2. The Challenges

2.1 This chapter outlines the background against which this plan has been developed. There is great uncertainty about many of the factors which are outlined here due to the impact of the economic downturn and from the government's proposed changes in the planning framework. The result is that the Plan needs to be flexible enough to respond to changes in these factors while still delivering the desired objectives. The following is based upon the current information at the time of writing, but this is subject to change.

Supporting the Local Economy

2.2 As a centre of excellence for learning and research, Oxfordshire has earned global recognition. Alongside the oldest university in England, the county plays host to what is widely regarded as the best new university in the country and a range of internationally-regarded research and development institutions, including the new Synchrotron light source, Diamond.

2.3 Oxfordshire is a county alive with enterprise, beauty, learning and history. Businesses, institutions and communities have thrived here for centuries and will continue to do so into the future.

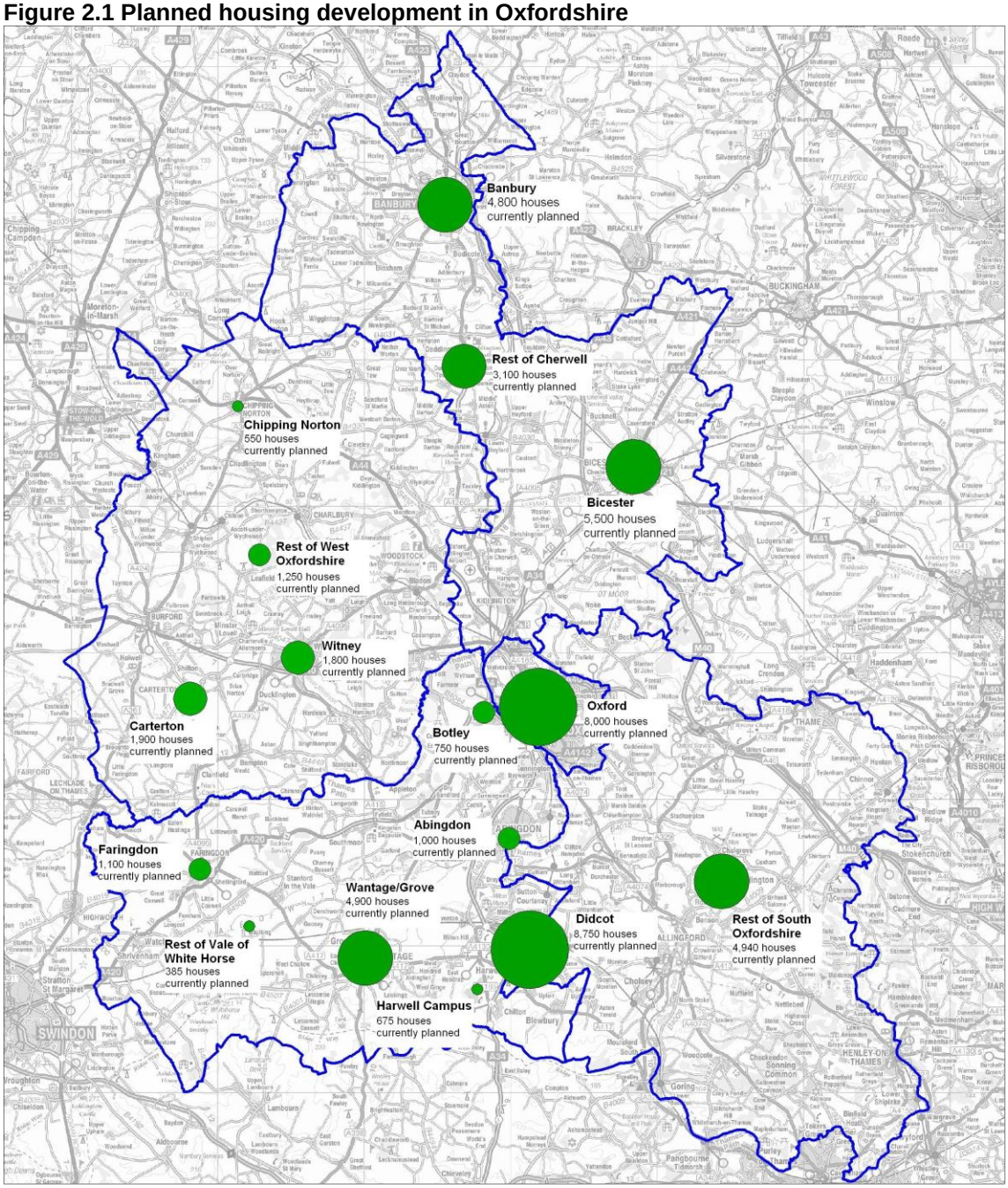
2.4 The breadth of enterprise, opportunity and culture makes Oxfordshire a unique and stimulating place in which to live and work. As an employer, Oxfordshire's highly qualified labour pool facilitates new business growth and development, creating a shared entrepreneurial culture within the county.

2.5 Oxfordshire has consistently high levels of employment and the resident workforce is amongst the most highly qualified in the country. Key industries based here include international publishing, high tech business and biotechnology, car manufacture and motorsport.

2.6 The district Local Development Frameworks will set out the strategies and locations for future developments. These will play a vital role in determining how the local economy develops into the future. It is important for Oxfordshire to establish a transport system that supports economic investment and growth.

2.7 All of the district councils are developing their emerging Local Development Frameworks although none has been fully adopted. While the changes to the planning system that are to be introduced by the government mean that these plans may be revised the overall figures in them give an indication of the level of growth that this Local Transport Plan will need to accommodate.

Figure 2.1 Planned housing development in Oxfordshire



Housing 2006-2026 (number of houses planned in each area)				
Oxfordshire 47,800-49,400	Cherwell	11,800-13,400	Banbury	4,800
			Bicester	5,500
			Rest of district	3,100
	Oxford (minimum number)			8,000
	South Oxfordshire	10,940	Didcot	6,000
			Rest of district	4,940
	Vale of White Horse	11,560	Abingdon-on-Thames	1,000
			Botley	750
			Didcot	2,750
			Faringdon	1,100
			Harwell Campus	675
			Wantage/Grove	4,900
			Rest of district	385
	West Oxfordshire	5,500	Carterton	1,900
			Chipping Norton	550
			Witney	1,800
			Rest of district	1,250

Sources: Latest versions of core strategies/preferred options statements of district council Local Development Frameworks (as at February 2011)

2.8 The population of the county could grow from its current level of around 630,000 to over 700,000 by 2029. This could have some profound impacts on the geography of the county. By 2016, for example, Didcot may have grown to about 38,000 and be larger than Abingdon-on-Thames and by 2026 it may have about 46000 residents and be approaching Banbury in size.

2.9 A significant increase in the county's employment base is also planned. The location of the new jobs will impact on the level of commuting that takes place around the county which, if it was made by car, would lead to a corresponding increase in congestion. Other services, such as schools, shops and health services will also need to be expanded to cater for this growth.

Improving Accessibility

2.10 Access to jobs and services is essential to a good quality of life. For people who own or have access to a car, getting around Oxfordshire is relatively straightforward, albeit time-consuming in congested areas. The county's road network is well-developed, and provides car users with direct links to all major destinations. However, for those people who do not have access to a car for all

or part of the time, getting to key destinations is often far from easy. The coverage of the public transport network is significantly less comprehensive than the general road network, leaving some people who rely on buses and trains with severely limited access to jobs and services.

2.11 Oxfordshire has a rich environment and cultural heritage combined with educational and scientific excellence. Yet despite this widespread affluence and success, there are areas of localised urban deprivation and dispersed rural deprivation, with an increasing gap between rich and poor. As it is more difficult to tackle these dispersed pockets of poor accessibility in a cost effective way these problems have persisted.

2.12 In many areas services are being concentrated in the main towns of Oxfordshire and in particular into Oxford. Shops and services have been closed down in many villages, and education and health services centralised. Many jobs have gone from the rural economy which has meant people have had to move out of rural areas, making services far more difficult to maintain in these areas.

2.13 There are over 4,000 kilometres of road in Oxfordshire. The majority of these operate satisfactorily but there are a number of locations where the network is under stress. Many of the key delay points are at junctions, including:

* M40 Junctions 9 and 10 and approaches to Junction 11;
* A34/A44 junction at Peartree;
* A40/A44 Wolvercote and A40 Cutteslowe Roundabouts; and
* A34 Hinksey Hill interchange and Kennington, Heyford Hill and Littlemore roundabouts on the Oxford Ring Road.

Figure 2.2 Oxfordshire estimated annual average daily traffic flows – 2010

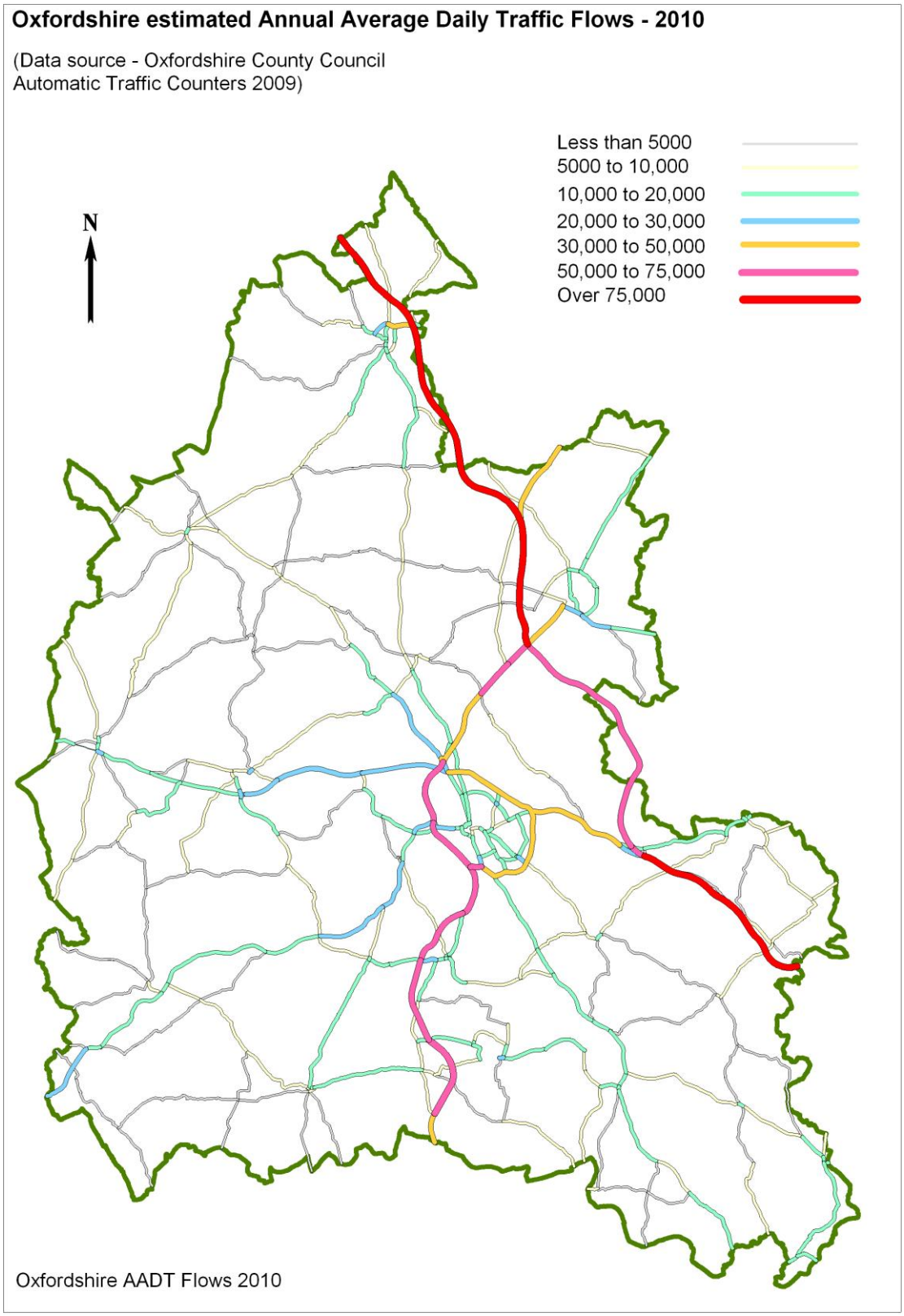
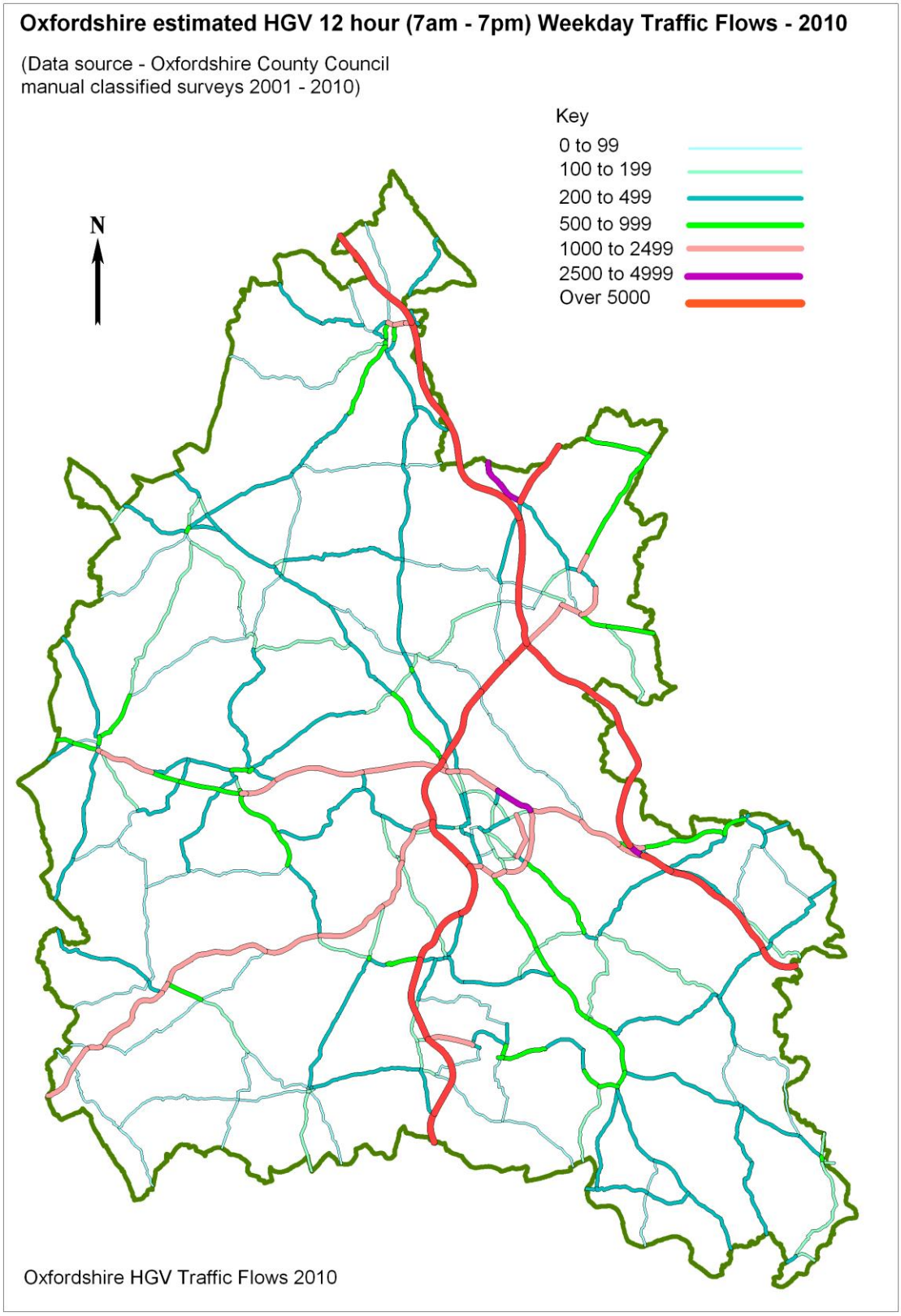


Figure 2.3 Oxfordshire estimated HGV 12 hour weekday traffic flows 2010



2.14 A number of key links in the network are under stress, including:

* A40 between Witney and Oxford;
* A34 between Milton Interchange and Marcham; Interchange and between Lodge Hill and M40;
* M40 between Junctions 9 (Bicester) and 10 (Ardley); and
* A43 approaching M40.

2.15 The M40 and A34 carry particularly high levels of heavy goods vehicles reflecting their role as part of the primary link between the south coast ports and the midlands and north. The A44 and A420 are largely single carriageway routes but both have high proportions of lorries on all or part of them, as does the A40 between Burford and Witney. There is also significant congestion on urban roads in Oxford, Abingdon-on-Thames, Banbury, Bicester, Henley and Witney.

2.16 Oxfordshire faces significant growth and infrastructure challenges over the life of this Plan and it will be important that an efficient and effective road network is provided to ensure that the housing and economic growth potential of Oxfordshire is realised. During this plan period, there will be substantial private investment going into the Science Vale UK area to ensure that the opportunity to develop world-class science based research and development capability is fully maximised.

Central Oxfordshire

2.17 Due to the importance of the road network and the expected growth in road traffic Oxfordshire County Council invested in the Central Oxfordshire Transport Model (COTM), an advanced multi-modal strategic model, to help with strategic transport planning decisions.

2.18 The COTM has been able to identify likely areas of congestion and the extent of this congestion for 2007 and future years 2016 and 2026. These future years incorporate some assumed highway and public transport network infrastructure changes, in addition to committed and assumed housing and employment growth.

2.19 In both the morning and evening peak periods the model predicts an increase in the number of trips being made on the network up to 2026. The total time spent and distance travelled on the network is predicted to increase while there is predicted to be a

decrease in the average speed of journeys.

2.20 The model is also able to assess the impact of public transport trips in future years, both by rail and bus. Outputs from the model show that there is an increase in the number of public transport trips made towards Oxford in the morning peak between 2007 and 2026. This is most notable from origins in the east/south east of the city. It also shows that there are different routeing options taken from outlying settlements to reach Oxford.

2.21 The term "capacity" is used to describe the level of vehicle flow at which a part of the road network becomes unreliable and unpredictable to use. Congestion can occur at levels of flow well below its capacity, and roads can carry flows higher than their capacity albeit usually with a low standard of service. The capacity of a route is usually determined by the section of road or junction along it with the lowest capacity. The capacity of a section of road is mostly dependant upon the geometry of that road (width, number of junctions, hilliness etc) but can also vary with the mix of vehicles that are using it. The capacity of a junction is a complex function of the geometry, vehicle mix and the pattern of flows in and out. It is usually the case that along a route junctions are more likely to reach their capacity at a lower level of flow than the roads themselves although this is not always the case.

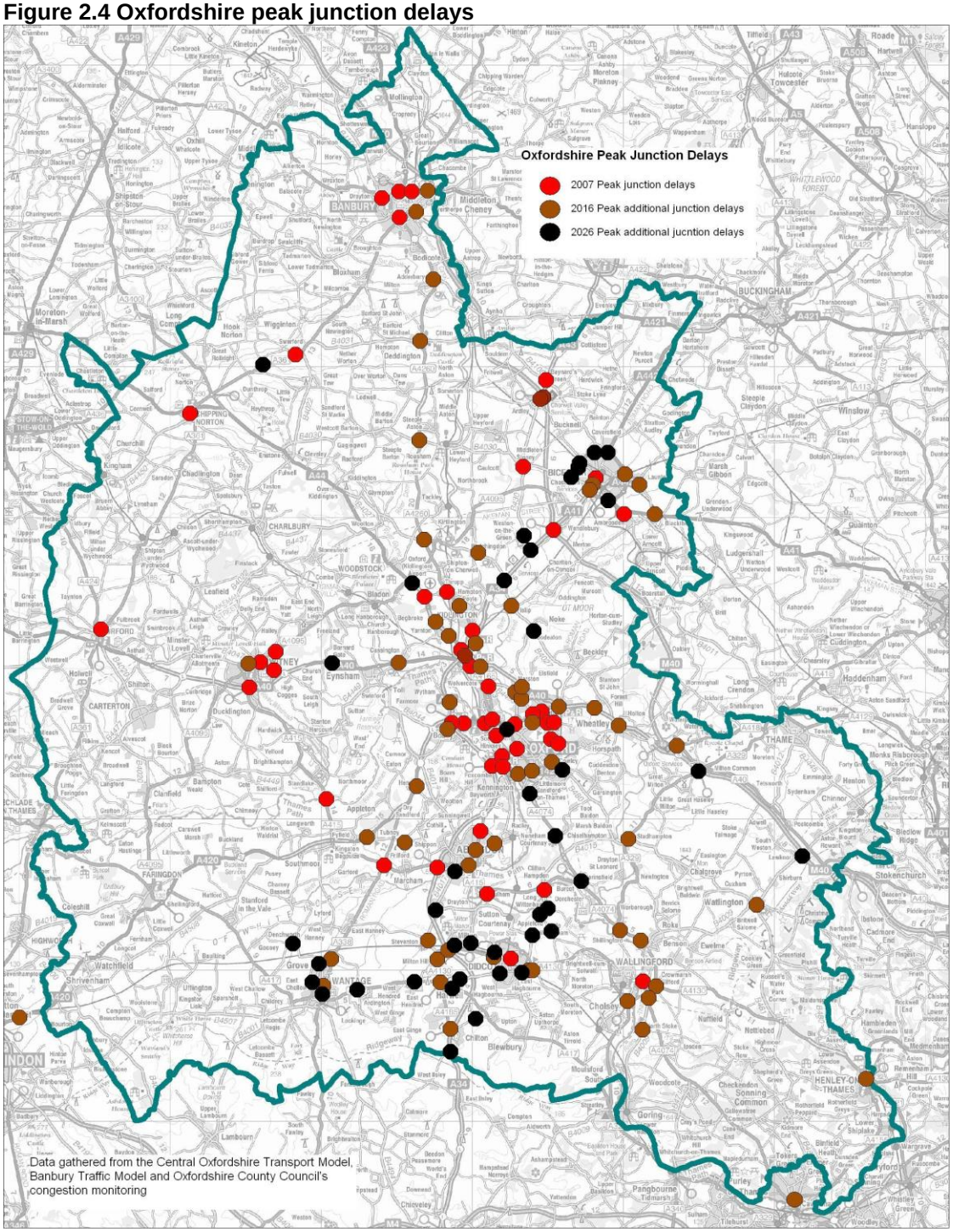
2.22 In 2007, the junctions at capacity in central Oxfordshire included the Culham and Clifton Hampden river crossings, junctions on the Oxford southern by-pass such as Hinksey Hill and Kennington, and key access points onto the A34 and A40.

2.23 By 2026 there will be an increase in the number of junctions that experience delays in the morning peak. Those with the greatest delays are mainly situated around central Oxford and to the South of Oxford. Junctions of note are:

* Bicester town centre (Field Street, North Street and St John's Street gyratory);
* Middleton Stoney Road/Oxford Road junction;
* Middleton Stoney (B430 – signalised junction);
* Botley Interchange (A34 southbound on-slip);
* Central Oxford (St Aldates and Beaumont Street);
* Hinksey Hill junction and the Kennington roundabout;
* Clifton Hampden at the river crossing;
* Culham at the river crossing;

* Frilford traffic lights;
* Milton interchange; and
* Chilton (A4185 southbound towards the A34 Chilton Slips).

Figure 2.4 Oxfordshire peak junction delays



2.24 In addition to junction capacities, many more links are over capacity in 2026 when compared to 2007:

* the A34 is generally at capacity in the peak periods with the growth in trips more significant in the evening peak than the morning peak period;
* the M40 reaches capacity between Junctions 9 and 10 by 2026 in both directions;
* the eastbound approach to Wolvercote roundabout operates at capacity in the 2026 morning peak periods;
* the A40 east of Oxford becomes overcapacity west of Cutteslowe to Wolvercote roundabout;
* on the A4074/A423, the section of the road between Hinksey Hill roundabout and Sainsbury's roundabout operates at capacity due to delays caused at junctions;
* sections of the A4260 operates will have up to 80% more trips in 2026 compared to 2007 leading to an increase in the number of trips made on the approaches to Cutteslowe roundabout; and
* some eastbound sections of the A420 will operate over capacity in the morning peak.

2.25 The following locations were highlighted as congested juctions within the Science Vale UK area in 2007:

* Frilford traffic lights;
* Rowstock Roundabout;
* Power Station Roundabout, Didcot;
* Culham and Clifton Hampden river crossings;
* Milton Interchange (approaches from Didcot and Steventon); and
* A417/Featherbed Lane junction.

Banbury

2.26 Cherwell District Council has identified that Banbury should take the majority of that district's future growth. Although Banbury already has a good economic background, additional jobs would be required to balance the housing growth with 10 hectares of employment land being allocated. In order to better understand the impact of this growth in Banbury on the roads in and around the town and on the strategic network, in particular on the M40, the county and district councils invested in a *SATURN* model of the

town and immediate area.

2.27 The general findings of the model can be summarised as:

* over time, total time spent and distance travelled on the network increase, whilst the average speed across the network decreases;
* the most significant changes on the network are predicted between 2007 and 2016;
* the total time spent and distance travelled on the network increases;
* the average speed decreases by about 3km per hour; and
* the number of over capacity junctions increases.

2.28 In 2007 there was peak time delay on the A422, A361 and the A4260 in Banbury, although these delays were not as significant as on some other parts of the county network. The majority of junctions which are at or over capacity are on north-south routes, including:

* Ruscote Avenue / Queensway;
* Southam Road / Oxford Road;
* Concord Avenue / Upper Windsor Street; and
* Middleton Road / Ermont Way.

2.29 Predicted increases in traffic are focused on Ruscote Avenue/Queensway, Southam Road and Upper Windsor Street, tying in with the junction problems. The M40 Junction 11 is over capacity for all development options. This congestion will clearly impact on bus services in the area as many of these use these north-south routes.

Rest of the county

2.30 The county council's monitoring of congestion highlights a number of locations where there is already a problem with congestion including:

* Frilford Crossroads
* Henley Bridge
* Burford Bridge
* Chipping Norton
* A44 Bladon Roundabout

2.31 Congestion on the A420 and A4074 can extend into Oxfordshire from Swindon and Reading respectively, while there can also be congestion approaching the bridge at Sonning.

Reducing the Environmental Impact of Travel

2.32 Transport can produce a number of impacts on the environment at a number of different levels. The impact of the proposals in this plan will be subject to strategic environmental assessment (SEA) which will aim to quantify the overall impact of the proposals and identify opportunities for any adverse impacts to be mitigated against. The following sections set out the background for some of the major impacts but this can be found in more detail in the scoping report prepared for the SEA.

Natural Environment

2.33 Natural environment assets include:

* over two thirds of Oxfordshire is devoted to agriculture. As well as contributing to the rural economy and producing food, fibre and fuel, farmed land, if managed for the purpose, can also provide other public benefits including clean water, biodiversity, climate change mitigation through flood storage and attenuation, high quality landscapes and access to the countryside via the public rights of way network;
* distinctive rural and urban landscapes - almost a quarter of Oxfordshire is designated as one of three Areas of Outstanding Natural Beauty. The Oxfordshire Wildlife and Landscape Study divides the county into nine distinctive *landscape character areas*, and over 240 *landscape description units* which describe more subtle variations. There are 241 conservations areas across Oxfordshire (designated for special architectural or historic interest which it is desirable to preserve or enhance) and a wide variety of building styles reflected in the county's towns and villages;
* a distinctive and varied geology which has influenced local building materials and styles;
* biodiversity of national and international importance. Oxfordshire is a biodiverse county with habitats including rivers and wetlands, woodlands, grasslands, and farmland. Seven Special Areas for Conservation are designated

under European law; there are also four National Nature Reserves, 102 Sites of Special Scientific Interest; 362 local wildlife sites, and many other reserves run by trusts and charities. In addition a wide range of species are found in Oxfordshire, many protected by legislation;

* woodlands - some 7% of the county is wooded, including nearly 3% Ancient Semi-Natural Woodlands, dating from 1600AD or earlier; and
* Oxford is surrounded by Green Belt land with great potential to improve the natural environment and other public access benefits here for local people.

2.34 These assets, together with other undeveloped land such as rights of way, road verges, green spaces, plus street trees and landscaped areas in the wider 'public realm' are collectively described as 'Green Infrastructure'. The definition of Green Infrastructure is

"a strategically planned and delivered network of high quality green spaces and other environmental features. It should be designed and managed as a multifunctional resource capable of delivering a wide range of environmental and quality of life benefits for local communities."

Green Infrastructure can provide many social, economic and environmental benefits close to where people live and work including:

* space and habitat for wildlife with access to nature for people;
* places for outdoor relaxation and play;
* climate change mitigation, such as growing wood for fuel, helping to reduce CO_2 emissions;
* climate change adaptation, such as reducing surface runoff, improving water storage capacity, reducing the effects of extreme weather events, and cooling urban heat islands;
* environmental education; and
* improved health and well-being – lowering stress levels and providing opportunities for exercise.

2.35 Green Infrastructure should be provided as an integral part of all new development, alongside other infrastructure such as utilities and transport networks. The management of existing networks of land can also be improved to increase multifunctional benefits.

Highways land and rights of way are an important part of Oxfordshire's green infrastructure resource.

2.36 It is now widely accepted that climate change is due to increased amount of atmospheric greenhouse gases. Carbon dioxide is the major greenhouse gas in the atmosphere; transport is a major source of carbon dioxide emission. A number of scenarios were developed for the Copenhagen Conference on Climate Change in 2009. In all of these scenarios it is likely that by 2050 Oxfordshire will experience hotter, dryer summers and warmer, wetter winters and an increased likelihood of severe weather incidents. The UK Climate Impacts Programme has looked in more detail at the potential impact on mean annual temperature. This indicates that predicted temperature increase is highly unlikely to be less than 1-2 degrees or more than 3-4 degrees.

Medium emissions scenario 2050 Oxfordshire					
Probability level	10%	33%	50%	67%	90%
Increase in average daily temperature	1-2°	2-3°	2-3°	2-3°	3-4°

Source: UK Climate Impacts Programme, UK Climate Predictions 09 (2009) (interpreted from published maps)

2.37 For petrol cars, carbon dioxide production is at its lowest at speeds of about 60kph (40mph). As with other pollutants carbon emissions are lowest when steady speeds are achieved - start/stop conditions are likely to be the least carbon efficient conditions. However, any potential reduction in carbon dioxide emissions from speed control is likely to be outweighed by even a small increase in traffic levels. This means that while traffic management proposals may moderate the amount of carbon dioxide produced by travel it is likely that reductions can only be made if there is a large scale change in the form of power used by transport or by reductions in the amount of travel undertaken, or both of these.

Promoting Health, Safety and Quality of Life

2.38 The links between health, well being and an active lifestyle have been well documented. The provision of guided walks and cycle rides, together with the promotion of active modes, is likely to play an important part in delivering health benefits. This is an area which needs joint partnership action between local authorities, health agencies and local communities. Road safety and accident reduction also makes a major contribution to the impact of transport on individuals' overall quality of life.

Health & Life Expectancy

2.39 There is a considerable difference at ward level in Oxfordshire between those areas with the highest life expectancy and those with the lowest as shown below. This is a highly complex issue which is related to many factors including lifestyle and social class. One important aspect of this relationship is that people in lower social classes tend to take less physical exercise, including cycling and walking. However, another important aspect in this difference is that areas with lower current age profiles tend to have the longer life expectancy while those with older populations have a shorter expectancy. This can cloud other relationships such as between activity levels and life expectancy where it can be unclear if current population age or activity level is responsible for lower life expectancy levels (in any case these are likely to be highly related to each other).

Health and life expectancy			
	% who participate in moderate intensity activity*	Top 20% life expectancy range	Bottom 20% life expectancy range
Oxford	20.5	81-82	75-77
Cherwell	24.0	82-85	75-78
South Oxfordshire	22.3	82-89	73-79
Vale of White Horse	25.0	82-84	77-79
West Oxfordshire	25.7	82-85	78-79
Oxfordshire		**82-89**	**73-79**
Top five wards for life expectancy	Didcot Ladygrove, Burford, Kidlington North, Abingdon Dunmore, Bicester South		
Bottom 5 wards for life expectancy	Sandford, Caversfield, Oxford Carfax, Otmoor, Oxford Blackbird Leys		

Source: Oxfordshire Partnership, Public Health Strategy for Oxfordshire (October 2007)
(at least 30 mins of moderate intensity activity 3 times a week)*

Projected population age ranges, Oxfordshire (000s)			
	2006	*2016*	*2026*
0-15	114	121	126
16 - 59(f)/64(m)	390	410	414
65+(m)/60+(f)	111	136	160
85+	15	20	23
Total population	**616**	**668**	**701**

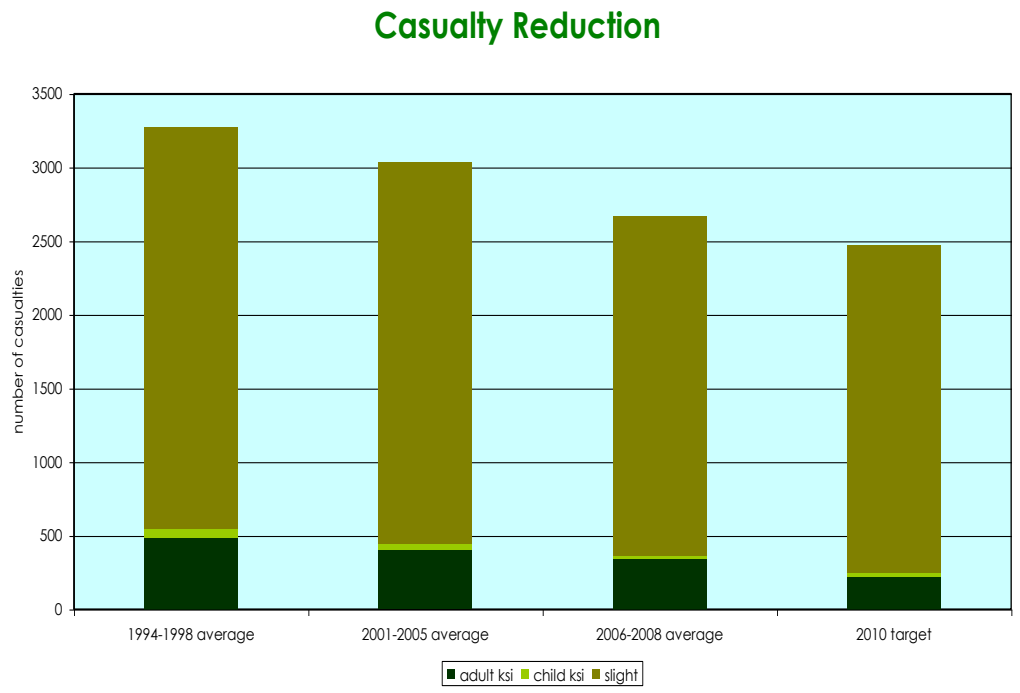
Source: Oxfordshire Population and household forecasts, 2009 (August 2009)

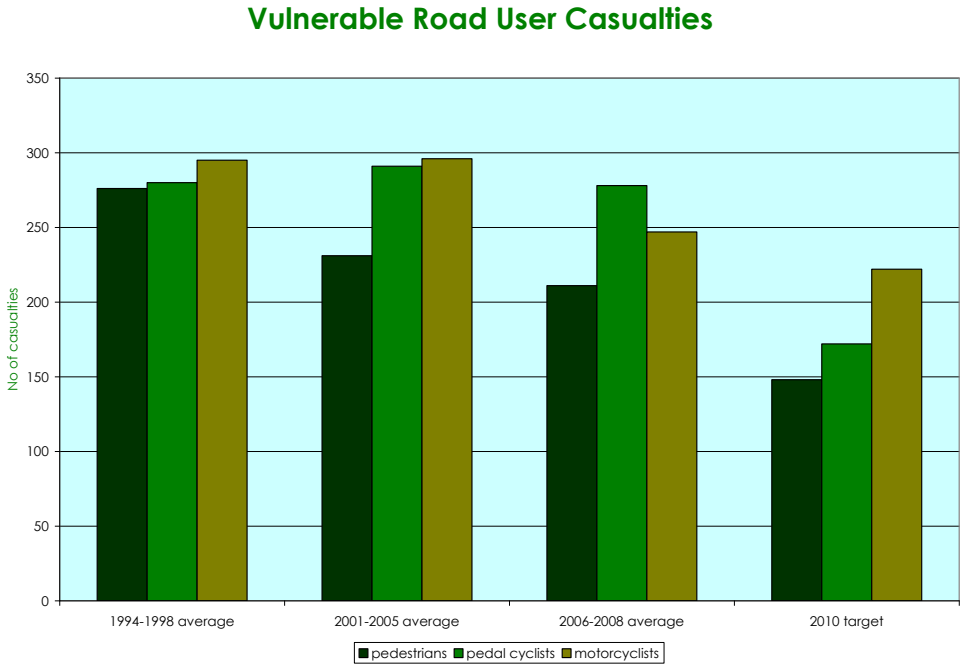
2.40 While the population in all age groups is expected to increase through this LTP period, the numbers in older age groups is expected to rise the most. The numbers of people aged over 60 (for females) or 65 (for males) is expected to increase by over 40% with the number over 85 increasing by over 50%.

Casualties

2.41 Oxfordshire's progress on reducing casualties over the last fifteen years has at least matched national trends, and has resulted in reductions in total casualty numbers of over 25% between 1994-98 and 2006-08. Our reduction in pedestrian and pedal cycle injuries, however, has been disappointing.

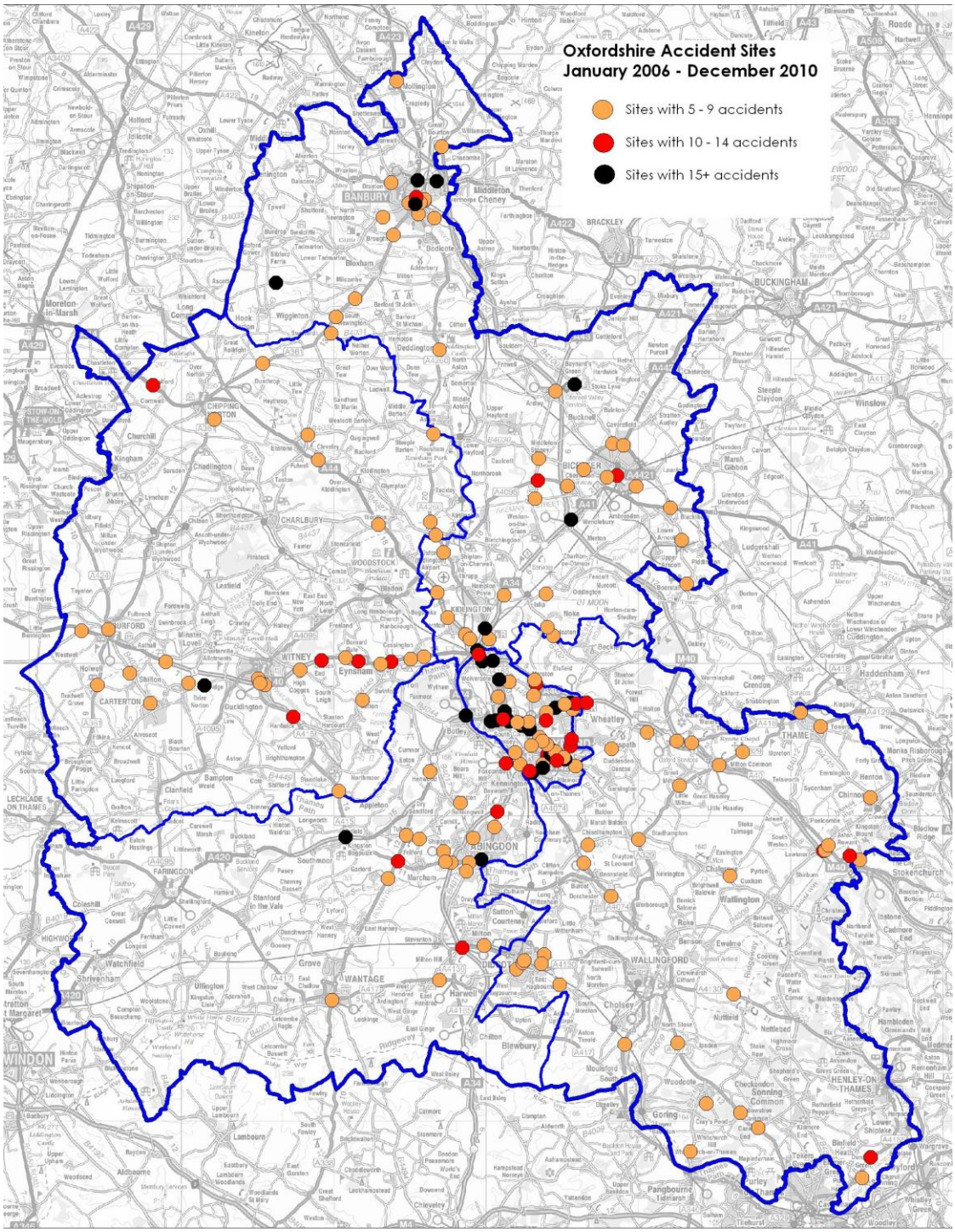
Figure 2.5 Oxfordshire casualty reduction





ksi = number of persons killed or seriously injured. Data from Thames Valley Police, analysed by Oxfordshire County Council

Figure 2.6 Oxfordshire Accident sites January 2006 – December 2010



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