

**Birmingham City Council**

# **Birmingham Development Plan**

## **Transport Analysis of Green Belt Options**

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### Appendix A Accessibility Analysis







# 1 Introduction

## 1.1 Background

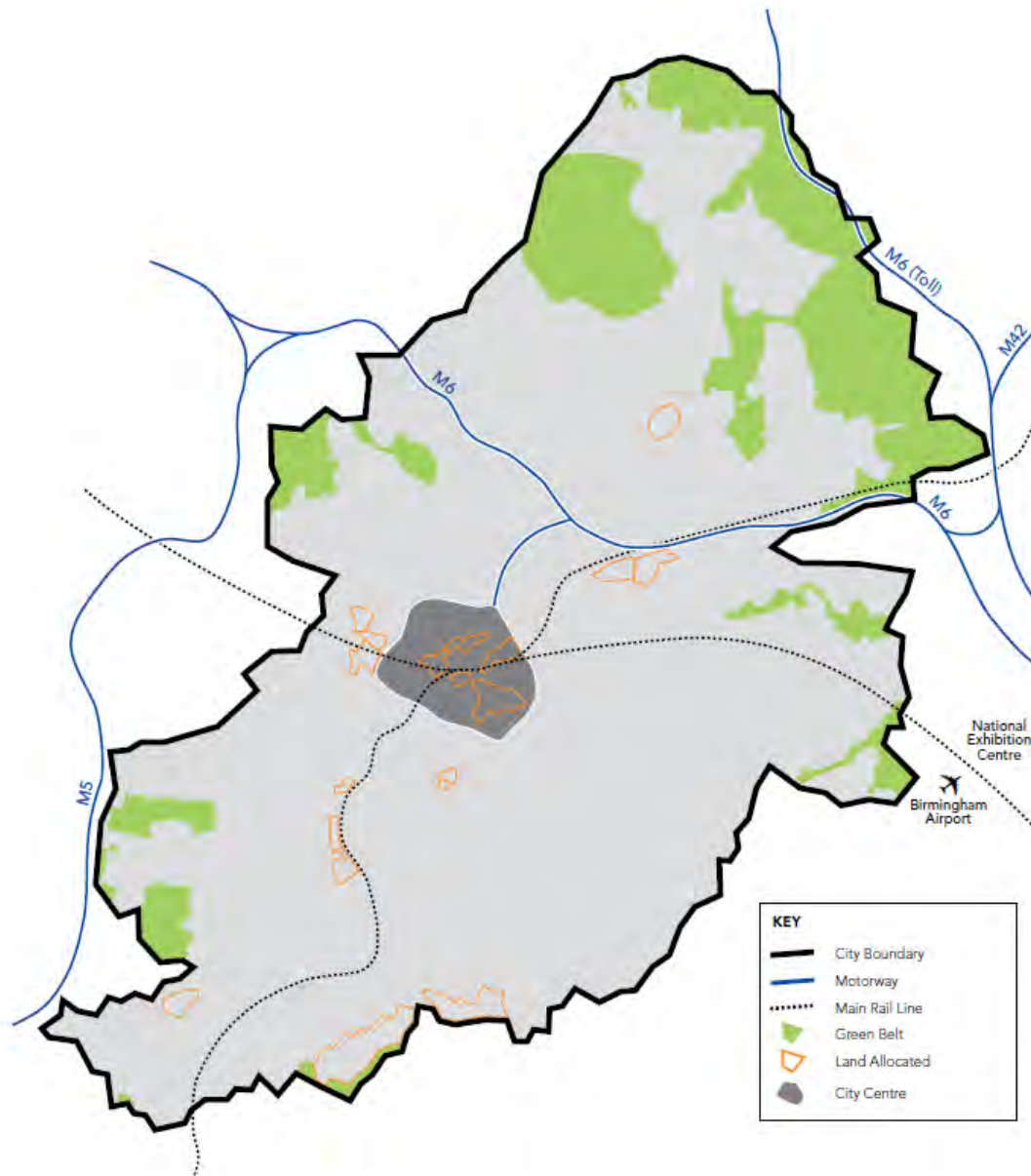
- 1.1.1 The Birmingham Development Plan Options Consultation<sup>1</sup> identifies a need to plan for circa 80,000 new homes, and accommodate the need for new employment-generating activity. This growth is needed to enable a projected population increase by 2031 of 150,000, and to address the City's current unemployment levels of 12.7%.
- 1.1.2 The strategy for delivering new housing and employment is clearly reliant on the regeneration of brownfield sites. However it has been acknowledged that there are not sufficient brownfield areas to accommodate all of this growth within the Plan period. Birmingham City Council has therefore embarked upon a process of considering the release of land from its own Green Belt to accommodate these needs.
- 1.1.3 A preliminary analysis of the development potential of all of the City's Green Belt was undertaken by Birmingham City Council using the following principles:
- Sufficient land is needed to accommodate a sustainable urban extension which would include a range of community and other supporting infrastructure such as schools and/or could accommodate an employment site which would provide a minimum 50 hectare plot size.
  - Is not subject to significant environmental and physical constraints.

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<sup>1</sup> Birmingham Development Plan: Planning for Birmingham's growing population – Options Consultation (Oct 2012)



Figure 1-1: Development opportunities



1.1.4 Following the initial analysis, the majority of Green Belt sites were dismissed and four sites retained for further consideration.

- a Hill Wood, East of Watford Gap.
- b West of the M6 Toll.
- c West of Sutton Coldfield Bypass, Walmley.
- d East of Sutton Coldfield Bypass, Walmley.



Figure 1-2: Green Belt Options



1.1.5 The next stage of the process was to undertake further analysis to appraise each of these sites, and to identify which, if any, of the sites are suitable to accommodate either a sustainable urban extension accommodating up to 10,000 new homes, and/or up to 50Ha of employment land.

1.1.6 Phil Jones Associates (PJA) was commissioned to undertake a transport analysis of the four potential development locations and the results of that exercise are set out in this report.

## 1.2 Study Brief

1.2.1 The City Council's strategy for delivering new homes will be based upon the principles of creating sustainable neighbourhoods. This will involve providing, amongst other things, good access to facilities such as shops, leisure and work opportunities, and providing convenient options to travel to these destinations by public transport, on foot and by bicycle.



## 1. Introduction

1.2.2 The principle objective of this study is to consider which of the four sites is most appropriate for providing a new *sustainable urban extension* of up to 10,000 new homes, or an employment development of 50 Hectares.

1.2.3 The brief therefore required PJA to:

- Expand upon what a sustainable urban extension should comprise, including the supporting infrastructure and the requirements for schools, medical centres, leisure facilities and shops.
- Define the services and facilities that each site needs access to.
- Measure the accessibility of each site using journey times, by walk, cycle, public transport and car to relevant land uses.
- Identify and compare the movement constraints on the transport networks that support each site.
- Score and compare each of the sites, as a sustainable urban extension or employment development in transport terms.

## 1.3 Report Structure

1.3.1 This report presents the analysis undertaken in accordance with the study brief, and is structured as follows:

- The Approach;
- Defining the Development;
- Measuring Connectivity;
- Measuring Capacity; and,
- Options Appraisal.



## 2 The Approach

### 2.1 Summary

2.1.1 This chapter provides an overview of the approach used for the assessment, and how this has been established.

### 2.2 Guidelines contained in National Policy

2.2.1 National policy towards development and plan making is set out in the National Planning Policy Framework (NPPF)<sup>2</sup>, which states a presumption in favour of sustainable development. These principles are reflected in Birmingham City Council's own policy, and in essence mean that development should promote sustainable travel and sustainable modes of transport. In summary this means that the development should:

- a Be located and designed where practical to accommodate the efficient delivery of goods and supplies;
- b Give priority to pedestrian and cycle movements;
- c Have access to high quality public transport facilities;
- d Aim for a balance of land uses within existing areas so that people can be encouraged to minimise journey lengths for employment, shopping, leisure, education and other activities;
- e Promote a mix of uses in order to provide opportunities to undertake day-to-day activities including work on site; and,
- f Ensure key facilities such as primary schools and local shops, for example, will be located within walking distance of most properties.

2.2.2 These principles set the foundation for developing an assessment of the development options.

### 2.3 Consultation on the Methodology

2.3.1 Consultation has been held with Centro, the Highways Agency, and officers within Birmingham City Council, in order to inform the methodology used in the study.

2.3.2 Feedback received from members of the public, and neighbouring local authorities of Tamworth District Council, Lichfield District Council and Staffordshire County Council has also been reviewed, and the main issues raised were:

- The impact upon strategic and local highways, and access to retail leisure and employment sites in Tamworth;
- The implications for transport infrastructure within Lichfield District; and,

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<sup>2</sup> National Planning Policy Framework – Department for Communities and Local Government (March 2012)



## 2. The Approach

- The potential impacts on communities in Staffordshire (in relation to access and highways).

2.3.3 These comments are acknowledged; however the primary purpose of the assessment at this stage is to consider the four sites in the context of the most suitable location for a Sustainable Urban Extension to Birmingham. We take the view that the more accessible a site is to the facilities within the Birmingham boundary, the less attractive journeys to other destinations become, therefore the need to travel outside the city is reduced.

2.3.4 On this basis, the focus of this report is to identify how the sites relate to existing facilities and services within the Birmingham boundary, rather than facilities further afield; and the methodology has been developed to reflect this.

2.3.5 It is accepted that there are trip attractors (schools, retail, employment and leisure opportunities) outside the Birmingham, however, and further consideration will need to be given to the wider impacts on infrastructure caused by travel to these places in future stages of work.

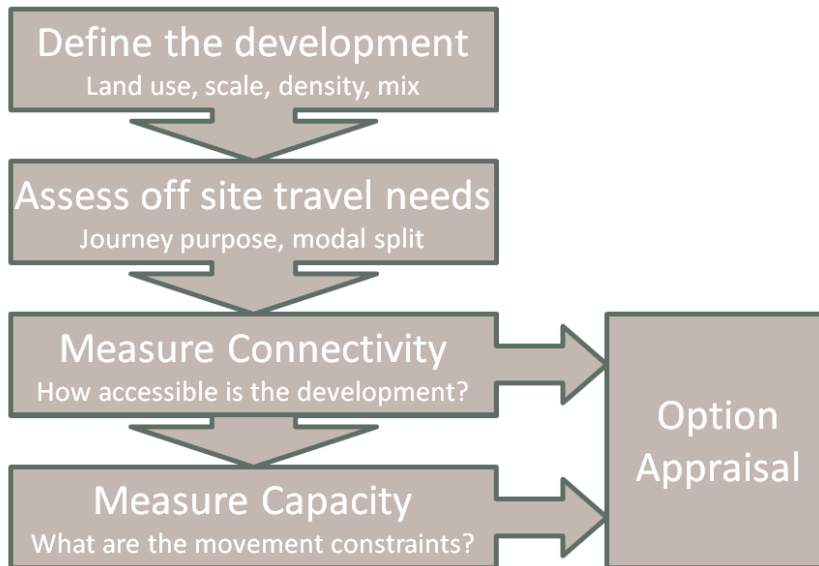
### **2.4 Location Option Assessment Framework**

2.4.1 A framework has been developed to meet the objectives of the study, which scores the connectivity of a site and the capacity of the local transport network, to assess the suitability of a site for development. The framework is a tool which gathers information from established local area models and evidence bases such as Census, BCC survey data and site and route audits. It then translates the information into common scoring metrics, allowing weightings to be added where appropriate.

2.4.2 As part of the Framework, four tasks have been carried out. These define the development mix, quantum and infrastructure; assess each development options offsite needs; measure the potential connectivity of each development option; and measure the ability of the local transport network to accommodate growth.



**Figure 2-1: Location Option Assessment Framework structure**



## 2.5 Define the development mix

2.5.1 It is important to understand the travel needs of the development. The requirements of people and goods travelling to and from the development will depend upon the type, scale, density and mix of both the primary and secondary land uses. Getting the mix right will reduce the need for people to travel off site to shop and work, and getting the scale right means that larger supporting land uses, such as secondary schools, will become more accessible.

## 2.6 Assess off-site travel needs

2.6.1 It is acknowledged that some land uses cannot be provided on site, such as Hospitals, Town Centres or City Centre based jobs, and travel to destinations outside of the site will occur.

2.6.2 The demand for off-site services and facilities can be appraised and categorised by journey purpose and modal split using national and regional statistics. This has been used to give a weighting to the connectivity scores captured in the framework.

2.6.3 Assumptions have been made regarding highway access arrangements, and supporting infrastructure. For instance, in order for the development to be sustainable there has to be an assumption of a minimum level of connectivity by public transport. Therefore new public transport connections have been proposed, which overlay the existing network.



### 2.7 Measuring Connectivity

- 2.7.1 An overarching objective of the Birmingham Development Plan is to have a Connected City. This is as much about having the right development in the right place as it is about the right infrastructure. The level of connectivity has been established using accessibility analysis and asks if a site can meet set journey time thresholds to the required destinations.
- 2.7.2 In order to measure the connectivity of each option modal split targets and associated journey time thresholds are set. The actual journey time by each travel mode is then measured, using industry-standard software, and each site is scored against the required journey time thresholds.

### 2.8 Measuring Capacity

- 2.8.1 The capacity of the network is defined by the physical constraints to movement, and this can be observed, and in some cases measured. The capacity of the cycle and walk networks, for instance, is measured by understanding the quality of routes and any severance issues that occur.
- 2.8.2 The performance of the highway network has been measured using the City Council's Diamond Model and the West Midlands PRISM Model. The outputs of this have been used with observations, to assess how many congested junctions, within Birmingham, each site will put additional pressure on. Consideration has been given to the opportunities to improve the highway network, and the benefit that this might bring. A more rigorous 'impact assessment' of the wider highway network will be carried out at a later stage.
- 2.8.3 The capacity of the public transport has been considered, but not included within the Location Option Assessment Framework.

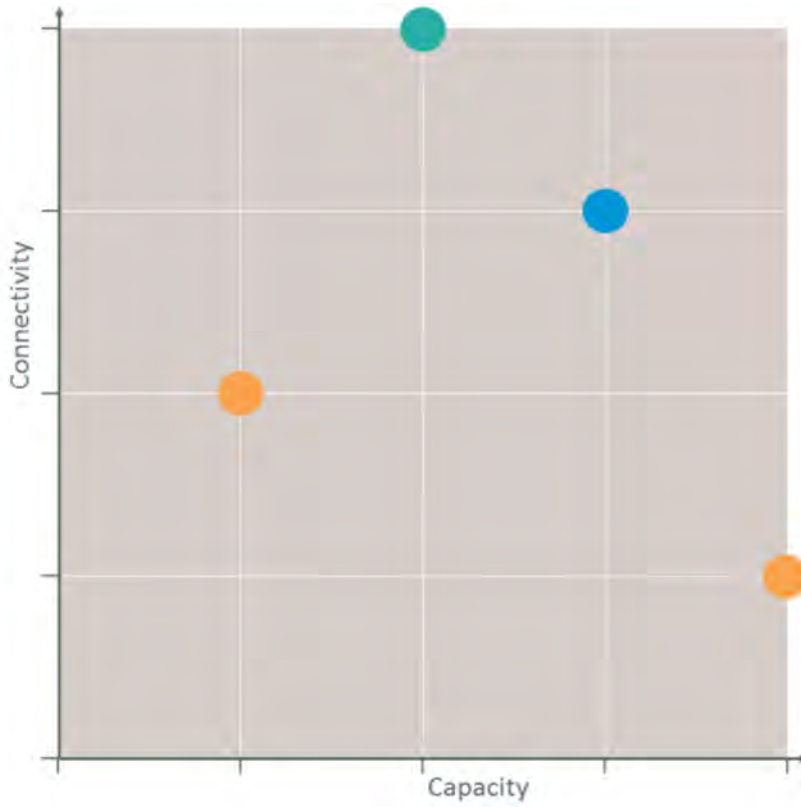
### 2.9 Options Appraisal

- 2.9.1 The result of the connectivity and capacity analysis has been brought together using a common scoring metric. This is where weightings are applied, if necessary, and the four sites can be compared in a balanced way against all criteria.
- 2.9.2 The following diagram shows how the results of the options appraisal might look. The green spot shows a site with good accessibility, but only average capacity, which may lend itself to a sustainable mixed used development. The orange spot shows a site with poor accessibility, but high network capacity, which lends itself to a single use which generates a lot of trips, albeit unsustainable.





Figure 2-2: Location Option Assessment Framework – Example output





### 3 Defining the Development

3.1.1 In order to establish what facilities and services the development needs access to, it is first important to understand how large each development would be, and what facilities and services are likely to be provided on-site.

3.1.2 This chapter presents the potential development options, and sets out what each of these might look like either as a residential site, or an employment site.

#### 3.2 Options presented by the Birmingham Development Plan

3.2.1 The Birmingham Development Plan Greenbelt Options Appendix<sup>3</sup>, considers the development options in turn and identifies their theoretical residential and employment capacity, these numbers form the basis of the assessment.

**Table 3-1: Development Options defined by Birmingham City Council in Figure 1.2**

Site	Employment Opportunity	Residential Capacity
Site A: Hill Wood, East of Watford Gap	50 Hectares	8,700 dwellings
Site B: West of M6 Toll	50 Hectares	9,500 dwellings
Site C: West of Sutton Coldfield Bypass	50 Hectares	7,900 dwellings
Site D: East of Sutton Coldfield Bypass	50 Hectares	6,100 dwellings

#### 3.3 Services and facilities provided on each residential site

3.3.1 All developments require supporting facilities and services, and these should be located within a reasonable journey time. Larger developments may contain these services on site as secondary land uses and therefore be more self-sufficient, and, as journeys will naturally be shorter, they become sustainable.

3.3.2 The type and number of facilities and services provided on a residential site is dependent upon how many people live on the development. 2011 Population and Household Census for areas including Sutton Coldfield, Walmley, Erdington, Minworth, Castle Vale, Castle Bromwich and Kingshurst, has been gathered, which indicates an average of 2.4 people per dwelling. This is used as a proxy to estimate the population potential of each development area.

<sup>3</sup> Birmingham Development Plan: Planning for Birmingham’s growing population – Green Belt Options Appendix (October 2012)

**Table 3-2: Calculating the potential number of residents**

Site	Residential Capacity	Potential Population
Site A: Hill Wood, East of Watford Gap	8,700 dwellings	20,880 people
Site B: West of M6 Toll	9,500 dwellings	22,800 people
Site C: West of Sutton Coldfield Bypass	7,900 dwellings	18,960 people
Site D: East of Sutton Coldfield Bypass	6,100 dwellings	14,640 people

3.3.3 The development guide ‘Sustainable Settlements’<sup>4</sup> presents research on population catchments for local facilities. This has been used to determine what services and facilities could be provided on site.

**Table 3-3: On-site facility provision (upper end of catchment range used)**

Facility	Population Catchment	Site A	Site B	Site C	Site D
Primary School	1:4500	5	5	4	3
Secondary School	1:15000	1	2	1	1
Doctors Surgery	1:3000	7	8	6	5
Public House	1:7000	3	3	3	2
Corner Shop	1:5000	4	5	4	3
Local Shopping Ctr	1:10000	2	2	2	1
Post Office	1:10000	2	2	2	1
Community Centre	1:15000	1	2	1	1
Sports Centre	1:25000	1	1	0	0
Superstore	1:25000	1	1	0	0
Restaurants	1:5000	4	5	4	3

3.3.4 It can be assumed then that many of the journeys made throughout the day will be internal to each site. This level of self-sufficiency supports the very idea of Sustainable Development.

3.3.5 These facilities will in themselves create new employment opportunities, many of which will be taken up by people who live on the site. The number of jobs created by each local facility has been defined using the national TRICS database<sup>5</sup> and the HCA Employment Densities Guide<sup>6</sup>.

<sup>4</sup> Sustainable Settlements – A Guide for Planners, Designers and Developers. Barton, Davis & Guise (UWE 1995). Data in Table 3.3 is referenced to Coombes, Farthing and Winter (1992-1994)

<sup>5</sup> <http://www.trics.org/> - TRICS 2012(b)v6.10.1

<sup>6</sup> Employment Densities Guide: 2<sup>nd</sup> Edition – Homes & Communities Agency (2010)

**Table 3-4: The number of jobs created on site**

Facility	Jobs per facility	Site A	Site B	Site C	Site D
Primary School	37	185	185	148	111
Secondary School	125	125	250	125	125
Doctors Surgery	25	175	200	150	125
Public House	14	43	43	43	29
Corner Shop	18	73	92	73	55
Local Shopping Ctr	41	82	82	82	41
Post Office	6	12	12	12	6
Community Centre	8	8	17	8	8
Sports Centre	75	75	75	0	0
Superstore	285	285	285	0	0
Restaurants	28	111	139	111	83

### 3.4 Services and facilities provided on each employment site

3.4.1 An employment site is dependent upon its accessibility to the local population, and connections to the wider transport network. They tend to need fewer on site supporting services, apart from perhaps some small food retail outlets and children’s nurseries. However these on-site services account for only a small part of the daily demand for movement. Therefore this is disregarded for the purposes of this assessment.

3.4.2 Birmingham City Council has defined the mix of uses for the potential employment sites.

**Table 3-5: The number of jobs created on site**

Land use	Allocation	GFA/Ha	Jobs/sqm	Site A	Site B	Site C	Site D
B1	20%	54%	12	4500	4500	4500	4500
B2	60%	45%	36	3750	3750	3750	3750
B8	20%	58%	70	829	829	829	829
				<b>9079</b>	<b>9079</b>	<b>9079</b>	<b>9079</b>

### 3.5 Summary

3.5.1 There are a number of notable findings from this initial stage of the assessment, these are:

- A population increase of up to 20,000 could be accommodated on Land West of Sutton Coldfield Bypass;
- Over 9,000 new jobs could be provided on an employment site;



- A Sustainable Urban Extension of 10,000 new homes would provide its own schools, GP's, shops and community centres; and
- A residential development of this size would create over 1,000 new jobs.



## 4 Assessing off-site travel needs

4.1.1 The previous chapter established what each development option may comprise; the next stage is to understand the off-site requirements.

4.1.2 This chapter presents the assessment of the facilities that each development option requires access to; the infrastructure required to serve each site; and a means of measuring the relative need for one set of services against another.

### 4.2 Services and facilities required for each residential site

4.2.1 Whilst residents will use on-site facilities, it is likely that some will use facilities in the vicinity of the site. This may be a result of a slight under provision on the site, or preference for alternative services elsewhere.

4.2.2 There are also other services and destinations that will definitely not be provided on site. It is reasonable to assume that destinations such as hospitals and higher education are not provided on site, and that these are a primary need of developments. 100% of journeys to these services will be 'external'.

4.2.3 It is also reasonable to assume, as demonstrated previously, that destinations such as primary schools and doctors surgeries will be provided on site. However, there will be a proportion of residents who will travel off site to these destinations. This has been calculated using actual figures from the calculations presented in Table 3.3. Where a marginal under provision is found, an assumption is made that there will be an off-site requirement.

4.2.4 Perhaps the most important requirement for a residential site is access to jobs, since many of these journeys will take place in weekday peak periods. The new residential areas will create an employment demand. 2011 Population and Household Census for areas including Sutton Coldfield, Walmley, Erdington, Minworth, Castle Vale, Castle Bromwich and Kingshurst, has been gathered, which indicates an average of 1.21 economically active people per residential dwelling.

**Table 4-1: Number of Jobs needed to support the Sustainable Urban Extension**

Category	Site A	Site B	Site C	Site D
Economically active people	10,527	11,495	9559	7,381
Jobs created on site (Table 3.4)	1,073	1,252	676	458
Jobs required off site	9,454	10,243	8,883	6,923

**Table 4-2: Off-site facility requirement. (% of demand)**

Facility	Site A	Site B	Site C	Site D
Primary School	0	1%	5%	8%
Secondary School	28%	0	21%	0
Doctors Surgery	0	0	5%	0
Public House	0	8%	0	4%
Corner Shop	4%	0	0	0
Local Shopping Centre	4%	12%	0	32%
Post Office	4%	12%	0	32%
Community Centre/Youth	28%	0	21%	0
Sports Centre	0	0	100%	100%
Superstore/District Centre	0	0	100%	100%
Restaurants	4%	0	0	0
Hospital	100%	100%	100%	100%
Higher Education	100%	100%	100%	100%
Comparison Retail	100%	100%	100%	100%
Commercial Centre (Sutton/Birmingham)	100%	100%	100%	100%
Leisure (Cinema, Bowling etc.)	100%	100%	100%	100%
Business (Economic Zones)	100%	100%	100%	100%
Jobs	89%	89%	93%	94%

4.2.5 These are the destinations that a Sustainable Urban Extension will need access to, and are the destinations that have been modelled in the later stages of this assessment.

### 4.3 Services and facilities required for each employment site

4.3.1 An employment site is dependent upon its accessibility to the local population, and connections to the wider transport network. It is considered that the more accessible it is to the urban area, the more likely it is that people would consider jobs on the site as a realistic employment opportunity. With over 8,000 new jobs possible, the employment development needs to be accessible to as many residents as possible.

4.3.2 However business to business opportunities are also important. Whilst it is difficult to measure, it is reasonable to assume that there is some demand for travel between major areas of employment, and between the Economic Zones. Therefore this is included within the analysis.



## 4. Assessing off-site travel needs

### 4.4 Infrastructure required to access each site

4.4.1 It is assumed that each site is served by a comprehensive network of movement infrastructure and access to the highway work. The following assumptions are also made:

- Site A would be accessed off A5127 with a distributor road running east west, and off Watford Gap Road;
- Site B would be accessed off a new junction and distributor road with A453 Tamworth Road, Weeford Road and Lindridge Road;
- Site C would be accessed off Springfield Road, Thimble End Road, Webster Way, with a new junction connecting Webster Way with the A38;
- Site D would be accessed via a new distributor road connecting the A38 to the A4097 Kingsbury Road, with a connection through Site C to Webster Way.

4.4.2 It is assumed that all committed infrastructure can be delivered within the plan period, and that all highway improvement lines, for instance on the A5127, will also be made use of.

4.4.3 The existing public transport network does not penetrate any of the development sites, and in its current route pattern will not be able to meet the needs of the potential urban extensions. It is considered that that this scale of development would merit a step-change in public transport provision to meet overall transport sustainability aims; a purely incremental adaptation of the current public transport offer is considered inappropriate to meeting the City's overall development aims.

4.4.4 Therefore a series of new public transport routes has been devised for each potential SUE location, which provide access to key destinations, such as Sutton Coldfield Town Centre, Birmingham City Centre, major employment areas and the Economic Zones. The routes are identical, as far as practically possible, for each potential SUE location. Services were configured for each location considering the following criteria:

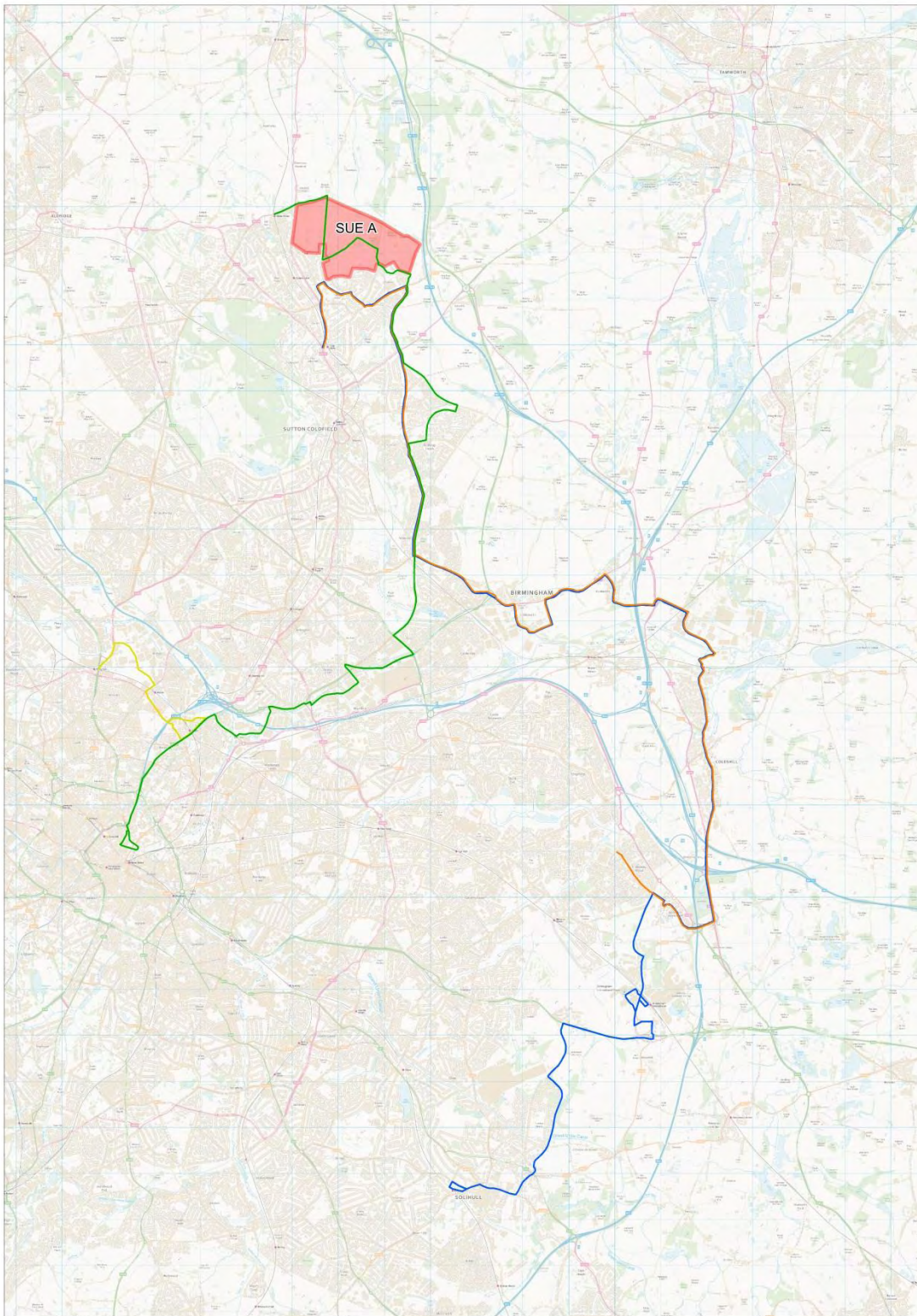
- Location Viability – providing connectivity that would make the location either an attractive location to reside, or attractive for business location.
- Development Quantum – provide sufficient capacity to accommodate trips made by the SUE and trips made by existing trip generators on the route.
- Financial Affordability – creating a service that could reasonably be kick started by funding from the SUE development and that could easily be subsidised in the future.
- Public Acceptability – Services that would receive the endorsement of the public, local business and council members.





- Natural Resources and Environment – services that efficiently use energy and that have limited impact on the environment.

**Figure 4-1: New public transport routes Site A**





**Figure 4-2: New public transport routes Site B**

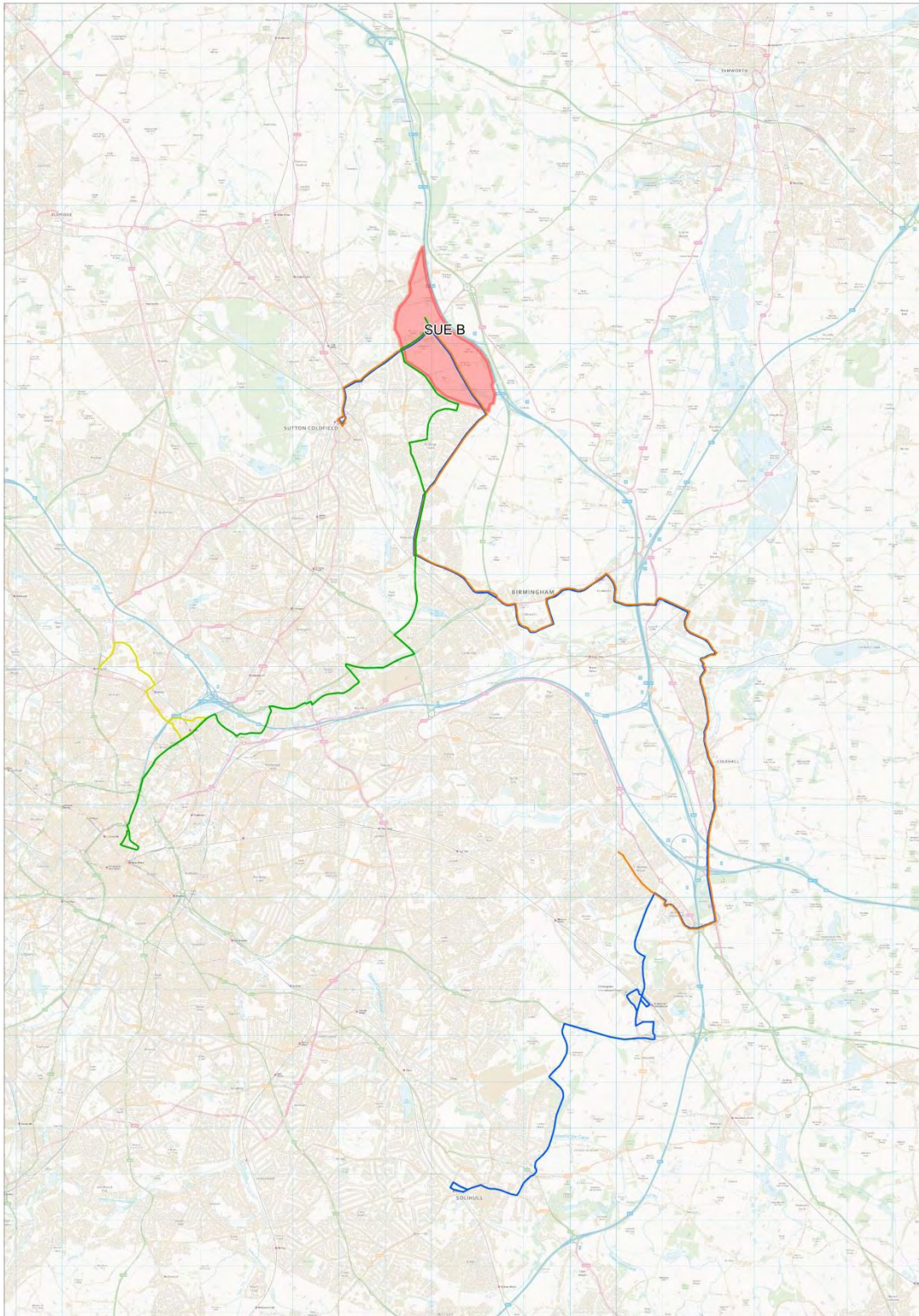




Figure 4-3: New public transport routes Site C

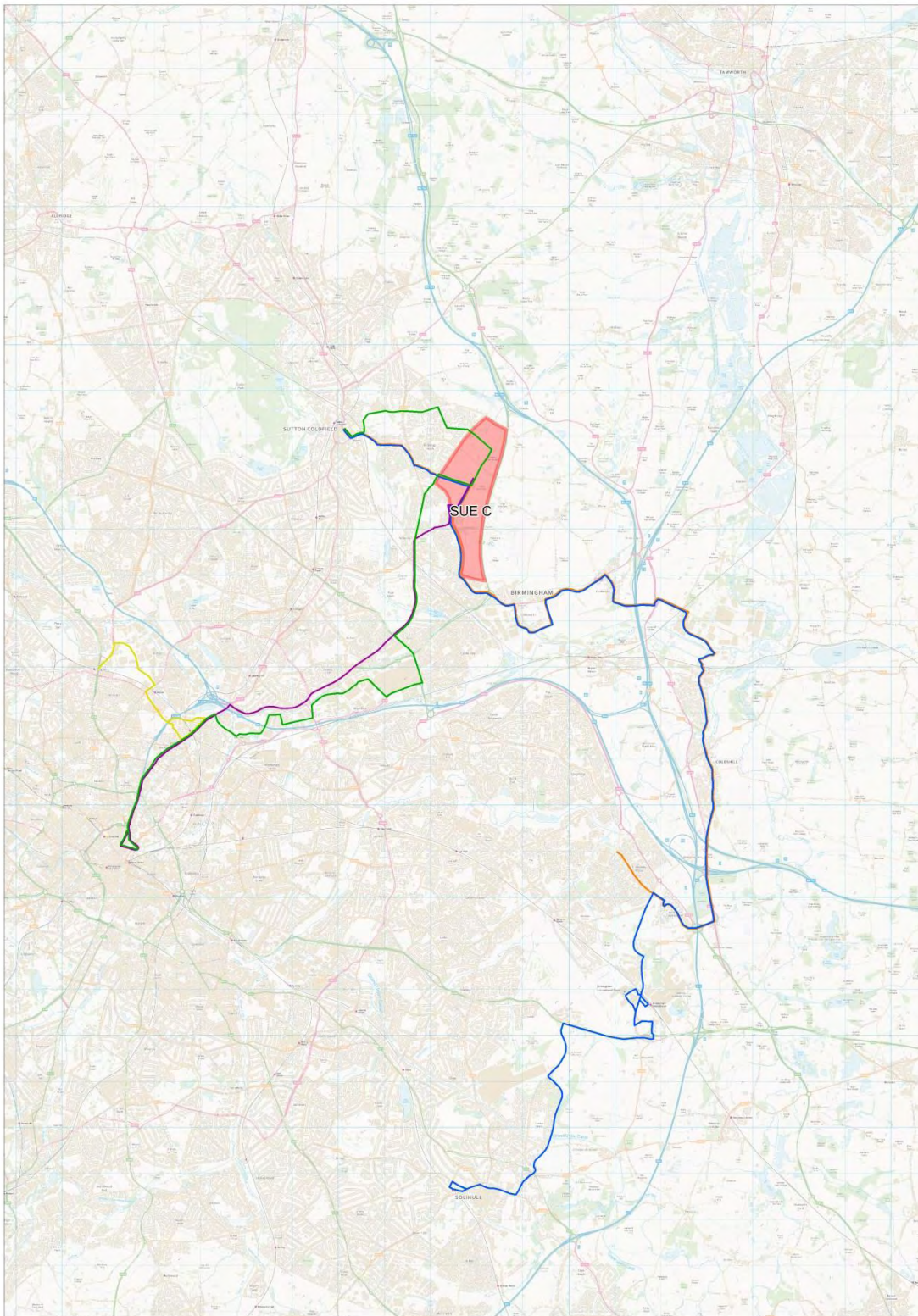
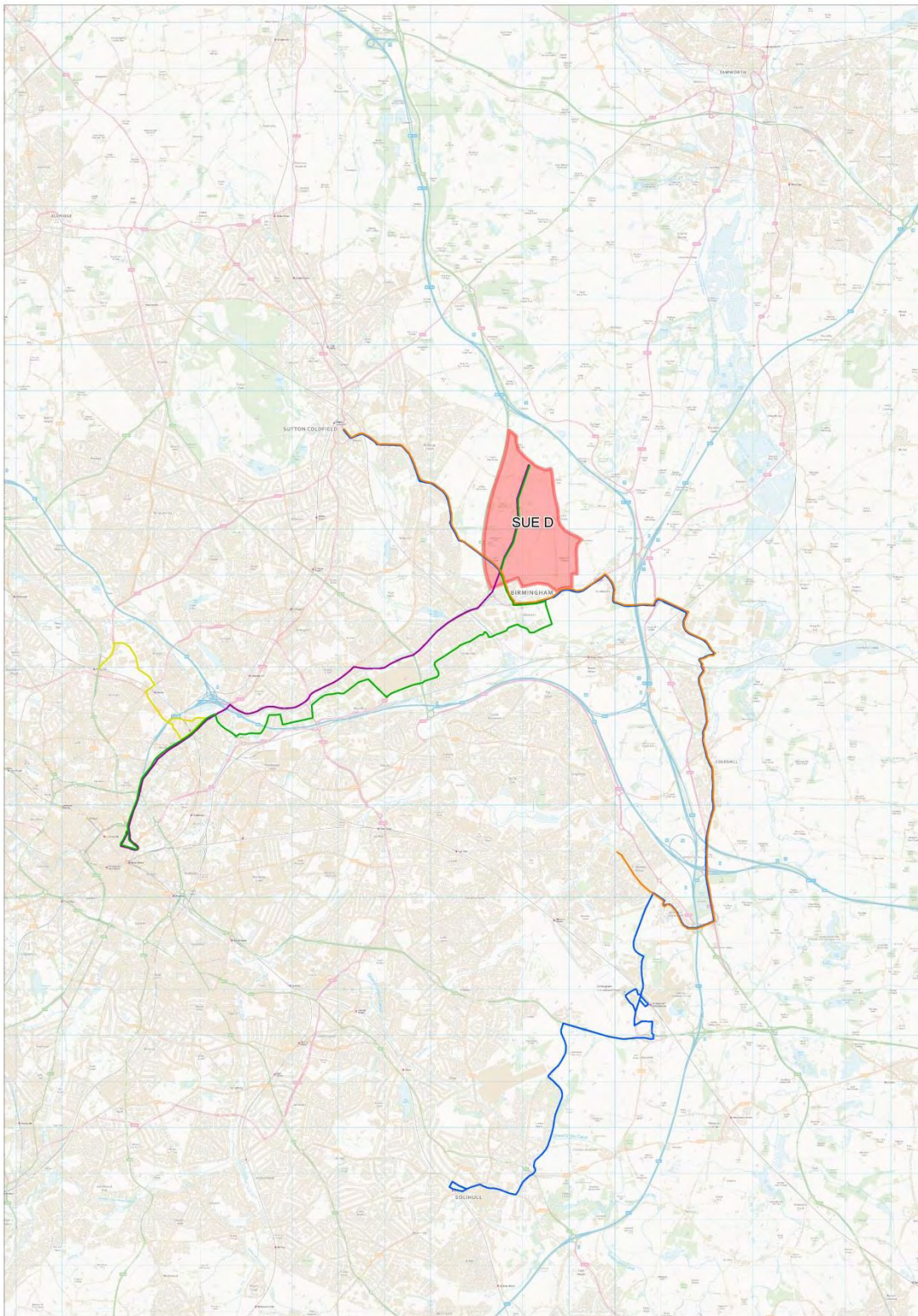




Figure 4-4: New public transport routes Site D





## 4.5 Capturing the relative importance of journey purpose and travel mode

- 4.5.1 It is clear from the assessments above, that the sites have a much stronger requirement for some services than others. The potential Sustainable Urban Extension will generate a higher travel demand for jobs, for instance, than it will for a hospital. It is appropriate therefore that this is taken into account.
- 4.5.2 It is also appropriate, given the policy requirement to create a sustainable development, to give weight to journeys that can be carried out by sustainable modes.
- 4.5.3 The National Trip End Model (NTEM)<sup>7</sup> is a Department for Transport database containing travel information for the entire country, which can be broken down into geographical areas. The current dataset NTEM 6.2 has been interrogated to derive daytime trip purposes for the Birmingham area (main 2013) to provide journey purpose and modal split.

**Table 4-3: TEMPRO (NTEM 6.2) Journey Purpose – Birmingham Urban Area**

Journey Purpose	Journey Proportion
Work	29%
Business	3%
Education	18%
Shopping	18%
Personal Business	6%
Recreation	13%
Visiting	11%
Holiday	2%
<b>Total</b>	<b>100%</b>

<sup>7</sup> [www.gov.uk](http://www.gov.uk) The National Trip End Model (NTEM) forecasts and the Trip End Model Presentation Program (TEMPro) software are used for transport planning purposes. The current version used in this assessment is NTEM 6.2.



**Table 4-4: TEMPRO (NTEM 6.2) Modal split – Birmingham Urban Area**

Journey Purpose	Walk	Cycle	Bus	Rail	Car Pax	Car
Work	11%	3%	14%	5%	13%	55%
Employer's Business	7%	2%	4%	7%	10%	71%
Education	43%	2%	18%	2%	20%	15%
Shopping	33%	1%	11%	1%	21%	32%
Personal Business	33%	1%	10%	1%	21%	39%
Recreation	32%	1%	8%	1%	22%	36%
Visiting	33%	1%	8%	1%	24%	33%
Holiday	1%	1%	7%	3%	48%	8%

4.5.4 This data will be used alongside that in Tables 4.1 and 4.2, to measure the need of people to travel to and from each site, and to assign a weighting to those needs using journey purpose and mode choice.

## 4.6 Summary

4.6.1 There are a number of notable findings from this stage of the assessment, these are:

- A Sustainable Urban Extension would accommodate over 10,000 new economically active people;
- There will be a small residual demand on nearby schools and other facilities;
- The current bus network meets the needs of the existing conurbation but a Sustainable Urban Extension of 10,000 new homes would merit new services connecting the site with key areas of employment, education and retail;
- Less than 30% of daily trips are journeys to work, where around 20% are for education and 20% for shopping;
- Walking is the single most important mode of travel, with 43% of education journey made on foot;
- People in the West Midlands are three times more likely to catch the bus to work than catch the train, and nine times more likely when travelling to school;
- The private car remains the most popular mode of travel to work and for business, although in four out of eight journey purposes the car is not the favoured mode; and
- Cycling currently has only a low mode share and there is considerable scope to increase its use if conditions can be improved.
- Each site is measured against the average mode split of the existing urban area, but the target mode split for the SUE should be more aspirational than this.





#### 4. Assessing off-site travel needs





## 5 Measuring Connectivity

5.1.1 This chapter defines the criteria against which connectivity is measured; describes the destinations that will be modelled; outlines the methodology for using the Accession Model; and presents the output of the accessibility analysis.

### 5.2 Defining Connectivity Criteria

5.2.1 Accessibility is a measure of journey time by mode, where factors such as congestion, public transport service frequency, and route availability are taken into account. Connectivity adds definition to accessibility by defining the limits within which people are prepared to travel.

5.2.2 The connectivity requirements for a Sustainable Urban Extension will be defined using reasonable upper limits of journey times that correspond with the average modal split outlined in Table 4.4.

5.2.3 Journey time is critical in understanding the connectivity of a site, as the longer a journey takes, the less attractive it becomes and the less likely it will be made. In the case of walking and cycling the longer (and less attractive) a journey becomes, the more likely people will choose to travel by motorised mode.

5.2.4 Journey time criteria have been taken from the National Travel Survey (Table NTS0306)<sup>8</sup>, which provides the average trip length by main mode over the last ten years. This is used on the basis that a sustainable urban extension should have at least as good accessibility as the adjacent areas. The table does not break down travel time by journey purpose, so a judgement based manual adjustment will be made.

**Table 5-1: National Travel Survey – Average trip length by main mode, Great Britain 2002-2011 (journey time calculated using an estimated urban average speed)**

Main mode	Trip Length (Miles)	Speed (mph)	Journey Time (mins)
Walk	0.7	3	14
Cycle	2.6	9	17
Bus	4.8	16	18
Rail	8.3	13	38
Car Pax	8.9	25	21
Car Driver	8.6	25	20

<sup>8</sup> [www.gov.uk](http://www.gov.uk) The National Travel Survey is the primary source of data on personal travel patterns in Great Britain, which has collected data since 1988.



## 5.3 Destinations to be modelled

5.3.1 The following destinations have been modelled.

**Table 5-2: Destinations modelled in Accession**

Journey Purpose	Destination detail added
Work	Census Journey to Work trip ends
Employer's Business	Economic Zones
Education	Primary Schools
	Secondary Schools
	Higher Education
Shopping	Food Stores
	Comparison Retail Parks
	Town Centre (Sutton/Birmingham)
Personal Business	Economic Zones
Recreation	Leisure (such as fitness, sports centres, cinemas and bowling)
Visiting	Also included GP & Hospital visits
Holiday	Leisure
-	Railway Stations (including Park & Ride opportunities)
-	Motorway junctions (including A5(T) and M6 Toll)

5.3.2 Employment journey purposes were intentionally been split into two criteria, which are: existing employment areas and potential employment areas.

5.3.3 2001 Census Journey to Work data provides an end point data set on the location and number of all jobs in the West Midlands. This provides an opportunity to assess journeys to work where, for instance, people already in employment may choose to live on the potential SUE site, or indeed a resident of the SUE takes up a new position with an existing employer.

5.3.4 The Economic Zones are assessed as a separate employment criteria, given their profile in the BDP and as areas where new jobs will be created. Other employment sites that are considered areas of high potential for new job creation have been added to the group of Economic Zones. Sites in this category include:

- Advanced Manufacturing Hub – Economic Zone
- The Food Hub – Economic Zone
- City Centre Enterprise Zone – Economic Zone
- Tyseley Environmental Enterprise District – Economic Zone
- Life Sciences Campus – Economic Zone

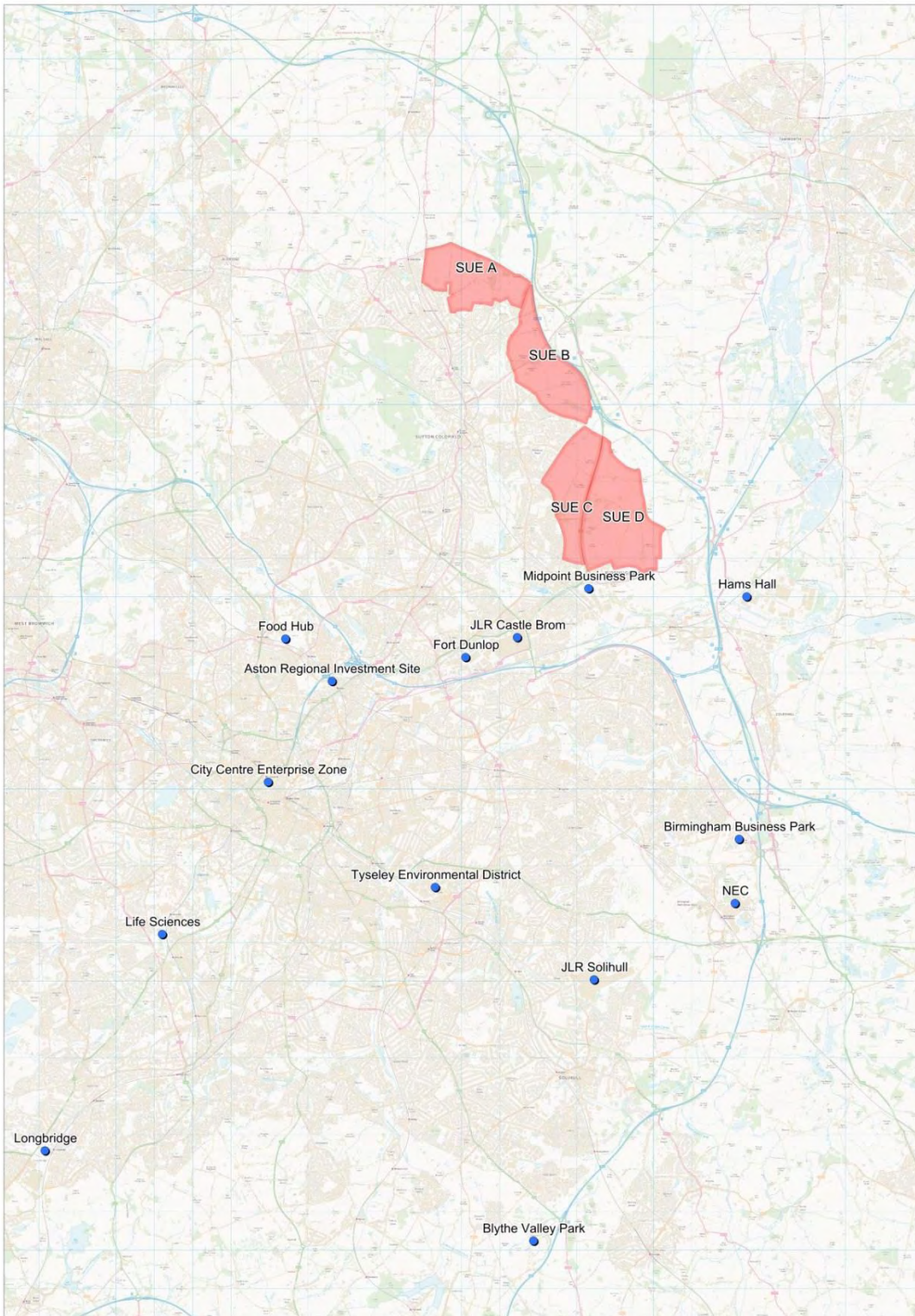


- Longbridge ITEC Park – Economic Zone
- Jaguar, Castle Bromwich – Core Employment Area
- Minworth Business Park – Core Employment Area
- Hams Hall
- Birmingham Business Park
- Land Rover, Lode Lane
- Blythe Valley Business Park

5.3.5 Town Centre locations are also in a separate category to Food Stores and Non-Food Comparison Retail Stores. The importance of Town Centres is highlighted in the BDP, with particular focus on Sutton Coldfield and the City Centre. Other District Centres and District Growth Centres are included in this category, such as Erdington, Walmley, Perry Barr and Meadway.



Figure 5-1: Economic Zones





## 5.4 Accession Modelling

5.4.1 Accession has been used to make two measurements for each potential Sustainable Urban Extension:

- The minimum journey time to each destination required; and,
- The number of destinations within 10, 20, 30, 40, 50 and 60 minute journey times of each potential urban extension by mode.

5.4.2 The full results of the Accession analysis are contained in Appendix A, and a summary of the results are presented in the following tables. It should be noted that journey times are presented for a selected mode of travel, while the full analysis contains data for all modes for every journey purpose and all journey time isochrones.

**Table 5-3: Accession results –journey time to closest facility by mode<sup>9</sup>**

Journey Purpose	Chosen Mode	JT Criteria	A	B	C	D
Employment Area	Public Transport	36	18	12	6	22
Economic Zones	Public Transport	36	30	30	10	20
Hospitals	Car	15	9	5	8	9
GP Surgeries	Walk	12	24	8	25	48
Primary Schools	Walk	12	16	22	18	28
Secondary Schools	Cycle	17	8	8	8	13
Higher Education	Public Transport	24	17	11	15	29
Food Retail	Car	8	3	4	4	6
Non-Food Retail	Car	23	5	1	3	4
Leisure	Public Transport	24	28	19	18	31
Town Centres	Public Transport	36	22	16	12	29
Train Stations	Car	8	5	7	10	11
Motorway Junction	Car	8	4	7	10	11

5.4.3 Accession is a tool that calculates journey time by travel mode, and to do this it has to make a number of over-arching assumptions. These might include limiting the number of interchanges that a public transport journey is assumed to make, or limiting the distance that people are willing to walk to make an interchange.

<sup>9</sup> These journey times are samples extracted from the full output. All modes for each journey purpose were assessed.



## 5. Measuring Connectivity

- 5.4.4 The model also makes assumptions regarding the coordinates at which a journey starts within the site, and the point of access to the transport network. Finally the model uses the data it is given relating to delays and timetables and applies journey time penalties where appropriate.



5.4.5 The results of the analysis are, on the whole, considered to be representative, but any results that do not appear so, have been noted and taken into account when interpreting the model.

Figure 5-2: Accession output - Journey time isochrones by bus from Site A

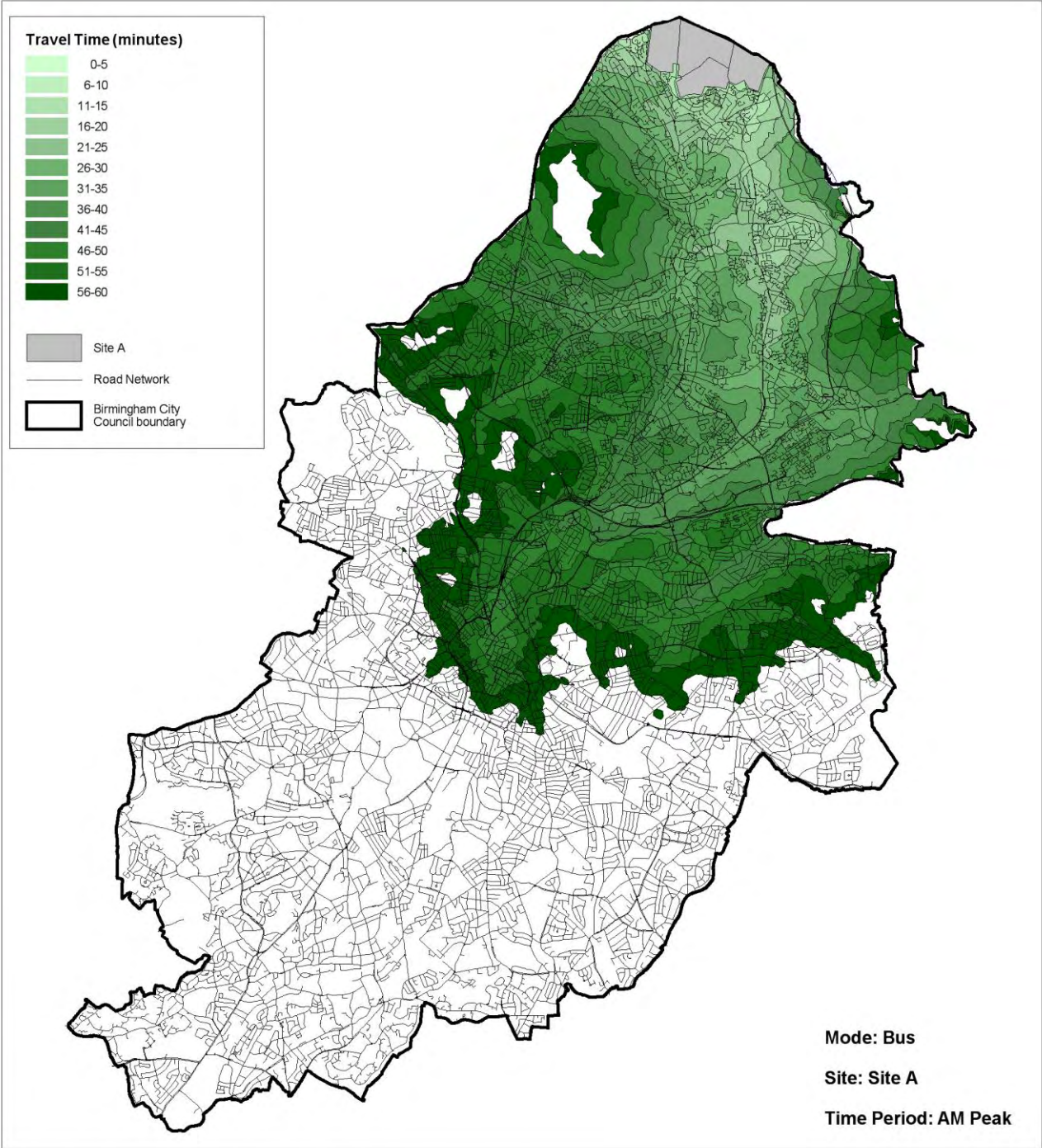




Figure 5-3: Accession output - Journey time isochrones by bus from Site B

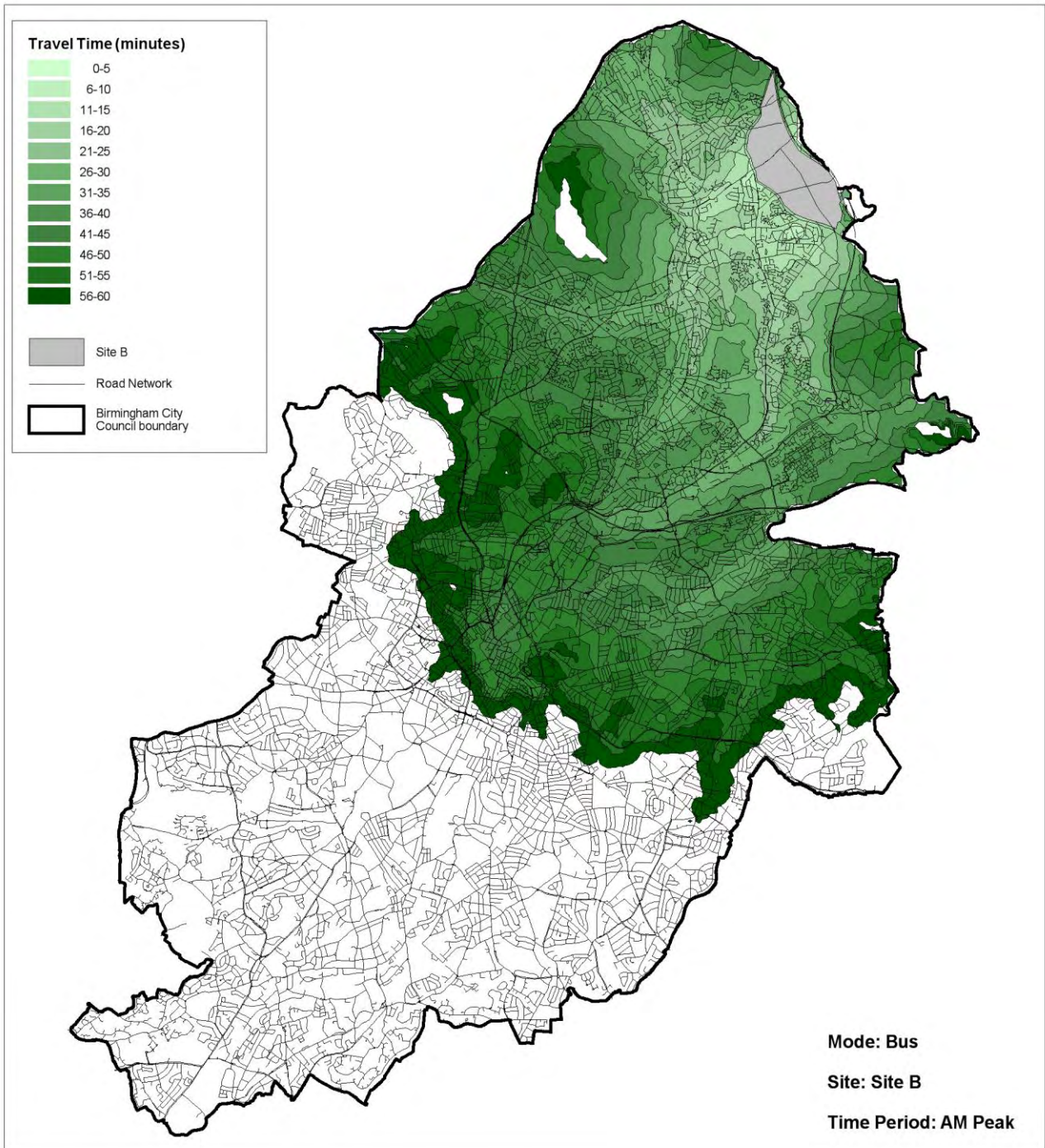






Figure 5-4: Accession output - Journey time isochrones by bus from Site C

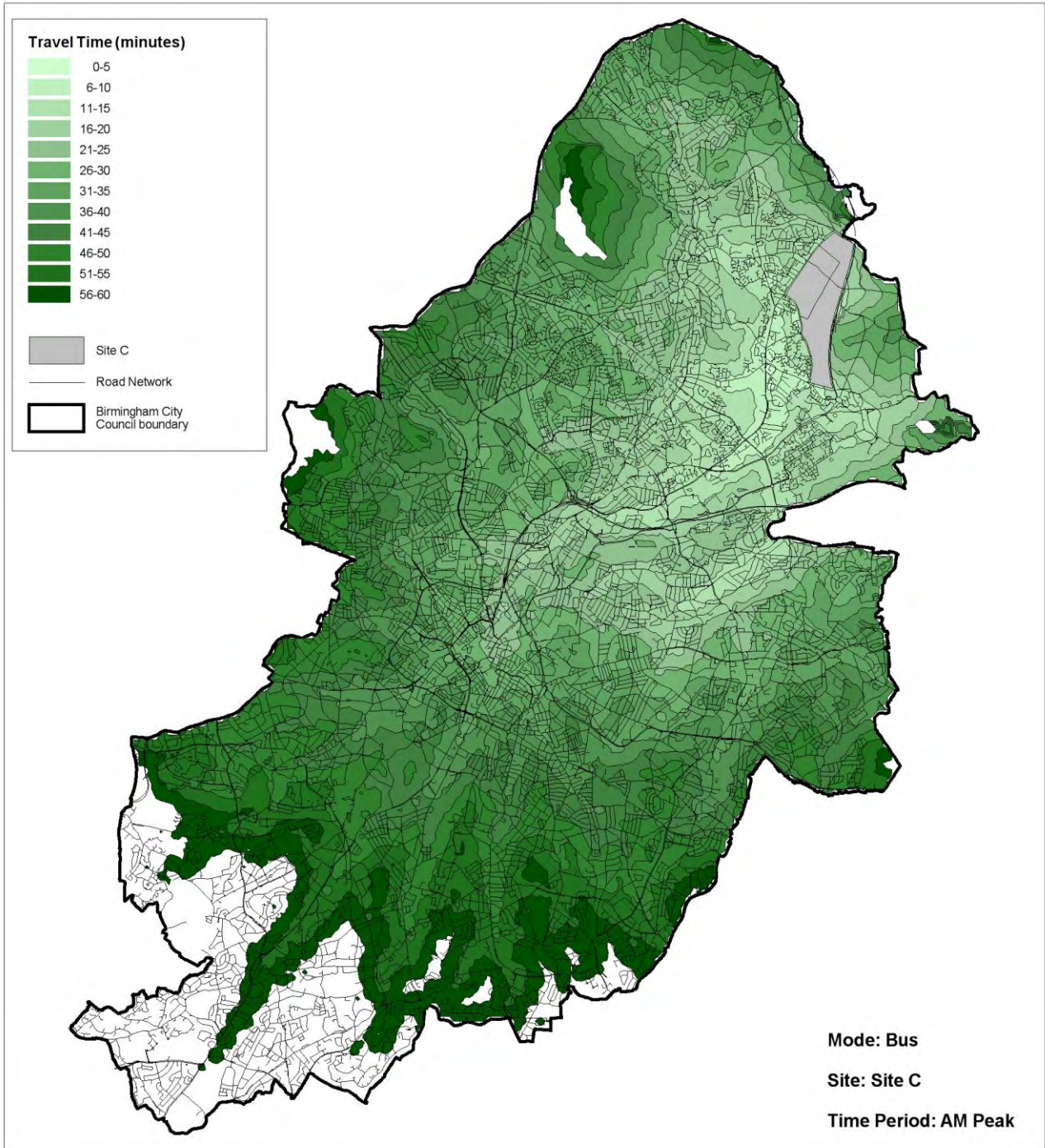




Figure 5-5: Accession output - Journey time isochrones by bus from Site D

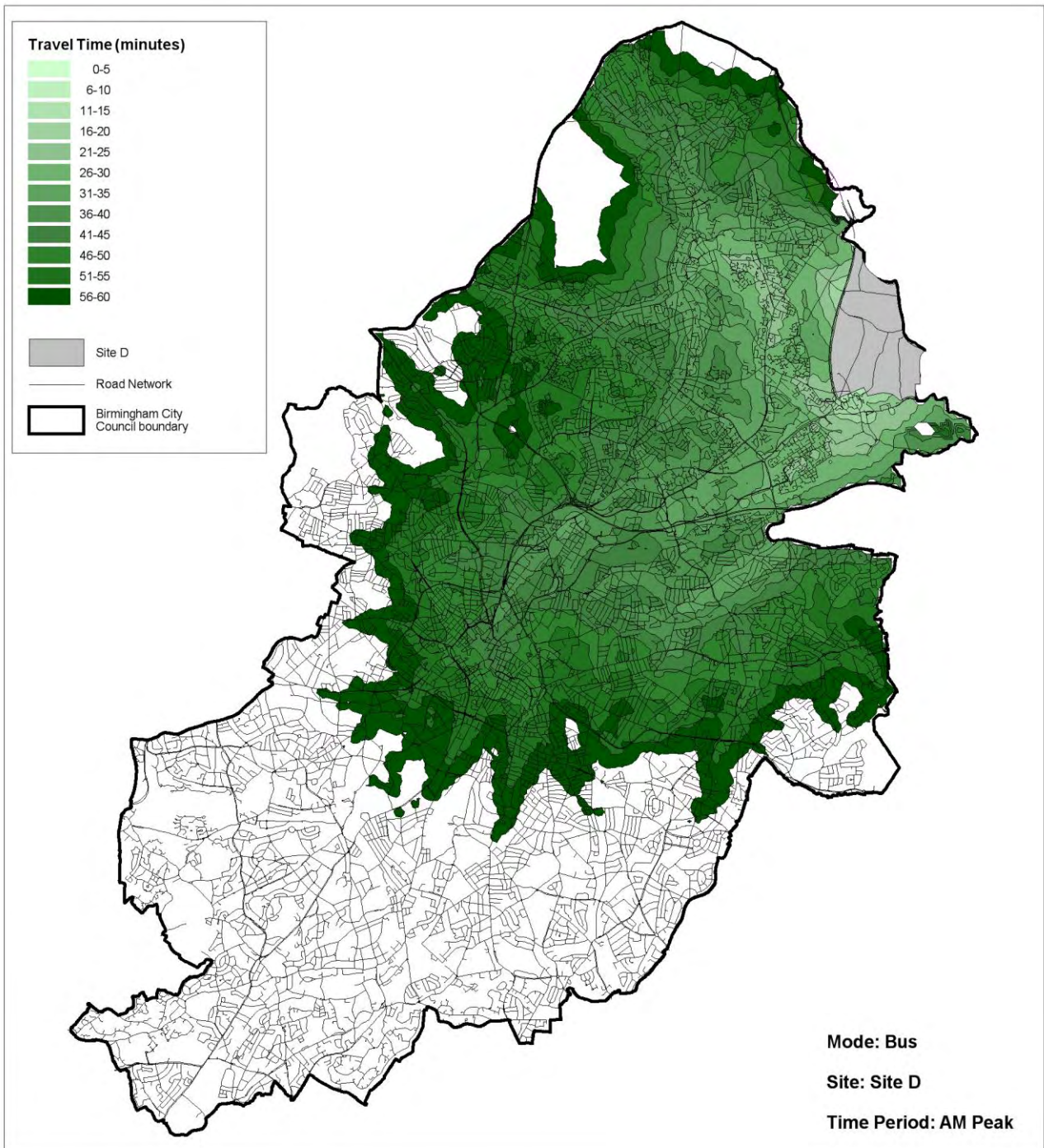




Figure 5-6: Accession output - Journey time isochrones by bicycle from Site A

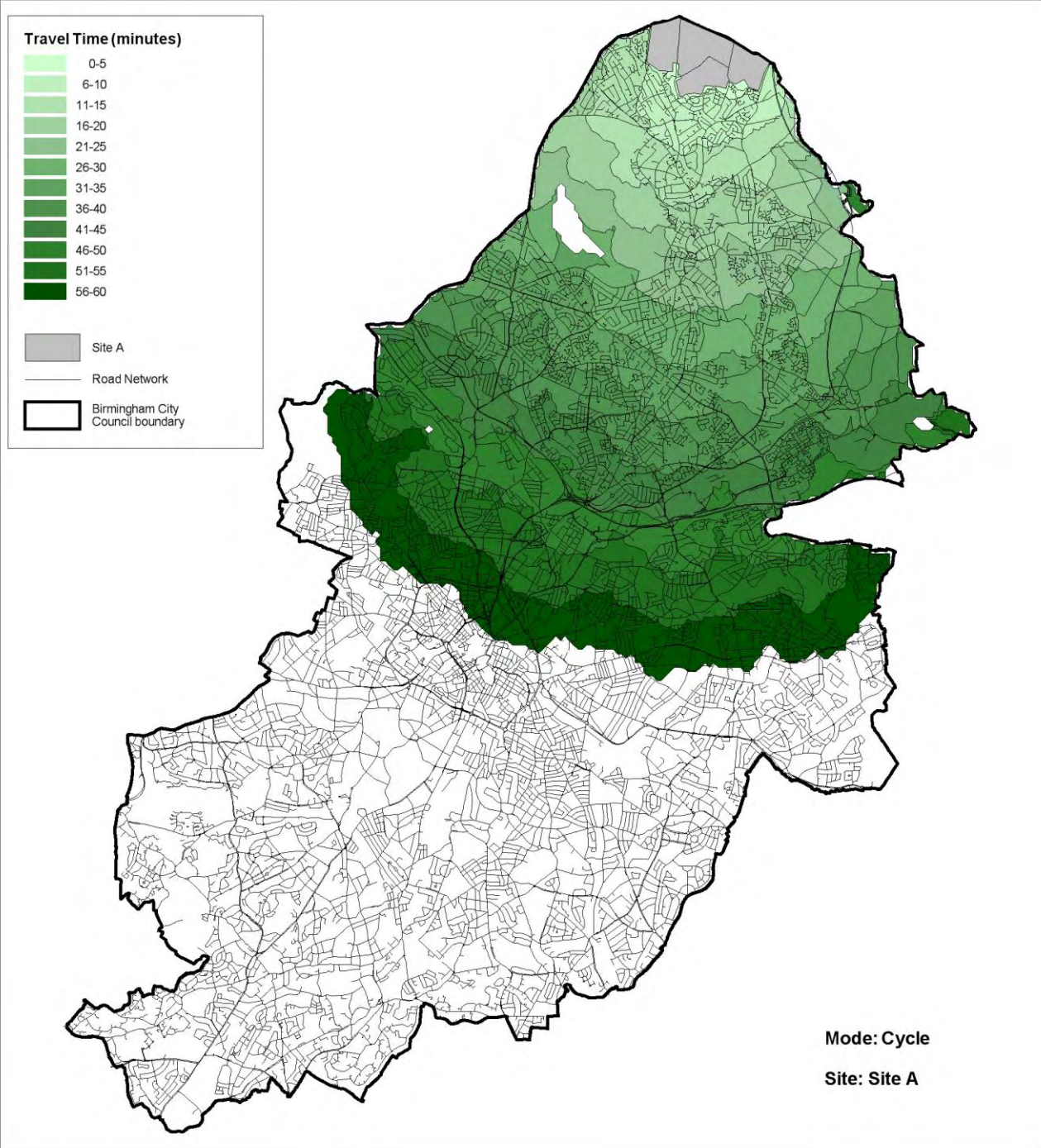




Figure 5-7: Accession output - Journey time isochrones by bicycle from Site B

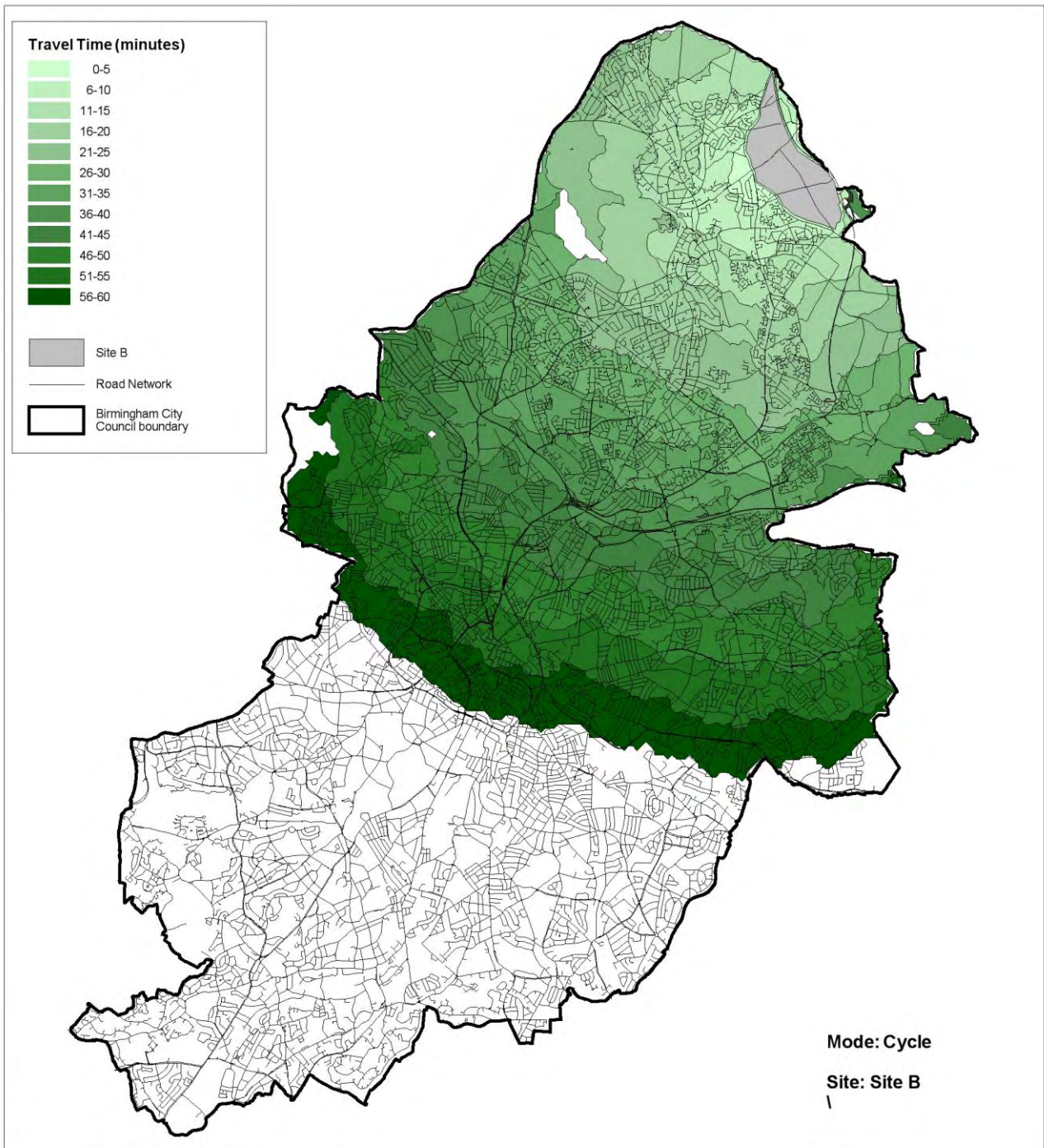




Figure 5-8: Accession output - Journey time isochrones by bicycle from Site C

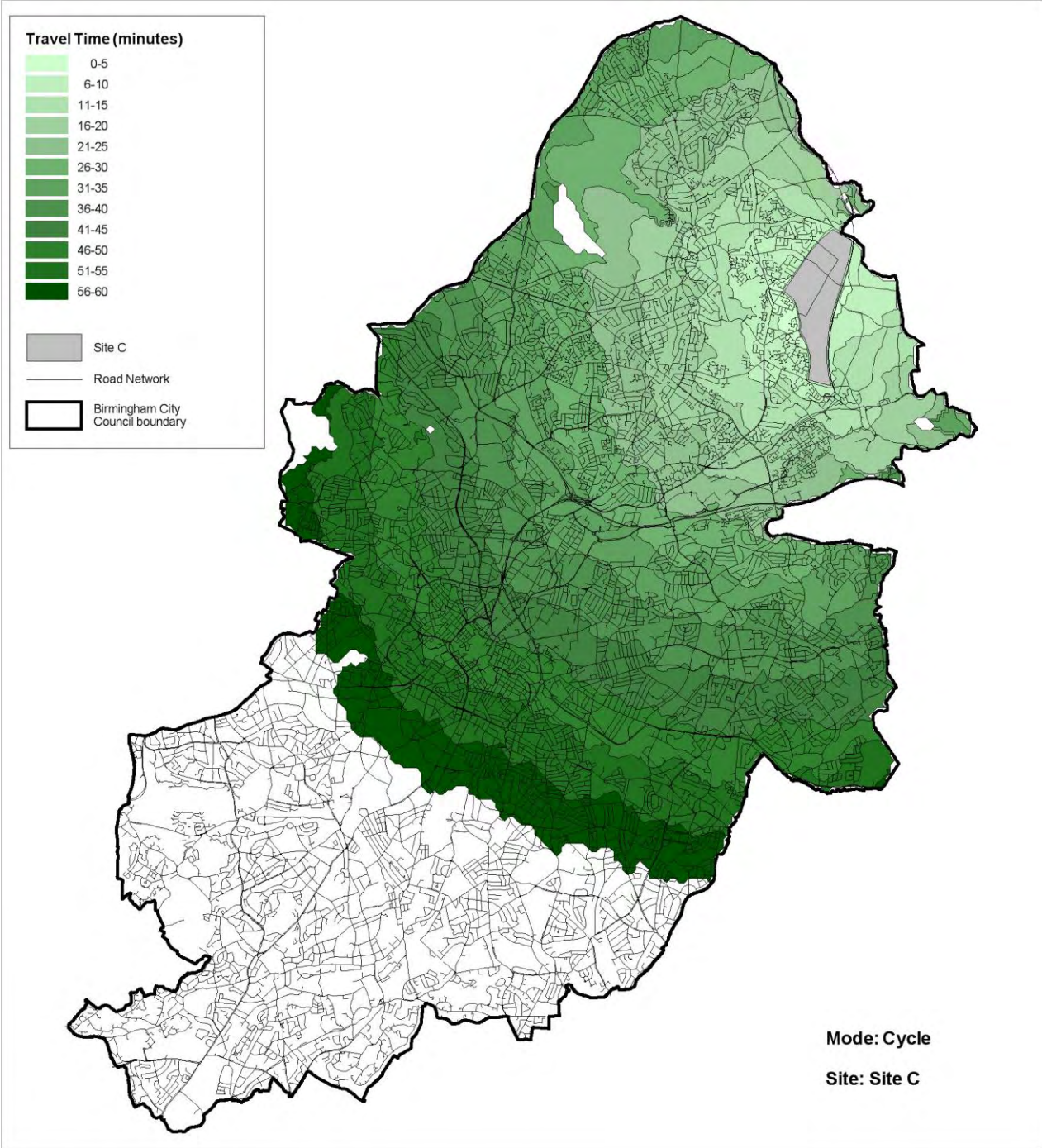
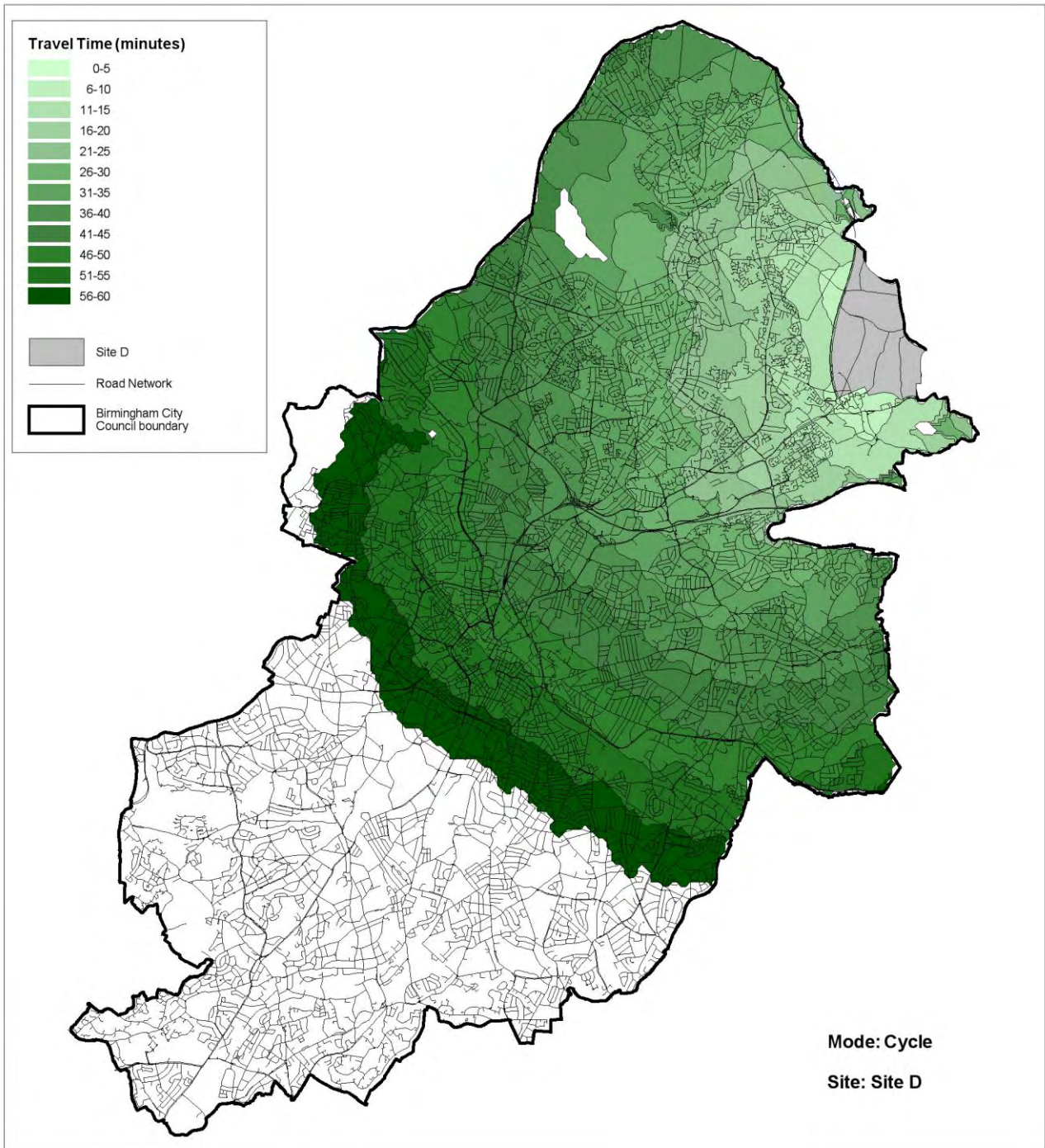




Figure 5-9: Accession output - Journey time isochrones by bicycle from Site D



**Table 5-4: Accession results – Number of facilities within an acceptable journey time**

Journey Purpose	Chosen Mode	JT (mins)	A	B	C	D
Employment trip end	Public Transport	36	43,136	73,704	316,469	63,250
Economic Zones	Public Transport	36	3	4	6	4
Hospitals	Car	15	2	3	3	3
GP Surgeries	Walk	12	0	1	0	0
Primary Schools	Walk	12	1	0	1	0
Secondary Schools	Cycle	17	2	7	7	3
Higher Education	Public Transport	24	6	9	15	3
Food Retail	Car	8	3	6	7	4
Non-Food Retail	Car	23	31	37	45	44
Leisure	Public Transport	24	1	1	5	0
Town Centres	Public Transport	36	5	6	11	5
Train Stations	Car	8	2	2	1	0
Motorway Junction	Car	8	1	1	1	2
Population	Public Transport	36	109,002	196,026	530,524	134,410

## 5.5 Summary

5.5.1 There are a number of notable findings from this stage of assessment, these are:

- The connectivity threshold is for a Sustainable Urban Extension to be accessible to services within a 20 minutes journey by all modes, except for rail, for which the threshold is extended to 40 minutes;
- Accessibility to the Economic Zones is considered to be a key measure, alongside motorway junctions and train stations;
- All of the sites meet the Connectivity criteria shown for access to Economic Zones, Secondary Schools and Food Stores, but none do for Primary Schools;
- It is clear that Site C is more accessible to existing jobs, Economic Zones, education, retail and more population than any of the other sites; and
- There is little to differentiate Sites B and D, whilst Site A is the least accessible.



## 6 Measuring Capacity

- 6.1.1 The transport network provides development with an *opportunity* to gain access to facilities and services that it needs, which was measured in Chapter 5. However no transport network is perfect and there are *constraints* to movement, which also need to be considered.
- 6.1.2 These constraints are different for each mode of travel, and therefore a different approach is required to appraise each element of the network.
- 6.1.3 This Chapter reviews each travel mode and identifies the constraints that each development option will have to face.

### 6.2 Constraints to walking

- 6.2.1 The network of footpaths in north Birmingham is generally of a satisfactory standard. Issues around poorly maintained surfaces and dimly-lit routes can be overcome with targeted investment. However there are issues that are more significant, and perhaps more difficult to mitigate.
- 6.2.2 Each development will create a series of new pedestrian desire lines, which connect to destinations on the shortest path possible. Destinations have been selected for this assessment from Table 5.2, including access to:
- GP surgeries;
  - Primary Schools;
  - Secondary Schools;
  - Train Stations; and
  - Town Centres.
- 6.2.3 Consideration has been given to routes from each development option to selected destinations within a reasonable walk time, and penalties are applied when unavoidable conflicts or severance occurs. These include:
- Narrow footways with limited opportunity for improvement;
  - Footways on high traffic volume highway;
  - Crossings over very large, inhospitable highways;
  - Lack of natural surveillance; and
  - Steep gradients.





6.2.4 A relaxation of the penalties is afforded where alternative, more suitable routes are available.

**Table 6-1: Penalties against walk routes**

Journey Purpose	A	B	C	D
GP Surgeries	0	2	1	2
Primary Schools	0	1	1	1
Secondary Schools	1	1	1	1
Town Centres	1	2	2	2
Train Stations	1	2	3	4

6.2.5 The results of the analysis show that Site D has the most constraints for pedestrians, which is expected given that the site is more remote and located adjacent to an existing employment area. Site A has the least amount of constraints, which is largely down to the residential nature of the adjoining routes.

### 6.3 Constraints to cycling

6.3.1 There is a reasonable network of cycle routes in north Birmingham, which following recent investment offer a more viable alternative to walking and car journeys. Again these can be severed by infrastructure and the environment of routes can be compromised by traffic volume and the lack of dedicated facilities on links and junctions, together with direct alternate routes.

6.3.2 Consideration has been given to routes to destinations within a reasonable cycle journey of each development option. Destinations have been selected for this assessment from Table 5.2, including access to:

- Economic Zones;
- Secondary Schools;
- Higher Education;
- Food Retail;
- Comparison Retail;
- Leisure;
- Town Centres; and
- Train Stations.

6.3.3 'Bikeability' levels have been used to guide the appraisal where:

- Level 1 is the ability to master riding a bike, suitable routes might be off-road only;



## 6. Measuring Capacity

- Level 2 is the ability to ride on road for short journeys; and,
- Level 3 is the ability to deal with a variety of difficult road conditions.

6.3.4 Particular note has been made of conflicts that arise on a cycle journey. Penalties are given where:

- There are no off-road options available;
- There are no quieter on-road routes available;
- There is a requirement to cycle along high traffic volume/high speed corridors; and
- There no opportunities to provide some segregation for cyclists in hostile environments.

**Table 6-2: Penalties against cycle routes**

Journey Purpose	A	B	C	D
Economic Zones	3	3	2	2
Primary Schools	1	2	1	1
Secondary Schools	1	2	1	1
Higher Education	3	2	2	2
Food Retail	2	2	1	1
Comparison Retail	3	2	1	1
Leisure	2	3	1	1
Town Centres	3	3	1	1
Train Stations	3	3	1	1

6.3.5 The results of the analysis show that Sites C and D have the least constraints for cyclists, which is primarily due to their proximity to the off-road Newhall Valley and Birmingham and Fazeley Canal routes.

6.3.6 Site A is severely constrained by the limited number of quieter routes available to travel south.

6.3.7 Site B is constrained by the steep gradients and the narrow railway bridges on the east of Sutton Coldfield town centre.



## 6.4 Constraints to bus use

- 6.4.1 Consideration has been given to whether the capacity of the local bus network should be appraised. However there are two reasons why this has not been done. Firstly the frequency of existing bus services can readily be increased and bus networks are under constant review. Secondly we have proposed new bus services to serve the site, accommodate additional demand and complement the existing network. Therefore we conclude that the capacity of the bus network will not be a deciding factor in the appraisal of the four sites.
- 6.4.2 One key physical constraint is the availability of kerb space at Sutton Coldfield public transport interchange. This is a constraint for many bus routes in north Birmingham, and is likely to affect Sites A and B more than C and D, where buses en-route to the City Centre have to stop in Sutton Coldfield first. However it is known that there are proposals to overhaul these arrangements and improve the connection between the bus interchange and the railway station.
- 6.4.3 A further consideration is that of bus priority infrastructure. The A38 Tyburn Road corridor has the infrastructure to deliver bus priority along the whole route, and this may be worthy of consideration to support new services to Sites C and D. Unfortunately there is little space available on the A5127 Birmingham Road to provide the same level of priority for services to Sites A and B.
- 6.4.4 It is concluded then, that some thought should be given to the opportunities the A38 brings to development on Sites C and D, for purposes of a new high capacity public transport link.

## 6.5 Constraints to rail use

- 6.5.1 Consideration has also been given to the capacity of the railway network and its ability to accommodate growth. It is well known that the Cross City Line is at capacity during peak periods along its length to Birmingham. The proximity of each site to the railway line, which is measured in the previous chapter, is clearly important but the performance of the Cross City Line is perhaps less relevant when finding a differentiator between the four sites.
- 6.5.2 The performance of rail based Park & Ride sites have also been considered as a potential differentiator, again the proximity benefits have been measured in the previous chapter. It is known that all of the existing facilities are oversubscribed, and we have not been able to assess at this stage which P&R site might have a better chance of improvement for the benefit of the potential development options, compared to any of the others. Certainly, like the highway network, investment can be made in infrastructure where it is needed.
- 6.5.3 Centro were consulted on the potential provision for new or enhanced railway stations. The following options were discussed:



## 6. Measuring Capacity

- A new park and ride site at Blake Street – Potential benefits for Sites A and B. For the purposes of this assessment the proposal is disregarded given the high costs of construction, lack of available space, and limited trains serving the station (However the feasibility of this should seriously be considered in the context of a large SUE, particularly if Site A were to come forward for development);
- A new turn back facility north of Blake Street to increase the number of trains – Potential benefits for Sites A and B. This proposal may lend weight to a new park and ride facility, but the capital costs could be prohibitive. Furthermore this would require a full review of the amount of rolling stock needed to fulfil the timetable, which would also be cost prohibitive (Again, this should be considered as part of an infrastructure strategy for Site A);
- Increasing the capacity of Four Oaks Park and ride – Potential benefits for Sites A and B. This option has been considered by Centro, but the major constraint on this site is the poor vehicular access, and potential difficulties in getting a planning permission (This proposal is not included within appraisal, but it is recommended that the proposal is retained as part of the strategy for the route corridor);
- Improvements to the Tamworth line – Potential benefits to all sites. This could bring about a shift of passenger demand from the Cross City Line, and a reduction in congestion on the local network. However Tamworth Station is not within a nNetwork travel zone, which adds to travel costs and reduces the attractiveness for travel to Birmingham. The car park works on an expensive pay and display system, whereas Centro park and ride sites are currently free. Finally Network Rail improvements that were set to offer frequency and time benefits have met a technical obstacle and have been removed from the Network Rail Control Period (The Network Rail list of upcoming projects); (This is an opportunity to reduce highway congestion in Sutton Coldfield and to relieve pressure on the Cross City Line. It is recommended that this is considered as part of the infrastructure strategy for the SUE and for the rail network as a whole); and,
- New stations on the Sutton Park freight line – The value for money case will need to be demonstrated for this scheme, as the potential benefits to Sites C and D are clearly apparent. There are also wider benefits for the local economy and local residents that need to be fully assessed.

6.5.4 It is clear that new rail infrastructure could offer significant benefits to the development options and the existing population. However heavy rail infrastructure is very expensive to deliver and an SUE should not be predicated on the delivery of such schemes at the expense of an alternative transport strategy. Therefore it is concluded that although these scheme will not be taken into account in this assessment, further consideration should be given to their feasibility.



## 6.6 Highway Constraints

- 6.6.1 In January 2013, Birmingham City Council commissioned AECOM to produce an assessment of the vehicular impact of the Birmingham Development Plan options. The DIAMOND WM model was used, this was developed for the Highways Agency and local authorities to assess the impact of development trips on the road network.
- 6.6.2 The DIAMOND Model is a strategic tool, which considers demand and impact on links, but not junctions. It does not measure the capacity of junctions, nor the ability to accommodate turning movements or queuing traffic. The West Midlands PRISM Model will be used for this purpose, which can provide a more detailed, multi-modal analysis of refined development options, after this study is complete.
- 6.6.3 Notwithstanding this, the DIAMOND model has been used alongside observations, TrafficMaster data and local knowledge to appraise the constraints that the local highway network will present for each development option.
- 6.6.4 The junctions that are considered critical within the north Birmingham area have been appraised, these are junctions that are known to operate at or close to capacity:
- A5127 Lichfield Road with Mere Green Road; Four Oaks Station; Tamworth Road; Sutton Coldfield ring road;
  - A5127 Birmingham Road with Jockey Road; Chester Road; Six Way Erdington; Kingsbury Road; Gravelly Hill – *It is acknowledged that there are Highway Improvement Lines on Birmingham Road in the vicinity of Gravelly Hill. This has a potential benefit for all sites, and particularly for Sites A and B;*
  - Whitehouse Common Road with Tamworth Road; Rectory Road; (Hollyfield Road) Rectory Road; Berryfields Road;
  - Somerville Road with Monmouth Drive; Stonehouse Road;
  - Chester Road with Boldmere Road; Birmingham Road; A38; Heartland Spine Road – *There has been a bid to Government for funds through the LTP for a significant scheme improving Chester Road between the A38 and M6, which will have benefits for all sites, but particularly Sites C and D;*
  - A38 junctions at Bassetts Pole; Minworth; Chester Road; Bromford (including the junction with Heartlands Spine Road);
  - Routes on the northern and western periphery of Sutton Park, Particularly at Chester Road and Thornhill Road; and,
  - Trunk Road junctions with A38; A5; M6; M6 Toll and M42.



## 6. Measuring Capacity

6.6.5 For the purposes of this exercise journey purposes that generate longer trips have been assessed, although it is assumed that all journey purposes have been considered in the DIAMOND model. Destinations have been selected for this assessment from Table 5.2, including access to:

- Economic Zones (whilst journeys to all work destinations are important, for the purposes of this high level assessment, the Economic Zones are thought to be representative of the key employment destinations in the City. Refer to Section 2.3);
- Hospitals;
- Comparison Retail;
- Leisure;
- Town Centres (Sutton Coldfield and Birmingham); and
- Train Stations.

6.6.6 The following table shows the number of critical junctions, in Birmingham, that each journey purpose will effect on from each site (including junctions on the Trunk Road Network).

**Table 6-3: The number of critical junctions affected by each site**

Journey Purpose	A	B	C	D
Economic Zones (Employment)	11	11	5	1
Hospital	4	2	3	3
Comparison Retail	4	4	3	0
Leisure	4	4	3	0
Town Centres (Sutton and City)	12	11	6	3
Train Stations	1	3	4	5

6.6.7 It is important to note that no weighting is given to the type, size or capacity of a junction. This impartiality is important for a number of reasons, but primarily because we know that most routes in Birmingham are approaching capacity in the peak hours, regardless of their ability to cater for additional traffic or not. This table simply gives an indication of how many junctions will become a problem for each potential SUE development. However it will not identify how significant each problem could be, as this is subject to further detailed modelling using PRISM.

6.6.8 Site A has the potential to impact on the A5127 Birmingham Road and Whitehouse Common corridors, where there are a significant number of critical junctions. This could be a concern for neighbouring authorities and the Highways Agency, where the Trunk Road Network and rural roads could become a realistic alternative routing option.



- 6.6.9 Generally sites A and B are more constrained by the local highway network than Sites C and D. Sites C and D will impact on fewer junctions. However some of these are significant junctions on the A38 and Heartlands Spine Road.
- 6.6.10 The assessment takes a balanced view and has identified that the overall difference between the sites is marginal. It is accepted that the issues and opportunities in each area are different, but there is no site that clearly stands out as a candidate for exclusion. Once the development options have been refined, it is recommended that a more detailed modelling exercise is undertaken to establish the vehicular impact on the local and strategic road networks.



## 7 Options Appraisal

7.1.1 Having completed the Connectivity and Capacity Analyses, the next step is to bring all the information and analysis together, using a common scoring metric to appraise each site.

### 7.2 Approach

7.2.1 The Location Option Assessment Framework brings together the Accession analysis, TrafficMaster data, DIAMOND models, walk and cycle route appraisals, new bus networks, and highway constraint analysis and scores them using a common metric. The scores are for Connectivity and Capacity.

- Connectivity Score 0-5 where 0 is no connectivity and 5 is excellent connectivity;
- Capacity Score 0-5 where 0 is no capacity and 5 is sufficient capacity.

7.2.2 The Accession output from Chapter 5 is used twice for the Connectivity score, as follows:

- The journey time to the nearest facilities has been measured. If a destination can be reached within a reasonable journey time the development scores 5, and this score diminishes as the journey time increases; and,
- The number of facilities that can be accessed within a set journey time has been measured. The sites are scored against each other. If a site can access around the same number of facilities as the highest scoring site, it scores 5, and this score diminishes as the number of facilities reduce.

7.2.3 The constraint assessments contained in Chapter 6 are scored to appraise Capacity. The scores are calculated for each mode as follows:

- The Walkability of a site assumes a baseline of no constraints, and up to five penalties can be applied. No constraints will score 5, and each penalty point will reduce this figure.
- The Bikeability of a site assumes a baseline of no constraints, and up to five penalties can be applied. No constraints will score 5, and each penalty point will reduce this figure.
- The number of highway constraints that each development is subject to is scored. Where, for instance, less than 2 junctions are affected, the score is 5. Where up to 4 junctions are affected the score is 4 and so on.





## 7.3 Connectivity Scores

7.3.1 Table 5.1 outlined the average trip length by main mode, according to the National Travel Survey. This has been used to inform a standard against which the Accession analysis can be appraised, on the basis that a sustainable urban extension might have better accessibility than the average.

**Table 7-1: Journey Time Criteria by mode for each destination**

Journey Purpose	Walk	Cycle	PT	Car Dri/Pax
Employment trip end	22	21	36	23
Economic Zones	22	21	36	23
Hospitals	12	17	24	15
GP Surgeries	12	17	12	8
Primary School	12	17	12	8
Secondary School	22	21	12	8
Higher Education	22	21	24	23
Food Retail	12	17	12	8
Comparison Retail	22	21	36	23
Leisure	12	17	24	15
Town Centres	22	21	36	23
Train Stations	22	21	12	8
Motorway Junction	12	17	12	8
Employment trip origin (population)	22	21	36	30

7.3.2 These journey times are used to define the reasonable time within which facilities can be accessed as outlined in Section 7.2.

**Table 7-2: Score of the minimum journey time to the nearest facility**

Journey Purpose	Mode Selected	Site A	Site B	Site C	Site D
Employment Area	Public Transport	5	5	5	5
Economic Zone	Public Transport	5	5	5	5
Hospitals	Car	5	5	5	5
GP Surgeries	Walk	0	5	0	0
Primary Schools	Walk	2	0	0	0
Secondary Schools	Cycle	5	5	5	5
Higher Education	Public Transport	5	5	5	2
Food Retail	Car	5	5	5	5
Non-Food Retail	Car	5	5	5	5
Leisure	Public Transport	3	5	5	1
Town Centres	Public Transport	5	5	5	5
Train Stations	Car	5	5	1	0
Motorway Junction	Car	5	5	5	5
20,000 population	Cycle	4	5	4	4

7.3.3 Using this measure it can be seen that for most journey purposes there is little to separate the sites. Table 7.3 scores the Accession measurement of the number of facilities accessed within a set journey time.

**Table 7-3: Score of the number of facilities accessed within a reasonable journey time (Measured against best performing site for each purpose)**

Journey Purpose	Mode Selected	Site A	Site B	Site C	Site D
Employment trip end	Public Transport	0	0	5	5
Economic Zones	Public Transport	0	2	5	3
Hospitals	Car	2	5	1	1
GP Surgeries	Walk	0	5	0	0
Primary Schools	Walk	5	0	0	0
Secondary Schools	Cycle	0	5	5	1
Higher Education	Public Transport	0	1	5	1
Food Retail	Car	0	4	5	3
Non-Food Retail	Car	2	4	5	5
Leisure	Public Transport	0	0	5	0
Town Centres	Public Transport	0	1	5	5
Train Stations	Car	5	0	0	0
Motorway Junction	Car	0	0	5	5
Population	Cycle	0	3	5	2



- 7.3.4 The Journey purpose scores for each site are added together and the scoring is marked as a percentage, where 100% is attained if each journey purpose scores 5.
- 7.3.5 The scoring for a Residential Sustainable Urban Extension will not include the Population journey purpose scores, whereas the following journey purposes have been selected to score the Employment option:
- Economic Zones;
  - Train Stations;
  - Motorway Junctions;
  - Employment Output Areas; and
  - Population.
- 7.3.6 Two scores are collected for each site, which are the 'Accessibility Score' that is the overall scoring of accessibility by all modes; and the 'Sustainability Score', which is the scoring of accessibility only by walk, cycle and public transport. A score is given for each site in turn as an employment site and then as a residential site.

**Table 7-4: Un-weighted Connectivity Score - Residential SUE**

Journey Purpose	Site A	Site B	Site C	Site D
Accessibility Score	45%	61%	68%	50%
Sustainability Score	34%	52%	64%	34%

- 7.3.7 The residential Connectivity Analysis shows that Site C has the best sustainable credentials of those sites identified in the Birmingham Development Plan.
- 7.3.8 The same analysis has been carried out with an 'importance weighting' that inflates the score according to the relative 12 hour travel demand and journey purpose. For instance, journey purposes such as Leisure will naturally score lower than say employment or retail.

**Table 7-5: Weighted Connectivity Score - Residential SUE**

Journey Purpose	Site A	Site B	Site C	Site D
Accessibility Score	45%	53%	67%	52%
Sustainability Score	25%	37%	58%	35%

- 7.3.9 The weighted residential Connectivity Analysis again shows that Site C has the best sustainable credentials of those sites identified in the Birmingham Development Plan.

**Table 7-6: Un-weighted Connectivity Score – Employment Site**

Journey Purpose	Site A	Site B	Site C	Site D
Accessibility Score	55%	68%	80%	62%
Sustainability Score	32%	38%	76%	33%

7.3.10 The employment Connectivity Analysis shows that Site C has the best sustainable credentials of those sites identified in the Birmingham Development Plan. There is little to choose between sites A, B and D.

7.3.11 The same analysis has been carried out with an ‘importance weighting’ that inflates the score according to the relative 12 hour travel demand and journey purpose.

**Table 7-7: Weighted Connectivity Score – Employment Site**

Journey Purpose	Site A	Site B	Site C	Site D
Accessibility Score	57%	70%	75%	71%
Sustainability Score	26%	26%	26%	18%

7.3.12 For the weighted employment Connectivity Analysis sites C and D perform better than Sites A and B. It is also noted that Site D clearly has better access to the Strategic Road Network, which will be a key consideration for potential employers.

7.3.13 This assessment has considered each site as independent developments, but not considered a mix of options. It is worth noting then, that if the employment site was delivered on an adjacent site to the residential development, say on C or D, then it is likely these sites would score higher in ‘connectivity’ terms.

## 7.4 Capacity scores

7.4.1 The capacity of the transport network has been appraised on the basic assumption that it has the potential to fully serve each site (score 5). However where the network in the locality of each site is seen to have defects or issues of congestion or delay, penalties have been applied.

7.4.2 Table 6.1 presented the penalties for each of the walk routes to each site.

**Table 7-8: Walkability Scores - Residential SUE**

Journey Purpose	A	B	C	D
GP Surgery	4	2	3	2
Primary School	4	3	3	3
Secondary School	3	3	3	3
Town/Neighbourhood Centre	3	2	2	2
Train Stations	4	2	1	0
Overall Score	4	3	3	2

**Table 7-9: Walkability Scores - Employment Site**

Journey Purpose	A	B	C	D
Train Stations	4	2	1	0
Population	3	4	3	2
Overall Score	4	3	2	1

**Table 7-10: Bikeability scores - Residential SUE**

Journey Purpose	A	B	C	D
Economic Zones	2	2	3	3
Primary Schools	4	3	4	4
Secondary Schools	4	3	4	4
Higher Education	2	2	3	3
Food Retail	3	3	4	4
Comparison Retail	3	3	4	4
Leisure	3	3	4	4
Town Centres	3	3	4	4
Train Stations	3	2	4	4
Overall Score	3	3	4	4

**Table 7-11: Bikeability scores - EmploymentSite**

Journey Purpose	A	B	C	D
Train Stations	2	2	4	4
Population	3	3	4	4
Overall Score	3	3	4	4

**Table 7-12: Highway constraint scores - Residential SUE**

Journey Purpose	A	B	C	D
Economic Zones	0	1	3	3
Hospital	3	4	4	4
Comparison Retail	3	3	4	4
Leisure	3	3	4	4
Town Centres	0	1	2	4
Train Stations	5	4	3	3
Overall Score	3	3	4	4

**Table 7-13: Highway constraint scores - Employment Site**

Journey Purpose	A	B	C	D
Economic Zone	0	0	2	3
Train Station	4	3	4	4
Employment Areas	2	1	1	2
Residential Areas	0	0	1	1
Overall Score	1	1	2	3

7.4.3 The scores for walkability, bikeability and highway constraint are brought together, un-weighted, to derive a total Capacity Score

**Table 7-14: Overall Capacity Score**

Primary land use	A	B	C	D
Residential SUE	3 (58%)	3 (52%)	4 (63%)	4 (63%)
50Ha Employment Site	3 (50%)	2 (43%)	3 (53%)	3 (50%)

7.4.4 In capacity terms it is clear that all of the sites are served by a constrained transport network, which requires considerable improvement, regardless of which site is chosen. At first glance the difference between the sites is marginal, but Site C is clearly the most favourable for residential development and Site C or D is preferable for employment uses).

## 7.5 Location Option Assessment Output and Summary

The output of the Location Option Assessment Framework is expressed in the following graphs, which show:

- Site C is clearly more accessible and more sustainable than the other sites;
- Whilst sites A, B and D may not be preferred in accessibility terms, it is possible that some development could come forward in these areas.



Figure 7-1: Location Option Assessment - Residential SUE (Weighted for Sustainability)

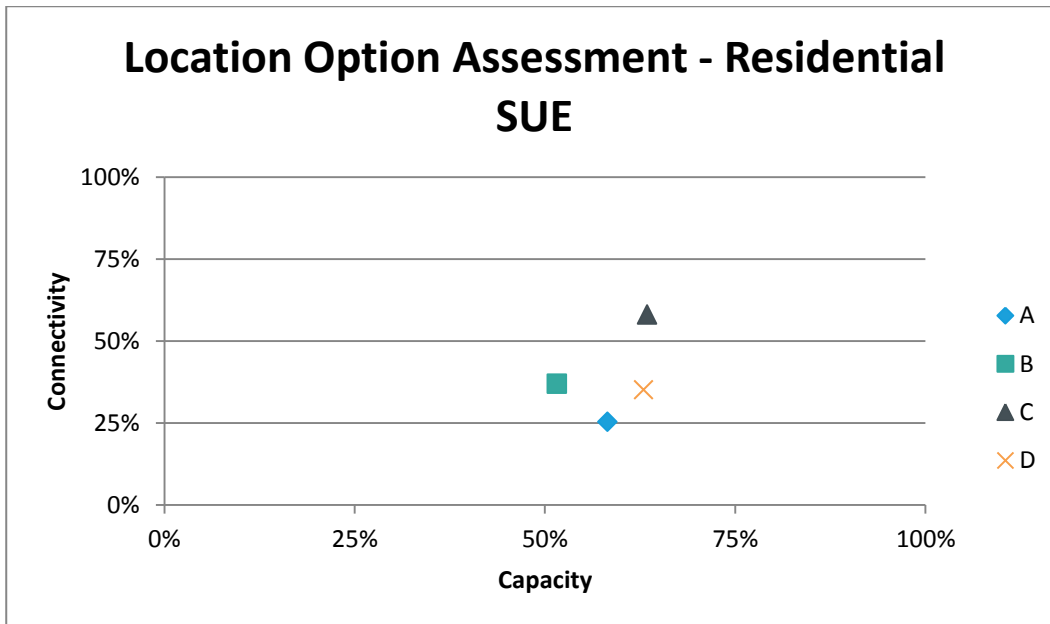
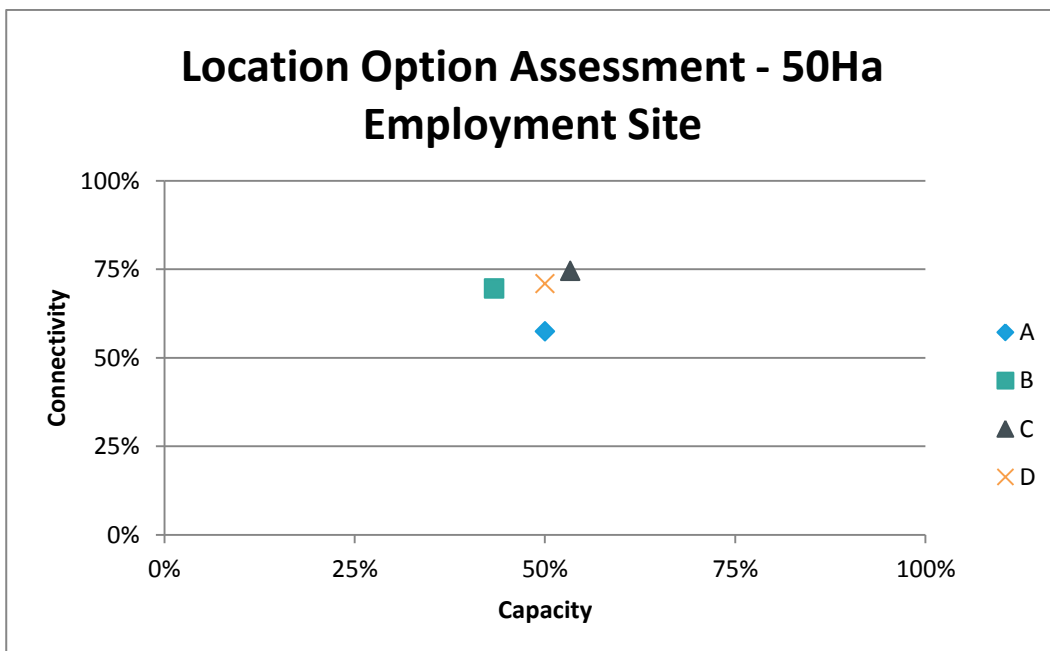


Figure 7-2: Location Option Assessment - Employment development (Weighted for Accessibility)





## 8 Conclusion

### 8.1 Chapter summary

- 8.1.1 The Birmingham Development Plan Options Consultation (October 2012) identifies a need to plan for circa 80,000 new homes, and accommodate the need for new employment-generating activity. There is insufficient brownfield land available to meet this need, so Birmingham City Council is considering using Green Belt land to the north east of the urban area:
- a Hill Wood, East of Watford Gap.
  - b West of the M6 Toll.
  - c West of Sutton Coldfield Bypass, Walmley.
  - d East of Sutton Coldfield Bypass, Walmley.
- 8.1.2 This study has considered which of these sites is most appropriate for providing a new *sustainable urban extension* of up to 10,000 new homes, or an employment development of 50 Hectares.
- 8.1.3 A location option assessment framework has been used to assess the Capacity and Connectivity of the four sites, using various sources of evidence such as modelling data, surveys, Census and route audits.
- 8.1.4 To ensure that a realistic assessment has been undertaken, further consideration has been given to the composition of the site, particularly with reference to complimentary land uses might be included such as shops, fitness centres and schools. It has been demonstrated that as a sustainable urban extension, the sites have the potential to become, to a certain degree, self-sustaining.
- 8.1.5 It was found that between 20,000 and 30,000 people could be accommodated, of which 10,000 would be economically active. The residential and employment sites could create over 9000 new jobs.
- 8.1.6 The sites would be of a scale that would require schools be provided on site, thus limiting the impact on existing schools. This also reduces the number of people having to travel off site in the busy morning peak hour.
- 8.1.7 Census data shows that 43% of school trips will be made on foot; but cycling retains a very low mode share. The aspiration would be for future development to achieve improved mode shares in terms of reducing reliance on car travel.





- 8.1.8 The Connectivity Analysis indicates that Site C is more accessible to existing jobs, Economic Zones, education, retail and other residential areas, than any of the other sites. Site A is the least accessible.
- 8.1.9 The Capacity Analysis revealed that Site D is the least accessible on foot, and Site A has the least severance to local facilities. Sites C and D would be easier to access by bicycle than A or B. Sites A and B are more constrained by the local highway network than Sites C and D.
- 8.1.10 The highest connectivity score given in the Location Option Appraisal Framework for a residential development is Site C. The highest connectivity score for an employment development is Site C.
- 8.1.11 The highest capacity scores are for C and D, but the results do not indicate any overriding transport capacity reasons to exclude any of the sites at this stage.

## 8.2 Development Opportunity

- 8.2.1 A sustainable urban extension is by definition, growth to an urban area that can contribute to creating more sustainable patterns of development, with well-planned infrastructure including access to a range of facilities. It is acknowledged that whilst limiting the need to travel is a primary objective, a requirement for social interaction, jobs, higher education, specialist health care means that travel *is* necessary. However there are many journeys that people wouldn't need to make if development was well planned. This is the 'golden thread' that runs through the National Planning Policy Framework, which provides the basis for the preparation of the Birmingham Development Plan.
- 8.2.2 Any proposed development therefore has to meet the objectives of NPPF, before a location is decided upon and a supporting infrastructure strategy developed. This was considered in Chapter 3, for the purposes of assessment. However, it is recommended that further consideration be given to what the scale of the development is, and the proposed mix of uses. This could have a positive effect on external trip generation of the development, and will play a part in the reducing its impact on neighbouring areas.
- 8.2.3 The Green Belt locations identified each have constraints, and with development each would have an impact on neighbouring rural and urban areas. However there is opportunity, to varying degrees, for development at any of these locations:
- Site A is the least well connected. It is the furthest site away from the main employment areas within Birmingham, and it would be subject to the longest bus journeys, thus car travel may be more attractive. It is perhaps more accessible to Lichfield than it is to Birmingham City Centre. There may be opportunities for modest development in the vicinity of key transport nodes such as Butlers Lane, Blake Street or Mere Green, particularly for Site A1. Site A2, however is not well connected, and is clearly less accessible than Site A1.



## 8. Conclusion

- Site B is reasonably well connected, although being remote from the Cross City Line, with good access to the A38, the propensity for people to travel by car is high. Sutton Coldfield is a key destination point for Sites A and B, and the routes into the Town Centre from the east are very congested in the peak hours, as well as at the weekend. As an employment site, it would rely quite heavily on the A446 link between Bassetts Pole and the M42 J9. This route is heavily congested, and has a poor safety record. Modest development may be possible if the A446 can be improved; a high quality and high capacity public transport corridor into Sutton Coldfield could be established; and, a direct high quality connection to the Newhall Valley cycle route be provided.
- Site C, the Land West of Sutton Coldfield Bypass, clearly presents the best option for either residential or employment development. It is the closest to Birmingham City Centre, more jobs and shops are accessible, and it has the best opportunities to engage with the sustainable transport network. The development of Site C also presents new opportunities for Site D.
- Assessed as a detached site, Site D is the least accessible of all, and perhaps the least attractive for residential development, but this might improve if it was developed alongside Site C. With its proximity to M42 at junction 9, it does offer a good opportunity as an employment site, although effort will be required to ensure that travel by public transport and cycling connections is attractive.

### 8.3 Infrastructure Strategy

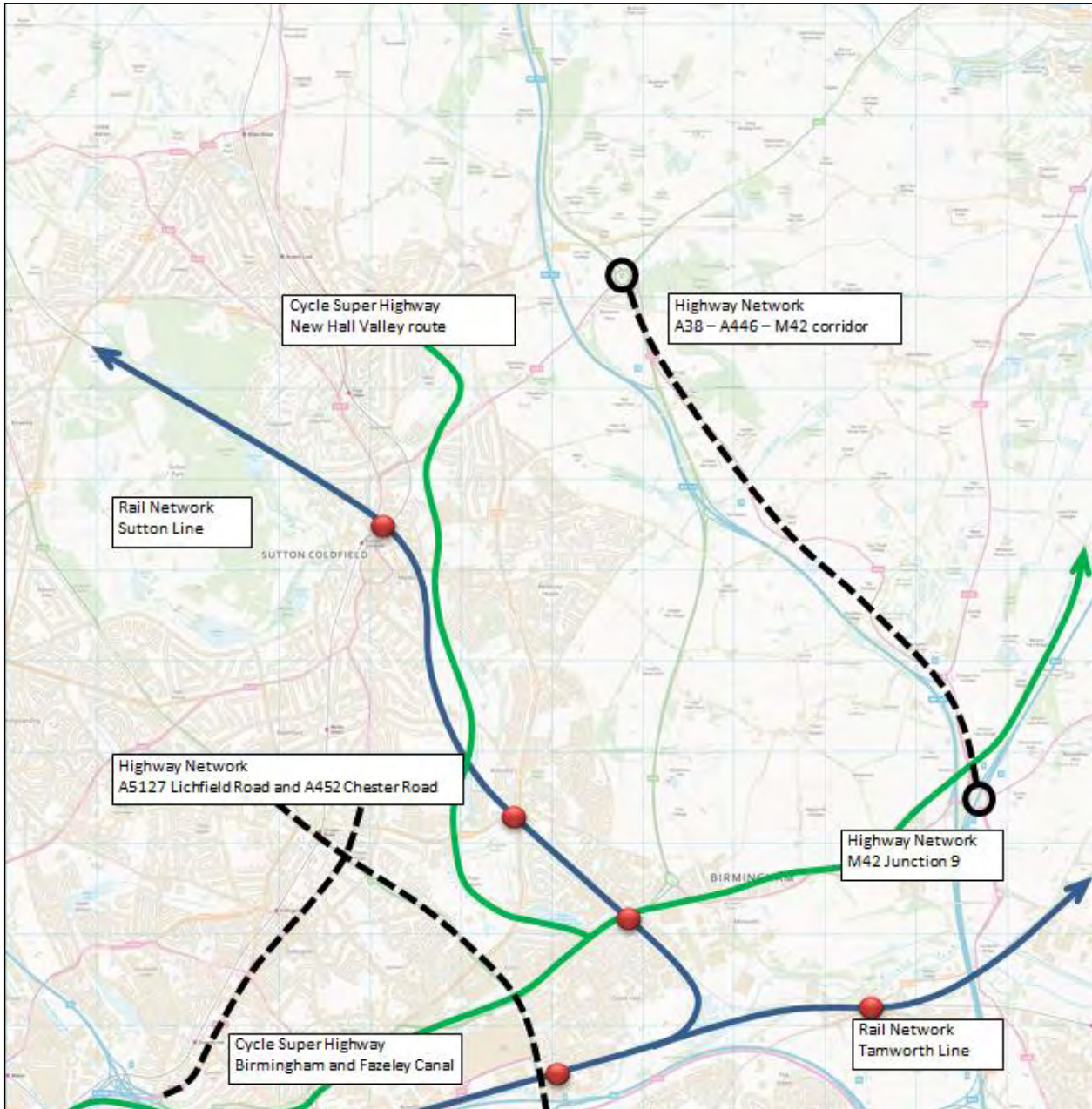
- 8.3.1 The accessibility of an urban extension is reliant on that of the adjoining urban area. The infrastructure required to support a Sustainable Urban Extension will need to be capable of overcoming existing constraints to improve connectivity for existing residents, in addition to facilitating future growth.
- 8.3.2 Issues of severance for pedestrians and cyclists, overcrowding on trains, and a lack of high quality, frequent and direct bus services are a key constraints to the growth of Birmingham. The Assessment has demonstrated that these issues exist, to varying degrees, for each of the potential development options. In order to overcome these constraints there are a number of overarching strategies that should be considered for implementation, regardless of which site is progressed.

**Table 8-1: Overarching Infrastructure Strategy (including but not limited to)**

Mode	Strategy
Walking	<ul style="list-style-type: none"> <li>- Walk routes into Sutton Coldfield Town Centre from all sides should be improved to reduce severance, not just at the ring road, but also along the radial corridors into the town.</li> <li>- The morning peak hour during school term time is when congestion reaches its worst point. More initiatives are required as part of effective travel planning to encourage parents and pupils to walk to school.</li> </ul>
Cycling	<ul style="list-style-type: none"> <li>- The cycling mode share in north Birmingham is very low, which presents an opportunity for modal shift.</li> <li>- Thought should be given to creating a seamless cycle network within north Birmingham, where more priority is given to cyclists.</li> <li>- Best practice is that that cycle routes should be: Direct; Connected; Attractive; Comfortable and Safe.</li> <li>- A Cycle Super Highway Route needs to be established between Sutton Coldfield and Birmingham City Centre, utilising the off-road routes along New Hall Valley and the Birmingham and Fazeley Canal.</li> </ul>
Bus	<ul style="list-style-type: none"> <li>- The public transport interchange at Sutton Coldfield Town Centre is crucial to the effectiveness of bus services in north Birmingham. A strategy is required to create an attractive and effective interchange.</li> <li>- Routes into Sutton Coldfield are extremely congested in peak hours and at weekends, when it is as sometimes quicker to cycle. Bold bus priority corridors should be considered to transport people in from the edge of Town.</li> </ul>
Rail	<ul style="list-style-type: none"> <li>- The overcrowding of the Cross City Line, the high demand for Park &amp; Ride and, the amount of traffic coming into Sutton Coldfield from Tamworth is significant. The incorporation of the Tamworth Line into the Centro area with the benefits that come with free/discounted parking, the nNetwork card and higher frequency services, could be one of the single most important aspirations for north Birmingham.</li> <li>- The Sutton Park line would create a new service, providing access to Moor Street Station. This might also relieve pressure on the Cross City Line and reduce the amount of people choosing to drive.</li> </ul>
Highways	<ul style="list-style-type: none"> <li>- Strategically the M42 at Junction 9 will need improvement, as It will be the point of entry to the motorway network for all of the sites (besides other trunk roads, A38 A5 etc., and M6 Toll).</li> <li>- The A446 is a key connection between the A38 and M42, but it is heavily congested, and requires widening to match the rest of the corridor (unless a part of the M6 Toll becomes available for public use).</li> <li>- The A38 corridor is a significant arterial corridor to Birmingham for residents of Sutton Coldfield and all of the potential sites.</li> </ul>



Figure 8-1: Overarching Infrastructure Strategy





8.3.3 The following tables outline the specific infrastructure strategy for each site.

**Table 8-2: Site specific Infrastructure Strategy – Site A**

Mode	Strategy
Walking	<ul style="list-style-type: none"> <li>- Pedestrian routes with crossings to: Mere Green; Blake Street and Butlers Lane Railway Station.</li> <li>- Crossings on A5127 Lichfield Road</li> </ul>
Cycling	<ul style="list-style-type: none"> <li>- Cycle routes toward Sutton Coldfield via Moor Hall and Four Oaks Park</li> </ul>
Bus	<ul style="list-style-type: none"> <li>- Direct connection to Railway Stations and into Sutton.</li> <li>- Bus routes on Lichfield Road to Sutton.</li> <li>- Bus routes via Walmley to A38 Corridor.</li> <li>- Bus routes to Lichfield.</li> </ul>
Rail	<ul style="list-style-type: none"> <li>- Investigate a new P&amp;R site at Blake Street Railway Station to relieve pressure on Four Oaks.</li> <li>- Investigate a turnaround north of Blake Street Railway Station to allow trains to terminate.</li> <li>- Consider additional rolling stock for the Cross City Line</li> <li>- Resolution to congestion at Four Oaks.</li> </ul>
Highways	<ul style="list-style-type: none"> <li>- Improve Lichfield Road corridor to Sixways and Gravelly Hill.</li> <li>- Improve circulation on Sutton ring road.</li> <li>- Improve Whitehouse Common corridor to Walmley.</li> <li>- Improvements to routes towards Lichfield including junctions with A5 and A38</li> </ul>

**Table 8-3: Site specific Infrastructure Strategy – Site B**

Mode	Strategy
Walking	<ul style="list-style-type: none"> <li>- Pedestrian routes towards Sutton Coldfield, with crossing on Whitehouse Common Lane</li> </ul>
Cycling	<ul style="list-style-type: none"> <li>- High quality defined infrastructure for a route into Sutton Coldfield.</li> <li>- Infrastructure to connect site to New Hall Valley route.</li> </ul>
Bus	<ul style="list-style-type: none"> <li>- Direct connection to Sutton Transport Interchange.</li> <li>- Consider bus only links into Sutton Coldfield.</li> <li>- Bus routes to Tamworth, and A38 corridor.</li> </ul>
Rail	<ul style="list-style-type: none"> <li>- Resolve congestion issues at Four Oaks P&amp;R</li> </ul>
Highways	<ul style="list-style-type: none"> <li>- Tamworth Road route into Sutton requires substantial improvement.</li> <li>- Whitehouse Common Lane requires significant improvement</li> <li>- The A446 and A38 will provide alternative routes for car traffic, and will be essential infrastructure for Site B – Substantial improvements required between Bassett Pole and M42, or consider bringing M6 Toll T1 to T4 back into public ownership.</li> </ul>



**Table 8-4: Site specific Infrastructure Strategy – Site C**

Mode	Strategy
Walking	-Pedestrian crossings at Walmley Road, Eachelhurst Road and Webster Way.
Cycling	- High quality defined infrastructure for a route into Sutton Coldfield. - Infrastructure to connect site to New Hall Valley route and Birmingham and Fazeley Canal.
Bus	- Direct connection to Birmingham City Centre - Direct connection into Sutton Coldfield - Bus rapid transit along Tyburn Corridor to Salford Circus - Consider business link services connecting Site and residential areas to Hams Hall, Birmingham Business Park, Birmingham International, Jaguar & Land Rover.
Rail	- Investigate the opportunity for a new Station at Castle Vale. - As part of the Sutton Line proposals, consider a new Station on the A38 Kingsbury Road and in Walmley
Highways	-Grade Separated connection with A38 and link through to Webster Way and Fox Hollies Road. -Capacity of the Chester Road corridor, routes into Sutton Coldfield and M42 Junction 9.

**Table 8-5: Site specific Infrastructure Strategy – Site D**

Mode	Strategy
Walking	-Crossing Kingsbury Road and A38 -Routes through Site C.
Cycling	- Routes into urban area to the west through Site C and to the south towards Water Orton and Castle Bromwich - Birmingham and Fazeley Canal - Infrastructure to connect site to New Hall Valley route and Birmingham and Fazeley Canal.
Bus	- Direct connection to Birmingham City Centre - Direct connection into Sutton Coldfield - Bus rapid transit along Tyburn Corridor to Salford Circus - Direct connections to Castle Bromwich and Solihull - Consider business link services connecting Site and residential areas to Hams Hall, Birmingham Business Park, Birmingham International, Jaguar & Land Rover.
Rail	- Investigate the opportunity for a new Station at Castle Vale. - As part of the Sutton Line proposals, consider a new Station on the A38 Kingsbury Road - Access improvements to Water Orton - Consider improvements on the Tamworth Line, new stations at Kingsbury or Hams Hall.
Highways	- Grade Separated junction with A38 and link through to Kingsbury Road. - Consider a direct link to M42 Junction 9 for employment uses. - Improvements to M42 Junction 9 - Road connection through Site C. - Capacity of the Chester Road corridor, routes into Sutton Coldfield



## 8.4 Recommendations for additional assessment

8.4.1 It is recommended that once the preferred options have been refined, the following tasks are undertaken:

- Further consideration of highway impact using the West Midlands PRISM traffic model and further detailed assessment of public transport options;
- Detailed assessment of junctions on the Strategic Road Network;
- A study of the potential scale and mix of uses that the Sustainable Urban Extension would accommodate to policy documents;
- Consideration of the transport issues and opportunities for neighbouring authorities;
- Continued consultation with Centro, Highways Agency, and other neighbouring authorities;
- Identification of detailed access and infrastructure strategy for the preferred development option;
- Identification of a supporting infrastructure strategy for Sutton Coldfield and the north east of Birmingham.



## **Appendix A    Accessibility Analysis**