WCC Modelling Protocol

Advice Note 02b.4 – Guidance on Testing New Infrastructure

Introduction

1. This note sets out expectations around testing new infrastructure within the existing suite of microsimulation models.

2. It has been produced in response to the issue of design and testing new link roads, distributor roads and relief roads within the existing microsimulation models and is intended to provide an overview regarding key considerations regarding testing the provision of new infrastructure, in the form of link roads and relief roads, within the models.

Underlying Assumptions

3. It is not considered appropriate that the design of a link road should be based entirely on the volume of traffic which is predicted to utilise the link road within the modelling.

4. The volume of traffic which is predicted to use a link is a function of the demand and the perceived attractiveness of the link within the model. When entering new links within the model they are often input based on the target aspirations for the area, this will comprise a certain combination of lanes, width and speed.

5. As a result of that combination, and due to the alignment and placement of the link within the model, a certain amount of traffic will elect to reassign away from their original route and onto the new link.

Initial Appraisal

6. Where WCC does not hold a microsimulation model which can be used to assess the new infrastructure proposals, the initial spatial analysis can be used to understand the potential implications of the new scheme (i.e. via GIS modelling or similar). This can be used to provide estimations of reassignment in the local area and to complete initial appraisal of constraints provided it is supplemented with more detailed modelling and option testing prior to any planning submission.

Assignment principles

7. Reassignment as a consequence of new infrastructure will be in response to both the attractiveness of the new measure and also the perceived cost of the alternative route (e.g. traffic constraints downstream as a result of congestion causes the route via the new link to be perceived to be cheaper).

8. Route cost, therefore, is a significant consideration in the assessment. The routing within the microsimulation models is based on a Generalised Cost Equation, which is, in turn,

supplemented with standard values from the TAG data book. Similar principles can be adopted during the initial stage of analysis if completed outside of a microsimulation model.

9. A brief overview of the GCE is provided as follows:

Generalised Cost Equation

10. The generalised cost equation used during the development of a Paramics model has a direct effect on the way vehicles route through the network. The generalised cost equation adopted within WCC models has been calculated on a vehicle type basis.

11. The GCE, for each vehicle type, have been calculated using the guidance outlined in TAG Unit A1.3 and Unit M2 using relevant values contained in the TAG Data Book Autumn 2015 release V1.4. In regards to the Vehicle Operating Costs (VOC) Traffic Master Data for the area of the model has been used to inform the average speeds required in the calculations, and therefore ensuring the GCEs are tailored to the study area in question.

12. Thus, the routing considerations of a vehicle within the model takes account of distance and speed and prioritises accordingly on the basis of the route which elicits the optimum cost.

Testing Considerations

13. When introducing a new link within a model, the link affects the GCE calculations as it can introduce an alternative route which may be shorter (distance) or quicker (speed).

14. The time taken to traverse the route is calculated on a 'live feedback' basis meaning that during each simulation run costs are constantly recalculated and routes re-optimised based on a number of parameters which include the route distance and time taken to traverse links. As the model becomes more congested the time taken to traverse a section of the network will increase but the distance remains constant.

15. This results in a certain number of vehicles using the link on the basis of the attractiveness. Time taken is a key component in this calculation, which is based, in part, on the speed limit coded in to the model.

16. Therefore, the design speed coded in to the model has a direct and significant impact on the number of vehicles which use the model. Additionally, the classification of the route within the model as major (i.e. a signposted, high standard route) or minor (lower standard, less attractive) will also have a significant impact on the number of vehicles which use the new link.

17. Testing should also consider the effects on the local transport network beyond the new infrastructure, particularly where reassignment occurs. It will be important to establish that any changes in traffic patterns beyond the scheme extent can be accommodated within the local network (and junctions).

Changing Design Considerations

18. Because the flows within the model are directly affected by the parameters attributed to the link road within the model, it is not considered appropriate to simply design the standard of the link road to be based on the flows which are extracted from the model.

19. The assumptions within the model will frequently have been input based on an aspiration for a certain standard of link to be delivered at a certain speed and consideration must be given to testing any alternative link assumptions within the model to understand the effects that changing the speed, classification or number of lanes will have on the study area.

20. Consideration must then be given to understanding whether any change in flows is acceptable and what the implications are for the wider network performance issues.

21. Any assumptions pertaining to the design of a link should be agreed with WCC Development Management and should adhere to the WCC Design Guide. These assumptions should be reflected within the model coding.