

Hoobrook Link Road Pre-Feasibility Study



The need for a road link in the Hoobrook area of Kidderminster was identified in the preparatory works undertaken to inform the Wyre Forest Local Development Framework, which has been developed by Wyre Forest District Council, with the endorsement of Worcestershire County Council.

This pre-feasibility report was commissioned to provide a strategic indication of the likely scope of delivering a Hoobrook Link Road scheme in Kidderminster, including an initial assessment of the potential traffic, environmental, socio-economic, infrastructure issues and costs associated with this scheme. This report represents a qualitative desk based assessment, supported by a number of preliminary site visits. The contents of this report should not be considered as definitive in any way. **Definitive costs can only be defined through the development of detailed scoping works to identify all the relevant issues and costs associated with this scheme.** This requires an assessment compliant with the Department for Transport's WebTAG appraisal process. With this caveat, the report identified the following strategic conclusions:

- Development of the Hoobrook Link Road would help to facilitate full redevelopment for employment purposes of the former British Sugar Site and the wider Stourport Road Employment Corridor which would deliver significant socio-economic benefits for the Wyre Forest District;
- A new link road would help to reduce existing congestion on the northern section of the A451 and the A451/A442 bus depot gyratory (ring road junction) and thus improve accessibility to local facilities and the town centre;

Worcestershire County Council is supportive of the provision of a Hoobrook Link Road, subject to a technically robust business case being developed to justify the delivery of this scheme as a means to deliver socio-economic success for the Wyre Forest area. As the costs of the scheme would be in excess of £10 millions, the assessment of the case for public sector investment in this infrastructure would have to meet Major Scheme Business Case standards.

Unless provided with robust technical evidence to the contrary, Worcestershire County Council would not be supportive of any change of use of the former British Sugar Site for residential purposes, since such a change of use would deliver significantly higher trip generation than employment uses. Key sections of the local highway network already operate at or above capacity at peak times, so additional trip generation is likely to cause significant peak journey time deterioration and reliability issues in the local area. The delivery of a Hoobrook Link Road in this context would not result in enhanced operation of the local network, nor as effectively support economic growth and regeneration, since this new capacity would be utilised to a greater extent by residential (as opposed to employment related) trip generation from this site. Furthermore, the provision of increased residential units, without an increase in employment opportunities will force residents to travel beyond the district to seek employment. This will increase car use; distances travelled and reduce the overall sustainability of the Wyre Forest district, being a documented sustainability issue cited in the Wyre Forest Local Development Framework.

**Worcestershire County Council
Hoobrook Link Road
Pre-feasibility Study**

December 2008



Halcrow Group Limited

Halcrow



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Contents

1	Introduction	1
	1.1 <i>Background</i>	1
	1.2 <i>Report Purpose</i>	1
	1.3 <i>Report Structure</i>	1
2	Approach	3
	2.1 <i>Methodology</i>	3
	2.2 <i>Alignment Options</i>	3
3	Scheme Traffic Assessment	5
	3.1 <i>Methodology</i>	5
	3.2 <i>Transport Policy</i>	5
	3.3 <i>Existing Highway Conditions</i>	6
	3.4 <i>Highway Network Capacity</i>	7
	3.5 <i>Potential Constraints/Impacts</i>	8
	3.6 <i>Additional Information/ Study Recommendations</i>	16
4	Environmental Assessment	18
	4.1 <i>Air Quality</i>	18
	4.2 <i>Historic Environment</i>	21
	4.3 <i>Ecology and Nature Conservation</i>	24
	4.4 <i>Landscape Character and Visual Impact</i>	39
	4.5 <i>Noise and Vibration</i>	47
	4.6 <i>Ground Conditions</i>	51
	4.7 <i>Water Environment</i>	53
	4.8 <i>Contaminated Land</i>	57
5	Socio-Economic Assessment	61
	5.1 <i>Methodology</i>	61
	5.2 <i>Baseline</i>	61
	5.3 <i>Potential Constraints/Impacts</i>	62
6	Infrastructure	64
	6.1 <i>Impacts on Existing Infrastructure</i>	64
	6.2 <i>Scheme Infrastructure</i>	65
7	Summary	69

Figures

Plates

Appendix 1 Ecological Survey Periods

1 Introduction

1.1 *Background*

Halcrow Group Limited (Halcrow) has been appointed by Worcestershire County Council (WCC) to carry out a pre-feasibility study of options for a new road, the Hoobrook Link Road, about 1.5 km south of Kidderminster town centre. The road would link the A451 Stourport Road in the west, adjacent to the former British Sugar site, and the A442/A449 Worcester Road at Hoobrook in the east.

The former British Sugar site on Stourport Road, situated within a predominantly industrial area that is recognised as requiring regeneration, has been designated as a potential development site for employment use in the Wyre Forest District Council Local Plan. The most likely mix of development is B1, B1(C)/B2 and B8 land uses (business, general and light industry and storage and distribution). Work undertaken by Faber Maunsell in 2002 on behalf of the former site owner, Associated British Foods, concluded that some additional road building, in the form of an east-west link road, would be required to allow the full development of the site, and associated regeneration of the wider industrial area, to be realised.

The study area, as illustrated in Figure 1, broadly comprises the former British Sugar site in the west, a section of the corridor occupied by the River Stour and Staffordshire and Worcestershire Canal in the centre and the Hoobrook Trading estate and northern end of Wilden Marshes in the east.

1.2 *Report Purpose*

The purpose of this report is to inform WCC's discussions with Wyre Forest District Council (WFDC) and Cill Dara Property Partnership (owners of the former British Sugar site) regarding the feasibility of a link road at Hoobrook.

1.3 *Report Structure*

An overview of the approach adopted for this study and potential alignment options are presented in Chapter 2. Scheme traffic,

environmental and socio-economic factors are reviewed in Chapters 3, 4 and 5. These chapters identify the key issues and potential constraints/impacts relating to the link road and also include recommendations regarding further work that would be required if the scheme were to be progressed further. Chapter 6 considers the existing infrastructure and scheme infrastructure and presents indicative timescales and costs for the road construction. A summary of the study findings and recommendations is provided in Chapter 7.

2 Approach

2.1 *Methodology*

This study is a high level, pre-feasibility investigation of the potential traffic, environmental, socio-economic and infrastructure issues associated with the potential new link road. As such, it is principally a qualitative desk based assessment, supported by a number of preliminary site visits. If proposals for the link road are to be taken forward there will need to be much more detailed investigation. The desk based assessments have been undertaken in accordance with standard best practice using information that is readily available for the study area. In addition, particularly for the assessment of contamination issues, use has been made of high resolution satellite remote sensing technology (see Section 4.8). Details of the methodologies used, together with recommendations for further work required for each respective technical area, are included within Chapters 3, 4 and 5.

For each technical area the issues associated with the link road were reviewed both generally and also specifically for individual alignment options as identified below.

2.2 *Alignment Options*

An initial examination of the study area was undertaken in order to identify potential alignment options for the link road. In identifying these options it was agreed with the WCC Project Manager (Martin Rowe) that a 'blank sheet' would be assumed with regard to the site development plans. Obviously the alignment of any link road will have a fundamental influence on the layout of the site development.

For the 'take off' location at the western end of the road it was considered desirable to make use of existing road junctions and avoid creating an additional junction if possible. Therefore, the existing junction with Clee Avenue was identified as a potentially suitable location for the intersection of the link road with the A451 Stourport Road.

There is a strong southwest-northeast axis travel demand in the area with the termination of the demand in the north easterly direction being the M5 motorway¹. The link road therefore needs to provide access for traffic, either directly or indirectly, to the Worcester Road roundabout at Hoobrook to facilitate access to the A449 Chester Road. Construction of the link road directly to the Worcester Road roundabout would most likely require some degree of compulsory purchase of adjacent properties and would result in a 5 on-off arm roundabout. This is not considered desirable from a highway design perspective and would be likely to require considerable reconstruction of the roundabout. It was therefore decided to identify alignments that involve indirect access to the roundabout, utilising elements of the existing road infrastructure as far as possible.

The eastern half of the former British Sugar site features a number of disused settling ponds (see Figure 2). It can be seen, even in advance of any assessment, that these would present geoenvironmental (topography, geology and soils, geotechnics and hydro-geology) constraints to the construction of the link road (see Sections 3.2.6 and 3.2.7). Three alignment options have therefore been identified; Option 1 by-passing the settling ponds to the north, Option 2 cutting through the ponds area and Option 3 by-passing the ponds to the south, as illustrated in Figure 3.

Option 1 continues roughly parallel to the Severn Valley Railway (SVR), which bounds the study area to the north, before connecting with the A442 through the northern section of the Hoobrook Trading Estate by means of a new junction. Option 2 also runs roughly parallel to the SVR but further south than Option 1, connecting to the A442 via the existing industrial Road No 1 within the Hoobrook Trading Estate. Option 3 runs in a slightly south-east direction and involves access onto Wilden Way, joining the A442/A449 via the Wilden Way approach to the existing Hoobrook Roundabout.

¹ Wyre Forest District Local Plan Review. Public Local Inquiry Objection Ref No 635. Summary Proof of Evidence of: Philip Taylor. Faber Maunsell. October 2002

3 Scheme Traffic Assessment

3.1

Methodology

A desk based assessment was undertaken using information that is readily available for the local area. Traffic queue data identified within the WCC 2006 base traffic SATURN model for the Wyre Forest/Kidderminster has also been reviewed for an indication of highway network capacity.

A broad assessment of the traffic issues associated with the provision of a link road and the impacts this would be likely to have on the operation of the existing highway network, at both the strategic and local level, has been made.

The key issues addressed include:

- Accessibility;
- Road safety;
- Sustainable transport provision; and
- Link road connections.

Additional information and actions needed to undertake a more detailed feasibility assessment of the link road in future have also been considered.

3.2

Transport Policy

Within the WCC Local Transport Plan 2, 2006-2011 (LTP2) a series of transport related issues have been identified for the Wyre Forest district of Worcestershire, including:

- Lack of access to key services by public transport;
- Congestion in Stourport and Kidderminster constrains access to employment sites, contributing to air quality problems; and
- Stourport Road employment corridor for redevelopment in a deprived area.

The regeneration Prospectus Scoping Paper titled ‘Connecting Kidderminster’, January 2008 produced by the Wyre Forest District Council (WFDC) and partners, identified a series of transport opportunities for the local area. These include:

- Kidderminster is recognised as a strategic centre for the other two towns of Stourport and Bewdley, and provides the main source of local employment opportunities. The vision for area is to develop underused and vacant sites into high quality employment areas, attracting new companies, people, skills and training to the area;
- Possible provision of a ‘Hoobrook Link Road’ following the redevelopment of the British Sugar site, creating stronger links to the deprived areas of Oldington and Foley Park.
- Improvements to public transport provision and access to Kidderminster railway station.

Each of the issues and opportunities has been considered in the context of the analysis undertaken below.

3.3

Existing Highway Conditions

The A451 Stourport Road provides a link running north to south connecting Kidderminster to Stourport-on-Severn, and forms part of the ring road around Kidderminster Town Centre to the north. Within Stourport-on-Severn, the A451 runs directly north to south through the town centre, continuing to Great Witley.

The A451 is provided as a wide single lane carriageway for the majority of its length, with a hatched central reserve. This road provides access to residential areas on both sides of the road, and to a series of large industrial areas south of the Seven Valley Railway Line (SVRL), including the Vale and Ordington Trading Estates.

North of the SVRL, the A451 provides access to large residential areas located to the southwest of Kidderminster, with an increasing number of dwellings/developments taking direct access off the road on approach to the town centre.

The A451 is a designated bus route for five bus services providing frequencies at best, every 20 minutes (for a single service).

The A442 Worcester Road (changing into the A449) connects to M5 Junction 6 to the south, and to the ring road around Kidderminster to the north. This road is provided as a dual carriageway, reducing to a wide single carriageway on route towards the motorway, and as it routes through a short tunnel under the SVRL.

The A442 provides access to a number of large industrial areas to the west of the carriageway, and access to residential areas located to the east. This road also forms the most direct route to Kidderminster from Worcester, and one of several routes between Kidderminster and the M5 motorway.

3.4

Highway Network Capacity

Traffic queues generated at key junctions on the surrounding highway network have been identified using information derived from the WCC 2006 SATURN model for the Wyre Forest/Kidderminster. Traffic queues have been identified for the most sensitive weekday morning and evening peak hours, and the results are provided below.

In the morning peak the result from the SATURN model suggests queues of 12 vehicles on the B4549 Sutton Park Road approach to the A451 Stourport Road. Queues of 38 vehicles are also shown to occur on the A451 on approach to the A442 'Bus depot' roundabout. In the morning peak, queues are also generated on the A449 Chester Road South approach to the WildenWay/A449 /A442/ Chester Road South Roundabout.

In the evening peak hour, the SATURN model shows queues of 11 vehicles on the A451 on approach to the A451/ B4549 Sutton Park Road signal controlled junction. Queues of 19 vehicles are also shown to occur on the A442 approach to the 'Bus depot' roundabout.

The results derived from the SATURN model during the peak hours suggests the highway network was already congested in 2006, and likely to get worst in later years.

3.5

3.5.1

Potential Constraints/Impacts

Accessibility

The ARUP British Sugar Site Transport Assessment, dated March 2008, suggests probable locations of traffic congestion for key junctions on the local highway network. While the degree of traffic congestion generated during the most sensitive peak hours is not identified, this would inevitably reduce vehicle accessibility to local facilities and the town centre. These junctions include:

- A451/A4535 Sutton Road;
- A451/B4549 Sutton Park Road (distributor road providing access to surrounding residential areas and route to Bewdley);
- A451/A442 Bus Depot Gyrotory (ring road junction);
- A449/A442 Worcester Road/Chester Road South/Wilden Lane Roundabout;
- A451 Minster Road/B4195 Worcester Street;
- A4025/B4193 Hartlebury Road Roundabout

The impacts (opportunities and constraints) that the link road would have on the accessibility of local and strategic areas have been considered, and are set out below.

Strategic Impacts

Opportunities:

- The link road would provide residents/employees living and working to the west of the A451, with significantly better access to Kidderminster Railway Station via the new link road and A442, without having to travel into the town centre;
- A more direct and faster route for vehicles associated with the industrial developments located on sites either side of the A451 to gain access to M5 Junction 5 (travelling northbound). The provision of a link road would negate the need for these vehicles to travel northbound onto the congested Kidderminster ring road, before routing towards the motorway;

- Would provide residents living to the west of the A451 significantly better access to shopping facilities in Kidderminster town centre, especially to the town centre car parks located east of the town centre off the Ringway (A451), via the A442. This would negate the need for these residential trips to route onto the ring road via the congested A451.

Constraints:

- The provision of a link road is not considered to provide any great opportunity for wide ranging east – west links across the Wyre Forest District through Kidderminster, as rural trips (from the west) accessing the A451, would still be required to pass close by Kidderminster town centre or Stourport-on-Severn, to gain access to the road, before connecting to the new link road;
- Would not provide any journey time savings for trips associated with the industrial developments situated either side of the A442/A499 to gain access to the M5 Junction 6 (travelling southbound).

Local Impacts

Opportunities:

- A reduction in traffic travelling onto the Kidderminster ring road, and to the south on the A451, travelling through the centre of Stourport-on-Severn. This would occur as east-west links would be improved in the immediate area, thus not requiring vehicles to travel into Kidderminster or Stourport-on-Severn in order to switch between the two roads (A451 and A442/A449);
- Reduced traffic congestion on the A451, would be likely to enable shorter bus service journey times on this road;
- Potential for closer working ties between various industrial units located on the A451 and A442, without the need for excessive trips made external to the industrial areas;

- Would provide some journey time savings for trips associated with the industrial developments situated either side of the A451 to gain access to the M5 (travelling southbound via the A442/A449 to Junction 6);
- Would provide local residents greater access to education, leisure and employment opportunities on either side of the link road (A451 and A442);
- Greater accessibility for service vehicles to access local industrial developments, through the provision of a new road built to a suitable standard, able to accommodate HGVs.

Constraints:

- New junctions on the existing A451 and A442 carriageways could result in some new traffic queues being generated.

3.5.2

Road Safety

Injury accident data included within the ARUP British Sugar site TA (March 2008) was reviewed in terms of highway safety. In total, 46 personal injury accidents were recorded along the A451 Stourport Road in the vicinity of the British Sugar site between 1st November 2002 and 31st October 2007. Of these 46 accidents, 16 involved vulnerable road users. Cyclists were involved in six collisions, one of which was categorised as serious, whilst pedestrians were affected in ten accidents, resulting in one fatality, three serious injuries, and 6 slight severity injuries.

All but one accident involving cyclists and pedestrians on the A451 occurred on its northern section (north of the SVRL and the British Sugar site). The segregated traffic free cycle routes which run parallel to A451 on both sides of its southern section end at Clee Avenue. All of the accidents involving cyclists, occurred to the north of this point, highlighting how the safety of cyclists deteriorates once the segregated cycle route ends. Most of the accidents involving cyclists resulted from vehicles turning into cyclists, particularly when making right turn movements.

Accidents involving pedestrians predominantly occurred within approximately 100m of existing pedestrian crossing facilities, suggesting that a lack of pedestrian crossings is not a factor for most accidents. All of the collisions involving pedestrians were attributed to pedestrians attempting to cross the road without due care and attention. One pedestrian was intoxicated when involved in the accident, and children were involved in two incidents.

In terms of road safety, the opportunities and constraints of providing a link road include:

Strategic Impacts

Opportunities:

- Less traffic on parts of the A451 north of Clee Avenue as a result of traffic re-distributing onto the link road, may reduce the potential for vehicle conflicts with pedestrians/cyclists.

Constraints:

- The link road would allow for additional areas off the A451 and A442 to be developed, which would be likely to attract more HGV's to the local area. It is considered that more HGV's on the road network could cause more traffic accidents to occur, as these vehicles have a reduced ability to stop quickly in an emergency situation and are more difficult to manoeuvre around corners.

Local Impacts

Opportunities:

- If the new junctions linking the new link road to the A451 and A442 were to be signal junctions they could incorporate signalised pedestrian crossings within their design. This could

aid a reduction in pedestrian injury accidents occurring on the A451 and A442;

- The link road could enable traffic to flow more freely on the local highway network, reducing the number of shunt accidents that occur through lack of concentration in slow moving and congested traffic.

Constraints:

- Less congestion of the A451 and A442 may increase the speeds of vehicles travelling on these roads in the peak hours, combining with times at which pupils are walking to school;

3.5.3

Sustainable Transport Provision

The area surrounding the proposed link road is considered to have adequate sustainable transport provision. In terms of pedestrian links, two signal controlled pedestrian crossing are provided on the A451 in relatively close proximity to the link road's potential location, one provided approximately 100m north of the SVRL, and one to the north of Foley Drive.

The A442 does not provide any formal pedestrian crossing points for the majority of its length, and acts as a barrier to pedestrians in locations where this road is provided as a dual carriageway.

Provision for cyclists in the local area is considered to be good, with segregated cycle routes provided on the A451, linked to several sections of on-road cycle roads on minor roads taking access off the A451. A leisure cycle route (number 54) is provided between the A451 and A442, running parallel with the A451 alongside the Staffordshire and Worcestershire Canal and River Stour.

The A442 also has a segregated footway provided alongside the carriageway between the town centre and SVRL, with a suitable on-road route provided for cyclists leading off this road, continuing south on Wilden Lane.

A total of five bus services operate on the A451, with two of these running part way on this road, to serve residential areas to the west via Water Nash Road. Bus stops are provided at regular frequencies on the A451, provided as a combination of flagposts and shelters. The bus services operating on the A451 include; the 294; 3, X3, 11 and 760, providing a single service best frequency of a bus every 20 minutes (294), ranging to 1 service a day (760).

A further two bus services are provided on the A442 (leading into the A449), including the 295 and 303. These provide a 2 hourly and hourly service to areas south of the town centre, via Wilden Lane (south of the SVRL), and the A442 respectively. Bus stops are provided at regular intervals on the A442/A449, and to a lesser degree on Wilden Lane.

In terms of sustainable transport provision, the opportunities and constraints of providing a link road include:

Strategic Impacts

Opportunities:

- Would provide residents/employees living and working to the west of the A451 significantly better access to Kidderminster Railway Station via the new link road and A442, without having to travel into the town centre;
- Reduced traffic congestion on the A451 as a result of the link road would decrease bus journey times between Stourport-on-Severn to Kidderminster (and visa versa);
- The link road would provide a direct east-west cycle/pedestrian connection south of the town, that does not currently exist in this location;
- The provision of a link road would open up new parcels of land for development, that would generate additional personage/revenue for bus services, if re-routed to serve these areas.

Constraints:

- Reduced traffic congestion on the local highway network as a result of the link road, may improve journey times for some car based trips in the local area. This would make car driving more attractive compared to using public transport.

Local Impacts

Opportunities:

- Reduced traffic predicted to travel on the Kidderminster ring road, allowing less congestion for bus services to operate, enabling faster journey times to be achieved;
- Possibility to provide new bus routes along the link road, reaching areas that are not currently served by public transport;
- Option to incorporate advanced stop-lines for cyclists at signal controlled junctions connecting the link road to the existing highway. Similarly these junctions could incorporate traffic signals that change for an approaching bus service;
- Option to incorporate a signal controlled pedestrian crossing across the A442, as part of a signal controlled junction connecting the link road to the existing highway;
- Greater pedestrian/cycle links east-west south of Kidderminster.

Constraints:

- Severance of National Cycle Network Route 54 by the proposed link road, however it is considered that this cycle route would be maintained, with the link road provided as a bridge over the existing cycle route.

3.5.4

Link Road Connections

Three road alignment options have been examined. The A451 connection is the same for all three options, intersecting the A451

opposite Clee Avenue to create a four arm roundabout or signal controlled junction.

In terms of the connection of the eastern end of the link road to the existing highway network, three differing options are considered. Referring to the three options (1 to 3) as shown on Figure 2 comments are provided as follows:

Option 1

This alignment sees the link road connect to the A442 through the north section of the Hoobrook Trading Estate, south of the SVRL bridge. The link road would then connect to the A442 via a new roundabout or signal controlled junction. Some redevelopment of the Hoobrook Trading Estate to accommodate the new road would be required.

A link road connection in this location is considered acceptable, although forward visibility of the junction from the north, could be affected by the A442 travelling under the SVLR bridge. It is also considered that differences in land gradients between the Hoobrook Industrial Estate and the A442 could be greater in this location than for Option 2 which could have cost implications. This would need to be confirmed as part of further, more detailed, studies.

This alignment would result in an additional junction on the A442 which would impact on the flow of traffic currently using the road.

Option 2

This alignment sees the link road connect to the A442 via the existing industrial Road No 1 within the Hoobrook Industrial Estate. This is likely to require upgrading of the industrial road carriageway to a higher standard and some redevelopment of the Hoobrook Industrial Estate to accommodate the new road but it would not add to the number of junctions on the A442.

Access to the A442 in this location is considered to be suitable for the provision of a three arm junction, either as a roundabout or signal controlled junction.

Option 3

The third route option involves access onto Wilden Way, then joining the A442/A449 via the Wilden Way approach to the existing Hoobrook Roundabout.

The roundabout would be likely to require some improvement works to accommodate the increase in traffic approaching from the Wilden Lane arm. Full reconstruction, however, is not anticipated.

3.6

Additional Information/Study Recommendations

It is considered that if the link road scheme is to be progressed further the following information/studies would be required:

- A detailed review, and update as necessary, of the WCC SATURN model for the Kidderminster/Wyre Forest highway network (produced in 2006). This model should then be used to test the effect the provision of the link road would have on the distribution of traffic flows in the local area and how this re-distribution could impact the operation of the existing highway network. Modelling would also be required to assess the impacts and optimum location of new road junctions on Stourport Road and Worcester Road/Wilden Lane. In order to consider the wider transport issues in this area, the existing Wyre Forest SATURN model would need to be updated and developed into a multi-modal model. At this stage, our best estimate of the fees required to undertake this work is £300,000. However, we would need to discuss and assess the scope of the work needed with Worcestershire County Council. We would then be able to refine this fee figure based on the outcome of these discussions.
- In order to undertake a more detailed feasibility study of the link road in terms of road safety, injury accident data for a wider area around the link road location should be obtained. This data should be analysed for the cause of accidents, with

consideration of whether provision of the link road could potentially harm or improve the safety record of the local highway network;

- A more detailed review of public transport should be undertaken to include:
 - a) discussion with public transport operators on the possibility of re-routing services, and the benefits this could bring;
 - b) investigation of options for bus priority signal controlled junctions to connect the link road to the A451 and A442;
 - c) obtaining information on passenger numbers and routes taken on public transport, to determine if the existing services could accommodate additional users, generated by developing land parcels around the link road for employment uses.

4 Environmental Assessment

4.1 *Air Quality*

4.1.1 *Methodology*

A desk based assessment was undertaken using information for the local area as detailed below. No site specific air quality data is currently available.

- Wyre Forest District Council - district level policy and plan documents and related progress reports, Air Quality Monitoring Area data;
- WCC - county level policy and plan documents; and
- Environment Agency - National Air Quality Strategy, plans and policies.

4.1.2 *Policy and Legal Context*

There are numerous policy and legal considerations relevant to the feasibility of the link road with regard to air quality including EU and National legislation and guidance, County and District Council guidance, and National and Regional planning policies and non planning guidance notes. Key acts and regulations of relevance include:

- Environmental Protection Act 1990 (Section 78A (2) of Part 2A)
- Environment Act 1995 (Part –II Contaminated Land and Abandoned Mines)
- Clean Air Act 1993 (c. 11)
- The Air Quality (England) (Amendment) Regulations 2002

Wyre Forest District Council (WFDC) has developed a long term strategy to handle air quality in a corporate and multi-disciplinary way, covering all their wider policy areas; such as land use planning, transport planning, energy efficiency, waste management, economic development and regeneration.

WFDC has two roles with respect to air quality:

- to develop strategic plans with the aim of reducing poor air quality within the Wyre Forest Area; and
- to monitor and quantify the current air pollution status within the District.

Four Air Quality Review and Assessment Reports and two progress reports have been published to date.

There are two air quality management areas declared within the District:

- Blackwell Street, Horsefair in Kidderminster (2.75km north of the study area); and
- Welch Gate in Bewdley (4.16km north-west of the study area).

Levels of NO₂ are monitored in these two areas and Action Plans to reduce the levels were adopted by WFDC late in 2004. In addition, the National Air Quality Strategy 2005 was adopted by WFDC in 2006. The strategy represents a comprehensive approach towards maintaining and improving ambient air quality and cover 8 pollutants regarded as being of most concern at present.

4.1.3

Potential Constraints/Impacts

Nitrogen Dioxide (NO₂)

Nitrogen dioxide is one of a number of nitrogen oxides (NO_x), that are formed during high temperature combustion processes in internal combustion engines used in vehicles and some industries. Road traffic is the main source of NO₂ in the Wyre Forest District and the NO₂ concentrations tend to be highest in the urban environments with high traffic levels. Some large industrial sources in the district also impact the overall concentration of NO₂.

NO₂ is a respiratory irritant and also plays a part in the production of another atmospheric pollutant, Ozone. Nitrogen oxides remain in the atmosphere for approximately one day before they are oxidised to

nitric acid. Nitrogen oxides are therefore a contributory factor in the production of acid rain.

Along the congested stretches of the A451 and A442 slightly higher level of NO₂ have been observed, which are further exacerbated during peak hours when the road traffic increases substantially. As such the link road is likely to reduce the concentration of NO₂ along the congested stretches on A442 and A451 by providing a bypass. This could have a beneficial impact on NO₂ levels at the Horsefair AQMA. However, traffic flow and air quality modelling would be required to quantify this.

PM10 Particulates

PM10 describes the fraction of airborne particulate matter that is less than 10µ (micron) in size. The focus of the strategy in the Wyre Forest District is targeted towards the impacts of particulates on the respiratory airways.

PM10 and other particulate matter may vary considerably in chemical and physical composition. At present the principal sources of these particles are combustion processes, including traffic and industry. During construction processes some issues are also likely to arise related to PM10 as a result of fugitive dust. Therefore the issues associated with fugitive dust during construction of the link road would require adequate mitigation measures, particularly due to the proximity of the study area to residential areas.

4.1.4

Additional Information/ Study Recommendations

As stated above, no site specific air quality data is currently available. If the link road scheme is to be progressed further the following information/studies would be required:

- site specific monitoring of the air quality;
- analysis and modelling with respect to the design traffic volume for the link road;
- dispersion modelling for air pollutants originating from the proposed road; and

- plan for management of fugitive dust during proposed construction.

4.2

Historic Environment

4.2.1

Methodology

This section provides a summary of the existing known archaeological and cultural heritage resource within the study area which for the purposes of this assessment is 600 metre radius from the centre of the three alignment options. This information has been used to highlight potential archaeological and built heritage constraints to the construction of the link road and to highlight likely mitigation measures, as well as providing recommendations for further study.

Baseline information regarding the archaeological and cultural heritage resource of the study area was gathered from the following sources:

- Worcestershire Historic Environment and Archaeology Service - Historic Environment Record for archaeological sites and monuments information;
- The Multi Agency Geographic Information for the Countryside (MAGIC) website (www.magic.gov.uk) - an interactive map based resource that contains information on key environmental schemes and designations, as supplied by seven government organisations including English Heritage.

4.2.2

Baseline

Statutory designations

According to the MAGIC website there are no designated sites adjacent to, or within, the study area. Designations examined were:

- Scheduled Ancient Monuments (SM);
- Areas of Ancient Woodland;
- World Heritage Sites;
- Registered Battlefields;
- Historic Parks and Gardens; and

- Listed Buildings.

Non-statutory designations

There are 6 sites located on the alignments of the three route options that are recorded on the Worcestershire Historic Environment Record (WHER):

- An area of high palaeoenvironmental potential (WSM38018/38021) determined via palaeoenvironmental sampling (WSM 39807) and borehole survey (WSM 38019) (Option 3 only);
- Field name of Blacklands Meadow (WSM34007) possibly indicating Prehistoric, Roman or post-Roman settlement (Option 3 only);
- Conjectural route of Godham Way (WSM30280), thought to have delineated the extent of a medieval forest (Options 1, 2 and 3);
- Staffordshire and Worcestershire Canal (WSM 12001), (Options 1, 2 and 3);
- Tramway on the line of the Stourport Road WSM 34538, (Options 1, 2 and 3).

Within the study area there are a further 34 sites recorded by WHER. These comprise:

- The former course of the River Stour (WSM38011)
- A find spot of a Neolithic Axe (WSM5128)
- Documentary evidence for De Hoo medieval settlement (WSM15021) and Oldington medieval settlement (WSM15020) also a post medieval rolling/slitting/water mill and forge (WSM34444)
- 3 Water management features which include a historic water meadow (WSM35268); a post medieval water pumping station (WSM12898) and a sluice gate (WSM38010)
- from place name evidence, a watermill (WSM35872); a gate (WSM30241) and Hartlebury common (WSM28799) the post medieval Plats wharf (WSM38012/3)

- Railway viaducts (WSM38149) and (WSM37156) on the Oxford, Worcester and Wolverhampton Railway (WSM31664/6)
- 3 sites relating to the Severn Valley Railway (WSM28592) which include Foley Halt railway station (WSM8536) and the Kidderminster/Bewdley loop and guard post (WSM31669)
- 9 sites recorded by the Defence of Britain Project which include: an air raid shelter (WSM33307); a road block and weapons pit (WSM28621); a second weapons pit (WSM28556); a former firing range (WSM27606); a defence strong point (WSM27560); an emergency water tank (WSM31317); a road block (WSM28589); Foley Mill armament store (WSM29461) and a Royal Ordnance Factory (WSM22554)
- historic, but not listed, buildings which include: Foley Park Primary School (WSM38529); 16-37 Northumberland Avenue (WSM35646); 33 and 34 Reservoir Road (WSM38463); 406 Stourport Road (WSM38245); Marsh Farm (WSM34613) and Smethwick Drop Forgings Factory (WSM33283).

4.2.3

Potential Constraints/Impacts

There are no known statutorily protected sites either directly affected or adjacent to any of the three proposed options. Impacts are likely to be concerned with previously unknown archaeological deposits as opposed to impacts on known resources.

Clearly there is the potential for palaeoenvironmental remains to exist and to be disturbed/destroyed by the construction and this potential increases towards the south and the position of route option 3, as there is less modern disturbance to the former ground levels. However, despite the disturbance caused by modern industry and the creation of extensive settling ponds, there is still the potential for archaeological deposits of all periods to survive within the alignment of all three options. It is probable that most of the archaeological deposits are likely to be related to the river and water management of the flood meadows and later the working of the canal.

4.2.4

Additional Information/ Study Recommendations

In the first instance, advice from the Local Authority Archaeological Advisor should be sought regarding their requirements. The scope of their requirements should be requested in the form of an archaeological brief.

It is anticipated that the baseline requirement will be for a desk based archaeological assessment to include a walkover survey and consultation of historic mapping and aerial photography. If the construction details are available at that time, an impact assessment of the proposed development should be included as part of this process.

In the event that not enough archaeological information is available, given the paucity of previous work within the area, archaeological trial trenching may be required to further inform the impact assessment of the route options.

4.3

Ecology and Nature Conservation

4.3.1

Methodology

In order to identify national and local nature conservation designations and any ecological records which already exist for the link road study area, a desk study was conducted for a 2km radius from the centre of the three alignment options. The desk study was based upon a search of records from the following sources:

- the Multi Agency Geographic Information for the Countryside website (MAGIC);
- Worcestershire Biological Records Centre (WBRC); and
- Wyre Forest District Local Plan, 2004-2011.

A desk study is valuable in identifying past biological records and nature conservation designations. Understanding nature conservation issues within the wider area contributes towards the appraisal of the ecological value of the proposal area and the habitats and species that it actually or potentially supports. Where applicable, the information supplied has been incorporated into this desk study where they are particularly informative or relevant.

4.3.2

Policy and Legal Context

Where relevant, the desk study takes account of the legislative protection afforded to specific habitats and species that receive protection in the UK under various legislation, including:

- The Wildlife and Countryside Act 1981 (as amended);
- The Countryside and Rights of Way Act 2000;
- The Badger Protection Act 1992;
- The Conservation (Natural Habitats &c.) Regulations 1994 (as amended);
- The Hedgerow Regulations 1997; and
- The Wild Mammals (Protection) Act 1996.

In addition to the data search, relevant legislation and conservation guidance in the form of national and county biodiversity actions plans were also referred to. Following The Convention on Biological Diversity (1992), the UK Biodiversity Action Plan (UK BAP) was published in 1994 to guide national strategy for the conservation of biodiversity through Species Action Plans (SAPs) and Habitat Action Plans (HAPs), which set conservation targets and objectives. Most areas now possess a local Biodiversity Action Plan (BAP) to complement the national strategy where priority habitats and species are identified and targets set for their conservation. BAPs are the key nature conservation initiative in the UK, working at national, regional and local levels. The Worcestershire BAP (WBAP) was produced in 1999.

The WBAP contains nineteen HAPs for Worcestershire's key wildlife habitats and twenty SAPs. In addition, the WBAP also contains three Generic Action Plans for common themes that permeate most aspects of biodiversity conservation in the county. Within the WBAP, there are six HAPs with direct relevant to the site:

- Canals;
- Urban;
- Woodland;
- Ponds;
- Rivers;

- Fen;
- Marsh;
- and five SAPs:
 - (i) Adder *Vipera berus*;
 - (ii) Bats;
 - (iii) Great Crested Newt *Triturus cristatus*;
 - (iv) Otter *Lutra lutra*, and
 - (v) Slow Worm *Anguis fragilis*.

Wyre Forest District Local Plan: 2004 - 2011

The boundary of the proposal area is located within the local authority area of Wyre Forest District Council. The Local Plan was adopted in January 2004 and sets out the planning aims and objectives for the area in the form of policies covering all aspects of the local environment. The pertinent nature conservation and biodiversity policies associated with the link road are:

Policy NC.1 ‘Areas of National Importance’ – *Proposals for development in or likely to affect an area of national importance to nature conservation will be subject to the most rigorous examination. Development, including temporary uses, that may have an adverse effect, either directly or indirectly, on an existing or proposed Site of Special Scientific Interest or a National Nature reserve, or any other area of National importance to nature conservation will not be permitted, unless it can be clearly demonstrated two criteria are met, as follows:*

- (i) *there are no reasonable alternative means of meeting the need for the development nationally; and*
- (ii) *the reasons for the development outweigh the nature conservation value of the site itself and the need to safeguard the nature conservation value of the national network of such sites.*

This will include development outside the boundaries of such areas in instances where changes in the hydrology, or pollution, noise, light, vibration, or any other disturbance could have a material adverse effect. In consequence, it will usually be necessary to retain or create undeveloped, natural, or semi-natural buffer zones adjoining such areas.’

Policy NC. 2 ‘Areas of Regional, County or Local Importance’ –

Development, including temporary uses, that may have an adverse effect, either directly or indirectly, on an existing or proposed Local Nature Reserve, other nature reserves, an important arboretum, a Special Wildlife Site, a Regionally Important Geological or Geomorphological Site, an area subject to an agreement for the purposes of nature conservation under Section 39 of the Wildlife and Countryside Act (1981) as amended, or any other area of regional, county or local importance to nature conservation, will not be permitted unless it can be clearly demonstrated two criteria are met, as follows:

- (i) there are no reasonable alternative means of meeting the need for the development within the region, County or District, as appropriate to the particular level of the site; and*
- (ii) the reasons for the development outweigh the nature conservation value of the site itself, and the need to safeguard to regional, County or District network of such sites.*

This will include development outside the boundaries of such areas in instances where changes in the hydrology, or pollution, noise, light, vibration, or any other disturbance could have a material adverse effect. In consequence, it will usually be necessary to retain or create undeveloped, natural, or semi-natural buffer zones adjoining such areas’.

Policy NC. 3 ‘Wildlife Corridors and Stepping Stones’ –

Development, including temporary uses, that may have an adverse effect, either directly or indirectly, on a feature in the landscape of value to nature conservation by virtue of its linear or continuous structure, or as a stepping stone, will not be permitted unless the need for the development clearly outweighs the value of the feature to be conserved, including its value as part of a network.

In relation to such feature, this will include development that would:

- (i) impair physical continuity of the feature;*
- (ii) impair efficient functioning of the feature in the movement, colonisation, migration, dispersal or genetic exchange, of flora or fauna;*
- (iii) have an adverse effect on the habitat value within the feature; or*
- (iv) have an adverse effect on a protected species dependant on the use of the affected part of the feature.*

This will include development outside the boundaries of such feature in instances where changes in the hydrology, or pollution, noise, light, vibration, or any other disturbance could have a material adverse effect.

Where developments are approved, developers will be required to create, enhance and manage such features, wherever feasible and appropriate.

Planning conditions, obligations or management agreements will be used, as appropriate, to secure implementation of this Policy.'

Policy NC. 4 'Protected Species' – *'Development, including temporary uses, that may have an adverse effect, either directly or indirectly, on a species protected by European or British law, will not be permitted unless it can be clearly demonstrated three criteria are met, as follows:*

- (i) there are no reasonable alternative means of meeting the need for the development nationally;*
- (ii) the reasons for the development outweigh the protected status of the species and the need to safeguard the national population of the species; and*
- (iii) in the case of the species protected under European law, there are no satisfactory alternative means of meeting the need for the development nationally or internationally and; the development is not detrimental to the maintenance of the species population at a favourable conservation status in its natural range; and the development is in the interests of public health or safety, or there are other imperative reasons of overriding public interest.*

This policy will apply to area, buildings and structure that are known, suspected or likely to be used for permanent or intermittent habitation, hibernation, breeding, migration, passage or foraging, during the day or night, by protected species; as well as to the species themselves. It will include development any distance from such species, areas, buildings and structures, in instances where changes in the hydrology, or pollution, noise, light, vibration, or any other disturbance could have a material adverse effect. In consequence, it will usually be necessary to retain or create

undeveloped, natural or semi-natural, buffer zones in the vicinity of such species and their habitats’.

Policy NC. 5 ‘Biodiversity’ – *‘Development should wherever possible and feasible, retain, enhance, manage and if appropriate reintroduce the District’s indigenous biodiversity; and in particular those species and habitats identified as priorities for action in the Biodiversity Action Plan for Worcestershire (1999) as appropriate to the District; or the District’s Biodiversity Action Programme.*

Developers may be required to demonstrate how their proposals meet this requirement or otherwise why it is not possible, feasible or appropriate, as relevant.

Planning conditions, obligations or management agreements will be pursued, as appropriate, to secure implementations on this Policy’.

4.3.3

Baseline Data

Designated Sites

The desk study and consultation with WBRC has confirmed the presence of three Sites of Special Scientific Interest (SSSI) and six Special Wildlife Sites (SWS) within a 2km radius of the site.

Sites of Special Scientific Interest

Site of Special Scientific Interest	SSSI Easting	SSSI Northing
Wilden Marsh and Meadows	382885.81	274219.36
River Stour Flood Plain	382295.44	273201.48
Devil’s Spittlefull	380784.94	275154.89

Devil’s Spittlefull SSSI and the River Stour Flood Plain SSSI are not located within or immediately adjacent to the link road study area and are therefore not considered further within this desk study. However, Wilden Marsh and Meadows SSSI is located within the footprint of the

link road study area (see Figure 4). The following SSSI description is paraphrased from the Natural England (NE) citation.

Wilden Marsh and Meadows SSSI – OSGR SO 827 738

Lying amongst the floodplain of the River Stour, Wilden Marsh is the richest and most diverse wetland in Worcestershire supporting examples of fen, damp meadow, marshy grassland and carr. The fen vegetation is represented by large colonies of plant species scarce in the county such as lesser reedmace *Typha angustifolia*, lesser waterparsnip *Berula erecta* and water dock *Rumex hydrolapathum*, including an abundance of common species in the form of greater pond-sedge *Carex riparia*, wild angelica *Angelica sylvestris*, greater reedmace *Typha latifolia*, meadowsweet *Filipendula ulmaria* and yellow iris *Iris pseudacorus*.

The substantial areas of neutral damp grassland consisting of partially grazed or neglected area contain a number of ditches with abundant fool's water-cress *Apium nodiflorum*, marsh horsetail *Equisetum palustre*, marsh woundwort *Stachys palustris* and water mint *Mentha aquatica*, together with reed sweet-grass *Glyceria maxima* and reed canary-grass *Phalaris arundinacea*. The grazed meadows are noted for their abundance of southern marsh-orchid *Dactylorhiza praetermissa*, whilst the areas of neglected grassland and marsh are especially species-rich, and include species such as sneezewort *Achillea ptarmica*, fen bedstraw *Galium uliginosum*, marsh pennywort *Hydrocotyle vulgaris*, marsh cinquefoil *Potentilla palustris*, marsh arrow-grass *Triglochin palustris* and marsh valerian *Valeriana dioica*. The area is also supports considerable stands of rushes and sedges i.e. wood club-rush *Scirpus sylvaticus*, sea club-rush *Scirpus maritimus*, star sedge *Carex echinata* and the rare lesser tussock-sedge *Carex diandra*.

The carr is dominated by alder *Alnus glutinosa* and crack willow *Salix fragilis* interspersed with grey willow *Salix cinerea* scrub present within the marsh vegetation on its edge. Other trees include white willow *Salix alba* and crack willow pollards; there are also a number of notable specimens of black poplar *Populus nigra*.

Wilden Marsh also has some ornithological interest particularly for wetland birds, including snipe *Gallinago gallinago*, which breed here; this

interest is enhanced by the proximity of the open water provided by the adjacent settling ponds.

Worcestershire BAP has a HAP for Marsh and Fen, which makes direct reference to Wilden Marsh and Meadows SSSI, denoting it as one of the largest SSSIs in the county designated for its marsh interest.

Special Wildlife Sites

Special Wildlife Site	Grid Reference
Burlish Camp	SO809738
Vicarage Farm Heath	SO816741
River Stour	SO831761
Wilden Meadows	SO823734
Staffordshire and Worcestershire Canal	SO828766
Captain's and Stanklyn Pools and Spennels Valley	SO852750

Of the six SWSs within the 2km search area, two, the River Stour and the Staffordshire and Worcestershire Canal are located within the link road study area. The following SWS descriptions are paraphrased from the information provided by WBRC.

River Stour

The River Stour is an important corridor and is the principal ecological corridor in more urban stretches; it also adjoins some of the county's best marshland and wet grassland sites. Aquatic flora is limited throughout to bank side trees, with common scrub cover augmented in places by wet willow and alder woodland. Otters are known to utilise the river and there are historical records for water vole and the rare club-tailed dragonfly.

Staffordshire and Worcestershire Canal

The canal forms an important corridor through the landscape, especially where it is bordered by marshland and grassland associated with the Stour valley and sandstone cliffs supporting mixed woodland. The canal is subject to heavy usage by boats, anglers and walkers with an associative impact upon flora and fauna. Correspondingly, aquatic flora is limited by the boat traffic, though there are sections with better marginal vegetation. Faunal records are limited, however, otters are known to use the canal and it is almost certainly used as a feeding corridor by kingfishers and bats.

Flora and Fauna

The following species information pertaining to the proposal area and its immediate environs has been obtained from WBRC.

(a) Flora

There are two records for flora species located within the former British Sugar site comprising: bur chervil *Anthriscus caucalis* and flixweed *Descurainia sophia* both recorded in June 2003. These are denoted as 'Locally Notable' species within the records.

The remainder of the flora present within the area of interest pertains to Wilden Marsh and Meadows SSSI, which is to be expected as the SSSI is primarily designated for its rich and diverse habitats.

(b) Fauna

The following species are ordered alphabetically and not listed in priority of ecological significance.

Amphibians: There is a record for common toad *Bufo bufo* at Wilden Marsh and Meadows SSSI dated 1996 and one record for great crested newt *Triturus cristatus*: dated October 1999, also for the SSSI.

Badger: No records for the proposal area were returned from WBRC. The nearest record for badger *Meles meles* activity exists for faecal

matter found within Wilden Marsh in June 2002, which lies outside of the eastern extents of the proposal area.

Bats: WBRC provided records for three bats species within the area of interest relating to Wilden Marsh and Meadows SSSI. There is a record each for Daubenton's bat *Myotis daubentoni*, Natterer's bat *Myotis nattereri* and Noctule *Nyctalus noctula* all dated 1996.

Birds: There is one record for the former British Sugar site for cuckoo *Cuculus canorus* dated 2006, whereas there are numerous records for various bird species relating to Wilden Marsh and Meadows SSSI. Notable species recorded include skylark *Alauda arvensis* (1996); scaup *Aythya marila* (1996); tree pipit (1991, 1994, 1996, 1997); linnet *Carduelis cannabina* (1996); lesser spotted woodpecker *Dendrocopos minor* (1991, 1994, 1995, 1996); reed bunting *Emberiza schoeniculus* (1996, 1998, 1999, 2000); black tailed godwit *Limosa limosa* (1994, 1996, 1998); grasshopper warbler *Locustella naevia* (1991, 1994, 1995, 1996); nightingale *Luscinia megarhynchos* (1996); common scoter *Melanitta nigra* (1989, 1996, 1998); spotted flycatcher *Muscicapa striata* (1996, 1998); curlew *Numenius arquata* (1996); lapwing *Vanellus vanellus* (1994, 1996, 1998, 1999, 2000) and barn owl *Tyto alba* (1989, 1991, 1996, 2006).

Invertebrates: Within the area of interest, there records for two species relating to Wilden Marsh and Meadows SSSI; these comprise mouse moth *Amphipyra tragopognis* (1999); cinnabar *Tyria jacobaeae* (1996 and 1999).

Otter: Otter presence has been detected within Wilden Marsh and Meadows SSSI in 2006 comprising tracks, signs access from the River Stour, droppings and perch remains.

Reptiles: There is one record for reptile presence recorded within the area of interest pertaining to Wilden Marsh and Meadows SSSI, comprising viviparous lizard *Lacerta vivipara* (1996).

Water vole: Water vole *Arvicola terrestris* presence is recorded within Wilden Marsh and Meadows SSSI in 1990 and 1996.

4.3.4

Potential Constraints/Impacts

The potential impacts associated with each of the three route options are discussed below. It should be noted that the following is only preliminary. Further assessment, as part of a detailed ecological impact assessment would be able to provide a fuller and more specific impact summary for all concerned receptors.

Option 1

The potential ecological impacts associated with Option 1 comprise:

- impacts derived from felling of woodland trees and standard trees that are associated with nesting birds, potential bat roosts, badger activity, biodiversity and conservation of woodland botanical species and trees;
- impacts to bat flight lines from the introduction of artificial lighting;
- impacts to breeding habitat and habitat connectivity for great crested newts;
- impacts to riparian corridor and species such as otter and water vole especially associated with artificial lighting; and
- impacts to water quality to both the River Stour and the Staffordshire and Worcestershire Canal from construction works and during operation.

Option 2

The potential ecological impacts associated with Option 2 are the same as for Option 1 plus:

- impacts to any great crested newts present within the settling ponds.

Option 3

The potential ecological impacts associated with Option 3 are the same as for Option 1 plus:

- impact to Wilden Marsh and Meadows SSSI. The proposed Option 3 alignment would have a significant effect upon the Wilden Marsh and Meadows SSSI as it would bisect the SSSI into two separate areas, thus impacting upon the SSSI's nature conservation interest, ecological integrity and its current habitat connectivity. Therefore, it is imperative that consultation with Natural England (NE) and the County Ecologist is undertaken at the earliest opportunity in order that these stakeholders can comment upon the proposal and the potential impacts to the SSSI. Such comments would inform the preparation of a mitigation strategy as appropriate.

In the event of any loss of area or fragmentation of the SSSI, it is highly likely that NE would request that compensation in the form of habitat creation is provided as part of the mitigation measures for the scheme. This may require the provision of additional land to compensate for the area of SSSI lost or fragmented by the development. As part of any habitat creation, a management plan is likely to be required by NE and actioned by the developer over a specific number of years as agreed with NE.

4.3.5

Additional Information/ Study Recommendations

The following ecological site surveys are recommended in order that the current ecological context of the link road study area can be researched and recorded. Only then can a full ecological impact assessment of the proposed road be made.

Flora

In order to gain a more detailed view of the species and habitats that are present within the proposal area, it is recommended that a Phase 1 Habitat Survey is undertaken. Conducted following the methodology of the Joint Nature Conservation Committee (2004)², Phase 1 Habitat

² Joint Nature Conservancy Council, (2004), *Handbook for Phase 1 Habitat Survey – a Technique for Environmental Audit*. Revised reprint 2003. Joint Nature Conservancy Committee, Peterborough.

Survey is a standard technique for classifying and mapping British habitats with the aim of providing a record of habitats likely to have ecological importance. The dominant plant species present are recorded, with the habitats classified and mapped; in addition, the presence or potential presence of protected species is also noted during the survey. The optimal months to undertake the survey is May-September inclusive.

In relation to the woodland present within the proposal area, it is recommended that a tree survey is undertaken during the months of April - October inclusive to record the tree species and age.

Fauna

The following survey recommendations for the proposal area are ordered alphabetically in order of species and not listed in priority of ecological significance. A table illustrating the optimal months for undertaking the following surveys is presented in Appendix 1.

- (a) **Amphibians:** The great crested newt is a priority species under the UK BAP and included as a SAP within the Worcestershire BAP; the species action plan aims to maintain and enhance current populations. Great crested newts and their breeding ponds are protected under the Wildlife and Countryside Act 1981 (as amended) and Schedule 2 of The Conservation (Natural Habitats &c.) Regulations 1994 (as amended). As ponds are present within the proposal area it is recommended that a Habitat Suitability Index (HSI) is undertaken. The results of the HSI will indicate habitat suitability for this species and subsequently determine whether a great crested newt presence/absence survey is required. If a presence/absence survey is required, it is to be undertaken by an ecologist with a current Natural England license for surveying for this species. The survey should aim to undertake a minimum of six visits (depending on whether great crested newts are present), spread out between late April through to mid June. If great crested newts are found, a mitigation strategy will have to be prepared to protect the newts in advance of any proposed construction works.

- (b) **Badger:** The principal law protecting badgers, The Protection of Badgers Act 1992, is primarily based upon the need to protect badgers from baiting and deliberate harm or injury. Removal of significant areas of badger foraging habitat may, however, also contravene the act as it can be perceived as cruelty. As the woodland within the proposal area has the propensity to support badgers, it is recommended that a badger survey is undertaken. Although the survey can be undertaken at any time of the year, the optimal survey period is during the winter months (January – April inclusive) due to tall ground vegetation having died back, thus making searching for badger activity easier. Consultation with the Worcestershire Badger Society is also recommended prior to conducting the survey, as it is possible that the Society may have further information regarding badgers within the locality of the site that may contribute towards the survey and subsequent mitigation. The results of the survey would inform the preparation of a mitigation strategy, if necessary.
- (c) **Bats:** All bats and their places of refuge are protected in the UK under the Wildlife and Countryside Act 1981 (as amended) and The Conservation (Natural Habitats &c.) Regulations 1994 (as amended). The UK BAP contains six SAPs for individual bat species comprising: barbastelle bat *Barbastella barbastellus*, Bechstein's bat *Myotis bechsteinii*, greater mouse-eared bat *Myotis myotis*, pipistrelle bat *Pipistrellus pipistrellus*, greater horseshoe bat *Rhinolophus ferrumequinum* and lesser horseshoe bat *Rhinolophus hipposideros*. Worcestershire BAP contains a single SAP which covers all species of bat. Within Worcestershire, fourteen of the seventeen species of UK bat have been recorded with only three species, common pipistrelle, soprano pipistrelle *Pipistrellus pygmaeus* and brown long-eared *Plecotus auritus* being considered as common. Any mature trees in the study area with suitable roosting features (i.e. cracks, voids) are considered of potential value for summer roosting bats. Therefore, it is recommended that an initial bat roost assessment is undertaken of all suitable trees

within the study area. The assessment would be able to identify the trees with likely roosting potential and would inform mitigation measures in relation to any arboricultural works in order to lessen any impacts to bat species and their roosts.

- (d) **Birds:** All breeding birds, whilst actively nesting, are protected in the UK under the Wildlife and Countryside Act 1981 (as amended). Some birds receive additional legal protection through Section 1 of the Wildlife and Countryside Act 1981 (as amended) such as barn owl, whereby they are protected against intentional disturbance whilst building or occupying a nest, and against disturbance of dependent young. As the woodland within the study area is likely to support various bird species and the mosaic of habitats present in the SSSI provide optimum habitat for a range of species, it is recommended that a breeding bird survey is undertaken during the optimal months of March to June inclusive. Any works which will involve the removal or disturbance of features, which can be used by breeding birds, should be undertaken outside the main bird breeding season, which is March to August inclusive. If the removal of such features has to occur during the bird breeding season, a survey by an experienced ecologist will be necessary immediately in advance of the works to check for nesting bird.
- (e) **Invertebrates:** As the proposal area provides suitable habitat for invertebrate species, it is recommended that an invertebrate survey is undertaken during the optimum months (May – September inclusive).
- (f) **Reptiles:** Reptiles receive a limited degree of protection in the UK under the Wildlife and Countryside Act 1981 (as amended). The proposal area provides potential habitat opportunities for reptiles and it is therefore recommended that a reptile survey is undertaken to determine presence/absence and, if present, the species and population size. The optimal survey time would be May to June or September to October.

If statutorily protected reptiles are found, a mitigation strategy will have to be prepared to protect the reptiles in advance of any construction works.

- (g) **Otter:** The otter *Lutra lutra* is given full protection under Schedule 5 of the Wildlife and Countryside Act (WCA) 1981 (as amended) and Schedule 2 of the Conservation (Natural Habitats, etc.) Regulations, 1994 (Regulation 38). It is illegal to intentionally kill an otter or to intentionally, or recklessly, damage or disturb the places they use for shelter or protection. Otter is a priority species under the UK BAP and is included as a SAP within the Worcestershire BAP. As otters have been recorded using the River Stour and may possibly utilise the Staffordshire and Worcestershire Canal, it is recommended that a presence/absence survey is undertaken for this species.

- (h) **Water vole:** The water vole *Arvicola terrestris* is given full protection under Schedule 5 of the WCA 1981 (as amended). It is illegal to intentionally kill a water vole or to intentionally, or recklessly, damage or disturb the places they use for shelter or protection. Water vole is a priority species under the UK BAP and included as a SAP within the Worcestershire BAP. As a record is present for water vole activity within Wilden Marsh and Meadows SSSI and there are historical records for activity within the Staffordshire and Worcestershire Canal, it is recommended that a presence/absence survey is undertaken for this species during the optimal survey months of March – May inclusive. The survey should include all viable watercourses within and immediately adjacent to the proposal area.

4.4

4.4.1

Landscape Character and Visual Impact

Methodology

In order to establish the baseline conditions of the landscape resource of the study area a desk based assessment has been undertaken supplemented by a brief site visit undertaken by a qualified landscape architect in late August 2008. The purpose of the site visit was to gain an appreciation of the visibility of the site from the surrounding

landscape. This will then help to identify the sensitivity of the landscape resource and how the features associated with a road development may have a direct or indirect effect on the landscape and visual amenity of the area.

4.4.2

Baseline Conditions

Baseline information has been gathered from the desk study and site visit. This section examines the existing landscape and visual context of the study area in terms of:

- Statutory landscape designation and policies that indicate sensitivity of areas and routes to changes in landscape character and visual quality, Policy and Legal Context;
- The landscape character and features of the site, and its contributions to the wider landscape; and
- The extent and nature of the site visibility.

4.4.3

Policy and Legal Context

There are a number of statutory and non-statutory landscape designations of relevance to the study area. These local landscape designations are illustrated in Figure 4.

Part of the Wilden Marsh and Meadows SSSI, having national importance, is in the south east of the study area.

The Staffordshire and Worcestershire Canal, which runs through the centre of the study area, is designated a linear Canal Conservation Area along its entire length. It forms an important historic feature through the site, with the use of red brick, an early canal material, providing special interest. The bridge of the Severn Valley Railway on the northern edge of the site is also brick built and has a distinctive semi-elliptical arch structure. The canal has mature vegetation either side of it adding to the character of the conservation area. The Canal is an important leisure resource, being a popular route for leisure boats with a major complex of basins located at its southern end in Stourport-on-Severn. The towpath is also a popular route for walking and cycling.

The River Stour runs parallel to the canal and both are designated Special Wildlife Sites, a non statutory designation of county

importance. The Stour Valley is considered within the WFDC Local Plan as an important landscape feature with considerable value for recreation and nature conservation within the district.

In addition to those trees protected under the canal conservation area, there is also a Woodland Tree Preservation Order and a number of other significant trees on the site which are protected by tree preservation orders on the Sugar Beet Factory Site. This therefore indicates that most of the trees on the site are afforded some protection.

The boundary of the proposal area is located within the local authority area of Wyre Forest District Council. The Local Plan was adopted in January 2004 and sets out the planning aims and objectives for the area in the form of policies covering all aspects of the local environment. The pertinent landscape and visual impact policies associated with the link road are detailed below.

Policy LA.4 – *Particular attention will be paid to conservation of the natural beauty and environment of the Stour Valley. Proposals for development in the Valley will be subject to the most careful consideration. Development that would have a significant adverse effect on the landscape quality or character of the Stour Valley will not be permitted.*

Policy NC.1 – *Proposals for development in or likely to affect an area of national importance to nature conservation will be subject to the most rigorous examination. Development, including temporary uses, that may have an adverse effect, either directly or indirectly, on an existing or proposed Site of Special Scientific Interest, a National Nature Reserve, or any other area of national importance to nature conservation, will not be permitted, unless it can clearly be demonstrated two criteria are met, as follows:*

(i) there are no reasonable alternative means of meeting the need for the development nationally;

(ii) the reasons for the development outweigh the nature conservation value of the site itself and the need to safeguard the nature conservation value of the national network of such sites.

This will include development outside the boundaries of such areas in instances where changes in the hydrology, or pollution, noise, light, vibration, or any other disturbance could have a material adverse effect. In consequence, it will usually be necessary to retain or create undeveloped, natural, or semi-natural buffer zones adjoining such areas.'

Whilst many of the designations within the study area are given their status under Nature Conservation, they would also be afforded protection as locally important landscape features under the WFDC Local Plan. Protection and proper management of these sites is vital to ensure their continued contribution to the character of the landscape.

Policy LA.1 – *Development proposals must safeguard, restore or enhance the character of the surrounding landscape. In considering planning applications, regard will be had to the extent to which the proposal:*

(i) is informed by, appropriate to, and integrates with the landscape character;

(ii) safeguards and strengthens the components of landscape character and local distinctiveness, with particular attention to the scale, layout, design, detailing of the proposal and its relationship with existing buildings, features and vegetation;

(iii) relates to the characteristics and sensitivity of the landscape, and its capacity to accommodate the impact of the development.

The introduction of detracting features, or the removal of important landscape features should be avoided. Development proposals which would have an adverse impact on landscape character will not be permitted.

Policy LA.8 – *The environmental impact of strategic road proposals must be assessed in detail as part of the accompanying Environmental Statement. Any adverse impact on the quality and character of the landscape should be minimised. The detailed design must include appropriate mitigation measures and proposals for new planting.'*

Landscape Character

A formal landscape character assessment has not been carried out at this stage but in order for the baseline conditions to be identified, the

local landscape character has been recorded using the Worcestershire Landscape Character Assessment, www.worcestershire.gov.uk/home/wcc-lca-home. The site falls within two of the Worcestershire landscape character areas; Urban Area and Riverside Meadows.

There is no information sheet for the Urban Areas but for the Riverside Meadows, the key characteristics are as follows:

- Flat, low-lying topography
- Seasonally flooded alluvial floodplain
- Meandering river channel
- Grazing meadows
- Scattered riverside and hedgerow trees
- Medium to large hedged fields with ditches unsettled with few roads.

Landscape Features

The site is situated in the Stour Valley with the River Stour in the valley bottom at 35 AOD. The landscape is characterised by the river flood plain meadows in the valley floor with urban industrial settlement found on the shallow upland valley. The disused British Sugar Factory is found to the west, and modern commercial and industrial premises in the east. The factory site is derelict with many of the buildings now demolished and building rubble remains on site. Landmark buildings such as the factory towers are still standing but are not likely to remain there for long as the site is designated for re-development. The industrial and commercial units in the east of the site are typical of modern out of town industrial estates with one and two storey units and associated storage yards.

The industrial character of the area has influenced the nature of the landscape found within the site. Both the Worcestershire and Staffordshire Canal and the Severn Valley Railway (SVR) create linear landscape features along these modes of transport with mature vegetation aligning each. The Worcestershire and Staffordshire Canal and River Stour run in a north south direction separating the two industrial areas. The Severn Valley Railway runs along the northern

boundary of the site and is raised on an embankment. The railway crosses the canal and river on a brick built viaduct, an historical feature within the site. The site is surrounded by 19th and 20th century residential development on the west, north and east sides. The Wilden Marsh & Meadows SSSI is to the south eastern of the study area and continues south into the River Stour floodplain.

The SVR within the study area is on an embankment, lined by mature trees which help to create some enclosure and screen views of the industrial areas.

To the south, Hoo Brook is lined with a significant belt of woodland which connects to the Wilden Marsh and Meadows SSSI site in the south and also links up with the significant vegetation found along the canal and river. Altogether the vertical landscape features of the mature trees and the vertical townscape give the site an enclosed character.

Summary of Landscape Character

The site contains a number of important landscape features which have been heavily influenced by the industrial past of Kidderminster. The railway and the canal, together with the river, form two main green corridors on the site. The River Stour and Staffordshire and Worcestershire Canal combine to form a valuable landscape resource as much of the surrounding natural river valley landscape has been eroded by its industrial land use.

Visibility

Visibility from the north is limited by the Severn Valley Railway line, raised on embankment and viaduct. To the west visibility is restricted by a belt of mature trees that lines the A451 with views limited to disused entrances of the old factory site. Visibility to the south is limited by mature woodland to the south west, the associated mature vegetation of the Staffordshire and Worcestershire Canal that crosses the site and mature vegetation lining Hoo Brook. In the east,

commercial and industrial premises along the A442 Worcester Road restrict views.

There are likely to be some residential visual receptors along the A451, the A442 and Wilden Lane. There may also be a few industrial and commercial receptors found along Lisle Avenue and on the A442 within the study area. There are no public rights of way crossing the site although the towpath along the canal is open and provides a recreational route in a north south direction. The Severn Valley Railway line that bounds the northern edge of the site is raised above the site on embankment and viaduct, and its users will have views into the site.

4.4.4

Potential Constraints/Impacts

General

The construction of the road will result in a permanent change in land use. Those options which result in the minimal disturbance to existing landscape resource will have the least negative landscape impact. Options which result in the loss of existing vegetation would be more visually intrusive than those which leave it intact. Replacement planting will eventually restore some visual protection of the road and may restore some of the lost landscape character in the long term. Careful consideration of the siting of vertical features will reduce impacts as would the choice of materials, particularly at sensitive locations such as the canal.

It is likely that the main landscape and visual impacts of the road will occur where it crosses the Staffordshire and Worcestershire Canal and River Stour. The river and canal cannot be avoided as they cross the length of the site. The vegetation associated with the canal is the most significant found within the site. As it stands it serves to provide a secluded setting for the canal within its industrial context. It also helps to restrict views across the site. There will be a negative impact on the setting of the canal and river, being important landscape resources which will be permanently changed by the construction of the road. Some of the tranquillity will be lost as a result of the traffic movement along the road. To minimise the impact on the canal and its users, the bridge vegetation should ideally be sited where the loss of existing vegetation

would be least. Any vegetation that is lost should be replaced and if there is any damage to the towpath or canal as a result of the bridge/road construction then this should also be replaced like for like.

To further minimise the impact of the road, the choice of material finish for the bridge should consider the close proximity of the Severn Valley Railway bridge which is brick built. Similar use of material finish would help to minimise the proliferation of materials which can in itself cause an adverse impact on landscape character.

There are likely to be visual receptors from the A451 and houses along it, the Severn Valley Railway and the houses and industrial premises off the A442. The canal users will have a permanent change in view although its users are transient and therefore would experience the change for a short period as they pass the road.

Option 1

In the west, a new junction is proposed just south of the railway. This is likely to result in some of the boundary trees being lost to accommodate the engineering works but this can be mitigated by replacement planting. A band of vegetation will need to be removed to accommodate the road and a bridge where it crosses the river and canal. This will have a negative impact on the Canal Conservation Area Order and this will be greatest for this option as it will traverse it at its widest points.

Option 2

The potential impacts of Option 2 are very similar to Option 1 although it will cross the river and canal where the width of the vegetation is narrower and thus less vegetation would be lost. With this option there would also be less land take required at the junction with the A442 as the existing access point into the Hoobrook Industrial Estate would be utilised.

Option 3

Option 3 would result in a greater number of negative impacts. As well as the impacts to the canal and river this route would also bisect the Wilden Marsh and Meadow SSSI. The road would permanently change the land use of the northern area of the SSSI having a permanent encroachment and bifurcation of the designated site. The residential receptors along Wilden Lane would also experience a change in view. Such residential receptors are considered to have a high sensitivity.

4.4.5

Additional Information/ Study Recommendations

The initial site visit was carried out during the summer months when visibility is restricted by leaf cover on deciduous trees. A further site visit should be carried out during the winter months to assess winter time visibility.

Individual assessment of impacts on receptors should be carried out when a route for the road has been defined.

A tree survey may be required to ascertain the quality of the existing trees.

The indirect effects of construction machinery at the site and approach routes during construction would need to be considered in further assessments.

Cumulative impacts of the road development with the development of the factory site will need to be considered.

A landscape strategy and masterplan together with a maintenance strategy to mitigate the loss of any vegetation and manage enhancement planting would be required to help minimise impacts in the long term.

4.5

Noise and Vibration

4.5.1

Methodology

A desk based scoping exercise has been undertaken to identify the key noise issues related to the link road, supplemented by a preliminary

site visit (11 September 2008) to ascertain existing noise sources within the study area.

4.5.2

Policy and Legal Context

The following national guidelines and standards are relevant to the assessment of the link road proposal:

- BS 5228, Part 1 1997 Noise and Vibration Control on Construction and Open Sites
- Volume 11, Section 3, Part 7 Traffic Noise and Vibration of DMRB (2008)
- Noise Insulation Regulations 1988 (NIR)
- Calculation of Road Traffic Noise The Department of Transport
- World Health Organisation Guidelines for Community Noise (1999)
- BS6472 'Evaluations of Human Exposure to Vibration in Buildings (1 Hz to 80 Hz)
- BS7385 'Evaluation and Measurement for Vibration in Buildings: Part 2 Guide to Damage Levels from Groundborne Vibration
- The draft Guidelines for Noise Impact Assessment produced jointly by the Institute of Acoustics (IOA) and the Institute of Environmental Management and Assessment (IEMA).

The significance of noise level changes can be assessed using the Guidelines for Noise Impact Assessment produced by a joint working Party of the Institute of Acoustics and Institute of Environmental Management and Assessment. Although these guidelines are at a draft stage at present they are of relevance.

4.5.3

Environmental Baseline

Existing Noise Sources

A preliminary site visit was made to the site on 11 September 2008 to ascertain existing noise sources which include:

- A451 Stourport Road, located at the western end of the Link Road route.

- A442 Worcester Road, located at the eastern end of the Link Road route.
- A449 Chester Road South, located at the eastern end of the Link Road route.
- A449 Worcester Road, located at the eastern end of the Link Road route.
- Wilden Lane, which runs to the south east of the Link Road route.
- The Severn Valley Railway which passes to the north of the Link Road route.
- The Vale Industrial Estate to the south of the former British Sugar Site.
- The Lisle Avenue industrial area to the north of the former British Sugar Site and immediately north of the Severn Valley Railway.
- The Enterprise Centre at the eastern end of the Link Road route to the west of the A442 Worcester Road.

Key Receptors

There are a number of potentially sensitive receptors to noise and vibration in the vicinity of the Link Road route options and these are identified as follows:

- Residential properties on the western side of the A451 Stourport Road, opposite the former British Sugar Works site;
- Residential properties at the eastern end of the Link Road route fronting Wilden Lane, including Stokesay Close, Harlech Way, Rhuddlan Way, Ewloe Close and Hopton Drive;
- Residential properties to the north-east of A442 Worcester Road including Ludlow Road; and
- Quiet areas away from major noise sources located along the Link Road routes.

4.5.4

Potential Constraints/Impacts

There is a potential for noise and vibration to arise from the activities during both the construction and operation of the Link Road. The construction phase, as with other major projects would be subject to a

wide range of activities. However, the principal noise impacts are likely to arise from construction traffic using the local road network, from remediation, from earthworks activities for site preparation and from construction works for roads and structures.

Noise impacts at the western end of the route options, at properties adjacent to the A451 and Clee Avenue, are likely to be similar for each of the three route options considered. However, at the eastern end of the route the potential noise impacts due to Option 3 are likely to be greater than for Options 1 and 2 because the alignment of Option 3 is the closest route to houses in Wilden Lane. The junctions of Options 1 and 2 on the A442 are opposite houses in Ludlow Road, however existing baseline noise levels in this area are higher than in Wilden Lane.

Permanent impacts and benefits may arise on the surrounding road network due to the changes in traffic flow. These noise level changes would need to be identified in a detailed noise assessment (see Section 4.5.5 below).

4.5.5

Additional Information/ Study Recommendations

A noise and vibration assessment would need to be undertaken to determine the potential significant impacts of the Link Road during both the construction and operational phases.

The assessment should be undertaken in accordance with the appropriate national standards and guidance. The assessment would involve:

- Consultation with Wyre Forest District Council (WFDC), to confirm the Local Authority's policy on noise and vibration;
- Construction noise and vibration assessment (in accordance with BS5228);
- Road traffic noise assessment in accordance with DMRB (following CRTN methodology).

The significance of any noise level changes should be assessed using the Guidelines for Noise Impact Assessment produced by a joint

working Party of the Institute of Acoustics and Institute of Environmental Management and Assessment.

The area of study should extend a distance of 600m from each route option. In addition, the assessment should include those links in the surrounding road network where noise levels are predicted to increase by at least 1dB as a result of the proposals. Where traffic flow is likely to increase by 25% or more or reduce by at least 20%, a change in noise level of at least 1dB(A) will occur. DMRB indicates that it is not necessary to assess the noise impact of traffic changes less than these criteria.

In advance of the noise and vibration assessment a full noise measurement survey would be required. This survey should include the noise-sensitive receptors and quieter areas, for comparison with predicted future noise levels.

The main consultee for the noise and vibration assessment will be the Environmental Health Department of WFDC with whom it would be necessary to seek agreement on the assessment method, the sensitive receptors to be considered, significance criteria, monitoring strategy and the general form of any mitigation.

4.6

Ground Conditions

4.6.1

Methodology

A broad, desk based assessment was undertaken, supplemented by a site visit (11 September) to identify the ground conditions issues and constraints in terms of topography, geomorphology, geology and soil cover.

4.6.2

Baseline

Topography

Regional topography of the Wyre Forest District in and around Kidderminster ranges between flat to rolling. However there are some hilly tracts in the district.

The study area is situated in the flood plain of the River Stour. The general topography is marked by minor undulations due to the

presence of the settling ponds. The lowest point along the study area is occupied by the channel of the River Stour.

Geomorphology

Human interventions over time have altered the basic character of the River Stour floodplain. Geomorphically it is a depressed floodplain, with a number of manmade ponds and pits.

Geology and Soils

The study area and its surrounding region are marked by sedimentary deposits consisting of sandstone and sandy soil.

Since the general lithology in the study area is comprised of sandstones the permeability and porosity is high. This allows a large proportion of precipitation to infiltrate into the ground. As a result the underlying formation is a 'high quality aquifer'. This also means that the underlying formation is very susceptible to pollution and contamination (see Section 4.7).

The overlaying soil in the study area ranges from sandy to alluvial and consists of glacial and post-glacial sands, alluvium and river terrace gravels from palaeo-channels (now extinct). This soil completely overlies much of the bedrock and provides mobile sediment; re-worked by the present-day River Stour.

4.6.3

Potential Constraints/Impacts

The presence of the settling ponds within the eastern half of the British Sugar site would appear to be the key ground conditions issues relating to the construction of the link road. An alignment that crosses through the settling ponds would experience geo-environmental (topography, geotechnics, geology and soils, and hydro-geology) issues relating to the draining, sludge removal and filling of the affected ponds. This would be a key issue with regard to Option 2.

All three route options would cross the floodplain of the River Stour and would require construction of a bridge to cross the river and the Staffordshire and Worcestershire Canal. As such, part of the road will

need to be built on raised embankments which would result in changes to the topography and geomorphology of the area.

4.6.4 *Additional Information/ Study Recommendations*

Detailed geo-technical ground investigations would be required to investigate the ground conditions fully before a final route alignment could be agreed.

4.7 **Water Environment**

4.7.1 *Methodology*

A broad, desk based assessment was undertaken, supplemented by a site visit (11 September) to identify the principal issues and constraints relating to the water environment of the study area.

4.7.2 *Policy and Legal Context*

The water environment is regulated by a large volume of legislation, guidance notes and documents. Key acts, regulations and planning guidance of relevance include:

- Environment Act (1995 as amended)
- Land Drainage Act (1991)
- Water Resources Act (1991 as amended)
- The Highways Act (1980 as amended)
- The Surface Waters Regulations 1997 (amended 2003); which transposes the EC Freshwater Fish Directive 78/659/EEC
- The Surface Waters (River Ecosystem) (Classification) Regulations (1994)
- The Surface Waters Regulations (1998); which transposes the EC Dangerous Substances Directive 76/464/EEC and daughter directives
- The Water Environment Regulations (2003); which transposes the Water Framework Directive 2000/60/EC
- The Groundwater Regulations (1998); which transposes the EC Groundwater Directive 80/68/EEC
- PPS23; which replaces PPG23 and intends to complement the new pollution control framework under the Pollution Prevention and Control Act 1999 and the IPPC Regulations 2000

- PPS25; Development and Flood Risk (2006); which explains how flood risk should be considered at all stages of the planning and development process and also sets out the importance of the government attaches to the management and reduction of flood risk in the land-use planning process, to acting on a precautionary basis and to taking account of climate change.
- Circular 04/06 (Communities and Local Government): The Town and Country Planning (Flooding) (England) Direction; December 2007.
- PPG5 and Ciria guidance 'Control of water pollution from construction sites'

4.7.3

Baseline

The water environment features within the study area are:

- the River Stour;
- the Staffordshire and Worcestershire Canal;
- the balancing ponds; and
- the groundwater aquifer.

River Stour

The River Stour is a first order tributary of the River Severn. It passes through the urban areas of Cookley, Wolverly and Kidderminster, flowing through the study area in a north-south direction before discharging to the River Severn at Stourport-on-Severn.

Staffordshire and Worcestershire Canal

The Staffordshire and Worcestershire Canal is a 46 mile (74 km) long, narrow navigable canal constructed in 1771. It runs from the River Severn at Stourport to the Trent and Mersey Canal at Haywood Junction in Staffordshire.

In 1959 it was planned to close the canal, but it was saved through the efforts of a volunteer group - the Staffordshire and Worcestershire Canal Society. The canal was re-classified as a cruise-way in 1968, and was declared to be a Conservation Area the following year.

Within the study area it flows parallel to the River Stour on a north-south curvilinear path.

Settling Ponds

Within the eastern half of the former British Sugar site there are a number of disused settling ponds. These ponds are primarily rain fed for most of the year, except for the rare occasions when they might receive and hold flood water in the event of flooding. These ponds may contribute towards local ground water recharge.

Preliminary assessment based on remotely sensed high resolution satellite imagery of the study area (@April 14th 2007) indicates that local surface water runoff contributing to these ponds has brought some contaminants (dissolved and suspended/particulate) from the abandoned British Sugar works and possibly some other industrial sources in the nearby area (see Section 4.8).

In addition to these contaminants Cyanobacteria (blue-green algae) has been identified in these ponds from the satellite image interpretation (identified from their typical reflectance character within the visible spectrum of light).

Groundwater

As stated in Section 4.6 above the study area is underlain by Triassic Sandstone which forms a high quality aquifer and contains significant quantities of groundwater. The study area lies within a well demarcated Ground Water Management Unit (see Figure 5) under the Worcestershire Middle Severn Catchment Abstraction Management Strategy (CAMS).

In the immediate vicinity of the study area the aquifer has been classified as 'major aquifer of high vulnerability to surface contamination' since the cap formation of clay is either nonexistent or has a marginal presence.

4.7.4

Potential Constraints/Impacts

River Stour and Staffordshire and Worcestershire Canal

Both the River Stour and the S&W Canal could be impacted physically and with regard to water quality as a result of the link road construction and operation.

Physical impacts could arise from constrictions in the open channel flow (both temporary during construction and/or permanent) which could result in alterations to the hydraulic character of the watercourses.

Water quality impacts such as increased suspended sediment load and increased dissolved and suspended pollutants could arise from both construction activities and surface water run-off from the new road.

Since the river and canal would need to be bridged whichever route is selected such impacts are likely to be similar for all alignment options. Option 2 however, may have greater water quality impacts during construction as a result of the removal of potentially contaminated sludge (see Section 4.8) from the nearby settling ponds.

The road will impact the Canal Conservation area as it will be crossing through the Conservation Area and probably one of the abutments of the bridge would need to be within this area.

Settling Ponds

Only Option 2 would impact the settling ponds. Physical impacts would involve the permanent loss of at least some of these waterbodies. Water quality impacts could include changes in suspended sediments and dissolved and suspended pollutants, especially during construction, when removal of potentially contaminated sludge (see Section 4.8) would be required.

Groundwater

Impacts upon the groundwater could arise from the ingress of contaminated surface water run-off from the new road.

Option 2 would involve the permanent loss of some of the settling ponds which may act as groundwater recharge sources.

Drainage

The link road would cross the flood plain of the River Stour and thus would be considered as a development within the flood plain which would require consultation with the Environment Agency. The design of the road and embankment would require the impact on flood flows to be considered and accounted for as appropriate.

4.7.5

Additional Information/ Study Recommendations

As stated above, consultation with the Environment Agency would be required if the link road scheme is to be progressed further.

To fully assess the impacts of the road upon the River Stour and its floodplain hydraulic modelling and a full flood risk assessment would be required.

Flood Defence Consent and Land Drainage Consent are likely to be required for construction of the embankment and bridge and for any flood compensation works if required.

Water quality sampling and analysis would be required to confirm the levels of water contamination (see Section 4.8) within the balancing ponds and mitigation measures implemented as appropriate.

A large part of Kidderminster is within 'groundwater source protection zones' which is a designation based upon aquifer models to protect specific sensitive locations such as springs, wells and boreholes used for public water supply. The designated status of the proposed project site needs to be investigated so that a full assessment of the likely groundwater constraints to the development can be undertaken.

4.8

Contaminated Land

4.8.1

Methodology

A desk based assessment of the study area was undertaken using high resolution satellite remote sensing technology using the 'High Resolution Satellite Image' from the French Remote Sensing Satellite

(SPOT) dated April 14th 2007. The satellite data considered for the identification of critical issues was of a spectral band of 0.48-0.71µm and pixel resolution of 2.5m (99% Cloud Free Coverage). This data is available on a public domain; <http://earth.google.fr>. A brief confirmatory site visit was undertaken on 1 September to supplement the desk based assessment.

4.8.2

Policy and Legal Context

There exists a large volume of relevant legislation, guidance notes and documents addressing the issue of contaminated land which has been considered in this pre-feasibility assessment. Key acts and regulations of relevance include:

- Environmental Protection Act 1990 (Section 78A (2) of Part 2A)
- Environment Act 1995 (Part –II Contaminated Land and Abandoned Mines)
- Land drainage act 1991 (Part-II; Section 28; Restoration and improvement of Ditches)
- The Contaminated Land (England) Regulations 2006
- The Contaminated Land (England) Regulations 2000 (Statutory Instrument 2000 No. 227).

4.8.3

Baseline

Since contaminated land is a generic term, that implies a range of issues with varying definitions, it has been considered essential to define it for the present study. The definition used has been drawn from the Environmental Protection Act 1990 and for all practical purposes the notion of land contamination within this study has been restricted to this definition.

Section 78A (2) of Part 2A of the Environmental Protection Act 1990 defines contaminated land as:

‘any land which appears to the local authority in whose area the land is situated to be in such a condition, by reason of substances in, on or under the land, that (a) significant harm is being caused or there is a significant possibility of such harm being caused; or (b) pollution of controlled waters is being, or is likely to be, caused.’

Harm is defined as:

'harm to the health of living organisms or other interference with the ecological systems of which they form part, and in the case of man, includes harm to his property.'

Potential land contamination issues are only considered to be prominent within the former British Sugar site.

The sugar factory closed down in 2002 and since then the industrial infrastructure was abandoned until early 2008 when virtually all the buildings and structures were demolished and the majority of rubble was cleared from the site.

Examination of the satellite imagery indicates a number of issues of concern with regard to contamination. The satellite data indicates evidence of:

- the flow of iron hydro-oxide (originating from some machinery at the site) into some of the settling ponds;
- coal/chemicals dumped/spread over certain parts of the land (which require further investigation);
- biological/industrial contamination of water in the settling ponds;
- presence of thick sludge (organic deposits) at the bottom of the settling ponds.

The extent of contamination may/may not be of a very serious nature, but it defiantly requires attention and further investigation.

The findings of the satellite imagery analysis are presented in Plates 1 to 8.

Primarily the contamination at this site appears to be confined to the waters and sludges of the balancing ponds and isolated locations on the ground. The ponds and pits have biological contamination, which is very likely to contain some toxins (particularly Cyanotoxin originating from Cyanobacterium) and pathogens (primarily Cryptosporidium) etc. In addition the former industrial practice at the site has lead to some

dumps of unidentified industrial solid wastes which are causing contamination of the soil and water.

4.8.4

Potential Constraints/Impacts

Since ground/water contamination within the study area appears to be associated primarily with the balancing ponds, contamination issues are likely to be of greatest relevance to Option 2 which passes through the balancing ponds.

Removal of contaminated water and sludge from the affected ponds will therefore be a constraint upon the Option 2 alignment.

Dismantling of all remaining plant and machinery and the safe removal of dumped materials, rusted iron and other metallic waste will also need to be addressed for all potential routes.

4.8.5

Additional Information/ Study Recommendations

In order to confirm the findings of the desk based study and thus allow a full assessment of likely impacts associated with ground/water contamination issues further work would be required as follows:

- Thorough testing of the settling ponds water, for all type of inorganic and organic contaminants, toxins and pathogens;
- Examination of the dumps for its nature and possibility of soil contamination;
- Development of a sustainable disposal plan for contaminated material and solid waste;
- Plan for protection of the underlying stratum from possibility of contamination since it is a major aquifer;
- Development of appropriate drainage infrastructure within the study area, in order to reduce the possibility of stagnation of polluted water and its percolation into the underlying aquifer.

5 Socio-Economic Assessment

5.1

Methodology

Historically, the justification for the building of new roads in the UK was based on the outcomes of a standard Cost Benefit Analysis (COBA), which included transport related economic efficiency as the core (and in most cases, the only) benefit. Processes have since changed and Central Government has recently introduced good practice guidance: New Approach to Assessments (NATA). This guidance emphasises the need to expand the impact assessments for transport schemes to include wider benefits for local communities and economies.

For the current pre-feasibility study this analysis has been limited to a preliminary review of the existing social and economic baseline conditions within the link road's context area and a high level assessment of the possible social and economic impacts on the communities and economic base of the area.

5.2

Baseline

The 2007 Indices of Multiple Deprivation prepared by Department of Communities and Local Government (CLG) suggests that the context area around the proposed link road suffers from pockets of employment deprivation (see Figure 6). This reflects in poor economic activity rate and above average unemployment rates³.

The 2004 Annual Survey of Hours and Earnings suggests that average weekly income level of £350 for Wyre Forest is considerably below the County average of £415. Further, a relatively high percentage of

³ The economic activity rate for Wyre Forest District is currently 74.9% compared to an average of 81.7% for Worcestershire. Likewise, the unemployment rate for Wyre Forest District is currently 4.3% compared to an average of 4.2% for Worcestershire. (Source: 2007 Labour Force Survey, NOMIS)

working age population in the District is in receipt of income support benefit compared to Worcestershire⁴. These conditions reflect high levels of income deprivation within the link road's context area (see Figure 7).

The closure of British Sugar's operations, which provided some 72 full time equivalent jobs locally⁵, is likely to have had a detrimental impact on the Wyre Forest District's economy. Further, Advantage West Midlands, the Regional Development Agency is of the view that the Wyre Forest District's economic prospects are currently constrained due to its existing road infrastructure.

In addition to the employment and income deprivation, the IMD 2007 data also indicates that the communities within the context area also suffer from access to services deprivation (see Figure 8).

5.3

Potential Constraints/Impacts

Delivery of the Hoobrook link road would unlock the full potential of a major regeneration site within the District. The Proof of Evidence submitted for the British Sugar redevelopment in 2002 at a Public Inquiry for the Local Plan Review suggests that the local road infrastructure could only support development of between six to twelve hectares of the former British Sugar site. This could create some 648 gross new jobs for the local economy. However, with the link road

⁴ Some 9.7% of working age population in Wyre Forest is in receipt of income support compared to 7.9% in Worcestershire. (Source: Department for Work and Pensions Income Support Statistics, Neighbourhood Statistics, 2003)

⁵ Source: *Council to talk to sugar bosses*, first published on 25th Jan 2001, <http://archive.thisisworcestershire.co.uk/2001/1/25/340099.html>

the full 28 hectare site could be redeveloped, possibly creating a total of 3,025 gross new jobs for the Wyre Forest District economy⁶.

The link road could improve access to facilities in Worcester (including Worcester Hospital) and reduce pressures on oversubscribed services in Kidderminster. It could also improve the access of local communities to the green space and the canals around the British Sugar site. Provision of a dedicated cycleway as part of the road design could further help to promote cycling within the local area. Both these impacts have the potential to promote healthier living.

With regard to the three proposed route options it is likely that the scale and significance of all above impacts would be similar. However, Options 1 and 2 may also facilitate further development of the Hoobrook Trading Estate. Option 3 is less likely to generate a similar impact.

⁶ These estimates are based on extrapolation of the plot ratio and floorspace assumptions presented in the 2002 Proof of Evidence. Halcrow Group Ltd has subsequently applied good practise employment density assumptions i.e. 15 sq m per employee for B1 uses, 30 sq m per employee for B1c / B2 uses and 60 sq m per employee for B8 uses.

6 Infrastructure

6.1 *Impacts on Existing Infrastructure*

6.1.1 *Services*

Statutory undertakers searches (water, electricity, gas and telecommunications) have been undertaken for the study area. As would be expected for an urban location of this type all services would be affected. The cost implications for diversionary works to enable the link road to be constructed are, therefore, likely to be substantial. At this pre-feasibility stage of study, however, it is not possible to accurately quantify these costs and detailed consultation with the relevant statutory undertakers would be required. As such, service diversions pose a major consideration for the link road construction and are likely to have significant financial implications.

6.1.2 *Severn Valley Railway*

The study area is bordered to the north by the Severn Valley Railway (SVR). The link road would not have a direct impact upon the railway. However, travellers on the railway would have transient views into the site and of any new link road. Alignment Option 1 comes closest to the railway and careful assessment of the required ground works would be required to ensure that there is no detrimental impact upon the railway embankment. Location and design details for the new junction at the eastern end of the link road would need to take into consideration the existing SVR bridge over Worcester Road.

6.1.3 *Staffordshire and Worcestershire Canal*

The Staffordshire and Worcestershire Canal is a 46 mile (74 km) long, narrow navigable canal constructed in 1771. It runs from the River Severn at Stourport to the Trent and Mersey Canal at Haywood Junction in Staffordshire.

In 1959 it was planned to close the canal, but it was saved through the efforts of a volunteer group - the Staffordshire and Worcestershire Canal Society. The canal was re-classified as a cruise-way in 1968 under the Transport Act 1968 and the entire length of the canal with all its physical infrastructure, trees and buildings were declared to be a

Conservation Area in the following year. This has resulted in historical buildings and structure being retained and improved sympathetically.

Since the Canal runs in a north-south direction through the centre of the study area and it would need to be bridged by whatever link road route was selected, it therefore poses a significant constraint upon construction of the link road. Potential impacts upon the canal have been discussed in Chapter 4.

6.2

6.2.1

Scheme Infrastructure

Alignments

Three alternative route alignments for the link road have been proposed as described in Chapter 2 and shown on Figure 3.

At this pre-feasibility study stage it is not possible to produce design plans of any great detail. However, a preliminary options layout drawing has been produced to illustrate the indicative footprint for each option (see Figure 9). This has been based upon the following assumptions:

- The existing infrastructure in the surrounding area is 30mph dual and single carriageway with Stourport Road being single carriageway and Worcester Road being dual carriageway. With this in mind the link road footprint has been based upon 2-way single carriageway, with a footway/cycleway on either side. Design standard widths of 7.3m for the carriageway plus 3m for each footway/cycleway. This gives an overall link road width of 13.3m.
- The footprint does not include any earthworks that may be required due to the profile of the existing ground;
- The tie in to the A451 Stourport Road has been shown as a roundabout for all three options at the junction with Clee Avenue;
- Option 1 approaches the A442 Worcester Road through the northern section of the Hoobrook Trading Estate and terminates at a new, signalised junction;
- Option 2 approaches the A442 Worcester Road via an existing access road within the Hoobrook Trading Estate and terminates at an upgraded (signalised) junction;

- Option 3 is shown to tie in initially with Wilden Way (minor road), via a new signalised junction with access to the residential area. Link road traffic would then join with the A442/A449 via the Wilden Way approach to the A449/A442/Chester Road South roundabout at Hoobrook. It is likely that this roundabout would require some improvement works to accommodate the increase in traffic approaching from the Wilden Lane arm. However, full reconstruction is not anticipated (the cost of any such improvement works have not been included in the cost estimates shown below);
- Signalised junctions are preferred for the Options 1 and 2 tie-ins with the A442 as land is not so readily available in those locations;
- All alignment options have to cross the River Stour and Staffordshire and Worcestershire Canal which would require construction of a bridge at the full width of the carriageway including footway/cycleways. The construction of a bridge could lead to unexpected costs if issues with ground conditions or other unforeseen circumstance arise;
- The link road will be lit.

6.2.2

Timescale

Based upon experience of similar schemes of similar complexity constructed within the last five years the programme of **construction only** for this scheme is likely to be in the region of 50 weeks.

The above, however, only relates to the construction programme, it does not include for the following:

- transport modelling
- environmental studies recommended in Chapter 4;
- consultation with stakeholders;
- environmental mitigation works;
- ground investigations;
- detailed design;
- obtaining planning consent;
- procurement, or
- service diversions.

In practice, at least a 5 year scheme programme, incorporating the following stages, is considered likely to be required for development of the link road:

- Preliminary design – including transport modelling, environmental assessment studies, topographic surveys and planning etc;
- Detailed Design and Procurement;
- Construction and supervision.

6.2.3

Indicative Scheme Construction Costs

At this pre-feasibility study stage it is not possible to provide detail, robust construction costs. However, for the purposes of this report preliminary cost estimates have been prepared as shown in Table 1 below. These estimates have been based on previous project experience, in particular a recently completed estimate for a similar link road scheme in North Somerset (using SPONS Construction Rates).

Table 1

Preliminary Scheme Construction Cost Estimates

Alignment Option	Estimated Construction Cost
Option 1	£18.6M
Option 2	£18.7M
Option 3	£19.9M

The estimates presented above are for **construction** only and are based on the following:

- 2008 prices with **no** inflation allowance;

- Costs **exclude** any remediation of contaminated land
- Bridge design - conservation and landscape and visual impact requirements are such for this location that a 'landmark' bridge design would most likely be required for this scheme. In addition, the topography of the area is such that a bridge span of at least 150 metres is likely to be required. The bridge construction element of these costs is therefore substantial;
- A £5M risk contingency figure (approx 30%) has been included.

There is considerable professional risk in providing such outline cost figures, in advance of even a preliminary design, and it is essential that the assumptions and exclusions made are recognised and taken into account. It is strongly recommended that further work is undertaken to enable robust costings to be provided for detailed decision-making purposes.

In addition, it is important to recognise that construction costs only form part of the overall scheme cost and the figures presented above do not include for the following:

- preliminary design including transport modelling, environmental assessment studies, topographic surveys and planning etc;
- consultation with stakeholders;
- environmental mitigation works;
- ground investigations;
- detailed design;
- procurement;
- site supervision or
- service diversions.

7

Summary

Halcrow has undertaken a pre-feasibility study of options for a new link road at Hoobrook, just south of Kidderminster town centre, on behalf of Worcestershire County Council.

The purpose of the report is to inform WCC's discussions with Wyre Forest District Council (WFDC) and Cill Dara Property Partnership (owners of the former British Sugar site) regarding the feasibility of a link road at Hoobrook.

Desk based assessments of the traffic, environmental and socio-economic constraints and potential impacts of three proposed link road alignment options have been undertaken and requirements for further work that would be required if the scheme were to be progressed further have been identified. Preliminary scheme **construction only** cost estimates have been presented.

The key findings of the study for each route option are presented in Tables 2, 3 and 4 and recommendations for further work are summarised in Table 5.

The following key conclusions can be drawn from the study:

- Development of the link road would help to facilitate full redevelopment of the former British Sugar site which would have significant socio-economic benefits for the Wyre Forest District;
- A new link road would help to reduce existing congestion on the northern section of the A451 and the A451/A442 bus depot gyratory (ring road junction) and thus improve access to local facilities and the town centre;
- There are a number of significant environmental constraints to the link road development including:
 - (i) Wilden Marsh and Meadows SSSI;
 - (ii) River Stour floodplain;

- (iii) Staffordshire and Worcestershire Canal conservation area;
- (iv) Woodland Tree protection designation area;
- (v) Potential land and water contamination issues, principally with regard to the settling ponds;
- (vi) The river and canal provide a valuable landscape resource as much of the surrounding natural river valley landscape has been eroded by its industrial land use;
- (vii) Potential for palaeoenvironmental remains. Most archaeological deposits are likely to be related to the river and water management of the flood meadows and later the working of the canal;
- (viii) Sensitive residential visual and noise receptors, particularly on Wilden Lane.

- The transport and socio-economic impacts of the development are broadly similar for all three alignment options considered. Distinction between the options arise principally due to environmental factors (see Tables 2, 3 and 4);
- Considerable service diversion works will be required. Detailed costs for these will need to be identified in consultation with the relevant statutory undertakers;
- Considerable further study, to include traffic modelling, hydraulic modelling, ecological surveys and geo-technical ground investigations would be required if the scheme were to be progressed further;
- Notwithstanding the requirement for further studies it is recommended at this stage that Option 3 is discounted from further consideration due to its significantly adverse impact on the Wilden Marsh and Meadow SSSI, its proximity to sensitive visual and noise receptors on Wilden Lane and its greater estimated scheme cost.

Table 2
SUMMARY OF STUDY FINDINGS – OPTION 1

Parameter	Beneficial Impacts/Opportunities	Damaging Impacts/Constraints
Traffic Impacts	<ul style="list-style-type: none"> Reduced congestion on the northern section of the A451 and the A451/A442 bus depot gyratory (ring road junction) will improve access to local facilities and Kidderminster town centre Less traffic on the A451 north of Clee Avenue as a result of traffic re-distributing onto the link road may reduce the potential for vehicle conflicts with pedestrians/cyclists Opportunity to enhance pedestrian/cycle infrastructure within the design of the new road and new junctions Less congestion on the existing road network may reduce bus journey times making bus travel more attractive 	<ul style="list-style-type: none"> New junctions on the existing A451 and A442 could result in the formation of some new traffic queues Less congestion may lead to increased vehicle speeds on the existing network which could impact road safety Reduced traffic congestion may improve journey times for some car based trips making car driving more attractive to using public transport
Air Quality	<ul style="list-style-type: none"> Reduced congestion could lead to reduced NO₂ levels which could lead to improvements in the Horsefair AQMA (needs confirmation) 	<ul style="list-style-type: none"> Fugitive dust issues could arise during construction
Historic Environment		<ul style="list-style-type: none"> Potential for palaeoenvironmental remains to be disturbed/destroyed during construction
Ecology and Nature Conservation		<ul style="list-style-type: none"> Adverse impacts derived from the felling of woodland and standard trees that are associated with nesting birds, potential bat roosts, badger activity, biodiversity and conservation of woodland botanical species and trees (greatest for this option as it crosses the Woodland Tree Preservation area at its widest point) Impacts to bat flight lines from the introduction of artificial lighting Impacts to breeding habitat and habitat connectivity for great crested newts Impacts to the River Stour and H&W Canal riparian corridor and species such as water vole and otter (especially associated with artificial lighting) Impacts to water quality of the Stour and H&W Canal
Landscape and Visual Impact		<ul style="list-style-type: none"> Permanent change to the landscape character of the area, particularly the H&W Canal Conservation Area (greatest for this option as it crosses the Conservation Area at its widest point). Transient visual impacts for users of the SVR and H&W Canal Permanent loss of some boundary vegetation at the location of the new junction with A442
Noise and Vibration	<ul style="list-style-type: none"> Potential noise impacts/benefits on the existing road network associated with new traffic flows need to be quantified. 	<ul style="list-style-type: none"> Potential noise impacts/constraints associated with new traffic flows need to be quantified. Detrimental noise impacts during construction especially with regard to construction traffic.
Ground Conditions		<ul style="list-style-type: none"> No significant damaging impacts are considered likely
Water environment - Hydrology, Flooding and Drainage issues		<ul style="list-style-type: none"> Development is within the River Stour floodplain The road embankment must be designed with adequate balancing culverts, taking into account the prevailing precipitation pattern and rate of surface runoff observed over last 100 years in the area. Climate change considerations also need to be taken into account Potential for temporary (during construction) and permanent (new road runoff/drainage) water quality impact on the River Stour, H&W Canal and groundwater aquifer
Contaminated Land/Water		<ul style="list-style-type: none"> Dismantling of all remaining plant and machinery and safe removal of dumped materials, rusted iron and other metallic wastes
Socio-economic Impacts	<ul style="list-style-type: none"> The link road would unlock the full redevelopment potential of the former British Sugar site which would have a positive impact on the local economy Improvement in access to local services and facilities in Kidderminster and Worcester. Improvement in access to the green space around the British Sugar site and suitable design could enhance pedestrian and cycling opportunities both of which have the potential to promote healthier living Potential to facilitate further development of Hoobrook Trading Estate 	
Costs	<ul style="list-style-type: none"> Based on indicative cost estimates, Option 1 would have the lowest construction costs 	

Table 3
SUMMARY OF STUDY FINDINGS – OPTION 2

Parameter	Beneficial Impacts/Opportunities	Damaging Impacts/Constraints
Traffic Impacts	<ul style="list-style-type: none"> Reduced congestion on the northern section of the A451 and the A451/A442 bus depot gyratory (ring road junction) will improve access to local facilities and Kidderminster town centre Less traffic on the A451 north of Clee Avenue as a result of traffic re-distributing onto the link road may reduce the potential for vehicle conflicts with pedestrians/cyclists Opportunity to enhance pedestrian/cycle infrastructure within the design of the new road and new junctions Less congestion on the existing road network may reduce bus journey times making bus travel more attractive 	<ul style="list-style-type: none"> New junctions on the existing A451 and A442 could result in the formation of some new traffic queues Less congestion may lead to increased vehicle speeds on the existing network which could impact road safety Reduced traffic congestion may improve journey times for some car based trips making car driving more attractive to using public transport
Air Quality	<ul style="list-style-type: none"> Reduced congestion could lead to reduced NO₂ levels which could lead to improvements in the Horsefair AQMA (needs confirmation) 	<ul style="list-style-type: none"> Fugitive dust issues could arise during construction
Historic Environment		<ul style="list-style-type: none"> Potential for palaeoenvironmental remains to be disturbed/destroyed during construction
Ecology and Nature Conservation		<ul style="list-style-type: none"> Adverse impacts derived from the felling of woodland and standard trees that are associated with nesting birds, potential bat roosts, badger activity, biodiversity and conservation of woodland botanical species and trees Impacts to bat flight lines from the introduction of artificial lighting Impacts to breeding habitat and habitat connectivity for great crested newts Impacts to the River Stour and H&W Canal riparian corridor and species such as water vole and otter (especially associated with artificial lighting) Impacts to water quality of the Stour and H&W Canal Potential impact to flora and fauna (including any Great Crested Newts) within the balancing ponds
Landscape and Visual Impact		<ul style="list-style-type: none"> Permanent change to the landscape character of the area, particularly the H&W Canal Conservation Area Transient visual impacts for users of the SVR and H&W Canal Permanent loss of some boundary vegetation at the location of the new junction with A442
Noise and Vibration	<ul style="list-style-type: none"> Potential noise impacts/benefits on the existing road network associated with new traffic flows need to be quantified. 	<ul style="list-style-type: none"> Potential noise impacts/constraints associated with new traffic flows need to be quantified. Detrimental noise impacts during construction especially with regard to construction traffic.
Ground Conditions		<ul style="list-style-type: none"> Geo-environmental issues (topography, geotechnics, geology and soils and hydrogeology) as a result of crossing through the settling ponds. Detailed geotechnical investigations will be required.
Water environment - Hydrology, Flooding and Drainage issues		<ul style="list-style-type: none"> Development is within the River Stour floodplain The road embankment must be designed with adequate balancing culverts, taking into account the prevailing precipitation pattern and rate of surface runoff observed over last 100 years in the area. Climate change considerations also need to be taken into account Potential for temporary (during construction) and permanent (new road runoff/drainage) water quality impact on the River Stour, H&W Canal and groundwater aquifer Potential water quality impacts within the settling ponds Permanent loss of some settling ponds
Contaminated Land/Water		<ul style="list-style-type: none"> Removal of contaminated water and sludge from affected settling ponds has potential for water quality impacts on the Stour, H&W Canal and groundwater aquifer Such contaminated material will need to be treated/safely removed from site Dismantling of all remaining plant and machinery and safe removal of dumped materials, rusted iron and other metallic wastes
Socio-economic Impacts	<ul style="list-style-type: none"> The link road would unlock the full redevelopment potential of the former British Sugar site which would have a positive impact on the local economy Improvement in access to local services and facilities in Kidderminster and Worcester. Improvement in access to the green space around the British Sugar site and suitable design could enhance pedestrian and cycling opportunities both of which have the potential to promote healthier living Potential to facilitate further development of Hoobrook Trading Estate 	

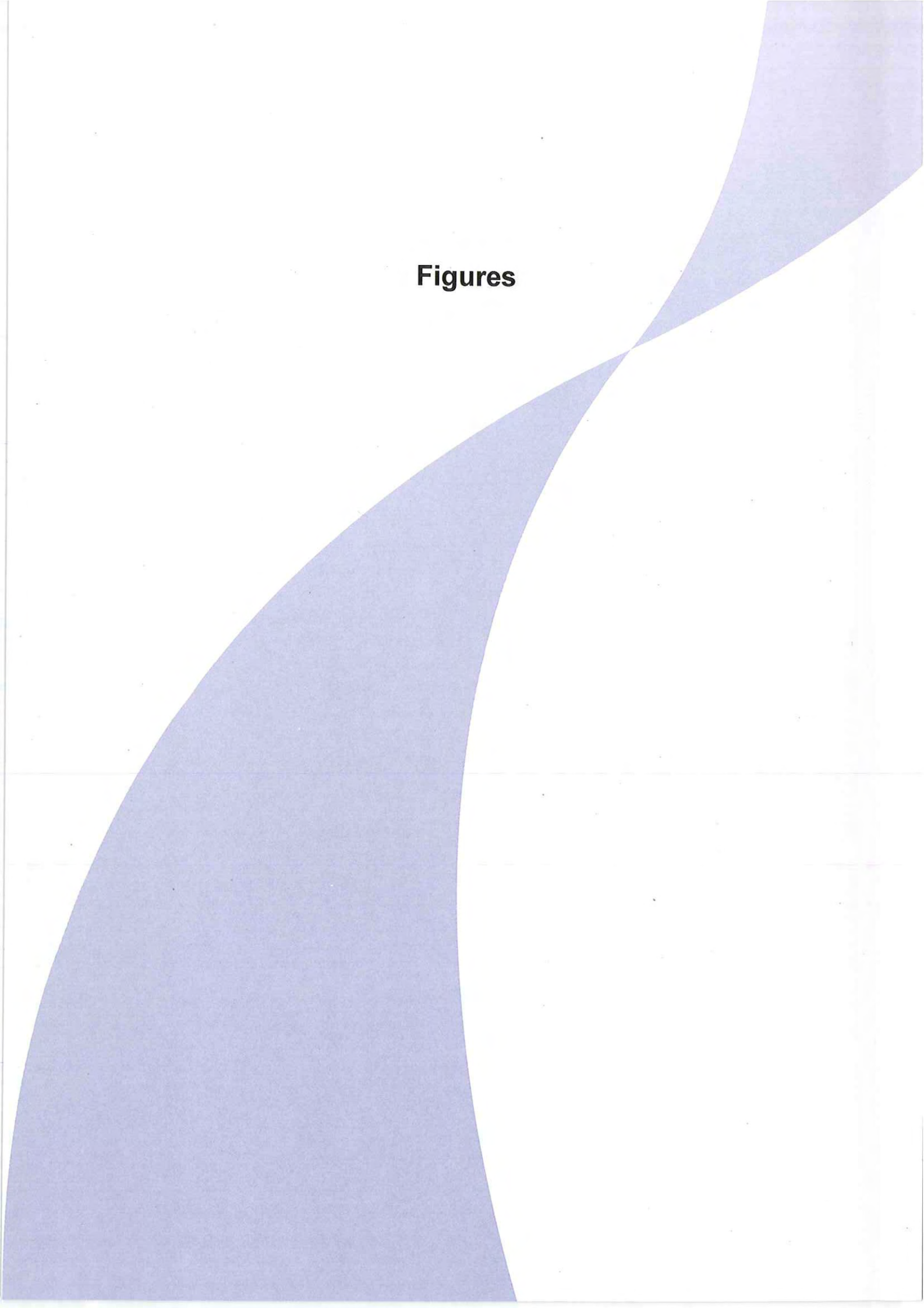
Table 4
SUMMARY OF STUDY FINDINGS – OPTION 3

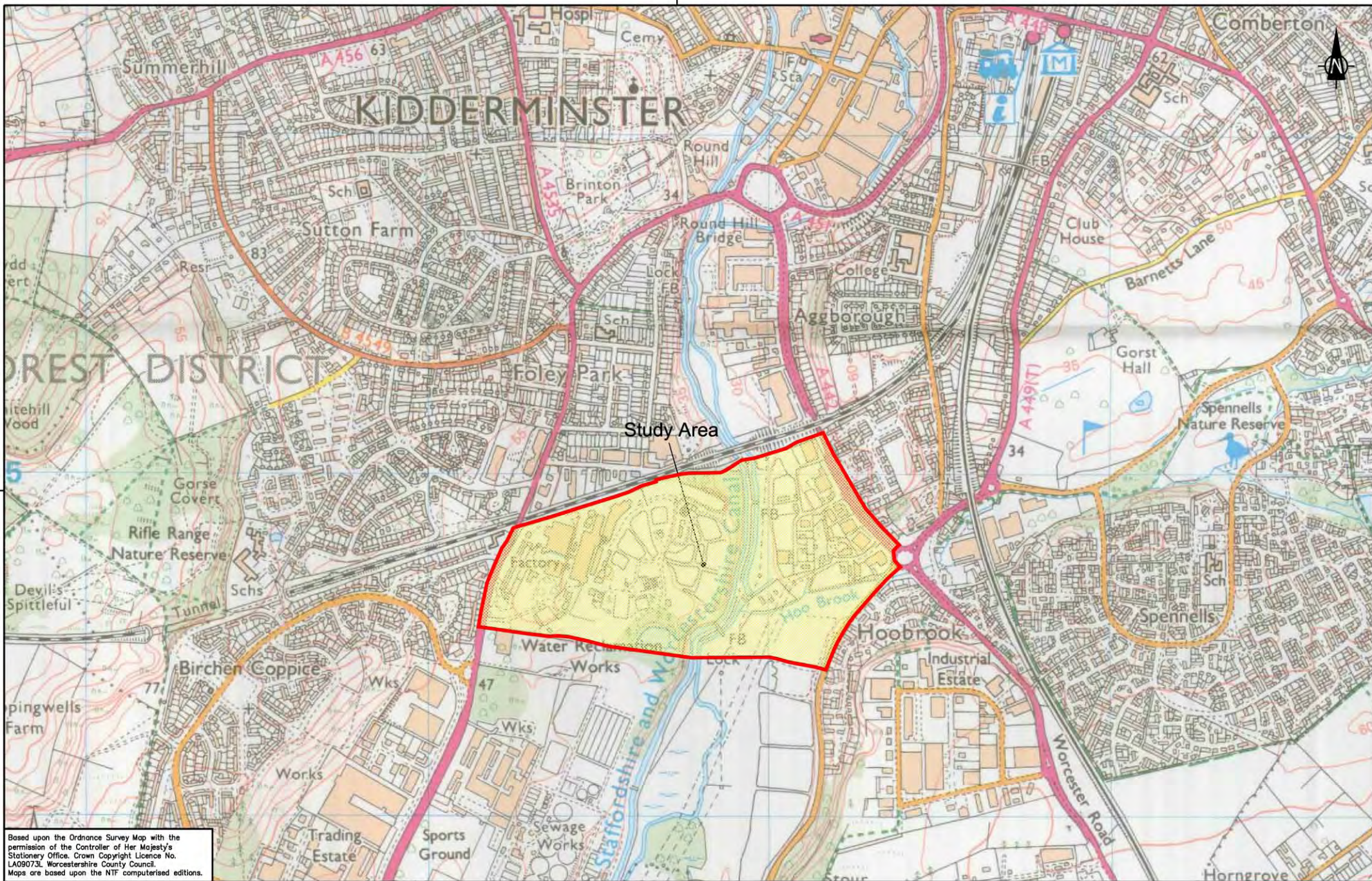
Parameter	Beneficial Impacts/Opportunities	Damaging Impacts/Constraints
Traffic Impacts	<ul style="list-style-type: none"> • Reduced congestion on the northern section of the A451 and the A451/A442 bus depot gyratory (ring road junction) will improve access to local facilities and Kidderminster town centre • Less traffic on the A451 north of Clee Avenue as a result of traffic re-distributing onto the link road may reduce the potential for vehicle conflicts with pedestrians/cyclists • Opportunity to enhance pedestrian/cycle infrastructure within the design of the new road and new junctions • Less congestion on the existing road network may reduce bus journey times making bus travel more attractive 	<ul style="list-style-type: none"> • New junctions on the existing A451 and A442 could result in the formation of some new traffic queues • Less congestion may lead to increased vehicle speeds on the existing network which could impact road safety • Reduced traffic congestion may improve journey times for some car based trips making car driving more attractive to using public transport
Air Quality	<ul style="list-style-type: none"> • Reduced congestion could lead to reduced NO₂ levels which could lead to improvements in the Horsefair AQMA (needs confirmation) 	<ul style="list-style-type: none"> • Fugitive dust issues could arise during construction
Historic Environment		<ul style="list-style-type: none"> • Potential for palaeoenvironmental remains to be disturbed/destroyed during construction (greatest for this option as there is less modern disturbance towards the south of the study area)
Ecology and Nature Conservation		<ul style="list-style-type: none"> • Significant, permanent adverse impact on the Wilden Marsh and Meadows SSSI (bi-section) • Adverse impacts derived from the felling of woodland and standard trees that are associated with nesting birds, potential bat roosts, badger activity, biodiversity and conservation of woodland botanical species and trees (greatest for this option as it crosses the Woodland Tree Preservation area at its widest point) • Impacts to bat flight lines from the introduction of artificial lighting • Impacts to breeding habitat and habitat connectivity for great crested newts • Impacts to the River Stour and H&W Canal riparian corridor and species such as water vole and otter (especially associated with artificial lighting) • Impacts to water quality of the Stour and H&W Canal
Landscape and Visual Impact		<ul style="list-style-type: none"> • Permanent change to the landscape character of the area, particularly the H&W Canal Conservation Area (greatest for this option as it crosses the Conservation Area at its widest point). • Transient visual impacts for users of the SVR and H&W Canal • Permanent loss of some boundary vegetation at the location of the new junction with A442 • Visual impact on sensitive residential receptors along Wilden Lane
Noise and Vibration	<ul style="list-style-type: none"> • Potential noise impacts/benefits on the existing road network associated with new traffic flows need to be quantified. 	<ul style="list-style-type: none"> • Potential noise impacts/constraints associated with new traffic flows need to be quantified. • Detrimental noise impacts during construction especially with regard to construction traffic. • Potential noise impacts for sensitive residential receptors on Wilden Lane
Ground Conditions		<ul style="list-style-type: none"> • No significant damaging impacts are considered likely
Water environment - Hydrology, Flooding and Drainage issues		<ul style="list-style-type: none"> • Development is within the River Stour floodplain • The road embankment must be designed with adequate balancing culverts, taking into account the prevailing precipitation pattern and rate of surface runoff observed over last 100 years in the area. Climate change considerations also need to be taken into account • Potential for temporary (during construction) and permanent (new road runoff/drainage) water quality impact on the River Stour, H&W Canal and groundwater aquifer
Contaminated Land/Water		<ul style="list-style-type: none"> • Dismantling of all remaining plant and machinery and safe removal of dumped materials, rusted iron and other metallic wastes
Socio-economic Impacts	<ul style="list-style-type: none"> • The link road would unlock the full redevelopment potential of the former British Sugar site which would have a positive impact on the local economy • Improvement in access to local services and facilities in Kidderminster and Worcester. • Improvement in access to the green space around the British Sugar site and suitable design could enhance pedestrian and cycling opportunities both of which have the potential to promote healthier living 	
Costs		<ul style="list-style-type: none"> • Based on indicative cost estimates, Option 3 would have the highest construction costs

Table 5
RECOMMENDATIONS FOR FURTHER WORK

Parameter	Work/Studies Required
Traffic Impacts	<ul style="list-style-type: none"> • Review and update of existing Wyre Forest SATURN model – to include traffic surveys as appropriate • Modelling of proposed development (tying into redevelopment proposals for the British Sugar site) • Detailed analysis of traffic accident data • Detailed review of public transport within the area
Air Quality	<ul style="list-style-type: none"> • Site specific air quality monitoring • Air quality modelling utilising results from traffic modelling above
Historic Environment	<ul style="list-style-type: none"> • Desk based archaeological assessment • Possible need for archaeological trial trenching
Ecology and Nature Conservation	<ul style="list-style-type: none"> • Phase 1 Habitat Survey • Protected Species Surveys
Landscape and Visual Impact	<ul style="list-style-type: none"> • Winter months site visit • Detailed landscape and visual impact assessment • Assessment of individual receptors once route has been decided • Production of landscape strategy and masterplan
Noise and Vibration	<ul style="list-style-type: none"> • Baseline noise monitoring survey • Noise and vibration assessment utilising results of traffic modelling above
Water	<ul style="list-style-type: none"> • Hydraulic modelling and full Flood Risk Assessment • Sampling and analysis of water quality within the settling ponds • Investigation of groundwater source protection status • Development of drainage strategy
Contamination	<ul style="list-style-type: none"> • Sampling and analysis of settling pond sludges and solid deposits to confirm nature and extent of any contamination • Development of a sustainable disposal plan for all contaminated material
Socio-economic Impacts	<ul style="list-style-type: none"> • Full detailed contextual analysis of relevant socio-economic factors to include details of the development proposals for the British Sugar site
Service Diversions	<ul style="list-style-type: none"> • Consultation with all relevant statutory undertakers regarding the required service diversions and associated costs
All	<ul style="list-style-type: none"> • Consultation with relevant stakeholders

Figures





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		SCALE 1:10,000 @ A3	
		Survey	OS Date
		Designed By	GMB Date 10/08
		Drawn By	GMB Date 10/08
		Checked By	JR Date 10/08
No.	Revision	By	Date

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Hoobrook Link Road
 Pre-Feasibility Study

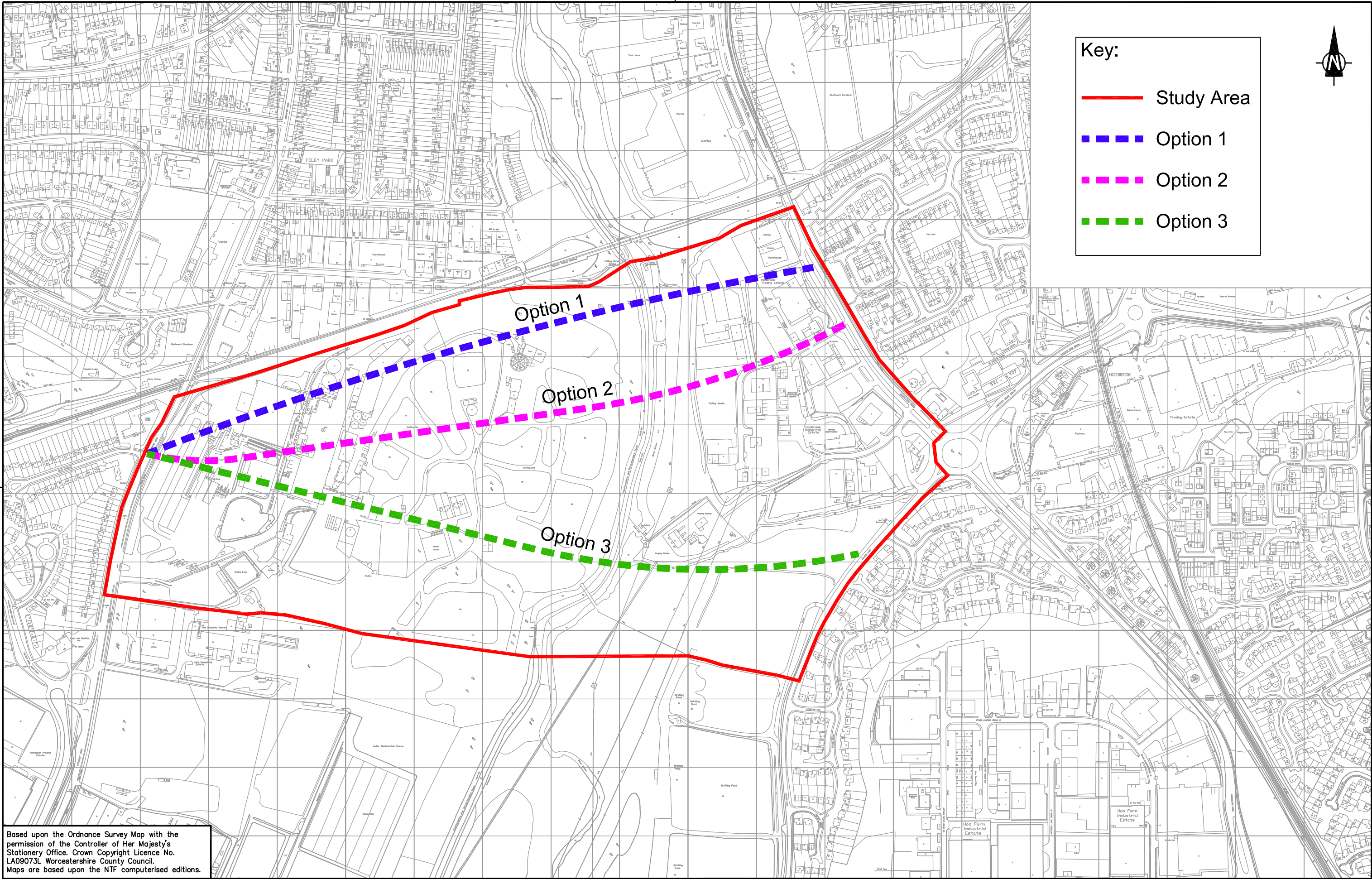
Study Area

worcestershire
highways

Drq.No. Figure 1



Figure 2 - Satellite image of the Study Area showing the balancing ponds filled with water and the general setup of the area
Source: SPOT Image dated 'April 14th 2007'.



Key:

- Study Area
- - - Option 1
- - - Option 2
- - - Option 3

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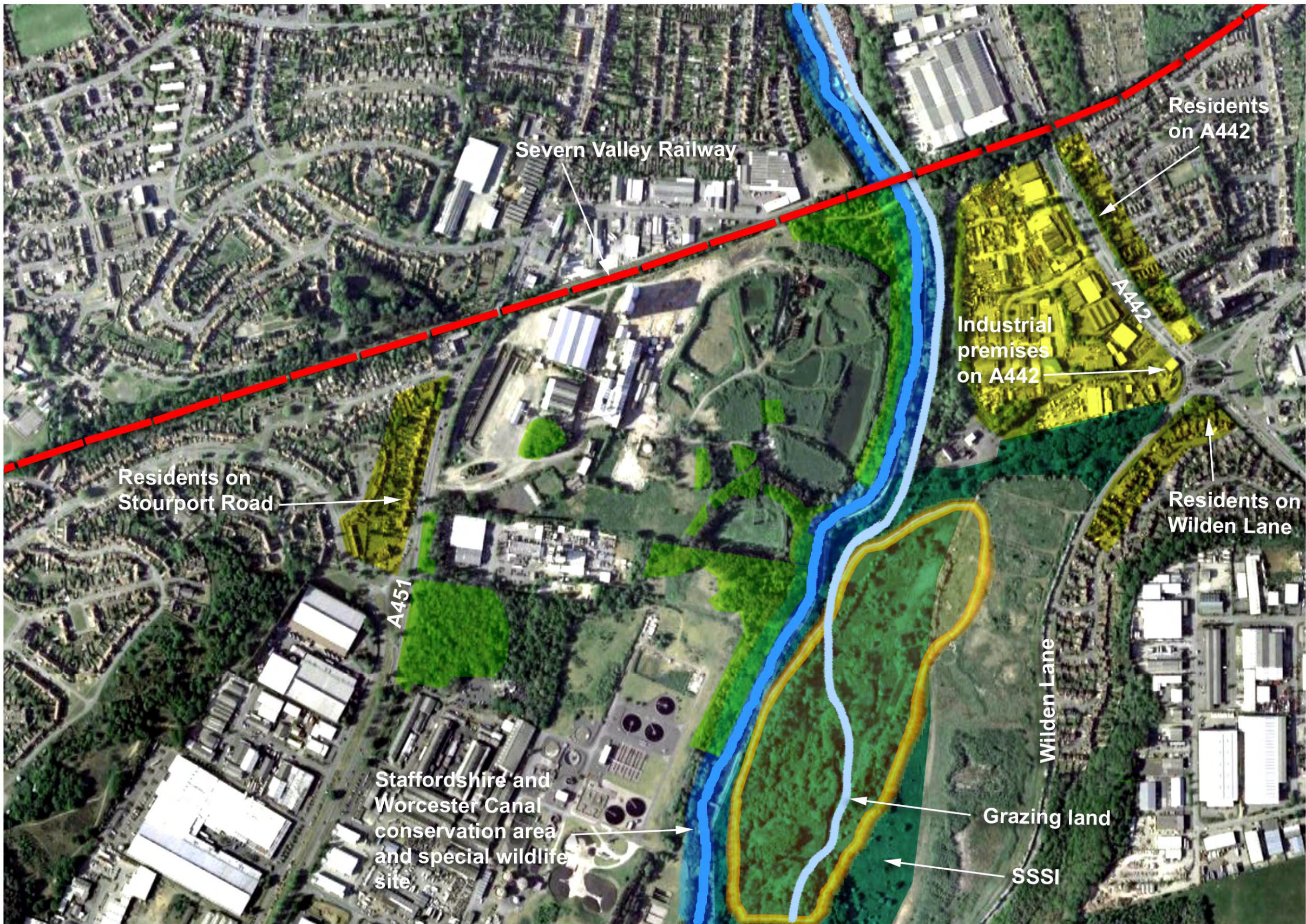
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Hoo Brook Link Road
 Pre-Feasibility Study

Alignment Options

worcestershire
highways

Drg.No. Figure 3



- KEY**
- Site of Special Scientific Interest SSSI
 - Severn Valley Railway
 - Visual Receptors
 - Tree Preservation Orders
 - Special Wildlife Sites (SWS)
 - Canal conservation area

Figure 4 - Landscape and Ecology Context Plan



Figure 5 - Ground Water Management Unit which includes the Study Area

Source: Environment Agency; December 2006; 'The Worcestershire Middle Severn Catchment Abstraction Management Strategy

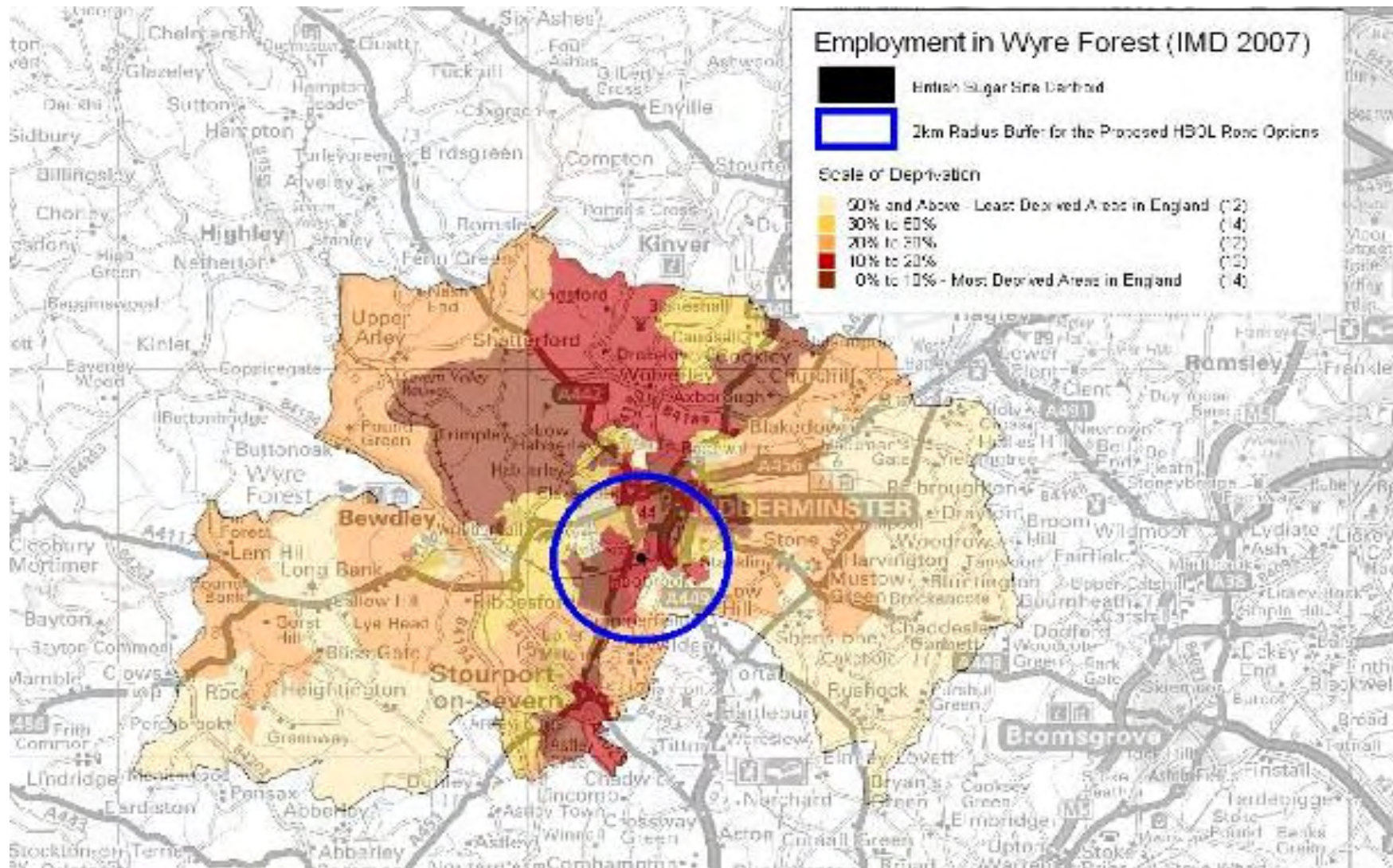


Figure 6 - Employment Deprivation in Wyre Forest District

Source: IMD, CLG, 2007

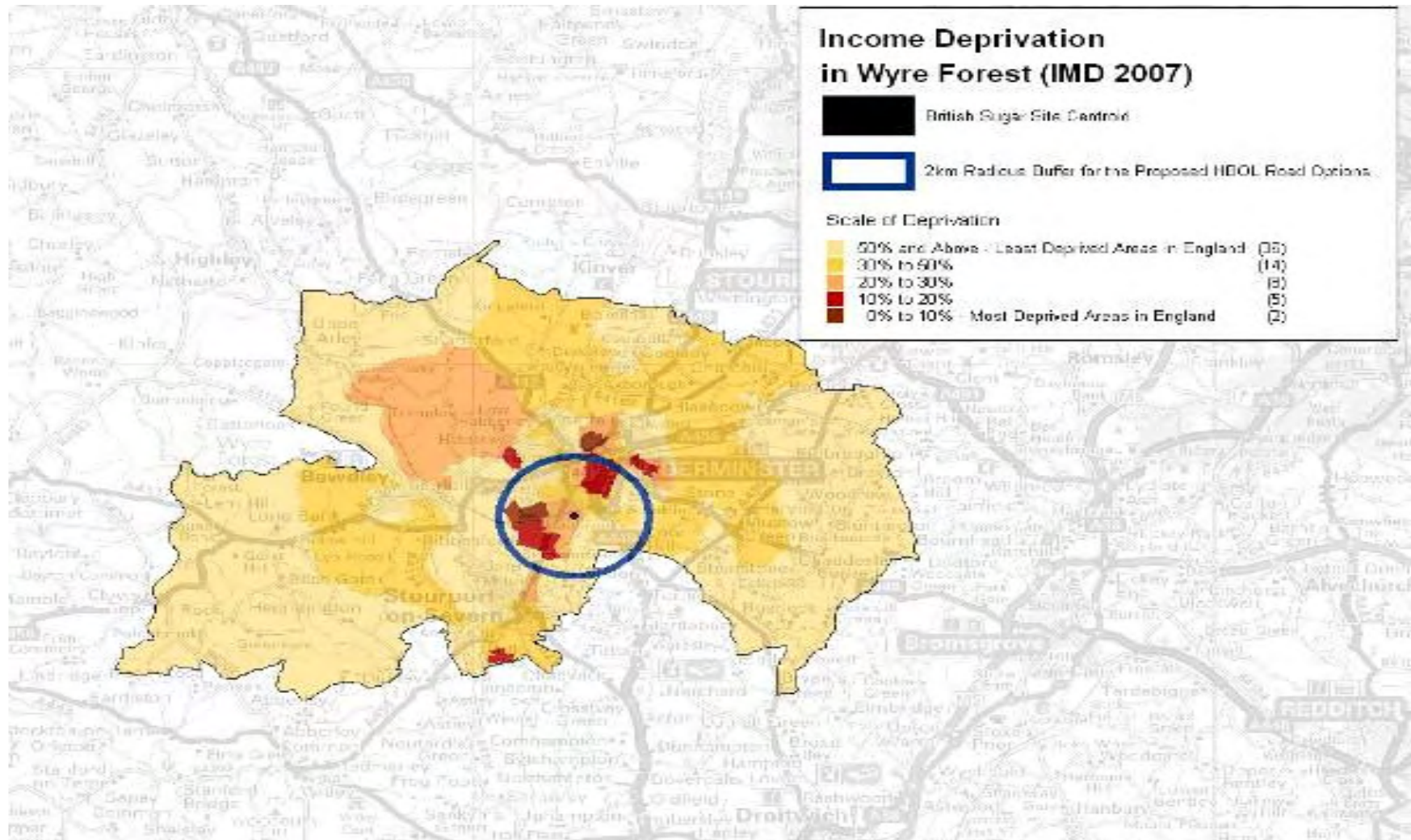


Figure 7 - Income Deprivation in Wyre Forest District
 (Source: IMD, CLG, 2007)

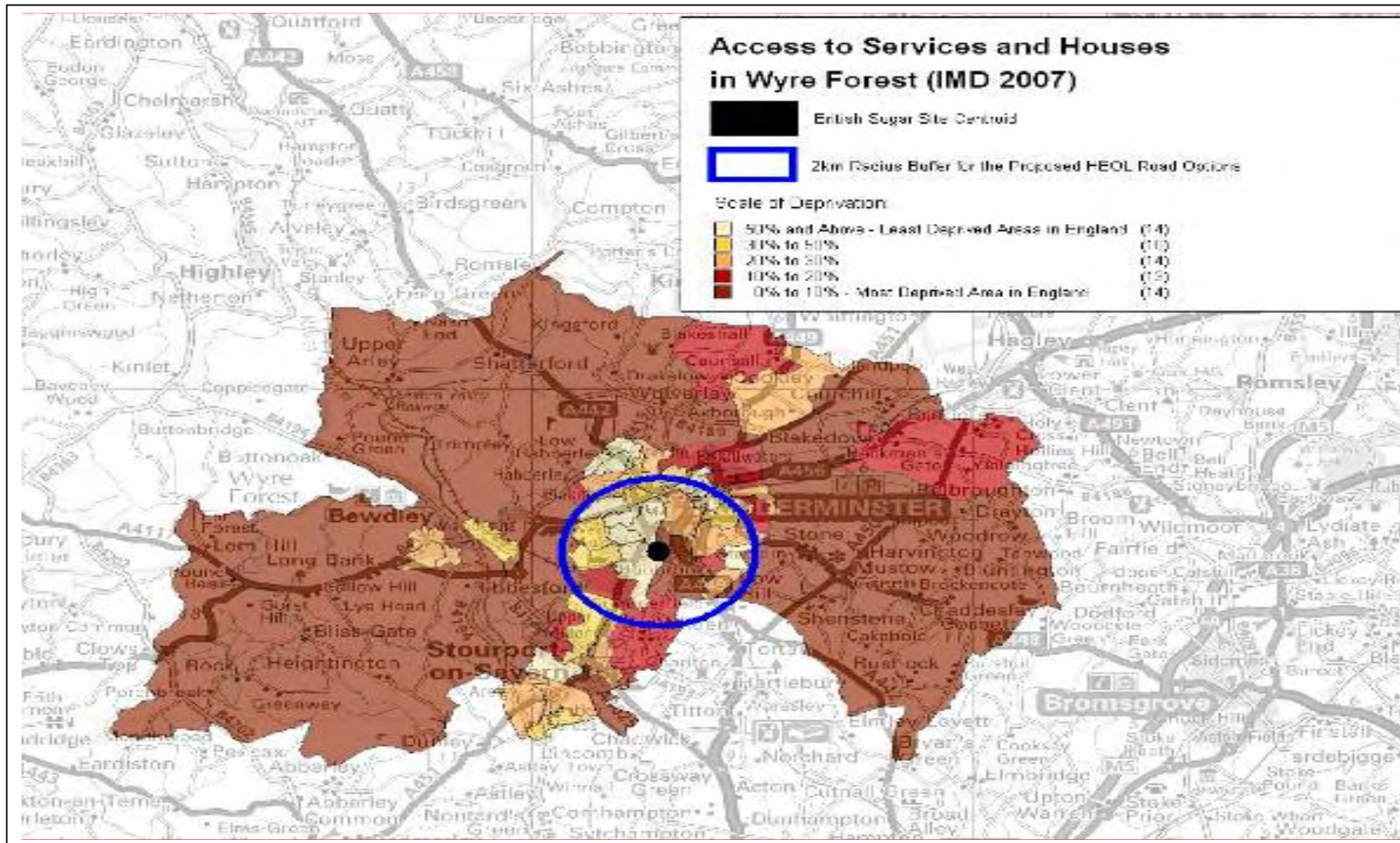
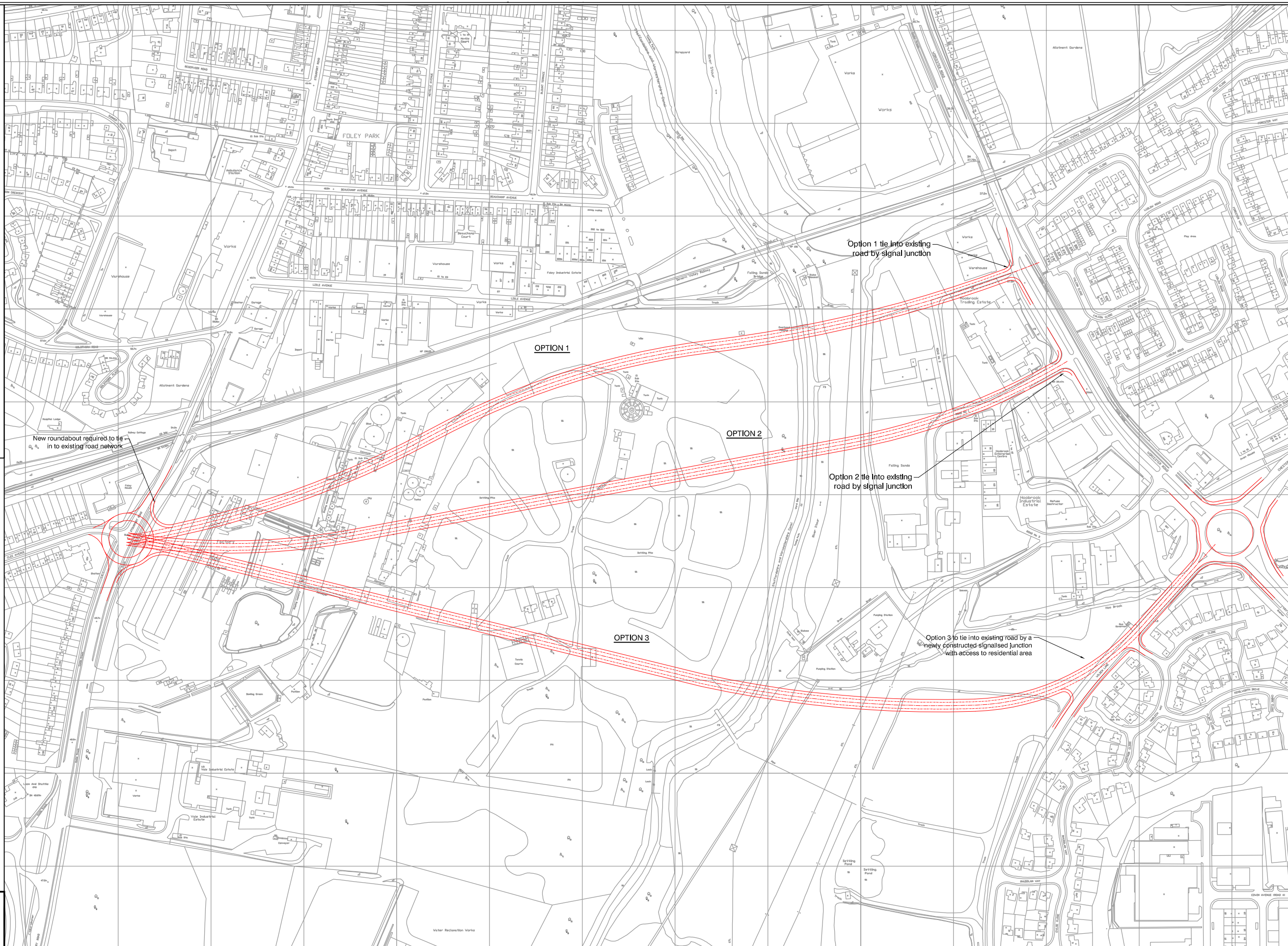


Figure 8 - Access to Services Deprivation in Wyre Forest District
 (Source: IMD, CLG, 2007)

NOTES

1. All options are based upon a 7.3m single carriageway with a 3m footway / cycleway on either side.
2. Alignments and junction layouts are indicative only and are not based upon an engineered solution.
3. Elements such as earthworks and land required for junctions and roundabouts have not been shown, as work to determine the requirements has not been investigated.



Based upon the Ordnance Survey Map with the permission of the Controller of Her Majesty's Stationary Office. Crown Copyright Licence No. LA09073L Worcestershire County Council. Maps are based upon the NTF computerised editions.

No.	Revision	By	Date

SCALE 1:2000@A1			
Survey	OS/KW	Date	
Designed By	MH	Date	09/08
Drawn By	MH	Date	09/08
Checked By		Date	

HOOBROOK LINK ROAD

ALIGNMENT OPTIONS
STUDY



Drq.No. Figure 9

Plates

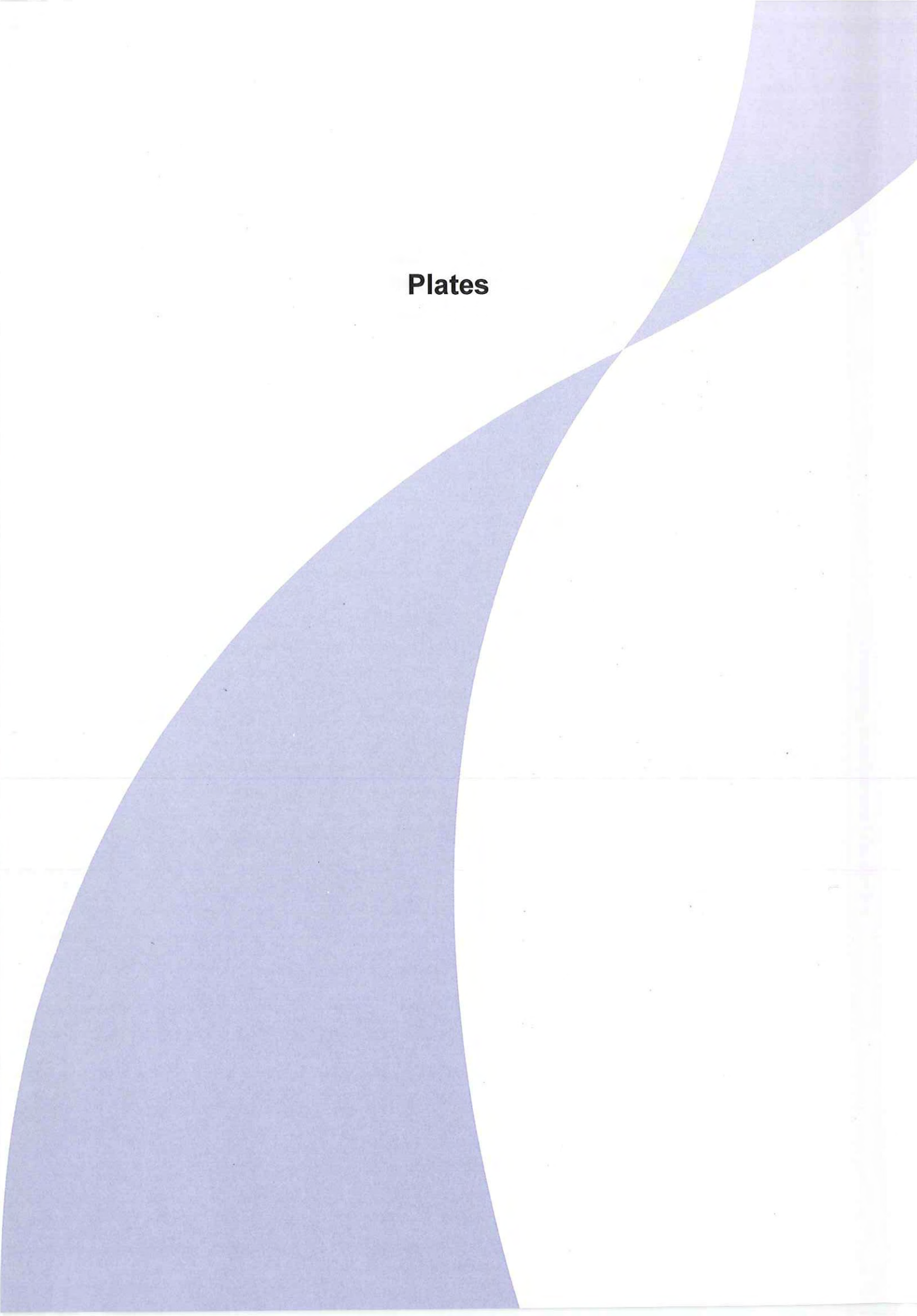




Plate – 1: 'Index of Plates'; Custom-cut for Interpretation of 'Satellite Images' along the study area covering the former 'British Sugar Factory Site'.

Source: High Resolution Satellite Image; SPOT; dated April 14th. 2007

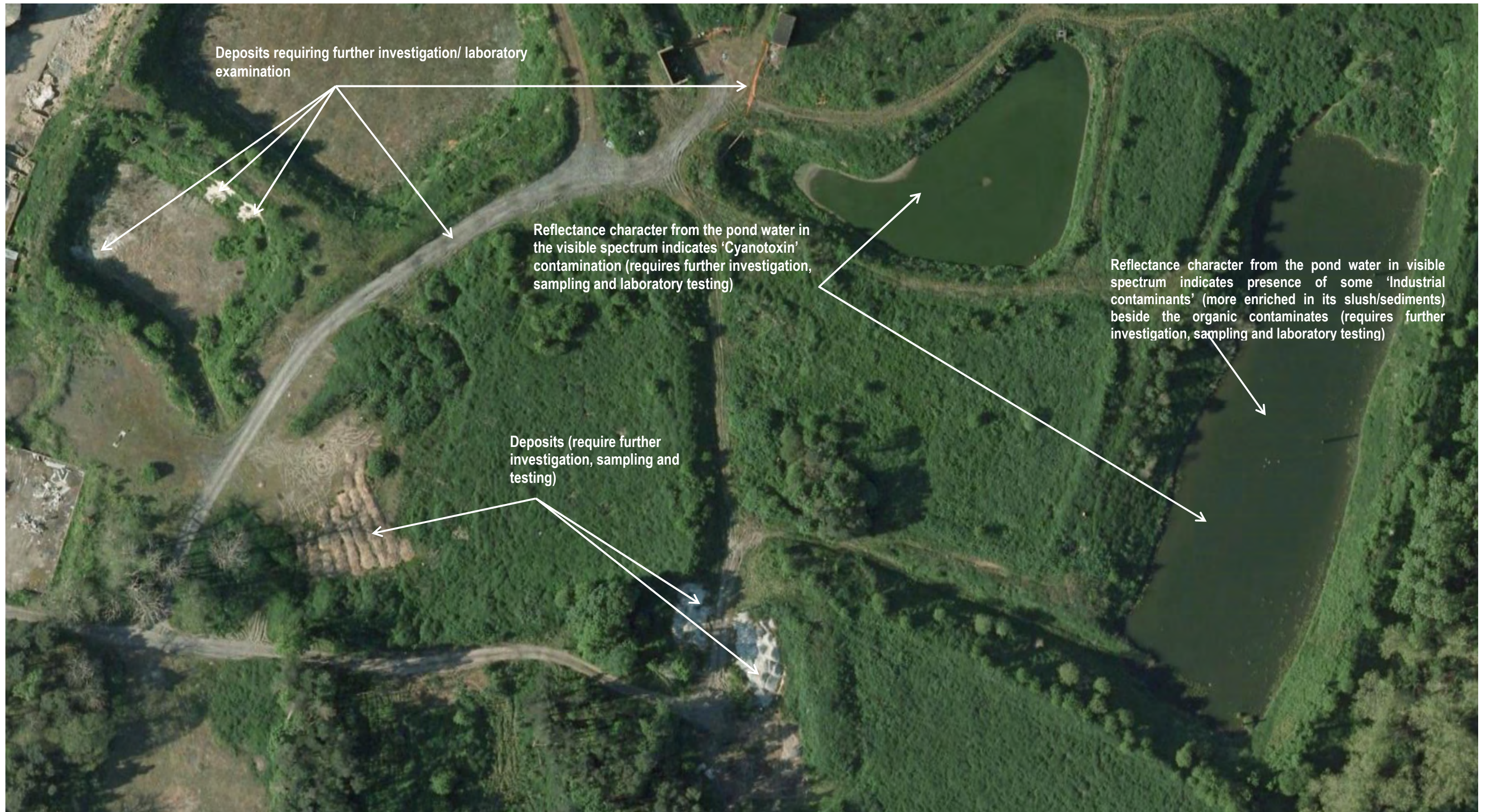


Plate – 2: A portion of the study area; depicting some of the issues associated with the unsolicited dumps (possible source of contamination), and the settling ponds along the former 'British Sugar Site'

Source: High Resolution Satellite Image; SPOT; dated April 14th. 2007

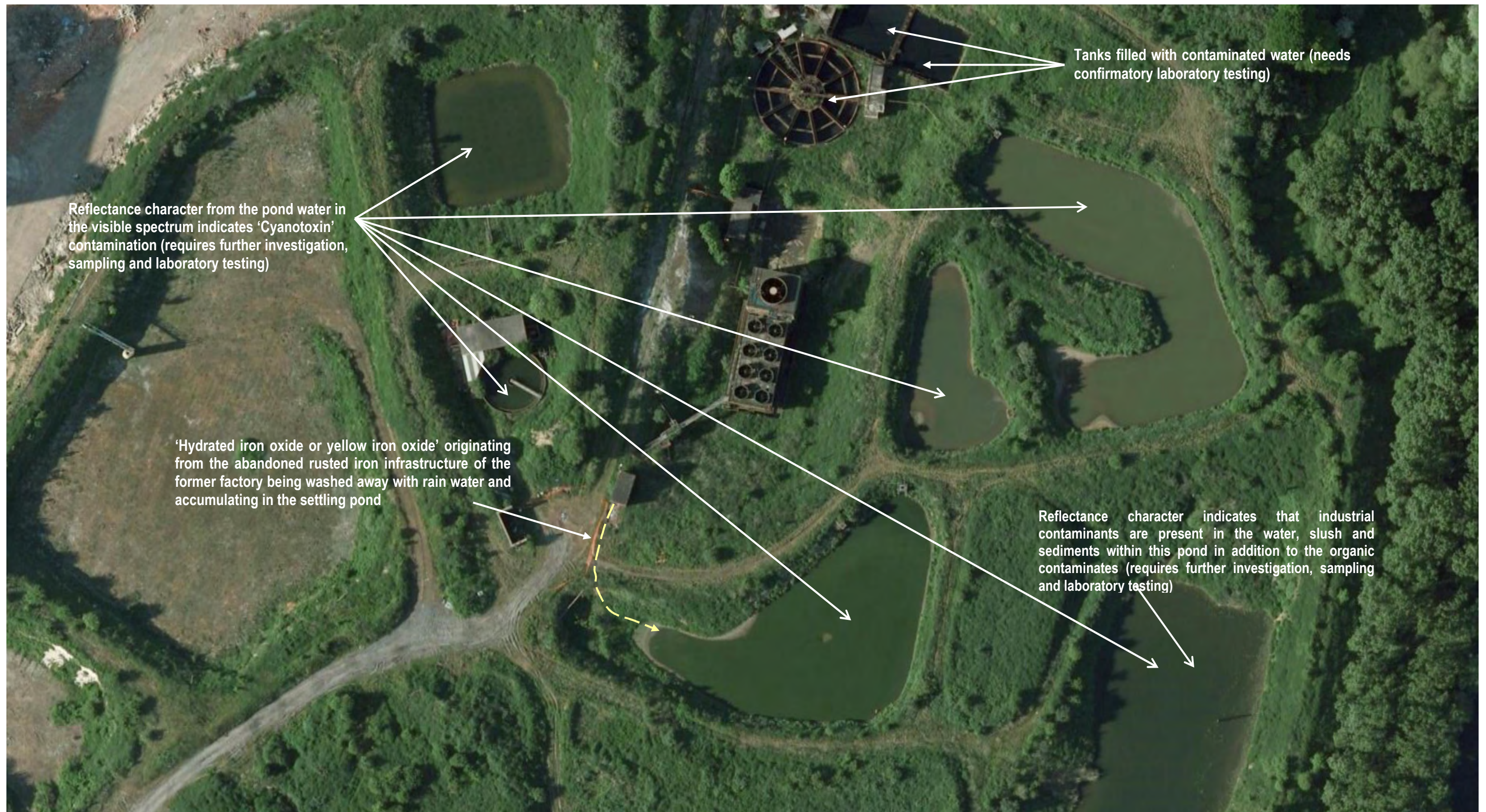


Plate – 3: A portion of the study area; depicting some of the issues associated with the contaminated water in the settling ponds at the former 'British Sugar Site'.

Source: High Resolution Satellite Image; SPOT; dated April 14th. 2007

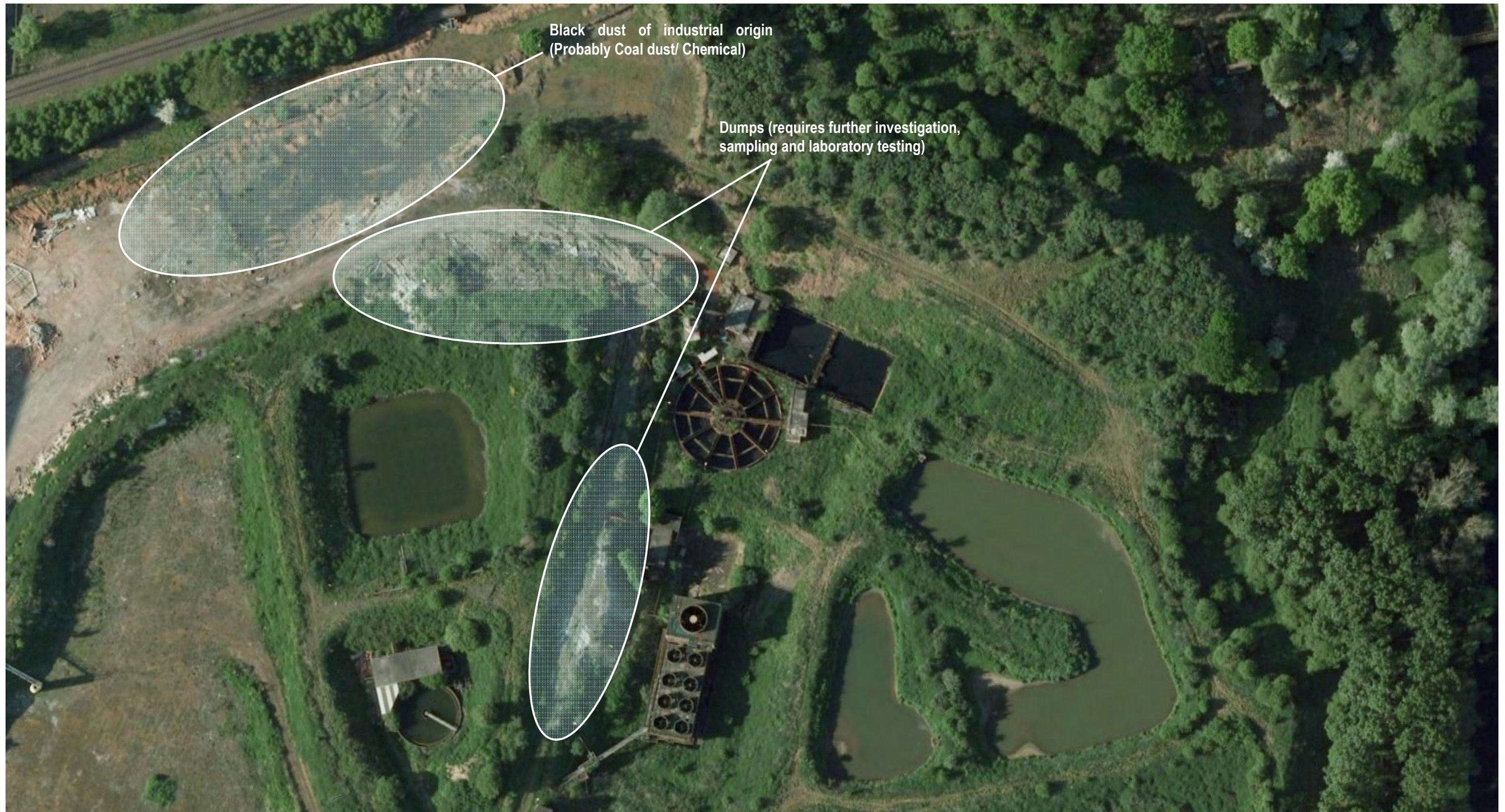


Plate – 4: A portion of the study area; depicting some of the issues associated with the suspicious dumps along the plant and machinery at sewage/sludge treatment facility and the settling ponds along the former ‘British Sugar Factory’ site.

Source: High Resolution Satellite Image; SPOT; dated April 14th. 2007



Plate – 5: A portion of the ‘Study Area’; depicting some of the issues associated with the plant and machinery area of the former ‘British Sugar Site’.

Source: High Resolution Satellite Image; SPOT; dated April 14th. 2007



Plate – 6: A portion of the study area; depicting some of the suspicious areas which may source chemical contamination of soil and ground water at the abandoned plant and machinery area of the former 'British Sugar Factory' Site.

Source: High Resolution Satellite Image; SPOT; dated April 14th. 2007



A generator set that has a low height exhaust. This generator may have led to precipitation of ultra fine particulate pollutants over the surround land and vegetation cover

The entire paved (having concrete slab) and bare (un-vegetated) area covered in this plate shows a blanket of precipitated particulate matter/dust of industrial origin, which needs removal and careful disposal

Plate – 7: A portion of the ‘Study Area’; depicting the structure of the former ‘British Sugar Factory’; most parts of the main structure have already been demolished in early 2008 and the rubble has largely been removed. On the basis of satellite image interpretation (supported by the ‘ground verification’ through a site visit in the first week of September 2008), it appears that the entire concrete slab and bare (un-vegetated) areas covered in this plate shows a blanket of precipitated particulate matter (also known as dust deposit) of industrial origin (dark grey colour in visible spectrum), which needs removal and careful disposal. The impervious concrete flooring/slab also needs to be removed and appropriately dumped at designated dumping site.

Source: High Resolution Satellite Image; SPOT; dated April 14th. 2007

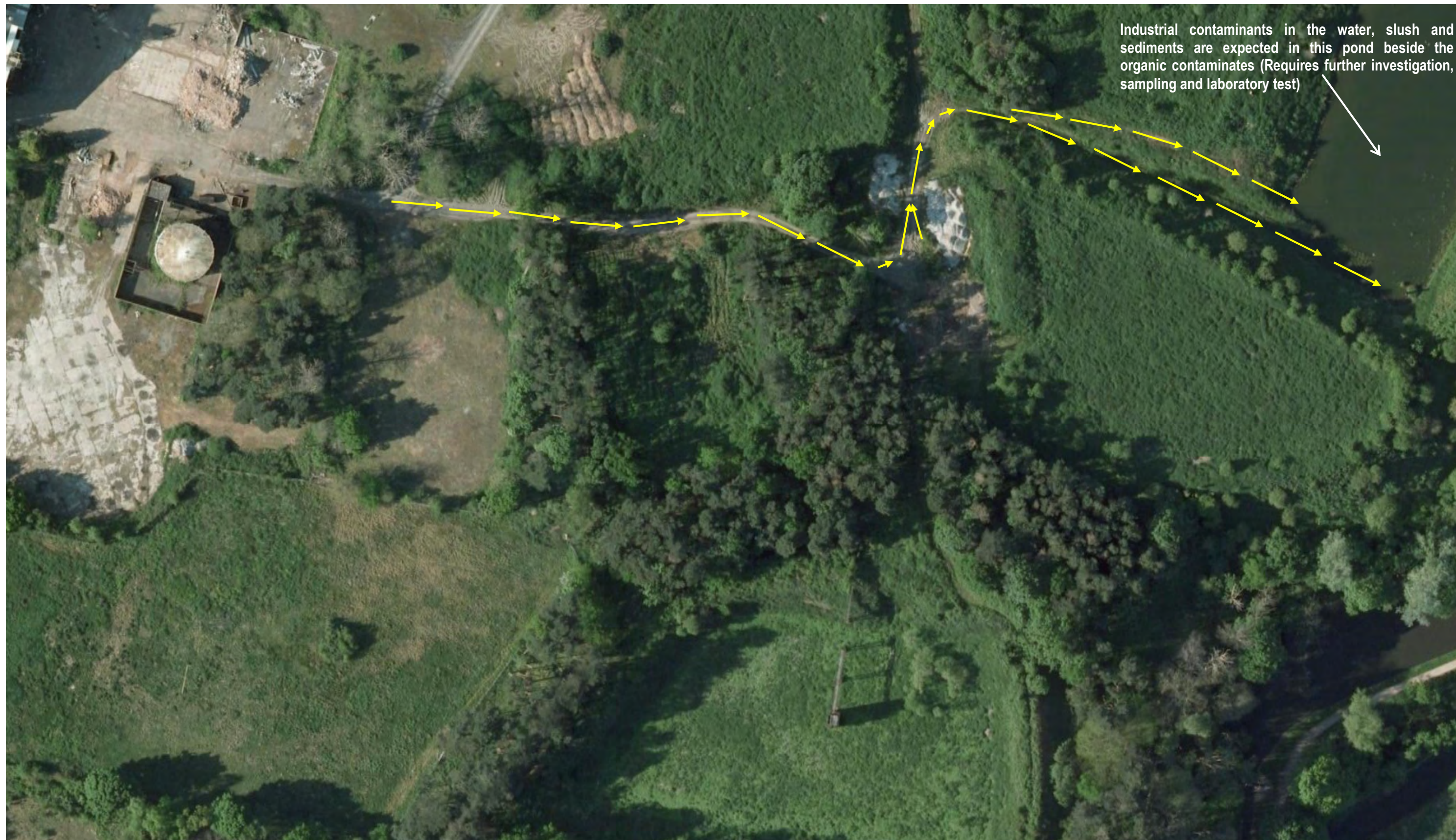


Plate – 8: A Portion of the study area showing the flow pattern of sediments and pollutants originating from the rubbles and suspicious dumps of material, indicating towards a strong likelihood of contamination in one of the ponds, remainder of the depicted in this segment appears nearly free from any soil contamination. Beside the contamination of industrial/chemical origin, the pond water appears to be contaminated with Cyanotoxin and some other contaminants of biological origin. Further confirmatory sampling and lab tests are recommended in the later part of the assessment process or in the master planning for the proposed development.

Source: High Resolution Satellite Image; SPOT; dated April 14th. 2007


A large, light blue, curved shape that starts from the bottom left corner and curves upwards and to the right, ending near the top right corner. It has a soft, gradient-like appearance.


Appendix 1 – Ecological Survey Periods

Ecological Survey Seasons

Survey	Jan	Feb	March	April	May	June	July	August	Sept	Oct	Nov	Dec	
Badgers	Optimum	Optimum	Optimum	Optimum	Sub-optimal	Sub-optimal	Sub-optimal	Sub-optimal	Sub-optimal	Sub-optimal	Sub-optimal	Sub-optimal	
Water vole	Sub-optimal	Sub-optimal	Optimum	Optimum	Optimum	Sub-optimal	Sub-optimal	Sub-optimal	Sub-optimal	Sub-optimal	Sub-optimal	Sub-optimal	
Otters	Optimum	Optimum	Optimum	Optimum	Optimum	Optimum	Optimum	Optimum	Optimum	Optimum	Optimum	Optimum	
Bat roost (Tree or Building)	TREE	TREE	TREE & BUILDING	BUILDING	BUILDING	BUILDING	BUILDING	BUILDING	TREE	TREE	TREE	TREE	
Bat activity	Unreliable	Unreliable	Unreliable	Sub-optimal	Optimum	Optimum	Optimum	Optimum	Optimum	Optimum	Unreliable	Unreliable	Unreliable
Reptiles	Unreliable	Unreliable	Sub-optimal	Sub-optimal	Optimum	Optimum	Sub-optimal	Sub-optimal	Optimum	Optimum	Unreliable	Unreliable	
Great crested newt	Unreliable	Unreliable	Sub-optimal	Sub-optimal	Optimum	Optimum	Sub-optimal	Sub-optimal	Unreliable	Unreliable	Unreliable	Unreliable	
Breeding Birds	Unreliable	Sub-optimal	Optimum	Optimum	Optimum	Optimum	Sub-optimal	Sub-optimal	Unreliable	Unreliable	Unreliable	Unreliable	
Terrestrial inverts	Unreliable	Unreliable	Unreliable	Sub-optimal	Optimum	Optimum	Optimum	Optimum	Optimum	Unreliable	Unreliable	Unreliable	
Phase 1 Habitat	Sub-optimal	Sub-optimal	Sub-optimal	Sub-optimal	Optimum	Optimum	Optimum	Optimum	Optimum	Sub-optimal	Sub-optimal	Sub-optimal	
Trees and Hedgerows	Unreliable	Unreliable	Unreliable	Optimum	Optimum	Optimum	Optimum	Optimum	Optimum	Optimum	Unreliable	Unreliable	

 Optimum Survey Times

 Sub-optimal time to survey

 Survey should not be undertaken as results may be unreliable

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