

# **North Central Bedfordshire Growth Options Study Appendices 1-4 July 2017**



**Appendix 1**

Constraints

Theme	Primary constraints	Secondary constraints	Notes	Data gaps and limitations
<i>Environmental designations</i>				
Historic environment	All designated assets present in HMA: Scheduled Monuments, Registered Parks and Gardens	Conservation Areas (CA)  Listed Buildings	<i>Listed Buildings, Registered Parks and Gardens and Scheduled Monuments data were obtained from Historic England.</i>  <i>There are no World Heritage Sites or Registered Battlefields present within the Study Area.</i>	<i>CA data not received from MKC, but have been manually digitized as 'indicative' based on information available on the Council's website. CA data not received from SCC, however none of relevance for the Study Area has been identified.</i>
Biodiversity	All internationally or nationally designated sites present in HMA: Sites of Special Scientific Interest (SSSI), National Nature Reserves (NNR),  Other: Ancient Woodland Inventory (AWI)	Priority Habitat Inventory (PHI)  Locally designated wildlife or geological sites, e.g. Sites of Nature Conservation Importance (SNCI), Local Nature Reserves (LNR), Local Wildlife Sites (LWS), Local Geological Sites (LGS)	<i>There are no Special Protection Areas (SPAs), Special Areas of Conservation (SACs) or Ramsar sites within the Study Area.</i>  <i>LNR, AWI, NNR, SSSI and PHI data were obtained from Natural England.</i>  <i>Priority Habitat Inventory describes Natural Environment and Rural Communities Act (2006) Section 41 habitats of principal importance. This replaces Natural England's previous separate Biodiversity Action Plan (BAP) habitat inventories.</i>	<i>Locally designated wildlife or geological sites data not received from BED, SCC and MKC. No sites of relevance for the study area have been identified for BED and SSC. Relevant sites within MKC have been manually digitized based on online maps available on the Local Authority's website.</i>
Landscape	Area of Outstanding Natural Beauty (AONB)  National Park	Locally identified sensitive landscapes	<i>There are no National Parks within the Study Area. The Chilterns AONB does not affect the potential growth locations within the Study Area.</i>  <i>Locally identified sensitive landscapes were identified from the following data:</i>  <i>CBC – landscapes identified as having 'high' or 'high-medium' sensitivity in a landscape character assessment</i>  <i>NHDC – landscapes identified as having</i>	<i>Locally identified sensitive landscape data was not received from MKC, BED, HUN and SCC.</i>  <i>Data for MKC has been manually digitized as 'indicative' based on information available on the Council's website.</i>  <i>No data of relevance for the Study area have been identified for BED, HUN and SCC.</i>

			<p><i>'high' or 'high-medium' sensitivity in a landscape character assessment</i></p> <p><i>AVDC - 'Areas of Sensitive Landscape'</i></p> <p><i>MKC - 'Areas of Attractive Landscape'</i></p>	
<p><i>Environmental issues, resources and infrastructure</i></p>				
Air quality	Not applicable	Current AQMA	<i>Data received from CBC and HUN.</i>	<i>No data received from BED, SCC and MKC, however no AQMAs of relevance for the Study Area have been identified for these Local Authorities during an online search.</i>
Soil quality	Not applicable	<p>Grade 1 (excellent quality) and Grade 2 (very good) agricultural land</p> <p>Grade 3 (good to moderate) agricultural land</p>	<p><i>Agricultural Land Classification data obtained from Natural England.</i></p> <p><i>Grade 4 (poor) and Grade 5 (poor) agricultural land not considered a constraint.</i></p>	
Water quality and water bodies / waterways	Ponds, lakes, reservoirs, rivers, streams, canals	Source Protection Zone 1 or 1c	<p><i>Water features, as primary constraint, are based on Ordnance Survey OpenMap-Rivers and OpenMap-Local data.</i></p> <p><i>Source Protection Zones data was obtained from the Environment Agency.</i></p>	
Flood risk	Flood Zones 3a and 3b	<p>Flood Zone 2</p> <p>Other surface water flood risk areas or flood storage areas</p>	<p><i>Flood Zones and Flood Storage Area data were obtained from the Environment Agency. The uFMFSW 1:100 dataset received from CBC, covering full project area, was included as 'other surface water flood risk areas'.</i></p> <p><i>There are no separate data for zones 3a and 3b therefore as a precautionary approach both are considered to be a primary constraint and therefore unsuitable for development. Areas in Flood Zone 2 may be developed on if the development is not classified as highly vulnerable in National Planning Practice Guidance - highly</i></p>	

			<i>vulnerable developments will have to meet 'exception test' requirements with appropriate design and mitigation.</i>	
Energy supply infrastructure	Not applicable	Buffer zone of 100 m either side of high voltage (400kV) electricity line	<p><i>Data obtained from National Grid.</i></p> <p><i>Exposure to electric and magnetic fields can occur up to 100 m from 400 kV overhead power lines.</i></p> <p><i>The balance between making land available for renewable energy generation or for housing should be considered as part of the Local Plan strategic allocation process.</i></p>	
Mineral resources	Not applicable	Mineral Safeguarding Areas	<i>Data received from CBC and NHDC.</i>	<p><i>No data was received from BED, HUN, SCC and MKC.</i></p> <p><i>Data from CBC covers BED. Data for HUN, SCC and MKC have been manually digitized from online resources available on the Local Authority's websites.</i></p>
Open space, sport and recreation areas	Public Rights of Way	<p>Publicly accessible open space (e.g. identified by PPG17 assessment)</p> <p>Sustrans national cycle routes</p>	<p><i>Public Rights of Way should be protected as per para. 75 in the NPPF. PROW data were obtained from CBC and NHDC.</i></p> <p><i>Existing open space, sports and recreational buildings and land, including playing fields, should not be built on unless provision of areas of equivalent or better quality is made elsewhere in the District (para. 74 of the NPPF). PPG17 data was received from CBC, NHDC and SCC.</i></p> <p><i>Although not mentioned in the NPPF, Sustrans national cycle routes are an important recreational resource. National Cycle Route data was obtained from Sustrans.</i></p>	<p><i>No PROW data was received from other neighbouring Local Authorities. No PROW data of relevance for the Study Area has been identified within HUN and SCC. Data for MKC has been manually digitized from online resources available on the Council's website. Data for BED has been downloaded from <a href="http://www.rowmaps.com">www.rowmaps.com</a>.</i></p> <p><i>No PPG17 data was received from BED, HUN and MKC.</i></p> <p><i>Data for MKC was obtained from <a href="http://data.gov.uk">data.gov.uk</a> (including Commons and Village Greens, Recreational Open Space and Proposed Recreational Open Space).</i></p> <p><i>Data for BED was manually digitized based</i></p>

				<p><i>on online resources available on the Council's website.</i></p> <p><i>No data of relevance for the Study Area has been identified within HUN and SCC.</i></p>
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**Appendix 2**

Viability Assessment – Detailed Method

## Context

The NPPF states that:

*"...to be considered deliverable, sites should be available now, offer a suitable location for development now, and be achievable with a realistic prospect that housing will be delivered on the site within five years and in particular that development of the site is viable..."*

*"...to be considered developable, sites should be in a suitable location for housing development and there should be a reasonable prospect that the site is available and could be viably developed at the point envisaged..."*

*"...to ensure viability, the costs of any requirements likely to be applied to development, such as requirements for affordable housing standards, infrastructure contributions or other requirements should, when taking account of the normal cost of development and mitigation, provide competitive returns to a willing land owner and willing developer to enable the development to be deliverable..."*

*"...it is equally important to ensure that there is a reasonable prospect that planned infrastructure is deliverable in a timely fashion..."*

Guidance on Strategic Housing Land Availability Assessments suggests a site is considered achievable for development where there is a reasonable prospect that housing will be developed on the site at a particular point in time. This is essentially a judgement about the economic viability of a site, and the capacity of the developer to complete and sell the housing over a certain period. It will be affected by:

- Market factors – such as adjacent uses, economic viability of existing, proposed and alternative uses in terms of land values, attractiveness of the locality, level of potential market demand and projected rate of sales (particularly important for larger sites);
- Cost factors – including site preparation costs relating to any physical constraints, any exceptional works necessary, relevant planning standards or obligations, prospect of funding or investment to address identified constraints or assist development; and
- Delivery factors – including the developer's own phasing, the realistic build-out rates on larger sites (including likely earliest and latest start and completion dates), whether there is a single developer or several developers offering different housing products, and the size and capacity of the developer.

## Broad approach

### Dwelling capacity and delivery trajectories

Due to the high level nature of our viability assessment, we limited the modelling of densities and development mixes to three scenarios, selected as below:

- **Houses, up to five-bed (30 dph)** - CBC's latest viability evidence base assessed densities and development mixes ranging from 25 dph to 55 dph. We modelled the 30 dph development mix as the lower density scenario, in line with Central Bedfordshire Council's dwelling capacity methodology. This development mix does not include any flats, and includes houses up to five bedrooms.
- **Houses, up to three-bed (44 dph)** – Luton BC's latest viability evidence base includes a development mix entitled "contemporary development", comprising a mix of houses up to three bedrooms, but does not include any flats.
- **Lower density low rise flats and terraced housing (55 dph)** - We have modelled CBC's highest density development mix (55 dph) as one of our scenarios. This development mix comprises low rise flats and terraced properties only.

We applied the scenarios to each site based on the following site-specific factors, irrespective of which local authority area they are within:



Location category	Net density	Net density if within 1.2km of public transport interchange
Small (fewer than 2,000 units) infill / extension to village	30	55
Small (fewer than 2,000 units) infill / extension to settlement in top two tiers of hierarchy	30	55
Large (2,000 units or more) infill / extension to village (effectively a new settlement)	44	55
Large (2,000 units or more) infill / extension to settlement in top two tiers of hierarchy	44	55
New settlement	44	55

In order to estimate the dwelling capacity to 2031 and 2035, we reviewed the document 'Housing Trajectory for Central Bedfordshire (Completions as at 30th June 2016)', drawing out benchmarks as follows:

#### Assumed delivery rates (dwellings per annum), incl. affordable housing

Number of units	Low potential future demand	Moderate potential future demand	High potential future demand
0-499 units	40	70	100
500-1,999 units	90	120	150
2,000+ units	150	200	250

In assessing the viability of each location, we asked two questions, with the answers assessed as follows:

#### Viability assessment criteria

Criteria / score	Highly likely	Moderately likely	Less likely
Is development at the assumed density likely to be viable, if delivered on a cleared and serviced land parcel?	High level viability modelling suggests that development at the assumed density with policy compliant affordable housing provision exceeds the Threshold Land Value at current costs and values.	High level viability modelling suggests that development at the assumed density with zero affordable housing provision exceeds the Threshold Land Value at current costs and values.	High level viability modelling suggests that development at the assumed density does not exceed the Threshold Land Value at current costs and values, even with zero affordable housing provision.
Is development at the assumed density likely to be viable, after accounting for potential local infrastructure and abnormal cost items?	High level viability modelling suggests that development at the assumed density with policy compliant affordable housing provision provides a meaningful contribution towards potential local infrastructure and abnormal cost items at current costs and values.	High level viability modelling suggests that development at the assumed density with zero affordable housing provision provides a meaningful contribution towards potential local infrastructure and abnormal cost items at current costs and values.	High level viability modelling suggests that development at the assumed density does not provide a meaningful contribution towards potential local infrastructure and abnormal cost items at current costs and values, even with zero affordable housing provision.

The minimum threshold used for a 'meaningful' contribution towards local infrastructure and abnormal costs was £30,000 per unit, and £750,000 per net developable hectare.

*NB - Site-specific work beyond the scope of this commission may result in the identification of additional local infrastructure requirements beyond the levels considered in our viability assessment. In particular, secondary schools have considerable land and funding requirements, and often create capacity beyond*

*the immediately proposed scale of development. Demand for secondary schools is dependent on factors such as the nature and affordability of new development, catchment areas / accessibility, current unmet demand and relationships with feeder schools, current utilisation / capacity for growth of existing assets, and demographic profiles of the existing and new population – assessment of this demand is beyond the scope of this commission. At some locations, this may result in the identification of significant investment requirements beyond the levels considered in our viability assessment.*

BBP Regeneration prepared a high level Residual Land Value viability model in order to establish the minimum average residential sales value required to achieve threshold land values for each location, with and without policy compliant affordable housing provision, given its:

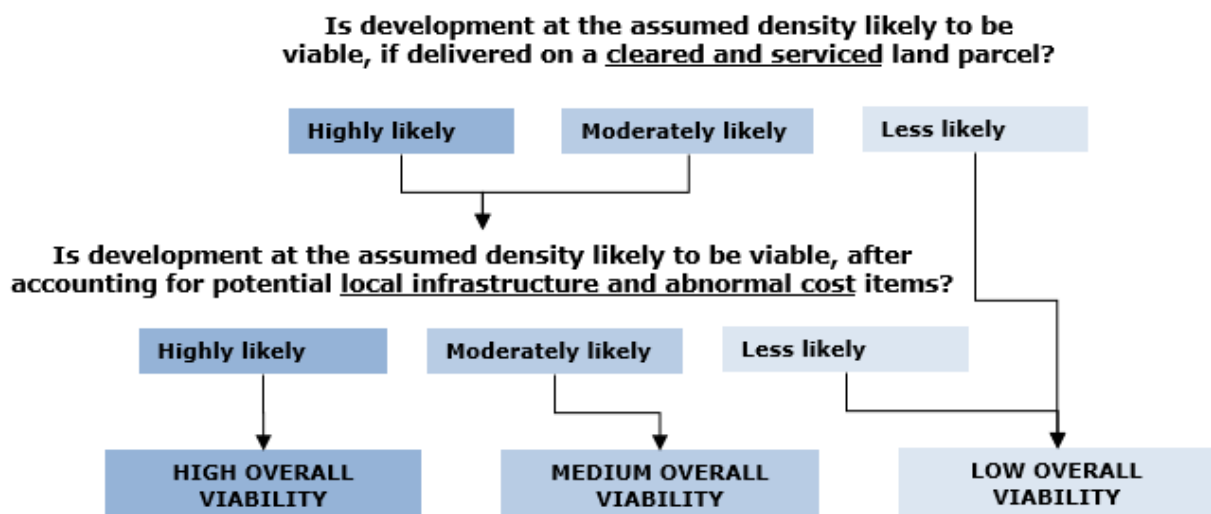
- Assumed density and development mix, applied based on the typology of the location
- Previous land use (greenfield or brownfield threshold land value), applied based on information provided by the local authorities

We then estimated the average residential sales value for each postcode sector within the study area, by analysing Land Registry price paid data from January 2013 to mid-2016, adjusting to mid-2016 prices, as well as adjusting second hand values to reflect new build premium where evident (cross referenced with Zoopla predicted average asking prices, and comparables analysis of asking prices on Rightmove).

We then compared the minimum average sales values (with and without policy compliant affordable housing provision) against the estimated average residential sales value for each location.

The overall viability of each location was then determined as per the decision flow chart below:

### Viability assessment flow



To provide the key data sources and assumptions for our high level viability model, we reviewed the existing and emerging development viability evidence base from Luton Borough Council (LBC) and Central Bedfordshire Council (CBC). In particular:

- Nationwide CIL Service (2015) Local Plan Viability Assessment: Luton Borough
- Three Dragons (2015) Viability Study – Refresh: Central Bedfordshire District
- Liaison with Three Dragons to compare emerging sales values data and assumptions from their commission for CBC, due to report later in 2016

As 28 out of the 31 locations were primarily within Central Bedfordshire, we used the assumptions relevant to that local authority where available - other than for planning policy assumptions and threshold land values, which were applied according to the Local Planning Authority relevant to each

location. Where particular assumptions were not readily available, we have drawn upon the existing viability evidence base for Luton BC.

The assumptions are also broadly in line with the existing evidence base viability base in neighbouring Aylesbury Vale and North Hertfordshire Districts.

As outlined in the following table, we updated a number of the assumptions, in particular:

- Updating build costs from Build Cost Information Service (BCIS) average prices for Bedfordshire in June 2016
- Updating threshold land values based on the net change in UKHPI house price growth and BCIS All-In Tender Price Index

### Key data sources and assumptions

	Luton Borough (For comparison only)	Central Bedfordshire (Applied to all sites)
<b>Development scheme</b>		
Site area / layout plan	No layout plans have been prepared; development mix assumptions have been applied to 24 different notional 'one-hectare tiles'. Assumed 60% net developable area, as all locations are over 2 hectares	
Unit mix, floorspace calculations	<p><b>Houses, up to five-bed (30 dph)</b></p> <ul style="list-style-type: none"> <li>• 20% 3-bed terraced (87 sq m private / 96 sq m affordable)</li> <li>• 20% 3-bed semi (95 sq m private / 96 sq m affordable)</li> <li>• 25% 4-bed detached (125 sq m private / 114 sq m affordable)</li> <li>• 25% 5-bed detached (150 sq m private / 125 sq m affordable)</li> <li>• 10% 2-bed bungalow (79 sq m)</li> </ul> <p><b>Houses, up to three-bed (44 dph)</b></p> <ul style="list-style-type: none"> <li>• 30% 2-bed terrace (75 sq m)</li> <li>• 30% 3-bed semi (93 sq m)</li> <li>• 35% 3-bed detached (93 sq m)</li> <li>• 5% 2-bed bungalow (100 sq m)</li> </ul> <p><b>Lower density low rise flats and terraced housing (55 dph)</b></p> <ul style="list-style-type: none"> <li>• 15% 1-bed flat (50 sq m)</li> <li>• 15% 2-bed flat (70 sq m)</li> <li>• 30% 2-bed terraced (71 sq m)</li> <li>• 40% 3-bed terraced (87 sq m / 96 sq m affordable)</li> </ul>	
Circulation space for flats	Allowance of 20% above NIA	<p><b>Existing viability evidence base:</b> Allowance of 12.5% above NIA</p> <p><b>Emerging viability evidence base:</b> Allowance of 15% above NIA</p>
Parking provision	No explicit costs or values reflected in BBP model	
<b>Capital values</b>		
Private housing	This was the <u>output</u> from the BBP Regeneration high level Residual Land Value appraisal model, and was compared to average sales values in each postcode sector	

	Luton Borough (For comparison only)	Central Bedfordshire (Applied to all sites)
Commercial	No explicit costs or values reflected in BBP model	
<b>Construction costs</b>		
Base build costs	<p><b>Existing viability evidence base:</b></p> <p>Gleeds cost report (March 2015) quotes BCIS Average Prices median for Bedfordshire March 2016:</p> <p>£1,168 / sq m for low rise flats (CSH Level 4)</p> <p>£1,044 / sq m for houses (CSH Level 4)</p>	<p><b>Existing viability evidence base:</b></p> <p>Quotes BCIS Average Prices for September 2014:</p> <p>£1,260 / sq m for flats (up to five storeys)</p> <p>£978 / sq m for houses</p> <p><b>UPDATED to BCIS Average Prices June 2016:</b></p> <p>£1,037 / sq m for flats (up to five storeys)</p> <p>£1,220 / sq m for houses (estate housing, generally), including prelims and contractor's overheads and profit, based on mean for Bedfordshire.</p>
Local site works	n/a	12% of base build cost
Abnormal costs	<p><b>Existing viability evidence base:</b></p> <p>Draws upon Gleeds cost report March 2015, which shows...</p> <ul style="list-style-type: none"> <li>• Archaeology £10,000 / ha</li> <li>• Flood defences £25,000 / ha</li> <li>• Site-specific access works £20,000 / ha</li> <li>• Decontamination £25,000</li> <li>• Piling £20,000 / ha</li> <li>• Service reinforcement £80,000 / ha</li> <li>• Ecological £20,000 / ha</li> <li>• <b>Total (assuming full range): £200,000 / ha</b></li> </ul>	<p><b>Existing viability evidence base:</b></p> <p>Allowance for 'opening up' of large sites £50-100,000 / net ha</p> <p><b>Assumed higher value:</b></p> <p>£100,000 / net ha for 'opening up' of large sites</p>
Professional fees	8.0% of base build and local site works (excluding contingencies)	<p><b>Existing viability evidence base:</b></p> <p>12% of base build and local site works (excluding contingencies)</p> <p><b>Emerging viability evidence base:</b></p> <p>9% of base build and local site works (excluding contingencies)</p>

	Luton Borough (For comparison only)	Central Bedfordshire (Applied to all sites)
Contingency	5.0% on base build costs, local site works	<p><b>Existing viability evidence base:</b> n/a</p> <p><b>Assumed based on Luton BC viability evidence base:</b> 5.0% on base build costs, local site works</p> <p><b>PLUS allowance for sensitivity:</b> Additional 5% on base build costs, local site works</p>
<b>Development and transaction costs</b>		
Land acquisition fees	1.35%	2.00%
NHBC site and plot registration fees, statutory / planning application fees	1.1% of total construction cost	<p><b>Existing viability evidence base:</b> n/a</p> <p><b>Assumed based on Luton BC viability evidence base:</b> 1.1% of total construction cost</p>
Residential disposal	Sales agents / legal fees 1.8% of market value for all units	Sales agents / legal fees 3.0% of market value for all units
Commercial marketing / letting fees	n/a	
<b>Profit, finance and taxation</b>		
Developer Profit on disposals	20% of GDV on private units	<p><b>Existing viability evidence base:</b> n/a</p> <p><b>Assumed based on Luton BC existing viability evidence base:</b> 20% of GDV on private units; 6% of GDV on affordable units</p>
Finance	n/a	6% of total costs
Development period for finance	n/a	Development of 40 units or less are assumed to be completed in one year or under, whilst schemes of 50 units and above are developed at the conservative rate of 20 units in Year 1 and 40 units per annum thereafter
VAT	Assumed to be zero rated due to new build development activity	
Other taxes	No other taxes or reliefs (e.g. income, capital gains, capital allowances) were modelled.	

	Luton Borough (For comparison only)	Central Bedfordshire (Applied to all sites)
<b>Growth and inflation</b>		
House price growth	None beyond mid-2016 in BBP model	
Construction costs	None beyond mid-2016 in BBP model	
Project costs	None beyond mid-2016 in BBP model	

	Luton Borough	Central Bedfordshire	North Hertfordshire District	Aylesbury Vale District
<b>Mitigation</b>				
Planning policy requirements	Enhanced sustainability credentials (Policy LP37) - £40 / sq m	Accessibility standards (CBC Policy 32) - £1,230 / unit  Enhanced sustainability credentials (CBC Policy 47) - £1,000 / unit	Sustainable design / construction standards – 2% of build cost	Code for Sustainable Homes level 4; 10% on-site renewable energy – 8% of base build cost
Affordable housing tenure mix  NB – This excludes Starter Homes at this time. The emerging viability evidence base for CBC indicates that the replacement of Shared Ownership homes with Starter Homes would have increase viability, so ours is a conservative position.	'Policy compliant' affordable housing provision assumed as 20% of total units, with a mix of 72% Affordable Rent and 28% Shared Ownership.	'Policy compliant' affordable housing provision assumed as 30% of total units, with a mix of 73% Affordable Rent and 27% Shared Ownership.	'Policy compliant' affordable housing provision assumed as 40% of total units, with mix of 65% Affordable Rent and 35% Shared Ownership.	'Policy compliant' affordable housing provision assumed as 31% of total units, with mix of 80% Affordable Rent and 20% Shared Ownership (as per Draft Local Plan, July 2016, and; Housing and Economic Development Needs Assessment, June 2015).
Affordable housing transfer value	n/a	50% of Market Value for Affordable Rental units, and; 60% for Shared Ownership units	37% of Market Value for Affordable Rental units, and; 60% for Shared Ownership units	45% of Market Value for Affordable Rental units, and; 60% for Shared Ownership units
Site-specific planning	£2,000 / residential unit	£2,200 / residential unit	£3,000 / residential unit	<b>Existing viability evidence base:</b>

	Luton Borough	Central Bedfordshire	North Hertfordshire District	Aylesbury Vale District
obligations				£10,000 / residential unit for larger schemes  £1,000 / residential unit for smaller schemes  <b>Assumed average:</b> £5,500 / residential unit
Local CIL	n/a	n/a	n/a	n/a
<b>Threshold land value</b>				
Site value	<p><b>Existing viability evidence base:</b></p> <ul style="list-style-type: none"> <li><b>Greenfield:</b> £330,000 / ha</li> <li><b>Brownfield:</b> £540,000 / ha</li> </ul> <p><b>UPDATED average based on net change between UKHPI house price growth and BCIS All-In TPI build cost inflation:</b></p> <ul style="list-style-type: none"> <li><b>Greenfield:</b> £420,000 / ha</li> <li><b>Brownfield:</b> £685,000 / ha</li> </ul>	<p><b>Existing viability evidence base:</b></p> <ul style="list-style-type: none"> <li><b>Greenfield:</b> £200-330,000 / ha</li> <li><b>Brownfield:</b> £650-950,000 / ha</li> </ul> <p><b>UPDATED average based on net change between UKHPI house price growth and BCIS All-In TPI build cost inflation:</b></p> <ul style="list-style-type: none"> <li><b>Greenfield:</b> £320,000 / ha</li> <li><b>Brownfield:</b> £920,000 / ha</li> </ul>	<p><b>Existing viability evidence base:</b></p> <ul style="list-style-type: none"> <li><b>Greenfield:</b> £370-500,000 / ha</li> <li><b>Brownfield:</b> n/a</li> </ul> <p><b>Assumed average:</b></p> <ul style="list-style-type: none"> <li><b>Greenfield:</b> £435,000 / ha</li> <li><b>Brownfield:</b> n/a</li> </ul>	<p><b>Existing viability evidence base:</b></p> <ul style="list-style-type: none"> <li><b>Greenfield:</b> £350,000 / ha</li> <li><b>Brownfield:</b> n/a</li> </ul> <p><b>UPDATED based on net change between UKHPI house price growth and BCIS All-In TPI build cost inflation:</b></p> <ul style="list-style-type: none"> <li>Greenfield: £388,636</li> <li><b>Brownfield:</b> n/a</li> </ul>
Stamp Duty Land Tax	n/a	Included in threshold land value	<p><b>Existing viability evidence base:</b></p> <p>HMRC scale (0% to 5%)</p> <p><b>UPDATED based on HMRC rates and thresholds: 4%</b></p>	<p><b>Existing viability evidence base:</b></p> <p>HMRC scale (0% to 5%)</p> <p><b>UPDATED based on HMRC rates and thresholds: 4%</b></p>

**Appendix 3**

Major transport infrastructure investment in North  
Central Bedfordshire



ID	Transport Infrastructure Investment	Scheme Description	Total Cost	Status	Likelihood of delivery by 2035	Comments
<b>ROADS (R)</b>						
R1	A1 Black Cat Roundabout	Works to increase size and overall capacity of the roundabout in response to severe congestion on NB and SB approaches	£5.6m	Completed	Confirmed (100%)	Opened 2015
R2	Bedford Western Bypass	Phase Two of the Bedford Western Bypass - completing link between A428 and A6	-	Completed	Confirmed (100%)	Opened 2016. A4280 (Biddenham) to A6 Clapham Road (in Bedford LHA)
<b>Oxford to Cambridge Expressway</b>		Plans to provide a continuous dual carriageway between Cambridge-MK-Oxford. This is planned to use mostly the existing A421 and A428 alignment, but will provide new infra where required			Medium (50%)	A feasibility study is currently being undertaken to examine the best options for the link (study due to be completed Autumn 2016). Potential to be started in Roads Period 2 (2020-2025)
R3	A428 Widening (Between A1 and Caxton Gibbet)	Upgrade of the existing A428 to dual two-lane expressway standard between the A1 at Black Cat Roundabout and the A1198 at Caxton Gibbet	-	Unknown/Early Stages	Medium (50%)	Estimated start 2020
R4	A421 Magna Park to J13 M1	Upgrade existing road to dual almost 3km of carriageway	£29m	In progress	Confirmed (100%)	CBC scheme. Status per IDP: Preparatory Work and undertaking works. Modelling work being undertaken to inform the business case and secure the release of funding allocated towards the scheme by DfT
R5	Biggleswade Eastern Relief	2.4km single carriageway paired with the eastern expansion of Biggleswade. Aimed at removing some through traffic from the town and providing capacity for new developments	-	Completed	Confirmed (100%)	Opened 2015. Developer funded (£106 Agreements)
R6a	Woodside Link Road	The Woodside Link will facilitate the development of a Sustainable Urban Extension to the north east of Houghton Regis and enhances local connectivity to Junction 11a.	£40m	In progress	Confirmed (100%)	Due to open November 2016
R6b	A5 De-trunking and Dunstable High Street Improvements	To deliver improvements to the High St following de-trunking to enhance the commercial and town centre.	£2.3m	In progress	High (75%)	The de-trunking will happen immediately the A5-M1 link road is open. High Street Improvements will come at a
R7	M1 J13 to J16 Smart Motorway	Plans to provide 'smart motorways' between J13 and J16. This will include variable speed limit and hard shoulder running in busier periods	-	Planned (Funded)	Confirmed (100%)	Expected start 2016/17
R8	M1 J10 to J13 Smart Motorway	Increased capacity by providing Hard Shoulder Running.	-	Completed	Confirmed (100%)	Improvement works on the M1 commenced in early 2010, and Junctions 11 and 12 will be improved as part of the scheme to facilitate 4 lanes of traffic to operate on the motorway.
R9	A5-M1 Link (Dunstable Northern Bypass)	The proposed Dunstable Northern 4.5km Bypass will run from the A5 close to its junction with the A505 (Leighton Linlade southern bypass) to a new junction (Jct 11a) with the M1 north of Luton	£162m	In progress	Confirmed (100%)	Due to open March 2017. An additional road scheme (Woodside Link) is also under construction (Cost: £38m) in proximity to this link.
R10	M1-A6 Link	Northern 4.4km bypass between the M1 at J11a and the A6 (A505 Hitchin Road)	£55m	Planned (Part funded)	High (75%)	CBC led scheme. Project will remove through traffic both from roads within Luton Dunstable and Houghton Regis and also from unsuitable minor roads outside the conurbation. At indicative design stage. £11m of LGF2 indicatively awarded. £12m of developer funding likewise available subject to conditions. £31m shortfall formed the basis of bid to SEM LEP for LGF3 funding. Bid for LGF3 funding submitted to SEM LEP and subsequently Central Government. Strategic Outline Business Case in process of being produced
R11	Leighton Eastern Link Road	Link road to the east of the town between A4012 and the A505	-	Planned (Funded)	High (75%)	Developer led scheme. Status per IDP: Planning applications submitted but not yet determined. Staged construction 1st phase from Heath Road via 278 agreement (2016/17), 2nd phase Vandyke Road link North (2017), 3rd phase Stanbridge Road (2017), 4th Vandyke Road South (2017/18).
R12	Biggleswade South A1 Jct	Scheme to increase the capacity on the roundabout to the south of the town together with dualling of the A6001 London Road up to its junction with Holme Court Avenue	-	Completed	Confirmed (100%)	Developer led scheme. Opened in 2014
R13	Arlesey Relief Road	New road from Arlesey High Street to A507	-	Unknown/Early Stages	High (75%)	Developer led scheme. Status per IDP: Outline alignment being considered (potential 2018)
R14	A1 East of England Improvements	Early stage of development looking at every option to provide a more modern highway link	-	Aspirational	Medium (50%)	Strategic study
R15	A1(M) Junctions 6-8 Smart Motorway	A1(M) Junction 6 (Welwyn North) to Junction 8 (Hitchin): upgrading to smart motorway including the widening of the carriageway from two lanes to three and provision for hard shoulder running	£50-100m	Planned (Funded)	High (75%)	Secured funding from the Roads Investment Strategy, proposed start Late Road Period 1 (2015-2020)
R16	Century Park Access Road	Access to employment site NE of London Luton Airport		Planned (Unfunded)	High (75%)	Council will continue to work in partnership with both Prologis (who own the site) and London Luton Airport Operations Limited to agree access to employment land east of Luton airport. Should be operational by 2020/21
R17	M1 J10 improvements	Grade separation		Completed	Confirmed (100%)	
R18	Luton Town Centre transport scheme	Completion of link road north of town centre, to complete ring road		Completed	Confirmed (100%)	
<b>PUBLIC TRANSPORT (P)</b>						
P1	Luton Dunstable Busway	Luton Airport - Luton Town Centre - Dunstable - Houghton Regis 10.4km busway, plus proposed extension through sustainable urban extensions on Luton's northern boundary	£90m	Completed	Confirmed (100%)	Opened in 2013
<b>East West Rail</b>		Project promoted by a consortium of Councils from across the East and South East England. It will provide a continuous rail route between Oxford and Cambridge that connects various radial rail routes from London, facilitating a variety of train paths			See below	

Central Beds Growth Options Study Assumptions   ITP's Accessibility Assessment			Consistency with AECOM's Model	Included in Proposed AECOM's Model Runs for year 2031
●				
●	Current and Future Scenarios	● Project completed	OK	Yes
●	Future Scenario	● Simulate by changing status of A34 at Oxford - A41-A4095-A4421-A421-A1-A428 at Cambridge to motorway ● It might need to consider journey time improvements for Stagecoach X5	TBC	TBC
Part of above	Part of above	● Part of above	TBC	TBC
Part of above	Part of above	● Part of above	OK	Yes (TBC)
●	Current and Future Scenarios	● Project completed	TBC	TBC
●				
●				
●				
●	Future Scenario	● Simulate by linking A5 and M1	OK	Yes
●	Future Scenario	● Simulate by linking M1 and Barton Rd	TBC	TBC
●	Current and Future Scenarios	● Project completed ● Link between Shenley Hill Rd and Leighton RD	OK	Yes (TBC)
●				
●				
●	Future Scenario	● Simulate by changing A1 J10 to J14 to motorway	TBC	TBC
●				
●				
●				
●				
●	Current and Future Scenarios	● Project completed	OK	Yes
See below	See below	● See below	N/A	N/A

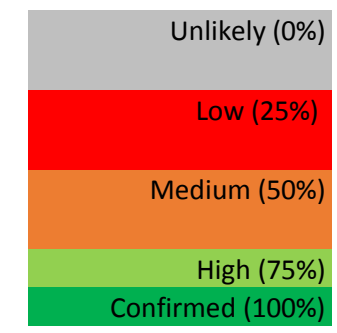
P2	Western Section (Phase 1)	New train services between Oxford/Oxford Parkway/Bicester Village	-	Completed (Oxf Pa-Bis) In progress (Oxf-Oxf Pa)	Confirmed (100%)	
P2	Western Section (Phase 2)	New train services between Oxford/Bicester/Village/MK/Bedford	-	Planned (Part funded)	High (75%)	Due to be operational by 2020. Ridgmont Station (Only station within CBC). Expected to operate hourly semi-fast services. Estimated journey time between Ridgmont and Bicester (30min)
P3	Central Section		-	Planned (Unfunded)	Medium (50%)	Possible completion of the scheme in the early 2030's. Proposed section at 'corridor' stage. Proposal is expected to provide an interchange with the East Coast Mainline. Estimated journey time between Bedford & Cambridge (20-30min)
P4	Midland Mainline Electrification	Network Rail is planning to electrify the Midland Main Line north of Bedford. Potential to increase capacity on the Midland Mainline and further development of local rail services	-	Unknown/Early Stages	Medium (50%)	This scheme may be brought forward as part of Network Rail's programme of works for Control Period 5 (April 2014 to March 2019). Some bridges have already been raised.
P5	Thameslink Programme	Upgrade and expand the existing Thameslink rail network to provide new and longer trains between a wider range of stations to the north and to the south of London without requiring passengers to change trains in London. Work includes platform lengthening, station remodelling, new railway infrastructure, and additional rolling stock	£6.5billion	In progress	Confirmed (100%)	Expected completion of the whole programme in 2018. Investment programme affecting all stations on Thameslink line
P6	Wixams Railway Station (Proposed)	Rail station adjacent to existing line to serve the new Wixams Development and associated car park	-	Unknown/Early Stages	High (75%)	Developer led scheme. Developers have submitted a bid to SEM LEP to secure funding to help finance the construction of the station
	<b>Bus/rail Interchanges</b>	Works to develop hubs to the local transport network through the creation of bus/rail interchanges			See below	
P7	Interchange at Arlesey		-	Unknown/Early Stages	Medium (50%)	Status per IDP: Scheme design. Improvements to be sought as part of the mitigation requests associated with Arlesey Cross development proposals
P8	Interchange at Biggleswade		-	Unknown/Early Stages	Medium (50%)	Status per IDP: Scheme design. No works currently programmed
P9	Interchange at Flitwick		£1.7m	Planned (Funded)	High (75%)	Status per IDP: Scheme design. Funding secured from various sources. Set to open in March 2018
P10	Interchange at Ridgmont		£2m	Planned (Unfunded)	High (75%)	Status per IDP: Scheme design. Proposals have been drawn up and funding is being sought to deliver the first stage of the scheme through the LGF3 process
P11	Interchange at Sandy		-	Unknown/Early Stages	Medium (50%)	Status per IDP: Scheme design. No works currently programmed
P12	Interchange at Leighton		-	Unknown/Early Stages	Medium (50%)	Status per IDP: Scheme design. No works programmed but outline designs are in place with discussions yet to take place with Network Rail as to their agreement
P13	Luton railway station improvements	Upgrade of station facilities, including DDA access to all platforms		Unknown/Early Stages	Medium (50%)	
P14	Northern Entrance to Luton Airport Parkway Station	Creation of a new northern entrance to Luton Airport Parkway station to reduce peak period crowding via the existing single entrance, and service residents, employees and visitors to the Napier Park/Stirling Place. The two		In progress	Confirmed (100%)	Planning permission for the scheme has been granted and initial construction works commenced using CL with further local contributions anticipated.
P15	New Luton North railway station / Park and Ride alternative	Aspirations for a new 'Luton North' rail station to serve growth north of Luton. Possible that this would result in closure of either Leagrave or Harlington rail stations. Park and ride considered as alternative, but proposals have not materialised as part of planning applications.		Aspirational	Unlikely (0%)	
P16	Light rail link from Luton Airport Parkway to Luton Airport terminal (and one other stop)	Announced April 2016, as part of Luton Airport expansion; reports of funding by Luton BC.	£200m	Planned (Unfunded)	High (75%)	Planning application due 2017; due for delivery by 2020/21
P17	Park and Ride - Stockwood Park			Unknown/Early Stages	Medium (50%)	Developer-led scheme, including required bus priority measures. Planning permission yet to be granted.
P18	Park and Ride - Butterfield			Planned (Unfunded)	High (75%)	Developer-led scheme, including required bus priority measures. Planning permission granted.

**CYCLING (C)**

	Current and Future Scenarios	● To be completed by Dec 2016	N/A	N/A
	Future Scenario	● Hourly services between: Oxford and MK; MK and Bedford; and MK and High Wycombe ● Estimated Journey times: <b>Oxford - MK</b> Oxf - Oxf Par = 4.5 mins Oxf Par - Islip = 3 mins Islip - Bic Town = 8 mins Bic Town - Wins = 13 mins Wins - Blet = 8.5 mins Blet - MK = 4 mins <b>MK - Bedford</b> MK - Blet = 4 mins Blet - W Sands = 9 mins W Sands - Ridg = 8 mins Ridg - Bed = 18 mins <b>MK - High Wycombe</b> MK - Blet = 4 mins Blet - Wins = 8.5 mins Wins - Ay Vale P = 19.5 mins Ay Vale P - Ay = 4 mins Ay - P Ris = 14 mins P Ris - H Wyco = 8 mins	N/A	N/A
	Future Scenario	● Hourly service between Bedford and Cambridge via Sandy ● Estimated Journey times: Bed - San = 9 mins San - Cam = 21 mins	N/A	N/A
	-	● Unable to include	N/A	N/A
	-	● Unable to include	N/A	N/A
	N/A	● N/A	N/A	N/A

<b>Cycle Hubs</b>	Provision of cycle hubs or equivalent infrastructure at a number of stations in the Central Beds and Bedford	£0.25m		See below	Total cost for schemes is approximately £250,000. With around £222,500 being provided by the Cycle Rail Fund.	
C1	Cycle Hub, Interchange & Thameslink Improvements	Bedford station	-	Planned (Funded)		
C2	Cycle Hub, Interchange & Thameslink Improvements	Sandy station	-	Planned (Funded)		
C3	Cycle Hub, Interchange & Thameslink Improvements	Biggleswade station	-	Planned (Funded)		
C4	Cycle Hub, Interchange & Thameslink Improvements	Arlesey station	-	Planned (Funded)		
C5	Cycle route adjacent to Busway	Surface treatment on this strategic route	Completed	Confirmed (100%)	Successful Transition Fund bid now promoting this "cycle superhighway" for commuting trips.	
<b>WATERWAYS (W)</b>						
W1	Bedford to Milton Keynes Waterway	20 mile cycling, walking and water route from Bedford to Milton Keynes, connecting the River Great Ouse at Bedford to the Grand Union Canal in Milton Keynes. Objective of providing a green corridor through the Northern Marston Vale Growth Area.	-	Aspirational	Medium (50%)	Waterway is being promoted by the Bedford to Milton Keynes Waterway Trust, of which Central Bedfordshire Council is a partner. As of the Local Transport Plan (2011) planning permission had been secured for 25% of its length.

**Deliverability**



	N/A	● N/A	N/A	N/A
●				
●				
●				
●				
●				

**Status for the purpose of ITP's Accessibility Analysis**

- Not included
  - Included Future Scenario
  - Included Current Scenario
- 2016** Current scenario  
**2031** Future scenario  
**TBC** To Be Confirmed

# Appendix 4

## Transport Assessment – Detailed Method

## Assessment Indicators

To provide high level transport inputs to the North Central Bedfordshire growth options study, ITP identified the following key assessment indicators with the objective of providing CBC with information and analysis to support the development of their spatial strategy:

### *Key Commuter Travel Mode Split*

This indicator is defined as the share of trips between different modes of travel namely public transport, active travel, taxi, driving car or van, motorcycle, work from home and other, which local residents use to travel to work. This is based on 2011 census data for Lower Super Output Areas (LSOAs) which contained the growth option, or the share that was thought to share similar urban characteristics to the growth option under analysis.

Public transport and active travel indicators were used for the assessment. Individual status was defined for each growth option as follows:

Key Commuter Travel Mode Split	Public Transport	Active Travel
High	≥ 10%	≥ 10%
Medium	5% - 10%	5% - 10%
Low	0% - 5%	0% - 5%

### *Public Transport Accessibility*

This accessibility indicator enabled ITP to calculate the number of jobs within 60 minutes of all growth options by public transport. ITP took into account existing conditions and assumed future conditions, which were assumed to change exclusively as a result of the introduction of planned public transport infrastructure schemes. The number of jobs was based on 2011 census data. No projections were made in relation to the location or number of future jobs.

For the purpose of modelling PT accessibility using TRACC (i.e. accessibility mapping software), travel time was measured from a point on the closest bus stop to individual growth options and used AM peak PT timetable information.

Individual status was defined for each growth option as follows:

Public Transport Accessibility	Estimated No. of Jobs within 60 mins	
	Existing Conditions	Assumed future conditions
High	≥ 120,000	≥ 120,000
Medium	60,000 - 120,000	60,000 - 120,000
Low	0 - 60,000	0 - 60,000

It should be noted that assumed future conditions comprised the implementation of the East West Rail (EWR) scheme. Whilst evidence suggests that there are various scheme aspirations, ITP's assumptions for the EWR Western and Central Sections were defined as follows:

- Hourly services between Oxford and Milton Keynes; Milton Keynes and Bedford; and Milton Keynes and High Wycombe.
- Estimated Journey times:



### **Oxford - Milton Keynes**

- Oxford - Oxford Parkway = 4.5 mins
- Oxford Parkway - Islip = 3 mins
- Islip - Bicester Town = 8 mins
- Bicester Town - Winslow = 13 mins
- Winslow - Bletchley = 8.5 mins
- Bletchley - Milton Keynes = 4 mins

### **Milton Keynes - Bedford**

- Milton Keynes - Bletchley = 4 mins
- Bletchley - Woburn Sands = 9 mins
- Woburn Sands - Ridgmont = 8 mins
- Ridgmont - Bedford = 18 mins

### **Milton Keynes - High Wycombe**

- Milton Keynes - Bletchley = 4 mins
- Bletchley - Winslow = 8.5 mins
- Winslow - Aylesbury Vale Parkway = 19.5 mins
- Aylesbury Vale Parkway - Aylesbury = 4 mins
- Aylesbury - Princes Risborough = 14 mins
- Princes Risborough - High Wycombe = 8 mins

- Hourly service between Bedford and Cambridge via Sandy

Estimated Journey times:

### **Bedford - Cambridge**

- Bedford - Sandy = 9 mins
- Sandy - Cambridge = 21 mins

### *Road Accessibility*

Similarly, this accessibility indicator estimated the number of jobs within 30 minutes of each growth option by road. ITP took into account existing conditions and assumed future conditions, which were exclusively expected to change as a result of the introduction of a number of major road infrastructure schemes. The number of jobs was based on 2011 census data. No projections were made in relation to the location or number of future jobs.

Travel times were evaluated for the AM peak from a central point (centroid) of each growth option and assumed the adequate provision of access routes from individual centroids to the existing road network. To estimate road accessibility, travel conditions were reflected using the Integrated Transport Network (ITN) dataset and 2016 average vehicles speeds derived from Traffic Master (TM) speed data.

Assumed future conditions take into account the implementation of major future road infrastructure as shown below:

- Bedford Western Bypass
- Oxford to Cambridge Expressway
- Biggleswade Eastern Relief
- A5-M1 Link (Dunstable Northern Bypass)
- M1-A6 Link
- Leighton Eastern Link Road
- A1(M) East of England Improvements

Individual status was defined for each growth option as follows:

Road Accessibility	Estimated No. of Jobs within 30 mins	
	Existing Conditions	Assumed future conditions
High	≥ 215,000	≥ 215,000
Medium	75,000 - 215,000	75,000 - 215,000
Low	0 - 75,000	0 - 75,000

Due to restrictions in relation to the possibility of editing the ITN dataset, simplified assumed future conditions for each growth option were required. Estimated number of jobs was based on where each growth option fell within each of the defined thresholds and the midpoints for each threshold. This assumption was applied for all potential growth options and was predominantly influenced by the future implementation of two potential major road infrastructure schemes namely the Oxford to Cambridge Expressway and the A1(M) East of England improvements, which were expected to benefit road accessibility (at least in the short term following implementation of the two schemes) for all growth options. It should be noted that both of these corridors are currently being studied by Highways England and no specific schemes have yet been identified or have funding committed other than for further feasibility work.

For example, if a potential growth option revealed a total number of jobs for the existing conditions greater than or equal to 37,500 but fewer than 75,000 ('Low' threshold), the assumption was that future road accessibility, largely related to the two major road infrastructure schemes, would result in sufficient improvements to enable this potential growth option to move from red to amber threshold. Conversely, if the total number of jobs was fewer than 37,500 the assumption was that the indicator remained unchanged.

### Indicative Existing Traffic Conditions

Indicative speed differentials, which were used as the thresholds for congestion, were prepared and used to add an extra level of detail to the transport input.

Whilst this simplified approach expresses 'congestion' imperfectly in terms of speeds (i.e. speed differentials) rather than more robust 'travel rates', which would take into account traffic volumes, this approach enabled ITP to draw a preliminary picture for the broader concept of 'congestion' in the study area from which:

- Uncongested travel conditions were assumed to occur during evening time periods (free-flow speeds). It takes into account that speeds recorded in the evening are more likely to depict little traffic interference on road links and presumably acceptable levels of congestion
- Decreases in driving speeds were assumed to be intentionally associated with 'congestion' rather than other factors such as roadworks, road closures, queuing time at junctions, etc.
- Speeds were not flow-weighted, taking into consideration traffic volumes on each link of the road network.

Our project team produced the speed differentials for AM (7:00am-9:00am) peak speeds based on a basic comparison with the evening speeds (7:00pm-11:00pm). The speed differentials were defined as shown below:

- ≥ 30 % speed reduction (Used for the assessment)
- 20% ≤ speed reduction < 30%
- 10% ≤ speed reduction < 20%
- <10% speed reduction
- No speed reduction or anomaly

These differentials were identified for four road types namely motorway, A roads, B roads and minor roads. For the assessment, indicative traffic conditions were evaluated by taking into account the length of roads contained within a circle from the centre of each growth option (R = 5,000m).

Due to the strategic nature of this study, indicative traffic conditions were only considered for motorways and A roads that revealed speed reductions equal or greater than 30%.

Individual status was defined for each growth option as follows:

Indicative Existing Traffic Conditions	Length of Motorway and A Roads* experiencing a speed reduction greater than or equal to 30%	
	Existing Conditions	Assumed future conditions
High	≥ 12,000	≥ 12,000
Medium	6,000 - 12,000	6,000 - 12,000
Low	0 - 6,000	0 - 6,000

\* Contained within a circle from centre of growth option (Radius = 5,000m)

To facilitate this assessment, our project team assumed improvements along the existing A1 road corridor between junctions 10 and 14 such that speed reductions would result in values below the '≥ 30 % speed reduction' threshold. That is, future improvements along the A1 would be sufficient (at least in the short term following the implementation of the scheme) to offer free-flow speeds (i.e. evening time periods speeds).

Similarly, the Oxford to Cambridge expressway was simulated by changing the status of the A34 at Oxford, A41, A4095, A4421, A421 and the A428 to also offer free-flow speeds.

### Personal Injury Collisions

Personal Injury Collisions (PIC) involving all vehicle types on roads within 200m and 1,000m of the perimeter of each growth option. This indicator was based on collisions from the website Crashmap for the period between 2011 and 2015.

To facilitate comparisons, the PIC indicator provided the indicative number of recorded fatal and serious collisions per Ha. For the purpose of the assessment, the 1,000m factor was used. To facilitate this, assessment indicators for existing conditions and assumed future conditions remained unchanged.

Individual status was defined for each growth option as follows:

Personal Injury Collisions	Indicative Number of Collisions per Ha
High (best performing in relation to other locations)	0.00 - 0.05
Medium	0.05 - 0.15
Low (worst performing in relation to other locations)	≥ 0.15

### Main Train Station Car Parking Facilities (to facilitate park and ride)

This indicator was introduced to supplement the PT accessibility indicator, as the PT accessibility indicator did not cover car / public transport trips. It sought to take into account potential PT trips that involve modal transfers at train stations from private vehicles to PT services.

This indicator is based exclusively on existing car park capacity at the four mainline stations within the study area. ITP assumed that there were no changes between existing conditions and assumed future



conditions. Basic assumptions were required in terms of the most likely train station to be used from each growth options based on travel distance to station car park facilities and knowledge of the study area. These assumptions are as follows:

- Growth options N1-N9: Flitwick
- Growth options N10-N15: Sandy
- Growth options N15-N20: Biggleswade
- Growth options N21-N30: Arlesey

Individual status was defined for each growth option as follows:

Park & Ride Main Train Station Facilities	Existing Car Park Capacity
High	≥ 200
Medium	100 - 200
Low	0 - 100

### Simplified Multi-Criteria Analysis

In line with the strategic nature of this transport input, ITP carried out a simplified multi-criteria task to help identify potential sustainable transport preferences. It should be noted that this element of the transport analysis used scores derived from the graded (High / Medium / Low) assessment rather than indicator-specific values. That is, defined weights were assigned directly to the graded findings and used to characterise different transport conditions for each growth option as follows:

Graded Finding	Assigned Score
High	5
Medium	3
Low	1

The methodology is primarily aimed at allowing a comparison of locations within each scenario and comparing individual locations across scenarios should therefore be treated with caution.

Further to the above, it is important to acknowledge that one limitation of this assessment becomes apparent when calculating assessment indicators for large sites. This is due to the need to represent growth options as a point for the purpose of accessibility modelling. Assessment indicators for large scale growth options could be significantly altered as a result of the assumptions used, both in a positive and negative way.

Notwithstanding the above, assessment indicators have been combined through a simplified multi-criteria analysis and the assessment scores weighted consistent with an aspiration that seeks to promote sustainable transport potential.

Weightings are not based upon any published guidance, but are a result of discussions with CBC to favour public transport indicators (i.e. public transport led approach). It should be noted that a sensitivity analysis was not undertaken.

The following weightings were applied to the scored derived from the graded assessment with a view to determining performance matrices for existing and assumed future conditions.

Assessment Indicator	Weighting Applied to Combined Result
Key Commuter Travel Mode Split: PT	30%
Key Commuter Travel Mode Split: Active Travel	5%
Public Transport Accessibility	30%
Road Accessibility	10%
Indicative Transport Conditions	5%
Personal Injury Collisions	5%
Mainline Train Station P&R Facilities	15%

Overall average values for each potential growth location were calculated using the following margins:

- High:  $\geq 3.7$
- Medium:  $\geq 2.4$  and  $< 3.7$
- Low:  $< 2.4$

The results of the graded assessment and the weighted analysis using the method above, which adopts a public transport led approach, are presented in tabular form and maps within the results chapter of this report.

### Other sources of data

#### Journey to Work O-D Data

In order to produce a preliminary distribution matrix for each of the potential growth options, 2011 census data was interrogated. First, the Middle Super Output Area (MSOA) which contained the spatial growth option, either in full or in part, was identified.

From this, the volume of trips originating from this MSOA to both local authorities areas and districts outside of Central Bedfordshire, as well as to other MSOAs within Central Bedfordshire was obtained. Using this, the top 75% of trips (in terms of volume) originating from this MSOA were extracted, and the directions of the destinations identified.

It should be noted that professional judgment was applied, looking at the local and wider road network, as to which roads were likely to be impacted upon, as a result of any proposed spatial growth options.