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SUBJECT: WNDC Comments on NCC20

This note sets out WNDC's comments on NCC20 – *A45 Corridor Improvements Trigger Points – Updated Analysis including SBA/WNDC Scheme* (dated 3rd July 2009). NCC20 provides an update on the level of development that could be accommodated at Daventry within the link capacity of the A45 westbound, and ultimately prior to the delivery of the Weedon-Flore-Upper Heyford (WFUH) Bypass.

Results of NCC20

The results contained within NCC20 suggest that the result of implementing the SBA4 junction improvement will be the reassignment of an element of traffic travelling through the A5/A45 junction from the A5 southbound to the A45 eastbound. The note quantifies this reassignment of traffic in Figure 1 as a reduction of approximately 156 Passenger Car Units (PCU) on the A5 southbound, and a subsequent increase of approximately 127 PCU on the A45 eastbound. This is brought about by a reduction in green-time on the A5 southbound compared to that of the Existing Layout, thus meaning that it is more convenient or less congested for vehicles to travel through the junction via the A45 eastbound, which will receive a greater proportion of green-time than the A5 southbound.

WNDC Comments

The following is a discussion of the concerns WNDC have with the approach taken to identify the level of development that can be accommodated and any issues with the technical work undertaken by Arup on behalf of NCC.

- 1. Appropriateness of modelling** – the aim of the work undertaken by NCC is to identify the potential for vehicles to reassign from their existing or predicted journey routes to those which may impact on the A45 link capacity. The Daventry Multi-Modal SATURN model was used for this task, which is the most logical tool for undertaking this sort of assessment, and as such WNDC does not have any issues with its use. WNDC does, however, wish to add caution to the level of precision that is applied to the results produced by the model, as a large scale or macro-model is being used to assess the micro impacts of the proposed changes to the A5/A45 standalone junction.

The A5-A45 junction was initially modelled using Linsig, a software programme for assessing standalone junctions, which identifies the green times for each arm and link at the junction. At this stage it should be noted that A5/A45 junction operates Microprocessor Optimised Vehicle Actuation (MOVA), which is an adaptive traffic control capable of maximising capacity at a junction by providing green-time to the most



congested arms by detecting traffic flows using sensor loops in the ground, thus the green times change on a constant basis to reflect the traffic conditions. In light of this it is considered that Linsig cannot replicate the conditions of the junction, however it is the best method of modelling standalone junctions.

2. **Validation** – it is noted that during the development of the Daventry Multi-modal Model, concern was raised by the Highways Agency (HA) over the validation of the model in the A5 corridor. Amendments were made to the model to satisfy the HA that it was fit for purpose; however this again suggests that a level of caution should be applied to the use of the results of this modelling.

WNDC consider that with future detailed modelling it would be possible to equalise the delay between the A5 southbound and the A45 eastbound routes such that there was no reassignment of traffic. This is especially the case given that there is a good degree of slack between the increase in traffic that could be absorbed through the junction with nil-detriment (3,175 dwellings based on HA13) and the 2,125 dwellings that WNDC consider could be permitted prior to the WFUH Bypass. In other words, it is likely that sufficient adjustments to the signal timings could be made to achieve the following:

- No reassignment between the A5 southbound and the A45 eastbound
- Nil-detriment with 2,125 dwelling (Monksmoor and Phase 1 of Church Fields)

3. **Modelling Inputs** – the modelling parameters input into the SATURN model were provided to WNDC by Arup for review. WNDC have made the following technical observations on the parameters used:

'Existing' Model

- a) The stage sequence modelled appears to be incorrect – Stages 3 and 4 should be reversed.
- b) There is too much 'green time' in the existing model. All the inter-stages are coded as 5 seconds, however they should be 6 seconds after Stage 1, 7 seconds after Stage 2, 6 seconds after Stage 3 (A5 full green) and 5 seconds after Stage 4 (A5 north-bound right-turn). Therefore, lost time due to inter-stages has been coded as 20 seconds when it should be 24 seconds. This will have the result of overestimating green-times and capacity at the junction.

'Proposed Model'

- c) The A45 W/B left turn does not run in Stage 4.
- d) This has been modelled at 100 second cycle time, whereas the 'Existing' Layout is modelled at 120 seconds. This means that the 'Proposed' scenario is being unfairly penalised as lost time is a higher proportion of cycle time. Therefore, the green times need to be increased to reflect a higher 120 second cycle time, i.e. comparing the existing and proposed on equal terms.
- e) Lost time is incorrect in the proposed model, again meaning a true comparison is not being made. The inter-stages have been modelled as Stage 1=6, Stage 2=7, Stage 3=6 and Stage 4=9, equalling a total effective lost time of 28 seconds. The geometry of the proposed layout is different to the existing so the intergreens have been recalculated. They should be coded as Stage 1=5, Stage 2=5, Stage 3=5 and Stage 4=5, a reduction of 8 seconds over what was modelled.

- f) The saturation flows used in the model have changed. Below is a table showing the changes, with any increases or decreases calculated as a percentage with proposed new saturation flows for SATURN.

Junction Arm/Link	Existing Linsig (RR67) Sat-flow (120s CT) pcu/hr	Proposed Linsig (RR67) Sat-flow (120s CT) pcu/hr	% Change for 'Proposed'	Existing SATURN sat-flow	Calculated new Sat-flow for 'Proposed' model	Suggested / rationalised new Sat-flow for 'Proposed' model
A5 south-bound left turn	1846	1833	-0.7%	2200	2184	2200
A5 south-bound ahead	1971	3990	+102.4%	2200	4454	4450
A45 west-bound ahead	1745	1985	+13.8%	2200	2503	2500
A45 west-bound right turn	1685	1720	+2.1%	2200	2246	2250
A5 north-bound left turn	1981*	1941	+2.1%	2200	2246	2250
A5 north-bound ahead	1965	1965	0%	2200	2200	2200
A5 north-bound right turn	1747	1717	-1.7%	2200	2162	2150**
A45 east-bound ahead	1908	1919	+0.6%	2200	2212	2200
A45 east-bound right turn	1830	1873	+2.3%	2200	2251	2250

* Calculated as if the approach was signalised so the existing and proposed could be compared using RR67.

** The saturation flow is decreased slightly as the lane is slightly narrower. There will be safety benefits from separately signalling this tight turn.

Summary

WNDC have reviewed NCC20 and have concerns over the use of the modelling approach taken in identifying the threshold of development that may be permitted within the link capacity of the A45 west. The exercise seeks to use a strategic model to identify the implications of minor amendments to a standalone junction.

Furthermore, the modelling input parameters for both the Existing and Proposed Layouts do not appear to be accurately represented in these scenarios, and the results draw conclusions from what is not considered to be a fair comparison of modelled cycle times.

WNDC consider that there is sufficient spare capacity within the proposed junction improvement to allow the signal timings to be adjusted such that 2,125 dwellings could be accommodated at nil-detriment with no traffic reassignment issues.

Finally, while WNDC does not object to the use of the Daventry Multi-Modal model for the modelling undertaken thus far, and indeed for undertaking this exercise, we are aware that there have been validation issues with the model, and thus would suggest that a degree of caution is applied in applying a high level of precision to the results of this modelling exercise.

WNDC have contacted Arup setting out their comments and concerns over the use of NCC20 in prescribing thresholds for development at this Inquiry and are currently awaiting a response on the issues raised.