

**Staffordshire Moorlands District
Council**

Staffordshire Moorlands Housing Sites
Transport Infrastructure Costs
February 2010

Halcrow Group Limited

DRAFT

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Executive Summary

To be completed for insertion into final study report.

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1 Introduction

- 1.1.1 Staffordshire Moorlands District Council is preparing their Core Strategy for the Local Development Framework. The strategy will inform the requirements for residential development, and specifically the targets for affordable housing.
- 1.1.2 PPS12 provides criteria to identify sites for development, such as the capacity of existing transport infrastructure to accommodate growth. Significant growth is likely to require additional infrastructure to absorb the increased demand. This new infrastructure has an associated cost which could affect the overall viability of a proposed housing scheme.
- 1.1.3 The cost of new infrastructure is broadly proportional to the local environmental and infrastructure constraints, and the scale of new development. In line with the PPS12 tests of soundness, it is necessary to appraise the deliverability and viability of proposed development schemes.
- 1.1.4 This report identifies indicative costs of transport infrastructure to support the development of twelve sites in Staffordshire Moorlands, and should be read in conjunction with 'Transport Infrastructure Costs Methodology' document. The methodology for identifying transport infrastructure costs was submitted to Staffordshire County Council (SCC) for comments prior to undertaking this report, and their feedback has been adopted in the final methodology document. The methodology for identifying transport infrastructure costs is provided in **Appendix A**.
- 1.1.5 This report has been developed in consultation with SMDC, and the feedback received from officers is provided in **Appendix B**.
- 1.2 ***Report purpose***
- 1.2.1 This document has not been prepared to act as a guide for determining planning applications. It provides an indication of the possibilities for off-site highway infrastructure costs based on fixed criteria, where increased need and demand is placed on existing infrastructure generated by the proposals. The specific infrastructure requirements of each site are not considered in the report, and would be identified at a planning application stage, and in consultation with the highway authority, Staffordshire County Council.

1.3

Housing sites

1.3.1

Twelve potential residential housing sites have been identified within Staffordshire Moorlands. These are primarily grouped around the urban areas of Leek, Biddulph and Cheadle. Staffordshire Moorlands District Council (SMDC) has provided information on each sites' location, number of units proposed at each location, and housing mix/tenure and access details. This information is provided in **Appendix C**.

1.3.2

Of the twelve sites, three are located in Leek, three in Biddulph, and four in Cheadle. The remaining two sites are located close to Cheadle in the rural villages of Upper Tean and Kingsley. Residential sites consist of different numbers of dwellings, and these are summarised below in Table 1.1. For the purpose of this exercise where housing sites consist of a range of dwellings (i.e. 55-200 dwellings), the top range of the number of dwellings proposed has been used.

Site no.	Site location	Units proposed	Mix/tenure
1	Leek (area 3)	150 dwellings	3/4 bedroom housing
2	Leek (area 6a)	75 dwellings	3/4 bedroom housing
3	Leek	30 dwellings	2/3 bedroom housing
4	Biddulph (area 4)	330 dwellings	3/4 bedroom housing
5	Biddulph	30 dwellings	3/4 bedroom housing
6	Biddulph	42 dwellings	1/2 bedroom housing
7	Cheadle (areas 1 & 2)	430 dwellings	3/4 bedroom housing
8	Cheadle (area 4a)	55-200 dwellings	3/4 bedroom housing
9	Cheadle (areas 6 & 7)	300-450 dwellings	3/4 bedroom housing
10	Cheadle	32 dwellings	2/3 bedroom housing
11	Upper Tean	15 dwellings	2/3 bedroom housing
12	Kingsley	30 dwellings	3/4 bedroom housing

Table 1.1: Housing sites

1.3.3

The transport costs (approximated) associated with planning consent being granted for each of the above sites, is detailed in the following chapters.

2 Pedestrian/cycle infrastructure

2.1 *Introduction*

2.1.1 Walking and cycling are important modes of travel to and from housing sites, as these modes offer the most sustainable alternative to the car, make a positive contribution to the overall character of a place, public health and to tackling climate change through reductions in carbon emissions. Good pedestrian and cycle access to local amenities, schools and employment sites is vital if the development sites are to champion sustainability. It is therefore considered that housing sites should be connected to existing infrastructure provision.

2.2 *Approach*

2.2.1 Gaps in pedestrian/cycle infrastructure provision between housing sites and the adjoining highway network, has been identified in relation to existing employment sites, primary/secondary schools, and bus stops. The criterion used to identify infrastructure gaps includes:

- The location and condition of existing footways/cycle routes linking development sites to local amenities; and,
- The availability of safe and convenient crossing facilities between local schools, employment sites, and the development sites

2.2.2 Where gaps in transport infrastructure have been identified, a consistent methodology has been used to apply a cost to fill the gaps, and provide a connected route between the housing sites and surrounding amenities.

2.3 *Pedestrian access*

2.3.1 Following this methodology, the requirements are presented in Table 2.1, which shows the approximate costs associated with pedestrian infrastructure improvements identified for each housing site.

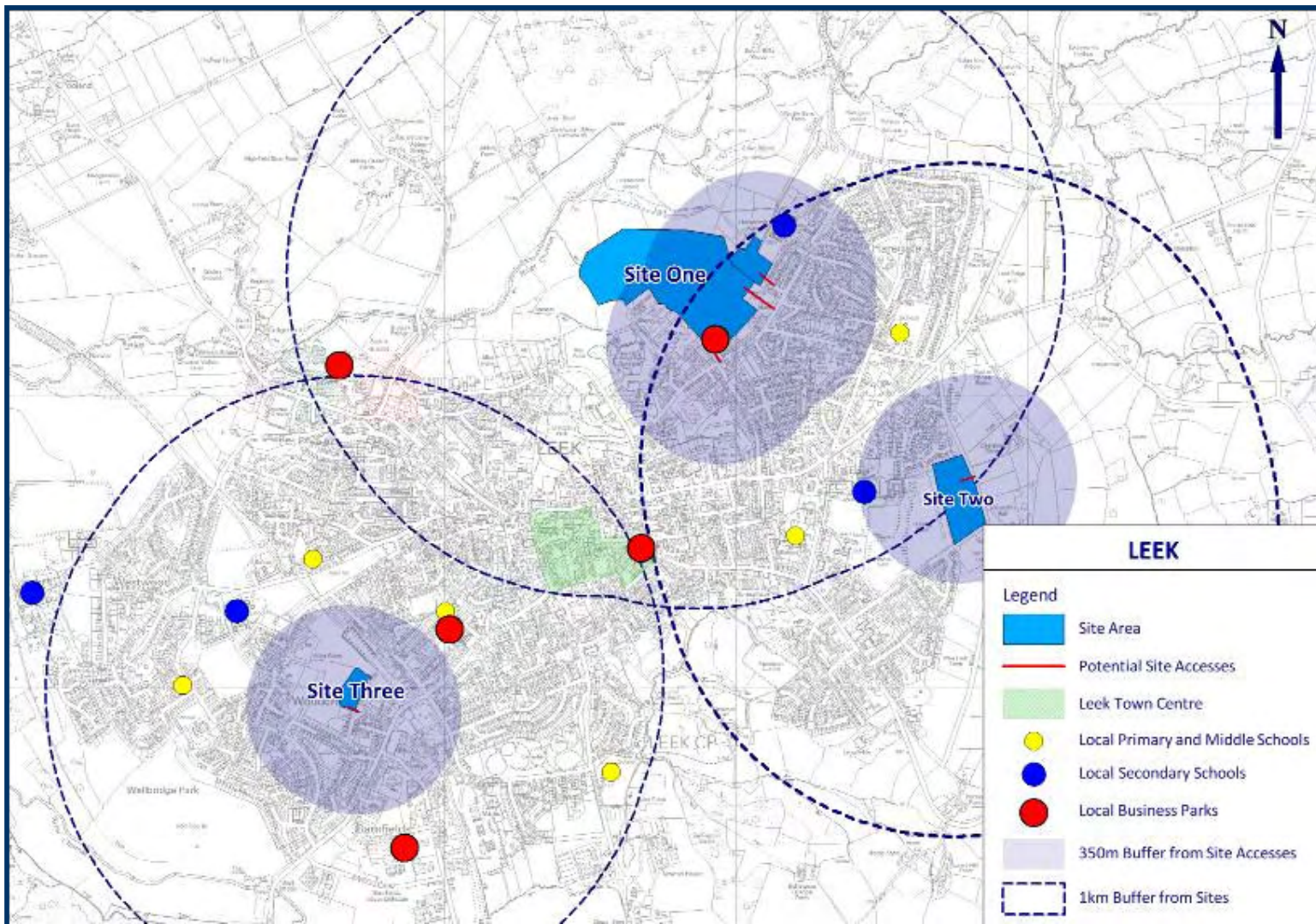


Figure 2.1: Leek housing sites & amenities

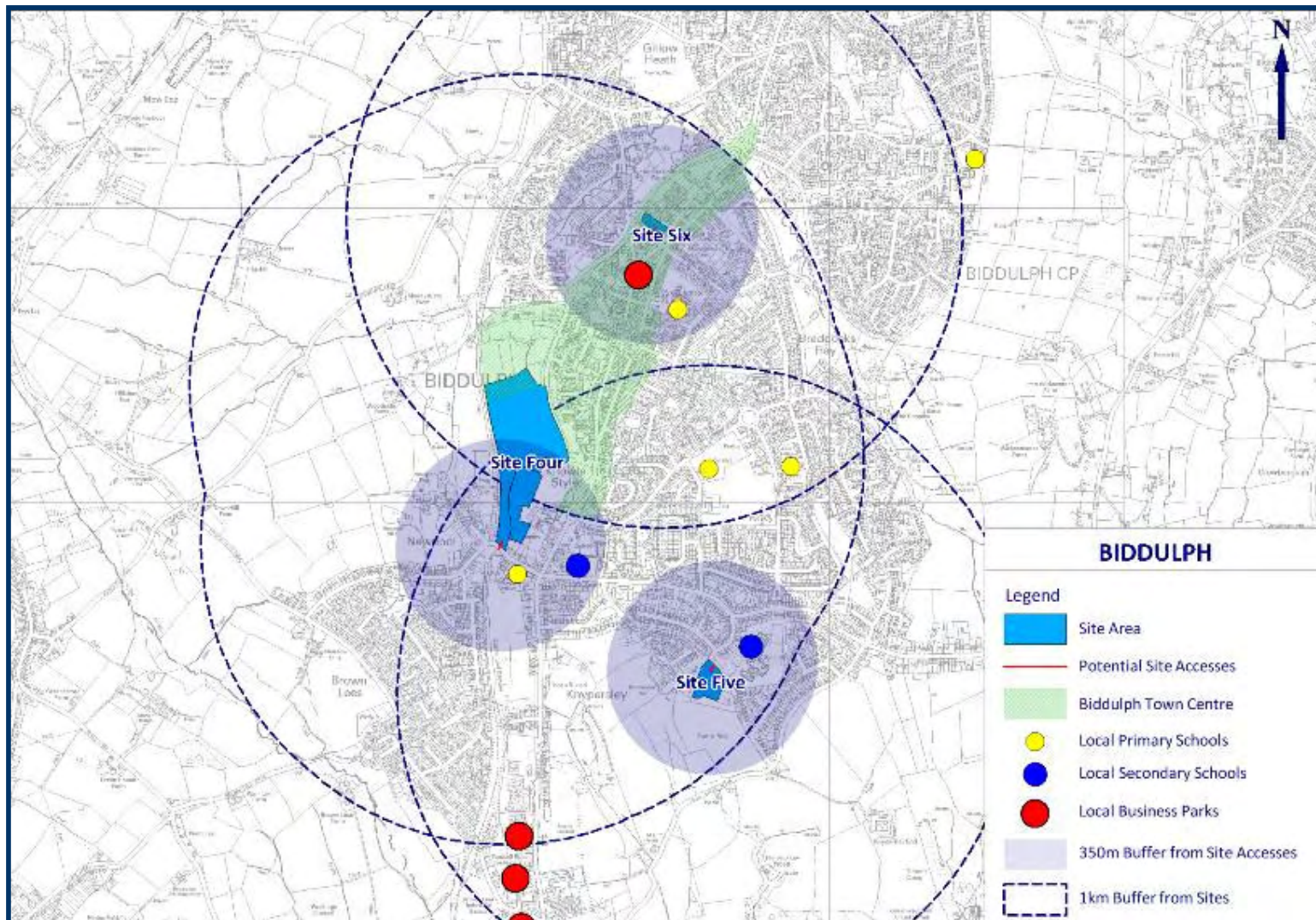


Figure 2.2: Biddulph housing sites & amenities

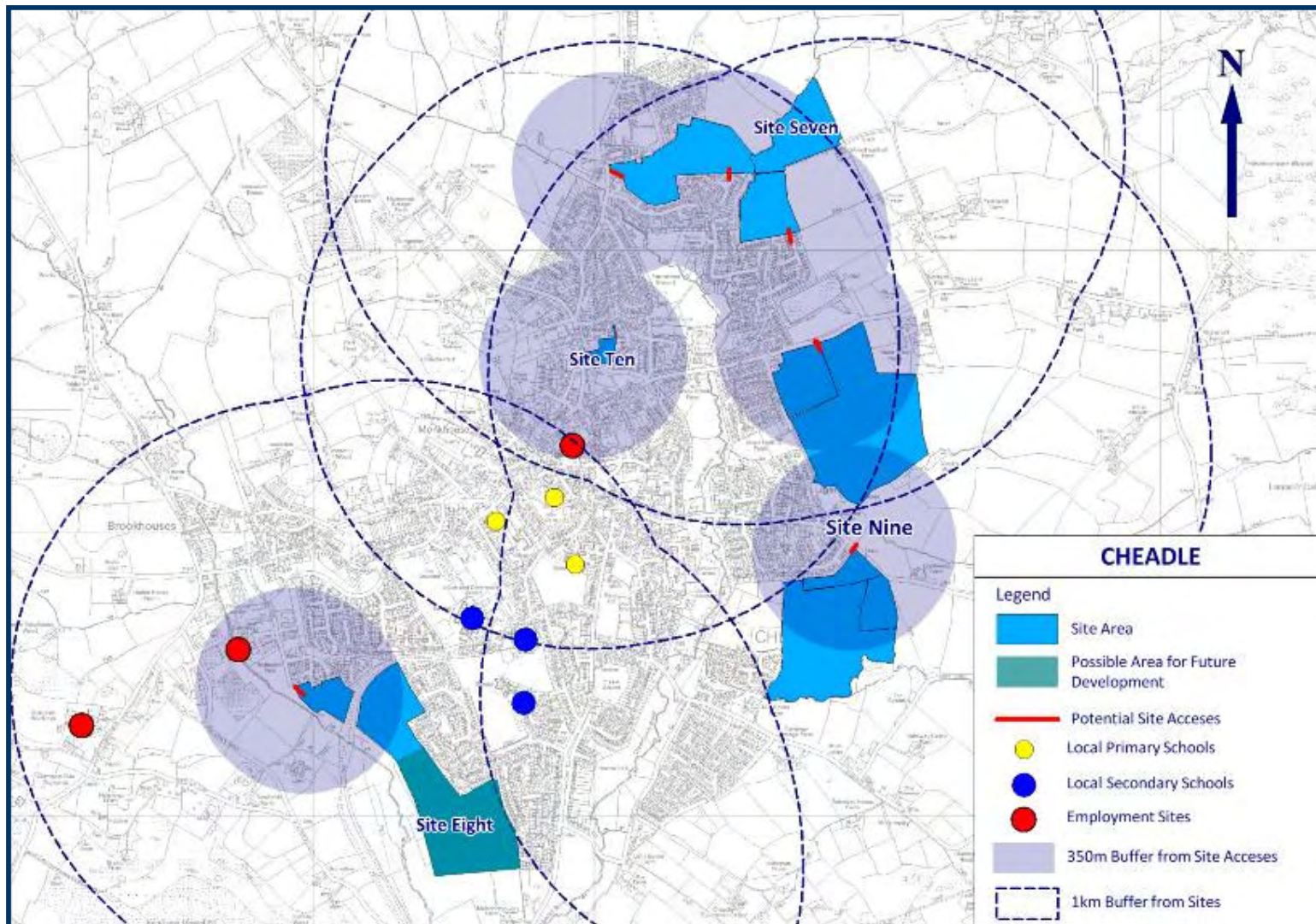


Figure 2.3: Cheadle housing sites & amenities

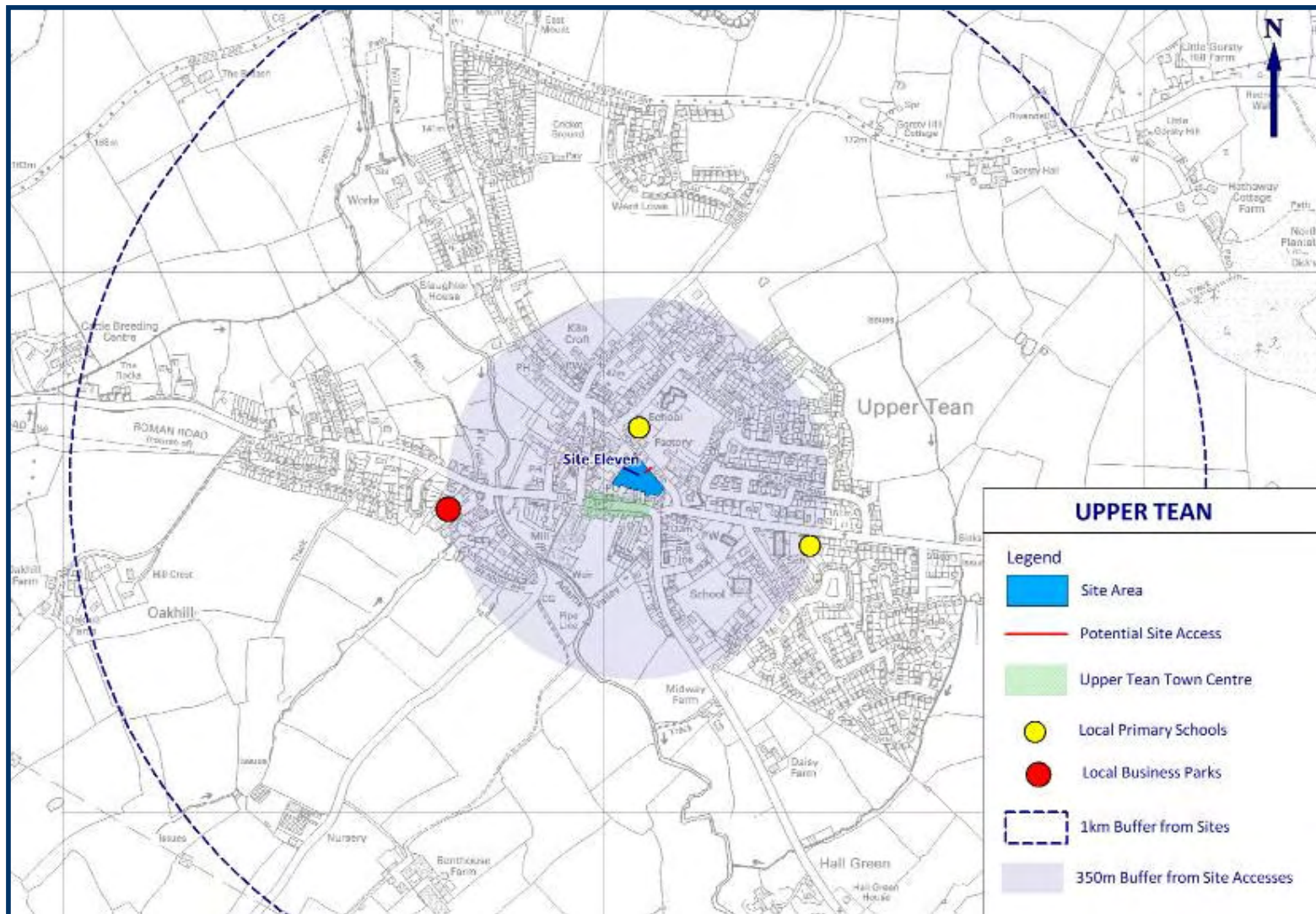


Figure 2.4: Upper Tean housing sites & amenities

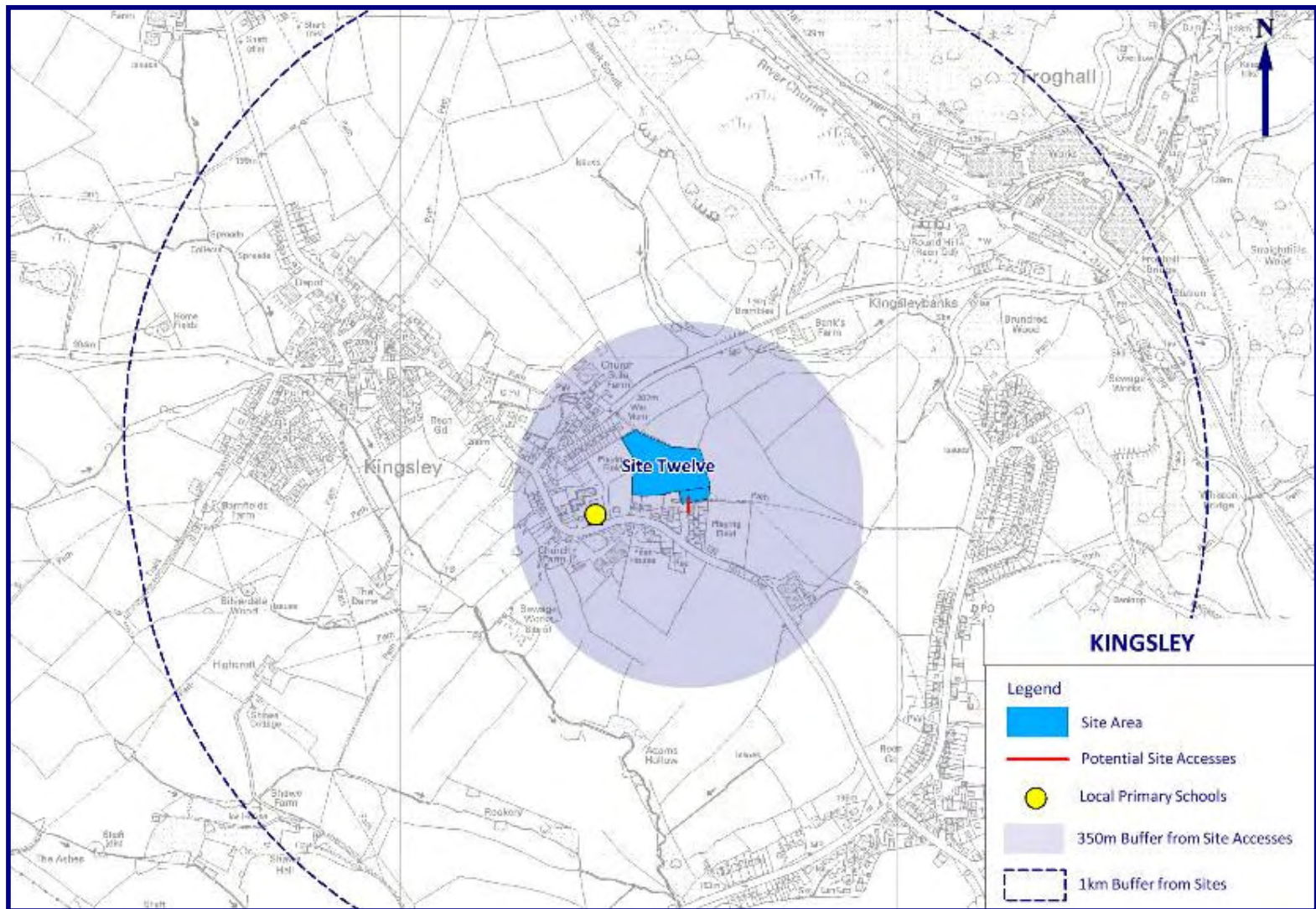


Figure 2.5: Kingsley housing sites & amenities

Site	Is severance an issue between the site and amenities within 1 km?	Cost towards a pedestrian crossing	Is the site connected to an existing footways	Cost towards footways	Total cost of pedestrian infrastructure improvements
1	No	£0	Yes	£0	£0
2	Yes	£45,500	Yes	£0	£45,500
3	Yes but only 30 dwellings	£0	Yes	£0	£0
4	No	£0	Yes	£0	£0
5	No	£0	No	£227.50	£228
6	No	£0	Yes	£0	£0
7	Yes	£45,500	Yes	£0	£45,500
8	Yes	£45,000	No	£0	£45,000
9	Yes	£45,500	No	£3,101	£48,601
10	Yes	£0	Yes	£0	£45,500
11	Yes	£45,500	Yes	£0	£45,500
12	No	£0	Yes	£0	£0

Table 2.1: Associated costs towards pedestrian infrastructure improvements

2.3.2 For sites in which additional pedestrian infrastructure is a requirement, information on how this has been identified is detailed below.

Site two

2.3.3 A pedestrian crossing is identified for the Buxton Road/ Novi Lane junction, providing a safe connection between the housing site and primary school located to the north.

Site five

2.3.4 There is a requirement to provide a footway along the northern boundary of the site, providing a connection between the housing site and adjoining areas along Conway Road.

- Site six**
- 2.3.5 Severance has been identified between the site and schools located on the opposite side of Congleton Road, requiring a pedestrian crossing to be provided. However, some sites, whilst they meet the required criteria, are marginal, due to, for example, the housing tenure or scale of development. It is considered that these severance issues, whilst relevant, will be addressed by infrastructure improvements proposed by the AAP.
- 2.3.6 The AAP considers the pedestrianisation of a section of the High Street, which will improve pedestrian links in proximity of the site. Given that site 6 will largely consist of 1 and 2 bedroom apartments, trips between local schools and the site will be less significant. The requirement for a pedestrian crossing has been waived in this instance, but a general contribution to AAP / strategic measures has been identified for improving pedestrian accessibility in the area.
- Site seven**
- 2.3.7 A pedestrian crossing identified for Froghall Road, to be located on pedestrian desire lines opposite the proposed access road.
- Site eight**
- 2.3.8 A cost has been included for this site to provide a pedestrian crossing of the distributor road, which will sever the footpath that runs along the former railway line. The footpath is on an embankment, and therefore the solution could represent a significant cost, if the distributor road were to be bridged. .
- 2.3.9 This improvement if it is taken in the form of a pedestrian footbridge would be an approximate cost of £800,000. Alternatively, if the distributor road was lightly trafficked, a pedestrian crossing would be provided at a cost of £45,000. For the purpose of this study, the most cost affective solution has been used.
- Site nine**
- 2.3.10 A pedestrian crossing has been identified for Ashbourne Road providing a pedestrian crossing linking the two areas of the site. Also the missing section of footway linking the proposed northern access with Moor Lane, and the southern access to Thorley Drive, will be completed.
- Site ten**
- 2.3.11 A pedestrian crossing identified for Leek Road, reduces the severance of a major route through the town.

Site eleven

- 2.3.12 The provision of a pedestrian crossing at the Cheadle Road/ Draycott Road junction, connects the site to the school located to the southeast.
- 2.3.13 Costs have been derived using the assumptions set out in the methodology, however no contribution is expected at sites where existing pedestrian infrastructure is sufficient to meet demand. Two housing sites were not considered to be of a sufficient size to warrant a new pedestrian crossing (less than 30 dwellings), and therefore no crossing facilities have been identified for these sites.

2.4

Cycle access

2.4.1

Existing cycle infrastructure close to all twelve development areas has been identified in relation to the three types of cycle routes identified in the area:

- ***Signed cycle routes*** - On road cycle routes provided as cycle lanes with signage;
- ***Advisory cycle routes*** – cycle routes thought to be suitable for cyclists with signage, but without the provision of cycle lanes, and;
- ***Cycle paths*** - Off road routes with signage.

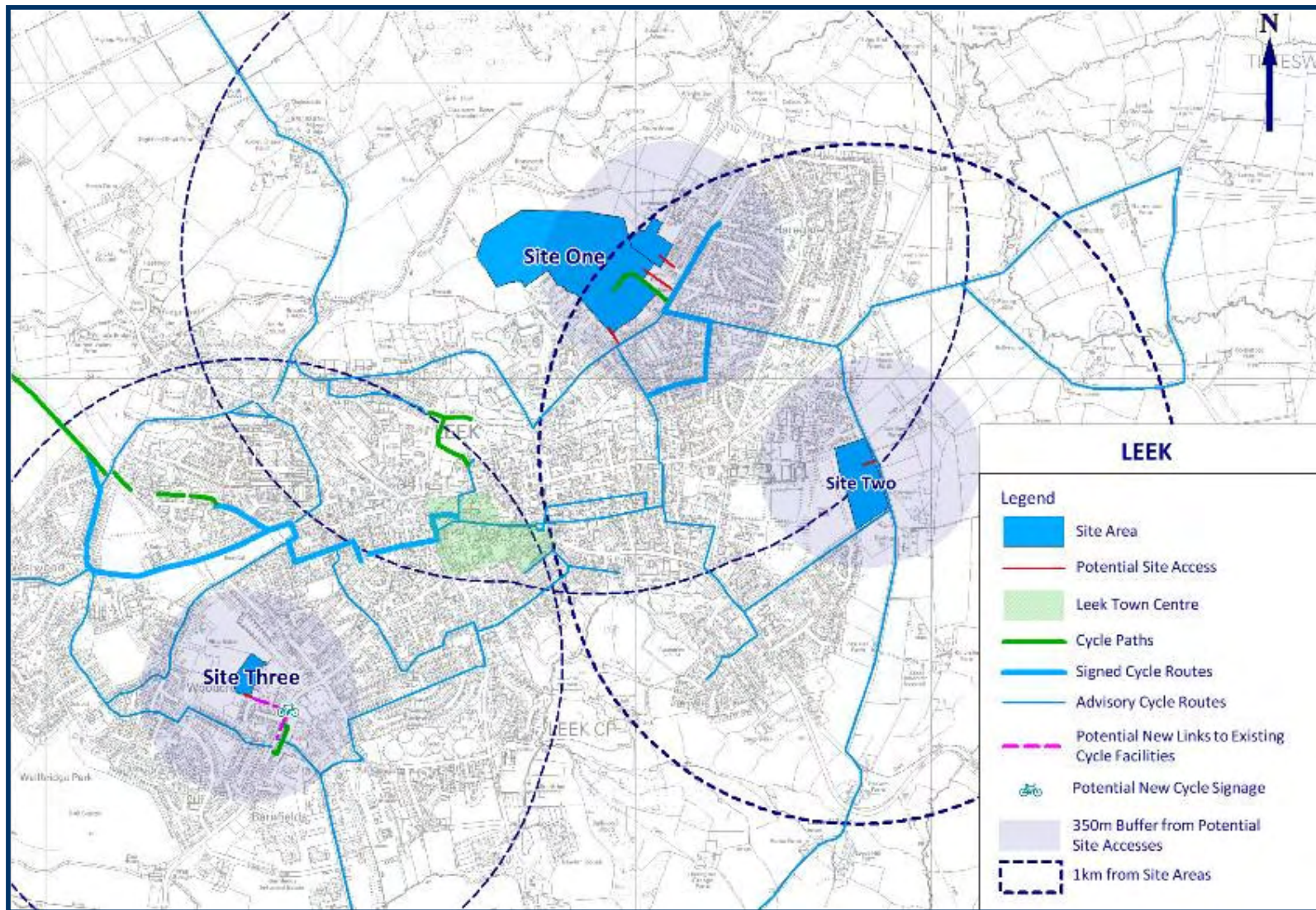


Figure 2.6: Leek housing sites & cycle infrastructure

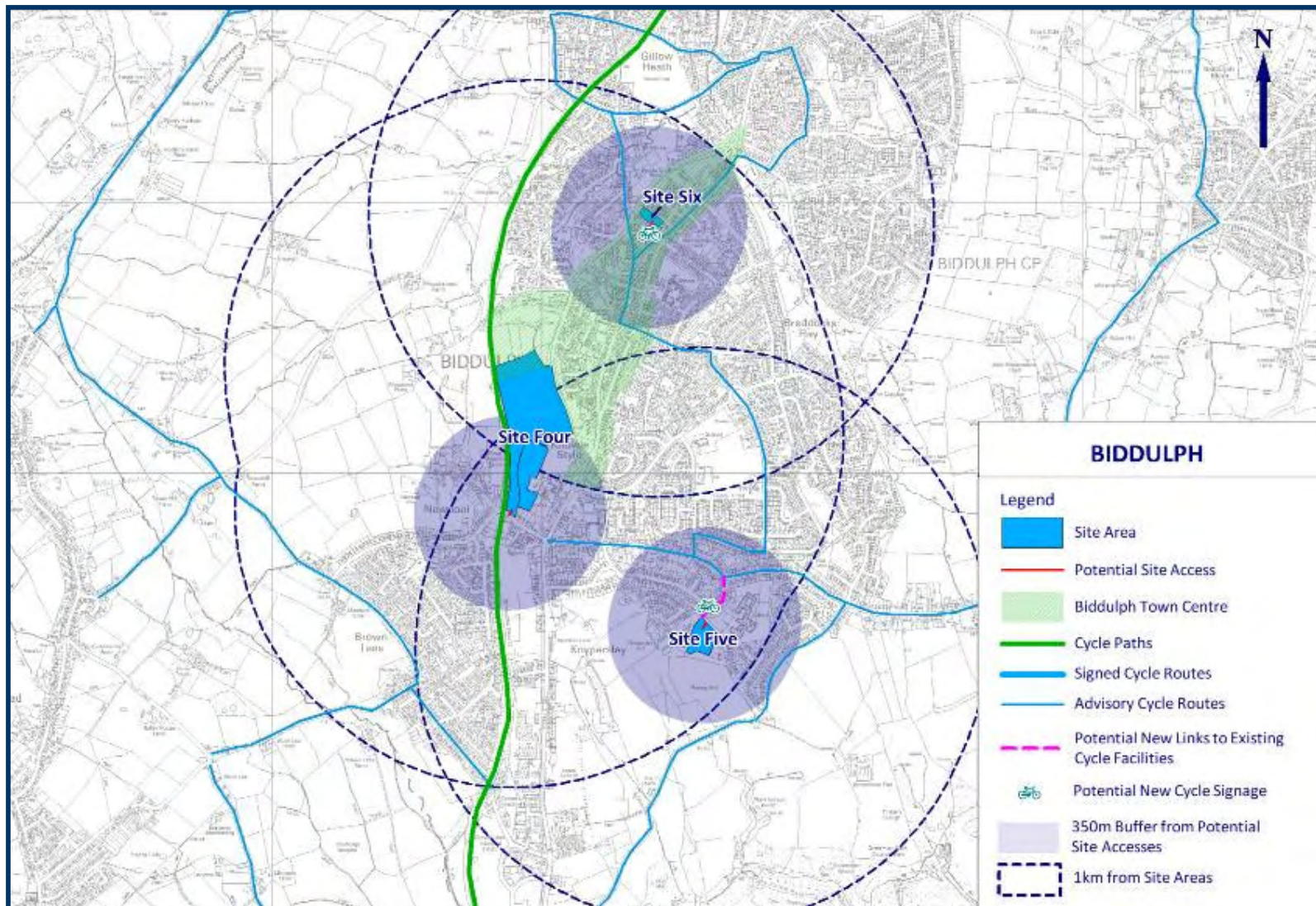


Figure 2.7: Biddulph housing sites & cycle infrastructure

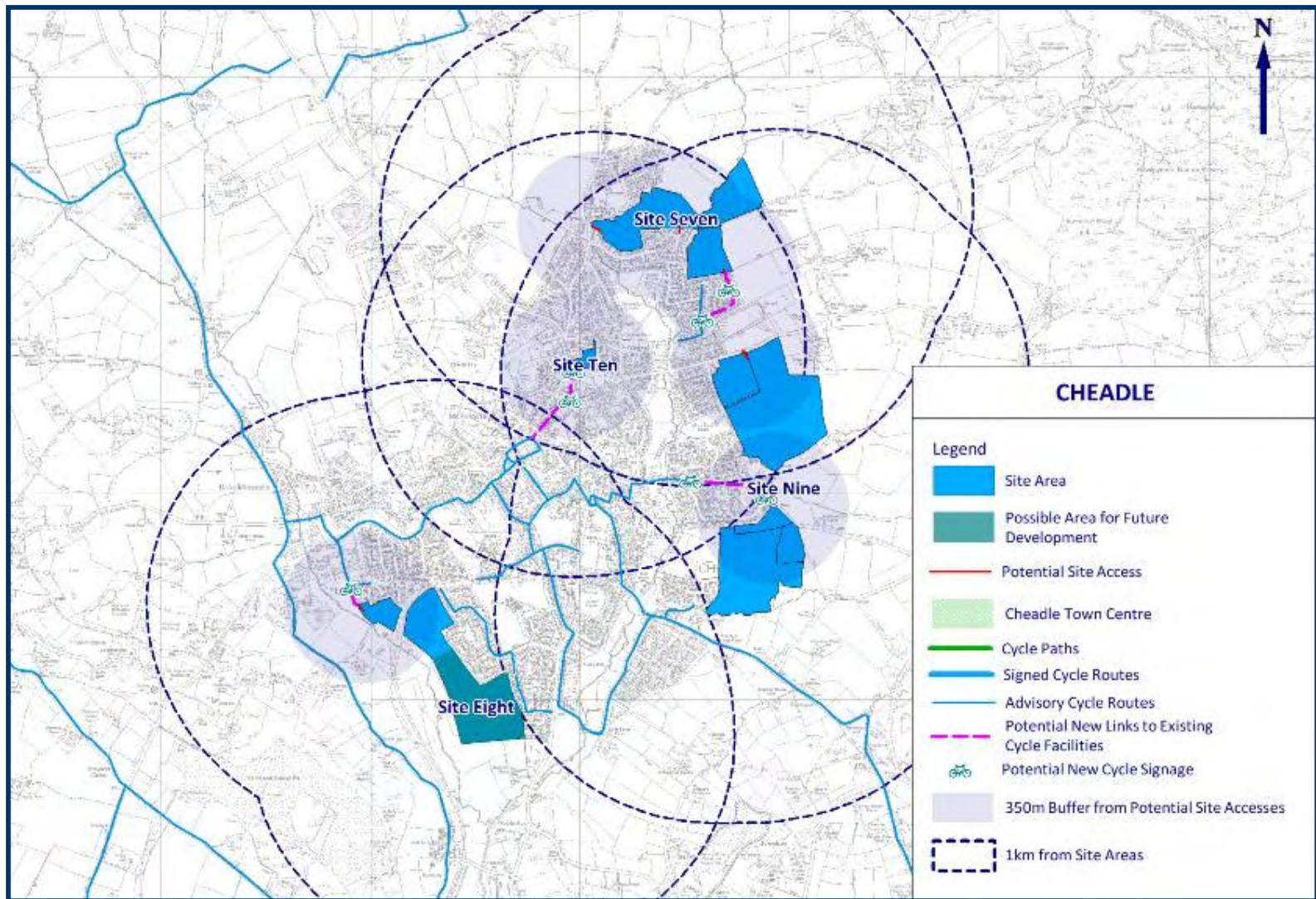


Figure 2.8: Cheadle housing sites & cycle infrastructure

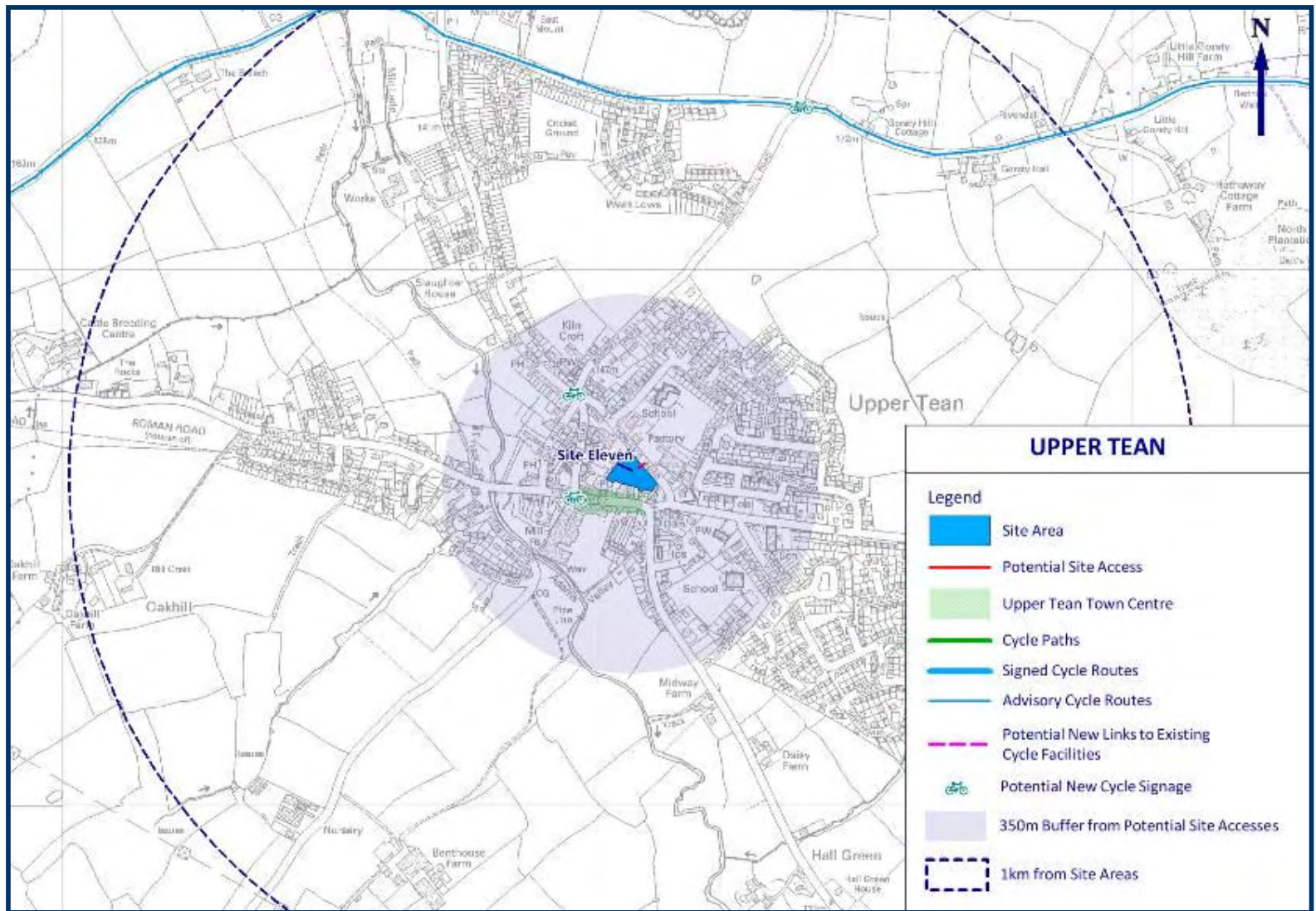


Figure 2.9: Upper Tean housing sites & cycle infrastructure

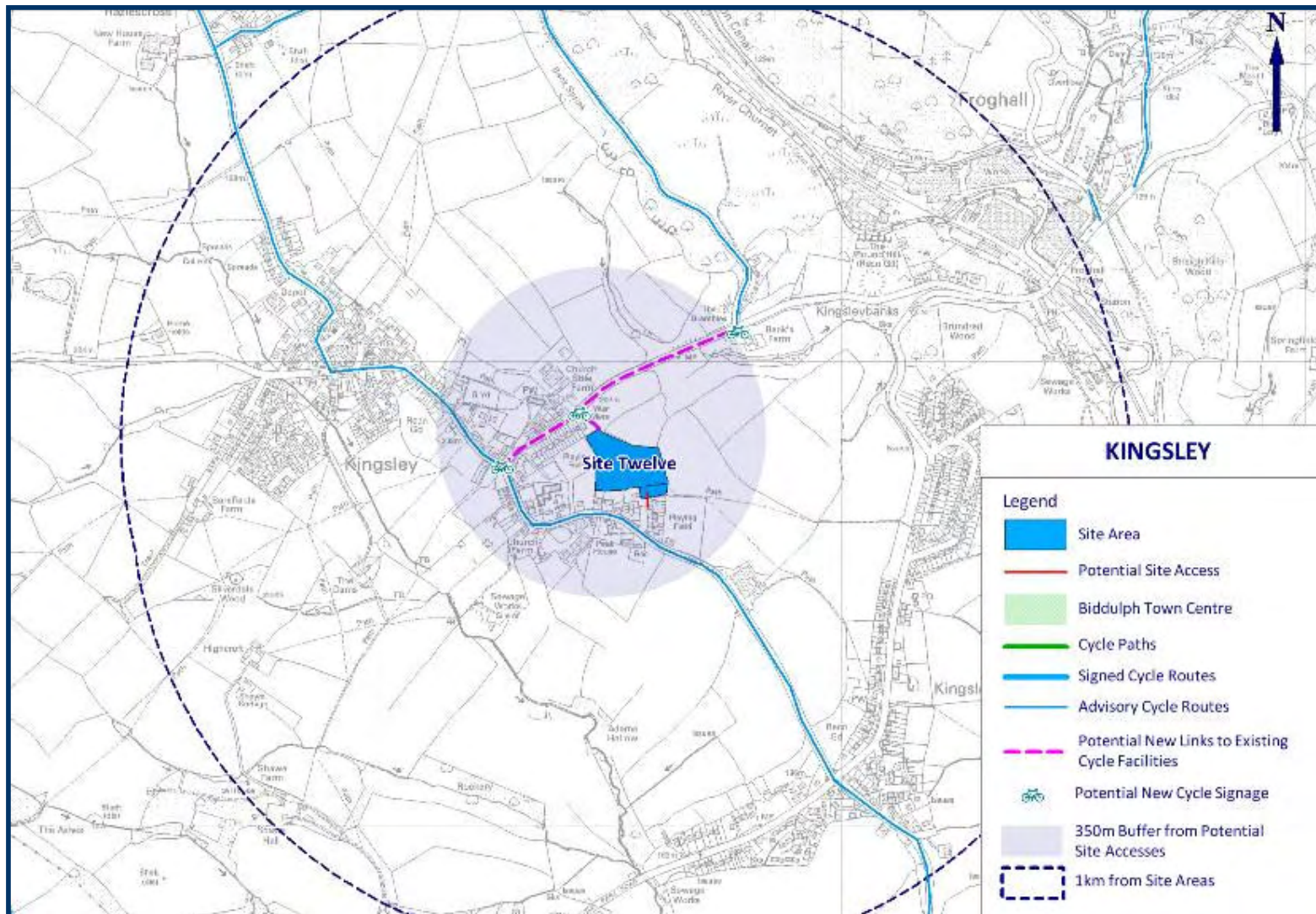


Figure 2.10: Kingsley housing sites & cycle infrastructure

2.4.2 As outlined in the methodology, an associated cost has been attributed to each site, based on infrastructure being introduced to link the housing sites with existing cycle routes. It is assumed that the housing sites would provide a similar cycle link to those already surrounding the site, i.e. if the closest existing route is an advisory route, then additional signage would be provided to extend this advisory route.

2.4.3 Table 2.2 shows the approximate cost associated with cycle infrastructure improvements at each housing site.

Site	Linked route required	Number of signs required	Total contribution for cycling infrastructure
1	No	No signs	£0.00
2	No	No signs	£0.00
3	Yes	4 signs	£400.00
4	No	No signs	£0.00
5	Yes	4 signs	£400.00
6	Yes	4 signs	£400.00
7	Yes	4 signs	£400.00
8	Yes	4 signs	£400.00
9	Yes	4 signs	£400.00
10	Yes	4 signs	£400.00
11	Yes	4 signs	£400.00
12	Yes	4 signs	£400.00

Table 2.2 Costs associated with cycle infrastructure improvements

2.4.4 Costs have been derived using the assumptions set out in the methodology, with sites 1, 2 and 4 already having connections to existing cycle routes, requiring no additional provision required. All other sites would be connected to existing advisory cycle routes, therefore only a cost towards additional cycle signage has been identified for these sites.

3 Bus service infrastructure

3.1

Introduction

3.1.1

Bus routes and stops form a key element of housing sites, and are vital to reducing longer distance car trips. Bus routes should serve larger development sites that have a density to generate a high enough patronage to support a good level of service, without the need for long-term subsidy.

3.2

Approach

3.2.1

In accordance with the methodology for bus service provision, housing sites within 350m of a bus stop providing a half hourly frequency or more to an urban centre, are considered to meet requirements for access to public transport. For those sites that fail to meet this criteria, each have been considered on a site by site basis, taking into account the scale of development site, and practical options for improving bus connection. The existing peak hourly frequency of bus services passing within 350m of each housing site is summarised below in Table 3.1.

Site	Local buses passing site	Frequency of bus services (M-F) per hour	Major centre served
1	18, 165, 166	4.5	✓
2	165, 166, 495	2.0	✓
3	18, 118, 194, 195, 165, 166	4.8	✓
4	423, 424, 6A, 9, 94, X1	11.0	✓
5	99, 196, 423, 424	3.0	✓
6	6A, 99, 195, 196	5.0	✓
7	123, 10, 32, 32A, 234, 235, 236	6.7	✓
8	7, 7A, 14, 32, 236, 123,	7.0	✓
9	10, 14, 32A, 123	2.7	✓
10	235, 234, 236, 10, 14, 32A, 123	4.2	✓
11	7, 7A, 14, 236 - 32A	3.0	✓
12	32, 236	4.0	✓

Table 3.1: Bus services and frequencies

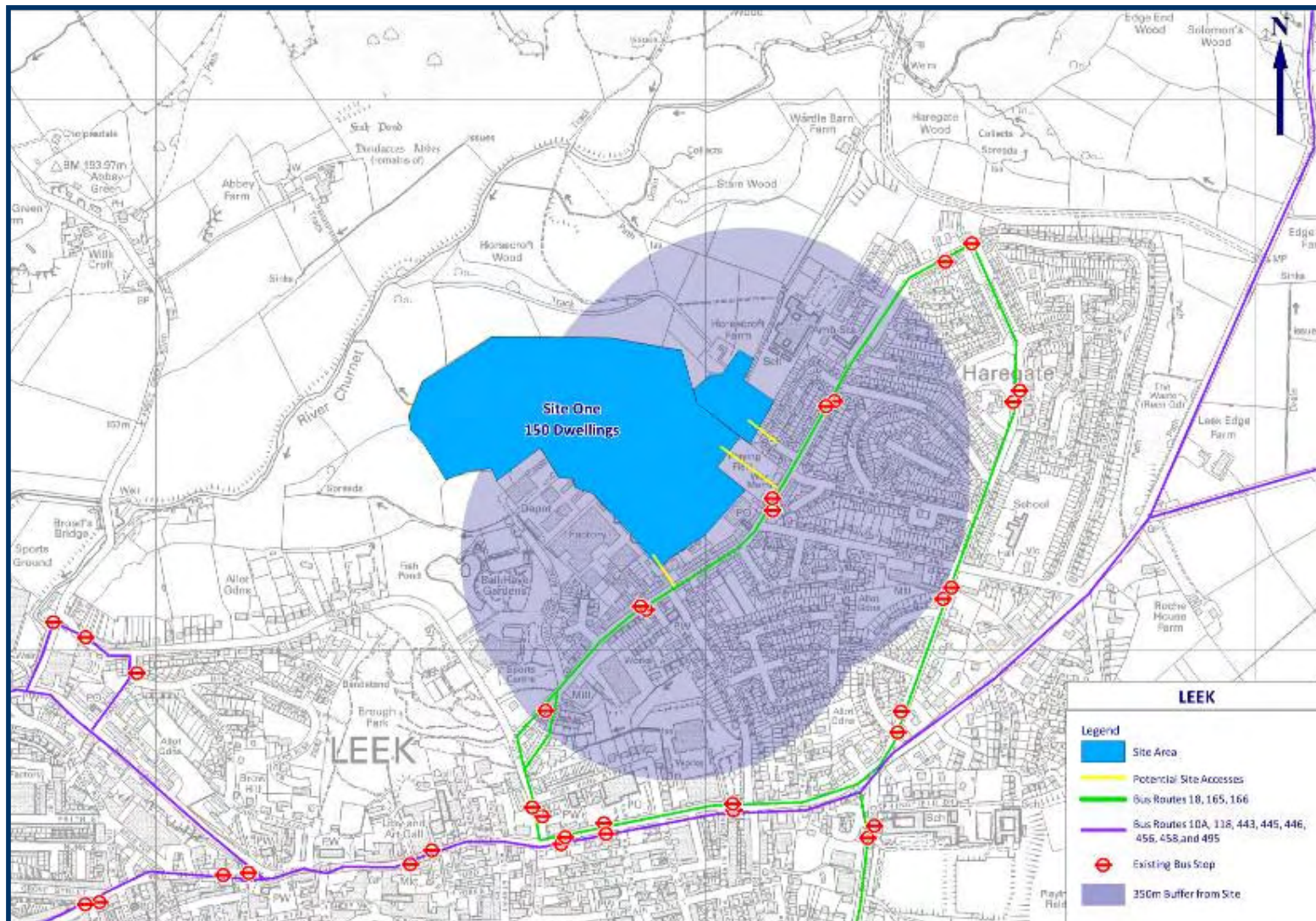


Figure 3.1: Site 1 – bus service provision & stops

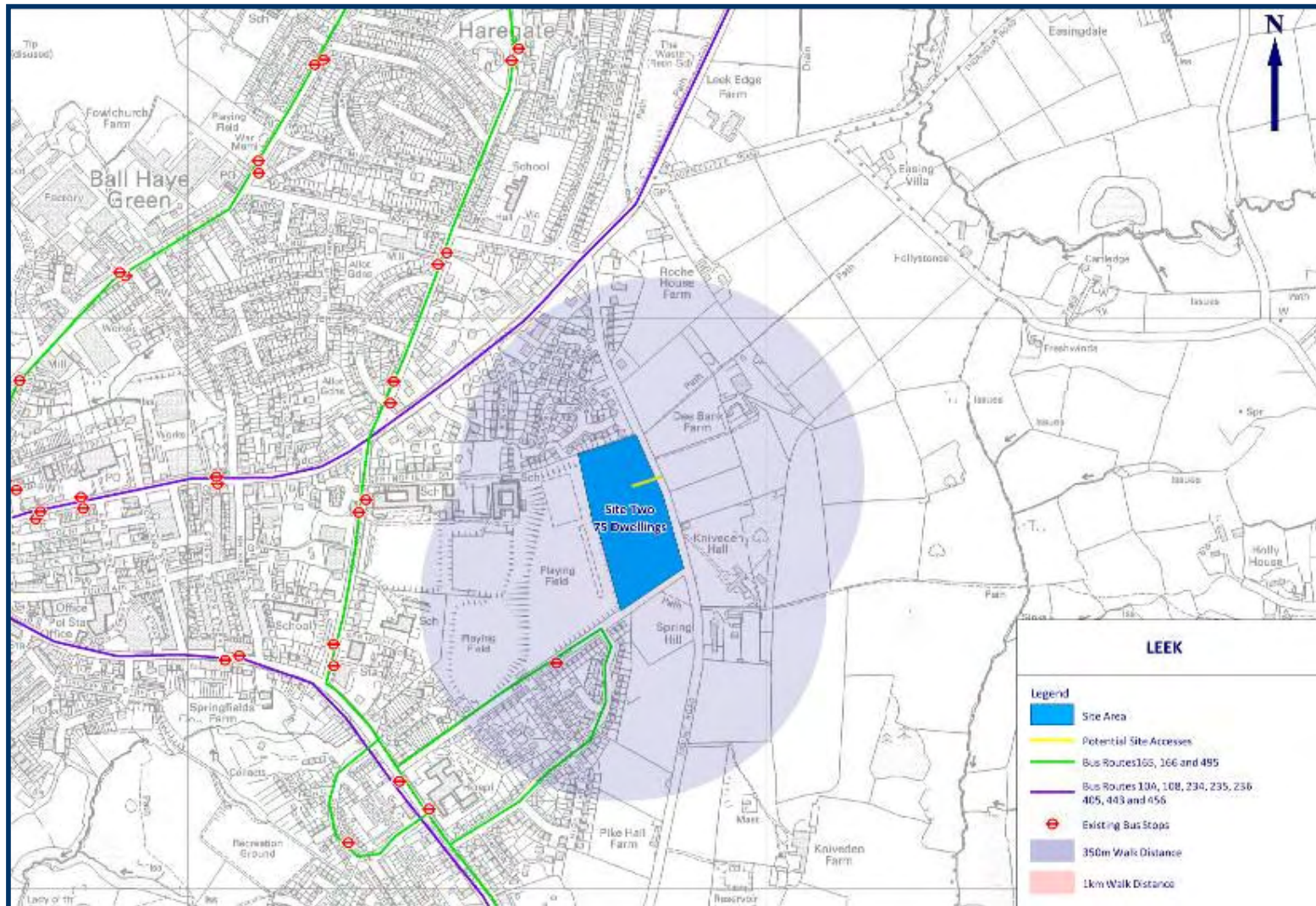


Figure 3.2: Site 2 – bus service provision & stops

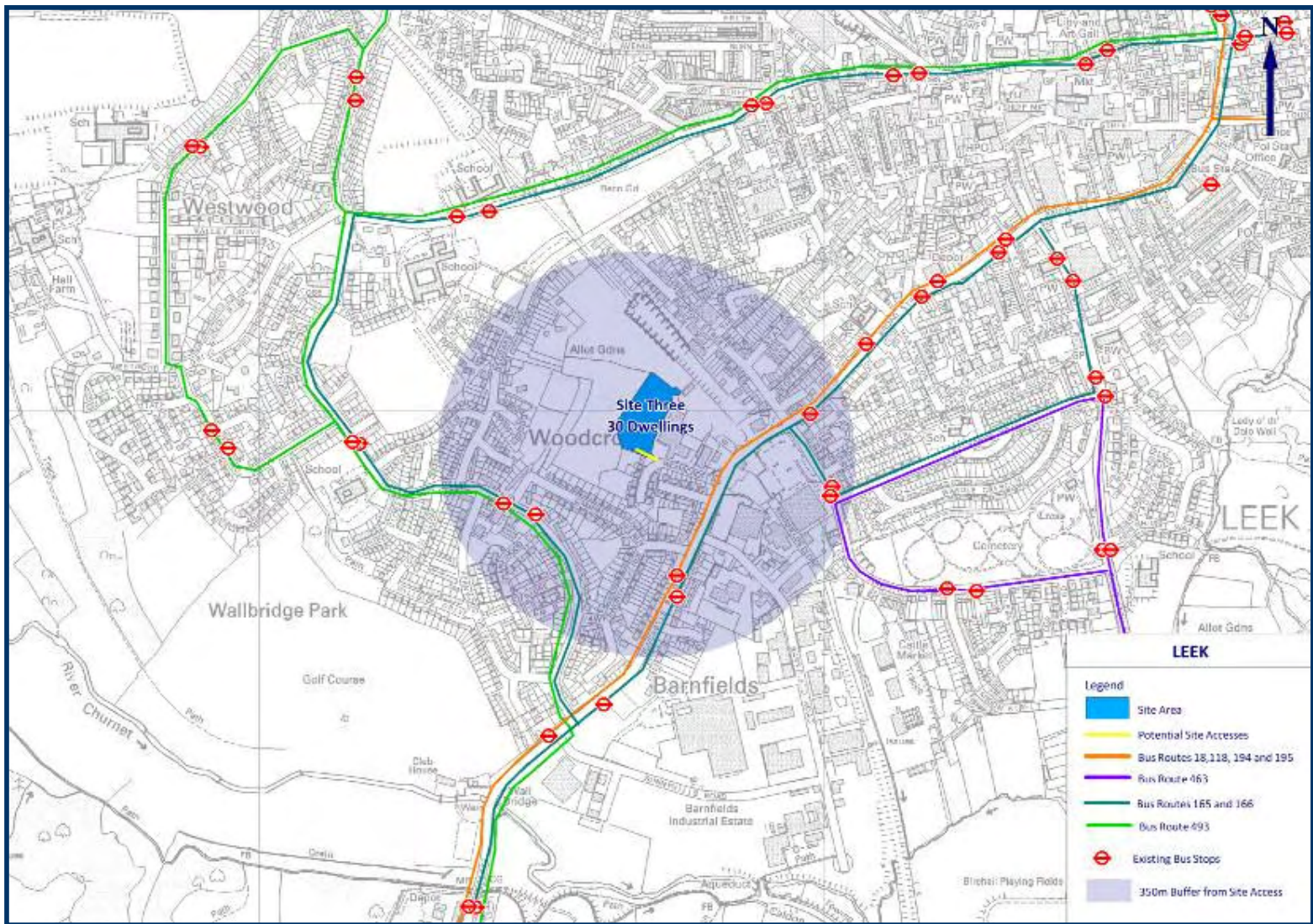


Figure 3.3: Site 3 – bus service provision & stops

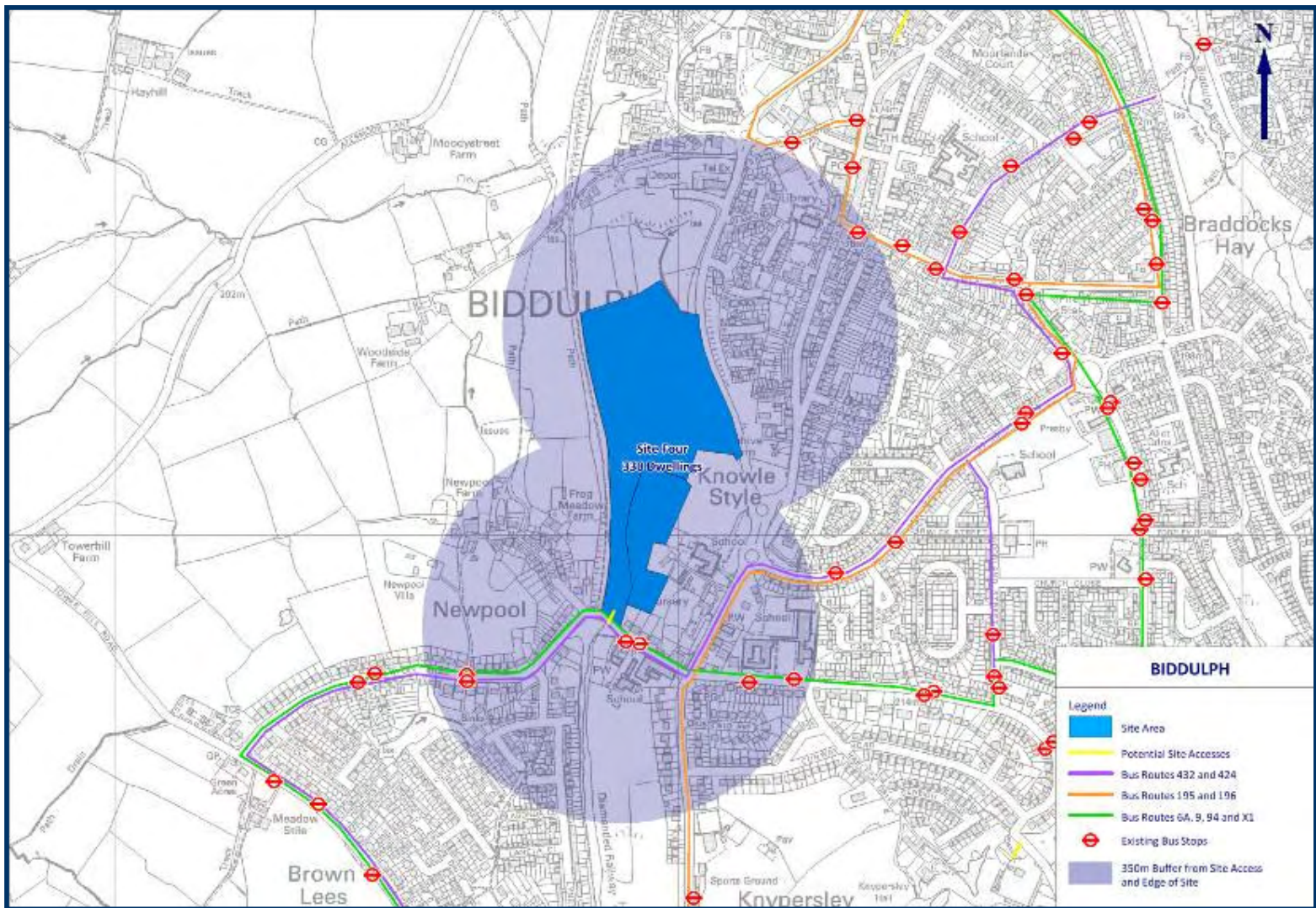


Figure 3.4: Site 4 – bus service provision & stops

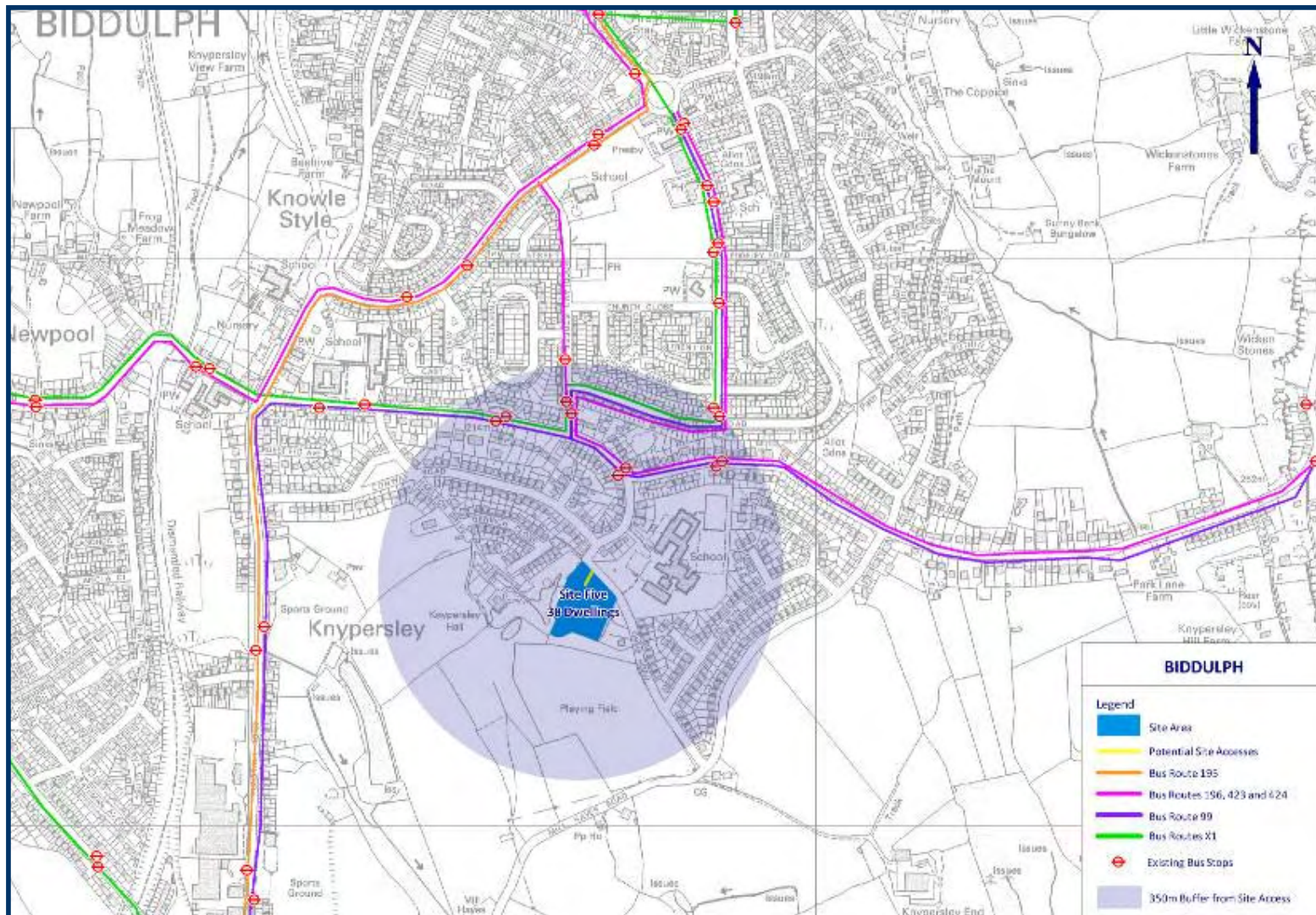


Figure 3.5: Site 5 – bus service provision & stops

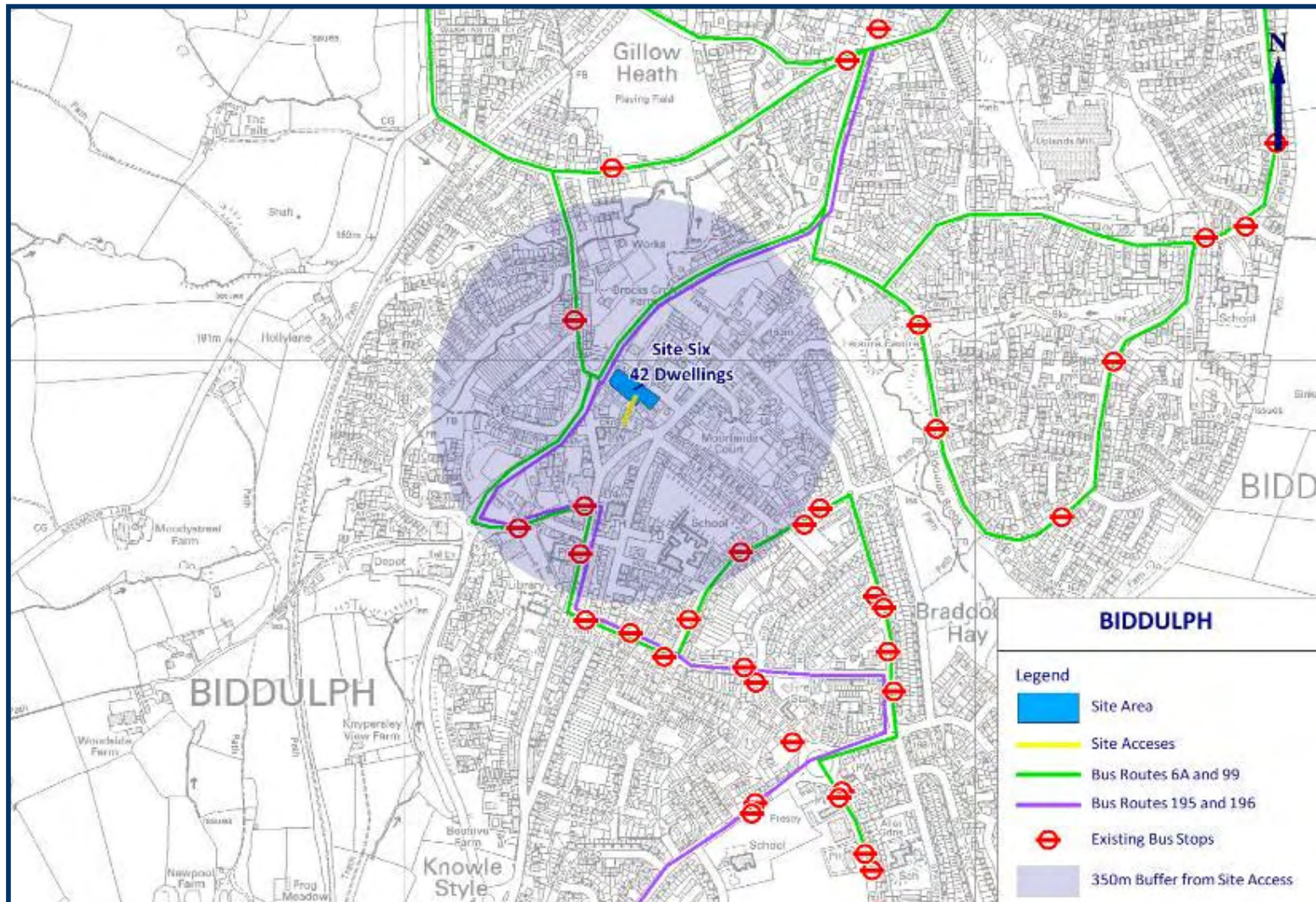


Figure 3.6: Site 6 – bus service provision & stops

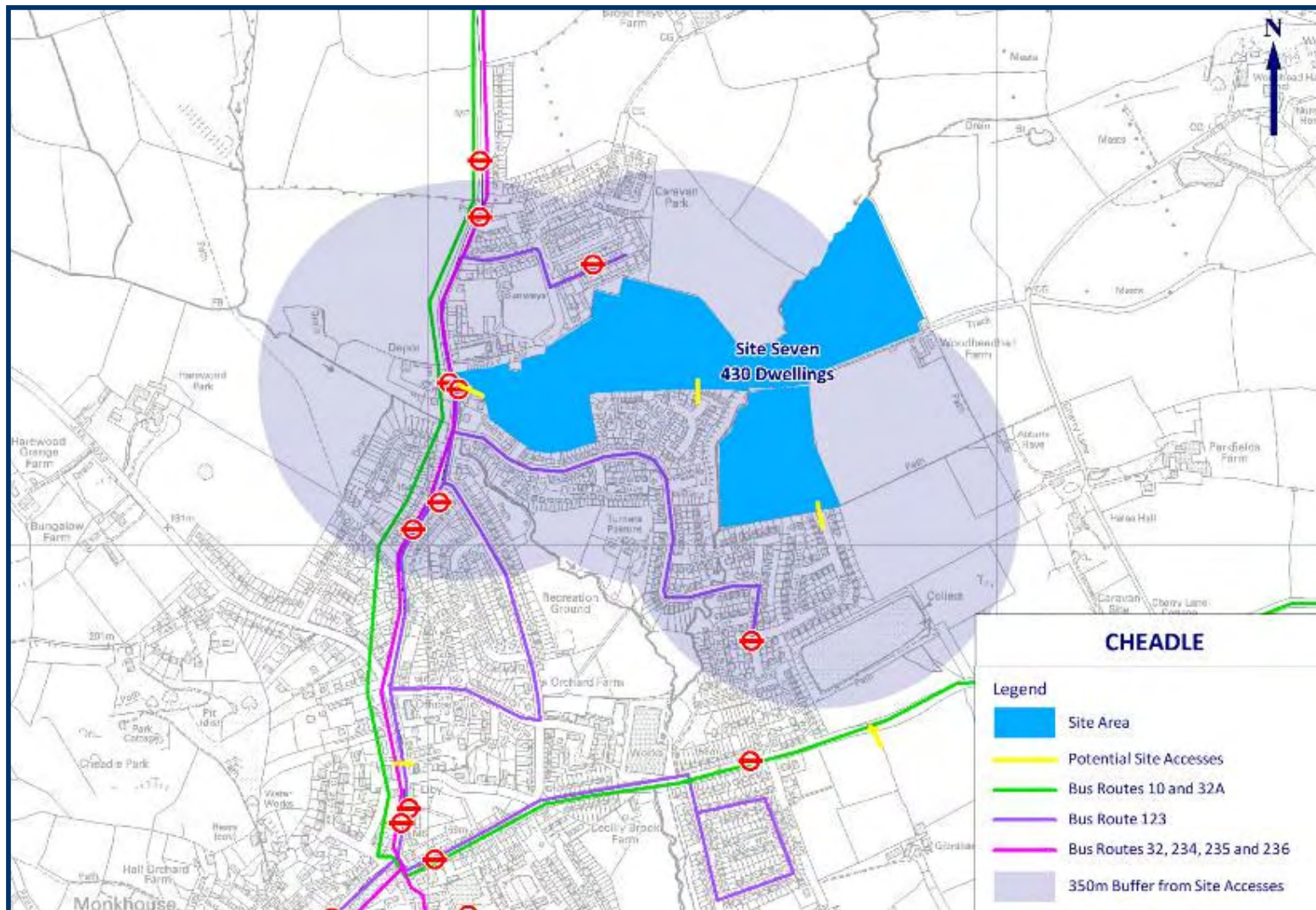


Figure 3.7: Site 7 – bus service provision & stops

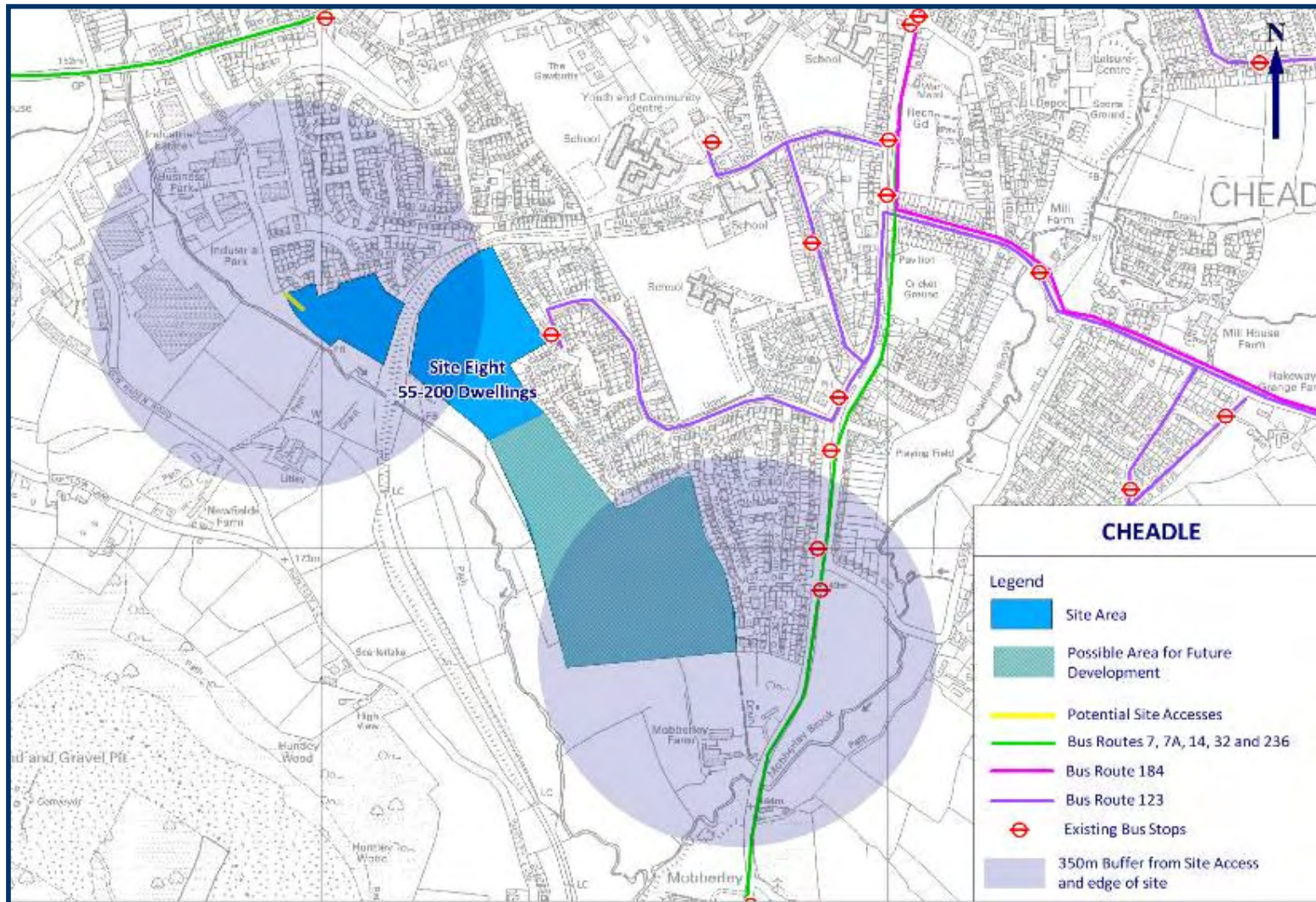


Figure 3.8: Site 8 – bus service provision & stops

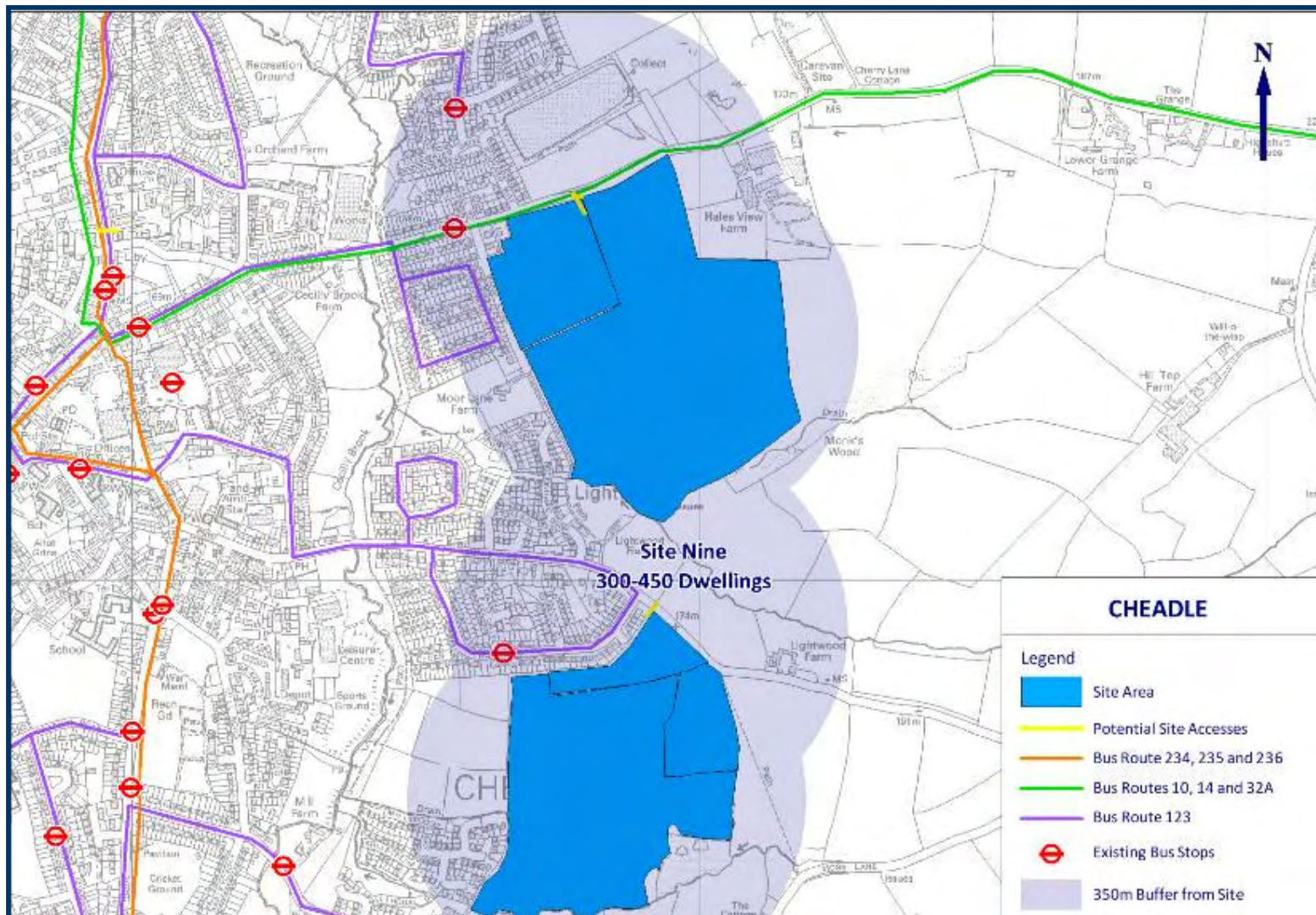


Figure 3.9: Site 9 – bus service provision & stops

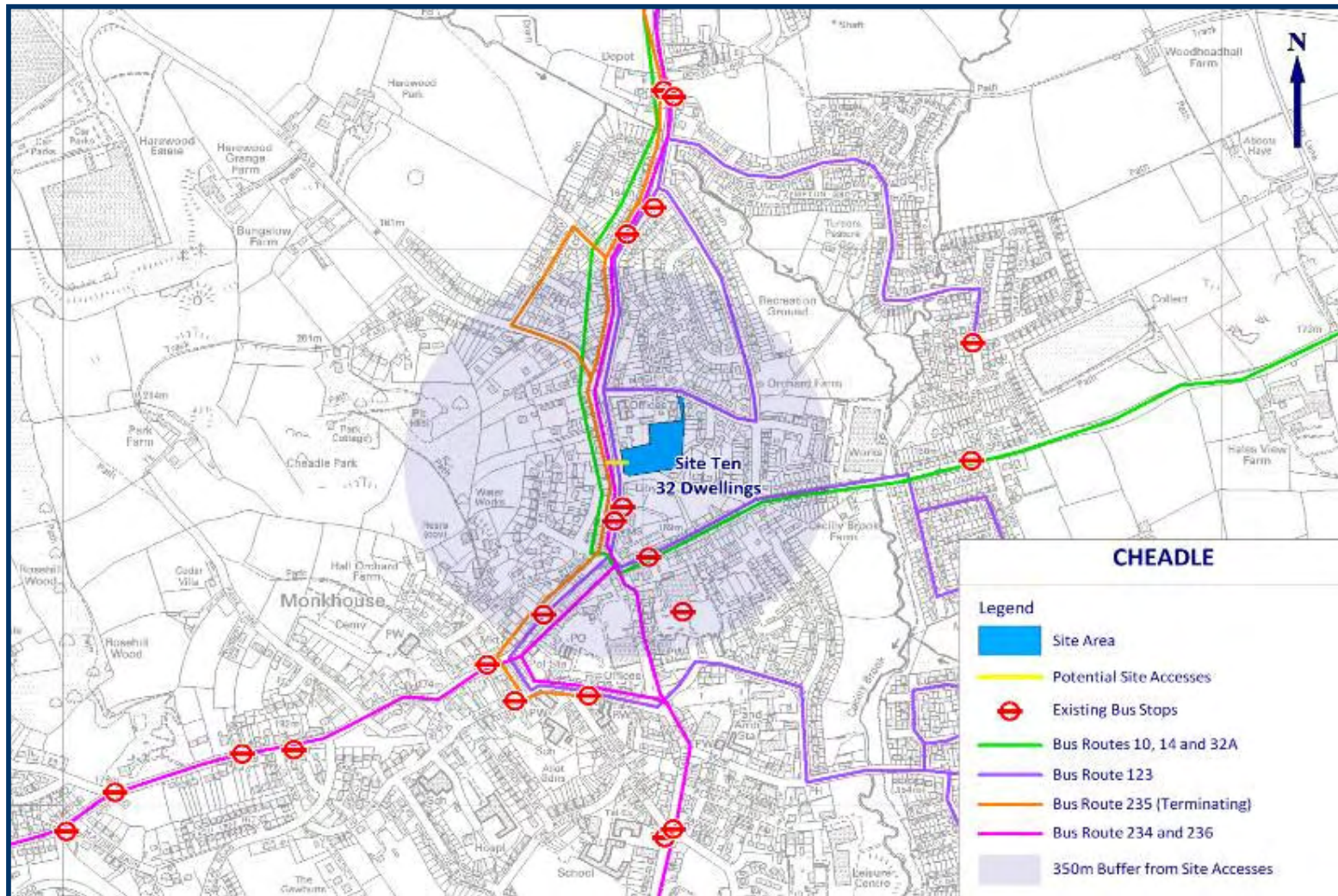


Figure 3.10: Site 10 – bus service provision & stops

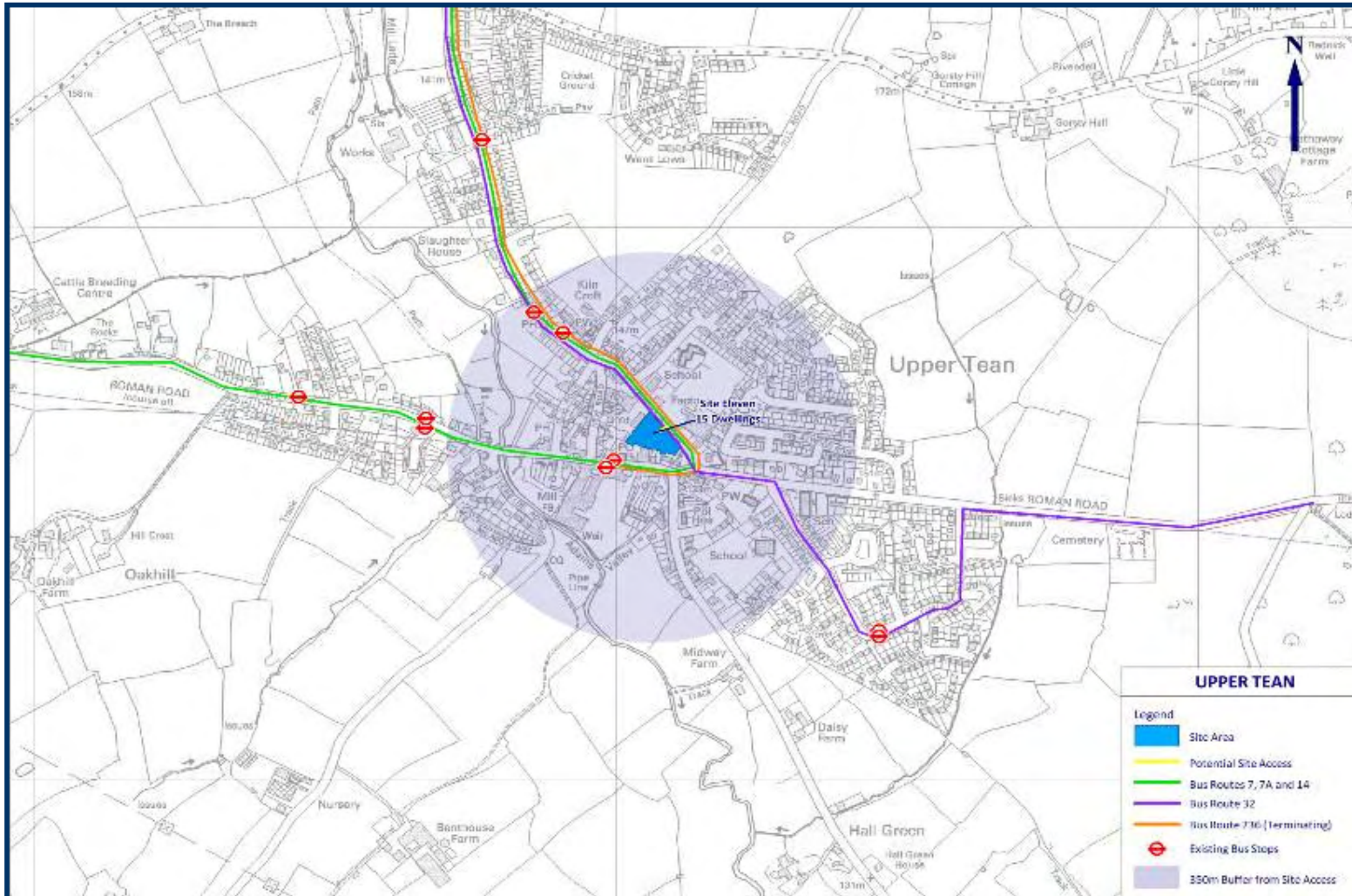


Figure 3.11: Site 11 – bus service provision & stops

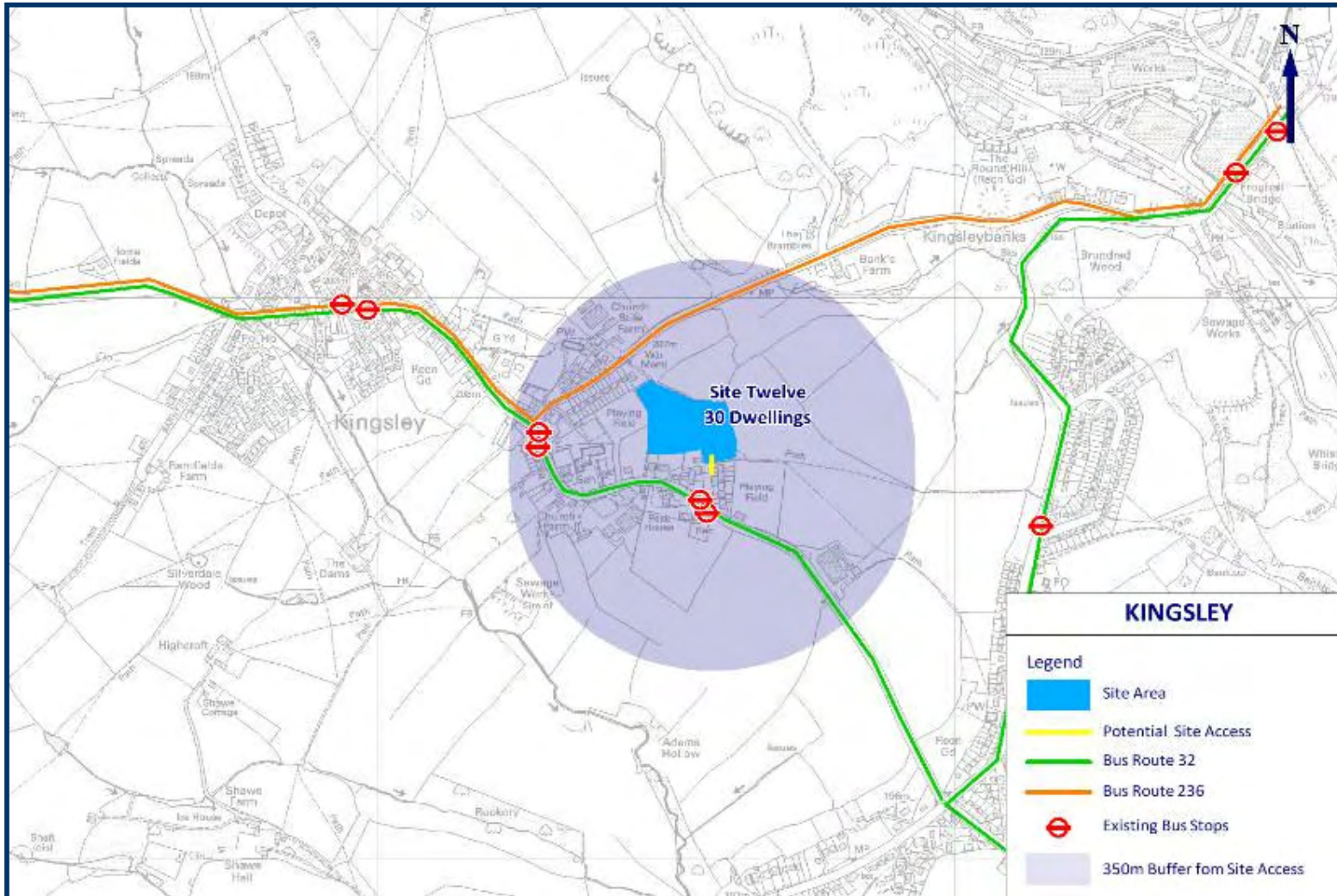


Figure 3.12: Site 12 – bus service provision & stops

- 3.2.2 Development sites 8 and 9 in Cheadle are two of the largest residential sites of the study, with 200 dwellings proposed at site 8, and 450 dwellings at site 9. The local Cheadle town bus service, the 123 currently runs close to both sites, suggesting that it could easily be rerouted to serve both sites, improving public transport accessibility for future residents. It is therefore suggested that an additional vehicle is added to the 123 fleet and the service diverted onto both sites, potentially doubling the 123's frequency. This will improve overall public transport accessibility sites 8 and 9.
- 3.2.3 Site 7 is considered to be more accessible to existing public transport provision than sites 8 and 9, and has better access options for the 123 service to run through the site, with minor alterations. Currently the route penetrates adjacent residential areas, which have only one access, leading to unnecessary route mileage. It may be possible to route the 123 on a loop through the site to the adjacent residential areas, avoiding unnecessary mileage, and at no extra cost.
- 3.2.4 The cost of providing a single additional bus vehicle to enhance an existing route is estimated to be approximately £100,000 per year, with an understanding that these costs will be covered by the developers for the first five years of operation. It is therefore anticipated that an overall contribution of £500,000 would be received from the developers, split proportionately per site pending number of dwellings in each, with site 8 contributing £153,846 and site 9 £346,154.
- 3.2.5 A site visit was undertaken to determine the location and condition of bus stops closest to each development site. This information was used to establish what contribution, if any, would be needed to upgrade existing bus infrastructure. It is assumed that all existing flag stops would be up upgraded to cantilever stops at a cost of £3000 per upgrade, and bus stops with a cantilever or enclosed shelter would not require a contribution.
- 3.2.6 It was determined that the flag stop located along Kniveden Lane, adjacent to site 2 in Leek would be upgraded to a high quality bus shelter. This was decided on the basis that no additional service could effectively be diverted onto the site to effectively increase frequency. However the upgrade of the stop to provide a high quality bus shelter, including Real time Information (RTI), if appropriate, and raised kerbs for ease of boarding and alighting, will improve waiting facilities for existing and potential future bus users.

3.2.7

The methodology suggests that ‘a practical and realistic’ approach should be taken when attributing bus service infrastructure cost to each new development. Table 2.2 shows costs attributed to each site in relation to bus service infrastructure improvements.

Site	Cost of bus rerouting	Type of bus stop upgrade	Number of stops for upgrading	Cost of upgrading bus stops	Total cost of PT enhancements
1	£0	Cantilever	2	£6,000	£6,000
2	£0	High Quality Bus Shelter	1	£6,000	£6,000
3	£0	Cantilever	2	£6,000	£6,000
4	£0	Cantilever	2	£6,000	£6,000
5	£0	Cantilever	2	£6,000	£6,000
6	£0	No Upgrade	0	£0	£0
7	£0	Cantilever	4	£12,000	£12,000
8	£153,846	Cantilever	4	£12,000	£165,846
9	£346,154	Cantilever	4	£12,000	£358,154
10	£0	Cantilever	2	£6,000	£6,000
11	£0	Cantilever	2	£6,000	£6,000
12	£0	Cantilever	2	£6,000	£6,000

Table 3.2: Bus service infrastructure costs

4 Travel Plan Requirements

4.1 *Introduction*

4.1.1 A Travel Plan (TP) is a tailor made package of initiatives that are designed to promote more sustainable travel and reduce reliance on the private car. A TP details a series of mechanisms, initiatives, targets, indicators, consultation, monitoring, and review and change procedures, periodically throughout the TP process. The document is continuously evolving and initially accompanies the Transport Assessment in support of a planning application.

4.1.2 There are a variety of different types of TP's, namely for employment and workplaces, residential sites, and schools. A TP for a residential site is largely concerned with journeys made from a single origin (home) within the site, to multiple destinations.

4.1.3 TP requirements and associated costs have been identified in accordance with the methodology. The cost of the TP is dependant on the number of dwellings proposed for of the each housing sites, however the following requirements are consistent across all sites:

- Provision of a part time Travel Plan Co-ordinator (TPC);
- Marketing material; and
- TP monitoring.

4.2 *Approach*

4.2.1 SCC Travel Plan (TP) policy states that a Framework TP is required for all developments over 50 dwellings, and a full TP required for all developments over 80 dwellings. We have assumed a TP Co-ordinator (TPC) is required for a period of 5 years for all sites requiring a FTP or TP, employed on a part-time basis across all potential housing sites identified in each settlement area. The TPC would be appointed by the developer of the site(s) and report monitoring results back to SCC on an annual basis. This methodology is consistent with SCC guidance.

4.2.2 On this basis, all residential housing sites with proposals for less that 50 dwellings would not be required to provide a TP, and therefore any costs associated with a TP would not be attributed to these housing sites. The sites not requiring a TP include sites 3, 5, 6, 10, 11 and 12, as they are less than 50 dwellings.

4.2.3 A TP is required for all sites over 50 dwellings irrespective of its location, and these documents are developed to reflect the specific transport characteristic of each site, whether it be in located in the town centre, or edge of town. The cost of employing a TPC will be split proportionately between each dwelling pending number of dwellings in each.

4.2.4 Part time TPC's would be appointed by the developer of a site(s), and would liaise with Travel Planning and Development Control officers at SCC in order to update promotional material and undertake annual monitoring exercises

4.2.5 Table 4.1 shows the estimated cost of providing a TPC, and expected contribution from each housing site.

Site	Travel Plan coordinator needed	TPC costs	TPC monitoring costs	Total
1	✓	£66,667	£5,000	£71,667
2	✓	£33,333	£5,000	£38,333
3	x	-	-	-
4	✓	£100,000	£5,000	£105,000
5	x	-	-	-
6	x	-	-	-
7	✓	£79,630	£5,000	£84,630
8	✓	£37,037	£5,000	£42,037
9	✓	£83,333	£5,000	£88,333
10	x	-	-	-
11	x	-	-	-
12	x	-	-	-

Table 4.1: Travel Plan coordinator costs

4.2.6 Contributions from developers towards welcome packs (one per dwelling at £50 per pack) are shown in Table 4.2, along with the total contribution derived from travel plan costs.

No.	Development proposals	Welcome pack costs	Total cost for travel planning
1	150 dwellings	£7,500	£79,167
2	75 dwellings	£3,750	£42,083
3	30 dwellings	-	£0
4	330 dwellings	£16,500	£121,500
5	30 dwellings	-	£0
6	42 dwellings	-	£0
7	430 dwellings	£21,500	£106,130
8	55-200 dwellings	£10,000	£52,037
9	300-450 dwellings	£22,500	£110,833
10	32 dwellings	-	£1,600
11	15 dwellings	-	£0
12	30 dwellings	-	£0

Table 4.2: Travel Plan costs

4.2.7

The final column (in bold) includes the total travel planning cost per site, including co-ordinator, monitoring costs, and welcome pack provision.

5 Off-site highway improvements

5.1 *Introduction*

5.1.1 In accordance with the methodology for identifying costs associated with off-site highway improvements, the most congested junctions within each of the settlement areas were identified, and mitigation requirements and costs identified for each housing site and settlement area.

5.1.2 The analysis undertaken in this chapter uses a Travel Demand Model that was created to consider off-site mitigation requirements, and information on this model is provided in **Appendix D**.

5.2 *Junction identification*

5.2.1 A site visit was undertaken to each of the settlement areas during a weekday morning peak hour, in order to identify junctions that were operating close to capacity. Key junctions in each settlement area were grouped into categories based on their operation observed during the site visit, based on the level of queues generated on each approach to the junction. The grading of junctions observed is set out below in Table 5.1

Existing Junction Capacity	Description
Operating at 20% of capacity	No problem
Operating at 40% of capacity	Queues unlikely
Operating at 60% of capacity	Occasional queuing
Operating at 80% of capacity	Sometimes significant queuing
Operating at 100% of capacity	Always congested

Table 5.1: Junction grading criteria

5.2.2 Key junctions were identified in each settlement area, as being those considered to be operating at 80% capacity or above (based on the level of existing vehicle queues and delays) identified

5.2.3 The existing observed capacity of each junction is set out below in Tables 5.2 to 5.4.

No.	Junction name	Capacity score
1	A53 Buxton Road/A53 Stockwell Street/Ball Haye Road/ A53 Ball Haye Street (signals)	80%
2	Fountain Street/A53 Ball Haye Street/Derby Street/A523 Ashbourne Road/A53 Haywood Street (Roundabout)	80%
3	A53 Brook Street/St Edward Street/A53 Broad Street/A520 Compton (signals)	80%
4	A53 Broad Street/A53 Newcastle Road/Burton Street/Junction Road (roundabout)	80%

Table 5.2: Constrained junctions in Leek

5.2.4

Junctions 2 and 3 in Leek have been identified within the emerging masterplan being developed by SMDC for the area, with improvements being suggested including the removal of the roundabout (junction simplification) at junction 2 and improvements to the signals / pedestrian crossing facilities for junction 3.

No.	Junction name	Capacity score
1	A527 Congleton Road/Thames Drive (roundabout)	80%
2	A527 Tunstall Road/Park Lane/ Newpool Road (signals)	80%

Table 5.3: Constrained junctions in Biddulph

No.	Junction name	Capacity score
1	A521 High Street/A522 Leek Road/A522 Tape Street (roundabout)	80%
2	A522 Tape Street/Queen Street (roundabout)	80%
3	A522 Tape Street/B55032 Ashbourne Road (roundabout)	80%

Table 5.4: Constrained junctions in Cheadle

5.2.5

Junctions 1 and 2 in Cheadle have also been identified as requiring capacity improvements, from their inclusion in the emerging draft masterplan being developed for SMDC. Improvements identified in the report include a change from a roundabout layout to a signal controlled junction design, with pedestrian facilities included.

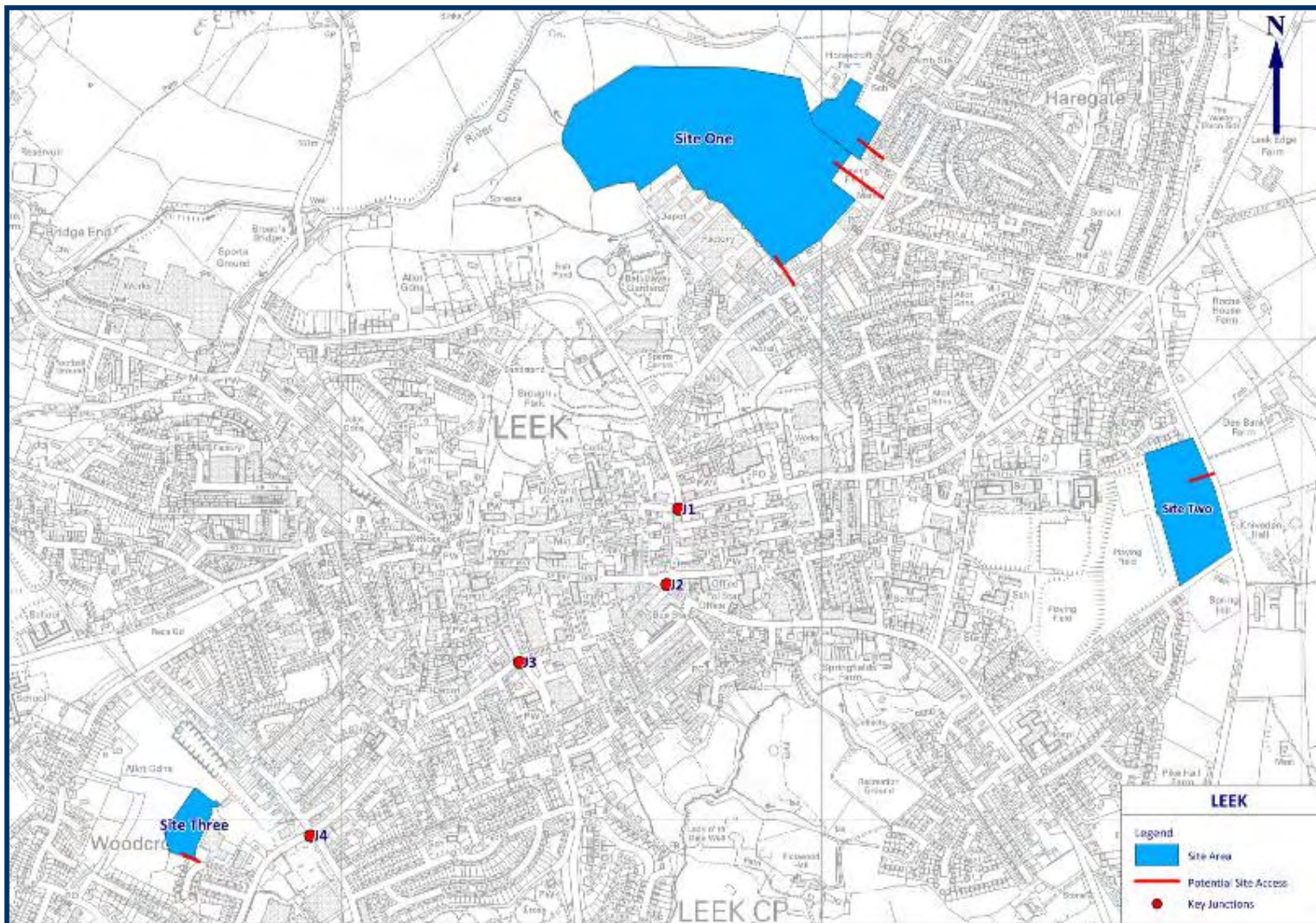


Figure 5.1: Leek housing sites & junctions

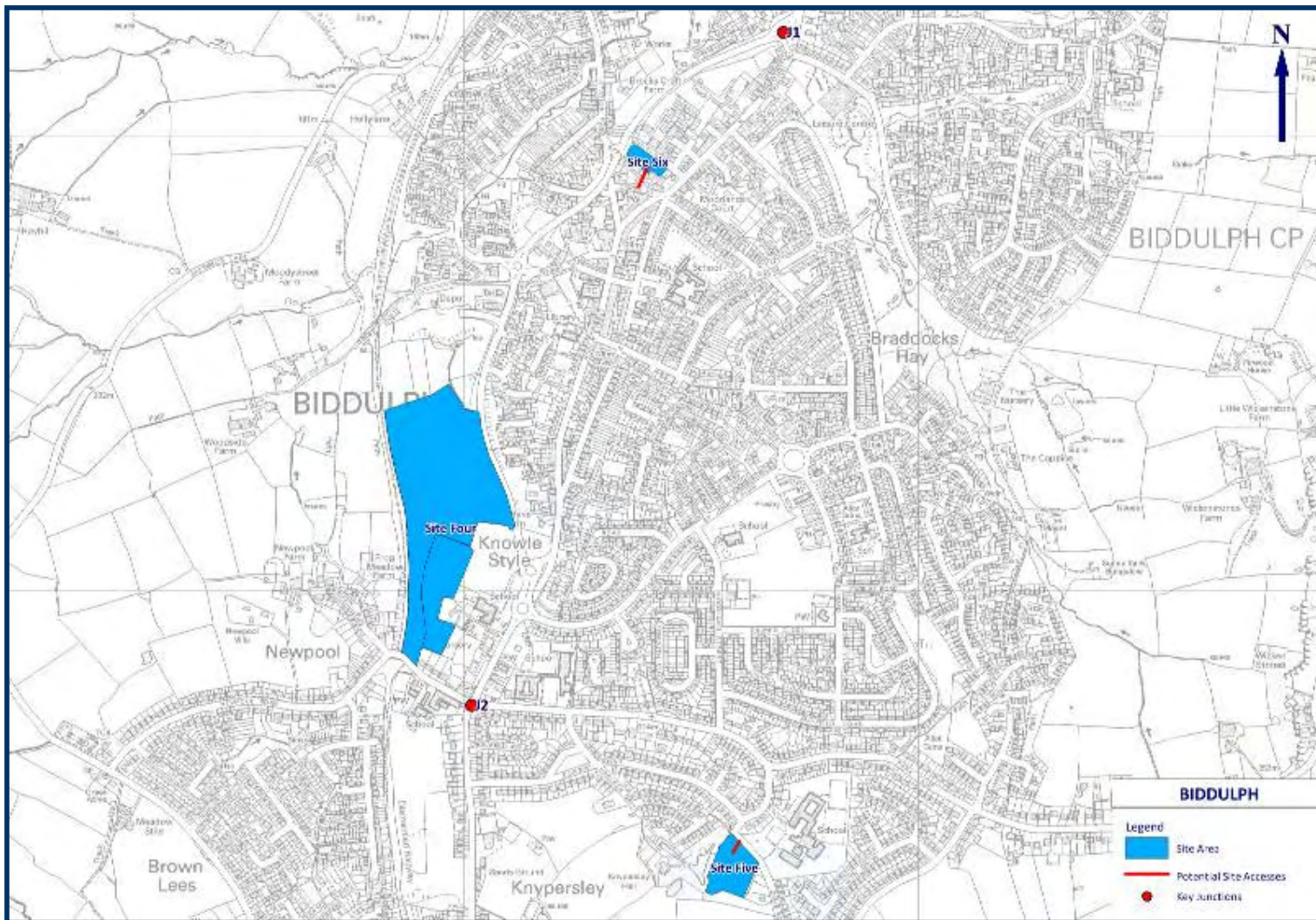


Figure 5.2: Biddulph housing sites & junctions

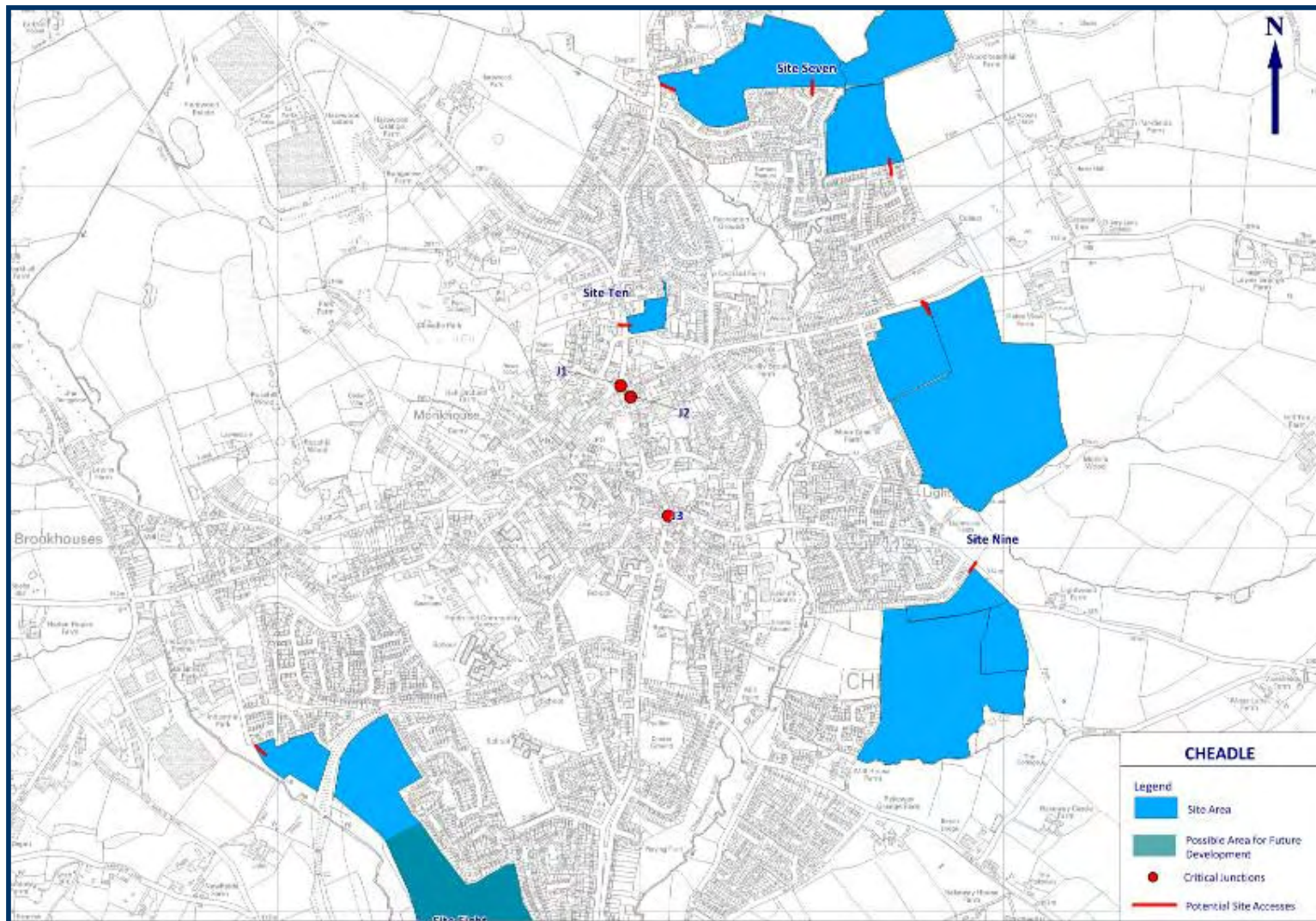


Figure 5.3: Cheadle housing sites & junctions

5.3

Housing sites trip generation

5.3.1

The trip generating potential of each of the housing sites located within the three settlement areas, were identified using TRICS and 2001 Census data. Person trip rates were derived from TRICS for private dwellings with edge of town/rural locations, in order to provide a robust view on trip generation, irrespective of the sites location. The trip rate identified is set out below in Table 5.5

Land use	Arrivals	Departures	Total
Residential dwellings	0.7	0.4	1.1

Table 6.6: Morning peak person trip rate per dwelling

5.3.2

The above table identifies total person trips per dwelling for a weekday morning hour. This trip rates represents trips made by all modes of transport i.e. car, bus, walk/cycle, etc.

5.3.3

In order to identify the number of car trips that could be generated to and from each of the housing sites during the morning peak hour, 'journey to work' census data has been derived from a residential output area in each settlement area from 2001 census data.

5.3.4

Table 5.6 shows the percentage of employment trips made by car at each settlement area. An assumption has been made that half of all employment trips made by people travelling as a passenger in a car are included as car trips. This is a robust assumption as it is likely that many of these are existing trips already using the local network.

Settlement Area	% Employment Car Trips
Leek	69%
Biddulph	80%
Cheadle	82.5%

Table 5.6: Percentage of car users in each settlement area

5.3.5

The above car user percentages were applied to person trip rates to identify the number of morning peak hour trips that would be generated by each of the housing sites. An example of applying this methodology to site 1 in leek is set out below in Table 5.7

LEEK- Site 1		
Ref	Generating Factors	Output
Input		
A	Number of dwellings proposed at site 1	150 dwellings
B	% car users (derived from census data)	69%
C	Two-way person trip rates (derived from TRICS 2009)	1.1
Output		
D	Number of person trips generated during the morning peak at site 1	D= A x C
		165 person trips
E	Number of vehicle trips generated during the morning peak at site 1	E=D x B
		114 vehicle trips

Table 5.7- Example of how trip generation is calculated

5.3.6

The trips generated by each housing site (excluding sites 11 and 12 located outside a major urban area) during a morning peak hour are set out below in Table 5.8.

Housing Site No.	Dwellings Proposed	*Vehicle Trips
1	150 dwellings	114
2	75 dwellings	59
3	30 dwellings	22
4	330 dwellings	263
5	30 dwellings	24
6	42 dwellings	34
7	430 dwellings	391
8	200 dwellings	182
9	450 dwellings	409
10	32 dwellings	29

Table 5.8: Morning peak two-way trips per site

* based on two-way morning peak hour trip rates derived from TRICS

5.4

Trip distribution & assignment

5.4.1

Census 2001 Journey to Work data was used to determine where people, who will live in the proposed developments, work thereby providing an indication of trip distribution. This traffic was assigned onto the adjoining highway network, using major roads that provided the most direct and realistic route between origin and destination.

5.5

Mitigation requirement

5.5.1

Using the site numbering identified earlier in this report (1 to 12), the impact on each junction has been identified using the process identified within the methodology. The impact each site has on the junctions is set out below in Tables 5.9 to 5.17.

Junction name: Leek junction 1				
Housing site	Existing network capacity score	Congestion risk factor score	Total score	Comments
Site 1	80%	18%	111%	Major mitigation measure required at the junction
Site 2		10%		
Site 3		3%		

Table 5.9: Leek junction 1

Junction name: Leek junction 2				
Housing site	Existing network capacity score	Congestion risk factor score	Total score	Comments
Site 1	80%	18%	111%	Major mitigation measure required at the junction
Site 2		10%		
Site 3		3%		

Table 5.10: Leek junction 2

Junction name: Leek junction 3				
Housing site	Existing network capacity score	Congestion risk factor score	Total score	Comments
Site 1	80%	18%	111%	Major mitigation measure required at the junction
Site 2		10%		

Site 3		3%		
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Table 5.11: Leek junction 3

Junction name: Leek junction 4				
Housing site	Existing network capacity score	Congestion risk factor score	Total score	Comments
Site 1	80%	10%	98%	Minor mitigation measure required at the junction
Site 2		5%		
Site 3		3%		

Table 5.12: Leek junction 4

Junction name: Biddulph junction 1				
Housing site	Existing network capacity score	Congestion risk factor score	Total score	Comments
Site 4	80%	18%	104%	Minor mitigation measure required at the junction
Site 5		3%		
Site 6		3%		

Table 5.13: Biddulph junction 1

Junction name: Biddulph junction 2				
Housing site	Existing network capacity score	Congestion risk factor score	Total score	Comments
Site 4	80%	25%	115%	Major mitigation measure required at the junction
Site 5		5%		
Site 6		5%		

Table 5.14: Biddulph junction 2

Junction name: Cheadle junction 1				
Housing site	Existing network capacity score	Congestion risk factor score	Total score	Comments
Site 7	80%	25%	153%	Major mitigation measure required at the junction
Site 8		25%		
Site 9		18%		

Site 10		5%		
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Table 5.15: Cheadle junction 1

Junction name: Cheadle junction 2				
Housing site	Existing network capacity score	Congestion risk factor score	Total score	Comments
Site 7	80%	25%	153%	Major mitigation measure required at the junction
Site 8		18%		
Site 9		25%		
Site 10		5%		

Table 5.16: Cheadle junction 2

Junction name: Cheadle junction 3				
Housing site	Existing network capacity score	Congestion risk factor score	Total score	Comments
Site 7	80%	25%	153%	Major mitigation measure required at the junction
Site 8		18%		
Site 9		25%		
Site 10		5%		

Table 5.17: Cheadle Junction 3

5.6

5.6.1

Mitigation identification

Mitigation has been identified for congested junctions based on the cumulative traffic impact of each housing site located within the same settlement area. Typical mitigation is likely to be the conversion of roundabouts to signal controlled junctions, and the provision of MOVA at existing signal junctions. These are considered to be appropriate measures to increase capacity and to manage the additional traffic. Many of the junctions under consideration have a limited amount of highway land available, to implement more comprehensive junction improvements.

5.6.2

Off-site mitigation has only been considered for congested junctions within the major urban settlement areas. Junctions within Upper Tean and Kingsley were considered to be operating at capacity better than 80%, and therefore able to accommodate the additional trips generated by the proposals in these areas.

5.7

Off-site highway improvement costs

5.7.1

The costs attributed to each of the housing sites are set out below in Table 5.18.

Site no.	Assumed proposals	Total cost	Cost per dwelling
1	150 dwellings	£245,916	£1,639.44
2	75 dwellings	£128,761	£1,716.81
3	30 dwellings	£25,323	£844.11
4	330 dwellings	£164,179	£497.51
5	30 dwellings	£14,925	£497.51
6	42 dwellings	£20,896	£497.51
7	430 dwellings	£365,178	£849.25
8	200 dwellings	£173,840	£869.20
9	450 dwellings	£322,204	£716.01
10	32 dwellings	£38,777	£1,211.79
11	15 dwellings	£0	£0.00
12	30 dwellings	£0	£0.00

Table 5.18: Off-site contributions per site

5.7.2

The table shows that each dwelling (excluding sites 11 and 12 located outside urban areas) would be required to contribute up to £2,000 towards office highway improvements. This excludes contributions made to more strategic transport schemes identified for each area.

5.7.3

Mitigation costs have been shared proportionally across the sites that share an impact on a particular junction. This takes into account the number of units, trip generation and trip distribution.

5.7.4

At junctions where large mitigation measures are required, but due to observed land constraints, they cannot be delivered, a smaller mitigation scheme has been identified, and the outstanding financial contribution has been put aside towards other strategic highway improvements (identified in the following Chapter).

6 Strategic highway costs

6.1 *Introduction*

6.1.1 The previous Chapter identified the likely transport costs, which are typical of most UK based residential development sites, irrespective of location and highway authority. This Chapter considers contributions to strategic transport schemes that have been identified in each settlement.

6.1.2 Strategic highway costs have been identified in accordance with infrastructure improvements set out in the Area Action Plan (AAP) documents available for each settlement area.

6.2 *Strategic highway requirements*

6.2.1 Strategic highway requirements have been discussed with SCC in relation to integrated transport schemes for delivery in each of the three major settlement areas. These schemes are largely included within the Staffordshire Moorlands District Integrated Transport Strategy (SMDITS) as part of the Local Transport Plan 2 (LTP2), but these are currently under review with reference to LTP3 guidance and objectives.

6.2.2 Masterplans are currently in the process of being developed for Leek and Cheadle, and follow several months of work that has researched the different ways that the town centres could be improved. The masterplans present a baseline study and design options for proposed land uses, and transport infrastructure requirements.

6.2.3 In circumstances where an authority may wish to control the impact of a development, but the desired restrictions go beyond the bounds that conditions cover, the authority may enter into a Section 106 Agreement or Planning Obligation. Planning obligations should only ever be prepared when it is considered that a development will have negative impacts that cannot be dealt with through conditions.

6.2.4 Planning obligations should only be sought where they meet all of the following tests:

- Relevant to planning;

- Necessary to make the proposed development acceptable in planning terms;
- Directly related to the proposed development;
- Fairly and reasonably related in scale and kind to the proposed development; and
- Reasonable in all other aspects.

6.2.5 A S106 agreement is identified in relation to a specific improvement scheme, which needs to be identified before a contribution is requested. Given that the improvements identified in the Integrated Transport Strategy and other AAP documents are insufficiently detailed at this stage, it is not possible to attribute a cost from each housing site to these schemes.

6.2.6 In order to identify infrastructure improvements that require developer funding to implement them, the following documents have been reviewed:

- Biddulph Town Centre Area Action Plan (February 2007);
- Leek Town Centre Masterplan – Options Workshop Presentation;
- Cheadle Town Centre Masterplan – Options Workshop Presentation;
- Staffordshire Moorlands District Integrated Transport Strategy (29th September 2009).

6.2.7 Measures have been identified for each settlement area and are outlined below.

6.3 *Leek*

6.3.1 Within the Leek town centre masterplan – Options workshop presentation a number of schemes have been identified as potential improvements these are:

- Pedestrian/cycle connections linking town centre with Brough Park;
- Raised pedestrian crossing north of Market Place
- Public Realm improvements to Derby Street, Sheep Market, Market Place and Stanley Street;
- Provide pedestrian cycle linkages to new commercial square;
- Traffic calming on St Edward Street;
- Public transport priority on A520, A53;
- Remodelled bus station;
- Upgraded car parking at Church Street/A520 and A520/A53;

- Improved junction at A523/A520, A53/A523 Stockwell Street, A53/A523 Ashbourne Road & A53/A520 with new materials, signage and architectural lighting;
- Pedestrian/cycle routes with appropriate crossing points at a number of locations;
- Remodelling of junction/crossing arrangement on A523 Ashbourne Road;
- Public Transport link to potential new railway station;
- Provide after hours traffic restriction scheme.

6.3.2

Further more general proposals have been identified within the Moorlands Integrated Transport Strategy both specific to Leek and the wider district, these are:

- Continuing development of Public Transport Partnerships (PTP) on Route 18 Leek – Hanley;
- Develop access proposals for Leek Cornhill area including new access road;
- Measures to encourage walking and cycling;
- A53 Broad Street pedestrian crossing;
- Completion of National Cycle Network;
- Pedestrian crossing priorities;
- Community transport schemes;
- Bus strategy;
- Bus stop upgrades;
- Improved rail station passenger infrastructure at Blyth Bridge;
- Deliver Moorlands Connect Demand Responsive Rural Public Transport;
- Safer Routes to School scheme for Leek High School;
- Local Safety Scheme at A52 Kingsley Road/Dilhorne Road;
- Zebra crossing upgrades;
- Implementing the Rights of Way Improvement Plan;
- Consider signalisation of other junctions and develop proposals to link town centre traffic signals;
- Cornhill development junction improvements;
- Review of Road Hierarchy;
- Sustainable Travel Awareness;
- Leek cycle routes.

6.3.3 The infrastructure improvement schemes proposed within the Integrated Transport Strategy and Leek AAP options presentation document, are at this stage insufficiently detailed for a cost estimate to be provided.

6.4

Biddulph

6.4.1

Within the Biddulph Town Centre Area Action Plan (February 2007) a number of schemes have been identified as potential improvements these are:

- Pedestrianisation or part pedestrianisation of High Street between South View and Station Road;
- Town centre traffic management plan;
- Landscaping and environmental improvement scheme on High Street;
- Wharf Road cycle parking;
- Wharf Road - 400-500 car parking spaces;
- Wharf Road - Enhanced pedestrian linkages;
- Provision of pedestrian/cycle links to town centre and Biddulph Valley Way from the Bypass site;
- Potential for public transport linkages to be provided to the Bypass site;
- Footpaths to be provided between Wharf Road and High St/Well St junction and between Co-op & Weatherspoons;
- Pedestrian refuge across bypass and new footpath on the large council car park;
- Landscaping, signing and architectural lighting improvements;
- Landscaping to be provided at Tunstall Road/Bypass and Bypass/Congleton Road junctions;
- New sign for town centre access at Wharf Road;
- Appropriate signage for through traffic around the town centre and along the bypass;
- Public Realm, landscaping and signposting at Wharf Road/Bypass, High Street/Well Street junctions and on High Street at the War Memorial;
- Traffic management measures;
- Cycle routes at Wharf Road and to provide a North-South link;
- Cycle Parking at three sites;
- Taxi rank with adjacent bus facility.

6.4.2

Further more general proposals have been identified within the Moorlands Integrated Transport Strategy both specific to Biddulph and the wider district, these are:

- Completion of National Cycle Network;
- Pedestrian crossing priorities;
- Community transport schemes;
- Bus strategy;
- Bus stop upgrades;
- Improved rail station passenger infrastructure at Blyth Bridge;
- Deliver Moorlands Connect Demand Responsive Rural Public Transport;
- Zebra crossing upgrades;
- Implementing the Rights of Way Improvement Plan;
- PTP Route 99 Biddulph- Macclesfield;
- Complete Biddulph cycling strategy and cycle infrastructure improvements;
- Pedestrian priority measures in Biddulph;
- Biddulph Regeneration;
- Continued implementation of Town centre traffic management proposals;
- Safer Routes to School at Biddulph High School;
- Biddulph Cycling Strategy;
- Continued development of Public Transport Partnerships (PTP) Biddulph – Macclesfield;
- Pedestrian crossing upgrade at A527 Congleton Road, Biddulph;
- Cycle parking facilities linked to new interchange.

6.4.3

The infrastructure improvement schemes proposed within the Integrated Transport Strategy and the Biddulph Area Action Plan (February 2007), are at this stage insufficiently detailed for a cost estimate to be provided.

6.5

Cheadle

6.5.1

Within the Cheadle Town Centre Masterplan – Options Workshop Presentation a number of schemes have been identified as potential improvements these are:

- Public Realm improvements along High Street, and public square;
- New pedestrian route on Cross Street;
- New commercial square and improved pedestrian/cycle links;
- Raised pedestrian crossing at Cross Street/Chapel Street;
- Potential public transport link to Blythe Bridge;
- Public transport superstops;
- Enhanced junctions at A522/Chapel Street and Chapel Street/A521;
- Traffic calmed/shared surface environment on High Street/Bank Street/Chapel Street;

- Pedestrian/cycle improvements at multiple locations;
- Upgraded car parking at A522/Chapel Street and Well Street;
- Public Realm improvements at three locations to form new gateways to the town;
- Remodelling of junction and crossing at the A522/High Street junction.

6.5.2 Further more general proposals have been identified within the Moorlands Integrated Transport Strategy both specific to Cheadle and the wider district, these are:

- Completion of National Cycle Network;
- Pedestrian crossing priorities;
- Community transport schemes;
- Bus strategy;
- Bus stop upgrades;
- Improved rail station passenger infrastructure at Blyth Bridge;
- Deliver Moorlands Connect Demand Responsive Rural Public Transport;
- Zebra crossing upgrades;
- Implementing the Rights of Way Improvement Plan;

6.5.3 The schemes proposed within the Integrated Transport Strategy and the Cheadle town centre masterplan – options workshop presentation, are at this stage insufficiently detailed for a cost estimate to be provided.

6.6 *Summary*

6.6.1 This chapter has identified a range of strategic highway infrastructure schemes for each settlement area, which would typically require developer funding to assist in their implementation.

6.6.2 However, due to the lack of detail regarding the delivery of these scheme, no costs have been associated with them. Consideration will be given to financial contributions at the planning application stage.

7 Summary & conclusion

7.1 *Summary*

7.1.1 This report identifies indicative costs of transport infrastructure to support the development of twelve sites in Staffordshire Moorlands, and should be read in conjunction with ‘Transport Infrastructure Costs Methodology’ document. Twelve potential residential housing sites have been identified within Staffordshire Moorlands. These are primarily grouped around the urban areas of Leek, Biddulph and Cheadle.

7.1.2 Transport infrastructure costs have been identified towards:

- Travel Planning
- Pedestrian / Cycle Infrastructure
- Bus service provision
- Off-site highway costs

7.1.3 Strategic highway requirements have also been identified separate to the above, for further cost considerations in the future. The overall transport costs associated with housing sites, identified by site and settlement, are set out below.

7.1.4 The costs per settlement area are set out below, and per site overleaf.

Leek

7.1.5 Total transport infrastructure costs of £585,150, with an average cost per dwelling of £2,076. These exclude any additional costs associated with strategic transport improvements.

Biddulph

7.1.6 Total transport infrastructure costs of £334,528, with an average cost per dwelling of £703. These exclude any additional costs associated with strategic transport improvements.

Cheadle (including Upper Tean and Kingsley)

7.1.7 Total transport infrastructure costs of £1,957,101, with an average cost per dwelling of £1,973. These exclude any additional costs associated with strategic transport improvements.

Site area	Site reference	Development proposals	Public transport costs	Cycle costs	Pedestrian costs	Junction improvement costs	TPC and TP costs	Total cost	Cost per house
Site 1	LE076, LE059	150 dwellings	£6,000	£0.00	£0	£245,916	£79,167	£331,083	£2,207.22
Site 2	LE140	75 dwellings	£6,000	£0.00	£45,500	£128,761	£42,083	£222,344	£2,964.59
Site 3	LE014	30 dwellings	£6,000	£400.00	£0	£25,323	£0	£31,723	£1,057.44
Site 4	BD106, BD071	330 dwellings	£6,000	£0.00	£0	£164,179	£121,500	£291,679	£883.88
Site 5	BD069	30 dwellings	£6,000	£400.00	£228	£14,925	£0	£21,553	£718.43
Site 6	BD102	42 dwellings	£0	£400.00	£0	£20,896	£0	£21,296	£507.04
Site 7	CH001, CH080, CH081	430 dwellings	£12,000	£400.00	£45,500	£365,178	£106,130	£529,208	£1,230.72
Site 8	CH003, CH085	200 dwellings	£165,846	£400	£45,000	£173,840	£52,037	£437,123	£2,186
Site 9	CH0129, CH073, CH075, CH076	450 dwellings	£358,154	£400.00	£48,601	£322,204	£110,833	£840,192	£1,867.09
Site 10	CH015	32 dwellings	£6,000	£400.00	£45,500	£38,777	£1,600	£92,277	£2,883.67
Site 11	UT019	15 dwellings	£6,000	£400.00	£45,500	£0	£0	£51,900	£3,460.00
Site 12	KG019A, KG019B	30 dwellings	£6,000	£400.00	£0	£0	£0	£6,400	£213.33

Total transport infrastructure costs per housing site

7.2

Conclusion

7.2.1

This report has identified approximate transport infrastructure requirements and costs, which would likely to be required by the highway authority in each site obtaining planning permission.

7.2.2

Costs and requirements have been identified using a consistent methodology, but the results can only be used as an indication of predicted costs, and each site would still be required to go through the development control process and considered in terms of current transport policy guidance and infrastructure requirements, when the sites promoters come forward with planning applications.

DRAFT

Appendix A

Technical note

Project	Staffordshire Moorlands Housing Sites	Date	20 November 2009
Note	Cost of strategic transport improvements associated with potential housing sites	Ref	
Author	N Gorski		

1 *Introduction*

1.1 This note sets out the proposed methodology for identifying possible transport costs associated with the development of potential residential sites in North Staffordshire and the Staffordshire Moorlands.

2 *Methodology*

2.1 Potential housing sites should meet minimum criteria to enable access to jobs and local facilities. Sites should:

- be directly connected local pedestrian infrastructure;
- be directly connected to existing cycle infrastructure or roads considered suitable for cycling; and
- be located within 350m of a bus stop providing a half hour minimum frequency serving a major centre.

2.2 Costs would be attributed to each site in accordance with minimum access requirements. Costs associated with planning applications are typically required towards transport infrastructure and sustainability improvements under the following categories:

- Travel Plan (TP)
- Pedestrian / Cycle Accessibility
- Public Transport Accessibility
- Offsite Highway Improvements

2.3 The costs have been developed solely for this note, and should not be used for any other purpose. It is also considered that a 20% uplift in all costs specified in this note would be applied to take account of preliminaries and design.

2.4 Cost specified are indicative at this stage, but will be refined and finalised in the final submission. As a result, the costs stated in this note are subject to change.

2.5 The scale of contribution required by each development site is largely dependant on the size of the development, activity levels during peak hours, site accessibility, and commitment to sustainability. In summary, the contribution amount is not consistent across all sites, but can be determined by a consistent methodology.

3 **Travel Plan**

3.1 The Department for Transport (DfT) ‘Guidance on Transport Assessments’ (March 2007), states that a TP is required for a development threshold of 80 dwellings and over. The scope of the TP is dependant on the number of dwellings proposed, however the following aspects are assumed to be included:

- Provision of a Travel Plan Co-ordinator (TPC);
- Marketing material; and
- TP monitoring.

3.2 TP costs associated with each of the above measures are identified per dwelling, based on two sized residential developments of 150 and 500 dwellings. These are considered to be the upper and lower end scales of development considered in the area.

3.3 The cost for each TP measure is set out below in **Table 3.1**.

Travel Plan Requirements	Total Cost
TPC – Provided on a part-time basis (per annum)	£20,000
Cycle, walk, public transport, car share marketing information – Welcome pack (per dwelling)	£50
TP monitoring (annual), undertaken by the TPC (per site)	£1000

Table 3.1: Travel Plan Requirements & Costs

3.4 TP costs have been identified using DfT guidance and costs identified through ongoing project experience.

3.5 Based on TP requirements and total costs identified in the above table, the costs per dwelling towards a TP would include:

- £750 per dwelling for a development size of 150 dwellings. This is based on a TPC being provided (including monitoring) on a part time basis for a 5 year period.
- £260 per dwelling for a development sized based on 500 dwellings. This is based on a part time TPC being provided (including monitoring) for a 5 year period.

4 **Cycle Access**

The North Staffordshire LTP states ‘the National Cycle Network in North Staffordshire is now virtually complete, and there is a growing network of both off and on road routes allowing cyclists to reach all parts of the conurbation’. The LTP states that both SCC and STCC fully recognise the importance of investing in cycling, and therefore good cycle accessibility is considered to be a primary requirement for any future residential development site.

4.1 In order to determine if a residential development site would qualify for a contribution towards cycle access improvements/provision, the site would be subjected to the flow chart set out below in **Figure 4.1**.

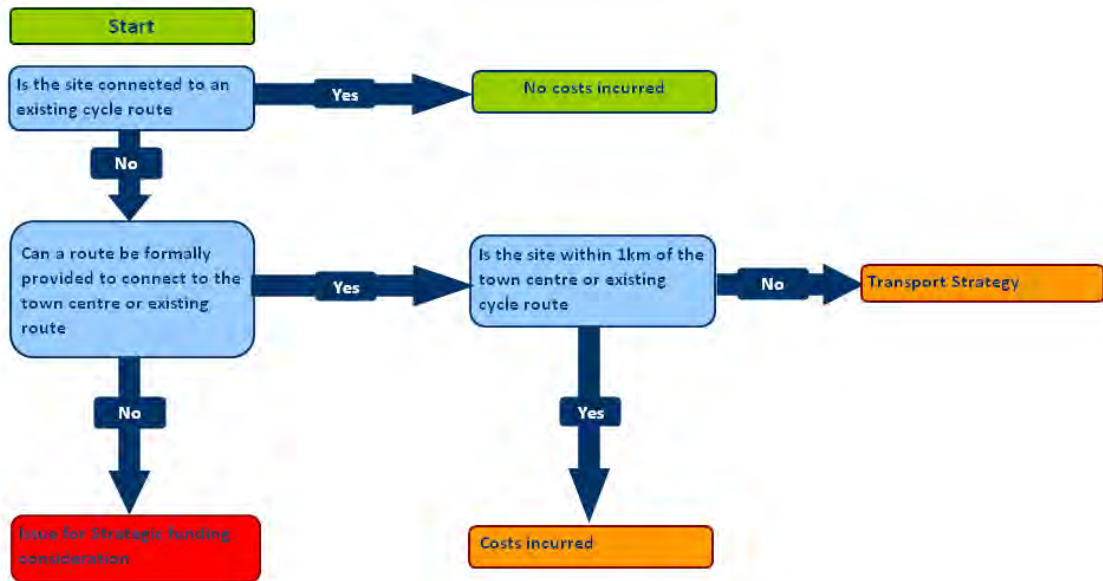


Figure 4.1: Cycle Contribution Methodology

4.2 Using the Geographical Information System (GIS) package; MapInfo, the following methodology would be used to determine if a site meets minimum accessibility criteria:

- Each of the proposed residential development sites would be plotted in MapInfo, and a 1km isochrones produced around each of the sites;
- Existing cycle infrastructure / routes would be plotted, including off/on road routes, signage, and cycle crossings. Information on infrastructure would be obtained from SCC, as part of a desk top analysis, and site observations. SCC would also be contacted to ascertain details of any committed cycle infrastructure that is due to be implemented on the highway network in the near future;
- Key local and town centre destinations would be plotted onto the existing cycle infrastructure plan, to identify if routes serve each of these areas, and provide a continuous connection between potential housing sites. 5km is considered reasonable cycling distance of a site to local facilities, as identified in Planning Policy Guidance 13 (PPG13), March 2001. The location of employment sites has already been obtained from SCC, and the other facilities would be identified from a desktop /site visit analysis.

4.3 Putting the layers together will identify if there are any infrastructure gaps between potential housing sites to existing infrastructure provision, and determine if routes provide connections to local jobs and facilities without significant severance issues.

For sites not deemed to meet the accessibility criteria, costs associated with cycle infrastructure would be required.

- 4.4 In terms of possible infrastructure requirements associated with cycling, it is considered that a contribution could be required for the provision of:
- On-highway cycle facilities such as cycle lanes, advanced stop lines at signal junctions, and toucan crossings
 - Greenways or off-road cycle routes typically provided along canals, rivers or through park land
 - Cycle programmes in conjunction with the ‘Safer Routes to Schools’ programme, or other signing or cycle parking facilities.

4.5 Suitable infrastructure measures and costs have been identified for cycling, and these are listed below in **Table 4.1**.

Cycle Infrastructure	Total Cost
On-road cycle route (lining and green surfacing) – cost per metre (based on route of 2m in width)	£10
Blue cycle signing (per sign)	£100

Table 4.1: Cycle Infrastructure & Costs

4.6 Infrastructure costs are approximations identified using SPONS (2006), and include for labour, plant and material costs. These do not include costs for contingency or preliminaries, and do not consider design costs, of which all would be additional.

4.7 Based on the cycle infrastructure and total costs identified in Table 4.1, costs per dwelling would be identified on a site by site basis.

5 **Pedestrian Access**

5.1 PPG13 suggests 1km to be a suitable walking distance from a site to local amenities, although this assumes that the appropriate infrastructure is provided for pedestrians to make this journey.

5.2 In order to determine if a residential development site would qualify for a contribution towards pedestrian infrastructure provision, the site would be subjected to the methodology (flow chart) set out in **Figure 5.1**.

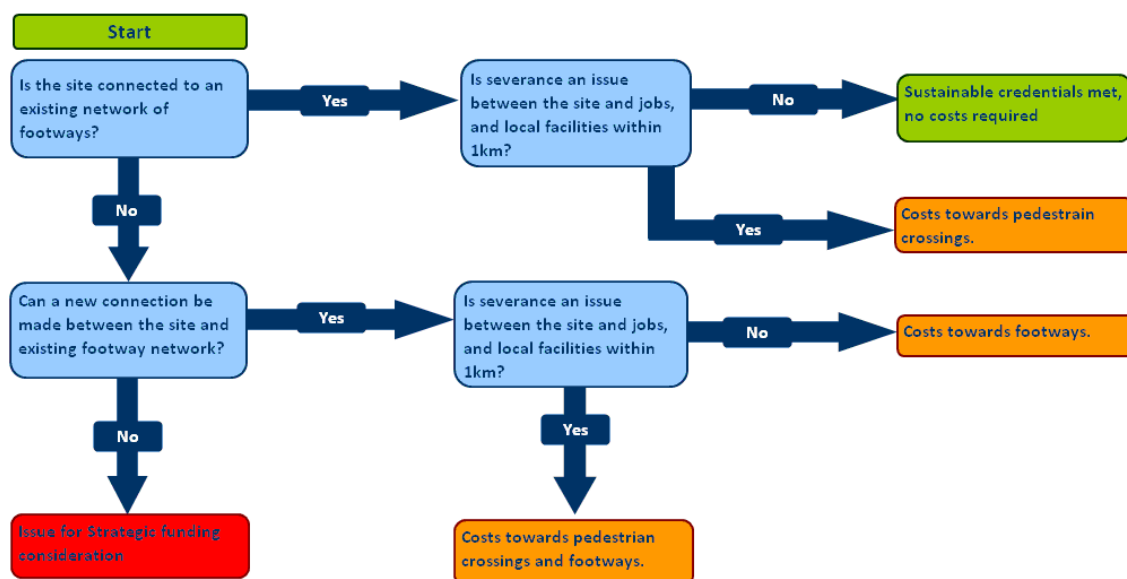


Figure 5.1: Pedestrian Contribution Methodology

5.3 Information required to inform the above methodology process includes:

- The location of footways on the highway network, and identification of severance issues (major roads with no pedestrian crossing facilities) based on likely pedestrian desire lines;
- Locations of employment sites and local facilities within 1km of the site

5.4 This information would be input into MapInfo to determine accessibility to existing pedestrian infrastructure, in the same way as described for access to cycle infrastructure in Chapter 4.

5.5 Costs associated with pedestrian infrastructure have been identified and set out below in **Table 5.1**.

Pedestrian Infrastructure	Total Cost
New section of footway (2m width)- cost per metre	£2.50
Dropped kerbs (1m length) – cost per metre	£1.50
Street lighting columns – cost per column	£35,000
Single Crossing (Puffin)	£35,000

Table 5.1: Pedestrian Infrastructure & Costs

5.6 Infrastructure costs are approximations identified using SPONS (2006), and include for labour, plant and material costs. These do not include costs for contingency or preliminaries, and do not consider design costs, of which all would be additional.

5.7 Pedestrian infrastructure costs would be identified per dwelling on a site by site basis, following the identification of a housing sites’ accessibility to existing infrastructure.

6 Public Transport

6.1 The North Staffordshire LTP 2006/07 – 2010/11 makes reference to a ‘bus strategy’ for the area, and states that bus service levels are defined in three ways:

- A core network of bus services to key facilities (major employment sites, hospitals, major retail areas and leisure opportunities) along key corridors. These mainly operate along the proposed bus priority corridors (the bus transit network), and implemented on a phased basis as resources permit
- A supporting network of other services that improve through the bus quality partnership, as resources permit (which could be traditional or demand-responsive or, more likely, a mix of both)
- The filling in of the gaps with more flexible, dial -a-ride or demand responsive services, which include evenings and weekends, as resources permit (see Bus Strategy for further details)

6.2 Infrastructure requirements are typically sought towards bus service provision depending on the scale of the development site, and its existing level of public transport accessibility. Other infrastructure requirements relate to the provision or upgrading of bus stops and/or contributions for limited period bus passes for site occupiers.

6.3 SCC adopts a minimum development accessibility standard to public transport of 350m of a bus stop, offering at least 2 buses per hour frequency to a main centre. This standard has been adopted to determine a housing sites’ minimum accessibility to public transport.

6.4 MapInfo would be used to identify bus stop location, and this information has already been obtained from SCC. Using the same methodology as adopted for determining access to pedestrian/cycle infrastructure, the distance of sites to bus stops would be identified. Information regarding existing or proposed bus routes and frequencies serving individual stops would be obtained from SCC (if available), or obtained by undertaking a desktop/site visit review.

6.5 **Table 6.1** sets out likely costs associated with public transport services and infrastructure.

Public Transport Requirements	Total Cost
Provision of a new bus service (per annum)	£100,000
Showcase bus stop (shelter, lighting & information)	£6,000
Extension of an existing bus service (per annum)	£20,000
New bus stop (cantilever)	£1,000

Table 6.1: Public Transport Requirements & Costs

6.6 Infrastructure costs are approximations identified using SPONS (2006), and include for labour, plant and material costs. These do not include costs for contingency or preliminaries, and do not consider design costs, of which would all be additional.

6.7 Based on the public transport infrastructure and total costs identified in Table 6.1, costs per dwelling would be identified on a site by site basis.

7 Off-Site Highway Improvements

7.1 In terms of identifying a likely cost for off-site highway improvements, it is considered that the following methodology would be followed:

- Identify person trip rates for residential development within TRICS in accordance with TRICS ‘best practice’ guidance. Trip rates would be identified for a weekday morning hour;
- Identify what proportion of trips would be made by car, using ‘journey to work’ data for an adjacent residential ward from 2001 census data;
- Identify trip distribution using ‘journey to work’ destination data, and assign traffic on the basis of the major roads that provided the most direct route between origin and destination wards;
- Identify key junctions (congested) in which development traffic would need to travel through during the peak periods;
- Identify operating constraints at junctions during the morning peak using a risk assessment criteria.
- Determine the ability of the network to accommodate the additional level of traffic to be generated by the development sites during the same periods by determining a ‘congestion risk factor’ associated with key junctions.
- If junctions are unable to operate within capacity with predicted traffic generation levels, identify the level of adverse traffic impact generated using the ‘congestion risk factor’, and the level of mitigation needed at key junctions.

7.2 In order to determine network constraints, a “heat map” would be developed in MapInfo to show existing network capacity with a colour grading. This information would be obtained from SCC or from site observations. **Table 7.1** sets out the grading methodology.

Existing Junction Capacity	Description
Operating at 20% of capacity	No problem
Operating at 40% of capacity	Queues unlikely
Operating at 60% of capacity	Occasional queuing
Operating at 80% of capacity	Sometime significant queuing
Operating at 100% of capacity	Always congested

7.1: Highway Network Capacity Grading

7.3 This table will provide a baseline of capacity for the highway network, in which to compare future housing site traffic impact. It is considered that only existing junctions receiving a total score of 80% would be considered for mitigation, as anything less is assumed to be able to accommodate additional traffic flows.

7.4 *Off-Site Highway Contribution Methodology*

7.5 The requirement for a contribution towards off-site highway improvements would be identified by the traffic impact each housing site would have on key junctions during a weekday morning peak hour. A level of impact that each site would have on a particular junction would be identified from the trip generation and distribution work undertaken. The output would be a ‘congestion risk factor’ being identified and attributed to each housing site, calculated on a junction by junction basis

7.6 A ‘congestion risk factor’ identifies a level of impact that the housing site would have on a particular junction, and assigns a percentage to level risk. The risk levels are set out below in **Table 7.2**.

Percentage Assigned	Impact Level
3%	Small Impact
5%	Minimum Impact
10%	Some Impact
18%	Significant Impact
25%	High level of Impact

Table 7.2: Congestion Risk Factor Grading

7.7 The percentages identified for the ‘Existing Network Capacity Grading’ and ‘Congestion Risk Factor Grading’, would be added together for each junction to identify if congestion is an issue, and if so, to determine the level of off-site highway improvements required to mitigate traffic impact. An example of the calculations that would be undertaken for each junction is provided below in **Table 7.3**.

Junction Name:				
Housing Site	Existing Network Capacity Score	Congestion Risk Factor Score	Total Score	Comments
Site 1	80%	15%	108%	Large impact (cumulative) on a junction – major mitigation required
Site 2		10%		
Site 3		3%		

Table 7.3: Off-site Impact Results Table (For Each Junction)

7.8 It is considered that only existing junctions receiving a total score of 80% or above, would be considered as being a capacity risk, and therefore considered for mitigation measures (off-site highway improvement costs).

7.9 Table 7.3 not only identifies the traffic impact of a single housing site may have on a particular junction, but considers the cumulative impact that several housing sites may have on a junction. In this circumstance the ‘congestion risk factor’ would be used to determine a proportion of mitigation costs associated with each site impacting upon the junction.

7.10 The grading of mitigation requirements is provided in **Table 7.4**.

Cumulative Impact Percentage	Mitigation Requirement
Less than 95%	No mitigation required
95% to 105%	Minor Mitigation Required (£100,000)
105% and above	Major mitigation required (£300,000)

Table 7.4: Mitigation Identification Scoring

7.11 The off-site highway improvements and costs are identified in **Table 7.5**, and would be identified on a site by site basis, based on the impact received.

Off Site Mitigation Packages	Total Cost
Minor junction improvement	£100,000
Major junction improvement	£300,000

Table 7.5: Off Site Mitigation Requirements & Costs

7.12 Infrastructure costs are approximations identified using SPONS (2006), and include for labour, plant and material costs. These do not include costs for contingency or preliminaries, and do not consider design costs, of which would be additional to the costs identified above.

7.13 In terms of how this requirement would equate to contributions per dwelling for each housing site, these would be identified on a junction by junction basis.

8 **Shared Costs**

8.1 In a similar way to the identification of the cumulative traffic impact that several housing sites could have on a particular junction, it is anticipated that these sites could also share the cost of off-site highway improvements. It is possible that costs towards pedestrian/cycle and public transport infrastructure improvements could also be shared. These issues would be considered when the potential housing site locations are made available, and accessibility levels are determined.

8.2 There may also be strategic costs for some larger development sites, which could require the provision of a link road, etc to be provided through the site, or through a number of sites. These costs have not been identified at this stage, but would be considered on a site by site basis, and included additional to the costs identified above.

9 **Summary**

9.1 This note has identified a methodology and costs associated with all transport infrastructure typically required for a residential development. A minimum accessibility criterion has been identified using local standards with which to assess each site, and contribution options have been identified for sites of an upper and lower scale.

9.2 The methodology would enable a sites' location to be assessed in terms of minimum accessibility standards, or to identify an appropriate contribution towards improving accessibility.

Appendix B

Staffordshire Moorlands Housing Sites (Transport)

The following table sets out the comments made by Staffordshire Moorlands District Council (SMDC) on the 'Transport Infrastructure Costs Study' (December 2009), and responses provided by Halcrow on the issues identified.

No.	SMDC Comments	Halcrow Response
LEEK		
1	Page 9 and other pages - enlarge site 1 to include Bode Business Park with additional potential site access this could provide directly onto Ball Haye Green.	Site 1 has been enlarged to include the Bode Business Park, with a new access being provided from this site onto Ball Haye Green.
2	Page 9 – Leek Housing Sites & Amenities - identify Ball Haye Green as a local business park	This business park has now been included. This business park was not originally included in the post-code data provided by SCC, as at the time the database was being put together by SCC (2007), this site hadn't been sub-divided into a number of units, and was been occupied by a single user. The site has only recently become a business park since the initial survey by SCC was undertaken.
3	Page 9 – Leek Housing Sites & Amenities - amend legend from Local Primary Schools to Local Primary and Middle Schools as Churnet View (to north of site 1) is a Middle School.	The legend/key has been changed to read 'Local Primary and Middle Schools'
BIDDULPH		
1	Page 10 – Biddulph Housing Sites & Amenities Map – Biddulph Town Centre boundary should correspond to boundary of the AAP	The Biddulph Town Centre boundary has been changed to reflect that shown in the AAP document.
2	Page 10 – Biddulph Housing Sites & Amenities Map – Knypersley First School on Newpool Road not shown (shows Meadows Special School to north instead which is no longer in use)	The report has been changed inline with comments.
3	Page 10 – Biddulph Housing Sites & Amenities Map – would query the access point shown for site 4 - understood that the	We have discussed the option of accessing site 4 off the by-pass with SCC development control officers, and have identified the most

No.	SMDC Comments	Halcrow Response
	County would not want to see any newly created accesses onto the bypass and that the access point would be the telephone exchange road?	logical point of access would be from the south of the site from Newpool Road. This access preference has been discussed with SCC, and has been used to access the site in the study.
4	Page 14 – paragraph 2.3.5 - is this correct as it appears to be a distance from the development and residents could access the town centre without crossing Congleton Road – it seems a large expense which could make a residential scheme unviable.	<p>We have applied a consistent approach to identifying pedestrian infrastructure requirements associated with each housing site, and for site 6, a severance issue was identified between the site and schools located on the opposite side of Congleton Road, requiring a pedestrian crossing to be provided. However, there are marginal deviations to the criteria applied, including the type of housing tenure, scale of development, and if any severance issues are to be address by infrastructure improvements proposed with the AAP.</p> <p>The AAP considers the pedestrianisation of a section of the High Street, which will improve pedestrian links in proximity of the site. Given that site 6 will consist of largely 1/2 bedroom apartments, the scope for trips between local schools and the site will be minimal. On this basis, the requirement for a pedestrian crossing has been waived in this instance, but replaced with a contribution to AAP / strategic measures identified for improving pedestrian access in this area.</p>
5	Page 17 – same comment as previously about the extent of Biddulph Town Centre and access point to Site 4.	As before, the report has been changed inline with comments
6	Page 26 – map – same comment about access point shown for Site 4.	As before, the report has been changed inline with comments
CHEADLE		
1	Page 11 - Cheadle Housing Sites and Amenities Map – most southerly yellow dot 'local primary school' should be blue (Cheadle High School).	The plan has been changed to reflect the correct school type.
2	Para 2.3.6 – Amend to read 'Froghall Leek Road'.	The report has been changed inline with comments

No.	SMDC Comments	Halcrow Response
3	Para 2.3.7 – Amend to read ‘Ashbourne’.	The report has been changed inline with comments
4	Para 3.2.2 – should site 7 in Cheadle also be contributing towards the cost of an additional vehicle as it is on the same 123 bus route?	Site 7 is considered to be more accessible to existing public transport provision than sites 8 and 9, and has better options for a bus being able to run through the site, following minor changes to the route of the 123 bus service, that currently makes two u-turns within adjacent sites. Following the development of site 7, the bus could run a loop through the site, at no extra cost, and would not require an additional vehicle (bus) to be provided.
5	Table 2.1 - No costs for Site Eight are included. Costs associated with bridging the railway embankment – retaining public footpath along this route?	Part of these costs would be considered to be associated with on-site cost, however the retention of a pedestrian crossing is important. Therefore a cost has been included for a pedestrian crossing of the distributor road. A bridge crossing is estimated to cost around £800,000, which has not been included in the appraisal.
6	Para 6.4.1, Cheadle, Amend first bullet to read ‘Oakmoor Road and Ashbourne Ashmore Road.’	The report has been changed inline with comments
7	Site Eight includes land to the south which is no longer included in the Addendum. This should be consistent throughout the document, ‘Site Eight – Bus Service Provision and Stops’ map marks the area to the south as ‘possible area for future development’.	Agreed, site 8 has been amended so that it is consistent on all plans, showing the top section of the site as being for development, and the bottom section as for potential future expansion.
RURAL		
1	Page 13 - Kingsley Housing Sites & Amenities - Site 12 Kingsley could potentially have an access off Haste Hill Avenue serving at least part of a scheme for the site.	Agreed, access to site 12 has now been relocated to Haste Hill Avenue, and the accessibility of the site updated to reflect access via this road.
GENERAL		
1	(a) There is concern as to whether a Travel Plan, and in particular a Travel Plan Co-ordinator, would be needed for all sites or whether there are any criteria.	(a) SCC Travel Plan (TP) policy states that a Framework TP is required for all developments over 50 dwellings, and a full TP required for all developments over 80 dwellings. We have assumed a TP Co-ordinator (TPC) is required for a period of 5

No.	SMDC Comments	Halcrow Response
	<p>(b) The costs for a Travel Plan seem considerable for some sites and difficult to justify. For example, it seems illogical to have a travel plan for site 6 in Biddulph as it is in the town centre (aims of travel plan quoted as being 'to promote more sustainable travel and reduce reliance on the private car') and this would be another £17,500 along with the £45,000 pedestrian crossing and if required would probably make the scheme unviable taking into account other needs like affordable housing. Are there not any locational factors in determining the need for a travel plan or is it just a fixed cost per dwelling no matter whether the site is in the town centre or on the edge of the town?</p> <p>(c) Also would this post be at Staffs CC?</p> <p>(d) What is the evidence for a full-time post at Cheadle and part time at Leek / Biddulph?</p>	<p>years for all sites providing a FTP or TP, employed on a part-time basis across all potential housing sites identified in each settlement area. The TPC would be appointed by the developer of the site(s) and report monitoring results back to SCC on an annual basis. This methodology is consistent with SCC guidance.</p> <p>(b) A TP is required for all sites (over 50 dwellings) irrespective of its location, and these documents are developed to reflect the specific transport characteristic of each site, whether it be in located in the town centre, or edge of town. The fact that site 6 is located within the town centre, suggests that a TP should be more effective in this location, due to greater transport provision and better access to local amenities.</p> <p>(c) No, TPC's are appointed by the developer of a site (s) but would liaise with Travel Planning and Development Control officers in order to update promotional material and undertake annual monitoring exercises.</p> <p>(d) This point has been updated following discussions with the Travel Planning team at SCC. It was agreed that a part-time TPC could be provided across all settlement sites, irrespective of the sites size. The infrastructure costs associated with this have been updated, and have reduced the costs placed on dwellings located in Cheadle.</p>

No.	SMDC Comments	Halcrow Response
	(e) The need for bike stands on residential developments where the properties are privately owned seems hard to justify – is this a standard requirement?	(e) SCC guidance suggests cycle stands need to be provided flats and student accommodation only. On this basis, the provision of bike stands at housing sites has been removed.
2	<p>(a) With regard to the off-site highway infrastructure requirements, what consideration has been given to the additional traffic generated from other sites apart from the 12 which were assessed? These can cumulatively amount to a large number of additional traffic trips and would presumably increase congestion further on existing junctions.</p> <p>(b) The transport infrastructure costs would also presumably be lower per dwelling if apportioned across more dwellings</p> <p>(c) Is it right to assume that the 12 sites assessed should bear the full cost of the off-site junction improvements?</p>	<p>(a) No trips generated by other sites have been accounted for, as this is not within the scope of this study. This study is to identify the broad costs of infrastructure associated with 12 specific housing sites, at the time of undertaking the study. A separate and more detailed study would be required to consider cumulative traffic impact associated with all committed development sites coming forward.</p> <p>(b) The more dwellings proposed, the greater the traffic impact on the adjoining highway network, to a stage when additional off-site highway mitigation would be required. This would place additional costs per dwellings on each housing site, but it is agreed that there will be a maximum threshold of development that can be provided on each site, before triggering significant mitigation requirements.</p> <p>(c) It is right to assume that the 12 sites bear the full cost of immediate highway improvements that relate directly to each site i.e. missing section of footway, new bus stops, etc, however these sites would also contribute to AAP and/or strategic measures identified for each settlement area, of which would be shared costs.</p>
3	(a) How have the costs of the off-site highway improvements for each junction been calculated? For example, the junction improvement costs seem particularly high for Leek compared to Biddulph and Cheadle.	(a) Off site highway improvements have been identified for each site using a consistent approach set out in the methodology document. The methodology uses a common trip rate, mode splits identified on a settlement area basis, and distribution based on the directness of major routes in and out of the settlement area.

No.	SMDC Comments	Halcrow Response
	<p>(b) The off site highway improvement cost for Site 2 in Leek seem particularly high for a development of 75 dwellings particularly when the cost per dwelling is considered against the requirements for Site 3 Leek and those of the other towns and importantly the mode split for car users, using 2001 'journey to work' data is significantly less for Leek than for the other 2 towns (Leek – 73% car users, Biddulph – 82% car users, Cheadle – 88% car users). Similarly the off-site highway costs per dwelling for site 10 in Cheadle seem very high for a small development.</p>	<p>(b) Off-site highway (junction mitigation) costs are highest for leek, as this settlement area contains the highest number of junctions currently operating close too or over capacity. Therefore any development proposed in the area, putting traffic through a congested junction, would trigger a requirement for mitigation. Traffic impact has been identified in a consistent manner across all sites, based on the local characteristics of the settlement area in which they are based. Refer to the study methodology document for more information.</p>

Appendix C

HOUSING SITE VIABILITY – TRANSPORT

Sites to be assessed for local offsite transport infrastructure costs

Site	Site Ref.	Description	Capacity	Mix/Tenure	Potential Access
Area 3, North of Leek	LE076, LE059, Bode Business Park	Large Urban Extension – comprises of mix of brownfield and greenfield including part landfill site, current employment site and vacant field	150 dwellings across all sites	Medium density housing (3/4 bedroomed), market and affordable housing, mix of owner occupied, social rented and intermediate	Directly from Ball Haye Green and Tittesworth Avenue
Area 6a, Rear of Leek High School, Leek	LE140	Small Urban Extension – greenfield vacant land	75 dwellings	Low density housing (3/4 bedroomed), market and affordable housing, mix of owner occupied and intermediate	Directly from Mount Road
Land off Woodcroft Road, Leek	LE014	Urban Site – vacant, derelict land, brownfield	30 dwellings	High density housing (2/3 bedroomed) market and affordable housing, mix of owner occupied and social rented	Directly from Woodcroft Road
Area 4, West of Bypass, Biddulph	BD106, BD071	Large Urban Extension – greenfield, open countryside site	330 dwellings across both sites	Medium density housing (3/4 bedroomed), market and affordable housing, mix of owner occupied, social rented and intermediate	Directly off bypass
Knypersley Garden Centre, Biddulph	BD069	Small Urban Extension – brownfield/greenfield, former garden centre	30 dwellings	Medium density housing (3/4 bedroomed), market and affordable housing, mix of owner occupied and intermediate	Indriectly from Conway Road

Minster Mill, Walley Street, Biddulph	BD102	Urban Site – conversion of mill building to residential	42 dwellings	High density housing (1/2 bedroomed) market and affordable housing, mix of owner occupied and social rented	Town centre
Areas 1 & 2, North Cheadle	CH001, CH080, CH081	Large Urban Extension – greenfield open countryside and vacant land	430 dwellings (240 on CH001 and 190 on CH080/81)	Medium density housing (3/4 bedroomed), market and affordable housing, mix of owner occupied, social rented and intermediate	Directly from Froghall Road and also possibly Cheltenham Avenue and Bala Grove
Area 4a, Brookhouses, Cheadle	CH003, CH085 (Northern part only)	Small Urban Extension – greenfield open countryside site	55 - 200 dwellings (55 on CH003 and 145 on northern part of CH085 if viable)	Medium density housing (3/4 bedroomed), market and affordable housing, mix of owner occupied and intermediate	Directly from extension of Brookhouse Way
Areas 6 and 7, Eastern Cheadle	CH0129, CH073 (part), CH075, CH076 (part)	Large Urban Extension – greenfield open countryside	300 – 450 dwellings on dispersed sites	Medium density housing (3/4 bedroomed), market and affordable housing, mix of owner occupied and intermediate	Directly from Oakamoor Road and Ashbourne Road
Stoddards Garage, Leek Road, Cheadle	CH015	Urban Site – brownfield site in employment use	32 dwellings	High density housing (2/3 bedroomed) market and affordable housing, mix of owner occupied and social rented	Direct access off Leek Road
Haulage Depot, St. Thomas's Road, Upper Tean	UT019	Village Site – small brownfield site in employment use	15 dwellings	High density housing (2/3 bedroomed) market and affordable housing, mix of owner occupied and social rented	Village centre
Land off	KG019A,	Village Site – small	30	Low density	Off Haste Hill

Haste Hill Avenue, Kingsley	KG019B	greenfield site in open countryside	dwelling across both sites	housing (3/4 bed roomed) market and affordable housing, mix of owner occupied, social rented and intermediate	Avenue
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Appendix D

Technical note

Project Staffordshire Moorlands

Date 27 January 2010

Note Travel Demand Model

Ref CBBAJV

Author E O'Neill

1 *Introduction*

1.1 This technical note identifies a 'Travel Demand Model' for three settlement areas in Staffordshire Moorlands. Its purpose is to identify the cumulative traffic impact that potential housing sites would have on key junctions in each settlement area, and to determine costs associated with mitigating this impact.

1.2 The three settlement areas considered include Leek, Biddulph and Cheadle, with the methodology of the analysis and results presented below. The potential housing sites situated in the combined settlement areas, are set out below in Table 1.1.

Site no.	Site location	Units proposed	Mix/tenure
1	Leek (area 3)	150 dwellings	3/4 bedroom housing
2	Leek (area 6a)	75 dwellings	3/4 bedroom housing
3	Leek	30 dwellings	2/3 bedroom housing
4	Biddulph (area 4)	330 dwellings	3/4 bedroom housing
5	Biddulph	30 dwellings	3/4 bedroom housing
6	Biddulph	42 dwellings	1/2 bedroom housing
7	Cheadle (areas 1 & 2)	430 dwellings	3/4 bedroom housing
8	Cheadle (area 4a)	55-200 dwellings	3/4 bedroom housing
9	Cheadle (areas 6 & 7)	300-450 dwellings	3/4 bedroom housing
10	Cheadle	32 dwellings	2/3 bedroom housing
11	Upper Tean	15 dwellings	2/3 bedroom housing
12	Kingsley	30 dwellings	3/4 bedroom housing

Table 1.1: Housing sites

2 *Establishing existing junction capacity*

2.1 A site visit was undertaken to each of the settlement areas during a weekday morning peak hour, in order to identify junctions that were operating close

to capacity. Key junctions in each settlement area were grouped into categories based on their operation observed during the site visit, based on the level of queues generated on each approach to the junction. The grading of junctions observed is set out below in Table 2.1.

Existing Junction Capacity	Description
Operating at 20% of capacity	No problem
Operating at 40% of capacity	Queues unlikely
Operating at 60% of capacity	Occasional queuing
Operating at 80% of capacity	Sometime significant queuing
Operating at 100% of capacity	Always congested

Table 2.1: Junction grading criteria

2.2 Key junctions were identified in each settlement area, as being those considered to be operating at 80% capacity or above (based on the level of existing vehicle queues and delays) identified

2.3 The junctions identified in each settlement area during the weekday morning site visit, are set out below, starting with those identified for Leek in Table 2.2.

No.	Junction name	Capacity score
1	A53 Buxton Road/A53 Stockwell Street/Ball Haye Road/ A53 Ball Haye Street (signals)	80%
2	Fountain Street/A53 Ball Haye Street/Derby Street/A523 Ashbourne Road/A53 Haywood Street (Roundabout)	80%
3	A53 Brook Street/St Edward Street/A53 Broad Street/A520 Compton (signals)	80%
4	A53 Broad Street/A53 Newcastle Road/Burton Street/Junction Road (roundabout)	80%

Table 2.2: Constrained junctions in Leek

2.4 The above table shows four junctions within Leek were identified as currently operating at 80% of capacity or above. Junctions 2 and 3 are also identified as being junctions with existing capacity problems within the emerging masterplan being developed by Staffordshire Moorlands District Council (SMDC). This document suggests highway improvements are

required to both of these junctions, with the removal of the roundabout (junction simplification) being identified for junction 2, and improvements to the signals / pedestrian crossing facilities for junction 3.

2.5 Constrained junctions identified in Biddulph are set out in Table 2.3, and in Cheadle in Table 2.4.

No.	Junction name	Capacity score
1	A527 Congleton Road/Thames Drive (roundabout)	80%
2	A527 Tunstall Road/Park Lane/ Newpool Road (signals)	80%

Table 2.3: Constrained junctions in Biddulph

No.	Junction name	Capacity score
1	A521 High Street/A522 Leek Road/A522 Tape Street (roundabout)	80%
2	A522 Tape Street/Queen Street (roundabout)	80%
3	A522 Tape Street/B55032 Ashbourne Road (roundabout)	80%

Table 2.4: Constrained junctions in Cheadle

2.6 Junctions 1 and 2 in Cheadle have also been identified as requiring capacity improvements, from their inclusion in the emerging draft masterplan being developed for SMDC. Improvements identified in the report include a change from a roundabout layout to a signal controlled junction design, with pedestrian facilities being incorporated into its design.

2.7 All junctions within Biddulph and Cheadle as identified above, are considered to be currently operating at 80% of their total capacity. These locations of junctions are shown below in Figures 2.1 to 2.3.

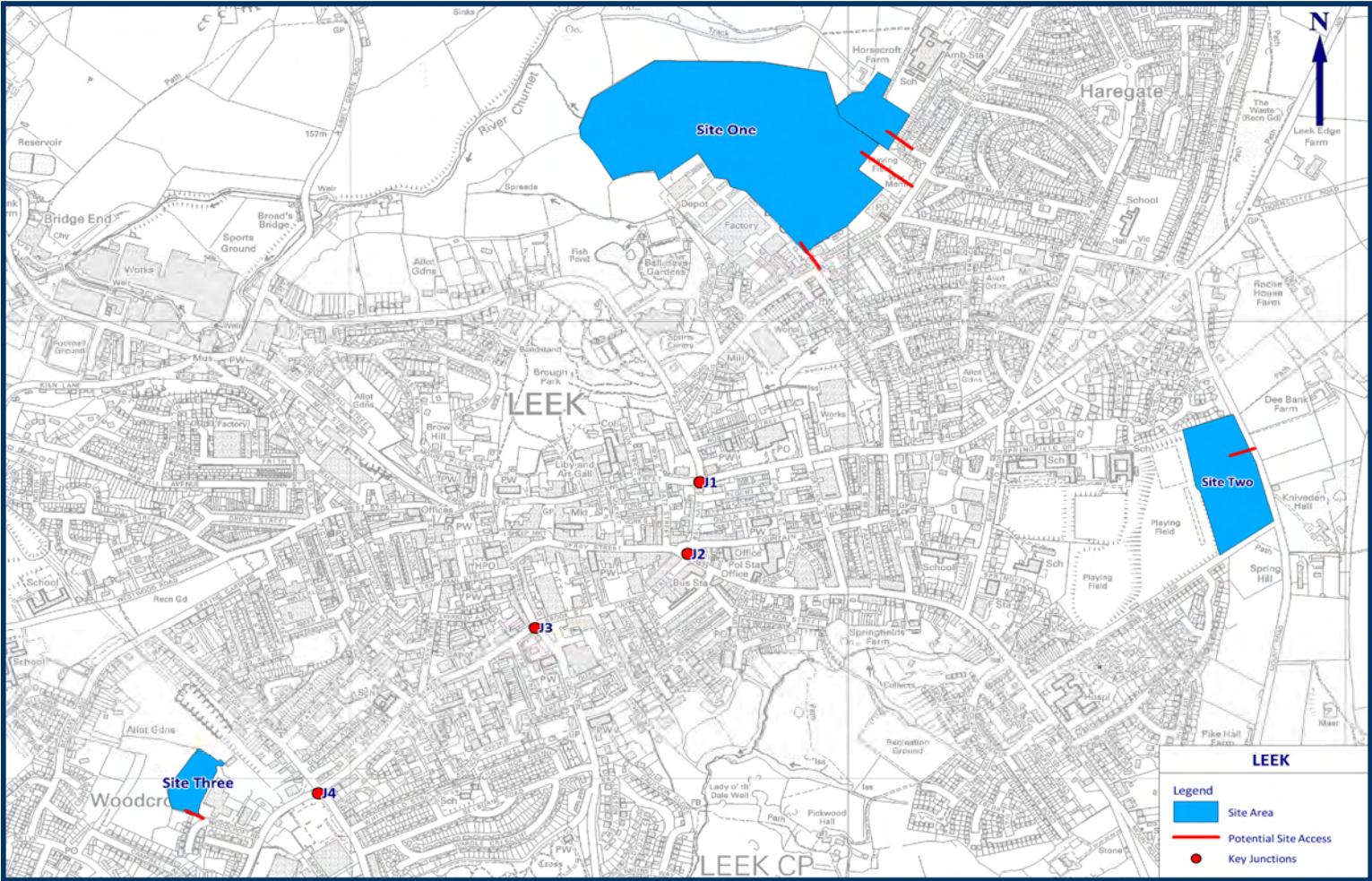


Figure 2.1: Leek housing sites & junctions

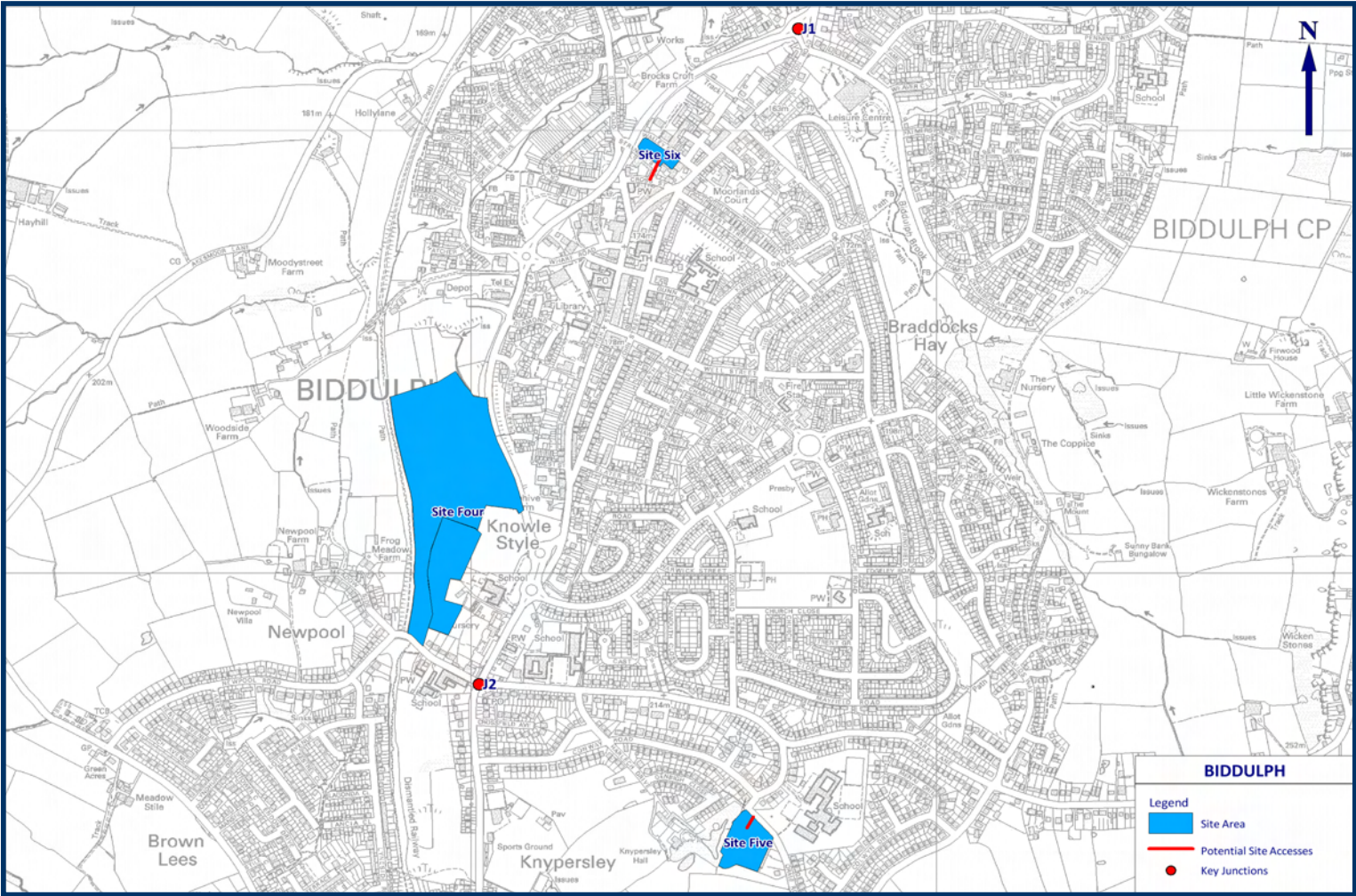


Figure 2.2: Biddulph housing sites & junctions

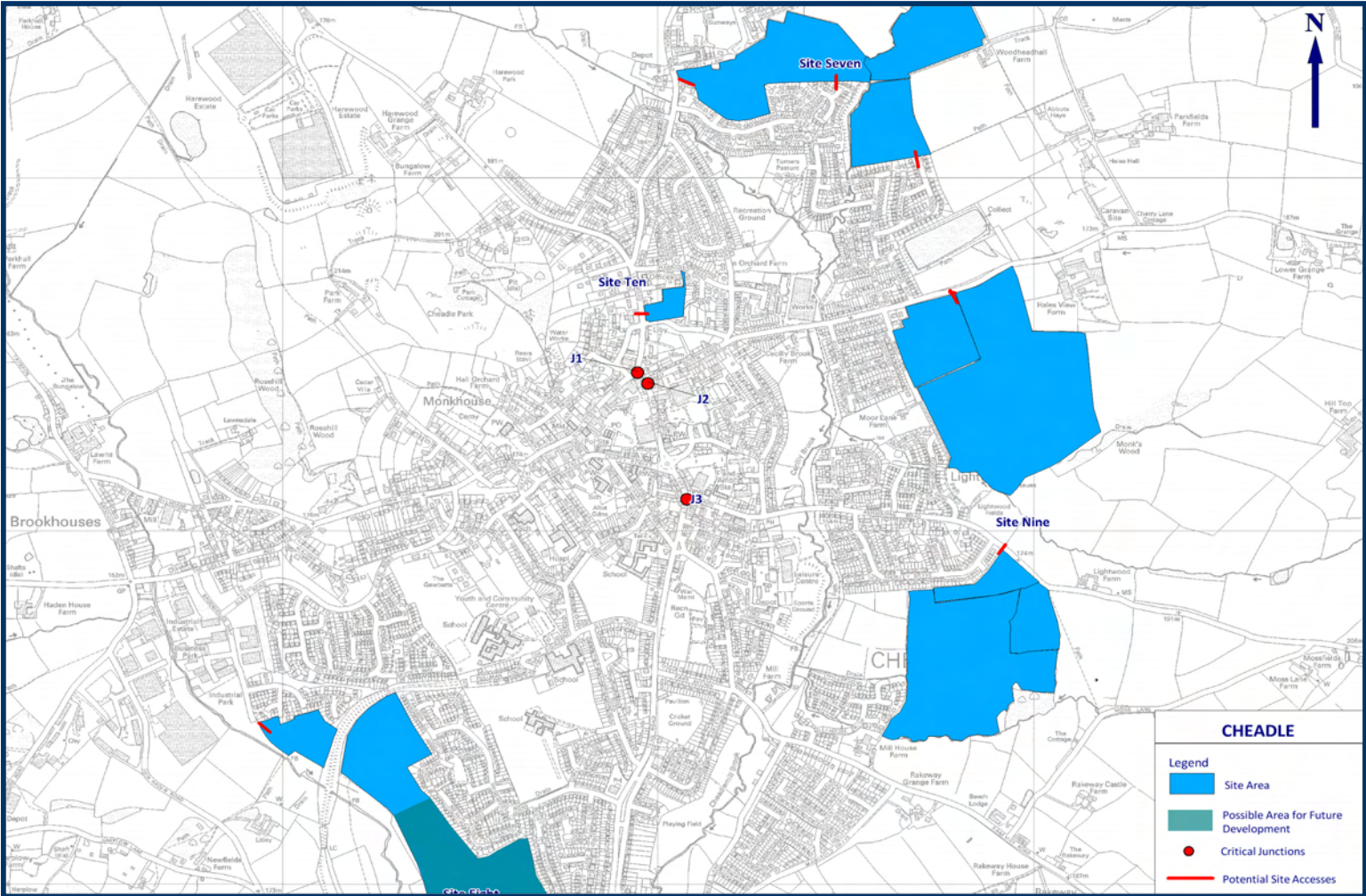


Figure 5.3: Cheadle housing sites & junctions

3 Housing sites trip generation

3.1 The trip generating potential of each of the housing sites located within the three settlement areas, were identified using TRICS and 2001 Census data. Person trip rates were derived from TRICS for private dwellings with edge of town/rural locations, in order to provide a robust view on trip generation, irrespective of the sites location. The trip rate identified is set out below in Table 3.1.

Land use	Arrivals	Departures	Total
Residential dwellings	0.7	0.4	1.1

Table 3.1: Morning peak person trip rate per dwelling

3.2 The above table identifies total person trips per dwelling for a weekday morning hour. This trip rates represents trips made by all modes of transport i.e. car, bus, walk/cycle, etc..

3.3 In order to identify the number of car trips that could be generated to and from each of the housing sites during the morning peak hour, ‘journey to work’ census data has been derived from a residential output area in each settlement area from 2001 census data.

3.4 Table 3.2 shows the percentage of employment trips made by car at each settlement area. An assumption has been made that half of all employment trips made by people travelling as a passenger in a car are included as car trips. This is a robust assumption as it is likely that many of these are existing trips already using the local network.

Settlement Area	% Employment Car Trips
Leek	69%
Biddulph	80%
Cheadle	82.5%

Table 3.2: Percentage of car users in each settlement area

3.5 The above car user percentages were applied to person trip rates to identify the number of morning peak hour trips that would be generated by each of the housing sites. An example of applying this methodology to site 1 in leek is set out below in Table 3.3.

LEEK- Site 1		
Ref	Generating Factors	Output
Input		
A	Number of dwelling proposed at site 1	150 dwellings
B	% car users (derived from census data)	69%
C	Two-way person trip rates (derived from TRICS 2009)	1.1
Output		
D	Number of person trips generated during the morning peak at site 1	D= A x C 165 person trips
E	Number of vehicle trips generated during the morning peak at site 1	E=D x B 114 vehicle trips

Table 3.3- Example of how trip generation is calculated

3.6 The trips generated by each housing site (excluding sites 11 and 12 located outside a major urban area) during a morning peak hour are set out below in Table 3.4.

Housing Site No.	Dwellings Proposed	*Vehicle Trips
1	150 dwellings	114
2	75 dwellings	59
3	30 dwellings	22
4	330 dwellings	263
5	30 dwellings	24
6	42 dwellings	34
7	430 dwellings	391
8	200 dwellings	182
9	450 dwellings	409
10	32 dwellings	29

Table 3.4: Morning peak two-way trips per site
* based on two-way morning peak hour trip rates derived from TRICS

4 **Trip distribution & assignment**

4.1 Census 2001 Journey to Work data was used to determine where people, who will live in the proposed developments, work thereby providing an indication of trip distribution. This traffic was assigned onto the adjoining highway network, using major roads that provided the most direct and realistic route between origin and destination.

5 **Traffic impact**

5.1 Following the distribution and assignment of housing traffic on the highway network, if this traffic was identified to travel through one of the junctions

previous identified as operating at 80% of its capacity or above, an impact associated with the number of trips passing through the junction was identified. This was undertaken for all housing sites in each settlement area, in order to identify single site traffic impact on key junctions, and determine the cumulative impact on junctions considering all sites.

5.2 A ‘congestion risk factor’ identifies a level of impact that each housing site would have on a particular junction, and assigns a percentage level risk. The risk levels are set out below in Table 5.1.

Percentage Assigned	Impact Level
3%	Small Impact
5%	Minimum Impact
10%	Some Impact
18%	Significant Impact
25%	High level of Impact

Table 5.1: Congestion Risk Factors

5.3 The percentages identified for the ‘Existing Network Capacity Grading’ and ‘Congestion Risk Factors, would be added together to identify the cumulative traffic impact on a junction, already known to be operating at capacity level of 80% or above. An example of how this methodology is applied is set out below in Table 5.2.

Junction No: 1				
Housing Site	Existing Network Capacity Score	Congestion Risk Factor Score	Total Score	Comments
Site 1	80%	15%	108%	Large impact (cumulative) on a junction – major mitigation required
Site 2		10%		
Site 3		3%		

Table 5.2: Off-site Impact Results Table (For Each Junction)

5.4 The methodology shown in the above table not only identifies the traffic impact of a single housing site may have on a particular junction, but considers the cumulative impact of all housing sites with the settlement area. This is used to determine a proportion of mitigation costs associated with each site impacting upon a specific junction.

5.5 Sites 11 and 12 are located outside a major urban area, in rural villages. Site visits suggested no junctions in proximity to these sites we shown to

operate close to capacity, and given the scale of the development proposed in these areas, traffic impact calculations were not identified for these two sites.

5.6 The grading of mitigation requirements is provided in Table 5.3.

Cumulative Impact Percentage	Mitigation Requirement
Less than 95%	No mitigation required
95% to 105%	Minor Mitigation Required (£100,000)
105% and above	Major mitigation required (£300,000)

Table 5.3: Mitigation Identification Scoring

5.7 The off-site highway improvement costs associated with a particular scale of mitigation are identified in Table 5.4, and would be identified on a site by site basis, based on the impact received.

Off Site Mitigation Packages	Total Cost
Minor junction improvement	£100,000
Major junction improvement	£300,000

Table 5.4: Off Site Mitigation Costs

5.8 Infrastructure costs are approximations identified using SPONS (2006), and include for labour, plant and material costs. These do not include costs for contingency or preliminaries, and do not consider design costs, of which would be additional to the costs identified above.

5.9 In terms of the types of mitigation that is classed under each scale, options basically includes the upgrading of existing signal technology to MOVA or SCOOT as a minor mitigation measure, and upgrading an existing roundabout to signals being a major scheme. Other mitigation options would be considered on a site by site basis if necessary.

6 Mitigation Results

6.1 The traffic impact on each key junction by settlement area, and the mitigation costs identified are set out below in Tables 6.1 to 6.3.

Junction no.	Existing Capacity	Site 1	Site 2	Site 3	Total
1	80%	18%	10%	3%	110%
2	80%	18%	10%	3%	110%
3	80%	18%	10%	3%	110%
4	80%	10%	5%	3%	98%

Table 6.1: Junction Mitigation Scoring (Leek)

Junction no.	Existing Capacity	Site 4	Site 5	Site 6	Total
1	80%	18%	3%	3%	103%
2	80%	25%	5%	5%	115%

Table 6.2: Junction Mitigation Scoring (Biddulph)

Junction no.	Existing Capacity	Site 7	Site 8	Site 9	Site 10	Total
1	80%	25%	25%	18%	5%	153%
2	80%	25%	18%	25%	5%	153%
3	80%	25%	18%	25%	5%	153%

Table 6.3: Junction Mitigation Scoring (Cheadle)

6.2

Based on the mitigation scores identified above, the mitigation costs were identified for each junction, as set out below in Tables 6.4 to 6.7.

Junction no.	Improvement Type	Costs
1	MINOR	£100,000
2	MINOR	£100,000
3	MINOR	£100,000
4	MINOR	£100,000
Total		£400,000

Table 6.4: Junction Mitigation Costs (Leek)

Junction no.	Improvement Type	Costs
1	MINOR	£100,000
2	MINOR	£100,000
Total		£200,000

Table 6.5: Junction Mitigation Costs (Biddulph)

Junction no.	Improvement Type	Costs
1	MAJOR	£300,000
2	MAJOR	£300,000
3	MAJOR	£300,000
Total		£900,000

Table 6.5: Junction Mitigation Costs (Cheadle

6.3

Based on the mitigation measures identified above, the cost per dwelling for each housing site was calculated, and the results summarised below in Table 6.8.

Site no.	Assumed proposals	Total cost	Cost per dwelling
1	150 dwellings	£245,916	£1,639.44
2	75 dwellings	£128,761	£1,716.81
3	30 dwellings	£25,323	£844.11
4	330 dwellings	£164,179	£497.51
5	30 dwellings	£14,925	£497.51
6	42 dwellings	£20,896	£497.51
7	430 dwellings	£365,178	£849.25
8	200 dwellings	£173,840	£869.20
9	450 dwellings	£322,204	£716.01
10	32 dwellings	£38,777	£1,211.79
11	15 dwellings	-	-
12	30 dwellings	-	-

Table 6.8: Off-site contributions per housing site