

**JOINT STUDY INTO THE FUTURE GROWTH
IMPLICATIONS OF REDDITCH TOWN TO 2026**

**Prepared for Worcestershire County Council, Redditch
Borough Council, Bromsgrove District Council and
Stratford-on-Avon District Council**

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WHITE YOUNG GREEN PLANNING

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1 INTRODUCTION

Background

1.01 White Young Green Consulting (WYG) was commissioned in May 2007 by Worcestershire County Council, in conjunction with the planning authorities of Redditch Borough and Bromsgrove District, to carry out a strategic assessment of the implications for potential future growth within and adjoining Redditch Borough over the period to 2026. In July 2007, the commission was extended to review the implications of growth on the edge of Redditch for Stratford-on-Avon District, which abuts Redditch to the east, when Stratford-on-Avon Council joined the commission. The study is strategic in its scope and is to be used to inform the sub-regional decision making processes relating to the development of a preferred option of Phase 2 of the Partial Revision of the Regional Spatial Strategy for the West Midlands region to 2026. The purpose of the study is to give clear technical guidance to the four authorities and to the regional planning body on:

- a) The potential urban capacity of Redditch Borough to accommodate housing and employment growth to 2026;
- b) The level of additional peripheral growth required to meet the housing and employment requirements set out in the West Midlands Regional Spatial Strategy (WMRSS) Spatial Options Consultation; and
- c) The implications of accommodating those peripheral growth levels in the various locations around Redditch Borough.

1.02 The study is strategic and technical in nature and is not intended to be subject to public consultation at this stage with the exception of a limited exercise to identify potential sources of housing capacity within the urban area. However, in preparing the report there has been consultation with officers within the commissioning authorities and other organisations.

Purpose of Report

1.03 The detailed study requirements set out in the project brief supplied by Worcestershire County Council, which is attached to **Appendix A**. The purpose of this study is to respond to the various elements of the brief. The intended approach to meeting the project requirements was set out in the submitted tender proposal and a more detailed description of the methodology employed is provided in section 3 of this report.

Contents of Report

1.04 The report is structured as follows:

- Section 2 provides a brief synopsis of the strategic planning policy context, which sets the scene for the detailed technical analysis which follows.
- Section 3 describes in more detail the general methodological approach to the study and explains various assumptions adopted.
- Section 4 identifies the development requirements associated with the three potential growth scenarios referred to in the project brief.
- Section 5 summarises the assessments of constraints, setting out sources of information used to identify these.
- Section 6 provides an overview of various opportunity sites identified through the application of a constraints matrix.
- Section 7 involves the use of a Strength Weaknesses Opportunities and Threats (SWOT) analysis to narrow down the choice of strategic options for growth.
- Section 8 uses the results of the technical analysis to present views on the implications of seeking to accommodate the growth options within and adjoining the Borough. This section provides a broad overview of the optimal levels of future growth for the town over the period assessed in light of the prevailing constraints and the need to achieve a balanced and sustainable future for Redditch.
- Section 9 sets out the main conclusions reached in the report.
- Section 10 an addendum to the main report, provides a brief summary of the possible implications for growth of Redditch arising from the housing and employment land provisions set out in the preferred option of Phase Two of the Partial revision of the RSS, as approved by the Regional Planning Partnership for submission to the Secretary of State.

2 THE CURRENT STRATEGIC PLANNING CONTEXT

- 2.01 The West Midlands Regional Spatial Strategy was published in June 2004. A key aim of the Strategy is to make the Major Urban Areas (MUAs) attractive places in which to live and work and therefore action is heavily prioritised towards Birmingham, the Black Country, Solihull, Coventry, Stoke and Newcastle-under-Lyme. The Strategy also recognises a need for smaller scale, local regeneration areas which includes Redditch along with Biddulph, Burton-upon-Trent, Cannock, Kidderminster, Leek, Rugby, Rugeley, Stafford, Tamworth, Telford and Worcester but it is qualified in that any growth should not detract from the regeneration of the Major Urban Areas.
- 2.02 In the MUAs of Birmingham/Solihull, the Black Country, Coventry and the North Staffordshire conurbation more development opportunities will be created to retain and attract people and investment. In other areas new development will be focused on the Region's other large settlements and in particular the five sub-regional foci of Hereford, Rugby, Shrewsbury, Telford and Worcester.
- 2.03 One of the RSS's Objectives is to retain the Green Belt which encircles the conurbation and surrounds Redditch. There is an exception if it can be shown that a release of Green Belt land is necessary to bring about regeneration of an urban centre. Whilst it is the case that new residential development in the Green Belt surrounding Redditch would have a regenerative effect on the town centre of Redditch through increased spending, WYG is of the view that this alone would be insufficient to justify a release of Green Belt land.
- 2.04 The stated aims of the Green Belt according to Planning Policy Guidance 2: Green Belts (PPG 2) which was published in 1995 with amendments in 2001 are to:
- check the unrestricted sprawl of large built-up areas;
 - prevent neighbouring towns from merging into one another;
 - assist in safeguarding the countryside from encroachment;
 - preserve the setting and special character of historic towns; and
 - assist in urban regeneration, by encouraging the recycling of derelict and other urban land.
- 2.05 The guidance explains that the most important attribute of the Green Belt is its openness - the quality of the landscape is not relevant to the inclusion of land within a Green Belt or to its continued protection. Within Green Belts there is a general presumption against inappropriate development and such development should not be approved, except in very special circumstances. Inappropriate development is regarded as being, by definition, harmful to the

Green Belt. The construction of new buildings inside a Green Belt is inappropriate unless the development is related to agriculture and forestry; essential facilities for outdoor sport and recreation; limited extension, alteration or replacement of existing dwellings; limited infilling in existing villages, limited affordable housing for local community needs, or limited infilling or redevelopment of major existing developed sites identified in adopted local plans.

- 2.06 The guidance also states that the essential characteristic of Green Belts is their permanence and that their protection must be maintained as far as can be seen ahead and boundaries should be altered only in exceptional circumstances. In order to ensure protection of Green Belts within this longer timescale, this will in some cases involve safeguarding land between the urban area and the Green Belt which may be required to meet longer-term development needs.
- 2.07 The Borough of Redditch Local Plan No.2 established three such 'Areas of Development Restraint' (ADRs) at Webheath, Brockhill and along the route of the planned but now abandoned improvements to the A435 to the east of the town. These designations were continued in Local Plan No.3 which was adopted in May 2006. There is also an ADR at Ravensbank Drive within Bromsgrove District that is intended to assist in meeting Redditch's possible long term employment land needs.
- 2.08 The RSS says that any development proposed on the edge of the MUAs or on other greenfield sites should meet the following criteria:
- there are no suitable alternatives available on previously developed land and buildings within built up areas;
 - the development should be capable of being served by rail or high quality public transport within easy access of centres and facilities; and
 - the development respects the natural environment, built environment and historic heritage.
- 2.09 In approving the RSS, the Secretary of State recommended that some issues should be investigated further and the West Midlands Regional Spatial Strategy – Phase Two Revision, Spatial Options, considers Housing, Employment, Transportation and Waste in more detail. This, therefore, amounts to a partial review of the RSS and neither the RSS's regional spatial strategy, nor spatial strategy objectives which include the regional role of individual settlements and the Green Belt, are specifically subject to re-evaluation.
- 2.10 However as the Spatial Options paper says, *'Following the Barker Review and the Government household projections (April 2006) it is clear that the Government will expect the Region to build more homes than set out in the current WMRSS'*. More recently, the Government has signalled its desire to see the provision and delivery of new housing given greater priority. It is clear that the

Region will be under pressure to accept higher targets. The Phase Two Revision considers three levels of housing growth. Option 1 is based on the continuation of existing WMRSS policies; Option 2 has been derived from 'advice and further discussions with Strategic Authorities' whilst Option 3 meets the overall levels of housing demand associated with the Government's latest household projections and the need to replace obsolete stock.

- 2.11 As will be indicated in the following chapters, of these options, Option 1 would not meet Redditch's own local needs to 2026 and would therefore not be consistent with policies underpinning the role of Redditch in the existing regional spatial strategy, where Redditch is intended to primarily meet its own needs. Option 1 could be accommodated by existing urban capacity and the development of the ADR land in the period up to 2026, but extensions of the urban area onto land currently designated as Green Belt would be required to accommodate Options 2 and 3. Consequently it may be inferred that the current RSS strategy and objectives concerning both the role of large settlements and the Green Belt may have to be reviewed in order to accommodate the levels of housing growth in either Options 2 or 3. In considering Redditch, the Spatial Options Revision specifically notes that in accommodating such levels of housing growth this implies development within neighbouring districts.
- 2.12 The position is therefore far from clear as the Phase Two Revision is clearly considering options that would be at odds with the Spatial Strategy and policies of the existing RSS which are not specifically the subject of the consultation exercise and which may otherwise be expected to be considered by the next full revision to the RSS.
- 2.13 Since the RSS was prepared, The Supplement to Planning Policy Statement No.1 (which completed its consultation in March 2007) has signalled a wider view on 'sustainable development'. Not only should strategies seek to reduce the need to travel but other initiatives such as renewable energy, carbon neutral housing and the need to plan for the effects of climate change such as the increased incidence of flooding should be taken account of through the planning process. The location of any new development would need to be in accordance with this advice particularly if sustainability were to be used to outweigh harm resulting from development in the Green Belt.
- 2.14 The Phase Two Revision also recognises that *'it is important that the right types of houses are built in the right places, where people need them, whilst respecting the character of the community and the environment where they are built'*. In order to maintain Redditch's unique structure (resulting from its planned development as a New Town) which incorporates a high proportion of greenspace, the gross land take of any peripheral development is likely to be significantly higher than would be the case in other towns in the region.

3 METHODOLOGY ADOPTED TO IDENTIFY DEVELOPMENT CAPACITY AND REQUIREMENTS

3.01 The analysis leading to the identification of development capacity and requirements can be broken down into three key stages. The basic methodology applied within those stages is described below.

Stage 1 – Assessment and Development Requirements

3.02 The first stage of methodology is to analyse the likely future development requirements for Redditch Borough for the period 2001 to 2026, arising from the partial review of the RSS.

3.03 In respect of housing, three development options for the period 2001 to 2026 are considered in this report at the request of the commissioning authorities:

- i) 4,300 new dwellings – based on a continuation of levels of housing development set out in the current WMRSS
- ii) 8,200 new dwellings – based on natural growth and reducing out migration.
- iii) 13,200 dwellings – based on natural growth in households plus allowance for in-migration (34%)

3.04 The study initially assessed the extent to which Redditch Borough can accommodate the growth associated with the three scenarios within its current built up area. An assessment of Housing Land Availability based on sites identified by Redditch Borough Council and by third parties as a result of a restricted consultation exercise has been carried out. The results of this assessment are contained in **Appendix B**.

3.05 In order to minimise a reliance on external centres for employment opportunities and the detrimental effect that this would have on the promotion of more sustainable patterns of transport, an allowance has been made for the provision of new employment land to meet the needs of the new populations. The decline in employment in the manufacturing sectors is anticipated to continue throughout the UK and most of Europe and it should be noted that this figure does not include any allowance for new employment land allocations which may be necessary as a result of any restructuring of the existing employment base.

3.06 In terms of retail and town centre needs, an assessment of quantitative need associated with the three housing growth scenarios has been undertaken along with an assessment of qualitative deficiencies in existing areas of the town. The assessment was carried out on a level of broad

goods categories (convenience and comparison) and does not seek to subdivide any of the general goods categories (e.g. bulky comparison retail goods). In considering the need for new retail floorspace in the period beyond 2011, the assumption that Redditch should accommodate growth rising from its catchment area has been adopted, incorporating retail floorspace needs arising from the various housing and employment growth scenarios. In terms of preferred locations for accommodating any assessed increases in retail floorspace, the sequential approach to site locations set out in PPS6 should be followed. However, any major peripheral expansion of Redditch through new housing developments will generate its own needs for additional retail floorspace, particularly convenience shopping. Guidance has been given on the scale and function of the additional floorspace required as well as general guidance on the most appropriate location within any identified peripheral growth areas, in order to maximise accessibility to retail facilities by a choice of modes of transport.

- 3.07 In respect of other key town centre uses, the study identifies the current levels of provision within the study area (i.e. within Redditch Borough and Bromsgrove and Stratford-on-Avon District). The likely level of future leisure provision required to support the forecast levels of housing and employment growth over the period to 2026, for a range of commercial leisure activities (such as cinemas, bowling alleys, bingo halls, commercial sports leisure complexes, family entertainment centres) is identified having regard to qualitative factors.
- 3.08 The Children's' Services Directorate of the County Council has provided details of the range of existing school facilities within and adjoining Redditch and their likely capacities to accommodate the number of children (primary, secondary and post sixteen) which could be generated by the growth scenarios considered. Where the capacities of existing schools in any area to accommodate likely growth in school age population associated with potential growth is restricted, this is identified as a weakness in the SWOT assessment. The same information was sought and received from the Children, Young People and Families Directorate at Warwickshire County Council.
- 3.09 For the provision of open space and other community facilities, a general assessment has been made and the amount of land required for such uses based on appropriate ratios of space needed per head of population or household. The scope for upgrading existing facilities as an alternative to providing new has also been considered.

Stage 2 – Analysis of Constraints to Developments

- 3.10 The second stage of the methodology, which was carried out in parallel to the first stage of assessing needs, is the preparation of a constraints matrix. The purpose of this exercise was to identify the variety and extent of a wide range of development constraints affecting the periphery

of Redditch's built up area. This approach involved an analysis of the adopted development plan documents available from the four commissioning authorities in order to identify prevailing physical and policy constraints, the extent of which is illustrated using GIS mapping techniques. The principal transport corridors have also been identified and, in particular, the main constraints to the efficiency of operation have been examined. That assessment is included at **Appendix C**. Additionally, an analysis of constraints relating to archaeology, landscape and topography has been carried out. Also, through initial consultation with statutory undertakers, the strategic constraints associated with the provision of necessary support infrastructure by public utilities (electricity, gas, telecoms and foul drainage) have been identified. While information was requested from Severn Trent Water regarding the adequacy of potable water supplies in the study area, none was received. A summary of that investigation is included at **Appendix D**. In addition, the commissioning authorities have provided up to date information on flood risk areas based on PPS25 defined Flood Zones.

- 3.11 In this way, a comprehensive appraisal of development constraints has been carried out in order to assess the implications associated with major peripheral growth at Redditch. The investigation of constraints led to the identification of potential development options which have been examined using a Strengths, Weaknesses, Opportunities and Threats (SWOT) analysis technique. A further part of the SWOT analysis was to consider each of the identified potential development sites against a range of sustainability criteria such as accessibility to existing employment areas, retail provision, public utilities and access ability by a range of modes of transport. Where locations were assessed to be relatively unsustainable when considered against the criteria, this was classed as a weakness.
- 3.12 Various broad alternative mechanisms for achieving delivery of required physical and social infrastructure support of new major developments have been considered, although due to the strategic nature of the exercise, it was not appropriate to establish detailed mechanisms for infrastructure delivery as part of this study.

Stage 3 – Preparation and Evaluation of the Implications of Directions of Peripheral Growth

- 3.13 Having investigated requirements and constraints, a range of potential development scenarios has been prepared. The benefits and drawbacks associated with each scenario have been identified.
- 3.14 The final stage of the study was to assess the implications of accommodating significant levels of additional housing and associated employment, retail and community uses, in and around the built up area of Redditch. Implications were assessed not just in terms of the effects on Redditch, but also in regard to general consequences for other settlements in the vicinity of Redditch.

- 3.15 For the purposes of this study, taking into account existing RSS policies and government policy on Green Belts and Housing, a sequential approach has been adopted to meeting any identifiable capacity with first preference being previously developed land within the existing urban area, followed by the ADRs and any other non-Green Belt land and finally land within the Green Belt. In the Green Belt, the study has sought to identify directions for growth which would cause the least harm to the purposes of the Green Belt, whilst producing sustainable forms of development which may outweigh this harm. It must be stressed that brief extends to Redditch and the land immediately surrounding the town and no assessment is made in this report as to whether or not development at Redditch would amount to a more, or less, sustainable form of development than other locations within the WMRSS area.

4 IDENTIFIED REQUIREMENTS

Redditch Strategic Land Requirements

- 4.01 The West Midlands Regional Spatial Strategy (RSS) Phase Two Revision sets out housing targets for Redditch Borough for the period 2001 -2026. There are three growth options amounting to 4,300, 8,200 and 13,200 new dwellings.

Completions and Commitments post 2001

- 4.02 Since 2001 a total of 2,632 dwellings have been built, have been granted planning permission or are regarded as outstanding commitments. These dwellings must be deducted from the RSS figures in order to identify the outstanding dwelling requirement to meet any of the above options.

Table 1: Completions and Commitments 2001 - 2006

Completions 2001 – 2006 (910 Greenfield, 576 Brown)	1,486
Under construction at 1.4.06	314
Planning Permission at 1.4.06 (Full 405, Outline 320)	725
Permissions since 1.4.06	83
Commitments Development Plan	24
TOTAL	2,632

- 4.03 This therefore reduces the amount of land that has to be identified to meet RSS growth options up to 2026 to 1,668, 5,568 and 10,568 dwellings respectively.

Existing Housing Land Capacity

- 4.04 Redditch Borough Council carried out an Urban Capacity Study (UCS) in 2004. As part of this WYG study, a partial Housing Land Availability Assessment has been carried out which re-visited some of the sites identified in the Redditch UCS which still remain undeveloped. There are two elements to the study; firstly a survey of potential sites over 0.1ha has been undertaken and secondly a desk based analysis of past trends from other sources of capacity such as from sites smaller than 0.1ha.

Surveyed Capacity

- 4.05 In order to minimise the effect of trend based capacity, sites of 0.1ha or more were assessed rather than the threshold of sites which could accommodate 10 or more dwellings which was used in the 2004 study. 244 sites were identified as being undeveloped or with potential for

development. 139 sites were surveyed but rejected as being unsuitable for residential development due to factors such as lack of adequate access, shape, topography or within employment areas. 7 sites were surveyed and considered as having some potential for residential development and a further 6 sites were the subject of development briefs where some residential capacity had been identified. The capacity of these 13 sites was calculated as 736 dwellings based on indicative layouts prepared by Joe Holyoak, Urban Designer. That assessed capacity includes land to the south of Alexandra Hospital which also has potential for alternative use for employment purposes. The remaining sites were included within the Open Space Needs Assessment undertaken for Redditch Borough Council by Scott Wilson in 2005. This Assessment and its recommendation to retain the quantity of land used for leisure and recreation uses has been approved by Redditch Borough Council and these sites are therefore considered to be safeguarded. They have been excluded from any calculation of existing capacity and were not surveyed.

Other sources of capacity

4.06 An analysis of past trends shows that new residential accommodation is expected to continue to be provided from other sources of capacity such as sites below the 0.1 ha threshold and the conversion or redevelopment of existing buildings. The following table is from data supplied by Redditch Borough Council and is based on recent trends. It should be noted that there is an assumption that no capacity will occur from the redevelopment of employment sites. The rationale behind this is that a high proportion of the town's employment capacity is on large industrial estates that would be unsuitable for residential use and that the Council maintains a policy of resisting the loss of employment sites to other uses.

Table 2: Trend Based Sources of Capacity

	2006-16	2016-26	Total
Net Increase From Redevelopment	30	30	60
Conversion and Subdivision	75	70	145
Employment Sites	0	0	0
Intensification	100	50	150
Other Windfall	225	225	450
Total	430	375	805

Source: Redditch Borough Council

4.07 Table 3 below summarises the sources of capacity and the calculation of required new allocations necessary to meet each growth option. These figures demonstrate that a high proportion of the assumed capacity is trend based rather than site specific which may raise uncertainty as to the long-term robustness of this assessment. It is also of note that the average rate of completions between 2001 and 2006 was almost 300 dwellings per annum which is significantly in excess of

the rate of 141 dwellings per annum needed to deliver Option 1, somewhat short of the rate needed to deliver Option 2 (366 per annum) well behind a rate of 586 per annum to achieve Option 3.

Table 3: Net Required Allocations

	Option		
	1	2	3
Dwellings Required 2001-26	4,300	8,200	13,200
Completions and Commitments since 2001		2,632	
Surveyed Capacity		736	
Trend Based Capacity		805	
Total Completions, Commitments and Capacity		4,173	
New Allocations required	127	4,027	9,027

Other Land Uses

- 4.08 In order to foster sustainable forms of development which will provide for adequate levels of amenity and reduce the need to travel, the new population will require additional employment opportunities and will generate demand for services such as shopping, schools and other community services.

Employment Land

- 4.09 Worcestershire County Council has commissioned a report into the employment land requirements for the County by GVA Grimley. A preliminary working draft of the report forecasts a continuing decline in demand for B2 uses, a decline in B8 with increases in B1 space. The current GVA Grimley report indicates an average employment land need across the modelled scenarios of around 54 hectares with a supply of 18 hectares.
- 4.10 WYG considers that additional B1 will not be provided on vacated B2 or B8 sites, due to the location and character of existing industrial estates in Redditch. However, WYG considers that there is a need to provide high quality B1 sites to compensate for a restructuring of the existing employment base as well as to provide employment opportunities for 'new' population, to avoid undue reliance on out-commuting. Therefore a modest standard of 1ha of employment land per 15ha of residential land has been adopted, compared with the previous Structure Plan ratio of 1ha per 70 dwellings (the equivalent of around 2ha per 15ha). This generates a requirement for 8.2, 15.6 and 25.1 ha for the three growth options respectively. This allowance is related to the 'new' population and further allocation may be required to provide modern B1 accommodation resulting

from the anticipated restructuring of the employment market up to 2026, which will more properly be dealt with as part of the LDF process.

- 4.11 WYG has disregarded any existing employment land capacity including 25ha at Ravensbank Drive, 10ha of which is included in the Bromsgrove Local Plan as an Area of Development Restraint to meet the future needs of Redditch beyond 2011. There has been some discussion with Redditch Borough Council regarding the possibility that part of the site to the rear of the Alexandra hospital in the south of the town may be required to provide employment opportunities. This site amounts to 10.73 ha and is included within the calculation of housing capacity at 277 units. However, this land could equally be used for employment purposes (as an extension of the existing employment allocation in the adopted local Plan No. 3). Therefore a maximum of 10.73 ha or 277 dwellings may need to be added to the new residential requirement if this land is allocated for employment purposes.

Retail

- 4.12 The demand for additional convenience retail floorspace has been calculated using £1,870 per head (from MapInfo Brief 04/02 2016 forecast) and assuming a store turnover of £6,000 sq.m. This generates a need for an additional net floorspace of 2,975 sq.m. for Option 1, 5,673 sq.m. for Option 2 and 9,133 sq.m. for Option 3. This would equate to a small supermarket for Option 1, a large supermarket for Option 2 and a superstore for Option 3. Assuming a site area multiplier of 6x the net area this would equate to land requirements of 1.8, 3.4 and 5.5 ha respectively.
- 4.13 The spending capacity of the new population will also lead to increased demand for additional comparison floorspace but an assumption has been made that this will be accommodated within the town centre and will be taken into account as part of the LDF process.

Open Space

- 4.14 Redditch Borough Council has adopted the recommendations of an Open Space Needs Assessment report by Scott Wilson. This concludes that Redditch should maintain its current ratio of 7.43ha of open space per 1000 population which includes the NPFA standard of 2.7ha/1000 for Playing Fields. This is accepted as being a high ratio when compared to most other towns and stems from Redditch's planned structure as a New Town. It is considered that any major expansion of the town should continue the town's established character.
- 4.15 WYG is advised that this proportion is being met on all new developments through the development control system and has therefore assumed that this will continue to be the case for the proportion of development forecast to take place within the existing urban area. WYG has

applied the ratio to the additional 'new' allocation in order to maintain the existing overall form and character of the town. In practice, this figure should enable existing features such as woodland, flood plain, high ground and sites of landscape or ecological interest to be incorporated into any resulting masterplan exercise as well as meeting standards for playing fields, playgrounds and amenity uses.

Education and Community Uses

- 4.16 Worcestershire County Council's Children's Services Directorate confirmed that current projections would indicate that Option 1 could be accommodated within existing schools, Option 2 may need some extensions or reconfiguration but not new sites, whilst Option 3 is likely to give rise to a demand for new schools depending on the location of new housing areas. The view has been taken that demand for other community uses such as churches, health centres and the like could be accommodated within existing provision for Options 1 and 2 but would require additional space for Option 3. Accordingly, an allowance of 8ha has been made in Option 3 to meet these needs.

Summary

- 4.17 The following table summarises the total land required to meet the three growth options. Chart 1 shows this distribution for Option 2 and Chart 2 demonstrates that the proportions of land taken for a particular use vary considerably between the options.

Table 4: New Land Requirements by Land Use for each RSS Option (ha)

	OPTION		
	1	2	3
Residential	3.63*	115.06*	257.91*
Employment	8.19	15.62	25.14
Retail	1.79	3.40	5.48
Open Space	2.10	66.40	148.90
Education & Community	0.00	0.00	8.00
Total	15.71	200.48	445.43

* This figure assumes that land to the rear of Alexandra Hospital will be used for residential, rather than employment, purposes.

Chart 1: New Land Use Requirements by Land Use (Option 2)

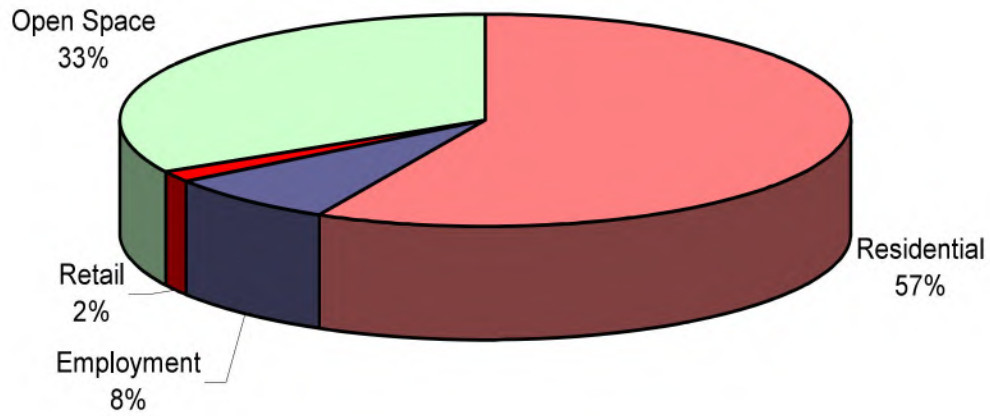
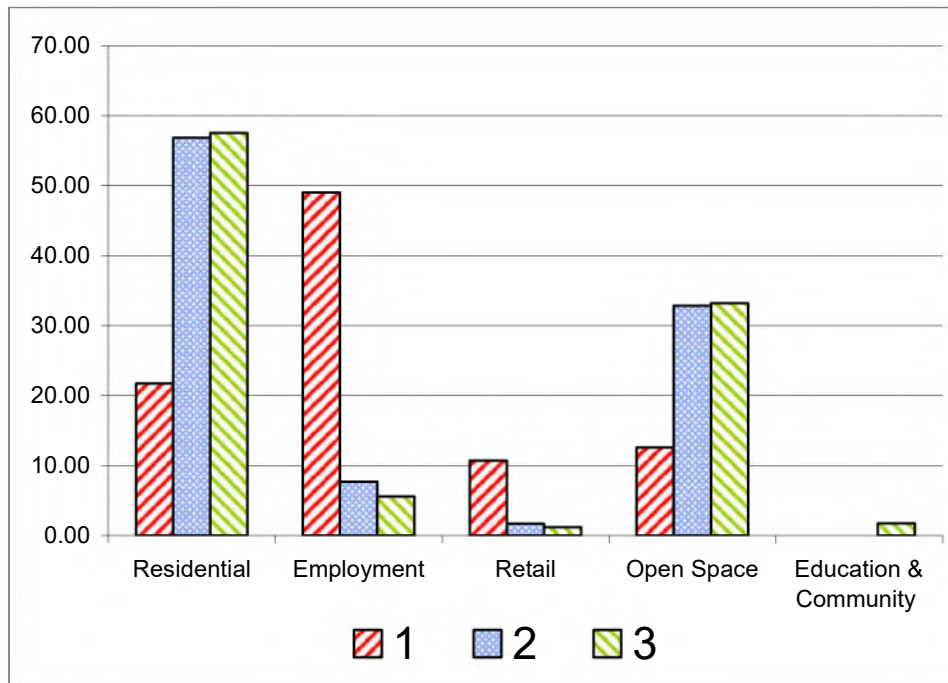


Chart 2: Land-Use Percentage by Option



5 IDENTIFIED CONSTRAINTS

- 5.01 As indicated in Section 3, the study involves an examination of the strengths and severity of a wide range of development constraints affecting the periphery of Redditch's built up area.
- 5.02 The extent and nature of the policy related development constraints and also relating to a number of physical constraints were derived from the following sources:
- i) The Borough of Redditch Local Plan No.3 – adopted May 2006
 - ii) The Bromsgrove District Local Plan – adopted January 2004
 - iii) The Stratford-on-Avon District Local Plan Review – adopted July 2006
- 5.03 The general approach adopted was to extract relevant information from the proposals maps (and other sources as described below) and to transpose the information onto Redditch Borough Council's and Stratford-on-Avon District Council's GIS databases to generate scale maps showing overlapping layers of constraints. Sieve analysis techniques were then employed using the constraints maps to identify the sites with most development potential.
- 5.04 In addition to the information derived from the above sources, Worcestershire County Council (WCC) was able to supply information on policy constraints relating to minerals deposits (land safeguarded for potential future mineral workings) derived from the adopted Minerals Local Plan; high quality agricultural land; information regarding the location, type and current capacity of schools in and around Redditch; the location and type of medical facilities and the location of designated retail centres within the study area. The County Council was also able to provide preliminary advice on the sensitivity of the landscape to development through the application of the County Landscape Character Assessment. White Young Green Transportation supplied relevant information relating to existing road transport infrastructure constraints and advised on constraints associated with the provision of new transport infrastructure to serve the levels of new development arising from the three growth scenarios.
- 5.05 There were difficulties in recording and evaluating the relative strength of various policy related constraints arising from the fact that the participating authorities in the study derive their own policies for generally protecting land from development within their respective local plans. For example, Bromsgrove District Council uses the designations of 'Landscape Protection Area' and 'Area of Great Landscape Value' and Stratford-on-Avon District Council uses the designation of "Special Landscape Area", whilst Redditch Borough Council only uses the designation of Green Belt to cover the extensive area of open countryside to the southwest of the town. Looked at objectively, the quality of the landscape in that area is similar to landscape which carries a greater array of protective policy within the other districts.

- 5.06 Another important factor which had a bearing on the amount of land which could be identified for potential development within the built up area of Redditch was the extensive provision of 'Primarily Open Space' which is generally protected by Policy R.1 of the adopted local plan. However, a substantial amount of that open space land is also protected through important ecological designations, such as Sites of Special Scientific Interest (SSSIs), Special Wildlife Sites (SWSs) or Local Nature Reserves (LNRs). The extent of potential development land examined within the built up area of Redditch has been somewhat circumscribed by Redditch Borough Council's strong desire to retain the green infrastructure available within the built up area on the basis that it is an integral part of the planned new town and is a vital component of the town's distinguishing character.
- 5.07 There is one fundamental policy constraint which has for many years affected the extent to which Redditch can expand at the periphery of the town, this being the Green Belt which wraps itself around the boundary of the built up area of Redditch. Through the process of preparing local plans for Redditch Borough, certain land parcels have been excluded from the Green Belt in order to potentially accommodate long term growth requirements for the town. Those designated 'Areas of Development Restraint' are insufficient in themselves to accommodate the scale of growth put forward in the RSS Revision Options 2 and 3 (see Section 6). Although RSS policy, which is not currently under review, is to retain the Green Belt, it is an inevitable consequence of accommodating the substantial levels of growth suggested by Options 2 or 3 that land which is currently Green Belt will have to be built upon. In identifying options that would involve incursions into the Green Belt, WYG has had regard to the purposes of Green Belts as set out in paragraph 2.04 above in order to ensure that any necessary breaches of the Green Belt boundaries are carried out sensitively so as to minimise the harm arising.
- 5.08 In respect of the physical constraints WYG gave particular emphasis to those relating to flooding and highway infrastructure. Flooding is an important development constraint within certain parts of Redditch, relating to the River Arrow and its tributaries, and to the south west, Swan's Brook. For the constraints mapping exercise WYG has concentrated on land falling within the Flood Risk Zone 3. Within such zones, according to advice in Table D.1 of PPS25 land is assessed to have a greater than 1 in 100 or greater annual probability of river flooding and there are restrictions placed on the type of development that are appropriate within Flood Risk Zone 3 Areas. Residential development will only be permitted in Zone 3 if the exceptions test can be passed. PPS25 introduces a sequential approach to development in flood zones with the first preference, when planning for new development, being Flood Zone 1.

- 5.09 With respect to transportation constraints, White Young Green Transportation carried out an initial review of existing road conditions within Redditch and has, through liaison with Worcestershire County Council as Highway Authority, assessed the parts of the highway network that present the greatest difficulties in accommodating the traffic generated by significant additional growth (Appendix C).
- 5.10 In respect of physical constraints development, in addition to highway infrastructure, key sources of information were the Environment Agency in respect of flood plain and flood risk and the various relevant statutory undertakers in terms of electricity, gas and telecommunications provision, foul drainage and sewage treatment.
- 5.11 Where sites were selected in the study for further examination as to their development potential on the basis of the desktop exercise, an initial site investigation was carried out in order to identify the extent of any site specific constraints which could not be fully appreciated from the desktop assessment, such as boundary features, topography and the potential impact of physical constraints such as noise, air quality and overhead electricity pylons.
- 5.12 One of the main difficulties of the study was to objectively review the various physical and policy constraints in order to distinguish which, if any, were effectively barriers to accommodating development on a given site and which were less onerous, or could be overcome through amelioration measures funded by the development itself. Significant physical/policy constraints which have been particularly influential in narrowing down the options for potential development are:
- i) Land which is recognised as being of international importance in terms of nature conservation, including Special Protection Areas (SPAs) and Special Areas of Conservation (SACs).
 - ii) Land recognised as being of national importance for nature conservation, including National Nature Reserves (NNRs) and Sites of Special Scientific Interest (SSSIs).
 - iii) Land recognised as being of regional/local importance for nature conservation, including Local Nature Reserves, Special Wildlife Sites and Sites of Importance for Nature Conservation.
 - iv) Land occupied by Scheduled Ancient Monuments.
 - v) Land occupied by ancient semi natural or ancient woodland.

6 IDENTIFIED DEVELOPMENT OPPORTUNITY AREAS

The Areas of Development Restraint (ADRs) and Other Related Land

- 6.01 The Borough of Redditch Local Plan No.3 contains three Areas of Development Restraint at Webheath, Brockhill and along the line of the abandoned improvements to the A435. These sites have been identified as having long-term potential to meet the needs of the town and whilst they cannot be released until the matter has been properly considered at a future review of the Development Plan they have been excluded from the Green Belt. This land has the same status as White Land and should be regarded as being sequentially preferable to areas within the Green Belt.
- 6.02 The Practice Guidance for Strategic Housing Land Availability Assessments published in July 2007 says that suitable greenfield sites as well as broad locations which would normally have been identified by the RSS should be included within the assessment of long term capacity (beyond 10 years). It is therefore necessary to consider what capacity could be provided by these sites before assessing the amount of new allocations that would be required to meet each of the three RSS growth options.
- 6.03 Redditch Borough Council has assessed the combined capacity of Webheath and Brockhill at 525 dwellings for each period 2006-16 and 2016-26, a total of 1050 dwellings. The Council has not previously attributed any capacity to the A435 ADR and this ADR differs from those at Webheath and Brockhill on the basis that it abuts the administrative boundary of Stratford-on-Avon and there is no well defined physical distinction between the designated ADR land and adjoining land within Stratford District to the west of the A435. In assessing the potential capacity of that area of land at a strategic level, within the scope of this study, the logical approach is to consider the whole strip of land encompassed by the existing build up area of Redditch and the A435, rather than the ADR in isolation. In addition, linked to the ADR designation to the north is a triangular area of land situated within the administrative boundary of Stratford-on-Avon bounded by the A435 and the A4023. That land is known as the Winyates Green Triangle site. This site is excluded from the Green Belt and is "white land" in the adopted Stratford-on-Avon Local Plan. The site was removed from the Green Belt in a previous (2000) Local Plan and allocated for housing to assist in meeting the needs of Redditch at that time. When the Stratford-on-Avon Local Plan was reviewed the Winyates Triangle site was de-allocated because there was no overriding housing requirement to be met at that time. However the Local Plan Inspector rejected the case by the Council to re-instate the site as Green Belt hence the current designation as "white land". A part of that overall area of land (i.e. site 18 on Plan 1, page 26) is potentially affected by flooding, but other than that the site is free from the range of strategic constraints

described in Section 5. However, we note that this area as a whole is characterised by large woodland plantations which may have local value as an amenity or recreational resource and some of the trees are the subject of Preservation Orders. In addition there are potential issues relating to the coalescence between Redditch and Mappleborough Green, without suitable undeveloped 'buffers' being in place. These are matters to be addressed as part of the LDF. We assess the gross area of the land free from strategic constraints within the overall site to be 45ha.

6.04 Based on a similar apportionment of land uses as shown in Chart 1 (57% of the gross area being residential) and based on an overall density of 35 dwellings per hectare we estimated that the designated A435 ADR, the adjoining land to the west of the A435 and the Winyates Triangle site could potentially accommodate some 898 dwellings. It should be noted that this approach assumes that some 43% of the gross land area will be used for employment, open space and community uses, the disposition and the configuration of which is a matter for the LDF. On that basis there is a surplus of land to meet Option 1, a requirement to allocate sufficient land to accommodate around 2,000 dwellings for Option 2 and around 7,000 dwellings for Option 3.

6.05 The following table summarises the amount of new land that would have to be found to meet the three growth scenarios, taking into account the development of the ADR sites (and other related land in the case of the A435).

Table 5: ADRs and Net Land Requirements

Growth Scenario	1	2	3
Land Required (ha)	15.71	200.48	445.43
Webheath & Brockhill ADRs (net)		30.0	
A435 ADR (net) and adjoining land (net)		25.7	
Total		55.7	
Balance	-39.99	144.78	389.73

Note: "Land Required" for each growth scenario taken from Table 4

Potential Development Options on the Urban Periphery (excluding ADRs)

6.06 It can be seen that there is more than sufficient land which can be brought forward through the development of the Webheath and Brockhill ADR sites within the Borough of Redditch Local Plan No.3, to accommodate Growth Option 1. However, the combined development of the 3 ADR sites and also Winyates Green Triangle could not meet the overall land requirements necessary to accommodate Growth Options 2 and 3. Therefore the issue of taking land out of the Green Belt to accommodate future development in Redditch applies if either Growth Option 2 or 3 is selected.

6.07 The desktop assessment identified 21 separate areas on the edge of Redditch encompassing all of the land on the urban periphery. The extent of those sites has been identified initially using OS

based plans, including proposals maps, on the basis of readily identifiable site boundary features such as roads and rivers wherever possible. The location of the sites identified for further consideration by the SWOT analysis, is shown on the plan at **Appendix E**.

- 6.08 The purpose of identifying a range of sites that collectively encompass all of the land on the urban periphery within the Bromsgrove, Redditch and Stratford's administrative boundaries was to ensure that all reasonable opportunities to achieve balanced growth within Redditch were explored and options for dispersed peripheral growth through the 'pepper potting' of sites can also be considered. In identifying the land parcels for further consideration within the SWOT analysis, it was not assumed that all of the land within any given numbered land parcel was able to accommodate, or was appropriate for development. The purpose of the initial assessment was to identify whether there was, in general terms, sufficient quantity of land on the urban periphery to potentially absorb the development requirements arising from the three growth options, whilst allowing more detailed consideration of the nature and severity of the constraints within the land parcels, to gain an understanding of the realistic and appropriate potential for accommodating development.
- 6.09 The process involved in narrowing down the various sites identified in the third stage of the investigation is described in Section 7.

7 STRENGTHS, WEAKNESSES, OPPORTUNITIES AND THREATS (SWOT) ANALYSIS

- 7.01 SWOT analysis is essentially a business management tool used in the strategic planning process, particularly by commercial organisations. However, it is also a useful general problem solving technique and the principles of SWOT analysis create a mechanism for assisting in the resolution of land use planning issues such as those relating to the comparative assessment of the suitability of sites to meet identified requirements. Its main advantage is that it facilitates comprehensive assessment of both positive and negative factors on a consistent basis. Its principal drawback is that it is often difficult to distinguish a clear 'winner' from the process, since weaknesses and threats will almost invariably arise from any particular option considered. The approach inevitably involves an element of value judgement through the weighing up of factors identified in each of the four elements of the analysis in order to include or exclude any particular option from further assessment.
- 7.02 When used as a business tool, the analysis is usually structured to take account of internal resources and capabilities (strengths and weaknesses) as well as factors external to the organisation (opportunities and threats). For the purposes of this study we have sought to apply the general principles of SWOT analysis to each of the sites identified in the initial search, in order to narrow down the options for accommodating substantial growth to sites with the greatest attributes (as measured generally by strengths and opportunities) and the fewest deficiencies (in terms of weaknesses and threats).
- 7.03 The results of the SWOT assessment for each of the identified sites are included at **Appendix F**. Generally, key site **strengths** include well defined development boundaries and strong physical relationship with the existing built up area. Sites that are relatively accessible to the Primary and District Distributor road network or are relatively well served by public transport and are well related to existing foci for employment and Redditch town centre are also viewed as being relatively strong. The main **weaknesses** relate to the range of constraints identified in Section 5, both physical and in terms of planning policy. WYG has not, within the scope of this study, sought to identify any potential land ownership constraints which could prevent or hinder development going forward on an individual site.
- 7.04 All of the sites identified (excluding the ADR land, Winyates Green Triangle and sites 3A & 7) lie within the Green Belt. This is flagged up in each case as a weakness. However, in order to try and distinguish between the various Green Belt sites WYG assessed in each case, the extent to which the Green Belt purposes would be harmed. It is clear that each identified site option would be contrary to the purposes relating to:

- Checking the unrestricted sprawl of large built up areas;
- Assistance of safeguarding the countryside from encroachment; and
- Assisting urban regeneration by encouraging the recycling of derelict and other urban land.

WYG does not consider the purpose of preserving the setting and special character of historic towns to be relevant in this case. This effectively leaves the purpose of preventing neighbouring towns from merging into each other. It is evident that certain options are worse than others in that respect and as such WYG distinguish them with the following designation under weaknesses in the SWOT analysis – Green Belt (+).

- 7.05 The **opportunities** arising from development within any given site generally relate to the potential to secure significant offsite benefits or the potential to create a physical link with other suitable sites which would create a more appropriate development site with greater possibilities of securing related necessary facilities or infrastructure as part of a comprehensive scheme.
- 7.06 Examples of identified **threats** are the imminent prospects of the site in question being reallocated for a different use or a commitment to development of a different kind by planning permission. Where collectively the existence of a wide range of constraints on a particular site is likely to significantly undermine the prospects of development being achieved, then this is highlighted in the threats section. Also, where there is concern that there may be a substantive objection from an important statutory body not consulted as part of the study preparation, this is flagged up under the threats section of the SWOT analysis.

8 OPTIONS FOR ACCOMMODATING GROWTH AROUND REDDITCH

Introduction

- 8.01 The results of the SWOT analysis and the separate investigation of transport and utility related constraints, have enabled a rationalisation of the potential development options and also a better understanding of the implications of achieving peripheral growth around Redditch in all directions. Each of the sites viewed individually, or in combination, exhibit important weaknesses as well as strengths and identifying the extent of growth that can be accommodated on the periphery of Redditch town and the most appropriate location for/direction of peripheral growth will involve fine judgement based on further study involving public consultation. However, taking the SWOT analysis results in the round WYG is able to provide initial advice on the implications associated with various alternative options.
- 8.02 Two sites are immediately notable, in our view, regarding the extent and severity of existing constraints, to the point that it is advised that they should effectively be ruled out of the assessment of potential future development options. These are Sites 3A (Redditch Golf Club and Morton Stanley Park) and Site 7 (Abbey Park Golf Course). Both of these sites are valuable in their own right as part of town's formal sports provision and most of the land in each of the sites is also affected by important ecological designations. In addition, Site 7 is within Flood Zone 3. While other sites also contain ecological designations (or physical constraints), the designated areas within Sites 3A and 7 cover a significantly greater proportion of the available land area.
- 8.03 The exclusion of these two sites leaves 19 sites for further consideration on the basis that they may possess some level of development potential. For each of those sites, Table 6 below gives an indication of the extent of each site that is potentially capable of accommodating development, through exclusion of land subject to topography, landscape ecology and flood risk constraints. More intensive investigation of each site would be required to precisely quantify site capacity and the mix of uses which would be appropriate.

Table 6: Net Developable Areas within Option Sites

KEY	SITE	(A) SITE AREA (HA)	(B) LAND SUBJECT TO ECOLOGICAL, TOPOGRAPHICAL, LANDSCAPE AND FLOODING CONSTRAINTS (HA)	(C) FLOOD AREA ASSUMPTION (HA)	(D) TOTAL AVAILABLE LAND AREA (HA)
1	Land North of Astwood Bank	216	76	11	129
2	Land Adjacent to Ham Green	270	31	14	226
3	Land West of Redditch Golf Course	215	20	17	178
4	Land West of A448	359	14	11	334
5	Land East of A448	193	30	23	140
6	Land at Lowan's Farm	124	0	0	124
8	Land Between A441 & Rycknield Street	390	66	59	266
9	land between Rycknield Street, M42 and A435	482	88	0	394
10	Land at Holt End	308	103	0	205
11	South of Cobley Hill	705	144	56	505
12	Rough Hill Wood and Land north of Jill Lane	251	114	0	137
13	Land to north of Sambourne and Middletown Villages	352	48	41	273
14	Land between Studley & Redditch	129	7	7	122
15	Land east and northeast of Studley	302	50	96	156
16	Land south of Hardwick Lane	486	89	145	252
17	Land east of A435 & south of A4189	334	67	0	267
18	Narrow strip of land between Redditch and A435	48	3	0	45
19	Land north of A4189 & east of A435	320	98	0	247
20	Land between A435 & Blind Lane	245	38	0	207
TOTAL		5754	1087	479	4230

Notes: D = A minus B and C

Designated ADR land within sites 3, 6 and 18 excluded.

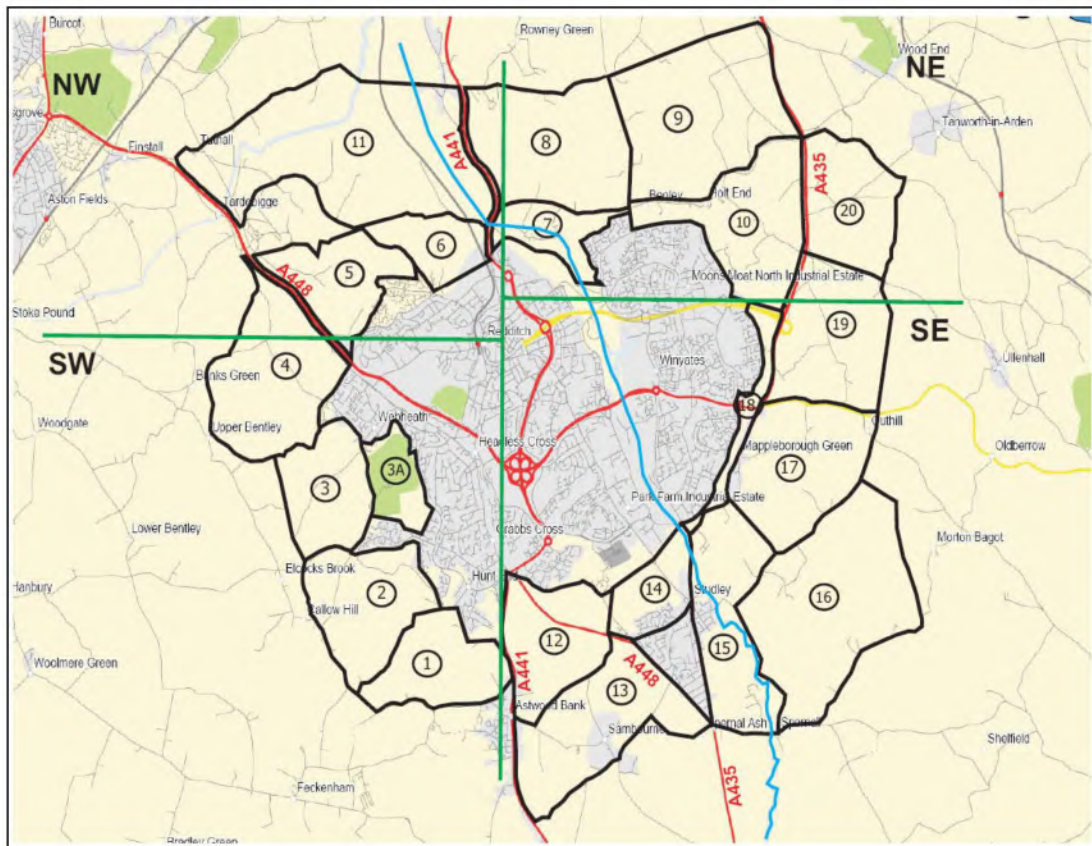
8.04 By comparing the estimates of net land available for development within the various sites identified in Table 6, with the net strategic land requirements associated with Growth Options 2 and 3 at Table 5, it can be seen that, in principle, a number of sites are large enough to accommodate Growth Option 2, while two (Sites 9 and 11) are large enough to accommodate Growth Option 3. Various combinations of sites would therefore be able to meet the identified quantum of land required to accommodate Growth Options 2 or 3.

8.05 Having established that sufficient quantum of land exists on the urban periphery to accommodate major growth in principle, it is necessary to explore the following matters which collectively determine whether it is appropriate for Redditch to meet either Growth Options 2 or 3;

- i) Is Redditch, in general terms, a sustainable location to accommodate major additional growth?
- ii) Assuming that the answer to i) is “yes”, taking into account environmental, policy and infrastructure constraints and opportunities, are there any clear, overriding benefits in seeking to concentrate major additional growth in any particular part of the urban periphery, and if so, where?

8.06 These matters are addressed below. In order to assist consideration of question ii) and to ensure that the assessment of growth options remains strategic in its scope, Plan 1 below divides Redditch into four quadrants – north west, north east, south west and south east (NB the split is not intended to create four equal sized quadrants). The text generally refers to the quadrants identified above, unless site specific details were required to illustrate particular points.

Plan 1: Showing Sites Subject to SWOT Analysis by Quadrant



Is Redditch a Sustainable Location to Accommodate Major Growth?

- 8.07 The answer to the first question is a qualified affirmative. Redditch is closely related in physical terms to the Birmingham conurbation and is well connected to it via the main highway network (A441, A435, M42 and M5) and via the train network. Redditch is large enough to have its own substantial employment base, a variety of housing, and a range of public amenities and facilities, to make an attractive place to live and work in its own right.
- 8.08 The important caveats are that the range of employment opportunities in Redditch cannot contend with that available in the Birmingham conurbation, leading to high levels of net out commuting (assisted by the excellent accessibility to the conurbation by car). Accessibility by train and bus to Birmingham is not as good as it could be (leading to further increased reliance on the car for commuting/shopping purposes).
- 8.09 Provided that additional major growth at Redditch is accommodated in a sustainable way, in terms of both location of new development and through the comprehensive provision of appropriate supporting social and physical infrastructure, together with additional employment generating development, there is no reason in principle, why Redditch should not accommodate the additional housing growth envisaged in the emerging RSS revision, on grounds of sustainability.
- 8.10 In addressing the second question, it is clear that there are certain constraints which have an important bearing on the most appropriate direction for accommodating growth and also on the scale of growth that can realistically be absorbed on Redditch's urban periphery. Two important considerations in that respect are constraints relating to highways/transportation and public utilities infrastructure. Both of these matters are addressed in some detail in the reports attached at Appendices C and D. There follows below a synopsis of the findings of those reports in relation to options for accommodating growth around Redditch.

Summary of Highway/Transportation Constraints

- 8.11 A strategic assessment of the existing road network carried out by WYG as part of the study has identified constraints in terms of the capacity of parts of the primary distributor and district distributor network, to accommodate the additional traffic likely to be generated by accommodating Growth Options 2 or 3. The report also considers, in broad terms, the relative merits of accommodating growth beyond the urban periphery of Redditch in terms of sustainability, taking into account the accessibility of potential development areas to Redditch town centre for pedestrians, cyclists and by public transport.

8.12 The main conclusions arising from the assessment of highway/transportation capacity and constraints carried out by WYG, the report of which is attached in Appendix C, are as follows:

- In terms of accessibility by non car modes, concentrating major new urban development to the north (associated with the A441 (north) link) and north-west (associated with the A448 (west) link) of the town, would be the most sustainable locations. (i.e. SWOT sites 5, 6, 8, 11 and 9).
- There are a number of link roads and junctions within Redditch that appear to be at, or nearing, operational capacity – these being the A441 (north) Bordesley link, the A435 (east) link and Crabbs Cross roundabout. All other assessed links/junctions appear to be operating within design capacity.
- Following assessment of the level of additional growth (residential and employment) needed to accommodate the three growth options and consequent improvements to the highway network required, it is considered that the primary highway network is able to accommodate the growth associated with Options 1, 2 or 3 within either the north west, north east or south east quadrants, subject to adequate infrastructure improvement measures on parts of the main road network. The potential costs associated with the provision of infrastructure improvements will vary depending on the location chosen for development and extent of physical works required. However, in general terms the report identifies that to accommodate Option 1 the highway infrastructure costs could range up to £175.25 million, to accommodate Option 2 the costs range from £7.5 million to £227.75 million and to accommodate Option 3 the costs would range from £73.75 million to £332.25 million.
- From consideration of the combination of sustainable accessibility and estimated infrastructure costs the report suggests that the most appropriate locations to accommodate major growth are as follows:
 - for Spatial Option 1, all development is accommodated by existing “committed developments”
 - for Spatial Option 2, development concentrated around the A441 (north) link, or A448 Bromsgrove Highway Link. (SWOT site numbers 6, 8 and 11)
 - for Spatial Option 3, development concentrated around the A441 (north) link, or A448 Bromsgrove Highway Link. (SWOT site numbers 5, 6, 8 and 11)

8.13 The report also recommends several areas of additional data collection and research, including investigation of the feasibility of moving the existing main railway station in Redditch to a new location associated with major developments within the A441 (north) corridor (SWOT site No 11) which could (if linked with the provision of a second rail track between Redditch and Barnt Green), potentially improve the capacity of the main rail network to accommodate trains to and from

Birmingham and reduce commuting by car, although the substantial cost of achieving this is recognised.

Summary of Utility Infrastructure Capacity and Constraints

- 8.14 The main conclusions arising from the assessment of utility infrastructure capacity constraints carried out by WYG, the report of which is attached in Appendix D, are as follows:
- The supply of gas should not influence either the number of new homes in Redditch or the location of new homes as all growth options can be accommodated through a connection from the existing medium pressure network. Generally, the further development is located from the existing medium pressure network, the greater the capital investment required from developers and development agencies.
 - The existing data and telecommunication network in Redditch should not unduly influence housing growth or the location of housing growth. The best connections for development growth in terms of economics would be to the north of the town centre where there are ADSL and SDSL networks; telephone exchanges to the south, west and east are ADSL only.
 - The supply of network electricity should not unduly affect residential growth beyond Redditch although capital investment costs might be reduced by locating new homes in certain locations beyond the east of the town. Development to the south and west of Redditch would be most expensive. (SWOT site numbers 1 to 4)
 - In respect of drainage, the most sustainable and perhaps least expensive locations to construct new homes beyond Redditch are areas where the permeability of the soil is the greatest and failing this close to existing water courses, most likely to the north and east of Redditch. (SWOT site numbers 8 to 10 and 15 to 20)
- 8.15 The report finds that the single most pertinent utility infrastructure constraint is provision for foul water disposal and development to the west of the River Arrow would be potentially more expensive and less sustainable in that respect. The key foul water constraints governing new development within and surrounding Redditch are:
- Severn Trent Water has stated that there are no planned capital works being carried out to the Sernal Sewage Treatment Works (STW), located to the southeast of Redditch treating most of central, northern and eastern areas of the town. Detailed modelling will be required to assess the capacity of each of the growth options against the existing effluent discharge licence but it is understood anecdotally from Redditch Borough Council that the discharge

consent into the River Arrow at Sernal STW is not too onerous; confirmation from Severn Trent Water is still outstanding.

- Foul flows from any major new development in or around Redditch would most likely be conveyed to Sernal STW either by gravity (new development to the north, south and east of Redditch) or a combination of pumping and gravity from the western perimeter of the town (see below). Providing treated effluent discharge licenses into the River Arrow are flexible at this location as suggested above then any capital investment to increase the capacity of the treatment works should be funded by the incumbent licensed Sewerage Undertaker (Severn Trent Water) provided the new development is allocated within the next Development Plan (a Sewerage Undertaker has a duty to provide capital investment for population growth allocated in a Development Plan).
- Irrespective of whether development is 'allocated' any development in or around Redditch may be significantly constrained by Severn Trent Water's feasibility, design and build programmes for the delivery of new assets. Severn Trent Water will not programme this work before their 2010 - 2015 capital investment period (AMP5).
- Severn Trent Water has stated that major planned capital work is planned to the Priest Bridge Sewage Treatment Works (south west of Redditch treating existing flows from the west of the town) within the AMP4 period (2005-2010). This capital work is based on a current design population of 15,000 and therefore does not include for any of the growth options in this study. Severn Trent Water has advised that the Sewage Treatment Works will be difficult to extend once these works have been carried out thus limiting population growth to the west of Redditch unless new foul flows are pumped over the 'ridge' into the catchment served by Sernal STW. Pumping all foul water over the 'ridge' from the west to the east of the town will not be a wholly sustainable solution.
- The existing sewerage network within and downstream of Redditch Town Centre is stressed and has a history of sewer flooding. Effectively any significant new development north or northwest of the town centre may require a complex engineering solution with likely disruption to the centre of Redditch.
- The Bow Brook River downstream of the Priest Bridge Sewage Treatment Works to the west of Redditch and the River Arrow downstream of the Sernal Sewage Treatment works to the south east of Redditch are considered unsuitable to accept significant amounts of additional treated effluent from the treatment works.

8.16 Effectively any development to the southwest of 'The Ridge' (very approximately the A448) would have to be drained to Sernal Sewage Treatment works using one or more pumps. These pumps would have to be designed such that foul water is pumped to an outfall downstream of the stressed sewerage network in the town centre.

- 8.17 Any development to the north or northwest (upstream) of the Town Centre may trigger a very convoluted scheme to convey water to Sernal Sewage Treatment Works via a new trunk sewer through the town centre, or by pumping flows into a new trunk sewer further east.
- 8.18 The most sustainable solution would be to develop close to or to the east of the River Arrow, again a new trunk sewer might be required but this could potentially be a gravity sewer.
- 8.19 The report concludes that it is *“becoming clear that large scale residential development generally to the east of the River Arrow is preferable in terms of reduced capital investment and more sustainable solutions (reduced foul water pumping costs). Both foul water and electricity solutions will be cheaper and simpler [to the east of the town] & [i.e. SWOT sites 8 to 10 and 15 to 20]”*
- 8.20 Taking into account all identified constraints (policy, physical, natural and infrastructure) WYG sets out below its view on the implications of seeking to achieve Growth Options 2 and 3 within the identified Redditch “quadrants”.

North West Quadrant (Sites 5, 6 and 11)

- 8.21 Development in this area offers the following advantages:
- Sufficient land is available to accommodate Growth Options 2 and 3, taking into account physical constraints and flood risk areas.
 - The potential to link to the A448 and the A441 corridors.
 - Site 6 contains an ADR with potential to extend the development area beyond the current boundaries.
 - Potential for development along the rail/river corridor, including possibility of relocating the Redditch train station and dualling of the track between Redditch and Barnt Green, and potentially, the provision of a high quality new business park with good connections to the M42.
 - Would facilitate funding of the Bordesley bypass and related A441 (north) link improvements.
 - Site 6, the southern part of Site 11 and the eastern part of Site 5 are well located relative to Redditch town centre and existing and proposed employment areas.
- 8.22 However development in this quadrant also has a number of disadvantages including:
- The disposition of the various physical constraints is such as it would lead to a fragmented development pattern within the quadrant.

- Major development within Sites 5, 6 and 11 would probably require a new road crossing of the main railway line (if the relocation of the train station is not feasible) to create a highway link between the A448 and A441. Given the various constraints, in particular variations in topography, such a highway link would be very expensive and potentially time consuming to achieve.
- The sites are all to the west of the River Arrow, and as such the foul drainage requirements would be more difficult and costly to meet.
- Would potentially bring development close to Bordesley affecting its character (although this is not designated as a settlement in the development plan).

North East Quadrant (Sites 7, 8, 9, 10 and 20)

8.23 Major development on the urban periphery within the north east quadrant of Redditch presents a number of advantages, set out below:

- Site 8 is well related to Redditch town centre and existing and planned employment areas, via the A441 (north) link, representing a relatively sustainable location for growth. Additionally, the highway related infrastructure improvements associated with development within Site 8 are relatively cheap and quick to achieve.
- The sites in the north east quadrant are to the east of the River Arrow and therefore it is likely to be less costly to develop within this area in terms of foul drainage provision.
- It also likely to be less costly to develop within this area in terms of telecoms provision and electricity supplies.
- Development within Site 8 provides the opportunity to fund the Bordesley bypass and other associated works on the A441 (north) link.
- Development within Site 8 could link with development on the eastern part of Site 11 and also with Site 6, to form a sustainable urban extension around the A441 (north) link.
- Site 10 provides a relatively self contained opportunity to accommodate either housing or employment development through the extension of the built up area beyond the planned extension of Ravensbank Industrial Estate.

8.24 However, development within the north east quadrant also gives rise to certain disadvantages, as follows:

- Site 9 would be relatively unsustainable to develop in isolation and, if developed in association with Site 8, would probably require provision of a new link road between the A441 and the A435 to create a defensible long term northern boundary for the town. That link road is likely to be expensive and time consuming to build.

- Development within Sites 9 and 10 have the potential to “swallow up” Beoley and Holt End adversely affecting their character.
- The full development of Site 8 would bring the extent of the built up area of Redditch close to Rowney Green, affecting its character.
- Development within Site 20 in isolation would be unsustainable, being remote from the built up area of Redditch and the town centre. Extending the developed area of Redditch beyond the A435 to the east would make it difficult to establish a long term, defensible boundary for the Green Belt.
- Development of Site 20 would take the extent of the built up area of Redditch close to Tanworth in Arden, affecting the character of that settlement.

South East Quadrant (Sites 12 to 19)

8.25 With the exception of certain areas of land immediately adjacent to the built up area of Redditch, the south east quadrant effectively contains all of the study area land within Stratford-on-Avon District. Accommodating development within this quadrant would bring with it the following principal advantages:

- Site 14, the northern part of Site 15, Sites 17, 18 and 19 are reasonably well located to the principal employment areas within Redditch.
- Major development within Sites 12 and 14 could potentially fund the provision of an A441 (south) link relief road, which would assist in relieving bottle necks at the Crabbs Cross roundabout.
- Development within Sites 17, 19 and 20 could potentially fund any necessary improvements to the A435.
- The northern part of Site 15, together with Sites 16 to 19 are located to the east of the River Arrow, so that necessary foul drainage infrastructure would be relatively easy to achieve at a relatively low cost.
- Development within Site 18, both within the designated A435 ADR and also within the land designated as Green Belt located between the ADR and the A435, along with the Winyates Green Triangle would appear to be both feasible and sustainable.

8.26 However, major growth within the south east quadrant would bring with it the following the disadvantages:

- Sites within this quadrant are relatively remote from Redditch town centre and are less accessible by all modes of transport to the centre than sites within the north western north east quadrants.

- Development on sites within the south east quadrant to the east of the A435 (i.e. Sites 15, 16, 17 and 19) would create difficulties in achieving a long term, defensible boundary for the Green Belt in this direction.
- Development within Sites 12 to 15 would have the effect of submerging the settlements of Astwood Bank, Sambourne and Studley within the built up area of Redditch, affecting the character of those settlements.
- The separate development of Site 16, in isolation from Sites 17 and 15 would be unsustainable, effectively creating a new settlement within the Green Belt.

South West Quadrant (Sites 1 to 4)

8.27 The accommodation of major growth within the south west quadrant would bring with it the following principal advantages:

- A substantial proportion of the land within Sites 1 to 4 (excluding Site 3A) does not exhibit significant environmental or policy constraints.
- There is the potential for the Webheath ADR to be developed independently from the remainder of Site 3. The development of that ADR could potentially be achieved in tandem with Site 4, subject to a new link being created to the A448.

8.28 However, accommodating a major growth in the south west quadrant would involve a range of significant disadvantages, including:

- Due to the configuration of the primary road network within Redditch and constraints in terms of the capacity of the A441 (southern) link, Sites 1 to 3 are poorly connected to the main road network and, unlike other quadrants, there is significantly less prospect of being able to achieve satisfactory connection with the main road network in association with major development on Sites 1 to 3, due to the length of new roads which would have to be built and also the difficult topography existing along all potential routes.
- Sites 1 to 3 are relatively remote from either Redditch town centre or the main employment areas within Redditch, in respect of all modes of transport.
- While Sites 1 to 3 are not given any specific landscape value in the Redditch Local Plan No.3, these areas are equally, if not more attractive than certain areas designated as Special Landscape Area or Areas of Great Landscape Value, within other quadrants.
- All of the land within Sites 1 to 4 lies to the west of the River Arrow and as such the provision of foul drainage to serve new development would be relatively problematical and costly.

- Linked to the lack of potential to provide a new primary road connection between the A448 and the A441 (south) link, it would be difficult to identify defensible long term boundaries for the Green Belt, should development extend in a south westerly direction from the existing built up area.
- Development of Site 1 would effectively create the coalescence of Astwood Bank with Redditch, affecting the character of that settlement.

Phasing of Development

8.29 Virtually all of the peripheral development site options on the edge of Redditch will involve the provision of substantial investment in infrastructure, particularly on highways and drainage, to bring them forward. Even if such provision was to be substantially developer funded, the procedural requirements to secure approval for the major infrastructure works is likely to take a number of years, with construction taking several further years to complete. There is therefore a consequent threat that the delivery of developments required by Growth Options 2 and 3 could be heavily concentrated in the latter half of the strategy period.

Growth Option 1

- 8.30 It can be seen from Table 5 that a combination of the three designated ADRs in Redditch, and/or the Winyates Green Triangle site, have more than sufficient potential to meet the residual land requirements associated with Growth Option 1.
- 8.31 The road infrastructure mitigation measures needed to bring forward Growth Option 1 within such a dispersed growth distribution strategy, would be relatively limited, potentially involving some improvements to the A435 (south) link, the Bordesley bypass and improvements to Crabbs Cross roundabout. The need for such infrastructure improvements should be the subject to further scrutiny in the light of the outputs of the recommended transport model for the town/district.
- 8.32 The view is that there is no overriding constraint to the early release of any of the three ADRs, (or the Winyates Green Triangle site) through the LDF, subject to the outcome of the RSS review process.

Growth Option 2

- 8.33 Should Redditch be required to accommodate Growth Option 2, it can be seen from Tables 4 and 5 that notwithstanding the development of the three designated ADRs and also the Winyates Green Triangle site up to their maximum potential, there would still be a requirement to release additional land on the urban periphery currently within the Green Belt. Taking into account the

range of constraints and opportunities assessed in the context of various land parcels considered to have some potential to accommodate growth, it is concluded that the adverse strategic planning implications associated with accommodating growth adjacent to the town would be minimised to the north/north east with development concentrated around the A441 (north) link (SWOT site areas 6, 8 and 11). Within that general area there is a good prospect of achieving substantial levels of new development relatively early in the period assessed, since one of the pre-requisites for accommodating that growth, the Bordesley By-pass, already has planning permission, with the principal reason for non implementation being lack of committed funding. Development within Sites 6, 8 and the eastern part of Site 11 offers the opportunity to fund not only the bypass but also the related link widening and improvements to Millrace/A441 (Sainsbury's) roundabout. As can be seen from Table 6, there is sufficient land with development potential within Sites 6, 8 and 11 to accommodate the development requirements associated with Growth Option 2.

- 8.34 A further area within the north east quadrant which merits further investigation as to whether it presents an early development opportunity is land within Site 10 to the north of the Ravensbank employment allocation site within the Bromsgrove District Local Plan. While there are important constraints relating to ecological designations and topography in the central and eastern parts of Site 10, there is an area of land to the north of the existing allocation which could form a self contained extension to the built up area of Redditch and which could be accommodated on the highway network. Depending on the scale of growth, some improvements to the junction of the primary distributor and the A435 to serve the development, may be required.

Growth Option 3

- 8.35 It is evident that to achieve Growth Option 3 there would need to be more substantial allocations of development within the Green Belt on the urban periphery of Redditch.
- 8.36 Taking into account the range of constraints and opportunities assessed in the context of the various land areas considered to have some potential for growth, it is concluded that the adverse strategic planning implications associated with accommodating growth adjacent to the town would be minimised by initially concentrating development in the north/ north-east of Redditch, in a similar fashion to that suggested for Option 2. On balance it is considered that the impact of the various strategic constraints to development is relatively low to the north/north- east of the town, while this direction of growth also has the important advantage of being the most sustainable in transportation terms. Should such additional growth be accommodated in the north east quadrant, there will most likely be a requirement for a new link road between the A441 (north) link and the A435 (north) link in order to form an outer boundary to the major development contained within Sites 8, 9 and 10 and to ensure that the levels of traffic generated by that development can be

distributed in such a way that the wider network still generally functions within design capacity. The timescale for providing such a major road link could be in the region of 5 years. This could lead to pressure for very high levels of housing completions in the latter part of the period assessed, in order to meet the Growth Option 3 housing target.

- 8.37 Further consideration should also be given to accommodating development around the A448 (west) link (SWOT Sites 4 and 5) coupled with new junction connections to the A448, although the extent to which SWOT Site 5 can contribute is substantially reduced by flooding and topography. The prospects of being able to create a long term defensible Green Belt boundary formed by a major road connection between the A448 (west) link and the A441 (north), are slim, due to a combination of severe topography, flood risk, protected wildlife sites and the need to cross the main Redditch to Birmingham railway.
- 8.38 In order to assist in overcoming such bottlenecks to growth in the north east and north west quadrants, it is concluded that further detailed consideration should be given to the potential for accommodating major growth within Sites 12 and 14 in the south east sector, in association with the provision of a Crabbs Cross Relief Road (linking the A441 (south) to Woodrow Drive (District Distributor Road) which would effectively form an outer boundary to development within that urban extension area. However, it should be noted this may lead to an adverse affect on the Alvechurch Highway by loading additional traffic onto it and, due to the configuration of that road, it would be relatively expensive to achieve significant improvements to its capacity. Also this development scenario would lead to coalescence between Redditch and Studley and could add to traffic congestion on the A435.

Other Considerations which could Influence the Direction of Growth

- 8.39 From the consideration of other constraints, there are none which would override the general conclusion that there are fewer disadvantages associated with accommodating major development to the north of Redditch than trying to accommodate it to the south, east or west. For example, the response from the Worcestershire Children's Services Directorate Education Authority indicates that new school provision (primary, middle and high) is likely to be required should major development be accommodated either to the north or the south (west) of Redditch, so that this factor has no substantive influence on the preferred direction of growth. Primary schools in the south east quadrant, within Warwickshire, appear to have little capacity to accommodate substantial housing growth in that area, whereas the non-denominational schools of all tiers outside that area (ie to the east of Redditch) appear have some residual capacity. While the distribution of supermarkets and district centres within the built up area is fairly evenly spread, the south west quadrant is relatively poorly provided in that respect. By far the largest choice and range of retail and leisure uses in the town is to be found in Redditch town centre, which is toward

the northern part of the built up area. Major development at the northern periphery of Redditch raises a new potential for a major sports / leisure complex at the Abbey Stadium site, in light of the potential for substantial increases in population (such a proposal would have to be assessed against Policy R.7 of the adopted Borough of Redditch Local Plan No.3).

- 8.40 One constraint to development northwards that will require further investigation, however, is mineral deposits. According to the adopted Hereford and Worcester Minerals Plan Proposals Map there are several areas of sand and gravel deposits to the north and west of Redditch. Parts of sites 5, 8, 9 and 10 are subject to that constraint to some extent. Policy M.2 of the adopted Worcestershire County Structure Plan seeks to safeguard such known mineral deposit areas and proposals for development which would sterilise or prevent them from being worked will be resisted unless certain criteria are met. Any proposal to promote major housing and related development within sites 5, 8, 9 and 10 would need to be carefully assessed against the relevant criteria.

9 CONCLUSIONS

- 9.01 This analysis has calculated the gross land required to meet the three options set out in Phase 2 of the Partial Revision of the Regional Spatial Strategy for the West Midlands region to 2026. In addition to residential land this includes an allowance for employment, retail and community uses required to meet the needs of the new population together with sufficient land to maintain the generous proportion of green space in order to maintain the town's character.
- 9.02 WYG has calculated how many dwellings could be accommodated on sites within Redditch's existing urban area both by surveying potential development sites and by an analysis of past trends. The analysis shows that identified urban capacity alone is insufficient to meet any of the Options.
- 9.03 The Borough of Redditch Local Plan No.3 designates three Areas of Development Restraint (ADRs) which it recognised may be needed to accommodate future growth. These areas are excluded from the Green Belt but it is a matter for future revisions to the Development Plan (the LDF) to consider their actual allocation. These areas could be regarded as being sequentially preferable to other areas of open countryside that have either been considered for development (either as part of previous reviews of the Local Plan or through Section 79 Inquiry) and ruled out, or have never been considered at all. The ADRs and Winyates Green Triangle (an area of White Land within Stratford-on-Avon's administrative area) have been assessed in this study as having a capacity of 1948 dwellings.
- 9.04 The identified urban capacity plus the development of the ADRs and Winyates Triangle would be sufficient to meet Option 1 but further urban extensions which would inevitably involve land designated as Green Belt would be required to cater for either Option 2 or 3. Much of this land would fall within the neighbouring authorities of Bromsgrove and/or Stratford-on-Avon Districts.
- 9.05 Whilst calculations allow Redditch's generous levels of green space to be maintained in any expansion area which would facilitate the incorporation of major landscape and ecological features, the extent of urban extension required to meet Option 2 and more particularly Option 3 would be perceived as a major incursion in to surrounding countryside.
- 9.06 Constraints imposed by highway and drainage infrastructure are generally less to the north than to the south and west. Also expansion northwards including the development of the Brockhill ADR would be relatively close to the town centre and significant savings on vehicle mileage in comparison with the more peripheral locations could be achieved particularly if improved public transportation links are incorporated into any masterplan for the area. The improvement to rail

services could also make a significant contribution to reducing existing and future reliance on the car and the potential for relocating the rail station as part of a transportation hub to the north of the town should be further evaluated.

- 9.07 For these reasons the opinion is that development to the north of the town is more likely to result in a more sustainable pattern of development.

10 ADDENDUM

10.01 Since this report was drafted The Regional Planning Partnership has concluded that the Preferred Option for growth between 2006 and 2026 at Redditch should be 6,600 dwellings, 3,300 to be found within Redditch Borough Council's area and a further 3,300 in the neighbouring administrative areas of Bromsgrove and/or Stratford-on-Avon Districts.

10.02 In order to compare this preferred option with the three alternatives considered in the report it is necessary to adjust the initial targets of 4,300, 8,200 and 13,200 dwellings to be provided between 2001 and 2026 by taking into account the 1,486 dwellings that were constructed between 2001 and 2006 to give a 2006 base date. On this basis Option 1 would have required 2,184 dwellings, Option 2 6,714 dwellings and Option 3 11,714 dwellings. Therefore the Preferred Option at 6,600 dwellings is more than Option 1 but less than either Option 2 or Option 3.

Development within Redditch Borough Council's Area

10.03 Figures given by Redditch Borough Council to the Regional Housing Land Capacity Study 2007 and shown in Table 1 indicate that at that time there were 1,146 'committed' dwellings made up from

- 314 dwellings under construction at 1.4.06,
- 725 dwellings with outstanding Planning Permission at 1.4.06,
- 83 dwellings that have been granted Planning Permission since 1.4.06, and
- 24 dwellings committed by the Development Plan.

10.04 Taking into account these commitments and the urban capacity assessed by this report there is a need to provide 613 dwellings on urban expansion sites which, based on 35 dwellings per hectare, would require 17.5 ha. Table 7 shows that the Redditch Borough Council's assessment of the capacity of the Webheath and Brockhill ADRs and our assessment of the A435 ADR is more than sufficient to meet the revised target of 3,300 dwellings.

Table 7: Revised Land Requirement 2006 - 26

Required Within Redditch		3,300
Commitments	1,146	
Surveyed Capacity	736 ^{*1}	
Trend Based Capacity	805	
Urban Capacity	2,687	
Required Urban Extension		613
Webheath & Brockhill ADRs	1050	
A435 ADR	598 ^{*2}	
Total ADR	1648	
Surplus		1,035

***Notes:**

1. Figure assumes that Alexandra Hospital will be developed for residential, rather than employment use. This will be subject of further review as part of the Redditch LDF.
2. For the A435 capacity we have adopted a pro-rata figure based on the assessed capacity for the larger site (18) shown on Plan 1, page 26. The gross developable area of the ADR is 30ha (figure supplied by RBC). We assume 57% for housing at 35 dph.

Development outside Redditch Borough Council's Area

- 10.05 Moving on to the requirement to source 3,300 dwellings from sites outside Redditch, unless designations are amended through the forthcoming LDFs for the constituent authorities, the release of white land would be sequentially preferable to sites within the current Green Belt. Adopting the approach to assess capacity carried out at paragraph 6.04 and subtracting the above potential capacity for the A435 ADR, the residual capacity of the non ADR land to the west of the A435 and the Winyates Green Triangle combined is 300 dwellings. This would reduce the amount of new development to be built on Green Belt land to 3,000 dwellings.
- 10.06 Based on a density of 35 dwellings per hectare this would amount to 85.7 hectares and based on a similar land use mix shown on Chart 1 would be require a gross site area of 150.3 hectares to be allocated on land within the current Green Belt.

Employment Land

- 10.07 The Preferred Option includes a requirement to provide a Rolling Five-year Reservoir of Employment Land of 17 ha (8 ha of which could be provided in neighbouring authority areas) and a Long Term Commitment of 51 ha (24 ha outside Redditch Borough Council's area). Allowing for current unused allocations within Redditch at 1st April 2007 of 18.85 ha, an additional 8.15 ha of additional employment land will have to be allocated within the Redditch Borough Council area to meet this long term target.
- 10.08 With regards to identifying 24 ha of employment land to meet Redditch's needs but provided beyond the Borough Council's boundaries, there are 4.67 ha remaining at Ravensbank Industrial Estate together with a further 10.3 ha that was included as an Area of Development Restraint in the Bromsgrove Local Plan 2004. Therefore a further 9.03 ha will need to be allocated to meet Redditch's needs within the neighbouring authority areas of Bromsgrove and/or Stratford upon Avon Districts

Other Uses

- 10.09 The report notes that Redditch Borough Council have adopted a green space standard of 7.43 ha/1000 population and this ratio was used to calculate the gross land requirements whilst maintaining Redditch's established character. Assuming that this greenspace standard is being applied to the commitments and urban capacity additional greenspace must be allocated to cater for the 613 new dwellings within Redditch and the 3,300 in the adjoining districts. Based on a household size of 2.2, 3,913 dwellings would accommodate a population of 8,609 which would require 70 ha of greenspace.
- 10.10 In addition the new population would require 2.75 ha of space to accommodate new convenience retail facilities but would not be likely to require additional education or other community uses.

Total Land Requirements

10.11 The following Table summarises the overall land requirements:

Table 8: Total Land Requirements to meet Preferred Option of RSS Phase Two Revision for the growth of Redditch (ha)

	Redditch BC		Bromsgrove and/or Stratford-on-Avon District	
	Required	Capacity	Required	Capacity
Housing	94.3 ¹	123.9 ²	94.3 ¹	0
Employment	27	18.85 ⁴	24	14.97 ⁵
Green Space	16.1 ³	0	53.9	0
Community	2.75	0	0	0
Total	140.15	142.4	172.2	14.97

¹: 3,300 dwellings @ 35 dph

²: Urban Capacity + Commitments + ADR @35 dph

³: Based on 7.43 ha/1000 for ADRs, assuming that standards for commitments and urban capacity are being achieved.

⁴: From Redditch Borough Council's Employment Commitments in Redditch Borough 1 April 1996 – 31 March 2007

⁵: ADR plus remaining capacity at 1 April 2007 (Source Redditch BC)

10.12 These figures show that there is no need to allocate additional land within Redditch Borough Council's boundaries but there may be a need to redistribute uses within the allocated sites; for instance from residential to employment and green space. There is a need to identify 157.23 ha of additional land outside Redditch's boundaries to meet the targets of the RSS Preferred Option.

Distribution of Development

10.13 In addition to updating the start date from 2001 to 2006 it is now proposed policy that in meeting these targets, small adjustments (including the possibility of compensating additions) to the Green Belt may be appropriate, if necessary, to allow for the most sustainable form of development.

10.14 It is also proposed to replace the former Sub-Regional Foci with Settlements of Significant Development which will now include Redditch. However both the existing and Phase 2 revisions of the RSS require Redditch to fulfil the same role i.e. to meet its own generated growth requirements only, notwithstanding the change in the designation of the town.



10.15 If these RSS revisions are accepted by the Secretary of State then, as part of the LDF preparation, it would be necessary for the three authorities to jointly consider the most appropriate distribution for growth outside the urban area, based on the principles of sustainable development.



APPENDIX A

Project Brief Supplied by Worcestershire County Council

PROJECT BRIEF FOR TENDER PURPOSES JOINT STUDY INTO THE FUTURE GROWTH IMPLICATIONS OF REDDITCH TOWN TO 2026

PREAMBLE

1. West Midlands Regional Assembly (WMRA) as Regional Planning Body (RPB) for the West Midlands Region is currently undertaking a partial revision of the West Midlands Regional Spatial Strategy (WMRSS). The current WMRSS was approved in June 2004. As part of the revision process the WMRA undertook between January and March 2007 a consultation exercise on the Spatial Options for the Region for the period 2001-2026. The consultation exercise considered (inter alia) issues in relation to the two main drivers of the WMRSS – housing and employment. Following on from the Spatial Options consultation exercise the WMRA is now commencing the preparation of a Preferred Option which will be submitted to the Secretary of State in late 2007/early 2008.

2. In developing the Preferred Option there will be many areas where difficult and sensitive decisions will need to be made. The Spatial Options consultation exercise just completed has demonstrated that one such area relates to the implications of future growth within Redditch Borough given the projected high level of future 'local' housing need and the perceived limited capacity of the Borough and Redditch Town in particular to accommodate further growth to 2026. The Spatial Options consultation has indicated that future growth at a level indicated by two of the three options (8200 and 13200 houses and associated employment land needs to 2026) could raise significant issues, including the need for cross boundary development.

3. Against this backcloth Worcestershire County Council, as Strategic Planning Authority, has been asked by the WMRA to lead a partnership including Redditch Borough Council and Bromsgrove District Council in commissioning independent consultants to undertake a land use planning study to provide an improved evidence base to inform the preparation of the Preferred Option for the Region. This evidence base is to comprise both an assessment of the potential urban capacity of Redditch Town to 2026; and an assessment of the implications of the possible options/directions of growth for the Town.

STATUS AND PURPOSE OF THE STUDY

4. The Study is a strategic level study to inform the sub regional decision making processes as part of the development of a Preferred Option for the West Midlands Region to 2026. The purpose of the Study is to give clear technical guidance to the three authorities and to the RPB on (a) the potential urban capacity of Redditch Town to accommodate housing and employment growth to 2026; (b) the level of additional peripheral growth required to meet the housing requirements set out in the WMRSS Spatial Options consultation; and (c) the implications of accommodating those peripheral growth levels in the various locations around Redditch Town within Worcestershire.

5. The Study will not incorporate any form of public consultation but will require technical consultation with the three commissioning authorities and

relevant outside organisations. The Study will be dealing with sensitive issues and information and will be confidential between the commissioning authorities, the RPB and the consultants until such time that the authorities and RPB consider it appropriate to place its findings in the public domain.

PLANNING AND STUDY CONTEXT

6. As mentioned above the Study is to provide technical evidence to inform the regional planning process for the West Midlands and in particular the development of a Preferred Option for submission to the Secretary of State. As such the Study must be considered within the context of the current revision process leading to the development of the Preferred Options. The consultants should therefore be aware of and take into account in undertaking the Study:

- (i) the nature and detail of the current revision process of the existing WMRSS;
- (ii) the principles and objectives of the current WMRSS within which the partial revision sits; and
- (iii) the responses to date of the three commissioning authorities to the Spatial Options consultation as a contribution to the development of the technical evidence base.

7. Additionally the Study should take into account all relevant current national policy guidance, including that which may have been issued subsequent to the original adoption of the WMRSS in June 2004.

8. The Study itself will be confined to the administrative areas of Redditch and Bromsgrove Districts within Worcestershire. In relation to locations for growth it will not be required to consider possible cross boundary locations in relation to Stratford-on-Avon District or Warwickshire. However the nature of the work may dictate the consideration of the cross boundary implications of accommodating growth around Redditch in the administrative area of Worcestershire which could give rise to development needs in the administrative areas of Warwickshire and Stratford-on-Avon (see paragraph 9 (vi) below).

STUDY REQUIREMENTS

9. Within the context of National Planning Guidance and the WMRSS, the Study will:

- (i) consider and identify the urban capacity of Redditch Town to 2026. This will take into account the suitability of land for development for both housing and employment uses, including, as appropriate, mixed use development and appropriate density assumptions;
- (ii) within the context of (i) above, identify the shortfall in housing and employment land needs required to meet the three levels of growth required in the Spatial Options consultation document;
- (iii) based on the findings of (ii) above, identify the likely level of peripheral growth required to meet any housing and employment needs shortfall identified;

- (iv) in addition to and in the context of (ii) and (iii) above, identify peripheral growth requirements to enable the development of Redditch Town as a Sustainable Community (e.g. social, educational, community facilities);
- (v) within the context of (ii)-(iv) consider the implications of accommodating the levels of growth required at peripheral locations around Redditch Town within Worcestershire. These implications should take into account impacts in relation to the following:
 - (a) national policy guidance
 - (b) regional policy guidance as established by the current WMRSS
 - (c) the wider environment, historic environment, biodiversity and landscape
 - (d) infrastructure requirements, specifically transportation, water and sewerage
 - (e) flood risk
 - (f) climate change factors
 - (g) sustainable communities/town form
 - (h) cross-district boundary development needs
- (vi) within the context of (v) above identify any impacts which will give rise to cross county boundary issues with Stratford-on-Avon District in Warwickshire even though the primary development needs may be accommodated within Worcestershire (e.g. infrastructure issues).

10. With respect to the above requirements the Study should take into account, (where appropriate), the need for consistency of approach with national, regional and sub regional practice (eg urban capacity methodologies; assessment of employment land needs).

11. It should be noted that as the Study is to provide evidence at a strategic level it will not be necessary to express outcomes at a detailed ordnance survey based level. Graphic presentation should take the form only of key diagrams.

LEAD AUTHORITY

12. Worcestershire County Council will act as lead authority for the Study and will be the contact point for the appointed consultants. The project will be subject to confidential reports to an inter-authority panel of senior officers in the first instance.

WORKING ARRANGEMENTS

13. The three authorities commissioning the Study require an independent view on the potential future capacity and growth implications for Redditch Town. However, the County Council as strategic planning authority and the two District Councils as local planning authorities, clearly have between them substantial expertise and knowledge in relation to the strategic and local planning issues within Worcestershire. The authorities also hold significant detailed information at both a strategic and local scale. Whilst an independent outcome is required it is essential that this expertise, knowledge and information is fed into the process in order to assist the consultants in reaching informed and accurate conclusions. To this end it is proposed that the consultants should work closely with officers of the authorities in the assembly of base information. It is proposed that this link

should initially be through the County Council as lead authority for the project, within the details of exact working arrangements and information provision to be agreed with the appointed consultants.

14. In addition the consultants will be required to involve, (as appropriate), other organisations directly to in order to gain relevant technical information to inform the study (eg the Highways Agency; Severn Trent water); and liaise/consult as far as possible with consultants acting region-wide on behalf of the WMRA on similar issues.

TIMESCALE

15. The project is to commence before the end of April 2007 and be completed by the end of July 2007. As part of the process of appointing a consultant specific milestones will be identified within the contract. However, in order to feed into the RPB timetable for the preparation of the Preferred Option initial "draft" findings will be required by the end of June 2007.

OUTPUTS/REQUIREMENTS OF THE CONSULTANTS

- (i) Attendance at an initial joint briefing meeting with officer representatives of the three authorities to consider the detailed approach to undertaking the work. To include such as working arrangements/role and inputs of the local authorities/timescales/clarification of outputs, etc. and to establish the detailed project plan.
- (ii) Submission of a report to the authorities following the initial joint meeting detailing the discussions at the meeting and agreed outputs/approach to the work (i.e. the project plan).
- (iii) Attendance as required at a regular (monthly?) progress meeting with officer representatives of the three authorities.
- (iv) Submission and presentation of a written final report to officer representatives of the three authorities at least two weeks before the agreed end date of the project.
- (v) Submission of a written clear and logical final report to the three authorities covering all the aspects set out in the section "Project Requirements" (unless subsequently jointly agreed to be amended) by the specified end date of the project.
- (vi) All mapped information to be prepared and provided by the consultants.
- (vii) Both the draft and final reports to be provided in paper and electronic format, including key diagrams.

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30th March 2007**



APPENDIX B

**Housing Land Availability Assessment carried out by
White Young Green Planning**

Master Sites List

No	Address	Selected	Greenspace	Rejected	Comments	Capacity
1.01	Bromsgrove Highway		x			
1.02	Pitcheroak Wood		x			
1.03	Sport Ground rear Poplar Drive		x			
1.04	Cricket Ground Bromsgrove Rd		x			
1.05	Valley Stadium		x			
1.06	Bordesley Lane			x	Part of Abbey Stadium	
1.08	Rear St Lukes Infant School		x			
1.09	Torrs Close			x	Too narrow	
1.10	Pool Bank		x			
1.11	Ashperton Close		x			
1.12	Foredrift Close			x	No access	
1.13	Oak Tree Ave		x			
1.15	Brockhill Drive		x			
1.16	Salters Lane		x			
1.19	Oak Tree Ave		x			
1.20	Batchley Rd			x	Undevelopable Shape/Existing Car Park to Shops	
1.21	Bromsgrove Rd		x			
1.24	Greenfields			x	Too narrow	
1.25	Greenfields				Too small	
1.26	Hollowfields Close		x			
1.28	Foxlydiate Cres			x	No access, too small	
1.31	Rowan Rd			x	Not developable - church car park	
1.32	Rowan Crescent		x			
1.33	Salters Lane			x	2 houses	
1.34	Poplar Rd			x	Insufficient depth	
1.35	Poplar Rd Shops r/o		x			
1.37	Poplar Rd			x	Insufficient Depth	
1.39	Poplar Rd Sportsground		x			
1.40	HDA Social Club		x			
1.41	Cherry Tree Walk			x	Club Car Park	
1.42	HDA Cricket		x			
1.43	Batchley First School		x			
1.44	Cherry Tree Walk		x			
1.45	Beech Tree Close		x			
1.46	Batchley Pool		x			
1.47	Batchley Rd			x	Wrong Shape	
1.51	Bentley Close			x	Active Allotments	
1.53	Batchley Rd			x	Insufficient depth	
1.54	Brockhill			x	Active Pub	
1.55	Batchley Rd			x	Undevelopable Shape	
1.56	Bromsgrove Rd (Works)		x			
1.57	Valley Stadium		x			

1.58	Edward St	x			Development Brief	25
1.60	Hewell Rd	x				17
1.65	Abbey Stadium			x	In leisure use	
1X3	Fire Station	x				18
1X8	Homer Works			x	Protected Employment Use	
1X14	Widney House	x				58
2.03	Golf Course		x			
2.05	Callow Hill Lane		x			
2.06	Callow Hill Lane		x			
2.07	Foxholes Lane			x	No access	
2.08	Foxholes Lane			x	Below threshold 0,1ha	
2.09	Morton Stanley Park		x			
2.11	Birchfield Rd		x			
2.12	Foxlydiate Hotel		x			
2.15	Springvale Road		x			
2.16	Sandygate Close			x	Insufficient developable area	
2.18	Boxnott Close		x			
2.19	South West MSP		x			
2X21	Crumpfields Lane			x	Outside Development Boundary & Green Belt	
3.03	Feckenham Rd			x	In active use - scouts and TA	
3.06	Feckenham Rd			x	No access	
3.08	Leacroft Rd			x	Overlooking to N	
3.09	Leacroft Rd			x	Car Park to Residences	
3.10	Priestfield Rd			x	Net DA too small	
3.11	Banners Lane			x	Levels, used as playground	
3.13	Banners Lane			x	Insufficient DA	
3.26	Peterbrook Close	x				6
3.33	Leacroft Rd			x	Access	
3.39	Swinburne Rd			x	Drainage/levels	
3.41	Feckenham Rd			x	Levels	
3.49	Crabbs Cross Car Park			x	Access, inadequate DA	
3X7	Evesham Rd			x	In active use - Nursing Home	
3X13	Yvonne Rd			x	Multiple ownership, no access	
3X20	The Meadway			x	Access, previous refusal pp	
4.02	Birmingham Rd			x	Greenfield outside boundary	
4.04	Dagnell End Rd			x	Insufficient Plot depth, open countryside	
4.10	Marfield Farm School	x				29
4.15	Moons Moat Drive			x	access	
4.17	Winyates Way			x	Employment area, access	
4.30	Paper Mill Drive			x	Access, insufficient depth	
4.31	Ryknild St	x				22
4.45	Church Hill District Centre			x	Development Brief	57
4.50	Eagle Rd			x	Employment Site	
4.51	Merse Rd			x	Employment Site	
4.54	Ravensbank Drive			x	access, insufficient depth	

4X5	Church Hill District Centre			x	Development Brief (see 4.45)	
5.07	Abbey Rd			x	Access	
5.17	Fishing Line Rd			x	Employment Site	
5.18	Station Car Park			x	In use	
5.21	Church Rd			x	Development Brief (see 5X4)	
5.22	Bates Hill			x	Part NW Quadrant	
5.30	Summer St			x	Insufficient DA	
5.33	Stevenson Ave			x	Church Car Park	
5X4	Church Rd (NW Quad)			x	Development Brief	103
5X12	Prospect Hill			x	Development Brief	103
5X18	Glover Street			x	Under 0.1ha	
6.02	Brook St			x	Employment Site	
6.07	Holloway Drive			x	access	
6.15	Arthur St			x	Employment Site	
6.16	Arthur St			x	Employment Site	
6.26	Holloway Drive			x	Caravan Site	
6.28	Battens Drive			x	Health Club	
6.34	Wirehill Drive			x	Levels, Insufficient depth	
6.40	Holloway Drive			x	access	
6.45	Brook St			x	Employment area, access	
7.01	Lowlands Lane		x			
7.02	Foxcote Close		x			
7.03	Between Ipsley Alders Marsh & Otter Close		x			
7.04	Far Moor Lane			x	Access	
7.05	Far Moor Lane			x	Insufficient DA	
7.06	Far Moor Lane			x	Access	
7.07	Mordiford Close			x	Effect on surrounding properties	
7.08	Colts Lane		x			
7.09	Lowlands Lane Play Area		x			
7.10	Merse Rd			x	Employment Area	
7.12	Huntington Close		x			
7.13	Costers Lane		x			
7.15	Whitehouse Lane		x			
7.16	Barrow Close		x			
7.22	Winyates Way			x	Employment Area, No depth	
7.23	South Moons Moat		x			
7.24	South Moons Moat		x			
7.25	South Moons Moat		x			
7.26	East Moons Moat		x			
7.27	Lassington Close		x			
7.28	Lowlands Lane		x			
7.29	Berkley Close		x			
7.30	Berkley Close		x			
7.31	Furze Lane		x			
7.32	Kingham Close		x			

7.33	Winyates Way			x	Insufficient depth	
7.34	Battens Drive			x	Insufficient depth, access	
7.35	Edgmond Close			x	Insufficient DA	
7.38	Berkeley Close			x	Insufficient DA	
8.01	Kingsley College		x			
8.02	Green Lane			x	Developed site	
8.03	Rear Hospital			x		277
8.04	Wirehill		x			
8.07	Rough Hill Drive		x			
8.08	Salford Close		x			
8.09	Fladbury Close			x	Shape and DA	
8.10	Kempsford Close		x			
8.11	Greenlands Drive		x			
8.12	Wharrington Hill			x	Access, Developable Area	
8.13	Wharrington Hill		x			
8.14	Throckmorton Rd		x			
8.15	Woodrow and Greenlands		x			
8.16	Crabbs Cross Island			x	Access	
8.17	Rough Hill Drive			x	Access and depth	
8.18	Towbury Close		x			
8.19	Rockford Close		x			
8.20	Lineholt Close		x			
8.21	Wirehill		x			
8.22	Nine Days Lane		x			
8.27	Woodrow Drive			x	Access	
8.28	Woodrow Drive			x	Access, Hospital campus, planting	
8.29	Woodrow Drive			x	Access, Hospital Campus	
8.30	Pedmore Close			x	Access	
8.31	Thomas Moore School			x	Access, depth	
8.34	Greenlands Drive		x			
8.35	Throckmorton Rd			x	Access	
8.37	Greenlands Drive		x			
8.38	Dingleside Middle School PF		x			
8.40	Woodrow North		x			
8.41	Bushley Close		x			
8.44	Woodrow Centre CP		x			
8.43	Astley Close			x	Insufficient depth	
8.45	Greenlands Drive Sports Field		x			
8.47	McDonalds Island		x			
8.49	Throckmorton Road		x			
8.51	Ombersley Close			x	Proximity to houses	
9.01	Watery Lane		x			
9.02	Ipsley Church Lane		x			
9.03	Warwick Highway			x	Access	
9.04	Warwick Highway			x	Access	

9.05,b,c	Warwick Highway		x			
9.08	Matchborough Way		x			
9.09	Millhill Road		x			
9.10	Dilwyn Close			x	Depth	
9.11	Claybrook Drive		x			
9.12	Matchborough and Washford		x			
9.13	Woolaston Rd			x	Employment	
9.16	Crossgate Depot			x	Employment	
9.19	Pipers Rd			x	Employment	
9.20	Pipers Rd			x	Employment	
9.21	Watery Lane			x	Shape	
9.22a,b	Arrow Valley Park		x			
9.24	Charlecote Close			x	DA too small	
9.27	Merevale Close			x	DA too small	
9.30	Ipsley Lane			x	Grounds of Hotel	
9.29	Ipsley Lane		x			
9.31	Field Farm			x	House and Garden	
9.36	Breaches Lane		x			
9.37	Matchborough and Washford		x			
9.39	Winward Rd			x	Depth, access	
9.40	Millhill Road		x			
9.42	Hatfield Close			x	Depth, access	
9.43	Warwick Highway			x	Highway constraint	
9.44	Warwick Highway			x	Highway constraint	
9.47	Studley Rd			x	Highway constraint	
9.50	Studley Rd			x	Employment	
9.53	Claybrook Drive			x	Employment	
9.55	Heming Rd		x			
9.56	Bartleet Rd			x	Employment	
9.57	Icknield Street Drive			x	Employment, depth, access	
9.58	Matchborough Way		x			
9.59	Matchborough Way			x	Employment	
9.62	Matchborough Way			x	Employment	
9.63	Matchborough Way			x	Employment	
9.67	Ipsley Church Lane		x			
9.68	Old Forge Drive			x	Employment	
9X11	Matchborough District Centre			x	Development Brief	17
10.01	Manor House			x	Multiple ownership, no access	
10.02	Church Rd			x	Private Gardens	
10.03	Beverley Close		x			
10.04	Queen Street			x	Developed Site	
10.05	Chapel St Overdale		x			
10.08	Ridgeway School			x	Access	
10.09	Cyprus Ave			x	Multiple ownership, no access	
10.10	Beverley Close		x			

10.12	Feckenham Rd Allotments		x			
10X09	Dark Lane	x			If existing house demolished - intensification (estimated yield)	6
10X16	Astwood Bank			x	Greenfield outside dev boundary 7 Green Belt	
10X17	Evesham Rd			x	access	
10X19	Gorse Close			x	Greenfield, outside boundary	
11.01	Mill Lane			x	Redevelopment of existing houses? No real net gain	
11.04	The Saltway			x	garden to Manor House	
11.05	Coupass Cottages			x	Access	
11.06	Coupass Cottages			x	Access	
11.08	Mill Lane			x	Redevelopment of existing houses? No real net gain	
11.13	B4090			x	Access, outside dev boundary, greenfield	
12.01	Foredrift Close			x	Access, depth	
12.02	Wirehill Drive			x	Access, depth	
12.03	Oakenshaw Woods		x			
12.04	East Tesco			x	Highway constraint, depth limited	
12.05	Oakenshaw Woods E		x			
12.06	Holloway Drive			x	Highway constraint	
12.07	Greenlands Drive		x			
12.09	Greenlands Drive			x	Highway constraint	
X1	A435 ADR			x	ADR	
X2	Brockhill ADR			x	ADR	
X5	Webheath ADR			x	ADR	

TOTAL CAPACITY:

738

KEY

	Greenspace (safeguarded)
	Rejected sites
	Capacity
	Development Briefs

From Scott Wilson study - assumed no capacity and not surveyed
 Surveyed and rejected from capacity calculation
 Surveyed and assessed as having capacity
 Sites having Development Briefs & capacity



APPENDIX C

**Highways and Transportation Capacity Constraints Assessment
carried out by White Young Green Consulting Ltd**



JOINT STUDY INTO THE FUTURE GROWTH

IMPLICATIONS OF REDDITCH TOWN TO 2026

Highways and Transportation Capacity and Constraints

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Project No: A036294

Report No. RT036294/02

ISSUE No.	1 (v1)	2 (v2)	3 (v3)	4 (v4)	5 (v5)	6(v6)
DATE	10-07-07	01-08-07	20-08-07	27-09-07	18-10-07	05-12-07
PREPARED BY	MJC	MJC	MJC	MJC	MJC	MJC
CHECKED BY	JJ	JJ	JJ	JJ	JJ	ND
APPROVED BY	ASG	ASG	ASG	ASG	ASG	ND

JOINT STUDY INTO THE FUTURE GROWTH IMPLICATIONS OF REDDITCH TOWN TO 2026

Highways and Transportation Capacity and Constraints

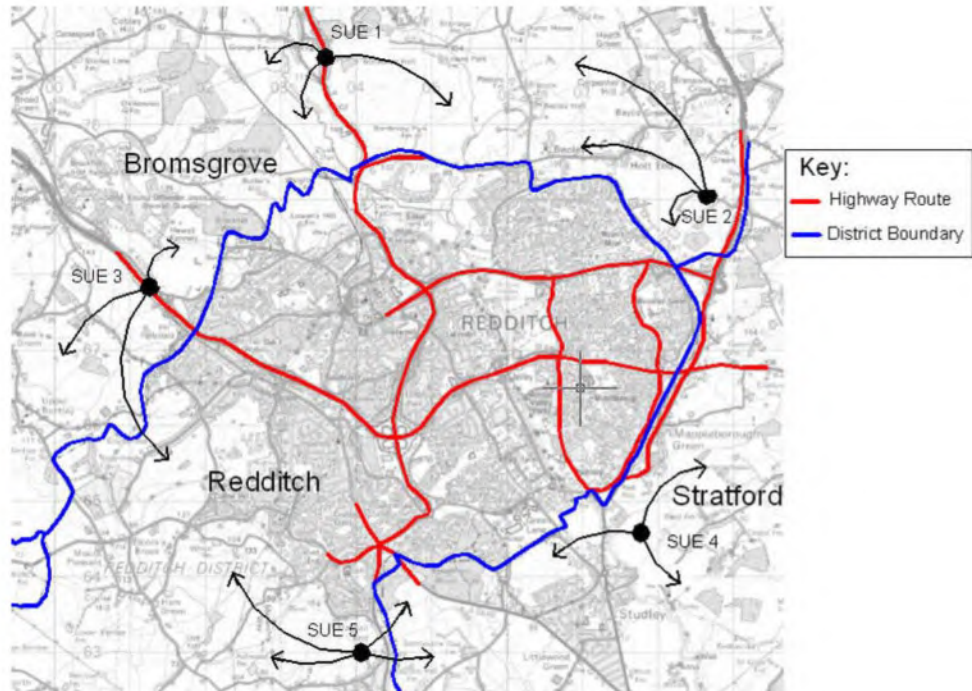
1.0 EXECUTIVE SUMMARY

Background

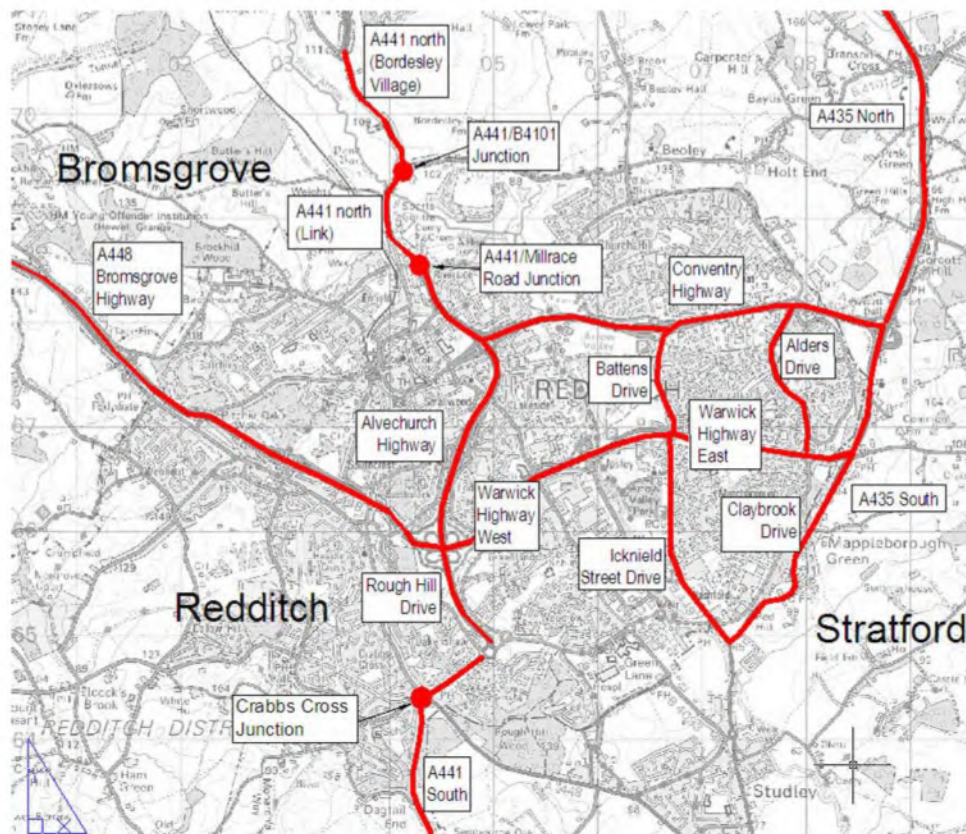
- 1.1 The West Midlands Regional Assembly is currently undertaking a consultation with key stakeholders, including Worcestershire County Council, with regard to the number of new homes to be included in the new Regional Spatial Strategy (RSS). To achieve the desired level of housing growth within the West Midlands a number of key locations are targeted; each of these locations has been allocated growth options to be considered as part of the consultation. One of the locations targeted is the Borough of Redditch in Worcestershire with a population of 78,807 in 2001 at the commencement of the RSS 25-year plan period.
- 1.2 Worcestershire County Council, in conjunction with Redditch Borough Council, Bromsgrove District Council and Stratford-on-Avon District Council, has asked White Young Green to evaluate the transport impacts of three housing growth options by identifying locations suitable to accommodate the proposed new development, identify current and anticipated growth constraints, and recommend which growth options can be accommodated in a sustainable manner. One of the key constraints to growth will be the physical capacity of the local highway network.
- 1.3 The Draft West Midlands Regional Spatial Strategy (RSS) proposes three Spatial Options for considerable new housing to be delivered by 2026. The first Spatial Option is required to accommodate 4,300 dwellings, the second 8,200 dwellings and the third 13,200 dwellings. A significant proportion of the Redditch provision is to be delivered in the form of 'Sustainable Urban Extensions' (SUEs) around the Redditch urban area in selected districts external to the Borough.

Work Undertaken

- 1.4 This report considers broad overall impacts of five SUEs in or around Redditch and determines the potential of the local highway network to accommodate the three options under consideration. The locations of the SUEs are shown on the following page:



1.5 Given the broad nature of this study capacity assessments were only undertaken for the primary highway links / junctions within Redditch Borough. The assessed network is shown below:



- 1.6 A separate WYG study was undertaken concluding that 4,173 dwellings have already been granted planning permission, is considered to be an Area of Development Restriction (ADR) or been constructed between 2001 and 2006 or identified as having available capacity for development sites within Redditch. For the purpose of this report these sites have been classified as 'Committed Developments' and resultant traffic flows have been incorporated within the existing base traffic flows.
- 1.7 The following existing links and junctions were determined to be at or nearing operational capacity: A441 (north) Bordesley Village, A441 (north) Bordesley Link, A435 (east) Link and the Crabbs Cross Roundabout. All other assessed links/junctions are considered to operate within design capacity.

Conclusions

- 1.8 A broad review of sustainable accessibility has been undertaken. The review has determined preferential SUE locations relative to walking, cycling, bus and rail accessibility to Redditch Town Centre and Rail Station. It has been determined that SUEs located adjacent to the A441 (north) link SUE location 1 and the A448 (west) link SUE location 3 would provide the most sustainable, from an accessibility view, location for urban development.
- 1.9 The primary highway network has been assessed to determine what additional level of residential development can be accommodated and what improvement measures may be required, if any, to accommodate the likely traffic effects of each of the spatial options under consideration.
- 1.10 The assessment has determined traffic capacities of links and junctions on the primary highway network within Redditch with a $\pm 10\%$ tolerance margin. Given this level of tolerance the assessment has considered improvement scenarios ranging from 'do nothing' to 'worst case' and this is reflected in the indicative cost estimates that have been provided.
- 1.11 The findings of this report indicate that the level of development for Spatial Option 1 is accommodated by existing committed developments within Redditch Borough. Estimated costs for accommodating the improvement measures, if required, are anticipated to be up to **£175.25m** dependent upon the actual operation of junctions / links as opposed to the theoretical assessments within this report (excluding any highway access infrastructure costs).
- 1.12 The findings of this report indicate that the primary highway network can accommodate Spatial Option 2 in all assessed SUE locations given adequate infrastructure improvement measures. Estimated costs for accommodating the improvement measures are anticipated to be between **£7.50m and £227.75m** dependent upon SUE locality and potential improvement measures and

upon actual operation of junctions / links as opposed to the theoretical assessments within this report (excluding any highway access infrastructure costs).

- 1.13 The findings of this report indicate that the primary highway network can accommodate Spatial Option 3 in all assessed SUE locations given adequate infrastructure improvement measures. Estimated costs for accommodating the improvement measures are anticipated to be between **£73.75m and £332.25m** dependent upon SUE locality, potential improvement measures and upon actual operation of junctions / links as opposed to the theoretical assessments within this report (excluding any highway access infrastructure costs).

Recommendations

- 1.14 The report concludes recommended SUE locations based on sustainable accessibility and estimated infrastructure costs for each of the Spatial Options and therefore this study recommends for:

- | | | |
|------------------|---|--|
| Spatial Option 1 | - | No additional Development Required |
| Spatial Option 2 | - | SUE 1 located adjacent to A441 (north) link; or, |
| | - | SUE 3 adjacent to A448 (west) link Bromsgrove Highway. |
| Spatial Option 3 | - | SUE 1 located adjacent to A441 (north) link; or, |
| | - | SUE 3 adjacent to A448 (west) link Bromsgrove Highway. |

2.0 PURPOSE AND LAYOUT OF REPORT

2.1 This study examines the highways and transportation implications of possible 'sustainable urban extensions (SUEs)¹ to help meet housing allocations in the draft Regional Plan 2001 – 2026. This report summarises the findings of the study and also makes recommendations on further work for the longer term. The purpose of the study is to aid Worcestershire County Council's, Redditch Borough Council's, Bromsgrove Borough Council's and Stratford Council's further comments on the draft Regional Plan, in particular in relation to the scale of SUEs.

2.2 The report does not deal with matters outside those relating to highways and transportation; it is recognised, however, that there are many other factors which may influence the final choice of locations for SUEs. Neither is it intended to prejudice district council views on the Draft Plan.

2.3 The remainder of this report is structured as follows:

	Page
Section 3: Background.....	10
Section 4: Approach and Technical Assumptions.....	11
Section 5: Existing Network.....	14
Section 6: Sustainability.....	21
Section 7: Spatial Options Impacts.....	27
Section 8: Improvement Costs.....	30
Section 9: Conclusions, Recommendations and Next Steps.....	35

¹ Including a range of housing types; access to a range of local employment schools and services; conservation of important environmental assets and natural resources; re-use and recycling of waste; in addition to enhancements to sustainable transport modes, including walking, cycling and public transport.

TABLES

Table 1	Proposed Gross Build Rate Options
Table 2	Highway Assessment Locations
Table 3	Land Take up 2001-2006
Table 4	Internal Land Capacity
Table 5	Committed ADR's
Table 6	Maximum Link CRF Capacities
Table 7	Base Junction Capacities
Table 8	Base Junction Optimum Capacities
Table 9	Sustainable Modal Ranking and Adopted Levels
Table 10	Revised Spatial Options Build Rates
Table 11	Spatial Option 2 – Improvement Measure Requirements
Table 12	Spatial Option 3 – Improvement Measure Requirements
Table 13	Improvement Measures / Costs
Table 14	Potential Improvement Costs Summary

FIGURES

Figure 1:	Redditch District Primary Highway Network
Figure 2:	Base Primary Highway Capacity
Figure 3:	SUE Locations
Figure 4:	TRICS Modal Split Percentages
Figure 5:	Walking Accessibility
Figure 6:	Cycling Accessibility
Figure 7:	Public Transport Accessibility (Bus)
Figure 8:	Rail Accessibility
Figure 9:	Proposed Improvement Work Locations

APPENDICES

Appendix A: TRICS Reports

Appendix B: Traffic Flow Data

Appendix C: Extract – Road Traffic Statistics 2005

Appendix D: AADT Assessment

Appendix E: Traffic Distribution Assessment

Appendix F: Extract from TA 46/97 Annex D/2

Appendix G: Multi Modal Split – Derived from TRICS Database

Appendix H: WYG Indicative Land Requirements Study Extract

Appendix I: NRTF Assessment

Appendix J: Capacity Assessment Model Printouts

Appendix K: Multi Modal Ranking Assessment

Appendix L: Link and Junction Capacity Assessments

Appendix M: Cost Appraisal Assumptions

3.0 BACKGROUND

3.1 The Draft West Midlands Regional Spatial Strategy (RSS) proposes three Spatial Options for considerable new housing to be delivered by 2026. A significant proportion of the Redditch provision is to be delivered in the form of SUEs around the Redditch urban area in selected districts external to the Borough. These residential forecast options are displayed in **Table 1**.

Table 1: Proposed Gross Build Rate Options

	Total Dwellings 2001-2026
Option 1	4,300
Option 2	8,200
Option 3	13,200

3.2 The main purpose of this report is to assess the highway capacity and sustainability issues associated with the options under consideration, highlighting pressure points on the primary road network, detail potential mitigation measures and sustainable linkages to the main urban centre of Redditch and its train station.

3.3 This study is a strategic level study to inform the sub-regional decision making processes as part of the development of a preferred option for the West Midlands Region. The purpose of the study is to give clear technical guidance to the three authorities on:

- a) The potential urban capacity of Redditch to accommodate housing and employment growth to 2026;
- b) The level of peripheral growth required to meet the housing requirements set out in the WMRSS Spatial Options consultation;
- c) The implications of accommodating those peripheral growth levels in the various locations around Redditch within Worcestershire and/or Warwickshire.

3.4 The study does not incorporate any form of public consultation but does draw from technical knowledge from the three commissioning bodies whilst maintaining an independent assessment.

4.0 APPROACH and TECHNICAL ASSUMPTIONS

Approach

- 4.1 This project takes as its starting point the current operation of the highway network. This has been derived from existing classified turning count data and two way flow data supplied by Worcestershire County Council.
- 4.2 Link capacities have been reviewed against Congestion Reference Flows (CRF) calculated in accordance with TA 46/97 Annex D/2 and tested with the junction capacity analysis software ARCADY, TRANSYT and LINSIG.
- 4.3 It is understood that there is currently no district transport model that provides accurate capacities of the highway network within Redditch. This study is therefore only able to review, in general terms, the broad potential traffic capacity of the highway network within Redditch based on junction and link capacity assessments. A more robust approach would be to assess the area wide network within the district via a transport model. This exercise should be undertaken at a later date; however, this is not possible at this time given the current time scales and availability of raw data.

Technical Assumptions

- 4.4 The assumptions made and parameters set when assessing the impacts of the Spatial Options are summarised as follows:

Residential trip rate: A peak hour rate of 0.6 trips per dwelling to external destinations, equating to around 7 trips per dwelling per day, has been used. Note: This trip rate has been derived from a simple analysis of the TRICS database². TRICS reports can be found in **Appendix A**.

Employment trip rate: A peak hour rate of **1.4 trips per 100 sqm GFA**³, equating to around 10 trips per 100 sqm GFA per day. This has been derived from a simple analysis of the TRICS database. TRICS reports can be found in **Appendix A**.

Assessment of local links: Links to local facilities within / around the SUEs have not been explored in this study but will need to be when the analysis reaches a more detailed stage.

Base traffic growth: It is anticipated that the development will account for the majority of future traffic growth and therefore general traffic growth on the highway network has been assumed to be 0% from 2007 to 2026.

² A national database of traffic surveys relating to various types of development. AM and PM peak totals have been averaged to provide a peak hour trip factor.

³ GFA = Gross floor area. For the purposes of this project, GFA = 30% of total site area.

Traffic Count Data: Traffic count data has been supplied by Worcestershire County Council Contained within **Appendix B**. A general Passenger Car Unit (PCU) conversion factor of 1.055 has been adopted where appropriate.

Out of Season Traffic Data: Out of Season traffic data has been adopted for the A435 dual and single carriageway links to the east of Redditch. A general factor of 3% has been added to the flows to accommodate the seasonal change in traffic volume. This factor has been taken from the DFT Transport Statistics Bulletin - Road Traffic Statistics 2005. An extract of this document is provided in **Appendix C**.

AADTs Conversion Factors: For the purposes of calculating AADTs from peak hour flows and vice versa, a simple assessment of the traffic counts supplied by WCC has been undertaken found in **Appendix D**. A peak hour conversion factor of 10.4 has been adopted.

General Distribution: A simple review of outbound AADT trips on the main arterial routes has been undertaken to determine weighting factors. The results of the assessment have been utilised to provide an indicative assignment upon the highway network and is shown in **Appendix E**.

SUE Assignments: have been broadly based on Census data and conclude that 80% of traffic leaves Redditch Borough to the north and 20% traverse into or through Redditch Borough. Traffic flow assignments for SUE locations to the south of Redditch have concluded 90% will travel north and 10% disperse southward.

Highway Assessment: Only primary highway routes and key junctions have been assessed due to the broad scale of this assessment.

Impact Assessment Area: Traffic impact has primarily been examined within Redditch Borough; however, some links to the north have also been assessed where the impact is considered to be material.

Assessment of Impact: Due to the broad scale of this study it is anticipated that any development scenarios creating impacts $\pm 10\%$ of the links theoretical design capacities may be accommodated.

Assessment of Capacity: Specific highway links and junctions have been assessed where traffic flow data is available. Assessments have been undertaken using industry standard modelling software, or against contained within TA 46/97 Annex D/2 where only two-way flows are available. A copy of TA 46/97 is contained within **Appendix F** along with details of assumptions applied.

M42 Motorway: This has not been reviewed at this early stage but will require detailed assessment to determine its overall ability to accommodate any scale of growth.

Sustainable Transport Multi-Modal Splits: In addition to the residential trip rates determined above, a simple analysis has been undertaken using the TRICS database to

determine a geographical modal split to be applied in addition to the trip rates. The TRICS report can be found in **Appendix G**.

Exploration of Mitigating Measures: Any newly identified measures have been assessed at a broad level to establish deliverability and estimated cost impacts.

Wider Benefits of Mitigating Measures: The potential measures will benefit the wider community as well as serving the Spatial Option developments, (e.g. by providing existing residents with access to better public transport or reducing current traffic levels.

Existing Studies: One existing study has been incorporated into this report being the Bordesley Bypass situated to the north of Redditch on the A441.

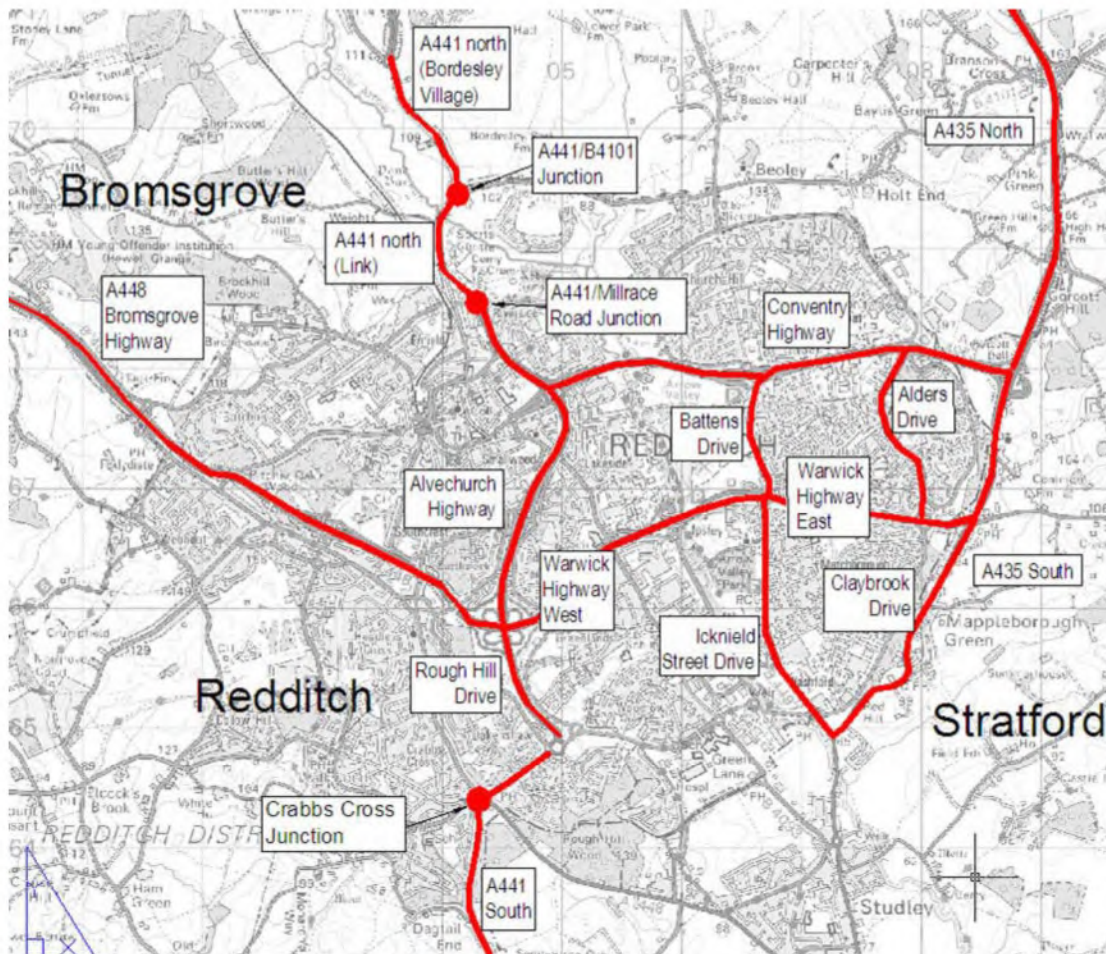
ADR's: Three ADR's being Brockhill, Webheath and A435 are considered within the report to be potentially available for development. The capacity of the Webheath and Brockhill ADR's combined are given by Redditch Borough council as 1050 dwellings. The A435 / Winyates Triangle ADR located off the A435 south (single carriageway section) comprises 29 Hectares. For the purposes of this report an appropriate housing density is taken to be 35 dwellings per hectare.

A435 / Winyates Triangle ADR: A previous study undertaken by GVA Grimley assessed the impact of the A435 ADR and Winyates Green Triangle. The assessment determined that the impacting traffic created by the ADR would disburse on Far Moor Lane and Claybrook Drive other than the A435. This has been incorporated into this assessment

5.0 EXISTING NETWORK

- 5.1 This section undertakes a broad review of the local highway network in terms of current traffic capacity. It identifies areas of constraint on the highway network and potential mitigation measures that may increase the capacity of the highway network. **Figure 1** illustrates the primary highway road network that will be assessed.

Figure 1: Redditch District Primary Highway Network



Existing Traffic Flow Data

- 5.2 Traffic flow data has been made available to undertake an assessment of the capacity and operation of the primary highway road network within Redditch Borough. From a review of this information key areas have been targeted for assessment as listed in **Table 2**. Traffic Flow data is shown in **Appendix B**.

Table 2: Highway Assessment Locations

Location	Data Type
A441 North (Bordesley)	AADTs
A441 North (Link)	AADTs
Warwick Highway East	AADTs
Warwick Highway West	AADTs
Alvechurch Highway	AADTs
Coventry Highway	AADTs
A448 Bromsgrove Highway	AADTs
Roughill Drive	AADTs
A435 North	AADTs
A441 South	Manual peak Hour Sensitivity Turning Counts undertaken by WYG
A435 South	AADTs
Icknield Street Drive	AADTs
Battens Drive	Assumption made that two way flows equal to Icknield Street Drive
Claybrook Drive	Assumption made that two way flows equal to Icknield Street Drive
Alders Drive	Assumption made that two way flows equal to Icknield Street Drive
Crabbs Cross Roundabout	Manual peak Hour Sensitivity Turning Counts undertaken by WYG
Sainsbury's roundabout	Classified Turning Counts
B4101 / A441 Signalised Junction (at Bordesley Garage)	Classified Turning Counts

Committed Growth Studies

5.3 Initial growth studies⁴ have been undertaken to determine what level of development has already been committed by the Local Authority as listed in **Table 3**.

Table 3: Land Take up 2001-2006

Take up since 2001	Number of Dwellings
Build completions between 2001 and 2006	1,486
Builds under construction at 2006	314
Planning permissions granted	725
Planning permissions granted between 2006 and current date	83
Other development plan commitments	24
Total	2,632

⁴ WYG Indicative land requirements 2001 to 2026 contained within **Appendix H**

- 5.4 In addition to the committed developments highlighted in **Table 3**, the study has determined additional capacities for development growth within Redditch's existing urban conurbation. These are listed in **Table 4**.

Table 4: Internal Land Capacity

HCAA	Number of Dwellings
Surveyed capacity	736
Small sites and other trend based sources of capacity	805
Total	1,541

Committed ADRs

- 5.5 Following discussions with Redditch Borough Council three ADRs have been identified as shown in **Table 5**. These ADRs have been incorporated within the scheme as committed developments and adopted within the existing base model.

Table 5: Committed ADR's

ADR Location	Hectares	Density	Number of Dwellings
Brockhill – West of Redditch	12.86	35	450
Webheath – West of Redditch	17.14	35	600
A435 ADR and Winyates Triangle – East of Redditch	25.7	35	899
Total			1,949

Committed Developments

- 5.6 In total the growth study has identified 6,122 “committed” dwellings from land take studies, internal land capacities and ADRs. The “committed development” impacts will be incorporated into all of the three Spatial Options and applied to the existing (2007) operation of the road highway network as a base situation.

Current Highway Link Capacities

- 5.7 Congestion Reference Flows (CRF) calculated in accordance with TA 46/97 have been applied to determine the measure of the performance of a road link between two junctions, The CRF of a link is given by the formula:

$$\text{CRF} = \text{Capacity} * \text{NL} * \text{Wf} * 100/\text{Pkf} * 100/\text{PkD} * \text{AADT}/\text{AAWT}$$

Results of the assessment provide the theoretical AADT two-way flow capacities detailed within **Table 6**. Full calculations and details are shown in **Appendix F**.

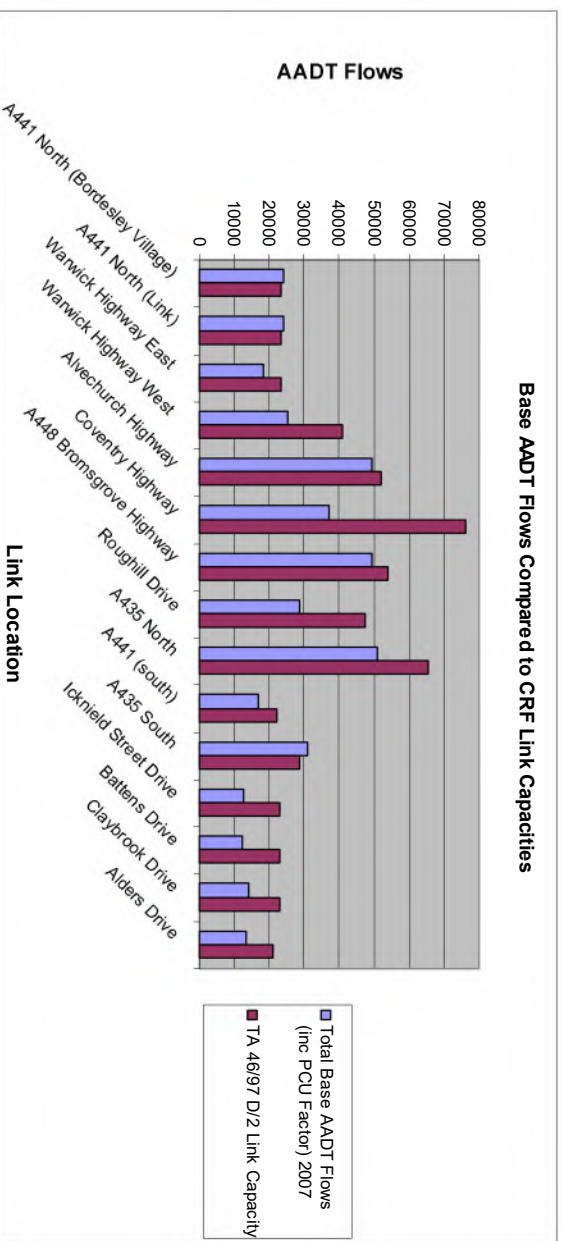
Table 6: Maximum Link CRF Capacities

Link	CRF 24h AADT
A441 North (Bordesley)	23,260
A441 North (Link)	23,260
Warwick Highway East	23,396
Warwick Highway West	41,047
Alvechurch Highway	52,170
Coventry Highway	75,990
A448 Bromsgrove Highway	53,852
Roughill Drive	47,451
A435 North	65,469
A441 South	22,385
A435 South	27,583
Icknield Street Drive	23,010
Battens Drive	23,010
Claybrook Drive	23,010
Alders Drive	21,134

Base Traffic Flows (Existing flows incorporating growth study results and ADRs) compared with current highway link capacities

5.8 Existing traffic flow data, provided by WCC, has been factored to the current base year of 2007 using NRTF⁵ central growth factors. The NRTF factor calculations are shown in **Appendix I**. The adopted base year traffic flows including the impact of the WYG growth study results (excluding completions and dwellings under construction anticipated to be catered for within traffic flow growth factors) in comparison to the road link capacities are illustrated in **Figure 2**.

Figure 2: Base Primary Highway Capacity



⁵ NRTF – National Road Traffic Forecast

5.9 The results above indicate three links on the primary highway network that are reaching / beyond their CRF capacities, these being the A441 north (Bordesley), A441 north (Link) and the A435 South. All other assessed links are considered to be operating within capacity.

Current Junction Capacities

5.10 In addition to the assessed links above, three junctions have been identified as bottlenecks within the operation of the highway network being:

- Crabbs Cross Roundabout
- Sainsbury's Roundabout
- B4101 / A441 Signalised Junction

5.11 Operational analysis has been undertaken for the junctions outlined in **Para 5.9** and existing spare capacities are illustrated in **Table 7**.

Table 7: Base Junction Capacities

Location	Maximum Design Operating Capacity	AM Peak Operating Capacity	PM Peak Operating Capacity	Comments
Crabbs Cross Roundabout	0.90% RFC	0.942% RFC	1.234% RFC	AM peak operating above capacity and PM peak operating above capacity.
Sainsbury's Roundabout	0.90% RFC	0.648% RFC	0.816% RFC	AM peak operating well within capacity, pm peak operating close to but below capacity.
B4101 / A441 Signalised Junction (at Bordesley Garage)	0% PRC	26.4% PRC	3.6% PRC	The junction is operating within capacity levels. (90s cycle time)

*Capacity models contained within **Appendix J**

5.12 Further to **Table 7**, operational analysis has been undertaken for the junctions identified in **Para 5.9** using the industry standard software, ARCADY, LINSIG and TRANSYT to determine optimum flow capacities; these results are shown in **Table 8**.

Table 8: Base Junction Optimum Capacities

Location	Potential Additional Flows (PCU) during peak hours
Crabbs Cross Roundabout	0 PCU
Sainsbury's Roundabout	250 PCU
B4101 / A441 Signalised Junction (at Bordesley Garage)	100 PCU (120s cycle time)

*Capacity models contained within **Appendix J**

Existing Network conclusions

- 5.13 **Section 5** has identified the current operational capacity of the primary highway network in Redditch Borough (including the committed growth identified within **Para 5.5** and ADRs identified in **Para 5.6**).
- 5.14 It can be concluded that of those links / junctions that were assessed, three links and one junction providing access into the Borough are currently at or nearing capacity, these being the A441 (north) link, the A435 (east) link and the Crabbs Cross Roundabout.
- 5.15 All other assessed links operate satisfactorily with spare capacity to accommodate some additional residential / employment growth.

Potential Improvements to Links/Junctions relating to Base Scenario

- 5.16 This section identifies potential measures to improve existing base capacity issues on the assessed highway network
- 5.17 Previous studies have identified the need for a bypass north of Bordesley. This bypass would form a dual 2 lane carriageway around the existing development and increase the capacity at this location to approximately 75,000 PCU's per day.
- 5.18 A review of the Crabbs Cross roundabout junction has been undertaken to determine whether additional capacity can be created through improvement measures. Firstly, by reviewing the topography of the land surrounding the junction, the scope for increasing the size of the junction may be limited without the acquisition of third party land. If it is possible then an additional throughput of approximately 365 PCUs could be accommodated.
- 5.19 Unless acquisition of third party land is an option it is considered that a single carriageway bypass would alleviate the congestion at the junction, linking the A441 north of Astwood Bank to the Woodrow Drive link east of the Alvechurch Highway / Roughill Drive roundabout junction.
- 5.20 A review has been undertaken regarding the potential signalisation of the Crabbs Cross Roundabout; however, given the existing layout and potential land constraints it is anticipated that only a marginal increase in capacity could be achieved. This is due to the relatively even dispersion of traffic flows impacting each entry / exit arm.

5.21 In addition a review of the Sainsbury's Roundabout has been undertaken. Given substantial gyratory widening works, entry and exit arm widening along with part signalisation an additional peak hour throughput of 850 PCU's could be accommodated.

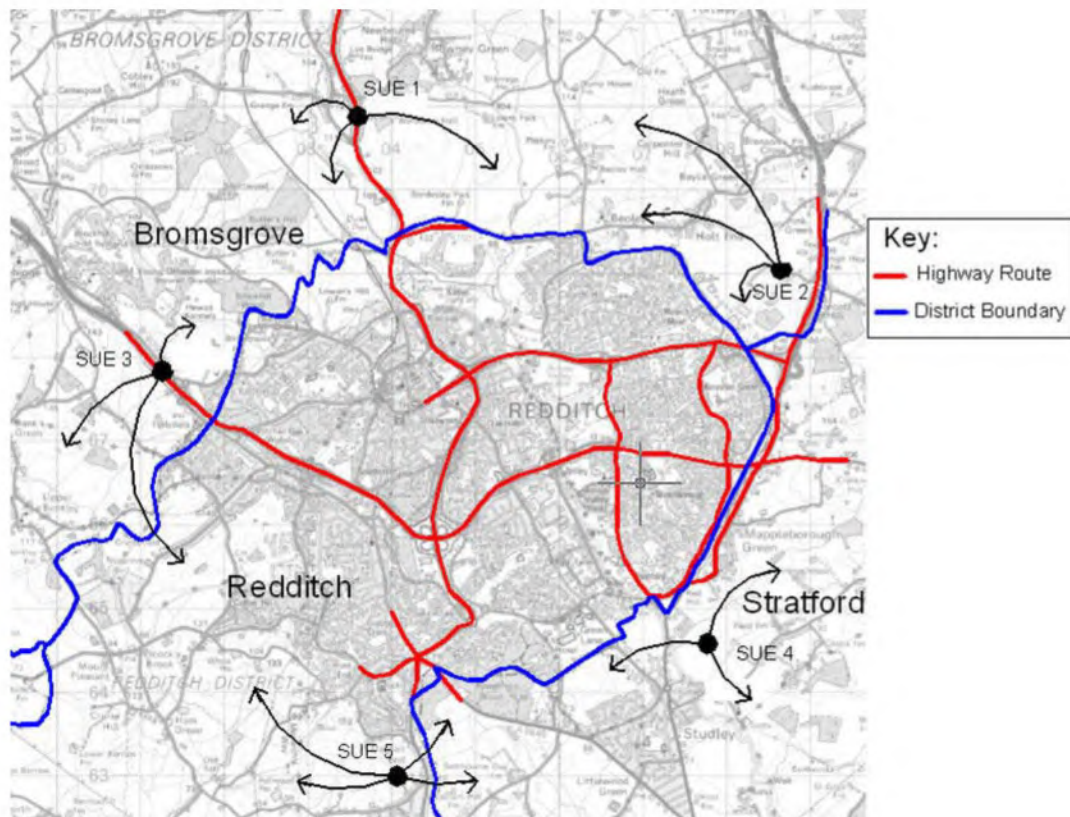
Potential Sustainable Urban Extension Locations

5.22 Further to the constraints identified above, excluding the already identified committed growth (**Para 5.5**), six broad locations have been identified to accommodate the spatial options dependant upon the outcome of this report. These locations are to form the basis of this study and comprise:

- 1) **To the North of Redditch Adjacent to the A441**
- 2) **To the North East of Redditch Adjacent to the A435**
- 3) **To the West of Redditch Adjacent to the A448**
- 4) **To the South East of Redditch Adjacent to the A435**
- 5) **To the south of Redditch Above Astwood Bank Adjacent to the A441**
- 6) **Equal Split of Locations 1 to 5 Above.**

5.23 Potential location of the SUEs and direction of growth are illustrated in **Figure 3**.

Figure 3: SUE Locations



6.0 SUSTAINABILITY

6.1 This section considers the existing level of sustainable transport, in the form of pedestrian, cycle and public transport access, within the vicinity of the proposed SUEs.

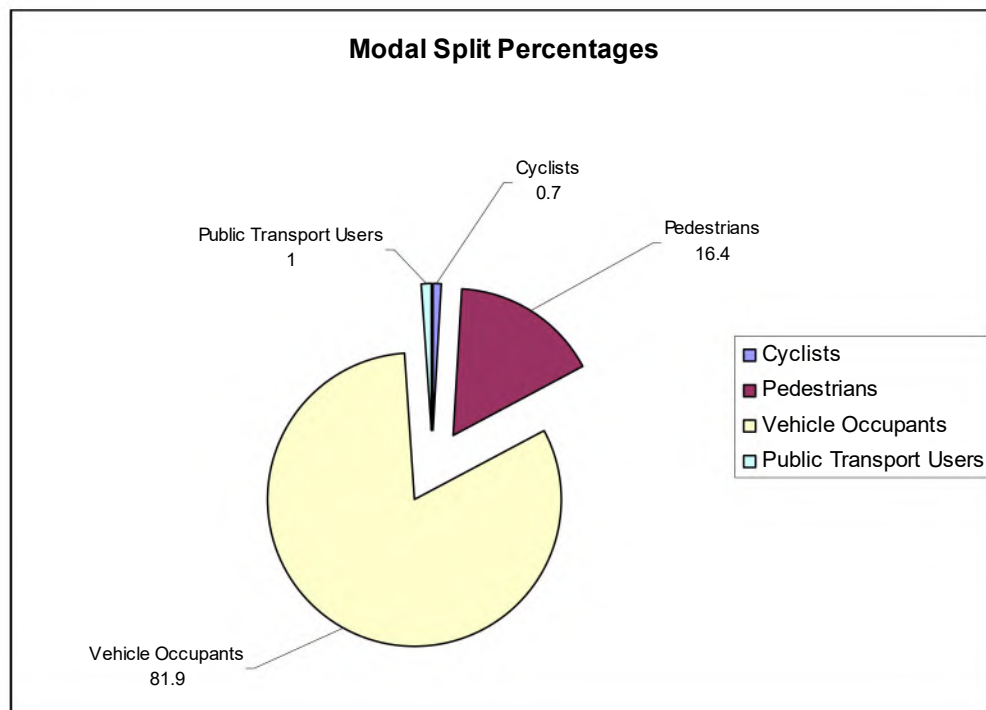
6.2 It will determine modal use patterns for each of the proposed SUEs by comparing existing pedestrian, cyclist and public transport facilities along with modal split percentages derived from the TRICS (Trip Rate Information Computer System) Database v2007(b).

Multi Modal Assessment

6.3 An assessment of the TRICS database has been undertaken to obtain an understanding of the general proportion of trips being undertaken by sustainable modes of transport to provide a median point for the SUE developments modal patterns to be formed around.

6.4 The assessment was undertaken for mixed private housing land use within Worcestershire to provide a robust assessment (no suitable data is available from TRICS for Warwickshire). The findings are illustrated in **Figure 4**.

Figure 4: TRICS Modal Split Percentages



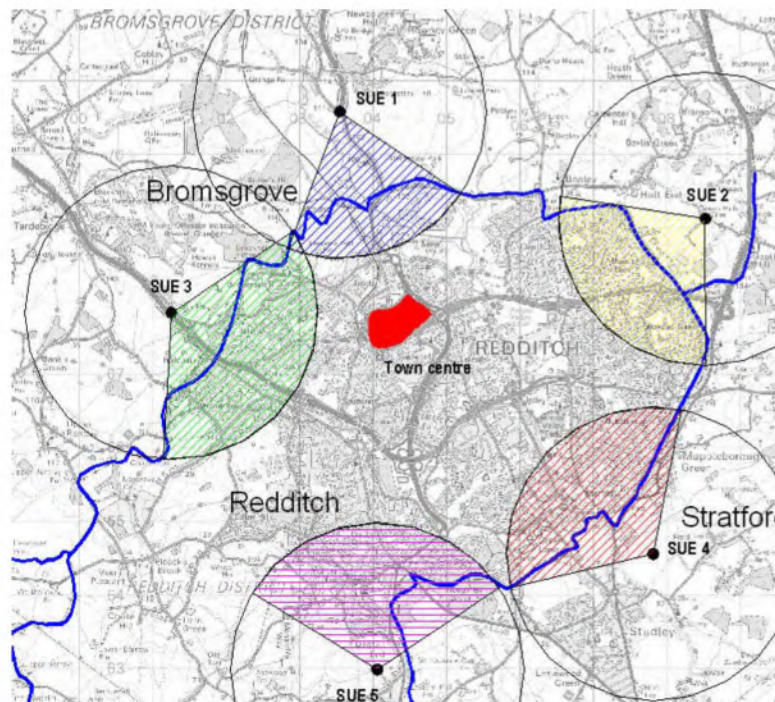
6.5 **Figure 4** indicates that Worcestershire, in general, has a modal split of 81.9% private car users. The figures derived from the TRICS database do not split the vehicle occupants down into

separate categories. It is considered that the modal splits identified accurately reflect the 'base' situation for travel within Redditch.

Walking Accessibility

- 6.6 In terms of pedestrian movement, accessibility is governed by available/proposed routes and trip length. In terms of distance, it is necessary to consider what is realistic for a walk trip. The Institution of Highways and Transportation in their document "Guidelines for Providing for Journeys on Foot" state that "walking accounts for over a quarter of all journeys and over four fifths of journeys less than one mile". Manual for Streets (2007), states that walking "is the principal form of travel for trips under one mile". The PPG13 A Guide to Better Practice document (2001) identifies that people are prepared to walk up to 2 km. PPG13 also identifies walking as the most important mode of travel at the local level and that walking offers the greatest opportunity to replace short car trips of up to 2 km. The DfT in their Transport Statistics on walking in Great Britain state that the average length of a walk journey is 0.6 miles (965m).
- 6.7 It can be concluded therefore that distances up to 2 km can generally be undertaken on foot and that walking is an effective mode for trip making at this distance. A 2 km isochrone from the individual SUE locations are illustrated in **Figure 5** in relation to Redditch town centre and general conurbations.

Figure 5: Walking Accessibility

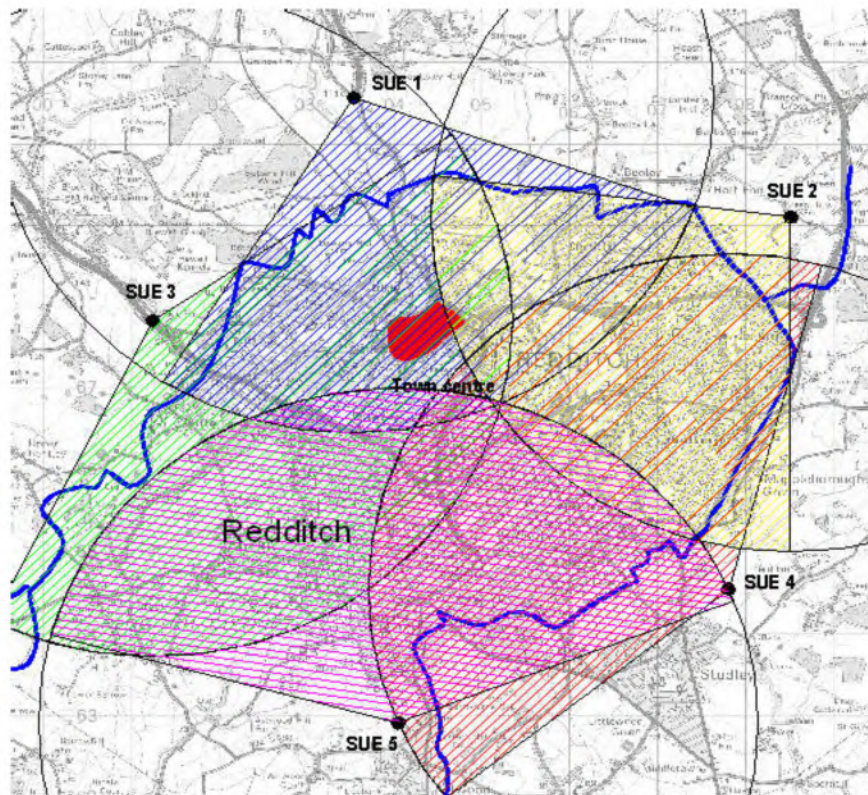


- 6.8 The assessment illustrates that SUE location 1 (3.0 km) is closest to Redditch Town Centre followed by SUE locations 3 (3.1 km), 2 (4.5 km), 4 (4.7 km) and 5 (4.7 km). All SUE centroids are over 2km from Redditch Town Centre.

Cycling Accessibility

- 6.9 In terms of cycling movements, accessibility will be governed by available/proposed routes and trip length. The DfT in their Transport Statistics on Cycling in Great Britain state that the average length of a cycle journey is 2.4 miles (3.84 km). The PPG13 “A Guide to Better Practice document” (2001) identifies that people are prepared to cycle up to 8 km.
- 6.10 It can be concluded that approximately 4 km represents a reasonable cycling distance and that 8 km is a maximum realistic range for worthwhile numbers of cycle trips. A 4 km isochrone is displayed within **Figure 6** in relation to Redditch town Centre and general conurbations.

Figure 6: Cycling Accessibility



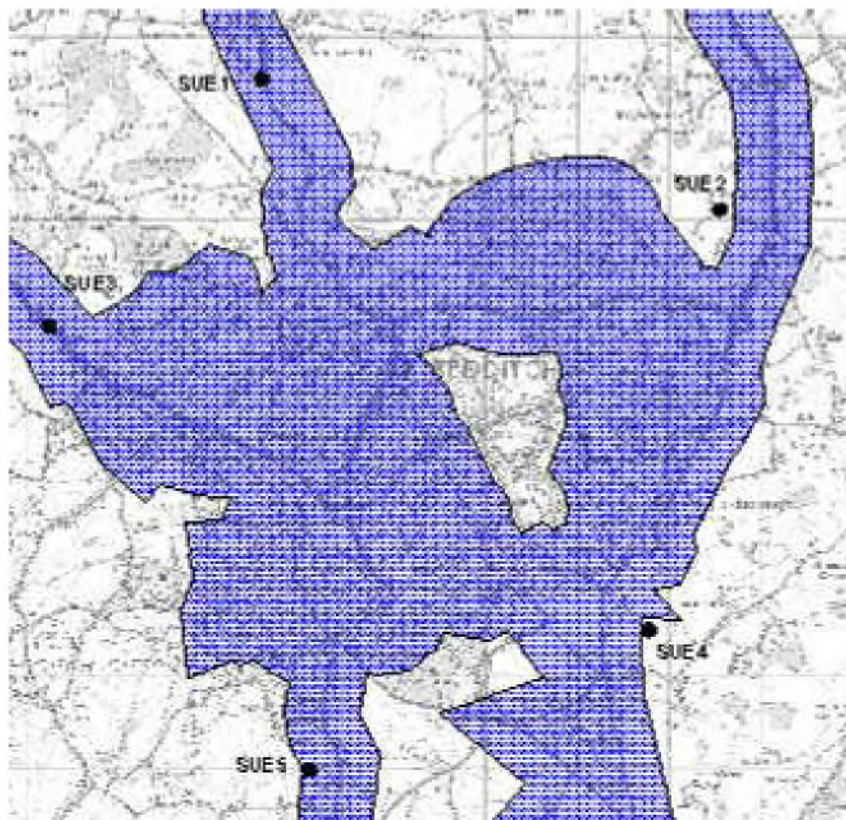
- 6.11 The assessment concludes that the most suited SUE location by means of cycle passage is either locations of SUE 1 or SUE 3, each having centroids within 4 km of Redditch Town Centre. Accessibility from SUE location 3 is limited to the East of Redditch Town Centre given the

maximum average cycling distance adopted of 4 km, whereas SUE locations 4 and 5 are approximately 4.7 km from Redditch Town Centre and therefore may not be accessible by cycle modes.

Public Transport Accessibility

- 6.12 The Institute of Highways and Transportation's (IHT) 'Planning for Public Transport in Developments' that 'new developments should be located so that public transport trips involve a walking distance of less than 400m from the nearest bus stop'
- 6.13 A review of the existing bus routes has been undertaken to determine the existing catchment areas and potential to extend routes by means of assessing their existing length from Redditch Town Centre compared to Journey Times. **Figure 7** identifies the current bus routes with 400m Isochrones.

Figure 7: Public Transport Accessibility (Bus)

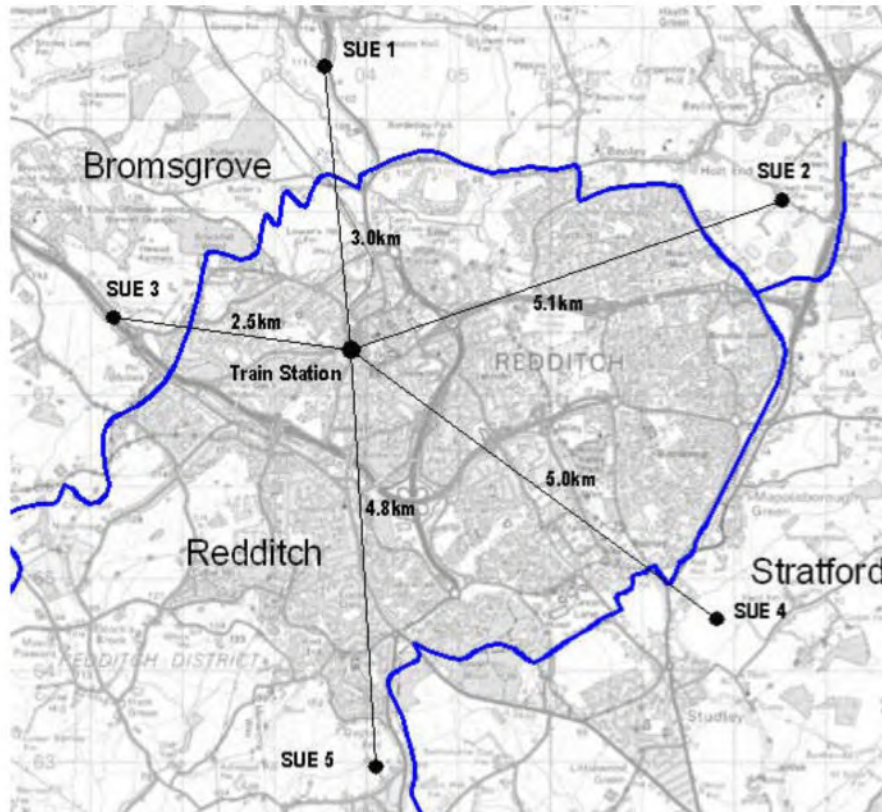


- 6.14 The assessment illustrates that all of the proposed SUE locations are on or adjacent to existing bus routes.

Rail Accessibility

- 6.15 It is considered given the accessibility distances determined for foot passage in **Para 6.6**, a distance of 2km would suit accessibility to rail stations. SUE distances from Redditch rail station (direct line distances) are illustrated in **Figure 8**.

Figure 8: Rail Accessibility



- 6.16 The assessment illustrates that SUE location 3 (2.5 km) is closest to Redditch rail station followed by SUE locations 1 (3.0 km), 5 (4.8 km), 4 (5.0 km) and 2 (5.1 km). All SUE centroids are over 2km from Redditch's rail station.
- 6.17 The current rail line terminates at Redditch and is accommodated by a single track. It is understood that the rail infrastructure is currently at / above capacity levels and would require mass improvement works to increase its existing capabilities.

Modal Split Conclusions

6.18 By reviewing the results above a simple scoring assessment has been undertaken to determine the rankings of sustainability for each of the SUE locations. The results of which are shown in **Table 9**.

Table 9: Sustainable Modal Ranking and adopted Levels

SUE Location	Walking (ranked 1-5)	Cycling (ranked 1-5)	Public Transport (Bus & Rail) (ranked 1-5)	Total Score	Target Modal Split
SUE 1 – A441 North	6	6	5	17	71.9%
SUE 2 – A435 North East	3	3	1	7	83.9%
SUE 3 – A448 West	5	6	6	17	71.9%
SUE 4 – A435 South East	1	1	2	4	91.9%
SUE 5 – A441 South	1	1	3	5	87.9%
SUE Combination (equal development split)	4	4	4	12	79.9%

Ranking Assessment contained in **Appendix K**

6.19 The general modal split for Redditch was determined to be 81.9% in **Para 6.4**. It has been assumed that locations most benefiting from current access to the town centre and rail station will benefit by up to +10%, where as SUE locations ranked lower will have lesser anticipated modal splits by up to -10%. These modal splits estimates will be utilised in **Section 7** when calculating the traffic generation impact for each of the SUE locations.

6.20 It may be beneficial, dependent upon the outcome of this report regarding the optimum location for SUE(s), to relocate the existing rail station to the north of Redditch Town Centre off the A441. The scenario could have the following benefits:

- Provide excellent rail accessibility to SUE 1 and moderate accessibility to SUE location 2 and 3 given adequate infrastructure provision.
- Shorten rail journeys between Redditch and Birmingham
- Increase Rail Capacity on the Rail Line.

7.0 SPATIAL OPTIONS IMPACT

- 7.1 This section reviews the Borough's ability to accommodate each of the Spatial Options upon its primary highway network. It incorporates the committed growth developments identified in **Para 5.5**, and the capacity restraints identified in **Section 5.0**. Due to the time period to which the residential growth is targeted phasing of the development has been applied.
- 7.2 By taking into account the "committed developments", identified in **Para 5.6**, the required level of residential provision is shown in **Table 10**.

Table 10: Revised Spatial Options Build Rates

	Spatial Option 1 (Dwellings)	Spatial Option 2 (Dwellings)	Spatial Option 3 (Dwellings)
Total	-1822 (already accommodated within committed developments)	2,078	7,078

- 7.3 The conclusions in **Table 9** indicate that Spatial Option 1 is accommodated by the identified "committed developments". Subsequently this assessment will only focus on Spatial Options 2 and 3 regarding highway impact and capacity constraint.

SUE Location Impact Assessment

- 7.4 Individual assessments, to determine improvement requirements, have been undertaken for each Link / Junction relating to individual SUE locations and Spatial Options. The assessments are contained in **Appendix L** and conclusions summarised in **Tables 11** and **12**.

Table 11: Spatial Option 2 - Improvement Requirements

SUE Location	SUE Location 1	SUE Location 2	SUE Location 3	SUE Location 4	SUE Location 5	SUE Location Equal Combination
A441 (Bordesley)	Yes	Possible	Possible	Yes	Yes	Yes
A441 Bordesley Link	Yes	Possible	Possible	Yes	Yes	Possible
Warwick Highway East	No	No	No	No	No	No
Warwick Highway West	No	No	No	No	No	No
Alvechurch Highway	Possible	Possible	Possible	Possible	Possible	Possible
Coventry Highway	No	No	No	No	No	No
Bromsgrove Highway	Possible	Possible	Possible	Possible	Possible	Possible
Roughill Drive	No	No	No	No	No	No
A435 North	No	Possible	No	Possible	No	No
A441 South	No	No	No	No	Yes	Possible
A435 South	Possible	Yes	Possible	Yes	Possible	Possible
Icknield Street Drive	No	No	No	No	No	No
Battens Drive	No	No	No	No	No	No
Claybrook Drive	No	No	No	No	No	No
Alders Drive	No	No	No	No	No	No
Crabbs Cross Roundabout	Possible (junction improvements)	Yes (junction improvements)	Yes (junction improvements)	Not assessed due to anticipated minimal impact	Yes (Bypass)	Yes (junction improvements)
Sainabury's Roundabout	No	Not assessed due to anticipated minimal impact	No	Yes (junction improvements)	No	No
B4101 / A441 Signalised Junction (at Bordesley Garage)	Not assessed due to bypass	No	No	Not assessed due to bypass	Not assessed due to bypass	Not assessed due to bypass

Table 12: Spatial Option 3 - Improvement Requirements

SUE Location	SUE Location 1	SUE Location 2	SUE Location 3	SUE Location 4	SUE Location 5	SUE Location Equal Combination
A441 (Bordesley)	Yes	Possible	Yes	Yes	Yes	Yes
A441 Bordesley Link	Yes	Possible	Yes	Yes	Yes	Yes
Warwick Highway East	No	Possible	No	Possible	No	No
Warwick Highway West	No	No	No	No	No	No
Alvechurch Highway	Possible	Possible	Possible	Yes	Yes	Possible
Coventry Highway	No	No	No	No	No	No
Bromsgrove Highway	Possible	Possible	Yes	Possible	Possible	Possible
Roughill Drive	No	No	No	No	Yes	No
A435 North	No	Yes	No	Possible	Possible	Possible
A441 South	No	No	No	No	Yes	Possible
A435 South	Yes	Yes	Possible	Yes	Yes	Yes
Icknield Street Drive	No	No	No	No	No	No
Battens Drive	No	No	No	No	No	No
Claybrook Drive	No	No	No	No	No	No
Alders Drive	No	No	No	No	No	No
Crabbs Cross Roundabout	Possible (junction improvements)	Yes (junction improvements)	Yes (junction improvements)	Not assessed due to anticipated minimal impact	Yes (Bypass)	Yes (Bypass)
Sainsbury's Roundabout	Yes ⁶	Not assessed due to anticipated minimal impact	Potential (junction improvements)	Yes ⁶	Yes (junction improvements)	Yes (junction improvements)
B4101 / A441 Signalised Junction (at Bordesley Garage)	Not assessed due to bypass	No	Not assessed due to bypass	Not assessed due to bypass	Not assessed due to bypass	Not assessed due to bypass

⁶ Junction improvements & re-routing of traffic – potential northern bypasses

8.0 IMPROVEMENT COSTS

- 8.1 This section identifies anticipated cost approximations for construction of improvement measures identified within this report. Broad assumptions have been identified for each of the improvement works specified. All cost estimates should only be considered as indicative. Broad assumptions for each cost appraisal measure are contained within **Appendix M**.
- 8.2 **Table 13** identifies the relevant estimated upper and lower range of costs associated with each of the Spatial Options and SUE locations whilst locations of anticipated works are shown on **Figure 9**.

Table 13: Improvement Measures / Costs

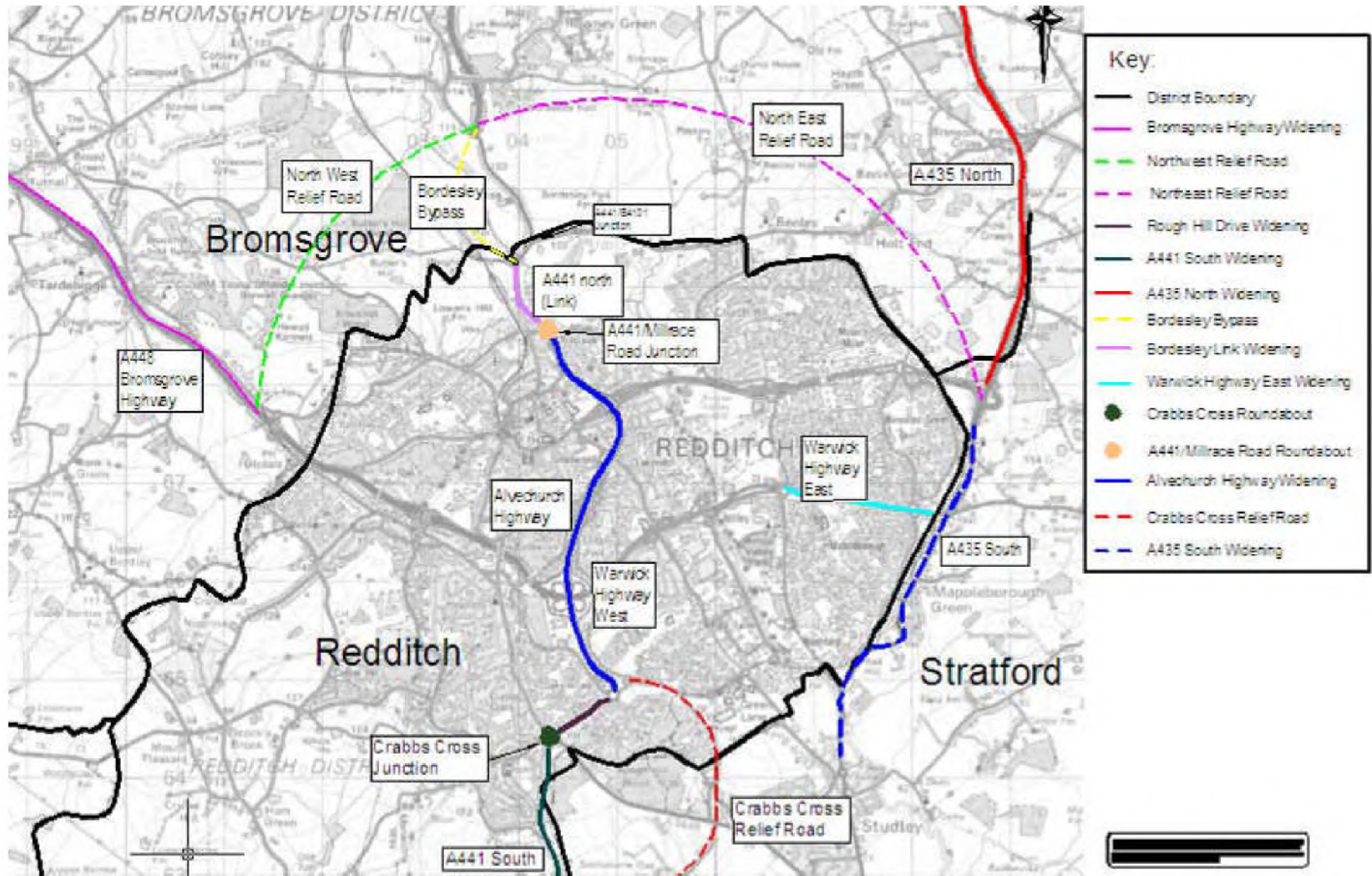
Development Location	Mitigation Requirements		
	Spatial Option 1 (committed Developments)	Spatial Option 2	Spatial Option 3
SUE1 – Off A441 (North)	1) Potential Bordesley Bypass 2) Potential Bordesley Link Widening 3) Potential Alvechurch Highway Widening 4) Potential Bromsgrove Highway Widening 5) A435 Widening (south) 6) Potential Crabbs Cross Junction Improvements	1) Bordesley Bypass 2) Bordesley Link Widening 3) Potential Alvechurch Highway Widening 4) Potential Bromsgrove Highway Widening 5) Potential A435 Widening (south) 6) Potential Crabbs Cross junction improvements	1) Bordesley Bypass 2) Bordesley Link Widening 3) Potential Alvechurch Highway Widening 4) Potential Bromsgrove Highway Widening 5) A435 Widening (south) 6) Crabbs Cross junction improvements 7) Sainsbury's Roundabout improvement Works 8) North East Relief Road.
Anticipated Cost (million)	£0m - £175.25m (Ave = £87.625m)	£20.25m - £175.25m (Ave = £97.75m)	£73.75m - £205.25m (Ave = £139.50m)
SUE2 – Off A435 (North East)	1) Potential Bordesley Bypass 2) Potential Bordesley Link Widening 3) Potential Alvechurch Highway Widening 4) Potential Bromsgrove Highway Widening 5) A435 Widening (south) 6) Potential Crabbs Cross Junction Improvements	1) Potential Bordesley Bypass 2) Potential Bordesley Link Widening 3) Potential Alvechurch Highway Widening 4) Potential Bromsgrove Highway Widening 5) Potential A435 Widening (north) 6) A435 Widening (south) 7) Crabbs Cross junction improvements	1) Potential Bordesley Bypass 2) Potential Bordesley Link Widening 3) Potential Warwick Highway Widening (east) 4) Potential Alvechurch Highway Widening 5) Potential Bromsgrove Highway Widening 6) A435 Widening (north) 7) A435 Widening (south) 8) Crabbs Cross junction improvements
Anticipated Cost (million)	£0m - £175.25m (Ave = £87.625m)	£23.50m - £229.25m (Ave = £126.375m)	£77.50m - £234.25m (Ave = £155.875m)

Development Location	Mitigation Requirements		
	Spatial Option 1 (committed Developments)	Spatial Option 2	Spatial Option 3
SUE3 – Off A448 (West)	<ol style="list-style-type: none"> 1) Potential Bordesley Bypass 2) Potential Bordesley Link Widening 3) Potential Alvechurch Highway Widening 4) Potential Bromsgrove Highway Widening 5) Potential A435 Widening (south) 6) Potential Crabbs Cross Junction Improvements 	<ol style="list-style-type: none"> 1) Potential Bordesley Bypass 2) Potential Bordesley Link Widening 3) Potential Alvechurch Highway Widening 4) Potential Bromsgrove Highway Widening 5) Potential A435 Widening (south) 6) Crabbs Cross junction improvements 	<ol style="list-style-type: none"> 1) Bordesley Bypass 2) Bordesley Link Widening 3) Potential Alvechurch Highway Widening 4) Bromsgrove Highway Widening 5) Potential A435 Widening (south) 6) Crabbs Cross junction improvements 7) Sainsbury's Roundabout improvement works
Anticipated Cost (million)	£0m - £175.25m (Ave = £87.625m)	£7.50m - £175.25m (Ave = £91.375m)	£85.50m - £176.25m (Ave = £130.875m)
SUE4 – Off A435 (South)	<ol style="list-style-type: none"> 1) Potential Bordesley Bypass 2) Potential Bordesley Link Widening 3) Potential Alvechurch Highway Widening 4) Potential Bromsgrove Highway Widening 5) A435 Widening (south) 	<ol style="list-style-type: none"> 1) Bordesley Bypass 2) Bordesley Link Widening 3) Potential Alvechurch Highway Widening 4) Potential Bromsgrove Highway Widening 5) Potential A435 Widening (north) 6) A435 Widening (south) 7) Sainsbury's Roundabout improvement works 	<ol style="list-style-type: none"> 1) Bordesley Bypass 2) Bordesley Link Widening 3) Potential Warwick Highway Widening (east) 4) Alvechurch Highway Widening 5) Potential Bromsgrove Highway Widening 6) Potential A435 widening (north) 7) A435 Widening (south) 8) Sainsbury's Roundabout improvement works 9) North East Relief Road⁷ 10) Potential North West Relief Road
Anticipated Cost (million)	£0m - £175.25m (Ave = £87.625m)	£37.25m - £227.75m (Ave = £132.50m)	£140.00m - £306.25m (Ave = £223.125m)

Development Location	Mitigation Requirements		
	Spatial Option 1 (committed Developments)	Spatial Option 2	Spatial Option 3
SUE5 – Off A441 (South)	1) Potential Bordesley Bypass 2) Potential Bordesley Link Widening 3) Potential Alvechurch Highway Widening 4) Potential Bromsgrove Highway Widening 5) Potential A435 Widening (south) 6) Potential Crabbs Cross Junction Improvements	1) Bordesley Bypass 2) Bordesley Link Widening 3) Potential Alvechurch Highway Widening 4) Potential Bromsgrove Highway Widening 5) A441 Widening (south) 6) Potential A435 Widening (south) 7) Crabbs Cross Relief Road / Bypass	1) Bordesley Bypass 2) Bordesley Link Widening 3) Alvechurch Highway Widening 4) Potential Bromsgrove Highway Widening 5) Roughill Drive Widening 6) Potential Widening to A435 (north) 7) A441 Widening (south) 8) A435 Widening (south) 9) Crabbs Cross Relief Road / Bypass 10) Sainsbury's Roundabout improvement works 11) North East Relief Road ⁷ 12) Potential North West Relief Road
Anticipated Cost (million)	£0m - £175.25m (Ave = £87.625m)	£42.00m - £189.50m (Ave = £115.75m)	£171.00m - £332.25m (Ave = £251.675m)
Equal Combination of Sues	1) Potential Bordesley Bypass 2) Potential Bordesley Link Widening 3) Potential Alvechurch Highway Widening 4) Potential Bromsgrove Highway Widening 5) Potential A435 Widening (south) 6) Potential Crabbs Cross Junction Improvements	1) Bordesley Bypass 2) Potential Bordesley Link Widening 3) Potential Alvechurch Highway Widening 4) Potential Bromsgrove Highway Widening 5) Potential A441 Widening (south) 6) Potential A435 Widening (south) 7) Crabbs Cross Junction Improvements	1) Bordesley Bypass 2) Bordesley Link Widening 3) Potential Alvechurch Highway Widening 4) Bromsgrove Highway Widening 5) Potential North West Relief Road ⁷ 6) Potential Widening to A435 (north) 7) North East Relief Road 8) A441 Widening (south) 9) A435 Widening (south) 10) Crabbs Cross Relief Road / Bypass 11) Sainsbury's Roundabout improvement works
Anticipated Cost (million)	£0m - £175.25m (Ave = £87.625m)	£23.0m - £186.50m (Ave = £104.75m)	£73.75m - £320.00m (Ave = £196.875m)

Broad assumptions for each cost appraisal are contained within **Appendix M**.

Figure 9: Proposed Improvement Work locations



9.0 CONCLUSIONS, RECOMMENDATIONS AND FURTHER WORK

Conclusions

- 9.1 This study has examined the highways and transportation implications of possible 'sustainable urban extensions' to help meet housing allocations in the draft Regional Plan 2001 – 2026. This report summarises the findings of the study and also makes recommendations on further work for the longer term. The purpose of the study is to aid the joint⁷ Council's further comments on the draft Regional Plan, in particular in relation to the scale of SUEs.
- 9.2 The Housing allocations for Redditch Borough have been set as 4,300 dwellings for Spatial Option 1, 8,200 dwellings for Spatial Option 2 and 13,200 dwellings for Spatial Option 3.
- 9.3 The primary highway network within Redditch Borough has been assessed. This study has determined physical constraints that limit possible locations for SUEs in terms of capacity and economic cost. In broad terms, it is possible to serve new major developments within / adjacent to Redditch Borough, however new infrastructure will be required and fluctuations in cost dependent upon development locality.
- 9.4 A separate WYG study has been undertaken that concludes 6,122 dwellings have already been granted planning permission are areas of Development Restriction (ADR's) or been constructed between 2001 and 2006 or identified as available capacity for development sites within Redditch. For the purpose of this report these sites have been classified as 'Committed Developments' and resultant traffic flows have been incorporated within the existing base traffic flows.
- 9.5 The assessment identified several existing links / junctions that will be nearing or beyond their theoretical operational capacity, being:
- A441 (north) Bordesley Link;
 - A441 North (Bordesley)
 - A435 (south);
 - Crabbs Cross Roundabout Junction;

⁷ Joint council includes: Worcestershire county Council, Redditch Borough council, Bromsgrove Borough council, Stratford Council

9.6 Five location options (and a sixth option comprising a fifth of each of the five locations) for SUEs have been assessed within this study, being:

- A441 (North) Adjacent to Bordesley (SUE Location 1);
- A435 (North) North of Holt End (SUE Location 2);
- A448 (West) Adjacent to Bromsgrove Highway / A4184 junction (SUE Location 3);
- A435 (East) Adjacent to Studley (SUE Location 4);
- A441 (south) North of Astwood Bank (SUE location 5);
- Equal combination of SUEs 1 to 5;

9.7 A review into the sustainable accessibility has been undertaken regarding all SUE locations relating to Foot, Cycle, Bus and Rail Accessibility to Redditch Town Centre and rail station. The review has determined that SUEs located at the A441 (north) Link (SUE location 1) and A448 (west) Link (SUE location 3) provide the best linkages to Redditch Town Centre and Rail Station.

9.8 The study has determined worst and best case cost estimations for infrastructure provision relating to each SUE locality and Spatial Option.

Table 14: Potential Improvement Costs Summary

Development Location	Mitigation Requirements Cost Bands		
	Spatial Option 1	Spatial Option 2	Spatial Option 3
A441 (north) SUE 1	£0m - £175.25m (Ave = £87.625m)	£20.25m - £175.25m (Ave = £97.75m)	£73.75m - £205.25m (Ave = £139.50m)
A435 (north) SUE 2	£0m - £175.25m (Ave = £87.625m)	£23.50m - £229.25m (Ave = £126.375m)	£77.50m - £234.25m (Ave = £155.875m)
A448 (West) SUE 3	£0m - £175.25m (Ave = £87.625m)	£7.50m - £175.25m (Ave = £91.375m)	£85.50m - £176.25m (Ave = £130.875m)
A435 (East) SUE 4	£0m - £175.25m (Ave = £87.625m)	£37.25m - £227.75m (Ave = £132.50m)	£140.00m - £306.25m (Ave = £223.125m)
A441 (south) SUE 5	£0m - £175.25m (Ave = £87.625m)	£42.00m - £189.50m (Ave = £115.75m)	£171.00m - £332.25m (Ave = £251.675m)
SUE Combined	£0m - £175.25m (Ave = £87.625m)	£23.0 - £186.50m (Ave = £104.75m)	£73.75m - £320.00m (Ave = £196.875m)

9.9 It is difficult to anticipate the actual operation of links / junctions when they have reached their theoretical capacity levels. The lower costs, identified in **Table 14**, illustrate a based case scenario of required improvement costs, whereas the higher figures provides a worst case scenario (based on requirements highlighted within **Tables 11 and 12**).

- 9.10 The study has identified that for Spatial Option 1 no additional development is required given existing committed developments.
- 9.11 The study has identified that for Spatial Option 2 the preferred development locality would be (based on an average between cost estimates) either a SUE located adjacent to the A448 Bromsgrove highway (SUE location 3), a SUE located adjacent to the A441 north link (SUE location 1) or an equal split between all SUE locations. Given the sustainable accessibility, determined within **Section 6**, the combination of SUEs option may provide limited sustainable accessibility; however, from an economic spatial view, the combination of SUEs could provide a robust expansion across the whole of Redditch and not concentrate development growth to one direction, thus benefiting all of Redditch District.
- 9.12 In terms of traffic and highways constraint the favoured locations for sustainable urban developments for Spatial Option 2 would be a SUE located adjacent to the A448 Bromsgrove highway (SUE location 3) or a SUE located adjacent to the A441 (north) link (SUE location 1).
- 9.13 The study has identified that for Spatial Option 3 the preferred development locality, in terms of transportation and highway constraints, would be (based on an average between cost estimates) either a SUE located adjacent to the A441 north link (SUE location 1) or a SUE located adjacent to the A448 Bromsgrove Highway Link (SUE location 3).

Recommendations and Next Steps

- 9.14 Further to the broad findings in this study, it is recommended that Redditch and its environs can accommodate all of the Spatial Options given adequate Infrastructure improvement measures. In general the study has identified, in terms of Highways and Transportation, the most appropriate locations for sustainable urban development, dependent upon the Spatial Option, would be either SUE located adjacent to the A441 north link (SUE location 1), A448 west link (SUE location 3) or an equal combination of SUE locations.
- 9.15 It is recommended that a further detailed review of the highway network within the Borough of Redditch is undertaken by means of a Redditch Borough, if not Worcestershire County (and including parts of Warwickshire County) wide transport model. This will more precisely indicate areas for potential future growth and capacity concerns (at a local level). Such a model would require the collection of substantial traffic survey data.

- 9.16 To equally disperse the traffic impact of the proposed SUEs leaving the Borough in a northern direction, it may be beneficial to construct a northern relief road linking the A448 via the A441 to the A435.
- 9.17 A detailed sustainability study should be undertaken to examine existing pedestrian cycle and public transport linkages and the potential to improve sustainable transport links to the proposed SUE locations.
- 9.18 Future work should review the existing use of the Railway Station and limited Town Centre parking provision. A potential solution to improve journey times (between Redditch and Birmingham) and assist in physically linking northern SUEs, would be to either relocate the existing Railway Station to the north of Redditch off the A441 and provide a shuttle service to the Town Centre utilising the old railway lines land take; or construct a new off line station adjacent to the propose SUE location 1. However to improve the capacity of the rail network between Birmingham and Redditch will requires the provision of a second track between Redditch and Barnt Green, the cost of which would be substantial. Nevertheless we would recommend that initial discussions regarding feasibility should be undertaken with the DfT and Network Rail.

Sustainability & Renewable Energy – Building Services System Summary Sheet

SUSTAINABLE TECHNIQUE	APPLICATION	ADVANTAGES	DISADVANTAGES	COSTS				COMMENT	SUITABILITY for SCHEME
				PAYBACK PERIOD	CAPITAL	DESIGN	OPERATIONAL		
Mixed Mode Ventilation	A combination of natural ventilation via opening windows and/or external louvres/openings and mechanical ventilation. Usually in the form of natural supply and mechanical extract.	<ol style="list-style-type: none"> 1. Partial reduction in capital, running and maintenance costs of HVAC systems. 2. Useful when natural ventilation is restricted but no real requirement or desire for full mechanical systems. 3. More reliability and security of natural supply requirements. 4. Qualifies for BREEAM credit 	<ol style="list-style-type: none"> 1. Some restrictions in control. 2. Unpredictable nature of external effects i.e. temperature and wind direction. 3. Restricts flexibility of internal spaces. 4. Reduces opportunity for heat recovery. 	Medium	Medium	Medium	Medium		High Medium Low
Seasonal Commissioning	Operational review/re-commissioning to be undertaken during first year of operation	<ol style="list-style-type: none"> 1. Maximises operating efficiency of systems. 2. Qualifies for BREEAM credit 	<ol style="list-style-type: none"> 1. Additional commissioning costs 	Long	Low	Low	Low		High Medium Low
Minimise Construction Site Impacts	Adopt best practice policies to all site activities	<ol style="list-style-type: none"> 1. Minimise wastage, pollution and energy consumption from site activities 2. Qualifies for BREEAM credit 	<ol style="list-style-type: none"> 1. Possible additional construction costs 	Long	Low	Low	Low		High Medium Low
Thermal Comfort Zoning	Undertake thermal comfort modelling and ensure that systems are designed to provide appropriate level of zoning and occupant control	<ol style="list-style-type: none"> 1. Provide appropriate level of occupant comfort 2. Qualifies for BREEAM credit 	<ol style="list-style-type: none"> 1. Increased design period input 2. More complex controls systems 3. Additional commissioning costs 	Long	Low	Low	Low		High Medium Low
Combined Heat and Power	Gas fired CHP engines to generate electricity and heat. (Biomass could also be considered)	<ol style="list-style-type: none"> 1. Good efficiency on medium to large sites. 2. Potential to 'sell' back energy to the grid. 3. Carbon tax levy applicable. 	<ol style="list-style-type: none"> 1. Utilisation profile of building must provide adequate load requirements to achieve efficiency at all times. 2. Procurement methods have major effect on viability and costs. 	Medium	High	High	Medium		High Medium Low
Grey Water Recycling	Utilisation of basin and shower drainage water for recycling and application to WC flushing and landscape watering etc.	<ol style="list-style-type: none"> 1. Saving on mains water and drainage costs 2. Contributes towards BREEAM rating. 	<ol style="list-style-type: none"> 1. External Excavations for tanks 2. Additional plant and equipment to maintain. 3. Additional distribution within building. 	Long	High	High	Low		High Medium Low
Rainwater Harvesting	Utilisation of rainwater for recycling and application to WC flushing and landscape watering etc.	<ol style="list-style-type: none"> 1. Saving on mains water and drainage costs. 2. Contributes towards BREEAM rating 	<ol style="list-style-type: none"> 1. External Excavations for tanks 2. Additional plant and equipment to maintain. 3. Additional distribution within building. 	Medium	Medium	High	Low		High Medium Low
Waterless Urinals	Urinals do not require water supplies for flushing.	<ol style="list-style-type: none"> 1. Saving on mains water and drainage. 2. Contributes towards BREEAM rating 	<ol style="list-style-type: none"> 1. Inherent high maintenance requirements and hence costs. 2. Smell problems if maintenance reduced. 	Medium	Medium	Low	Low		High Medium Low
Mains Water Leak detection	Leak detection for all major leaks to mains water supplies to the building	<ol style="list-style-type: none"> 1. Minimise wastage of water due to major water leaks 2. Qualifies for BREEAM credit 	<ol style="list-style-type: none"> 1. Additional installation costs 	Long	Low	Low	Low		High Medium Low
Sanitary Water supply shut-off	Provide proximity detection shut off to water supplies to toilet blocks	<ol style="list-style-type: none"> 1. Minimises wastage of water due to internal water leaks 2. Qualifies for BREEAM credit 	<ol style="list-style-type: none"> 1. Additional installation costs 	Long	Medium	Low	Low		High Medium Low
Variable Speed Drives	Speed controlled drives on pumps and fans where applicable.	<ol style="list-style-type: none"> 1. Eligible for Enhanced Capital Allowances. 2. Systems can be accurately commissioned. 	<ol style="list-style-type: none"> 1. Higher initial capital costs. 2. Increase in system complexity. 	Short	Medium	Low	Low		High Medium Low

Sustainability & Renewable Energy – Building Services System Summary Sheet

Photovoltaics	Roof mounted solar cells used to generate electricity.	1. Grants available. 2. Free Non-fossil fuel source. 3. Savings on roof cladding. 4. Can be Retrofit. 5. Generally simple installation procedures. 6. Large variety of types and concepts. 7. Can prolong roof life. 8. Small scale could be used as an educational demonstration programme. 9. Contributes towards BREEAM rating if large enough energy contribution	1. Fairly High capital costs and long payback periods. 2. Complex manufacturing procedure and technology. 3. High embodied energy levels. 4. Generally increased roof maintenance & access concerns. 5. Current Government grant initiatives nearing end of availability period. Continuing availability of grants to be considered.	Long	High	High	Medium		High Medium Low
i. Photovoltaics Monocrystalline	The most efficient of the PV technologies in good light conditions								
ii. Photovoltaics Polycrystalline	Highly efficient in good light conditions. Less embodied energy than monocrystalline.								
iii. Photovoltaics Thin-film	The most efficient in poor light conditions. An extremely sturdy, vandal-proof PV.								
iv. Photovoltaics Hybrid	A combination of monocrystalline and thin-film technologies, this has high peak output coupled with excellent performance in poor light conditions								
Solar Collectors	Roof mounted fluid based panels generating heat to fuel domestic hot water for instance.	1. Grants available. 2. Free Non-fossil fuel source. 3. Savings on roof cladding.	1. Full duty boiler and associated equipment required for periods of year when little sun. 2. Increased maintenance costs. 3. Current government grant initiatives nearing end of availability period. Continuing availability of grants to be considered.	Medium	High	High	Medium		High Medium Low
Ground Source Heating and/or Cooling	Utilisation of the earths thermal properties to generate heat and/or cooling via piped systems.	1. "Free" non-fossil primary energy source. 2. Reduced maintenance costs.	1. Early site and project analysis required. 2. Unpredictability of source until drilling is carried out. 3. Additional drilling costs.	Medium	High	High	Medium		High Medium Low
Thermal Mass	Utilisation of the inherent heavy thermal weight of exposed structural components to retain and release energy at appropriate times. Normally used with natural ventilation & night time cooling.	1. Free cooling/heating 2. Cost reduction to internal finishes. 3. Greater regulation of swings in internal temperature. 4. Qualifies for BREEAM credit	1. Restrictions in choice of construction techniques. 2. Limitations in control. 3. Internal aesthetics of materials. 4. Additional costs associated with exposed services installation	Long	High	Medium	Low		High Medium Low
Wind Energy (Large Scale)	High level wind driven blades used to generate electricity.	1. Grants/finance available. 2. Embedded renewable electrical energy source. 3. Contributes towards BREEAM rating if large enough energy contribution	1. Planning restrictions. 2. Noise 3. 'Up front' payments required.	Long	High	High	Medium		High Medium Low
Wind Energy (Small Scale)	Packaged 'plug in' units used to generate electricity.	1. Grants/finance available. 2. Embedded renewable electrical energy source 3. Can be Retrofit. 4. Modular concept can be applied. 5. Can incorporate turbine to generate hot water. 6. Small scale could be used as an educational demonstration programme. 7. Contributes towards BREEAM rating if large enough energy contribution.	1. Planning Restriction 2. More applicable to domestic/small scale situations.	Short	Low	Medium	Medium		High Medium Low
Biomass	The utilisation of alternative non-fossil fuels e.g. forestry waste, husks, olive stones/pulp etc to fuel boilers.	1. Non-fossil fuel source.	1. Regular source of fuel required i.e coppice rotation etc. 2. Usually transportation costs for fuel.	Medium	High	High	Low		High Medium Low
Occupant and/or Daylight controlled switching	Sensors incorporated to switch internal electric lighting in relation to occupants and levels of external daylight.	1. Maximise use of daylight. 2. Minimise use of electrical lighting 3. Qualifies for BREEAM credit	1. Increase in complexity of systems	Short	Medium	Medium	Medium		High Medium Low

Sustainability & Renewable Energy – Building Services System Summary Sheet

Heat Recovery (Air Systems)	Various methods of extracting heat energy from extract air stream and applying it to supply air streams e.g. plate exchangers, thermal wheel, run-around coil, heat pipes etc.	<ol style="list-style-type: none"> 1. Reduces direct heating and cooling energy consumption. 2. Can reduce primary heating equipment requirements. 3. Contributes towards BREEAM rating (CO₂ output) 	<ol style="list-style-type: none"> 1. Increases capital outlay of plant. 2. Additional controls required. 3. Risk of cross contamination between air streams. 4. Large variation in efficiencies with methods. 5. Additional maintenance costs with some methods. 	Short	Low	Low	Medium		High Medium Low
Sunpipes	Reflective ducts used to transfer natural light into internal or deep plan spaces.	<ol style="list-style-type: none"> 1. Benefits of natural light to occupants. 2. Savings energy associated with artificial lighting. 3. Reduces glare. 	<ol style="list-style-type: none"> 1. Additional structural & architectural considerations required to incorporate equipment. 	High	Medium	Low	Low		High Medium Low
Lightshelves	Reflective panel installed within the facade to direct natural light deeper into the occupied space.	<ol style="list-style-type: none"> 1. Benefits of natural light to occupants. 2. Savings energy associated with artificial lighting. 3. Reduces glare. 4. Enhances passive solar energy. 5. Can act as a solar shading device. 	<ol style="list-style-type: none"> 1. Additional structural & architectural considerations required to incorporate equipment into facade. 2. Enhances passive solar energy. 3. Can act as a solar shading device. 4. Reduces electrical light energy consumption. 	Long	Medium	Low	Low		High Medium Low
Windcatchers & Penthouse Louvres	A method of passive/natural ventilation reliant on the stack effect through a duct/penthouse.	<ol style="list-style-type: none"> 1. Passive natural supply and extract ventilation to internal or deep plan spaces. 	<ol style="list-style-type: none"> 1. Additional structural & architectural considerations required to incorporate equipment. 2. Additional controls and maintenance costs. 	Medium	Medium	Medium	Medium		High Medium Low
Fuel Cells	Fuel Cells produce electricity and heat by combining hydrogen and oxygen in an electrochemical process.	<ol style="list-style-type: none"> 1. High electrical efficiency 2. Significantly lower emissions of pollutants than conventional energy conversion technologies 3. Reduced greenhouse gas emissions. 4. Quiet operation 5. Modular construction 	<ol style="list-style-type: none"> 1. High costs. 2. Many formats still in R&D stages. 3. Fuel choice - availability, storage and reliability 4. No real codes of practice, standards and regulation exist. 5. Not fully developed in building services applications. 	Short	High	High	?		High Medium Low
Non-Touch Water Appliances	Sensor operated taps and WC flush controls to give a regulated amount of water.	<ol style="list-style-type: none"> 1. 40%-70% savings on cold water usage. 2. Contamination and Infection control as no physical contact with appliances. 3. Contributes towards BREEAM rating 	<ol style="list-style-type: none"> 1. Electrical supply required (battery or mains). 2. Cost increase on conventional taps & cisterns. 	Short	Low	Low	Low		High Medium Low
One-Touch Water Appliances	Single touch button or handle operated taps to give a regulated amount of water.	<ol style="list-style-type: none"> 1. 40%-70% savings on cold water usage. 2. Contributes towards BREEAM rating 	<ol style="list-style-type: none"> 1. Marginal cost increase on conventional taps & cisterns. 	Short	Low	Low	Low		High Medium Low
Urinal Flush Controls	Ceiling or wall mounted sensors to operate and control the regular flushing of single or multiple urinals.	<ol style="list-style-type: none"> 1. 70%-90% savings in cold water usage on unmanaged systems. 2. Compliance with current water regulations. 3. Contributes towards BREEAM rating 	<ol style="list-style-type: none"> 1. Electrical supply required (battery or mains). 2. Minor additional maintenance. 	Short	Low	Low	Low		High Medium Low
Flow Restrictors	Methods of restricting water flow in hot and cold water pipework and appliances to avoid wastage, via inline devices or outlets.	<ol style="list-style-type: none"> 1. 20%-50% savings on cold water usage. 2. Qualifies as BREEAM credit 	<ol style="list-style-type: none"> 1. Additional pipework modifications. 2. Minor additional maintenance costs. 	Short	Low	Low	Low		High Medium Low
High Performance Glazed Facades	Glazed facades effecting heat transfer, solar gain and shading, condensation risk, occupant visual comfort and acoustic performance. Methods include multiple glazing, solar coatings, inert gas filling, solid or motorised louvres and blinds, ventilated cavity etc.	<ol style="list-style-type: none"> 1. Improved control of solar heat gains and reduction in cooling requirements. 2. Glare reduction. 3. Increase in acoustic performance. 4. Increased insulation properties to minimise heating requirements and draughts. 5. Potential to incorporate solar shading. 	<ol style="list-style-type: none"> 1. Increased capital cost. 2. Complexity of installation. 3. Potential cavity condensation risk. 	Medium	High	High	Low		High Medium Low

Sustainability & Renewable Energy – Building Services System Summary Sheet

Green guide to specification	Building Materials specified in accordance with Green Guide to Specification	<ol style="list-style-type: none"> 1. Minimises impact on the environment of materials 2. Minimises embodied energy within buildings 3. Qualifies for BREEAM credit 	<ol style="list-style-type: none"> 1. May restrict materials available 2. May impact on cost. 	Long	Medium	Low	Low		High Medium Low
Cyclists facilities	Provide adequate cyclists facilities	<ol style="list-style-type: none"> 1. Encourages 'green travel' 2. Qualifies for BREEAM credit 		Long	Low	Low	Low		High Medium Low

LEGEND	
Payback Period	
Short	0 – 5 years approximately
Medium	5 – 20 years approximately
Long	20 years or over

APPENDIX B

SPECIFICATION OF TELEPHONE EXCHANGES IN REDDITCH

Redditch (WMRJ)

General information

Exchange name:	Redditch
Exchange code:	WMRJ
Location:	Worcestershire, West Midlands
Postcode:	B976EW
Serves (approx):	11,491 residential premises 783 non-residential premises

Broadband availability overview

ADSL:	Yes
SDSL:	Yes
LLU services:	Yes
Cable:	Yes
Wireless:	No

BT Wholesale ADSL/SDSL information

ADSL status:	Enabled
ADSL enable date:	21 May 2003
ADSL prereg:	317/300 (+48 duplicates)
SDSL status:	Enabled
SDSL enable date:	29-May-05
ADSL Max status:	Enabled (Green)
ADSL Max enable date:	31-Mar-06

Local loop unbundling presence

Be:	Enabled
Bulldog:	Not available
CPW / TalkTalk:	Enabled
Easynet / Sky:	Enabled
Edge Telecom:	Not available
HomeChoice:	Not available
Lumison:	Not available
Node4:	Not available
Orange:	Not available
Pipex:	Not available
Tiscali:	Not available
WB Internet:	Not available
Zen Internet:	Not available

Exchange history

19/10/2006	BT have set a target date of Q2 2008 for the switch to 21CN for the Redditch exchange
30/08/2006	Easynet has enabled the Redditch exchange for their service
29/08/2006	Be Unlimited has enabled the Redditch exchange for their service

BT 21CN rollout status

Target date:	Q2 2008
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Wireless broadband availability

LTT Broadband:	Not available
Now Wireless:	Not available

Cable broadband availability

Virgin Media: Available in some areas

Astwood Bank (WMAST)

General information

Exchange name: Astwood Bank
Exchange code: WMAST
Location: [Worcestershire,](#)
[West Midlands](#)
Postcode: B966ED
Serves (approx): 1,909 residential premises
126 non-residential premises

Broadband availability overview

ADSL: Yes
SDSL: No
LLU services: No
Cable: Yes
Wireless: No

BT Wholesale ADSL/SDSL information

ADSL status: Enabled
ADSL enable date: 06 Oct 2004
ADSL prereg: 231/500 (+39 duplicates)
SDSL status: Not available
SDSL enable date: -
ADSL Max status: Enabled (Green)
ADSL Max enable date: 31-Mar-06

Local loop unbundling presence

Be: Not available
Bulldog: Not available
CPW / TalkTalk: Not available
Easynet / Sky: Not available
Edge Telecom: Not available
HomeChoice: Not available
Lumison: Not available
Node4: Not available
Orange: Not available
Pipex: Not available
Tiscali: Not available
WB Internet: Not available
Zen Internet: Not available

Exchange history

BT have set a target date of Q4 2010 for the switch
19/10/2006 to 21CN for the Astwood Bank exchange

BT 21CN rollout status

Target date: Q4 2010

Wireless broadband availability

LTT Broadband: Not available
Now Wireless: Not available

Cable broadband availability

Virgin Media: Available in some areas

Headless Cross (WMHX)

General information

Exchange name:	Headless Cross
Exchange code:	WMHX
Location:	Worcestershire, West Midlands
Postcode:	B974LL
Serves (approx):	10,774 residential premises 272 non-residential premises

Broadband availability overview

ADSL:	Yes
SDSL:	Yes
LLU services:	Yes
Cable:	Yes
Wireless:	No

BT Wholesale ADSL/SDSL information

ADSL status:	Enabled
ADSL enable date:	02 Jul 2003
ADSL prereg:	368/300 (+52 duplicates)
SDSL status:	Not available
SDSL enable date:	-
ADSL Max status:	Enabled (Green)
ADSL Max enable date:	31-Mar-06

Local loop unbundling presence

Be:	Enabled
Bulldog:	Not available
CPW / TalkTalk:	Enabled
Easynet / Sky:	Enabled
Edge Telecom:	Not available
HomeChoice:	Not available
Lumison:	Not available
Node4:	Not available
Orange:	Not available
Pipex:	Not available
Tiscali:	Not available
WB Internet:	Not available
Zen Internet:	Not available

Exchange history

04/03/2007	Easynet (Sky) has enabled the Headless Cross exchange for their service
26/10/2006	Be Unlimited has enabled the Headless Cross exchange for their service
19/10/2006	BT have set a target date of Q2 2008 for the switch to 21CN for the Headless Cross exchange
20/06/2006	Be Unlimited has updated the enablement date for the Headless Cross exchange to 30/09/2006 (Was previously 31/07/2006)

BT 21CN rollout status

Target date:	Q2 2008
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Wireless broadband availability

LTT Broadband:	Not available
Now Wireless:	Not available

Cable broadband availability

Virgin Media:	Available in some areas
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Ipsley (WMIPS)

General information

Exchange name:	Ipsley
Exchange code:	WMIPS
Location:	Worcestershire, West Midlands
Postcode:	B980AN
Serves (approx):	10,627 residential premises 523 non-residential premises

Broadband availability overview

ADSL:	Yes
SDSL:	Yes
LLU services:	Yes
Cable:	Yes
Wireless:	No

BT Wholesale ADSL/SDSL information

ADSL status:	Enabled
ADSL enable date:	31 May 2002
ADSL prereg:	99 (+0 duplicates)
SDSL status:	Not available
SDSL enable date:	-
ADSL Max status:	Enabled (Green)
ADSL Max enable date:	31-Mar-06

Local loop unbundling presence

Be:	Enabled
Bulldog:	Not available
CPW / TalkTalk:	Enabled
Easynet / Sky:	Enabled
Edge Telecom:	Not available
HomeChoice:	Not available
Lumison:	Not available
Node4:	Not available
Orange:	Not available
Pipex:	Not available
Tiscali:	Not available
WB Internet:	Not available
Zen Internet:	Not available

Exchange history

21/12/2006	Easynet has enabled the Ipsley exchange for their service
19/10/2006	BT have set a target date of Q1 2011 for the switch to 21CN for the Ipsley exchange
06/09/2006	Be Unlimited has enabled the Ipsley exchange for their service
20/06/2006	Be Unlimited has updated the enablement date for the Ipsley exchange to 30/09/2006 (Was previously 31/07/2006)

BT 21CN rollout status

Target date:	Q1 2011
--------------	---------

Wireless broadband availability

LTT Broadband:	Not available
Now Wireless:	Not available

Cable broadband availability

Virgin Media:	Available in some areas
---------------	-------------------------

Studley (WMSTD)

General information

Exchange name:	Studley
Exchange code:	WMSTD
Location:	Warwickshire, West Midlands
Postcode:	B807LR
Serves (approx):	3,188 residential premises 256 non-residential premises

Broadband availability overview

ADSL:	Yes
SDSL:	No
LLU services:	No
Cable:	Yes
Wireless:	No

BT Wholesale ADSL/SDSL information

ADSL status:	Enabled
ADSL enable date:	04 Feb 2004
ADSL prereg:	322/250 (+43 duplicates)
SDSL status:	Not available
SDSL enable date:	-
ADSL Max status:	Enabled (Green)
ADSL Max enable date:	31-Mar-06

Local loop unbundling presence

Be:	Not available
Bulldog:	Not available
CPW / TalkTalk:	Not available
Easynet / Sky:	Not available
Edge Telecom:	Not available
HomeChoice:	Not available
Lumison:	Not available
Node4:	Not available
Orange:	Not available
Pipex:	Not available
Tiscali:	Not available
WB Internet:	Not available
Zen Internet:	Not available

Exchange history

BT have set a target date of Q4 2010 for the switch 19/10/2006 to 21CN for the Studley exchange

BT 21CN rollout status

Target date:	Q4 2010
--------------	---------

Wireless broadband availability

LTT Broadband:	Not available
Now Wireless:	Not available

Cable broadband availability

Virgin Media:	Available in some areas
---------------	-------------------------

APPENDIX B

DfT National Road Traffic Census

Road No: Grid Ref.: Day and Date: Link Based Census No:

Location:

Hour Commencing		01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Vehicles
Pedal Cycles	Northbound							3	2	2	0	0	0	1	0	0	1	0	3							12
	Southbound							4	1	0	0	0	0	1	1	1	4	3	0							15
	Both							7	3	2	0	0	0	2	1	1	5	3	3							27
Motor Cycles	Northbound							6	1	4	1	6	4	3	3	1	1	14	4							48
	Southbound							2	3	2	2	1	1	1	0	1	5	5	7							30
	Both							8	4	6	3	7	5	4	3	2	6	19	11							78
Cars	Northbound							374	479	228	162	165	195	235	173	229	294	400	259							3193
	Southbound							96	202	141	140	147	171	221	203	247	379	563	301							2811
	Both							470	681	369	302	312	366	456	376	476	673	963	560							6004
Buses	Northbound							0	7	4	1	2	3	2	4	3	4	2	1							33
	Southbound							0	2	1	1	0	0	0	0	0	0	0	1							5
	Both							0	9	5	2	2	3	2	4	3	4	2	2							38
Light Goods Veh's	Northbound							36	45	52	40	52	40	36	38	38	39	21	12							449
	Southbound							27	29	38	31	31	32	39	39	35	49	51	26							427
	Both							63	74	90	71	83	72	75	77	73	88	72	38							876
2-Axle Lorries	Northbound							3	8	8	8	10	11	7	8	7	8	5	2							85
	Southbound							5	8	6	11	7	9	6	7	13	5	7	2							86
	Both							8	16	14	19	17	20	13	15	20	13	12	4							171
3-Axle (Rigid)	Northbound							1	3	1	1	1	1	2	3	2	1	0	0							16
	Southbound							1	0	1	1	1	1	1	1	2	1	0	0							10
	Both							2	3	2	2	2	2	3	4	4	2	0	0							26
4-Axle (Rigid)	Northbound							1	2	1	1	0	1	1	0	0	0	0	0							7
	Southbound							0	0	1	1	1	1	0	0	0	2	0	0							6
	Both							1	2	2	2	1	2	1	0	0	2	0	0							13
3/4-Axle (Artic)	Northbound							0	1	1	2	1	0	0	2	0	0	1	0							8
	Southbound							2	0	0	0	1	1	1	1	1	0	2	0							9
	Both							2	1	1	2	2	1	1	3	1	0	3	0							17
5-Axle (Artic)	Northbound							1	1	2	1	3	2	2	2	1	1	1	0							17
	Southbound							0	0	2	2	3	1	2	0	2	2	0	0							14
	Both							1	1	4	3	6	3	4	2	3	3	1	0							31
6-Axle or more (Artic)	Northbound							0	1	0	0	2	0	1	1	0	0	1	0							6
	Southbound							0	0	2	2	1	0	0	0	0	0	0	0							5
	Both							0	1	2	2	3	0	1	1	0	0	1	0							11
Totals	Northbound							425	550	303	217	242	257	290	234	281	349	445	281							3874
	Southbound							137	245	194	191	193	217	272	252	302	447	631	337							3418
	Both							562	795	497	408	435	474	562	486	583	796	1076	618							7292

Site No: 02060076

Site Reference: 02060076

A4189, Warwick Highway, Redditch (west side)
 Week Begin: 14 May 2007

Vehicle Count Report

Channel: Channel 1

Time Begin	Mon May 14	Tue May 15	Wed May 16	Thu May 17	Fri May 18	Sat May 19	Sun May 20	5-Day Av	7-Day Av
0:00	29	38	33	42	47	81	99	38	53
1:00	22	9	11	15	26	46	47	17	25
2:00	16	12	22	13	13	21	20	15	17
3:00	12	16	21	13	21	24	24	17	19
4:00	40	31	34	36	39	36	20	36	34
5:00	177	177	198	188	199	118	43	188	157
6:00	419	458	434	476	478	164	109	453	363
7:00	1409	1465	1411	1382	1334	230	140	1400	1053
8:00	1732	1857	1736	1733	1595	438	197	1731	1327
9:00	781	827	759	942	757	522	385	813	710
10:00	579	589	583	672	584	627	561	601	599
11:00	527	527	559	574	539	679	627	545	576
12:00	582	606	620	594	622	669	661	605	622
13:00	714	676	650	683	758	657	618	696	679
14:00	672	616	580	583	668	704	623	624	635
15:00	736	704	735	706	753	535	528	727	671
16:00	697	718	773	735	816	474	485	748	671
17:00	867	850	865	847	824	526	469	851	750
18:00	603	635	635	638	595	531	395	621	576
19:00	420	411	509	432	480	381	342	450	425
20:00	313	321	318	385	388	254	303	345	326
21:00	247	235	236	288	209	206	178	243	228
22:00	143	152	172	157	179	159	126	161	155
23:00	94	100	105	102	144	153	71	109	110
12H,7-19	9899	10070	9906	10089	9845	6592	5689	9962	8870
16H,6-22	11298	11495	11403	11670	11400	7597	6621	11453	10212
18H,6-24	11535	11747	11680	11929	11723	7909	6818	11723	10477
24H,0-24	11831	12030	11999	12236	12068	8235	7071	12033	10781
Am Peak	8:00 1732	8:00 1857	8:00 1736	8:00 1733	8:00 1595	11:00 679	11:00 627	- 1731	- 1423
Pm Peak	17:00 867	17:00 850	17:00 865	17:00 847	17:00 824	14:00 704	12:00 661	- 851	- 803

G - Global Event, L - Local Event

Printed at 15:20:02 on 14 Jun 2007

Site No: 02060076

Site Reference: 02060076

A4189, Warwick Highway, Redditch (west side)
 Week Begin: 14 May 2007

Vehicle Count Report

Channel: Channel 2

Time Begin	Mon May 14	Tue May 15	Wed May 16	Thu May 17	Fri May 18	Sat May 19	Sun May 20	5-Day Av	7-Day Av
0:00	32	30	44	39	57	74	110	40	55
1:00	15	16	13	19	30	35	58	19	27
2:00	1	14	14	22	17	23	23	14	16
3:00	15	21	22	22	23	26	22	21	22
4:00	23	22	21	16	18	26	14	20	20
5:00	57	69	72	64	74	53	38	67	61
6:00	220	250	235	220	242	123	77	233	195
7:00	550	523	585	630	552	231	113	568	455
8:00	915	931	930	932	887	414	138	919	735
9:00	602	631	666	607	641	553	380	629	583
10:00	560	531	540	529	593	716	604	551	582
11:00	640	604	603	647	607	854	690	620	664
12:00	686	657	744	749	904	865	766	748	767
13:00	709	657	741	727	1023	781	705	771	763
14:00	780	797	791	805	979	770	677	830	800
15:00	917	957	1004	953	1180	559	632	1002	886
16:00	1318	1317	1345	1382	1357	593	557	1344	1124
17:00	1960	1941	2005	1895	1528	607	566	1866	1500
18:00	1076	1072	1115	1196	964	590	480	1085	928
19:00	627	642	686	648	664	502	381	653	593
20:00	394	392	416	449	390	309	275	408	375
21:00	293	308	305	333	277	215	204	303	276
22:00	220	235	277	259	226	167	141	243	218
23:00	91	96	125	139	171	137	82	124	120
12H,7-19	10713	10618	11069	11052	11215	7533	6308	10933	9787
16H,6-22	12247	12210	12711	12702	12788	8682	7245	12532	11226
18H,6-24	12558	12541	13113	13100	13185	8986	7468	12899	11564
24H,0-24	12701	12713	13299	13282	13404	9223	7733	13080	11765
Am Peak	8:00 915	8:00 931	8:00 930	8:00 932	8:00 887	11:00 854	11:00 690	- 919	- 877
Pm Peak	17:00 1960	17:00 1941	17:00 2005	17:00 1895	17:00 1528	12:00 865	12:00 766	- 1866	- 1566

D - Global Event, L - Local Event

Printed at 15:20:06 on 14 Jun 2007

Site No: 02060072

Site Reference: 02060072

A441 Smallwood
Week Begin: 14 May 2007

Vehicle Count Report

Channel: Channel 1

Time Begin	Mon May 14	Tue May 15	Wed May 16	Thu May 17	Fri May 18	Sat May 19	Sun May 20	5-Day Av	7-Day Av
0:00	50	79	55	63	101	138	146	70	90
1:00	20	24	38	35	45	108	85	32	51
2:00	30	41	37	34	42	60	70	37	45
3:00	10	23	19	28	37	54	48	23	31
4:00	17	19	23	24	30	42	49	23	29
5:00	104	95	106	89	96	98	66	98	93
6:00	196	246	250	236	254	154	139	236	211
7:00	607	624	604	639	623	269	236	619	515
8:00	1089	1152	1202	1151	1181	507	380	1155	952
9:00	927	969	962	892	991	760	749	948	893
10:00	989	1008	976	1108	1125	1159	1055	1041	1080
11:00	1174	1021	1174	1098	1226	1418	1220	1139	1190
12:00	1280	1249	1252	1161	1360	1461	1464	1260	1318
13:00	1195	1189	1144	1172	1484	1355	1189	1237	1247
14:00	1279	1261	1286	1259	1512	1381	1172	1319	1307
15:00	1385	1391	1361	1435	1720	1261	1094	1458	1378
16:00	1697	1783	1612	1687	1865	1085	784	1729	1502
17:00	2141	2145	2082	2187	2000	1106	653	2111	1759
18:00	1305	1401	1372	1452	1317	899	570	1369	1188
19:00	843	867	909	927	898	612	466	889	789
20:00	626	585	623	712	653	549	410	640	594
21:00	508	493	467	655	469	387	362	518	477
22:00	278	320	396	366	362	360	238	344	331
23:00	134	142	195	207	228	254	141	181	186
12H,7-19	15068	15193	15027	15241	16404	12661	10566	15387	14309
16H,6-22	17241	17384	17276	17771	18678	14363	11943	17670	16379
18H,6-24	17653	17846	17867	18344	19268	14977	12322	18196	16897
24H,0-24	17884	18127	18145	18617	19619	15477	12786	18478	17236
Am Peak	11:00 1174	8:00 1152	8:00 1202	8:00 1151	11:00 1226	11:00 1418	11:00 1220	- 1181	- 1220
Pm Peak	17:00 2141	17:00 2145	17:00 2082	17:00 2187	17:00 2000	12:00 1461	12:00 1464	- 2111	- 1926

Site No: 02060072

Site Reference: 02060072

A441 Smallwood
Week Begin: 14 May 2007

Vehicle Count Report

Channel: Channel 2

Time Begin	Mon May 14	Tue May 15	Wed May 16	Thu May 17	Fri May 18	Sat May 19	Sun May 20	5-Day Av	7-Day Av
0:00	47	71	62	77	90	180	194	69	103
1:00	24	34	32	31	47	110	130	34	58
2:00	24	26	21	27	42	47	60	28	35
3:00	20	20	28	37	32	53	61	27	36
4:00	75	53	61	48	55	73	38	58	58
5:00	240	240	241	233	253	142	63	241	202
6:00	680	726	689	697	678	271	153	694	556
7:00	1820	1978	1979	1909	1880	468	270	1913	1472
8:00	2627	2759	2558	2542	2568	990	438	2611	2069
9:00	1759	1839	1682	1792	1806	1462	916	1776	1608
10:00	1328	1361	1316	1366	1456	1604	1710	1365	1449
11:00	1394	1268	1321	1300	1379	1783	1763	1332	1458
12:00	1415	1258	1322	1406	1437	1739	1724	1368	1472
13:00	1443	1317	1441	1424	1591	1707	1631	1443	1508
14:00	1264	1310	1266	1391	1566	1720	1450	1359	1424
15:00	1373	1401	1404	1348	1726	1326	1231	1450	1401
16:00	1478	1459	1418	1485	1614	1168	894	1491	1359
17:00	1510	1447	1468	1575	1450	973	825	1490	1321
18:00	1166	1163	1254	1391	1209	1163	764	1237	1159
19:00	921	890	983	1052	1035	896	606	976	912
20:00	654	634	625	718	692	567	471	665	623
21:00	445	410	405	531	511	464	380	460	449
22:00	279	265	277	357	347	343	205	305	296
23:00	132	143	153	216	235	217	138	176	176
12H,7-19	18577	18560	18429	18929	19682	16103	13616	18835	17699
16H,6-22	21277	21220	21131	21927	22598	18301	15226	21631	20240
18H,6-24	21688	21628	21561	22500	23180	18861	15569	22111	20712
24H,0-24	22118	22072	22006	22953	23699	19466	16115	22570	21204
Am Peak	8:00 2627	8:00 2759	8:00 2558	8:00 2542	8:00 2568	11:00 1783	11:00 1763	- 2611	- 2371
Pm Peak	17:00 1510	16:00 1459	17:00 1468	17:00 1575	15:00 1726	12:00 1739	12:00 1724	- 1548	- 1600

G - Global Event, L - Local Event

Printed at 15:16:03 on 14 Jun 2007

Site No: 00190006

Site Reference: ALL9RED

A441 Bordesley, Redditch
 Week Begin: 14 May 2007

Vehicle Count Report

Channel: Southbound

Time Begin	Mon May 14	Tue May 15	Wed May 16	Thu May 17	Fri May 18	Sat May 19	Sun May 20	5-Day Av	7-Day Av
0:00	34	48	45	50	84	110	121	52	70
1:00	27	23	26	31	24	74	73	26	40
2:00	12	17	23	21	23	33	49	19	25
3:00	7	19	15	14	26	39	57	16	25
4:00	26	27	28	29	29	44	42	28	32
5:00	127	133	131	131	129	105	75	130	119
6:00	241	259	264	267	293	136	196	265	237
7:00	763	718	768	800	848	262	295	779	636
8:00	1020	1034	1089	906	1005	421	338	1011	830
9:00	767	835	768	1090	737	658	603	839	780
10:00	663	624	645	964	673	792	873	714	748
11:00	652	576	632	623	659	746	764	628	665
12:00	652	664	589	650	671	761	753	645	677
13:00	660	765	674	660	728	773	671	697	704
14:00	818	646	635	678	741	787	670	704	711
15:00	681	653	714	722	773	600	495	709	663
16:00	857	862	892	911	938	504	426	892	770
17:00	930	982	1017	1042	976	497	473	989	845
18:00	828	840	826	868	781	490	428	829	723
19:00	496	514	500	507	534	390	345	510	469
20:00	362	357	374	378	364	299	298	367	347
21:00	269	239	258	287	263	216	217	263	250
22:00	181	187	241	210	236	215	196	211	209
23:00	112	119	142	180	182	141	98	147	139
12H,7-19	9291	9199	9249	9914	9530	7291	6789	9437	8752
16H,6-22	10659	10568	10645	11353	10984	8332	7845	10842	10055
18H,6-24	10952	10874	11028	11743	11402	8688	8139	11200	10404
24H,0-24	11185	11141	11296	12019	11717	9093	8556	11472	10715
Am Peak	8:00 1020	8:00 1034	8:00 1089	9:00 1090	8:00 1005	10:00 792	10:00 873	- 1048	- 986
Pm Peak	17:00 930	17:00 982	17:00 1017	17:00 1042	17:00 976	14:00 787	12:00 753	- 989	- 927

G - Global Event, L - Local Event

Printed at 15:10:54 on 14 Jun 2007

**A441 Bordesley, Redditch
Week Begin: 14 May 2007**

Vehicle Count Report

Channel: Northbound

Time Begin	Mon May 14	Tue May 15	Wed May 16	Thu May 17	Fri May 18	Sat May 19	Sun May 20	5-Day Av	7-Day Av
0:00	29	37	18	50	51	84	85	37	51
1:00	14	16	31	24	24	56	66	22	33
2:00	14	19	15	18	29	33	48	19	25
3:00	10	18	27	16	24	51	46	19	27
4:00	36	30	31	34	35	38	31	33	34
5:00	106	89	99	85	101	84	47	96	87
6:00	387	434	456	413	405	128	71	419	328
7:00	1094	1153	1203	1134	1123	258	139	1141	872
8:00	984	943	1016	991	1034	420	222	994	801
9:00	671	731	626	617	664	494	492	662	614
10:00	606	568	545	602	601	643	731	584	614
11:00	582	654	640	679	698	764	899	651	702
12:00	644	625	652	665	803	871	1030	678	756
13:00	657	618	406	716	805	793	874	640	696
14:00	708	802	741	736	767	786	711	751	750
15:00	711	772	734	757	866	634	650	768	732
16:00	996	964	1044	1004	971	631	639	996	893
17:00	1076	1154	1199	1158	1010	629	473	1119	957
18:00	658	658	730	732	723	571	420	700	642
19:00	435	443	422	484	503	399	354	457	434
20:00	280	300	313	368	348	260	264	322	305
21:00	220	219	203	264	239	194	199	229	220
22:00	166	159	171	164	174	160	129	167	160
23:00	77	88	90	114	110	131	71	96	97
12H,7-19	9387	9642	9536	9791	10065	7494	7280	9684	9028
16H,6-22	10709	11038	10930	11320	11560	8475	8168	11111	10314
18H,6-24	10952	11285	11191	11598	11844	8766	8368	11374	10572
24H,0-24	11161	11494	11412	11825	12108	9112	8691	11600	10829
Am Peak	7:00 1094	7:00 1153	7:00 1203	7:00 1134	7:00 1123	11:00 764	11:00 899	- 1141	- 1053
Pm Peak	17:00 1076	17:00 1154	17:00 1199	17:00 1158	17:00 1010	12:00 871	12:00 1030	- 1119	- 1071

G - Global Event, L - Local Event

Printed at 15:10:50 on 14 Jun 2007

Weekday Survey (2003 & 2005)

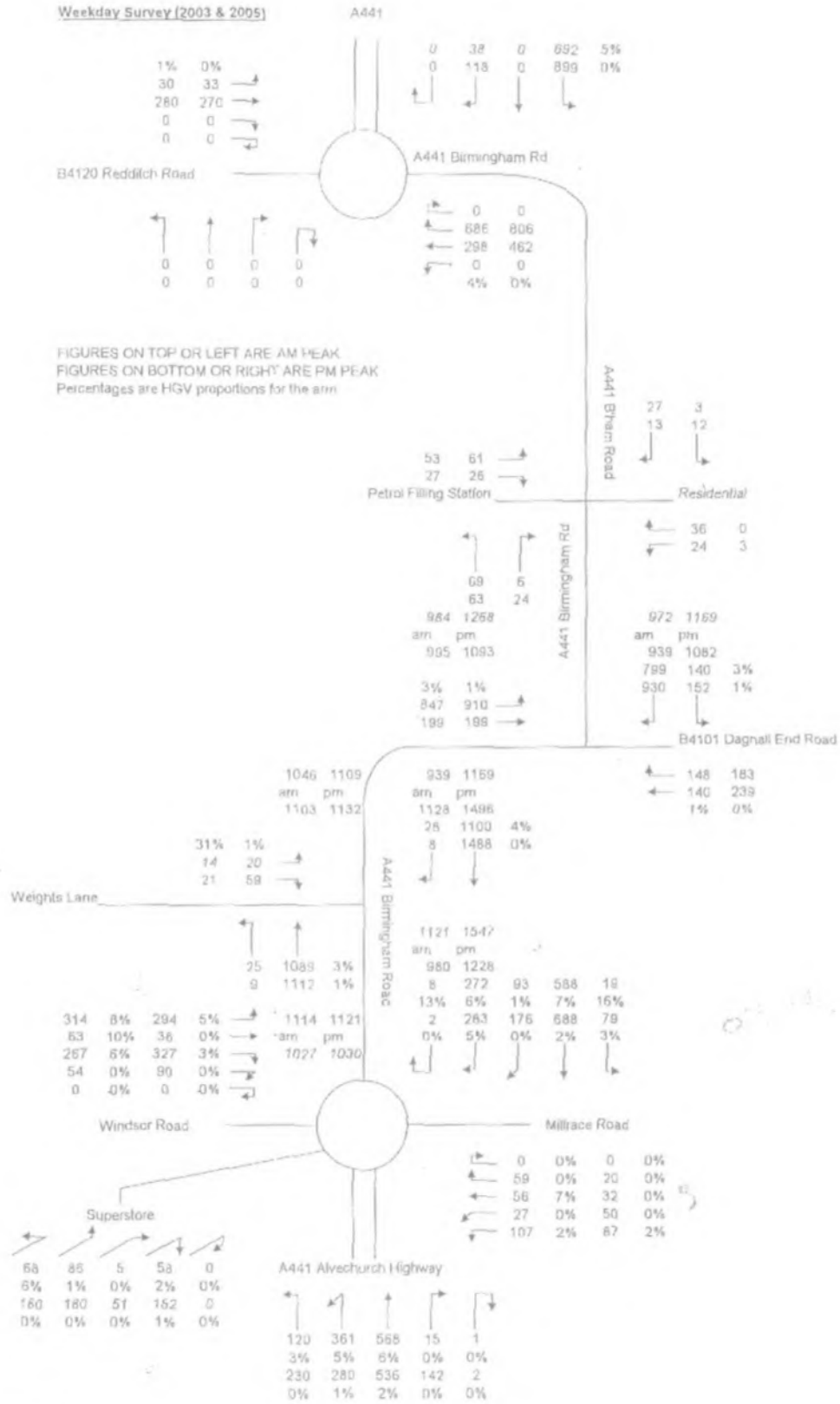


FIGURE 3.1

Manual Classified Link Counts, Redditch

DATE: 17/08/2017

LOCATION: A435 SITE 1 (north of the Coventry Highway Junction)

TIME / CLASS	NORTHBOUND								SOUTHBOUND								TOTAL MOVEMENT FROM ARM
	PEDAL CYCLE	MOTOR CYCLE	CAR	LGV	OGV 1	OGV 2	BUS COACH	TOTAL	PEDAL CYCLE	MOTOR CYCLE	CAR	LGV	OGV 1	OGV 2	BUS COACH	TOTAL	
7:30 - 7:45	0	4	297	41	18	21	0	381	0	2	395	67	9	11	1	485	866
7:45 - 8:00	0	7	307	43	18	26	0	401	0	5	372	62	5	13	2	459	860
8:00 - 8:15	0	6	314	60	29	16	0	425	0	2	357	54	12	12	0	437	862
8:15 - 8:30	0	5	362	59	22	13	0	461	0	2	336	57	18	24	1	438	899
HOURLY TOTAL	0	22	1280	203	87	76	0	1668	0	11	1460	240	44	60	4	1819	3487
8:30 - 8:45	0	1	393	46	24	23	0	487	0	4	317	67	17	14	1	420	907
8:45 - 9:00	0	2	326	49	22	11	0	410	0	0	229	53	28	15	0	325	735
9:00 - 9:15	0	0	202	40	18	10	1	271	0	1	192	39	19	23	1	275	546
9:15 - 9:30	0	3	209	42	20	12	0	286	0	1	199	32	22	17	1	272	558
HOURLY TOTAL	0	6	1130	177	84	56	1	1454	0	6	937	191	86	69	3	1292	2746
PERIOD TOTAL	0	28	2410	380	171	132	1	3122	0	17	2397	431	130	129	7	3111	6233

16:30 - 16:45	0	2	313	64	11	11	1	402	0	5	324	46	20	9	0	404	806
16:45 - 17:00	0	4	292	49	14	11	0	370	0	4	295	60	8	9	0	376	746
17:00 - 17:15	0	4	378	59	5	8	0	454	0	7	435	42	5	5	1	495	949
17:15 - 17:30	0	2	386	57	11	8	1	465	0	5	398	31	10	8	0	452	917
HOURLY TOTAL	0	12	1369	229	41	38	2	1691	0	21	1452	179	43	31	1	1727	3413
17:30 - 17:45	0	5	409	30	3	5	0	452	0	1	410	32	8	10	0	461	913
17:45 - 18:00	0	5	320	37	4	8	0	374	0	3	319	30	6	3	2	363	737
18:00 - 18:15	0	3	321	37	6	4	0	371	0	2	305	27	6	5	2	347	718
18:15 - 18:30	0	2	317	33	4	3	0	359	0	1	313	21	4	3	0	342	701
HOURLY TOTAL	0	15	1367	137	17	20	0	1556	0	7	1347	110	24	21	4	1513	3069

PERIOD TOTAL	0	27	2736	366	58	58	2	3247	0	28	2799	289	67	52	5	3240	6487
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Manual Classified Link Counts, Redditch

DATE: 25/02/14 10:58:43 AM

LOCATION: A435 SITE 2 (north of the Warwick Highway Junction)

TIME / CLASS	NORTHBOUND								SOUTHBOUND								TOTAL MOVEMENT FROM ARM
	PEDAL CYCLE	MOTOR CYCLE	CAR	LGV	OGV 1	OGV 2	BUS COACH	TOTAL	PEDAL CYCLE	MOTOR CYCLE	CAR	LGV	OGV 1	OGV 2	BUS COACH	TOTAL	
7:30 - 7:45	0	1	228	44	9	11	1	294	0	4	183	21	10	12	2	232	526
7:45 - 8:00	0	2	240	40	4	9	1	296	0	5	199	25	12	16	1	258	554
8:00 - 8:15	0	0	175	32	8	7	1	223	1	4	178	32	17	6	0	238	461
8:15 - 8:30	0	2	223	36	14	14	0	289	0	5	228	32	16	8	0	289	578
HOURLY TOTAL	0	5	866	152	35	41	3	1102	1	18	788	110	55	42	3	1017	2119
8:30 - 8:45	0	2	184	29	11	11	0	237	0	1	209	31	16	4	0	261	498
8:45 - 9:00	0	0	145	27	15	12	0	199	0	0	182	35	9	10	0	236	435
9:00 - 9:15	0	1	130	32	10	14	0	187	0	0	127	25	12	8	0	172	359
9:15 - 9:30	0	0	119	28	10	8	0	165	0	1	139	28	11	7	1	187	352
HOURLY TOTAL	0	3	578	116	46	45	0	788	0	2	657	119	48	29	1	856	1644
PERIOD TOTAL	0	8	1444	268	81	86	3	1890	1	20	1445	229	103	71	4	1873	3763
16:30 - 16:45	0	4	165	31	9	4	0	213	0	1	193	39	8	7	0	248	461
16:45 - 17:00	0	3	197	45	6	5	0	256	0	1	191	33	4	8	0	237	493
17:00 - 17:15	0	5	221	33	2	4	0	265	0	2	234	26	4	7	0	273	538
17:15 - 17:30	0	3	230	22	8	3	0	266	0	2	262	34	6	3	0	307	573
HOURLY TOTAL	0	15	813	131	25	16	0	1000	0	6	880	132	22	25	0	1085	2065
17:30 - 17:45	0	5	245	19	3	3	0	275	0	6	276	26	3	3	0	314	589
17:45 - 18:00	0	4	193	22	4	1	0	224	0	4	235	17	2	4	0	262	486
18:00 - 18:15	0	0	173	20	2	2	1	198	0	2	219	23	3	4	1	252	450
18:15 - 18:30	0	1	152	15	3	1	0	172	0	1	194	18	3	3	0	219	391
HOURLY TOTAL	0	10	763	76	12	7	1	869	0	13	924	84	11	14	1	1047	1916
PERIOD TOTAL	0	25	1576	207	37	23	1	1869	0	19	1804	216	33	39	1	2112	3981

Location Crabbs Cross Roundabout, Redditch
 Date 7th June 2007
 Time 08:00-09:00
 Undertaken by WYG Leicester
 Weather conditions Dry

AM Peak

	Roughill Drive	The Slough	A441 Evesham Road South	Windmill Drive	Evesham Road North	Totals
Roughill Drive	0	144	372	324	102	942
The Slough	228	0	12	84	36	360
A441 Evesham Road South	504	24	0	144	60	732
Windmill Drive	456	132	216	0	102	906
Evesham Road North	270	84	144	42	0	540
Totals	1458	384	744	594	300	3480

Flows reversed for PM peak

	Roughill Drive	The Slough	A441 Evesham Road South	Windmill Drive	Evesham Road North	Totals
Roughill Drive	0	228	504	456	270	1458
The Slough	144	0	24	132	84	384
A441 Evesham Road South	372	12	0	216	144	744
Windmill Drive	432	84	144	0	42	702
Evesham Road North	102	36	60	102	0	300
Totals	1050	360	732	906	540	3588

Manual Classified Link Counts, Redditch

DATE: TUESDAY 7th AUGUST 2007

LOCATION: A435 SITE 1 (north of the Coventry Highway Junction)

TIME / CLASS	NORTHBOUND								SOUTHBOUND								TOTAL MOVEMENT FROM ARM
	PEDAL CYCLE	MOTOR CYCLE	CAR	LGV	OGV 1	OGV 2	BUS COACH	TOTAL	PEDAL CYCLE	MOTOR CYCLE	CAR	LGV	OGV 1	OGV 2	BUS COACH	TOTAL	
7:30 - 7:45	0	4	297	41	18	21	0	381	0	2	395	67	9	11	1	485	866
7:45 - 8:00	0	7	307	43	18	26	0	401	0	5	372	62	5	13	2	459	860
8:00 - 8:15	0	6	314	60	29	16	0	425	0	2	357	54	12	12	0	437	862
8:15 - 8:30	0	5	362	59	22	13	0	461	0	2	336	57	18	24	1	438	899
HOURLY TOTAL	0	22	1280	203	87	76	0	1668	0	11	1460	240	44	60	4	1819	3487
8:30 - 8:45	0	1	393	46	24	23	0	487	0	4	317	67	17	14	1	420	907
8:45 - 9:00	0	2	326	49	22	11	0	410	0	0	229	53	28	15	0	325	735
9:00 - 9:15	0	0	202	40	18	10	1	271	0	1	192	39	19	23	1	275	546
9:15 - 9:30	0	3	209	42	20	12	0	286	0	1	199	32	22	17	1	272	558
HOURLY TOTAL	0	6	1130	177	84	56	1	1454	0	6	937	191	86	69	3	1292	2746
PERIOD TOTAL	0	28	2410	380	171	132	1	3122	0	17	2397	431	130	129	7	3111	6233

16:30 - 16:45	0	2	313	64	11	11	1	402	0	5	324	46	20	9	0	404	806
16:45 - 17:00	0	4	292	49	14	11	0	370	0	4	295	60	8	9	0	376	746
17:00 - 17:15	0	4	378	59	5	8	0	454	0	7	435	42	5	5	1	495	949
17:15 - 17:30	0	2	386	57	11	8	1	465	0	5	398	31	10	8	0	452	917
HOURLY TOTAL	0	12	1369	229	41	38	2	1691	0	21	1452	179	43	31	1	1727	3418
17:30 - 17:45	0	5	409	30	3	5	0	452	0	1	410	32	8	10	0	461	913
17:45 - 18:00	0	5	320	37	4	8	0	374	0	3	319	30	6	3	2	363	737
18:00 - 18:15	0	3	321	37	6	4	0	371	0	2	305	27	6	5	2	347	718
18:15 - 18:30	0	2	317	33	4	3	0	359	0	1	313	21	4	3	0	342	701
HOURLY TOTAL	0	15	1367	137	17	20	0	1556	0	7	1347	110	24	21	4	1513	3069
PERIOD TOTAL	0	27	2736	366	58	58	2	3247	0	28	2799	289	67	52	5	3240	6487

Out of Season Factor Applied

TIME / CLASS	NORTHBOUND								SOUTHBOUND								TOTAL MOVEMENT FROM ARM
	PEDAL CYCLE	MOTOR CYCLE	CAR	LGV	OGV 1	OGV 2	BUS COACH	TOTAL	PEDAL CYCLE	MOTOR CYCLE	CAR	LGV	OGV 1	OGV 2	BUS COACH	TOTAL	
7:30 - 7:45	0	4	306	42	19	22	0	392	0	2	407	69	9	11	1	500	892
7:45 - 8:00	0	7	316	44	19	27	0	413	0	5	383	64	5	13	2	473	886
8:00 - 8:15	0	6	323	62	30	16	0	438	0	2	368	56	12	12	0	450	888
8:15 - 8:30	0	5	373	61	23	13	0	475	0	2	346	59	19	25	1	451	926
HOURLY TOTAL	0	23	1318	209	90	78	0	1718	0	11	1504	247	45	62	4	1874	3592
8:30 - 8:45	0	1	405	47	25	24	0	502	0	4	327	69	18	14	1	433	934
8:45 - 9:00	0	2	336	50	23	11	0	422	0	0	236	55	29	15	0	335	757
9:00 - 9:15	0	0	208	41	19	10	1	279	0	1	198	40	20	24	1	283	562
9:15 - 9:30	0	3	215	43	21	12	0	295	0	1	205	33	23	18	1	280	575
HOURLY TOTAL	0	6	1164	182	87	58	1	1498	0	6	965	197	89	71	3	1331	2828
PERIOD TOTAL	0	29	2482	391	176	136	1	3216	0	18	2469	444	134	133	7	3204	6420

16:30 - 16:45	0	2	322	66	11	11	1	414	0	5	334	47	21	9	0	416	830
16:45 - 17:00	0	4	301	50	14	11	0	381	0	4	304	62	8	9	0	387	768
17:00 - 17:15	0	4	389	61	5	8	0	468	0	7	448	43	5	5	1	510	977
17:15 - 17:30	0	2	398	59	11	8	1	479	0	5	410	32	10	8	0	466	945
HOURLY TOTAL	0	12	1410	236	42	39	2	1742	0	22	1496	184	44	32	1	1779	3521
17:30 - 17:45	0	5	421	31	3	5	0	466	0	1	422	33	8	10	0	475	940
17:45 - 18:00	0	5	330	38	4	8	0	385	0	3	329	31	6	3	2	374	759
18:00 - 18:15	0	3	331	38	6	4	0	382	0	2	314	28	6	5	2	357	740
18:15 - 18:30	0	2	327	34	4	3	0	370	0	1	322	22	4	3	0	352	722
HOURLY TOTAL	0	15	1408	141	18	21	0	1603	0	7	1387	113	25	22	4	1558	3161
PERIOD TOTAL	0	28	2818	377	60	60	2	3344	0	29	2883	298	69	54	5	3337	6682

Manual Classified Link Counts, Redditch

DATE: TUESDAY 7th AUGUST 2007

LOCATION: A435 SITE 2 (north of the Warwick Highway Junction)

TIME / CLASS	NORTHBOUND								SOUTHBOUND								TOTAL MOVEMENT FROM ARM
	PEDAL CYCLE	MOTOR CYCLE	CAR	LGV	OGV 1	OGV 2	BUS COACH	TOTAL	PEDAL CYCLE	MOTOR CYCLE	CAR	LGV	OGV 1	OGV 2	BUS COACH	TOTAL	
7:30 - 7:45	0	1	228	44	9	11	1	294	0	4	183	21	10	12	2	232	526
7:45 - 8:00	0	2	240	40	4	9	1	296	0	5	199	25	12	16	1	258	554
8:00 - 8:15	0	0	175	32	8	7	1	223	1	4	178	32	17	6	0	238	461
8:15 - 8:30	0	2	223	36	14	14	0	289	0	5	228	32	16	8	0	289	578
HOURLY TOTAL	0	5	866	152	35	41	3	1102	1	18	788	110	55	42	3	1017	2119
8:30 - 8:45	0	2	184	29	11	11	0	237	0	1	209	31	16	4	0	261	498
8:45 - 9:00	0	0	145	27	15	12	0	199	0	0	182	35	9	10	0	236	435
9:00 - 9:15	0	1	130	32	10	14	0	187	0	0	127	25	12	8	0	172	359
9:15 - 9:30	0	0	119	28	10	8	0	165	0	1	139	28	11	7	1	187	352
HOURLY TOTAL	0	3	578	116	46	45	0	788	0	2	657	119	48	29	1	856	1644
PERIOD TOTAL	0	8	1444	268	81	86	3	1890	1	20	1445	229	103	71	4	1873	3763

16:30 - 16:45	0	4	165	31	9	4	0	213	0	1	193	39	8	7	0	248	461
16:45 - 17:00	0	3	197	45	6	5	0	256	0	1	191	33	4	8	0	237	493
17:00 - 17:15	0	5	221	33	2	4	0	265	0	2	234	26	4	7	0	273	538
17:15 - 17:30	0	3	230	22	8	3	0	266	0	2	262	34	6	3	0	307	573
HOURLY TOTAL	0	15	813	131	25	16	0	1000	0	6	880	132	22	25	0	1065	2065
17:30 - 17:45	0	5	245	19	3	3	0	275	0	4	276	26	3	3	0	314	589
17:45 - 18:00	0	4	193	22	4	1	0	224	0	6	235	17	2	4	0	262	486
18:00 - 18:15	0	0	173	20	2	2	1	198	0	2	219	23	3	4	1	252	450
18:15 - 18:30	0	1	152	15	3	1	0	172	0	1	194	18	3	3	0	219	391
HOURLY TOTAL	0	10	763	76	12	7	1	869	0	13	924	84	11	14	1	1047	1916
PERIOD TOTAL	0	25	1576	207	37	23	1	1869	0	19	1804	216	33	39	1	2112	3981

TIME / CLASS	NORTHBOUND								SOUTHBOUND								TOTAL MOVEMENT FROM ARM
	PEDAL CYCLE	MOTOR CYCLE	CAR	LGV	OGV 1	OGV 2	BUS COACH	TOTAL	PEDAL CYCLE	MOTOR CYCLE	CAR	LGV	OGV 1	OGV 2	BUS COACH	TOTAL	
7:30 - 7:45	0	1	235	45	9	11	1	303	0	4	188	22	10	12	2	239	542
7:45 - 8:00	0	2	247	41	4	9	1	305	0	5	205	26	12	16	1	266	571
8:00 - 8:15	0	0	180	33	8	7	1	230	1	4	183	33	18	6	0	245	475

APPENDIX C

Table 3.1

Average daily traffic flows by month: 2001 - 2005 ¹

Index: Average daily traffic flow in month = 100

	Motorways			All rural major and minor roads		
	Cars and taxis	Goods vehicles	All motor vehicles	Cars and taxis	Goods vehicles	All motor vehicles
January	91	94	91	87	93	87
February	94	98	94	91	97	91
March	98	101	98	96	101	97
April ²	101	101	101	101	101	101
May	101	99	100	103	100	103
June	103	101	103	105	104	105
July	106	103	105	107	103	107
August	108	98	107	111	100	110
September	104	104	105	106	105	106
October	103	105	103	102	105	102
November	98	105	100	98	104	99
December ³	94	91	93	93	88	92
	All urban major and minor roads			All roads		
	Cars and taxis	Goods vehicles	All motor vehicles	Cars and taxis	Goods vehicles	All motor vehicles
January	97	95	96	91	94	91
February	98	99	97	94	98	94
March	102	101	102	98	101	98
April ⁴	102	101	102	101	101	101
May	101	100	101	101	99	101
June	101	101	101	103	101	103
July	101	104	101	105	103	105
August	98	98	98	107	99	106
September	101	104	101	104	104	104
October	101	103	101	102	105	103
November	101	104	102	99	105	100
December ³	97	89	97	94	90	94

1. Indices are based on average daily traffic and are not affected by the varying number of days in each month.

Source: National Core Census, DfT.

2. Figures affected by Easter.

020-7944 6397

3. Figures affected by Christmas.

[Back to Table titles](#)

The All urban major and minor roads' section has been adopted for the assessment of the A435.

Traffic count survey data has been undertaken during August 2007 (which is considered to be an out of season month). To obtain a satisfactory factor to increase the survey data to that of data within season it is considered that September's figures should be utilised. This provides a weighting factor of 1.03% that should be applied to the August (out of season) counts. It is considered that this would provide an adequate assumption given the lack of any more robust data.



APPENDIX D

**Utility Infrastructure Capacity Constraints Assessment
carried out by White Young Green Consulting Ltd**



Joint Study into the Future Growth Implications of Redditch Town to 2026

Utility Infrastructure Capacity and Constraints

White Young Green
Executive Park
Avalon Way
Anstey
Leicester
LE7 7GR

Tel No: 0116 2348000

Fax No: 0116 2348001

Project No: A036294

Report No. RT036294/03

ISSUE No.	01	02	03			
DATE	04/07/07	13/09/07	11/10/07			
PREPARED BY	JLH	MCM	JLH			
APPROVED BY	MM	JLH	MCM			

**JOINT STUDY INTO THE FUTURE GROWTH IMPLICATIONS OF REDDITCH TO 2026
– UTILITY INFRASTRUCTURE CAPACITY AND CONSTRAINTS**

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FIGURES

Figure 1	The location of BT Telephone Exchanges in Redditch
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APPENDICES

Appendix A	- Sustainable & Renewable Energy – Building Services Summary Sheet
Appendix B	- Specification of Telephone Exchanges in Redditch

1.0 **EXECUTIVE SUMMARY**

1.1 **Synopsis**

The West Midlands Regional Assembly is currently undertaking a consultation with key stakeholders, including Worcestershire County Council, in regard to the number of new homes to be included in the new West Midlands Regional Spatial Strategy (RSS). To achieve the desired level of housing growth within the West Midlands a number of key locations are targeted; each of these locations has been allocated growth options to be considered as part of the consultation. One of the locations targeted is the Borough of Redditch in Worcestershire with a population of 78,807 in 2001 at the commencement of the RSS 25-year plan period.

Worcestershire County Council, in conjunction with Redditch Borough Council, Bromsgrove District Council and Stratford-on-Avon District Council, has asked White Young Green (WYG) to evaluate the impact of three housing growth options by identifying locations suitable to accommodate these proposed new allocations, identify current and anticipated growth constraints, and recommend which growth options can be accommodated in a sustainable manner. One of the key constraints to growth will be the supply and distribution of utility services, and the removal of wastewater.

This discrete report considers the impact of each of the three growth options (Option 1 is based on a net increase of 172 dwellings per year, Option 2 is based on a net increase of 328 dwellings per year and Option 3 is based on a net increased of 528 dwellings per year) in terms of water supply, water distribution, gas supply and distribution, power supply and distribution, the provision of data and telecommunication services and the conveyance, treatment and disposal of wastewater. A basic commentary of the provision of lower carbon technologies has also been included within the electricity section.

This report considers the impact of each growth options on twenty-one theoretical development parcels to the north, south, east and west of the Borough of Redditch.

1.2 **Summary of Utility Capacity and Constraints**

1.2.1 *Wastewater*

Current engineering practises dictate that surface water and foul water will be conveyed and discharged separately; surface water will be drained using a sustainable drainage system such that local infiltration into the ground or local attenuation will ensure that new discharges of stormwater will not exceed those generated prior to new development. Foul water will most

likely be discharged into the public sewerage network or perhaps into a new locally sited package treatment facility (although this generates further constraints in the form of new treated water discharge consents to be negotiated with the Environment Agency). Effectively this report finds that the disposal of surface water will not be a development constraint at the northern and eastern perimeter of Redditch but might generate more expensive solutions where watercourses are more limited to the west of Redditch.

Conversely the discharge of foul water may limit sustainable development potential in certain parts of Redditch very significantly. The key foul water constraints governing new development within and surrounding the Borough of Redditch are as follows;

- Severn Trent Water has stated that there are no planned capital works being carried out to the Sernal Sewage Treatment Works (STW), located to the southeast of Redditch treating most of central, northern and eastern areas of the town. Detailed modelling will be required to assess the capacity of each of the growth options against the existing effluent discharge licence but it is understood anecdotally from Redditch Borough Council that the discharge consent into the River Arrow at Sernal STW is not too onerous; confirmation from Severn Trent Water is still outstanding
- Foul flows from any major new development in or around Redditch would most likely be conveyed to Sernal STW either by gravity (new development to the north, south and east of Redditch) or a combination of pumping and gravity from the western perimeter of the town (see below). Providing treated effluent discharge licenses into the River Arrow are flexible at this location as suggested above then any capital investment to increase the capacity of the treatment works should be funded by the incumbent licensed Sewerage Undertaker (Severn Trent Water) provided the new development is allocated within the next Development Plan (a Sewerage Undertaker has a duty to provide capital investment for population growth allocated in a Development Plan).
- Irrespective of whether development is 'allocated' any development in or around Redditch may be significantly constrained by Severn Trent Water's feasibility, design and build programmes for the delivery of new assets. Severn Trent Water will not programme this work before their 2010 - 2015 capital investment period (AMP5)
- Severn Trent Water has stated that major planned capital work is planned to the Priest Bridge Sewage Treatment Works (south west of Redditch treating existing flows from the west of the town) within the AMP4 period (2005-2010). This capital work is based on a current design population of 15,000 and therefore does not include for any of the growth options in this study. Severn Trent Water has advised that the Sewage Treatment Works will be difficult to extend once these works have been carried out thus limiting population growth to the west of Redditch unless new foul flows are pumped over the 'ridge' into the catchment served by Sernal STW.

Pumping all foul water over the 'ridge' from the west to the east of the town will not be a wholly sustainable solution

- The existing sewerage network within and downstream of Redditch Town Centre is stressed and has a history of sewer flooding. Effectively any significant new development north or northwest of the town centre may require a complex engineering solution with likely disruption to the centre of Redditch
- The Bow Brook river downstream of the Priest Bridge Sewage Treatment Works to the west of Redditch and the River Arrow downstream of the Sernal Sewage Treatment works to the south east of Redditch are considered unsuitable to accept significant amounts of additional treated effluent from the treatment works

Effectively any development to the southwest of 'The Ridge' (very approximately the A448) would have to be drained to Sernal Sewage Treatment works using one or more pumps. These pumps would have to be designed such that foul water is pumped to an outfall downstream of the stressed sewerage network in the town centre.

Any development to the north or northwest (upstream) of the Town Centre may trigger a very convoluted scheme to convey water to Sernal Sewage Treatment Works via a new trunk sewer through the town centre, or by pumping flows into a new trunk sewer further east.

The most sustainable solution would be to develop close to or to the east of the River Arrow, again a new trunk sewer might be required but this could potentially be a gravity sewer.

Clearly modelling would need to be undertaken to assess discharge compliance of the Sewage Treatment Works to the River Arrow before increased flows can be accommodated within the Sernal Sewage Treatment Works.

It is very important that any new development be inserted into the new Development Plan at the earliest opportunity in order that Severn Trent Water are able to plan, design and construct new infrastructure and treatment facilities at the earliest opportunity with reduced capital contributions from development agencies and private developers.

1.2.2 *Water*

Severn Trent Water has not been able to provide a satisfactory response to both written communication and a meeting with its Commercial Services and Developer Services Managers in the time given to undertake this study, however Severn Trent Water has stated that it will continue to consider the implications of all three growth options in terms of water supply and water distribution and will respond in due course.

Severn Trent Water has confirmed that 97% of the water supplied to Redditch is from a groundwater source wherein there is likely to be some form of abstraction restriction imposed by the Environment Agency over the duration of the RSS.

Severn Trent Water has an overriding duty to provide domestic water connections to both new residential and new commercial premises. Theoretically any water cycle constraints (water abstraction and treated effluent discharge licences) placed by the Environment Agency will have to be managed by the incumbent Water and Sewerage Undertaker; clearly Severn Trent Water would be able to influence national and regional bodies to a certain degree and therefore should be treated as a key stakeholder in the regional and local planning process.

Severn Trent Water is currently completing a new Water Resources Study to fulfil its obligations under the Water Act 2003 (this will be published early in 2008).

It is typical for the incumbent Water Undertaker (Severn Trent Water) to contribute toward the cost of new water networks and any associated network reinforcement via a relevant deficit or discounted aggregate lump sum contribution.

1.2.3 Gas

The existing gas network in Redditch, operated primarily by National Grid the incumbent gas transporter, is robust. There is an extensive medium pressure gas network supporting low-pressure distribution networks. The medium-pressure network is connected to a high-pressure network both to the north and south of Redditch.

Planning and Development near Hazardous Installations (PADHI) restrictions apply to all high-pressure gas apparatus therefore the HSE may be invited to comment by the Planning Authority on the suitability of new developments close to high-pressure gas mains. High-pressure gas transmission mains are located to the north and northwest of the town.

It is anticipated that the existing medium pressure gas network could be extended to support new development close to the existing Borough boundary to the north, east, south and west without substantial capital investment. A worst-case will exist where large discreet parcels of new development are located a considerable distance from the existing medium-pressure network; in this case a new high-pressure to medium-pressure pressure reducing station could be required. Although this might trigger a significant capital outlay these costs should be shared with National Grid (following a Design Study and Economic Test) and the overall investment costs should be modest compared with other utility service infrastructure.

1.2.4 Electricity

Power supply in Redditch is supported from Redditch North Primary Substation, Ipsley Primary Substation, and Redditch South Primary Substation. Each of these three substations transform power at 66kV (from the Feckenham Grid Supply Point) to standard 11kV high-voltage circuits, which are in-turn transformed down to 415V (standard domestic low-voltage connections) via a large number of locally sited secondary substations.

Any of the three growth options located within the area supplied from Ipsley Primary Substation (west side of Redditch) can be accommodated without any major capital investment other than new 11kV high-voltage circuits constructed for the sole-use of the new development sites. The further the development from Ipsley Primary Substation the more costly the new network connections will be.

Any development to the north of Redditch that would naturally be supplied from Redditch North Primary Substation will trigger one or two new 33/11kV transformers (circa £600k ea) once growth is above Option 1 (plus new 11kV circuits for the sole-use of the developments).

Any significant development (Options 1, 2 or 3) to the south of Redditch, naturally supplied from Redditch South Primary Substation would trigger two new 33/11kV transformers (circa £1.2m) plus new 11kV networks for the sole-use of the developments.

1.2.5 Low and Zero Carbon Energy Provision

A Renewable and Sustainable Energy Building Services System Summary Sheet is enclosed in Appendix A. This schedule identifies methods for actively and passively reducing carbon emissions through new technologies and improved design methodology. Many of the technologies listed can be applied to most types of development however sources of local bio-fuels (including biomass), wind speed and ground conditions (heat pumps) are variable and dependent on location. Average wind speeds in and surrounding Redditch, even at raised topographical elevations to the north of Redditch do not generate wind speed in excess of 7.2m/s at 45m above ground level which is the industry normal for operating an efficient wind turbine. It is therefore unlikely that wind turbines would reduce the bulk of the power requirement for the growth of Redditch. A more accurate in-situ measurement of wind speed is recommended to confirm this statement (wind speed taken from the BWEA website).

Two sources of commercially available wood fuel can be obtained within 30 miles of Redditch however the scale of the wood fuel supply would not likely be sufficient to provide the scale of biomass energy required for any of the growth options listed. Other sources of biomass fuel

should be investigated and incorporated into an integrated zero-carbon strategy alongside the other design methodologies and sustainable technologies listed in Appendix A.

1.2.6 *Data and Telecommunication*

New development would ideally be located closer to existing Telephone Exchanges as the distance from a domestic property to a BT Openreach Exchange is proportional to the Broadband speed available at that property. Development to the north, west, east and south of Redditch may therefore provide suitable for Broadband connections without the risk for further BT Telephone Exchanges or enhanced network investment (copper to fibre-optic cabling across a large swathe of Redditch).

New commercial and employment land should equally be located close to an Exchange that has both ADSL and SDSL systems activated. ADSL can provide fast download speeds but only SDSL will provide upload speeds to match download speeds.

Currently only Redditch Telephone Exchange is SDSL enabled and therefore all commercial development should be located closer to this Exchange. Redditch Telephone Exchange is located immediately to the north of the town centre.

1.3 Conclusions and Recommendations

1.3.1 *Conclusions*

The supply of gas should not influence either the number of new homes in or around Redditch or the location of new homes in or around Redditch as all growth options can be accommodated through a connection from the existing medium pressure network. The further development is located from the existing medium pressure network the greater the capital investment required from developers and development agencies.

The existing data and telecommunication network in Redditch should not unduly influence housing growth or the location of housing growth. The best connections for economic development growth would be to the north of the town centre where there are ADSL and SDSL networks; telephone exchanges to the south, west and east are ADSL only.

The supply of electricity should not unduly effect residential growth in or around Redditch although capital investment costs might be reduced by locating new homes in certain locations, namely locations served from Ipsley Primary Substation (SP0566) to the east of the Borough. Development to the south and west of Redditch would be most expensive.

Provided sustainable drainage methods (SuDS) are incorporated into each new development parcel then the conveyance of surface water to an agreed outfall should not be a very significant development constraint. Ideally the least expensive location to construct new homes in or around Redditch, in terms of stormwater drainage, would be locations where the permeability of the soil is greatest such that soakaways can be constructed, failing this development close to existing watercourses (most likely to the north and east of Redditch where the density of watercourses is greatest) would be favourable.

The single most pertinent utility infrastructure constraint is foul water. Development to the west of the River Arrow may potentially be more expensive and less sustainable and Severn Trent Water and the Environment Agency as statutory consultees may likely reject development proposals. Development adjacent to and to the east of the River Arrow would provide the simplest foul water solution whichever growth option is adopted.

Water supply constraints in Redditch are yet to be confirmed. Severn Trent Water will respond formally following the completion of further investigations.

Low and zero carbon energy provision would most likely be created from more than one sustainable source; wind energy would not be very efficient as average wind speeds are not sufficiently high and large sustainable local sources of bio-fuel/biomass cannot be located at this time. Without more precise master-planning data it is not possible to determine the best value low and zero-carbon technologies in terms of capital outlay, capital return periods, operating costs and carbon savings however it is highly likely that Level 4 and 5 of the Code for Sustainable Homes might be difficult to achieve without some form of district Combined Heat and Power (CHP), potentially fuelled by natural gas with a zero-carbon supplement.

1.3.2 *Recommendations*

Although information with regard to water abstraction, treatment and distribution has not been forthcoming from Severn Trent Water, and a knowledge of soil conditions with regard to the infiltration of surface water is not known, it is becoming clear that large scale residential development generally to the east of the River Arrow is preferable in terms of reduced capital infrastructure investment and a more sustainable solution. Both foul water and electricity solutions will be cheaper, simpler and more sustainable.

This study has enabled White Young Green to accumulate significant sources of valuable information and it is strongly recommended that upon adoption of the Regional Spatial Strategy by the West Midlands Regional Assembly a coherent and sustainable infrastructure services strategy be developed to support Worcestershire County Council, Redditch Borough

Council, Bromsgrove District Council and Stratford-on-Avon District Council develop their Local Development Framework Plans.

An early and continuous dialogue with the incumbent utility undertakers will inevitably provide better forward planning of trunk utility assets and consequently a speedier delivery, additionally an early and continuous dialogue will enable a more equitable apportionment of capital infrastructure investment between the utility undertaker, development agencies and public or private development partners. This may or may not include a 'roof tax' type similar to that operated in Milton Keynes. Central Networks are now able to operate in this manner and there are models for water and sewerage undertakers to operate this type of equitable apportionment model also such that Severn Trent Water might adopt this approach.

2.0 INTRODUCTION

The West Midlands Regional Assembly is currently undertaking a consultation with key stakeholders, including Worcestershire County Council, in regard to the number of new homes to be included in the new West Midlands Regional Spatial Strategy (RSS). To achieve the desired level of housing growth within the West Midlands a number of key locations are targeted; each of these locations has been allocated growth options to be considered as part of the consultation. One of the locations targeted is the Borough of Redditch in Worcestershire with a population of 78,807 in 2001 at the commencement of the RSS 25-year plan period. New development relating to the growth of Redditch will need be located in the County of Worcestershire (Borough of Redditch or Bromsgrove District) and/or Warwickshire (Stratford-on-Avon) to the east of Redditch.

Worcestershire County Council, in conjunction with Redditch Borough Council, Bromsgrove District Council and Stratford-on-Avon District Council, has asked White Young Green (WYG) to evaluate the impact of the three housing growth options by identifying locations suitable to accommodate this proposed new accommodation, identify current and anticipated growth constraints, and recommend which growth options can be accommodated in a sustainable manner. One of the key constraints to growth will be the supply and distribution of utility services, and the removal of wastewater.

This discrete report considers the impact of each of the three growth options (Option 1 is based on a net increase of 172 dwellings per year, Option 2 is based on a net increase of 328 dwellings per year and Option 3 is based on a net increased of 528 dwellings per year) in terms of water supply, water distribution, gas supply and distribution, power supply and distribution (grid electricity and lower carbon sources), the provision of data and telecommunication services and the conveyance, treatment and disposal of wastewater.

2.1 Assumptions

The three growth options which are currently being considered for progression to a preferred option by the West Midlands Regional Assembly are highlighted in Table 1, below.

Table 1 – Residential Growth Options (numbers of new residential dwellings)

	2001	2006	2011	2016	2021	2026
Option 1	172	860	1,720	2,588	3,440	4,300
Option 2	328	1,640	3,280	4,920	6,560	8,200
Option 3	528	2,640	5,280	7,920	10,560	13,200

Option 1 is based on a net increase of 172 dwellings per year, Option 2 is based on a net increase of 328 dwellings per year and Option 3 is based on a net increased of 528 dwellings per year. To convert the number of new dwellings into a net increase in population a factor of 2.49 people per residential dwelling has been considered and is understood to be in accordance with current planning guidelines.

It is understood that between 2001 and 2005 1224 dwellings have been constructed and therefore population growth is currently between Option 1 and Option 2. If Option 2 or Option 3 is adopted in the RSS then it is anticipated that any shortfall will be recaptured. Further, it is assumed that there might be a two-phased delivery of the RSS population growth; an initial phase below the required average and a second period delivering above the required average number of new houses. This is because of the need for significant highway infrastructure improvements that may control the delivery of new homes.

It is understood from the Worcestershire County Council 2001 Census (Worcestershire County Population Report) Table 2 that the population of Redditch in 2001 was 78,807 with a total number of residential dwellings of 29,458 (2.49 people per dwelling). **Therefore Growth Option 1 reflects a population increase of approximately 0.6% per annum, Option 2 reflects a growth of 1.1% per annum, whereas Option 3 represents 1.8% per annum.**

Table 1 can be converted, providing a number of very loose assumptions are applied, into a series of water, wastewater, gas and electricity demands. **Tables 2 and 3, below** indicate the water, wastewater and electricity loads associated with this anticipated population growth;

Table 2 – Net Increase in Water Demand and Dry Weather Foul Water Discharge

	2001	2006	2011	2016	2021	2026
Option 1	68.5m ³ /day	342.5m ³ /day	685.0m ³ /day	1,027.5m ³ /day	1,370.0m ³ /day	1,712.5m ³ /day
Option 2	130.7m ³ /day	653.5m ³ /day	1,307m ³ /day	1,960.5m ³ /day	2,614m ³ /day	3,267.5m ³ /day
Option 3	210.4m ³ /day	1052m ³ /day	2,104m ³ /day	3,156m ³ /day	4,208m ³ /day	5,260.0m ³ /day

It is assumed that current water demand is typically 160 litres per person per day however it is understood that additional pressure will be borne on developers and householders to improve water conservation within new residential developments over the forthcoming years. More accurately a demand of 146 litres per capita per day might be considered and therefore the effect on the incumbent water undertaker's network stated in Table 2 is a worst case.

Clearly the increase in estimated water demand within the Borough as tabled above should approximately mirror the likely increase in foul sewage flow-rates (during dry-flow); it is anticipated that Severn Trent Water would add some contingency based on limited infiltration into the sewerage network for wet weather events. Sewers for Adoption (6th Edition) states that six dry weather flows should be accommodated in adoptable sewerage design, supposedly equivalent to 4000 litres per day. It is believed that this would provide a very large factor of safety and would therefore be considered unsuitable for long-term investment planning.

New surface water discharges from new residential development in Redditch will incorporate sustainable drainage technologies and therefore surface water discharges from brownfield sites will mirror or reduce existing discharge whereas surface water discharges from greenfield sites should mirror the existing greenfield runoff rate. Capital investment to accommodate new surface water loads would therefore be a function of sustainable drainage and attenuation facilities at site specific level, and not a function for the incumbent sewerage undertaker.

Table 3 – Net Increase in Peak Electricity Demand (Undiversified)

	2001	2006	2011	2016	2021	2026
Option 1	370kVA	1,850kVA	3,700kVA	5,550kVA	7,400kVA	9,250kVA
Option 2	705kVA	3,525kVA	7,050kVA	10,575kVA	14,100kVA	17,625kVA
Option 3	1,135kVA	5,676kVA	11,350kVA	17,025kVA	22,700kVA	28,375kVA

The electricity loads considered in Table 3 provide an allowance of 2.0kW per residential dwelling (2.15kVA based on a power factor of 0.93). This average load for each new property assumes that electricity would not be utilised for space or water heating because of recent changes to Part L of the approved Building Regulations. Further, a diversity factor has not been included; typically a diversity factor of 0.75 might be utilised to reflect the variation in peak load times across a large network.

The increased demand stated Table 3 does not include any provision for low or zero-carbon energy provision generated at a specific site, or make any allowance for low or zero-carbon energy generated locally and connected into the incumbent operator's network (known as Distributed Generation). Furthermore, it is anticipated that more energy efficient design and

conservation parameters will be incorporated into many of the new residential development projects to further reduce the loads established in Table 3.

Table 4 describes the net increase in gas loads given to National Grid such that they might test their existing network to understand existing development constraints and the scope of any significant capital investment programme to accommodate the Growth Options cited.

Table 4 – Net Increase in Gas Demand (Undiversified)

	2001	2006	2011	2016	2021	2026
Option 1	860kW/hr	4,300kW/hr	8,600kW/hr	12,900kW/hr	17,200kW/hr	21,500kW/hr
Option 2	1,640kW/hr	8,200kW/hr	16,400kW/hr	24,600kW/hr	32,800kW/hr	41,000kW/hr
Option 3	2,640kW/hr	13,200kW/hr	26,400kW/hr	39,600kW/hr	52,800kW/hr	66,000kW/hr

The gas demands quoted in Table 4 describe simultaneous peak demand based on a typical average domestic requirement of 5kWh per residential dwelling (equivalent to an annual quantity – AQ – of 7350kW per dwelling). Although this utilises average, and not worst-case, loads Table 4 is understood to represent a worst case because of the likely use of low and zero-carbon technologies that might be interchangeable wholly or in-part with natural gas supply. Further ‘district’ or ‘community’ plant that is operated with natural gas will incorporate a level of diversity not included in Table 4 (hence likely worst-case).

A very basic assumption has been utilised to consider the provision of basic data and telecommunication infrastructure; the nearer a dwelling is positioned to a BT Telephone Exchange the faster the likely broadband or data connection speed. It is additionally assumed that BT Openreach will fund all infrastructure reinforcement required to support the given Growth Options; other service providers will ‘piggy-back’ BT Openreach.

Newer technologies such as ‘Fibre to the Home’ might be incorporated at site specific level but it is assumed that this funding would be based on market driven need and funded directly by individual developers.

2.2 Methodology

A series of 21 discrete notional development parcels have been derived, each of which will accommodate a significant proportion, if not all, of the new housing attributable to each of the new growth options 1, 2 and 3.

The net increase in utility and wastewater loads have been derived using the assumptions stated above and these derived loads have been issued together with details of the notional development parcels to each of the incumbent statutory undertakers; Severn Trent Water, Central Networks West, National Grid and BT Openreach. Unfortunately each undertaker has not been granted sufficient time to undertake a detailed modelling exercise (allocating best and worst case options to each area of Redditch to understand the impact of the growth options), however each undertaker has been able to comment upon the proposals and White Young Green has been able to meet each undertaker and ask the following questions;

- Where are the strategic points of supply for the Borough of Redditch and is this constrained in any way and by whom?
- How is water/gas/electricity/telecom data distributed to and within Redditch, where are the stresses in the existing network and where would network growth be constrained and by whom?
- Where are the strategic wastewater treatment and disposal points for Redditch, are these constrained and by whom?
- Where are the stresses in the existing wastewater sewerage/drainage network and where will network growth be constrained in the future
- What capital investment programmes are there for network growth and security of supply in Redditch and what network growth and security of supply investment will likely be planned in the foreseeable future?
- What element of network growth will be afforded by the regulated utility business and which parts will notionally be funded through public and private developer led activity?

In addition to the dialogue conducted at each meeting the following documents were studied by competent persons to understand more fully each incumbent undertakers longer term development aspirations and capital investment priorities;

- Worcestershire County Council 2001 Census Analysis
- Redditch Borough Council Housing Strategy Statement
- West Midlands Regional Spatial Strategy – Phase 2 Revision
- Water Resources for the Future – A Summary of the Strategy for the Midlands Region (Environment Agency)
- Water Resources Plan 2005-2010 (Severn Trent Water)
- Long Term Development Statement 2005-2010 (Central Networks West)
- Long Term Development Statement (National Grid)

3.0 WASTEWATER

3.1 Key Stakeholders and Consultees

The conveyance and treatment of wastewater is undertaken through the ten Sewerage Undertakers in England and Wales, under regulation by Ofwat. The discharge of treated water and surface water, through sewers, watercourses or otherwise is controlled by the Environment Agency. Disposal of surface water may also be controlled through an Internal Drainage Board, but not within and surrounding the Borough of Redditch. Watercourses, sustainable drainage devices and attenuation devices such as balancing lagoons might be owned and operated by private Management Companies, Sewerage Undertakers, Local Authorities or the Environment Agency. The design and engineering codes of practice surrounding the adoption, ownership and management of sustainable drainage devices (SuDS) will likely change significantly during the current RSS period to 2026.

Severn Trent Water is the licensed Sewerage Undertaker for Redditch and has been consulted in conjunction with Redditch Borough. Severn Trent Water has provided a limited response to the request for data to support this study, however further information has been requested in order to provide a more comprehensive assessment of the sewerage restrictions relating to this study. It should be noted that the Environment Agency is a key consultee at both extremities of the water supply and disposal process; raw water abstraction and treated water disposal and should be consulted separately to understand whether there is any flexibility for increased abstraction or treated water discharge locally. However for the purpose of this consultation all dialogue with Severn Trent Water and Redditch Borough is based on the assumption that current Environment Agency constraints will remain fixed and in some circumstances existing constraints will be further tightened over the 25-year RSS plan period as dictated at a national level.

3.2 Existing Network Constraints

Current sustainable engineering practises dictate that surface water will be attenuated within each development parcel so that the discharge from any new development site is equivalent or less than the existing surface water discharge during all rainfall events up to and including a 100-year event. Effectively all network reinforcement is contained within each development parcel and funded entirely by each developer. Therefore new development, at any of the growth options tabled, will not be constrained by the capacity of the existing sewerage or watercourse network provided that onsite attenuation is provided to restrict surface water flows from the site and protect water quality in surface water conduits.

It is possible that surface water discharges might be problematic where development is located at low level and/or away from existing watercourses or existing surface water sewers. This is considered a small risk as Batchley Brook, Red Ditch, Bordesley Brook, the River Arrow and Dagnell Brook all serve the northern extremities of the town. Church Hill Brook, Blacksoils Brook, and Ipsley Brook all serve the eastern perimeter of the town, Brandon Brook, Bank Brook, Woodrow Brook and the River Arrow serve the south and south west extremities of the town. Although Swan's Brook and Bow Brook serve the west of the town the relative density of officially designated water courses is less and engineering solutions might potentially be more complex if the soil conditions prevent infiltration drainage.

There are existing Local Authority maintained surface water balancing lagoons within Redditch but, again, all new surface water discharges should be attenuated upstream of these lagoons. Similarly there are a number of Environment Agency regulated watercourses within Redditch which will also be protected, in terms of both water quality and flooding risk, but this should not present further development constraints provided an effective SuDS design is incorporated into the detail design of the development infrastructure upstream of any outfall into the protected watercourses listed.

Conversely the foul sewerage network is heavily constrained at three points in the water cycle; network carriage through the existing sewerage network in Redditch, sewage treatment capacity at Priest Bridge and Sernal Sewage Treatment Works, and the discharge of treated effluent into existing watercourses (Bow Brook and the River Arrow). Each growth option cited in this report and the location of new development will be affected by these issues.

Redditch is subdivided into three primary wastewater catchments; the Sernal catchment which ultimately discharges into the River Arrow via Sernal Sewage Treatment Works to the southeast of Redditch, the Priest Bridge catchment which discharges via Priest Bridge Sewage Treatment Works into Bow Brook to the southwest of Redditch and the Astwood Bank catchments discharges to the Brandon Brook via the Astwood Bank Sewage Treatment Works (an autonomous catchment unlikely to be affected by large scale new development).

Priest Bridge drains an area to the west of the 'Ridge', which is effectively an area contained within an arc between 6.00 and 10.00 on a clock face. The area east and northeast of the 'Ridge' containing the town centre, drains into the Sernal catchment. Both catchments drain approximately from north to south (north to southeast or north to southwest).

Severn Trent Water has stated that major planned capital work is proposed to the Priest Bridge Sewage Treatment Works (south west of Redditch) within the AMP 4 period. This capital work however is based on a current design population of 15,000 and does not include for any of the growth options in this study. Severn Trent Water has advised that the Sewage

Treatment Works will be difficult to extend once these works have been carried out, and therefore the upgrading works required for growth options 1, 2 or 3 would need to be assessed and incorporated into the Severn Trent Water capital programme for upgrading of the Priest Bridge Sewage Treatment Works as soon as possible. If these growth options are not incorporated into the capital works at an early stage, then development to the west and south west of Redditch may be restricted.

Severn Trent Water has advised that the Bow Brook is currently considered unsuitable to accept any additional treated effluent from the Priest Bridge Sewage Treatment Works, and therefore the capacity of the treatment works is constrained by this issue. Severn Trent Water had previously indicated that any foul discharge from new development to the west of Redditch should be pumped into the Sernal Catchment, however this carries its own risks.

The Sernal catchment contains the older parts of the Redditch sewerage network which historically conveys much of the existing surface water flows through Redditch and a number of sections of sewer, typically in the town centre, have historically been subject to sewer flooding. Improvements have been completed by Severn Trent Water but effectively new development to the north of the town, or pumped discharges from the west of the town may need to be conveyed through stressed sections of the network with increased flooding risk.

Severn Trent Water has confirmed that there are no planned capital works being carried out to the Sernal Sewage Treatment Works and detailed modelling will be required to ensure that any increased foul water discharge to the treatment works will not compromise the discharge compliance to the River Arrow (as set by the Environment Agency). If there is any concern over the compliance of the discharge consent from the treatment works, then this may restrict development to all of Redditch unless onsite upgrading works are carried out to increase the capacity of the treatment works. Clearly as no such works are planned this could take years for Severn Trent Water to implement.

Severn Trent Water has advised that although there are planned capital works to the Astwood Bank Sewage Treatment Works within the AMP4 period, these will not extend the capacity of the works to accommodate Options 1, 2 or 3. Severn Trent Water has advised that the capacity of the works would need to be reviewed to assess whether any increased foul water discharge from the treatment works would compromise the discharge compliance.

3.3 Anticipated Capital Investment for Growth Options

Severn Trent Water has a duty to invest in its sewerage network (infrastructure and non-infrastructure) to support new development allocated in a Local Development Framework document. This investment is planned in 5-year asset management programmes; currently

Severn Trent Water is delivering AMP4 (2005 to 2010) but are starting to plan for AMP5 (2010 – 2015). Severn Trent Water, as a statutory consultee, would therefore discourage growth to the west and northwest of Redditch as this would trigger significant capital expenditure. The Environment Agency may act similarly. Further, Severn Trent Water has a duty to reduce sewer flooding incidents and would therefore not support development to the north of the town centre.

The preferred area of growth, as dictated by Severn Trent Water, might be adjacent to or to the east of the River Arrow, however this would likely trigger a new foul trunk sewer from the northeast of Redditch to Spernal Sewage Treatment Works; although this activity might be funded by Severn Trent Water provided it has sufficient time to develop a capital investment strategy following adoption of the RSS, the likely delivery time for this new asset might be considerable and form a constraint within itself. The capacity of Spernal Sewage Treatment Works would also have to be tested to understand whether there is sufficient capacity, but should additional capacity be required then it is understood that there are fewer constraints associated with the discharge of treated effluent at this location compared with other Sewage Treatment Works in the area. For the purposes of this study it is assumed that all Environment Agency consents, including treated effluent discharge, will remain fixed.

Irrespective of Severn Trent Water's need to support growth allocated in the Local Plan, developers would additionally contribute to requisitioned sewers and pay fully for new sewers and pumping stations to be adopted by the sewerage undertaker.

3.4 Locating New Housing Development to limit Infrastructure Reinforcement

If development were located upon land that was able to discharge surface water directly to ground via sustainable infiltration devices (soakaways) this would provide the most sustainable, and cost effective, method of discharging surface water. At this juncture the permeability of land within and surrounding Redditch is unknown therefore land adjacent to Environment Agency monitored watercourses would offer the next most sustainable, and cost effective, solution provided sustainable drainage technologies are incorporated at site level.

Attenuated surface water discharges should be available on the northern, southern and eastern perimeters of Redditch, but to a more limited extent to the west of Redditch where there are Environment Agency controls on discharges to Swan's Brook.

Perhaps more importantly growth in Redditch would ideally be accommodated in areas adjacent or to the east of the River Arrow to ensure that new foul water flows can be conveyed by gravity into Spernal Sewage Treatment Works without increasing the risk of

sewer flooding in an already stressed sewerage network. As suggested in 3.3 this might trigger a new trunk foul sewer and therefore it is likely that package treatment facilities may also be considered as an option.

All development within and surrounding Redditch carries an additional risk of capital investment at Sernal Sewage Treatment Works (during AMP5 - 2010 to 2015) to increase the treatment capacity of these works.

4.0 WATER

4.1 Key Stakeholders and Consultees

There are ten water and sewerage undertakers in England and Wales and sixteen water only undertakers. These undertakers are licensed to abstract, distribute and supply water under regulation. Population growth might be constrained by each of these factors and consideration has therefore been given to each of these functions.

Abstraction of raw water is regulated by the Environment Agency whom will likely contribute directly to West Midlands Regional Assembly at a strategic water resources level. The current trend is for a reduction of abstracted water across the region. For the purposes of this study it is assumed that Severn Trent Water is familiar with Environment Agency constraints given that it has to submit a 25-year Water Resource Plan to the Agency. This next plan is due to be submitted in December 2007 and is being prepared at the time of this study such that Severn Trent Water is particularly keen to contribute to this consultation exercise but has failed to spare the resources to do so. It is understood that all Environment Agency constraints will be captured at a local level within the Severn Trent Water consultation.

The Borough of Redditch, Bromsgrove District and Stratford-on-Avon District (and counties of Worcestershire and Warwickshire) are located entirely within the Water Undertaking licensed to Severn Trent Water. In recent times a number of new undertakers have been granted a Water Supply Licence through the Water Supply Licensing regime created within the Water Act 2003 but none of the seven new entrants have an established presence in Worcestershire, Warwickshire or the West Midlands and are therefore not stakeholders in this process.

4.2 Existing Network Constraints

Severn Trent Water has not been able to provide a satisfactory response to both written communication and a meeting with its Commercial Services and Developer Services Managers in the time given to undertake this study, however Severn Trent Water has stated that it will continue to consider the implications of all three growth options in terms of water supply and water distribution and will respond in due course. White Young Green is continuing to pursue Severn Trent Water for a satisfactory response to this enquiry.

Severn Trent Water has confirmed that 97% of the water supplied to Redditch is from a groundwater source wherein there is likely to be some form of abstraction restriction imposed by the Environment Agency over the duration of the RSS.

Severn Trent Water is currently completing a new Water Resources Study to fulfil its obligations under the Water Act 2003 (this will be published December 2007/January 2008).

4.3 Anticipated Capital Investment for Growth Options

All incumbent Water Undertakers have a duty to provide new connections to both residential and commercial property under section 45 and 55 of the Water Industry Act 1991. Furthermore, under section 42 of the Water Industry Act 1991 and subsequently reinforced in the Water Act 2003, a Water Undertaker must provide a financial contribution toward the capital cost of any requisitioned water main if the new requisitioned main has an inherent asset value. In addition a fixed Infrastructure Charge is also levied on a 'per connection' basis. It is stated that Infrastructure Charges are levied to fund non-network infrastructure such as Water Treatment Works, Reservoirs and Pumping Stations. Capital investment allocated within each regional water undertakers' 5-year Asset Management Plan (AMP) versus developer financed capital funding can vary. Water Undertakers submit a five-year capital expenditure plan to Ofwat to determine the level of price raises that can be implemented to support population growth, network security, pressure improvement and leakage amongst other things. Once this plan is implemented Water Companies cannot easily derive additional capital funding for capitalised works other than through third party contributions. It might be argued that there is pressure for Water Companies to utilise developer funded activities to derive maximum benefit (however developer derived funding should not be utilised to support improvements to network operation except to maintain pressure and security of supply to existing customers at pre-development levels). Occasionally Water Companies align their capital investment programmes with major areas of new development (not necessarily that allocated in Local or Development Framework Plans as this does not carry any development certainty), most often this capital investment will continue to be recovered from developers, but in the form of a 'claw-back' - often rechargeable as a 'roof tax' over and above the standard Infrastructure Charge for Water and Sewerage.

4.4 Locating New Housing Development to limit Infrastructure Reinforcement

The preferred location for new housing allocation within and around the Borough of Redditch cannot be ascertained until all the water distribution network constraints are more fully understood. Severn Trent Water has confirmed that it will continue to review the three growth strategies upon its existing network and will respond in due course. White Young Green will continue to pursue a response to this enquiry.

5.0 GAS

5.1 Key Stakeholders and Consultees

Since the demise of Transco and National Grid Transco the national gas distribution network has been divided into its regional components (these regional distribution networks always existed behind the Transco brand). Scotia Gas Networks acquired the gas transportation (GT) networks in the South of England and Scotland (since renamed Southern Gas Networks and Scottish Gas Network – SGN). Wales and West Utilities acquired the Welsh and West of England gas transportation network. Northern Gas Networks acquired the North of England. The four remaining gas transportation regions, including the East and West Midlands, were retained by National Grid. National Grid has therefore been consulted in this process.

5.2 Existing Network Constraints

Redditch is supported by a robust medium-pressure gas distribution network, which is connected in two locations to National Grid's regional high-pressure network to the south and north of Redditch. The medium-pressure network is locally reduced into a low-pressure distribution network in order to provide domestic connections.

The medium pressure network has good connectivity and should easily be extendable to accommodate residential growth close to the existing network within the Borough.

Large discreet parcels of growth associated with Options 2 and 3 might trigger a new connection from the high-pressure network, this will be expensive relative to typical gas connection activities but modest compared with other infrastructure investment projects.

The Health and Safety Executive (HSE) has a set of guidelines called PADHI (Planning Advice Near Hazardous Installations). The HSE is a statutory consultee during the planning process, and uses the PADHI guidelines to assess whether a development is at risk due to the proximity of hazardous installations. (In this case the high pressure gas transmission mains located to the north and northwest of Redditch).

The PADHI guidelines are based on risk zones around a hazardous installation, known as inner, middle and outer zones. The distance of these zones from each hazardous installation will be set by the HSE and Planning Authority, and will determine the acceptable distances that particular types of development can be built to hazardous installations.

The guidelines place each type of development into a sensitivity category, ranging from Level 1 (lowest sensitivity) to Level 4 (most sensitive) Typical types of development for each rating

are described below; however reference should be made to the PADHI document for a full description of all each sensitivity category and types of development.

Level 1 – Based on the normal working population e.g. factories less than 3 storeys high with less than 100 occupants and also car parking,

Level 2 – Based on the general public, at home and involved in normal activities e.g. domestic development less than 30 properties,

Level 3 – Based on vulnerable members of the public e.g. schools, and housing developments with greater than 30 properties.

Level 4 – Very large and sensitive developments e.g. hospitals, nursing homes, nurseries, and large open air developments where more than 1000 people could be present.

The distances set by the Planning Authority could place a significant restriction on the development layout and type of development that can take place (particularly in the north, south, west, northwest and southwest of Redditch where high pressure gas mains exist). It is possible that the HSE could object to any planning application that does not fall within the PADHI guidelines.

The distances associated with the risk zones should be determined as soon as possible in order that an assessment of the likely permissible development in proximity to the high pressure gas main can be determined.

An extract of the decision matrix that the HSE will use to determine whether it will lodge an objection to a development is shown below: This matrix has been taken from the PADHI guidance document.

Level of Sensitivity	Development in Inner Zone	Development in Middle Zone	Development in Outer Zone
1	DAA	DAA	DAA
2	AA	DAA	DAA
3	AA	AA	DAA
4	AA	AA	AA

DAA = **Don't Advise Against Development**

AA = **Advise Against Development**

5.3 Anticipated Capital Investment for Growth Options

In most instances, certainly where modest quantities of gas are required, gas networks will be extended into new development sites to provide new connections seemingly without the need for off-site reinforcement. In actual fact, reinforcement is often required but will be funded directly by the incumbent GT (National Grid in this instance) without notification.

Where larger quantities of gas are required, typically for larger and multi-phase developments, the incumbent GT (National Grid) may request (often via an independent gas transporter), a fee for undertaking a Design Study. This Design Study often takes six months to complete and will identify a specific capital investment project that will enable the new connection activities to be undertaken. Once the Design Study is completed an Economic Test will be completed to identify the proportion of the off-site network reinforcement payable by the developer; the capital funding payable by the developer is related to the value of the new revenue stream and the rate at which the maximum revenue stream will be realised. The developer contribution is often a smaller proportion of the overall capital investment.

If gas connections are required in bulk as a single application then a proportion of the network investment might be payable by the requisitioner, however applications for more modest parcels of land should instigate gas network reinforcement with very little developer financed contribution.

5.4 Locating New Housing Development to limit Infrastructure Reinforcement

The existing gas infrastructure network should not constrain residential growth in any specific location however the quantity of off-site network reinforcement will vary modestly depending on the location and size of discreet residential development parcels.

Large discreet parcels of growth, if positioned close to the to the existing high to medium pressure reducing stations to the north and south of the town should reduce the scope of new infrastructure to a minimum by removing the risk of a new high-pressure to medium-pressure pressure reducing station.

Large development parcels located to the east or west extremities of Redditch may trigger more significant infrastructure activities, particularly where the parcels are located further away from the high to medium pressure reducing stations.

Similarly smaller parcels of development land located close to the robust medium-pressure gas network should pose few constraints in terms of design, build and funding.

As part of the network constraint consultation National Grid Gas identified a series of notional connection points on its medium pressure gas network to the north, west, south east and south of Redditch, and these are located as follows:

Bromsgrove (West) at grid co-ordinates (401937,267566)

Bromsgrove (North) at grid co-ordinates (403669,268760)

Warwickshire Border (south east) at grid co-ordinates (407121,263171)

Green Field (South) at grid co-ordinates (403228,263104)

National Grid Gas then modelled Growth Options 1, 2 and 3 at these points and have since confirmed that;

- Growth Option 1 can be accommodated from the existing medium pressure network at points to the north, south, west and south east of Redditch without the need for network reinforcement
- There is insufficient capacity to the south of Redditch to accommodate Growth Options 2 and should development be located around this area, reinforcement of the medium pressure network would be required back to the high pressure network
- Growth Option 2 could be accommodated to the north, east and west of Redditch without the need for reinforcement
- National Grid Gas have confirmed that there is sufficient capacity to support Growth Options 3 to the north of Redditch
- There is insufficient capacity to support Growth Option 3 located entirely in the south, east or west of Redditch, and reinforcement of the medium pressure network back to the high pressure network would likely be required

As previously mentioned in this report, certain types of development cannot be located close to high-pressure pipelines as these are considered hazardous installations under PADHI guidance (Planning and Development adjacent to Hazardous Installations). There are a number of high pressure pipelines to the north, south, west, northwest and southwest of Redditch, and therefore reference should be made to the PADHI guidelines when considering development parcels in proximity to high pressure gas mains.

6.0 ELECTRICITY

6.1 Key Stakeholders and Consultees

The generation of electricity in England, Scotland and Wales is primarily provided by a number of large coal or gas fired power stations which distribute energy via the national grid. The national grid system is operated by National Grid who distribute energy to a number of Grid Connection Points. All networks downstream of the Grid Connection Points are primarily operated by Distribution Network Operators.

Locally and regionally generated power, often low carbon energy, might be connected either to the national grid or to assets operated by the regional Distribution Network Operators (depending on the connection voltage); this is known as Distributed Generation. Alternatively low/zero-carbon energy sources may be generated locally and utilised locally without connection onto the DNO network; for the purposes of this report it is assumed that domestic power requirements will be derived from the incumbent DNO's network (Central Networks).

The electricity distribution market in England, Wales and Scotland is largely facilitated through the fourteen licensed Distribution Network Operators (DNOs). Each of these operators has an inherited network aligned to the former Regional Electricity Companies. Redditch is located in the area formerly operated by Aquila and is now wholly operated under regulation by Central Networks (West) Ltd., part of the E.ON group of companies.

Although the distribution market has been opened up to independent Distribution Network Operators (iDNOs) this Growth Study is intended to derive the existing electricity network constraints associated with Central Networks' distribution asset base, and the capital investment required by Central Networks to support each of the Growth Options 1, 2 and 3.

6.2 Existing Network Constraints

All of the anticipated levels of growth (options 1, 2 and 3) within and adjacent to the Borough of Redditch can be accommodated at a national distribution level by National Grid; this has been confirmed by Central Networks.

The Borough of Redditch is supplied with power secured from National Grid at Feckenham 'Grid Supply Point' (Ordnance Survey Map Reference SO0261). This Grid Supply Point transforms power from the national grid at 400kV and 275kV onto 66kV regional circuits operated by Central Networks West. The 'Firm Capacity' at Feckenham Grid Supply Point is currently 504MVA but will be increased to 576MVA by National Grid during 2007 (replacing two existing transformers to provide five 180MVA 400/66kV transformers).

A 66kV closed loop operates between Feckenham Grid Supply Point, Redditch North Primary Substation, Ipsley Primary Substation and Redditch South Primary Substation. This loop is operated by Central Networks West and a whole section of this 66kV circuit between Feckenham and Redditch South is currently being upgraded so that forecast peak electricity demand for Redditch can be fed efficiently in either direction from Feckenham Grid Supply Point in the event of an operational failure. The upgrading of this 66kV circuit is effectively future-proofing power supply to the three Primary Substations in Redditch in terms of security but should also future proof the trunk network for the duration of the RSS in terms of capacity (based on population growth of 1.5% per annum).

Redditch itself is supported from Redditch North Primary Substation (SP0368), Ipsley Primary Substation (SP0566), and Redditch South Primary Substation (SP0365). Each of these three substations transform power at 66kV (from the Feckenham Grid Supply Point) to standard 11kV high-voltage circuits, which are in-turn transformed down to 415V (standard domestic low-voltage connections) via a large number of locally sited secondary substations.

Redditch North Primary Substation supports most of northern Redditch. Redditch North Primary Substation has 2 no. 20MVA and 1 no. 20/40MVA 66/11kV transformers; this effectively means that the 'Firm Capacity' is 52MVA (allowing for failure of the largest transformer and a cyclic rating of plus 30%). The Redditch North demand at system peak during 2005/2006 was 42.4MVA. If all of the new housing growth were fed from Redditch North Primary Substation, **Option 1 could be accommodated without any further work at the Redditch North Primary Substation, whereas Option 2 and Option 3 could not be accommodated without the replacement of existing transformers.** Option 2 might require the replacement of 1 no. 20MVA transformer with a 20/40MVA transformer for approximately £600k, whereas Option 3 might require the replacement of both 20MVA transformers with two further 20/40MVA transformers for approximately £1.2m. These indicative budget costs do not include any allowance for new 11kV circuits between each development site and the primary substation, new circuit breakers or extensions of the existing 11kV boards; the likely cost of additional cable laying activities would be entirely dependent on the location of the proposed new electricity load. As Central Networks naturally invest in their network, based on a stated population growth of 1.5% per annum, it is anticipated that Central Networks' own long term capital investment at the Redditch North Primary Substation prior to 2026 would additionally accommodate Option 2 however it must be noted that under new licence conditions Ofgem can allow any capital investment apportioned to Network Growth to be recharged back to a public or private developer. Effectively this means that should all new development be solely hung-off Redditch North Primary Substation then only Option 1 might be derived without significant third party contributions to the improvement of Central Networks' infrastructure.

Similar constraints will apply to Ipsley Primary Substation and Redditch South Primary Substation. Ipsley Primary Substation currently has a Firm Capacity of 40MVA and the substation demand at system peak in 2005/06 was 36.8MVA. Effectively this means that if all of the new population growth was hung-off Ipsley Primary Substation then all three Growth Options would trigger a new transformer. Fortunately it is intended to replace an existing 20/40MVA transformer with a 60MVA transformer within the next 18 months, which will increase the Firm Capacity to 78MVA. **Central Networks' funded planned works will allow all three Growth Options (1, 2 and 3) to be accommodated from Ipsley Primary Substation without major network investment** other than new 11kV boards, new 11kV circuits and new circuit breakers.

Redditch South Primary Substation currently has a Firm Capacity of 39MVA; **if any of the Growth Options are supplied solely from Redditch South Primary Substation then both the existing transformers would have to be replaced at an indicative cost of £1.2m. Again, these indicative budget costs do not include any allowance for new 11kV circuits between each development site and the primary substation, new circuit breakers or new 11kV boards;** the likely cost of additional cable laying activities would be entirely dependent on the location of the proposed new electricity load.

6.3 Anticipated Capital Investment for Growth Options

Central Networks publishes a Long Term development Statement to mirror its Distribution Price Control Review Period (DPCR); the current DPCR period is 2005 to 2010. Central Networks has confirmed that it is starting to prepare its Long term Development Statement for the DPCR period 2010 to 2015. The current statement (and future statements) will contain information on all strategic distribution assets, current electricity demand for Redditch and forecast demand for Redditch. The current development statement bases population growth on an average 1.5% per annum, higher than that proposed in Growth Option 1 and Growth Option 2 (and certainly higher than actual growth in this same period). It should be noted that the current and forecast demands for Redditch are actually based on a wider area than the Borough itself; Central Networks base on its asset investment and planning on the areas supported by strategic and primary substations (the wider area is supported by a 66,000 volt strategic network supported from a grid supply point at Feckenham and the sub-regional 33,000 volt networks at three primary substations within Redditch – Redditch North, Redditch South and Ipsley).

Standard population growth funding attributed to each Long Term Development Plan is usually calculated from an extrapolation of actual demands on each of the primary networks over a number of preceding years (it has been confirmed that Central Networks West utilises an average population growth figure of 1.5% per annum) and does not actively capture new

development projects allocated in Local Plans or Local Development Frameworks (LDF) unless an 'Availability Charge' is being paid. Importantly recent changes to License Conditions introduced by Ofgem allow a DNO to recharge any new capital investment under the 'population growth' sub-line through a form of 'Capital Clawback' or 'Roof Tax' (similar to the mechanism utilised under s106 of the Town and Country Planning Act).

A DNO such as Central Networks is unlikely to forward-fund network reinforcement attributable to new development until actually triggered by a formal new connection application. Therefore a large new development, if contained within an LDF or not, would probably require off-site network reinforcement before the new connections can be completed. The scale of this off-site reinforcement specific to the Growth Options being attributed to Redditch as described below.

Central Networks has suggested that only 20-25% of new loads allocated through the LDF process are actually transformed into a formal new connections application and therefore Central Networks rely entirely on its own data to forecast population growth. Data across its whole regional network indicates that average population growth (based on increased demand in preceding years) is currently 1.5% per annum.

6.4 Locating New Housing Development to limit Infrastructure Reinforcement

Central Networks has a duty to connect new domestic loads. All of the Growth Options 1, 2 and 3 can be accommodated within or surrounding Redditch Borough, however there will be some relatively modest variations to the scale of capital investment required to support each of the housing growth options.

Any of the three growth options located within the area supplied from Ipsley Primary Substation (east side of Redditch) can be accommodated without any major capital investment (once the planned upgrading works are completed by Central Networks) other than a new 11kV high-voltage network; the cost of any new 11kV circuits downstream of a Primary Substation will be entirely proportional to the distance of the new development from the Primary Substation (an indicative sum of £200/m might be considered at this stage).

Any development to the north of Redditch that would naturally be supplied from Redditch North Primary Substation will trigger one or two new 33/11kV transformers (c. £600k ea) plus a new 11kV high-voltage network once growth is above Option 1 (using a capital investment sum of £200/m for twin 11kV cables installed in public highway).

Any significant development (Options 1, 2 and 3) to the south of Redditch, naturally supplied from Redditch South Primary Substation would trigger two new 33/11kV transformers (c.

£1.2m) plus new 11kV high-voltage networks (at a unit cost of £200/m for every metre between the development site and the Primary Substation).

Any development to the west of Redditch would likely be served from either the Redditch North Primary Sub Station or Redditch South Primary Sub Station, and would trigger similar reinforcement costs to those identified above.

6.5 Summarised Commentary on Low and Zero Carbon Potential for Redditch

Although outside the main body of this study, a review of network electricity and gas constraints would not be complete without a cursory examination of low and zero-carbon technologies that may be available to generate heat, cooling and power within the environs of Redditch for the provision of truly sustainable communities. Clearly the provision of these low and zero-carbon energy sources would reduce the reliance of non-sustainable energy generation and very likely reduce overall carbon emissions. However it is certainly not guaranteed that the inclusion of renewable energy sources will remove the need to provide a fundamentally robust grid supplied electricity and gas infrastructure to meet peak demand when the local micro-generated low carbon energy source cannot meet peak demand.

A Renewable and Sustainable Energy – Building Services System Summary Sheet is enclosed in Appendix A. This schedule identifies methods for actively and passively reducing carbon emissions through new technologies and improved design methodology. Many of the technologies listed can be applied to most types of development however sources of local fuel and wind speed are variable and dependent on location. **It should be noted that average wind speeds in and around Redditch, even at raised topographical elevations to the north of Redditch do not generate wind speed in excess of 7.2m/s at 45m above ground level which is the industry normal for operating an efficient wind turbine.** It is therefore unlikely that wind turbines would efficiently reduce the bulk of the power requirement for the growth of Redditch.

Two sources of commercially available wood fuel can be obtained within 30 miles of Redditch however the scale of the wood fuel supply would not likely be sufficient to provide the scale of biomass energy required for any of the growth options listed. Other sources of biomass fuel should be investigated and incorporated into an integrated zero-carbon strategy alongside the other design methodologies and sustainable technologies listed in Appendix A.

Low and zero carbon energy provision would most likely be created from more than one sustainable source; wind energy would not be very efficient as average wind speeds are not sufficiently high and large local sources of bio-fuels cannot be located at this time. Without more precise survey data it is not possible to determine the best value low and zero-carbon

technologies in terms of capital outlay, capital return periods, operating costs and carbon savings however it is highly likely that Level 4 and 5 of the Code for Sustainable Homes might be difficult to achieve without some form of community Combined Heat and Power (CHP), potentially fuelled by natural gas with a zero-carbon technology supplement.

7.0 DATA AND TELECOMMUNICATIONS

7.1 Key Stakeholders and Consultees

Although there are a wide array of data and telecommunication service providers to both commercial and domestic premises much of the physical infrastructure services in the UK are owned by either BT or Virgin Media (formerly Cable and Wireless and NTL amongst others). Although many other service providers own and operate infrastructure networks few are able to provide broadband, cable television and telephony services to the majority of domestic premises in the UK. Further BT incorporates Openreach (BT Openreach) which is effectively an asset owner and distributor of third party services, including BT retail and wholesale services. BT Openreach is a platform on which Broadband, Cable and Telephone services providers can operate. Other service providers such as Bulldog, Tiscalli, Talk Talk, Easynet, Pipex, Orange etc install equipment at a local BT Telephone Exchange in order to provide a supply to domestic and commercial premises.

This consultation reviews the location of new development in relation to existing BT Exchanges, considers the current and proposed range of services operated from each Exchange, the anticipated network development at each Exchange and related downstream network and defines the likely Broadband efficiency based on distance to each Exchange.

7.2 Existing Network Constraints

Figure 1, below, describes a map of Redditch identifying the location of the five Telephone Exchanges within Redditch and Appendix B provides a summary of the services available at each Exchange identified.

Ultimately these five Exchanges will provide Broadband and Telephone services across the whole of the Borough (Broadband speed will vary proportionally to distance from Exchange) and it is therefore unlikely that the growth options stated will be significantly constrained by existing data and telecommunication infrastructure.

It might be noted that some of the Exchanges will be enhanced to provide a '21st Century Network' upgrade before others and this might be considered as a modest constraint but effectively BT will invest in infrastructure to support its customer base wherever its customer base is located once it becomes economically viable to do so.

7.3 Anticipated Capital Investment for Growth Options

BT Openreach will provide new connections to all domestic premises without charge and will encourage the growth of its network by contributing a fixed fee for each new BT connection installed to new domestic premises. Effectively BT will invest in its network to support new development wherever this might be located. The greater the number of new connections the greater the revenue stream generated and the better the business case for network growth investment (either in terms of replacing copper with fibre or upgrading Exchanges).

Figure 1



Figure 1 Commentary

The Exchange to the North of the town centre is Redditch, Astwood Bank is the Exchange to the South of the town on the A441, Headless Cross is to the West of the town, Ipsley is to the East of the town and Studley is located to the Southeast of the town in the Stratford-on-Avon District.

7.4 Locating New Housing Development to limit Infrastructure Reinforcement

New development would ideally be located closer to existing Telephone Exchanges as the distance from a domestic property to a BT Openreach Exchange is proportional to the Broadband speed available at that property. Development to the north, west, east and south of Redditch may therefore provide suitable for Broadband connections without the risk for further BT Telephone Exchanges or enhanced network investment (copper to fibre-optic cabling across a large swathe of Redditch).

New commercial and employment land should equally be located close to an Exchange that has both ADSL and SDSL systems activated. ADSL can provide fast download speeds but only SDSL will provide upload speeds to match download speeds.

Currently only Redditch Telephone Exchange has SDSL enabled and therefore all commercial development should be located closer to this Exchange.

8.0 CONCLUSIONS, RECOMMENDATIONS AND NEXT STEPS

8.1 Conclusions

The supply of gas should not influence either the number of new homes in or around Redditch or the location of new homes in or around Redditch, however it should be noted that all growth options can be accommodated from the existing medium pressure gas network to the north of Redditch without the need for network reinforcement should new development be cited generally to the north rather than south, east or west.

The existing data and telecommunication network in Redditch should not unduly influence housing growth or the location of housing growth. Any employment growth cited to the north of Redditch would benefit from both ADSL and SDSL services as SDSL is operated only from Redditch Telephone Exchange to the north of the town centre. SDSL will have more marketability and might more readily suit Economic Development policy.

The supply of network electricity should not unduly effect residential growth in or around Redditch although capital investment costs might be reduced by locating new homes in certain locations, namely those closest to Ipsley Primary Substation (SP0566). Development to the south of Redditch would be most expensive.

Provided suitable sustainable drainage (SuDS) methodologies are employed, and appropriate flooding risk assessments have been undertaken, then the number and location of new homes should not be unduly influenced by surface water and stormwater drainage issues. The most sustainable, and perhaps least expensive, location to construct new homes in Redditch in terms of stormwater drainage would be locations where the permeability of the soil is greatest, failing this close to existing watercourses (most likely to the north and east of Redditch where the density of existing watercourses is greatest).

The single most pertinent infrastructure constraint as derived from this study (given that the water supply constraints are not fully understood) is foul water. Effectively development to the west of the River Arrow may potentially be more expensive and less sustainable than development adjacent to or to the east of the River Arrow because of infrastructure constraints in the existing sewerage network. Severn Trent Water has also confirmed that it will need to carry out modelling of its current sewage treatment works at Priest Bridge, Sernal and Astwood Bank to assess the full effect of any increased foul water flows and the subsequent discharge of treated effluent, however anecdotal evidence suggests that Sernal STW would appear to have the most flexibility. Sernal STW drains all parts of Redditch to the east of an arc drawn between 6.00 and 10.00 on a clock face of Redditch.

Water supply constraints in Redditch are yet to be confirmed. Severn Trent Water will respond formally following the completion of further investigations.

Low and zero carbon energy provision would most likely be created from more than one sustainable source; wind energy would not be very efficient as average wind speeds are not sufficiently high and large local sources of biomass available in sufficient quantities to deliver the growth options cited cannot be located.

8.2 Recommendations and Next Steps

Although information with regard to water abstraction, treatment and distribution has not been forthcoming from Severn Trent Water, and a knowledge of soil conditions with regard to the infiltration of surface water is not known, it is becoming clear that large scale residential development generally adjacent to or to the east of the River Arrow is preferable in terms of reduced capital investment and greater sustainability (a reduced foul water pumping requirement). Both foul water and electricity solutions will be cheaper and simpler on development generally located close to or to the east of the River Arrow.

It is strongly recommended that upon adoption of the West Midlands RSS by the West Midlands Regional Assembly the dialogue with each of the key infrastructure service providers be expanded such that actual modelling data can be made available to determine the likely budgeting costs for the preferred development options once these are more fully developed by Redditch and their partners. In this study White Young Green has been able to open a dialogue with each of the key infrastructure service providers but has not been able to develop this dialogue beyond notional modelling and strategic design assumptions. White Young Green can continue to have a dialogue with each undertaker to ensure that value is achieved throughout the infrastructure supply chain, review the value associated with all types of utility infrastructure solutions and establish mechanisms for the equitable apportionment of capital investment, including capital 'claw-back' or roof tax. White Young Green can also review more innovative combined sustainable energy and utility solutions using both traditional utility providers and new independent market entrants utilising design, build, fund, operate and maintain (DBFOM) contracts or more traditional design and build solutions.

An early and continuous dialogue with the incumbent utility undertakers will inevitably provide better forward planning of trunk utility assets and consequently a speedier delivery, additionally an early and continuous dialogue will enable a more equitable apportionment of capital infrastructure investment between the utility undertaker, development agencies and public or private development partners. This may or may not include 'roof tax' type similar to those operated in Milton Keynes. Central Networks are now able to operate in this manner and there are models for water and sewerage undertakers to operate these models also.

APPENDIX A

SUSTAINABLE & RENEWABLE ENERGY – BUILDING SERVICES SUMMARY SHEET

Sustainability & Renewable Energy – Building Services System Summary Sheet

The following table summarises some of the currently available sustainable techniques, many of which can be applied to most projects. The list is by no means exhaustive but includes most methods which are currently economically viable. The table also includes techniques which will contribute towards an improved BREEAM rating.

The table indicates the general advantages and disadvantages of each application and its likely relevance/application to the scheme. It should be noted that the details are not based on any form of modelling, calculation, consumption estimates, utilisation profile or payback analysis etc.

The table is intended to give an overall appreciation of the potential techniques which could be incorporated in the scheme but in no way precludes the application of any, should there be a particular requirement. It may be that the client requires to show-case or demonstrate a particular technology which would make the economic viability and payback of the system irrelevant.

It should be noted, however, that the ease of implementation of any of the above depends greatly on the budget allocation, programme, procurement methods and attitude to sustainability etc. but particularly the required level of flexibility to be incorporated in the space and the level of knowledge regarding how the space is to be utilised.

Project Title			
Project Number	Date	Revision	
Contributors			

SUSTAINABLE TECHNIQUE	APPLICATION	ADVANTAGES	DISADVANTAGES	COSTS				COMMENT	SUITABILITY for SCHEME
				PAYBACK PERIOD	CAPITAL	DESIGN	OPERATIONAL		
Design for ease of Maintenance	Design and specification of building and plant to ensure ease and efficiency of maintenance	<ol style="list-style-type: none"> Improves ease of maintenance and extended life of plant Qualifies for BREEAM credit 	<ol style="list-style-type: none"> Study must be undertaken at early stage 	Long	Low	Low	Low		High Medium Low
Orientation & Passive Solar Design	Orientating the building to maximise passive techniques ie solar	<ol style="list-style-type: none"> Reduction in solar gains to internal spaces Saving in cooling system and energy costs Increases stability of internal environment Should be capital cost "neutral" 	<ol style="list-style-type: none"> Existing site restrictions i.e. plot size and dimensions, access, infrastructure etc. Can be difficult to implement on inner city sites. 	Long	Low	Low	Medium		High Medium Low
Solar Shading	Internal and External shading devices including Brise Soleil, overhangs, blinds, louvres, reflective glass etc.	<ol style="list-style-type: none"> Reduction in solar gains to internal spaces and glare. Increase heating benefit from low sun in winter. Saving in cooling system and energy costs Should be capital cost "neutral" 	<ol style="list-style-type: none"> Façade and aesthetics of building require careful design. 	Medium	Medium	High	Medium		High Medium Low
Natural Ventilation	Natural ventilation to areas via operable windows and/or external louvres/openings.	<ol style="list-style-type: none"> Major reduction in capital, running and maintenance costs of HVAC systems. 	<ol style="list-style-type: none"> External Noise. Restrictions in control. Unpredictable nature of external effects i.e. temperature and wind direction. Restricts flexibility of internal spaces. Reduces opportunity for heat recovery. 	Short	Low	High	High		High Medium Low

Sustainability & Renewable Energy – Building Services System Summary Sheet

SUSTAINABLE TECHNIQUE	APPLICATION	ADVANTAGES	DISADVANTAGES	COSTS				COMMENT	SUITABILITY for SCHEME
				PAYBACK PERIOD	CAPITAL	DESIGN	OPERATIONAL		
Mixed Mode Ventilation	A combination of natural ventilation via opening windows and/or external louvres/openings and mechanical ventilation. Usually in the form of natural supply and mechanical extract.	<ol style="list-style-type: none"> 1. Partial reduction in capital, running and maintenance costs of HVAC systems. 2. Useful when natural ventilation is restricted but no real requirement or desire for full mechanical systems. 3. More reliability and security of natural supply requirements. 4. Qualifies for BREEAM credit 	<ol style="list-style-type: none"> 1. Some restrictions in control. 2. Unpredictable nature of external effects i.e. temperature and wind direction. 3. Restricts flexibility of internal spaces. 4. Reduces opportunity for heat recovery. 	Medium	Medium	Medium	Medium		High Medium Low
Seasonal Commissioning	Operational review/re-commissioning to be undertaken during first year of operation	<ol style="list-style-type: none"> 1. Maximises operating efficiency of systems. 2. Qualifies for BREEAM credit 	<ol style="list-style-type: none"> 1. Additional commissioning costs 	Long	Low	Low	Low		High Medium Low
Minimise Construction Site Impacts	Adopt best practice policies to all site activities	<ol style="list-style-type: none"> 1. Minimise wastage, pollution and energy consumption from site activities 2. Qualifies for BREEAM credit 	<ol style="list-style-type: none"> 1. Possible additional construction costs 	Long	Low	Low	Low		High Medium Low
Thermal Comfort Zoning	Undertake thermal comfort modelling and ensure that systems are designed to provide appropriate level of zoning and occupant control	<ol style="list-style-type: none"> 1. Provide appropriate level of occupant comfort 2. Qualifies for BREEAM credit 	<ol style="list-style-type: none"> 1. Increased design period input 2. More complex controls systems 3. Additional commissioning costs 	Long	Low	Low	Low		High Medium Low
Combined Heat and Power	Gas fired CHP engines to generate electricity and heat. (Biomass could also be considered)	<ol style="list-style-type: none"> 1. Good efficiency on medium to large sites. 2. Potential to 'sell' back energy to the grid. 3. Carbon tax levy applicable. 	<ol style="list-style-type: none"> 1. Utilisation profile of building must provide adequate load requirements to achieve efficiency at all times. 2. Procurement methods have major effect on viability and costs. 	Medium	High	High	Medium		High Medium Low
Grey Water Recycling	Utilisation of basin and shower drainage water for recycling and application to WC flushing and landscape watering etc.	<ol style="list-style-type: none"> 1. Saving on mains water and drainage costs 2. Contributes towards BREEAM rating. 	<ol style="list-style-type: none"> 1. External Excavations for tanks 2. Additional plant and equipment to maintain. 3. Additional distribution within building. 	Long	High	High	Low		High Medium Low
Rainwater Harvesting	Utilisation of rainwater for recycling and application to WC flushing and landscape watering etc.	<ol style="list-style-type: none"> 1. Saving on mains water and drainage costs. 2. Contributes towards BREEAM rating 	<ol style="list-style-type: none"> 1. External Excavations for tanks 2. Additional plant and equipment to maintain. 3. Additional distribution within building. 	Medium	Medium	High	Low		High Medium Low
Waterless Urinals	Urinals do not require water supplies for flushing.	<ol style="list-style-type: none"> 1. Saving on mains water and drainage. 2. Contributes towards BREEAM rating 	<ol style="list-style-type: none"> 1. Inherent high maintenance requirements and hence costs. 2. Smell problems if maintenance reduced. 	Medium	Medium	Low	Low		High Medium Low
Mains Water Leak detection	Leak detection for all major leaks to mains water supplies to the building	<ol style="list-style-type: none"> 1. Minimise wastage of water due to major water leaks 2. Qualifies for BREEAM credit 	<ol style="list-style-type: none"> 1. Additional installation costs 	Long	Low	Low	Low		High Medium Low
Sanitary Water supply shut-off	Provide proximity detection shut off to water supplies to toilet blocks	<ol style="list-style-type: none"> 1. Minimises wastage of water due to internal water leaks 2. Qualifies for BREEAM credit 	<ol style="list-style-type: none"> 1. Additional installation costs 	Long	Medium	Low	Low		High Medium Low
Variable Speed Drives	Speed controlled drives on pumps and fans where applicable.	<ol style="list-style-type: none"> 1. Eligible for Enhanced Capital Allowances. 2. Systems can be accurately commissioned. 	<ol style="list-style-type: none"> 1. Higher initial capital costs. 2. Increase in system complexity. 	Short	Medium	Low	Low		High Medium Low

Sustainability & Renewable Energy – Building Services System Summary Sheet

Photovoltaics	Roof mounted solar cells used to generate electricity.	1. Grants available. 2. Free Non-fossil fuel source. 3. Savings on roof cladding. 4. Can be Retrofit. 5. Generally simple installation procedures. 6. Large variety of types and concepts. 7. Can prolong roof life. 8. Small scale could be used as an educational demonstration programme. 9. Contributes towards BREEAM rating if large enough energy contribution	1. Fairly High capital costs and long payback periods. 2. Complex manufacturing procedure and technology. 3. High embodied energy levels. 4. Generally increased roof maintenance & access concerns. 5. Current Government grant initiatives nearing end of availability period. Continuing availability of grants to be considered.	Long	High	High	Medium		High Medium Low
i. Photovoltaics Monocrystalline	The most efficient of the PV technologies in good light conditions								
ii. Photovoltaics Polycrystalline	Highly efficient in good light conditions. Less embodied energy than monocrystalline.								
iii. Photovoltaics Thin-film	The most efficient in poor light conditions. An extremely sturdy, vandal-proof PV.								
iv. Photovoltaics Hybrid	A combination of monocrystalline and thin-film technologies, this has high peak output coupled with excellent performance in poor light conditions								
Solar Collectors	Roof mounted fluid based panels generating heat to fuel domestic hot water for instance.	1. Grants available. 2. Free Non-fossil fuel source. 3. Savings on roof cladding.	1. Full duty boiler and associated equipment required for periods of year when little sun. 2. Increased maintenance costs. 3. Current government grant initiatives nearing end of availability period. Continuing availability of grants to be considered.	Medium	High	High	Medium		High Medium Low
Ground Source Heating and/or Cooling	Utilisation of the earths thermal properties to generate heat and/or cooling via piped systems.	1. "Free" non-fossil primary energy source. 2. Reduced maintenance costs.	1. Early site and project analysis required. 2. Unpredictability of source until drilling is carried out. 3. Additional drilling costs.	Medium	High	High	Medium		High Medium Low
Thermal Mass	Utilisation of the inherent heavy thermal weight of exposed structural components to retain and release energy at appropriate times. Normally used with natural ventilation & night time cooling.	1. Free cooling/heating 2. Cost reduction to internal finishes. 3. Greater regulation of swings in internal temperature. 4. Qualifies for BREEAM credit	1. Restrictions in choice of construction techniques. 2. Limitations in control. 3. Internal aesthetics of materials. 4. Additional costs associated with exposed services installation	Long	High	Medium	Low		High Medium Low
Wind Energy (Large Scale)	High level wind driven blades used to generate electricity.	1. Grants/finance available. 2. Embedded renewable electrical energy source. 3. Contributes towards BREEAM rating if large enough energy contribution	1. Planning restrictions. 2. Noise 3. 'Up front' payments required.	Long	High	High	Medium		High Medium Low
Wind Energy (Small Scale)	Packaged 'plug in' units used to generate electricity.	1. Grants/finance available. 2. Embedded renewable electrical energy source 3. Can be Retrofit. 4. Modular concept can be applied. 5. Can incorporate turbine to generate hot water. 6. Small scale could be used as an educational demonstration programme. 7. Contributes towards BREEAM rating if large enough energy contribution.	1. Planning Restriction 2. More applicable to domestic/small scale situations.	Short	Low	Medium	Medium		High Medium Low
Biomass	The utilisation of alternative non-fossil fuels e.g. forestry waste, husks, olive stones/pulp etc to fuel boilers.	1. Non-fossil fuel source.	1. Regular source of fuel required i.e coppice rotation etc. 2. Usually transportation costs for fuel.	Medium	High	High	Low		High Medium Low
Occupant and/or Daylight controlled switching	Sensors incorporated to switch internal electric lighting in relation to occupants and levels of external daylight.	1. Maximise use of daylight. 2. Minimise use of electrical lighting 3. Qualifies for BREEAM credit	1. Increase in complexity of systems	Short	Medium	Medium	Medium		High Medium Low

Sustainability & Renewable Energy – Building Services System Summary Sheet

Heat Recovery (Air Systems)	Various methods of extracting heat energy from extract air stream and applying it to supply air streams e.g. plate exchangers, thermal wheel, run-around coil, heat pipes etc.	<ol style="list-style-type: none"> 1. Reduces direct heating and cooling energy consumption. 2. Can reduce primary heating equipment requirements. 3. Contributes towards BREEAM rating (CO₂ output) 	<ol style="list-style-type: none"> 1. Increases capital outlay of plant. 2. Additional controls required. 3. Risk of cross contamination between air streams. 4. Large variation in efficiencies with methods. 5. Additional maintenance costs with some methods. 	Short	Low	Low	Medium		High Medium Low
Sunpipes	Reflective ducts used to transfer natural light into internal or deep plan spaces.	<ol style="list-style-type: none"> 1. Benefits of natural light to occupants. 2. Savings energy associated with artificial lighting. 3. Reduces glare. 	<ol style="list-style-type: none"> 1. Additional structural & architectural considerations required to incorporate equipment. 	High	Medium	Low	Low		High Medium Low
Lightshelves	Reflective panel installed within the facade to direct natural light deeper into the occupied space.	<ol style="list-style-type: none"> 1. Benefits of natural light to occupants. 2. Savings energy associated with artificial lighting. 3. Reduces glare. 4. Enhances passive solar energy. 5. Can act as a solar shading device. 	<ol style="list-style-type: none"> 1. Additional structural & architectural considerations required to incorporate equipment into facade. 2. Enhances passive solar energy. 3. Can act as a solar shading device. 4. Reduces electrical light energy consumption. 	Long	Medium	Low	Low		High Medium Low
Windcatchers & Penthouse Louvres	A method of passive/natural ventilation reliant on the stack effect through a duct/penthouse.	<ol style="list-style-type: none"> 1. Passive natural supply and extract ventilation to internal or deep plan spaces. 	<ol style="list-style-type: none"> 1. Additional structural & architectural considerations required to incorporate equipment. 2. Additional controls and maintenance costs. 	Medium	Medium	Medium	Medium		High Medium Low
Fuel Cells	Fuel Cells produce electricity and heat by combining hydrogen and oxygen in an electrochemical process.	<ol style="list-style-type: none"> 1. High electrical efficiency 2. Significantly lower emissions of pollutants than conventional energy conversion technologies 3. Reduced greenhouse gas emissions. 4. Quiet operation 5. Modular construction 	<ol style="list-style-type: none"> 1. High costs. 2. Many formats still in R&D stages. 3. Fuel choice - availability, storage and reliability 4. No real codes of practice, standards and regulation exist. 5. Not fully developed in building services applications. 	Short	High	High	?		High Medium Low
Non-Touch Water Appliances	Sensor operated taps and WC flush controls to give a regulated amount of water.	<ol style="list-style-type: none"> 1. 40%-70% savings on cold water usage. 2. Contamination and Infection control as no physical contact with appliances. 3. Contributes towards BREEAM rating 	<ol style="list-style-type: none"> 1. Electrical supply required (battery or mains). 2. Cost increase on conventional taps & cisterns. 	Short	Low	Low	Low		High Medium Low
One-Touch Water Appliances	Single touch button or handle operated taps to give a regulated amount of water.	<ol style="list-style-type: none"> 1. 40%-70% savings on cold water usage. 2. Contributes towards BREEAM rating 	<ol style="list-style-type: none"> 1. Marginal cost increase on conventional taps & cisterns. 	Short	Low	Low	Low		High Medium Low
Urinal Flush Controls	Ceiling or wall mounted sensors to operate and control the regular flushing of single or multiple urinals.	<ol style="list-style-type: none"> 1. 70%-90% savings in cold water usage on unmanaged systems. 2. Compliance with current water regulations. 3. Contributes towards BREEAM rating 	<ol style="list-style-type: none"> 1. Electrical supply required (battery or mains). 2. Minor additional maintenance. 	Short	Low	Low	Low		High Medium Low
Flow Restrictors	Methods of restricting water flow in hot and cold water pipework and appliances to avoid wastage, via inline devices or outlets.	<ol style="list-style-type: none"> 1. 20%-50% savings on cold water usage. 2. Qualifies as BREEAM credit 	<ol style="list-style-type: none"> 1. Additional pipework modifications. 2. Minor additional maintenance costs. 	Short	Low	Low	Low		High Medium Low
High Performance Glazed Facades	Glazed facades effecting heat transfer, solar gain and shading, condensation risk, occupant visual comfort and acoustic performance. Methods include multiple glazing, solar coatings, inert gas filling, solid or motorised louvres and blinds, ventilated cavity etc.	<ol style="list-style-type: none"> 1. Improved control of solar heat gains and reduction in cooling requirements. 2. Glare reduction. 3. Increase in acoustic performance. 4. Increased insulation properties to minimise heating requirements and draughts. 5. Potential to incorporate solar shading. 	<ol style="list-style-type: none"> 1. Increased capital cost. 2. Complexity of installation. 3. Potential cavity condensation risk. 	Medium	High	High	Low		High Medium Low

Sustainability & Renewable Energy – Building Services System Summary Sheet

Green guide to specification	Building Materials specified in accordance with Green Guide to Specification	<ol style="list-style-type: none"> 1. Minimises impact on the environment of materials 2. Minimises embodied energy within buildings 3. Qualifies for BREEAM credit 	<ol style="list-style-type: none"> 1. May restrict materials available 2. May impact on cost. 	Long	Medium	Low	Low		High Medium Low
Cyclists facilities	Provide adequate cyclists facilities	<ol style="list-style-type: none"> 1. Encourages 'green travel' 2. Qualifies for BREEAM credit 		Long	Low	Low	Low		High Medium Low

LEGEND	
Payback Period	
Short	0 – 5 years approximately
Medium	5 – 20 years approximately
Long	20 years or over

APPENDIX B

SPECIFICATION OF TELEPHONE EXCHANGES IN REDDITCH

Redditch (WMRJ)

General information

Exchange name:	Redditch
Exchange code:	WMRJ
Location:	Worcestershire, West Midlands
Postcode:	B976EW
Serves (approx):	11,491 residential premises 783 non-residential premises

Broadband availability overview

ADSL:	Yes
SDSL:	Yes
LLU services:	Yes
Cable:	Yes
Wireless:	No

BT Wholesale ADSL/SDSL information

ADSL status:	Enabled
ADSL enable date:	21 May 2003
ADSL prereg:	317/300 (+48 duplicates)
SDSL status:	Enabled
SDSL enable date:	29-May-05
ADSL Max status:	Enabled (Green)
ADSL Max enable date:	31-Mar-06

Local loop unbundling presence

Be:	Enabled
Bulldog:	Not available
CPW / TalkTalk:	Enabled
Easynet / Sky:	Enabled
Edge Telecom:	Not available
HomeChoice:	Not available
Lumison:	Not available
Node4:	Not available
Orange:	Not available
Pipex:	Not available
Tiscali:	Not available
WB Internet:	Not available
Zen Internet:	Not available

Exchange history

19/10/2006	BT have set a target date of Q2 2008 for the switch to 21CN for the Redditch exchange
30/08/2006	Easynet has enabled the Redditch exchange for their service
29/08/2006	Be Unlimited has enabled the Redditch exchange for their service

BT 21CN rollout status

Target date:	Q2 2008
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Wireless broadband availability

LTT Broadband:	Not available
Now Wireless:	Not available

Cable broadband availability

Virgin Media: Available in some areas

Astwood Bank (WMAST)

General information

Exchange name: Astwood Bank
Exchange code: WMAST
Location: [Worcestershire,](#)
[West Midlands](#)
Postcode: B966ED
Serves (approx): 1,909 residential premises
126 non-residential premises

Broadband availability overview

ADSL: Yes
SDSL: No
LLU services: No
Cable: Yes
Wireless: No

BT Wholesale ADSL/SDSL information

ADSL status: Enabled
ADSL enable date: 06 Oct 2004
ADSL prereg: 231/500 (+39 duplicates)
SDSL status: Not available
SDSL enable date: -
ADSL Max status: Enabled (Green)
ADSL Max enable date: 31-Mar-06

Local loop unbundling presence

Be: Not available
Bulldog: Not available
CPW / TalkTalk: Not available
Easynet / Sky: Not available
Edge Telecom: Not available
HomeChoice: Not available
Lumison: Not available
Node4: Not available
Orange: Not available
Pipex: Not available
Tiscali: Not available
WB Internet: Not available
Zen Internet: Not available

Exchange history

BT have set a target date of Q4 2010 for the switch
19/10/2006 to 21CN for the Astwood Bank exchange

BT 21CN rollout status

Target date: Q4 2010

Wireless broadband availability

LTT Broadband: Not available
Now Wireless: Not available

Cable broadband availability

Virgin Media: Available in some areas

Headless Cross (WMHX)

General information

Exchange name:	Headless Cross
Exchange code:	WMHX
Location:	Worcestershire, West Midlands
Postcode:	B974LL
Serves (approx):	10,774 residential premises 272 non-residential premises

Broadband availability overview

ADSL:	Yes
SDSL:	Yes
LLU services:	Yes
Cable:	Yes
Wireless:	No

BT Wholesale ADSL/SDSL information

ADSL status:	Enabled
ADSL enable date:	02 Jul 2003
ADSL prereg:	368/300 (+52 duplicates)
SDSL status:	Not available
SDSL enable date:	-
ADSL Max status:	Enabled (Green)
ADSL Max enable date:	31-Mar-06

Local loop unbundling presence

Be:	Enabled
Bulldog:	Not available
CPW / TalkTalk:	Enabled
Easynet / Sky:	Enabled
Edge Telecom:	Not available
HomeChoice:	Not available
Lumison:	Not available
Node4:	Not available
Orange:	Not available
Pipex:	Not available
Tiscali:	Not available
WB Internet:	Not available
Zen Internet:	Not available

Exchange history

04/03/2007	Easynet (Sky) has enabled the Headless Cross exchange for their service
26/10/2006	Be Unlimited has enabled the Headless Cross exchange for their service
19/10/2006	BT have set a target date of Q2 2008 for the switch to 21CN for the Headless Cross exchange
20/06/2006	Be Unlimited has updated the enablement date for the Headless Cross exchange to 30/09/2006 (Was previously 31/07/2006)

BT 21CN rollout status

Target date:	Q2 2008
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Wireless broadband availability

LTT Broadband:	Not available
Now Wireless:	Not available

Cable broadband availability

Virgin Media:	Available in some areas
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Ipsley (WMIPS)

General information

Exchange name:	Ipsley
Exchange code:	WMIPS
Location:	Worcestershire, West Midlands
Postcode:	B980AN
Serves (approx):	10,627 residential premises 523 non-residential premises

Broadband availability overview

ADSL:	Yes
SDSL:	Yes
LLU services:	Yes
Cable:	Yes
Wireless:	No

BT Wholesale ADSL/SDSL information

ADSL status:	Enabled
ADSL enable date:	31 May 2002
ADSL prereg:	99 (+0 duplicates)
SDSL status:	Not available
SDSL enable date:	-
ADSL Max status:	Enabled (Green)
ADSL Max enable date:	31-Mar-06

Local loop unbundling presence

Be:	Enabled
Bulldog:	Not available
CPW / TalkTalk:	Enabled
Easynet / Sky:	Enabled
Edge Telecom:	Not available
HomeChoice:	Not available
Lumison:	Not available
Node4:	Not available
Orange:	Not available
Pipex:	Not available
Tiscali:	Not available
WB Internet:	Not available
Zen Internet:	Not available

Exchange history

21/12/2006	Easynet has enabled the Ipsley exchange for their service
19/10/2006	BT have set a target date of Q1 2011 for the switch to 21CN for the Ipsley exchange
06/09/2006	Be Unlimited has enabled the Ipsley exchange for their service
20/06/2006	Be Unlimited has updated the enablement date for the Ipsley exchange to 30/09/2006 (Was previously 31/07/2006)

BT 21CN rollout status

Target date:	Q1 2011
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Wireless broadband availability

LTT Broadband:	Not available
Now Wireless:	Not available

Cable broadband availability

Virgin Media:	Available in some areas
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Studley (WMSTD)

General information

Exchange name:	Studley
Exchange code:	WMSTD
Location:	Warwickshire, West Midlands
Postcode:	B807LR
Serves (approx):	3,188 residential premises 256 non-residential premises

Broadband availability overview

ADSL:	Yes
SDSL:	No
LLU services:	No
Cable:	Yes
Wireless:	No

BT Wholesale ADSL/SDSL information

ADSL status:	Enabled
ADSL enable date:	04 Feb 2004
ADSL prereg:	322/250 (+43 duplicates)
SDSL status:	Not available
SDSL enable date:	-
ADSL Max status:	Enabled (Green)
ADSL Max enable date:	31-Mar-06

Local loop unbundling presence

Be:	Not available
Bulldog:	Not available
CPW / TalkTalk:	Not available
Easynet / Sky:	Not available
Edge Telecom:	Not available
HomeChoice:	Not available
Lumison:	Not available
Node4:	Not available
Orange:	Not available
Pipex:	Not available
Tiscali:	Not available
WB Internet:	Not available
Zen Internet:	Not available

Exchange history

BT have set a target date of Q4 2010 for the switch 19/10/2006 to 21CN for the Studley exchange

BT 21CN rollout status

Target date:	Q4 2010
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Wireless broadband availability

LTT Broadband:	Not available
Now Wireless:	Not available

Cable broadband availability

Virgin Media:	Available in some areas
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REDDITCH JOINT STUDY

SWOT ANALYSIS OF IDENTIFIED POTENTIAL GROWTH OPTIONS

Site reference: 20

Land between A435 and Blind Lane

Site area: 245ha

STRENGTHS

- 1 Access available to A435

WEAKNESSES

- 1 Contains a small pond – possible wildlife/habitat constraint Alderhanger Wood and Round Wood both Ancient Woodland
- 2 Green Belt – would bring built up area closer to Tanworth in Arden but no coalescence of settlements. Lack of defensible long term boundary for Green Belt to east
- 3 Distant from Redditch
- 4 A435 fast dual carriageway in this location making access expensive/major engineering works
- 5 Hilly topography
- 6 Access to A435 is via limited junctions due to fast one-way dual carriageways – cannot access/exit in all directions
- 7 'Special Landscape Area' on Stratford proposals map
- 8 No logic to developing in isolation and would only can be considered in conjunction with Sites 10 and 19.

OPPORTUNITIES

- 1 To exploit attractive natural features
- 2 To use A435 road transport links to Birmingham/Redditch
- 3 To use or alter existing A435 junctions as access to/from site
- 4 To connect to site 10 and thus to Redditch

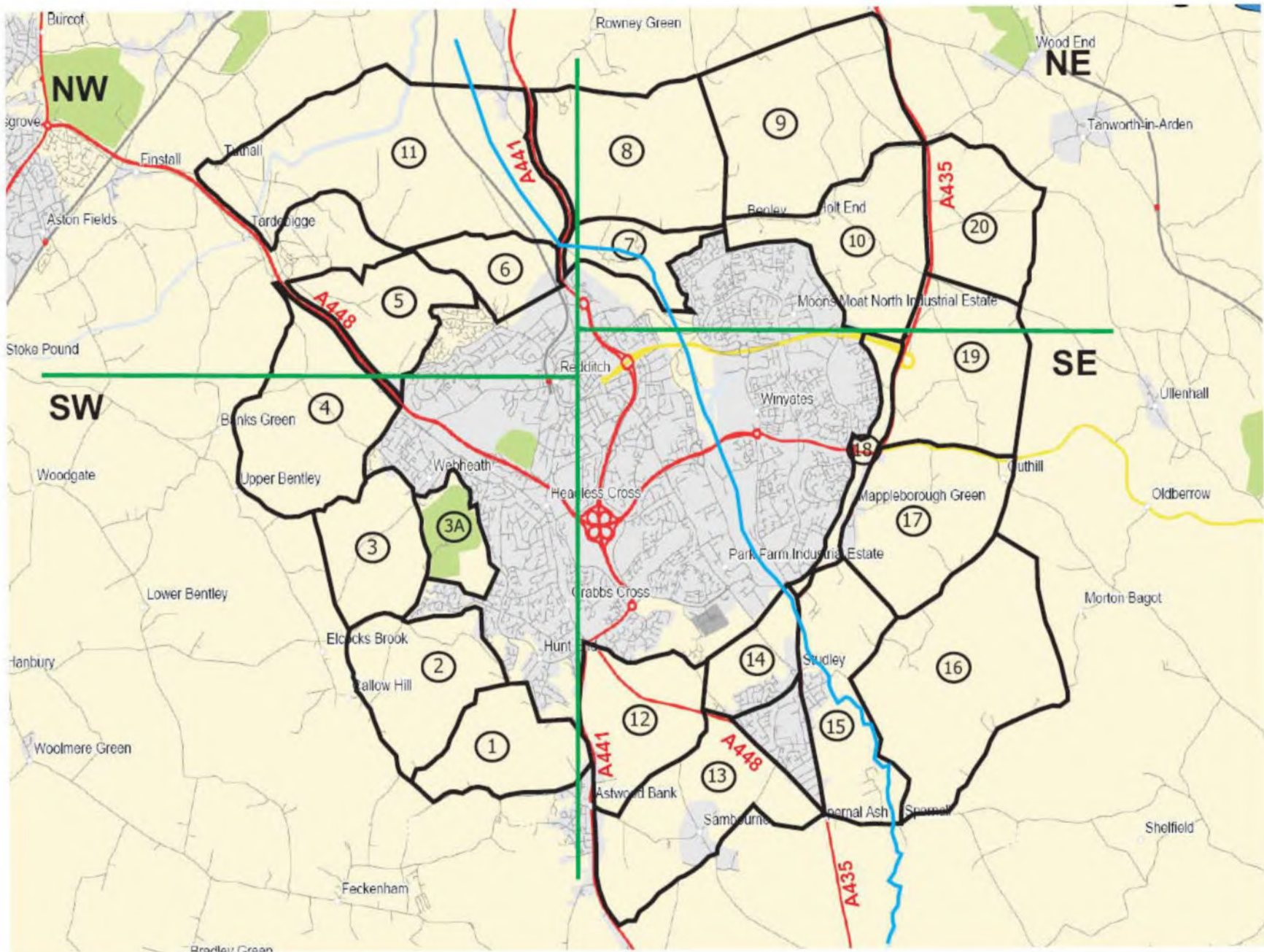
THREATS

- 1 New or altered junctions may be opposed by Highways Agency or local Highways Authority on safety grounds – too many junctions in close proximity to one another



APPENDIX E

Plan Showing Sites Considered within SWOT Analysis



APPENDIX F

Results of SWOT Analysis

REDDITCH JOINT STUDY

SWOT ANALYSIS OF IDENTIFIED POTENTIAL GROWTH OPTIONS

Site reference:1

Site area: Land north of Astwood Bank

Site Area: 216 ha

STRENGTHS

- 1 Adjacent to existing urban area of Redditch and rural settlement of Astwood Bank
- 2 Linkage to Astwood Bank and close to local High School (St Augustine's RC school)
- 3 Discrete parcel might contain both option 1 and 2 housing at 2026

WEAKNESSES

- 1 Poor access other than A441 at eastern edge of site (and capacity constraints on the A441). Location is relatively remote from the Primary Distributor network
- 2 Topography (rolling countryside with eastern area relatively steep)
- 3 Green Belt(+) – coalescence between Astwood Bank and Redditch
- 4 (Small) part within Flood Zone 3
- 5 Relatively distant from town centre
- 6 Poor public transport links to other parts of Redditch
- 7 Not suitable for sustainable walking/cycling to town centre
- 8 Highway capacity on A441- existing capacity constraint at Crabbs Cross roundabout
- 9 Naturally drains to sewage treatment works with limited discharge capacity therefore pumping over ridge into east Redditch is required, where it may hit stressed network in Redditch town centre
- 10 Options 2 and 3 would require works at Redditch South Primary substation circa £1.2m + new network
- 11 Lack of capacity at local high schools

OPPORTUNITIES

- 1 Potential to introduce high quality public transport from the south – however, existing capacity constraints would limit opportunity
- 2 Potential to add to existing local facilities as part of major development

THREATS

- 1 A combination of inadequate local road network, drainage infrastructure costs and topographical constraints likely to severely restrict development potential

REDDITCH JOINT STUDY

SWOT ANALYSIS OF IDENTIFIED POTENTIAL GROWTH OPTIONS

Site reference: 2

Site area: Land adjacent to Ham Green

Site Area: 270 ha

STRENGTHS

- 1 Adjacent to existing urban area
- 2 Could potentially link to sites 1 and 3

WEAKNESSES

- 1 No direct connection to District Distributor road. Existing urban roads not designed to accommodate high flows so major road improvements would be required to link to Primary Distributor network.
- 2 In excess of 2km to town centre which would limit sustainable walking/cycling
- 3 Undulating topography with some relatively steep slopes at northern end (restricts potential to link to DDR)
- 4 Green Belt
- 5 SAM on part of site
- 6 Part within Flood Zone 3
- 7 In common with other sites in SW Redditch, is relatively remote from the town centre
- 8 Relatively poor public transport access to rest of Redditch
- 9 Naturally drains to sewage treatment works with limited discharge capacity therefore pumping over ridge into east Redditch is required, where it may hit stressed network in Redditch town centre
- 10 Options 2 and 3 would require works at Redditch South Primary substation circa £1.2m + new network
- 11 Lack of capacity at local first, middle and high schools

OPPORTUNITIES

- 1 Potential for enhancing sustainability by linking with sites 1 and 3, providing opportunity for development of critical mass necessary to deliver major new transport infrastructure, but would still be major problems linking to Primary Distributor network and due to inadequacy of local road network

THREATS

- 1 Combination of transport and drainage infrastructure costs and topographical constraints likely to severely restrict development potential
- 2 Potential objection by Environment Agency on grounds of flood risk

REDDITCH JOINT STUDY

SWOT ANALYSIS OF IDENTIFIED POTENTIAL GROWTH OPTIONS

Site reference:3

Land West of Redditch Golf Course

Site area: 215 ha

STRENGTHS

- 1 Northern part includes Webheath Area of Development Restraint (principle of future development accepted)
- 2 Provide logical infilling between Webheath and Elcock's Brook/Callow Hill

WEAKNESSES

- 1 Current access only possible through existing residential roads-insufficient capacity to develop all of land parcel
- 2 Therefore, would require major new access from/to A448. However, no suitable linkage point back to main road network
- 3 Northern route out of Redditch creating bottle-neck
- 4 Small part of site with SWS designation
- 5 Not well related to existing town centre
- 6 Topography and landscape value
- 7 Part within Flood Zone 3
- 8 Green Belt
- 9 Naturally drains to sewage treatment works with limited discharge capacity therefore need to pump over ridge into east Redditch where it may hit stressed network in town centre
- 10 Options 2 and 3 would require works at Redditch South Primary substation circa £1.2m + new network
- 11 Grade II listed building within this site
- 12 Lack of capacity at local first, middle and high school

OPPORTUNITIES

- 1 Could combine with site 3A (though site 3A is unlikely)
- 2 Could deliver major infrastructure on back of the development (although without linkage to Site 4 no opportunity to provide direct link to A448)
- 3 Potential to achieve development at the Webheath ADR site relatively quickly as a discrete parcel, with yield being determined by capacity of local road network

THREATS

- 1 Access and infrastructure costs and restricted opportunities to achieve satisfactory highway solution (connection to Primary Distributor network), severely limit development potential
- 2 Potential objection by Environment Agency on grounds of flood risk

REDDITCH JOINT STUDY

SWOT ANALYSIS OF IDENTIFIED POTENTIAL GROWTH OPTIONS

Site reference:3A
Redditch Golf Club and Morton Stanley Park
Site area:91ha

STRENGTHS

- 1 Logical rounding off of urban area
- 2 Well related to existing community services
- 3 Outside Food Zone
- 4 Direct link to District Distributor (Windmill Drive) possible
- 5 Close to existing infrastructure hence utility network extensions more modestly priced

WEAKNESSES

- 1 Existing golf course and park (has value to community as a leisure facility and as a public park-protected formal open space)
- 2 Landscape quality
- 3 Limited capacity for new traffic on the DDR
- 4 Substantial parts designated as SWS and LNR
- 5 Naturally drains to sewage treatment works with limited discharge capacity therefore pumping over ridge into east Redditch is required, where it may hit stressed network in Redditch town centre
- 6 Options 2 and 3 would require works at Redditch South Primary substation circa £1.2m + new network

OPPORTUNITIES

- 1 Close enough to encourage cycling linkage to town centre
- 2 Could combine with site 3 (but would depend on capacity of DDR)
- 3 Could deliver major infrastructure on back of the development (but limited options to upgrade DDR)

THREATS

- 1 Access and infrastructure costs
- 2 Loss of existing golf club and thus likely to be unacceptable to Sport England and also loss of a public park
- 3 Sewer flooding in Redditch town centre/old town

REDDITCH JOINT STUDY

SWOT ANALYSIS OF IDENTIFIED POTENTIAL GROWTH OPTIONS

Site reference: 4
Land West of A448
Site area: 359 ha

STRENGTHS

- 1 Could take access off A448, with good links to Bromsgrove and Redditch town centre
- 2 Minimal highway impact on Redditch town centre
- 3 Well related to existing development at Webheath

WEAKNESSES

- 1 Full development of site would require new access onto A448
- 2 Part of site is ancient semi-natural woodland
- 3 Green Belt
- 4 Naturally drains to sewage treatment works with limited discharge capacity therefore pumping over ridge into east Redditch is required, where it may hit stressed network in Redditch town centre
- 5 Options 2 and 3 would require works at Redditch South Primary substation circa £1.2m + new network
- 6 Sand and gravel deposits identified on part of site
- 7 Lack of capacity in local first school

OPPORTUNITIES

- 1 Could link to site 3 as a logical rounding off of the urban area (but link back to DDR (Windmill Drive) restricted by capacity of DDR)
- 2 Could deliver major infrastructure on back of the development

THREATS

- 1 Access and infrastructure costs
- 2 Limit to capacity on A448
- 3 Sewer flooding

REDDITCH JOINT STUDY

SWOT ANALYSIS OF IDENTIFIED POTENTIAL GROWTH OPTIONS

Site reference: 5
Land East of A448
Site area: 193 ha

STRENGTHS

- 1 Relatively well connected to Redditch town centre and existing employment areas
- 2 Potential to link to A448 through upgrade of existing access
- 3 Logical extension to relatively new housing area (Brockhill)
- 4 Limited highway impact on town centre

WEAKNESSES

- 1 Green Belt
- 2 Steep topography running alongside A448
- 3 Southern part designated as SWS and LNR and northern part is SWS
- 4 Site traversed by land in Flood Zone 3
- 5 Upstream of very stressed sewerage network therefore foul drainage would naturally drain into town centre network with flooding history
- 6 Sand and gravel deposits identified on part of site
- 7 Lack of capacity in local first school

OPPORTUNITIES

- 1 Sustainable urban expansion, close to existing facilities
- 2 High quality public transport along A448
- 3 Could link to site 6 to provide critical mass to deliver infrastructure

THREATS

- 1 Potential objection by Environment Agency on grounds of flood risk
- 2 Risk of sewer flooding in town centre unless more complex scheme, potentially involving a new trunk sewer to link to Sprenal Sewage Treatment Works, implemented.

REDDITCH JOINT STUDY

SWOT ANALYSIS OF IDENTIFIED POTENTIAL GROWTH OPTIONS

Site reference: 6

Land north and south of Lowan's Hill Farm

Site area: 124 ha

STRENGTHS

- 1 Good links to Redditch town centre, including railway station, existing community facilities and also local employment areas
- 2 Substantial part of site already designated as ADR- therefore principle of development accepted
- 3 Links to existing residential areas
- 4 No environmental designation
- 5 Relatively low impact on Redditch highways
- 6 Provide relatively modest priced utility connections

WEAKNESSES

- 1 Partially Green Belt
- 2 Abuts SWS to north and west
- 3 Site dissected by operational railway line. However land to the east and west of the railway line could be developed separately, if necessary, failing the relocation of railway station (see opportunities below)
- 4 Traffic generated would pass through Windsor Road, which has limited capacity in peak hours – might be partly mitigated by signalised junction
- 5 Would load traffic onto A441, adversely affecting Bordesley
- 6 Would affect B4101
- 7 Steep topography
- 8 Upstream of very stressed sewerage network therefore foul drainage would naturally drain into town centre network with flooding history
- 9 Lack of capacity in local first schools

OPPORTUNITIES

- 1 Sustainable urban expansion, close to existing facilities.
- 2 If developed in conjunction with land to north, offers opportunity to relocate railway station to provide new transport interchange and park and ride facility linking to town centre
- 3 Potential to contribute to implementation of Bordesley By-pass

THREATS

- 1 Transport interchange and alterations to railway line relies on cooperation of Network Rail
- 2 Potential objections from Highways Agency re loading additional traffic onto J2 of M42

- 3 Risk of sewer flooding in town centre unless more complex scheme, potentially involving a new trunk sewer to link to Spernal Sewage Treatment Works, implemented.

REDDITCH JOINT STUDY

SWOT ANALYSIS OF IDENTIFIED POTENTIAL GROWTH OPTIONS

Site reference: 7
Abbey Park Golf Course
Site area: 104 ha

STRENGTHS

- 1 Proximity to town centre and existing services
- 2 Proximity to existing employment allocations
- 3 Reasonable access to District Distributor road
- 4 Not Green Belt
- 5 Improved foul drainage opportunities (combined with sites to north)
- 6 Good utility connection opportunities

WEAKNESSES

- 1 Southern and eastern edges within Flood Zone 3
- 2 Much of site is Special Wildlife Site and also SSSI in eastern part
- 3 Existing Golf Course (has value as an existing community facility)
- 4 Highway capacity difficulties at junction between B4101 and A441
- 5 Proximity to SAM

OPPORTUNITIES

- 1 Extension of existing residential development
- 2 New trunk foul sewer to sewage treatment works to relive existing sewer flooding history

THREATS

- 1 Loss of golf course and objection by Sport England
- 2 Substantial threat to important wildlife designations covering most of site

REDDITCH JOINT STUDY

SWOT ANALYSIS OF IDENTIFIED POTENTIAL GROWTH OPTIONS

Site reference: 8

Land between A441 and Rycknield Street

Site area: 390ha

STRENGTHS

- 1 Good road access to M42 and A441 into Redditch
- 2 Utilise existing access onto A441 via B4101(Dagnell End Rd)
- 3 Well related to existing town centre
- 4 Some relatively flat land within site
- 5 Foul and surface water drainage options more flexible

WEAKNESSES

- 1 Green Belt(+)- Would take built development edge close to Rowney Green
- 2 Flood Zone 3 affects eastern part of site
- 3 North- western part of site includes AGLV and SWS
- 4 Highway capacity difficulties at junction between B4101 and A441
- 5 Would load traffic onto A441, adversely affecting Bordesley
- 6 Substantial off-site highway infrastructure upgrade for Options 2 and 3
- 7 Sand and gravel deposits identified on part of site
- 8 Lack of capacity in local first, middle and high schools

OPPORTUNITY

- 1 Potential to contribute to implementation of Bordesley By-pass
- 2 Could link to sites 6 and 11 for provision of infrastructure
- 3 Opportunity for high quality public transport provision into Redditch (and to Birmingham)
- 4 Designated areas of landscape value could be retained/enhanced as country park
- 5 Sufficiently sized land parcel to more easily accommodate sustainable drainage and energy opportunities

THREATS

- 1 Potential objection from Highways Agency re loading of additional traffic onto J3 of M42

REDDITCH JOINT STUDY

SWOT ANALYSIS OF IDENTIFIED POTENTIAL GROWTH OPTIONS

Site reference: 9

Land between Rycknield Street, M42 and A435

Site area: 482 ha

STRENGTHS

- 1 Good road access to M42 and A435 into Redditch
- 2 Self contained within existing roads
- 3 Could link to sites 8 and 10 for economies of scale and provision of infrastructure, including high quality public transport
- 4 Utilise existing access onto A441 via Church Hill/Dagnell End Rd
- 5 Foul and surface water drainage options more flexible

WEAKNESSES

- 1 Green Belt (+)- Coalescence with Beoley and Holt End
- 2 Small areas of ancient woodland and SWS
- 3 Remote from existing community services and facilities- not logical to develop unless linked to site 8 and 10
- 4 Topography at southern and eastern ends (land drops away west of Brockhill Lane, towards centre of site)
- 5 Potential to overload A435
- 6 Limited linkage to town centre
- 7 Distance to existing utility network hubs increasing cost of connections
- 8 Sand and gravel deposits identified on part of site
- 9 Lack of capacity in local first, middle and high schools

OPPORTUNITIES

- 1 Potential for sustainable urban extension that is self contained
- 2 Opportunity for future expansion (north of Brockhill Farm) towards M42
- 3 Sufficiently sized land to more easily accommodate sustainable drainage and energy opportunities

THREATS

- 1 Potential objection from Highways Agency re loading of additional traffic onto J3 of M42

REDDITCH JOINT STUDY

SWOT ANALYSIS OF IDENTIFIED POTENTIAL GROWTH OPTIONS

Site reference: 10
Land south of Holt End
Site area: 308 ha

STRENGTHS

- 1 Self contained urban extension, well related to existing urban area
- 2 Good access to Redditch and M42 via A435 and A4023
- 3 Well located to existing employment sites (part allocation for future employment land in Bromsgrove Local Plan)
- 4 Flexible foul and surface water drainage solutions
- 5 Relatively close to existing utility network hubs

WEAKNESSES

- 1 Green Belt(+)-coalescence with Beoley and Holt End
- 2 Small area of SAM
- 3 Small area of Ancient Woodland and SWS
- 4 Topography (some steep slopes)
- 5 Limited linkage to town centre
- 6 Potential to overload A435
- 7 Sand and gravel deposits identified on part of the site
- 8 Lack of capacity in local first, middle and high schools

OPPORTUNITIES

- 1 Sustainable urban expansion
- 2 Could link to sites 8 and 9
- 3 Deliver high quality public transport into Redditch via A4023 or B4101 to the north of the site
- 4 Topography could be used to hide development from the A435
- 5 Part of site could potentially come forward in short term, subject to junction capacity on A435

THREATS

- 1 Potential objection from Highways Agency re loading of additional traffic onto J3 of M42

REDDITCH JOINT STUDY

SWOT ANALYSIS OF IDENTIFIED POTENTIAL GROWTH OPTIONS

Site reference: 11
Land south of Cobley Hill
Site area: 705ha

STRENGTHS

- 1 Part of site east of railway could access to Redditch and M42 via A441 and could also link to A448 creating new major Primary Distributor
- 2 Well related to sites 5, 6 and 8
- 3 Similar to other potential sites to the north of Redditch, is relatively proximate to the town centre
- 4 Size of land parcel provide more flexibility in terms of sustainable drainage and energy provision

WEAKNESSES

- 1 Green Belt(+)- potential coalescence with Bordesley
- 2 Small area of Ancient Woodland
- 3 Two large areas of SWS traversing the site
- 4 Capacity on existing road network (ie could not serve the development solely from either the A448 or the A441)
- 5 Railway line running through site (to achieve full development potential would have to cross the railway line with a new link road)
- 6 Traversed at north-eastern end by the Worcester and Birmingham Canal
- 7 Flood Zone 3 to east (River Arrow) and west of site
- 8 Full sustainability potential can only be realised in conjunction with development of Site 6 – not logical to develop in isolation from sites 5 and 6
- 9 Distance to existing utility network hubs increasing cost of connections
- 10 Infrastructure railway crossings required to provide connection to existing drainage networks with capacity
- 11 Lack of capacity in local first school

OPPORTUNITIES

- 1 Potential to provide major highway transport link between A448 and A441 funded by major development
- 2 Linkage with Sites 5, 6 and 8 could create large scale development area well connected to the A448, A441 and the M42
- 3 Potential to create (together with Site 6) a new rail station, multi modal interchange and high quality public transport link into Redditch
- 4 Sufficiently sized land to more easily accommodate sustainable drainage and energy opportunities
- 5 Ability to use the ecological designations as a major wildlife corridor and area of open space infrastructure

THREATS

- 1 Delays due to creation of major transport link
- 2 Potential objection from the Highways Agency re overloading on J2 of M42
- 3 Potential objection to development from Environment Agency on flood risk grounds.
- 4 Risk of sewer flooding in town centre unless more complex scheme, potentially involving a new trunk sewer to link to Spenal Sewage Treatment Works, implemented.

REDDITCH JOINT STUDY

SWOT ANALYSIS OF IDENTIFIED POTENTIAL GROWTH OPTIONS

Site reference: 12

Rough Hill Wood and land north of Jill Lane

Site area: 251ha

STRENGTHS

- 1 Physically connected to Redditch – close to amenities etc
- 2 Eastern and southern parts reasonably level
- 3 Good road access to A448 and A441 via Jill Lane (B4092)

WEAKNESSES

- 1 Rough Hill Wood protected as recreational woodland and Site of Special Scientific Interest (SSSI)
- 2 New Coppice protected as Special Wildlife Site (SWS)
- 3 Distant from Redditch town centre
- 4 Hilly topography at Rough Hill Wood and SW corner of site
- 5 Highway capacity constraints on A441
- 6 Green Belt (+) – coalescence of Redditch and Astwood Bank and virtual linkage to Studley
- 7 Slough Farm and New Coppice both Ancient Woodland
- 8 Site designated as ‘Special Landscape Area’ on Stratford LP proposals map
- 9 Industrial estate within site (adjacent to Green Lane) – possible bad neighbour to residential development – HGV movements/noise
- 10 This area generally considered (by Water Authority) to be unsuitable to accept significant amounts of additional treated effluent from the Sernal Sewage Treatment works.
- 11 Denominational schools (primary, junior and secondary) are all at capacity (non-denominational schools have some capacity).

OPPORTUNITIES

- 1 To use selectively retained woodland at Rough Hill Wood to increase amenity value of development site
- 2 To exploit hilly topography to create development with character
- 3 To use natural features to add value to development
- 4 To link up with sites 13 and/or 14
- 5 To use A448/Jill Lane as road access
- 6 To connect to site 1 to create larger self-sufficient development site
- 7 To fund improvements in public transport
- 8 To potentially fund a Crabbs Cross Junction Relief Road

THREATS

- 1 Excessive cost of developing/providing infrastructure on hilly terrain

2 Noise from A448 traffic

REDDITCH JOINT STUDY

SWOT ANALYSIS OF IDENTIFIED POTENTIAL GROWTH OPTIONS

Site reference: 13

Land to north of Sambourne and Middletown villages

Site area: 352ha

STRENGTHS

- 1 Relatively flat topography
- 2 Connected to Studley – scope for logical extension plus use of existing services/amenities/infrastructure
- 3 A448 and A441 access – road links to Redditch and beyond

WEAKNESSES

- 1 Not connected to Redditch. Makes no sense to develop in isolation from sites 12 and 14 and could not, by itself, bring forward the required infrastructure improvements to unlock the highway capacity constraints at Crabbs Cross junction.
- 2 Distant from Redditch town centre
- 3 Green Belt designation (+): coalescence of Studley and Astwood Bank (plus Sambourne and Middletown however these latter two are both very small hamlets)
- 4 Flood Zone 3 to north east of Middletown
- 5 Public transport access/provision poor
- 6 Highway capacity constraint on A441
- 7 Sambourne village is a Conservation Area
- 8 'Sambourne Reins' Ancient Woodland
- 9 All of site is 'Special Landscape Area' on Stratford proposals map
- 10 This area generally considered (by Water Authority) to be unsuitable to accept significant amounts of additional treated effluent from the Spernal Sewage Treatment works.
- 11 Denominational schools (primary, junior and secondary) are all at capacity (non-denominational schools have some capacity).

OPPORTUNITIES

- 1 To connect to site 12 and thus to Redditch
- 2 To exploit natural attractiveness to create quality development
- 3 To exploit proximity to existing services/infrastructure in Studley e.g. schools
- 4 Contribute toward provision of Crabbs Cross junction Relief Road
- 5 To use Whitemoor Road and Sambourne Lane as road access links to A441 and A448

THREATS

- 1 Potential objection to development from the Environment Agency on flood risk grounds.

REDDITCH JOINT STUDY

SWOT ANALYSIS OF IDENTIFIED POTENTIAL GROWTH OPTIONS

Site reference: 14

Land between Studley and Redditch

Site area: 129ha

STRENGTHS

- 1 Close to hospital
- 2 Close to services etc in both settlements (Redditch and Studley)
- 3 Good road access off B4093 and A435
- 4 Public transport access likely to be good given proximity to Redditch and Studley
- 5 Well connected to Redditch – schools/shops/employment nearby
- 6 Well connected to Studley – schools/shops/employment nearby
- 7 Flat topography
- 8 Farmland not of high quality – mostly pasture
- 9 Well defined development boundaries (roads)

WEAKNESSES

- 1 Contains protected open areas – football pitch/Studley Common
- 2 Green Belt (+): Coalescence of Studley and Redditch
- 3 Distant from Redditch centre
- 4 East section of site partly developed already with business uses, restricting housing potential
- 5 NE of site in Flood Zone
- 6 This area generally considered (by Water Authority) to be unsuitable to accept significant amounts of additional treated effluent from the Sernal Sewage Treatment works.
- 7 Denominational schools (primary, junior and secondary) are all at capacity (non-denominational schools have some capacity).

OPPORTUNITIES

- 1 To exploit proximity to hospital for medical related employment
- 2 To exploit proximity to existing employment adjacent to A435
- 3 To exploit proximity to recreational opportunities in Rough Hill Wood
- 4 Use of dismantled railway for provision of a Crabbs Cross junction Relief Road
- 5 To connect Studley with Redditch to create sustainable non-dispersed settlement pattern/critical mass of population to sustain services/public transport
- 6 To connect to sites 12 and 15
- 7 Opportunity for expansion of established mass of employment/office uses
- 8 To exploit existing services in Redditch/Studley

THREATS

- 1 Potential objection to development from Environment Agency on flood risk grounds

REDDITCH JOINT STUDY

SWOT ANALYSIS OF IDENTIFIED POTENTIAL GROWTH OPTIONS

Site reference: 15

Land east and northeast of Studley

Site area: 302ha

STRENGTHS

- 1 Mostly flat
- 2 Some land uncultivated/overgrown so less attractive
- 3 Connected to Redditch and Studley - scope for logical extension to settlements plus use/upgrade of existing services/amenities
- 4 Access from A435 linking to Redditch/Birmingham
- 5 Close to existing employment at Washford and Park Farm

WEAKNESSES

- 1 Contains Water Reclamation Works – likely to be a zone surrounding this facility that cannot be developed
- 2 In River Arrow Floodplain – large parts of site at risk of flooding on Environment Agency flood maps
- 3 Poorly connected to Redditch
- 4 Distant from Redditch town centre
- 5 Green Belt (+): Coalescence of Redditch and Studley and Mappleborough Green
- 6 North-westernmost part of site is sports pitch – likely to be protected
- 7 Contains Scheduled Ancient Monument – remains of ‘The Priory’
- 8 ‘Special Landscape Area’ on Stratford proposals map
- 9 Denominational schools (primary, junior and secondary) are all at capacity (non-denominational schools have some capacity).

OPPORTUNITIES

- 1 To connect to site 14 to create physical connection to Redditch and Studley
- 2 To exploit existing established services/infrastructure in Studley
- 3 To use A435 and Hardwick Lane as access
- 4 To build Studley by-pass road as higher capacity road to serve new development

THREATS

- 1 Possible future expansion of Water Treatment Works required – reduces developable area
- 2 Opposition to loss of sports pitch
- 3 Hardwick Lane low capacity country lane
- 4 A435 already highly congested through Studley – further loading of traffic less acceptable unless upgrade/bypass

- 5 Potential objection to development from Environment Agency on flood risk grounds.

REDDITCH JOINT STUDY

SWOT ANALYSIS OF IDENTIFIED POTENTIAL GROWTH OPTIONS

Site reference: 16
Land south of Hardwick Lane
Site area: 486ha

STRENGTHS

- 1 Largely flat

WEAKNESSES

- 1 Likely to be poor public transport access
- 2 Green Belt but no coalescence of settlements
- 3 Hilly in NE of site
- 4 Distant and separate from Redditch. No logic to its development unless linked to sites 15 and 17
- 5 'The Alders' Ancient Woodland
- 6 Poor road access – no high capacity roads such as A or B class roads
- 7 Large parts of southern part of site at risk of flooding on Environment Agency flood maps
- 8 Contains overhead electricity power lines in SE of site
- 9 Development boundaries not well defined – streams/public footpaths/field boundaries
- 10 'Special Landscape Area' on Stratford proposals map
- 11 Local primary schools at capacity

OPPORTUNITIES

- 1 To link with sites 15 and/or 17 to create connectivity to Redditch and/or Studley
- 2 To exploit attractive site features/surroundings/setting
- 3 To upgrade Hardwick Lane and/or Sernal Lane for road access

THREATS

- 1 Potential objection to development from Environment Agency on flood risk grounds.

REDDITCH JOINT STUDY

SWOT ANALYSIS OF IDENTIFIED POTENTIAL GROWTH OPTIONS

Site reference: 17

Land east of A435 and south of A4189

Site area: 334ha

STRENGTHS

- 1 Close to Redditch
- 2 Good road access – A435 and A4189

WEAKNESSES

- 1 Hilly in parts
- 2 Green Belt but no coalescence except with Outhill village which is a very small hamlet
- 3 'Cranhills Wood' Ancient Woodland
- 4 'Special Landscape Area' on Stratford proposals map
- 5 Difficult to identify long term revised Green Belt boundary to east, notwithstanding Hardwick Lane
- 6 Without tandem development within sites 15 and 19, would create a relatively isolated enclave surrounded by Green Belt
- 7 Local primary schools at capacity

OPPORTUNITIES

- 1 To exploit hilly locations for wind power
- 2 To exploit natural attractiveness to add character to development
- 3 To upgrade Hardwick Lane for road access
- 4 To use A4189 for road access
- 5 To connect to sites 15, 18, or 19

THREATS

REDDITCH JOINT STUDY

SWOT ANALYSIS OF IDENTIFIED POTENTIAL GROWTH OPTIONS

Site reference: 18

Narrow strip of land between Redditch and A435

Site area: 48ha

STRENGTHS

- 1 Close to Redditch
- 2 Potential for access to A435 or Far Moor Lane/Claybrook Drive
- 3 Not in Green Belt
- 4 Parts of site overgrown/unused former farmland
- 5 Close to existing employment at Washford and Moon's Moat (Ravensbank)
- 6 Designated 'Area of Development Restraint' in Redditch Local Plan

WEAKNESSES

- 1 Narrow, mostly man-made hill dividing two busy roads – physically difficult to develop
- 2 Potential coalescence with Mappleborough Green
- 3 Contains allotments – need to accommodate/replace
- 4 Distant from Redditch town centre
- 5 Narrow strip of land between two busy roads makes access difficult/inefficient – many access points needed for relatively small number of houses
- 6 Contains established woodland some of it protected by TPO

OPPORTUNITIES

- 1 To connect to Redditch
- 2 To exploit woodland as part of site's character
- 3 To use existing high capacity roads for access
- 4 To link to sites 15, 17 and 19

THREATS

- 1 Traffic noise from fast/busy roads/slip roads – A435 and A4023
- 2 Capacity of local road network to accommodate large scale development requires further investigation

REDDITCH JOINT STUDY

SWOT ANALYSIS OF IDENTIFIED POTENTIAL GROWTH OPTIONS

Site reference: 19

Land north of A4189 and east of A435

Site area: 320ha

STRENGTHS

- 1 Good access to A435 – links to Redditch/Birmingham
- 2 Close to Redditch

WEAKNESSES

- 1 Very hilly topography
- 2 Grove Wood and Conduit Coppice both Ancient Woodland
- 3 Contains small sewage works – possible safe distance required
- 4 'Special Landscape Area' on Stratford proposals map
- 5 Green Belt but no coalescence of settlements
- 6 Difficult to define long term defensible Green Belt boundary to east
- 7 Development in isolation in this area would create a relatively disconnected enclave within the Green Belt

OPPORTUNITIES

- 1 To use A435 high capacity road as access point
- 2 Exploit high ground for wind energy
- 3 To use A4189 as main access to site
- 4 To connect to site 10

THREATS