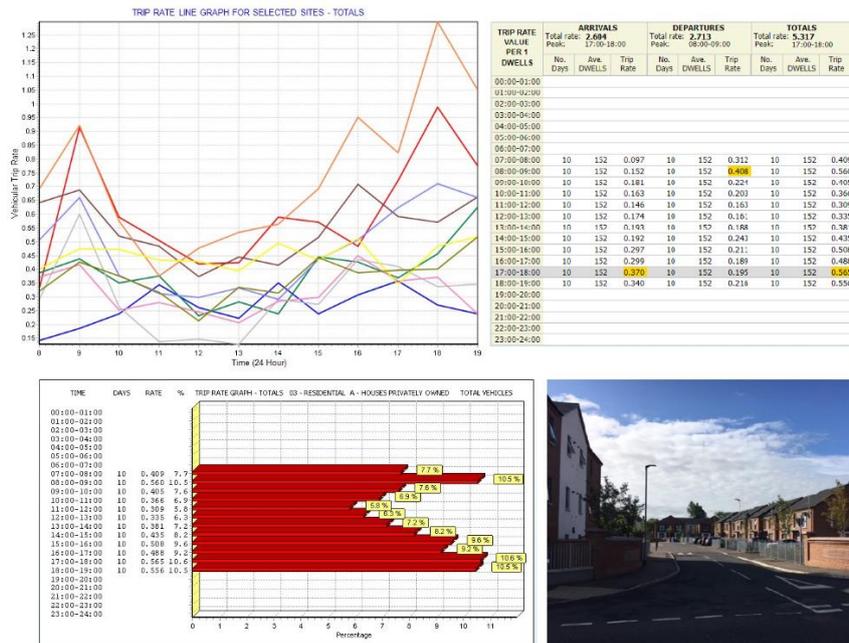




# TRICS Consortium Limited

## TRICS Good Practice Guide 2021



December 2020

Author: Ian Coles

## Contents

1.	Overview .....	4
2.	Using the most up to date version of TRICS and archived versions.....	5
3.	Understanding Land Use Definitions .....	6
4.	Site selection by Region, Location Type and other data fields .....	7
5.	The Use of Comment Boxes .....	11
6.	Understanding Trip Rate Calculation Parameter Definitions.....	11
7.	How TRICS Defines Gross Floor Area (GFA) .....	13
8.	The Method of TRICS Trip Rate Calculations.....	14
9.	Using Older TRICS Data .....	15
10.	Seasonal Trip Rate Variation .....	16
11.	Peak Hours and Days.....	17
12.	Avoiding the Production of Pre-Determined “Preferred” Trip Rates .....	22
13.	Representative Sample Sizes and Cross Testing .....	25
14.	Resurveys and Multiple-Surveys .....	28
15.	Weighting Factors in Trip Rate Calculations and Manual Deselection .....	30
16.	Trip Rates and Limits of Extrapolation .....	31
17.	Mixed Use Sites and TRICS.....	35
18.	Understanding Count Type Definitions.....	37
19.	Understanding the TRICS Vehicle Occupants Count .....	39
20.	Understanding the TRICS Servicing Vehicles Count .....	42
21.	Correct Presentation of Trip Rates and Methods .....	44
22.	The Standard Assessment Methodology (SAM) .....	52
23.	TRICS Compliant Surveys and the Provision of Survey Data .....	54
	Appendix A – A worked example of a Trip Rate Calculation scenario .....	57

## Tables

Table 1 – General guide to site compatibility by Main Location type.....	9
--	---



## Figures

Figure 1 – Extract of TRICS system information showing TRICS version number .....	5
Figure 2 – Extract of Help section showing land use type definitions.....	6
Figure 3 – Location fields and definitions button within a Site Details screen .....	9
Figure 4 – TRICS Main Location definitions .....	10
Figure 5 – Comment Boxes are present within individual site records.....	11
Figure 6 – Definitions of all trip rate parameters can be easily found.....	12
Figure 7 – The trip rate calculation factor is always displayed (top left) .....	12
Figure 8 – The minimum survey cut-off date is defaulted to 8 Years .....	15
Figure 9 – TRICS output (highlighting survey dates) .....	17
Figure 10 – Graphical display of trip rates showing peaks .....	18
Figure 11 – Trip rate calculation results table .....	18
Figure 12 – Comparative survey trip rate graph for multiple sites .....	19
Figure 13 – TRICS output (highlighting survey days).....	20
Figure 14 – Graphical display of trip rates showing “double peaking” .....	21
Figure 15 – Scatterplot diagram identifying low/high relative trip generation .....	23
Figure 16 – Trip rate parameter summary .....	23
Figure 17 – Calculation Reference code on TRICS outputs .....	24
Figure 18 – “Audit Another TRICS User Session” box on the TRICS system Homescreen.....	24
Figure 19 – Example of rank order screen with 85 <sup>th</sup> /15 <sup>th</sup> percentiles highlighted.....	26
Figure 20 – Example of “Cross Testing” of mean and median trip rates .....	28
Figure 21 – Example of Site List showing Initial Surveys and Re-Surveys .....	28
Figure 22 – Example of Site Details showing linkage to initial and re-survey details .....	28
Figure 23 – Example of Survey Selection screen showing “Most Recent Survey Only” and “Busiest Survey” radio buttons.....	30
Figure 24 – Example of trip rate results showing the “Estimate Trip Rates” Feature.....	32
Figure 25 – Example of a 03/A scatterplot by Site Area (higher fluctuation in range) .....	33
Figure 26 – Example of a 03/A scatterplot by Dwellings (lower fluctuation in range).....	33
Figure 27 – Example of a scatterplot showing a lack of apparent visual correlation between GFA and vehicle trips (manufactured example for illustrative purposes) .....	34
Figure 28 – Example of a scatterplot showing a visual correlation between GFA and vehicle trips (albeit significantly influenced by external factors) .....	35
Figure 29 – Extract of Help screen showing count type definitions.....	37
Figure 30 – Example of a modal split pie chart .....	38
Figure 31 – Multi-Modal count types for Greater London (left) and outside of London (right).....	39
Figure 32 – Example of a TRICS® Vehicle Occupants count .....	40
Figure 33 – Vehicle Occupants Split Graph in TRICS® .....	41
Figure 34 – The Servicing/Standard Vehicle Percentages table in TRICS® .....	43
Figure 35 – Example of Servicing Vehicle count.....	44
Figure 36 – Default sections to be included in a TRICS® PDF output with additional optional features also shown .....	46
Figure 37 – Land Use selection and regional breakdown in a TRICS® PDF output.....	47
Figure 38 – Primary Filtering selections in a TRICS® PDF output .....	48
Figure 39 – Secondary Filtering selections in a TRICS® PDF output .....	49
Figure 40 – List of included sites in a TRICS® PDF output .....	50
Figure 41 – The trip rate calculation results table in a TRICS® PDF output.....	51
Figure 42 – The Parameter Summary in a TRICS® PDF output.....	52
Figure 43 – Example of a site list with SAM surveys highlighted .....	52
Figure 44 – Extract from the Travel Plan Monitoring Report.....	54



## Appendix Figures

Figure A- 1 – Selecting the 03/A TRICS® land use sub-category (Houses Privately Owned) .....	57
Figure A- 2 – Selecting the required minimum and maximum number of dwellings .....	58
Figure A- 3 – Selecting the required range of parking spaces per dwelling .....	58
Figure A- 4 – Selecting the required range of bedrooms per dwelling .....	58
Figure A- 5 – Selecting the minimum percentage of dwellings that are privately owned .....	59
Figure A- 6 – Selecting the main TRICS® location types to include .....	59
Figure A- 7 – Selecting the required population ranges within 1 mile and 5 miles radii .....	60
Figure A- 8 – The Progress Checklist at the stage where trip rate calculations can be undertaken .....	60
Figure A- 9 – The TRICS® Filtering Summary .....	61
Figure A- 10 – The List of selected sites within the trip rate calculation process .....	62
Figure A- 11 – The List of selected surveys within the trip rate calculation process .....	62
Figure A- 12 – The trip rate calculation results table .....	63
Figure A- 13 – The rank order list table for 0800-0900 by departures.....	64

## 1. Overview

- 1.1. This TRICS® Good Practice Guide supersedes the 2016 version of this document. It is fully endorsed by TRICS Consortium Limited and its six Shareholders (Dorset Council, Kent County Council, East Sussex County Council, West Sussex County Council, Surrey County Council and Hampshire County Council).
- 1.2. The aim of this document is to provide guidance to users of TRICS® to encourage good practice when using the system, and to also provide guidance to parties tasked with auditing outputs produced by the system (which may appear in Transport Assessments or other documentation). Version 7.7.3 of the software (released in September 2020) has been used in all examples given within the document.
- 1.3. TRICS® is a very flexible system providing a large amount of survey data across a wide range of development types, therefore allowing great potential variation in the calculation of both vehicular and multi-modal trip rates. Therefore, it is quite possible that two users of the system, applying different filtering criteria and ranges to a task, may end up producing different results. This guide is intended to assist users in ensuring that correct procedures and understanding of the system are practised in the production of trip rate calculations, and is also intended to provide guidance to assist in the correct and thorough auditing of TRICS® data once it is received by third parties.
- 1.4. There are many areas within the system whereby careful selection criteria and ranges are important in achieving robust and reliable trip rates. This guidance is designed to assist users in this task.
- 1.5. The correct way to build a selection of surveys for the purposes of calculating trip rates is to decide initial inclusion criteria, and then filter the database using the various options provided by the system to provide a representative sample. The incorrect method is to produce trip rates to fit a pre-determined and preferred trip rate figure. This guidance, if followed correctly, will assist users in avoiding such incorrect, “pre-determined” methods.
- 1.6. Recipients of data generated by TRICS® need assurance that the data has been produced in accordance with the guidance contained within this document. Therefore, it is the responsibility of all TRICS® users to ensure that full details of how data was obtained, along with clear indications of what the data represents, are provided to data recipients. Additional assistance for auditors of reports where TRICS® data has been used can be found within Section 22 of this document.
- 1.7. The principles covered in this guide apply to both traffic surveys and multi-modal surveys. It should be noted that multi-modal surveys were first introduced into the database in 2000, whilst traffic-only surveys were present from the very first versions of the database. Both traffic and multi-modal surveys are regularly added to the database through annual data collection programmes.
- 1.8. Previous versions of this guidance have been widely used to reinforce data produced in accordance with the methods contained within this document. In cases of dispute, such as when conflicting sets of results are presented at Public Inquiries, it has often been the Good Practice Guide which has influenced Inspectors in their decision making.

## 2. Using the most up to date version of TRICS and archived versions

- 2.1. TRICS® software and database updates are issued on a quarterly basis, these usually being in March, July, September, and December. New survey data is usually added to the database in each quarter, with new system features also added in quarterly updates as and when they are developed. The current series of TRICS® versions is Series 7. During 2020 there were four scheduled releases, these being 7.7.1 in March, 7.7.2 in July, 7.7.3 in September, and 7.7.4 in December.
- 2.2. There is no set rule against using an earlier version of the system. However, users should always aim to use the most up to date version wherever possible. The version in use is indicated by the issue number, which is always present on the Homescreen of the system. With quarterly system updates new data is added to the database and, from time to time, some survey sites are removed from the database due to issues with their data, whilst others may be relocated from one land use sub-category to another (due to re-classification), and others may have some of their data corrected. All instances of deleted, corrected and relocated survey sites are stated within the list of new sites document for each quarterly system release, and these are available as PDF's in the Library module of TRICS® (accessible via the "Library" icon at the top of all system screens). Users can often use the current up-to-date version of TRICS® to audit data supplied using an earlier version; it is only necessary to use an archived, older version of the system should there have been any changes made to the database that may have affected the selected set of survey sites being audited.



Figure 1 – Extract of TRICS system information showing TRICS version number

- 2.3. When using TRICS® online, users will by default always be operating the most up-to-date version of the system. However, users may on occasion require the use of an older version of TRICS® to audit trip rate calculations produced using a previous version of the system. This can be done by downloading an older version via the TRICS® software archive (which is accessible once logged in to the Members Area at [www.trics.org](http://www.trics.org). Section 21 provides further detail about the auditing of TRICS® data. If using older versions of the system, users should take care to ensure that there are no issues relating to survey sites that have subsequently been moved, amended or deleted (see 2.2), as the inclusion of such data could render the trip rate results unreliable and open to potential challenge.
- 2.4. In instances where there is a conflict between two sets of TRICS® results, data that has been produced whilst adhering to the Good Practice Guide will be considered more representative and robust. This takes precedence over the actual version of the system being used. If in such a conflict both users have adhered to this guidance, then a further analysis of each method used to obtain the sets of results should be undertaken, following the principles contained within this guide, with the appropriate professional judgement applied thereafter.

### 3. Understanding Land Use Definitions

- 3.1. Within TRICS® version 7.7.3 (issued in September 2020) there were 121 land use sub-categories, all of which are defined within the Help section of the system, accessible by clicking on the Help icon at the top of all TRICS® system screens.

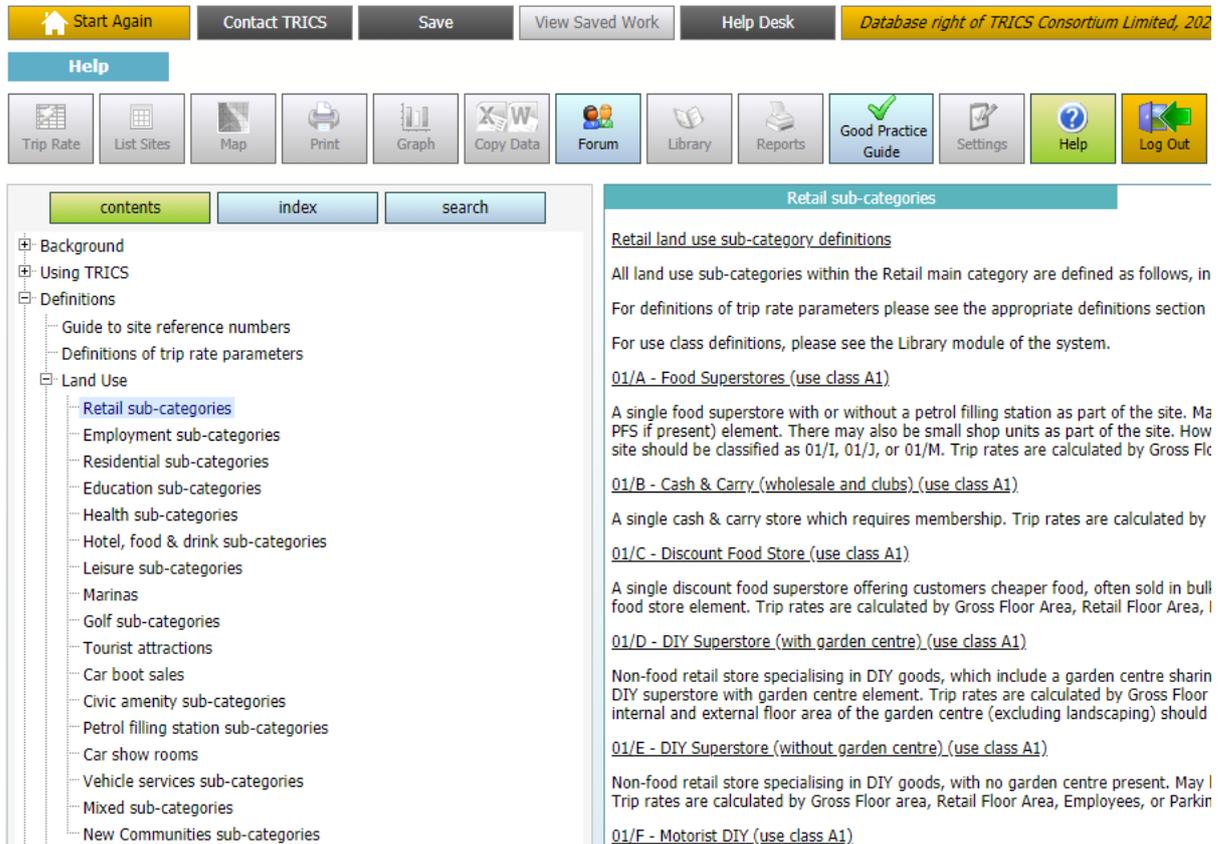


Figure 2 – Extract of Help section showing land use type definitions

- 3.2. It is vital that users undertake trip rate calculations using land use sub-categories appropriate to their individual development scenarios. For example, a DIY Superstore is not compatible with a Builders Merchant site in TRICS® (and there are countless other examples). For more obscure development types users need to proceed with a greater degree of caution. The Miscellaneous category (16/A in the database) contains all sites that do not fit into any other specific sub-category. It is within the Miscellaneous sub-category that users should search if they are unable to find a suitable site in any other sub-category. However, there is no guarantee that users will find the type of development they are looking for. Also note that due to the mixed and varying nature of developments within this sub-category, trip rates cannot be calculated for 16/A Miscellaneous sites.

## 4. Site selection by Region, Location Type and other data fields

- 4.1. The issue of survey sites within the TRICS® database being included/excluded by specific regions has often been raised by users. This has led to TRICS® undertaking comparative research into trip rates split by region and by main TRICS® location type. This research was undertaken in two stages, with vehicular trip rate variation assessed in 2019, followed by an assessment of multi-modal trip rate variation in 2020. In both cases, key land use sub-categories were studied, these being 01/A (Food Superstore), 02/A (Office) and 03/A (Houses Privately Owned), with the aim of this research being to establish whether region or TRICS® location type produced any patterns of significant trip rate variation. The initial report on the vehicular analysis is available for download in the Library module of the TRICS® system. It is called *"A Comparison of Vehicular Trip Rate Variation by TRICS® Regions and Location Types – Technical Note"*. The second report, covering the multi-modal analysis, will soon also be made available within the Library module, and the subsequent version of the Good Practice Guide will be updated accordingly.
- 4.2. In both stages of the vehicular research, trip rates were calculated per 100m<sup>2</sup> of Gross Floor Area (for the Food Superstore and Office land use sub-categories) and per 1 dwelling for the Houses Privately Owned sub-category, with arrival, departure and total peak periods and full survey duration periods being covered. The percentages of trip rate variance were then calculated for each regional or location type grouping compared to trip rates for all survey sites in the sample used for each land use sub-category, and a system of rankings showed how the groupings compared to each other across the land uses, to see if any significant patterns emerged. It was from the presentation of sets of tables displaying these results that our conclusions were drawn.
- 4.3. The vehicular analysis by region revealed no evidence of any clear, consistent pattern of vehicular trip rate variation, with any variation appearing to fluctuate randomly throughout. If there had been a clear basis for overall trip rate variation by region alone, then we would have seen certain regions ranking consistently lower or higher than others, but our study did not find this. Our conclusion from this is that a considerable number of other factors are influencing trip generation to a significantly greater degree than region alone.
- 4.4. On the other hand, the vehicular analysis by location type did show an overall structured and consistent variation in trip rates. The ranked comparison of TRICS® location types showed the Edge of Town category ranking mostly at the top in terms of trip rates, with the Town Centre/Edge of Town Centre grouping of categories ranking mostly at the bottom. This suggests that, although there are of course numerous factors that can influence trip generation, TRICS® location type is certainly an important one of these.
- 4.5. Therefore, our vehicular study revealed that there is a significantly higher correlation between location type and vehicular trip rates than there is between region and vehicular trip rates, with location type clearly showing a greater level of consistency and a clear, emerging pattern, compared to the apparent randomness of fluctuations when trip rates are split by region. Our subsequent multi-modal study, following the same structure of analysis as the vehicular study, found similar conclusions, and upon publication of the multi-modal technical note this guidance will be further updated accordingly. Therefore, our current guidance is that regional selection should not be a major consideration when applying trip rate calculation filtering criteria, whilst TRICS® location type appears to be one of the most influential factors in terms of trip generation, and therefore should be one of the main filtering considerations.

- 4.6. Bearing in mind the results of our research, with hard data now being available, it is not considered good practice to exclude survey sites within the TRICS® database on the sole basis of such sites being located within any particular region. We consider that a more robust use of the TRICS® filtering process takes place on a case-by-case basis, taking into account the numerous factors that can influence trip generation, with the TRICS® location type being at the forefront of these.
- 4.7. There are clearly some extreme exceptions to the above. For example, trip rates generated from a development within a major city centre would probably be somewhat different to those generated from the Shetland Islands, for obvious reasons. But if all local potential influencing factors are carefully considered, especially the TRICS® location type, there is no obvious reason why some trip rates generated from a site within, say, Glasgow, would not apply to a similar development within, for example, Greater Manchester. Similarly, some development scenarios in parts of London may be compatible in terms of trip generation with sites in other large cities. However, the importance of compatibility in terms of local population, vehicle ownership, location type, etc. cannot be stressed enough. It is within development data of individual TRICS® survey sites, through the use of the filtering process, where true potential compatibility should be established, rather than applying an automatic exclusion of certain regions, which could unnecessarily remove many actually compatible sites from a user's selected dataset.
- 4.8. Care should also be taken to ensure that data fields used in site selection filtering are relevant to each individual case. For example, using average levels of car ownership within a 5-mile radius of a development as a criteria in the filtering process would be more appropriate for a land use sub-category such as a food superstore than it would be for a residential development. For the latter, average car ownership per household within a 5-mile radius would probably not be as an effective or relevant a filter, as it is the car ownership level of the households within the particular residential development scenario that we would be interested in, and not that of the greater surrounding area. This and other factors including, for example, demographic considerations (amongst other things), when appropriate, should also be considered when deciding on the filtering criteria that is to be used, so that justification can be readily provided for each element of the database filtering criteria should it be required at any point. Therefore, users should always take care to ensure that each instance of filtering by TRICS® database field can be justified in the context of the type of development being analysed.
- 4.9. A specific example where the correct filtering of a TRICS® database field is essential is when dealing with food superstore sites with or without petrol filling stations included in the survey count. If a proposed development is to include a PFS, then this should be reflected by the exclusion of sites within the database that do not include a PFS in their survey counts. Similarly, if a proposed development is not to include a PFS, then filtering should ensure that stores with a PFS included in their survey counts are excluded. This approach is necessary as surveys at food superstores with a PFS also record trips to the PFS only, in addition to trips to the store only and trips that take in both the store and the PFS in the same visit. It should be noted that individual TRICS® surveys at food superstores do not break down counts into trips to the PFS only, trips to the store only, or trips that include a visit to both the PFS and the store, with only the total trips in and out of the site as a whole being represented.
- 4.10. As discussed above, we consider the TRICS® main location type to be one of the most important data fields in terms of site selection compatibility. It is reasonable to suggest that developments located in a town or city centre, with good local public transport accessibility will, as a general rule, achieve a different type of modal split to a similar development located in the countryside

without local public transport accessibility. Mixing sites which are clearly incompatible in a dataset for trip rate calculations could potentially lead to misleading trip rates being generated. A general guide to compatibility by TRICS® main location category is shown in the table below.

Location Type	Town Centre	Edge of Town Centre	Suburban Area	Edge of Town	Neighbourhood Centre	Free Standing
Town Centre	-	Possibly compatible	Not compatible	Not compatible	Not compatible	Not compatible
Edge of Town Centre	Possibly compatible	-	Possibly compatible	Possibly compatible	Not compatible	Not compatible
Suburban Area	Not compatible	Possibly compatible	-	Possibly compatible	Possibly compatible	Not compatible
Edge of Town	Not compatible	Possibly compatible	Possibly compatible	-	Possibly compatible	Possibly compatible
Neighbourhood Centre	Not compatible	Not compatible	Possibly compatible	Possibly compatible	-	Not compatible
Free Standing	Not compatible	Not compatible	Not compatible	Possibly compatible	Not compatible	-

Table 1 – General guide to site compatibility by Main Location type

- 4.11. Clearly there would be many potential “borderline” cases where compatibility between two or more different main location types might be possible. Therefore, **Table 1** is not necessarily to be taken as an absolute table of rigid compatibility covering all cases. For example, a town or city centre may be very close to the town or city’s actual physical edge. Also, if you look at the “Suburban Area” category, which can include sites both in quiet residential areas a significant distance from a town/city centre, and sites within busy built-up areas just outside the edge of a town/city centre, you will see how wide-ranging this main location type can be (see **Figure 4**). To assist users in addressing these issues, and to provide greater clarity on location types on a site-by-site basis, in December 2007 additional location sub-categories were introduced, and the entire TRICS® database reviewed as a result. Users are now encouraged to examine both the main location and sub-location categories to identify compatibility of sites to be included in their selected datasets. We consider the best approach is to examine the location of the development scenario, and then combine this with an examination of compatibility through the TRICS® location type definitions. A full definition of location types and sub-types is accessible by clicking on the “Definitions” button next to the Location indicator on the Site Details screen of an individual TRICS® site record.
- 4.12. In the first instance, it is recommended that users include sites across location types that are possibly compatible, and then examine the individual site locations in more detail using facilities such as Google Maps, before refining the dataset further if necessary using their professional judgement.

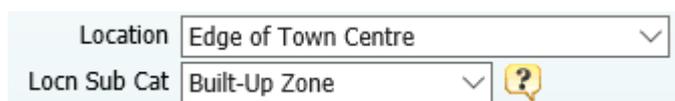


Figure 3 – Location fields and definitions button within a Site Details screen



### TRICS® LOCATION DEFINITIONS – DECEMBER 2008

NOTE: Individual development sites within the TRICS® database are allocated location categories (and sub-categories if applicable) on a site-by-site basis, at the discretion of the TRICS® system development team. If there is no significant predominance of local features that places a site within an appropriate location sub-category, the selection of “No sub-category” is displayed.

#### Main Location: Town Centre

Within the central core area of the heart of the town/city (e.g. the primary shopping area), as defined in the local development plan (if appropriate).

Figure 4 – TRICS Main Location definitions

- 4.13. There will be instances where the main location type mix within a selected set of surveys will not be considered compatible. For example, a mix of sites containing both “Town Centre” and “Free Standing (out of town)” main location types will most likely produce misleading and unrepresentative trip rate results for a development assessment. If a mix of main location types is used (see [Table 1](#)), it is the responsibility of the user generating the trip rates to ensure that justification for the inclusion of the mix is provided. This can include geographical location evidence, such as maps, etc.
- 4.14. Users should note that there is no compatibility matrix for location sub-categories, as they are sub-sets which fall within the overall location type. However, users should consider the relevance of these sub-categories when selecting surveys and use their professional judgement accordingly.

## 5. The Use of Comment Boxes

- 5.1. Within individual TRICS® sites there is a wide variety of information available, assisting users in the site selection process. Additional descriptive information is also displayed within comment boxes, containing further site, development, parking, and survey count details, which supplement the fixed data fields. This additional information is often important for a more complete understanding of a development in the database, so users should be encouraged to study comments, as such additional information may assist in determining the compatibility of a site with a user’s development assessment scenario.
- 5.2. TRICS® Research Report 99/2 (*“Research into Trip Rate Variation” by Harrison Webb*) analysed variations in trip rates at retail stores, taking into account factors such as consumer expenditure, time series analysis, and the analysis of parking supply and peak demand. These are just a few examples of some of the numerous additional factors which may affect trip rates, that fall outside the data fields and calculation processes of the TRICS® database. A more recent piece of research, *Research Report 09/1 (“An econometric study of the relationship between land use and vehicle trip generations” by David Broadstock)* examined economic and demographic influences, which again exist outside of the database and operations of TRICS®.
- 5.3. Comment box information is only visible within individual site, development, parking, travel plan, and survey day screens. Comment boxes are not used in the site selection filtering process, or at any other point within the system, being purely descriptive data fields. If full individual site information is output to a PDF document, all comment box information will be automatically included. Recipients of TRICS® trip generation results, if suspecting that a particular site may not be compatible with the development scenario being assessed, should ask the user who supplied the results to provide this further level of individual site detail, so that the comment information can be examined. Therefore, it is in the user’s interest to ensure that comment boxes are examined before sites are included in a selected set for calculation. This may not be practical when dealing with very large sets of surveys, but when it comes to smaller data sets it is highly recommended, as it could help in avoiding any potential conflict at a later stage.

Population within 1 mile	5,001 to 10,000	<b>Comment</b> This site is located in the village of Bracklesham Bay, which is to the south-west of Chichester and west of Bognor Regis on the south coast. The site is the northern part of the village, with the B2198 Bracklesham Lane to the west, which runs south towards the coast and north via the village of Somerley. The site has a single vehicle access for all modes. To the east of the site is open land, with a holiday (caravan) park to the north and residential areas to the west and south. The events venue of Bracklesham Barn is also just to the south of the site.
Population within 5 miles	25,001 to 50,000	
Population within 500m	2200	
Car ownership (5 miles)	1.1 to 1.5	
Is the location of the site hilly or flat	Flat	

Figure 5 – Comment Boxes are present within individual site records

## 6. Understanding Trip Rate Calculation Parameter Definitions

- 6.1. Trip rates can be calculated using a variety of data fields, known as trip rate calculation parameters, and it is important that users understand the definitions of the various parameters available. A full list of parameter definitions is available within the Help module, which users can access by clicking on the Help icon whenever using the system.

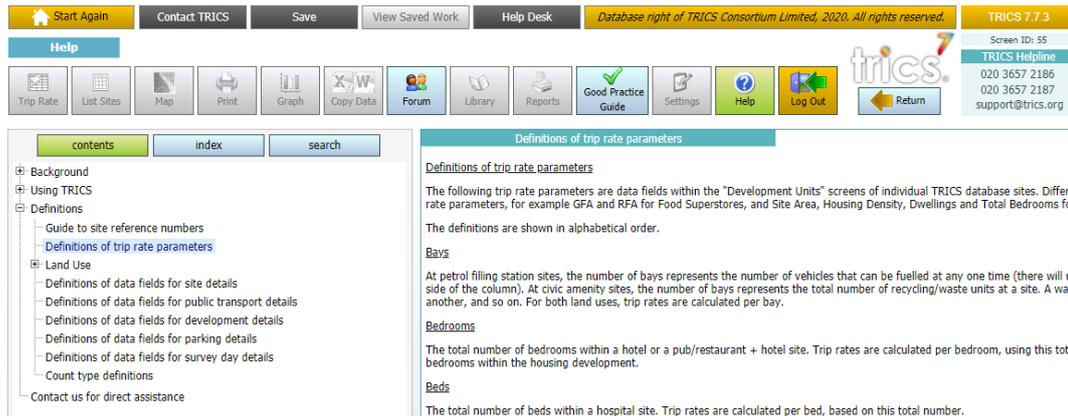


Figure 6 – Definitions of all trip rate parameters can be easily found

6.2. Users should also understand the trip rate calculation factor, which is always displayed at the top left hand corner of the trip rate calculation results screen (see Figure 7). In the case of Gross Floor Area (GFA), the calculation factor is always 100m<sup>2</sup>, so all trip rates produced by the system using this calculation parameter are represented as trip rates per 100m<sup>2</sup> of GFA. For trip rates calculated by Employees, the factor is trips per Employee, for Dwellings it is trips per Dwelling, and for Site Area it is trips per Hectare. It is important that this is understood by the user and incorporated into the results presented to the recipient of trip generation outputs. For example, a GFA trip rate of 35.78 should be presented as “35.78 trips per 100m<sup>2</sup> of GFA”, along with information on the time period, the count type and the trip direction (i.e. arrivals, departures or total), so that the results can be fully understood. Section 21 provides more detail regarding the correct presentation of TRICS® data.

TRIP RATE VALUE PER 100 SQM	ARRIVALS			DEI	
	Total rate: 61.997 Peak: 12:00-13:00			Total rate: Peak:	
	No. Days	Ave. GFA	Trip Rate	No. Days	
00:00-01:00					
01:00-02:00					
02:00-03:00					
03:00-04:00					
04:00-05:00					
05:00-06:00	1	10000	0.170	1	
06:00-07:00	4	7647	0.781	4	
07:00-08:00	15	6889	1.395	15	
08:00-09:00	15	6889	2.710	15	
09:00-10:00	15	6889	4.274	15	
10:00-11:00	15	6889	5.540	15	
11:00-12:00	15	6889	5.926	15	

Figure 7 – The trip rate calculation factor is always displayed (top left)

6.3. More recent sites within the database (for the relevant land use sub-categories) include a “GFA Not in Use” figure, which represents GFA as defined within the TRICS® Help section that was not in use at the time the survey was undertaken. Older data within TRICS® does not display this figure. Where the “GFA Not in Use” figure is known, users have the option to include or exclude the figure from the total GFA used in trip rate calculations. Users should note that with older data, any obvious GFA not in use was identified and excluded wherever possible. Users should always make it clear in their reports whether “GFA Not in Use” has been excluded through

TRICS® Settings (accessed via the Settings icon at the top of the screen). More detail on how GFA is defined in TRICS® is provided in [Section 7](#).

## **7. How TRICS Defines Gross Floor Area (GFA)**

- 7.1. One of the most often used trip rate calculation parameters within the TRICS® system is Gross Floor Area (GFA), which is represented in square metres. It is an option for trip rate calculation across a wide variety of land use sub-categories within the database, and as discussed in Section 6 of this guide, trip rates calculated by GFA are displayed per 100m<sup>2</sup> by default in results tables.
- 7.2. It is important for users to understand how TRICS® defines GFA. The TRICS® definition is long established and is independent, in that it may not follow the definition of GFA provided by any other organisation (and there are multiple definitions available). It is also important to understand some slight variations of the definition of GFA within TRICS® for certain land use sub-categories. The main definition of GFA, as provided in the TRICS® Help module, is the total internal floor area of all floors within a site's building (or buildings), including any mezzanine floors. Internal floor areas will include all areas accessible to staff and visitors (for example office space, canteens, storage areas, toilets, etc), but will exclude service areas (for example lift shafts, stairwells, plant and visitor car parks etc).
- 7.3. For the 01/H (Garden Centre), 01/L (Builders Merchant) and 01/S (Mixed Bargain Retail Unit) land use sub-categories, the GFA will also include external areas of developments, excluding landscaping and parking. So, any outdoor sales, storage, or other active external areas (following the general definition outlined in [7.2](#)) will be included in the total GFA figure. This will also apply to garden centres should they be included within a DIY Superstore (land use sub-category 01/D). And this will also apply to garden centres, builders merchants and mixed bargain retail units should they be part of a Retail Park site (land use sub-categories 01/J and 01/K).
- 7.4. For the 02/E (Warehousing – Self Storage) and 02/F (Warehousing – Commercial) land use sub-categories, the GFA will also include external storage areas. So, any external areas of such developments that are used for external storage (i.e. outside of the main building or buildings), following the general definition outlined in [7.2](#), will be included in the total GFA figure. This will also apply to warehouse units should they be included within a Business Park (land use sub-category 02/B), or within an Industrial Estate (land use sub-category 02/D).
- 7.5. For the 14/A (Car Show Room) land use sub-category, the GFA will also include external sales areas. So, any external areas of such developments that are used to display vehicles for sale, following the general definition outlined in [7.2](#), will be included in the total GFA figure. This will also apply to car show rooms should they be included within a Business Park (land use sub-category 02/B), or within an industrial estate (land use sub-category 02/D).
- 7.6. When assessing development scenarios that include a development's GFA, TRICS® users should always be aware of the TRICS® GFA definition, if applicable including the exceptions outlined above. So, in examining development proposal site plans, care should be given with regards to what is included and not included in a site's GFA within TRICS® development data. A planning application may provide a GFA for a development, but that definition may not be the same as the TRICS® definition which the data within the database is based upon. This means that in some cases, reasonable adjustments to a proposed development's GFA figure may be necessary prior to undertaking TRICS® trip generation calculations, should the definitions of GFA differ.

Any such adjustments should be presented within reports written by the user to avoid any potential misunderstandings.

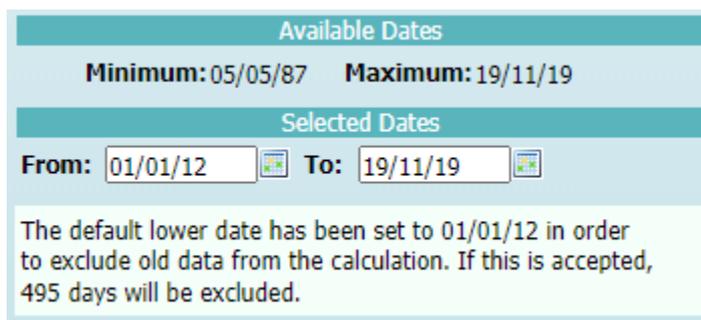
## 8. The Method of TRICS Trip Rate Calculations

- 8.1. The TRICS® method used to generate trip rates is consistent for all land use sub-categories within the database. It is a method that has been assessed and considered to be statistically robust, and users should become familiar with it, so that the process of TRICS® calculations can be fully understood.
- 8.2. TRICS® can calculate trip rates for an individual survey or can calculate the mean average trip rates for any number of surveys within a single land use sub-category. Mean average trip rates are calculated where there are at least two surveys included in a set as selected by a user. The method of calculation can be broken down into three stages, which apply to each survey count period and each direction (arrivals, departures, and totals).
- 8.3. The first stage of the process is obtaining mean trip rate parameter figures. For any individual survey period and direction (for example Arrivals 0800-0900), all surveys in the selected set that have count data present are included. Using Gross Floor Area (GFA) as an example of the selected trip rate calculation parameter, the system adds the GFA figures for each included development, and then divides the result by the number of included surveys, the end result being the mean trip rate parameter figure (*mTRP*).
- 8.4. The second stage of the process is obtaining mean survey count figures. Again, this applies to all survey periods and directions, and all surveys in the selected set that have count data present are included. Again using the example of the Arrivals 0800-0900 count, and in this example looking at the Total Vehicles count type, the system adds the Arrivals Total Vehicles 0800-0900 counts for each included survey, and then divides the result by the number of included surveys, the end result being the mean arrivals count figure (*mARR*).
- 8.5. The third stage of the process is the final calculation that provides the trip rate generation results. Using the mean trip rate parameter figure *mTRP* (see 8.3), and the mean arrivals survey count figure *mARR* (see 8.4), the calculation  $(mARR/mTRP) \times 100$  is undertaken. Note that because GFA is used in this example the calculation factor of 100 has been used, as trip rates by GFA are always represented in TRICS® per 100m<sup>2</sup>. For a different calculation parameter, for example Dwellings, the trip rates would be displayed per dwelling, and therefore the calculation simply be  $mARR/mTRP$ . The calculation is undertaken for all time periods and directions, which is presented in the trip rate calculation results table.
- 8.6. It is important to note that mean average trip rates for a group of selected surveys should only be presented as having been generated using TRICS® if they have been taken directly from the trip rate calculation results table using the standard TRICS® method detailed above. TRICS® does not endorse any other method of obtaining mean average trip generation rates other than the standard method specified in this section. For example, users might decide to take a TRICS® rank order list, which displays non-averaged trip rates by individual survey, ranked in relative order of trip rate intensity, and then manually calculate a mean average of the trip rates in this list. In such a case, the resulting figures would not have been generated by TRICS®, as the data would have been manipulated by the user outside the processes of the TRICS® system. It is the clear position of TRICS® that if its trip rate generation results are manipulated in any way by a user outside of the standard calculation process, then the figures resulting from this

manipulation cannot be stated as having been generated by TRICS®. Therefore, any such manipulation should be made very clear in any subsequent reporting, as should the fact that the resulting figures have not been derived using TRICS®. Organisations tasked with auditing TRICS® trip rate calculation results are encouraged to assess whether the TRICS® method of calculation outlined in this section has been correctly applied.

## 9. Using Older TRICS Data

- 9.1. TRICS® contains survey data from as far back as the 1980's to the present day, with a large data collection programme undertaken every year. There are currently over 8,000 survey days in the database. Users should note that within the trip rate calculation filtering process some survey days will be automatically excluded by default from the selected set by a minimum date cut-off, although this can be adjusted by users.
- 9.2. The default minimum survey date cut-off is set to the 1<sup>st</sup> of January, 8 years prior to the release year of the latest version of TRICS®. For example, TRICS® version 7.7.3, which went live in September 2020, had a cut-off default of 01/01/2012. The minimum cut-off date can be amended by users to any required date. The 8-year default is particularly helpful in assisting TRICS® system developers in determining future data collection programmes.



The screenshot shows a dialog box with the following content:

**Available Dates**  
**Minimum: 05/05/87**    **Maximum: 19/11/19**

**Selected Dates**  
**From:**   **To:**

The default lower date has been set to 01/01/12 in order to exclude old data from the calculation. If this is accepted, 495 days will be excluded.

*Figure 8 – The minimum survey cut-off date is defaulted to 8 Years*

- 9.3. Although there is no fixed rule for amending the default survey date cut-off, TRICS® can provide some guidance on the use of older TRICS® data and trip generation trends over time to assist users in making informed professional judgements. The background to this guidance follows technical research into trip generation trends that was undertaken by TRICS® in 2019. This guidance, whilst not covering all development types, examined three key land use sub-categories, these being 01/A (Food Superstores), 02/A (Offices), and 03/A (Houses Privately Owned), across a timescale from 1989 until 2018, looking at trends over time in both vehicular and multi-modal contexts. The findings of this research were presented at the 2019 TRICS® User Meeting, and the PowerPoint presentation slides including text commentary can be freely downloaded from [www.trics.org](http://www.trics.org).
- 9.4. Without being too speculative, this limited analysis shows, for a small number of land use categories, a general apparent reduction in vehicular trips over time. This is also evident to a certain degree for total people trips, although these appear to be more dynamic, with individual modes showing more inconsistent trends. However, the research suggests an overall, general shift towards non-vehicular modes over time has taken place. Users should understand that this was just an initial, straightforward type of analysis, undertaken using TRICS® to calculate trip rates, and that any anomalies that may have appeared in the results could have been caused by

a variety of factors. But TRICS® considers that this research has been a worthwhile exercise that provides some interesting observations for discussion. What is clear from this exercise is that TRICS® needs to continue to undertake large numbers of surveys as we move forwards, as we look to continue to monitor trends over time. This technical analysis could be repeated at regular intervals in the future.

- 9.5. Users are encouraged to obtain a statistically sound survey sample without the need to amend the default survey date cut-off wherever possible. More recent data within the TRICS® database can be considered more representative of current trip generation levels when assessing a new development scenario, with older TRICS® data being more representative of historic trip generation levels. The technical research into trip generation trends over time was not exhaustive by development types, so the trends indicated in the results of this analysis would not necessarily apply to land use sub-categories that were not assessed. Trip rate variation over time may be lesser or greater for the land use sub-categories not covered by the research, and users are encouraged to examine historic trends within the database when it is felt appropriate. It is considered reasonable for users to extend the survey date cut-off to include older data in instances where a data sample may be considered too small with the default cut-off date in place. It is up to TRICS® users to decide on a case by case basis how to apply cut-off dates using professional judgement, and users are encouraged to state their reasons for amending the cut-off date within their reports.
- 9.6. Users applying any type of factoring to older TRICS® survey data should make this very clear when presenting their results, as post-factored data cannot be considered data generated by the TRICS® system. Data initially produced by TRICS®, prior to any factoring taking place, should be first presented (as TRICS® data), and then the factored data (with details of the factoring used and the reasoning for the factoring taking place) presented second. This will ensure that the recipient of reports including trip generation data is made aware of the trip generation has been produced by TRICS®, and any data that is a result of factoring. This practice is especially important so that data can be audited correctly by a third party (also using TRICS®).

## **10. Seasonal Trip Rate Variation**

- 10.1. For the use of TRICS® to be fully effective for a “typical peak day” development assessment scenario, users should, when selecting surveys through the trip rate calculation filtering process, aim to ensure that non-typical seasonal travel behaviour is avoided whenever practical and possible. For example, trip rates for a golf course in January will probably be lower than in August.
- 10.2. Research commissioned by TRICS®, entitled *“Seasonality Research Report – TRICS® Research Report 02/2”*, examined seasonal variation in detail, across a variety of different land use sub-categories. This report is available within the TRICS® Library module, but it should be considered in the context of the time when the report was written in 2002. TRICS® encourages users to examine seasonality of surveys within the database during the site selection process using their professional judgement, being aware that seasonal variations in trip generation will differ in scale for the many different development types available. Consideration should be given to seasonal variation in sets of surveys that have a large enough sample size to provide this level of filtering detail, as it is recognised that there will be instances where such fine tuning may not be possible (and in such cases this does not reduce the validity of the trip generation obtained through the use of TRICS®; the results would just need to be viewed in the context of the times of the year when the surveys in the selected set were undertaken).

- 10.3. It is considered good practice for users to always present survey dates for all sites used in the trip rate calculation process. This information is available within PDF and CSV outputs that are generated by users following the calculation of trip rates.

LIST OF SITES relevant to selection parameters

<p><b>1</b></p> <p><b>AD-01-C-01</b></p> <p>GREENWELL ROAD ABERDEEN EAST TULLOS IND. ESTATE Suburban Area (PPS6 Out of Centre) Industrial Zone Total Gross floor area: 1950 sqm Survey date: <b>MONDAY</b> 18/11/19</p>	<p><b>LIDL</b></p>	<p><b>ABERDEEN CITY</b></p> <p>Survey Type: <b>MANUAL</b></p>
<p><b>2</b></p> <p><b>AN-01-C-02</b></p> <p>BELFAST ROAD CARRICKFERGUS  Edge of Town Development Zone Total Gross floor area: 1325 sqm Survey date: <b>WEDNESDAY</b> 12/10/16</p>	<p><b>LIDL</b></p>	<p><b>ANTRIM</b></p> <p>Survey Type: <b>MANUAL</b></p>

Figure 9 – TRICS output (highlighting survey dates)

- 10.4. When examining a regular peak trip generation scenario, if there is sufficient survey data available within the selected land use category to avoid using survey dates outside what would be considered typical peak times of the year, such that removal of these days would not compromise the robustness and representative integrity of the remaining data set (see [Section 13](#)), then users could remove “out of season” survey days. Leaving such surveys in the selected set might be considered unnecessary in some situations, possibly leading to the generation of artificially low trip rates. If the inclusion of “out of season” survey days cannot be avoided, this should be made clear in reporting. On the other hand, users should also consider avoiding using “extraordinary peak” surveys (e.g. the days leading up to Christmas for food superstores), when attempting to provide data for more regular peak activity, as this might lead to the generation of artificially high trip rates. In either case, it should be made clear in reporting whenever survey data from “out of season” or “extraordinary peak” times has been included in a selected set.
- 10.5. If a user decides to include “out of season” survey data and then apply any factoring to the subsequent trip generation results, then it should be made clear in reporting which data has been produced using TRICS®, and which has been factored, as any factored results are no longer considered to be TRICS® data. This is particularly important for auditing purposes. Any factors used will need to be explained and justified, and it should also be made clear that the factoring process has taken place outside the processes of TRICS®. It is highly recommended in such cases where factoring does take place that the TRICS® results are displayed alongside any factored results for comparative purposes.

## 11. Peak Hours and Days

- 11.1. When presenting TRICS® data it is considered good practice to provide trip rate calculation results covering peak hours of activity alongside the generally accepted “road peak hours” (i.e. 0800-0900 weekday mornings and 1700-1800 weekday evenings). Given the wide range of development types within TRICS®, the actual site peak hours (for arrivals and departures) may not necessarily correspond with the road peaks. In cases where they do not, trip rates for both road peaks and site peaks should be supplied if requested by the data recipient. To cover both peaks, the supply of trip rate graphs is recommended. These can be accessed directly from the trip rates calculation results screen.

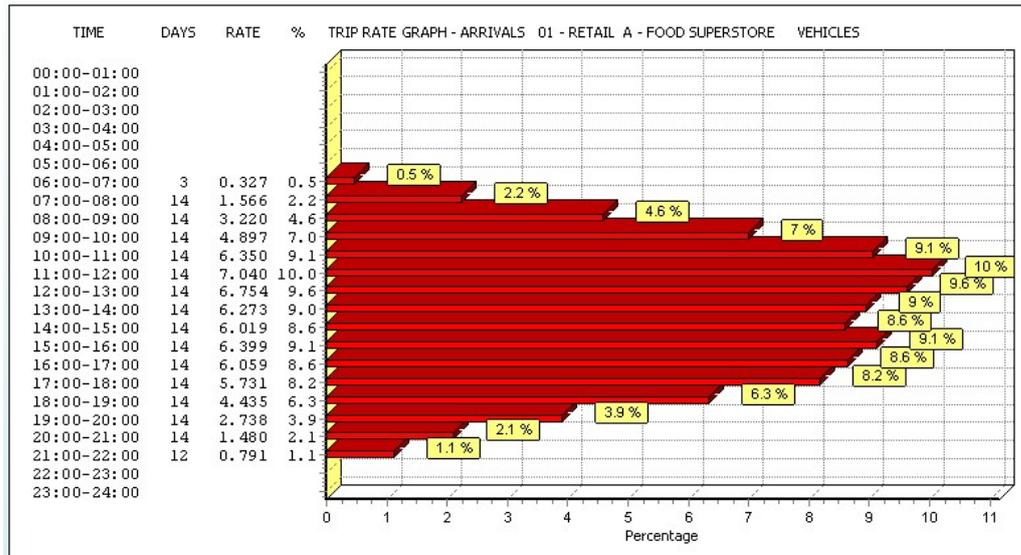


Figure 10 – Graphical display of trip rates showing peaks

- 11.2. When supplying peak trip rates, it should be made clear by the supplier whether the “peak” represents the road peak or the hour or other period of peak activity at the site (or selected set of sites). See Section 21 for further detail on how to correctly present TRICS® data.
- 11.3. The development peak trip rate hours are also displayed at the top of the trip rate calculation results screen, as shown in the example below. These are site peaks, the actual busiest time periods in terms of traffic/transport activity, rather than road peaks. By supplying the results table and accompanying trip rate graphs, all peak information can be supplied in full to the data recipient. The total trip rates are also shown in the example below – these are the trip rates for the whole survey period, not to be confused with peak hour trip rates.

TRIP RATE VALUE PER 100 SQM	ARRIVALS			DEPARTURES			TOTALS		
	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
	Total rate: <b>70.079</b>			Total rate: <b>70.119</b>			Total rate: <b>140.198</b>		
	Peak: 11:00-12:00			Peak: 12:00-13:00			Peak: 12:00-13:00		
00:00-01:00									
01:00-02:00									
02:00-03:00									
03:00-04:00									
04:00-05:00									
05:00-06:00									
06:00-07:00	3	6734	0.327	3	6734	0.030	3	6734	0.357
07:00-08:00	14	5874	1.566	14	5874	1.041	14	5874	2.607
08:00-09:00	14	5874	2.220	14	5874	2.402	14	5874	5.622

Figure 11 – Trip rate calculation results table

- 11.4. A visual example of the range of peaks and the fluctuation of trip generation across a range of selected sites can be found when viewing the “Survey Selection” option within the trip rate calculation process and then clicking on the “Graph” icon. A line graph that plots and compares each individual site in a user’s selected set is then displayed, with time shown on the x-axis and vehicular trip rates shown on the y-axis. This provides an excellent example of the range of trip rates that TRICS® generates within a selected set of surveys, with the individual survey peaks throughout the day clearly identified. This emphasises that TRICS® is not intended to provide an

exact “prediction” of trip rates for any given scenario. Instead this clearly demonstrates that TRICS® provides a range that users can work with, something very important that users should understand. TRICS® provides an average (mean) set of trip rate calculations in its results tables (with an example given in *Figure 11*), but it is often the case that a wide range of trip generation rates on a site by site basis have been used to get to the figures shown. As well as the line graph displaying this phenomenon quite clearly, users can see this effect in other representations such as within rank order lists and rank order scatterplot diagrams.

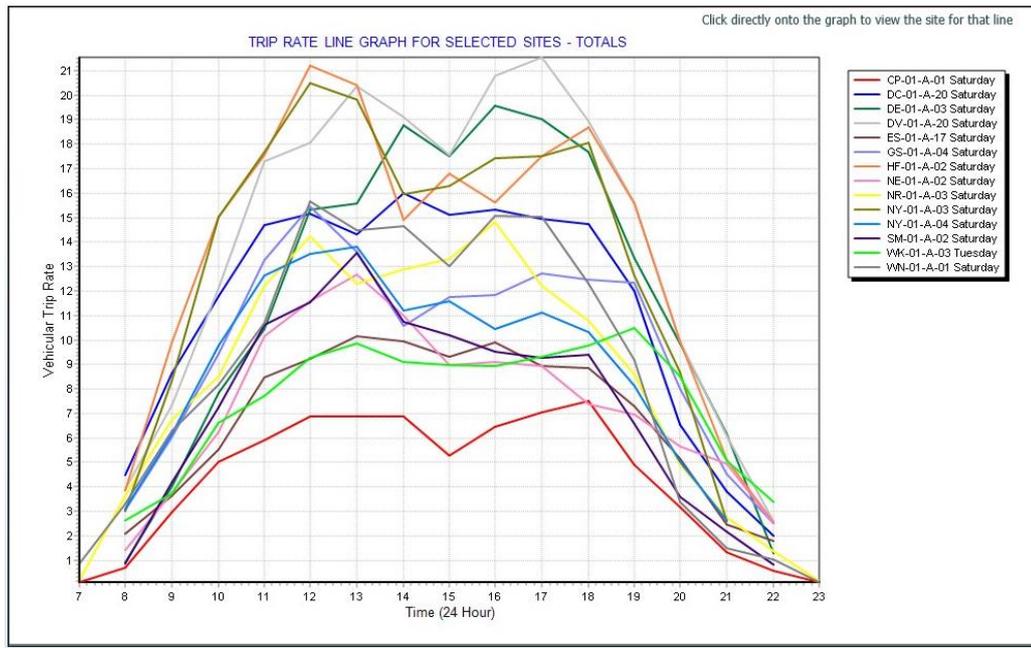


Figure 12 – Comparative survey trip rate graph for multiple sites

- 11.5. Users should not mix weekday and weekend surveys together in a selected set for trip rate calculation, as the profiles of travel during the week compared with weekends typically differ to a considerable degree; by mixing weekdays and weekends together a “hybrid” profile would emerge, which is not representative of any day, and is something that could lead to artificially inflated trip rates (see 11.7). For this reason, the day of the week for each survey included should be included in trip generation reports, in summary form or in an appendix. In TRICS® outputs such information is included by default, with an example shown in *Figure 13*.

LIST OF SITES relevant to selection parameters

<p><b>1 CV-01-A-01</b></p> <p>THOMAS STREET BAILIEBOROUGH BECKSCOURT Edge of Town No Sub Category Total Gross floor area: 5000 sqm Survey date: SATURDAY 20/05/17</p>	<p><b>TESCO</b></p>	<p><b>CAVAN</b></p>	<p>Survey Type: MANUAL</p>
<p><b>2 DC-01-A-20</b></p> <p>DORCHESTER ROAD WEYMOUTH  Edge of Town No Sub Category Total Gross floor area: 5500 sqm Survey date: SATURDAY 29/03/14</p>	<p><b>MORRISONS</b></p>	<p><b>DORSET</b></p>	<p>Survey Type: MANUAL</p>

Figure 13 – TRICS output (highlighting survey days)

- 11.6. Some land use categories typically generate peak activity on specific days of the week. For example, offices tend to be consistent from Monday to Friday, whilst food superstores will generally peak at weekends. Therefore, for offices a data set covering a range of days from Monday to Friday would be fine, whilst for food superstores it would be considered good practice to provide trip rates for Fridays, then Saturdays, and finally Sundays. Of course, there may be a specific need for a certain day of the week to be examined, but for such cases it would also be good practice to present peak day trip rates alongside this when reporting.
- 11.7. The phenomenon of “double-peaking” can produce artificially high trip rates, which would be clearly misrepresentative. This can happen when weekdays are mixed with weekends in a selected survey set. For example, food superstores tend to display different peak activity times for Fridays than for Saturdays. Therefore, when combined, results would probably show higher total trip rates than if they had been calculated including just Fridays or Saturdays. This is because both peak periods (in this example typically mid to late afternoon on Fridays and late morning to early afternoon on Saturdays) would be incorrectly included together within the set of surveys, artificially inflating the overall trip generation calculated. An example of this phenomenon is illustrated in [Figure 14](#). In the first image the results shown are for Fridays, whilst in the second image the results are for Saturdays. The final image displays results for Fridays and Saturdays combined, showing double peaking occurring.

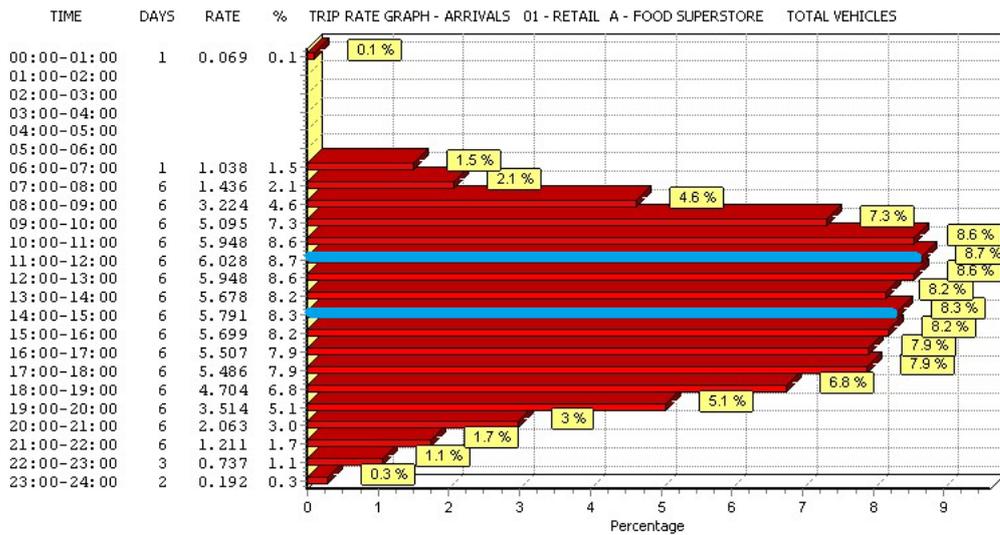
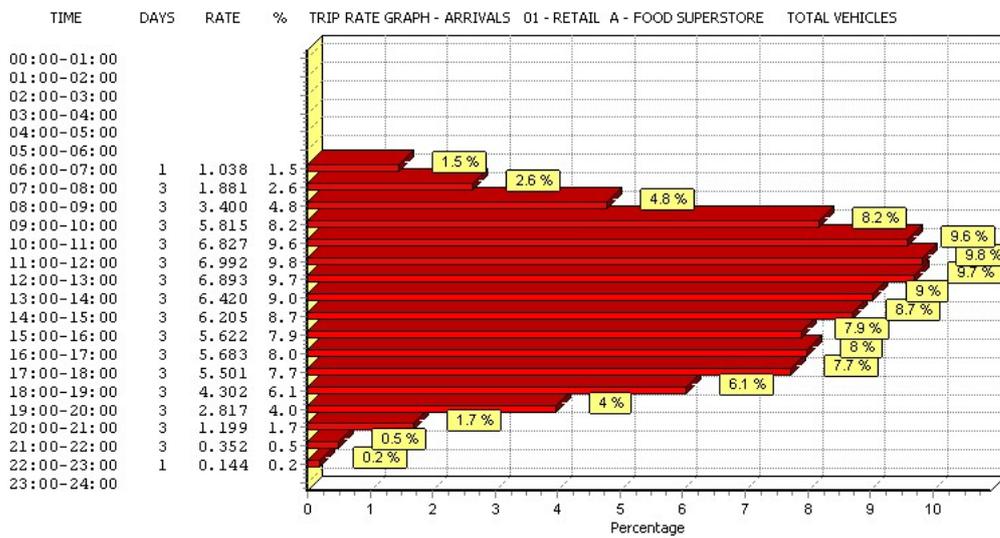
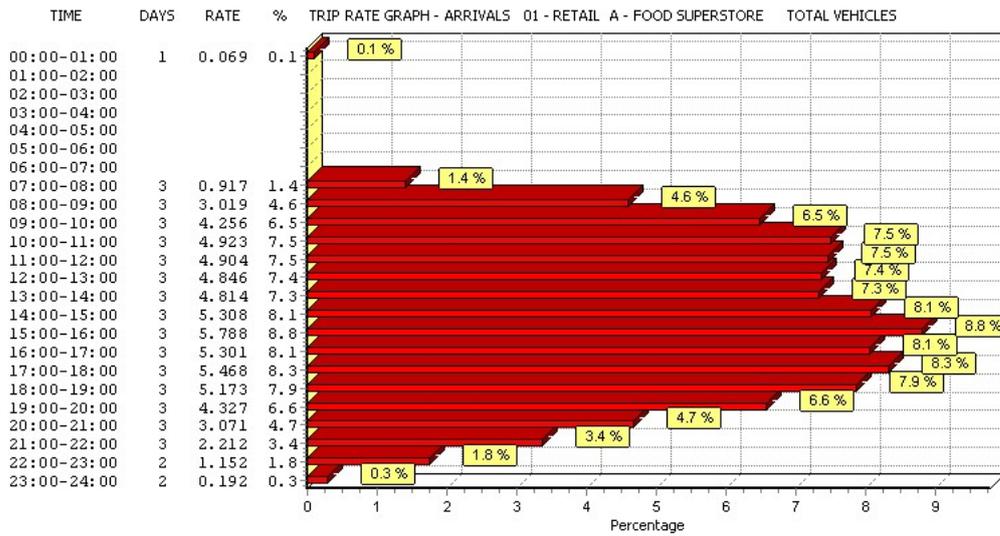


Figure 14 – Graphical display of trip rates showing “double peaking”

## **12. Avoiding the Production of Pre-Determined “Preferred” Trip Rates**

- 12.1. The correct procedure for filtering sites in TRICS® is to apply selection criteria to an initially complete set of surveys within an appropriate land use category. To produce reliable and robust trip rates users should always avoid attempting to “fit” trip rate results to pre-determined preferred levels by manipulating the system incorrectly. Such methods, constituting bad practice, can be identified by parties tasked with auditing TRICS® data, and careful examination of TRICS® outputs can expose such instances of system misuse. It is always recommended that recipients of TRICS® reports request full details of all selection processes used through the calculation process (should they not be evident in reports), which are produced by default in TRICS® outputs, so that any such misuse of the system can be identified.
- 12.2. The basic approach that TRICS® recommends is followed for producing trip rates is to first identify the acceptable criteria ranges for site selection, then filter the sites according to that criteria, and then produce the trip rates once filtering is complete. In terms of the initial filtering criteria, it is important that all parties involved in the assessment and audit of trip generation for any given project are engaged early on, so that this important stage in the process can be discussed and the inclusion criteria agreed upon. This approach can avoid potential disputes arising at a later stage concerning the appropriateness of individual TRICS® sites within a selected set of surveys, which can in turn avoid further work being required to resolve any such disputed situation.
- 12.3. If misuse of TRICS® has taken place to try and “fit” trip rate results to pre-determined preferred levels, this can often be identified through careful auditing and scrutiny of TRICS® reports and use of the system itself. For example, rank order list scatterplots display trip levels on a site by site basis (on the y axis) by trip rate parameter levels (on the x axis). By examining the positions in rank order scatterplot diagrams of sites provided by those who have produced and submitted trip rate reports, those auditing the results who have access to TRICS® can identify whether the sites included in selected sets are within an acceptable trip generation range, by undertaking a similar calculation exercise themselves and including sites meeting a reasonable criteria as a comparison). If significant differences are found that could indicate possible misuse of TRICS®, auditors should request an explanation from the provider of the original TRICS® reports.
- 12.4. A user might argue that a particular development is expected to generate unusually high or low trip rates, if there is evidence outside of TRICS® that supports such an assertion. However, it is the initially agreed selection criteria that should reflect any anticipated elements of the proposed development which may affect trip rates, and this criteria should be clearly understood by all parties involved in the process from the outset. It is important that once trip rates have been calculated, users should not make any further amendments to the selected set of surveys to try and influence subsequent results towards a pre-determined, preferred level.

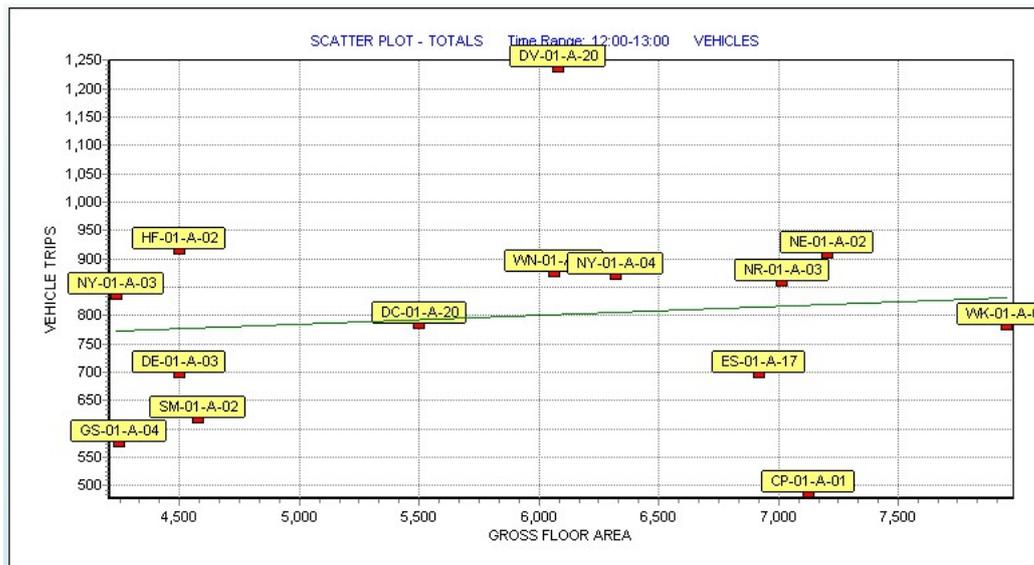


Figure 15 – Scatterplot diagram identifying low/high relative trip generation

12.5. Recipients of TRICS® reports can always request full details of how all trip rates have been calculated, including all selections made through the process. A handy quick-glance method of identifying a few of the selections made is the trip rate parameter summary, which is always present at the bottom of the trip rate calculation results table in PDF outputs generated by TRICS®. If this summary is not present in reports supplied then this can always be requested, since the summary must have been manually removed by the data supplier as it is included in TRICS® reports by default (and therefore such instances could potentially be causes for concern).

18:00 - 19:00	10	5650	4.078	10	5650	4.795	10	5650	8.873
19:00 - 20:00	10	5650	2.749	10	5650	3.250	10	5650	5.999
20:00 - 21:00	10	5650	1.579	10	5650	2.124	10	5650	3.703
21:00 - 22:00	10	5650	0.752	10	5650	1.087	10	5650	1.839
22:00 - 23:00	2	5780	0.493	2	5780	0.831	2	5780	1.324
23:00 - 24:00	1	4625	0.865	1	4625	1.038	1	4625	1.903
Total Rates:			68.167			68.315			136.482

**Parameter summary**

Trip rate parameter range selected: 4500 - 7200 (units: sqm)  
 Survey date date range: 01/01/12 - 11/03/20  
 Number of weekdays (Monday-Friday): 0  
 Number of Saturdays: 10  
 Number of Sundays: 0  
 Surveys automatically removed from selection: 0  
 Surveys manually removed from selection: 0

Figure 16 – Trip rate parameter summary

12.6. The trip rate parameter summary is not by any means the only method of tracking the selections made by TRICS® users, but it is nevertheless useful. The summary can raise questions relating to data robustness and representation, which should always be checked by the recipient of TRICS® reports whenever there is doubt as to the integrity of the process used to produce the trip rates supplied. It is the user’s responsibility to make clear that the procedures followed in producing the trip rates supplied are sound, and do not suggest any “fit” to pre-determined preferred trip rate levels. When in doubt, auditors of data should insist on a full trail of evidence, as discussed in [Section 21](#).

12.7. Those tasked with auditing and assessing TRICS® reports, who have access to the system themselves, also have the facility to directly recreate the user session of those who produced the trip rates in the report, using the system’s auditing facility. By default, whenever a trip

generation PDF output is created in TRICS®, a unique Calculation Reference code is produced, and this shown at the top right of the very first page of the output. Users should note that the version of TRICS® that was used to create the report is also displayed at the top left of each page. The Calculation Reference code can be used by auditors to recreate the original user session, by inputting the code into the “Audit Another TRICS User Session” box on the TRICS® system’s Homescreen. However, users should be aware that the same TRICS® version that was used to generate the original report must be used to audit it in this way. More detailed guidance on the use of the auditing facility is available as a technical note within the “Audit Another TRICS® User Session” area of the Homescreen. *Figure 17* provides an example of a Calculation Reference code on a TRICS® PDF output, and *Figure 18* shows the area on the TRICS® system Homescreen where this reference code can be input.

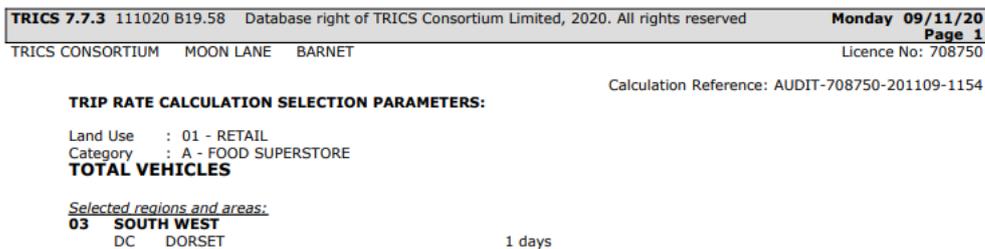


Figure 17 – Calculation Reference code on TRICS outputs

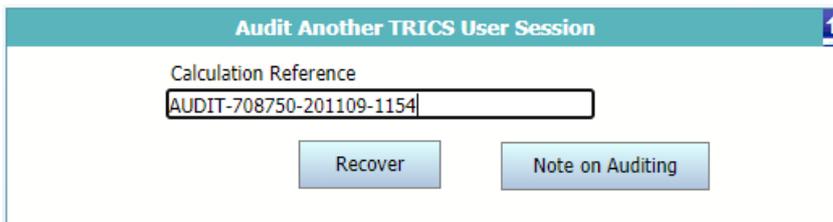


Figure 18 – “Audit Another TRICS User Session” box on the TRICS system Homescreen

- 12.8. At the time of writing this version of this document, TRICS® Consortium Limited was working with partners in looking at the concept of “Decide and Provide”, which is a revision of previous understandings of forecast scenarios. Part of the work on this undertaken by TRICS® was a study of trip generation trends over time, and preliminary results of our initial research can be found within the TRICS® Library module (see *“TRICS Guidance Note – Changes in Travel Behaviour – August 2019”*). Our initial analysis, using the TRICS® system, showed that for selected land use categories trip rates have been generally reducing over time, which is perhaps not something that many had envisaged. As work continues to progress in association with our partner organisations, the TRICS® Good Practice Guide will be further updated accordingly.

## 13. Representative Sample Sizes and Cross Testing

- 13.1. The TRICS® database contains a wide variety of different land use categories, each of which contains a set of survey sites. For some sub-categories, the set of available data is significantly larger than for others, often due to the variation of popularity between land uses and the time when new categories were introduced to the database and surveys commenced. Obtaining a representative sample of data for a trip rate calculation involves a balance between meeting a set of criteria for inclusion and the availability of surveys in the system.
- 13.2. The general approach for obtaining a representative sample of data is to include as many surveys as possible. But this should not compromise a user's inclusion criteria. Wherever possible, users should aim to use as stringent a set of criteria as possible that allows a representative, reasonable sample of surveys to be obtained. However, there are no fixed rules to this; the aim is to achieve a reasonable balance using professional judgement. It is considered better practice to have a lower yet practical number of surveys acceptable to the selection criteria than to have a larger data set that is not. In the latter case, there might be a higher risk of trip rates becoming misrepresentative when compared to the former case, due to inclusion criteria potentially being too relaxed. Because of the complex diversity of the database, it is impossible to suggest a fixed number of surveys that would work with every scenario. It is more important that users ensure that all sites selected are compatible with the appropriate criteria, that would preferably be agreed in advance by all parties involved in the process. Following this, trip rates can be scrutinised in the very first instance to check for weighting and bias in the average (mean) results using "cross testing" (see 13.8), with more detailed auditing following this. It is considered good practice that a more "inclusive" than "exclusive" approach to site filtering is applied, so long as search criteria are not compromised to a degree where results could be considered questionable. This is the important part. Users should be prepared to be flexible with their criteria, but not so much that the results could potentially be challenged.
- 13.3. If it becomes evident whilst auditing TRICS® reports (should those auditing them have direct access to TRICS®) that there are more sites within the database that match all relevant criteria for inclusion than those presented, the auditor should question the exclusion of sites. The opposite should apply if an auditor believes there are sites included in the selected set that should not have been. When there are such instances of doubt it is important that whoever has produced the report explains their reasoning through the processes of selection that were undertaken. Following this, if the auditor believes that the dataset should be amended, then this should be discussed between both parties and, upon agreement, a revised set of calculations generated.
- 13.4. If users are limited to data from one TRICS® site only, it should be made clear that this is the case. In such instances it is considered good practice to supply the full site, development and survey day details of the site used, so that recipients of the report generated are provided with a fuller understanding of this one individual site.
- 13.5. 15<sup>th</sup> and 85<sup>th</sup> percentile trip rates can be obtained using the rank order process. The method by which TRICS® identifies the 15<sup>th</sup> and 85<sup>th</sup> percentile surveys in the rank order list is simple and not mathematically complex. The surveys which are closest to 15 and 85 percent of the way down the list, which is ranked by relative trip rate intensity, are regarded as the 15<sup>th</sup> and 85<sup>th</sup> percentile surveys for the specified time period (or peak period per survey) selected by the user. It is recognised that there are varying opinions and policies when it comes to the applicability of 15<sup>th</sup> and 85<sup>th</sup> percentile trip rates, and TRICS® merely provides the facility to use this feature at the discretion of our users, applying their own professional judgement in all cases.

13.6. If a user wishes to produce 15<sup>th</sup> and 85<sup>th</sup> percentile trip rates, then TRICS® recommends that users have at least 20 surveys present in a rank order list before such trip rates are quoted in reports. A warning message to this effect is displayed in the rank order list screen whenever less than 20 surveys are included in the data set (this is based on the experience of the TRICS® management team). TRICS® does not recommend that 15<sup>th</sup> or 18<sup>th</sup> percentile trip rates based on under 20 surveys are quoted, so it is the user’s responsibility to provide evidence for the robustness of any figures quoted.

Rank order for: **No of Dwellings**  
 Calculated on: **TOTALS**  
 Time range: **08:00-09:00**

Total: 32    85<sup>th</sup> Percentile = no. 6    NF-03-A-06 Tot: 0.760  
 15<sup>th</sup> Percentile = no. 27    NE-03-A-02 Tot: 0.421

Median Values		Mean Values	
Arrivals	0.147	Arrivals	0.144
Departures	0.430	Departures	0.426
Totals	0.577	Totals	0.570

Rank	Site Ref	Description	Town/City	DWELLS	Day	Date	Arrivals	Departures	Totals	Parking Spaces Per Dwelling
1	TY-03-A-02	SEMI DETACHED & BUNGALC	COOKSTOWN	101	Thursday	14/03/19	0.208	0.713	0.921	4.19
2	AN-03-A-09	DETACHED & SEMI-DETACHE	CARRICKFERGUS	151	Wednesday	12/10/16	0.252	0.662	0.914	3.03
3	WC-03-A-01	DETACHED HOUSES	WICKLOW	50	Monday	28/05/18	0.300	0.600	0.900	3.60
4	DL-03-A-10	SEMI DETACHED & DETACHE	MALAHIDE	65	Wednesday	20/06/18	0.138	0.754	0.892	3.28
5	WA-03-A-04	DETACHED	WATERFORD	280	Tuesday	24/06/14	0.179	0.589	0.768	3.51
6	NF-03-A-06	MIXED HOUSES	GREAT YARMOUTH	275	Monday	23/09/19	0.207	0.553	0.760	2.13
7	NY-03-A-10	HOUSES AND FLATS	RIPON	71	Tuesday	17/09/13	0.183	0.521	0.704	0.83
8	DN-03-A-03	DETACHED/SEMI-DETACHED	LETTERKENNY	50	Monday	01/09/14	0.100	0.560	0.660	2.50
9	NF-03-A-16	MIXED HOUSES & FLATS	WYMONDHAM	138	Tuesday	20/10/15	0.210	0.449	0.659	2.01
10	NF-03-A-07	MIXED HOUSES & FLATS	WYMONDHAM	297	Friday	20/09/19	0.175	0.455	0.630	3.37
11	ES-03-A-03	MIXED HOUSES & FLATS	POLEGATE	212	Monday	11/07/16	0.165	0.462	0.627	1.68
12	ES-03-A-05	MIXED HOUSES & FLATS	NEAR EASTBOURNE	99	Wednesday	05/06/19	0.131	0.495	0.626	1.99
13	KC-03-A-07	MIXED HOUSES	HERNE BAY	288	Wednesday	27/09/17	0.240	0.385	0.625	3.09
14	DO-03-A-03	DETACHED/SEMI DETACHED	BELFAST	79	Wednesday	23/10/13	0.089	0.519	0.608	2.62
15	KC-03-A-04	SEMI-DETACHED & TERRACE	AYLESFORD	110	Friday	22/09/17	0.127	0.473	0.600	1.77
16	CV-03-A-02	DETACHED & SEMI DETACHE	CAVAN	80	Monday	22/05/17	0.150	0.438	0.588	3.48
17	DN-03-A-04	SEMI-DETACHED	LETTERKENNY	83	Friday	26/09/14	0.145	0.422	0.567	2.19
18	DH-03-A-03	SEMI-DETACHED & TERRACE	DURHAM	57	Friday	19/10/18	0.211	0.333	0.544	3.33
19	SH-03-A-05	SEMI-DETACHED/TERRACED	TELFORD	54	Thursday	24/10/13	0.130	0.370	0.500	1.17
20	SC-03-A-04	DETACHED & TERRACED	BYFLEET	71	Thursday	23/01/14	0.141	0.352	0.493	2.49
21	DS-03-A-02	MIXED HOUSES	DERBY	371	Tuesday	10/07/18	0.089	0.402	0.491	2.92
22	ST-03-A-07	DETACHED & SEMI-DETACHE	STAFFORD	248	Wednesday	22/11/17	0.105	0.383	0.488	3.55
23	WS-03-A-08	MIXED HOUSES	ANGMERING	180	Thursday	19/04/18	0.106	0.367	0.473	2.93
24	SC-03-A-05	MIXED HOUSES	HORLEY	207	Monday	01/04/19	0.092	0.362	0.454	3.14
25	HF-03-A-03	MIXED HOUSES	BUNTINGFORD	160	Monday	08/07/19	0.119	0.319	0.438	3.95
26	WS-03-A-09	MIXED HOUSES & FLATS	WORTHING	197	Thursday	05/07/18	0.102	0.325	0.427	1.93
27	NE-03-A-02	SEMI DETACHED & DETACHE	SCUNTHORPE	432	Monday	12/05/14	0.067	0.354	0.421	1.00
28	WS-03-A-04	MIXED HOUSES	HORSHAM	151	Thursday	11/12/14	0.139	0.278	0.417	2.28
29	WS-03-A-10	MIXED HOUSES	LITTLEHAMPTON	79	Wednesday	07/11/18	0.089	0.241	0.330	2.41
30	NF-03-A-04	MIXED HOUSES	NORTH WALSHAM	70	Wednesday	18/09/19	0.071	0.214	0.285	2.36

Page 1 of 2

Figure 19 – Example of rank order screen with 85<sup>th</sup>/15<sup>th</sup> percentiles highlighted

13.7. TRICS® will highlight the 15<sup>th</sup> and 85<sup>th</sup> percentile trip rates whenever 6 or more surveys are included in a data set. If there are less than 6 surveys, then the feature will not be present, and no surveys will be highlighted. TRICS® does not endorse any quoted 15<sup>th</sup> or 85<sup>th</sup> percentile figures should there be less than 6 surveys in a data set. A user with such a small data set may decide to apply their own formulae to obtain what they consider to be 15<sup>th</sup> and 85<sup>th</sup> percentile figures, but the methods used to do this should always be presented in reports, and it should be made clear that the process used was outside of TRICS®.

13.8. A good method to establish the level of “weighting” or “bias” (see Section 15) in average (mean) trip rates (i.e. trip rates calculated using more than one survey) is to subject results to “cross-testing”, and this can also assist users in identifying the appropriateness of 85<sup>th</sup> and 15<sup>th</sup> percentile trip rates. This is a straightforward process that is recommended to all users following every trip rate calculation undertaken. Users can compare average (mean) trip rates from the main calculation results screen for a selected time period (for example the peak hour), with the corresponding median figure for the same time period taken from the rank order list for the same set of surveys. This can be done automatically by selecting the “Cross Test” icon shown on the trip rate calculation results screen. This quick procedure produces a percentage variation figure, which is displayed alongside the two (mean and median) trip rate figures. If this variation percentage is low, then, broadly speaking, trip rates can be considered not to have

significant “weighting” factors. If the variation percentage is high, this suggests that there is a higher level of “weighting” or “bias” in the data, which could warrant further scrutiny of the site selection process that was undertaken and the trip rate results that were obtained.

- 13.9. With larger data sets it would be unusual to see a significant mean to median variation. With smaller data sets, “weighting” or “bias” in the survey data may be more evident and have a greater effect on average (mean) trip rates. Once you get down to a very small data set (for example 3 surveys), the potential effect of weighting becomes greater, and this may be reflected in a higher variation percentage figure being displayed. For instance, it would not be unusual for a small dataset of, say, 5 surveys, producing a variation greater than 10%. This does not mean that trip rate results are invalid; it just means that weighting factors have a stronger effect on the smaller data set. However, should users be presented with a very large variation (say for example 30% or more), then in the interests of good practice and robustness they should review their original inclusion criteria and carefully examine the selections made through the trip rate filtering process. In cases of such high variation there may be an individual site that is so different from the rest in the selected set that it produces a significant weighting effect. Where this occurs, a review of the strictness of the search criteria should be undertaken to see if the overall number of selected sites can be increased without the inclusion criteria being significantly compromised. TRICS® recommends this approach as opposed to the alternative of simply removing the “rogue” site from the selected list (which is not considered good practice as this could be interpreted as manipulation). Users should understand that there will always be the potential for “outliers” within selected sets of TRICS® surveys, but this does not make these individual surveys invalid; they are just another representation of the ranges and diversity that can be found within sites of the same land use sub-category. It is important to reiterate that the Cross Test is available to provide users with quick guidance on weighting effects in a selected data set, and does not intended to justify any subsequent removal of individual surveys from a selected set in order to manually reduce this level of variation. It should also be noted that should users end up with a very small Cross Test variation, this does not necessarily mean that all selections made through the process are correct and robust; it just demonstrates a low level of statistical weighting taking place. As always, care should always be taken when agreeing inclusion criteria for site selection, and TRICS® recommends that Cross Test results are included in all reports alongside trip rate calculation results.
- 13.10. TRICS® cannot provide an indication of what is an “acceptable” Cross Test variation percentage for any individual situation, as every scenario is unique and may have a wide variety of influencing factors. It is often the case that the larger the data set is the smaller the variation will tend to be, but this may not necessarily always be the case. The Cross Test is intended only to provide an indication of weighting effects due to natural diversity in the survey data. Although this feature is a good indicator of the level of weighting taking place in a data set, producing reliable and robust results requires good professional judgement from all users.
- 13.11. Users should be aware that rank order lists of trip rates can be calculated using either a user-defined period or the “peak hour” on a site-by-site basis. The latter method selects the busiest hour of trip activity for each individual survey in the selected set. Therefore, the Cross Test is not applicable whenever the “Site-by-Site Peak Hour” rank order option is selected, as the Cross Test relies on a direct time comparison across all surveys between the trip rate calculation results screen and the rank order list. Users should always clearly state which methods for calculating rank order lists have been used in each individual case.

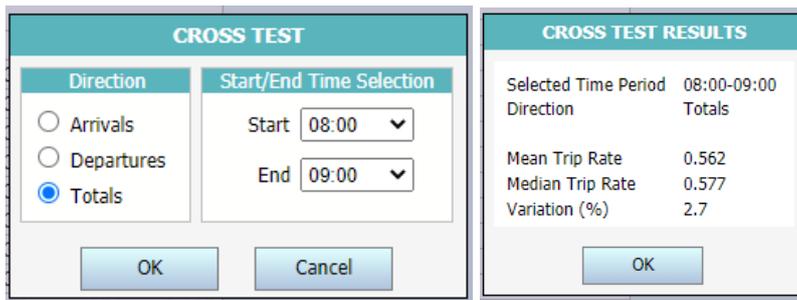


Figure 20 – Example of “Cross Testing” of mean and median trip rates

## 14. Resurveys and Multiple-Surveys

14.1. Existing sites are sometimes re-visited by TRICS® for a re-survey, to see how traffic and transport patterns may have changed over time (with the caveat that all surveys are undertaken on a single day and so can be subject to a variety of factors). Sites that have been surveyed on more than one occasion are clearly identified as such in TRICS® within the “Status” column in site lists, as shown in *Figure 21*. Note that to display the Status column in site lists users are required to select the “Additional Columns” button and then tick the “Status” option.

Reference	Description	Map	Town/City	Area	Location	SITE AREA	DWELLS	Survey Type	Most Recent Survey	Day of Week	Status
AD-03-M-01	BLOCKS OF FLATS		ABERDEEN	ABERDEEN CITY	Neighbourhood Centre	0.50	72	VEHICLES	22/06/09	Tuesday	One-Off
AN-03-M-01	TERRACED/SEMI D/FLA		BELFAST	ANTRIM	Suburban Area (PP56 C	2.52	114	VEHICLES	26/10/17	Thursday	One-Off
BA-03-M-01	NELSON WARD DRIVE		RADSTOCK	BATH & NORTH EAST SO	Edge of Town Centre	4.00	141	MULTI-MODAL	02/10/18	Tuesday	One-Off
BE-03-M-01	FLATS & SEMI DETACH		ERITH	BEXLEY	Edge of Town	4.00	343	MULTI-MODAL	20/09/18	Thursday	One-Off
BE-03-M-04	BLOCKS OF FLATS		SIDCUP	BEXLEY	Neighbourhood Centre	0.30	98	MULTI-MODAL	19/09/18	Wednesday	One-Off
BN-03-M-01	TERRACED & BLOCKS C		BARNET	BARNET	Edge of Town	2.32	105	MULTI-MODAL	09/03/17	Thursday	Initial Survey
BN-03-M-02	TERRACED & BLOCKS C		BARNET	BARNET	Edge of Town Centre	10.81	271	MULTI-MODAL	24/04/19	Wednesday	Re-Survey
BR-03-M-01	BLOCKS OF FLATS		BRISTOL	BRISTOL CITY	Suburban Area (PP56 C	0.40	42	MULTI-MODAL	06/10/06	Friday	Initial Survey
BR-03-M-02	BLOCKS OF FLATS		BRISTOL	BRISTOL CITY	Suburban Area (PP56 C	0.40	42	MULTI-MODAL	12/10/09	Monday	Re-Survey
BT-03-M-01	BLOCK OF FLATS		WEMBLEY	BRENT	Suburban Area (PP56 C	0.52	284	MULTI-MODAL	03/06/15	Wednesday	One-Off
BT-03-M-02	BLOCK OF FLATS		WEMBLEY	BRENT	Suburban Area (PP56 C	0.60	232	MULTI-MODAL	18/05/15	Monday	One-Off
BT-03-M-03	BLOCKS OF FLATS		NEASDEN	BRENT	Suburban Area (PP56 C	0.26	74	MULTI-MODAL	19/05/16	Thursday	One-Off
CA-03-M-01	MIXED HOUSES & FLAT		WATERBEACH	CAMBRIDGESHIRE	Edge of Town	1.75	52	MULTI-MODAL	20/06/18	Wednesday	One-Off
CB-03-M-01	SEMI DETACHED		COCKERMOUTH	CUMBRIA	Edge of Town	35.50	790	VEHICLES	11/09/90	Tuesday	One-Off
CB-03-M-02	BLOCKS OF FLATS		CARLISLE	CUMBRIA	Suburban Area (PP56 C	0.90	44	VEHICLES	29/10/03	Wednesday	One-Off
CB-03-M-03	SEMI-DETACHED		WORKINGTON	CUMBRIA	Edge of Town	2.90	82	MULTI-MODAL	20/06/05	Monday	Initial Survey
CB-03-M-04	SEMI-DETACHED & TEF		CARLISLE	CUMBRIA	Suburban Area (PP56 C	0.46	20	MULTI-MODAL	24/06/16	Friday	One-Off
CN-03-M-01	HOUSES & FLATS		CARMARTHEN	CARMARTHENSHIRE	Suburban Area (PP56 C	1.65	48	MULTI-MODAL	18/09/08	Thursday	Initial Survey
CN-03-M-02	HOUSES & FLATS		CARMARTHEN	CARMARTHENSHIRE	Suburban Area (PP56 C	1.65	49	MULTI-MODAL	14/10/14	Tuesday	Re-Survey
CV-03-M-01	SEMI DETACHED & TER		CAVAN	CAVAN	Edge of Town	2.86	60	VEHICLES	22/05/17	Monday	One-Off
DC-03-M-01	MIXED HOUSES/FLATS		NEAR POOLE	DORSET	Neighbourhood Centre	5.00	130	VEHICLES	30/04/91	Tuesday	One-Off

Figure 21 – Example of Site List showing Initial Surveys and Re-Surveys

14.2. There are three types of “Status” label in the database: One-Off, Initial Survey, and Re-Survey. A “One-Off” site appears only once in the database and was surveyed on one single occasion. An “Initial Survey” site represents an “original” site that was visited again on one or more later occasions for a re-survey (with these occasions represented in separate site list rows with “Re-Survey” labels). To assist users in site navigation between re-surveyed sites there is a direct link within the Site Details screen, as shown in *Figure 22*.

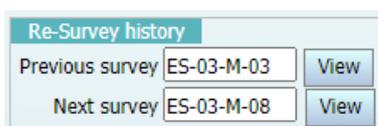


Figure 22 – Example of Site Details showing linkage to initial and re-survey details

- 14.3. It is important that users avoid including any development more than once within a selected data set. This can occur if a user inadvertently includes (or decides to include) both a re-surveyed site and its re-survey together in a trip rate calculation, and this can lead to “weighting” of trip rate results (see [Section 13](#) and [Section 15](#)). Because of this, TRICS® identifies where developments have been included twice in a selected data set. Such incidences are highlighted in yellow within the Selected Sites option in the trip rate calculation filtering process. To assist users further, by default TRICS® then automatically deselects sites that have been re-surveyed by others in the same data set, leaving only the most recent site included. This provides a fail-safe for users which means that a user would have to manually override this function to remove its effect. If users include both a re-surveyed site and any subsequent re-surveys in a selected set, the results from such a calculation cannot be endorsed by TRICS®. The only exception to this is where there is a specific need to focus on one single development and its various surveys, for example to examine any changes in trip generation at that development over time.
- 14.4. Individual sites may sometimes have more than one survey day included in their site record. For example, a food superstore may include a set of Friday, Saturday and Sunday surveys in its site record, or there may be seasonal surveys covering 3 separate Saturdays at different times of the year. Users should ensure that whenever trip rates are calculated, each site in the selected set is represented by only 1 survey day. Just like with sites that have been re-surveyed, by default TRICS® automatically selects only the most recently undertaken survey per site record selected, and just like selected sites, users would need to override this fail-safe in order to include multi-surveys for any individual development in a trip rate calculation. TRICS® cannot endorse any such inclusion, with some exceptions as explained in [14.3](#). All survey days used in a trip rate calculation for each site are listed as part of trip rate calculation results PDF outputs, so a recipient of a TRICS® report will be able to identify where this has taken place (as long as all information on the selection process has been included in the report), and if so should seek clarification from the report provider.
- 14.5. Users have three options for survey inclusion within the Survey Selection screen of the trip rate calculation filtering process. The first two are shown as “Most Recent Survey Only” and “Busiest Survey” radio buttons. The “Most Recent Survey Only” option is set as the default, as this automatically ensures that only the most recent survey at each individual site is included in the selected data set. The second “Busiest Survey” option is similar in that it only allows the inclusion of one survey per site record, although in this instance the survey day with the highest total daily vehicular activity is selected for each individual site, rather than the most recent survey. As “Busiest Survey” will tend to produce higher trip rates it is vital that users choosing this option make it clear in their reports that this choice was made, and that it is possible that the data provided is closer to a “worse-case scenario” in terms of traffic generation than a true average (as would more likely be obtained by the using the default “Most Recent Survey Only” option). Failure to provide this important information in reports would be misleading, especially if an “average” trip rate rather than a “worse case average” had been agreed upon in an early stage of the process.



Figure 23 – Example of Survey Selection screen showing “Most Recent Survey Only” and “Busiest Survey” radio buttons

14.6. The third option entitled “All Surveys” would mean that all survey days in the selected set would be included in the trip rate calculation. As discussed earlier in this section, users should be aware that use of the “All Surveys” option would mean that sites with multi-surveys would have all of these surveys included in the resulting trip rate calculation, and so “All Surveys” should only be selected for exceptional circumstances (as explained in 14.3).

## 15. Weighting Factors in Trip Rate Calculations and Manual Deselection

15.1. As discussed earlier in this document (see Section 13) there are “weighting” factors that can influence trip rates generated by TRICS®. In a selected set of surveys these can consist of a site with unusually high or low traffic/transport generation, a site with a trip rate calculation parameter value (e.g. Gross Floor Area or Number of Employees etc) which is significantly higher or lower than the majority of the sites in the selected set, or a combination of both of these factors. There can also be numerous other factors that can contribute to a weighting effect. These could include specific local influences at the time that surveys took place, events taking place at sites that may have added to trip generation, or other factors that may have had the opposite effect (contributing to a reduction in trip levels). It should be noted that TRICS® cannot identify specific causes on a site-by-site basis, hence the true causes of weighting can be speculative, but in terms of unusually high or low trip rate calculation parameter figures (e.g. GFA) or high or low levels of trip activity at specific sites, this is something that users can observe when studying individual site data.

15.2. A good method for identifying the effect of weighting factors is “cross-testing” (see 13.8), which can reveal weighting effects in comparisons between mean trip rates (averages produced in the main trip rate calculation results table) and median trip rates (from a rank order list). However, cross-testing on its own does not prove robustness and reliability of trip rate results. It is also important to understand that cross-testing cannot be used if rank order lists are calculated by the “peak hour” method (see 13.11).

- 15.3. A rank order list is also a good place to look for potential weighting factors. Users can examine rank order lists to see if the range of trip rates displayed rises from the bottom of the list in a steady, reasonably incremental order. If there are one or more trip rates displayed in a rank order list which seem out of place when compared to the pattern of trip rates in the list in general, this could identify potential issues that warrant further scrutiny of a user's initial inclusion criteria and the trip rate calculation selection process that was undertaken. Users are encouraged to examine rank order lists and then examine the individual site details and survey counts of any sites in the list that appear to be "outliers", so that there can be a better understanding of them and the potential causes of their trip generation variation.
- 15.4. TRICS® does not generally recommend the manual removal of individual sites from selected data sets within the trip rate calculation filtering process. There is the option for users to manually remove sites and survey days, but users should proceed with utmost caution if doing this (see [Section 12](#)). If manual deselection does take place, users are required to provide a reason for each instance. TRICS® records each reason given, and these reasons are then included in the PDF outputs of trip rate calculation results generated by the system. Auditors of TRICS® reports should examine these outputs carefully. As mentioned earlier in this document, "outlier" sites as identified in rank order scatterplot diagrams are considered to be just as valid as any other site in a selected set, and are an example of the range and diversity of trip rates within individual land use sub-categories in the database. It should be noted that significant weighting factors as indicated in the results of a Cross Test (see [Section 13](#)) are not sufficient reason on their own to manually remove individual sites and surveys from a selected set.
- 15.5. If a recipient of a TRICS® report suspects that there are significant weighting factors present in the calculation of trip rates worthy of further scrutiny, then clarification should be sought from whoever produced the report.

## **16. Trip Rates and Limits of Extrapolation**

- 16.1. TRICS® allows users to calculate trip rates and then extrapolate them using an "Estimate Trip Rates" feature in the trip rate calculation results screen. As discussed earlier in this document, all trip rates are displayed per a "trip rate value" factor such as "per 100m<sup>2</sup> GFA" or "Per Employee" etc. (see [6.2](#)). The "Estimate Trip Rates" feature allows the user to extrapolate the trip rates initially displayed in a results table to represent the actual size etc. of their development scenario.
- 16.2. For example, if a user's development scenario is a 03/A (Houses Privately Owned) development of 120 dwellings, the trip rates per dwelling figures could be extrapolated using the "Estimate Trip Rates" feature, with the user inputting a dwelling value of 120 to produce second and extrapolated column of trip rates (highlighted in grey) next to the initial figures. Therefore, this second set of figures would represent "per 120 dwellings" in this case, instead of "per dwelling".



TOTAL VEHICLES				Estimate TRIP rates				TOTALS				
Survey Start/End: 07:00-21:00				State TRP Figure & Extrapolate Results <input type="checkbox"/> ON				Estimated TRIP rate value per 120 DWELLS				
Trip rate parameter range available: 50 - 371 (units: )				Estimated TRIP rates shown in shaded column (for 120 DWELLS)								
TRIP RATE VALUE PER 1 DWELLS	ARRIVALS			Total Estimated Trip rate	DEPARTURES			Total Estimated Trip rate	TOTALS			Total Estimated Trip rate
	No. Days	Ave. DWELLS	Trip Rate		No. Days	Ave. DWELLS	Trip Rate		No. Days	Ave. DWELLS	Trip Rate	
	Total Rate: 2.635 Peak: 17:00-18:00			315.967	Total rate: 2.651 Peak: 08:00-09:00			317.917	Total rate: 5.286 Peak: 08:00-09:00			633.884
00:00-01:00												
01:00-02:00												
02:00-03:00												
03:00-04:00												
04:00-05:00												
05:00-06:00												
06:00-07:00												
07:00-08:00	31	145	0.088	10.548	31	145	0.325	38.997	31	145	0.413	49.545
08:00-09:00	31	145	0.148	17.740	31	145	0.427	51.250	31	145	0.575	68.990
09:00-10:00	31	145	0.163	19.578	31	145	0.195	23.361	31	145	0.358	42.939
10:00-11:00	31	145	0.136	16.275	31	145	0.163	19.552	31	145	0.299	35.827
11:00-12:00	31	145	0.139	16.648	31	145	0.165	19.765	31	145	0.304	36.413
12:00-13:00	31	145	0.180	21.576	31	145	0.165	19.818	31	145	0.345	41.394
13:00-14:00	31	145	0.180	21.576	31	145	0.175	20.963	31	145	0.355	42.539
14:00-15:00	31	145	0.194	23.254	31	145	0.214	25.705	31	145	0.408	48.959
15:00-16:00	31	145	0.296	35.481	31	145	0.190	22.801	31	145	0.486	58.282
16:00-17:00	31	145	0.309	37.132	31	145	0.185	22.215	31	145	0.494	59.347
17:00-18:00	31	145	0.388	46.508	31	145	0.180	21.549	31	145	0.568	68.057

Figure 24 – Example of trip rate results showing the “Estimate Trip Rates” Feature

- 16.3. Users should exercise caution when extrapolating trip rates, as there are varying degrees of accuracy when extrapolating by different land use, survey sample size, and trip rate calculation parameter. In the first instance, users are encouraged to ensure that the average trip rate parameter value of their selected surveys (as shown on the trip rate calculation results screen) is as close as possible to the corresponding size (or other value) of their development scenario (without compromising their selection criteria).
- 16.4. The reliability and robustness of any extrapolation can be scrutinised by analysing rank order list scatterplot diagrams. For example, we can look at the residential land use sub-category 03/A (Houses Privately Owned). If surveys are calculated first by Site Area and then by Number of Dwellings, the “line of best fit” on the rank order scatterplot appears to visually fit the data better when calculated by Dwellings than when calculated by Site Area. This is because the Site Area option does not account for the varying density of developments within the selected data set, resulting in a greater visual range displayed on the corresponding scatterplot. This is quite logical, as when residential trip rates are calculated by Dwelling, we could imagine trip generation increasing by a more proportional amount as developments increase in dwelling numbers.

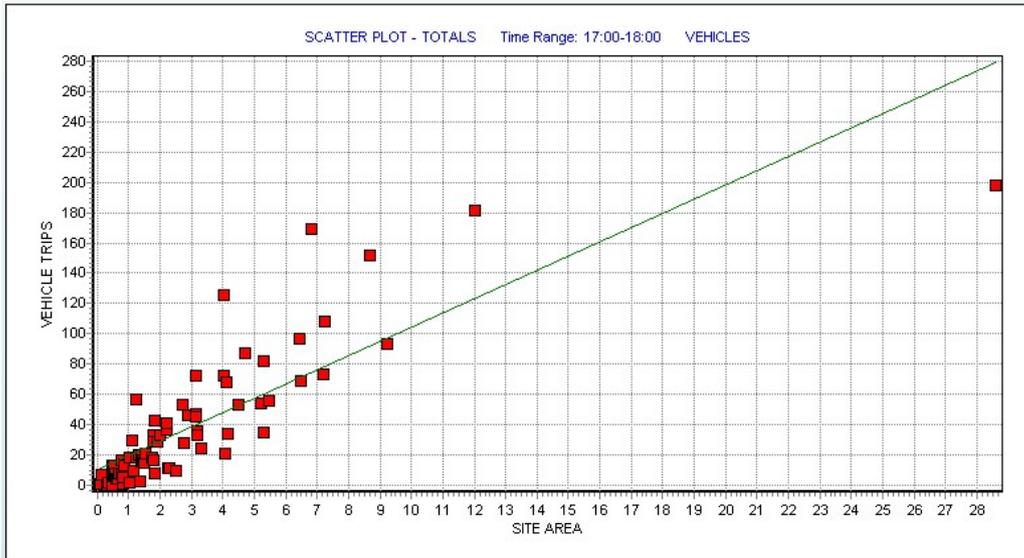


Figure 25 – Example of a 03/A scatterplot by Site Area (higher fluctuation in range)

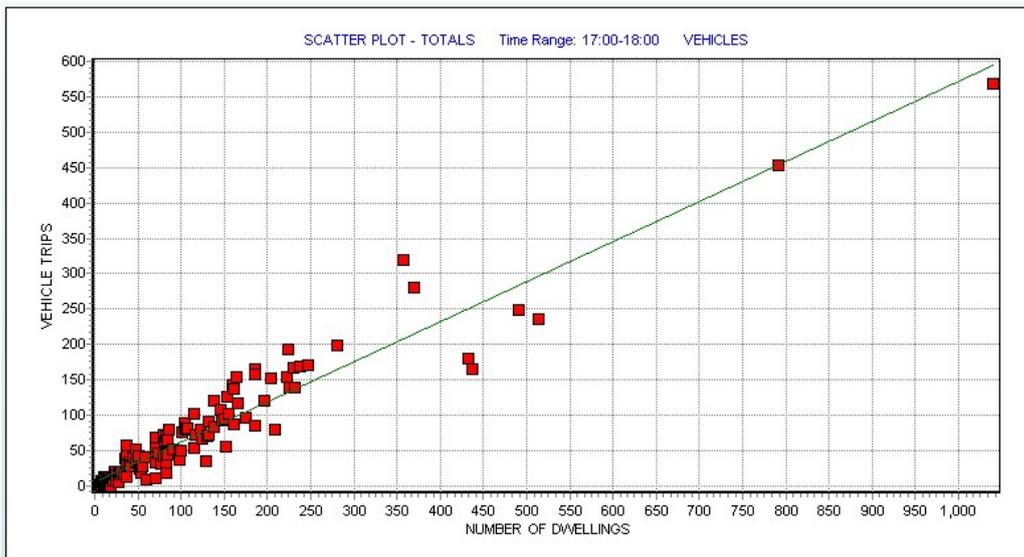
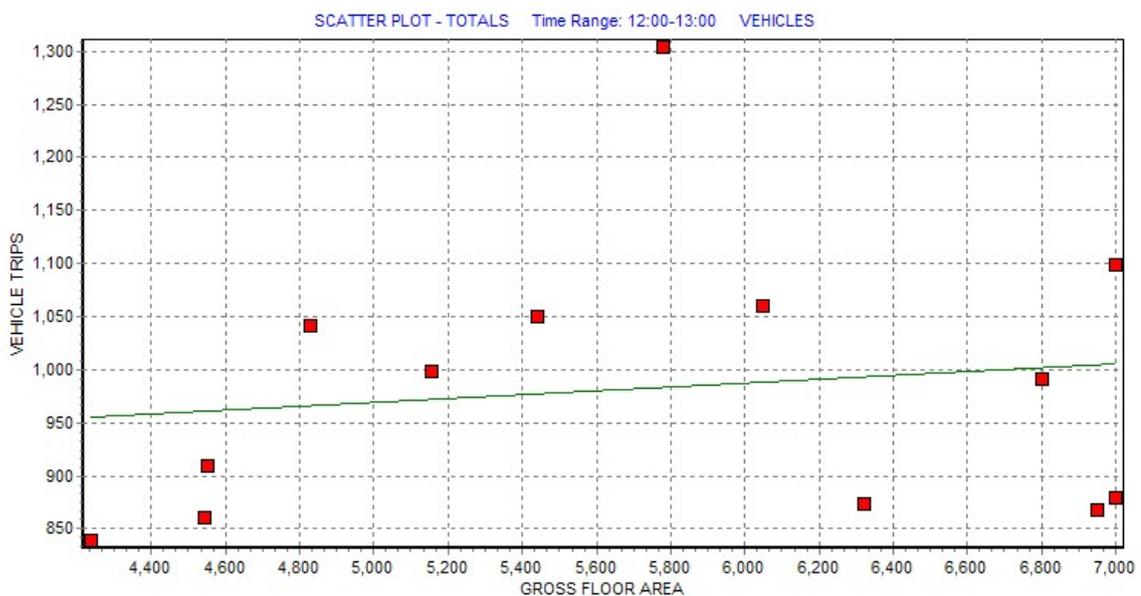


Figure 26 – Example of a 03/A scatterplot by Dwellings (lower fluctuation in range)

- 16.5. The examples in [Figure 25](#) and [Figure 26](#) illustrate how reliability of extrapolation can vary significantly across land use sub-categories and the trip rare parameter options selected. Users should always proceed with caution in identifying what is to be considered a safe limit for extrapolating trip rates, exercising their professional judgement in all cases, with scatterplots provided as supporting evidence in reports produced using TRICS®. Auditors of TRICS® reports should also request scatterplots be provided should they consider these necessary to provide clarification. The amount of range in a scatterplot will also vary depending on the size of a data set, along with numerous external factors outside of TRICS® that may also influence trip rates (see [17.6](#)).
- 16.6. There are sometimes clear visual correlations shown on scatterplots between the trip rate calculation parameter (x axis) and level of trips (y axis), with an example being shown in [Figure 26](#). However, there are sometimes no clear visual correlations, depending on the land use sub-

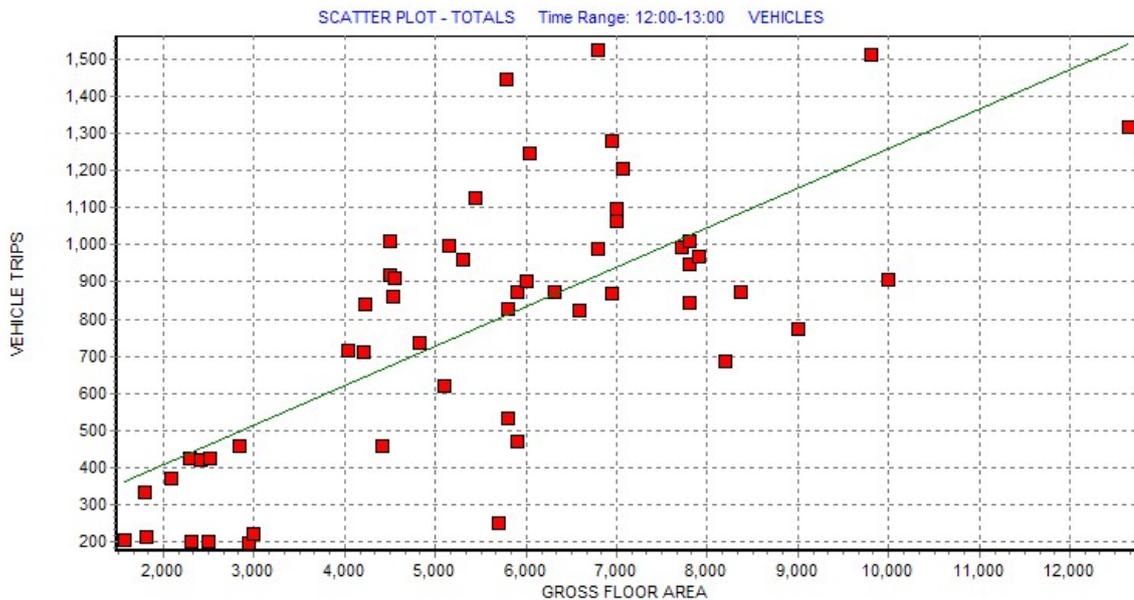
category and trip rate calculation parameter selected. In such cases, use of the Estimate Trip Rates feature to extrapolate trip rates is not recommended. If it is used in such cases, the large range shown on the scatterplot should be accounted for when reporting. *Figure 27* appears in the first instance (by way of a large range in the scatterplot) to suggest that food superstores do not display any clear relationship between GFA and vehicle trips, therefore limiting the accurate use of the Estimate Trip Rates feature. However, this does not necessarily tell the whole story. It is known that there is in fact a strong relationship between GFA and trip generation for food superstores (see *TRICS Research Report 09/1: “An Econometric Study of the Relationship Between Land Use and Vehicle Trip Generations”*). However, other external factors outside of TRICS® can also exert strong influences on trip generation, and this can be illustrated in scatterplots accordingly, which can mask such a relationship. Such influential factors can be numerous, but may include local competition, road network issues, demographics, and economic situations. Something very important to note is that TRICS® is designed to provide guidance on a range of potential trip generation, and it is not intended to provide an absolute prediction for any specific development scenario (see *11.4 and Figure 12*). This is because there are many factors that can affect trip rates, both internal and external to the selection parameters available within TRICS®.



*Figure 27 – Example of a scatterplot showing a lack of apparent visual correlation between GFA and vehicle trips (manufactured example for illustrative purposes)*

16.7. *Figure 27* shows that when a relatively small data sample for food superstores is represented in a scatterplot it can appear that there is no clear, visual relationship between GFA (x axis) and vehicle trips (y axis). However, if we use a larger data set, such as that shown in *Figure 28*, we can see that there is a clearer indication that there is indeed a relationship. The trip generation relationships between land use sub-categories and their various trip rate parameter options will vary and will sometimes be more visually obvious in some cases compared to in others. The level of effects on trip generation from external factors outside of TRICS® (see *16.6*) will also vary. Users should account for the fact that a wide range of variation is taking place and is often expressed in visual differences between scatterplots. This means that a good degree of caution should be exercised in this regard when attempting to draw conclusions on trip generation influences and relationships from what is presented in these diagrams. It cannot be said that *Figure 27* shows a lack of a relationship between GFA and vehicle trips, but it could be said that such a relationship is being visually masked by external factors. There is no obvious visual correlation in the scatterplot, but this could be due to factors external to TRICS® having a

greater influence on trip rates than for some other land use sub-category and trip rate calculation parameter combinations. Users should also be aware that sometimes there may not actually be as strong a relationship between a trip rate calculation parameter and trip rates for a particular land use sub-category compared to other combinations. Users are encouraged to compare any scatterplots appearing to visually indicate a lack of a relationship between a trip rate calculation parameter and trip rates with a scatterplot using a larger data set from the same land use sub-category, to see if a visual relationship appears, as illustrated in *Figure 27* and *Figure 28*. This could assist users in an explanatory way within their reporting.



*Figure 28 – Example of a scatterplot showing a visual correlation between GFA and vehicle trips (albeit significantly influenced by external factors)*

16.8. Whenever extrapolated trip rates produced by the “Estimate Trip Rates” feature are quoted in TRICS® reports, it should be made clear that this feature has been used, and that the trip rates quoted have not been directly taken from the original trip rate calculation results before the extrapolation took place.

## 17. Mixed Use Sites and TRICS

17.1. Users often require trip rates for a development scenario constituting a mix of land use categories (for example retail units mixed with leisure and employment etc). There are a number of mixed use or “multi-use” sites within TRICS®, but due to their specific mixed use development scenarios users may need to investigate the individual components separately by land use sub-category where no TRICS® sites within the 16/B (Mixed Use) sub-category are considered to be compatible. It should also be noted that due to their diverse nature, surveys at mixed use developments cannot be used to calculate trip rates in TRICS®. However, users could extract data for individual mixed use sites and manually calculate trip rates (for example using Excel), using a figure such as Site Area (which is present in the database for mixed use sites). However, if doing this, users should make it clear in their reporting that manual calculations were undertaken, and not automatically calculated by TRICS®.

17.2. When compiling trip rates for individual components comprising a mixed development scenario, users should be aware that any cross-visitation activity between individual components would

not be accounted for within the trip rates generated using TRICS®. This means there is the possibility that once all trip rates for each individual unit are combined, the total trip rate sum could end up being artificially inflated. For example, someone visiting a mixed retail and leisure development might visit both units, but in terms of true trip generation they would still be a single arrival at and departure from the greater site. This means that combining trip rates obtained from individual land use sub-categories could potentially lead to the double-counting of trips in this respect. Therefore, when reporting, users should make it clear that the trip rates presented are the combined total of the individual components within the greater development, and that the sum of trip rates by individual unit does not necessarily constitute the mixed use site as a whole, given the possibility of people visiting more than one of the units at the development in a single trip. Stating that the combined trip rates of constituent units represent potential trip rates for the greater development could be misleading and unrepresentative. The only exception is when a site or sites within the 16/B (Mixed Use) land use category have been used to produce trip rates manually (see [17.1](#)).

- 17.3. This leads us to the question of what is a reasonable and acceptable factor to apply to mixed use development scenarios once trip rates have been obtained for the individual units and then combined, to avoid the potential for over-inflated trip rates representing the greater development. This is a question that has been asked for a long time by TRICS® users, but unfortunately there can be no straight answer that could apply to all mixed development scenarios. Every site will be different in numerous ways, so tackling the issue of internalisation within mixed developments will require scenario testing by practitioners using their own professional judgement.
- 17.4. If users decide to apply reduction factors to combined trip rates derived from individual mixed use site components, to take into account estimated levels of internalisation, it is very important that the original combined data derived from TRICS® is presented in reports, followed by details of the factors subsequently applied, with it also being made very clear that any amended trip rates provided post factoring are not trip rates calculated directly from TRICS®. It is important that users understand that in such cases the role of TRICS® ends when the original trip rates by individual development unit are calculated before any factoring takes place. TRICS® does not endorse any specific factoring methods that users may apply to data. However, TRICS® understands that factoring may be necessary to correctly represent a mixed development, and that such an approach would be in general principle considered reasonable and logical. Nevertheless, it remains fully the user's responsibility to provide evidence and justification in support of any factoring applied post calculation.
- 17.5. In 2018 a major TRICS® survey and research study was undertaken at a large 17/A (New Communities – Free Standing Settlement) at Cambourne in Cambridgeshire. At the time of the survey this development consisted of over 4,000 residential dwellings plus a variety of other development types including retail, community facilities, schools, offices, a leisure centre, and other land uses. There were over 10,000 inbound vehicle trips and over 13,000 inbound people trips (all modes combined) recorded on the day of the survey. What was unique about this study is that it was the first of its kind to examine levels of internalisation for a selected number of non-residential developments within such a large mixed site. A TRICS® technical report was subsequently produced detailing all findings, and this is freely available and can be accessed via the TRICS® Library module, entitled "[Cambourne Village TRICS® Survey – Technical Report](#)". The surveys undertaken were split, so that an overall standard multi-modal TRICS® survey covering the whole development was undertaken, at the same time as 7 separate multi-modal surveys at internal developments. These internal surveys also included additional interview questions to identify internalisation across the various developments, trips made by those who live outside

of Cambourne compared to trips made by those who live within Cambourne, and the type of trip “user” (for example “live in Cambourne”, “work in Cambourne”, etc). This wealth of additional data also allowed TRICS® to create a “Cambourne Village Analysis Portal”, which is also freely available to TRICS® users once they have logged in to the Members area at [www.trics.org](http://www.trics.org). This portal allows users to interrogate the data by making a variety of selections and to see for themselves the levels of internalisation identified for the various developments surveyed amongst other types of analysis.

- 17.6. It is very important to note that the Cambourne study was a very first examination by TRICS® of a major free-standing mixed development of this type. Although it provides some interesting results including data on internalisation, and allows TRICS® users to further examine the data using the Cambourne Portal facility, we must stress that we have drawn no conclusions from this study, neither have we speculated with regards to what the results might imply for any other mixed use development of any type. This was very much a single one-day study of a single large mixed development, so the results obtained reflect this. TRICS® does not endorse any application of the results obtained from this study to any modelling of any other mixed development. No trends can or should be defined from the data obtained in this study, but it is an important first step in our understanding, and we hope to increase this understanding with further multi-modal surveys at new communities as we move forwards.

## 18. Understanding Count Type Definitions

- 18.1. It is important that users fully understand the definitions of the many count types present within TRICS®. The number of count types have increased over time to allow greater detail and breakdown within our surveys, and definitions of all count types can be found within the Help section of the system, which can be accessed by selecting the Help icon at any stage during its use.

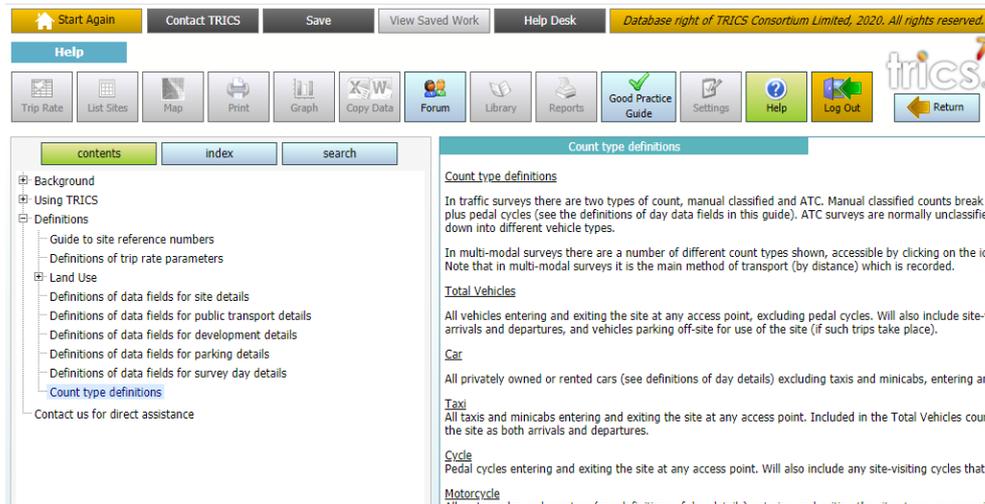


Figure 29 – Extract of Help screen showing count type definitions

- 18.2. Users should ensure that they correctly present all trip rate and count data in their reports, specifying in each case the TRICS® count types the figures represent. All current TRICS® count types are shown in [Figure 31](#). It should be noted that additional count types have appeared in the system over time. Multi-modal count types were introduced in 2000, followed by the Taxis count type in 2006, along with new counts for bus passengers, train passengers and coach

passengers (previously Public Transport Users had been contained within a single count type). PSV, OGV and pedal cycle counts were then introduced in 1998, and in 2013 separate Car, Motorcycle and LGV counts were also introduced, with all surveys undertaken in 2013 onwards containing this additional survey count breakdown. In 2015 multi-modal surveys in Greater London also included the new modes of Docklands Light Rail, Overground, National Rail and Underground. And 2016 saw the introduction of Servicing Vehicles counts (see [Section 20](#)).

- 18.3. It is important that the methodology of TRICS® surveys is also clearly understood by users. A freely available document is the [TRICS® Multi-Modal Methodology](#), which is available within the Library module of TRICS®. This document explains how we assess sites prior to undertaking multi-modal surveys, providing examples of TRICS® survey specifications and details of what is and what is not included in the various count types. For example, it is sometimes the case that the number of vehicles in a TRICS® survey exceeds the number of vehicle occupants for a given count period. This can be explained by the fact that drivers of vehicles picking up/dropping off people at a site are excluded from the vehicle occupants count (whenever this is possible). Those examining TRICS® survey data should be aware of this, along with specific exceptions in the methodology (for example surveys at schools, and surveys at some land use sub-categories located in town and city centres, amongst others); the survey data in the system is accurate, so it is just a matter of understanding the TRICS® methodology correctly.
- 18.4. It is also important to understand that modal split pie charts, accessed directly from individual multi-modal survey count screens, represent the split of total two-way trips throughout a survey’s duration (unless users select the peak period option). For example, if we take an office site near a city centre there may be a significant number of pedestrian trips taking place at lunchtime, and TRICS® will record these as it does all other trips arriving at and departing from a site. In the example shown in [Figure 30](#), the percentage of total people trips that were pedestrians is shown in the pie chart as 25.5%. However, it would be misleading to claim in reports that 25.5% of employees at the office used in the example walk to work, as this is clearly not the case, as all trips throughout the survey’s duration were recorded and not just trips at peak arrival and departure times. Instead it would be correct to state that 25.5% of all trips to and from the site through the survey duration were made on foot. Auditors of TRICS® reports should always request clarification if this is not clearly presented.

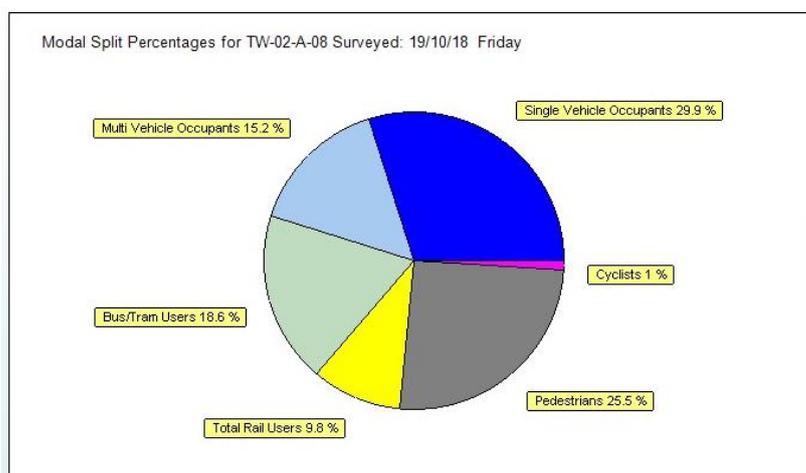


Figure 30 – Example of a modal split pie chart

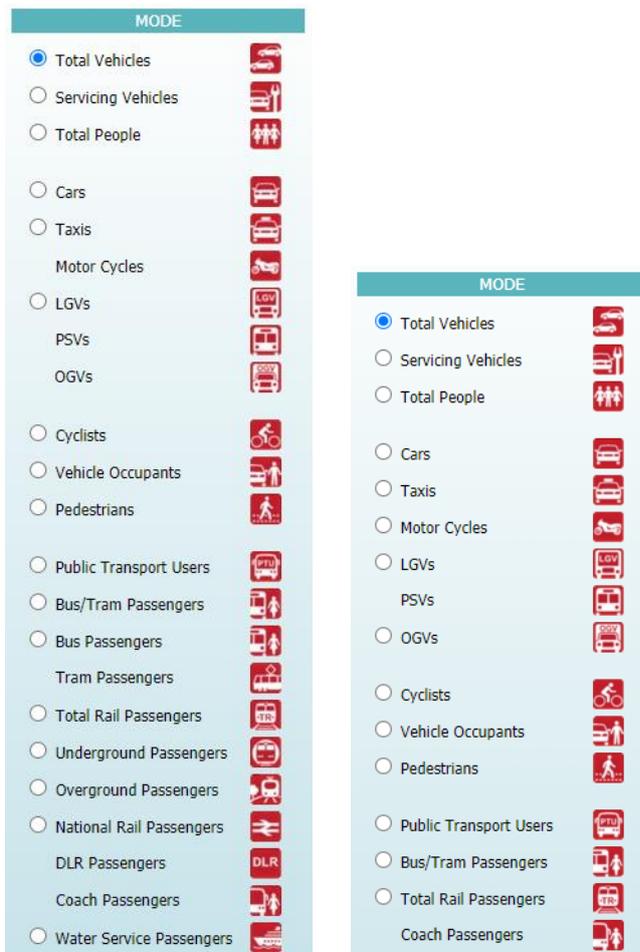


Figure 31 – Multi-Modal count types for Greater London (left) and outside of London (right)

## 19. Understanding the TRICS Vehicle Occupants Count

- 19.1. The Vehicle Occupants count in TRICS® was introduced upon the commencement of multi-modal surveys in 2000. It is combined with public transport users, pedestrians, and cyclists, to form the Total People count, from which modal split pie charts can be derived. This section of the document should assist users in their understanding of what is and what is not included in the Vehicle Occupants count, which is present in all multi-modal surveys in the database.
- 19.2. In all cases (with the exception of school surveys which is explained in 19.11), the Vehicle Occupants count includes all occupants of vehicles who are visiting any surveyed site, but excludes all drivers of vehicles who are picking up and dropping off passengers at a site (and are therefore not considered to be visiting a site themselves). This rule applies to occupants of all vehicle types (except bus and coach passengers who are recorded separately), with taxi drivers being treated the same way as drivers of private vehicles who are picking up/dropping off passengers. However, it is important to note that if a driver of a vehicle physically visits a site in the same way as a passenger does, then the driver will be included in the Vehicle Occupants count.
- 19.3. Two examples can be given to illustrate the inclusion or exclusion of drivers and passengers of vehicles in the Vehicle Occupants count. The first example is a driver of a private car with two passengers arriving at a site, with the two passengers being dropped off and the driver then

leaving the site. In this case, one car would be recorded arriving and then departing, and two vehicle occupants (the two passengers) would be recorded arriving. The second example is a driver of a private car with two passengers arriving at a site, and all three people in the car visiting the site. In this case, one car would be recorded arriving, and three vehicle occupants (the two passengers plus the driver) would be recorded arriving. When presenting reports that include Vehicle Occupants counts or trip rates, it is considered good practice that TRICS® users clarify that such counts exclude drivers of vehicles picking up/dropping off passengers.

19.4. The rules for the inclusion and exclusion of vehicle occupants explained in 19.2 and 19.3 apply as much as possible through TRICS® multi-modal surveys. However, at some survey sites this will be more difficult than at others, so the exclusion of drivers of vehicles picking up/dropping off passengers at some sites may not always be possible. At some larger sites where observation of all pick-up and drop-off activity may not be fully achievable (for example perhaps at some large residential developments, industrial estates or retail parks), and where the nature of a site means that interviews to enable this information to be obtained cannot be undertaken, the Vehicle Occupants count may include some drivers that are not physically visiting sites. However, in such instances the overall level of trip activity would probably be at the higher end of the scale, and as such it is not considered that these exceptions would have much of an impact on the overall survey counts. For most surveys we can identify and exclude pick-up and drop-off trips either through observation or interview (or a combination of both), so we do not consider the exceptions to be a significant statistical issue.

19.5. The Vehicle Occupants count is presented in a different way to other count types in the TRICS® database (see Figure 32). Whereas all other count types display single columns for arrivals departures through the survey periods, the Vehicle Occupants count provides a split of vehicles with 1 occupant, 2 occupants, 3 occupants, up to a maximum of 7 occupants. This split is obtained through observations or by interviews during TRICS® surveys, and this allows the total number of vehicle occupants per count period to be calculated, with this being presented in the final column for arrivals and departures, with the sum of both being displayed in the Totals column in the same way as for all other count types.

**Survey Dates**  
Tuesday 24/09/19

**VEHICLE OCCUPANTS**  
This count consists of car occupants, light goods vehicle occupants, motorcycle riders and OGV occupants  
Taxi drivers and drivers of private vehicles picking up/dropping off passengers at the site are excluded from the count

**MODE**

- Total Vehicles
- Servicing Vehicles
- Total People
- Cars
- Taxis
- Motor Cycles
- LGVs
- PSVs
- OGVs
- Cyclists
- Vehicle Occupants
- Pedestrians
- Public Transport Users
- Bus/Tram Passengers
- Total Rail Passengers
- Coach Passengers

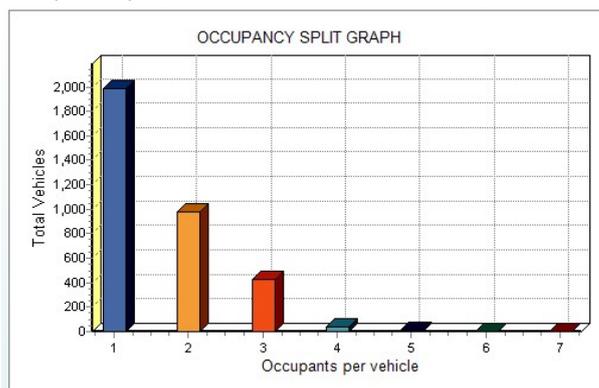
Note on car sharing and vehicle occupants inclusion

Bracketed figures assume initial number at site to be 0

Time	Occupancy per Vehicle Arriving							Arr 2769	Occupancy per Vehicle Departing							Dep 2682	Totals 5451	Accumulation
	1	2	3	4	5	6	7		1	2	3	4	5	6	7			
00:00-01:00																		
01:00-02:00																		
02:00-03:00																		
03:00-04:00																		
04:00-05:00																		
05:00-06:00																		
06:00-07:00																		
07:00-08:00	75	22	3	0	0	0	0	128	96	40	30	3	0	0	0	278	406	(-150)
08:00-09:00	86	38	3	0	0	0	0	171	97	102	84	9	3	0	0	604	775	(-583)
09:00-10:00	60	52	15	0	0	0	0	209	53	43	20	0	0	0	0	199	408	(-573)
10:00-11:00	70	34	2	1	0	0	0	148	58	43	10	0	0	0	0	174	322	(-599)
11:00-12:00	44	63	9	0	0	0	0	197	89	34	9	0	0	0	0	184	381	(-586)
12:00-13:00	83	28	6	1	0	0	0	161	76	35	5	0	0	0	0	161	322	(-586)
13:00-14:00	51	31	7	2	0	0	0	142	86	20	9	0	0	0	0	153	295	(-597)
14:00-15:00	66	17	18	1	0	0	0	158	107	24	5	1	0	0	0	174	332	(-613)
15:00-16:00	93	57	35	0	0	0	1	319	117	20	5	1	0	0	0	176	495	(-470)
16:00-17:00	120	56	40	5	2	0	0	382	95	37	7	1	0	0	0	194	576	(-282)
17:00-18:00	99	66	57	8	0	2	0	446	109	22	11	0	0	0	0	186	632	(-22)
18:00-19:00	91	47	28	6	3	0	0	308	69	52	6	2	0	0	0	199	507	(87)
19:00-20:00																		
20:00-21:00																		
21:00-22:00																		
22:00-23:00																		
23:00-24:00																		

Figure 32 – Example of a TRICS® Vehicle Occupants count

- 19.6. Using the figures shown in *Figure 32* as an example, the method of calculating the sum of vehicle occupant arrivals can be explained. If we look at the 0700-0800 inbound period there are 75 vehicles with 1 occupant, 22 vehicles with 2 occupants, and 3 vehicles with 3 occupants. Therefore, the total number of inbound vehicle occupants for this period can be calculated using the following formula:  $75 + (22*2) + (3*3) = 128$
- 19.7. It should also be noted that the first arrivals “1” column does not just show the number of inbound vehicles with just a driver that visited the site. The vehicle occupants within this column will be a combination of drivers on their own that arrived at the site, and single passengers who are picked up/dropped off by a driver who is not visiting the site. The same approach continues through the “2”, “3”, “4” columns etc.
- 19.8. It is important to understand that the Vehicle Occupants count does not differentiate between site-visiting drivers and passengers. Therefore, TRICS® users will need to make their own estimations based on assumptions with regards to this, applying their professional judgement. It should be made clear in reporting that any such assumptions used to estimate any drivers/passengers split were made outside of the TRICS® process, with the user’s own method used to estimate this split also being clearly explained. Should auditors of reports see splits between drivers and passengers without such explanatory detail they should contact whoever produced the report for further clarification.
- 19.9. The Vehicle Occupants count can assist users in providing an indication of the level of “car sharing” taking place at any individual multi-modal site. Again, users would need to make some assumptions and apply their professional judgement after examining a Vehicle Occupants count to arrive at estimates for car sharing activity, so if presenting such estimates in reports their assumptions and methods used should always be clearly explained.
- 19.10. To view the vehicle occupancy split in a more visual format, users can click on the “Occupancy Split” icon at the top of the count screen, and an Occupancy Split Graph (see *Figure 33*) will then be displayed. In this graph the total number of vehicles is shown on the y axis, with the occupants per vehicle shown on the x axis.



*Figure 33 – Vehicle Occupants Split Graph in TRICS®*

- 19.11. There is one exception to the rules of inclusion in the TRICS® Vehicle Occupants count, and this applies in the case of multi-modal surveys at schools. Any parents or guardians who physically enter the boundaries of a school within a vehicle are included within the Vehicle Occupants count, but any parents or guardians who park anywhere outside a school will not be included (their vehicles will be included in the relevant vehicles count in all cases). It should also be noted that all parents or guardians who walk to/from school with their children or use public transport are always included in the appropriate mode within the multi-modal count. This exception is

designed to ensure that the Vehicle Occupants count is not over-represented in multi-modal school surveys, given the rules stated for all other development types as detailed within this section of this document. It is considered good practice for users to explain this exception in their reports if TRICS® trip rate analyses are undertaken for school sites.

- 19.12. A note explaining the TRICS® Vehicle Occupants count is also available as a PDF when viewing any Vehicle Occupants count for an individual TRICS® site. The button that accesses this note is shown near the top of the image in *Figure 32*, called “*Note on car sharing and vehicle occupants inclusion*”.

## **20. Understanding the TRICS Servicing Vehicles Count**

- 20.1. The TRICS® Servicing Vehicles count was first introduced for surveys in Greater London in 2014 as part of an agreement between TRICS® and Transport for London. It was then extended to specifically commissioned Standardised Assessment Methodology (SAM) surveys (see *Section 22*), before being introduced to the annual TRICS® multi-modal data collection programme in 2017. For all multi-modal surveys undertaken from 2017 onwards a Servicing Vehicles count will be included wherever such vehicles can be identified. Users should note that Servicing Vehicles counts are not included in vehicular-only TRICS® surveys.
- 20.2. When the first Servicing Vehicles counts were undertaken they were split by cars, LGV’s, OGV(1) and OGV(2) (see *Section 18*), with a new split for motorcycles added for surveys undertaken from 2019 onwards.
- 20.3. The Servicing Vehicles count records all vehicles that arrive at and depart from a site that perform a servicing function. Examples of such functions include delivery vehicles picking up or dropping off items, plumbers, electricians, fast food deliveries, waste disposal and recycling vehicles, etc). It is important to note that the criteria for inclusion of a vehicle within the Servicing Vehicles count is the function of the vehicle during each trip and not just the type of vehicle, so if a vehicle is undertaking a servicing function at a site during a survey it will be included in the Servicing Vehicles count. This also means that if a vehicle that can be used for servicing is visiting a site but is not undertaking a servicing function in that trip it will be excluded from the Servicing Vehicles count. Because of this important distinction, if vehicles servicing a site cannot be identified with a high level of confidence than a survey will exclude a Servicing Vehicles count.
- 20.4. It is also important to note that for certain types of development many of the vehicles arriving at and departing from the site would be included in the Servicing Vehicles count. An example of this would be a multi-modal survey undertaken at a O2/G (Parcel Distribution Centre) development. At such a site, many branded OGV’s might be recorded arriving at and departing from the development through the survey duration. All of these branded OGV’s would be included in the Servicing Vehicles count, because although they are vehicles belonging to the organisation of the site being surveyed, their very purpose at a parcel distribution centre would be to service the site by picking up or dropping off items. Similar levels of inclusion would also likely apply to O2/F (Warehousing – Commercial) sites.
- 20.5. Users should also be aware of how the Servicing Vehicles count sits alongside all other count types in the TRICS® database. Servicing Vehicles counts, split between the vehicle types that comprise them, are not in addition to the standard car, motorcycle, LGV, OGV(1) and OGV(2)

counts in a site record. Instead, the Servicing Vehicles count is an extract of the standard counts of those types. So, if we take for example the standard LGV's count in a survey and the total number of inbound LGV's is 25, if the corresponding number of LGV's in the site's Servicing Vehicles count is 11, this means that out of the 25 total LGV's 11 of them were servicing the site. It does not mean that we need to add the 25 LGV's in the standard count to the 11 LGV's in the Servicing Vehicles count to get to the total number of LGV's that arrived at the site during the survey. Therefore, it is very important that users understand this fundamental principle of the Servicing Vehicles count being an extract of the total counts by vehicle type and not a count in addition to them, and if reports are to include Servicing Vehicles this principle should be clearly explained to avoid potential misinterpretation by report recipients.

- 20.6. To identify which multi-modal surveys in TRICS® include a Servicing Vehicles count there is a tick box called "Servicing Vehicles count recorded" present within the Total Vehicles count screen for all individual multi-modal surveys. This indicates whether a Servicing Vehicles count was included as part of the multi-modal TRICS® survey specification that was written prior to the survey taking place. If the box is ticked but there is no Servicing Vehicles count visible this means that a Servicing Vehicles count was undertaken, but that no vehicles serviced the site through the survey. If the box is un-ticked it means that a Servicing Vehicles count was not included in the survey. However, this does not indicate that no vehicles serviced the site; it just means that such vehicles could not be identified due to the nature of the survey that was undertaken. If the box is ticked and vehicles did service the site during the survey, then the Servicing/Standard Vehicle Percentages table (see *Figure 34*) is populated. These figures are automatically calculated by TRICS®, showing the total number of standard vehicles by the 5 types (total inbound plus outbound through the survey duration), and then a percentage split between those that were servicing the site and those that were not.

Servicing Vehicles count recorded  

Servicing/Standard Vehicle percentages			
	Vehicles	Servicing %	Standard %
OGV (1)	20	70	30
OGV (2)	20	100	0
Light goods	575	29	71
Motor car	19399	0	100
Motor cycle	29	0	100

Figure 34 – The Servicing/Standard Vehicle Percentages table in TRICS®

- 20.7. An example of a Servicing Vehicles count is shown in *Figure 35*. It shows the various inbound and outbound vehicle types, with these combined in inbound and outbound totals columns.

Survey Dates		SERVICING VEHICLES											
<input checked="" type="radio"/> Saturday 28/09/19													
MODE		INBOUND					OUTBOUND						
<input type="radio"/> Total Vehicles <input checked="" type="radio"/> Servicing Vehicles <input type="radio"/> Total People <input type="radio"/> Cars <input type="radio"/> Taxis <input type="radio"/> Motor Cycles <input type="radio"/> LGVs <input type="radio"/> PSVs <input type="radio"/> OGVs <input type="radio"/> Cyclists <input type="radio"/> Vehicle Occupants <input type="radio"/> Pedestrians <input type="radio"/> Public Transport Users <input type="radio"/> Bus/Tram Passengers Total Rail Passengers Coach Passengers	Time	Car 0	LGV 83	MOTC 0	OGV1 7	OGV2 10	Total 100	Car 0	LGV 85	MOTC 0	OGV1 7	OGV2 10	Total 102
	00:00-01:00												
	01:00-02:00												
	02:00-03:00												
	03:00-04:00												
	04:00-05:00												
	05:00-06:00												
	06:00-07:00	0	1	0	2	1	4	0	3	0	0	1	4
	07:00-08:00	0	4	0	4	2	10	0	9	0	5	0	14
	08:00-09:00	0	7	0	0	2	9	0	13	0	1	2	16
	09:00-10:00	0	10	0	1	1	12	0	10	0	1	2	13
	10:00-11:00	0	9	0	0	0	9	0	6	0	0	0	6
	11:00-12:00	0	6	0	0	0	6	0	6	0	0	1	7
	12:00-13:00	0	10	0	0	0	10	0	6	0	0	0	6
	13:00-14:00	0	11	0	0	0	11	0	7	0	0	0	7
	14:00-15:00	0	6	0	0	2	8	0	8	0	0	1	9
	15:00-16:00	0	6	0	0	0	6	0	7	0	0	0	7
	16:00-17:00	0	6	0	0	1	7	0	3	0	0	0	3
	17:00-18:00	0	3	0	0	0	3	0	5	0	0	1	6
	18:00-19:00	0	0	0	0	0	0	0	0	0	0	0	0
	19:00-20:00	0	0	0	0	0	0	0	2	0	0	1	3
	20:00-21:00	0	1	0	0	1	2	0	0	0	0	0	0
	21:00-22:00	0	3	0	0	0	3	0	0	0	0	1	1
	22:00-23:00												
	23:00-24:00												

Figure 35 – Example of Servicing Vehicle count

20.8. Users can calculate trip rates for Servicing Vehicles counts in the same way as they can for all other TRICS® count types. It should be noted that the same rules apply for Servicing Vehicles as for other count types, in that for a calculation to be undertaken all surveys in a selected set must have the Servicing Vehicles count included.

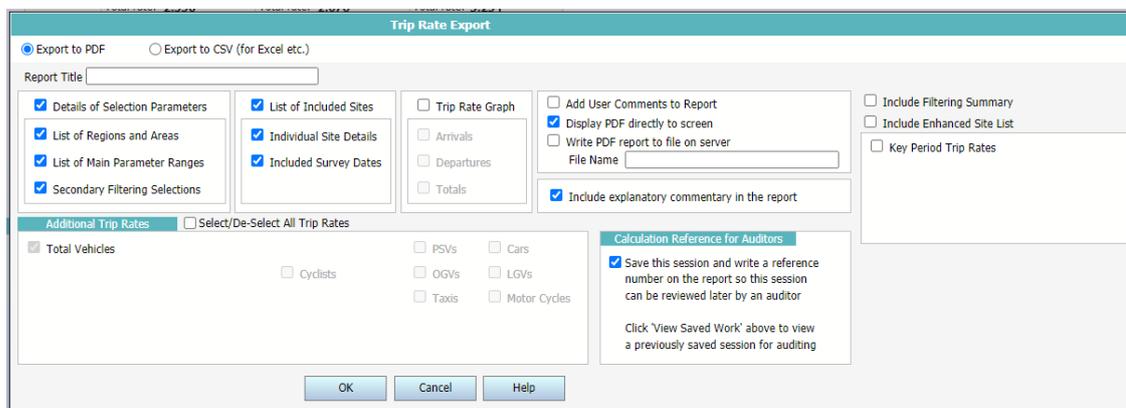
## 21. Correct Presentation of Trip Rates and Methods

- 21.1. Users have a responsibility to ensure that all data generated using TRICS®, and all subsequent reports that include TRICS® data, meet the good practice standards as outlined in this document, providing good clarity of results and explanations of all methods used.
- 21.2. Reports should be written and presented in such a way as to include clearly traceable methods as to how all data was obtained through the use of TRICS®, so that this can be fully understood by recipients and auditors of reports. Therefore, any third party with access to TRICS® themselves should be able to examine the data provided in reports and be able to scrutinise all selections and processes used to obtain trip rate results. For example, if a report states that “a trip rate of 2.34 arrivals for the hour 1700-1800 per 100m<sup>2</sup> of Gross Floor Area was generated”, this cannot be taken as fact unless the methods used to arrive at this figure are clearly outlined in the report, either in the main body of the report or within an appendix. Detailing clear methods that were used to arrive at results, and ensuring the results themselves are expressed in the correct way, is even more important if a report is to be audited by an organisation that does not have access to TRICS®, and is therefore unable to undertake their own comparative analysis.
- 21.3. If an attempt at auditing TRICS® data cannot be adequately completed due to a lack of explanatory detail provided in a report, the auditor should request all missing and required information from whoever supplied the report. The level of detail required to understand the processes that have taken place to arrive at trip rates using TRICS® is always available through

the outputs that TRICS® generates, so there can be no reasonable technical reason through the use of TRICS® for an acceptable level of detail covering the processes and selections undertaken not being provided.

- 21.4. If the full set of procedures and selections as to how TRICS® data has been obtained are included in a report, but the trip rate results are significantly different to those generated by an auditor who has access to TRICS®, both parties must work together to understand why these differences are evident, and to agree a final set of figures. Again, the best way to avoid such a scenario is for reports generated by TRICS® to include the detail of all processes and selections made to arrive at the original set of results. There is the potential for misinterpretation to occur should a report attempt to explain the processes and selections undertaken in a way that does not correspond to the way that TRICS® operates, and this is why including the detail of TRICS® PDF outputs in full is so important; these outputs are always presented in a consistent format that anyone with access to TRICS® will be familiar with, and also have the option to include automated explanatory commentary on each section of the output, which can be especially useful to auditors of TRICS® reports who may not be fully familiar with TRICS® (and for those who do not have any direct access to the system).
- 21.5. Trip rates generated by TRICS® should always be presented in their full and correct context in reports. It should be made clear in each instance what exactly is represented by the trip rates quoted. For example, a statement saying *“trip rates of 3.26 were generated by TRICS®”* would be insufficient, as this does not contain enough information for recipients of reports to successfully understand and audit the results. All trip rates quoted in reports must display the relevant time period, direction, and trip rate calculation factor (see 6.2), for the trip rates to be correctly interpreted. Therefore, a correct version of the initial statement would be *“trip rates of 3.26 trips per 100m<sup>2</sup> GFA, for the arrivals period 1700-1800, were generated by TRICS®”*.
- 21.6. The version of TRICS® used to obtain trip rate results should also be clearly stated in reports. It should be noted that PDF outputs generated by TRICS® include the version of the system used at the top of each page.
- 21.7. It is also very important to note that auditors of reports should examine PDF trip rate results outputs generated by TRICS® to identify their source. At the top of each page of outputs will be the name of the organisation that generated them along with a TRICS® licence number. Should an auditor of a report not be able to see one or either of these important items of information on the PDF, or should this information indicate that TRICS® was used by an organisation other than that which has written the report that is being audited, then it is possible that there has been a breach of TRICS® Copyright. In all such cases, auditors should contact TRICS® Consortium Limited directly to report such a potential breach, as any report produced including trip rates generated by TRICS® that have been obtained outside of our Terms and Conditions should be considered inadmissible and should be rejected. TRICS® will investigate every incidence of such potential breaches and will take all appropriate action whenever necessary.
- 21.8. Every time that trip rates generated by TRICS® are presented in reports, the land use sub-categories used to obtain the data should be clearly indicated. For example, it would be incorrect to state that *“residential trip rate arrivals were 4.11 per household for the 1700-1800 time period”*, if the residential land use sub-category is not clearly specified. As there are many land use sub-categories within TRICS® confusion can easily arise if the relevant sub-categories used in the calculation of trip rates are not made clear. Therefore, a correct version of the initial statement might be *“residential trip rate arrivals for the 03/A (Houses Privately Owned) land use sub-category were 4.11 per household for the 1700-1800 time period.”*

- 21.9. Although TRICS® can provide information through its PDF outputs showing the site selection criteria applied when calculating trip rates, it cannot explain the reasons why the criteria was applied. Providing this detail in reports is the sole responsibility of the organisation generating TRICS® trip rate results. Failure to explain the reasoning behind the selections made through the trip rate calculation process could leave the results open to challenge, and auditors of reports should request clarification on the reasoning behind any selections made should they feel this is necessary in order to fully understand what has been produced and reported.
- 21.10. The following paragraphs explain the various sections of a TRICS® PDF output that is generated following the calculation of vehicular trip rates. The examples provided are for a calculation undertaken using the 03/A (Houses Privately Owned) land use sub-category, with trip rates calculated by dwellings. These paragraphs, which conclude this section of this document, provide both those writing reports and those auditing them with some further good practice tips with regards to providing information on the selections made during trip rate calculation filtering process and understanding what the outputs mean. For auditors of reports there is some handy information on items within the outputs that they might want to focus on in terms of examining the correctness of the processes and selections that have been made.
- 21.11. It should be noted that the sections of the PDF outputs that are included in this example are just the sections that are included by default whenever a user selects to export a PDF. There are additional features that can also be included in the report, as shown in *Figure 36*. These features include additional trip rates for available separate count types (the Total Vehicles count type is always included by default), trip rate graphs, user’s own comments (which can be added to the output to provide their own further explanatory detail), a filtering summary that puts all of the selections made in to one handy area, enhanced details for the list of selected sites, and a section providing key survey period trip rates. Users are encouraged to explore these additional optional sections as they can provide good further clarity and detail.



*Figure 36 – Default sections to be included in a TRICS® PDF output with additional optional features also shown*

- 21.12. The first section of the PDF output (*Figure 37*) displays the land use sub-category that was used, along with the number of surveys in the final selected set by TRICS® regions and sub-areas (see *Section 4*). Note that at the header at the top of the page is the user-defined title of “03/A Weekday Total Vehicle Trip Rates”. A user generating a PDF output can input any title they wish, but it is good practice for the title to be an easy quick reference explaining what the overall output contains. Also note the Calculation Reference that is displayed underneath the header on the right side (see *12.7*).



Calculation Reference: AUDIT-708750-201112-1136

**TRIP RATE CALCULATION SELECTION PARAMETERS:**

Land Use : 03 - RESIDENTIAL  
 Category : A - HOUSES PRIVATELY OWNED

**TOTAL VEHICLES**

*Selected regions and areas:*

<b>02 SOUTH EAST</b>	
HF HERTFORDSHIRE	1 days
WS WEST SUSSEX	1 days
<b>04 EAST ANGLIA</b>	
NF NORFOLK	2 days
<b>06 WEST MIDLANDS</b>	
ST STAFFORDSHIRE	1 days
<b>17 ULSTER (NORTHERN IRELAND)</b>	
AN ANTRIM	1 days

*This section displays the number of survey days per TRICS® sub-region in the selected set*

Figure 37 – Land Use selection and regional breakdown in a TRICS® PDF output

21.13. The next section of the PDF output (*Figure 38*) displays the selections that have been made within the Primary Filtering stage of the trip rate calculation process. It includes the trip rate calculation parameter range (in this example Dwellings) that was specified by the user, and the actual range of the included surveys in the selected set. An important selection to focus on is the “Selected survey days” item, which indicates how many surveys were undertaken on which days of the week (see 11.5 that explains why weekdays and weekends should not be mixed together in selected sets of surveys). Another is the “Selected Locations” item, which shows how many surveys fall within each of the main TRICS® location categories (see Section 4 that explains compatibility between the various location types). The Primary Filtering is very important when it comes to auditing reports, as it contains the main selections before we move on to the more “fine tuning” stage of Secondary Parameters.

**Primary Filtering selection:**

*This data displays the chosen trip rate parameter and its selected range. Only sites that fall within the parameter range are included in the trip rate calculation.*

Parameter: No of Dwellings  
 Actual Range: 151 to 248 (units: )  
 Range Selected by User: 150 to 250 (units: )

Parking Spaces Range: All Surveys Included

Parking Spaces per Dwelling Range: All Surveys Included

Bedrooms per Dwelling Range: All Surveys Included

Percentage of dwellings privately owned: All Surveys Included

Public Transport Provision:

Selection by: Include all surveys

Date Range: 01/01/12 to 08/07/19

*This data displays the range of survey dates selected. Only surveys that were conducted within this date range are included in the trip rate calculation.*

Selected survey days:

Monday 1 days  
 Tuesday 1 days  
 Wednesday 2 days  
 Thursday 2 days

*This data displays the number of selected surveys by day of the week.*

Selected survey types:

Manual count 4 days  
 Directional ATC Count 2 days

*This data displays the number of manual classified surveys and the number of unclassified ATC surveys, the total adding up to the overall number of surveys in the selected set. Manual surveys are undertaken using staff, whilst ATC surveys are undertaken using machines.*

Selected Locations:

Edge of Town 6

*This data displays the number of surveys per main location category within the selected set. The main location categories consist of Free Standing, Edge of Town, Suburban Area, Neighbourhood Centre, Edge of Town Centre, Town Centre and Not Known.*

Selected Location Sub Categories:

Residential Zone 4  
 Out of Town 1  
 No Sub Category 1

*This data displays the number of surveys per location sub-category within the selected set. The location sub-categories consist of Commercial Zone, Industrial Zone, Development Zone, Residential Zone, Retail Zone, Built-Up Zone, Village, Out of Town, High Street and No Sub Category.*

Figure 38 – Primary Filtering selections in a TRICS® PDF output

21.14. The next section of the PDF output (Figure 39) displays the selections that have been made within the Secondary Parameter stage of the trip rate calculation process. This part of the selection process is more of an area of “fine tuning” but is also of importance and worthy of scrutiny by auditors of reports. Most of the selection information within this section lists the population and car ownership ranges and the number of surveys in the selected set that correspond to each. Selection parameters such as population and car ownership can be important factors when considering what types of sites should be included in a selected set in an early stage of the process. For example, if a development scenario is for a site in an isolated location where the local population may be minimal, it would be good practice to scrutinise the selections made in this section and potentially question any included sites that may show higher levels than those originally anticipated.



**Secondary Filtering selection:**

Use Class:  
C3

6 days

*This data displays the number of surveys per Use Class classification within the selected set. The Use Classes Order 2005 has been used for this purpose, which can be found within the Library module of TRICS®.*

Population within 500m Range:

All Surveys Included

Population within 1 mile:

1,001 to 5,000	2 days
5,001 to 10,000	2 days
10,001 to 15,000	2 days

*This data displays the number of selected surveys within stated 1-mile radii of population.*

Population within 5 miles:

5,001 to 25,000	2 days
25,001 to 50,000	1 days
75,001 to 100,000	3 days

*This data displays the number of selected surveys within stated 5-mile radii of population.*

Car ownership within 5 miles:

0.6 to 1.0	1 days
1.1 to 1.5	3 days
1.6 to 2.0	2 days

*This data displays the number of selected surveys within stated ranges of average cars owned per residential dwelling, within a radius of 5-miles of selected survey sites.*

Travel Plan:

Yes	4 days
No	2 days

*This data displays the number of surveys within the selected set that were undertaken at sites with Travel Plans in place, and the number of surveys that were undertaken at sites without Travel Plans.*

PTAL Rating:

No PTAL Present	6 days
-----------------	--------

*This data displays the number of selected surveys with PTAL Ratings.*

Figure 39 – Secondary Filtering selections in a TRICS® PDF output

21.15. The next section of the PDF output (*Figure 40*) is the list of all included sites and surveys in the selected set. This is a very handy quick reference to the location types, addresses, days of the week and trip rate calculation parameter sizes for every included site, and so gives a good summary in a single area covering all this important information. Examining this list is a quick and easy way to become familiar with the site when auditing reports.

*LIST OF SITES relevant to selection parameters*

<p><b>1 AN-03-A-09</b>      <b>DETACHED &amp; SEMI-DETACHED</b></p> <p>SLOEFIELD DRIVE CARRICKFERGUS</p> <p>Edge of Town No Sub Category Total No of Dwellings: 151</p> <p>Survey date: <b>WEDNESDAY</b> 12/10/16</p>	<p><b>ANTRIM</b></p> <p>Survey Type: <b>MANUAL</b></p>
<p><b>2 HF-03-A-03</b>      <b>MIXED HOUSES</b></p> <p>HARE STREET ROAD BUNTINGFORD</p> <p>Edge of Town Residential Zone Total No of Dwellings: 160</p> <p>Survey date: <b>MONDAY</b> 08/07/19</p>	<p><b>HERTFORDSHIRE</b></p> <p>Survey Type: <b>MANUAL</b></p>
<p><b>3 NF-03-A-13</b>      <b>MIXED HOUSES</b></p> <p>BEAUFORT WAY GREAT YARMOUTH BRADWELL</p> <p>Edge of Town Residential Zone Total No of Dwellings: 198</p> <p>Survey date: <b>TUESDAY</b> 11/09/18</p>	<p><b>NORFOLK</b></p> <p>Survey Type: <b>DIRECTIONAL ATC COUNT</b></p>
<p><b>4 NF-03-A-15</b>      <b>MIXED HOUSES &amp; FLATS</b></p> <p>SILFIELD ROAD WYMONDHAM</p> <p>Edge of Town Out of Town Total No of Dwellings: 235</p> <p>Survey date: <b>THURSDAY</b> 20/09/18</p>	<p><b>NORFOLK</b></p> <p>Survey Type: <b>DIRECTIONAL ATC COUNT</b></p>
<p><b>5 ST-03-A-07</b>      <b>DETACHED &amp; SEMI-DETACHED</b></p> <p>BEACONSIDE STAFFORD MARSTON GATE</p> <p>Edge of Town Residential Zone Total No of Dwellings: 248</p> <p>Survey date: <b>WEDNESDAY</b> 22/11/17</p>	<p><b>STAFFORDSHIRE</b></p> <p>Survey Type: <b>MANUAL</b></p>
<p><b>6 WS-03-A-04</b>      <b>MIXED HOUSES</b></p> <p>HILLS FARM LANE HORSHAM BROADBRIDGE HEATH</p> <p>Edge of Town Residential Zone Total No of Dwellings: 151</p> <p>Survey date: <b>THURSDAY</b> 11/12/14</p>	<p><b>WEST SUSSEX</b></p> <p>Survey Type: <b>MANUAL</b></p>

*This section provides a list of all survey sites and days in the selected set. For each individual survey site, it displays a unique site reference code and site address, the selected trip rate calculation parameter and its value, the day of the week and date of each survey, and whether the survey was a manual classified count or an ATC count.*

Figure 40 – List of included sites in a TRICS® PDF output

21.16. The next section of the PDF output (Figure 41) contains the trip rate calculation results table. This is the table from which average (mean) trip rates are taken and presented in reports. Note that this section includes a significant amount of automated explanatory commentary to assist auditors (and of course users) in their understanding of what this tabulated data represents. The table is split into three sub-sections, which display trip rates for Arrivals, Departures and Totals. Something that is important to note is that calculations are undertaken for each separate column independently, and so if we take into account rounding factors, the figures in the Totals column may not necessarily be the exact sum of the trip rates in the Arrivals and Departures columns (this is a perfectly normal statistical consequence and is not any sort of bug in the system). The trip rate calculation factor is shown above the table (in this example trip rates are displayed per dwelling), and the bold entries amongst the figures represent the peak periods for Arrivals, Departures and Totals. The Total Rates shown at the bottom of the table are the sums of all rates in their respective columns. It is also important to note that the commentary underneath the table explains the method used to calculate average (mean) trip rates in TRICS®, which is something that users creating reports and auditors in receipt of reports should become familiar with, to better their understanding of the mathematical processes that TRICS® undertakes to produce these results once all user selections have been made.

TRIP RATE for Land Use 03 - RESIDENTIAL/A - HOUSES PRIVATELY OWNED  
**TOTAL VEHICLES**  
 Calculation factor: **1 DWELLS**  
**BOLD print indicates peak (busiest) period**

Time Range	ARRIVALS			DEPARTURES			TOTALS		
	No. Days	Ave. DWELLS	Trip Rate	No. Days	Ave. DWELLS	Trip Rate	No. Days	Ave. DWELLS	Trip Rate
00:00 - 01:00									
01:00 - 02:00									
02:00 - 03:00									
03:00 - 04:00									
04:00 - 05:00									
05:00 - 06:00									
06:00 - 07:00									
07:00 - 08:00	6	191	0.147	6	191	0.318	6	191	0.465
08:00 - 09:00	6	191	0.171	<b>6</b>	<b>191</b>	<b>0.410</b>	<b>6</b>	<b>191</b>	<b>0.581</b>
09:00 - 10:00	6	191	0.171	6	191	0.200	6	191	0.371
10:00 - 11:00	6	191	0.167	6	191	0.192	6	191	0.359
11:00 - 12:00	6	191	0.142	6	191	0.163	6	191	0.305
12:00 - 13:00	6	191	0.180	6	191	0.182	6	191	0.362
13:00 - 14:00	6	191	0.166	6	191	0.192	6	191	0.358
14:00 - 15:00	6	191	0.185	6	191	0.229	6	191	0.414
15:00 - 16:00	6	191	0.255	6	191	0.226	6	191	0.481
16:00 - 17:00	6	191	0.299	6	191	0.196	6	191	0.495
17:00 - 18:00	<b>6</b>	<b>191</b>	<b>0.358</b>	6	191	0.185	6	191	0.543
18:00 - 19:00	6	191	0.315	6	191	0.185	6	191	0.500
19:00 - 20:00									
20:00 - 21:00									
21:00 - 22:00									
22:00 - 23:00									
23:00 - 24:00									
<b>Total Rates:</b>			2.556			2.678			5.234

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP\*FACT. Trip rates are then rounded to 3 decimal places.

The survey data, graphs and all associated supporting information, contained within the TRICS Database are published by TRICS Consortium Limited ("the Company") and the Company claims copyright and database rights in this published work. The Company authorises those who possess a current TRICS licence to access the TRICS Database and copy the data contained within the TRICS Database for the licence holders' use only. Any resulting copy must retain all copyrights and other proprietary notices, and any disclaimer contained thereon.

The Company accepts no responsibility for loss which may arise from reliance on data contained in the TRICS Database. [No warranty of any kind, express or implied, is made as to the data contained in the TRICS Database.]

Figure 41 – The trip rate calculation results table in a TRICS® PDF output

21.17. The final section of the PDF output (Figure 42) is the Parameter Summary, and this appears directly underneath the trip rate calculation results screen by default. Therefore, auditors of reports should be aware that this summary should always appear in PDF outputs unless it has been manually removed (and if this is the case then auditors should certainly request this information as it can be very important in understanding certain elements of the trip rate calculation selection process). This summary displays quick references to the trip rate calculation parameter range selected, the survey date range, the numbers of surveys for weekdays and weekend days, and the number of surveys that have been automatically and manually removed from the selected set prior to calculation. TRICS® automatically removes surveys to ensure that only one survey at a development is included in a calculation, to avoid “weighting” and “bias” (see Section 13 and Section 15), but it is the manual deselection of surveys by whoever generated trip rates that auditors should apply particular scrutiny to (see Section 15). If any surveys have been manually removed, then they would by default be listed in the PDF output, along with the reason for removal in each case. Auditors should examine these outputs carefully for any evidence of manual survey removal, starting with the Parameter Summary, and if any manually removed surveys are not listed and explanations for their removal not provided, then this information should most certainly be requested.

**Parameter summary**

Trip rate parameter range selected: 151 - 248 (units: )  
 Survey date date range: 01/01/12 - 08/07/19  
 Number of weekdays (Monday-Friday): 6  
 Number of Saturdays: 0  
 Number of Sundays: 0  
 Surveys automatically removed from selection: 1  
 Surveys manually removed from selection: 0

*This section displays a quick summary of some of the data filtering selections made by the TRICS® user. The trip rate calculation parameter range of all selected surveys is displayed first, followed by the range of minimum and maximum survey dates selected by the user. Then, the total number of selected weekdays and weekend days in the selected set of surveys are show. Finally, the number of survey days that have been manually removed from the selected set outside of the standard filtering procedure are displayed.*

Figure 42 – The Parameter Summary in a TRICS® PDF output

## 22. The Standard Assessment Methodology (SAM)

- 22.1. In 2005 TRICS® introduced a national standard methodology for assessing trip generation and mode choice at developments with travel plans in operation by undertaking surveys in the multi-modal TRICS® format. This methodology is known as SAM (Standardised Assessment Methodology). It is a system that undertakes surveys upon request including standard multi-modal TRICS® count types, with additional quantitative and descriptive information also collected on a site’s travel plan. However, it does not provide reasons for any of the trip generation or mode split results; like all standard TRICS® surveys, SAM surveys provide the trip generation data that organisations can then interpret using their professional judgement.
- 22.2. Local authorities have introduced the requirement for SAM surveys into planning agreements for new developments, so that travel plan targets can be measured against actual trip activity. For this purpose, a “Travel Plan” data section has been introduced into TRICS®, which contains descriptive information on a site’s travel plan measures, the dates when these measures were implemented, and where available their costs. As shown in *Figure 43*, SAM surveys can easily be identified within the TRICS database as they are highlighted in orange in site lists. SAM surveys are otherwise known as Level 3 Surveys, with standard multi-modal surveys being Level 2 and traffic vehicle only surveys being Level 1.

Reference	Description	Map	Town/City	Area	Location	SITE AREA	DWELLS	Survey Type	Most Recent Survey	Day of Week
NF-03-M-30	MIXED HOUSES & FLAT		NEAR NORWICH	NORFOLK	Neighbourhood Centre	6.89	119	VEHICLES	11/09/18	Tuesday
NF-03-M-31	MIXED HOUSES & FLAT		NEAR NORWICH	NORFOLK	Neighbourhood Centre	2.30	46	VEHICLES	05/10/17	Thursday
NF-03-M-32	MIXED HOUSES & FLAT		NEAR NORWICH	NORFOLK	Neighbourhood Centre	7.20	240	VEHICLES	12/09/18	Wednesday
NF-03-M-33	MIXED HOUSES & FLAT		NEAR NORWICH	NORFOLK	Neighbourhood Centre	7.20	239	VEHICLES	11/10/16	Tuesday
NH-03-M-01	TERRACED/FLATS		PLAISTOW	NEVHAM	Suburban Area (PP56 C	0.64	45	MULTI-MODAL	19/02/07	Monday
NT-03-M-01	BLOCK OF FLATS		NOTTINGHAM	NOTTINGHAMSHIRE	Town Centre	0.13	44	VEHICLES	22/11/10	Monday
NY-03-M-01	SEMI D./TERRACED		HARROGATE	NORTH YORKSHIRE	Suburban Area (PP56 C	0.80	14	MULTI-MODAL	22/09/05	Thursday
NY-03-M-03	SEMI D./TERRACED		HARROGATE	NORTH YORKSHIRE	Suburban Area (PP56 C	0.80	14	MULTI-MODAL	11/09/08	Thursday
OX-03-M-01	MIXED HOUSES		THAME	OXFORDSHIRE	Edge of Town	5.98	100	MULTI-MODAL	28/06/18	Thursday
RC-03-M-01	TERRACED		NEAR MOUNTAIN ASH	RHONDDA CYNON TAFF	Free Standing (PP56 Ot	4.30	172	VEHICLES	21/06/90	Thursday
RD-03-M-01	MIXED FLATS & HOUSE		RICHMOND	RICHMOND	Suburban Area (PP56 C	0.73	76	MULTI-MODAL	10/03/16	Thursday
RE-03-M-01	BLOCKS OF FLATS		READING	READING	Edge of Town	0.63	79	MULTI-MODAL	03/11/06	Friday
RO-03-M-01	SEMI-DET.		BALLAGHADEREEN	ROSCOMMON	Edge of Town Centre	1.02	24	VEHICLES	13/05/09	Wednesday
SC-03-M-01	HOUSES & FLATS		REDHILL	SURREY	Edge of Town	9.52	454	MULTI-MODAL	10/09/09	Thursday
SC-03-M-02	HOUSES & FLATS		NEAR FRIMLEY	SURREY	Neighbourhood Centre	11.00	342	MULTI-MODAL	10/02/10	Wednesday
SC-03-M-03	HOUSES & FLATS		REDHILL	SURREY	Edge of Town	9.52	500	MULTI-MODAL	08/09/11	Thursday
SC-03-M-04	HOUSES/FLATS		GUILDFORD	SURREY	Suburban Area (PP56 C	3.00	130	MULTI-MODAL	13/10/11	Thursday
SC-03-M-05	HOUSES & FLATS		STAINES	SURREY	Suburban Area (PP56 C	1.10	52	MULTI-MODAL	19/11/12	Monday
SC-03-M-06	HOUSES & FLATS		REDHILL	SURREY	Edge of Town	9.52	500	MULTI-MODAL	11/12/13	Wednesday
SC-03-M-07	HOUSES/FLATS		GUILDFORD	SURREY	Suburban Area (PP56 C	4.90	199	MULTI-MODAL	24/10/13	Thursday
SC-03-M-08	MIXED HOUSES & FLAT		LONGCROSS	SURREY	Neighbourhood Centre	10.68	107	MULTI-MODAL	12/11/19	Tuesday
SK-03-M-01	BLOCKS OF FLATS		PECKHAM	SOUTHWARD	Edge of Town Centre	0.69	122	MULTI-MODAL	28/09/17	Thursday
SK-03-M-02	BLOCKS OF FLATS		PECKHAM	SOUTHWARD	Edge of Town Centre	0.69	122	MULTI-MODAL	22/11/18	Thursday
SM-03-M-01	DETACHED & TERRACE		TAUNTON	SOMERSET	Neighbourhood Centre	5.09	135	MULTI-MODAL	26/09/18	Wednesday
TW-03-M-01	DETACHED & BUNGALC		NEWCASTLE	TYNE & WEAR	Edge of Town	1.57	27	VEHICLES	13/11/15	Friday
TW-03-M-02	MIXED HOUSES & FLAT		NEWCASTLE UPON TYNE	TYNE & WEAR	Suburban Area (PP56 C	2.07	108	MULTI-MODAL	19/10/18	Friday
VG-03-M-01	SEMI-DET./TERRACED		BARRY	VALE OF GLAMORGAN	Suburban Area (PP56 C	1.22	40	VEHICLES	18/10/10	Monday
WE-03-M-01	TERRACED		CHMGEFORD	WAI THAM FOREST	Suburban Area (PP56 C	1.55	48	MULTI-MODAL	15/11/07	Thursday

Figure 43 – Example of a site list with SAM surveys highlighted

- 22.3. Local authorities will vary in terms of the SAM survey conditions they may place within planning agreements, but one example might be the requirement for a survey to take place within years 1, 3 and 5 of the operation of a development's travel plan. This would enable sufficient monitoring over an extended period, and any changes to the travel plan through this period would be reflected within the Travel Plan data section within the TRICS® site records. This is of course just one example, as TRICS® has found that some developments require surveys at more frequent (sometimes annual) intervals, whilst others require more surveys or less over time until the planning agreement SAM conditions are eventually fulfilled.
- 22.4. It is highly recommended that SAM surveys are undertaken using TRICS®-approved data collection contractors, with the surveys managed by the TRICS® team.
- 22.5. As all SAM surveys are undertaken to the standard TRICS® multi-modal data collection methodology, they are fully compatible for inclusion in standard TRICS® trip rate calculations, subject of course to the usual criteria for site inclusion. There is no fundamental reason why any sites highlighted as being undertaken through the SAM process should be excluded when users undertake the trip rate calculation filtering process.
- 22.6. As with all TRICS® surveys there may be numerous factors external to a site's travel plan that influence trip generation (see 16.6). Therefore, it should not be claimed (based on the TRICS® SAM survey results alone) that a specific element of a site's travel plan has directly influenced trip generation at any SAM development, as such a claim requires significant independent evidence outside of TRICS® survey data.
- 22.7. If providing survey count and trip rate results from an individual SAM site in the TRICS® database in reports, it would be good practice to include the Travel Plan data section along with all other descriptive site information, as this will provide report recipients with important and descriptive information about the composition of the development's travel plan.
- 22.8. In December 2012, a new feature called the Travel Plan Monitoring Report (TPMR) Generator was made available within the TRICS® system (see Figure 44). This facility allows users to make a series of selections that are used to provide a summary of an individual SAM site's trip rates and modal split, along with a summary of its travel plan measures. This facility is available for any individual SAM site that includes a Travel Plan data section. It is a very handy facility that, once the user selections are made, can generate an automated PDF report containing explanatory commentary, so it is useful as a guided summary to explain the SAM survey results to anyone who may not be familiar with TRICS®. This facility can also compare trip generation and mode split results over time (should the development have been surveyed on more than one occasion) within the single report. Users are encouraged to present TPMR reports in line with the overall guidance contained within this document, in that they should explain to recipients of reports what is being presented in a clear manner, providing additional descriptive commentary of their own should this be considered necessary.

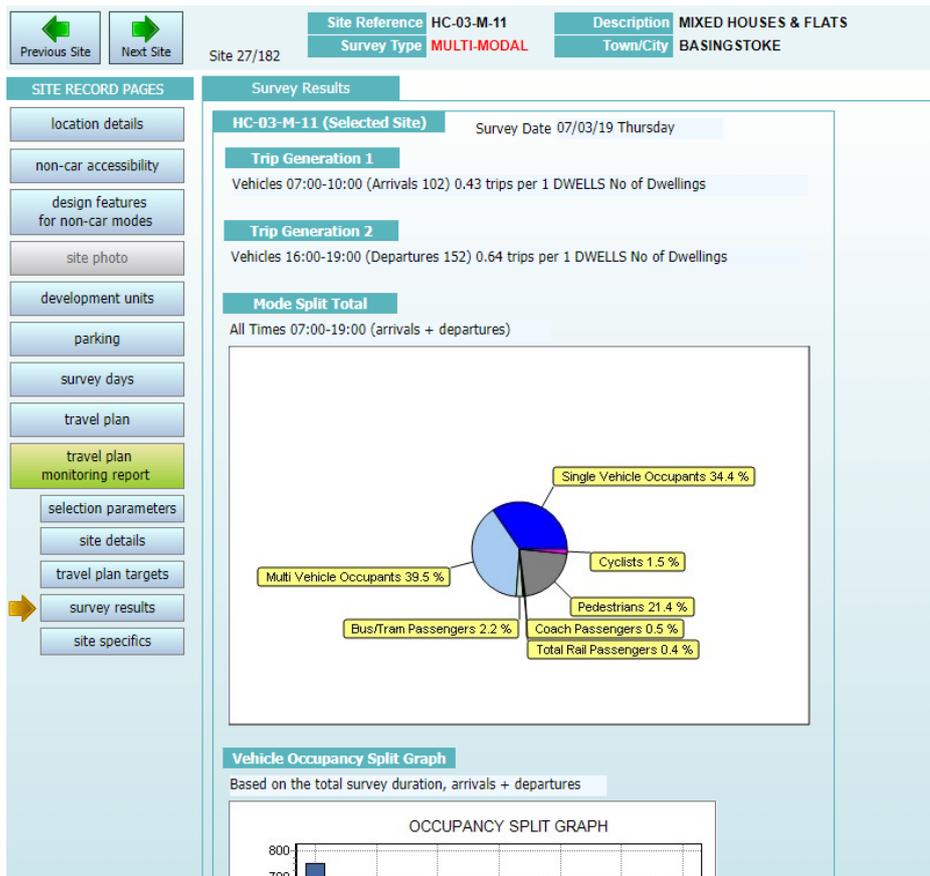


Figure 44 – Extract from the Travel Plan Monitoring Report

## 23. TRICS Compliant Surveys and the Provision of Survey Data

- 23.1. The TRICS® team can manage the whole process of undertaking a multi-modal TRICS® survey at any type of development. Should any organisation want to commission TRICS® to undertake a survey for them there is a clear and structured process in place.
- 23.2. Firstly, TRICS® should be contacted with some basic information about the development where a survey is required. This should include a plan of the site indicating all vehicular and pedestrian access points to the development, to give the TRICS® team an early indication of the general scale of a development and its potential survey complexity. Prior to a site visit by a member of the TRICS® team taking place, a TRICS® Survey Agreement must be signed (examples of this agreement are freely available upon request). This agreement includes a commitment by the client to pay a fixed fee for the initial site visit work and the subsequent production of a detailed TRICS® survey specification.
- 23.3. Following a site visit being undertaken by TRICS®, the multi-modal survey specification is produced, detailing all enumerator positions and instructions, and this allows TRICS® to provide a quote to the client that covers all work associated with the survey project. So this quote includes the fixed fee for the site visit and the production of the survey specification, the actual survey, and the subsequent data input and validation testing process, up to the point when the data is fully validated and the finalised TRICS® outputs and Certificate of TRICS® Survey Compliance ready to be forwarded to the client organisation. Once the quote has been issued, should the client decide not to proceed with the survey, then the fixed fee for the initial work

undertaken by TRICS® is charged at that point. Should the client go ahead and commission the survey, then once a purchase order for the full quote has been received by TRICS®, no fees are charged until the whole survey process has been completed.

- 23.4. Once a TRICS® survey has been commissioned (i.e. following the survey specification being produced and a quote supplied to the client and then accepted), the client is then put in contact with one of our TRICS®-approved data collection companies, so that a survey date can be agreed and the process of collecting the supporting site, development, parking and travel plan information necessary to populate the TRICS® database can commence. It is necessary for the client to assist the data collection company with the supply of relevant pieces of information about the development so that the TRICS data can be considered complete, and details of all required information is available from TRICS® in the form of a guidance document.
- 23.5. It should be appreciated that there is a reasonable period necessary for the turnaround of a TRICS® survey through its various project stages, from the initial enquiry through to the finalised TRICS® outputs being forwarded to the client. Consideration should also be given to the lead time our TRICS®-approved data collection contractors require to arrange staff and other preparations, especially so for more complex surveys requiring a higher level of resources. Following a survey count taking place, reasonable time should be considered for data processing, data input and data validation testing to take place. The actual timescales for a survey project will of course vary, depending on a number of factors including the complexity of a survey and the resources required, but an estimate of timescales can be discussed on a case-by-case basis between clients and TRICS® as projects commence.
- 23.6. There are, on an annual basis, two TRICS® survey windows. These are the Spring window (March to June) and the Autumn window (September to November). There are set cut-off dates announced on an annual basis at [www.trics.org](http://www.trics.org), after which time no new survey projects can commence for surveys taking place in the current window, so any clients wishing to commission surveys should take note of these and plan ahead. It should be appreciated that a significant amount of work is involved in taking a survey project through its various stages, and it is not something that can be turned around rapidly without potentially comprising the robustness of the final results, hence the need for such deadlines to be in place.
- 23.7. Any organisation can decide to manage a survey project themselves and supply their own survey data to TRICS® for input and validation testing, so that it can be considered and certified as being TRICS®-compliant (subject to the validation process being successfully concluded). Whilst TRICS® encourages clients to commission us to manage the whole survey process as outlined above, organisations have the option to do this themselves. However, we do emphasise that we have vast experience in managing these projects with utmost efficiency, which we believe could save clients significant costs as opposed to managing these projects themselves.
- 23.8. For a survey managed by an organisation other than TRICS® to have its data certified as TRICS®-compliant, the same procedures outlined earlier in this section, including the site visit and production of a survey specification, need to be followed in the same way as if TRICS® were managing the project ourselves, following the guidelines contained within the TRICS® Multi-Modal Methodology Document (see 18.3). TRICS® data collection forms would need to be fully populated with all site, development, parking, and if applicable travel plan information, and it should be noted that a survey cannot be considered TRICS®-compliant if this supporting information is missing. The fully completed data collection forms should then be forwarded to TRICS® for the data input and validation process to take place. There are fees associated with



this (per survey), which can be found at [www.trics.org](http://www.trics.org). It should also be noted that the TRICS® validation process is comprehensive and stringent to ensure high quality, and clients supplying survey data to go through the process should expect to receive a number of validation queries, all of which would need to be fully resolved for the data to be certified as TRICS®-compliant. Once a survey has been successfully validated, its data is kept on the TRICS® database for general access by TRICS® member organisations unless otherwise indicated by the client.

- 23.9. Having a survey certified as being TRICS®-compliant means that the data has been thoroughly tested by our fully independent organisation and is considered to be of a high standard of robustness, following a widely recognised methodology that has been in place and further developed and enhanced since multi-modal TRICS® surveys first started taking place back in 2000.

## Appendix A – A worked example of a Trip Rate Calculation scenario

In this appendix TRICS® has provided a worked example, covering a fictional development scenario, to illustrate the steps a user might go through in terms of the trip rate calculation filtering process. It is important to note from the outset that the sequence of actions shown does not apply to any specific development, with the only intention being to guide users through a potential scenario whilst applying the principles of TRICS® good practice.

The development scenario used in this example is a privately owned housing development in a suburban/edge of town location. A summary of the main characteristics of the development, which we can consider using TRICS®, is as follows.

- The site is within a suburban part of a medium sized town, not that far from the edge of town.
- The development will comprise of 120 dwellings.
- Most dwellings will be houses as opposed to flats (although there will be a mix).
- It is anticipated that at least 85% of dwellings will be privately owned.
- It is anticipated that all dwellings will have more than 1 bedroom.
- It is anticipated that there will be between 2 and 3 parking spaces per dwelling.
- Total Vehicle trip rates by dwelling are required for totals (two-way trips) for 0700-1900.
- Total Vehicle trip rates by dwelling are required for arrivals for 1600-1900.
- Total Vehicle trip rates by dwelling are required for departures for 0700-1000.

As we know that at least 85% of dwellings at the development will be privately owned, and that the majority of dwellings will be houses as opposed to flats, we can select the 03/A (Houses Privately Owned) TRICS® land use sub-category. So, at the TRICS® Homescreen we can select the 03/A sub-category. As we are calculating vehicular trip rates, we can accept the default radio button option for this, as shown in *Figure A- 1*.

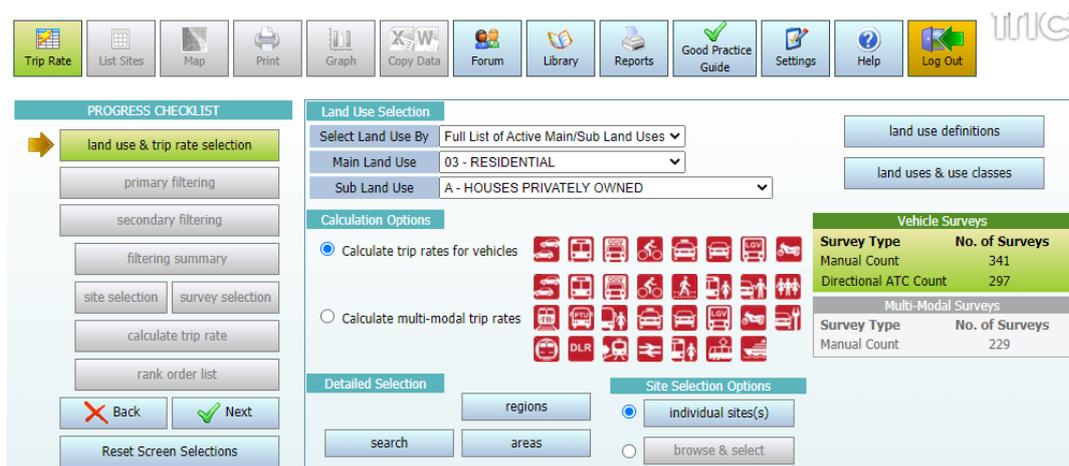


Figure A- 1 – Selecting the 03/A TRICS® land use sub-category (Houses Privately Owned)

By clicking on the **Next** button, we can commence with the filtering process. This takes us into the Primary Filtering stage. We can then make sure the correct trip rate calculation parameter is selected. For residential land use sub-categories, the “No of Dwellings” option is the default, so we accept this default and then we can start to move through the Primary Filtering section applying our inclusion criteria. The first of these is the range of the number of dwellings at the development. As our proposed

development has 120 dwellings, and we are going to apply other criteria, we need to select a reasonable range of dwellings so that we end up with a decent survey sample whilst at the same time not diluting our criteria too much. So, we can put a range of 60-180 dwellings into the Minimum and Maximum range fields (see *Figure A- 2*), making sure we click on the **Accept** button next to the range so that the database updates correctly.

Trip Rate Parameters		
Description	Surveys	Include
Site area	607	<input type="radio"/>
No of Dwellings	638	<input checked="" type="radio"/> ?
Housing density	242	<input type="radio"/>
Total Bedrooms	254	<input type="radio"/>

Parameter Range	
Selection by: No of Dwellings	
Units:	
Minimum: 4	From: <input type="text" value="60"/>
Maximum: 4334	To: <input type="text" value="180"/>
<input type="button" value="Accept"/>	

*Figure A- 2 – Selecting the required minimum and maximum number of dwellings*

The next step is for us to select the required number of parking spaces per dwelling range. Again we should proceed carefully to ensure that we do not end up with too few selected surveys, so in some cases we may have to consider extending the minimum and maximum acceptance range for this, but in this example we can apply the 2-3 parking spaces per dwelling that we anticipate at the development. So first we need to untick the “Include all surveys” default in the Parking Spaces Per Dwelling Range section, and then input 2 into the Minimum box and 3 into the Maximum box (see *Figure A- 3*). Again, we need to click on the **Accept** button once we have done this to ensure the database is updated correctly.

Parking Spaces Per Dwelling Range	
Include all surveys	<input type="checkbox"/>
Minimum: 0.23	From: <input type="text" value="2"/>
Maximum: 8.75	To: <input type="text" value="3"/>
<input type="button" value="Accept"/>	

*Figure A- 3 – Selecting the required range of parking spaces per dwelling*

We can now move on to stating our required range of the number of bedrooms per dwelling. We know from our development scenario that all dwellings will have over 1 bedroom, so as per the previous selection we can untick the “Include all surveys” box in the Bedrooms Per Dwelling Range area and input 2.00 into the Minimum box (see *Figure A- 4*), ensuring that only developments with a minimum of 2.00 bedrooms per dwelling are included in our selected set (again clicking on the **Accept** button afterwards). Note that the maximum number of bedrooms per dwelling for our selected set at this stage is 5.0. In other scenarios we may decide to reduce this number if we feel this is appropriate, but for this example we can leave the maximum number as it is.

Bedrooms Per Dwelling Range	
Include all surveys	<input type="checkbox"/>
Minimum: 1.60	From: <input type="text" value="2.00"/>
Maximum: 5.00	To: <input type="text" value="5.00"/>
<input type="button" value="Accept"/>	

*Figure A- 4 – Selecting the required range of bedrooms per dwelling*

We know that at least 85% of dwellings are anticipated to be privately owned, so we can also ensure that only sites that match this criteria are included in our selected set by stating this minimum percentage in the Percentage of dwellings privately owned area (see [Figure A- 5](#)). After unticking the “Include all surveys” box, we have a choice of inputting a minimum or maximum percentage for privately owned dwellings, so we make sure that the “Minimum” radio button is selected (as it is by default), and then we can input the figure of 85 into the data field and click on the [Accept](#) button.



*Figure A- 5 – Selecting the minimum percentage of dwellings that are privately owned*

At this point we can check to see that our days of the week are acceptable. We can see that only Mondays to Fridays have surveys that meet our criteria up to this point, so this is fine for our residential development scenario. We then move across to ensure our TRICS® location types meet our criteria. We know that the development is to be within a suburban area near the edge of town, so we can include both the “Suburban Area” and “Edge of Town” options within the “Location Types to include” area (see [Figure A- 6](#)). We note that one of the sites in the selected set is in an “Edge of Town Centre” location, so we can remove that site by unticking the “Edge of Town Centre” box.

Location Types to include		
	No. of surveys	Include
Town Centre		<input checked="" type="checkbox"/>
Edge of Town Centre	1	<input type="checkbox"/>
Suburban Area	8	<input checked="" type="checkbox"/>
Edge of Town	5	<input checked="" type="checkbox"/>
Neighbourhood Centre		<input checked="" type="checkbox"/>
Free Standing		<input checked="" type="checkbox"/>
Not Known		<input checked="" type="checkbox"/>

*Figure A- 6 – Selecting the main TRICS® location types to include*

At this point our Primary Filtering selections are complete, so we can now move on to the Secondary Filtering section by clicking on the [Next](#) button within the Progress Checklist at the left-hand side of our screen. We are then presented with our range options for population and car ownership. Once again we need to provide a balance between the strictness of our inclusion criteria and the survey sample that we end up with, with an eye on a more “inclusive” than “exclusive” approach, and we will find that with different development scenarios and conditions this will sometimes require more work than at other times. In our development scenario our site is going to be developed within a medium sized town, so we might decide to remove the highest included population ranges within a 1 mile radius and within a 5 mile radius (see [Figure A- 7](#)). This is not something we might do every time, but we may feel that this will remove the sites with the highest local populations whilst at the same time not compromising our selected set of data too much. So here we will remove the 15,001-20,000 range for the population within a radius of 1 mile and we will remove the 125,001-250,000 range for the population within a radius of 5 miles. Note that in this particular example by removing the highest population range within a radius of 1 mile the highest range within a radius of 5 miles has automatically been removed (indicating that it was the same in the selected set site in both cases).

Population < 1 Mile			Population < 5 Miles		
Select	Population Within 1 Mile	Days	Select	Population Within 5 Miles	Days
	Not Known			Not Known	
	1,000 or Less			5,000 or Less	
<input checked="" type="checkbox"/>	1,001 to 5,000	2	<input checked="" type="checkbox"/>	5,001 to 25,000	4
<input checked="" type="checkbox"/>	5,001 to 10,000	6	<input checked="" type="checkbox"/>	25,001 to 50,000	5
<input checked="" type="checkbox"/>	10,001 to 15,000	4		50,001 to 75,000	
<input type="checkbox"/>	15,001 to 20,000	0	<input checked="" type="checkbox"/>	75,001 to 100,000	2
	20,001 to 25,000		<input checked="" type="checkbox"/>	100,001 to 125,000	1
	25,001 to 50,000		<input checked="" type="checkbox"/>	125,001 to 250,000	0
	50,001 to 100,000			250,001 to 500,000	
	100,001 or More			500,001 or More	

Figure A-7 – Selecting the required population ranges within 1 mile and 5 miles radii

At this point it is very important to note that there were other selection areas within the Primary Filtering and Secondary Filtering sections of the process that we also could have actioned, but for the purpose of this example we have decided not to. Users facing different development scenarios may place more importance on some selection areas than others on a case-by-case basis, and as long as the principles of good practice outlined in this document are followed a user’s decision to omit one or more of the selection areas within the filtering process can be acceptable as long as the user’s reasoning is adequately explained. It should be remembered that it is always down to the user to justify all selections (and non-selections) that have been made, and to include all processes that have been followed clearly in their reports.

Now that we have completed our Primary and Secondary filtering selections, we click on the [Next](#) button in the Progress Checklist on the left-hand side of our screen (see [Figure A-8](#)). Whereas before we did this the buttons below the Secondary Filtering button were unavailable to us (being “greyed out”), we can see that they are now available as we have completed the Primary Filtering and Secondary Filtering stages of the process.

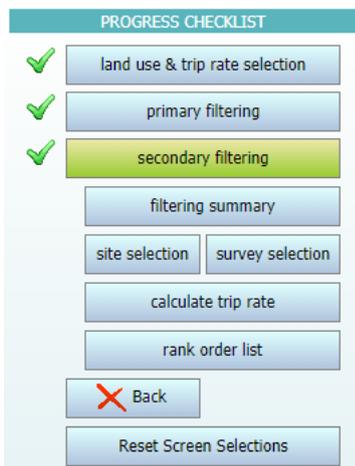


Figure A-8 – The Progress Checklist at the stage where trip rate calculations can be undertaken



Before we go ahead and calculate our trip rates, we can have a look at a summary of our filtering selections by clicking on the [filtering summary](#) button (see [Figure A-9](#)). This gives us a quick and easy recap of the criteria we have applied and the number of surveys in our selected set.

Filtering Summary		
Land Use	03/A	RESIDENTIAL/HOUSES PRIVATELY OWNED
Selected Trip Rate Calculation Parameter Range	60-180 DWELLS	
Actual Trip Rate Calculation Parameter Range	62-151 DWELLS	
Date Range	Minimum: 01/01/12	Maximum: 19/11/19
Parking Spaces Range	All Surveys Included	
Parking Spaces Per Dwelling Range:	Selected: 2 to 3	Actual: 0.23 to 8.75
Bedrooms Per Dwelling Range:	Selected: 2.00 to 5.00	Actual: 1.60 to 5.00
Percentage of dwellings privately owned:	Minimum	85%
Days of the week selected	Tuesday	1
	Wednesday	3
	Thursday	2
	Friday	3
Main Location Types selected	Suburban Area (PP56 Out of Centre)	4
	Edge of Town	5
Population within 500m	All Surveys Included	
Population <1 Mile ranges selected	1,001 to 5,000	2
	5,001 to 10,000	3
	10,001 to 15,000	4
Population <5 Mile ranges selected	5,001 to 25,000	4
	25,001 to 50,000	2
	75,001 to 100,000	2
	100,001 to 125,000	1
Car Ownership <5 Mile ranges selected	1.1 to 1.5	9
PTAL Rating	No PTAL Present	9

Figure A-9 – The TRICS® Filtering Summary

We can now examine the sites we have within our selected set by clicking on the [site selection](#) button in the progress Checklist (see [Figure A-10](#)). As we can see, one of the developments (in Liphook) was surveyed on four separate occasions, and so by default TRICS® has removed the three earliest site records for this development automatically to avoid “weighting” and “bias” in the trip rate calculations. This is clearly indicated by the inclusion boxes for three sites being unticked, and by the messages shown in the “Reason for Deselection/Automatic Removal” column on the right-hand side of our screen. In our example there is nothing else we need to do at this stage.

Select	Reference	Description	Map	Town/City	Area	Location	DWELLS	Status	Reason for Deselection/Automatic Removal
<input checked="" type="checkbox"/>	DN-03-A-04	SEMI-DETACHED		LETTERKENNY	DONEGAL	Edge of Town	83	One-Off	
<input checked="" type="checkbox"/>	DN-03-A-05	DETACHED/SEMI-DETA		LETTERKENNY	DONEGAL	Suburban Area (PP56 C	146	One-Off	
<input checked="" type="checkbox"/>	DO-03-A-03	DETACHED/SEMI-DETA		BELFAST	DOWN	Edge of Town	79	One-Off	
<input checked="" type="checkbox"/>	DV-03-A-02	HOUSES & BUNGALOW		HONITON	DEVON	Suburban Area (PP56 C	116	One-Off	
<input type="checkbox"/>	HC-03-A-18	HOUSES & FLATS		LIPHOOK	HAMPSHIRE	Suburban Area (PP56 C	62	Re-Survey	Removed: Site re-surveyed by HC-03-A-19
<input type="checkbox"/>	HC-03-A-19	HOUSES & FLATS		LIPHOOK	HAMPSHIRE	Suburban Area (PP56 C	62	Re-Survey	Removed: Site re-surveyed by HC-03-A-20
<input type="checkbox"/>	HC-03-A-20	HOUSES & FLATS		LIPHOOK	HAMPSHIRE	Suburban Area (PP56 C	62	Re-Survey	Removed: Site re-surveyed by HC-03-A-23
<input checked="" type="checkbox"/>	HC-03-A-23	HOUSES & FLATS		LIPHOOK	HAMPSHIRE	Suburban Area (PP56 C	62	Re-Survey	
<input checked="" type="checkbox"/>	LT-03-A-01	SEMI-DETACHED & DET		CARRICK-ON-SHANNON	LEITRIM	Suburban Area (PP56 C	90	One-Off	
<input checked="" type="checkbox"/>	NF-03-A-04	MIXED HOUSES		NORTH WALSHAM	NORFOLK	Edge of Town	70	One-Off	
<input checked="" type="checkbox"/>	SC-03-A-04	DETACHED & TERRACE		BYFLEET	SURREY	Edge of Town	71	One-Off	
<input checked="" type="checkbox"/>	WS-03-A-04	MIXED HOUSES		HORSHAM	WEST SUSSEX	Edge of Town	151	Initial Survey	

Figure A- 10 – The List of selected sites within the trip rate calculation process

We can also examine the survey days that we have within our selected set by clicking on the [survey selection](#) button within the Progress Checklist (see [Figure A- 11](#)). This displays the dates and days of the week of our included surveys, and again in our example there is nothing further we need to do at this stage.

Select	Reference	Date	Day of Week	Survey Type	Description	Town/City	Reason for Deselection/Automatic Removal
<input checked="" type="checkbox"/>	DN-03-A-04	26/09/14	Friday	Manual	SEMI-DETACHED	LETTERKENNY	
<input checked="" type="checkbox"/>	DN-03-A-05	03/09/14	Wednesday	Manual	DETACHED/SEMI-DETACHED	LETTERKENNY	
<input checked="" type="checkbox"/>	DO-03-A-03	23/10/13	Wednesday	Manual	DETACHED/SEMI-DETACHED	BELFAST	
<input checked="" type="checkbox"/>	DV-03-A-02	25/09/15	Friday	Manual	HOUSES & BUNGALOWS	HONITON	
<input checked="" type="checkbox"/>	HC-03-A-23	19/11/19	Tuesday	Manual	HOUSES & FLATS	LIPHOOK	
<input checked="" type="checkbox"/>	LT-03-A-01	24/04/15	Friday	Manual	SEMI-DETACHED & DETACHED	CARRICK-ON-SHANNON	
<input checked="" type="checkbox"/>	NF-03-A-04	18/09/19	Wednesday	Manual	MIXED HOUSES	NORTH WALSHAM	
<input checked="" type="checkbox"/>	SC-03-A-04	23/01/14	Thursday	Manual	DETACHED & TERRACED	BYFLEET	
<input checked="" type="checkbox"/>	WS-03-A-04	11/12/14	Thursday	Manual	MIXED HOUSES	HORSHAM	

Figure A- 11 – The List of selected surveys within the trip rate calculation process

We can now go ahead and calculate our trip rates by clicking on the [calculate trip rate](#) button in the Progress Checklist (see [Figure A- 12](#)). The trip rate calculation results table is then displayed.



TOTAL VEHICLES			Estimate TRIP rates			Weighting factors can affect trip rates. For further information please review section 13 of the Good Practice Guide			
Survey Start/End: 07:00-19:00			State TRP Figure & Extrapolate Results			<input type="button" value="OFF"/>			
Trip rate parameter range available: 62 - 151 (units: )									
TRIP RATE VALUE PER 1 DWELLS	ARRIVALS			DEPARTURES			TOTALS		
	No. Days	Ave. DWELLS	Trip Rate	No. Days	Ave. DWELLS	Trip Rate	No. Days	Ave. DWELLS	Trip Rate
	Total rate: <b>2,450</b>			Total rate: <b>2,544</b>			Total rate: <b>4,994</b>		
	Peak: 17:00-18:00			Peak: 08:00-09:00			Peak: 17:00-18:00		
00:00-01:00									
01:00-02:00									
02:00-03:00									
03:00-04:00									
04:00-05:00									
05:00-06:00									
06:00-07:00									
07:00-08:00	9	96	0.040	9	96	0.245	9	96	0.285
08:00-09:00	9	96	0.121	9	96	0.349	9	96	0.470
09:00-10:00	9	96	0.189	9	96	0.224	9	96	0.413
10:00-11:00	9	96	0.156	9	96	0.190	9	96	0.346
11:00-12:00	9	96	0.146	9	96	0.187	9	96	0.333
12:00-13:00	9	96	0.189	9	96	0.199	9	96	0.388
13:00-14:00	9	96	0.198	9	96	0.181	9	96	0.379
14:00-15:00	9	96	0.189	9	96	0.207	9	96	0.396
15:00-16:00	9	96	0.283	9	96	0.198	9	96	0.481
16:00-17:00	9	96	0.300	9	96	0.184	9	96	0.484
17:00-18:00	9	96	0.371	9	96	0.196	9	96	0.567
18:00-19:00	9	96	0.268	9	96	0.184	9	96	0.452
19:00-20:00									
20:00-21:00									
21:00-22:00									
22:00-23:00									
23:00-24:00									

Figure A- 12 – The trip rate calculation results table

We can now extract our trip rate results. As we can see, the Arrivals, Departures and Totals columns are shown, with the trip rates per 1 dwelling displayed in each of the third sub-columns. The time periods are also shown on the left-hand side, with the total trip rates for Arrivals, Departures and Totals shown in bold at the top of the table. Note that the period with the highest two-way trip rates is highlighted by a grey bar, and the highest trip rates by arrivals, departures and totals are highlighted in yellow.

In our development scenario we were tasked with obtaining the following trip rates:

- Total Vehicle arrivals (total two-way trips) per dwelling (0700-1900)
- Total Vehicle arrivals per dwelling (1600-1900)
- Total Vehicle arrivals per dwelling (0700-1000)

Note that these three sets of required figures are just for the purposes of this example, and there may be many variations in terms of trip rate periods, directions, and TRICS® count types that are required, and the three sets shown here are not indications of what users should calculate for any particular development scenario, they are just here for illustrative purposes in this one example.

Therefore, we can extract the trip rate figures from the results table shown in *Figure A- 12* as follows. Note that the expressions shown in green are a correct method of presenting single trip rate figures, whilst it is always important that the whole results table is also presented as evidence in reports.



Total (two-way) Total Vehicle trips for the period 0700-1900:

**4.994 Total Vehicle two-way trips per dwelling for 0700-1900** (taken from the bold total shown at the top of the Totals column).

Arrival Total Vehicle trips for the period 1600-1900:

We add up the separate arrivals trip rates for the 1600-1700, 1700-1800 and 1800-1900 periods to end up with **0.939 Total Vehicle arrival trips per dwelling for 1600-1900.**

Departure Total Vehicle trips for the period 0700-1000:

We add up the separate departures trip rates for the 0700-0800, 0800-0900 and 0900-1000 periods to end up with **0.818 Total Vehicle departure trips per dwelling for 0700-1000.**

We can also produce a rank order list for a stated direction and time range by clicking on the [rank order list](#) button the Progress Checklist (see *Figure A- 13*). In this example we have selected the 0800-0900 period and the direction is Departures, so the trip rates displayed in the rank order list represent Total Vehicles per 1 dwelling in each case.

Rank	Site Ref	Description	Town/City	DWELLS	Day	Date	Arrivals	Departures	Totals	Parking Spaces Per Dwelling
1	DO-03-A-03	DETACHED/SEMI DETACHED	BELFAST	79	Wednesday	23/10/13	0.089	<b>0.519</b>	0.608	2.62
2	HC-03-A-23	HOUSES & FLATS	LIPHOOK	62	Tuesday	19/11/19	0.113	0.500	0.613	2.19
3	DN-03-A-05	DETACHED/SEMI-DETACHED	LETTERKENNY	146	Wednesday	03/09/14	0.171	<b>0.432</b>	0.603	2.12
4	DN-03-A-04	SEMI-DETACHED	LETTERKENNY	83	Friday	26/09/14	0.145	<b>0.422</b>	0.567	2.19
5	SC-03-A-04	DETACHED & TERRACED	BYFLEET	71	Thursday	23/01/14	0.141	<b>0.352</b>	0.493	2.49
6	WS-03-A-04	MIXED HOUSES	HORSHAM	151	Thursday	11/12/14	0.139	<b>0.278</b>	0.417	2.28
7	LT-03-A-01	SEMI-DETACHED & DETACHE	CARRICK-ON-SHANNON	90	Friday	24/04/15	0.067	<b>0.256</b>	0.323	2.07
8	DV-03-A-02	HOUSES & BUNGALOWS	HONITON	116	Friday	25/09/15	0.103	<b>0.241</b>	0.344	2.25
9	NF-03-A-04	MIXED HOUSES	NORTH WALSHAM	70	Wednesday	18/09/19	0.071	<b>0.214</b>	0.285	2.36

Figure A- 13 – The rank order list table for 0800-0900 by departures