Northern Archaeological Associates

YORKSHIRE DERWENT AQUEDUCT
DUPLICATION MAIN
ELVINGTON TO RICCALL

ARCHAEOLOGICAL APPRAISAL

prepared for

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on behalf of

YORKSHIRE WATER SERVICES LTD

NAA 01/104

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ARCHAEOLOGICAL APPRAISAL

1.0 INTRODUCTION

1.1 Northern Archaeological Associates were commissioned by Scott Wilson on behalf of Yorkshire Water Services Ltd to undertake an archaeological appraisal of the proposed water main duplication between Elvington and Riccall to the south-west of York (Figure 1). The aim of the appraisal was to identify any significant cultural heritage constraints (archaeological sites, listed buildings and other designated areas) that need to be taken into account during the design and construction of the new water main.

1.2 The report describes the location of the proposed pipeline and its environs, and the methodology and information sources utilised while undertaking the study. It describes any known archaeological remains along the pipeline route and immediate environs and assesses the potential for any previously unknown or unrecorded sites to survive within the area. The potential impacts and appropriate mitigation strategies of the development proposals are discussed.

1.3 The pipeline passes through two separate authorities, the City of York Council and the North Yorkshire County Council, and information presented in the report is divided between the two administrative areas.

1.4 The existing main, a 1050 mm diameter steel welded pipeline, was constructed in the 1960s within a 30 m wide easement. The proposed duplication main would be a 900 mm pipeline to be constructed within a 30 m wide easement.

1.5 This report supplements the initial Environmental Screening Report produced by Brown and Root in association with Scott Wilson on behalf of Yorkshire Water Services Ltd (Scott Wilson 2001) and revises an initial draft archaeological appraisal produced in November 2001.

2.0 LOCATIONS, TOPOGRAPHY AND GEOLOGY

2.1 The proposed route runs from Elvington wastewater treatment works to Riccall pumping station, a distance of some 14 km (Figures 3 to 7). Except for a deviation around the village of Wheldrake the route runs mostly parallel, and 25 m to the west, of the existing water main. The pipeline starts at the wastewater treatment works to the north of Elvington and runs round the west of Elvington village and then turns to continue in a south-westerly direction. The proposed route deviates from the existing pipeline by a distance of up to 330 m where it passes by the north-western side of Wheldrake. The deviation ensures the proposed pipeline does not enter the built up area of the village itself. The route then continues in a south-westerly direction before

crossing the A19 and terminating at the pumping station to the south of Riccall. The route passes through the civil parishes of Elvington and Wheldrake within the City of York and the parishes of Thorganby, Escrick, Skipwith and Riccall within the Selby District of North Yorkshire.

2.2 The landscape along the pipeline route is generally flat with a few gentle slopes and low hills. The ground surface varies in height between 8 m and 15 m OD. The area is susceptible to flooding hence numerous large dykes drain the landscape. The majority of settlements are located on marginally higher ground with Wheldrake and Escrick villages both located upon a low ridge which is orientated south-south-west to north-north-east.

2.3 The proposed pipeline route crosses six different types of underlying drift geology and soils. The types of geology and soil associations are shown in Table 1, their locations along the route are indicated on Figure 2. The majority of the land is under arable cultivation with a relatively small proportion being improved pasture, principally near the farmsteads adjacent to the pipeline route.

Table 1: Soils and geology

Type	Soil association	Geology	Soil description
552a	Kexby	Aeolian sand	Deep stoneless fine sandy soils affected by groundwater
572s	Bishampton 1	River terrace drift	Deep fine loamy soils with slowly permeable subsoils
712i	Foggathorpe 2	Glaciolacustrine clay	Slowly permeable seasonally waterlogged stoneless clayey and fine loamy over clayey soils
712a	Dale	Carboniferous and Jurassic clay and	Slowly permeable seasonally waterlogged clayey, fine loam over clayey and fine silty soils
821a	Everingham	Aeolian sand	Deep stoneless permeable fine sandy soils with bleached subsurface horizon
821b	Blackwood	Glaciofluvial drift	Deep permeable sandy and coarse loamy soils
831b	Sessay	Glaciolacustrine and glaciofluvial drift	Fine and coarse loamy, often stoneless, permeable soils

(Jarvis *et al* 1984)

3.0 METHODOLOGY AND INFORMATION SOURCES

3.1 The principal aims of the archaeological appraisal are:

- to identify known archaeological and cultural heritage sites within or immediately adjacent to the proposed pipeline routes
- to identify areas with the potential to contain any unrecorded archaeological remains
- to define areas where significant constraints will need to be taken into account during the route design
- to propose appropriate mitigation measures which could be built into the construction proposals to avoid, reduce or remedy any potential adverse effects identified

3.2 The following data sources were utilised for the appraisal:

- North Yorkshire County Council Sites and Monuments Record
- City of York Council Sites and Monuments Record
- North Yorkshire County Records Office
- East Riding of Yorkshire County Records Office
- City of York Reference Library (Local Studies)
- English Heritage National Monuments Record
- vertical and oblique aerial photographs
- published and unpublished historical and archaeological studies

A site inspection has been made of the majority of the pipeline route.

3.3 Informal consultations have been held with archaeological advisors for both the City of York Council and North Yorkshire County Council to discuss the results of the appraisal and proposed mitigation strategies.

4.0 ARCHAEOLOGICAL SITES

4.1 Archaeological sites recorded within 250 m of the proposed route for the sections within the City of York Council and the North Yorkshire County Council limits are listed in Tables 2 and 3 respectively. Sites are identified by their Sites and Monuments Record (SMR) number or National Monument Record (NMR) where the site has no SMR reference. Four new sites identified as a result of this appraisal are referred to as Sites 1 - 4. Only primary site numbers have been listed, and finds that are not accurately provenanced are not included but are referred to in the text as appropriate. A central grid reference, suggested classification and date are provided for each site, which are graded in archaeological significance as of 1 (national), 2 (regional) and 3 (local) importance. Grading is based upon professional judgement and the criteria set out in Annex 4 of Planning Policy Guidance Note 16 (DoE 1990). The location of the sites is indicated on Figures 3 to 7 from north to south along the pipeline route. Ploughed-out ridge and furrow are plotted on the same figures though not listed in Tables 2 and 3.

Table 2: Archaeological sites (City of York)

Site	Grid reference	Description	Grade	Date
2325	SE 6760 4465	Findspot: flint axe	3	
2332	SE 6720 4420	Mill	3	18th century
2333	SE 6672 4285	Brick kiln	3	18th century
2335	SE 6770 4540	Dovecot	3	17th century
SE 63 SE 10	SE 6748 4462	Building: railway station	3	*c.*1913
Site 1	SE 6960 4785*	Ridge and furrow	3	Medieval/post-medieval
Site 2	SE 6718 4448	Gravel pits	3	Post-medieval

* indicates site transected by proposed pipeline route

Table 3: Archaeological sites (North Yorkshire)

Site	Grid reference	Description	Grade	Date
12013	SE 6450 3935	Field boundaries	2	Prehistoric
12014	SE 6455 3910	Trackway	3	Post-medieval
12017	SE 6280 3780	Enclosures and field system	2	Prehistoric
12018	SE 6265 3680	Field boundaries	3	Medieval/post-medieval
12020	SE 6280 3725*	Field boundaries	2	Prehistoric/Roman
12021	SE 6275 3710	Ridge and furrow	3	Post-medieval
12022	SE 6325 3770*	Field boundaries	3	Uncertain
12023	SE 6285 3760	Field boundaries	3	Uncertain
12041	SE 6275 3698	Square barrow	2	Iron Age
12054	SE 6296 3746	Pottery	3	Roman
12061	SE 6290 3740	Roman building, possible villa	1	Roman
SE 64 SE 19	SE 6560 4150*	Field system	3	Iron Age/Roman
SE 63 NW 25	SE 6422 3952	Trackway	3	Post-medieval
SE 63 NW 26	SE 6427 3897	Trackway and enclosure	3	Medieval/post-medieval
SE 63 NW 28	SE 6445 3929	Enclosed settlement and ditches	2	Prehistoric
SE 63 NW 31	SE 6272 3721	Trackway and enclosures	2	Medieval/post-medieval
SE 64 SW 41	SE 6476 4071*	Settlement and field system	2	Iron Age/Roman
Site 3	SE 6628 4245*	Enclosure and field boundary	3	Uncertain
Site 4	SE 6492 3967	Sand pit	3	Post-medieval

* indicates site transected by proposed pipeline route

4.2 A total of 26 sites are recorded within the 250 m of the route of which six are directly transected. These comprise three areas of prehistoric settlements and associated field systems (SMR 12020, NMR SE 64 SE 19 and SE 64 SW 41), undated cropmarks of a small enclosure and field boundary (Site 3) and two areas of medieval or post-medieval ridge and furrow (SMR 12021 and Site 1). A further three sites are immediately adjacent to the proposed pipeline route, these being the site of a Roman building (SMR 12054 and 12061) and cropmarks of past field boundaries of uncertain date (SMR 12022). None of the sites are scheduled monuments, though the possible Roman villa site could be of national importance.

4.3 The sites recorded within the vicinity of the pipeline indicate four periods and types of activity. They consist of prehistoric settlement and field systems, Roman settlement, medieval field systems, and post-medieval field systems and structures.

4.4 The English Heritage Vale of York aerial photographic survey highlights a strong correlation between the type of geology and the density of recorded cropmarks. In areas of aeolian sand cropmark evidence is extremely detailed. This may in part be due to sandy soils being easier to cultivate and more attractive for settlement, though is probably due to the underlying sandy geology being more suitable to creating cropmarks. It should be noted that an absence of cropmarks does not indicate an absence of archaeological remains.

Prehistoric

4.5 All of the prehistoric sites identified were located within the southern half of the pipeline route where the route passes closest to Skipwith Common. The Common has recorded the greatest concentration of prehistoric archaeology within the region

including more than 20 Iron Age barrows. The most northerly of the prehistoric sites within 250 m of the pipeline are two cropmark field systems thought to be of Iron Age or Roman-British origin (NMR SE 64 SE 19 and SE 64 SW 41). The latter of these is recorded as also being the site of a possible settlement of the same period, though the settlement itself is centred just beyond the limit of the study area. Further south is the site of another enclosed settlement (NMR SE 63 NW 28) associated with field boundaries (SMR 12013). This settlement is located on the brow of a low ridge, noticeable within the very flat landscape. The pipeline route itself runs at the foot of this low ridge. At the southern end of the proposed route are two further areas of prehistoric field boundaries (SMR 12017 and 12020) and the site of a possible Iron Age square barrow (SMR 12041).

Roman

4.6 The principal potential archaeological constraint within the survey area is a possible Roman villa site to the south of King Rudding Lane near Riccall. Ploughing within this area has bought up Roman building material comprising stone foundations and roof tile and fragments of Roman pottery (SMR 12054 and 12061). Excavation of three trial trenches in 1977 failed to locate the actual structure though the material recovered is suggestive of a villa-type building within the immediate vicinity. Roman villa sites are generally considered to be of national importance. The landowner has indicated that the location where the stone foundations were recovered from is some 50 m to the east of the existing water main.

Medieval and post-medieval

4.7 Several cropmarks indicating past field boundaries and trackways were recorded (SMR 12014 and 12018; NMR SE 63 NW 26 and SE 63 NW 31). Three cropmarks of field boundaries of uncertain date may also be of this period (SMR 12022, 12023 and Site 3), though these may equally relate to the prehistoric landscape. Two areas of surviving ridge and furrow earthworks are transected by the pipeline route (Site 1 and SMR 12021). Gravel pits (Site 2) and a sand pit (Site 4) are shown on the 1850 1st edition Ordnance Survey map. There are a number of areas of former ridge and furrow recorded on the English Heritage Vale of York survey which are now ploughed flat but which may survive as negative features beneath the topsoil. These areas are located on Figures 3 to 7 as cropmark ridge and furrow. The remains of a mill, a dovecote and brick kilns (SMR 2332, 2333 and 2335 respectively) are located within 250 m of the proposed route, though not directly transected by the pipeline. The upstanding remains of the 1913 railway station in Wheldrake are also considered historically significant (NMR SE 63 SE 10), though these lie over 100 m east of the proposed route.

4.8 Elvington, located adjacent to an historic crossing point of the River Derwent, is an Anglian settlement recorded in the Domesday Book (1086). The settlement has prospered from passing trade that has crossed the River Derwent at this point. The village is located on marginally higher ground set back 200 m from the western river bank (Victoria County History 1976).

4.9 Wheldrake village is Anglian in origin. The historic core of the village is orientated along the top of a ridge within the generally flat landscape. The village exhibits a

classic medieval "toft and croft" layout. There were reputed to be eight tofts on either side of the street, indicating a relatively important village. There are some surviving 16th and 17th century buildings, though most date from the 18th century or later (*ibid*).

Potential for previously unrecorded archaeological remains

4.10 To assess the potential for previously unrecorded archaeological remains research has looked at both known archaeological sites outwith the pipeline corridor and the results of watching briefs undertaken along recently constructed pipelines within the vicinity of York. Based on the density of sites, their type and period, and the relationship between recorded cropmarks and underlying geology, two areas have been identified as having a greater potential for containing previously unrecorded archaeological remains.

4.11 To the north-west of Wheldrake, within an area of aeolian sand, there are cropmarks of a prehistoric landscape comprising a continuous field system with associated smaller enclosures and settlements. The cropmarks cover an area approximately 2 km square within arable fields on all four sides of Wheldrake Wood. The southern boundary of the cropmarks corresponds exactly with a change in underlying geology to glaciolacustrine clay. Where the proposed route runs around the north and west of Wheldrake it is approximately 1 km south-west of these cropmarks but within an area of underlying glaciolacustrine clay where there is a virtual total absence of cropmark evidence. It is probable that the prehistoric landscape identified around Wheldrake Wood continued south, particularly as Wheldrake village is situated on higher ground more suitable for occupation. There is therefore a potential for previously unknown archaeological remains to be encountered within this section of the pipeline route.

4.12 The proposed route runs through another area of glaciolacustrine clay which is largely absent of cropmarks between sites SMR 12022 and NMR SE 63 NW 26. Immediately east of this section the underlying geology changes to aeolian sand upon which extensive cropmarks of prehistoric field systems and enclosures have been identified to the north and west of Skipwith Common. There is a potential for further archaeological remains related to these field systems to survive within this section of the proposed pipeline route.

4.13 The results of archaeological monitoring along recent similar water pipeline schemes within the York area were also researched in order to assess the potential for previously unrecorded remains to be encountered during construction works. Such schemes included the 23 km pipeline between Moor Monkton and Elvington (YAT 1996) and the 13 km pipeline between Elvington and Harton (OSA 1997). With the exception of a Romano-British farmstead on the route of the former pipeline, no significant previously unrecorded sites were encountered along the route of either pipeline despite continuous archaeological monitoring, the vast majority of the features identified being the remnants of medieval field systems and modern or undated field boundaries.

5.0 LISTED BUILDINGS AND DESIGNATED AREAS

City of York

5.1 The old village centre of Elvington contains 12 listed buildings, mostly of 18th century date, and is designated a conservation area (Figure 3). However, the proposed pipeline route does not pass through the conservation area, nor does it pass within 250 m of any listed building.

5.2 Within Wheldrake there are 27 listed buildings and the village centre is designated a conservation area (Figure 4). However, the proposed pipeline route does not pass through the conservation area, nor does it pass within 250 m of any listed building.

5.3 There were no other designated areas (battlefield sites or registered parks and gardens) transected by the pipeline corridor. Listed buildings within conservation areas are not indicated on any of the figures.

6.0 CULTURAL HERITAGE CONSTRAINTS AND MITIGATION

Archaeology

6.1 Although there is a notable density of archaeological features within the vicinity of the proposed pipeline it is considered, with the possible exception of the potential Roman villa site near Riccall (SMR 12061), that any physical impact on the identified sites can be adequately mitigated either through advanced archaeological survey and excavation or a watching brief during the course of topsoil stripping or trench excavation. This work should be carried out in accordance with the North Yorkshire County Council guidelines within both administrative areas.

6.2 Subject to confirmation of the extent and location of the possible Roman villa site it is recommended that the pipeline is re-routed in order to avoid having an adverse impact on any subsurface remains should these be located within the proposed pipeline corridor.

Conservation areas

6.3 Both Elvington and Wheldrake villages have conservation areas designated to preserve the character and appearance of the settlements. However, the pipeline route does not transect either of these conservation areas and therefore will not have an adverse impact on either village.

7.0 ARCHAEOLOGICAL MITIGATION STRATEGY

Objectives

7.1 The principal objectives of the archaeological mitigation strategy for the pipeline can be defined as follows:

- avoid any impact on sites of national importance
- record all visible remains of ridge and furrow earthworks directly transacted by the pipeline route
- record areas of archaeological activity along the pipeline route and recover any associated artefacts during a watching brief
- establish the date and nature of any areas of archaeological activity

7.2 The methods by which the objectives are to be achieved include:

- to establish the location of the possible Roman villa site near Riccall by means of geophysical survey and fieldwalking and if necessary re-routing of the pipeline to avoid having an impact on the site and any associated features (SMR 12061)
- survey of ridge and furrow earthworks in advance of topsoil stripping
- geophysical survey targeting known cropmark sites and sampling of areas of glaciolacustrine clay where there is an absence of cropmarks
- rapid fieldwalking within vicinity of known cropmark sites
- rapid fieldwalking within two sections of pipeline closest to known cropmark field systems around Wheldrake Wood and Skipwith Common respectively
- further evaluation of sites of archaeological significance as necessary based upon the results of the field survey (such as intensive fieldwalking surveys)
- watching brief of topsoil removal within the pipeline corridor in the vicinity of all known archaeological sites in order to identify, investigate, record and recover features or finds of archaeological significance (where preservation *in situ* is not feasible)
- inspection to record the remains of ridge and furrow cultivation in areas of ploughed out ridge and furrow systems
- preparation of a report on the results of all archaeological works undertaken

7.3 Where geophysical survey (gradiometry) has been recommended it will be carried out within a 50 m wide corridor with the eastern edge of the survey located at least 10 m from the existing pipeline. This is because the existing 1050 mm steel pipeline will blank out the results of any such survey by creating a magnetic shadow on either side of the pipeline.

7.4 The archaeological mitigation strategy would be reviewed based upon the results of the geophysical survey and the fieldwalking undertaken.

8.0 DESCRIPTION OF WORKS

8.1 In order to clarify the predicted impacts of the proposed pipeline route an initial phase of archaeological evaluation by means of geophysical and fieldwalking survey is proposed. The proposed survey amounts to some 11.5 ha of geophysical survey and

5.2 km of rapid fieldwalking survey (35% of the pipeline route length). Irrespective of the results of the field survey it is anticipated that a watching brief will be necessary within certain areas of the pipeline route. Areas of proposed archaeological evaluation along the proposed pipeline route are described below north to south from Elvington to Riccall divided between the two administrative authorities. Proposed areas of fieldwalking, geophysical survey and anticipated watching brief are shown on Figures 3 to 7. Prior to the commencement of further archaeological evaluation a detailed project design will be prepared and submitted for approval to the archaeological advisors of both the City of York Council and North Yorkshire County Council.

Archaeological sites (City of York)

8.2 ***Site 1*** Survey of visible earthwork remains of ridge and furrow (Figure 3). A site inspection to record the sub-surface remains will also be undertaken during topsoil stripping. This will comprise recording of the spacing of the furrows, sample excavation, recording and retrieval of any associated finds.

8.3 ***North and west of Wheldrake*** Sample geophysical survey (gradiometry) will be undertaken of three areas (totalling some 2.3 ha) along the proposed pipeline corridor in order to investigate the possible continuation of the prehistoric landscape identified to north-west near Wheldrake Wood (Figure 4). The survey will sample parts of the proposed route where there is no record of past ridge and furrow cultivation. Rapid fieldwalking would also be undertaken along the pipeline corridor within the fields to the north and west of Wheldrake (a length of 1050 m).

Archaeological sites (North Yorkshire)

8.4 ***Site 3 and NMR SE 64 SE 19*** Three areas of geophysical survey (gradiometry) will be undertaken where the pipeline route transects cropmarks associated with both of these sites (Figures 5 and 6). Each of the areas would measure 200 m by 50 m (a total of 3 ha). Rapid fieldwalking would also be undertaken (a total length of 1650 m). Unless further evaluation is required it is anticipated that a watching brief would be carried out during construction within the vicinity of, and between, these two sites.

8.5 ***NMR SE 64 SW 41*** Geophysical survey (gradiometry) will be undertaken of a 200 m by 50 m (1 ha) area where the pipeline route transects this site (Figure 6). Rapid fieldwalking would be undertaken (a length of 200 m). Unless further evaluation is required it is anticipated that a watching brief would be carried out during construction within the vicinity of this site.

8.6 ***SMR 12013, NMR SE 63 NW 25 and SE 63 NW 28*** Geophysical survey (gradiometry) will be undertaken of a 200 m by 50 m area (1 ha) along the pipeline route within the vicinity of these sites (Figure 6). Rapid fieldwalking would be undertaken (a length of 800 m). Unless further evaluation is required it is anticipated that a watching brief would be carried out during construction within the vicinity of these sites.

8.7 ***SMR 12022 and 12023*** An area of geophysical survey (gradiometry) would be undertaken within the vicinity of cropmarks associated with these two sites (Figure 7). A further sample area of geophysical survey will be undertaken to the north of site

SMR 12022 in order to investigate the possible continuation of the prehistoric landscape identified to north and west of Skipwith Common on aeolian sand east of the pipeline route. Both areas of geophysical survey would measure 200 m by 50 m (a total of 2 ha). Rapid fieldwalking would also be undertaken (a total length of 1150 m). Unless further evaluation is required it is anticipated that a watching brief would be carried out during construction within the vicinity of these two sites.

8.8 ***SMR 12054 and 12061*** A geophysical survey and a fieldwalking survey would be undertaken within the field to the south of King Rudding Lane where the possible Roman villa site (SMR 12061) is situated (Figure 7). The geophysical survey would comprise 1.7 ha and would evaluate a 50 m wide corridor along the line of the proposed pipeline as well as an area around the location given for the villa by the landowner. This would aim to locate the remains of the villa in order to ascertain whether or not the proposed pipeline will transect the villa site. If the location of the villa is confirmed as being on the proposed pipeline route then it would be recommended that the pipeline route should be amended to avoid having an impact upon the site. A rapid field walking survey would be undertaken within the vicinity of all these sites. This would extend to a total length of 350 m but would also include a block of survey some 200 m wide for the first 80 m of the pipeline route to the south of King Rudding Lane to aid in ascertaining the location of the villa. Unless further evaluation is required it is anticipated that a watching brief would be carried out during construction within the vicinity of these sites.

8.9 ***SMR 12020 and NMR SE 63 NW 31*** A 120 m by 50 m area (0.6 ha) of geophysical survey (gradiometry) would be undertaken within the vicinity of cropmarks associated with these two sites (Figure 7) in order to establish the nature of any potential archaeological anomalies within the area of recorded medieval and post-medieval enclosure. Unless further evaluation is required it is anticipated that a watching brief would be carried out during construction within the vicinity of these two sites.

8.10 ***SMR 12021*** A survey of visible earthwork remains of ridge and furrow would be undertaken as well as a site inspection to record the sub-surface remains (Figure 7). This will comprise recording of the spacing of the furrows, sample excavation, recording and retrieval of any associated finds.

8.11 Intermittent archaeological inspection will also be undertaken along all sections of the stripped pipeline corridor.

Ploughed-out ridge and furrow remains

8.12 Where past fields of ridge and furrow cultivation have been identified in areas that are now levelled as arable fields or improved grassland a site inspection to record the remains will be undertaken. This will comprise recording of the spacing of the furrows, sample excavation, recording and retrieval of any associated finds. This shall be undertaken for each separate field of cropmark ridge and furrow directly transacted by the pipeline. Areas of cropmark ridge and furrow are shown on Figures 3 to 7.

Methodology

8.13 Prior to the commencement of further archaeological works a detailed project design will be prepared and submitted for approval to the archaeological advisors of both the City of York Council and North Yorkshire County Council.

Geophysical survey

8.14 Geophysical survey (gradiometry) will be carried out within a 50 m corridor with the eastern edge of the survey located at least 10 m from the existing pipeline. This is because the existing 1050 mm steel pipeline will blank out the results of any such survey by creating a magnetic shadow on either side of the pipeline. Resistivity and gradiometer survey undertaken within the vicinity of the possible Roman villa (SMR 12061) will cover a wider area in order to locate the probable remains of the Roman building. Geophysical surveys would be undertaken in accordance with English Heritage (1995) guidance.

Rapid fieldwalking

8.15 The field survey would consist of a series of five transects along the length of the proposed pipeline corridor based at intervals 10 m apart. Allowing for a scanning width of some 2 m this amounts to a sample of some 20% of the survey area. Collection would be upon individual transects with the location of any artefacts recorded along the length of each transect within 10 m collection units. The field walking survey undertaken within the vicinity of the possible Roman villa (SMR 12061) will cover a wider area in order to locate the possible remains of the Roman building.

Intensive fieldwalking

8.16 Should significant concentrations of artefacts be identified during the course of the rapid fieldwalking survey then any such areas would be subjected to more intensive fieldwalking. This additional survey would be on the basis of 10 m square grids from which a total collection of all artefacts would be made.

Monitoring and excavation

8.17 Archaeological monitoring will be undertaken during all topsoil removal within the designated sections of the pipeline route. All removal of topsoil will be undertaken using a back-actor fitted with a toothless ditching bucket, and will operate under archaeological supervision at all times. The machine will remove topsoil and any other deposits down to a depth at which any archaeological deposits are identified. Thereafter any necessary archaeological work will be undertaken by hand unless either extensive or deep deposits require removal.

8.18 Any archaeological features identified would be hand-cleaned, planned and recorded. All archaeological features would be photographed and recorded at an appropriate scale. A written description of features will be recorded using an established context recording system. Finds will be recorded, processed and submitted for post-

excavation assessment. Thirty-litre bulk palaeoenvironmental samples will be taken from appropriate deposits (such as ditch and pit fills) and submitted for assessment.

Report preparation

8.19 On completion of the excavation an assessment of the potential for further analysis of the site records and finds will be undertaken in accordance with English Heritage (1991) guidelines. This will include:

- collation of all site records
- compilation of a site narrative
- production of context, photographic, finds and illustration databases
- examination of the finds assemblages by relevant period specialists
- environmental assessment of selected bulk samples and other samples
- preparation of an assessment report which identifies areas of further analysis

8.20 A report on the surveys and excavations will be prepared and submitted to the City of York and the North Yorkshire Sites and Monuments Records within six months of the completion of fieldwork. A publication report will be produced if appropriate

Archive deposition

8.21 Formal arrangements for the storage of the archive and the deposition of any finds will be made with the curator of Yorkshire Museum in York subject to the agreement of the landowners.

9.0 MONITORING

9.1 Access to the archaeologists of the City of York Council and the Heritage Unit of North Yorkshire County Council to monitor the progress and results of the archaeological investigations would be provided at all reasonable times, subject to prior notification to the archaeological project manager and health and safety requirements.

10.0 CONCLUSION

10.1 The 14 km duplication main between Elvington and Riccall passes through two separate authorities, the City of York Council and the North Yorkshire County Council. The archaeological appraisal has identified 26 archaeological sites within 250 m of the pipeline route, the majority of which are within North Yorkshire. The pipeline route directly transects six of the sites. Within the City of York an area of medieval or post-medieval upstanding ridge and furrow is transected by proposed route. Within North Yorkshire the route transects three areas of prehistoric settlements and associated field systems, cropmarks of past field boundaries of uncertain date, and one area of medieval or post-medieval ridge and furrow. A further three sites are

immediately adjacent to the proposed pipeline route, these being the site of a possible Roman villa and further cropmarks of past field boundaries of uncertain date. None of the sites are scheduled monuments although the possible Roman villa site could be of national importance. There were no listed buildings within the vicinity of the proposed route.

10.2 Research on the wider region has identified detailed cropmark complexes of prehistoric settlements and field systems within areas where the underlying geology is comprised of aeolian sand both to the north-west and the north-east of the proposed route. These cropmarks are likely to be part of a wider prehistoric landscape which encompasses the pipeline route itself. There is therefore a potential for associated archaeological remains to survive along the proposed pipeline route, especially within the vicinity of Wheldrake village which is situated upon a low ridge within the generally flat flood plain of the River Derwent.

10.3 In order to mitigate the impact of the proposed pipeline a staged scheme of archaeological works is suggested. The initial stage of archaeological evaluation prior to construction would comprise some 11.5 ha of geophysical survey and 5.2 km (35% of the route length) of rapid fieldwalking survey. Based on the results of these surveys the mitigation strategy would be reviewed. If geophysical survey and fieldwalking confirm the location of the Roman villa site it would be recommended that the pipeline is re-routed to avoid having an impact on this site. The second phase of work would include targeted trial trenching and watching brief, and excavation within the vicinity of all identified archaeological sites, periodic archaeological monitoring of all other sections of the pipeline, recording of past ridge and furrow cultivation and preparation of a report on all the fieldwork results.

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Illustrations: Damien Ronan

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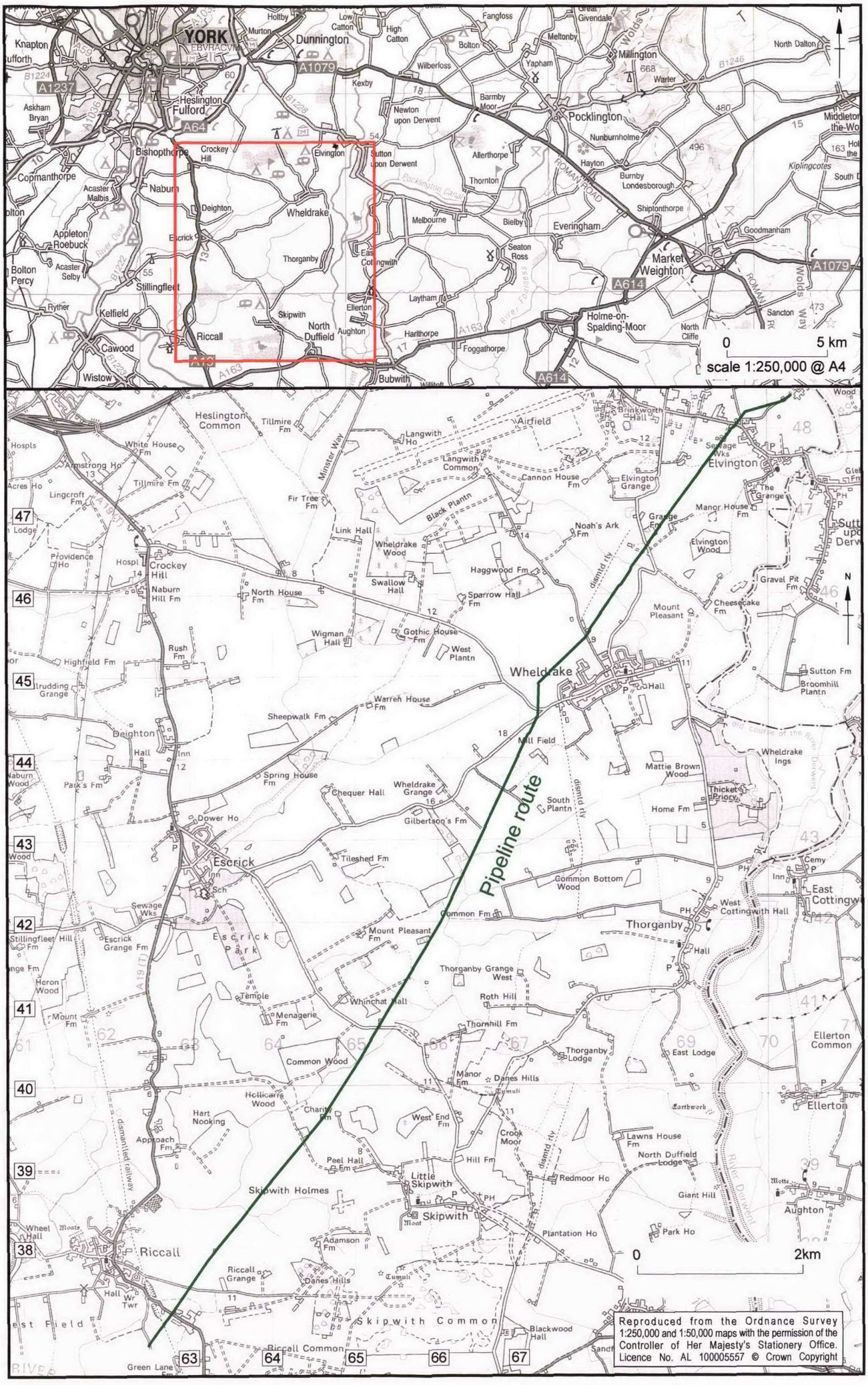

Figure 1 Yorkshire Derwent Aqueduct: pipeline location plan

Type	Soil association	Geology	Soil description
552a	Kexby	Aeolian sand	Deep stoneless fine sandy soils with affected by groundwater
572s	Bishampton 1	River terrace drift	Deep fine loamy soils with slowly permeable subsoils
712i	Foggathorpe 2	Glaciolacustrine clay	Slowly permeable seasonally waterlogged stoneless clayey and fine loamy over clayey soils
712a	Dale	Carboniferous and Jurassic clay and	Slowly permeable seasonally waterlogged clayey, fine loam over clayey and fine silty soils
821a	Everingham	Aeolian sand	Deep stoneless permeable fine sandy soils with bleached subsurface horizon
821b	Blackwood	Glaciofluvial drift	Deep permeable sandy and coarse loamy soils
831b	Sessay	Glaciolacustrine and glaciofluvial drift	Fine and coarse loamy, often stoneless, permeable soils

(Jarvis *et al* 1984)

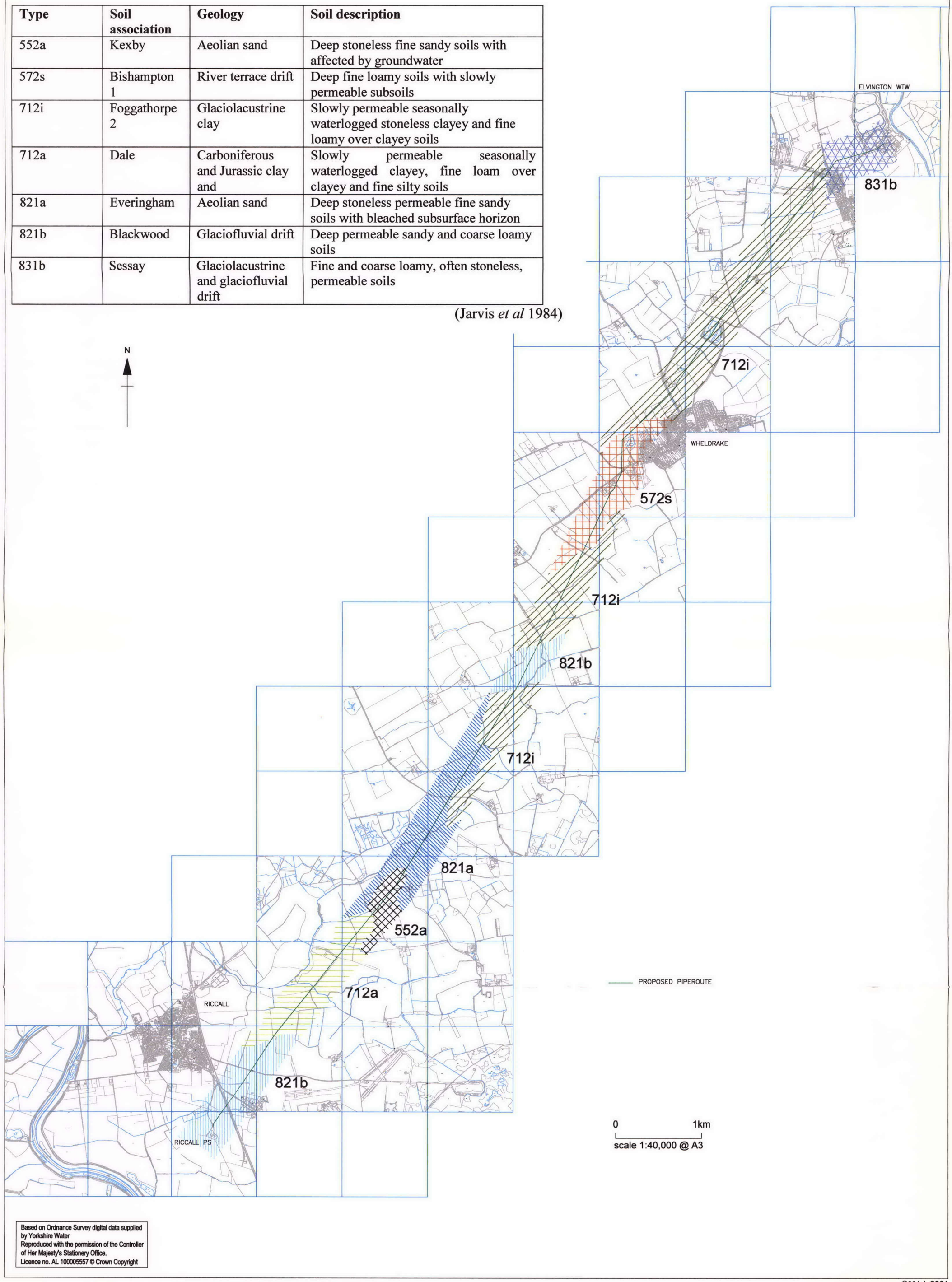

Figure 2 Yorkshire Derwent Aqueduct: geological areas along the pipeline route

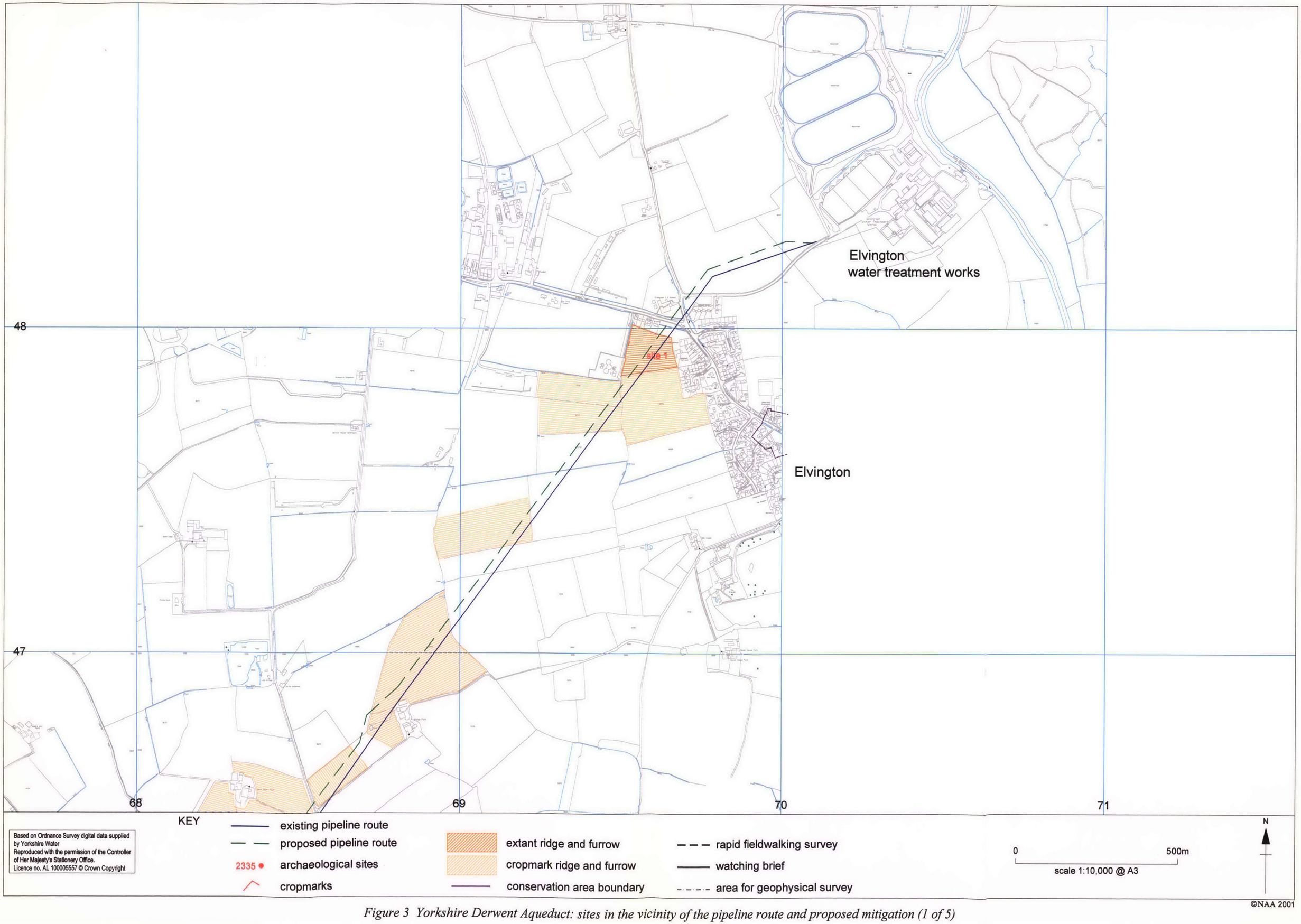

Figure 3 Yorkshire Derwent Aqueduct: sites in the vicinity of the pipeline route and proposed mitigation (1 of 5)

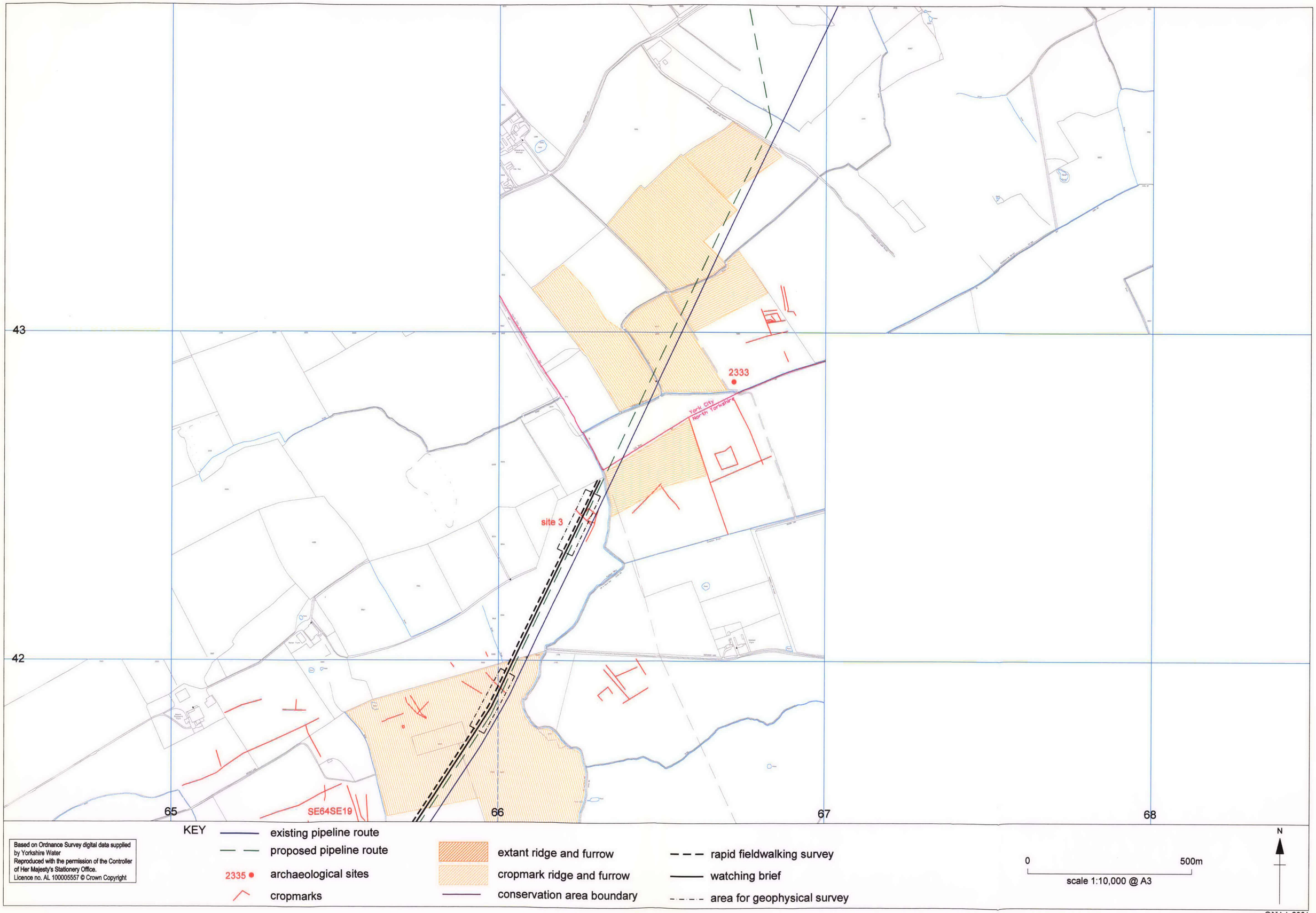

Figure 5 Yorkshire Derwent Aqueduct: sites in the vicinity of the pipeline route and proposed mitigation (3 of 5)

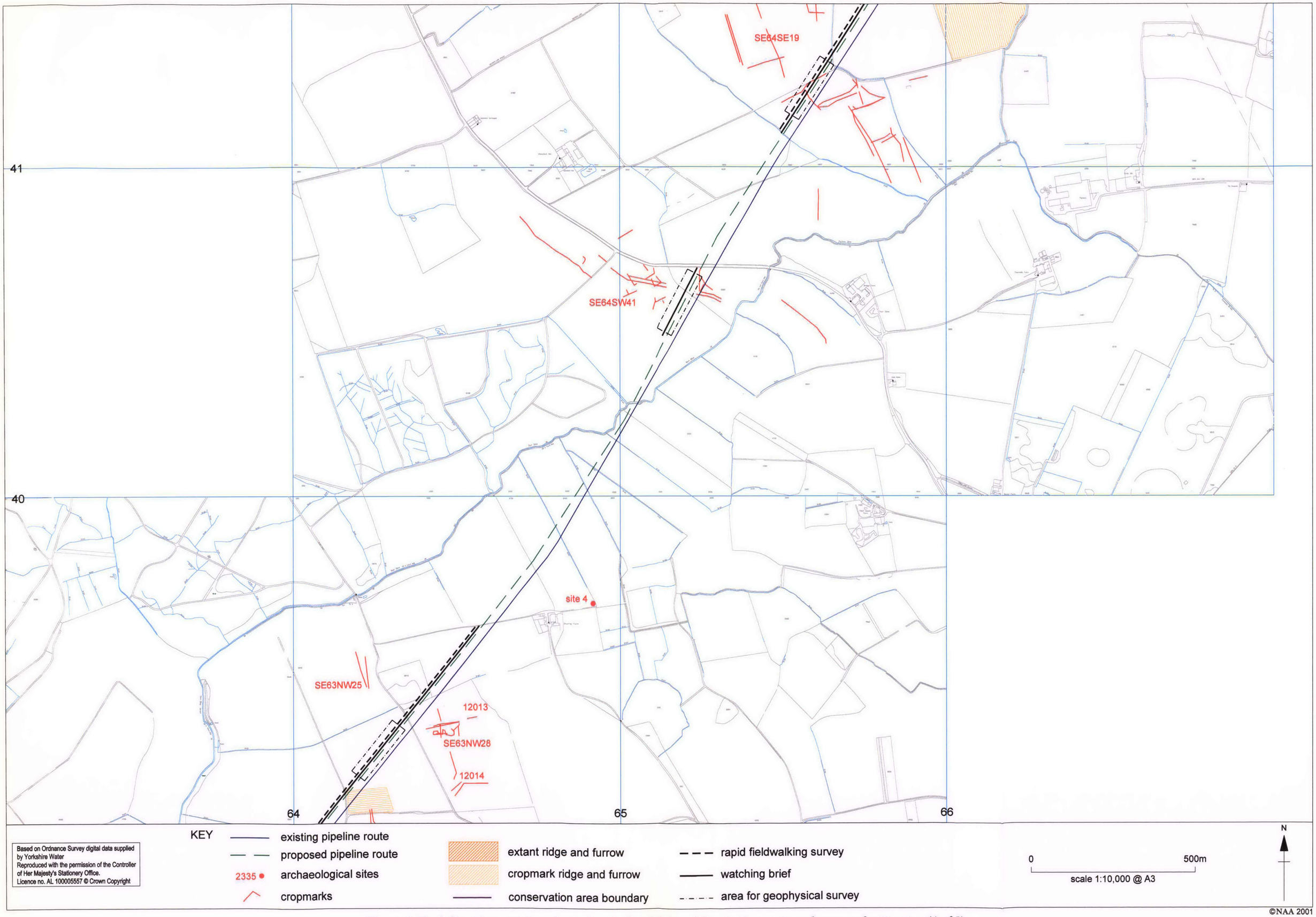

Figure 6 Yorkshire Derwent Aqueduct: sites in the vicinity of the pipeline route and proposed mitigation (4 of 5)

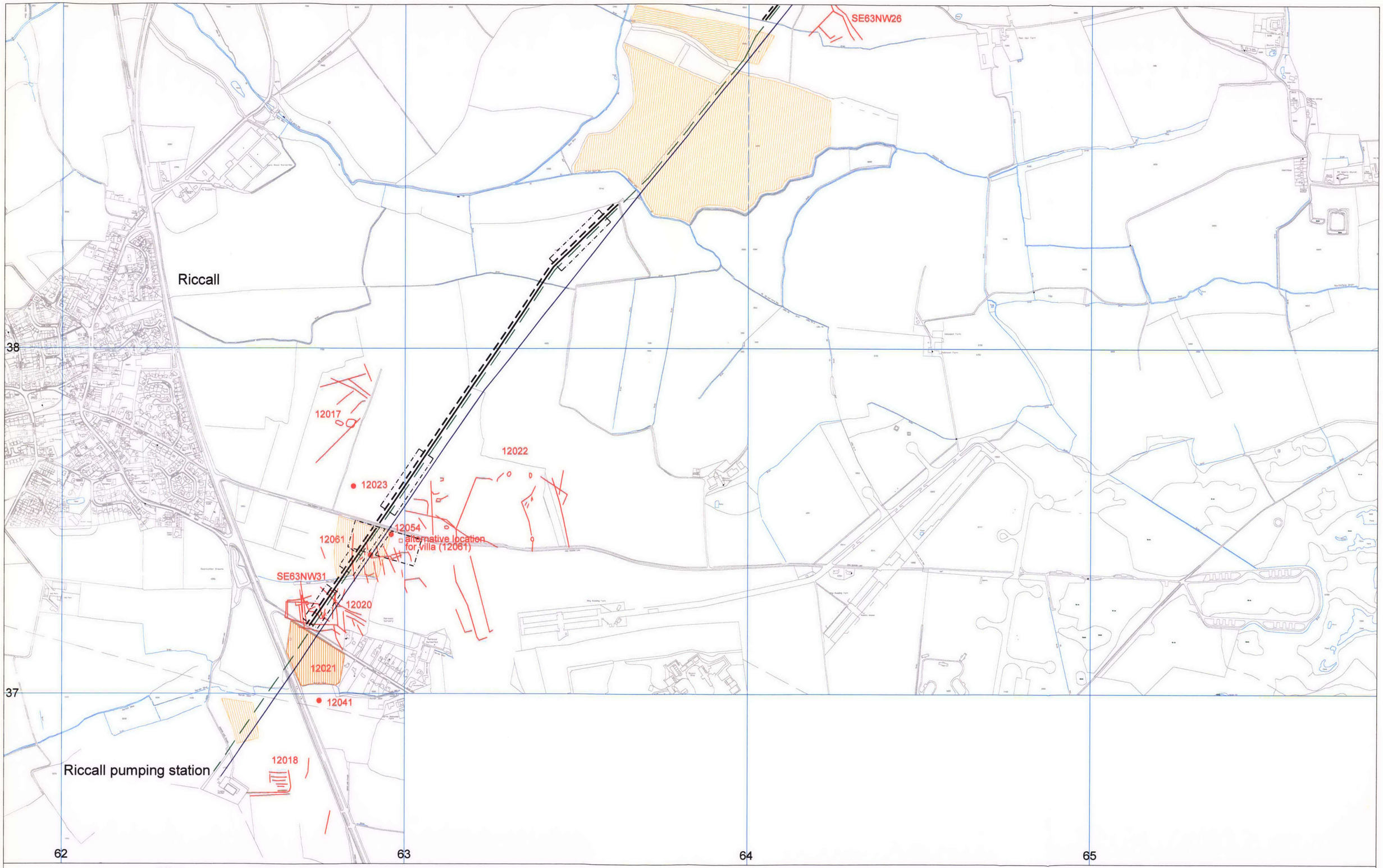

Figure 7 Yorkshire Derwent Aqueduct: sites in the vicinity of the pipeline route and proposed mitigation (5 of 5)

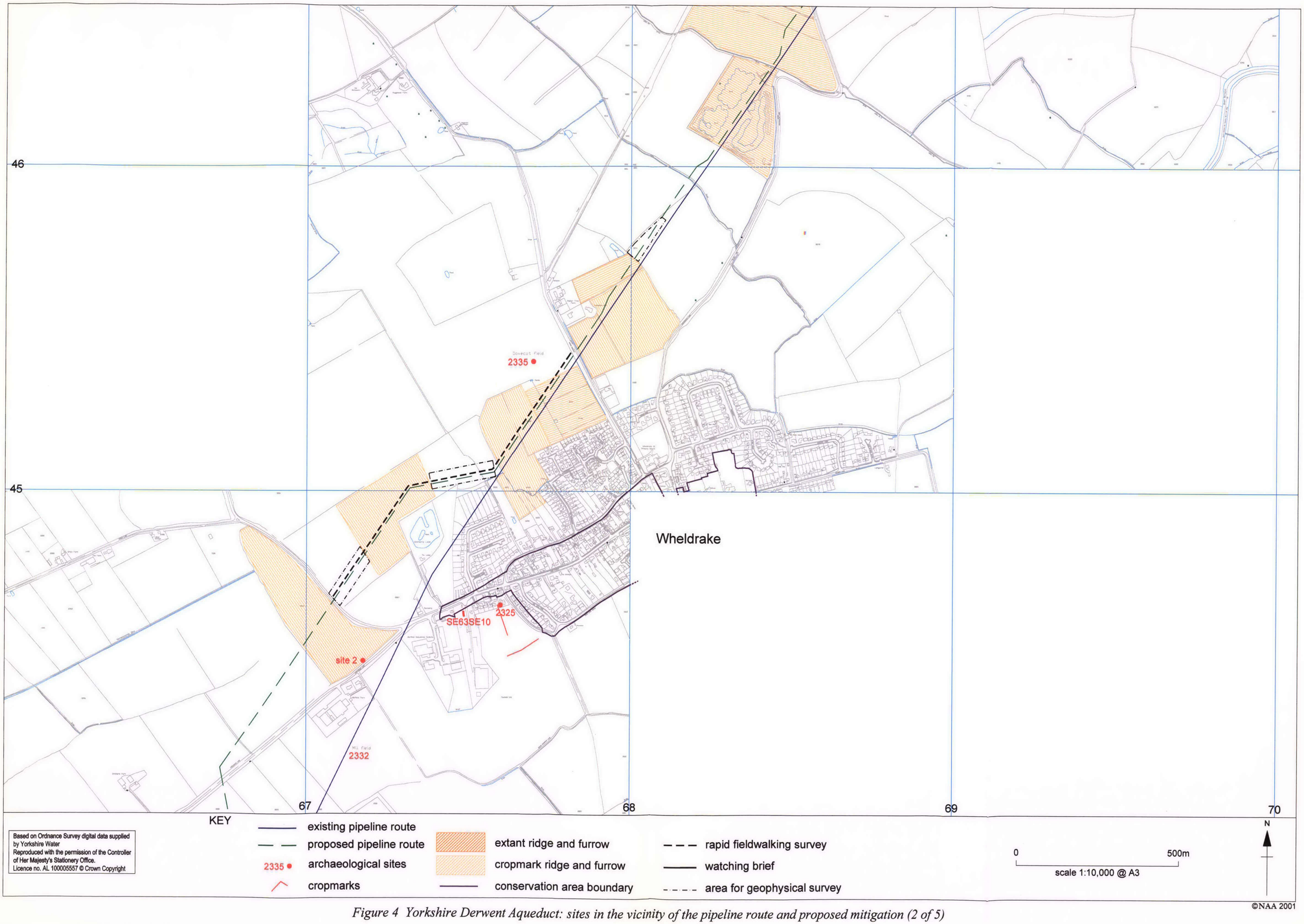

Figure 4 Yorkshire Derwent Aqueduct: sites in the vicinity of the pipeline route and proposed mitigation (2 of 5)