Western Inner Corridor

Western Link 1

A4.5.14. WL1 crosses the playing fields located beside Belmont Abbey and continues north eastwards through a historic parkland landscape from the Abbey to Belmont Golf Course. The area around the golf course is designated as a Special Wildlife Site and passes to the west of Hunderton Rough Special Wildlife Site, on the south bank of the River Wye. North of the Wye the route continues in a generally northerly direction towards A438 King's Acre Road. The route cuts across the Wye Valley Walk and Mortimer Trail on the north bank of the Wye. The land here is mostly agricultural although the route passes close to the historical settlement at Breinton. Where the route connects with A438 King's Acre Road, a signalised junction is proposed. There are houses situated at the proposed junction location and it is likely these would have to be demolished.

Western Link 2

A4.5.15. WL2 follows the same alignment as WL1 as far as Warham north of the Wye. Where the route diverges from WL1, the land use is mostly agricultural. From Ch 2250 to Ch 2400 the route crosses a small area of mixed plantation woodland. The route crosses pathways at Ch 3000, Ch 3204 and Church Walk at Ch 3946. It also passes within 50m of the north eastern corner of Green Lane Wood. Where the route intersects with the A438 King's Acre Road, there are houses which may require demolition. The alignment is likely to lead to severance of several fields it crosses, rendering them unsuitable for future agricultural use.

Western Link 3

A4.5.16. WL3 traverses the playing fields at Belmont Abbey, parkland around the Abbey and a Special Wildlife Site at Belmont Golf Course. The route also crosses directly over the golf course. North of the Wye the land use is primarily agricultural and the route passes close to parkland at Warham House. It crosses the Wye Valley Walk and Mortimer Trail on the north bank as well as pathways at Ch 2688 and Ch 2948. It is likely that some fields crossed by the route would be rendered unusable due to severance. Where the route intersects with the A438 King's Acre Road, there are houses that will probably require demolition.

Western Link 4

A4.5.17. WL4 starts on the A465 and the majority of this alignment crosses agricultural land. South of the Wye the route crosses Belmont Golf course and associated parkland and a Special Wildlife Site on the south bank of the Wye. North of the Wye, the route crosses the Wye Valley Walk, Mortimer Trail and a pathway at Ch 3203 and a small stream at Ch 3500. Where the route joins A438 King's Acre Road, there are houses that will probably require demolition. The alignment is likely to lead to severance of some of the fields that it crosses.

Western Link 5

A4.5.18. WL5 starts on the A465 and crosses the playing fields at Belmont Abbey, parkland at Belmont Golf Course and a Special Wildlife Site on the south bank of the Wye. North of the river the land is predominantly agricultural. It crosses pathways at Ch 2742, Ch 2946 and Church Walk at Ch 3672. It is probable that fields crossed by the route will be severed by the alignment and rendered unsuitable for future use.

Western Link 6

A4.5.19. WL6 follows the same alignment as WL4 as far as C1189 Upper Breinton Road and crosses primarily agricultural land. South of the River Wye it crosses Belmont Golf Course and a Special Wildlife Site. North of the river the land is agricultural and there are houses at the junction with A438 King's Acre Road that will likely require demolition. The route crosses two pathways at Ch 3265 and Ch 4209.

Western Link 7

A4.5.20. WL7 crosses fields and runs close to Huntingdon conservation area. The road crosses two tracks at approximately Ch 200 and Ch 700.

Preferred Route

A4.5.21. In terms of impact on land use, WL1 or WL2 are the preferred routes in the inner western corridor. Although both routes impact on Hunderton Rough, they bypass the golf course at Belmont unlike WL3, 4, 5 and 6. WL1 would be marginally preferred as it links to WL7 and is shorter in length therefore requiring less land take.

Western Outer Corridor

Western Link 8

A4.5.22. WL8 is a short section connecting A438 King's Acre Road with A4103 Roman Road and traverses Veldifer nurseries just north of the A438. It also runs through King's Acre Halt.

Western Link 9

A4.5.23. WL9 starts on the A465 and the majority of this route crosses agricultural land. It runs close to the eastern edge of Clehonger Court which is a listed building. It also runs along the western section of Belmont Golf Course. On the north bank of the Wye the route crosses parkland and woodland at Breinton Court. Where it connects with A438 King's Acre Road there are houses that will probably require demolition. The alignment is likely to cause severance of several fields.

Western Link 10

A4.5.24. WL 10 crosses agricultural land and the steep wooded banks of the River Wye. On the north bank of the river the route crosses over the parkland around Breinton and cuts across the Wye Valley Walk and Mortimer Trail. Travelling northwards the route passes through primarily agricultural land to the junction with A438 King's Acre Road. At the A438 there are dwellings either side of the proposed junction. The alignment is likely to result in the severence of several of the fields it crosses.

Western Link 11

A4.5.25. WL11 proceeds directly west of King's Acre Halt and runs westwards of the nurseries at Veldifer. It crosses primarily fields and cuts across pathways.

Western Link 12

A4.5.26. WL12 crosses fields to the junction with A4103 Roman Road at Stretton Sugwas. There are houses around the existing roundabout that are likely to be affected by the alignment. There is are two landfill sites situated within 500m of the alignment; one at Brockhall west of the route and at Stretton Sugwas to the north-west.

Western Links 13 and 14

A4.5.27. WL13 and WL14 are unlikely to result in a change in land use as they follow an existing road.

Preferred Route

A4.5.28. In terms of their impacts on land use, WL9 and WL11 are the preferred routes in the western outer corridor. WL9 bypasses Belmont Golf Club and would have a slightly less impact on agricultural land than WL10 as the route is shorter and would require less landtake. WL11 is preferred to WL8 as it bypasses the nurseries at Veldifer.

A4.5.29. Overall the preferred route is the western outer corridor routes as they generally have less impact on sites of nature conservation value.

A4.5.30. Figure A4.2 overleaf shows the land use constraints associated with the western corridors.

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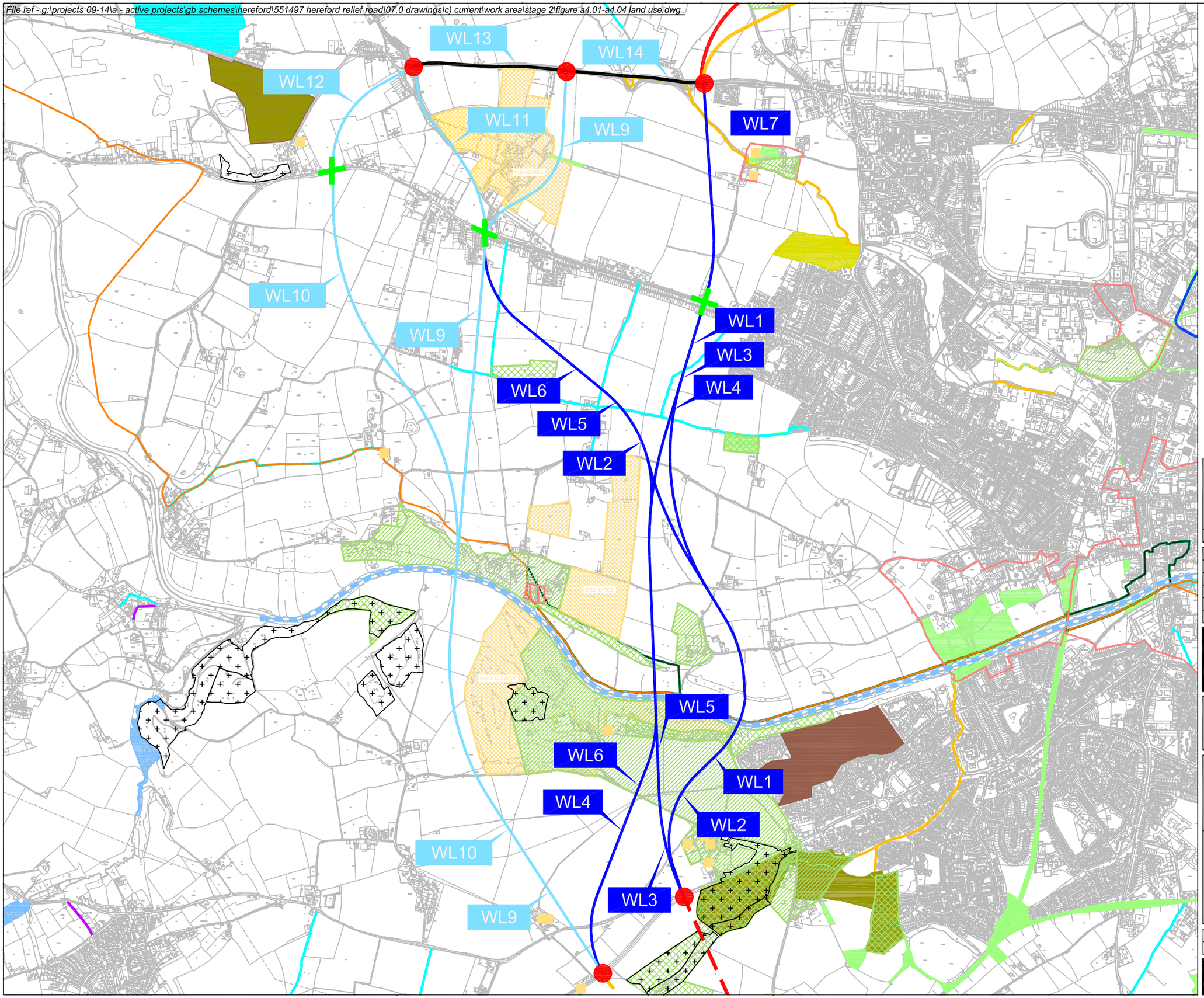

LEGEND

- Ancient Woodland
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- Site of Special Scientific Interest (SSSI)
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- UDP Proposed Housing Site
- Land Use (as annotated)
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- Wye Valley Walk
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Project Name
Hereford Relief Road

Drawing Title
Western Corridor
Land Use Constraints

Original Drawing Size :	A3
Scale : 1:20,000	Dimensions : -

Drawing No	Fig No	Rev
	A4.2	-

Northern Corridor

Northern Corridor Link 1

A4.5.31. NC1 crosses primarily agricultural land. At the junction with C1095 Tillington Road the alignment impacts slightly on the south eastern corner of Deer Park (an area of parkland) and cuts across a farm track at Hospital Farm. Where the route passes under A4110 Canon Pyon Road, the cutting is within a few metres of houses on the A4110, specifically Wyncroft. As the route proceeds eastwards it crosses agricultural land and some fields are likely to be severed by the alignment, rendering them unsuitable for future agricultural use.

Northern Corridor Link 2

A4.5.32. NC2 crosses primarily agricultural land as with NC1. However the more northerly alignment than NC1 in the initial section means the route bisects Deer Park and cuts across a farm track at Hospital Farm. The route is likely to lead to severance of several of the fields it crosses.

Northern Corridor Link 3

A4.5.33. NC3 crosses a mixture of agricultural and urban land. The start of the route from the A49 Holmer Road is primarily agricultural and it crosses a stream at Ch 120. The proposed bridge over Coldwells Road cuts across the north eastern corner of an orchard at Highfield House. The route crosses a stream at Ch 900 and runs through an orchard at Rose Gardens Cottage. The embankment for the bridge at Coldwells Road means that it is likely this orchard will have to be removed completely. Where the route crosses Munstone Road, it passes across the northern boundary of the housing development site at Holmer as designated in the Hereford Unitary Development Plan. As the route proceeds eastwards over the rail line and towards A465 Aylestone Hill, the land becomes more urban with increasing numbers of houses and some industrial units. The A4103 Roman Road would likely require some alignment at the eastern section of this alignment to tie the route into the roundabout at Aylestone Hill. At the junction with A465 Aylestone Hill the route intrudes slightly into the conservation area of Aylestone.

Northern Corridor Link 4

A4.5.34. NC4 crosses primarily agricultural land. The alignment is the same as NC3 to Rose Gardens Cottage and the impacts will be the same. It passes further north of the designated housing zone at Holmer than NC3 and is not likely to impact on its boundary. From Munstone Road to its termination point at A465 Aylestone Hill the route crosses fields, some of which are crossed by tracks and paths. The route passes north of Burcott Farm and to the east of two

large ponds which are possibly connected to the farm or a remnant of the disused canal. The proposed junction with A465 Aylestone Hill intrudes slightly into the northern boundary of the Aylestone conservation area.

Preferred Route

A4.5.35. The preferred route in the northern corridor is NC1 and NC3 as they would require less land take and avoid the parkland at Deer Park.

A4.5.36. Figure A4.3 overleaf shows the land use constraints associated with the northern corridor.

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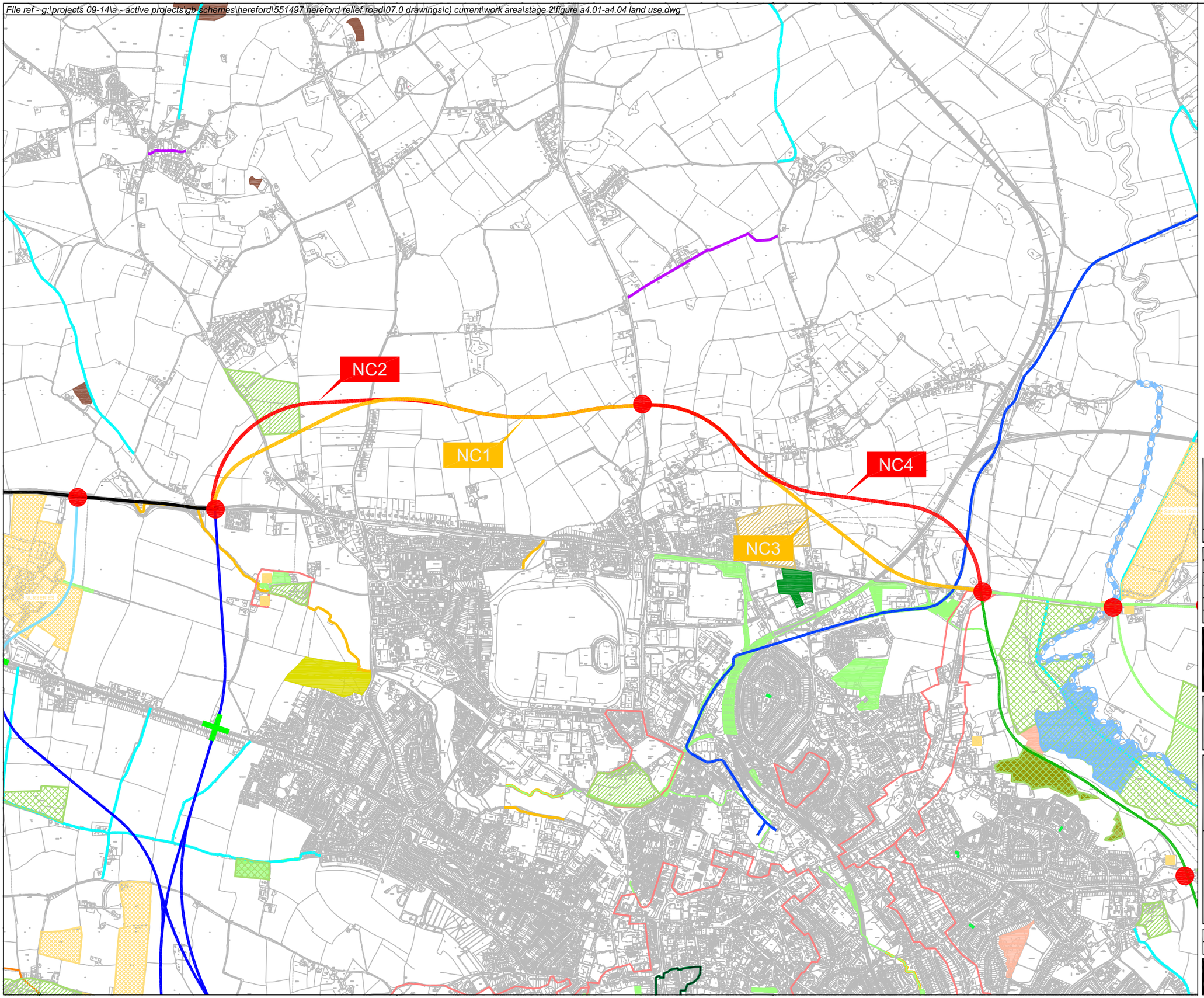

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	A4.3	-

Eastern Inner Corridor

Eastern Link 1

A4.5.37. EL1 begins at the junction with A465 Aylestone Hill and the northern section of this route falls within the conservation area of Aylestone. As the route proceeds southwards, it crosses agricultural land around Walney House Farm before crossing through Broadlands Local Nature Reserve. It also crosses agricultural land around Lower House Farm. Most of this alignment falls within or very close to a Zone 2 Flood zone. The route also runs along the southern boundary of the Lugg Meadows Special Area of Conservation and Special Wildlife Site. At the junction with A438 Ledbury Road, the route cuts across a small area of plantation woodland at Tupsley. This is a historical landfill site as shown in the GroundSure EnviroInsight report and there may be issues with contamination during construction.

Eastern Link 2

A4.5.38. EL2 crosses over fields and some areas of isolated woodland. A stream is located at Ch 775. The southern tip of the route at B4224 Hampton Park Road cuts through an orchard. The new junction with Hampton Park Road is situated within the conservation area along the road.

Eastern Link 3

A4.5.39. EL3 crosses orchards around Franchise Stone in its northern section and as it proceeds southwards it crosses The Stank, an earthbank flood defence north of the River Wye. It also crosses the Wye Valley Walk. The route passes to the west of Rotherwas scheduled monument and across unoccupied land within Rotherwas Industrial Estate. It also passes close to the sewage treatment works within Rotherwas.

Eastern Outer Corridor

Eastern Link 4

A4.5.40. EL4 falls within a Zone 3 floodplain and borders the northern edge of Lugg Meadows. Land use will not be significantly affected as it follows the route of an existing road (A4103 Roman Road).

Eastern Link 5

A4.5.41. EL5 is a continuation of EL4 on A4103 Roman Road and land use will not be significantly impacted. However, the existing Lugg Bridge is a listed structure and may require strengthening to conform with current bridge standards.

Eastern Link 6

A4.5.42. EL6 is a continuation of EL5 and north west of this route to the north of A465 Aylestone Hill is a safeguarded area for sand and gravel extraction. The majority of this route lies just beyond the boundary of the zone 3 floodplain of the River Lugg. The route crosses primarily floodplain grazing marsh and it is designated as common land. From Ch 750 to Ch 1940 the route cuts across parks and gardens of New Court at Lugwardine. The southern section of the route around A438 Ledbury Road lies within the zone 3 floodplain. A new bridge is proposed to cross the River Lugg. The route is likely to lead to the loss of common grazing land around the River Lugg.

Eastern Link 7

A4.5.43. EL7 crosses the common grazing land around the River Lugg and proceeds just west of New Court at Lugwardine and cuts across the parks and gardens associated with New Court. The southern section of the route lies within the zone 3 floodplain. Where the route intersects with the A438 Ledbury Road, it encroaches slightly into Lugg Meadows. As well as resulting in the loss of common grazing land and lands around New Court, the visual impact of a new road may affect the setting of the buildings at New Court, some of which are listed.

Eastern Link 8

A4.5.44. EL8 has similar impacts to EL7 although the slightly more westerly direction of it means the intersection point on A438 Ledbury Road does not impact directly on Lugg Meadows.

Eastern Link 9

A4.5.45. EL9 crosses Lugg Meadows and a major area of orchards north of B4224 Hampton Park Road. The majority of the route lies within a zone 3 floodplain. The land around the alignment is within the Hampton Bishop flood defences and the route crosses a flood defence embankment immediately south of the existing stream. The alignment will result in the loss of some grazing land but the impact on the orchards is likely to be greater as a larger area than that required for the road will have to be cleared to allow for construction and access. This will result in the severance of the orchard and may have impacts on its productivity.

Eastern Link 10

A4.5.46. EL10 will have the same impacts as EL9 as the route alignment is only slightly more easterly and the land use is not significantly different.

Eastern Link 11

A4.5.47. EL11 land use impacts are the same as for EL9 and EL10.

Eastern Link 12

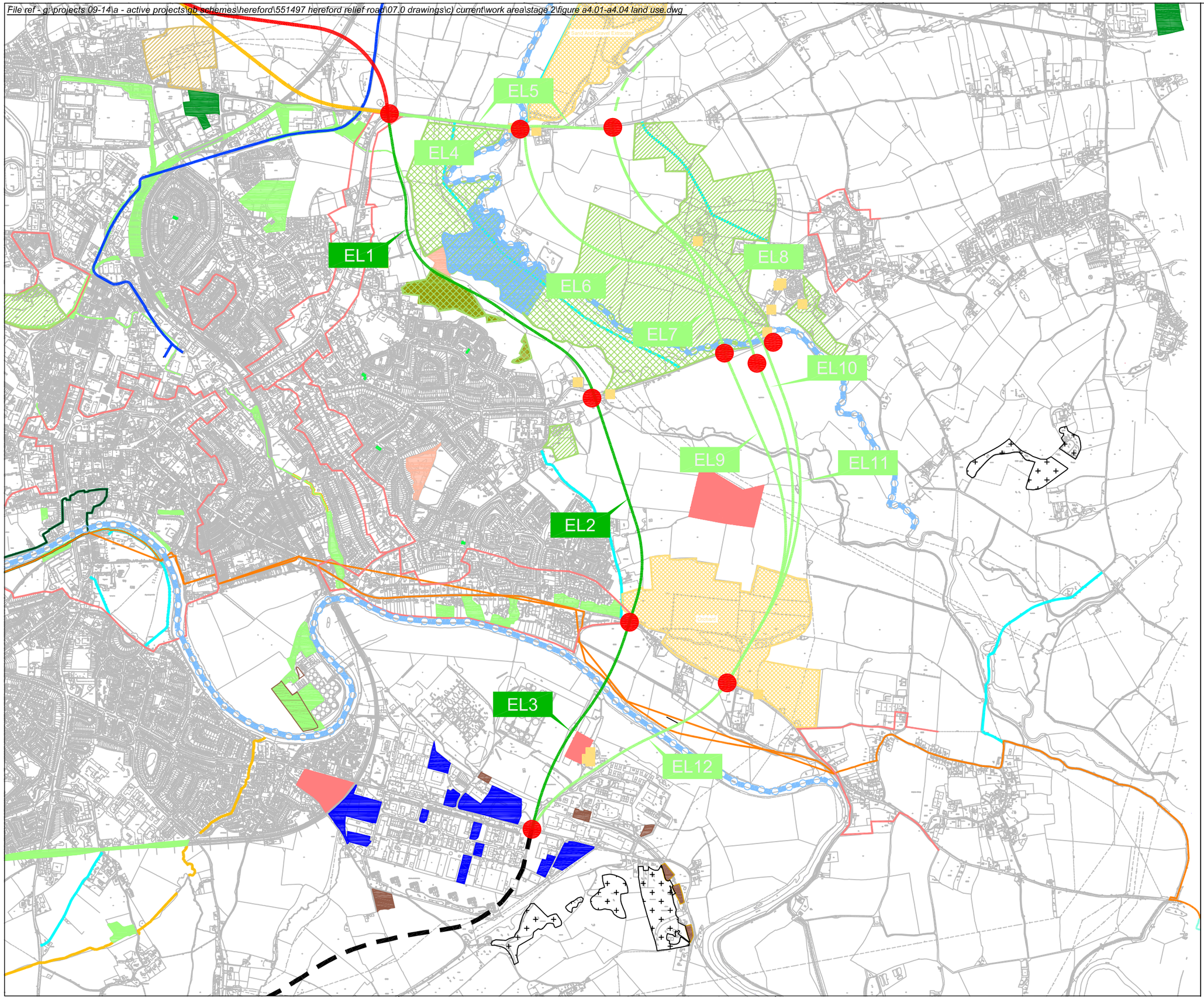
A4.5.48. EL12 lies within a zone 3 floodplain and crosses flood defences north of the river. This is The Stank, a wide earth embankment that protects the flat areas between the River Wye and River Lugg. Where the route runs south from B4224 Hampton Park Road, it passes between existing dwellings and runs through a small orchard. On the north bank of the Wye the route crosses the Wye Valley Walk. Land use on either side of the river is agricultural before grading into commercial land within the Rotherwas Industrial Estate. The route runs to the east of Rotherwas Chapel, a scheduled monument.

Preferred Routes

A4.5.49. In terms of the preferred route within the eastern corridors, all options will have major impacts on conservation sites and the floodplain of the River Lugg. The outer corridor is marginally preferable as it will have less of an impact on the internationally important Special Area of Conservation at Lugg Meadows. Of the outer corridor links, EL8 is slightly preferable as it has less of an impact on the existing floodplain. Links EL9-11 are equal in their impacts, although EL10 is slightly preferred as it is a continuation of EL8.

A4.5.50. Figure A4.4 shows the land use constraints associated with the eastern corridors.

File ref - g:\projects 09-14\a - active projects\gb schemes\hereford\551497 hereford relief road\07.0 drawings\c) current\work area\stage 2\figure a4.01-a4.04 land use.dwg



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Project Name
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Drawing Title
Eastern Corridor Land Use Constraints

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Drawing No	Fig No	Rev
	A4.4	-

A4.6. Summary of land use constraints

Table A4.2: Land Use Constraints	
Corridor	**Constraints**
Southern Corridor	Grafton Wood
	Hayleasow Wood and Newton Coppice Special Wildlife Site/area of ancient woodland
Western Inner	Belmont Abbey (setting of listed building)
	Belmont Golf Course
	Hunderton Rough Special Wildlife Site
	Wye Valley Walk
	Houses along King's Acre Road
	Huntingdon Conservation Area
Western Outer	Clehonger Court (setting of listed building)
	Breinton parklands
	Orchards at Upper Breinton
	Houses on A438 King's Acre Road/A4103 Roman Road
	Nurseries at Veldifer
Northern Corridor	Houses on A4103 Roman Road
	Orchards at Highfield House and Rose Gardens Cottage
	Disused canal
	Development land at Holmer
Eastern Inner	Broadlands Local Nature Reserve
	Lugg Meadows Special Area of Conservation/Site of Special Scientific Interest
	Orchards at B4224 Hampton Park Road
	Floodplain
	The Stank flood defence
	Rotherwas Chapel Scheduled Ancient Monument

Eastern Outer	Lugg Bridge listed structure
	Lugg Meadows
	New Court parkland and listed building
	Orchards at B4224 Hampton Park Road
	Floodplain
	The Stank flood defence
	Rotherwas Chapel Scheduled Ancient Monument

A4.6.1. All corridor options have significant land use and topographical constraints that require consideration when choosing a preferred route.

A5. Geology and Ground Conditions

A5.1. Introduction

A5.1.1. The engineering assessment of each link has been assessed in relation to topography, engineering characteristics, geology/ground conditions and man made features.

A5.2. Geology and Geomorphology

A5.2.1. This section of the report presents the findings of a more detailed desk study review and site visit that was undertaken to establish the geotechnical and geo-environmental constraints and risks along each of the route corridors. Available information has been assessed, collated and interpreted to provide advice in relation to these constraints.

A5.2.2. The geotechnical sections will be assessing;

- Solid Geology;
- Geomorphology;
- Ground Conditions;
- Hydrogeology & Groundwater Vulnerability;
- Man-made features.

A5.2.3. The following sources of information have been consulted in order to characterise the study area and help identify potential ground related hazards.

Geological Publications

A5.2.4. British Geological Survey (BGS):

- Geological Survey Solid and Drift Geology Map of Hereford (Sheet 198) Scale 1:50,000;
- Geological Survey Solid and Drift Geology Map of Ross-on-Wye (Sheet 215), Scale 1:50,000;
- Hydrogeological Map of England & Wales, Scale 1:625,000, Institute of Geological Sciences;
- Groundwater Vulnerability Map of Worcestershire, Sheet 29, Scale 1:100,000, Environment Agency;
- Groundwater Vulnerability Map of Powys, Sheet 28, Scale 1:100,000, Environment Agency;
- Historical Ground Investigation Information available within Amey records;
- Geo-Insight Groundsure Reports: Ref: HMD-404-826564.

A5.2.5. The geology of Hereford was ascertained from a review of the British Geological Survey Solid and Drift Geology Map of Hereford (England and Wales Sheet 198, 1:50 000) and Solid and Drift Geology Map of Ross-on-Wye (England and Wales Sheet 215, 1:50 000). Solid geology (bedrock) in the area comprises the Raglan Mudstone Formation (formerly known as Raglan Marls), part of the Lower Old Red Sandstone, which is of Siluro-Devonian age. The overlying St Maughan's Formation, also part of the Lower Old Red Sandstone and Devonian in age, is shown to be present to the south and north of the scheme corridors. The Old Red Sandstone strata are a sequence of ancient sedimentary rocks deposited in estuarine and deltaic conditions about 400 million years ago.

A5.2.6. The underlying geology for each corridor and associated links are shown on Figs A5.1 to A5.4 which are included later on within the main text of this report.

A5.2.7. During the Pleistocene era, a series of glacial periods and warm interglacial periods resulted in glaciers repeatedly advancing and retreating in the valleys in this region. Quaternary drift or superficial deposits (Glacial, River Terrace, Head, Fluvio-Glacial and Morainic Deposits, Sands and Gravel, Alluvium and Lacustrine Alluvium) are shown to be present overlying the solid geology in certain areas throughout the study area.

A5.2.8. The Glacial and Fluvio-glacial sand and gravel deposits were originally laid down by streams of meltwater at the edge of the receding Wye Glacier in the late Devensian period, approximately 13,500 years ago.

A5.2.9. The Head Deposits and Alluvium are post-glacial deposits of Flandrian age. Due to effects of deeply penetrating frost action in glacial times (cryoturbation), some of the solid strata are quite weathered and are similar to the superficial deposits.

A5.2.10. The River Terrace Deposits are either post Anglian-Devensian age 2nd or 3rd Terrace Deposits of the River Lugg and Proto-Wye, or younger, Flandrian age 1st or 2nd Terrace Deposits of the River Wye. Both the western and eastern corridors cross the River Wye, whilst the eastern outer corridor crosses both the River Wye and the River Lugg. The deposits are usually identified by the level at which they have been 'stranded' and are distributed as follows:

Table A5.1: Overview of Geology in Hereford		
Drift Deposits		**Age**
Alluvium		Flandrian
Lacustrine Alluvium		
First & Second Terrace River Deposits of River Wye		
Head Deposits		
Fluvio-glacial sand and gravel		Late Devensian
Glacial Deposits		
Morainic Deposits		
Second, third & fourth Terrace Deposits of River Lugg and Proto-Wye		Post Anglian – Devensian
Solid Geology		**Age**
St. Maughan's Sandstone Formation	Lower Old Red Sandstone Group	Devonian(Palaeozoic)
Raglan Mudstone Formation		Siluro - Devonian(Palaeozoic)

Drift Geology

A5.2.11. As described above, the drift or superficial deposits within the study area include Head Deposits, Alluvium, Lacustrine Alluvium, Glacial and Morainic deposits, Fluvio-glacial sand and gravel deposits and Fluvio-glacial River Terrace Deposits of the River Lugg and River Wye.

Head Deposits

A5.2.12. The Head Deposits are the product of solifluction (freeze-thaw) processes under periglacial conditions (i.e. tundra), which followed the Late Devensian glaciation. These deposits are likely to have been derived from the Raglan Mudstone and the St. Maughans Formations. The deposit is described by Barclay & Smith (2002) as a "variable deposit of clay, silt and sand, locally with pebbles or angular blocks of local origin". Where the deposits rest on the Lower Old Red Sandstone it is estimated to be up to 3m thick. The BGS sheet indicates that the Head Deposits occur as small outcrops throughout the study area. The eastern corridors, the western inner and the southern corridor cross these deposits at several locations. The links within these corridors that cross these deposits are EL1, EL9, WL1, WL2, SC1 and SC2.

Alluvium

A5.2.13. The Alluvium, which is Flandrian in age, typically occurs along the line of both the River Lugg and River Wye and as narrow outcrops along smaller tributaries of both rivers. These deposits are typically of local origin and likely to be of variable thickness and will comprise variable amounts of soft organic silts and clays and may be slightly organic. All route corridors will encounter these deposits throughout the study area.

Lacustrine Alluvium

A5.2.14. Lacustrine alluvium underlies both western corridors in various places. This is recorded as over 1m of brown silty clay with a few pebbles (Barclay & Smith, 2002). Alignments WL1, 2, 3, 4, 5, 6, 9 and 10 impact upon these deposits.

First & Second Terrace Deposits of the River Wye (Fluvio-glacial)

A5.2.15. These occur on the floodplain of the River Wye, south of Hereford. First River Terrace Deposits underlie the southern end of both eastern corridors, and specifically alignments, EL3, EL9, EL10, EL11 and EL12. It occurs between 1.5 and 4.5m above the floodplain and comprises up to 3m of silt, silty clay and sandy clay overlying up to 5m of gravel. Second River Terrace deposits underlie the western outer corridor, at elevations of between 6 and m above the floodplain. These are described by Barclay & Smith (2002) as sloping, patchy sheets up to 2m thick with cross bedding and pebble imbrication.

Second & Third River Terrace Deposits of the River Lugg (Fluvio-glacial)

A5.2.16. Both the eastern corridors are underlain by the Second River Terrace of the River Lugg, and specifically alignments EL2, 5, 7, 8 and 9. This is a reddish brown poorly sorted gravel of greywacke, siltstone, conglomerate, volcanics, quartz, limestone and sandstone.

Morainic Deposits

A5.2.17. These are glacial deposits which form roughly north-south ridges which mark the extents of glaciation or a stationary period of glaciation. A terminal end moraine, marking the final extent of Devensian glaciation, is crossed by the northern corridor. The ridges comprise poorly sorted cobbly gravel with silts and sands. An excavation into the moraine at Hereford Racecourse recorded a depth of 1.5m. Deposits of glacial till lie west of this moraine, whereas deposits to the east typically comprise outwash sediments over bedrock.

Till

A5.2.18. Till covers much of the ground west of Hereford. The geological memoir for the area (Brandon, 1989) describes two tills in the area; The Newer Till and the Older Till. All corridors, excluding the eastern corridors overlie parts of the Newer Till deposit. This is an ablation till comprising reddish brown clayey to sandy silt with unsorted gravel, cobbles and boulders. The thickness of the Newer Till is generally less than 4m.

A5.2.19. The extent of Devensian Glaciation, and the easternmost limit of till deposits, is marked by the terminal end moraine deposit, in the area west of the race course.

Fluvio-glacial Deposits

A5.2.20. The Glacial and Fluvio-glacial sand and gravel deposits were originally laid down by streams of meltwater and are located in a number of areas adjacent to the River Wye and River Lugg. Both the eastern and the western inner corridor cross these deposits.

Solid Geology

Raglan Mudstone Formation

A5.2.21. The Raglan Mudstone Formation forms the solid geology along all of the route corridors and typically comprises fining up sequences of reddish brown blocky micaceous mudstone with interbedded brown to greenish grey calcareous sandstones and calcretes or limestones. Mudstones are typically more common than other sediments and make up the majority of the formation. The total thickness of the Raglan Mudstone is known to be between 385 and 700m in the area around Hereford (BGS, 1989 & 2000) and it is thicker to the west. In the area north of Hereford the Formation is estimated to be up to 800m thick (Brandon et al, 1989).

A5.2.22. The ground investigation undertaken by Amey for the Rotherwas Access Road revealed that the upper surface of the Raglan Mudstone Formation was highly weathered and de-structured to a considerable depth, found to be greater than 8m in certain places. The investigation found that it is often difficult to distinguish the weathered material from the superficial deposits. The weathered Raglan Mudstone generally comprised firm to very stiff reddish brown slightly sandy, slightly gravelly clay.

A5.2.23. In its unweathered state the Raglan Mudstone comprised interbedded reddish brown mudstone, red brown and grey, fine to medium-grained micaceous sandstone or red brown siltstone.

A5.2.24. The strength of the Raglan Mudstone using both uniaxial compressive strength and point load index tests indicated results from around 2 MN/m2 (Mega Newtons per metre squared) (weak rock) to 53 MN/m2 (strong rock), with the average strength being around 16 MN/m2, which falls into the moderately strong category.

A5.2.25. The ease of excavation of the unweathered Raglan Mudstone for this scheme ranged from 'easy digging' to 'easy ripping'. It is therefore anticipated that elsewhere in Hereford this will be similar for the Raglan Mudstone which underlies all corridors being considered at this stage.

St Maughan's Formation

A5.2.26. The geological maps for the area indicate that The St. Maughan's Formation does not impact upon any of the route corridors, although it is located beyond the northern and southern ends of the various routes. This formation is approximately 630m thick and comprises fining up sequences of reddish brown mudstones and siltstones with reddish to purplish brown and green sandstones and occasional conglomerates. Calcretes occur throughout the formation, most commonly reworked into the conglomerates (Barclay & Smith, 2002). Where conformable with the Raglan Mudstone, the two formations may be separated by the Bishop's Frome Limestone, a massive calcrete bed.

A5.3. Geological Structure

A5.3.1. The bedrock underlying the area around Hereford dips to the southwest at an angle of between 5 and 15°. Where the western routes cross the River Wye, bedrock has a localised dip of up to 6° northeast. The junction between the two geological formations comprises a structure known as the Neath Disturbance, a persistent northeast trending normal fault. This is a large regional scale fault extending tens of kilometres with a downthrow to the south. Several smaller scale faults branch off the southern side forming inliers of the St. Maughan's Formation in the Raglan Mudstone.

A5.4. Geologically Designated Sites

A5.4.1. A review was undertaken of the Geological Conservation Review and Natural England websites to identify any important sites in the vicinity of Hereford that have been designated for their geological importance.

A5.4.2. For this study a 1km buffer zone has been set around each of the project corridors. Designated sites that fall within this buffer zone are described below.

110m AOD at Perry Hill before falling sharply to 58m AOD at the south bank of the River Wye. A major cut is required in this section from Ch 1300 to Ch 2000. North of the river ground levels rise again to around 80m AOD at C1189 Lower Breinton Road. The alignment will be in a cutting here and an underpass is proposed to carry the route under Lower Breinton Road. Ground levels remain fairly constant to the C1189 Upper Breinton Road before falling slightly to around 70m AOD at the proposed junction with the A438 King's Acre Road.

Western Link 10

A4.3.21. WL10 begins on the A465 at around 90m AOD. It follows the same alignment as WL9 to north of the River Wye. The alignment diverges from WL9 at around Ch 3000 with the proposed junction with C1189 Upper Breinton Road. This route then proceeds in an north westerly direction towards the A438 King's Acre Road. At the junction with Upper Breinton Road, the ground level is around 80m AOD and continues fairly level to around Ch 4000. The route crosses four minor laneways at Ch 3347, Ch 3495, Ch 3557 and Ch 3768 and it is proposed for these lanes to be stopped up. A minor cutting is proposed from Ch 4300 to 4880 to tie the alignment in with the proposed junction with A438 King's Acre Road at Ch 4900. Ground levels here are around 80m AOD.

Western Link 11

A4.3.22. WL 11 connects A438 King's Acre Road with A4103 Roman Road. Ground levels over this alignment are fairly even with the route beginning and ending at around 70m AOD. There are no major earthworks associated with this section although where the route crosses the A480 at Ch 320 and a minor road at Ch 882, it is proposed to sever these routes. The route will connect at A4103 Roman Road at the existing roundabout at Stretton Sugwas which is likely to require realignment of the existing road.

Western Link 12

A4.3.23. WL12 connects the junction of WL10 with A438 King's Acre Road to WL13 at Stretton Sugwas. Ground levels are fairly even with levels of around 70m AOD along the route. A minor embankment is proposed from Ch 0 to Ch 600 and a junction is proposed with the minor road at Ch 680.

Western Links 13 and 14

A4.3.24. These sections follow the A4103 existing Roman Road and connect the western corridor routes with the northern corridor. New roundabouts are proposed at the junctions with WL7 and WL8. Ground levels along the WL13 section are constant, around 70m AOD. Ground levels around the WL14

section are around 63m AOD. No major earthworks are proposed along these sections.

Preferred Route

A4.3.25. WL9 is the preferred route in terms of topography as the earthworks balance is more favourable and follows more closely the natural topography. Of the two link roads, WL8 and WL11, WL11 is the shorter route although considering the route as a whole, WL8 allows a shorter route overall as it connects with WL14 and will result in less severance of minor roads.

Northern Corridor

Northern Corridor Link 1

A4.3.26. NC1 begins on A4103 Roman Road at around 62m AOD and proceeds north and east to a proposed new roundabout with the A49 north Holmer Road. Ground levels rise to around 70m AOD in the vicinity of C1095 Tillington Road. A new bridge is proposed to carry the route over C1095 Tillington Road and the route will be carried on an embankment from Ch 200 to Ch 650. The proposed bridge will be at Ch 470 and will around 7.90m above ground level. Ground levels continue to rise as the route proceeds eastwards rising to around 90m AOD at the A4110 Canon Pyon Road. A cutting is proposed between Ch 820 to Ch 1550 and the route will be carried under the A4110 in an underpass. The cutting is around 8m lower than existing ground level. Ground levels remain around 90m AOD until Ch 1700 when levels start to fall slightly to around 85m AOD to the proposed roundabout with the A49 north.

Northern Corridor Link 2

A4.3.27. NC2 begins at the same point on the A4103 Roman Road as NC1 but proceeds in a more northerly alignment. Ground levels are around 70m AOD until Ch 750 where levels start to rise slightly. An embankment is proposed from Ch 100 to Ch 750 and a bridge at Ch 570 to carry the route over the C1095 Tillington Road. At the A4110 Canon Pyon Road ground levels are around 90m AOD and from this point, the route follows the same alignment as NC1.

Northern Corridor Link 3

A4.3.28. NC3 starts on the A49 Holmer Road and ground levels are around 85m AOD. As the route proceeds eastwards ground levels rise to around 95m north of Highfield House. A minor embankment is proposed from Ch 0 to Ch 170. Ground levels fall to around 80m AOD at Coldwells Road. A bridge is proposed to carry the route over Coldwells Road and an embankment is required from Ch 500 to Ch 1000. The bridge will be around Ch 580 and will

be 7m above existing ground level. Ground levels continue to fall towards the rail line where levels are around 60m AOD. The route will be carried on a bridge over the rail line and an embankment is proposed between Ch 1500 and Ch 2330. The height of the embankment is expected to be around 8m at its height. Ground levels fall to the end of the alignment at A465 Aylestone Hill where levels are around 55m AOD. The route will be carried on an embankment from the rail line and a bridge is proposed at Ch 2060 to carry the route over the disused canal.

Northern Corridor Link 4

A4.3.29. NC4 follows the same alignment as NC3 to Rose Gardens Cottage. Here it diverges and follows a more northerly alignment to the rail line before proceeding south to A465 Aylestone Hill. Where the route crosses Munstone Road ground levels are around 65m AOD. Ground levels then fall to around 60m AOD at the railway line and continue to fall to around 50m AOD where the route joins A465 Aylestone Hill at the proposed roundabout. The route will be carried on an embankment from Ch 1550 to Ch 2330 with a maximum height of around 8.4m. The bridge over the rail line will be around Ch 1800 and will be around 7m above existing ground levels. A bridge is also proposed over the canal at Ch 2060 and will be around 1.7m above ground level.

Preferred Routes

A4.3.30. In terms of topography and earthworks, NC1 and NC3 are the preferred Northern Corridor routes.

Eastern Inner Corridor

Eastern Link 1

A4.3.31. EL1 begins at the A465 Aylestone Hill and ground levels are around 52m AOD. Ground levels are fairly constant along this section at around 50 – 55m AOD. The route will be carried on an embankment from Ch 0 to Ch 900 with a maximum height of around 6.1m. An embankment is also proposed from Ch 1450 to Ch 2114 with a maximum height of 4m.

Eastern Link 2

A4.3.32. EL2 is a continuation of EL1 and connects the proposed roundabout at the A438 Ledbury Road with a proposed roundabout at the B4224 Hampton Park Road. Ground levels start at around 53m AOD at A438 Ledbury Road and rise to around 60m AOD at Ch 1000 before falling slightly to 54m AOD at B4224 Hampton Park Road. There are minimal earthworks associated with this section and the road will follow the natural terrain.

Eastern Link 3

A4.3.33. EL3 is a continuation of EL1 and EL2 and ground levels along this section are around 48 to 54m AOD. Most of the alignment will be carried on an embankment due to the need to cross the River Wye and ground levels at the crossing point are around 48m AOD. The bridge will be around 7m above ground level.

Eastern Outer Corridor

Eastern Link 4

A4.3.34. EL4 follows the route of the A465 Aylestone Hill Road across the Lugg Meadows, connecting a proposed roundabout at A4103 / A465 Aylestone Hill roundabout with a proposed roundabout approximately 730m eastwards on Aylestone Hill near Lugg Bridge.

Eastern Link 5

A4.3.35. EL5 is a continuation of EL4 and continues on the existing A4103. As with EL4 it is proposed to raise the road level up and provide a new embankment. Ground levels are currently around 52m AOD and it is proposed to raise the road to around 54-55m AOD. The road crosses existing drains which will be culverted under the road. The route utilises the existing Lugg Bridge and terminates at a proposed new roundabout approximately 1200m from the beginning of the scheme.

Eastern Link 6

A4.3.36. EL6 begins at the proposed new roundabout at the end of EL4 and proceeds in a general south and east direction to terminate at a proposed roundabout on A438 Ledbury Road. The ground here is fairly even with the beginning of the route starting at around 50m AOD and the end of the route is also around 50m AOD. Earthworks along this section are minimal with a proposed embankment from Ch 0 to Ch 1939 with a maximum height of 4m. A new bridge is proposed over the River Lugg at A438 Ledbury Road and ground levels here are around 47m AOD.

Eastern Link 7

A4.3.37. EL7 begins at the proposed new roundabout at the end of EL5 and terminates on A438 Ledbury Road, proceeding in a general southerly direction. Ground levels on A465 Aylestone Hill are around 52m AOD and fall towards A438 Ledbury Road at around 46m AOD. Minimal earthworks are proposed for this section, with a minor embankment from Ch 0 to Ch 200 and Ch 1050 to Ch 1452 to tie in with existing road levels. A new bridge is required over the River Lugg to connect EL7 to EL9 and ground levels here are around 47m AOD. The bridge will be approximately 2m above ground level.

Eastern Link 8

A4.3.38. EL8 follows the same general alignment as EL7 but diverges slightly in its route through New Court. Ground levels at A465 Aylestone Hill are around 52m AOD and fall to around 46m AOD at A438 Ledbury Road. Earthworks are minimal with embankments at Ch 0 to Ch 200 and Ch 1100 to Ch 1578 to allow tie in with existing road levels. A new bridge is proposed to cross the River Lugg and ground levels are around 47m AOD.

Eastern Link 9

A4.3.39. EL9 begins at the proposed new roundabout on A438 Ledbury Road and terminates on B4224 Hampton Park Road, connecting EL7 with EL12. Ground levels at A438 Ledbury Road are around 46m AOD and rise slightly to 47.6m at B4224 Hampton Park Road. It is proposed to carry the route on a minor embankment from Ch 0 to Ch 1100 with a maximum height of 3.6m. A new bridge is proposed at Ch 600 to carry the route over an existing stream.

Eastern Link 10

A4.3.40. EL10 connects EL8 and EL12 and runs in a similar direction to EL9 but slightly westwards. Ground levels around A438 Ledbury Road are 46m AOD and rise slightly towards B4224 Hampton Park Road to around 48m AOD. It is proposed to carry the route on a minor embankment from Ch 0 to Ch 1050 with a maximum height of 3.6m. A new bridge is proposed at Ch 500 to carry the route over the existing stream.

Eastern Link 11

A4.3.41. EL11 connects EL6 and EL12 and runs slightly westwards of EL9 and EL10. At A438 Ledbury Road ground levels are around 46m AOD and at B4224 Hampton Park Road 47m AOD. There are minimal earthworks associated with this section with the proposed road being carried on an embankment from Ch 0 to Ch 1500 with a maximum height of 3.5m. A bridge is proposed at Ch 630 over the stream, 1.6m above ground level.

Eastern Link 12

A4.3.42. This alignment connects the eastern outer corridors with the existing Rotherwas access road. Ground levels at B4224 Hampton Park Road are around 48m and rise slightly to around 50m AOD at Rotherwas. In order to carry the road over the River Wye, an embankment is required from Ch 0 to Ch 1381. A new bridge is proposed over the river which would be around 8m above ground level. Existing ground levels at the proposed crossing point of the Wye are around 47m AOD.

Preferred Route

A4.3.43. In terms of existing topography, the preferred eastern route is the Inner Corridor as there is less need for earthworks, existing ground levels are marginally higher and there is less need to provide additional bridges over watercourses.

A4.4. Summary of topography constraints

A4.4.1. The southern corridors are constrained by the undulating topography and the need to provide an overpass over the rail line. There is also a need to provide either an underpass or overpass for minor roads or sever them.

A4.4.2. The western corridors are constrained by the undulating topography of the area and the need to tie in any new route with existing roads. There is also a need to provide underpasses/overpasses or severance to several minor roads. Large sections of cut and fill are necessary to integrate the road into the landscape. The steep banks of the River Wye require major earthworks to allow for the construction of a new bridge.

A4.4.3. Topography along the northern corridors is less of a constraint here but earthworks are still required to tie the road into existing roads. There is a need to provide a bridge over the railway.

A4.4.4. The eastern corridors are constrained by the low lying topography and the need to construct the road in the floodplain of the River Lugg and Wye. Any route would have to be constructed above the floodplain, making earthworks, structures and the road itself visible in the environment.

A4.5. Land Use

Introduction

A4.5.1. Arial photographs show the land use around Hereford is mostly agricultural with a mixture of arable and pasture fields, with scattered orchards. Field sizes are generally large and boundaries are made up of hedgerows with a high percentage of hedgerow trees. To the south of the River Wye, the fields tend to have a higher proportion of pasture with scattered areas of woodland. North of the River Wye, there is a greater proportion of land in arable use with fewer wooded areas. To the east of Hereford, along the banks of the River Lugg, the land tends to be flatter and is a mosiac of pasture and arable land.

A4.5.2. East of Hereford there are less urban areas due to the River Lugg and its associated floodplain. The area is prone to floods and is designated as a zone 3 flood area. There are flood defence barriers around Hampton Bishop and north of Rotherwas the Stank is a large earth embankment providing flood protection to the flat areas between the River Wye and Lugg.

A4.5.3. The UDP housing policy indicates that during the plan period several thousand dwellings will be required in Hereford. Lands designated by the plan for future housing developments that may be impacted by the scheme include an allocated site at Belmont for 60 dwellings and a site at Holmer for 300 dwellings. Although all the routes fall outside the urban settlement boundary for Hereford, the provision of new housing will place increased pressure on the existing road network in the town and provide an impetus for a relief road.

A4.5.4. Other policies within the UDP provide protection for cultural and natural assets. Policy S7 Natural and historic heritage, states that the following assets will be protected, restored or enhanced:

- *sites and features of international, national and local nature conservation interest, species of biodiversity interest and areas of geodiversity;*
- *the historic heritage including archaeology, buildings and areas of historic or archaeological importance, and natural landscapes; and*
- *landscape features that contribute positively to local distinctiveness and quality of the local environment.*

A4.5.5. Policy LA4 Protection of historic parks and gardens, states:

- *development which would destroy, damage or otherwise adversely affect the historic structure, character, appearance, features or setting (including the designed visual envelope) of a registered historic park or garden will not be permitted;*

- *development proposals that would affect an historic park or garden should be accompanied by an historic landscape appraisal report and a restoration scheme, which may include or comprise a management plan, commensurate with the scale of the proposal that affects them;*
- *unregistered parks and gardens recognised and identified by the Council as currently of local importance will be afforded similar protection.*

A4.5.6. Policy LA5 Protection of trees, woodlands and hedgerows, states the enhancement and protection of individual trees, tree groups, woodlands and hedgerows will be secured by:

- *resisting proposals that would cause loss or damage to trees (including veteran trees), hedgerows, mature traditional orchards or woodlands which are worthy of retention. In particular, proposals affecting protected trees and Ancient and Semi-Natural woodlands will be subject to rigorous examination. Where the felling of protected trees is accepted replacement planting will be sought; and*
- *requiring development proposals to include an acceptable landscaping scheme submitted in accordance with policy LA6, the retention of those trees and hedgerows considered important to local amenity, together with measures to ensure their protection during development, and the replacement of trees and woodland lost to development with an equivalent area of planting.*

A4.5.7. Policy NC4 Sites of local importance, states:

- *development proposals which would directly or indirectly affect a Special Wildlife Site, Site of Importance to Nature Conservation, Local Nature Reserve, a Regionally Important Geological/Geomorphological Site or a site subject to agreement under Section 39 of the Wildlife and Countryside Act will not be permitted unless it can be demonstrated that there would be no harm to the substantive nature conservation value of the site, or that appropriate mitigation or compensatory measures can be taken in accordance with Policy NC7, or that the reasons for the development clearly outweigh the need to safeguard the nature conservation value of the site.*

A4.5.8. Policy HBA8 Locally important buildings, states:

- *development proposals that would adversely affect the appearance or setting of locally important buildings of architectural*

or historic interest, or buildings that make a valuable contribution to the historic character and appearance of an area, will not be permitted.

A4.5.9. The following section will look at each corridor in detail assessing impacts the route alignments will have on land use. Land Use Constraints are shown on Figures A4.1 to A4.4.

Southern Corridor

Southern Corridor Link 1

A4.5.10. SC1 starts at a proposed new roundabout at the A49 south and proceeds to a new roundabout on the A465. The route crosses mainly agricultural land with some areas of woodland and occasional watercourses. The route crosses the northern corner of Grafton Wood from Ch 300 to Ch 500. A culvert is proposed for an existing stream at Ch 1450. The route cuts through Hayleasow Wood and Newton Coppice Special Wildlife Site and a structure is proposed to carry the route over the woodland. The proposed alignment crosses agricultural land and is likely to result in severance of some of the fields, rendering them unusable for future agricultural use. The route also passes close to a site at Belmont which has been allocated for 60 new dwellings in conjunction with the implementation of Haywood Country Park.

Southern Corridor Link 2

A4.5.11. SC2 follows the same alignment as SC1 to the proposed overbridge over the rail line. It diverges from SC1 to a new roundabout at A465. The route crosses agricultural land and avoids crossing Hayleasow Wood by being diverted to the west of the wood. This route is also likely to lead to severance of several of the fields it crosses.

Preferred Route

A4.5.12. In terms of impacts on land use from the southern corridor, SC2 is the preferred route as it bypasses the Special Wildlife Site at Hayleasow Wood.

A4.5.13. Figure A4.1 shows the land use constraints associated with this corridor.

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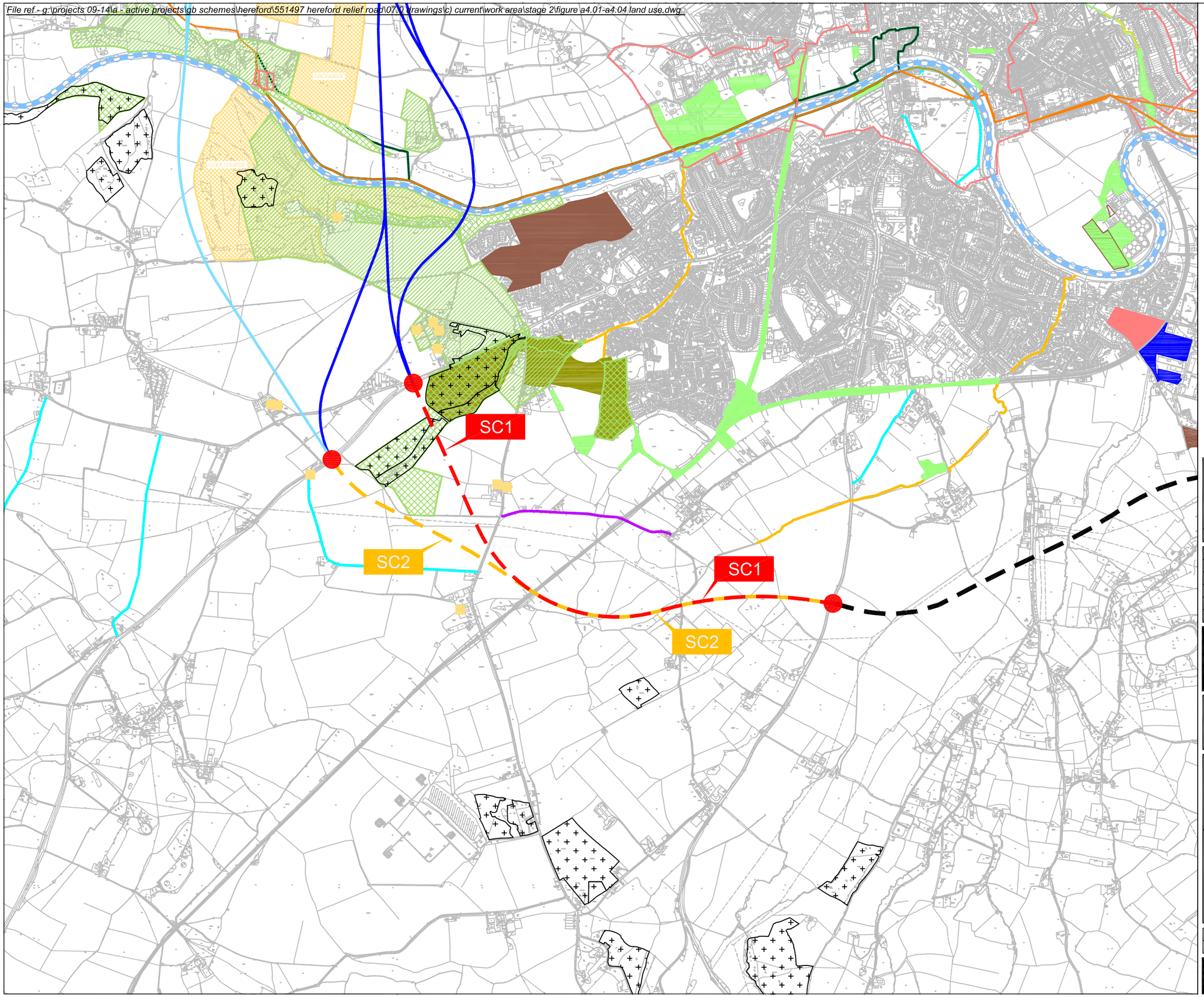

LEGEND

- Ancient Woodland
- Special Area of Conservation (SAC)
- Site of Special Scientific Interest (SSSI)
- Conservation Areas
- Special Wildlife Site (SWS)
- Historic Parks and Gardens
- UDP Proposed Housing Site
- Land Use (as annotated)
- Rotherwas Access Road
- Wye Valley Walk
- Bridle Way
- Listed Buildings

Rev	Revision details	Chkd	Appd	Date

Drawn: ED	Preliminary ✓
Design: ES	For comment
Chkd: SD	For tender
Appd: RM	For construction
Date: July 2010	As constructed
	Other

amey

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Project Name
Hereford Relief Road

Drawing Title
Southern Corridor Land Use Constraints

Original Drawing Size :	A3
Scale : 1:20,000	Dimensions : -

Drawing No	Fig No	Rev
	A4.1	-