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A66 Greta Bridge to Dyson Lane Improvements

Summary Of Geophysical Survey And Recommendations For Further Archaeological Investigations

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A66 GRETA BRIDGE TO DYSON LANE IMPROVEMENTS

SUMMARY OF GEOPHYSICAL SURVEY AND RECOMMENDATIONS FOR FURTHER ARCHAEOLOGICAL INVESTIGATIONS

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SUMMARY OF GEOPHYSICAL SURVEY AND RECOMMENDATIONS FOR FURTHER ARCHAEOLOGICAL INVESTIGATIONS

EXECUTIVE SUMMARY

A programme of geophysical survey was undertaken between September and November 1998 as part of the Stage 3 archaeological field assessment work for the proposed A66 Greta Bridge to Dyson Lane Improvement Scheme The work was carried out by GeoQuest Associates for BHWB Environmental Design & Planning, on behalf of North Yorkshire County Council and the Highways Agency

Some six hectares were surveyed, to assess the various route options that were then under consideration In addition to several areas of ridge and furrow cultivation seen towards the west end of the scheme, geophysical anomalies suggestive of possible prehistoric activity were identified near Grove House, and the possible ploughed down remains of a Roman road alignment were seen adjacent to Lanehead Lane. An assessment of the four favoured route options suggests that eight archaeological sites of varying importance will be affected to some degree by the proposals

Additional Stage 3 investigations are now proposed so that the scale, depth, nature and date of any archaeological deposits affected by the scheme can be determined. It is suggested that this work would comprise a combination of trial trenching, test pitting, and earthwork survey, and the results would enable an appropriate mitigation strategy to be formulated

1 INTRODUCTION

1.1 In July 1998 BHWB Environmental Design & Planning were commissioned by North Yorkshire County Council and the Highways Agency to review and update the archaeological information gathered for the above road improvement scheme A condition survey of the various route options was also carried out (BHWB 1998a), and this led to the formulation of a programme of Stage 3 archaeological field assessment work, in line with the requirements of volume 11 of the Design Manual for Roads and Bridges (DMRB, DOT 1994)

It should be noted that the road improvement corridor is divided between County Durham in the east and North Yorkshire in the west, the boundary being a small stream between Thorpe Grange and Greenbrough

2 PREVIOUSLY IDENTIFIED ARCHAEOLOGICAL SITES

2 1 The combined results of a 1997 archaeological desk-top survey (NAA 1997), a Stage 2 environmental assessment report (Landmark Partnership 1998, 23-25), and the 1998 condition survey (BHWB 1998a) identified a total of eight archaeological sites within the various road improvement corridors. Some of these sites are discussed in detail in the condition survey report, and all can be summarised, from west to east, as follows

Site	Description	Importance	NGR	Reference
A1	Roman bunal site, north-west ot Thorpe Grange	Regional	NZ09051295 centred	NAA site 27, LP site 16
A2	Roman road, Thorpe Grange	District	NZ09401260 centred	NAA site 26, LP site 15
A3	Stone Stoops Bridge and Stone Stoops House (site of)	No grade	NZ10131223 accurate, NZ10141221 accurate	
A4	Roman road, Newsham Grange and Greenbrough	Regional	NZ10401200 centred	NAA site 25, LP site 14
A5	Ridge and furrow earthworks (site of), west of Greenbrough	No grade	NZ10341187-NZ10561166 centred	
A6	Ridge and furrow earthworks (site of), east of Grange Cottages	Local	NZ10S01160 centred	
A7	Ridge and furrow earthworks, and field boundaries, south-east of Grove House	Local	NZ10951145 centred	
AS	Roman road, Stephen Bank	District	NZ11551113 centred	NAA site 21

2.2 As the present A66 broadly follows the alignment of the Scotch Corner to Penrith Roman road (Margary 1973, 433-446), it was also considered that there was a high potential for as yet undiscovered sites within the proposed road corridor

3 SUMMARY OF GEOPHYSICAL SURVEY

INTRODUCTION

3.1 A programme of geophysical survey was commissioned as the first phase of the Stage 3 field investigations, with the aim of providing more information about any archaeological remains which might coincide with the various road improvement corridors

3.2 The work was undertaken as two linked phases of survey, Phase 1 concentrating on the west end of the scheme around Thorpe Grange and Thorpe Grange Cottages, while Phase 2 considered the area the east, between Newsham Grange and Smallways In all, some six hectares were surveyed, divided between 13 separate areas, the locations of the survey areas are indicated on figure 1, while more detailed plans are provided in the technical survey report

3 3 The geophysical survey was undertaken by GeoQuest Associates, working as sub-contractors to BHWB Their report was produced in February 1999 (GeoQuest 1999), and the following text provides a summary of the main findings

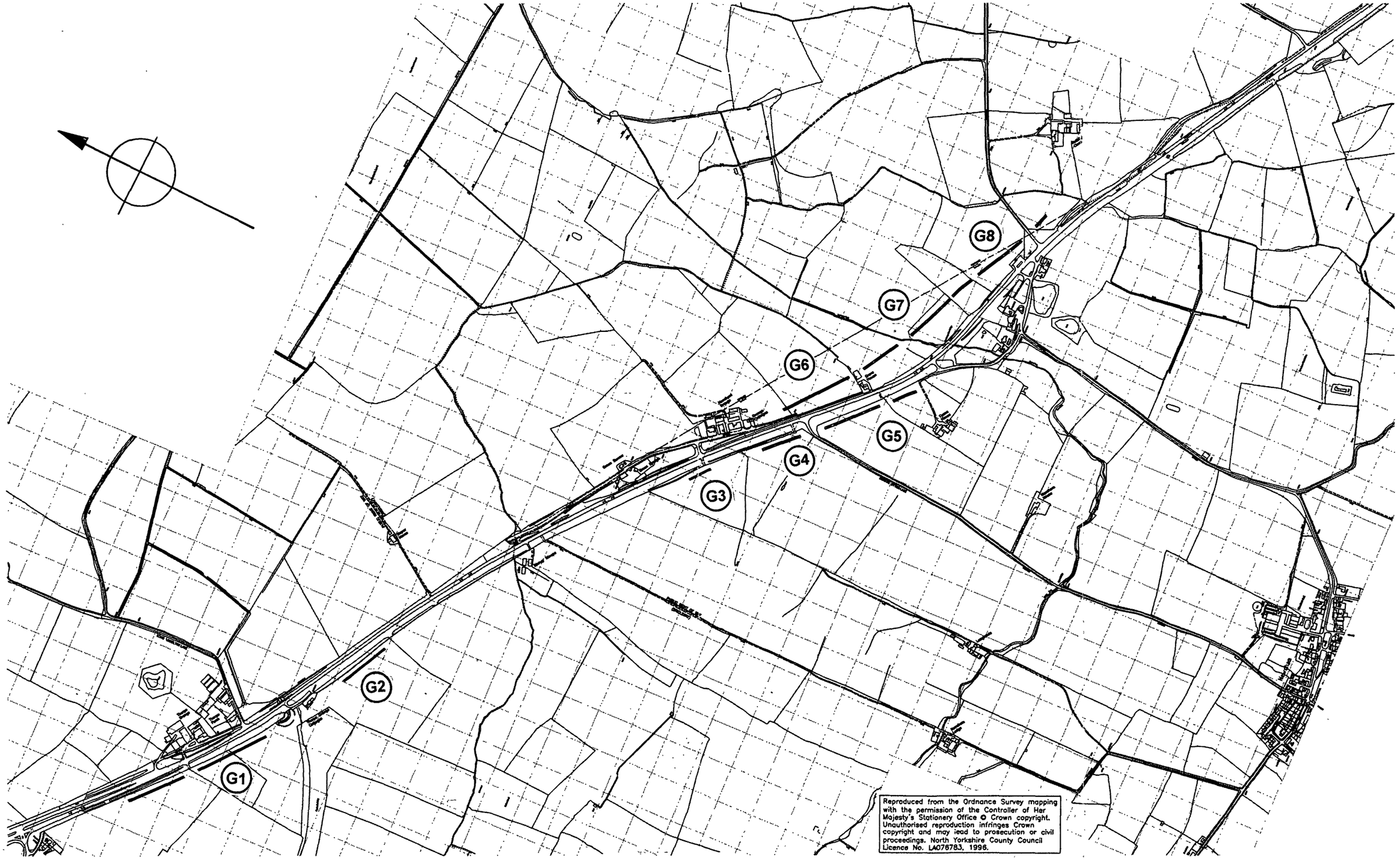
METHODOLOGY

3 4 The methodology for the survey was defined by a specification produced by BHWB (1998b), which took account of comments made by the County Archaeologists for both North Yorkshire and County Durham In brief, the surveys were conducted using GeoScan FM36 fluxgate gradiometers and data were collected in 20m square grids with readings taken at 1 0m by 0.5m intervals, thus providing 800 measurements per grid

3 5 The site survey work took place between September and November 1998 in poor weather conditions, and the survey of one area (Area G2) had to be abandoned due to waterlogged ground conditions The location and extent of the individual survey areas was determined by the four separate route options which were under consideration at the time (options 2, 4, 6 and 36) For ease of description, each survey area is considered to be aligned east-west.

SUMMARY OF RESULTS (see figures 3 and 4 of geophysical survey report)

3 6 In general, all the survey areas exhibited numerous dipolar magnetic anomalies, a fact not unexpected given the proximity of the existing road corridor The smaller magnetic features are likely to represent ferrous debris and litter while the larger examples are associated with telegraph poles, buried service pipes, land drains, fences, and feeding troughs In addition, some negative magnetic lineations are likely to be of natural, geological origin Nevertheless, some areas of archaeological potential were recognised



PHASE 1 GEOPHYSICAL SURVEY

PHASE 2 GEOPHYSICAL SURVEY

Projeot: **A66 GRETA BRIDGE TO DYSON LANE IMPROVEMENTS**

Project No. 2163

Date MAR 99

Client: **HIGHWAYS AGENCY**

Figure: **1**

Title: **LOCATION OF SURVEY AREAS**
GEOPHYSICAL SURVEY

BHWB

Scale 1:10,000

0 700

3 7 In Area G1W a former field boundary was identified towards the western end of the survey, while areas of what is likely to be ridge and furrow cultivation were seen in Areas G1C and G1W; it is noticeable that the ridge and furrow in Area G1C is parallel to existing field boundaries whereas that in Area G1W is not Other as yet unexplained linear anomalies were seen running across ridge and furrow on the east side of Area G1E The surveys do not appear to have detected any evidence for a possible Roman road alignment (Site A2) which was thought to pass through Areas G1C and G1W, or for a possible roadside cemetery (Site A1) which previous finds had suggested might lie towards the west end of Area G1W The field boundary identified in Area G1W is not depicted on the 1st edition (1857) Ordnance Survey 6" map

3 8 No features of archaeological interest appear to have been identified in Areas G3 and G4, while in Area G5W two parallel, weak negative lineations are thought to represent rubble land drains In Area G5E however, positive and negative linear anomalies are considered to represent a small structure and possibly three interrupted curvilinear ditches, apparently associated with or overlain by narrow ridge and furrow cultivation remains, these ditches may be of prehistoric origin.

3 9 Areas G6, G7 and G8 were surveyed to assess an off-line route option to the north of the existing A66 carriageway Possible stone wall footings or land drains were identified in the north-west corner of Area G6, while a soil-filled structure was seen to the north of a ferrous water pipe The geomagnetic image for the western end of Area G7W is dominated by the effects of farm buildings and fences, but little of archaeological interest appears to have been detected throughout the whole of Area G7. A very weak and diffuse magnetic lineation in Area G8W may well represent the ploughed-down remains of the former Roman road alignment

4 IMPACTS OF THE VARIOUS ROUTE OPTIONS

4 1 At the time of writing, it has been determined that Option 2 should go forward as the preferred scheme, although on-going discussion and liaison means that some parts if not all of the other options (Options 4, 6 and 36) may still be considered. For this reason, other route options are also outlined here.

4.2 As outlined in the previous condition survey (BHWB 1998a), a simple three tier impact grading system can be devised, based on the scale of impact of the proposals, namely

Major impact	Major disturbance (ie more than 75% of the area of known or estimated archaeological deposits)
Significant impact	Significant disturbance (ie between 25% and 75% of the area of known or estimated archaeological deposits).
Small-scale impact.	Minor disturbance (ie less than 25% of the area of known or estimated archaeological deposits)

4 3 In drawing up this information, consideration has also been made of the scale, significance, potential and current condition of the site, defined as the grade of the site

4 4 When making an assessment of the impact of the proposed options below, all construction works as specified on drawings labelled "Option 2" have been taken into account. It should be noted that farm access tracks and underpasses, landscaping, off-site planting schemes, haul routes, construction compounds, temporary construction roads, or the re-routing of services have not yet been considered.

ROUTE OPTION 2

4 5 This route option extends the base scheme to the east as far as Stephen Bank and includes a *c* 40m wide off-line section which runs from Newsham Grange to Lanehead Lane, around the north side of Grove House All other work would be confined to the existing A66 carriageway and verges, although there will some small-scale (c.10m maximum) cutting back of the existing southern road embankment at Thorpe Grange and at Greenbrough

4.6 At the west end of the scheme, the cutting back of the existing southern embankment will have a small-scale impact on the areas of ridge and furrow identified by the geophysical survey in Areas G1W and G1C, as well as a former field boundary seen in Area G1W There may also be some impact on the previously identified Roman burial site (Site A1) and suspected Roman road alignment (Site A2), no features suggestive of either site were identified by the geophysical survey in the adjacent fields but some deposits may survive in the southern roadside verge

4.7 Within the central part of the scheme, all the improvement works are to be confined to the existing road corridor, and so there will be no impact on Site A3 (Stone Stoops bridge and house) and Site A4 (Roman road at Newsham Grange and Greenbrough). There are similarly no impacts on an area of ploughed out ridge and furrow (Site A5) to the west of Greenbrough and on the various geophysical anomalies identified in Area G5E, although some features may extend into the existing southern roadside verge, depending on the depth of disturbance associated with previous construction techniques

4.8 The proposed off-line section of new road to the east of Newsham Grange will have an impact on several identified sites The possible area of ridge and furrow earthworks to the east of Grange Cottages (Site A6) will suffer a small-scale impact while there will be a major impact on the possible stone wall footings and the soil-filled feature identified by the geophysical survey in Area G6. The majority of the ridge and furrow earthworks and field boundaries (Site A7) to the south-east of Grove House will be avoided, although some small-scale impact will still occur

4.9 Further to the east, the proposed road improvement corridor lies just to the south of the presumed ploughed-down remains of the former Roman road alignment seen in Area G8W, and so this potentially important site should not be affected However, it is possible that there will be some small-scale impact on the Roman road (Site A8) at and to the east of the Lanehead Lane junction, where the former alignment may be represented by the existing A66 corridor and/or its lay-bys

4 10 It should be noted that the identified impacts at the west end of the scheme would be reduced or even avoided if land-take was confined to the existing verge However, there is some potential for as yet unrecorded remains within the wide verges of the existing carriageway, particularly towards the west of the scheme and at the extreme east end at Stephen Bank where the route of the A66 appears to coincide with the former Roman road alignment

ROUTE OPTIONS 4 AND 6

4 11 Options 4 and 6 are very similar to Option 2, with the exception that a 90m diameter roundabout is proposed at the junction of Lanehead Lane, in the general location of a disused garage With Option 4 the alignment of Lanehead Lane would remain the same, whereas with Option 6 the southern 160m of the lane would be diverted to the south-west, and the road on the south side of the carriageway would be realigned

4 12 For the majority of this option, namely to the west of Grove House, the impacts on the identified archaeological sites would be the same as with Option 2 However, the construction of the Lanehead Lane roundabout would have an significant impact on the presumed ploughed-down remains of the former Roman road alignment seen in Area G8W There would also be a small-scale impact on the Roman road (Site A8) to the east of Lanehead Lane, where the former alignment may be represented by the existing A66 corridor and/or its lay-bys

ROUTE OPTION 36

4 13 This option differs from the previous options in that, to the east of Newsham Grange, the new road is proposed to swing to the south of Grove House, culminating in a land-take of some 20m on the south side of the existing A66 near its junction with Dyson Lane The route will then swing north, to a similar junction at Lanehead Lane as that proposed by Option 6, namely a 90m diameter roundabout in the general location of a disused garage and the re-alignment of the southern 160m of Lanehead Lane to the west

4.14 For the majority of this option, namely to the west of Newsham Grange, the identified archaeological impacts would be the same as with Option 2. However, the realignment of the carriageway to the south of the existing A66 at Grove House would result in a significant impact on the various geophysical anomalies identified in Area G5E, although there would now be no impacts on the two areas of ridge and furrow earthworks (Sites A6 and A7), or on the geophysical anomalies seen in Area G6. Nevertheless, the construction of the Lanehead Lane roundabout would now have an significant impact on the presumed ploughed-down remains of the former Roman road alignment seen in Area G8W and there would also be a small-scale impact on the presumed Roman road alignment (Site A8) to the east of Lanehead Lane.

FARM ACCESS TRACKS AND UNDERPASSES

4.15 Although the need for farm access tracks and underpasses has not been fully explored and determined at the time of writing, several possible options are under consideration

4.16 Any new access arrangements at Thorpe Grange and Thorpe Grange Cottages are likely to be have a significant impact on the as yet unexplained geophysical anomalies that were identified towards the east side of Area G1E However, no anomalies were seen in Areas G3 or G4, which were surveyed to assess new possible access arrangements for Newsham Grange

SUMMARY OF IMPACTS BY ROUTE OPTION

Site	Description	Grade	NGR	Impacts by option
A1	Roman burial site, north-west of Thorpe Grange	R	NZ09051295 centred	Options 2, 4, 6 & 36 Uncertain, nothing seen in geophysical survey Small-scale? Land take of 10m to south of existing road boundary
A2	Roman road, Thorpe Grange	D	NZ09401260 centred	Options 2, 4, 6 & 36 Uncertain, nothing seen in geophysical survey Small-scale? Land take of 10m to south of existing road boundary
G1W G1C	Ridge and furrow and field boundary (geophysical anomalies), south of Newsham Grange	L	NZ09251270 centred, NZ09151278 accurate	Options 2, 4, 6 & 36 small-scale Land take of 10m to south of existing road boundary
G1E	Linear geophysical anomalies, west of Thorpe Grange Cottages	L?	NZ09040126 0 centred	Options 2, 4, 6 & 36 none But may be affected by new farm access arrangements
A3	Stone Stoops Bridge and Stone Stoops House (site of)	NG	NZ10131223 accurate, NZ10141221 accurate	Options 2, 4, 6 & 36 none
A4	Roman road, Newsham Grange and Greenbrough	R	NZ10401200 centred	Options 2, 4 6 & 36 none
A5	Ridge and furrow earthworks (site of), east of Greenbrough	NG	NZ10341187-NZ10561166 centred	Options 2, 4, 6 & 36 none
G5E	Linear geophysical anomalies, south of Grove House	D?	NZ10921138 centred	Options 2, 4 & 6 none Option 36 significant, land take of 40m to south of existing road boundary
AS	Ridge and furrow earthworks (site of), east of Grange Cottages	L	NZ10801160 centred	Options 2, 4 & 6 small-scale Land take of 20m in south-west corner Option 36 none
G6	Possible wall footings and soil-filled feature (geophysical anomalies), west of Grove House	L?	NZ10781165 centred	Options 2, 4 & 6 major, within new 40m wide road corridor Option 36 none
A7	Ridge and furrow earthworks, and field boundaries, south-east of Grove House	L	NZ10951145 centred	Options 2, 4 & 6 small-scale, partly within new 40m wide road corridor Option 36 none
G8W	Probable line of ploughed down Roman road, west of Lanehead Lane	D?	NZ11551113 centred	Option 2 none Options 4, 6 and 36 significant, partly within area of new roundabout
AS	Roman road, Stephen Bank	D	NZ11551113 centred	Options 2, 4, 6 & 36 small-scale in verge?

5 RECOMMENDATIONS FOR FURTHER WORK

5 1 It is recommended that the programme of archaeological field investigation is continued, through the excavation of a number of limited trial trenches and/or test pits as appropriate, and some non-intrusive earthwork survey; as noted above, this work corresponds to Stage 3 of the Department of Transport's Stages of Archaeological Assessment as defined in volume 11 of the Design Manual for Roads and Bridges (DMRB, DOT 1994). It is important to stress that this intrusive fieldwork is designed to assess the results of the geophysical surveys and to investigate those areas which were not able to be considered by the non-intrusive survey techniques

5.2 It should be noted that the recommendations as set out below are at present only provisional, and the scale and extent of the archaeological work may well be amended or altered in light of ongoing route option discussions and decisions Any firm recommendations would also need to be agreed with the various County Archaeological Officers in advance of any detailed specifications being drawn up and costings obtained

5 3 The combined results of the Stage 3 work (namely geophysical survey and trial trenching) can then be used to formulate an appropriate mitigation strategy for the proposed road improvement scheme The precise level and nature of this work will depend on the design and construction of the approved route option, but it is likely that some pre-construction investigation (detailed excavation and recording in advance of construction of sites considered to be of significant archaeological importance and for which no appropriate mitigation measures can be sought) and/or a watching brief during construction (investigation and recording of sites not warranting prior investigation, as well as the recording of sites which may be exposed during the course of development) will be required, in addition to the standard post-excavation assessment, analysis and reporting phases

TRIAL TRENCHING AND TEST PITTING

5.4 Given the potential archaeological impacts of the route options noted above, it would be appropriate to undertake some limited trial trenching to assess the various geophysical anomalies identified within the proposed road corridors In all cases, the trenches are 2m wide while their lengths are designed to sample specific features and a "blank" area at either end

5 5 In Areas G1W, G1C and G6 the geophysical anomalies could be assessed by the excavation of a total of six trenches In Area G1W two trenches 15m long should be cut parallel and at right-angles to the road, to ensure that the various anomalies are intersected at 90 degrees, while in Area G1C it would be sufficient to cut two 15m long trenches parallel to the A66. In Area G6 two 25m long trenches should be dug, one aligned north-south to insect both possible wall footings at the west end of the area, and the other to cut through the soil-filled ditch, this work would not be required if Option 36 was the chosen route option

5 6 Further trial trenching would be required in Area G8W, to investigate the ploughed down remains of the presumed Roman road alignment This could be achieved through the excavation of two 20m trenches towards the east end of the alignment in the area likely to be affected by the roundabout proposed as part of Options 4, 6 and 36, this work would not be required if Option 2 was the preferred choice

5.7 If Option 36 was chosen, trial trenching would need to take place in Area G5E, to investigate the geophysical anomalies identified here Three trenches would be appropriate, two 15m long at either end of the area and one 10m long to cut the curving anomaly seen in the centre. It would also be appropriate to excavate one or more additional trenches 10m long in the wide grass verge on the south side of the A66, to see whether any of the archaeological deposits extend to the north

5 8 In addition to the above, it would also be appropriate to look at some areas within the proposed road corridor which did not contain any obvious geophysical anomalies, to test whether these areas are really devoid of archaeological features. This work is best undertaken in previously undisturbed areas, such as Areas G7 for Options 2, 4 and 6, and could be accommodated by the adoption of a suitable sampling strategy, probably equivalent to the excavation of three 25m long trenches. If Option 36 was chosen, this work could take place in Area G5W when only one trench 25m long would be required.

5.9 It would also be appropriate to investigate some of those areas which were not able to be assessed by the non-intrusive survey techniques. As noted above, a high proportion of the road improvement works will be confined to the between 10m and 15m wide southern verge of the existing carriageway in the western half of the scheme, an area in which previous improvement works are said to have prepared the sub-base for a carriageway which was never built, and through which several services run, a Roman burial (site A1) appears to have been discovered during these works at the extreme west end of the scheme. Although any excavations will need to carefully consider the constraints imposed by Health and Safety issues and the presence of numerous services, specifically telephone and water mains, in these areas, it is important that a sufficient sample of ground is investigated

5 10 It is suggested that a series of *c* 2m square pits or small trenches should be excavated at c 100m intervals within the existing southern grass verge, or in the occasional strips of vacant undisturbed ground, from the west end of the scheme as far as Stoney Stoops These would test for the presence of any surviving Roman road surface (Site A2), as well as any other associated archaeological features, and it may be appropriate to concentrate some pits at the west end of the scheme to test for the presence of any burials (Site A1). A similar series of test pits, although fewer in number and this time in the north verge, is proposed for the east end of the scheme, to test for any survival of the Roman road in the area between Lanehead Lane junction and the eastern limit of the scheme Both sets of pits would be required irrespective of which route option was chosen

5 11 Finally, some trenching would be required in Area G1E, if any new farm access arrangements are to be constructed in this area; two trenches 20m long would suffice for this investigation

EARTHWORK SURVEY

5.12 The ridge and furrow earthworks and field boundaries to the south-east of Grove House (site A7) could be subject to an earthwork survey. In order to put these remains into context, it would be necessary to survey the whole field and any results would be used to locate the position of any trenches in Area G7W (see above). This work would not be required if Option 36 was the preferred route chosen

5.13 It is not considered necessary to investigate the ploughed down ridge and furrow earthworks to the east of Grange Cottages (Site A6) in advance of construction, although recording in this area may be accommodated by a watching brief at a later date

Summary of recommendations

Site	Description	Grade	Impacts	Stage 3 recommendations
A1	Roman burial site, north-west of Thorpe Grange	R	Options 2, 4, 6 & 36 small-scale?	All options test pits
A2	Roman road, Thorpe Grange	D	Options 2, 4, 6 & 36 small-scale?	All options test pits
G1W G1C	Ridge and furrow and field boundary (geophysical anomalies), south of Newsham Grange	L	Options 2, 4, 6 & 36 small-scale	All options trenching
G1E	Linear geophysical anomalies, west of Thorpe Grange Cottages	L?	Options 2, 4, 6 & 36 none But may be affected by new farm access arrangements	Farm access only trenching
G5E	Linear geophysical anomalies, south of Grove House	D?	Options 2, 4 & 6 none Option 36 significant	Options 2, 4 & 6 none, Option 36 trenching and test pits
A6	Ridge and furrow earthworks (site of), east of Grange Cottages	L	Options 2, 4 & 6 small-scale Option 36 none	All options none
G6	Possible wall footings and soil-filled feature (geophysical anomalies), west of Grove House	L?	Options 2, 4 & 6 major Option 36 none	Options 2, 4 & 6 trenching Option 36 none
A7	Ridge and furrow earthworks, and field boundaries, south-east of Grove House	L	Options 2, 4 & 6 small-scale Option 36 none	Options 2, 4 & 6 earthwork survey Option 36 none
G8W	Probable line of ploughed down Roman road, west of Lanehead Lane	D?	Option 2 none Options 4, 6 and 36 significant	Option 2 none Options 4, 6 and 36 trenching
A8	Roman road, Stephen Bank	D	Options 2, 4, 6 & 36 small-scale in verge?	All options test pits

6 REFERENCES

BHWB 1998*a A66 Greta Bridge to Dyson Lane Improvements Archaeological Condition Survey*

BHWB 1998b *A66 Greta Bridge to Dyson Lane Improvements and A66 Melsonby Crossroads to Scotch Corner Improvements: Contract and Specification for Geophysical Survey*

DOT 1994 *Design Manual for Roads and Bridges, Volume 11*

GeoQuest Associates 1999 *Geophysical Surveys for the A66 Greta Bridge to Dyson Lane Road Improvements, County Durham and North Yorkshire*

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Margary, I D 1973 *Roman Roads in Britain*

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