Fleam Dyke Pumping Station,
and Fulbourn - Cherry Hinton pipeline

An archaeological evaluation and watching brief

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In March 2014 an archaeological evaluation was undertaken at the Fleam Dyke (Cambridge Water) Pumping Station, near Fulbourn, Cambridge in advance of the construction of a Nitrates Reduction Scheme facility. Two 5m long trenches were dug some 12m apart within the PDA approx. 22m north-west of the main brick building. Within both of these trenches the natural chalk was encountered about a metre down, but in this no earlier archaeological features were found. In Trench 1 the edge of a modern cut with a chalk-concrete rubble fill was found (the latter associated with the construction of a recent inspection chamber some 8m to the south-east), whilst within both trenches a layer of redeposited chalk was encountered at about 30cms depth; the latter probably associated with the groundworks for the construction of the pumping station and borehole between 1912 and 1921. This horizon overlay weathered redeposited chalk which in turn rested directly upon a c.19th century or earlier plough soil that truncated the underlying bedrock as well as a number of 'ancient' tree throws and shallow solution features present in the chalk. These features were devoid of archaeological finds. Following that in May 2014 an archaeological watching brief was carried out on a new 70m long pipeline to this facility. Similarly this did not reveal any archaeology, the pipe trenches for this being cut through made-up ground. Finally, in September 2014 an archaeological watching brief was carried out on the pits dug for the laying of a 5.5 kilometre long effluent discharge pipeline from the Fleam Dyke Pumping Station to the Anglian Water foul main on Cherry Hinton Road, Cambridge. No archaeological features were revealed within the 57 testpits examined, although a buried soil with a struck flint flake was identified in one, and a number of flint scattersidentified along the route. Saxon and Postmedieval pottery was noted on the hilltop setting next to Fulbourn Windmill.

Introduction

This archaeological investigation was commissioned by Cambridge Water at the request of the Cambridgeshire County Council Historic Environment Team (CHET) (McConnell 2014) prior to the construction of a Nitrates Reduction Scheme facility at its Fleam Dyke Pumping Station, and in advance of the construction of a 5.3 kilometre long effluent discharge pipeline to the main Anglian Water foul sewer junction on Fulbourn Road, Cherry Hinton. The excavation site for the new facility (covering an area of approx.1625 sq m) was located some 22m to the north-west of the early 20th-century brick pump house (NGR TL 5394 5491), whilst the pipeline route from the Pumping Station (TL 539549) crossed the slightly higher ground of the chalk to the south of Fulbourn village (TL 517554), then along the south side of the Cambridge Road to Cherry Hinton (TL 490563). The pipeline was inserted through sub-surface drilled holes between drilling pits dug approximately 100m apart, therefore it was the pits rather than the whole pipeline route that was monitored.

Geology and topography

The underlying geology of the Pumping Station and first part of the pipeline route consists of the West Marlbury Marly Chalk of the Grey Chalk sub-group (the Lower Beds (Chalk Marl) of the Lower Chalk) from Fleam Dyke to the west of this just south of Fulbourn (BGS 2002). The route then crosses the subcrop of the Totternhoe Stone near Highfield Farm, Shelford Road (TL 512557) and above that into the Upper Beds of the Lower Chalk (*Actinocamix plenus* marls) on Mill Hill, Fulbourn. Following this the route then passes back down into the Lower Beds of the Lower Chalk (Chalk Marl) as it approaches Cherry Hinton. At several places thin spreads of sand and gravel or flint breccia were encountered at shallow depth (< 1 metre) within palaeochannels or periglacial features, some perhaps being sand and silt-filled solution features present within the upper weathered surface of the chalk.

Overall the topography of the route is downhill from Fleam Dyke Pumping Station at 29.82m AOD down to the Anglian Water foul sewer junction on Fulbourn Road, Cherry Hinton which is located at approx. 18m AOD (ground surface level). However, in between, the route crosses the Balsham Road just south of Fulbourn at about 15m AOD, the Babraham Road at 17m AOD, the Shelford Road at c.23m AOD, and the top of Mill Hill (TL 510559) at 33.89m AOD.

Archaeological background

On account of the size of area crossed by effluent discharge pipeline the archaeological background of this landscape was assessed within a kilometre radius of each of the two end points (Fleam Dyke Pumping Station and Fulbourn Road, Cherry Hinton) and a middle point (i.e. Grange Farm, Babraham Road, Fulbourn), all this data being compiled directly from the Cambridgheshire HER record given the absence of an existing desk-based assessment.

(1) Fleam Dyke Pumping Station [TL 5394 5491] sites and finds within a 1 km radius:

Neolithic-Bronze Age

The PDA lies within a landscape of known archaeological activity. Amongst the earliest sites we find within a kilometre of the pumping station is Mutlow Hill [CHER 06320], an Early Bronze Age barrow with 8-10 internments (cremations) which was near completely excavated by Richard Cornwallis Neville (Lord Braybrooke of Audley End House) in 1852. Amongst the finds from here were five faience beads, a bronze pin, burnt human bones within 'cloth bags' and urns (Neville 1852 & 1854). Nearby also were other ring ditches [CHER 09059, CHER 09061], presumably the remains of ploughed-out Bronze Age barrows, perhaps part of a group lying either side of the course of the Icknield Way. Further ring ditches have been identified to the north-west of the pumping station at Great Wilbraham [CHER 09312, CHER 10202] and also half a kilometre to the west of it towards the Balsham Road [CHER 1147]. The latter solitary barrow site is probably the one shown straddling the 25m AOD contour just 100m to the south of the pipeline route at TL 534548 (see Figure XX).

Iron Age

There are few Iron Age finds within the near vicinity, one of these being an Iron Age coin found near Mutlow Hill (CHER 06320a).

Roman

Roman finds in the form of brooches, bracelets and coins were found during the excavation of Mutlow Hill by Neville in 1852 (CHER 06320b). These objects appear to have been deposited around the Bronze Age barrow, suggesting that this may have been the focus of veneration, thus a 'Roman shrine', a fact partly suggested by the presence of a structure (Neville 1854). Roman pottery was also recovered to the north-west of the pumping station (CHER 06251), whilst Roman finds are also known from Fulbourn (CHER 09288a, CB14723, MCB16763). A section cut across Fleam Dyke in 1971 some 180m south-east of the pumping station revealed a land surface beneath it (thus pre-dating it) with some finds of iron slag, terra sigillata and other Roman ceramic, suggesting that the Early Anglo-Saxon earthwork had been aligned over the fringes of a dispersed Roman settlement (CHER 07889a). Between 1991-1993 the widening of the A11 cutting east of Mutlow Hill revealed a section through the dyke in which, once again, Roman coins were found beneath the dyke, proving the Saxon or later origins of it.

Anglo-Saxon

It is archaeological activity dating to the Saxon period that is the most significant in this area. Fleam Dyke (CHER 07889, CHER 07978, CHER 05294) is an Early Anglo-Saxon defensive dyke which lies immediately adjacent and to the north-east of the PDA (within 110-120m of the proposed evaluation trenches). Saxon inhumations have been found in the ditch, for instance near Great Wilbraham (06376), whilst a shield boss and spears said to be associated with skeletons were found when the vallum was levelled near Mutlow Hill. The visible earthworks of Fleam Dyke extend for over 3.5 miles between Fulbourn and Balsham, this being interpreted as a ditch/ bank arrangement, with the ditch being on the north-east side, it is believed to prevent access to Norfolk from the south-west. As C.E. Fox noted, the dyke is located at the junction between the fen and the wooded chalk country to the north-east. Sections were cut across the dyke at the Fulbourn/ Great Wilbraham end (Sections I-IV) in 1921-22. This revealed a main trench with a flat floor some 4-6 feet below the silt,

with the counterscarp slope being steeper than the scarp. In places a secondary trench was also identified upon the scarp slope, this being 'V' or 'U' shaped. In 1971 a section was cut across the dyke 180m south-east of the pumping station, close to the crossing point of the dismantled railway (07889a), whilst at the same time trenches were cut through the dyke by the Cambridge Water Board much closer to the site of the pumping station (CHER 07978). Here the bank was shown to have been made up of chalk nodules and brown clay (Browne *et al.* 1973). Excavations in 1991 interpreted the dyke as being part of a phased construction, Phase 1 being Early Anglo-Saxon and dating to the 5th- 6th centuries AD on the basis of radiocarbon dates from an excavated ox pelvis. The second phase ditch was also Saxon, but was larger (approx. 10m wide and 3m deep) (Malim 1996). Within the vicinity of the dyke near Fulbourn came the find of an Anglo-Saxon brooch (MCB 17745).

Medieval

A deserted medieval settlement (DMV) has been identified to the south of the PDA (CHER 08071), whilst medieval ridge and furrow and a headland can be recognised to the south-east of the dyke just to the west of Mutlow Hill. Mutlow (*Mut* = meet) is located at the meeting point of three Early Medieval hundreds, and in popular local tradition was thought of as a place of 'assembly'(CHER 06320)

Postmedieval – Modern

Fleam Dyke Pumping Station and borehole (CHER 06273) were constructed between 1912 and 1921, and although the machinery within the brick pump hall ceased working in 1976, it has since been removed and preserved.

(2) Grange Farm (Babraham Road), Fulbourn [TL 517 554] sites and finds within a 1 km radius:

Neolithic-Bronze Age

Approximately 100m to the north of the windmill (and pipeline route) on Mill Hill, Fulbourn (at TL 510561) cropmarks indicating the presence a series of nested square or rectangular enclosures plus a single ring ditch of unknown date (but possibly Bronze Age) were picked up during an air photo assessment of the land around the Ida Darwin Hospital (R.Palmer 2012 [CHER 09306]. Also, amongst the multi-period finds collected from fieldwalking undertaken by the Fulbourn Village History Society in 2002-2003 near Fulbourn Manor (TL 524563) were a number of pieces of burnt stone, burnt flint, some struck flint flakes plus a Neolithic handaxe [MCB17650]. A Late Bronze Age socketed axe (fragment) was found whilst metal detecting in the fields just south of the Shelford Road [MCB 16787], and moderately close to the current pipeline route.

Iron Age

During the course of archaeological excavation work carried out at the Chantry, Fulbourn (TL 520563) in 2005 by the Cambridgeshire CC Field Unit (Bailey & Spoerry 2005) three Iron Age pits were found [MCB 17229]. Approximately 100m to the north of the windmill (and pipeline route) on Mill Hill, Fulbourn (at TL 510561)

the above-mentioned cropmarks include a series of nested square or rectangular enclosures, some of which may be Iron Age.

Roman

Two Roman pits, one containing the base of a Romano-British cup or jar and a piece of Roman window glass and the other some domestic refuse were excavated during archaeological investigations at The Chantry near Fulbourn Manor [MCB 17229] (Bailey & Spoerry *ibid*.). Nearby the Fulbourn Village History Society collected Roman pot (Samian) and tile during the course of fieldwalking carried out close to the Manor in 2002-2003 [MCB 17650]. It is suggested that these finds resulted from various periods of manuring the cultivated ground. Close to the pipeline route near to the Shelford Road (at TL 513559) a grave containing a partial skeleton but no accompanying artefacts was found in 1998 by a digger driver [CB14598]. Subsequent radiocarbon dating indicated a C14 age of 1900+/- 40 years or 10-220 cal AD; the geographic isolation of this find suggesting a non-typical Roman burial. To the south of this (at TL 522546), some 550m to the east of Grange Farm, were found the cropmarks of ditches zig-zagging from the NW to the SE which might indicate the presence of a Roman trackway. The provisional dating for this was supported by finds of a mortarium as well as Roman pottery at around the same spot [CHER 11782]. In terms of chance finds, a bronze object in the form of a cockerel was found in 1995 during the course of metal detecting the area of TL 51 56 [CHER 11782]. Within this same area of Fulbourn Common that lies just to the north of the village a number of Roman coins ('plus a bronze leaf-shaped sword') were found during the 19th century (R.C.Neville 1854).

Medieval

Medieval remains recovered from the Chantry near Fulbourn Manor [MCB 17229] confirm the presence of 10th-12th century occupation (i.e. residual St.Neots ware), although the majority of the medieval features contained pottery of the 12th-14th century, alongside slag associated with an iron smithing area, as well as some sherds of the 14th-16th century (Bailey & Spoerry *ibid*.; Germany 2007). On the site of the nearby Colvilles Manor and chapel several phases of a medieval clunch building were uncovered which was associated 15th – century pottery and tiles, as well as a silver penny and a book clasp (Connor 2003). A Saxo-Norman settlement [MCB 17979] dating from the mid-11th to late 12th century has been identified at School Lane within the historic core of the village (TL 519561), the latter site containing traces of seven timber structures, some refuse pits, enclosures, boundary ditches and two wells (Bradley-Lovekin 2008). To the east of Fulbourn Manor at Zouches Close (TL 526558) a complex of medieval earthworks untouched by modern agriculture which included various tracks, ridge and furrow, and building plots with their associated yards [CB14720] were investigated by the Fulbourn Village Research Project in 2006, and earlier by the Fulbourn Manor Estate archaeological survey (Malim 2001). Other sites close to Fulbourn included Croft Field at TL 524563 [MCB 17650] which was fieldwalked by the Fulbourn Village History Society during the winter of 2002-3 yielding a small amount of medieval pottery, and nearby the site of medieval earthworks at Ox Meadow (TL 527560) which included a possible hollow way and settlement platforms [CHER 11229]. Within the same general area some medieval ridge and furrow running NWW-SSE and NE-SW were identified within the SW corner of the field at TL 526559 [CHER 09982]. An Anglo-Saxon stone cross [CHER

06483a] was unearthed from below the floor of the nave at St.Vigor's Church, Fulbourn (TL 520562) in 1869, the discovery of this suggesting an early founding date for the church (Fox 1922).

Postmedieval-Modern

Some postmedieval remains including brick, tile, pottery and coins were recovered during the excavation of the Chantry [MCB 17229], whilst the brick and timber-framed building of the manor house at Fulbourn (TL 521561) more certainly dates from the end of the 16th century (reign of Henry VIII), yet principally features a 17th-century core with 18th-19th century additions [CHER 06324]. Postmedieval pottery was also recovered during fieldwalking on Croft Field [MCB 17650], whilst on Mill Hill immediately adjacent to the pipeline route (at TL 510559) is to be found the brick and weather-boarded four storey octagonal smock mill [CHER 06230], the latter most likely built at the end of the 18th century, given its appearance on the 1806 Inclosure map. From the Modern period (mid-20th century) associated with the WWII defences is the 'starfish' bombing decoy [CB 15119] which is located on farmland at TL 527545, close to the pipeline route.

(3) Fulbourn Road, Cherry Hinton [TL 490563] sites and finds within a 1 km radius:

Neolithic-Bronze Age

On the opposite side of the Fulbourn Road from the pipeline termination lies the site of three ring ditches at TL 491560, the latter identified on air photos and since pinpointed by geophysics. An excavation of these ring ditches in 1997 revealed that the monuments were all approximately the same size, and that the backfilling sequences were identical. None appeared to have been used for burial, whilst the artefact (worked flint, burnt flint and pottery) and environmental evidence suggested a Neolithic-Bronze Age date together with pottery of Early-Middle Bronze Age to Middle-Late Bronze Age [CHER 08880]. Meanwhile, just to the north of the pipeline within the former grounds of Fulbourn Hospital at TL 495565 (now the Tesco supermarket) was found a Middle-Late Bronze Age ditched enclosure with a series of post-hole fence lines and possible structures for livestock management, but otherwise few artefact or faunal remains indicating suggested domestic activity (Brown & Score 1999). Bronze Age flint was recovered during excavations carried out in the High Street, Cherry Hinton in 2008 [MCB 17899], whilst to the north-east of the War Ditches Iron Age hillfort were found a series of two Bronze Age barrows (probably disc or bell-disc shape) at TL 484557. Partly destroyed by quarrying, one of these survives on the chalk at 160m AOD, and is approx. 100ft in diameter [CHER 04964] with a now destroyed primary burial and underlying postholes, one of which contained Grooved Ware, with Bronze Age sherds were found in the silted-up barrow ditch (Browne 1974). Another barrow was found close by containing Neolithic flint [CHER 04965], whilst 550m to the south-east of the monument cropmarks indicated a further two ring ditches [CHER 02763]. South of the Fulbourn Road at TL 491557 was a findspot with Bronze Age flint including four waste flakes and two large scrapers [CHER 04777], and close by to this at TL 491559 another site with a flint transverse arrowhead, a round scraper and six flakes [CHER 04776]. An unspecified location in Hinton Fields produced a number of flakes and blades [CHER 05101], whilst just north of the pipeline beneath a housing development (at TL 492567) lay another potential barrow site indicated by a cropmark on a 1983 air photo [CHER

09593]. Close to the Cherry Hinton Waterworks a flint arrowhead was found with a skeleton [CHER 05126A] (presumably an inhumation) in 1915 (Browne 1974), whilst other flint flakes were recovered from trenches at Cherry Hinton Infants School in 2010 [MCB 19393]. Finally, a few hundred metres to the west of here where the pipeline route crosses the Cambridge Road at TL 492558 a large retouched flake was found [CHER 04896]. Nearby to this was a possible ring ditch was identified on the Peterhouse Technology Park (TL 491559).

Iron Age

Within 500m of the end of the pipeline close to West Pit, Cherry Hinton (TL 484555) lies the site of War Ditches, a single bank and ditch circular Iron Age enclosure dating from the 4th century BC [CHER 04963]. This Early Iron Age defended settlement seems to have been abandoned shortly after its construction, only to be re-occupied during the 1st century BC (Belgic Late Iron Age), then abandoned following a massacre here during the second half of the 1st century AD. The site was first excavated in 1893, then by TC Lethbridge in 1939 (Lethbridge 1949), and more recently by Richard Mortimer in 2009 (Pickstone & Mortimer 2012). To the south east of War Ditches at TL 486555 air photographs have revealed the cropmark traces of small square fields which may be Iron Age – Roman in date [CHER 04830], whilst to the north-east at Fulbourn Park (at TL 500064 to the north of the hospital) yet another series of possible Late Iron Age- Roman cropmark features [CB 15632] were identified

Roman

Evidence for Roman settlement [CHER 04963a] including inhumations, several post-built structures (houses?), pits, wells, an oven or hearth, plus a 1st century AD fineware pottery kiln (see Evans 1989) were identified within the area of the Iron Age enclosure located at War Ditches, Cherry Hinton. Although discoveries of Roman burials here date from 1893, 1902, 1907 and 1912, the rather more extensive evidence of Roman occupation was found during excavations carried out by the Cambridgeshire Antiquarian Society and TC Lethbridge in 1939 and 1949, then by DA White in 1963 (White 1964). To the north beyond Fulbourn Hospital (TL 499570) lies the Hinton Fields (Manor Farm) Roman villa site which was discovered in 1978 following the examination of air photographs and fieldwalking. Over a period of eight years this site was excavated by volunteers (Pullinger & White 1991). Here large quantities of Roman pottery, tesserae and some coins were found associated with a 2nd-5th century AD timber, and subsequently timber and flint constructed building [CHER 05099]. South of here at Fulbourn Park another site was identified with small amounts of pottery and tile [CB 15632], whilst to the west of this more tile and flue tile was uncovered at no.1 High Street, Cherry Hinton (TL485562) [MCB 17899]. West of the village at the Norman Cement Works [CHER 05168] some 1st-2nd century pots (similar to the types from War Ditches) were found 30 feet down inside of a Roman well (Wilkerson *et al.* 1960), whilst a single sherd of Roman pot (of Nene Valley colour coat ware) came from an archaeological assessment carried out much closer to the present pipeline route in 1994 at TL 491560 [CHER 08880A]. both postholes and a ditch containing Roman pottery were also found at the Church of the Latter Day Saints (TL 484561) located to the west of the pipeline termination, whilst on the north side of Cherry Hinton at TL 495572 metal detectorist finds included both a Colchester brooch and coin [MCB 16701].

Anglo-Saxon

At War Ditches an Early – Middle Saxon (501– 700AD) inhumation cemetery was excavated in 1949 [CHER 04965a]. This consisted of nine secondary burials interned within a Bronze Age burial mound; these were accompanied with grave goods including an iron spearhead, knives, the iron mountings for a wooden bed, together with a silver ring, bronze belt fittings, a bone comb, crystal ball etc. (see Meaney 1964). North of the proposed pipeline at Fulbourn Old Drift (TL 490570) a group of Late Saxon (10^{th}-11^{th} century AD) features were found fronting the High Street. These included ditches, postholes and a pit all of which contained pottery [MCB 16703] (Atkins 2009). From the Teversham end of Cherry Hinton [MCB 16701] an Early-Middle Saxon long brooch and a strap fitting were recovered as part of the aforementioned metal detector find, whilst from the High Street close to the Baptist Church (TL 488566) came a Saxon-Medieval bronze strap end [CHER 04897].

Medieval

A small amount of 12^{th}-14^{th} century pottery was recovered alongside Saxon sherds from the New Vicarage site at Fulbourn Old Drift [MCB 16703], whilst from no.1 the High Street, Cherry Hinton there was evidence for medieval land reclamation associated with the street frontage, alongside pits of 13^{th} century date to the rear [MCB 17899]. The metal detectorist find at TL 495572 produced a medieval scabbard fragment and a buckle [MCB 16701]. West of here at the suggested site of Mallet's Manor [CHER 13015] an earthwork and dyke (ditch) suggested to be those of a Norman dwelling and a hollow way (respectively) were identified at TL 490572. Meanwhile closer to the pipeline route (on the south side of the Fulbourn Road at TL 491560) medieval pottery was recovered during the course of an archaeological assessment [CHER 08880B], whilst to the west of the pipeline end lies Cherry Hinton Hall, the site of a 15^{th}-century Brigettine priory [CHER 09927]. On the north-western edge of Cherry Hinton lies the fairly recently excavated site of Neath Farm; here a series of 12^{th}-15^{th} century plots were examined close to the medieval core of Cherry Hinton (Slater 2012) .

Postmedieval-Modern

In the course of the archaeological evaluation at Fulbourn Old Drift (Cherry Hinton) an 18^{th}-century boundary fence was identified, whilst significant finds of pottery, clay pipes and oval iron rings for joining sheep hurdles came from Hinton Fields, Teversham (TL 4957 [CHER 0510b]), with ridge and furrow cultivation nearby at Cherry Hinton Junior School [MCB 19549]. Within the grounds of the 19^{th}-century Cherry Hinton Hall were found several moats, thought to be postmedieval in date [CHER 12267] (TL 484564).

Methodology

(1) Fleam Dyke Pumping Station evaluation (March 2014)

Following CAT scanning for services, the already de-turfed lawn was excavated using a wheeled JCB with a 1.8m wide ditching bucket. This was stripped down to the

redeposited chalk beneath the topsoil, and then down to the top of the natural chalk which was cleaned by machine. Trench plans (measured sketch plans) were produced for each trench along with measured sketch sections at either end of each. Meanwhile a drawn section was produced for one of the long trench sections (at 1:10 scale). The trenches were metal detected at different levels of their excavation. A scaled photographic (digital colour) record was produced following the cleaning of the sections and the exposed natural beneath.

(2) Fleam Dyke Pumping Station internal pipeline watching brief (May 2014)

During the subsequent watching brief the stratigraphy exposed within this 70m long pipeline cut (Trenches 1+2) was logged at intervals and the depth to natural (where encountered) recorded. The upcast from this trench excavation was likewise inspected for finds.

(3) Effluent Discharge Pipeline: Fleam Dyke – Cherry Hinton (September 2014)

At each of the drill pit locations (approximately every 100m) both topsoil and subsoil were removed down to the level of the natural (i.e. between 0.3m and 1.5m below ground surface) using a 7-ton 360° with a ditching bucket, the size of the area excavated ranging between 1.2m x 2.5m and 1.6m-3m. Where the pipeline was over 2m deep the excavation was stepped, and hence the drill pits were wider. CAT scanning for services was undertaken by the contractors, as and when relevant. Each drilling pit dug was then examined by an archaeologist at the level of the stripped natural, whilst the upcast from these pits was also inspected for finds. Only after checking for archaeology and artefacts (and if necessary the digging and recording of features) did mechanical excavation to the pipeline depth proceed.

Where produced, plans and sections were drawn at a scale of 1:10, whilst a scaled photographic (digital colour) record was compiled for all of the pits following preliminary cleaning of the sections and natural. Surface finds (particularly where the pipeline crossed ploughed fields) were collected during fieldwalking along the route and up to 10m either side. Both these and the finds collected from the topsoil, subsoil, silt-filled natural and cut features were bagged and labelled-up using the testpit numbers and pipeline distance interval, and following this returned to the CAU Finds Department for processing. Several large environmental samples (5-10 litre) were taken from both the flint-filled features and buried soils for environmental analysis. Basic data on the soil stratigraphy and finds recorded from each of the drilling pits was then recorded using individual CAU Testpit Recording Sheets. Also (where relevant) the features and contexts (fills and cuts) were recorded using the standard CAU (MOLAS amended) sheets, and then cross-referenced to any drawn sections and photographs.

Throughout the course of this watching brief the provisional locations and ground heights of these test pits (AOD) were marked on the pre-pipeline proposal (1:2500 scale) survey plans and sections provided by the South Staffs Water (Cambridge Region) surveyors. These locations were subsequently corrected following receipt of the revised and re-surveyed pipeline and drilling pit plans from the company.

Results

(1) Fleam Dyke Pumping Station trench evaluation (FDP14(1))

A total of 21m^2 was excavated within two c.5m long evaluation trenches. Within each trench the top of the chalk natural was exposed at about 1m depth. No archaeology was revealed in either of these, although evidence of ancient tree-rooting (without archaeological finds) and solution features were recorded in both.

Trench 1

Trench sketch plan (W to E):
0 - 1m chalk; 1 - 2m weathered chalk (cream-buff coloured sandy-silty chalk within solution feature); 2 - 3.5m red-brown 'sub-soil' type fill of tree-rooting hollows and 'veins' through chalk; 3.5 – 5.2m chalk.

Trench sections:
@0m0-0.1m turf
0.1–0.25m topsoil
0.25-0.50m broken-up lumpy white chalk (re-deposited)
0.5-0.75m weathered clay-rich chalk (re-deposited)
0.75-0.91m red-brown buried soil (plough soil) with rare charcoal, coal and pot/tile
0.91-1.08m truncation at top of chalk (weathered broken-up chalk layer) with rooting
1.08m top of unweathered chalk layer with patches of solution feature

NB C18th-19thC glazed red earthenware pot found within buried soil

@3m
0-0.1m turf
0-0.3m topsoil
0.3-0.45m white lumpy chalk (re-deposited)
0.45-0.6m layer concrete rubble (fill of construction cut)
0.6-0.7m white weathered chalk (redeposited)
0.7-0.75m layer concrete rubble
0.75-0.78m white weathered chalk (redeposited)
0.78-0.8m mixed topsoil and chalk rubble with rare brick (on edge 20thCcut for shaft)
0.8-1.02m red-brown buried soil (plough soil) with rare charcoal etc.
1.04m truncation on top of chalk (partly covering small solution feature)

@5m
0-0.1m turf
0.1-0.2m topsoil
0.2-0.37m mixed topsoil and quarried roadstone (ballast <50mm) with incl tarmac
0.37-0.50m white lumpy weathered chalk (redeposited)
0.5-0.72m broken-up concrete rubble
0.72-0.76m weathered chalk (re-deposited)
0.76-0.86m broken-up concrete rubble
0.86-0.92m weathered chalk (re-deposited)
0.92-1.13m broken-up concrete rubble
1.13m truncated surface of top of chalk

Trench 2

Trench sketch plan (N-S):
0-0.5m chalk; 0.5-1.9m irregular shaped solution feature filled with buff-cream coloured weathered sandy-silty-chalk sediment with inclusions (as breccia) of white chalk lumps; 1.9-2.5m chalk; 2.5-2.6m ancient tree rooting; 2.6-3.3m chalk; 3.3-3.9m small solution feature with sandy-silty-chalky fill; 3.9-

4.6m chalk; 4.6-5m tree throw or solution feature with chalky sediment and breccia of white lumpy chalk

Trench section:
@ 2.5m
0-0.3m grey-brown topsoil
0.3-0.52m broken-up white lumpy chalk (re-deposited)
0.52-0.54m pinkish coloured weathered horizon in chalk (re-deposited)
0.54-0.78m 'dirty' weathered broken-down buff col. clay-rich chalk (re-deposited)
0.78-0.98 to 1.07m dark brown to reddish-brown compact buried soil (ploughsoil?)
1.07 -1.2m weathered top of natural chalk with solution feature and chalk breccia
1.2 top of unweathered chalk

(2) Watching brief on internal pipeline (FDP14(2))

The inspection of this 0.7m - 0.8m deep and c.70m long pipeline cut (Trenche 3+4) was undertaken on four different occasions between the 12th May and 2nd June 2014 during the progress of pipe laying.

Natural undisturbed chalk wasn't encountered at any point, the exposed stratigraphy consisting just of re-deposited chalk, and in some places a bed of broken-up concrete rubble beneath this. It could be seen from the shape of the topography in this area that the ground surface beneath the pumping station and ancillary buildings probably consisted of an apron of flattened redeposited chalk up to 1m thick.

Two test pits (Testpit A: 0.8 x 0.5m and Testpit B: 4m x 0.4m wide) were also dug to establish the whereabouts of an overflow pipe located some 25m to the NNW of the change in angle of the pipeline. These revealed relatively undisturbed soil profiles, with the top of the chalk lying at only 0.5m – 0.7m below ground level. Both these test pits lay outside of the apron of made-up ground just 30 m from the edge of the ditch of Fleam Dyke. A modern tree throw was encountered within the topsoil/ subsoil layers in Test pit B, whilst from the base of the topsoil within both test pits a very small amount of glass, charcoal and 19th- early 20th century pottery was recovered. In addition a buried soil was encountered within Test pit A just above the surface of weathered chalk, yet there were no indications of archaeology.

Testpit A

0-0.4m	topsoil consisting of laminae of light grey broken chalk lumps within a redeposited earthy chalk containing small fragments of charcoal and glass
0.4-0.7m	a buried soil consisting of occasional weathered chalk lumps in a dark brown – grey brown humic silt
0.7-0.85m	a weathered light grey broken-up chalk and chalky subsoil
0.85m	unweathered white chalk
1m	base of test pit

(3)) Effluent Discharge Pipeline: Fleam Dyke – Cherry Hinton (FDP14(3))

In all some 56 testpit holes were examined and measured, with only the penultimate hole (TP 57) missed out due to flooding. The drillpit beyond this was the connection with the existing Anglian Water foul sewer chamber on Fulbourn Road, and so was not examined, given that this had been dug into already made-up ground.

A total of 16 archaeological contexts, but no certain archaeological (dug) features were encountered, most of these 'features' appearing to be naturally water-cut (i.e. solution hollows and palaeo-channels) or else artefact-filled tree throws, tree rooting holes and hedge-root lines. However one (presumably prehistoric) buried soil

appeared to be of interest on account of its environmental potential, whilst the distribution of flaked (waste) flint as surface scatters along some sections of the pipeline also appear to have accumulated within natural solution hollows and other landscape sinks. Most interesting was the occurrence of 15th-16th century AD pottery plus a single possible Saxon sherd found within the fills and overlying undisturbed sub-soil above two probable hedge-rooting gullies in TP 37, the latter a hilltop site located just 50m to the west of Fulbourn Windmill (Mill Hill, Fulbourn). The occurrence of late 18th century pottery here within the subsoil may derive from the building and occupation of the current octagonal smock mill, yet the occurrence of the earlier pot is suggestive either of a previous mill or a very localised small settlement/ dwelling. Yet another sherd of 15th-century pottery and some 16th-17th century pottery were picked up as surface finds near TP 21-TP 22 (east of Fulbourn and south of the Balsham Road), and a few more from TP 9 + TP 10 located on the slopes of the ploughed chalk field north of the road.

A handful of weathered (patinated) struck flint and fresh struck black flint flakes were picked up within 10m of the pipeline route at the point where this crossed the second field immediately to the north of the Balsham Road (at TP 9 + 12). However, buried finds (including a few pieces of struck flint) were recovered from TP 14. The few pieces recovered from this testpit had been deposited within a silt-filled channel (001) and in the underlying buried soil and subsoils (002-004), along with fragments of burnt stone (see Appendix). However, by far the largest concentration of potentially worked flint was to be found on the south side of the Balsham Road between TP 16 - 19. Here the natural flint nodules lay at shallow depth within a series of solution hollows and small palaeo-channels, with both nodules and struck pieces of flint brought to surface by ploughing. Yet more flint was picked up from the surface along the pipeline route between TP 23-29.

A series of deep NE-SW trending erosional gullies were encountered within TP 48 opposite the old entrance to Fulbourn Hospital, yet none of these contained archaeological material. However, traces of charcoal and some crumbs of a now very eroded and disintegrated pot (most probably prehistoric) were observed within two nearby testpits (TP 41 + 43), this material likely representing surface weathered hill-wash material transported down a gentle gradient from the chalk slope to the south. These pottery fragments proved to be impossible to recover and properly identify. Environmental samples were taken from some of the natural palaeochannel and solution hollow deposits (particularly where buried soils were present), although none of these could be properly dated.

Drill pit	**Size (m)**	**Surface height (m AOD)**	**Depth to natural (cms)**	**Layers** [tps=topsoil, sbs= subsoil, rbl=rubble, coll=colluvium, slt=silt, alluv=alluvium, snd=sand, b soil=buried soil, w=weathered horizon, Ch(N)=chalk(natural), S+G(N)=sand=gravel	**Truncat level plough (cms)**	**Finds** [FL=struck flint; BF=burnt flint; CF=calcined flint, BN=bone, PT=pot, C=charcoal, CL=coal, TL=tile] *SFC*=surface find	**Notes**
TP1	3x1.6		30	tps,sbs,slt,Ch(N)	25?		channel
TP2	3x1.6		30	tps,sbs,Ch(N)	30		
TP3	3x1.6		30	tps,sbs,Ch(N)	30		
TP4	3x1.6		30	tps,sbs,Ch(N)	30		
TP5	3x1.6		40	tps,sbs,Ch(N)	40		
TP6							NOT DUG

TP7	3x1.5		46	tps,sbs,Ch(N)	45		
TP8	3x1.5	20.91	57-60	tps,sbs,w,Ch(N)	46?		
TP9	3x1.5	19.82	25-46	tps,sbs,w,Ch(N)	30?	PT[15th?16thC], FL (all *SFC*)	chalk brecc + tree rooting
TP10	3x1.5	17.47	97	tps,up sbs,low sbs,coll,w,Ch(N)	30?	PT[PMed] (all *SFC*)	slope wash
TP11	5x3.5	17.98	30	tps,w,Ch(N)	30		plough scars
TP12	5x3.5	18.03	30-42	tps,sbs,w,slt,Ch(N)	30	FL,CF (all *SFC*)	tree root fill sampled
TP13	5x3.5	15.75	36-40	tps,sbs,slt,Ch(N)	30-35	BF,FL (*SFC*)	plough scar
TP14	3.5x1.5	14.08	70-73	tps,sbs,alluv(001),top b soil(002), b soil(003), b subs(004)	30-40	BF,FL(*SFC*), BS(001-002), FL(002-004)	Pal channel, enviro smple <1> (003)
TP15	6x1.5	14.76	40-60	tps,sbs,sand,S+G(N), w, Ch(N)	30-40	FL(Tps)	shallow nat + palchannel
TP16	3x1.5	14.43	46-52	tps,sbs,slt(005),w, fl breccia(N),Ch(N)	40	PT[Mod-PM], FL(*SFC*),FL (sbs,005)	Enviro sample <3>(for FL)
TP17	3.1x1.5	14	55	tps,sbs,slt,Ch(N)	34?	FL(only *SFC*)	tree throw fill
TP18	3.1x1.5		c.80	tps,sbs,coll,coll(006), snd,w,Ch(N)	40?	FL(sbs,coll, 006)	colluv filled solution feat (not bottom)
TP19	3.1x1.5	15.12	65	tps,sbs.slt,w,Ch(N)	50?	FL(Tps,sbs)	
TP20	3.1x1.5	14.44	60	tps,sbs,w,Ch(N)	50		end FL sprd
TP21	3.1x1.5	14.54	47	tps,sbs,w,S+G,Ch(N)	45	BS,PT [16th/17thC] (*SFC*)	
TP22	3.1x1.5	14.5	45	tps,sbs,w,Ch(N)	40?	PT[15thC] (*SFC*)	
TP23	3.1x1.5	14.35	43-45	tps,sbs,w mixed,.Ch(N)	43	FL(Tps)	
TP24	3x1.5	16.93	50-55	tps,sbs,w,Ch(N)	45?	FL(Tps,sbs)	
TP25	3.15x1.5		45-50	tps,w,snd(N),Ch(N)	30-34	FL(Tps)	preserv w chalk + soln f
TP26	3.2x1.5	17.43	120-150	tps,sbs,slt coll(007), S+G(N),Ch(N)	70-80?	FL (Tps,sbs,007)	colluv filled soln f/ headland?
TP27	3.5x1.5	19.96	60-80	tps,sbs,snd,snd(N)	50	FL(Tps+*SFC*)	
TP28	3x1.5	21.21	75	tps,sbs,mixed slt,snd(N)	50-60	FL(Tps)	former metal detect Med coins nearby
TP29	2.7x1.5	20.39	60	tps, sbs,slt,w,Ch(N)	40-52	FL(*SFC* minor)	
TP30	3.15x1.5	20.6	65-67	tps,sbs,w slt,Ch(N)	55		
TP31	3x1.5	21.98	50-55	tps,sbs,w,Ch(N)	35-40	Fe slag (*SFC*)	
TP32	2.7x1.5	22.48	40-60	tps,sbs,wslt,Ch(N)	35-40		pipe trenches
TP33	3.1x1.5		25-30	tps,wslt,Ch(N)	25		same loc 32
TP34	3.2x1.5	23.42	50	tps,sbs,w,Ch(N0	30-34		geol is L.Chalk(Tott St)
TP35	3.2x1.5	26.65	43-47	tps,sbs,wslt,Ch(N)	30	BF,FL,PT (all *SFC*)	geol is M.Chalk?
TP36	3.2x1.5	31.78	40-43	tps,sbs,slt,w.Ch(N)	27-30	BF(Tps+*SFC*), FL+BN(sbs)	
TP37	2.9x1.2	33.42	60-65	tps,upper sbs,lower sbs (008),w, slt(009-010), Ch(N)	40	BN(009), PT [Saxon + PMed] (008-010)	parallel N-S furrows (009-010) =

							hedges?
TP38	3x1.2	31.89	40-50	tps,w ch brecc, Ch(N)	30		
TP39	2.9x1.2	29.14	55-58	tps,upper sbs,lower sbs,w,Ch(N)	30-40		
TP40	2.8x1.2	25.75	80-81	tps,sbs,slt,w.Ch(N)	50+	PT[PM] (*SFC*)	
TP41	2.9x1.25	22.77	86-88	tps,sbs,coll(011),w,Ch(N	45	PT[prehist?] (011)	traces PT only
TP42	3.1x1.2	21.78	64	tps,sbs,coll,Ch(N)	40?		
TP43	3x1.25	21.57	75-80	tps,sbs,coll, silt(012), ch brecc(N),Ch(N)	40?	C+PT?+BF (012)	NW-SE shallow palchannel
TP44	3.2x1.2	21.01	50-56	tps,sbs,coll,slt,w,Ch(N	36	PT[mod] (tps)	
TP45	3.4x1.5	20.74	46	tps,slt mixed,Ch(N)	43		
TP46	3.5x1.5	20.6	45	tps,slt mix,Ch(N)	45	C+CL(sbs,w)	
TP47	3x1.5	19.55	40	tps,slt mix,Ch(N)	40		
TP48	7x2	19.68	45-145	tps,(013-015), sbs,w,Ch(N)	42	BN(014)	series of deep interdig NE-SW gullies in chalk
TP49	3.2x1.5	20.29	60	tps,upper sbs,low sbs, w,Ch(N)	40-50		site of pipe trench
TP50	3.4x1.5	21.41	90	tps,upper sbs,low sbs,b soil + subs, Ch(N)	40?	FL(SFC)	sterile b soil@70cms
TP51a	2.9x1.5	20.39	104-110	tps,sbs,marl slt, colluv slt, b soil, slt,Ch(N)	50?		ditto
TP51b	3x1.5		90	tps,sbs,rbl/ concrete	50+		kV cable trench
TP52	3.3x1.5		65-70	tps,sbs,coll,w,Ch(N)	40-50		
TP53	3.5x1		50?	tps,w,Ch(N)	25		adj service trnch
TP54	2.5x1	19.2	85-90	tps,rbl,snd,plough soil,w,Ch(N)	75		
TP55	2.5x1	18.6	50	tps,upper sbs,lowsbs,w,Ch(N)	30+		
TP56	2.5x1	18.1	95	tps,redepos soil,sbs,redepos slt, buried ploughsoil,w,Ch(N)	60		
TP57							NOT SEEN -flooded

Table 1: Abbreviated test pit record

Context descriptions

TP14

(01) A light grey clayey silt with some moderately large (>50mm) weathered angular patinated flint plus an occasional-moderate amount of rotted burnt stone (sandstone) of similar size. No detectable struck flint in this, but fair amount of small mollusc (snail) shells – mostly wet-loving aquatic. Interpretation: the alluvium fill of a shallow (max 20cm deep and 2m wide) and impersistent N-S channel which cuts both the underlying buried soil(s) (002-004) and surface of the chalk. A bulk sample of this was taken for enviromental analysis (<2>).

(02) A crumbly light brown loamy silt mixed with flecked chalk and clay and traces of fossil rootlet holes. Included in this are occasional burnt flint and burnt stone fragments and rare flecks/ smears of charcoal. Within this were found small numbers of aquatic/ wet loving

snails. Interpretation: the oxidised (part-humified) surface layer of buried soil with some admixed alluvium. A thin (max 50-60mm) layer overlying the generally thicker buried soil and subsoil which has formed and been preserved within this N-S depression at the base of a shallow slope.

(03) A mottled dark black to grey organic (humic) layer containing carbonaceous peaty lenses throughout a dark brown-grey fossil root hole-filled silt that includes weathered chalk marl inclusions plus some pieces of broken and weathered (patinated) flint. Amongst this was a small amount of struck black flint (waste flake), some slightly burnt flint, moderately rare burnt stone, alongside thin lens-like smears of decomposed ashy red material – either burnt clay or decomposed burnt stone. Maximum thickness is c.100mm, preserved only on the edges of the trench where this hasn't been cut by the channel. Interpreted as an organic buried soil. A 10 litre bulk sample of this deposit was taken for environmental analysis (<1>).

(04) A silty dark brown clay with occasional organic (humic) streaks, fossil root holes and charcoal flecks. Amongst this is much angular flint (20-50mm) alongside chalk inclusions (marly streaks) towards its base.

TP16

(05) A brown to pale brown sandy silt which overlies a natural flint breccia, and changes from a silt to a sand upwards. Lower down this includes numerous poorly-worked (struck) black flint nodules, plus many fine small (5mm-10mm) struck waste flakes (no blades). This contains no traces of charcoal. A small bulk sample was taken for environmental analysis (<3>). The silt was interpreted as being a possible silt horizon capping flint nodules, some of the latter being opportunistically exploited in prehistory. This layer was overlain by a subsoil which included small fragments of coal.

TP18

(06) A light brown loosely compacted silt which is lighter in colour towards the base, and contains thin horizontal marly streaks. Interpretation: the silt of a colluvium-filled possible solution feature in the top of the chalk which also contains much finely-flaked waste flint debitage (small debitage: 90% <10mm diameter). This deposit is similar to (05) in TP 16. The silt was overlain by a more sterile colluvium above the level of the hollow, and above that by a subsoil. Below it rests upon a natural bank of flint-filled sand overlying the chalk. This natural feature was not bottomed within the trench (excavated only to 1.06m below surface).

TP26

(07) A yellow to mid-dark brown compact loamy silt up to 50cm thick which contains moderate amounts of unsorted angular patinated natural pieces of flint (50-150mm), some smaller flint gravel, abundant flecks of chalk, rarer small flecks of charcoal. This colluvium overlay the weathered top of the chalk at about 1.5m depth as a sloping bank of material (overlain by a subsoil), and here was interpreted as being either the infill of a natural hollow or solution feature, or else perhaps a bank of (Medieval-Postmedieval?) headland soil which has accumulated parallel to the old field boundary adjacent to the edge of the Babraham Road.

TP37

(08) A compact mid brown-dark brown loamy silt with an increasing amount of chalk flecks and weathered flint gravel towards its base. Amongst this a fragment of quite abraded and oxidised-looking (Saxon?) pottery was found, close to the base. The layer (up to 35cms thick) rested fairly uniformly beneath the subsoil, and overlay the rooting furrow/trenches containing fills (09) and (10). Most likely this is a lower subsoil layer which is probably earlier in date, and undisturbed by the ploughing above.

(09) This consisted of a fairly angular to sub-rounded weathered chalk rubble breccia in a matrix of mid-brown sand and silt with some humic streaks and a thin layer of pea grit towards the base. The latter suggests tree or shrub rooting. A number of wheel-turned unglazed black to red fabric coarseware sherds were recovered from this context, most in slightly better condition than from (08), one of these being a rim sherd. The SW-NE oriented 0.4-0.6m wide (and 15cm deep) linear furrow may well be that of a hedge line, or alternatively that of a root hole. It also lies parallel to the adjacent furrow some 1.5m to the SE of this, which would appear to have a similar origin.

(10) A similar context to (09) composed of a sub-angular to rounded weathered chalk rubble breccia in a matrix of mid brown sand and silt (20 cms deep). The pottery in this layer appears to be similar to that in (08) and (09), yet is in a fresher condition, though it lies a little closer to the surface. It may be Roman-Medieval in date. A small amount of abraded animal bone was found. Only the NW edge of this natural furrow or feature was exposed within the corner of the test pit. The sections of both these excavated slots were drawn.

TP41

(11) A pale mid brown compact clayey silt containing a large number of small weathered chalk (marl) inclusions (all <30mm), occasional inclusions of patinated angular flint, plus rare 'crumbs' of potentially prehistoric pot, which though small (<10mm), can still be identified as having a partially decomposed black shelly fabric. Other 'crumbs' detected were of small rolled pieces (<10mm) of burnt clay. This layer appeared to form part of a hard basal caly-rich colluvium (approx. 17cm thick) which overlay the top of the rubbly chalk sub-crop in this area. The 'pottery' crumbs in many cases were too small to collect, and as such are unlikely to be identified. It seems clear that these would have been transported some distance downslope. A small fragment of possible abraded animal bone was also retrieved.

TP43

(12) A hard compact chalky clay (12-15cms thick) containing inclusions of brecciated chalk as well as fossil root holes and rare small crumbs of a potentially prehistoric pot (which was too small to collect) and burnt flint, together with the occasional small fleck of charcoal. This filled what appeared to be a natural round-bottomed palaeochannel, which was about c.80cms wide, cut into the top of the chalk sub-crop and overlying a (natural) chalk-flint breccia.

TP48

(13) A very loose and soft light grey-brown loamy silt completely devoid of stones or any other cultural material (1m deep). This filled the top of a 1.3m deep and 0.5-0.7m wide sub-vertical and slightly undercut sinuous gully, part of a series of interdigitating channels cut into the top of underlying chalk ground surface. Within the top of (13) lay a single large 30-50 kg stone boulder.

(14) Within the base of the sectioned gully lay another loose and partly void-filled grey brown silty loam, the latter slightly more compact than (013) and with more inclusions of soft weathered marl and hard crushed lumps of chalk. Towards the base of this were found some natural waterworn ironstone nodules and some small patches of small mammal bones, the latter most likely associated with former burrows dug through the soft silt.

(15) A very thin layer of compact grey-green to yellow clay adhering to the base of the channel gully. This seemed to have traces of organic material (grey laminae) within it, though any such material was extremely fine grained.

The lack of any sort of cultural material (flint, burnt flint, pottery etc.) present within the layers dug from this 1m wide slot confirms the likelihood of this feature(s) being natural, and part of a ENE-WSW trending deep-cut channel sequence.

Conclusions

Fleam Dyke Pumping Station (evaluation and watching brief)

No earlier archaeological features (pre-dating the construction of the pumping station) were uncovered within the trenches and pipeline cuts examined, though we do have some evidence for former open woodland within this area and also the presence of small-scale solution features (Pleistocene-Holocene) within the top of the underlying chalk. The sharp truncation of this sometimes weathered/ sometimes unweathered chalk surface by a well-mixed buried soil layer suggests the presence of a former ploughsoil pre-dating the establishment of the pumping station in 1912. This is confirmed by the scatter of expected fragments of weathered brick and tile, rare coal, charcoal, and glazed ceramic, whilst the inclusion of a small sherd of a glazed red earthenware (GRE) dish supports the idea of there being an 18th- early 20th century AD date range for this cultivation. Laid over this (but not necessarily truncating it) was a layer of weathered redeposited chalk, and above this fresher-looking white lumpy chalk; the latter synonymous perhaps with the digging of the foundations for the brick pumping station just 20m+ to the north-east of these trenches and the excavation of a larger area of chalk for the sinking of the borehole. The spoil from these excavations was evidently dumped then spread out to form a flattened apron across the site. At the east end of Trench 1 we see a modern cut (2m wide and 0.6-0.7m deep) that is most likely associated with the sinking of the concrete shaft inspection chamber just 8m to the south-east of Trench 1. This was evidently backfilled fairly rapidly with layers of broken-up concrete rubble interleaved and compacted with re-deposited chalk. Presumably this (recent) event was then followed by landscaping, involving the introduction of topsoil and the re-seeding of turf.

The results of this evaluation suggests shallow disturbance right across this area, but also the potential in some places for preservation of archaeological deposits *if they had once existed*. However, the absence of archaeological artefacts or features, indicates a generally low probability for the presence of archaeology within the examined PDA.

Fleam Dyke – Cherry Hinton 5.5 km pipeline (testpitting and watching brief)

No archaeological features were encountered within any of the testpits, although a waste flake of struck flint was recovered from a thin buried soil surviving below the plough truncation in Testpit 14. However, thin scatters of worked flint were also collected from across the surface of the ploughed fields and testpit upcast between Testpits 12 and 14 to the east of the Balsham Road and from Testpits 17-19 immediately to the west of this (SEE Figure 4). Similar flint working waste was noted on the field surface just to the west of the Babraham Road (Testpits 27-29), and again along the pipeline route adjacent to the Fulbourn Road, both at Testpit 43 and between Testpits 50-51. No prehistoric pottery was recovered, either as surface finds, or from the testpit soils. The flint scatters indicate very minor background prehistoric (later Mesolithic/ early Neolithic?) at several locations along the pipeline route. A sherd of possible Saxon pottery was recovered from the base of Testpit 37 on the hilltop site next to Fulbourn Windmill. However, the most of pottery at this site appeared to be early-late Postmedieval in date, with some of it pre-dating the 18th century recorded origins of the mill.

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Specialist reports

Pottery *David Hall and Craig Cessford*

A small assemblage of 23 sherds weighing 148g was recovered. The earliest material present was a single possibly Saxon sherd from TP37 [008], although this derives from a context that also contained much later material. The rest of the pottery spans the 15th to 19th/20th centuries.

Cat.	Context	TP	Fabric	Date	No.	Wt. (g)	Comment
1	Surface	9	Red coarseware	15th-16th	1	2	Jug rim
3	Surface	10	Staffordshire-type slipware	17th-18th	1	3	
20	Surface	21	Brown sandy coarseware	15th	1	3	
23	Surface	22	Glazed red earthenware	16th-17th	1	9	
26	Surface	27	Unglazed late red earthenware	19th-20th	1	5	Flowerpot
26	Surface	27	Refined white earthenware	19th-20th	1	4	Blue transfer-printed willow pattern
32	Surface	35	Red coarseware	16th-17th	1	3	
34	Surface	36	Utilitarian English stoneware	19th	1	17	Bottle
38	Surface	37	Red coarseware	15th	1	5	
38	Surface	37	Refined white earthenware	19th-20th	2	4	Includes blue transfer-printed willow pattern
38	Surface	37	Unglazed late red earthenware	19th-20th	1	10	Flowerpot
39	8	37	Grey coarseware	16th	3	30	
39	8	37	Saxon?	Saxon	1	5	Probably Saxon, but identification uncertain
40	9	37	Grey coarseware	16th	2	10	
41	10	37	Post-Medieval fineware	16th-18th	1	2	
41	10	37	Red coarseware	16th	1	13	
41	10	37	Grey coarseware	16th	1	11	
45	Subsoil	40	Glazed red earthenware	16th-17th	1	2	
47	Topsoil	44	English stoneware	18th	1	10	

Table 2: Pottery catalogue

Flint report *Emma Beadsmoore*

A total of 51 (≥300g) flints were recovered from the pipeline; 34 (≥144g) were unburnt and worked, 15 (144g) burnt and worked, whilst 2 (12g) were just burnt. The flints are listed by type and feature in Table ?

Test pit	Type									Totals
	primary flake	secondary flake	tertiary flake	irregular core	single platform core	chip	chunk	burnt chunk	unworked burnt chunk/chip	
12			1					1		2
13	1	2	3					8	1	15
14		1	1					1		3
17		1								1
18		1	6							7
19		1	1			2			1	5
27		3			1					4
28		1								1
29		1	1	1						3
35								1		1
36								2		2
43								1		1
50		2	1							3
51			1							1
stray							1	1		2
	1	13	15	1	1	2	1	15	2	51

Table 3: Flints listed by features and type

The assemblage recovered from the pipeline route comprises flint working waste, but no tools. The material was largely waste flakes, with just a couple of cores. The majority of the flint was chronologically non-diagnostic, however, five flints were the products of systematic core reduction/flake production strategies, comparable to material found in later Mesolithic/earlier Neolithic assemblages. The material therefore provides evidence, albeit limited, of background prehistoric activity on site.

No further work is required on the limited flint assemblage, the majority of which is chronologically non-diagnostic.

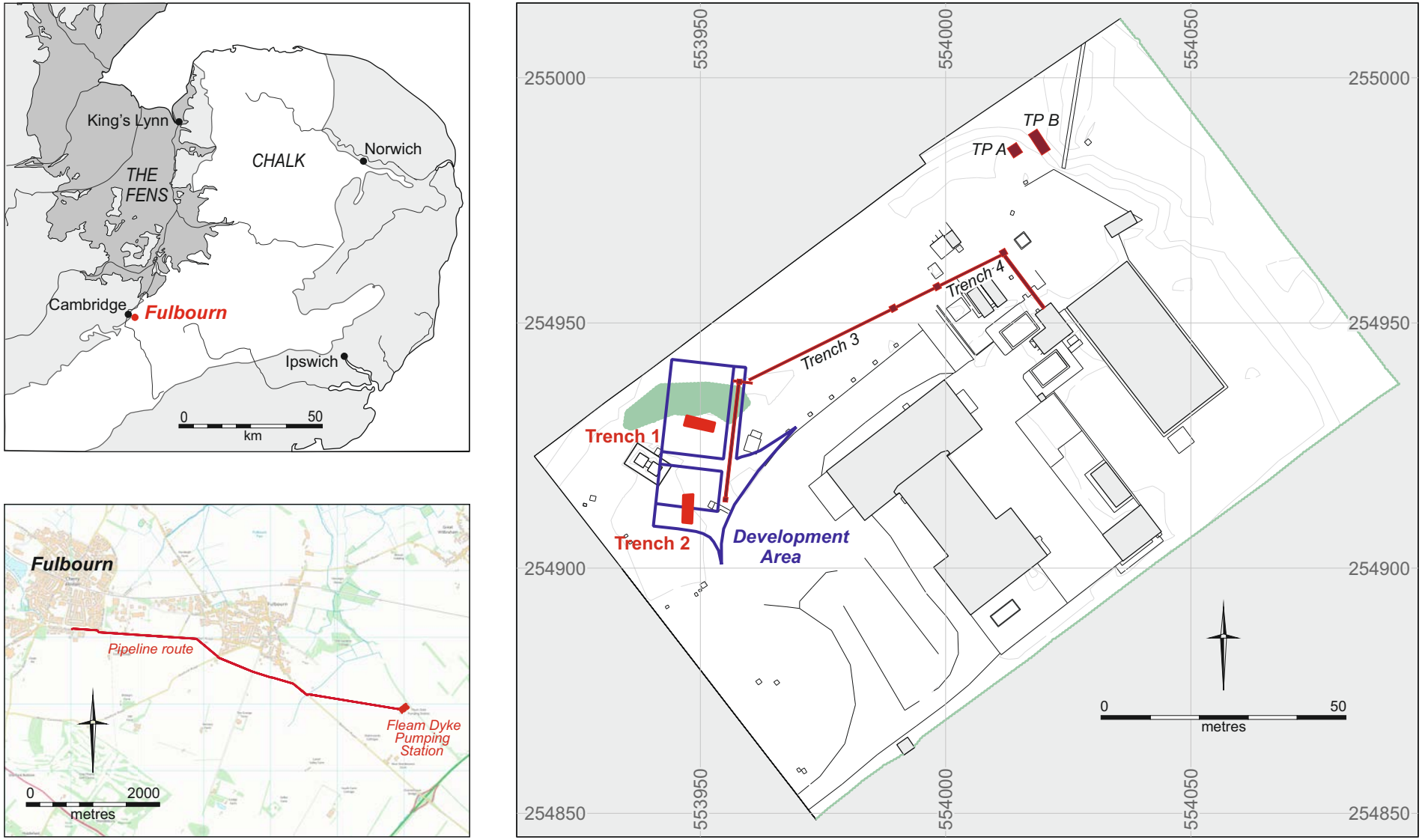

Figure 1. Location of site and trenches

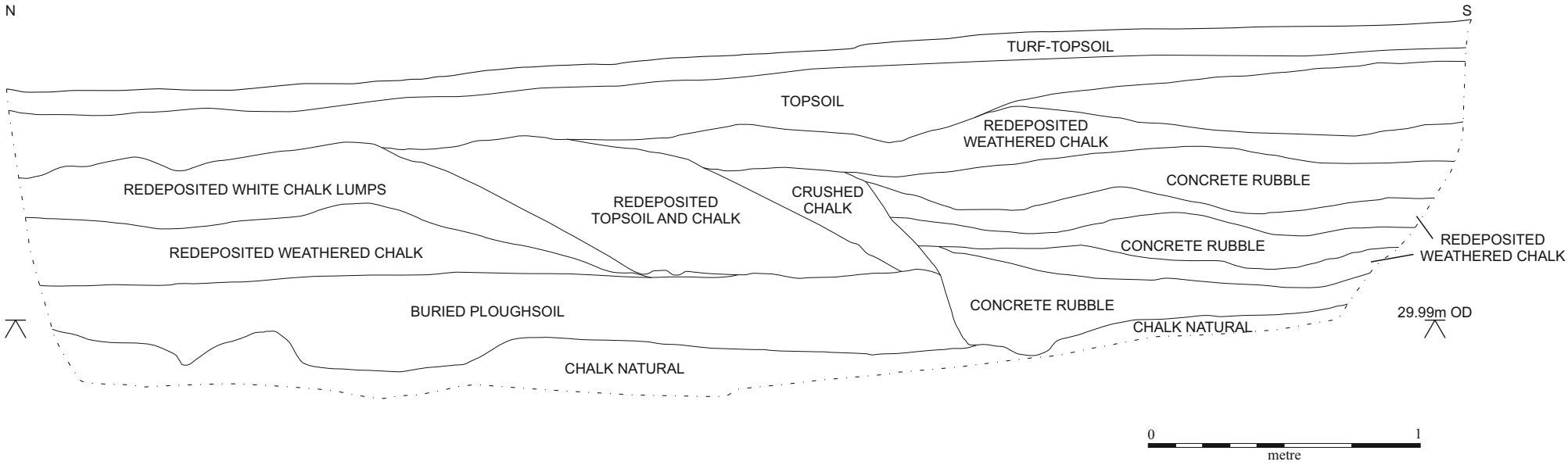

Figure 2. Section along Trench 1

Figure 3. South-facing section of Trench 1

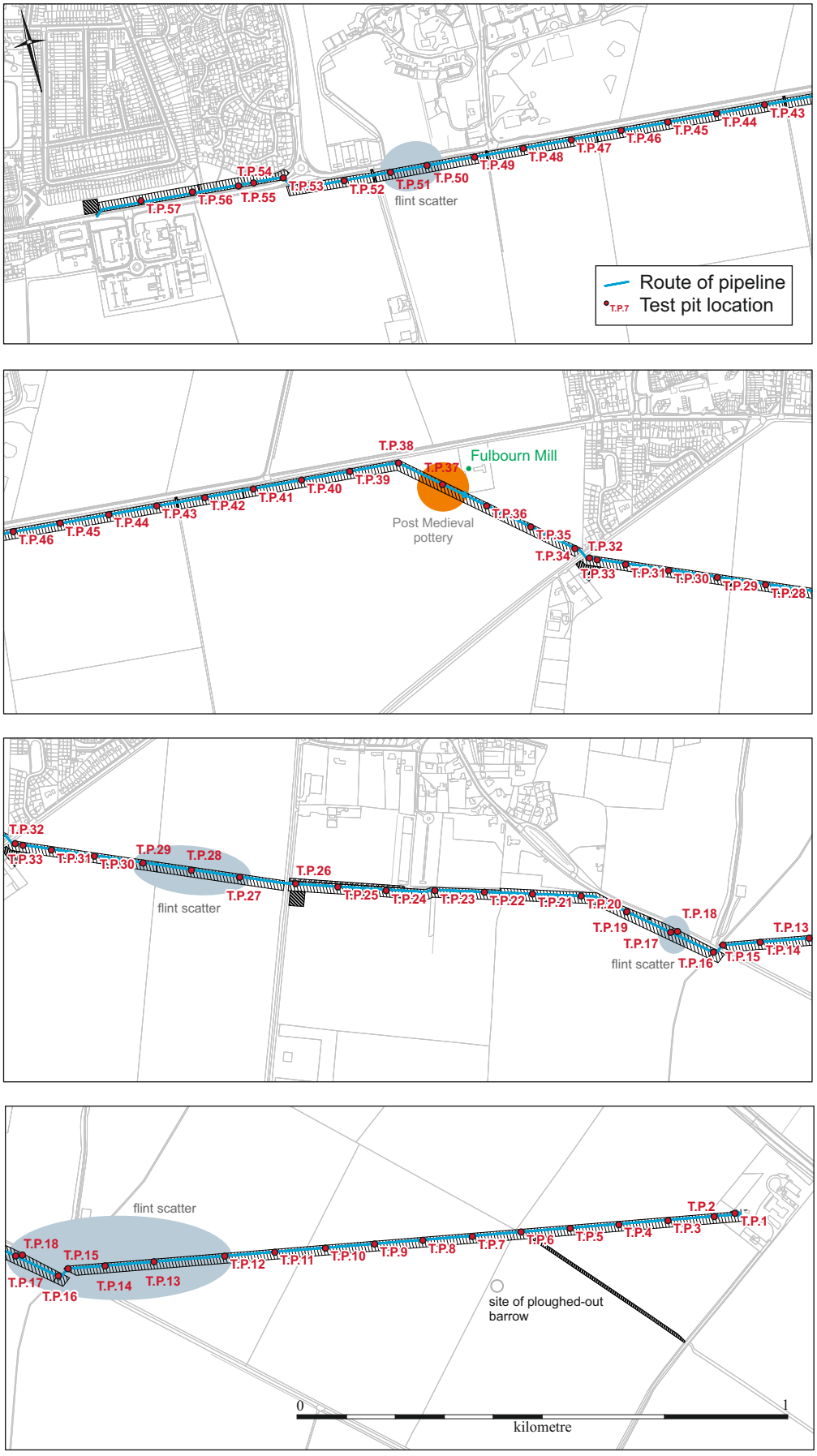

Figure 4. Locations of test pits along the pipeline

OASIS DATA COLLECTION FORM: England

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OASIS ID: cambridg3-174708

Project details

Project name	Fleam Dyke Pumping Station and Fulbourn-Cherry Hinton pipeline
Short description of the project	In March 2014 an archaeological evaluation was undertaken at the Fleam Dyke (Cambridge Water) Pumping Station, near Fulbourn, Cambridge in advance of the construction of a Nitrates Reduction Scheme facility. Two 5m long trenches were dug some 12m apart within the PDA approx. 22m north-west of the main brick building. Within both of these trenches the natural chalk was encountered about a metre down, but in this no earlier archaeological features were found. In Trench 1 the edge of a modern cut with a chalk-concrete rubble fill was found (the latter associated with the construction of a recent inspection chamber some 8m to the south-east), whilst within both trenches a layer of redeposited chalk was encountered at about 30cms depth; the latter probably associated with the groundworks for the construction of the pumping station and borehole between 1912 and 1921. This horizon overlay weathered redeposited chalk which in turn rested directly upon a c.19th century or earlier plough soil that truncated the underlying bedrock as well as a number of 'ancient' tree throws and shallow solution features present in the chalk. These features were devoid of archaeological finds. Following that in May 2014 an archaeological watching brief was carried out on a new 70m long pipeline to this facility. Similarly this did not reveal any archaeology, the pipe trenches for this being cut through made-up ground. Finally, in September 2014 an archaeological watching brief was carried out on the pits dug for the laying of a 5.5 kilometre long effluent discharge pipeline from the Fleam Dyke Pumping Station to the Anglian Water foul main on Cherry Hinton Road, Cambridge. No archaeological features were revealed within the 57 testpits examined, although a buried soil with a struck flint flake was identified in one, and a number of flint scatters identified along the route. Saxon and Postmedieval pottery was noted on the hilltop setting next to Fulbourn Windmill.
Project dates	Start: 10-03-2014 End: 25-09-2014
Previous/future work	No / No
Any associated project reference codes	FDP14 (1-3) - Sitecode
Any associated project reference codes	ECB4123 - HER event no.
Type of project	Field evaluation
Site status	None
Current Land use	Transport and Utilities 3 - Utilities
Current Land use	Cultivated Land 3 - Operations to a depth more than 0.25m
Monument type	BRICK PUMPING STATION Modern

Monument type	WINDMILL Post Medieval
Monument type	BARROW Early Bronze Age
Significant Finds	POTTERY Post Medieval
Significant Finds	POTTERY Early Medieval
Significant Finds	STRUCK WASTE FLINT Early Neolithic
Methods & techniques	"Targeted Trenches","Test Pits","Visual Inspection"
Development type	Pipelines/cables (e.g. gas, electric, telephone, TV cable, water, sewage, drainage etc.)
Development type	Service infrastructure (e.g. sewage works, reservoir, pumping station, etc.)
Prompt	Direction from Local Planning Authority - PPG16
Position in the planning process	After full determination (eg. As a condition)

Project location

Country	England
Site location	CAMBRIDGESHIRE SOUTH CAMBRIDGESHIRE FULBOURN Fleam Dyke (Cambridge Water) Pumping Station
Site location	CAMBRIDGESHIRE SOUTH CAMBRIDGESHIRE FULBOURN Fleam Dyke, Fulbourn - Cherry Hinton discharge pipeline
Postcode	CB21 5DA
Study area	5.5 Kilometres
Site coordinates	TL 5393 5485 52.169976386653 0.251122012754 52 10 11 N 000 15 04 E Line
Site coordinates	TL 490 563 52.184361585095 0.17971852128 52 11 03 N 000 10 46 E Line
Height OD / Depth	Min: 25m Max: 34m

Project creators

Name of Organisation	Cambridge Archaeological Unit
Project brief originator	Local Authority Archaeologist and/or Planning Authority/advisory body
Project design originator	Emma Beadsmoore
Project director/manager	Emma Beadsmoore
Project supervisor	Simon Timberlake
Type of sponsor/funding body	Water Authority/Company
Name of sponsor/funding body	Cambridge Water plc

Project archives

Physical Archive	Cambridge Archaeological Unit

recipient	
Physical Archive ID	FDP14(3)
Physical Contents	"Animal Bones","Ceramics","Environmental","Worked stone/lithics"
Digital Archive recipient	Cambridge Archaeological Unit
Digital Archive ID	FDP14(1-3)
Digital Contents	"Animal Bones","Ceramics","Stratigraphic","Survey","Worked stone/lithics"
Digital Media available	"GIS","Images raster / digital photography","Spreadsheets","Survey","Text"
Paper Archive recipient	Cambridge Archaeological Unit
Paper Archive ID	FDP14(1-3)
Paper Contents	"Ceramics","Stratigraphic","Survey","Worked stone/lithics"
Paper Media available	"Context sheet","Drawing","Map","Photograph","Plan","Report","Section","Survey "

Project bibliography 1

Publication type	Grey literature (unpublished document/manuscript)
Title	Fleam Dyke Pumping Station and Fulbourn-Cherry Hinton pipeline An archaeological evaluation and watching brief
Author(s)/Editor(s)	Timberlake, S.
Other bibliographic details	Report no. 1217
Date	2014
Issuer or publisher	Cambridge Archaeological Unit
Place of issue or publication	University of Cambridge
Description	Printed report includes cover with photo, 19 pages and 4 figures plus OASIS form. Also pdf version

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