

## South Warwickshire Local Plan Growth Options

### Climate Change Analysis

In assessing the spatial options, the following climate change impacts are considered:

#### A CAUSES OF CLIMATE CHANGE: SOUTH WARWICKSHIRE CARBON EMISSIONS

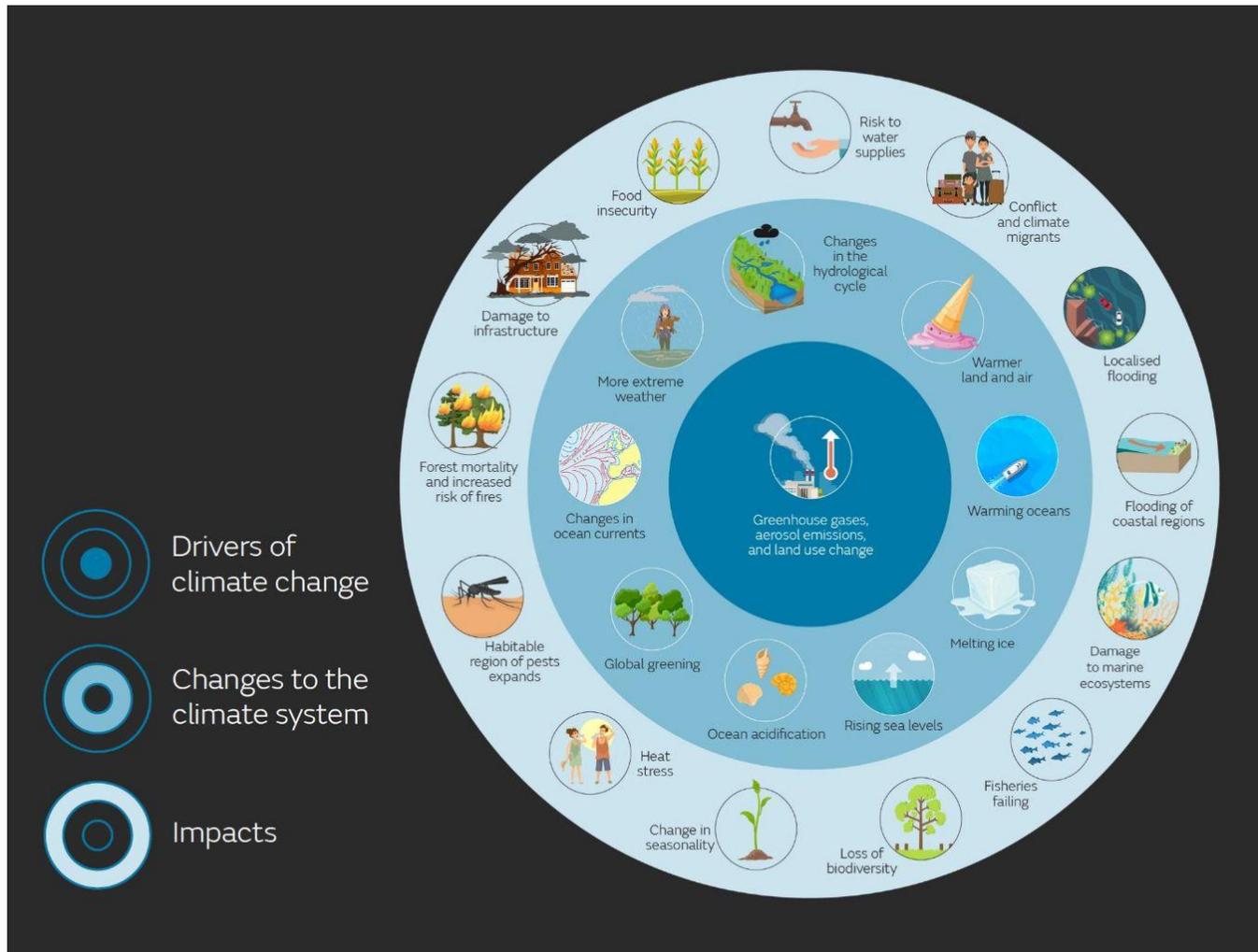
- i. **Transport-related impacts:** In Warwick District 39% (414,000 tCO<sub>2</sub>e) of carbon emissions are from on-road transport. 7% (74,000 tCO<sub>2</sub>e) are from aviation. 1.5% (20,000 tCO<sub>2</sub>e) is from rail. It is expected that in Stratford District on-road transport will also make up a significant proportion of carbon emissions. Aviation is not expected to be significant within Stratford District.
- ii. **Domestic Energy impacts:** In Warwick District 26% (273,000 tCO<sub>2</sub>e) of carbon emissions are from residential buildings. This is comprised of heating (primarily gas, but also oil and coal) and electricity (provided through the national grid). It is expected that that in Stratford District domestic energy will also make up a significant proportion of carbon emissions
- iii. **Institutional Buildings and Facilities Energy Impacts:** In Warwick District 13% (134,000 tCO<sub>2</sub>e) of carbon emissions are from commercial buildings and facilities. This is comprised of heating (primarily gas, but also oil and coal) and electricity (provided through the national grid). As Warwick District includes part of the University, a significant in-patient hospital, the Police HQ and the County Council HQ, it is likely that the proportion of institutional carbon emissions is higher than in Stratford District.
- iv. **Industrial Buildings and Facilities Energy Impacts:** In Warwick District 7.5% (79,000 tCO<sub>2</sub>e) of carbon emissions are from residential buildings. This is comprised of heating (primarily gas, but also oil and coal) and electricity (provided through the national grid). It is expected that that in Stratford District domestic energy will also make up a significant proportion of carbon emissions
- v. **Commercial Buildings and Facilities Energy Impacts:** In Warwick District 4% (40,000 tCO<sub>2</sub>e) of carbon emissions are from commercial buildings and facilities. This is comprised of heating (primarily gas, but also oil and coal) and electricity (provided through the national grid). It is expected that that in Stratford District commercial energy will make up a similar proportion of carbon emissions
- vi. **Agriculture, Food and Land-use (AFOLU):** In Warwick District 1% (10,000 tCO<sub>2</sub>e) of carbon emissions are from AFOLU – this derives partly from livestock and partly from “stationary” agricultural buildings and facilities. Given the much larger rural area of Stratford District, it is expected that that AFOLU will make up a much high proportion of carbon emissions.
- vii. **Waste Impacts:** In Warwick District, 1.5% (15,000 tCO<sub>2</sub>e) of carbon emissions are from waste. This is partly as a result of solid waste disposal and partly as a result of waste water processing. It is expected that that in Stratford District waste will make up a similar proportion of carbon emissions

NOTE: All data provided is derived from the SCATTER emission tool and are based on 2017 data.

At the time of preparing this analysis, the SCATTER data is not available for Stratford District or for South Warwickshire as whole. However, it is expected that this will be provided by March 2021 at which time the data will be reviewed and, if required the analysis below can be amended.

## B IMPACTS OF CLIMATE CHANGE

The impacts of climate change are well summarised by the diagram below produce by the Met Office



The Met Office has produced the following tables to illustrate changes to the climate and weather events globally and nationally.

## Global Changes

	Changes in intensity or frequency so far	Is this linked to climate change?	What is expected in the future?
Global heatwaves	Increase	Yes	Increase
Global cold events	Decrease	Yes	Decrease
Global heavy rain	Increase	Yes	Increase
Global drought	Increase*	Yes*	Increase
Global tropical storms	No trend detected	Inconclusive	Increase and decrease**

## National Changes

	Changes in intensity or frequency so far	Is this linked to climate change?	What is expected in the future?
UK warm spells	Increase	Yes	Increase
UK cold spells	Decrease	Yes	Decrease
UK heavy rain	Increase	Inconclusive	Increase
UK dry spells	No trend detected	Inconclusive	Increase (summer)
UK wind storms	No trend detected	Inconclusive	Inconclusive

In the future, the Met Office projects that the UK will see:

- Warmer and wetter winters
- Hotter and drier summers
- More frequent and intense weather extremes

Within Europe and the UK, the following impacts of climate change are likely to be felt, even in the range of 1 to 2 degree C increases:

- More frequent high temperature extremes in the summer
- More hot days and nights with impacts on human health and mortality
- Impacts on the distribution and abundance of plant and animal life. This has the potential to affect biodiversity,
- Changing patterns of plant and animal distribution could lead to impacts of crop yields and agricultural viability, as well as greater numbers of pests
- The capacity of the natural environment to provide key services could be diminished – such as reservoirs of water and natural erosion control
- The temperature increases could impact on economic wellbeing including agriculture; tourism; energy production; and supply of water and other natural resources
- Weather patterns are likely to become more unpredictable with potentially more extreme weather events such as damaging storms, floods and droughts

There is little local (south Warwickshire) data about the impacts of climate change and even where there is evidence (e.g increased frequency and intensity of flooding events), it is difficult to attribute this with any certainty to climate change. However, given the international and national picture set out above, there is no reason why South Warwickshire would be immune to the impacts of a changing global climate and adaptation will be relevant as the impacts described above for Europe and the UK become more prevalent locally.

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<b>A Rail corridors</b>	a) Provides good access to low carbon transport options for commuting and access to services. b) Rail services are more effective as a low carbon transport option where there is a high quality, sustainable transport interchange for onward journeys, including active travel modes, electric vehicles and public transport. c) Some stations have only infrequent services. d) Lack of convenience in terms of frequency or the location of stations at destinations may result in journeys by car and thereby	2 - sub option (ii) 3 - sub option (i)	Adaptation measures are likely to focus a) Agriculture and forestry - planting and growing b) Protective infrastructure and measures against environmental and weather events	2

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	<p>limit the potential carbon benefits of focusing development around stations</p> <p>e) For some of the more rural stations there is likely to be continued reliance on the car to access rail services. Unless these car journeys are low carbon (electric or hydrogen), these could add to carbon emissions</p> <p>f) Location of existing mainline/major stations correlates well to access to other services, infrastructure and employment thereby reducing need to travel.</p> <p>g) Focusing development along “corridors” may impact on the quality of transport options between corridors, even where settlements are in fairly close proximity. This could lead to reliance on the private car</p> <p>h) Depending on the extent to which Option H can be used alongside this, this option is likely to involve a significant quantum of development on greenfield land. This may have impacts on land for local food and carbon capture</p> <p>Sub-Option (i): would result in more distributed growth, including growth around smaller stations and potential stations. For the reasons set out in c), d) and e) above this may result in higher carbon impacts unless effective mitigation and infrastructure is put in place to support this.</p> <p>Sub-Option (ii): would focus development more. This could be more effective in enabling use of existing facilities, infrastructure,</p>		<p>c) Development layout and design</p> <p>d) Building construction methods</p> <p>e) Evolving and new infrastructure to provide essential resources such as water supplies</p> <p>None of these measure are likely to be directly impacted by this option</p>	

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	employment and services, and where necessary in enabling the provision of new facilities, infrastructure, employment and services.  NB: There is some uncertainty about how rail usage will recover from the Coronavirus pandemic			
<b>B Road corridors</b>	a) This option is likely to continue place a reliance the private car (although overlaps with option C (bus corridors) are noteworthy). Although on-road carbon emissions are likely to reduce in all options as low emission vehicles become more commonplace, some cars will continue to rely on petrol/diesel for many years to come and until the national electricity grid is entirely zero carbon, electric vehicle will also continue to have some impact on carbon emissions. b) Car production will continue to have carbon impacts (embodied carbon) - although this is a complex and evolving aspects of carbon emissions, particularly as production techniques evolve and electric cars (with batteries and fuel cells) become the norm. c) For the reasons set out in a) and b) above, this option is unlikely to reduce carbon emissions below those delivered through changes to national policy. d) Depending on the extent to which Option H can be used alongside this, this option is likely to involve a significant quantum of development on greenfield land. This may have impacts on land for local food and carbon capture	3 - sub option (ii) 4 - sub option (i)	As for Option A above	2

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	<p>Sub-Option (i): Unless the quantum of development in specific locations is of a scale to enable infrastructure, employment and services to be provided locally, distributed development across existing settlements may result in higher levels of car usage and car ownership with negative impacts on carbon emission (mitigation rating 4)</p> <p>Sub-Option (ii): By focusing development at certain key locations along road corridors, there is a greater opportunity to bring forward development at a scale which enable local infrastructure, services and jobs to be provided in close proximity, thereby reducing reliance on the car and reducing journey lengths in comparison to sub-option (i). (mitigation rating 3).</p>			
<b>C Main Bus Corridors</b>	<p>See impact A(i) - transport related emissions</p> <p>In spatial terms, it is notable that the road corridors set out in option B overlap significantly with the bus corridors in this option. In assessing the climate change implications of this option, it is therefore assumed that additional investment in bus services is made and that bus priority measures (including allocating road space to buses, at the expense of road space for private cars) will be implemented. Without this assumption, the assessment would be similar to option B above.</p> <p>a) Provides access to low carbon transport options for commuting and access to services, particularly if services switch to low emission fuels during the course of the Plan</p>	<p>2 - sub option (ii)  3 - sub option (i)</p>	<p>As for Option A above</p>	<p>2</p>

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	<ul style="list-style-type: none"> <li>b) Bus services are more effective as a low carbon transport option where there is a high quality, sustainable transport interchange for onward journeys, including active travel modes, electric vehicles and public transport.</li> <li>c) Convenience, frequency and reliability of services is key to this spatial strategy reducing reliance on the private car. Without improvements in this regard, development along bus corridors is likely to result continued or increased private car usage.</li> <li>d) Focusing development along “corridors” may impact on the quality of transport options between corridors, even where settlements are in fairly close proximity. This could lead to reliance on the private car</li> <li>e) Depending on the extent to which Option H can be used alongside this, this option is likely to involve a significant quantum of development on greenfield land. This may have impacts on land for local food and carbon capture</li> </ul> <p>Sub-Option (i): would result in more distributed growth, including growth around smaller settlements. This may result in higher carbon impacts unless effective mitigation and infrastructure is put in place to support this. In this case the difficulties of providing convenient, frequent and reliable transport services for relatively dispersed settlement patterns is likely to see a continued reliance on the car with resulting increases in carbon emissions cancelling out any benefits from improved alternative transport options. (Mitigation rating 3)</p>			

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	Sub-Option (ii): would focus development more. This could be more effective in enabling use of existing facilities, infrastructure, employment and services, and where necessary in enabling the provision of new facilities, infrastructure, employment and services (mitigation rating 2)  NB: There is some uncertainty about how bus usage will recover from the Coronavirus pandemic			
<b>D Employment Hubs</b>	a) Focusing development close to existing employment hubs has the potential to reduce commuting and to provide alternatives to the car for commuting journeys, thereby reducing carbon emissions. In particular, if the percentage of commutes that are under 5 miles is increased significantly, options for zero or very low emission journey (such as walking, cycling, e-bikes, e-scooters etc) are realistic b) In general (but not in all cases), existing employment hubs have well developed transport infrastructure for alternatives to the private car. c) Not all employment hubs have the full range of infrastructure and services (for example Quinton, Stoneleigh Park, M40 motorway junctions, University of Warwick). These locations could therefore result in additional journeys (potentially using private cars) for schools, retail and other functions. Depending the on the scale of development, this could be mitigated to a degree by	2	As for Option A above	2

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	<p>improving/providing these services in conjunction with development</p> <p>d) Beyond transport impacts, focused areas of development for housing and employment increase the potential for low carbon energy production and distribution such as hydrogen, district heating schemes and off grid renewable energy.</p> <p>e) Depending on the extent to which Option H can be used alongside this, this option is likely to involve a significant quantum of development on greenfield land. This may have impacts on land for local food and carbon capture</p> <p>f) Assuming infrastructure and planning policies encourage alternatives to the car this option is likely to have a positive impact on reducing carbon emissions (mitigation rating 2)</p> <p>NB: There is potential that patterns of work will change following the employment as a result of the Coronavirus pandemic, particularly around home working. However, given the extent of this is not known, the assumption made in this assessment is a full return to the existing distribution of workplaces.</p>			
<b>E Housing Waiting List</b>	a) With regard to climate change mitigation, this option is likely to have similar implications to Option F (Main Urban Areas) as the vast majority of the demand from the housing waiting list is focused in the main urban areas. The main difference is that this option also	2 (or 3 if greater focus on smaller market	As for Option A above	2

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	<p>includes some development (albeit at a more modest level) in smaller market towns and larger villages.</p> <p>b) For the smaller market towns and larger villages, most of these settlements provide the necessary infrastructure and services, although employment in some of these locations is limited. Further the scale of additional development in these locations, may not be sufficient to support significant improvements to infrastructure and services (although it may support the viability of existing). This element of this option is therefore likely to have a neutral impact on climate change</p> <p>c) As with option F, development in and around the 5 larger towns is likely to be in the periphery of the existing urban areas with associated opportunities sand issues for climate change mitigation. See option F below for commentary on this.</p> <p>d) Beyond transport impacts, where this option results in more focused and large scale areas of development, there will be increased potential for low carbon energy production and distribution such as hydrogen, district heating schemes and off grid renewable energy with benefits for carbon reduction.</p> <p>e) Depending on the extent to which Option H can be used alongside this, this option is likely to involve a significant quantum of development on greenfield land. This may have impacts on land for local food and carbon capture</p>	towns and larger villages)		

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<b>F Main Urban Areas</b>	a) Existing main urban areas provide a good range of infrastructure, services and employment. Bringing forward new development within or adjacent to these settlements therefore has the potential to reduce the need to travel and to utilise and improve existing zero and low emission transport infrastructure. b) Given the nature of the urban areas within South Warwickshire, it is likely that the majority of development with be around the urban edge. However as nearly all this will still be within 5 miles of town centres and local services, low or zero emission transport options should be realistic and viable with the right investment in infrastructure. However, the further sites are from town centres and facilities, the more reliance on private cars and unsustainable lifestyles. c) If development could be concentrated in a smaller number of large scale developments this option results in more focused and large scale areas of development, there will be increased potential for low carbon energy production and distribution such as hydrogen, district heating schemes and off grid renewable energy with benefits for carbon reduction. d) Depending on the extent to which Option H can be used alongside this, this option is likely to involve a significant quantum of development on greenfield land. This may have impacts on land for local food and carbon capture	2	As for Option A above	2

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<b>G Dispersed</b>	a) Distributed development often means more, smaller-scale sites are brought forward. This makes it harder to fund and deliver concentrated infrastructure improvements and services to support new development. It also means that many of the developments are not in close proximity to employment hubs. This has impacts on travel patterns and could lead to greater reliance on private car usage b) Low carbon and active modes of transport are often less well provided for in smaller settlements and the dispersed nature of development makes it more difficult to plan and fund infrastructure improvements to support these modes c) Dispersed development could make it harder to bring forward large scale low carbon and renewable energy schemes to support development d) Depending on the extent to which Option H can be used alongside this, this option is likely to involve a significant quantum of development on greenfield land. This may have impacts on land for local food and carbon capture	4	As for Option A above	2
<b>H Densification (inc. brownfield)</b>	a) Intensification of development in urban areas provides opportunities for investment in low and zero carbon modes of transport b) “Reusing” empty properties rather than developing new properties reduces the embodied carbon in construction	1 or 2 (dependent on supporting policies)	There is a question as to whether the density associated with this option will hinder the potential to bring forward low carbon ventilation and an adaptable urban climate.	2

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<b>&amp; empty homes)</b>	<ul style="list-style-type: none"> <li>c) More densely developed urban areas provide greater potential for low carbon energy production and distribution such as hydrogen, district heating schemes and off grid renewable energy with benefits for carbon reduction.</li> <li>d) Maximising the use of brownfield land will minimise the requirement for greenfield sites to deliver development needs. This could assist with the retention of carbon stores within trees and soil and with the right investment could maximise opportunities to increase carbon capture through tree planting, soil improvements, as well as potentially enabling large scale renewable energy such as solar or wind.</li> <li>e) Development on rural brownfield sites would need to be of sufficient scale to support the provision of infrastructure and services to minimise the need to travel. The carbon impact of such development would also depend on the transport options that are provided.</li> <li>f) With effective supporting policies regarding net zero carbon construction and buildings and infrastructure provision, this option has the potential to deliver development and lifestyles that are net zero carbon or close to it</li> </ul>		On the other hand the retention of more local land for planting and other forms of carbon capture may enable a more adaptable and biodiverse rural environment	