Hameldon Community College, Coal Clough Lane, Burnley, Lancashire

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SUMMARY

Planning permission has been granted for the demolition of Blessed Trinity RC College, off Coal Clough Lane, Burnley, Lancashire (NGR SD 8243 3148), which is to be replaced by Hameldon Community College as part of the Building Schools for the Future (BSF) scheme. In June 2008, Oxford Archaeology North (OA North) was commissioned to undertake a desk-based assessment of the site for the purpose of the planning application, to consider the impact any work would have on potential surviving archaeological remains. The report found that there were a number of sites in the vicinity of the proposed development, two of which would be directly affected by any proposed construction works, a colliery and associated tramway, or ginney (Sites 01 and 07). Cherry Fold Colliery was located at the centre of the development site and is known to have been established in the early nineteenth century. It was connected to two other collieries, Habergham in the west and Bareclay in the north, via a tramway which led to the Leeds-Liverpool Canal. This tramway was a chain haulage system, known as a chain ginney, which was generally driven by a horizontal engine powered by steam formed by boilers at the base of the shaft. No records survive for Cherry Fold, and above ground evidence for the pit is limited so, consequently, a programme of archaeological evaluation was required as a condition to the planning permission to locate any remains and assess their nature and extent. The work was undertaken in March 2009.

The first stage of the evaluation was to undertake a geophysical survey across the playing field of the college, in the vicinity of the Cherry Fold Colliery and chain ginney, to establish the location and extent of any associated features. A magnetometer survey was conducted over the whole area, with a smaller area of resistivity targeting the site of the colliery to determine the location of any structures (Stratascan 2009). In consultation with Lancashire County Archaeology Service (LCAS), the positions of five trial trenches were agreed, targeting a number of anomalies and potential features seen in the survey data. However, due to on-going construction works on-site, in close proximity to the archaeological remains, an archaeological watching brief was maintained during topsoil stripping to bridge the gap between the geophysical survey results being issued and agreeing the location of the trial trenches with LCAS. Additional watching brief was undertaken around the trial trenches towards the end of the evaluation, in an area outlined as potentially archaeologically sensitive.

Trenches 1 and 3 targeted anomalies with the potential to be remains of the ginney. Trench 2 was positioned over features that resembled structural remains in the survey data, and located over the site of the colliery buildings seen in the map regression (OA North 2008). Trench 4 also targeted apparent structural remains, and Trench 5 was positioned to investigate four small pit-like anomalies and a linear feature.

The results of the evaluation trenching found that Trenches 1 and 2 contained the remains of what was believed to be the ginney (126, 145 and 152), truncated by a culvert in Trench 2 (123). In Trench 3 to the south, the ginney remains were completely eradicated by the culvert so that no evidence remained. On excavation of Trench 4, instead of the brick walls that were expected, only a floor surface remained (100). In Trench 5 only field drains and culverts (102 and 114) were uncovered, with no evidence of colliery activity.
Trench 2 had been positioned to establish the character of large linear geophysical features that had the appearance of structures, but found no such evidence within the trench. However, during the watching brief of the topsoil strip a layer of clinker (161), with deeper channels (160) filled with the same material was observed. These are possibly the remains of structures where the stone or brick has been robbed and the area backfilled and levelled using clinker and industrial waste (157).

The archaeology that was identified was recorded adequately during the evaluation, and it is recommended that no further work is necessary on the site.
ACKNOWLEDGEMENTS

Oxford Archaeology North would like to thank Bovis Lend Lease for commissioning the project, and the on-site contractor, Hewlett, for logistical help on site. Thanks are also extended to Doug Moir of LCAS for his advice.

The geophysical survey was undertaken by Stratascan Ltd. The trial trenching fieldwork was undertaken by Becky Wegiel, Tim Christian and Ric Buckle, and Becky Wegiel also wrote the report. The drawings were produced by Marie Rowland. The project was managed by Emily Mercer, who also edited the report.
1. INTRODUCTION

1.1 CIRCUMSTANCES OF PROJECT

1.1.1 Blessed Trinity RC College (former St Hilda’s Girls’ School), Coal Clough Lane (NGR SD 8243 3148; Fig 1), is proposed for demolition and redevelopment of the site as Hameldon Community College, providing a college building and sports facilities. Planning permission has been granted with a condition to undertake an archaeological evaluation of the playing fields, consisting of an archaeological geophysical survey and subsequent targeted trial trenching, to provide information on the nature, extent and survival of any below-ground remains. The requirements of the condition were based on the results of a desk-based assessment, undertaken in July 2008 (OA North 2008) to support the planning application. The research identified 11 sites of archaeological potential within the study area, two of which were within the proposed development area, Cherry Fold Colliery and associated tramway, or ginney (Sites 01 and 07).

1.1.2 The geophysical survey was undertaken in March 2009 (Stratascan 2009, Appendix 3), and indicated areas of potential archaeological activity in and around the known location of the colliery, and included probable structural remains and possibly identified the remains of the ginney (Fig 2). Following the survey, consultation was undertaken with Doug Moir of the Lancashire County Archaeology Service (LCAS) regarding the areas of archaeological potential in the centre and south side of the existing playing field, and five trial trenches were positioned to take in the potential archaeological features seen in the geophysical survey results (Fig 2).

1.2 LOCATION, TOPOGRAPHY AND GEOLOGY

1.2.1 Blessed Trinity RC College is located on the south-western fringe of the town of Burnley, Lancashire (NGR SD 8243 3148), on the south side of the Calder Valley, although generally the proposed development site is relatively flat. The site is bound by Rossendale Road to the south-west, and Coal Clough Lane to the south-east. Along the northern and western side of the site is a housing estate, and Cherryfold Community Primary School is situated on the eastern side (Fig 1).

1.2.2 The solid geology of the region comprises mostly sedimentary rocks of the Lower Westphalian coal measures. These are Carboniferous period deposits which date to between 28- and 345 million years ago, and include sandstone and Millstone grits. The overlying drift geology is essentially post-glacial deposits, predominantly boulder clay with some areas of sands or gravels (Countryside Commission 1998). The soils of the surrounding area, as mapped by the Ordnance Survey Soil Survey of England and Wales (1983), are predominantly of the Brickfield 3 series, which are cambic stagnogley soils, deriving from the underlying geology.
1.2.3 A fault is believed to be positioned running roughly east/west across the playing fields to the north of the tennis courts (CSS 2008).

1.3 HISTORICAL BACKGROUND

1.3.1 The following background allows the site to be considered within the wider historical and archaeological context when assessing the archaeological remains, and has been taken from the desk-based assessment compiled by OA North (OA North 2008).

1.3.2 The origin of the name Burnley is somewhat ambiguous and has been suggested to derive from 'brun', possibly meaning brown and/or stream, and ‘ley’ derived from lea, meaning meadow. Both elements of the name could be from Old English (Ekwall 1922), hinting at early medieval origins for the settlement. The place name of Habergham, to the west of the proposed development site, is considered to be a derivation of ‘Hēabeoringa’ and ‘hamm’, possibly meaning ‘the enclosure of the dwellers by ‘Hēabeorh’, meaning mountain (op cit, 83). Most of the place-names in the area are topographical and are thought to reflect the dispersed nature of the settlement at the time (LCC 2005, 16).

1.3.3 Following the Norman Conquest of 1066, Burnley was a township in the essentially rural parish of Whalley, which lay in the Hundred of Blackburn (Morgan 1978). The first documentary reference to Burnley occurs in 1122, when a charter granted the church of St Peter’s to the monks of Pontefract Priory. The town is referred to as ‘Bronley’ in documents dating from 1241, and as ‘Brunley’ in the grant of free warren to Edmund de Lacy in 1251 (ibid).

1.3.4 The first market in Burnley was chartered in 1294, and granted to Henry de Lacy (Farrer and Brownbill 1911). This allowed for a market to be held in the town every Tuesday, and a cross was erected subsequently marking the location of the market. Documents amongst the de Lacy papers dating to this time include reference to a corn mill and a fulling mill, erected at a cost of 6s 8d, representing an early element of Burnley’s textile industry (LCC 2005; Bennett 1946, 100-1). The town developed around the church and the market, in the area known as Top o’ th’ Town (LCC 2005, 18) and, as a consequence, it is estimated that the population grew by over 40% during the fifteenth century, reaching approximately 1200 in the early sixteenth century (Hall 1977, 8).

1.3.5 In 1617 the market was extended and six annual cattle fairs were established (Bennett 1947, 80), and by 1650 Burnley was regarded as a small market town at a national level (Farrer and Brownbill 1911, 442). Within the Burnley and Habergham Eaves townships, many of the existing medieval farmsteads had been enlarged and rebuilt more substantially, and other new farms had been established, such as Coal Clough House in Cowden (op cit, 467). Burnley continued to grow in importance throughout the seventeenth century, and a number of inns were established due to the growing demand for hospitality, alongside which other trades and small-scale industries grew.
The woollen industry also became increasingly important to Burnley’s economy, particularly as the population grew, creating a surplus of labour which could not be employed in farming (Hall 1977, 8). The enclosure of all the commons in Burnley between 1617 and 1622 benefited the larger landowners, but it led to smaller farmers seeking alternative or additional income. This came in the form of the textile industry (LCC 2005, 20), and by 1650 many inhabitants were employed full time as handloom weavers either in their own homes or in loomshops (Bennett 1947, 253).

Aside from textiles, the coal mining industry was also growing in the sixteenth and seventeenth centuries, expanding from the small-scale where tenants dug coal and limestone for their own use as part of their manorial rights, to one where the rights were leased for fixed terms of years in return for rents (op cit, 94, 97). Coal was mined from several places in Burnley, particularly from the Ridge to the east of the town, from Broadhead Moor to the north and west, and from an area to the south around the proposed development site at Coal Clough (LCC 2005, 21). Most mines were shafts rather than drift mines. During the 1840s, however, the coal industry appears to have undergone considerable change in Burnley with some of the existing small pits being closed, such as Habergham (Cheapside) in 1848, and new larger collieries being established. Amongst the latter were Bank House Colliery, Fulledge Colliery, and Whittlefield Colliery, all of which were in operation by 1848 (op cit, 34). Fulledge was linked by a tramway to the Leeds-Liverpool Canal which, by 1816, formed a trans-Pennine route, and connected Burnley with the west coast port of Liverpool, and the east coast ports via the rivers Aire and Trent (Clarke 1990). A tramway was also in use at Cherry Fold Colliery, within the development site, linking it to Bareclay Pit to the north and on to the Leeds and Liverpool Canal. Other than these examples, little use was made of tramways to transport coal around Burnley at this time. By 1882, however, they were far more widely used, and by 1889 a system of tramways linked up collieries at Whittlefield, Clifton, Bank Hall, Rowley, Boggart Bridge and Towneley (LCC 2005, 34).

No records are known to survive of the Cherry Fold pit (Heys nd, 257), and physical evidence for the pit is limited. Neighbouring pits, for which records do survive, are the Bareclay Hills pit, located to the north, and the Cheapside pit (Habergham), located to the west (ibid). Bareclay Hills was used for the production of Arley coke and the old transport road came out onto Back Lane (now Rossendale Road) some 300 yards below Cherry Fold (ibid). Later, screened coal from Bareclay was transported by chain haulage to a coal staithes on the south side of Accrington Road, which probably once extended to Cherry Fold, as evidenced by the early maps. Coal from the Cheapside pit was transported by steam-powered and horse-drawn lorries before about 1870, but after this it was transported by chain haulage.

Most of the pits in the area made use of this system of haulage, known as the chain ginney (op cit, 262). The system was generally driven by an horizontal...
engine for which the steam was raised on a bank of three Lancashire Boilers situated at the bottom of the shaft (*ibid*). The Cheapside Pit was finally closed in 1943.

1.3.10 Much of the evidence for Cherry Fold pit is taken from the 1842 Tithe map and schedule, which names the land as being owned by the representatives of one John Hargreaves (deceased). Hargreaves Collieries Ltd apparently owned other land in the area, but evidence for this is limited to a simple lists of property in Habergham Eaves (NCHa 39/3, NCHa 15/1). They also owned the Bareclay Hills Pit (Nadin 2003).

1.3.11 In 1930, during the levelling and draining of Cherryfold playing fields, evidence of the existence of the pit at Cherry Fold was uncovered and reported in the Burnley Gazette on 14th January 1930 and 25th January 1930 (Nadin nd). The newspaper reported that on the 14th January workmen, employed by Borough Surveyors Department, discovered a disused pit ventilation shaft, the existence of which they were unaware. The shaft was said to be in a ‘excellent state of preservation’ and was sealed up again. It was 75 feet deep and filled to within 15 feet of the top with water and was constructed from course rubble. The shaft was not filled as it was not on building land. It was simply made safe and work was carried out to prevent ‘corrosion’. The shaft was covered with girders supporting wrought iron plates which, as was reported in the Burnley Gazette on the 24th January 1930, were installed some 55 years previously when a local farmers’ cow fell into the shaft. Cherry Fold pit was evidently quite forgotten until its discovery in 1930. The current state of the shaft is unknown, but must presumably still be *in situ* and is known to be situated beneath the tennis courts for the school.
2. METHODOLOGY

2.1 PROJECT DESIGN

2.1.1 A project design was submitted by OA North in accordance with a verbal brief from LCAS (Appendix 1). The project design was adhered to, and the work was consistent with the relevant standards and procedures of the Institute of Field Archaeologists and generally accepted best practice. An additional watching brief element was required prior to and following the trial trenching, which was carried out according to OA North’s usual methodology and as per the agreement of LCAS.

2.2 WATCHING BRIEF

2.2.1 Prior to the issue of the interim geophysical survey results and consequent positioning of the trial trenches, an archaeological watching brief was required of the topsoil strip within the playing field area. Two areas were stripped along the south-western and western edges of the site before the methodology was agreed for the subsequent evaluation trenching. The watching brief then continued following the completion of the trenching as the topsoil was removed over the remaining areas of high archaeological potential (Fig. 2).

2.2.2 The topsoil was removed by a mechanical excavator fitted with a toothless ditching bucket, and any significant archaeological deposits were cleaned by hand and recorded appropriately.

2.3 EVALUATION

2.3.1 The areas considered to have high archaeological potential (Fig 2) had been cordoned off prior to trial trenching, by the client’s on-site contractors, and the topsoil had been removed by mechanical excavator outside of these areas.

2.3.2 The trenches were located by Differential Global Positioning System (dGPS) and marked out accordingly (Fig 2). The topsoil and modern overburden was removed by mechanical excavator fitted with a 1.5m wide toothless ditching bucket, to the level of the first significant archaeological deposit. The surface was then cleaned by hand and inspected for archaeological features.

2.3.3 The trenches were fully recorded and, following on-site consultation with Doug Moir (LCAS), were not backfilled as the remaining topsoil across the areas of high archaeological potential was immediately stripped under archaeological watching brief for the purposes of the construction works (see 2.1, above).

2.4 ARCHIVE

2.4.1 A full professional archive has been compiled in accordance with current IFA and English Heritage guidelines (English Heritage 1991). The paper and
digital archive will be deposited with the County Record Office, Preston on completion of the project.
3. RESULTS

3.1 INTRODUCTION

3.1.1 In total, five trenches measuring 2.5m in width were positioned on features identified in the geophysical survey (Stratascan 2009, Appendix 3) of potential archaeological remains; Trenches 2 and 5 were 30m in length; Trenches 1 and 4 were 20m in length; and Trench 3 was 10m in length (Fig 2). No finds of archaeological potential were retained. Full details of contexts are included as a list in Appendix 2.

3.2 TRENCH 1

3.2.1 Trench 1 was aligned east-north-east/west-south-west, and was 20m by 2.5m (Fig 3). Topsoil 129, a dark blackish-grey soft clay-silt, and subsoil 130, a light brownish-grey plastic silty-clay, were removed to an average depth of 0.4m, down to the natural boulder clay 131. The eastern end of the trench had fallen outside of the cordoned-off areas of high archaeological importance, and had suffered damage from plant vehicles, which had reduced this end by approximately 0.3m lower than the rest of the trench. The vehicle tracks had partially impeded on some of the ginney remains found in this trench.

3.2.2 A group of features comprising three parallel linear features (133, 138 and 143) has been tentatively interpreted as the remains of the ginney, 126 (Figs 3 and 4, Plate 1). The interpretation is based on the correlation with the faint linear remains identified in the geophysical survey results and the mapping evidence showing the position of the ginney (OA North 2008). The easternmost feature of the three, ditch 133, was aligned north/south, and had a 0.25m deep U-shaped profile and measured 0.6m wide. It was filled by 132, a black indurated silty-grit material, which had a high proportion of coal dust and lumps. Approximately 2m to the west, ditch 143 was on the same alignment and had a similar U-shaped profile 0.2m deep but was wider, measuring at least 0.75m. The fill, 142, was a black weakly-cemented silty-grit, again with a high proportion of coal dust and lumps, and a proportion of clinker.

3.2.3 These ditches, 133 and 143, cut through layers 139, 140 and 141 (Fig 4), which lay between the ditches. Layer 139 was a black weakly-cemented silty-grit, with frequent lumps of coal and clinker. This overlay layer 140, a thin lens of light bluish-grey plastic silty-clay. The final layer, 141 was a mid brownish-grey friable silty-grit.

3.2.4 The third linear feature, 147, was also aligned north/south, but terminated within the excavated slot at the southern end (Fig 3). This had a flat bottomed U-shaped profile, with vertical edges, and was 0.2m deep and approximately 0.5m wide. It was filled by 146, a dark brownish-grey friable silty-grit, with frequent lumps of coal and clinker.
3.2.5 The possible ginney remains, 126, had been later truncated by a north/south aligned linear ditch 138. This had a U-shaped profile, and had three fills (Fig 4). The first of the fills, 137, was a mid orange-grey friable silty-grit, with frequent lumps of crushed brick. This was overlain by 136, a redeposited natural, which comprised dark greyish-yellow plastic silty-clay. The third and uppermost fill, 135, was a black weakly-cemented silty-grit, with frequent lumps of coal. Although the fills were similar to those found in the features interpreted as the ginney, the ditch was obviously later but its function is unknown; the position of the ditch in relation to the possible ginney remains, 126, made it unlikely to be a repair or upgrade, but the fills do not suggest a land boundary ditch or a drainage ditch.

3.2.6 In addition to the ginney remains was a stone culvert 127, which was aligned north-west/south-east. This was constructed from light greyish-yellow sandstone, which was roughly squared. It was likely that this culvert was the same as culvert 123 in Trench 2 (see 3.3, below).

3.3 TRENCH 2

3.3.1 Trench 2 was aligned east/west and measured 30m by 2.5m (Figs 2 and 3). Topsoil 149, a dark brownish-grey friable clay-silt, and subsoil 150, a mid brownish-grey firm silty-clay were removed down to the natural boulder clay 153.

3.3.2 Culvert 123 was recorded across the centre of the trench and aligned north/south. It was approximately 0.6m wide and constructed of light grey-yellow sandstone which was roughly hewn, and is probably the same culvert as 127 in Trench 1. It was constructed in cut 124, which had a U-shaped profile and steep straight sides. This was backfilled by 125, a dark bluish-grey with light yellow patches of soft silty-clay.

3.3.3 Following on from the remains of the ginney recorded in Trench 1 it is believed that it had been largely truncated at this point, and all that remained were two linear ditches, 145 and 152 (Fig 5), which had been cut through by culvert 123. Both ditches 145 and 152 had shallow U-shaped profiles, and were filled by a bluish-black firm silty-clay with a high proportion of crushed coal (144 and 151, respectively). These features were believed to be the same as linear features 133 and 144 in Trench 1.

3.3.4 The purpose of Trench 2 was to investigate the large rectilinear anomalies positioned within an area of low resistance seen in the geophysical survey results (Fig 2). These were not seen in plan, but it is likely that they relate to features visible in section as a layer of clinker within a matrix of dark grey silty-clay. This layer, 156, was located beneath topsoil 150, and above a layer of redeposited natural 155. It was quite uneven, and had an average depth of 0.16m. It is possible that this layer was a levelling deposit that had infilled the foundation trenches belonging to the previous colliery buildings located by mapping evidence in this area (OA North 2008).
3.4 TRENCH 3

3.4.1 Trench 3 was aligned east/west, and measured 10m long and 2.5m wide. It was excavated to an average depth of 0.3m. Topsoil 105, a dark brownish-grey friable clay-silt, and subsoil 106, a mid brownish-grey firm silty-clay, were removed down to the light to mid yellow boulder clay, 154.

3.4.2 This trench was positioned to traverse the line of a weak linear anomaly and partially intersect with a pit as seen on the geophysical survey results (Fig 2). On excavation, there was no sign of the pit-type feature to the west of the trench. However, the linear feature was observed aligned north/south across the trench.

3.4.3 The linear anomaly took the form of a culvert, 101, and was the same as that seen in Trenches 1 and 2 (Plate 2). It was constructed from mid greyish-yellow sandstone, which was roughly squared. The cut, 103, had been backfilled by 104, a mottled dark brownish-grey with yellow firm silty-clay. Previously, in Trench 1 and probably in Trench 2, the culvert was observed cutting through the remains of the ginney, but by this point there was no evidence of the ginney.

3.5 TRENCH 4

3.5.1 Trench 4 was aligned east/west and measured 20m by 2.5m (Figs 2 and 3). It was positioned to investigate the remains of the small structure identified in the geophysical survey results, along with three ovoid pits to the west. Topsoil 119, a light greyish-brown soft clay-silt, and subsoil 120, a mottled light greyish-brown and yellowish-grey plastic silty-clay, were removed down to the dark yellowish-grey natural boulder clay 121.

3.5.2 The pits at the west of the trench were not observed. However, an area of what appeared to be brick rubble correlated with the structure seen in the survey data. It comprised a layer of loose, dark reddish-orange, crushed brick, 107. At 0.4m thick, this layer does not represent the whole demolished building, and it lacked evidence of any other associated building materials. It overlay floor surface 108 (Plate 3), which consisted of a relatively thin, but very tough, layer of lime mortar, approximately 0.2m thick. This was on top of layer 109, a dark blackish-brown, weakly-cemented silt, which was probably a levelling layer for the floor surface. This in turn was above layer 110, a mid reddish-grey plastic silty-clay, and layer 111, a light yellowish-grey plastic silty-clay, which were both subsoils upon which the structure was constructed. No walls corresponding with those shown in the survey data were seen in the trench for building 100.

3.6 TRENCH 5

3.6.1 Trench 5 was aligned east-north-east/west-south-west and measured 30m by 2.5m (Fig 2 and Plate 4). The position of this trench was determined by two linear features aligned north/south at the west end of the trench, and four pits to the east, all of which were identified in the geophysical survey. Topsoil
3.6.2 The two linear features at the west of the trench were exposed. Both features were stone culverts, the westernmost was 114 and the easternmost was 102, and both were constructed from roughly-hewn yellow sandstone. Culvert 114 was constructed within cut 115, a U-shaped trench, which was backfilled by deposit 113, a mid orangey-brown loose silty-clay. Culvert 102 was constructed in cut 112 which, in turn, was backfilled by fill 122, a mid grey-brown plastic silt-clay.

3.6.3 The features on the geophysical survey interpreted as four pits were not seen, but a third culvert was recorded aligned east/west along most of the length of the trench in the location that the pit-like anomalies were positioned. This was partially constructed from rubble and bricks, and was still carrying water at the time of excavation and, therefore, was not fully investigated. It is likely that the pits on the geophysical survey were anomalies from the culvert caused by the magnetic material in its make-up, such as the bricks.

3.7 WATCHING BRIEF

3.7.1 During the first phase of the watching brief, prior to the trial trenching, topsoil was stripped from the west and south-west of the site under archaeological supervision. The topsoil contained modern debris and lenses of clinker and crushed coal. No archaeology was observed.

3.7.2 The watching brief resumed towards the end of the trial trenching, and concerned the area immediately around the trenches that had been designated areas of high archaeological potential. The topsoil was stripped to the level of the subsoil, which, for the purpose of this watching brief, was sufficient to observe any archaeological remains, given the results of the trial trenching.

3.7.3 In the area between Trenches 1 and 2 the ginney was visible, aligned north/south, with the intersection with culvert 123 visible. To the north of Trench 1, the ginney could be seen following a northerly direction right up to the northernmost boundary fence. Unfortunately, this part of the site was not covered by the watching brief and, consequently, plant had been tracking over the ginney, reducing the remains to a black smear.

3.7.4 Either side of Trench 2 there were large areas of clinker and crushed coal, which were most likely the anomalies detected in the geophysical survey. A slot was excavated to reveal a channel, 160, that had a very uneven U-shaped profile and was cut into redeposited natural 162. This was a mid yellow with grey-brown patches of firm silty-clay, and was the same as layer 155 in Trench 2. The fill of channel 160 was 161, a dark grey-black loose mix of grit and clinker. A second slot excavated to the south of Trench 2 showed a similar layer of brownish-black compact clinker 157. No actual cuts associated with 157 were visible. As concluded from the remains in Trench 2, the area seems to have been levelled with a fine layer of clinker, filling any shallow channels following the removal of colliery buildings.
3.7.5 In the area around Trench 4, the remainder of the building (100) was uncovered. Again, the remains were more amorphous in shape rather than any defined structure with walls.
4. CONCLUSIONS

4.1 DISCUSSION

4.1.1 Development of the playing fields for Blessed Trinity RC College provided an excellent opportunity to locate and assess the remains of Cherry Fold Colliery, of which little was known. The desk-based assessment (OA North 2008) revealed that there would have been structures associated with the colliery situated on the proposed development site, including the ginney that would have transported coal between the Bareclay and Habergham collieries, ultimately reaching the Leeds-Liverpool Canal. The geophysical survey, undertaken as the first stage of evaluation (Stratascan 2009), showed that there appeared to be the anticipated remains of structures and linear features that could relate to the colliery and ginney. The next phase in the programme of evaluation made the best use of the survey data, positioning the trenches where the maximum amount of information could be gathered.

4.1.2 Trench 1 contained no features associated with the colliery apart from the possible remains of the ginney, and the culverts observed were probably part of the drainage work known to have been carried out in the 1930s (OA North 2008). The floor surface found in Trench 4 could have belonged to a building associated with the colliery, although the function of the building cannot be inferred with so little information. The lime mortar floor was very clean, with no coal or clinker present on the surface, which suggests that the building was either an office or was utilised in a way that kept the floor clean. The layer of crushed rubble that was on top of the floor was very homogenous, consisting almost completely of brick. There was no roofing materials and general dirt that one would expect if this was building demolition rubble. Perhaps the building was taken down in a controlled manner with the building materials taken away to be reused elsewhere, which would correlate with the lack of walls found in the trench.

4.1.3 The group of linear features and layers that made up the ginney remains were visible in Trench 2, where they had been truncated by a culvert, northwards up to the northern site boundary fence. The ginney had two outer linear ditches, presumably where the outer rails were located, and a ditch down the centre where further rails would be situated. The overall width of the feature was 3.5m, this is wide enough to accommodate two sets of standard gauge rails (or narrow gauge, the evidence for the gauge is not clear, and would probably be dependant on the width of the trolleys using the ginney). Full trolleys would travel towards the canal, empty ones back up to the colliery.

4.1.4 The larger rectilinear features identified in the geophysical survey in the position of the colliery buildings seen from mapping evidence proved elusive when excavating Trench 2. Immediately beneath the topsoil was a thin layer of clinker that did not appear, at the time of initial excavation, to take any form other than a levelling layer and was removed. Shallow channels infilled by the clinker visible in some places lay underneath, and only became apparent when a wider area of topsoil was removed around the trench as part of the watching brief, although much of it had inadvertently suffered.
extensive damage from crossing plant. From the evidence collated from the
desk-based assessment (ibid), the geophysical survey results (Stratascan
2009) and the trial trenching, it is suggested that these features were probably
structures. Their size, approximately 25m in length, would imply perhaps
workshops or some sort of processing area, and with the ginney running
alongside one of the structures, this would allow easy removal following
processing of the coal.

4.1.5 The channels may have been the foundation trenches for the structures,
wherein the building materials have been robbed-out and removed in a
similar manner to the building found in Trench 4. The whole area was devoid
of worked stone or brick (except for the limited amount of crushed brick
found amongst the fills of the channel features) or any material which would
suggest widespread demolition. Again, as with the building in Trench 4, it is
suggested that the structures were dismantled and the materials taken away
for use elsewhere. This would account for the distended and distorted
appearance of the foundation trenches. The shallow depth of the foundations
would also suggest that there has possibly been some truncation across the
site, leaving a layer of clinker and industrial waste, remnants of the colliery
activities.

4.1.6 Other discrete features that were identified on the geophysical survey but
were not seen on the ground could have been areas of clinker in the topsoil
and subsoil, as demonstrated by the putative building foundations in Trench
2.
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6. ILLUSTRATIONS

6.1 FIGURES

Figure 1: Site Location Map

Figure 2: Location of Trenches in Relation to Geophysical Survey Results

Figure 3: Plan of Trench 1 and north-facing section

Figure 4: Plan of Trench 2 and sections

Figure 5: Plan of Trench 3

Figure 6: Plan of Trench 4 and south-facing section 104 through building 100

Figure 7: Plan of Trench 5

6.2 PLATES

Plate 1: View of ginney 126 in Trench 2 prior to excavation

Plate 2: Culvert 101 in Trench 3 shown truncating the ginney

Plate 3: Section through the crushed brick, lime mortar flooring and underlying levelling layers and subsoils, 107-111, evidence of the structure in Trench 4

Plate 4: View of Trench 1, showing the north-west/south-east aligned culvert
Figure 5: Plan of Trench 3
Plate 1: View of ginney 126 in Trench 2 prior to excavation

Plate 2: Culvert 101 in Trench 3 shown truncating the ginney
Plate 3: Section through the crushed brick, lime mortar flooring and underlying levelling layers and subsoils, 107-111, evidence of the structure in Trench 4

Plate 4: View of Trench 1, showing the north-west/south-east aligned culvert
APPENDIX 1: PROJECT DESIGN

1. INTRODUCTION

1.1 PROJECT BACKGROUND

1.1.1 Bovis Lend Lease (hereafter the ‘client’) has requested that Oxford Archaeology North (OA North) submit proposals to undertake an archaeological evaluation of a school site located to the south-west of the town centre of Burnley, Lancashire. The site is currently the Blessed Trinity RC College (former St Hilda’s Girls’ School), on Coal Clough Lane (NGR SD 8243 3148), which is proposed for replacement as Hameldon Community College as part of Phase 3 of the Building Schools for the Future (BSF). The site will be redeveloped to provide a college building, together with sports facilities.

1.1.2 A desk-based assessment was undertaken in July 2008 to inform a Heritage Statement (OA North 2008), for the purposes of the planning application. Research identified 11 sites of archaeological potential within the study area, two of which were within the proposed development area, Cherry Fold Colliery and associated tramway (Sites 01 and 07). In the sixteenth and seventeenth centuries, coal mining was a growing industry in the area, although most mines were shafts rather than drift mines. Cartographic evidence showed Cherry Fold Colliery (Site 01) was situated within the centre of the proposed development site, and established probably in the early nineteenth century. It was joined to Habergham Colliery to the west and Bareclay Colliery to the north via a tramway (Site 07), which eventually led to the Leeds Liverpool Canal beyond Bareclay Pit; the coal was transported by steam-powered and horse-drawn lorries before about 1870, but after this it was transported by chain haulage. Most of the pits in the area made use of this system of haulage, known as the chain ginney, which was generally driven by an horizontal engine for which the steam was raised on a bank of three Lancashire Boilers situated at the bottom of the shaft. It would seem that no records survive of the Cherry Fold Pit (Site 01) and any physical above ground evidence for the pit is limited.

1.1.3 During the 1840s, however, the coal industry appears to have undergone considerable change in Burnley with some of the existing small pits being closed, such as Cherry Fold and Habergham in 1848 (Sites 01 and 10), with new larger collieries being established. Amongst the latter were Bank House Colliery, Fulledge Colliery, and Whittlefield Colliery, all of which were in operation by 1848. Like Cherry Fold (Sites 01 and 07), Fulledge was linked by a tramway to the Leeds and Liverpool Canal and another tramway was associated with a pit south of Parker Lane, but otherwise little use was made of tramways to transport coal around Burnley at this time. By 1882, however, tramways were far more widely used, and by 1889 a system of tramways linked up collieries at Whittlefield, Clifton, Bank Hall, Rowley, Boggart Bridge and Towneley.

1.1.4 In 1930, during the levelling and draining of Cherryfold playing fields, evidence of the existence of the pit at Cherry Fold was uncovered. The shaft was said to be in a ‘excellent state of preservation’ and was sealed up again. It was 75 feet deep and filled to within 15 feet of the top with water and was constructed from course rubble. The shaft was not filled as it was not on building land. It was simply made safe and work was carried out to prevent ‘corrosion’. The shaft was covered with girders supporting wrought iron plates, which were installed some 55 years previously when a local farmers’ cow fell into the shaft. Cherry Fold Pit was evidently quite forgotten until its discovery in 1930. The current state of the shaft is unknown, but must presumably still be in situ and is known to be situated beneath the tennis courts of the school.

1.1.5 Planning permission has been granted with a condition to undertake an evaluation, consisting of an archaeological geophysical survey and subsequent targeted trial trenching. This will provide information on the nature, extent and survival of any below-ground remains in order that a suitable mitigation strategy can be arranged, should it be necessary.
1.1.6 The following proposals have been prepared following consultation with Doug Moir of the Lancashire County Archaeology Service (LCAS), which was informed by the preliminary geophysical survey results. Areas of archaeological potential have been highlighted in the centre and south side of the existing playing field.

1.1.7 The proposed methodology is concerned only with the stage of trial trenching.

1.2 OXFORD ARCHAEOLOGY

1.2.1 Oxford Archaeology (OA), which is an educational charity under the guidance of a board of trustees, has over 30 years of experience in professional archaeology, and can provide a professional and cost-effective service. We are the largest employer of archaeologists in the country, and can thus deploy considerable resources with extensive experience to deal with any archaeological obligations. In the UK, we have offices in Lancaster, Oxford and Cambridge, trading as Oxford Archaeology North (OA North), Oxford Archaeology (OA South), and Oxford Archaeology East (OA East) respectively, enabling us to provide a truly nationwide service. OA is an Institute of Archaeologists Registered Organisation (No 17). All work on the project will be undertaken in accordance with relevant professional standards.

2. OBJECTIVES

2.1 The following programme has been designed to investigate and evaluate areas of archaeological potential identified from the geophysical survey (Stratascan forthcoming). The fieldwork will be carried out in line with current IfA guidelines and in line with the IfA Code of Conduct. It will be conducted within the general parameters defined by PPG16 ‘Archaeology and Planning’ and current English Heritage guidelines.

2.2 Archaeological Trial Trenching: to undertake a programme of archaeological trenching to determine the quality, extent and importance of any archaeological remains on the site (in accordance with IFA standards (1999b)). The total area of trenching is 220 square metres.

2.3 Report Production: following completion of the fieldwork, a report will be produced for the client within eight weeks, unless a report submission deadline is agreed with the client at the time of commission. An archive will be produced to English Heritage guidelines (1991).

3. HEALTH AND SAFETY

3.1 RISK ASSESSMENT

3.1.1 OA North provides a Health and Safety Statement for all projects and maintains a Unit Safety policy. All site procedures are in accordance with the guidance set out in the Health and Safety Manual compiled by the Standing Conference of Archaeological Unit Managers (1997). OA North will liaise with the client to ensure all health and safety regulations are met. A detailed risk assessment will be completed in advance of any on-site works, with continuous monitoring and updating during the fieldwork. This can be supplied to all interested parties on request.

3.1.2 All open archaeological sites, especially in the event of deep excavations, will be inspected by the Site Director or other appointed and competent person. These inspection records will be signed and dated, and form part of the on-site Health and Safety folder, which will always be available to all interested parties on request.

3.2 STAFF ISSUES

3.2.1 All project staff will be CSCS qualified, proof of which can be provided in the form of CSCS cards.

3.2.2 All project staff will wear full basic PPE whilst on site.
3.2.3 A portable toilet with hand washing facilities is required and can be provided and located on or adjacent to the site, unless the client would prefer to arrange alternative facilities. Therefore, the cost has been provided as a contingency item.

3.3 SERVICES

3.3.1 Full regard will, of course, be given to all constraints (services etc) during the excavation as well as to all Health and Safety considerations. It is assumed that the client has full information as to the location of services. Any information regarding services, i.e. drawings or knowledge of live cables or services, within the proposed trenching areas and held with the client should be made known to the OA North project manager prior to the commencement of the trenching.

3.4 CONTAMINATION

3.4.1 Any known contamination issues or any specific health and safety requirements on site should be made known to OA North by the client to ensure all procedures can be met, and that the risk is dealt with appropriately.

3.4.2 Should any presently unknown contamination be discovered during excavation, it may be necessary to halt the works and reassess the risk assessment. Should it be necessary to supply additional PPE or other contamination avoidance equipment this will be costed as a variation.

3.5 FENCING REQUIREMENTS

3.5.1 The excavation trenches and any areas of archaeological sensitivity will be protected with barrier tape whilst open, and any appropriate signage. Where possible, the trenches will be opened and then backfilled for purposes of site security and health and safety reasons, once archaeological recording has been completed. Any other requirements for fencing at the client’s request (e.g. Heras-type security fencing) will be charged as a variation.

4. METHOD STATEMENT

4.1 ARCHAEOLOGICAL TRENCHING

4.1.1 The programme of trial trenching will target features identified from the results from the geophysical survey (Stratascan forthcoming), of which preliminary results have been issued, and establish the presence or absence of any archaeological deposits. The trial trenches will examine the date, nature, depth and quality of preservation of the remains, and establish the requirements for any further mitigation work.

4.1.2 Trenches: five trenches will target features identified in the geophysical survey results as being of archaeological potential, together with the information from the previous desk-based assessment (OA North 2008). This has also been discussed in consultation with LCAS.

4.1.3 Figure A shows the general areas abstracted from the survey results as being of archaeological potential. The trenches are positioned to examine these areas. Trenches 1, 3, and 5 will investigate the linear anomalies seen in both sets of survey data (i.e. magnetometry and resistivity), which may be related to the ginney known from the map regression analysis (ibid). Trench 5 will also investigate the row of four possible archaeological pits. Trenches 2 and 4 will look at the evidence for structural remains that may be associated with the early 19th century coal pit, and some features identified of possible archaeological potential but unknown origin will also be investigated by Trenches 4 and 3.

4.1.4 Trenches will be located by use of GPS equipment which is accurate to +/- 0.25m, or using an EDM Total Station, based on a site grid related to the national grid obtained from any available client base mapping. Altitude information will be established with respect to Ordnance Survey Datum.
4.1.5 **Methodology:** Topsoil and modern overburden will be removed by machine (fitted with a toothless ditching bucket) under archaeological supervision to the surface of the first significant archaeological deposit. This deposit will be cleaned by hand, using either hoes, shovel scraping, and/or trowels depending on the subsoil conditions, and inspected for archaeological features. All features of archaeological interest will be investigated and recorded unless otherwise agreed by LCAS.

4.1.6 All trenches will be excavated in a stratigraphical manner, whether by machine or by hand. They will not be excavated deeper than 1.2m to accommodate health and safety constraints, without shoring or stepping out of the trench sides. Should this be required, this may be costed as a variation should an additional time on site be necessary.

4.1.7 Any investigation of intact archaeological deposits will be exclusively manual. Selected pits and postholes will normally only be half-sectioned, linear features will be subject to no more than a 10% sample, and extensive layers will, where possible, be sampled by partial rather than complete removal. It is hoped that in terms of the vertical stratigraphy, maximum information retrieval will be achieved through the examination of sections of cut features. All excavation, whether by machine or by hand, will be undertaken with a view to avoiding damage to any archaeological features, which appear worthy of preservation *in situ*.

4.1.8 All information identified in the course of the site works will be recorded stratigraphically, using a system, adapted from that used by Centre for Archaeology Service of English Heritage, with sufficient pictorial record (plans, sections, colour slides and monochrome contacts) to identify and illustrate individual features. Primary records will be available for inspection at all times.

4.1.9 Results of all field investigations will be recorded on *pro forma* context sheets. The site archive will include both a photographic record and accurate large scale plans and sections at an appropriate scale (1:50, 1:20 and 1:10). All artefacts and ecofacts will be recorded using the same system, and will be handled and stored according to standard practice (following current Institute of Field Archaeologists guidelines) in order to minimise deterioration.

4.1.10 **Environmental Sampling:** Environmental samples (bulk samples of 40 litres volume, to be sub-sampled at a later stage) will be collected from stratified undisturbed deposits and will particularly target negative features (gullies, pits and ditches). An assessment of the environmental potential of the site will be undertaken through the examination of suitable deposits by the in-house palaeoecological specialist, who will examine the potential for further analysis. The assessment would include soil pollen analysis and the retrieval of charred plant macrofossils and land molluscs from former dry-land palaeosols and cut features. In addition, the samples would be assessed for plant macrofossils, insect, molluscs and pollen from waterlogged deposits. This will be carried out in accordance with English Heritage Guidelines (2001) The costs for the palaeoecological assessment are defined as a contingency and will only be called into effect if good deposits are identified and will be subject to the agreement of LCAS and the client.

4.1.11 Advice will also be sought as to whether a soil micromorphological study or any other analytical techniques will enhance the understanding of the site formation processes, including the amount of truncation to buried deposits and the preservation of deposits within negative features. Should this be required the costs for analysis will need to be agreed as a variation.

4.1.12 **Faunal remains:** If there is found to be the potential for discovery of bones of fish and small mammals a sieving programme will be carried out. These will be assessed as appropriate by OA North’s specialist in faunal remains, and subject to the results, there may be a requirement for more detailed analysis. A contingency has been included for the assessment of such faunal remains for analysis.

4.1.13 **Human Remains:** Any human remains uncovered will be left *in situ*, covered and protected. No further investigation will continue beyond that required to establish the date and character of the burial. LCAS, the Environmental Health Officer and the local Coroner will be
informed immediately. If removal is essential the exhumation of any funerary remains will require the provision of a Home Office license, under section 25 of the Burial Act of 1857. An application will be made by OA North for the study area on discovery of any such remains and the removal will be carried out with due care and sensitivity under the environmental health regulations. Any delays caused by unforeseen and complex excavation of inhumations may be subject to a variation to the cost of the contract and will be agreed with the client.

4.1.14 **Treatment of finds:** all finds will be exposed, lifted, cleaned, conserved, marked, bagged and boxed in accordance with the United Kingdom Institute for Conservation (UKIC) *First Aid For Finds*, 1998 (new edition) and the recipient museum's guidelines, in this case the Museum of Lancashire.

4.1.15 All identified finds and artefacts will be retained, although certain classes of building material can sometimes be discarded after recording if an appropriate sample is retained on advice from the recipient museum’s archive curator.

4.1.16 **Treasure:** any gold and silver artefacts recovered during the course of the excavation will be removed to a safe place and reported to the local Coroner according to the procedures relating to the Treasure Act, 1996. Where removal cannot take place on the same working day as discovery, suitable security will be employed to protect the finds from theft.

4.1.17 **Contingency plan:** a contingency costing may also be employed for unseen delays caused by prolonged periods of bad weather, vandalism, discovery of unforeseen complex deposits and/or artefacts which require specialist removal, use of shoring to excavate important features close to the excavation sections etc. This has been included in the Costings document and would be in agreement with the client.

4.1.18 The evaluation will provide a predictive model of surviving archaeological remains detailing zones of relative importance against known development proposals. An impact assessment will also be provided.

5. REPORT AND ARCHIVE

5.1 REPORT

5.1.1 An interim statement will be produced within approximately two weeks of the completion of the fieldwork. For the final report, one bound copy of a written synthetic report will be submitted to the client, together with a pdf version on CD, and a pdf version of the report will also be forwarded to the Lancashire HER and LCAS, within eight weeks of completion of the completion of the survey fieldwork, unless an alternative deadline is agreed with the client beforehand. It will present, summarise, and interpret the results of the programme detailed above in order to come to as full an understanding as possible of the archaeology of the development area. The report will include;

- a site location plan related to the national grid
- a front cover to include the NGR
- a concise, non-technical summary of the results
- the circumstances of the project and the dates on which the fieldwork was undertaken
- description of the methodology, including the sources consulted
- description and interpretation, to include the results of any specialist work undertaken, including the geophysical survey
- appropriate plans showing the location and position of features or sites located
• photographs as appropriate
• a copy of this project design, and indications of any agreed departure from that design
• the report will also include a complete bibliography of sources from which data has been derived, and a list of any further sources identified but not consulted

5.1.2 **Confidentiality:** all internal reports to the client are designed as documents for the specific use of the client, for the particular purpose as defined in the project brief and project design, and should be treated as such. They are not suitable for publication as academic documents or otherwise without amendment or revision.

5.2 **ARCHIVE**

5.2.1 The results of all archaeological work carried out will form the basis for a full archive to professional standards, in accordance with Appendix 3 of English Heritage guidelines (1991). This archive will be provided in the English Heritage Centre for Archaeology format and a synthesis will be submitted to the HER (the index to the archive and a copy of the report). OA North practice is to deposit the original record archive of projects (paper, magnetic and plastic media) with the County Record Office, Preston, and the material archive will be submitted to an appropriate museum, which is likely to be the Museum of Lancashire.

6. OTHER MATTERS

6.1 **PROJECT MONITORING**

6.1.1 Whilst the work is undertaken for the client, monitoring of the archaeological investigations will be undertaken by LCAS on behalf of the local planning authority who will be afforded access to the site at all times.

6.1.2 OA North will ensure that any significant results are brought to the attention of the client and LCAS as soon as is practically possible.

6.2 **SPOIL AND REINSTATEMENT**

6.2.1 The removed spoil will be stored adjacent to the trench, with the spoil separated into topsoil and subsoil. It is understood that there will be no requirement for reinstatement of the ground beyond backfilling. The ground will be backfilled so that the topsoil is laid on the top, and the ground will be roughly graded with the machine.

6.3 **SITE WELFARE**

6.3.1 Health and safety regulations require access to adequate handwashing facilities to be provided for the duration of the fieldwork. OA North has provided contingency costs for a cabin and toilet, which can be implemented on agreement from the client, unless the client wishes to arrange these.

6.4 **INSURANCE**

6.4.1 OA North has professional indemnity to a value of £2,000,000, employer’s liability cover to a value of £10,000,000 and public liability to a value of £15,000,000. Written details of insurance cover can be provided if required.

7. PROGRAMME AND STAFFING

7.1 **PROGRAMME**

7.1.1 **Archaeological Trial Trenching:** approximately seven days will be required for the site work. This will commence on Monday 16 March 2009.
7.1.2 **Report and Archive:** the report and archive will be produced following the completion of all the fieldwork. An interim statement can be provided within approximately two weeks following completion of the site work and the final report will be available within eight weeks of completion of the fieldwork. The archive will be deposited within six months.

7.2 **STAFFING**

7.2.1 The project will be under the direct management of Emily Mercer BA (Hons) MSc AIFA (OA North Senior Project Manager) to whom all correspondence should be addressed.

7.2.2 The evaluation will be supervised by an OA North project officer or experienced in this type of project. Due to scheduling requirements it is not possible to provide these details at the present time. All OA North project officers are experienced field archaeologists capable of carrying out projects of all sizes.

7.2.3 Christine Howard-Davis, BA, MIFA (OA North finds manager) has extensive knowledge of all categories of artefacts of all periods. The assessment and subsequent analysis of all artefacts recovered during the course of the investigation will be undertaken by or under the auspices of Christine.

7.2.4 Any requirement for conservation work will be undertaken by Jennifer Jones, the AML contract conservator based at the University of Durham. Jennifer is a nationally-recognised specialist in conservation, and is readily available to provide advice on the treatment of any delicate finds recovered from the excavation.

7.2.5 Environmental management will be undertaken by Elizabeth Huckerby BA, MSc (OA North environmental manager), who will also provide specialist input on pollen analysis/charred and waterlogged plant remains. Elizabeth has extensive knowledge of the palaeoecology of the North, and has contributed to all of the English Heritage funded volumes of the Wetlands of the North West. Elizabeth has also acted as palaeoenvironmental consultant for several archaeological investigations. Elizabeth will advise on site sampling procedures and co-ordinate the processing of samples and organise internal and external specialist input as required.

7.2.6 Andrew Bates BSc, MSc (OA North project officer) has considerable experience in commercial archaeology as both an archaeozoologist and field archaeologist throughout Britain. As an in-house archaeozoologist, he has been involved in the examination and stabilisation of animal bones both during the post-exavation process and as an on-site specialist.

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## APPENDIX 2: CONTEXT LIST

<table>
<thead>
<tr>
<th>Context</th>
<th>Trench</th>
<th>Description</th>
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<tbody>
<tr>
<td>100</td>
<td>4</td>
<td>Group: Floor of building (comprising 107, 108, 109, 110 and 111)</td>
</tr>
<tr>
<td>101</td>
<td>3</td>
<td>Yellow sandstone culvert, aligned north/south</td>
</tr>
<tr>
<td>102</td>
<td>5</td>
<td>Stone culvert, aligned north/south</td>
</tr>
<tr>
<td>103</td>
<td>3</td>
<td>Cut for culvert 101</td>
</tr>
<tr>
<td>104</td>
<td>3</td>
<td>Dark brownish-grey silty-clay fill of 103</td>
</tr>
<tr>
<td>105</td>
<td>3</td>
<td>Topsoil</td>
</tr>
<tr>
<td>106</td>
<td>3</td>
<td>Subsoil</td>
</tr>
<tr>
<td>107</td>
<td>4</td>
<td>Dark reddish-orange layer, mainly consisting of crushed brick</td>
</tr>
<tr>
<td>108</td>
<td>4</td>
<td>Light greyish-yellow layer of lime mortar</td>
</tr>
<tr>
<td>109</td>
<td>4</td>
<td>Dark blackish-brown silt layer</td>
</tr>
<tr>
<td>110</td>
<td>4</td>
<td>Mid reddish-grey silty-clay layer</td>
</tr>
<tr>
<td>111</td>
<td>4</td>
<td>Light yellowish-grey silty-clay layer</td>
</tr>
<tr>
<td>112</td>
<td>5</td>
<td>Cut for stone culvert 102</td>
</tr>
<tr>
<td>113</td>
<td>5</td>
<td>Mid orangey-brown sandy-clay fill of 115</td>
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<tr>
<td>114</td>
<td>5</td>
<td>Sandstone culvert, aligned north/south</td>
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<td>Stone culvert, aligned north/south</td>
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<td>Cut for culvert 123</td>
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<td>125</td>
<td>2</td>
<td>Fill of 124</td>
</tr>
<tr>
<td>ID</td>
<td>Type</td>
<td>Description</td>
</tr>
<tr>
<td>-----</td>
<td>-----------------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>126</td>
<td>Group</td>
<td>ginney remains (comprising 133, 139, 140, 141, 142, 143, 146, 147)</td>
</tr>
<tr>
<td>127</td>
<td>Stone culvert</td>
<td>aligned north-west/south-east</td>
</tr>
<tr>
<td>128</td>
<td>Cut for culvert</td>
<td></td>
</tr>
<tr>
<td>129</td>
<td>Topsoil</td>
<td></td>
</tr>
<tr>
<td>130</td>
<td>Subsoil</td>
<td></td>
</tr>
<tr>
<td>131</td>
<td>Natural boulder clay</td>
<td></td>
</tr>
<tr>
<td>132</td>
<td>Black indurated silty-grit</td>
<td>fill of linear 133</td>
</tr>
<tr>
<td>133</td>
<td>Cut of north/south aligned</td>
<td>linear, part of ginney remains 126</td>
</tr>
<tr>
<td>134</td>
<td>Redeposed natural layer</td>
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</tr>
<tr>
<td>135</td>
<td>Black weakly-cemented silty-grit fill of linear 138</td>
<td></td>
</tr>
<tr>
<td>136</td>
<td>Dark greyish-yellow plastic silt clay fill of linear 138</td>
<td></td>
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<td>137</td>
<td>Mid orangey-grey silt clay fill of linear 138</td>
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<td>138</td>
<td>Cut of linear truncating ginney remains 126</td>
<td></td>
</tr>
<tr>
<td>139</td>
<td>Coal and grit layer</td>
<td>part of ginney remains 126</td>
</tr>
<tr>
<td>140</td>
<td>Lens of redeposited natural</td>
<td>part of ginney remains 126</td>
</tr>
<tr>
<td>141</td>
<td>Silty-grit layer</td>
<td>part of ginney remains 126</td>
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<tr>
<td>142</td>
<td>Black weakly-cemented silt</td>
<td>grunt fill of linear 143</td>
</tr>
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<td>143</td>
<td>Cut of linear, aligned north/south, part of ginney remains 126</td>
<td></td>
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<tr>
<td>144</td>
<td>Bluish-black silt clay</td>
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<td>Linear feature</td>
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<td>Dark brownish-grey silt</td>
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<td>Cut of linear feature</td>
<td>aligned north/south, part of ginney remains 126</td>
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<td>148</td>
<td>Backfill around culvert</td>
<td>128</td>
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<td>149</td>
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<td>150</td>
<td>Subsoil</td>
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<td>151</td>
<td>Bluish-black silt clay</td>
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<td>Cut of linear feature</td>
<td>part of ginney remains</td>
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<tr>
<td>153</td>
<td>Natural boulder clay</td>
<td></td>
</tr>
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<td>---</td>
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<tr>
<td>154</td>
<td>3</td>
<td>Natural boulder clay</td>
</tr>
<tr>
<td>155</td>
<td>2</td>
<td>Redeposited natural</td>
</tr>
<tr>
<td>156</td>
<td>2</td>
<td>Gravel and clinker layer</td>
</tr>
<tr>
<td>157</td>
<td>WB</td>
<td>Layer of slag</td>
</tr>
<tr>
<td>158</td>
<td>1</td>
<td>Mid brownish-grey silty-grit fill of 159</td>
</tr>
<tr>
<td>159</td>
<td>1</td>
<td>Cut of shallow linear/pit</td>
</tr>
<tr>
<td>160</td>
<td>WB</td>
<td>Cut of channel</td>
</tr>
<tr>
<td>161</td>
<td>WB</td>
<td>Fill of 160, consists of mainly clinker</td>
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</table>
APPENDIX 3: GEOPHYSICAL SURVEY REPORT
Geophysical Survey Report

Hameldon Community College, Burnley

Oxford Archaeology North

March 2009

Job Ref: J2580

Richard Smalley BA (Hons) AIFA
Document Title: Geophysical Survey Report
Hameldon Community College, Burnley

Client: Oxford Archaeology North

Stratascan Job No: J2580

Techniques: Detailed gradiometry and resistance

National Grid Ref: SD 824 316

Field Team: Bryony Marsh MA and Allen Wright

Project Manager: Simon Stowe BSc. (Hons)

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Checked by: Peter Barker C.Eng MICE MCIWEM MIFA
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1 SUMMARY OF RESULTS

The geophysical survey undertaken over 3 hectares of sports field at Blessed Trinity Roman Catholic College, Burnley has identified a number of anomalies that are likely to relate to the ginney and other structures related to the former colliery. The levelling and drainage of the site undertaken in the 1930s is also evident within the survey data.

2 INTRODUCTION

2.1 Background synopsis

Stratascan were commissioned to undertake a geophysical survey of an area outlined for development as the Hameldon Community College. This survey forms part of an archaeological investigation being undertaken by Oxford Archaeology North.

2.2 Site location

The site is located at Blessed Trinity Roman Catholic College, Burnley, Lancashire at OS NGR ref. SD 824 316.

2.3 Description of site

The site consists of 3ha of flat land currently used as a sports field.

The underlying geology is Lower Westphalian (British Geological Survey South Sheet, Fourth Edition Solid, 2001). The drift geology is Boulder Clay and Morainic Drift (British Geological Survey South Sheet, First Edition Quaternary, 1977). The overlying soils are Brickfield 3 which are typical Cambic stagnogley soils. These consist of slowly permeable seasonally waterlogged fine loamy, fine loamy over clayey and clayey soils (Soil Survey of England and Wales, Sheet 3 Midland and Western England).

2.4 Site history and archaeological potential

The survey area covers part of the site of Cherry Fold Colliery which was established in the early nineteenth century and joined to Habergham Colliery to the west and Bareclay Colliery to the north via a ginney (tramway) which eventually led to the Leeds Liverpool Canal. Changes in the coal industry led to the closure of Cherry Fold and Habergham collieries.

The survey area was levelled and drained in 1930, during which time the pit at Cherry Fold was uncovered. The shaft was in an excellent state of preservation. It measured 75 feet deep, was filled to within 15 feet of the top with water and constructed from course rubble. This shaft is now located beneath the college tennis courts.

2.5 Survey objectives

The objective of the survey was to locate any anomalies that may be related to the ginney or other buildings related to the former colliery prior to trenching.
2.6 **Survey methods**

More information regarding these techniques is included in the Methodology section below.

3 **METHODOLOGY**

3.1 **Date of fieldwork**

The fieldwork was carried out over three days from 2\(^{nd}\) March 2009 when the weather was fine.

3.2 **Grid locations**

The location of the survey grids has been plotted in Figure 2 together with the referencing information. Grids were set out using a Leica Smart Rover RTK GPS.

An RTK GPS (Real-time Kinematic Global Positioning System) can locate a point on the ground to a far greater accuracy than a standard GPS unit. A standard GPS suffers from errors created by satellite orbit errors, clock errors and atmospheric interference, resulting in an accuracy of 5m-10m. An RTK system uses a single base station receiver and a number of mobile units. The base station re-broadcasts the phase of the carrier it measured, and the mobile units compare their own phase measurements with those they received from the base station. A SmartNet RTK GPS uses Ordnance Survey’s network of over 100 fixed base stations to give an accuracy of around 0.01m.

3.3 **Description of techniques and equipment configurations**

*Gradiometer*

Although the changes in the magnetic field resulting from differing features in the soil are usually weak, changes as small as 0.2 nanoTesla (nT) in an overall field strength of 48,000nT, can be accurately detected using an appropriate instrument.

The mapping of the anomaly in a systematic manner will allow an estimate of the type of material present beneath the surface. Strong magnetic anomalies will be generated by buried iron-based objects or by kilns or hearths. More subtle anomalies such as pits and ditches can be seen if they contain more humic material which is normally rich in magnetic iron oxides when compared with the subsoil.

To illustrate this point, the cutting and subsequent silting or backfilling of a ditch may result in a larger volume of weakly magnetic material being accumulated in the trench compared to the undisturbed subsoil. A weak magnetic anomaly should therefore appear in plan along the line of the ditch.
The magnetic survey was carried out using a dual sensor Grad601-2 Magnetic Gradiometer manufactured by Bartington Instruments Ltd. The instrument consists of two fluxgates very accurately aligned to nullify the effects of the Earth's magnetic field. Readings relate to the difference in localised magnetic anomalies compared with the general magnetic background. The Grad601-2 consists of two high stability fluxgate gradiometers suspended on a single frame. Each gradiometer has a 1m separation between the sensing elements so enhancing the response to weak anomalies.

**Resistivity**

This method relies on the relative inability of soils (and objects within the soil) to conduct an electrical current which is passed through them. As resistivity is linked to moisture content, and therefore porosity, hard dense features such as rock will give a relatively high resistivity response, while features such as a ditch which retains moisture give a relatively low response.

The resistance meter used was an RM15 manufactured by Geoscan Research incorporating a mobile Twin Probe Array. The Twin Probes are separated by 0.5m and the associated remote probes were positioned approximately 15m outside the grid. The instrument uses an automatic data logger which permits the data to be recorded as the survey progresses for later downloading to a computer for processing and presentation.

The resistance meter was used in conjunction with an MPX15 multiplexer to allow two adjacent readings to be taken at each instrument position.

Though the values being logged are actually resistances in ohms they are directly proportional to resistivity (ohm-metres) as the same probe configuration was used through-out.

### 3.4 Sampling interval, depth of scan, resolution and data capture

#### 3.4.1 Sampling interval

**Gradiometer**

Readings were taken at 0.25m centres along traverses 1m apart. This equates to 3600 sampling points in a full 30m x 30m grid. All traverses were surveyed in a “zigzag” mode.

**Resistivity**

Readings were taken at 1.0m centres along traverses 1.0m apart. This equates to 900 sampling points in a full 30m x 30 grid. All traverses were surveyed in a “zigzag” mode.

#### 3.4.2 Depth of scan and resolution

**Gradiometer**

The Grad 601 has a typical depth of penetration of 0.5m to 1.0m. This would be increased if strongly magnetic objects have been buried in the site. The collection of data at 0.5m centres provides an optimum methodology for the task balancing cost and time with resolution.
Resistivity
The 0.5m probe spacing of a twin probe array has a typical depth of penetration of 0.5m to 1.0m. The collection of data at 1m centres with 0.5m probe spacing provides an optimum resolution for the task.

3.4.3 Data capture

Gradiometer
The readings are logged consecutively into the data logger which in turn is daily downloaded into a portable computer whilst on site. At the end of each job, data is transferred to the office for processing and presentation.

Resistivity
The readings are logged consecutively into the data logger which in turn is daily downloaded into a portable computer whilst on site. At the end of each job, data is transferred to the office for processing and presentation.

3.5 Processing, presentation of results and interpretation

3.5.1 Processing

Gradiometer
Processing is performed using specialist software known as Geoplot 3. This can emphasise various aspects contained within the data but which are often not easily seen in the raw data. Basic processing of the magnetic data involves 'flattening' the background levels with respect to adjacent traverses and adjacent grids.

The following schedule shows the basic processing carried out on all processed magnetometer data used in this report:

1. Despike (useful for display and allows further processing functions to be carried out more effectively by removing extreme data values)

   Geoplot parameters:
   X radius = 1, y radius = 1, threshold = 3 std. dev.
   Spike replacement = mean

2. Zero mean traverse (sets the background mean of each traverse within a grid to zero and is useful for removing striping effects)

   Geoplot parameters:
   Least mean square fit = off
Resistivity
The processing was carried out using specialist software known as *Geoplot 3* and involved the 'despiking' of high contact resistance readings and the passing of the data though a high pass filter. This has the effect of removing the larger variations in the data often associated with geological features. The nett effect is aimed at enhancing the archaeological or man-made anomalies contained in the data.

The following schedule shows the processing carried out on the processed resistance plots.

<table>
<thead>
<tr>
<th>Processing Method</th>
<th>X radius</th>
<th>Y radius</th>
<th>Weighting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Despike</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Spike replacement</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High pass filter</td>
<td>10</td>
<td>10</td>
<td>Gaussian</td>
</tr>
</tbody>
</table>

3.5.2 Presentation of results and interpretation

Gradiometer
The presentation of the data for the survey involves a print-out of the raw data both as grey scale (Figure 3) and trace plots (Figures 4 and 5), together with a grey scale plot of the processed data (Figure 6) and the abstraction and interpretation of magnetic anomalies (Figure 7).

Resistivity
The presentation of the data for the site involves a print-out of the raw data as a grey scale plot (Figure 8), together with a grey scale plot of the processed data (Figure 9). Anomalies have been identified and plotted onto the ‘Abstraction and Interpretation of Anomalies’ drawing (Figure 10).

4 RESULTS

4.1 Gradiometry

Numbers in bold relate to ‘Anomaly ID’ on Figure 07

The detailed gradiometer survey has identified a number of features that may be related to the former mine works. Three linear anomalies orientated approximately north-south (1) can be seen in the southern central region of the survey area which may be related to the ginney. The western most of these features is much weaker in magnitude than the other two but its position correlates well with that of the ginney in the early maps of the area. A similar linear anomaly orientated approximately east-west (2) is evident in the central region of the site and may be related to a separate branch of the ginney.

A number of rectilinear anomalies can be noted within the survey area. A single rectilinear feature (3) can be noted in the south western limits of the site and a group of rectangular features (4) are evident in the central region. These anomalies may be related to former structures relating to the mine complex.
Positive linear and area anomalies representing cut features (5) of a possible archaeological origin such as pits and ditches have been identified within the survey area. A number of discrete positive anomalies (6) can be noted in the south eastern limits of the site. These anomalies have been interpreted as pits of a possible archaeological origin.

A series of land drains (7) can be seen in the eastern and southern limits of the survey area. Made ground (8) is also evident in the western, northern and eastern boundaries of the site. These features are possibly related to the drainage and levelling of the site which was undertaken in the 1930s.

4.2 Resistance

Letters in bold relate to ‘Anomaly ID’ on Figure 10

Two linear high resistance (A) anomalies have been identified within the resistance data. These anomalies may be related to the ginney and correlate well with features identified in the gradiometer data.

High resistance area anomalies (B) can be noted within the resistance data. These anomalies may be related to buried structural remains such as buildings from the former colliery. High resistance anomalies (C) related to land drains are evident throughout the survey area.

Three areas of low resistance (D) can be noted within the survey area. These anomalies may be related to cut features such as ditches of a possible archaeological origin. Alternatively they may be related to areas of moisture retention. A large area of low resistance (E) has been identified in the same location as the possible structural remains in the gradiometer data.

5 CONCLUSION

The geophysical survey undertaken at Hameldon Community College, Burnley has identified a number of features likely to be related to the former colliery known to be on the site.

Two high resistance anomalies correlate well with linear anomalies identified in the gradiometer data. These anomalies could well be related to the north-south orientated ginney with a further line branching off to the west.

Areas of high resistance indicate the presence of structural remains within the survey area. One of these areas in the south west of the site correlates well with structural remains identified in the gradiometer data.

A large area of low resistance identified in the centre of the site correlates with the position of possible structural remains evident in the gradiometer data. Low resistance is generally associated with cut features such as pits or ditches and not with structural remains. The fact that we have low resistance over apparent structural remains may suggest that the remains are buried at a level beyond the depth range of the resistance meter. Another possibility is that the low resistance is related to contamination plumes in this particular area of the site.
6 REFERENCES


APPENDIX A – Basic principles of magnetic survey

Detailed magnetic survey can be used to effectively define areas of past human activity by mapping spatial variation and contrast in the magnetic properties of soil, subsoil and bedrock.

Weakly magnetic iron minerals are always present within the soil and areas of enhancement relate to increases in magnetic susceptibility and permanently magnetised thermoremnant material.

Magnetic susceptibility relates to the induced magnetism of a material when in the presence of a magnetic field. This magnetism can be considered as effectively permanent as it exists within the Earth’s magnetic field. Magnetic susceptibility can become enhanced due to burning and complex biological or fermentation processes.

Thermoremnance is a permanent magnetism acquired by iron minerals that, after heating to a specific temperature known as the Curie Point, are effectively demagnetised followed by re-magnetisation by the Earth’s magnetic field on cooling. Thermoremnant archaeological features can include hearths and kilns and material such as brick and tile may be magnetised through the same process.

Silting and deliberate infilling of ditches and pits with magnetically enhanced soil creates a relative contrast against the much lower levels of magnetism within the subsoil into which the feature is cut. Systematic mapping of magnetic anomalies will produce linear and discrete areas of enhancement allowing assessment and characterisation of subsurface features. Material such as subsoil and non-magnetic bedrock used to create former earthworks and walls may be mapped as areas of lower enhancement compared to surrounding soils.

Magnetic survey is carried out using a fluxgate gradiometer which is a passive instrument consisting of two sensors mounted vertically either 0.5 or 1m apart. The instrument is carried about 30cm above the ground surface and the top sensor measures the Earth’s magnetic field whilst the lower sensor measures the same field but is also more affected by any localised buried field. The difference between the two sensors will relate to the strength of a magnetic field created by a buried feature, if no field is present the difference will be close to zero as the magnetic field measured by both sensors will be the same.

Factors affecting the magnetic survey may include soil type, local geology, previous human activity, disturbance from modern services etc.
APPENDIX B – Glossary of magnetic anomalies

Bipolar

A bipolar anomaly is one that is composed of both a positive response and a negative response. It can be made up of any number of positive responses and negative responses. For example a pipeline consisting of alternating positive and negative anomalies is said to be bipolar. See also dipolar which has only one area of each polarity. The interpretation of the anomaly will depend on the magnitude of the magnetic field strength. A weak response may be caused by a clay field drain while a strong response will probably be caused by a metallic service.

Dipolar

This consists of a single positive anomaly with an associated negative response. There should be no separation between the two polarities of response. These responses will be created by a single feature. The interpretation of the anomaly will depend on the magnitude of the magnetic measurements. A very strong anomaly is likely to be caused by a ferrous object.

Positive anomaly with associated negative response

See bipolar and dipolar.

Positive linear

A linear response which is entirely positive in polarity. These are usually related to infilled cut features where the fill material is magnetically enhanced compared to the surrounding matrix. They can be caused by ditches of an archaeological origin, but also former field boundaries, ploughing activity and some may even have a natural origin.
Positive linear anomaly with associated negative response

A positive linear anomaly which has a negative anomaly located adjacently. This will be caused by a single feature. In the example shown this is likely to be a single length of wire/cable probably relating to a modern service. Magnetically weaker responses may relate to earthwork style features and field boundaries.

Positive point/area

These are generally spatially small responses, perhaps covering just 3 or 4 reading nodes. They are entirely positive in polarity. Similar to positive linear anomalies they are generally caused by infilled cut features. These include pits of an archaeological origin, possible tree bowls or other naturally occurring depressions in the ground.

Magnetic debris

Magnetic debris consists of numerous dipolar responses spread over an area. If the amplitude of response is low (+/-3nT) then the origin is likely to represent general ground disturbance with no clear cause, it may be related to something as simple as an area of dug or mixed earth. A stronger anomaly (+/-250nT) is more indicative of a spread of ferrous debris. Moderately strong anomalies may be the result of a spread of thermoremnant material such as bricks or ash.

Magnetic disturbance

Magnetic disturbance is high amplitude and can be composed of either a bipolar anomaly, or a single polarity response. It is essentially associated with magnetic interference from modern ferrous structures such as fencing, vehicles or buildings, and as a result is commonly found around the perimeter of a site near to boundary fences.
Negative linear

A linear response which is entirely negative in polarity. These are generally caused by earthen banks where material with a lower magnetic magnitude relative the background top soil is built up. See also ploughing activity.

Negative point/area

Opposite to positive point anomalies these responses may be caused by raised areas or earthen banks. These could be of an archaeological origin or may have a natural origin.

Ploughing activity

Ploughing activity can often be visualised by a series of parallel linear anomalies. These can be of either positive polarity or negative polarity depending on site specifics. It can be difficult to distinguish between ancient ploughing and more modern ploughing, clues such as the separation of each linear, straightness, strength of response and cross cutting relationships can be used to aid this, although none of these can be guaranteed to differentiate between different phases of activity.

Polarity

Term used to describe the measurement of the magnetic response. An anomaly can have a positive polarity (values above 0nT) and/or a negative polarity (values below 0nT).

Strength of response

The amplitude of a magnetic response is an important factor in assigning an interpretation to a particular anomaly. For example a positive anomaly covering a 10m² area may have values up to around 3000nT, in which case it is likely to be caused by modern magnetic interference. However, the same size and shaped anomaly but with values up to only 4nT may have a natural origin. Trace plots are used to show the amplitude of response.
Thermoremmant response

A feature which has been subject to heat may result in it acquiring a magnetic field. This can be anything up to approximately +/-100 nT in value. These features include clay fired drains, brick, bonfires, kilns, hearths and even pottery. If the heat application has occurred insitu (e.g. a kiln) then the response is likely to be bipolar compared to if the heated objects have been disturbed and moved relative to each other, in which case they are more likely to take an irregular form and may display a debris style response (e.g. ash).

Weak background variations

Weakly magnetic wide scale variations within the data can sometimes be seen within sites. These usually have no specific structure but can often appear curvy and sinuous in form. They are likely to be the result of natural features, such as soil creep, dried up (or seasonal) streams. They can also be caused by changes in the underlying geology or soil type which may contain unpredictable distributions of magnetic minerals, and are usually apparent in several locations across a site.
Plotting parameters
+40nT

(Positive values displace above the trace line. Hidden values have not been plotted)

Client
OXFORD ARCHAEOLOGY NORTH

Project Title
GEOPHYSICAL SURVEY - HAMELDON COMMUNITY COLLEGE, BURNLEY

Subject
TRACE PLOT OF GRADIOMETER DATA SHOWING POSITIVE VALUES

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Scale
1:1000

Plot
A3

Checked by
PPB

Issue No.
01

Survey Date
MARCH 09

Drawn by
RAJS

Figure No.
04
Plotting parameters

-40nT

(Negative values displace above the trace line, hidden values have not been plotted)

Client

OXFORD ARCHAEOLOGY NORTH

Project Title

GEOPHYSICAL SURVEY - HAMELDON COMMUNITY COLLEGE, BURNLEY

Subject

TRACE PLOT OF GRADIOMETER DATA SHOWING NEGATIVE VALUES
PLOTTING PARAMETERS

Maximum +580 (black)
Minimum +330 (white)

OXFORD ARCHAEOLOGY NORTH

PROJECT TITLE: GEOGRAPHICAL SURVEY - HAMELDON COMMUNITY COLLEGE, BURNEY

SUBJECT: PLOT OF RAW RESISTANCE DATA

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Scale: 1:1000

Plot: A3
Checked by: PPB
Issue No.: 01
Survey Date: MARCH 09
Drawn by: RAJS
Figure No.: 08
Plotting parameters
- Maximum +550 (black)
- Minimum +300 (white)

Client:
OXFORD ARCHAEOLOGY NORTH

Project Title:
GEOPHYSICAL SURVEY - HAMELDON COMMUNITY COLLEGE, BURNLEY

Subject:
PLOT OF PROCESSED RESISTANCE DATA

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Survey date: MARCH 09

Figure No.: 09
Issue No.: 01