in the accuracy of age estimates. A 20% disequilibrium marker is also shown.

Fig. 6 Age Range The Cumulative frequency plot indicates the inter-aliquot variability in age. It also shows the **mean age range**; an estimate of sediment burial period based on mean D_e and D_r values with associated analytical uncertainties. The **maximum influence** of temporal variations in D_r forced by minima-maxima variation in moisture content and overburden thickness is outlined and may prove instructive where there is uncertainty in these parameters. However the combined extremes represented should not be construed as preferred age estimates.

Sample: GL22169

References

Adamiec, G. and Aitken, M.J. (1998) Dose-rate conversion factors: new data. *Ancient TL*, 16, 37-50.

Agersnap-Larsen, N., Bulur, E., Bøtter-Jensen, L. and McKeever, S.W.S. (2000) Use of the LM-OSL technique for the detection of partial bleaching in quartz. *Radiation Measurements*, 32, 419-425.

Aitken, M. J. (1998) An introduction to optical dating: the dating of Quaternary sediments by the use of photon-stimulated luminescence. Oxford University Press.

Bailey, R.M., Singarayer, J.S. , Ward, S. and Stokes, S. (2003) Identification of partial resetting using D_e as a function of illumination time. *Radiation Measurements*, 37, 511-518.

Bateman, M.D., Frederick, C.D., Jaiswal, M.K., Singhvi, A.K. (2003) Investigations into the potential effects of pedoturbation on luminescence dating. *Quaternary Science Reviews*, 22, 1169-1176.

Bateman, M.D., Boulter, C.H., Carr, A.S., Frederick, C.D., Peter, D. and Wilder, M. (2007) Detecting post-depositional sediment disturbance in sandy deposits using optical luminescence. *Quaternary Geochronology*, 2, 57-64.

Berger, G.W. (2003). Luminescence chronology of late Pleistocene loess-paleosol and tephra sequences near Fairbanks, Alaska. *Quaternary Research*, 60, 70-83.

Bøtter-Jensen, L., McKeever, S.W.S. and Wintle, A.G. (2003) Optically Stimulated Luminescence Dosimetry. Elsevier, Amsterdam.

Dietze, M., Kreutzer, S., Burow, C., Fuchs, M.C., Fischer, M., Schmidt, C. (2016) The abanico plot: visualising chronometric data with individual standard errors. *Quaternary Geochronology*, 31, 1-7.

Duller, G.A.T (2003) Distinguishing quartz and feldspar in single grain luminescence measurements. *Radiation Measurements*, 37, 161-165.

Galbraith, R. F., Roberts, R. G., Laslett, G. M., Yoshida, H. and Olley, J. M. (1999) Optical dating of single and multiple grains of quartz from Jinmium rock shelter (northern Australia): Part I, Experimental design and statistical models. *Archaeometry*, 41, 339-364.

Gliganic, L.A., May, J.-H. and Cohen, T.J. (2015). All mixed up: using single-grain equivalent dose distributions to identify phases of pedogenic mixing on a dryland alluvial fan. *Quaternary International*, 362, 23-33.

Gliganic, L.A., Cohen, T.J., Slack, M. and Feathers, J.K. (2016) Sediment mixing in Aeolian sandsheets identified and quantified using single-grain optically stimulated luminescence. *Quaternary Geochronology*, 32, 53-66.

Huntley, D.J., Godfrey-Smith, D.I. and Thewalt, M.L.W. (1985) Optical dating of sediments. *Nature*, 313, 105-107.

Hubbell, J.H. (1982) Photon mass attenuation and energy-absorption coefficients from 1keV to 20MeV. *International Journal of Applied Radioisotopes*, 33, 1269-1290.

Hütt, G., Jaek, I. and Tchonka, J. (1988) Optical dating: K-feldspars optical response stimulation spectra. *Quaternary Science Reviews*, 7, 381-386.

Jacobs, A., Wintle, A.G., Duller, G.A.T, Roberts, R.G. and Wadley, L. (2008) New ages for the post-Howiesons Poort, late and finale middle stone age at Sibdu, South Africa. *Journal of Archaeological Science*, 35, 1790-1807.

Lombard, M., Wadley, L., Jacobs, Z., Mohapi, M. and Roberts, R.G. (2011) Still Bay and serrated points from the Umhlatuzana rock shelter, Kwazulu-Natal, South Africa. *Journal of Archaeological Science*, 37, 1773-1784.

Mejdahl, V. (1979) Thermoluminescence dating: beta-dose attenuation in quartz grains. *Archaeometry*, 21, 61-72.

Murray, A.S. and Olley, J.M. (2002) Precision and accuracy in the Optically Stimulated Luminescence dating of sedimentary quartz: a status review. *Geochronometria*, 21, 1-16.

Murray, A.S. and Wintle, A.G. (2000) Luminescence dating of quartz using an improved single-aliquot regenerative-dose protocol. *Radiation Measurements*, 32, 57-73.

Murray, A.S. and Wintle, A.G. (2003) The single aliquot regenerative dose protocol: potential for improvements in reliability. *Radiation Measurements*, 37, 377-381.

Murray, A.S., Olley, J.M. and Caitcheon, G.G. (1995) Measurement of equivalent doses in quartz from contemporary water-lain sediments using optically stimulated luminescence. *Quaternary Science Reviews*, 14, 365-371.

Olley, J.M., Murray, A.S. and Roberts, R.G. (1996) The effects of disequilibria in the Uranium and Thorium decay chains on burial dose rates in fluvial sediments. *Quaternary Science Reviews*, 15, 751-760.

Olley, J.M., Caitcheon, G.G. and Murray, A.S. (1998) The distribution of apparent dose as determined by optically stimulated luminescence in small aliquots of fluvial quartz: implications for dating young sediments. *Quaternary Science Reviews*, 17, 1033-1040.

Olley, J.M., Caitcheon, G.G. and Roberts R.G. (1999) The origin of dose distributions in fluvial sediments, and the prospect of dating single grains from fluvial deposits using -optically stimulated luminescence. *Radiation Measurements,* 30**,** 207-217.

Olley, J.M., Pietsch, T. and Roberts, R.G. (2004) Optical dating of Holocene sediments from a variety of geomorphic settings using single grains of quartz. *Geomorphology*, 60, 337-358.

Pawley, S.M., Toms, P.S., Armitage, S.J., Rose, J. (2010) Quartz luminescence dating of Anglian Stage fluvial sediments: Comparison of SAR age estimates to the terrace chronology of the Middle Thames valley, UK. *Quaternary Geochronology*, 5, 569-582.

Prescott, J.R. and Hutton, J.T. (1994) Cosmic ray contributions to dose rates for luminescence and ESR dating: large depths and long-term time variations. *Radiation Measurements*, 23, 497-500.

Richter, D., Richter, A. and Dornich, K. (2015) Lexsyg Smart – a Luminescence detection system for dosimetry, material research and dating application. *Geochronometria*, 42, 202-209.

Singhvi, A.K., Bluszcz, A.., Bateman, M.D., Someshwar Rao, M. (2001). Luminescence dating of loess-palaeosol sequences and coversands: methodological aspects and palaeoclimatic implications. *Earth Science Reviews*, 54, 193-211.

Smith, B.W., Rhodes, E.J., Stokes, S., Spooner, N.A. (1990) The optical dating of sediments using quartz. *Radiation Protection Dosimetry*, 34, 75-78.

Spooner, N.A. (1993) The validity of optical dating based on feldspar. Unpublished D.Phil. thesis, Oxford University.

Templer, R.H. (1985) The removal of anomalous fading in zircons*. Nuclear Tracks and Radiation Measurements*, 10, 531-537.

Wallinga, J. (2002) Optically stimulated luminescence dating of fluvial deposits: a review. *Boreas* 31, 303-322.

Wintle, A.G. (1973) Anomalous fading of thermoluminescence in mineral samples. *Nature*, 245, 143-144.

Zimmerman, D. W. (1971) Thermoluminescent dating using fine grains from pottery. *Archaeometry*, 13, 29-52.

Land South of Barnsley Road
West Melton
South Yorkshire

Written Scheme of Investigation

Archaeological Evaluation by Trial Trenching

Land South of Barnsley Road
West Melton
South Yorkshire

ARCHAEOLOGICAL EVALUATION BY TRIAL TRENCHING

CONTENTS PAGE

Figure List

Appendices

1 Introduction

1.1 This document is a Written Scheme of Works (WSI) for Archaeological Evaluation by Trial Trenching, which sets out the details for the archaeological work required on land to the south of on land south of Barnsley Road, West Melton South Yorkshire, in order to inform South Yorkshire Archaeology Service of the archaeological potential of the site and to allow a reasoned decision to be made regarding the need for further archaeological work.

1.2 The Written Scheme of Works has been commissioned by the developers (Persimmon Homes South Yorkshire) and in compliance with the South Yorkshire Archaeology Service '*Model Brief for Archaeological Evaluation by Trial Trenching*'.

1.3 In accordance with the recommendations of the National Planning Policy Framework (February 2019) on '*Archaeology and Planning*', an Archaeological Evaluation by Trial Trenching has been proposed, following the results of a Heritage Assessment and Geophysical Survey. The results of the evaluation will be summarised in a report for an appropriate mitigation strategy to be formulated if necessary. If required, the mitigation will be outlined in a separate Written Scheme of Investigation.

2. Planning Background and Site Description

2.1 The site is allocated for residential development within the Rotherham Local Plan (site LDF0263). The Site Development Guidelines state that the site '*will require further archaeological evaluation as to the capacity of the site for the* *proposed level of development prior to the submission of a planning application. Evaluation will help establish the significance and condition of archaeological heritage assets at the site and allow the proposed scheme to be designed accordingly, i.e. having taken the identified archaeological evidence into consideration. The planning application submitted will need to be supported by a Heritage Statement that details the design strategy adopted, based on the results of a staged evaluation, which is likely to involve one or more of the following techniques:*

- *Fieldwalking*
- *Geophysical survey*
- *Trial trenching*

2.2 The site, which measures approximately 11.73ha is located immediately south of Barnsley Road and west of Pontefract Road, West Melton, approximately 8km south-east of Barnsley and 15km south-west of Doncaster (centered at SE 41857 01604. Fig. 1).

2.3 The Proposed Development Area currently consists of a large agricultural arable field bounded to the north and west by mature vegetation and Barnsley Road and Pontefract Road respectively, to the east by vegetation and residential properties and to the south by a football field.

2.4 The Proposed Development Area lies on sandstone bedrock of the Oak Rocks formation (British Geological Society. 2021).

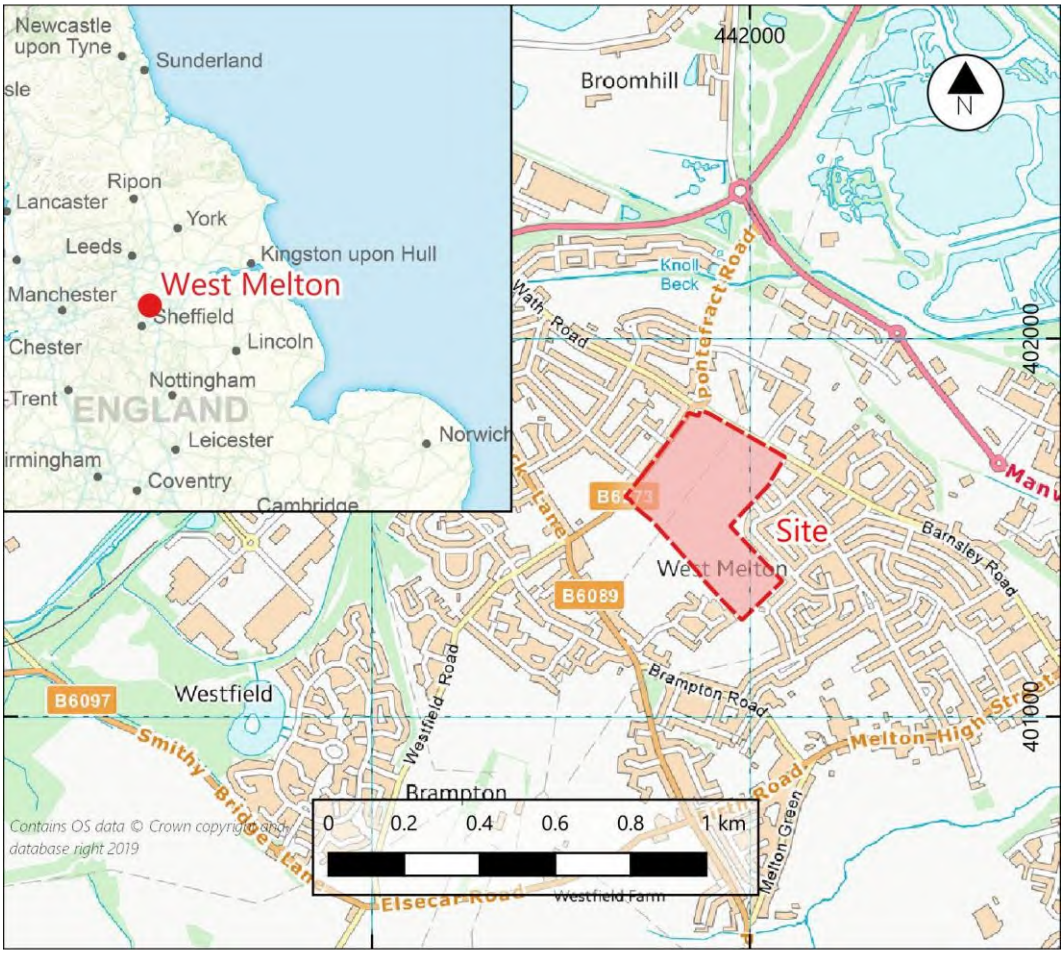


Figure 1. Site Location.

3. Archaeological and Historical Background

3.1 Although no prehistoric material has been revered from the vicinity, cropmarks of possible Iron Age or Romano British enclosures and features are recorded by the SMR as being present within the Proposed Development Area (SMR id's MSYY 5459 and MSY 5524). Two ditches were recorded during a Watching Brief carried out during works associated with a pipeline (Network Archaeology. 2002). The ditches contained no dating evidence but are believed to correspond with the recorded cropmarks.

3.2 The area has historically been heavily utilised for agricultural purposes since at least he Medieval period with areas of well-preserved ridge and furrow being identified in the area (SMR ID MSY12635).

3.3 Winterwell Field, the area in which the Proposed Development Area is located, is recorded in a local deed dating to 1507 as 'Wyntrewell' and is labelled as 'Witerwell Field' on the 1820 Enclosure Award map. The name 'Winterwell' is likely to refer to 'a spring that operated chiefly in winter' (Smith. 1961).

3.4 An Archaeological Desk Based Assessment (MAP. 2021) concluded that archaeological potential of the site is considered to be moderate and of local to regional significance. Archaeological deposits dating to the late prehistoric and Romano-British periods are likely to be encountered. Evaluation in the form of Geophysical Survey and Trial Trenching was recommended.

3.5 A Geophysical Survey (Phase Site Investigations. 2021) identified archaeological remains across the site including trackways which meet at a crossroads and anomalies suggestive of field boundaries or enclosures. These anomalies correspond with cropmark data within the site and with features identified during archaeological work in the vicinity of the site.

4. Aims and Objectives

4.1 The aim of the Archaeological Trial Trenching is to determine the presence/absence, nature, date, quality of survival and importance of archaeological deposits to enable an assessment of the potential and significance of the archaeology to be made.

4.2 Based on the archaeological deposits which may be encountered during evaluation the site has the potential to inform the following research questions regarding the Iron Age and Romano-British periods in South Yorkshire.

- Can we characterise different types of Iron Age and Romano-British field systems in different landscape zones?
- What were the economic, social or political roles of Iron Age and Romano-British field systems?
- Can the dates of Iron Age and Romano-British field system inception and disuse/ abandonment, be established with any greater accuracy?
- What were the economic, social or political roles of linear trackways?

5. Compliance

5.1 MAP will adhere to the general principles of the CIfA Code of Conduct (CIfA 2019) throughout the project and to the CIfA 'Standards and Guidance for Archaeological Field Evaluations' (CIFA 2020a).

5.2 All work will be carried out in accordance with chapter 16 of the National Planning Policy Framework (2021) on 'Archaeology and Planning'.

5.3 The work will be monitored under the auspices of South Yorkshire Archaeology Service who will be consulted before the commencement of site works.

5.4 All maps within this report have been produced from the Ordnance Survey with the permission of the Controller of Her Majesty's Stationery Office, Crown Copyright. License No. AL 50453A and also data derived from Open Street Map (https://www.opennstreetmap.org/copyright).

5.5 If human remains are encountered during the course of this evaluation, it is considered best practice to not remove the remains at this stage, however, this should be considered at a site-specific level. If it is deemed necessary to remove human remains, this will be carried out under the conditions of, and after the receipt of, licences for the removal of human remains (issued by the Ministry of Justice) and in accordance with the Burial Act (1857), 'Updated Guidelines to the Standards for Recording Human Remains' (Brickley & McKinley. 2017), CIFA guidelines 'Excavation and Post-Excavation Treatment of Cremated and Inhumed Human Remains (McKinley & Roberts 1993), and all Historic England and Advisory Panel on the Archaeology of Burials in England (APABE) guidance, to ensure that they are treated with due dignity. The preferred option would be for them to be adequately recorded before lifting, and then carefully removed for scientific study, and long-term storage with an appropriate museum; however, the burial licence may specify reburial or cremation as a requirement.

5.6 MAP Archaeological Practice is an ISO 9001 accredited organisation (certificate number GB2005425). The award of the ISO 9001 certificate, independently audited by the British Standards Institution (BSI), demonstrates MAP's commitment to providing a quality service to our clients. ISO (the International Organisation for Standardisation) is the most recognised standards body in the world, helping to drive excellence and continuous improvement within businesses.

6 Fieldwork Methodology

6.1 Twenty-three Trial Trenches are proposed, positioned in order to assess anomalies in the Geophysical data but also areas supposedly devoid of such anomalies (Fig. 2), all measure 40m x 2m. An additional 10% of trenching may be required as a contingency. The results of the evaluation may lead to further archaeological mitigation work which will be specified in a separate Written Scheme of Investigation.

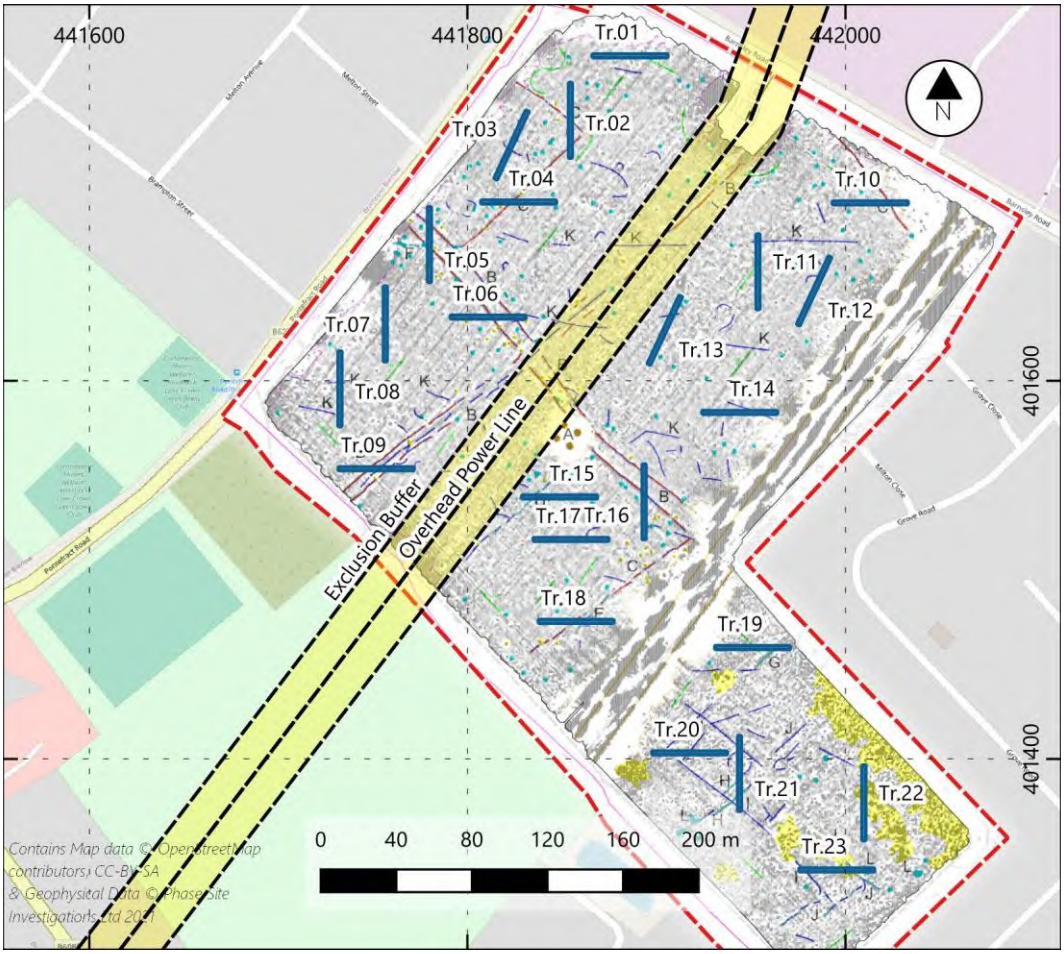


Figure 2. Trench Location Plan

6.2 A minimum of one week's notice of the commencement of fieldwork will be given to the SYAS.

6.3 All overburden, topsoil and any subsoils will be carefully removed by mechanical excavator using a wide toothless blade (ditching bucket), under archaeological supervision, to the top of archaeological features or layers, thereafter all excavation will be by hand. Areas of intensive modern disturbance will be given a low priority in excavation. Where practicable, the fills of these features will be removed by mechanical excavator.

6.4 Context recording methodologies and systems will be used. All archaeological deposits will be recorded according to principles of stratigraphic excavation on MAP's *pro forma* sheets, which are compatible with the MoLAS recording system. The MAP recording manual will be used on site where necessary. The stratigraphy of trenches will be recorded even if no archaeology is found.

6.5 The excavation sampling policy is:

a. A 100% sample of stakeholes

b. An initial 50% sample should be taken of all postholes, but where they are part of a building these should be 100% excavated

c. A 50% sample of pits with a diameter up to 1.5m (where justified, these should be 100% excavated,

d. A minimum 25% sample of all pits over 1.5m in diameter, but this should include a complete section across the pit to record a full profile (where justified, these should be 100% excavated)

e. linear features will be sampled a minimum of 20% along their length (each sample section to be not less than 1m), or a minimum of a 1m sample section, if the feature is less than 5m long.

f. All junctions/intersections and corners of linear features will be investigated and their stratigraphic relationships determined – if necessary, using box sections and all ditch terminals will be examined,

g. Funerary contexts, buildings and industrial features will be subject to sufficient excavation to establish the objectives of the evaluation but no archaeological deposit will be entirely removed unless this is unavoidable to meet the aims of the fieldwork.

6.6 In certain cases, the use of mechanical excavation equipment may also be appropriate for removing deep intrusions (e.g. modern brick and concrete floors or footings), or for putting sections through major features after partial excavation (e.g. ditches), or through deposits to check that they are of natural origin.

6.7 A full written, drawn and photographic record will be made of all material revealed during the course of the Trial Trenching. Plans should be completed at a scale of 1:50 or 1:20 (as appropriate), whilst section drawings should be at a scale of 1:10. Black and white film photographs will form the basis of the photographic archive, with colour slides where necessary. Digital photography will only be used to supplement the record.

6.8 A sampling strategy for the recovery for environmental remains has been formulated in accordance with an Environmental Strategy written by an Environmental Consultant (Diane Aldritt, appendix 1) and also follows the guidance of the Association for Environmental Archaeology (1995) and Historic England (2011).

6.9 Samples will be collected from primary and secondary contexts, where applicable, from a range of representative features, including pit and ditch fills, postholes, floor deposits, ring gullies and other negative features. Where features allow between 40 and 60 litres will be taken although entire contexts will be sampled if the volume is low, and specialist samples will be taken, the volume of these samples will be dependent on the material being sampled. Positive features will also be sampled; retention of structural material such as bricks will be implemented where necessary. Sampling will also be considered for those features where dating by other methods (for example pottery and artefacts) is uncertain. Animal bones will be hand collected, and course sieved samples collected from contexts containing a high density of bones. Small samples of other material will be recovered where applicable. Flotation samples and samples taken for coarse-mesh sieving from dry deposits will be processed at the time of the fieldwork wherever possible, partly to permit variation of sampling strategies if necessary, but also because processing at a later stage could cause delays.

6.10 All finds (artefacts and ecofacts) visible during excavation will be collected and processed, unless variations in this principle are agreed with the Local Authority. Finds will be appropriately packaged and stored under optimum conditions, as detailed in the RESCUE/UKIC publication First Aid for Finds. In accordance with the procedures outlined in MoRPHE, all iron objects, a selection of non-ferrous artefacts (including all coins), and a sample of any industrial debris relating to metallurgy will be X-radiographed before assessment. Any recording, marking and storage, materials will be of archive quality. We have made an allowance for a minimum three boxes and a contingency for a small finds box in calculating estimates for museums storage grant.

6.11 We will make provision within our excavation strategies, where necessary, for use of shoring, pumps or artificial lighting. Such strategies will also follow for sampling for radiocarbon, archaeomagnetic and/or dendrochronological determinations, as appropriate: where in situ timbers are found to survive in good condition, samples should be taken for dendrochronological assay.

6.12 Arrangements for site access and reinstatement are to be agreed with the commissioning body.

6.13 Health and safety will take priority over archaeological matters. Archaeologists undertaking fieldwork must observe safe working practices; the Health and Safety arrangements must be agreed and understood by all relevant parties before work commences. Risk assessments must be carried out and documented in accordance with Management of Health and Safety at Work Regulations 1999. The Contractor should determine whether this project is covered by Construction (Design and Management) Regulations 2015 and ensure that all requirements under the regulations are met. All archaeologists and visitors to site will comply with necessary precautions regarding COVID-19 as outlined in the RAMS for the site and sign a declaration to declare they are not infectious, adhere to social distancing and approved safety measures. Should stepping of the trenches be required, where depths exceed safe dimensions (in depth), the trench width of 2m should be measured at the base of the trench.

6.14 Necessary precautions should be taken over underground services and overhead lines.

6.15 All on site staff hold valid CSCS cards. All Project Officers and Project Managers hold a valid First Aid at Work Certificate and Site Supervisor Safety Training qualifications.

6.16 MAP will provide evidence of all necessary insurances, including Employer's Liability, Professional Liability and Public Liability Cover.

6.17 Site inspections will be arranged with SYAS, so that the general site stratigraphy can be assessed in the initial stage of trial trenching and/or so that the site can be inspected when fieldwork is near to completion but before any trenches have been backfilled. Site visits with the Historic England Yorkshire Region Science Advisor will be arranged if necessary.

7. Post Excavation Analysis and Report

7.1 Upon completion of the evaluation, the artefacts, soil samples and stratigraphic information will be assessed as to their potential and significance for further analysis.

7.2 A report will be prepared to include the following:

a) A non-technical summary of the results of the work, Introduction and aims and objectives.

b) An introduction which should include

- the site code/project number
- planning reference number and SMR Casework number
- dates when fieldwork took place
- grid reference

c) An account of the methods and results of the evaluation, describing structural data and associated finds and/or environmental data recovered.

d) Interpretation, including phasing of the site sequence and spot-dating of ceramics (Descriptive material should be clearly separated from interpretive statements). This shall be supported by the use of photographs and drawings, to include an overall plan of the site accurately identifying the location of trenches; individual trench plans as excavated indicating the location of archaeological features, with at least one section detailing the stratigraphic sequence of deposits within each trench.

e) A specialist assessment of the artefacts recovered with a view to their potential for further study. Allowance should be made for preliminary conservation and stabilisation of all objects and an assessment of long-term conservation and storage needs.

   Assessment of artefacts must include inspection of X-radiographs of all iron objects, a selection of non-ferrous artefacts (including coins), and a sample of any industrial debris relating to metallurgy. A rapid scan of all excavated material should be undertaken by conservators and finds researchers in collaboration. Material considered vulnerable will be selected for stabilisation after specialist recording. Where intervention is necessary, consideration will be given to possible investigative procedures (e.g glass composition studies, residues in or on pottery, and mineral preserved organic material). Once assessed, all material will be packed and stored in optimum conditions, as described in First Aid For Finds. Waterlogged organic materials should be dealt with, following Historic England documents, Guidelines for the care of waterlogged archaeological leather, and guidelines on the recording, sampling, conservation and curation of waterlogged wood.

f) A specialist assessment of environmental samples taken, with a view to their potential for subsequent study.

Processing of all samples collected for biological assessment, or sub-samples of them, will be completed. Bulk and site-riddled samples from dry deposits should have been processed during excavation, where possible. The preservation state, density and significance of material retrieved must be assessed, following methods presented in Environmental Archaeology and archaeological evaluations, or existing local guidelines, until national guidelines are available. Unprocessed sub-samples must be stored in conditions specified by the appropriate specialists.

Assessments for any technological residues will be undertaken. Samples for dating must be submitted to laboratories promptly, so as to ensure that results are available to aid development of specifications for subsequent mitigation strategies.

g) The results from investigations in archaeological sciences will be included in the Site Archive and presented in the Evaluation Report. Reports must include sufficient detail to permit assessment of potential analysis. They will include tabulation of data in relation to site phasing and contexts and must include non-technical summaries. The objective presentation of data must be clearly separated from interpretation. Recommendation for further investigation (both on samples already collected, and at future excavations) must be clearly separated from the results and interpretation.

h) An assessment of the archaeological significance of the deposits identified, in relation to other sites in the region.

i) A conclusion with recommendations for further post-excavation work, if required.

j) Detailed archive location and destination.

k) Appendices and figures, as appropriate, including a copy of the specification and/or project design.

l) References and bibliography of all sources used

7.3 Copies of the report will be submitted to the commissioning body, the Local Planning Authority and South Yorkshire Archaeology Service within 3 months of the completion of the evaluation, unless an alternative timescale is agreed.

7.4 We will provide a digital copy of the report in PDF format to the South Yorkshire Historic Environment Record.

7.5 A Brief, interim report may be required shortly after the completion of fieldwork.

7.6 The following Specialists have been contacted as are available to work on the project:

Pottery - T G Manby (Prehistoric),

M R Stephens (Medieval and Post-medieval)

P A Ware/P Mills (Roman)

Flint - P Makey

Animal Bone – J Richardson

Environmental Sampling – D Alldritt

Conservation – York Archaeological Trust

Human Remains – York Osteology

Ceramic Building Material – P Mills

Clay Tobacco Pipe - M R Stephens

7.7 A final report will comprise all below ground investigation and mitigation work.

8. Copyright, Confidentiality and Publicity

8.1 Unless the individual/organisation commissioning the project wishes to state otherwise, the copyright of any written, graphic or photographic records and reports rests with MAP.

9. Archive Preparation and Dissemination

9.1 The requirements for archive preparation and deposition must be addressed and undertaken in a manner agreed with Experience Barnsley who will be contacted before commencement of fieldwork. In line with the "Archaeological Archive Deposition Policy for Museums in Yorkshire and the Humber", produced by Renaissance Yorkshire, the museum will also be contacted during a mid-point review of the project during which information will be passed to the museum regarding the archive and the proposed timescale for deposition, and following the completion of work.

9.2 Guidance set out in the CIfA Toolkit for Selecting Archives (2019) will be followed, prior to the commencement of fieldwork in order to establish project-specific strategies for the retention or discarding of material. The retention of material will also be discussed with the Clifton Park Museum with regards to the significance and research potential of the archive.

9.3 The site archive, including finds and environmental material, subject to the permission of the relevant landowners, will be labelled, conserved and stored according to the United Kingdom Institute for Conservation (UKIC)'s. Provision will be made for the stable storage of paper records and their long term storage on a suitable medium, such as microfilm, a copy of which should be deposited with the NMR (Historic England). An index to the contents of the archive together with details of its date and place of deposition should be lodged with the SMR.

9.4 Archive deposition will be arranged in consultation with Experience Barnsley and South Yorkshire Archaeology Service and in accordance with their deposition policy relating to the preparation and transfer of archives. The timetable for deposition shall be agreed on completion of the site archive and narrative.

9.5 The digital archive will be deposited with the ADS.

10. Bibliography

British Geological Society. Geology of Britain Viewer. Available at; http://mapapps.bgs.ac.uk/geologyofbritain/home.html
[accessed 07.06.2021]

MAP. 2021. *Land South of Barnsley Road, West Melton, South Yorkshire, Archaeology and Heritage Desk Based Assessment*

Network Archaeology. 2002. Wentworth to Brampton Gas Pipeline: Archaeological Watching Brief.

Phase Site Investigations. 2021. Land South of Barnsley Road, West Melton, South Yorkshire, Archaeological Geophysical Survey

South Yorkshire Archaeology Service & Historic England. *South Yorkshire Historic Environment Research Framework*. Web Resource. Available at https://researchframeworks.org/syrf/ [Accessed 25.052021].

11. Best Practice & Scientific Guidance

Archaeological Conservation

Investigative Conservation: Guidelines on how the Detailed Examination of Artefacts from Archaeological Sites can Shed Light on their Manufacture and Use (2008): Officially archived, but available on request.

Guidelines on the X-radiography of Archaeological Metalwork (2006): https://historicengland.org.uk/images-books/publications/x-radiography-of-archaeological-metalwork/

Waterlogged Organic Artefacts: Guidelines on their Recovery, Analysis and Conservation (2018):

https://historicengland.org.uk/images-books/publications/waterlogged-organic-artefacts/

Environmental Archaeology

Animal Bones and Archaeology - Recovery to Archive (2019): https://historicengland.org.uk/images-books/publications/animal-bones-and-archaeology/

Deposit Modelling and Archaeology: Guidance for Mapping Buried Deposits (2020): https://historicengland.org.uk/images-books/publications/deposit-modelling-and-archaeology/

Environmental Archaeology: A Guide to the Theory and Practice of Methods, from Sampling and Recovery to Post-excavation (Second Edition) (2011): https://historicengland.org.uk/images-books/publications/environmental-archaeology-2nd/

Geoarchaeology: Using Earth Sciences to Understand the Archaeological Record (2015): https://historicengland.org.uk/images-books/publications/geoarchaeology-earth-sciences-to-understand-archaeological-record/

Guidelines for the Curation of Waterlogged Macroscopic Plant and Invertebrate Remains (2008): Currently being revised, but available on request.

Mineralised Plant and Invertebrate Remains: A Guide to the Identification of Calcium Phosphate Replaced Remains (2020):

https://historicengland.org.uk/images-books/publications/mineralised-plant-and-invertebrate-remains/

Geophysical Survey

EAC Guidelines for the Use of Geophysics in Archaeology: Questions to Ask and Points to Consider (2016) [Europae Archaeologiae Consilium]: https://historicengland.org.uk/images-books/publications/eac-guidelines-for-use-of-geophysics-in-archaeology/

Geophysical Survey in Archaeological Field Evaluation (2008): Officially archived, but available on request.

Marine Geophysics Data Acquisition, Processing and Interpretation: Guidance Notes (2013): https://historicengland.org.uk/images-books/publications/marine-geophysics-data-acquisition-processing-interpretation/

Human Remains

Guidance for Best Practice for the Treatment of Human Remains Excavated from Christian Burial Grounds in England (Second Edition) (2017) [Advisory Panel on the Archaeology of Burials in England]: https://www.archaeologyuk.org/apabe/pdf/APABE_ToHREfCBG_FINAL_WEB.pdf

Guidance for the Care of Human Remains in Museums (2005) [Department for Culture, Media and Sport]: https://www.archaeologyuk.org/apabe/pdf/DCMS_Guidance_Human_Remains_in_Museums.pdf

Large Burial Grounds: Guidance on Sampling in Archaeological Fieldwork Projects (2015) [Advisory Panel on the Archaeology of Burials in England]: https://www.archaeologyuk.org/apabe/pdf/Large_Burial_Grounds.pdf

Science and the Dead: A Guideline for the Destructive Sampling of Archaeological Human Remains for Scientific Analysis (2013) [Advisory Panel on the Archaeology of Burials in England]: https://www.archaeologyuk.org/apabe/pdf/Science_and_the_Dead.pdf

The Role of the Human Osteologist in an Archaeological Fieldwork Project (2018): https://historicengland.org.uk/images-books/publications/role-of-human-osteologist-in-archaeological-fieldwork-project/

Updated Guidelines to the Standards for Recording Human Remains (2017) [Chartered Institute for Archaeologists / British Association for Biological Anthropology and Osteoarchaeology]: https://babao.org.uk/assets/Uploads-to-Web/14-Updated-Guidelines-to-the-Standards-for-Recording-Human-Remains-digital.pdf

Materials Science and Industrial Processes

A Standard for Pottery Studies in Archaeology (2016) [Prehistoric Ceramics Research Group, the Study Group for Roman Pottery and the Medieval Pottery Research Group]: https://historicengland.org.uk/images-books/publications/standard-for-pottery-studies-in-archaeology/

Archaeological and Historic Pottery Production Sites: Guidelines for Best Practice (2015):

https://historicengland.org.uk/images-books/publications/archaeological-and-historic-pottery-production-sites/

Archaeometallurgy: Guidelines for Best Practice (2015): https://historicengland.org.uk/images-books/publications/archaeometallurgy-guidelines-best-practice/

Archaeological Evidence for Glassworking: Guidelines for Recovering, Analysing and Interpreting Evidence (2018): https://historicengland.org.uk/images-books/publications/glassworkingguidelines/

Organic Residue Analysis and Archaeology: Guidance for Good Practice (2017): https://historicengland.org.uk/images-books/publications/organic-residue-analysis-and-archaeology/

Science for Historic Industries: Guidelines for the Investigation of 17th- to 19th-century Industries (2018): https://historicengland.org.uk/images-books/publications/science-for-historic-industries/

Preservation in Situ

Land Contamination and Archaeology: Good Practice Guidance (2017): https://historicengland.org.uk/images-books/publications/land-contamination-and-archaeology/

Piling and Archaeology: Guidance and Good Practice (2019): https://historicengland.org.uk/images-books/publications/piling-and-archaeology/

Preserving Archaeological Remains: Decision-taking for Sites under Development (2016): https://historicengland.org.uk/images-books/publications/preserving-archaeological-remains/

Scientific Dating

Archaeomagnetic Dating: Guidelines on Producing and Interpreting Archaeomagnetic Dates (2006): Officially archived, but available on request; Historic England also suggests people consult the 'Archaeomagnetism: Magnetic Moments in the Past' webpages (https://www.bradford.ac.uk/archaeomagnetism/) hosted by the University of Bradford.

Dendrochronology: Guidelines on Producing and Interpreting Dendrochronological Dates (2004): Currently being revised, but available on request.

Luminescence Dating: Guidelines on Using Luminescence Dating in Archaeology (2008): Currently being revised, but available on request.

Practice and Guidelines

Archiving and Project Management

Brown, D.H. 2011. Archaeological Archives – A guide to best practice in creation, compilation, transfer and curation. Institute for Archaeologists and the Archaeological Archives Forum. 2nd Edition. http://www.archaeologyuk.org/archives/aaf_archaeological_archives_2011.pdf

Chartered Institute for Archaeologists. (2019) Code of Conduct. https://www.archaeologists.net/sites/default/files/CodesofConduct.pdf

Chartered Institute for Archaeologists. (2014b) Standard and Guidance for Archaeological Excavation. https://www.archaeologists.net/sites/default/files/CIfAS&GExcavation_1.pdf

Historic England. 2015c. Management of Research Project in the Historic Environment: The MoRPHE Project Managers' Guide. Swindon: English Heritage. https://historicengland.org.uk/images-books/publications/morphe-project-managers-guide/heag024-morphe-managers-guide/

Institute for Archaeologists. 2008. Standard and Guidance for the Collection, Documentation, Conservation and Research of Archaeological Materials. Reading: Institute for Archaeologists. http://www.archaeologists.net/sites/default/files/nodefiles/ifa_standards_materials.pdf

Institute for Archaeologists. 2009. Standard and Guidance for the Creation, Compilation, Transfer and Deposition of Archaeological Archives. Reading: Institute for Archaeologists.
http://www.archaeologists.net/sites/default/files/nodefiles/Archives2009.pdf

Institute for Archaeologists. 2010 Draft Standard and Guidance for Archaeological Geophysical Survey. Reading: Institute for Archaeologists.
http://www.archaeologists.net/sites/default/files/nodefiles/geophysicsSG.pdf

SYAS. 2001. Yorkshire, the Humber and the North- East: A Regional Statement of Good Practice for Archaeology in the Development Process. https://www.sheffield.gov.uk/content/dam/sheffield/docs/planning-and-development/archaeology/The-regional-statement-for-good-practice-in-archaeology-within-Planning--pdf--24KB-.pdf

APPENDIX 1

Conservation Strategy By Ian Panter of York Archaeological Trust

Artefacts from all categories and all periods will be recovered as a matter of routine during the excavation. When retrieved from the ground finds will be kept in a finds tray or appropriate bags in accordance with **First Aid for Finds**. Where necessary, a conservator may be required to recover fragile finds from the ground depending upon circumstances.

If waterlogged conditions are encountered a wide range of organic materials may be recovered, including wood, leather and textiles. Advice will be sought from a conservator to discuss optimum storage requirements before any attempt is made to retrieve organic finds and structural timbers from the ground.

After the completion of the fieldwork stage, a conservation assessment will be undertaken which will include the X-radiography of all the ironwork (after initial screening to separate obviously modern debris), and a selection of the non-ferrous finds (including all coins). A sample of slag may also be X-rayed to assist with identification and interpretation. Wet-packed material, including glass, bone and leather will be stabilised and consolidated to ensure their long-term preservation. All finds will be stored in optimum conditions in accordance with **First Aid for Finds** and **Guidelines for the Preparation of Excavation Archives for Long-Term Storage** (Walker, 1990).

Waterlogged wood, including structural elements will be assessed following the English Heritage guidelines, **Waterlogged wood: sampling, conservation and** curation of structural wood (Brunning 1996). The assessment will include species identification, technological examination and potential for dating.

The conservation assessment report will include statements on condition, stability and potential for further investigation (with conservation costs) for all material groups. The conservation report will be included in the updated project design prepared for the analysis stage of the project.

References

Brunning, R. and Watson, J. *Guidelines on Recording, Sampling, Conversation and Curation of Waterlogged Wood*. Swindon: English Heritage (2010). http://www.english-heritage.org.uk/publications/waterlogged-wood/waterlogged-wood.pdf

Karsten, A., Graham, K., Jones, J., Mould, Q. and Walton Rogers, P. (2012) *Waterlogged Organic Artefacts: Guidelines on Their Recovery, Analysis and Conservation*. Swindon: English Heritage. http://www.english-heritage.org.uk/publications/waterlogged-organic-artefacts/woa-guidelines.pdf

Walker, K. 1990 *Guidelines for the preparation of excavation archives for long-term storage*, Archaeology Section of the United Kingdom Institute for Conservation.

Watson, J., Fell, V. and Jones, J. (2008) *Investigative Conservation: Guidelines on How the Detailed Examination of Artefacts from Archaeological Sites can Shed Light on their Manufacture and Use*. Swindon: English Heritage. http://www.english-heritage.org.uk/publications/investigative-conservation/investigative-conservation.pdf

Watkinson, D. and Neal, V. 1998 First Aid for Finds *(3rd edition), RESCUE and the Archaeology Section of the United Kingdom Institute for Conservation.*

Institute for Archaeologists. (2008) *Standard and Guidance for the Collection, Documentation, Conservation and Research of Archaeological Materials*. Reading: Institute for Archaeologists. http://www.archaeologists.net/sites/default/files/node-files/ifa_standards_materials.pdf

APPENDIX 2

Environmental Strategy By Diane Alldrit

The on-site environmental sampling strategy will systematically seek to recover a representative sample of botanical, molluscan (both terrestrial and aquatic), avian and mammalian evidence from the full range of contexts encountered during the excavation. This will enable, at the assessment stage, the possibility for radiocarbon dating material to be obtained, and for an initial analysis of the economic and environmental potential of the site. In order to achieve this, a bulk sample (BS, Dobney *et al* 1992) comprising an optimum size of 40litre of sediment (where possible) should be taken from **every stratigraphically secure and archaeologically significant context**. In practice it may not always be possible to obtain 28l of sediment from certain features during the assessment stage, for instance from partially excavated pits or post-holes, in which case a single bucket sample, c.10 to 14litre should be taken at the site supervisors discretion. Deposits of mixed origin, for instance topsoil, wall fills and obvious areas of modern contamination, should be avoided where possible, as these will contain intrusive material and not provide secure radiocarbon dates.

All buckets and other sampling equipment must be clean and free of adherent soil in order to prevent cross-contamination between samples. If dry soil is to be stored for any length of time it should be kept in cool, dry conditions, and away from strong light sources. However, it is preferable to process samples as soon as possible after excavation.

Bulk soil samples shall be processed using an Ankara-type water flotation machine (French 1971) for the recovery of carbonised plant remains and charcoal. The flotation tank should contain a >1mm mesh for collection of the retent or 'residue' portion of the sample (which may contain pottery, lithics and animal / bird bone, in addition to the heavier fragments of charcoal which do not float). The 'flot' portion of the sample, which may include carbonised seeds, cereal grain, charcoal and sometimes mollusc shell, should be captured using a nest of >1mm and >300micron Endicot sieves. Flotation equipment, including sieves, meshes, brushes and so forth must be meticulously cleaned between samples in order to prevent contamination of potential radiocarbon dating material. All material resulting from flotation will be dried prior to microscopic examination. Flotation is not suitable for the recovery of pollen or for processing waterlogged samples, which shall be discussed below.

Where there is potential for waterlogged preservation, shown for instance by the presence of wood and other organic or wet material, then a 5 to 10litre size sample should be taken (GBA sample, Dobney *et al* 1992). This material is to be retained for later processing using laboratory methods to enable the recovery of waterlogged plant material and insects. For assessment purposes a 1litre sub-sample of the organic sediment from each potential waterlogged sample shall be processed using laboratory wash-over methods, and once processed kept wet. All waterlogged samples awaiting processing should be kept damp, preferably stored in plastic sealable tubs, and in cool conditions. Where large waterlogged timbers are recovered these should be stored under refrigerated conditions and an appropriate conservator consulted.

There is the possibility that the waterlogged deposits may require parasite egg analysis. It is proposed that the 'squash' technique is adapted, this would require small lumps of raw sediment approximately 3mm in diameter taken from three separate points from within the sample and homogenised in a little water by shaking. After allowing coarse particles to settle for a few moments, a drop of the supernatant was removed. This work would be undertaken by either John Carrott or Harry Kenwood if necessary.

If sediment suitable for pollen analysis is encountered, for instance rich organic peaty deposits, or deep ditch sections with organic preservation, the archaeobotanical specialist is to be consulted prior to any sampling taking place. These deposits would require sampling with large kubiena tins and require the specialist to be on-site. Pollen analysis, even at assessment level, would subsequently impose a considerable cost implication should it be carried out.

The specialist is available to provide consultation and advice on the environmental sampling strategy throughout the course of the excavation and during post-excavation processing if required.

References

Dobney, K. D., Hall, A. R., Kenward, H. K. and Milles, A. 1992 A working classification of sample types for environmental archaeology. *Circaea* 9 24-26.

French, D. H. 1971 An Experiment in Water Sieving. *Anatolian Studies 21* 59-64.

Land South of Barnsley Road
West Melton
South Yorkshire

Updated Project Design

Archaeological Evaluation by Trial Trenching

Land South of Barnsley Road

West Melton

South Yorkshire

Planning references- RB2022/0295

MAP Site Code- 05.02.21

Updated Project Design

Contents Page

1. Project Background

1.1 The site, which measures approximately 11.73ha is located immediately south of Barnsley Road and west of Pontefract Road, West Melton, approximately 8km south-east of Barnsley and 15km south-west of Doncaster (centred at SE 41857 01604. Fig. 1).

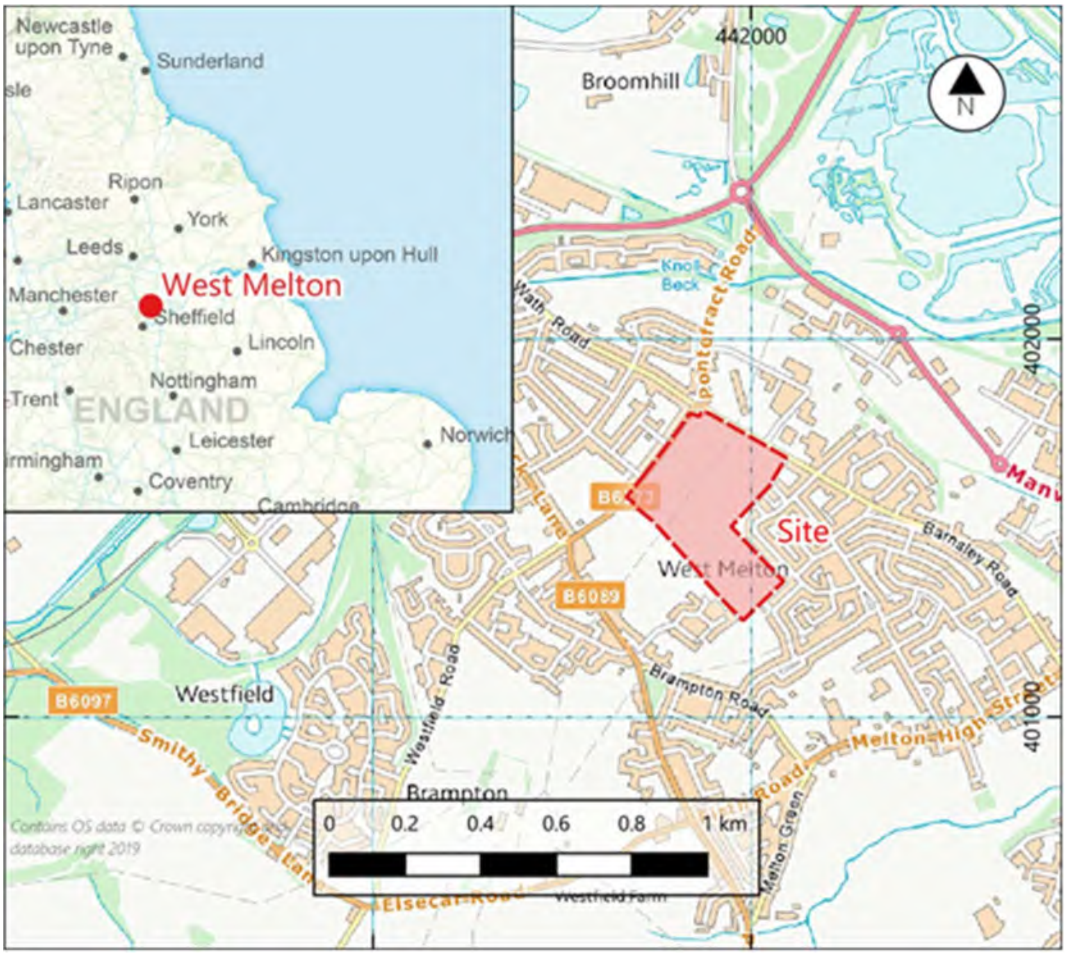


Figure 1: Site Location

1.2 The site, which prior to evaluation consisted of a large agricultural arable field bounded to the north and west by mature vegetation and Barnsley Road and Pontefract Road respectively, to the east by vegetation and residential properties and to the south by a football field.

1.3 Bedrock geology consists of Oak Rocks formation (BGS. 2023)

1.4 The evaluation by trail trenching was carried out in respect of condition 30, attached to planning permission (reference RB2022/0295) which had been granted by Rotherham Metropolitan Borough Council The condition stated that:

Part A (pre-commencement)

No development, including any demolition and groundworks, shall take place until the applicant, or their agent or successor in title, has submitted a Written Scheme of Investigation (WSI) that sets out a strategy for archaeological investigation and this has been approved in writing by the Local Planning Authority. The WSI shall include:

- *The programme and method of site investigation and recording.*
- *The requirement to seek preservation in situ of identified features of importance.*
- *The programme for post-investigation assessment.*
- *The provision to be made for analysis and reporting.*
- *The provision to be made for publication and dissemination of the results.*
- *The provision to be made for deposition of the archive created.*
- *Nomination of a competent person/persons or organisation to undertake the works.*
- *The timetable for completion of all site investigation and post-investigation works..*

Part B (pre-occupation/use)

Thereafter the development shall only take place in accordance with the approved WSI and the development shall not be brought into use until the Local Planning Authority has confirmed in writing that the requirements of the WSI have been fulfilled or alternative timescales agreed.

Reason

To ensure that any archaeological remains present, whether buried or part of a standing building, are investigated and a proper understanding of their nature, date, extent and significance gained, before those remains are damaged or destroyed and that knowledge gained is then disseminated.

2. Archaeological and Historical Background

2.1 Although no prehistoric material has been recovered from the vicinity, cropmarks of, possible Iron Age or Romano British, enclosures and features have been recorded by the SMR as being present within the Proposed Development Area (SMR ID's MSYY 5459 and MSY 5524). Two ditches were recorded during a Watching Brief carried out during work associated with a pipeline (Network Archaeology, 2002). The ditches contained no dating evidence but are believed to correspond with the recorded cropmarks.

2.2 The area has historically been heavily utilised for agricultural purposes since at least the Medieval period with areas of well-preserved ridge and furrow being identified in the area (SMR ID MSY12635).

3. Summary of Results to Date

3.1 An Archaeological Desk Based Assessment (MAP, 2021) concluded that archaeological potential of the site is considered to be moderate and of local to regional significance. Archaeological deposits dating to the late prehistoric and Romano-British periods are likely to be encountered. Evaluation in the form of a Geophysical Survey and Trial Trenching was recommended.

3.2 A Geophysical Survey (Phase Site Investigations, 2021) identified archaeological remains across the site including trackways which meet at a crossroads and anomalies suggestive of field boundaries or enclosures. These anomalies correspond with cropmark data within the site and with features identified during archaeological work in the vicinity of the site.

3.3 A programme of Archaeological Evaluation by Trial Trenching was carried out by MAP in 2022. The Evaluation targeted areas of the site which contained anomalies identified during the Geophysical Survey but also assessed areas of the site which were considered to be devoid of archaeological features and/or deposits. Twenty-three Trial Trenches were excavated across the site, of which eight contained archaeological features.

3.4 The Evaluation was successful in confirming the presence of archaeological features on the site which correlated to cropmark and geophysical data. Features appeared to represent a small enclosure in the north-western region of the site with two ditches which ran parallel, and on a north-west to south-east orientation, being interpreted as trackway ditches.

3.5 No datable material was identified during the course of the evaluation, with bulk samples producing material which may be derived from manuring and ploughing taking place on the site. As a result of the lack of datable material, additional Optically stimulated luminescence samples were taken from five archaeological features (Fig 2) which were submitted to the University of Gloucestershire for processing and analysis.

4. Summary Statement of Potential

4.1 Carbonised Plant Macrofossils and Charcoal

4.1.1 The environmental material has been fully catalogued and described, and no further work is required on the samples. (Alldritt. 2022).

4.2 Optically stimulated luminescence

4.2.1 OSL samples taken from five archaeological deposits were taken and submitted to the University of Gloucestershire for processing and analysis.in the absence of other sources of datable material the results of the samples have the potential to allow a date of the establishment and use of the features to be achieved and may also inform any recognisable development of features on the site. OSL samples have recently been taken on various sites across South Yorkshire and have indicated the earlier than anticipated inception of features, particularly routeways, and so the West Melton samples may also contribute to the wider understanding of archaeological landscapes which have, until recently, been assumed to date to the late prehistoric or Romano-British Periods.

4.2.2 Samples were taken from the following archaeological features;

- (504) fill of southernmost trackway ditch [506] within trench 5
- (507) fill of northernmost trackway ditch [509] within trench 5
- (510) fill of north-east to south-west orientated ditch within trench 5
- (1605) fill of northernmost trackway ditch [1606] within trench 16
- (1610) fil of southernmost trackway ditch [1611] within trench 16

5. Aims and Objectives

5.1 Academic Post-excavation Research Design

5.1.1 The South Yorkshire Historic Environment Research defines a set of research questions relevant to the historic environment of South Yorkshire. Period based themes and topics, which are deemed to be archaeologically important or significant, are discussed within the framework.

5.1.2 Based on the archaeological deposits which were encountered during evaluation, the site has the potential to inform the following research questions regarding the Iron Age and Romano-British periods in South Yorkshire.

- Can we characterise different types of Iron Age and Romano-British field systems in different landscape zones?
- What were the economic, social, or political roles of Iron Age and Romano-British field systems?
- Can the dates of Iron Age and Romano-British field systems inception and disuse/abandonment, be established with any greater accuracy?
- What were the economic, social, or political roles of linear trackways?

5.2 The results of recently submitted OSL samples from within the South Yorkshire area (for example at Ravenfield, MAP. 2023) has indicated that features which were presumed to be of Iron Age or Romano-British date had their origins in the Neolithic or Bronze Age periods. Should this be the case with the West Melton samples the work has the potential to inform the following research question within the South Yorkshire Research framework. *"How can we establish a higher resolution chronological framework to the Neolithic and Bronze Age? "*

5.2.1 The discussion of these themes within the report, with reference to forthcoming analysis of the OSL samples, and consideration of other sites in the area, will ensure that the site is properly placed within the wider archaeological landscape.

5.3 Final reporting

5.3.1 Following discussion with James Thompson of South Yorkshire Archaeology Service the evaluation report will be updated to reflect the aforementioned additional analysis and will be lodged with the South Yorkshire Historic Environment and the Archaeological Data Service.

5.4 Archive Deposition

5.4.1 The archive will be prepared for deposition as outlined in the Written Scheme of Investigation (MAP.2021.

5.4.2 The electronic records from the excavation and the digital photographs will be deposited on the ADS.

6. Method Statement

6.1 General Statement

6.1.1 Although the collection of all samples was carried out during the evaluation, the submission of the samples was carried out following discussion with South Yorkshire Archaeology Service and the University of Gloucester.

6.2 Task List

Task 1: Project Management

Financial administration maintaining contact with all members of the team, developer and other stakeholders, and providing progress reports to South Yorkshire Archaeology Service, plus general management of people and data.

Task 2: Optically stimulated luminescence samples- processing and analysis

Task 2.1- processing and analysis of samples

Task 2.2- production of report based on results

Task 3: Reporting

Task 3.1- update of report to incorporate all new material and review results and discussion as necessary

Task 3.2- update figures as necessary

Task 3.3- Amalgamate report to reflect updated and additional appendices

Task 3.4- dissemination of report

Task 4: Archiving and dissemination

Task 4.1- liaison with recipient museum/ repository

Task 4.2-preporation of physical and digital archive for deposition

Task 4.3-Deposition of physical and physical archive to museum/ repository

Task 4.4- Submission of relevant archive to ADS

7. Resources and Programming

7.1 Staffing and Equipment

7.1.1 The project team for the post-excavation analysis will involve:

- Charlie Puntorno- Tasks 1, 3.1 and 3.3
- Sophie Coy- Tasks 1 and 3.4
- Kelly Hunter- Tasks 1 and 4
- Max Stubbings- Task 3.2
- Professor Philip Toms- Task 2

7.1.2 No additional training is required for any of the above tasks.

7.1.3 All materials and equipment needed to complete all tasks will be available to appropriate team members.

7.1.4 All activities will adhere to MAP's Health and Safety, and Ethics policies, or relevant policies of the employing institution where team members are not employees of MAP.

8. Timetable

8.1 It is intended to produce the final at the earliest opportunity. However, because specialists to and participants in this project may have other obligations, the timetable has been suggested to take that into account. Nevertheless, the intention is to have produced the final report by the end of June 2023 with the deposition of the archive taking place as soon as possible thereafter, depending on the intention of the museum and/ or repository.

9. Bibliography

- British Geological Society. Geology of Britain Viewer. Available at: http://mapapps.bgs.ac.uk/geologyofbritain/home.html [accessed 11.05.23]

- MAP Archaeological Practice Ltd. 2021. Land South of Barnsley Road, West Melton, South Yorkshire. Archaeology and Heritage Desk Based Assessment.

- Network Archaeology. 2002. Wentworth to Brampton Gas Pipeline: Archaeological Watching Brief.

- Phase Site Investigations. 2021. Land South of Barnsley Road, West Melton, South Yorkshire, Archaeological Geophysical Survey.

- South Yorkshire Archaeology Service & Historic England. South Yorkshire Historic Environment Research Framework. Web Resource. Available at https://researchframeworks.org/syrf

Name	Feature	Easting	Northing	Elevation
OSL-013	[511]	441798.09917	401669.11414	42.40419
OSL-014	[509]	441798.26847	401665.76463	42.44327
OSL-015	[506]	441797.49178	401653.29976	42.58673
OSL-016	[1611]	441893.24937	401542.06223	42.81357
OSL-017	[1606]	441892.63797	401552.8225	42.68381
Control	Nat	441797.03284	401649.99298	43.33751

maparch
MAP Archaeological Practice

Legend

- Development Outline
- Trenches
- Segment

N

0 20 40 60 80 100 m

OSL Location Plan
Scale: 1:2000 @ A4