

## WCC Modelling Protocol

### Advice Note 001 – Education Trip Calculations

Protocol Category	Development Assumptions & Trip Generation	Version	001
cc	Warwickshire County Council	File reference	WCC_MP_AN01.V01
Prepared by	James Edwards (VM)	Date	25 January 2017

#### Introduction

1. This advice note (AN) has been produced to supplement the Warwickshire County Council Model Use Protocol (MUP) which governs the access and use of WCCs suite of models.
2. To supplement the WCC MUP, a series of advice notes have been produced to provide guidance on different aspects of the development and application of the existing suite of models.

#### Purpose of This Note

3. This note sets out guidance on modelling the impact of delivering schools within the microsimulation model, specifically concerning the derivation of trip generation figures for schools.

#### Background

4. As with all development proposals, the assessment of the impact of education facilities required the identification of appropriate assumptions pertaining to the generation and distribution of trips.
5. The National Travel Survey (NTS) identifies that during the AM peak hour, on average, 29% of journeys undertaken are associated with education<sup>1</sup>. Therefore it is considered pertinent that trips associated with education use are included within the model as accurately as possible.
6. The NTS defines a commute as a journey from home to usual place of work only. On this definition, 16% of all trips are for commuting. However, this means that if a (nontrivial) break in the journey is made, for example to take children to school on the way to work, the trip is no longer classified as a commute according to the definition<sup>2</sup>.
7. When trips to work are not direct from home, the most common reasons are to take a child to school, or to escort someone else for another purpose (eg taking a partner to their work).

<sup>1</sup> <https://www.gov.uk/government/collections/national-travel-survey-statistics> Table NTS0502

<sup>2</sup> NTS Trip chaining 2002 - 2014

This is known as trip chaining and, on average, 5% of trips to work which are in a chain are broken up by education escort. This is considered a significant proportion and thus detailed consideration regarding the strategy for applying education trips within a model is considered justified.

8. Wherever possible the preferred data source when calculating trip generation figures for any land use or development within Warwickshire to be based on appropriate local proxy data derived from similar uses. Where appropriate proxy data is not available then TRICS analysis should be undertaken to provide the trip generation figures.
9. In the case of education trips it is not possible to utilise proxy data since there are insufficient schools surveyed within the county to provide an appropriate match.
10. However, it is also considered that the application of trip rates derived from TRICS can oversimplify the creation of trip generation on the basis that the majority of trips are linked meaning that the education element comprises one part of a wider trip (i.e. from home to school and then on to work).
11. There are considered to be three core influencing factors which effect how a trip to school is undertaken including:
  - Distance from the school
  - Age of child
  - Availability of modes

### **National Trends**

12. NTS identifies that, on average, 45% of primary school pupils and 23% of secondary school pupil's travel to school by car.
13. For very short distance trips (under 1 mile) walking is the primary mode of travel. For trips which are 2 miles or greater in length then car is the dominant mode for primary school pupils and bus is the dominant mode for secondary school pupils.
14. This travel pattern is broadly reflected within Warwickshire but there is a propensity for change in different areas which occurs as a result of the nature of the local network. Schools in rural areas of the county will have a larger than average reliance on car based travel whilst schools within the town centre areas tend to have higher numbers of trips which are completed via sustainable modes (particularly walking & cycling).
15. These trend are reflected in Warwickshire but they vary depending upon which area of the county the education facilities are located. Therefore, it is recommended that, wherever it is possible to do, factors derived from proxy data within the Warwickshire area is utilised to determine the level of education based car trips to assign within a model.

### **Adopted Factors**

16. The methodology outlined within this note relies on a number of localised factors to determine the overall assignment effects of a school. These factors have been calculated spatially and include:

- The number of primary (5 to 10yrs old) and secondary (11 to 16yrs old) school pupils likely to be created per household based on an average of the latest population statistics.
  - The likely level of car usage associated with the school, split by primary and secondary schools, by area. If possible this data should be disaggregated down to geographical area (i.e. which district, and then an appropriate proxy school identified to provide even more refined information).
  - The local area population percentage classified as economically inactive.
17. The localised factors, derived from Warwickshire data, for each of the above is presented within **Appendix A** of this note.
18. The methodology for the calculation of trips associated with education use is set out within the following section of this note.

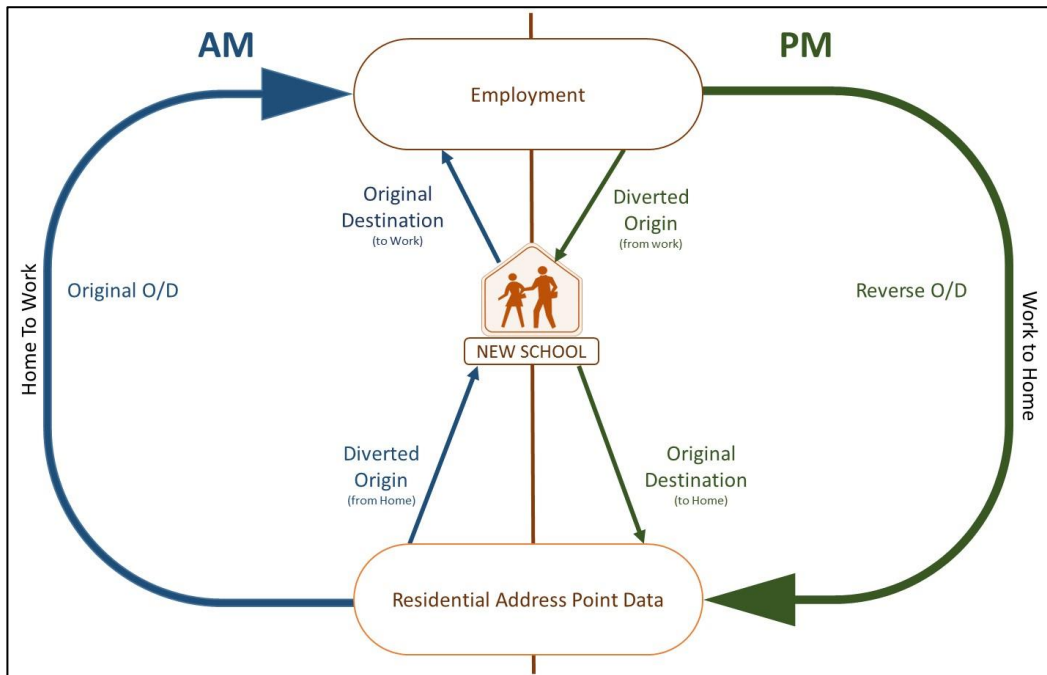
## **Methodology**

19. It is considered appropriate that the calculation of trip generation for education purposes adopts the following principles:
- That, for a new development which contains a school, the number of school pupils that will be created by the development will be based on the average school pupil per house-hold factor derived for the area based on the local household and population statistics.
  - The presumption should always be that the school will be fully populated from the point of opening and so trip generation calculations should be based on all pupil numbers.
  - That car based trip generation, for associated with the school, should be calculated on a per pupil basis and should make use of proximate locations and schools of similar type (primary or secondary) to determine the likely number of car based trips generated by the school.
  - That the school trip generation for cars and sustainable modes should be calculated using the most appropriate local school factors.
20. It is assumed that this method deals only with the generation of car based trips associated with school pupils. TRICS analysis will also be required to provide information on the staff numbers associated with the school also.
21. The purpose of this method is to ensure that the risk of double counting the trips associated with a school, alongside trips associated with new and/or existing residential developments, is minimised.
22. The recommended approach to dealing with the assignment of trips associated with schools, into an existing model is summarised as follows:
- The pupil mode share data for the area should be isolated from the education mode share survey data and utilised to calculate the number of car based trips created, per pupil, for primary/secondary schools using an appropriate set of proxy

data for schools in close proximity to the area where the new trips are proposed to occur.

- The population statistics for the area should be used to determine an appropriate factor for calculating the number of primary and secondary school pupils per household.
  - The pupils per household conversion factor should be used to calculate the number of pupils likely to be generated by the housing that will be delivered on site (if mixed development). It is assumed that the schools will be full and, on that basis, any residual spaces (i.e. one all pupils from adjacent housing within the same development have been accounted for) will be occupied by pupils who are travelling to the school from other areas of the model.
  - Residual pupil trips will be calculated by establishing the number of houses within either a set radius or a pre-agreed catchment area, the trip generation should then be distributed proportionally across the zones within that radius/area.
  - The pupil car based trip generation factor will be combined with the pupils per household value for each of the model zones (including the development zone) to create a set of trip generation and distribution assumptions for the school drop-off trips.
  - Most pupil based car trips will be assumed to be drop-offs and therefore will be assumed to divert from the existing zones to the school and then onward to the final destination. This will be captured via an adjustment to the origin zones to reduce the trip generation by the amount now predicted to travel towards the school.
  - The onward distribution, from the school, will then be calculated based on the distribution of the development or, if appropriate, the distribution associated with the origin zone (where the trip originally diverted from).
  - Return trips will, until more accurate information is available, be calculated as the proportion of the population within an area classified as 'economically inactive'
  - Trip generation will be disaggregated on an hourly basis based on a factoring process which will assess the TRICS trip generation info to determine an appropriate split of trip assignment across the model periods.
23. The principles of the redistribution/trip diversion effects which are outlined previously have also been illustrated within **Figure 1** on the following page.
24. The previous methodology is intended to serve as guidance and it is recognised that the split between trips which travel onwards from the school to work and those which return to home may be imbalanced in favour of the onward trips. At this stage the assumptions are considered sufficiently accurate for the modelling needs but, should more substantial evidence be made available which enables the return trips to be more accurately modelled then this would be considered and, if necessary, the advice not updated accordingly.

**Figure 1: Education Trip Diversion**



## **APPENDIX A**

### **Observed Factors**

**Table 1 – Observed Factors for Primary Schools**

Area	Number of Dwellings	Numbers on Roll	Pupils Per Dwelling	Car & Car-Share factor	Walk & Cycle Factor
North Warwickshire	25812	5054	0.20	46%	47%
Warwick	58679	8908	0.15	40%	56%
Stratford-on-Avon	51928	8757	0.17	46%	49%
Rugby	41875	7779	0.19	41%	53%
Nuneaton and Bedworth	52711	9753	0.19	38%	60%

**Table 2 – Observed Factors for Secondary Schools**

Area	Number of Dwellings	Numbers on Roll	Pupils Per Dwelling	Car & Car-Share factor	Walk & Cycle Factor
North Warwickshire	25812	4485	0.17	24%	45%
Warwick	58679	7253	0.12	23%	57%
Stratford-on-Avon	51928	8695	0.17	18%	27%
Rugby	41875	6472	0.15	22%	41%
Nuneaton and Bedworth	52711	7218	0.14	26%	61%