Ipswich Borough Council Local Plan

Examination of Core Strategy and Policies Development Plan Document Review and Site Allocations and Policies (Incorporating IP-One Area Action Plan) Development Plan Document

Stage 2 Matters and Questions - Response to Matter 9 Transport and Accessibility

June 2016

IPSWICH
BOROUGH COUNCIL

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Matter 9 – Transport and Accessibility (including for the IP-ONE Action Area) (Policies CS5, CS20, SP9, SP15, SP16, SP17, DM17, DM18 and Core Strategy Table 8A)

9.1 Are the policies and proposals (listed above) in connection with transport and accessibility soundly-based? If you contend that they are not how should they be modified?

1. Due to the link between transport and air quality in Ipswich, this statement also covers the Council's evidence in relation to air quality.

Consistent with National Policy

2. The Council's Soundness Self-Assessment Checklist[1] explains how the Local Plan is consistent with policies in the National Planning Policy Framework (NPPF) in relation to transport. Since the checklist was completed the Council has updated its traffic modelling[2] and this is discussed later in this Statement.

3. Paragraph 127 of the NPPF states that planning policies should 'sustain compliance with and contribute towards EU limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas (AQMAs) and the cumulative impacts on air quality from individual sites in local areas.' Consideration has been given to impacts on air quality through the Sustainability Appraisal (SA) process, taking into account the nature and location of the AQMAs[3]. The SA baseline contains details of the AQMAs against which the policies and site allocations have been assessed under SA objective ET1 'To improve air quality'. The conclusions of this are discussed later in this statement and indicate that the Local Plan is consistent with national policy on air quality.

4. Further Air Quality information was requested by the Inspector during the Ipswich Local Plan Stage 1 hearings held in March 2016. Further work has been carried out to model air quality and the results set out in a report, which is complemented by a letter from the consultants (attached at Appendix 1) which provides further explanation of the results. The reports indicate that, for the locations on the highway network where there is a medium to high risk of non-compliance with current government standards for air quality in relation to future development under the Ipswich Local Plan, it is considered that measures can be put in place which would mitigate the effects likely to arise from proposed development.

Positively Prepared

5. Aspiring to and facilitating a shift away from car based transport is an ambition which runs through the Local Plan. The Vision seeks to see pedestrians, cyclists and public transport users taking priority in the town centre and objective 6 aims to achieve significant modal shift. The Spatial Strategy (paragraph 6.9 of the Core Strategy) explains that the Plan 'places new residents in close proximity to jobs, shops, leisure and cultural facilities and public transport nodes, to support sustainable lifestyles.'

[1] Ipswich Borough Council, 2015, *Soundness Self-Assessment Checklist,* CDL reference SUCD23
[2] WSP/Parsons Brinckerhoff, 2016, *Ipswich Traffic Appraisal Modelling Suite (ITAMS) Forecast Model Report*, CDL reference PSCD18
[3] Arcadis, 2015, *Core Strategy and Policies DPD Review SA Report,* CDL reference SUCD09 and Arcadis, 2015, *Submission Site Allocations and Policies (Incorporating IP-One Area Action Plan) Development Plan Document,* CDL reference SUCD10

6. In this respect, the Local Plan supports the Suffolk Local Transport Plan[4] which, specifically for urban areas, aims to reduce demand for car travel, make efficient use of transport networks and improve infrastructure. Of particular relevance for the Local Plan, Part 2 sets out a transport strategy for Ipswich. This identifies the need for significant new developments, including the Garden Suburb, to have strong travel plans to minimise car use. Alongside this the strategy proposes improved urban traffic management, which would improve journeys by bus, cycling and walking, and the creation of safe and convenient cycling and walking routes. A key part of the transport strategy for Ipswich is the 'Transport Fit for the 21st Century' project, now known as Travel Ipswich[5]. Many of these measures are now in place and policy CS20 specifically supports this project.

Justified

7. As explained above, the Local Plan operates within the wider transport policy context set within the Local Transport Plan. The Local Plan's overall approach to transport complements the aims of the Local Transport Plan, as well as the NPPF, and therefore there is limited scope for significant alternative approaches towards transport.

8. Alternatives (i.e. no policy) were nevertheless considered through the Sustainability Appraisal (SA) process as set out in the SA reports[6]. For policies CS2, CS20, DM17 and DM18 the SA concluded that without these policies there would be less control over the transport effects of development and that over time effects from transport would be likely to be greater.

9. In relation to the IP-One area the SA concluded that in the absence of these policies there would be less certainty and direction in development (including transport) across the IP-One Area. Alternatives relating to SP9 had not been considered at earlier stages so a 'no policy' option was considered through the SA of the Proposed Submission Site Allocations Plan[7].

10. Policy CS5 is supported by Suffolk County Council, as per their response to the consultation on the Proposed Submission Core Strategy. Policy CS20 sets out the Council's support for the Travel Ipswich scheme which is a fundamental part of the Suffolk Local Transport Local Plan. Policies DM17 and DM18 provide the level of detail required for development management in relation to the broader aims of the CS policies and the Local Transport Plan.

11. Policy SP15 is supported by Suffolk County Council, as per their response to the consultation on the Proposed Submission Site Allocations plan.

12. Policy SP16 sets out support for the Wet Dock Crossing (now known as the Upper Orwell Crossings). This reflects Suffolk County Council's plans for the Wet Dock

[4] Suffolk County Council, 2011, *Suffolk Local Transport Plan 3 2011 - 2031*
[5] Suffolk County Council, *Travel Ipswich website*, CDL reference ICD46
[6] Arcadis, 2015, *Core Strategy and Policies DPD Review SA Report,* CDL reference SUCD09 (sections 4.3.2, 4.3.7 and 4.4.4) and Arcadis, 2015, *Submission Site Allocations and Policies (Incorporating IP-One Area Action Plan) Development Plan Document,* CDL reference SUCD10 (section 3.2) and Ipswich Borough Council, 2007, *Preferred Options Sustainability Appraisal,* CDL reference LPCD09 (see policy areas 52, 53, 54, 55 and 56)
[7] Hyder, 2014, *Proposed Submission Site Allocations and Policies (Incorporating IP-One Area Action Plan) SA Report,* CDL reference LPCD49 (see Appendix E)

Crossing, which has recently received funding[8]. Importantly policy SP16 seeks to ensure that the Wet Dock Crossing is not prejudiced by other development. Suffolk County Council supported policy SP16 through their response to the consultation on the Proposed Submission Site Allocations plan.

13. Policy SP17 is reflective of the aim to support the vitality and viability of the town centre whilst reducing car use. The focus on short stay car parking means that trips which directly support the town centre economy (such as for shopping and leisure) are not stifled whilst alternative modes of transport become more attractive for commuting purposes. This is important as the Retail and Commercial Leisure Study[9] and the Town Centre Opportunity Areas Report[10] indicate that parking provision is closely linked to the success of the town centre economy.

Effective

14. It is necessary under this heading to consider whether transport policies CS5, CS20, DM17 and DM18 can be delivered when taking into account the proposed Local Plan as a whole.

15. The Sustainability Appraisal considered the transport effects of all policies and site allocations under objectives ET4 'To reduce the effects of traffic upon the environment' and ET5 'To improve access to key services for all sectors of the population'. Potential effects on air quality were assessed under ET1 'To improve air quality'. The assessment acknowledged that whilst the transport policies themselves are positive, negative cumulative effects, with a degree of uncertainty, could nevertheless arise in relation to the effects of the Local Plan as a whole. To address these effects, a number of mitigation measures were identified through the Sustainability Appraisal and have been taken forward through the Local Plan, as detailed in the Annex to the SA Reports[11].

16. Transport modelling was initially undertaken in 2010[12]. The Council's paper 'Background to the Transport Evidence Informing the Ipswich Local Plan'[13] explains the conclusions of this report in that it concluded that highway capacity was not considered to be a constraint on development. The transport modelling has been updated, with a new report published in May 2016[14]. This concludes that there are a number of junctions where capacity would be exceeded by 2031 in the AM and/or PM peak, and a number of others which would be close to capacity. It is important to recognise that an element of growth in traffic would occur regardless of the Local Plan, that the modelling also considers the effects of planned development outside Ipswich Borough and that, assessed overall, the transport and traffic effects will not be severe.

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[8] http://www.newanglia.co.uk/2016/03/16/government-green-light-for-ipswich-wet-dock-crossing/
[9] Strategic Perspectives, 2010, *Retail and Commercial Leisure Study,* CDL reference ICD18
[10] DTZ, 2013, *Ipswich Town Centre Opportunity Areas Report,* CDL reference ICD15
[11] Ipswich Borough Council, 2014, *Annex to Proposed Submission Sustainability Appraisal Reports – Addressing Recommendations,* CDL reference LPCD36
[12] AECOM, *Ipswich Transport Model Assessment,* CDL reference ICD48
[13] Ipswich Borough Council, 2015, *Background to the Transport Evidence Informing the Ipswich Local Plan,* ICD48b
[14] WSP/Parsons Brinckerhoff, 2016, *Ipswich Traffic Appraisal Modelling Suite (ITAMS) Forecast Model Report*, CDL reference PSCD18

17. The report identifies that many of the locations which are predicted to experience capacity issues are currently subject to studies by Suffolk County Council including studies on the Upper Orwell Crossings, Star Lane Gyratory, A14 and Northern Ipswich capacity enhancements. These studies are likely to lead to measures which improve the operation of the highway network by 2031.

18. It must also be acknowledged that the modelling does not factor in detailed mitigation measures which may come forward specifically as part of new development. This is because at the Local Plan level, specifics such as access and the layout of sites are not yet known. Under paragraph 9.101 of the Core Strategy a transport assessment will be required for new development of 10 or more dwellings or 1,000 sq. m more of non-residential development. This will enable the transport impacts of the specific development schemes to be considered and mitigation measures to be identified.

19. Following receipt of the updated transport modelling Suffolk County Council, in their letter dated 24th May 2016[15], have confirmed that they consider there is no reason to find the plan unsound on transport grounds.

20. In terms of air quality, there are currently four Air Quality Management Areas in Ipswich all of which are linked to exceedances of concentrations of Nitrogen Dioxide which is emitted from vehicles. Air quality is an issue where there is a 'relevant receptor', e.g. homes or a school. Negative cumulative effects, with a degree of uncertainty, were identified through the Sustainability Appraisal in terms of the effects of the Local Plan as a whole. Policy DM17 was amended as a result to include specific reference to Air Quality Management Areas[16].

21. Subsequently the Council commissioned the production of the Air Quality Report[17] which has been complemented by a letter from WSP Parsons Brinkerhoff dated 24th June 2016, shown as appendix 1[18]. This specifically focuses on where there may be exceedances of nitrogen dioxide concentrations, as explained in section 1.2 of the report. An analysis of the Borough Council's nitrogen dioxide monitoring reveals that in many places concentrations are decreasing. It is thought that this is at least in part due to improving vehicle emissions.

22. The table below summarises the findings from the transport and air quality studies. For further detail, please consult Appendix 1. The table sets out what the likely impacts of the Local Plan are on junction capacity and exceedance of air quality legislation at the 28 junctions considered in the studies and whether or not the impacts can be mitigated.

[15] Letter from Suffolk County Council to Ipswich Borough Council, 24th May 2016, CDL reference PSCD18a
[16] Ipswich Borough Council, 2014, *Annex to Proposed Submission Sustainability Appraisal Reports – Addressing Recommendations,* CDL reference LPCD36
[17] WSP / Parsons Brinckerhoff, 2016, *Ipswich Core Strategy – Air Quality Report,* CDL reference PSCD19
[18] Letter from WSP/Parsons Brinckerhoff, 24th June 2016

Table 1: Local Plan Transport and Air Quality Impacts and Mitigation

Junction	Junction over capacity in 2031?	Percentage of traffic attributable to Ipswich Garden Suburb	Risk of exceedance of air quality standards in 2031 (Note 1)	Can congestion and air quality impacts be mitigated? (Note 2)
A1214 - Tuddenham Rd	Slightly	6-10	Low	Yes
A1214 – Westerfield Road	Marginally	4-8	Low	Yes
A1214 – Henley Road	No	8-14	Low	Yes
A1214 – Norwich Road	Slightly	3-5	Medium/High*	Yes
A1214 – Bramford Road	No	2-4	Medium/High*	Yes
A1214 – Yarmouth Road/West End Road	Slightly	1-2	Low	Yes
A1214 Hadleigh Road/B1075	Slightly	1-2	Low	Yes
Grafton Way/Commercial Road Gyratory	No	0.1-1.5	Low	Yes
Norwich Road/ Civic Drive	Marginally	1-3	Medium	Yes
Handford Road/Civic Drive	No	1-3	Low	Yes
Princes Street/Civic Drive	No	1-3	Low	Yes
Greyfriars Rd/Star Lane/College Street/Bridge Street	Slightly	2-3	Medium/High*	Yes
Bridge Street/ B1075/ Dock Street	Slightly	2-3	Medium/High*	Yes
Star Lane / St Peter's Street	No	0-5	Medium/High*	Yes
Star Lane / Foundation Street	No	0-5	High*	Yes
Star Lane / Slade Street	No	0-2	High*	Yes
Star Lane / Fore Street	No	0-2	High*	Yes
Star Lane / Grimwade Street	Slightly	1	Medium*	Yes
Grimwade Street / A1156	Slightly	0-1	Medium/High*	Yes
A1156 / Duke Street	No	1	Medium*	Yes
Nacton Road / Felixstowe Road	No	0-1	Low	Yes
Rope Walk / Grimwade Street	No	2-3	Low	Yes
St. Helen's Street / Grimwade Street	No	2-3	Medium*	Yes
St Helen's Street / Bond Street	Marginally	1-3	Low	Yes
St Helen's Street / Upper Orwell Street	No	1-3	Low	Yes
A1156 / Woodbridge Road	No	2	Low/Medium	Yes
St Margaret's St / Bolton Lane	No	0-3	Medium/High*	Yes
Fonnereau Road / Crown Street / Northgate Street	No	0-3	Medium/High*	Yes

** In a current AQMA*

Table notes:

1. *High risk - Includes existing/proposed residential at ground floor level within an AQMA, close to a junction with capacity issues in 2031 and where the modelled annual mean NO_2 concentrations in 2015 exceed 40µg/m^3 within the building/development footprint.*

   Medium risk - Includes locations with existing/proposed residential premises within an AQMA and/or where modelled annual mean NO_2 concentrations exceed 40µg/m^3 in 2015 close to the building/development footprint.

   Low risk - Where annual mean NO_2 concentrations clearly do not exceed 40µg/m^3 at locations with relevant exposure in 2015.

2. *Refer to the letter from WSP/Parsons Brinckerhoff for details of possible mitigation measures.*

23. The reports state that any negative impacts can be mitigated through highways based measures, measures to encourage modal shift and continuing technological improvements. In the letter, the consultants conclude that:

    'From our analysis to date, we are confident that the transport and air quality effects of the Local Plan can be appropriately mitigated having regard to its limited impact on the principally relevant junctions which are contained within air quality management areas, the scope for improvement at the majority of those junctions and the use of a package of travel plan initiatives in association with individual developments. Transport and air quality does not therefore raise any in principle concerns.'

24. The letter identifies possible solutions at a strategic and development scale which could be put in place to mitigate air quality effects and suggests other measures that could be considered to ensure good air quality in the future, including developing an air quality neutral policy as in Greater London and setting minimum NO_x emissions standards for developers for all new boiler and combined heat and power (CHP) plant.

25. In addition to location specific measures, the sustainable transport and electric charging point requirements of policy DM17 would reduce potential air quality effects across the Borough.

Next Steps

26. The Local Plan is not being progressed by the Council in isolation. There is an ongoing programme of work in relation to transport and air quality, which provides the context for the Local Plan; indeed the local plan policies and allocations will be required to support the AQAP as appropriate. The reports on transport and air quality produced by WSP/Parsons Brinckerhoff provide IBC with information on junctions that will be monitored for air quality impacts in the future.

27. The table below sets out some key current/planned transport and air quality work streams to be undertaken by the Borough Council or its partners.

Table 2: Work to Address Transport and Air Quality in Ipswich

Date	Transport	Air quality
Summer 2016	SCC Transport studies on A14, Northern Routes and completion of county wide modelling	Review of the AQMA boundaries.
Autumn 2016	SCC Upper Orwell Crossings work	Decision on AQMA boundaries
Spring 2017		IBC due to undertake source apportionment work
Autumn 2017		IBC due to publish AQAP
		IBC due to publish Low Emission Strategy SPD

Modifications

28. Pre-Submission Main Modifications were proposed by the Council to the following policies:
    - Policy CS20 - to facilitate cycling and walking in the Borough.
    - Policy DM18 - to refer to adopted, rather than minimum car parking standards.

29. Subject to these modifications, the Council considers these policies are soundly based.

Matter 9 Appendix 1 Transport and Accessibility:

Letter from WSP Parsons Brinckerhoff on Transport and Air Quality and accompanying Maps (AQ1-AQ17).

Please see separate documents.

Your Ref: SF99CT16/0074

Our Ref: MJC/ 70007052/D/L/

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Dear Robert,

Ipswich Local Plan – Transport and Air Quality Evidence

Further to our meeting on the 14 June 2016, where we discussed the recent transport modelling and air quality reports we have produced for you, we thought it would be helpful to set out our position on a number of the issues discussed with some additional detail and clarifications.

WORK UNDERTAKEN TO DATE

WSP | Parsons Brinckerhoff has been commissioned to undertake an assessment of the Ipswich Core Strategy and Policies Development Plan Document Review and Ipswich Site Allocations and Policies (Incorporating IP-One Area Action Plan) Development Plan Document (the Ipswich Local Plan). Specifically the commission relates to transport and air quality impacts.

The purpose of the transport commission is to assess the impact upon the highway network of the development planned within the Local Plan and to identify junctions that are likely to experience congestion in the future. The assessment has therefore focused upon network performance statistics and individual junction capacity assessments.

The purpose of the air quality commission is to indicate locations on the highway network where there is high, medium or low risk of non-compliance with current standards for air quality as included in the Government's Air Quality Strategy in relation to locations identified for future development under the Ipswich Local Plan so that locations indicated to have medium to high risk can then be prioritised for further investigation and/or mitigation as appropriate.

These two commissions have culminated in the preparation of two reports, namely:

- Ipswich Core Strategy, Ipswich Traffic Appraisal Modelling Suite (ITAMS) Forecast Model Report (May 2016)
- Ipswich Core Strategy, Air Quality Report (May 2016)

ADDITIONAL CLARIFICATION

Following the submission of WSP | Parsons Brinckerhoff Ipswich Core Strategy transport modelling and air quality reports, additional context and clarification has been sought with regard to the

combined impact upon the highway network and air quality within the town on a junction by junction basis.

In addition this letter provides (a) context with regard to Ipswich's position in relation to other similar towns within England (b) clarification with regard to the assumptions that have been included within the transport and air quality modelling particularly in relation to mitigation and (c) the effect that such mitigation could have upon the assessments undertaken and the resultant conclusions.

CONTEXT OF IPSWICH

ROAD TRAFFIC

This analysis has demonstrated that there is an expected increase in over capacity queues, total travel time, and total travel distance in 2031. The increase in travel time and distance can largely be attributed to the increase in number of trips. This manifests itself in a relatively small reduction in average speed and small additional travel time per vehicle.

Figure 1 below is taken from the Department for Transport (DfT) report 'Congestion on local 'A' roads, England: October to December 2015'.

Figure 1 - Average vehicle speeds during the weekday morning peak on local 'A' roads: England, monthly and annual averages from 2006/07 (Table CGN0205)

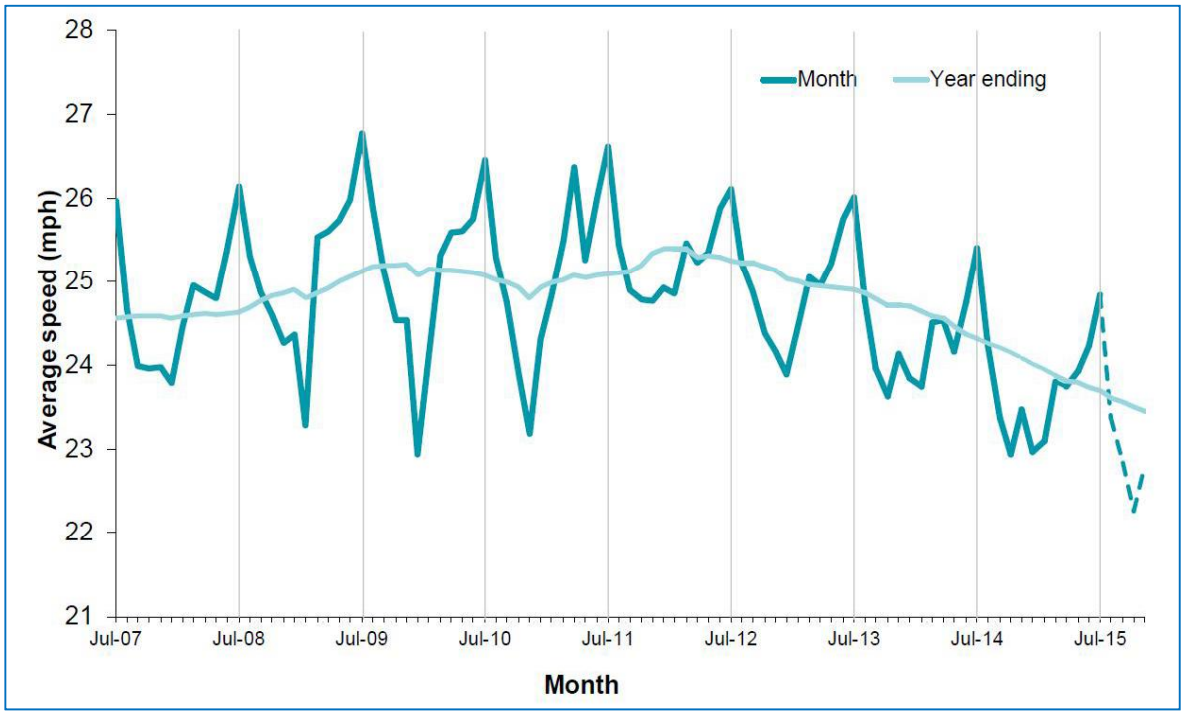

Figure 1 illustrates a trend in the reduction of average speed over time across England. Figure 2, below, is also taken from the DfT report and provides a regional breakdown of vehicle speeds.

Figure 2 - Average vehicle speeds during the weekday morning peak on local 'A' roads: by region, years ending December from 2011 (Table CGN0206)

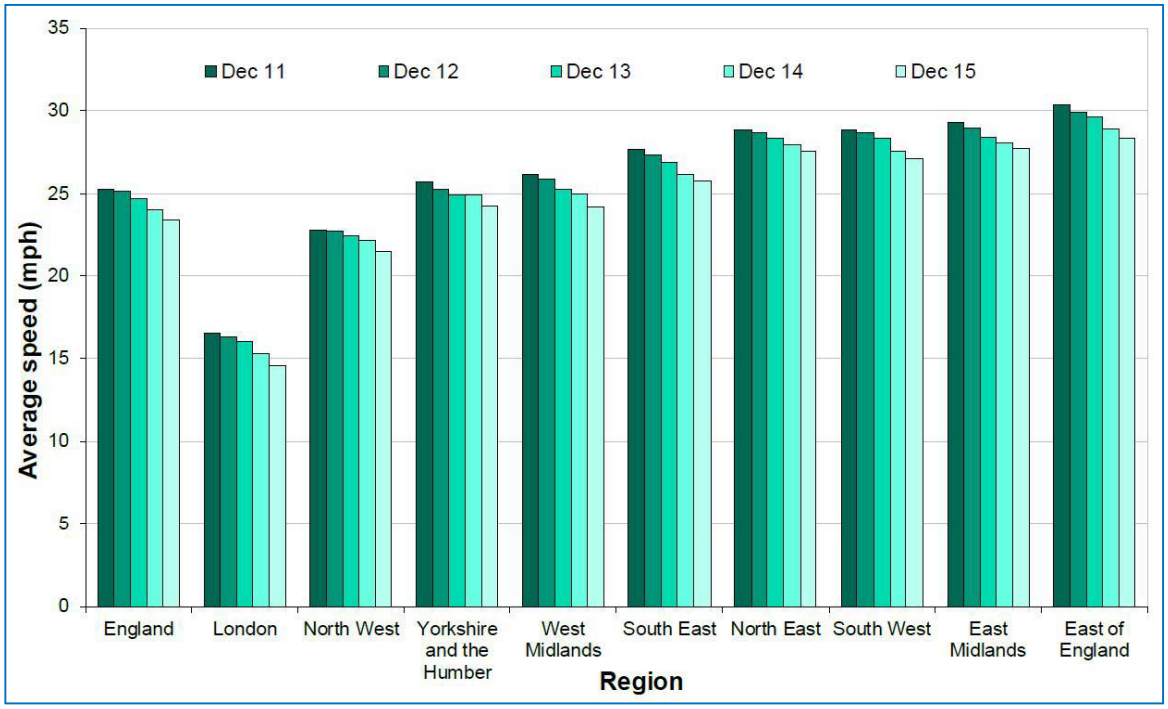

Figure 2 shows that at a regional level, all regions in England experienced slower average weekday morning peak speeds year on year for the last 5 years.

Figures 1 and 2 provide some context as to the typical congestion characteristics both within England as a whole and on a regional basis and demonstrate that Ipswich is not atypical in terms of trend but starts from a position of higher average speed i.e. less congestion.

AIR QUALITY

There are locations within Ipswich where road vehicle exhaust emissions cause ambient annual mean concentrations of nitrogen dioxide (NO_2) to exceed the air quality objective of 40 micrograms per cubic metre ($\mu g/m^3$). This objective is included in legislation for the protection of public health, and **applies at the façades of residential premises, schools, care homes and hospitals**; it does not apply at indoor locations, places of work, parks, gardens, on the footway nor within the roadway space where concentrations are highest.

IBC is responsible for Local Air Quality Management (LAQM) in Ipswich. Four Air Quality Management Areas (AQMAs) have been declared due to measured exceedances of the objective for annual average NO_2; these are:

- Norwich Road – Chevallier Street Junction (since 2006)
- St Margaret's Street – Crown Street (since 2006)
- Grimwade Street – St Helen's Street Junction – Star Lane gyratory (since 2006)
- Bramford Road/Yarmouth Road/Chevallier Street (since 2010)

According to the available evidence, there is full compliance with the 1-hour mean NO_2 objective and all other objectives for local air pollutants including particulates, and no issues are expected in the foreseeable future. This situation is certainly not unique to Ipswich, with many urban areas elsewhere in England experiencing compliance with all objectives except for annual mean NO_2. Examples include Tewksbury, Northampton, Bedford, Stockport, Cambridge, Oxford, Slough, Colchester and Chelmsford – to name just a few.

As a consequence of declaring the AQMAs, in 2008 IBC introduced an Air Quality Action Plan (AQAP) specifying measures to bring about improvements in air quality in these locations. These measures are focused on reducing road traffic emissions of NO_x. IBC is currently reviewing its AQMAs and will be undertaking a study on 'source apportionment' to enable the refinement of measures. This study is due to take place in Spring 2017.

IBC monitoring of annual mean NO_2 concentrations in recent years does indicate that near road air quality is gradually improving. These improvements will be in part due to general reductions in oxides of nitrogen (NO_x) emissions from vehicles due to cleaner technologies - notwithstanding recent scandals concerning certain car manufacturers and emissions claims for diesel vehicles, and partly due to IBC Action Plan measures.

There is a growing body of evidence from non-governmental organisations and testing companies, which are independent of vehicle manufactures, that on-road vehicle NO_x emissions are reducing, and that the new generation Euro 6 (VI) vehicles are delivering substantially lower NO_x emissions than previous Euro categories. In recent years the number of new diesel cars entering the vehicle fleet has exceeded the DfT's forecast and this, together with the failure of previous Euro standards to deliver lower emissions, has exacerbated problems with ambient annual mean NO_2 concentrations in many urban locations in the UK and worked against local authority AQAP measures to improve local air quality. Whilst Government ministers do not currently support a proposal for a diesel car scrappage scheme this does not mean that such a scheme would not be considered and implemented in future. Such a measure could substantially reduce ambient NO_2 at roadside if diesel cars are replaced with petrol or alternative low emissions technologies.

People are also increasingly choosing alternatives to the traditional combustion engine technologies when buying new vehicles; these can reduce - in the case of hybrid technology, or eliminate - electric vehicles, NO_x emissions on an individual vehicle basis. At present the proportion of such vehicles in the fleet is relatively small; however, the increasing provision of electric vehicle charging points (a measure included in IBC's AQAP), reducing vehicle prices and improvements in performance should result in this proportion increasing over time. Whilst recognising that there have been teething problems with the electric motor in some hybrid buses in London, this technology can deliver substantial reductions in bus NO_x emissions, especially as buses accelerate from being stationary when emissions are highest as the engine is put under load. Transport for London are also investigating wireless charging of buses at bus stops to boost the time that hybrid buses can run in electric mode. Hybrid buses are becoming increasing common in towns and cities such as Luton, Oxford, Slough and Cambridge. Hydrogen fuel cell buses which emit only water vapour are already in service on a number of routes in London, with trials elsewhere.

The AQAP also includes measures to reduce private car use and better regulate traffic flows to minimise congestion. As a consequence, and in order to reduce highway congestion an Urban Traffic Management Control (UTMC) system has been recently implemented in Ipswich. This is a live system which is constantly being optimised to maximise its benefits with further expansion of the system planned over the next few years and will enable reductions in vehicle emissions. Published evidence indicates that control measures to reduce stop-start conditions and smooth traffic flow would be effective in hot-spot locations such as junctions with periods of traffic congestion.

CAPACITY ASSESSMENT

With regard to junction capacity, turn based volume to capacity ratio (V/C) was considered for the analysis rather than overall junction V/C, this means all turns and approaches to junctions were analysed. This approach was adopted because considering only the average V/C for the overall junction may not highlight some junctions where there is potential significant delay. For example at a junction where three out of four approaches perform well with a V/C well below 90%, but the remaining approach experiences delay problems with a V/C over 100%. However the approach adopted will lead to the impact of delay being overestimated by the modelling where the capacity problem on the congested arm could easily be resolved by re-allocating capacity from the other arms. This will be the case at signal junctions where timings can be easily altered. As such, the use of turn based maximum V/C values is a 'worst case' interpretation of the overall junctions V/C performance.

WHAT HAS BEEN ASSESSED

ROAD TRAFFIC

The assessment undertaken to date has included use of the ITAMS modelling quite which includes the demand model element including walking, cycling, bus and vehicular trips. As part of this, the confirmed infrastructure and service alterations associated with planned development have been included within the model. However, there are a number of measures which could also affect network operation in a positive way which have not been included within the assessment.

If required, and successfully implemented these schemes would improve transport network performance compared to that currently reported. The schemes in the bullet point list are broken down into those which are currently committed, those which could be implemented if required and those that could form part of development associated planning conditions:

- Currently committed:
  - Area wide personal travel planning
  - Additional public transport provision
  - Signal optimisation through the UTMC system recently introduced in Ipswich
  - Bus priority
- Potential future schemes
  - Work Place parking levy
  - Car park pricing policy
  - Ipswich Northern Capacity Enhancements
- Development associated planning condition including
  - Bus Taster Tickets
  - Free cycle vouchers
  - Personal travel planning / travel leaflets
  - Accessibility and level of service to rail stations
  - Sustainable public transport infrastructure

The Ipswich Garden Suburb scheme is a great example of an opportunity to plan for sustainable transport, as set out in the Supplementary Planning Document Interim Guidance. Through measures associated with the site such as those set out above, the internal road layout and external junction

connections it will be possible to help change travel behaviour and could have a wider positive impact throughout the town and help foster a modal shift away from the private car. The impacts of this are not currently incorporated within the assessments but would have a substantial beneficial effect.

AIR QUALITY

So far the air quality analysis undertaken by WSP | Parsons Brinckerhoff has focussed on current conditions, without consideration of measures that could be taken to improve local air quality by reducing ambient NO_2 concentrations. IBC's environmental health team is currently reviewing the latter as part of its review of the AQMAs.

The modelling undertaken by WSP | Parsons Brinckerhoff also assumes higher vehicle emissions of NO_x than would be estimated by using the Department of Environment, Food and Rural Affair's (DEFRA) Emission Factor Toolkit (EFT) alone. The method used, known as the 'Calculator Using Realistic Emissions for Diesels' (CURED), was released earlier this year by Air Quality Consultants Ltd as a modification to the EFT for sensitivity testing[1]. The CURED method takes into account a wide range of published evidence from testing of vehicle emissions, including on road in service testing, and so is likely to provide a more realistic assessment than would otherwise be possible. Whilst this new method was not sanctioned by DEFRA it is gaining acceptance amongst the air quality professional community and is being increasingly used to assess proposals that are put before planning authorities.

The modelling has also been verified and calibrated by comparing model estimates against IBC air quality monitoring data to ensure that the modelled estimates of pollutant concentrations are reasonably realistic based on the input assumptions. This process allows for any uncertainties that may be associated with the traffic modelling process, from which the road traffic input data for the air quality model have been derived, and other real world aspects, which are necessarily simplified in modelling, to be compensated for. Air quality modelling of future scenarios can then be used to demonstrate potential measures intended to improve air quality in the form of changes to all or parts of the vehicle fleet and/or improvements concerning the highway network.

In addition to possible solutions considered above there are other measures that should be considered to ensure good air quality in the future, including:

- Development of an air quality neutral policy and assessment procedure for new development to address the risk of a 'creeping baseline' due to the additive air quality impacts of many individual schemes. A good model for this is the Greater London Authority's air quality neutral policy which addresses emissions from new buildings and road transport sources.

- Setting of minimum NO_x emissions standards for developers for all new boiler and combined heat and power (CHP) plant.

- A low emissions strategy Supplementary Planning Document in relation to current and future transport infrastructure and development.

- Bus quality partnerships, in particular measures that encourage bus operations to minimise emissions and replacement of older vehicles with technologies that have been proven as delivering lower emissions.

Where reference is made in the following section to mitigation, it will be likely to include a package of the measures as set out above.

[1] http://www.aqconsultants.co.uk/News/March-2016/New-Calculator-to-Support-Vehicle-Emissions-Sensit.aspx

JUNCTION BY JUNCTION ANALYSIS

This section considers each junction within the study area to consider the combined impact of the Local Plan in terms of air quality and transport on a junction by junction basis. It therefore pulls together information contained within both the air quality and transport reports into a single location to consider the overall impact upon the junction and surrounding area.

Risk of future non-compliance with air quality objectives has been considered taking account of IBC air quality monitoring data, traffic model outputs and air quality modelling for 2015 to indicate annual mean concentrations of NO_2, PM_{10} and $PM_{2.5}$ across the urban area bounded by the A1214 to the west and north, the Felixstowe railway line to the east and the River Orwell to the south.

- High risk - Includes existing/proposed residential at ground floor level within an AQMA, close to a junction with capacity issues in 2031 and where the modelled annual mean NO_2 concentrations in 2015 exceed 40µg/m^3 within the building/development footprint.

- Medium risk - Includes locations with existing/proposed residential premises within an AQMA and/or where modelled annual mean NO_2 concentrations exceed 40µg/m^3 in 2015 close to the building/development footprint.

- Low risk - Where annual mean NO_2 concentrations clearly do not exceed 40µg/m^3 at locations with relevant exposure in 2015.

IPSWICH GARDEN SUBURB

Within the Ipswich Local Plan, the Ipswich Garden Suburb (IGS) forms a major development to the north of Ipswich. At this point there are a number of key unknowns with regard to the site relating to transport, especially relating to the detailed internal road layout, access junctions, rail options and restraints on private vehicle use which will be considered at the planning application stage. For the purpose of the Local Plan, it has been assumed that full build out will occur within the plan period (including an additional 800 dwellings proposed after 2031) and that all parts of the site will have access to all connections to the wider highway network. In effect this enables all vehicles to make their optimum choice, i.e. it does not take account of any measures that may be implemented to discourage use of the private car. The effect of this is a likely overestimation of the attractiveness of this mode. However, at the strategic level of a local plan this is considered appropriate until more detailed developer proposals come forward.

For each junction set out below, the proportion of traffic made up from traffic associated with IGS is identified to assess the potential impact of the site on traffic and air quality conditions.

LOCATION 1: A1214 / TUDDENHAM ROAD

The analysis has identified a number of turning movements on the eastern and western approaches that are over capacity in the forecast year in all time periods and scenarios. However, the maximum reported V/C is 101.79, which indicates capacity is only slightly exceeded.

The impact at this junction is in part caused by the additional traffic associated to the IGS which accounts for 6% - 10% of all trips through the junction as a result of the vehicular access onto Tuddenham Road within the model. In practice, the access onto Tuddenham Road may be pedestrian, cyclist and public transport only and this would reduce the impact at this junction.

With regard to air quality, please refer to Figure AQ1. This location is not within an AQMA. Compliance with air quality objectives at all locations with relevant exposure is very likely. This is currently a low risk location and is likely to remain so.

If mitigation is still required following an assessment of the detailed site access proposals, there are many options which could be developed at this junction to enhance capacity including widening of approaches, increased flare lengths and signalisation. It is therefore considered that any potential impact at this junction could be mitigated as part of proposals put forward within any planning application.

Overall this junction is considered low risk, with limited highway impact and unlikely air quality impact. Further, potential mitigation schemes have been outlined that could be considered if required as part of planning application for the site.

LOCATION 2: A1214 / WESTERFIELD ROAD

The analysis has identified that all of the approaches to this junction operate satisfactorily, save the eastern approach arm in the single lane gyratory scenario in the evening peak. However, the maximum reported V/C is 100.27, which indicates capacity is only marginally exceeded.

The impact at this junction is in part caused by the additional traffic associated to IGS which accounts for between 4% - 8% of all trips through the junction given vehicular access onto Westerfield Road.

With regard to air quality, please refer to Figure AQ2. This location is not within an AQMA. Compliance with air quality objectives at all locations with relevant exposure is very likely. This is currently a low risk location and is likely to remain so.

If mitigation is still required following an assessment of the detailed access and site proposals, there are many options which could be developed at this junction to enhance capacity including widening of approaches, increased flare lengths or signalisation. It is therefore considered that any potential impact at this junction could be mitigated as part of proposals put forward within any planning application.

Overall this junction is considered low risk, with limited highway impact and unlikely air quality impact. Further, potential mitigation schemes have been outlined that could be considered if required as part of planning application for the site.

LOCATION 3: A1214 / HENLEY ROAD

The analysis has identified all the approaches to this junction operate with a V/C of less than 100. The worst performing approach is the eastbound movement through the junction which reaches 96.53 in the morning peak hour. The operation of this junction is therefore considered satisfactory pending detailed appraisal associated with any application for development upon the Ipswich Garden Suburb site which accounts for 8%-14% of all traffic at the junction.

With regard to air quality, please refer to Figure AQ3. This location is not within an AQMA. Compliance with air quality objectives at all locations with relevant exposure is very likely. This is currently a low risk location and is likely to remain so.

Overall this junction is considered low risk, with limited highway impact and unlikely air quality impact.

LOCATION 4: A1214 / NORWICH RD

The analysis has identified the majority of the approaches to this junction operate satisfactorily, excluding the short links in-between the two mini-roundabouts in some time periods. However, the maximum reported V/C is 101.81, which indicates capacity is only slightly exceeded. The impact at this junction is in part caused by the additional traffic associated to IGS which accounts for just 3% - 5% of all trips through the junction given vehicular access onto the A1214 to the north.

If mitigation is still required following an assessment of the detailed access and site proposals, it is considered traffic signals could provide a potential solution, which would remove the internal links and allow balancing of delay across all approach arms. Given the only slight exceedance of capacity, and the opportunities for an improvement scheme, it is not considered that the effects on this junction are significant in terms of the operation of the network in the forecast year.

With regard to air quality, please refer to Figure AQ4. This location is within the Norwich Road - Chevallier Street AQMA, which was declared in 2006 due to exceedances of the air quality objective for annual mean NO_2 concentrations (40µg/m^3). Existing locations with relevant exposure that are likely to have experienced exceedances in 2015 include the front façades of dwellings at 51 - 65 Chevallier Street, and Westwood Court on 147 Norwich Road at ground floor level to the east of the junction. Compliance with all other air quality objectives is very likely at all locations with relevant exposure. This is currently a high risk location and should be considered to be at least a medium risk location in the future. Further investigation as part of applications for development is warranted to determine appropriate mitigation which could include the signalisation of the junction.

Overall this junction is considered at least medium risk, with limited highway impact and potential air quality impact. Given a small proportion of IGS traffic will pass through the junction the impacts at this location will need to be considered in detail within any planning application and likely involve some mitigation at this junction.

LOCATION 5: A1214 / BRAMFORD ROAD

The review of capacity at this junction has demonstrated that V/C ratios do not exceed 90% for any turning movements in any time periods. The junction operation is therefore considered satisfactory. The Ipswich Garden Suburb has limited impact at this junction which accounts for only 2% - 4% of all trips through the junction.

With regard to air quality, please refer to Figure AQ5. This location is within the Bramford Road / Yarmouth Road / Chevallier Street AQMA, which was declared in 2010 due to exceedances of the air quality objective for annual mean NO_2 concentrations (40µg/m^3). Existing locations with relevant exposure that are likely to have experienced exceedances in 2015 include the front façades of dwellings on Yarmouth Road / Chevallier Street. This is currently a high risk location and should be considered to be at least a medium risk location. Further investigation is warranted to determine appropriate mitigation which should be considered in conjunction with mitigation for A1214 / Norwich Road; this could involve reconfiguration of the traffic signals to better regulate traffic flows through the junction.

Overall this junction is considered medium risk, with satisfactory highway performance and unlikely air quality impact.

LOCATION 6: A1214 / YARMOUTH ROAD / WEST END ROAD

The analysis has identified the majority of the approaches to this junction operate satisfactorily, excluding some turning movements on the northern and western approaches in both time periods. However, the maximum reported V/C is 101.73, which indicates capacity is only slightly exceeded. The Ipswich Garden Suburb has limited impact at this junction which accounts for only 1% - 2% of all trips through the junction.

Given the junction is signalised, with many approaches under capacity, it is considered optimisation of the signal timings could remove any over capacity approaches in the forecast year.

With regard to air quality, please refer to Figure AQ6. This location is not within an AQMA. Compliance with air quality objectives at all locations with relevant exposure is very likely. This is currently a low risk location and is likely to remain so.

Overall this junction is considered low risk, with limited highway impact and unlikely air quality impact.

LOCATION 7: A1214 / HADLEIGH ROAD / B1075

The analysis has identified the majority of the approaches to this junction operate satisfactorily, excluding some turning movements on the western approach in some time periods. The maximum reported V/C is 103.65, which indicates capacity is only slightly exceeded. The Ipswich Garden Suburb has limited impact at this junction which accounts for only 1% - 2% of all trips through the junction.

Given the junction is signalised, with many approaches under capacity, it is considered optimisation of the signal timings could remove any over capacity approaches in the forecast year.

With regard to air quality, please refer to Figure AQ6. This location is not within an AQMA. Compliance with air quality objectives at all locations with relevant exposure is very likely. This is currently a low risk location and is likely to remain so.

Overall this junction is considered low risk, with limited highway impact and unlikely air quality impact.

LOCATION 8: GRAFTON WAY / COMMERCIAL ROAD GYRATORY

The review of capacity at this junction has demonstrated that V/C ratios do not exceed 90% for any turning movements in any time periods. The junction operation is therefore considered satisfactory. The Ipswich Garden Suburb has limited impact at this junction which accounts for only 0.1% - 1.5% of all trips through the junction.

With regard to air quality, please refer to Figure AQ7. This location is not within an AQMA. Compliance with air quality objectives at all locations with relevant exposure is very likely. This is currently a low risk location and is likely to remain so.

Overall this junction is considered low risk, with limited highway impact and unlikely air quality impact.

LOCATION 9: NORWICH ROAD / CIVIC DRIVE

The analysis has identified that all but one of the approaches to this junction operate satisfactorily, excluding the northern approach arm in the single lane gyratory scenario in the morning peak hour. However, the maximum reported V/C is 100.97, which indicates capacity is only marginally exceeded. The Ipswich Garden Suburb has limited impact upon this junction which accounts for 1% - 3% of all traffic through the junction.

Mitigation options at this junction would be limited, although the level of congestion is not considered severe and measures to secure the reduction of travel demand should be the focus. This would include travel plans and other sustainable travel measures.

With regard to air quality, please refer to Figure AQ8. This location is not within an AQMA. Compliance with air quality objectives at all locations with relevant exposure is very likely within 100m of the junction. This is currently a low risk location although should be considered to be a medium risk location in the future. Further investigation as part of applications for development will be warranted to determine the appropriate mitigation.

IBC monitoring and the WSP | Parsons Brinckerhoff air quality modelling indicate that existing residential premises on the A1156 Norwich Road at over 100m to the west of the junction may have experienced annual mean NO_2 concentrations in excess of the air quality objective in 2015. This supports the case for considering a future medium risk in relation to mitigate congestion along this road.

Overall this junction is considered at low to medium risk, with limited highway impact but potential air quality impact. Given a small proportion of IGS traffic will pass through the junction the impacts at this location will need to be considered in detail within any planning application in order to inform any mitigation package to secure a reduction in travel demand which may be required.

LOCATION 10: HANDFORD ROAD / CIVIC DRIVE

The review of capacity at this junction has demonstrated that V/C ratios do not exceed 90% for any turning movements in any time periods. The junction operation is therefore considered satisfactory. The Ipswich Garden Suburb has limited impact at this junction which accounts for only 1% - 3% of all trips through the junction.

With regard to air quality, please refer to Figure AQ9. This location is not within an AQMA. Compliance with air quality objectives at all locations with relevant exposure is very likely. This is currently a low risk location and is likely to remain so.

Overall this junction is considered low risk, with limited highway impact and unlikely air quality impact.

LOCATION 11: PRINCES ST / CIVIC DRIVE

The review of capacity at this junction has demonstrated that V/C ratios do not exceed 90% for any turning movements in any time periods. The junction operation is therefore considered satisfactory. The Ipswich Garden Suburb has limited impact at this junction which accounts for only 1% - 3% of all trips through the junction.

With regard to air quality, please refer to Figure AQ10 (note that the roundabout indicated in the base map has been replaced by signalised junction). This location is not within an AQMA. Compliance with air quality objectives at all locations with relevant exposure is very likely. This is currently a low risk location and is likely to remain so.

Overall this junction is considered low risk, with limited highway impact and unlikely air quality impact.

LOCATION 12: GREYFRIARS RD / STAR LANE / COLLEGE STREET / BRIDGE STREET

The analysis has identified that all but one of the approaches to this junction operate satisfactorily, excluding the north western approach arm in all scenarios and time periods. However, the maximum reported V/C is 103.27, which indicates capacity is only slightly exceeded. The impact at this junction is in part caused by the additional traffic associated to the Ipswich Garden Suburb which accounts for 2% - 3% of all trips through the junction.

This junction is currently being assessed as part of both the Upper Orwell Crossings and Star Lane studies being undertaken by Suffolk County Council. These include options for replacing the two roundabouts with a single large roundabout or signalisation. There is significant potential to mitigate any impact in this location.

With regard to air quality, please refer to Figure AQ11. This location is within the Grimwade Street – St Helen's Street Junction – Star Lane gyratory AQMA, which was declared in 2006 due to exceedances of the air quality objective for annual mean NO_2 concentrations (40µg/m^3). Existing locations with relevant exposure that are likely to have experienced exceedances in 2015 include facades of residential premises on College Street, although these are mainly above ground floor level and so should experience lower concentrations with increasing height. Compliance with all other air quality objectives is very likely at all locations with relevant exposure. This is currently a high risk location and should be considered to be at least a medium risk location in the future.

The County Council's proposals are likely to secure the appropriate mitigation but this will need to be confirmed through further investigation as part of the planning application process.

Overall this junction is considered at least medium risk, with limited highway impact but potential air quality impact. Steps are already being taken to address the issues at this junction and the impacts of development at this location will be considered in more detail within those assessments.

LOCATION 13: BRIDGE STREET / B1075 / DOCK ST

The analysis has identified the majority of the approaches to this junction operate satisfactorily, excluding some turning movements on the south western approach in some time periods. The maximum reported V/C is 103.81, which indicates capacity is only slightly exceeded. The impact at this junction is in part caused by the additional traffic associated to the Ipswich Garden Suburb which accounts for 2% - 3% of all trips through the junction.

Given the junction is signalised, with many approaches under capacity, it is considered optimisation of the signal timings could remove any over capacity approaches in the forecast year.

With regard to air quality, please refer to Figure AQ12. This location is within the Grimwade Street – St Helen's Street Junction – Star Lane gyratory AQMA, which was declared in 2006 due to exceedances of the air quality objective for annual mean NO_2 concentrations (40µg/m^3). Existing locations with relevant exposure that may have experienced exceedances in 2015 include facades of residential premises on Stoke Street and at 1 Stoke Bridge Maltings on Dock Street. Compliance with all other air quality objectives is very likely at all locations with relevant exposure. This is currently a high risk location and should be considered to be at least a medium risk location in the future.

The County Council's proposals are likely to secure the appropriate mitigation but this will need to be confirmed through further investigation as part of the planning application process.

Overall this junction is considered at least medium risk, with limited highway impact but potential air quality impact. Steps are already being taken to address the issues at this junction and the impacts of development at this location will be considered in more detail within those assessments.

LOCATION 14: STAR LANE / ST PETER'S STREET

The review of capacity at this junction has demonstrated that V/C ratios do not exceed 100% for any turning movements in any time periods; however, the northern arm is close to capacity with a V/C ratio of 96.2%. The junction operation is therefore considered satisfactory. The impact at this junction is in in part affected by the additional traffic associated to the Ipswich Garden Suburb which accounts for up to 5% of all trips through the junction in the evening peak period.

With regard to air quality, please refer to Figure AQ11. This location is within the Grimwade Street – St Helen's Street Junction – Star Lane gyratory AQMA, which was declared in 2006 due to exceedances of the air quality objective for annual mean NO_2 concentrations (40µg/m^3). There are no existing locations with relevant exposure. Compliance with all other air quality objectives is very likely at all locations with relevant exposure. This is currently a low risk location in the absence of relevant exposure but should be considered to be at least a medium risk location in the future.

The County Council's proposals are likely to secure the appropriate mitigation but this will need to be confirmed through further investigation as part of the planning application process.

Overall this junction is considered a low risk but at least a medium risk location in the future. Steps are already being taken to address the issues at this junction with the Upper Orwell Crossings and Star Lane study proposals likely to lead to a significant reduction in traffic and associated air quality improvements. The impacts of development at this location will be considered in more detail within those assessments.

LOCATION 15: STAR LANE / FOUNDATION STREET

The review of capacity at this junction has demonstrated that V/C ratios do not exceed 90% for any turning movements in any time periods. The junction operation is therefore considered satisfactory. The impact at this junction is in in part affected by the additional traffic associated to the Ipswich Garden Suburb which accounts for up to 5% of all trips through the junction in the evening peak period.

With regard to air quality, please refer to Figure AQ13. This location is within the Grimwade Street – St Helen's Street Junction – Star Lane gyratory AQMA, which was declared in 2006 due to exceedances of the air quality objective for annual mean NO_2 concentrations (40µg/m^3). There are no existing locations with relevant exposure in the immediate vicinity of the junction where concentrations may be in exceedance. This is currently a low risk location in the absence of relevant exposure but should be considered to be a high risk location in the future with development proposals.

The County Council's proposals are likely to secure the appropriate mitigation but this will need to be confirmed through further investigation as part of the planning application process.

Overall this junction is considered a low risk but a high risk location in the future. Steps are already being taken to address the issues at this junction with the Star Lane proposals likely to lead to a significant reduction in traffic and associated air quality improvements. The impacts of development at this location will be considered in more detail within those assessments.

LOCATION 16: STAR LANE / SLADE STREET

The review of capacity at this junction has demonstrated that V/C ratios do not exceed 90% for any turning movements in any time periods. The junction operation is therefore considered satisfactory. The Ipswich Garden Suburb has limited impact at this junction which accounts for only 0% - 2% of all trips through the junction.

With regard to air quality, please refer to Figure AQ13. This location is within the Grimwade Street – St Helen's Street Junction – Star Lane gyratory AQMA, which was declared in 2006 due to exceedances of the air quality objective for annual mean NO_2 concentrations (40µg/m^3). There are no existing locations with relevant exposure in the immediate vicinity of the junction where concentrations may be in exceedance. This is currently a low risk location in the absence of relevant exposure but should be considered to be a high risk location in the future with development proposals.

The County Council's proposals are likely to secure the appropriate mitigation but this will need to be confirmed through further investigation as part of the planning application process.

Overall this junction is considered a low risk but a high risk location in the future. Steps are already being taken to address the issues at this junction and the Upper Orwell Crossings and Star Lane studies are likely to lead to a significant reduction in traffic and associated air quality improvements. The impacts of development at this location will be considered in more detail within those assessments.

LOCATION 17: STAR LANE / FORE STREET

The review of capacity at this junction has demonstrated that V/C ratios do not exceed 90% for any turning movements in any time periods. The junction operation is therefore considered satisfactory. The Ipswich Garden Suburb has limited impact at this junction which accounts for only 0% - 2% of all trips through the junction.

With regard to air quality, please refer to Figure AQ13. This location is within the Grimwade Street – St Helen's Street Junction – Star Lane gyratory AQMA, which was declared in 2006 due to exceedances of the air quality objective for annual mean NO_2 concentrations (40µg/m^3). There are no

existing ground floor locations with relevant exposure in the immediate vicinity of the junction where concentrations may be in exceedance. This is currently a medium risk location due to nearby first floor residential premises but should be considered to be a high risk location in the future when considering proposed development.

The County Council's proposals are likely to secure the appropriate mitigation but this will need to be confirmed through further investigation as part of the planning application process.

Overall this junction is considered a medium risk but a high risk location in the future. Steps are already being taken to address the issues at this junction with the Star Lane proposals likely to lead to a significant reduction in traffic and associated air quality improvements. The impacts of development at this location will be considered in more detail within those assessments.

LOCATION 18: STAR LANE / GRIMWADE STREET

The analysis has identified the majority of the approaches to this junction operate satisfactorily, excluding the western approach in the PM peak. The maximum reported V/C is 101.41 which indicates that capacity is only slightly exceeded. The Ipswich Garden Suburb has very limited impact at this junction which accounts for only 1% of all trips through the junction.

Given the junction is signalised, with many approaches under capacity, it is considered optimisation of the signal timings could remove any over capacity approaches in the forecast year. In addition, this junction is currently being assessed as part of both the Upper Orwell Crossings and Star Lane studies being undertaken by Suffolk County Council.

With regard to air quality, please refer to Figure AQ14. This location is within the Grimwade Street – St Helen's Street Junction – Star Lane gyratory AQMA, which was declared in 2006 due to exceedances of the air quality objective for annual mean NO_2 concentrations (40µg/m^3). Existing locations with relevant exposure that may have experienced exceedances in 2015 include facades of residential premises at 35-36 The Foyer Centre on Star Lane, and 68 and 75 Grimwade Street. Compliance with all other air quality objectives is very likely at all locations with relevant exposure. This is currently a high risk location and should be considered to be at least a medium risk location in the future when considering proposed development.

The County Council's proposals are likely to secure the appropriate mitigation but this will need to be confirmed through further investigation as part of the planning application process.

Overall this junction is considered a medium risk location in the future. Steps are already being taken to address the issues at this junction with the Upper Orwell Crossings and Star Lane studies likely to lead to a significant reduction in traffic and associated air quality improvements. The impacts of development at this location will be considered in more detail within those assessments.

LOCATION 19: GRIMWADE STREET / A1156

The analysis has identified the majority of the approaches to this junction operate satisfactorily, excluding the eastern approach in the AM peak in the single lane gyratory scenario. The maximum reported V/C is 103.77 which indicates capacity is only slightly exceeded. The Ipswich Garden Suburb has very limited impact at this junction which accounts for up to 1% of all trips through the junction.

This junction is currently being assessed as part of both the Upper Orwell Crossings and Star Lane studies being undertaken by Suffolk County Council. The analysis shows this junction only exceeds capacity in the single lane Star Lane Gyratory and would therefore be considered as part of any study to implement that scheme.

With regard to air quality, please refer to Figure AQ14. This location is within the Grimwade Street – St Helen's Street Junction – Star Lane gyratory AQMA, which was declared in 2006 due to

exceedances of the air quality objective for annual mean NO_2 concentrations (40µg/m^3). Existing locations with relevant exposure that may have experienced exceedances in 2015 include facades of residential premises at 68 and 75 Grimwade Street and on Fore Street. Compliance with all other air quality objectives is very likely at all locations with relevant exposure. This is currently a high risk location and should be considered to be at least a medium risk location in the future when considering future development.

The County Council's proposals are likely to secure the appropriate mitigation but this will need to be confirmed through further investigation as part of the planning application process.

Overall this junction is considered at least a medium risk. Steps are already being taken to address the issues at this junction with the Star Lane proposals likely to lead to a significant reduction in traffic and associated air quality improvements. The impacts of development at this location will be considered in more detail within those assessments.

LOCATION 20: A1156 / DUKE STREET

The analysis has identified that all approaches to this junction operate satisfactorily, with the eastern approach in the AM peak performing worst. The maximum reported V/C is 96.5 which indicates the junction is close to capacity. The Ipswich Garden Suburb has very limited impact at this junction which accounts for only 1% of all trips through the junction.

Given the junction is signalised, with many approaches under capacity, it is considered optimisation of the signal timings could further improve performance in the forecast year. In addition, this junction is currently being assessed as part of the Upper Orwell Crossings, Star Lane and Ipswich Corridor Route studies being undertaken by Suffolk County Council.

With regard to air quality, please refer to Figure AQ14. This location is within the Grimwade Street – St Helen's Street Junction – Star Lane gyratory AQMA, which was declared in 2006 due to exceedances of the air quality objective for annual mean NO_2 concentrations (40µg/m^3). Existing locations with relevant exposure that, according to the air quality modelling, may have experienced exceedances in 2015 include facades of residential premises at 136-138 Fore Street; however, nearby monitoring indicates lower concentrations than suggested by modelling, below 40µg/m^3. Compliance with all other air quality objectives is very likely at all locations with relevant exposure. This is considered to be a medium risk location and should be considered to remain so in the future when considering future development.

The County Council's proposals are likely to secure the appropriate mitigation but this will need to be confirmed through further investigation as part of the planning application process.

Overall this junction is considered a medium risk location. Steps are already being taken to address the issues at this junction with the Star Lane proposals likely to lead to a significant reduction in traffic and associated air quality improvements. The impacts of development at this location will be considered in more detail within those assessments.

LOCATION 21: NACTON ROAD / FELIXSTOWE ROAD

The review of capacity at this junction has demonstrated that V/C ratios do not exceed 90% for any turning movements in any time periods. The junction operation is therefore considered satisfactory. The Ipswich Garden Suburb has very limited impact at this junction which accounts for up to 1% of all trips through the junction.

With regard to air quality, please refer to Figure AQ15. This location is not within an AQMA. Compliance with air quality objectives at all locations with relevant exposure is very likely. This is currently a low risk location and is likely to remain so.

Overall this junction is considered low risk, with limited highway impact and unlikely air quality impact.

LOCATION 22: ROPE WALK / GRIMWADE STREET

The review of capacity at this junction has demonstrated that V/C ratios do not exceed 90% for any turning movements in any time periods. The junction operation is therefore considered satisfactory. The impact at this junction is in part caused by the additional traffic associated to the Ipswich Garden Suburb which accounts for 2% - 3% of all trips through the junction.

With regard to air quality, please refer to Figure AQ16. This location is not within an AQMA. Compliance with air quality objectives at all locations with relevant exposure is very likely. This is currently a low risk location and is likely to remain so.

Overall this junction is considered low risk, with limited highway impact and unlikely air quality impact.

LOCATION 23: ST. HELEN'S STREET / GRIMWADE STREET

The analysis has identified that all approaches to this junction operate satisfactorily, with the northern approach performing worst. The maximum reported V/C is 97.96 which indicates the junction is close to capacity. The impact at this junction is in part caused by the additional traffic associated to the Ipswich Garden Suburb which accounts for 2% - 3% of all trips through the junction.

Given the junction is signalised, with other approaches under capacity, it is considered optimisation of the signal timings could further improve performance in the forecast year.

With regard to air quality, please refer to Figure AQ16. This location is within the Grimwade Street – St Helen's Street Junction – Star Lane gyratory AQMA, which was declared in 2006 due to exceedances of the air quality objective for annual mean NO_2 concentrations (40µg/m^3). Existing locations with relevant exposure that, according to the air quality modelling, may have experienced exceedances in 2015 include facades of residential premises at the junction; however, nearby monitoring indicates lower concentrations than suggested by modelling, below 40µg/m^3. Compliance with all other air quality objectives is very likely at all locations with relevant exposure. This is considered to be a medium risk location and should be considered to remain so in the future in the future when considering future development.

The County Council's proposals are likely to secure the appropriate mitigation but this will need to be confirmed through further investigation as part of the planning application process.

Overall this junction is considered a medium risk location in the future. Steps are already being taken to address the issues at this junction with the Star Lane proposals likely to lead to a significant reduction in traffic and associated air quality improvements. The impacts of development at this location will be considered in more detail within those assessments.

LOCATION 24: ST HELEN'S STREET / BOND STREET

The analysis has identified the all approaches to this junction operate satisfactorily, with the exception of the eastern arm with a maximum V/C of 100.28 which indicates the junction is marginally over capacity. The impact at this junction is in part caused by the additional traffic associated to the Ipswich Garden Suburb which accounts for 1% - 3% of all trips through the junction.

Given the junction is signalised, with other approaches under capacity; it is considered optimisation of the signal timings could resolve any performance issues in the forecast year.

With regard to air quality, please refer to Figure AQ16. This location is not within an AQMA (it is just to the west of the Grimwade Street – St Helen's Street Junction – Star Lane gyratory AQMA).

Compliance with air quality objectives at all locations with relevant exposure is very likely. This is currently a low risk location and is likely to remain so.

Overall this junction is considered low risk, with limited highway impact and unlikely air quality impact.

LOCATION 25: ST HELEN'S STREET / UPPER ORWELL STREET

The review of capacity at this junction has demonstrated that V/C ratios do not exceed 90% for any turning movements in any time periods. The junction operation is therefore considered satisfactory. The impact at this junction is in part caused by the additional traffic associated to the Ipswich Garden Suburb which accounts for 1% - 3% of all trips through the junction.

With regard to air quality, please refer to Figure AQ16. This location is not within an AQMA. Compliance with air quality objectives at all locations with relevant exposure is very likely. This is currently a low risk location and is likely to remain so.

Overall this junction is considered low risk, with limited highway impact and unlikely air quality impact.

LOCATION 26: A1156 / WOODBRIDGE ROAD

The review of capacity at this junction has demonstrated that V/C ratios do not exceed 90% for any turning movements in any time periods. The junction operation is therefore considered satisfactory. The impact at this junction is in part caused by the additional traffic associated to the Ipswich Garden Suburb which accounts for 2% of all trips through the junction.

With regard to air quality, please refer to Figure AQ16. This location is not within an AQMA. Compliance with air quality objectives at all locations with relevant exposure is suggested by the air quality modelling; however, monitored concentrations of annual mean NO_2 on the south side of Woodbridge Road in 2015 suggest that facades of residential premises may have experienced concentrations exceeding 40µg/m^3. This is currently a low risk location but should be considered to be medium risk in the future when considering future development. Further investigation is warranted to determine appropriate mitigation.

Overall this junction is considered low risk, but with potential to be medium risk depending on planned development. Air Quality Management Plan measures supported by development related measures can provide appropriate mitigation.

LOCATION 27: ST MARGARET'S ST / BOLTON LANE

The review of capacity at this junction has demonstrated that V/C ratios do not exceed 90% for any turning movements in any time periods. The junction operation is therefore considered satisfactory. The impact at this junction is in part caused by the additional traffic associated to the Ipswich Garden Suburb which accounts for 0% - 3% of all trips through the junction.

With regard to air quality, please refer to Figure AQ17. This location is within the St Margaret's Street – Crown Street AQMA, which was declared in 2006 due to exceedances of the air quality objective for annual mean NO_2 concentrations (40µg/m^3). There are no existing locations with relevant exposure in the immediate vicinity of the junction and locations where monitored and modelled concentrations indicated exceedance of the air quality objective. This is currently a low risk location but should be considered to be medium/high risk in the future when considering future development. Further investigation in conjunction with planning applications is warranted to determine appropriate mitigation which could include reconfiguration of signal timings to smooth the flow of traffic.

Overall this junction is considered low risk, but with potential to be medium/high risk depending on planned development. Mitigation will need to reflect this.

LOCATION 28: FONNEREAU ROAD / CROWN STREET / NORTHGATE STREET

The review of capacity at this junction has demonstrated that V/C ratios do not exceed 90% for any turning movements in any time periods. The junction operation is therefore considered satisfactory. The impact at this junction is in part caused by the additional traffic associated to the Ipswich Garden Suburb which accounts for 0% - 3% of all trips through the junction.

With regard to air quality, please refer to Figure AQ17. This location is within the St Margaret's Street – Crown Street AQMA, which was declared in 2006 due to exceedances of the air quality objective for annual mean NO_2 concentrations (40µg/m^3). There are no existing locations with relevant exposure in the immediate vicinity of the junction and locations where monitored and modelled concentrations indicated exceedance of the air quality objective. This is currently a low risk location but should be considered to be at least medium/high risk in the future when considering future development. Further investigation is warranted in conjunction with planning applications to determine appropriate mitigation which could include optimisation of signal timings at adjacent junctions.

Overall this junction is considered low risk, but with potential to be medium risk depending on planned development. Mitigation will need to reflect this.

CONCLUSION OF JUNCTION BY JUNCTION ANALYSIS

From our analysis to date, we are confident that the transport and air quality effects of the Local Plan can be appropriately mitigated having regard to its limited impact on the principally relevant junctions which are contained within air quality management areas, the scope for improvement at the majority of those junctions and the use of a package of travel plan initiatives in association with individual developments. Transport and air quality does not therefore raise any in principle concerns.

Further, we believe on the basis of the analysis undertaken, IGS can be appropriately mitigated having regard to its limited impact on the principally relevant junctions, the scope for improvement at the majority of those junctions and the use of planning conditions in association with the development.

Yours sincerely

A. C. Talbot Digitally signed by Talbot, Andy Date: 2016.06.24 15:20:03 +01'00'

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Encl. Figures AQ1 – AQ17