Nottinghamshire County Council

Review of Network Classification for Reinstatement Category and Traffic Sensitivity Designation

Consultation Overview

Content

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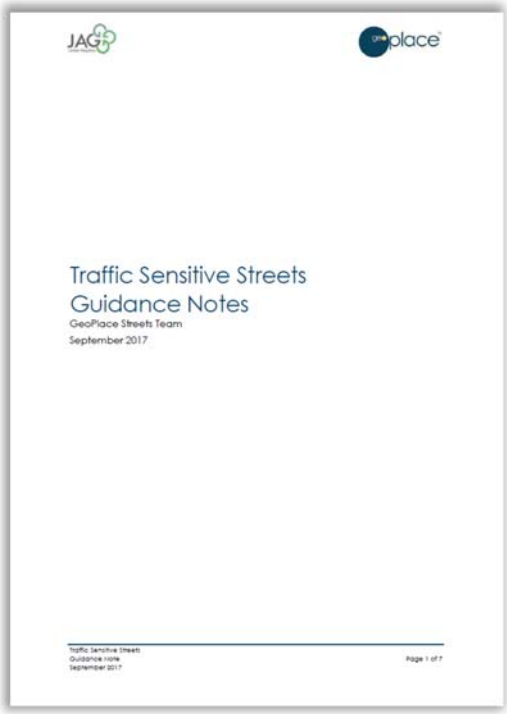
1 Introduction

1.1.1 In preparation for the introduction of a permit scheme Nottinghamshire County Council, *referred to as the Council*, has undertaken a review of the current local street gazetteer (LSG) reinstatement category and traffic-sensitivity designations. This document presents the methodology adopted for this review and update.

1.1.2 The purpose of the review was to assess differences between the current and potential designations for (1) **reinstatement category** and (2) **traffic-sensitivity** for each street (road) under the control of the Council – *highway maintainable at Public expense.*

1.1.3 This analysis has drawn upon standard guidance, *such as the National Street Gazetteer Custodian's Guidance Notes* (right), and procedures to undertake a network designation, using most recently available traffic-flow data. This will provide an evidence-based analysis to determine appropriate changes to reflect current network conditions and characteristics.

1.1.4 The output of the analysis is an up-to-date network designation which can underpin effective management of the network by the Council.



1.2 Regulatory consultation

1.2.1 Part 2 of the Schedule of the Street Works (Registers, Notices, Directions and Designations) (England) Regulations 2007 sets the procedure for the Council, *as a street authority*, to provide notice for their intention to make [changes to] the designation for a street as traffic-sensitive.

1.2.2 This document has been produced to complement this procedure, to outline the proposed changes. There is no set regulatory procedure for the Council to give notice for changes to the reinstatement categorisation, however this document also provides an overview of the methodology used for this review and the proposed changes.

1.2.3 More specific detail on the actual changes, for each street (by unique street reference number) has been published with the consultation documents.

2 Summary of Results

2.1.1 The table below shows changes between the current and new reinstatement category.

		Carriageway						Footway		Private Street	Maintained by another Highway Authority	Not Specified	Total
Current Reinstatement Category		Type 0	Type 1	Type 2	Type 3	Type 4	Type 6	High Duty	Other				
Carriageway	Type 0	14	39	44	1	8							106
	Type 1		18	124	13	17							172
	Type 2		10	118	69	21			1				219
	Type 3	1	4	84	101	40				1			231
	Type 4	4	15	75	802	11,482			1	44			12,423
	Type 6						55						55
Footway	High Duty							3					3
	Other	2	2	1	9	84			1,002				1,100
Private Street				1		26				758			785
Maintained by another Highway Authority			1								56		57
Not Specified												400	400
Total		21	89	447	995	11,678	55	3	1,004	803	56	400	15,551

2.1.2 The table below shows the reinstatement category type change by the difference between the current and future reinstatement type, i.e. '0' would indicate no change and if a Type 1 category changes to a Type 2 category this would be '-1'. In some cases, the changes will move the current designation into a new type, *e.g. from a footway to a carriageway designation.*

2.1.3 Overall, c.90% of the reinstatement categories are remaining the same.

		Reinstatement Category Type Change											
Current Reinstatement Category		-4	-3	-2	-1	0	1	2	3	4	Carriageway	Footway	Private
Carriageway	Type 0	8	1	44	39	14							
	Type 1		17	13	124	18							
	Type 2			**21**	**69**	**118**	**10**					**1**	
	Type 3				40	101	84	4	1				1
	Type 4					11482	802	75	15	4		1	44
	Type 6					55							
Footway	High Duty					3							
	Other					1002					98		
Private Street						758					27		
Maintained by another Highway Authority						56					1		
Not Specified						400							
Total		8	18	78	272	14007	896	79	16	4	126	2	45
Total %		0.1%	0.1%	0.5%	1.7%	90.1%	5.8%	0.5%	0.1%	0.0%	0.8%	0.0%	0.3%

2.1.4 The table (right) shows the proposed changes to the number of streets designated as traffic sensitive.

Current Traffic Sensitive	New Traffic Sensitive			
	No	Yes	Total	% of Total
No	14,866	50	14,916	96%
Yes	212	423	635	4%
Total	15,078	473	15,551	
% of Total	97%	3%		

2.1.5 Overall there is a proposed decrease of 162 streets from a total of 635 streets to 473 streets, with the overall volume of traffic sensitive streets representing c.3% of the total network.

3 Policy Framework

3.1 Reinstatement Category

3.1.1 The NRSWA (1991) Code of Practice: Specification for the Reinstatement of Openings in Highways (4th Edition 2019) defines the reinstatement types for roads.

3.1.2 Section 1.3 of the Code of Practice '**Road Categories'** sets out the criteria for the five types of road categories (refer to table right from the code of practice), *each with a limiting capacity expressed in millions of standard axles (msa).*

Table S1.1 Road Categories

Road Category	Traffic Capacity
Type 0	Roads carrying over 30 to 125 msa
Type 1	Roads carrying over 10 to 30 msa
Type 2	Roads carrying over 2.5 to 10 msa
Type 3	Roads carrying over 0.5 to 2.5 msa
Type 4	Roads carrying up to 0.5 msa

3.1.3 This section of the Code adds the following definition to the categorisation of roads:

- Road categories defined in Table S1.1 (as above) are based on the expected traffic to be carried by each road over the **next 20 years**.
- Valid traffic flows shall be assessed by accurately monitoring **commercial vehicles in excess of 1.5 tonnes unladen weight.**
- Traffic growth rates shall be determined from the average **of at least three separate assessments carried out over at least three years**.
- Where traffic growth rates are expected to increase significantly, as a result of changing traffic patterns, **only predictions generated from a recognised planning process may be used.** A zero-traffic growth rate shall be assumed until accurate information is available.

3.2 Traffic Sensitivity

3.2.1 The criteria and process to designate a street as traffic-sensitive is set out within the Street Works (Registers, Notices, Directions and Designations) (England) Regulations (2007).

3.2.2 Section 16 of these regulations: **Designation of streets as traffic-sensitive** defines the criteria where the Council (as a street authority) may designate a street as traffic-sensitive where **one or more** of the following criteria are met. These include criteria where the street:

- is one on which at any time the street authority estimate the traffic flow to be greater than 500 vehicles per hour per lane of carriageway, disregarding bus or cycle lanes;
- is one on which the traffic flow in both directions includes more than eight buses per hour;
- is designated by the local highway authority, as part of its winter maintenance programme…; or

3.2.3 These regulations also state that the Council may only designate a street as traffic-sensitive in accordance with the regulations for the times and on the dates when one or more of the criteria apply.

4 Methodology

4.1 Data Requirements

4.1.1 The analysis of reinstatement category and the designation of a street as traffic sensitive must be supported by inputs from a range of data sources. These fall into the following categories:

- road network data;
- traffic data; and
- complementary data.

4.2 Road Network Data

4.2.1 The road network data forms the basis of the database and analysis.

4.2.2 The Council has an inventory of all roads under their control, referred to as the **Local Street Gazetteer**), which includes the following:

- A unique street reference number (USRN);
- The current reinstatement classification; and
- The current traffic sensitivity designation and related timings.

4.2.3 **Ordnance Survey (OS) MasterMap – Highways** data has been used to add further road network detail required for the analysis, including:

- Road classification (A, B, C, D/U);
- Form of way (single or dual carriageway); and
- GIS plottable network.

4.2.4 The OS MasterMap data comprises individual road links, which can be associated with the USRNs within the LSG. Typically, a USRN contains multiple roadlinks.

4.2.5 The USRN form the basis of the classification processing task. Each USRN is represented as a 'record' within the database against which road classification information, traffic count data and assigned classification has been given.

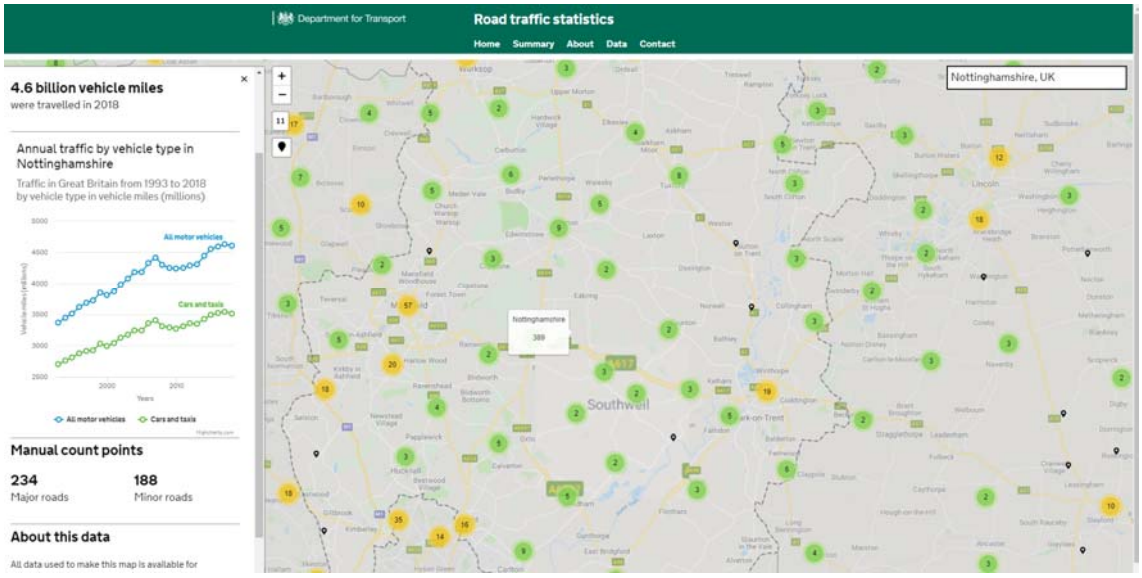
4.3 Traffic Data

4.3.1 Both classification tasks require an estimate of current traffic volumes on all roads, for which there are three sources of traffic flow data: DfT, local (Council) and derived from DfT congestion data.

4.3.2 DfT Traffic Count Data

4.3.3 The DfT collects traffic counts from various points across the Council's network and publishes this data, both in aggregated and disaggregate form, via roadtraffic.dft.gov.uk/. This data is available for selected major and minor roads.

4.3.4 There is data available for 389 individual count sites in Nottinghamshire from this DfT dataset providing a good coverage of recent traffic flow patterns on the Councils network. The graphic (below) shows the DfT Traffic Count Points across the County.



4.3.5 Analysis of the 2017 traffic count data identifies 232 DfT count sites which have traffic flow records for year 2017 which correspond to road links on the LHA network.

4.3.6 Council Traffic Flow Data

4.3.7 The LHA also collects traffic data and holds a database of counts conducted in past years. These include manual classified counts and automated traffic counts (ATCs).

4.3.8 The local data has been processed by the consultant to ensure a consistent format for the network designation requirements. This local data has been used to supplement the DfT count site data.

4.3.9 The Council holds its own traffic count data undertaken on a variety of roads across the network. This local data has been used to supplement the DfT count site data.

4.3.10 The majority of the count data is only available for a 16hr period. Annual Average Daily Traffic (AADT) has been derived by factoring the 16hr count to 24 hours by applying an uplift factor taken from the LHA provided 'factors 2017' workbook.

4.3.11 552 individual counts have been processed, assigned to a road link, and used in the network designation. This provides a good level of network coverage.

4.3.12 DfT Congestion Data

4.3.13 The coverage of the traffic count data (DfT and local counts) within Nottinghamshire provides a robust foundation for the development of the road classifications. However, not every road on the network has been subject to traffic counts, therefore it is necessary to look beyond the typical count data in order to provide an estimate of traffic volumes across the network.

4.3.14 The DfT collects statistics to monitor road congestion and journey time reliability compiled from journey time data from in-vehicle global positioning systems (GPS). This data is available to the Council and can be used by ORA, *under the relevant licence*, for analysis. This data is compiled by Trafficmaster, who are a division of Teletrac, one of the largest fleet companies in the UK.

4.3.15 The data contains average journey times for a link – an Integrated Transport Network (ITN) link - at 15-minute intervals on each day (where data exists). The data also includes the type of vehicle generating the journey time. As such, this provides a record of the number of GPS equipped vehicles which have been recorded travelling along each link for which speed data is available.

4.3.16 The coverage of this speed data in Nottinghamshire is very comprehensive, with over 80% of USRNs covered. In conjunction with the DfT and local count data this congestion data can provide data for a more granular wider network analysis.

4.4 Complementary Data

4.4.1 Some classification criteria, *in particular for Traffic Sensitivity designation*, have benefitted from local knowledge and qualitative input from those closely involved with network management across Nottinghamshire.

4.4.2 Examples of other complementary data includes bus route information from local passenger transport providers, *such as the bus route, frequency and times of service* and also the *winter maintenance network.* Bus network data and winter maintenance routes have been provided by the LHA and has been used in the designation of traffic sensitivity.

4.5 Data Collation and Processing

4.5.1 The analysis has been quantitatively supported by the inputs from a range of data sources.

4.5.2 Given the scale of the data requirements for the classification of all roads within the area, the input data has been collected and collated into a central database, allowing the necessary linkages between different datasets to be made, *for example each USRN linked to the ITN link ID within the congestion data.*

4.5.3 The specification for this database has been developed based on the data formats used, and the necessary data-joins and input criteria required.

4.5.4 The calculations required for the classification process are undertaken within the database, with the exception of some external analysis to inform input factors. These calculations include:

- Derived traffic flow calculations - *best estimate of AADT, hourly flows and commercial vehicle flows based on the most robust source of data for each road link;*
- Reinstatement category - *a reinstatement category based on the data analysis and the change to the current category;*
- Traffic sensitivity designation, *if the traffic count data identifies one of the applicable categories.*

4.5.5 Further details relating to these calculations are set out below:

4.6 Traffic Flow Calculations

4.6.1 Traffic flows on road links are a key requirement to both reinstatement and traffic sensitivity classification, and flow data must be disaggregated as follows depending on classification type: vehicle; lane; and time period (hourly).

4.6.2 These data requirements present the following challenges in terms of the analysis:

- The council does not have detailed traffic count data (whether manual or automatic traffic counts) for all of the roads within the local authority area;

- Historical trends in commercial vehicle traffic are restricted to a limited number of count locations and not available for each section of the network
- The collection of count data on each and every road link would be an extensive undertaking and would be cost prohibitive to any Council.

4.6.3 Careful review of the available traffic data against the classification requirements has informed the most appropriate means of developing the classification analysis.

4.6.4 The data sources were placed into a hierarchy which established the preferable source of data to use for classification calculations where multiple sources were available. This hierarchy is outlined in the table below:

Hierarchy	Traffic Data Source	Data Attributes
1	DfT count Data	• 232 Count Sites • Major and Minor Roads • Disaggregated by vehicle type • AADT and hourly flow
2	Local count data	• 552 Count Sites • Major and Minor Road • Disaggregated by vehicle type • Many sites only 16hr
3	TrafficMaster data	• Comprehensive network coverage • Disaggregation by vehicle type

4.6.5 **DfT count data** provides disaggregate data necessary to fulfil all classification requirements.

4.6.6 **Local count data** is also available at a disaggregate level, distinguishing by vehicle type and providing hourly flows, but many sites only capture flows for a 16hr period. The AADT at local count sites has been factored based on the profiles observed within the LHA.

4.6.7 **TrafficMaster data** does not provide traffic flow in its raw form, however a detailed analysis of the Trafficmaster record data has been undertaken, comparing the recorded GPS equipped vehicle records against the observed counts at DfT and local count sites. This established that when Trafficmaster records are aggregated over a significant duration, a strong relationship could be identified between recorded activity and observed flows.

4.6.8 Regression analysis has been undertaken to enable TrafficMaster data to be used to provide the following:

- Average Annual Daily Traffic (AADT)
- Average Annual Daily Flow (AADT) of commercial vehicles

4.6.9 Further details on the analysis and on the explanatory power of the TrafficMaster data is provided in Section 5.

4.7 Reinstatement Category Classification

4.7.1 The Notes for Guidance within the SROH provides further detail on the practical application of the classification methodology and states that calculated thresholds have been prepared in accordance with 'DMRB', the **Design Manual for Roads and Bridges**.

4.7.2 The DMRB (HD 24, DMRB 7.2.1) sets out the procedure for estimating 'Design Traffic'. The DMRB methodology has been adopted within this analysis for the calculation of MSA to determine reinstatement category. The calculation takes the following form:

- $T_i = 365 \times F \times Y \times G \times W \times P \times 10^{-6}$msa
- Design Traffic (T) = Σ Ti
- Where:
- F = Flow of Traffic (AADF) for each traffic class at opening
- Y = Design Period (Years)
- G = Growth Factor
- P = Percentage of vehicles in the heaviest loaded lane
- W = Wear Factor for each traffic class

4.7.3 The values and sources of the data used to populate each of the components of the Design Traffic calculation are set out in the following sections.

4.7.4 Flow of Traffic (AADF)

4.7.5 AADF (Annual Average Daily Flow) data is a key input to the calculation. An estimate of average daily commercial vehicle flows data is required for each road to be classified. This needs to be disaggregated by vehicle class, and in particular for commercial vehicles.

4.7.6 DfT disaggregated traffic flow data has been used as the primary source of data for the MSA calculation. Where DfT data is not available, the relationship between DfT AADT and the resulting MSA has been used to enable MSA to be calculated on road links with only local count data or TrafficMaster data available.

4.7.7 Design Year Period

4.7.8 This is defined as 20 years within the SRoH Code of Practice.

4.7.9 Growth Factor

4.7.10 The Note for Guidance states:

> Traffic growth rates should be determined from the average of at least three separate assessments carried out over at least three years';
>
> Where traffic growth rates are expected to increase significantly, as a result of changing traffic patterns, only predictions generated from a recognised planning process may be used**.** A zero-traffic growth rate shall be assumed until accurate information is available.

4.7.11 The DfT count site data is available for most sites for the period 2000-2017. This provides historic evidence of commercial vehicle traffic growth rates. The average annual growth rate for 'all HGV's' was as follows:

- -2.0% annual growth, resulting in an implied fall in HGV traffic of 37% over a 20-year period

4.7.12 This has been compared with regional Road Traffic Forecasts (RTF) produced by the DfT's National Transport Model (NTM). This provides forecast vehicle activity (veh kms) for different types of traffic at 5-yearly intervals to 2050. The rate of growth between for the period 2015-2035 has been used to derive annual and 20-year horizon HGV growth rates.

- -1.7% change in HGV traffic on 'Principal A Roads' in the East Midlands Region over 20 years.
- -5% change in HGV traffic on 'Minor Roads' in the East Midlands Region over 20 years.

4.7.13 Both sources suggest that commercial vehicle activity is likely to fall over a 20-year period. The DMRB guidance upon which the MSA calculation methodology is based indicates a preference for use of RTF as the basis for the growth rate. This is a forward-looking estimate of traffic changes, rather than the backward-looking measure based on historical evidence. Following careful consideration, the RTF forecast has been adopted for the basis of Nottinghamshire's MSA calculations.

4.7.14 Percentage of vehicles in the heaviest loaded lane

4.7.15 This is only applicable to roads with two or more lanes. In the absence of lane-by-lane data for all routes, a standard factor of **75%** derived from DMRB table 2.5 (to be used for all dual carriageways) has been adopted.

4.7.16 Wear Factor for each traffic class

4.7.17 Wear factors for different vehicle types are set out in DMRB Table 2.3 (see right). For this analysis, factors appropriate for highway maintenance (as opposed to new road) have been used within the reinstatement category calculation.

Wear Factors	Maintenance W_M	New W_N
Buses and Coaches	2.6	3.9
2-axle rigid	0.4	0.6
3-axle rigid	2.3	3.4
4-axle rigid	3.0	4.6
3 and 4-axle articulated	1.7	2.5
5-axle articulated	2.9	4.4
6-axle articulated	3.7	5.6
OGV1 + PSV	0.6	1.0
OGV2	3.0	4.4

4.7.18 Design Traffic and Reinstatement Category Classification

4.7.19 Design Traffic (in MSA) has been calculated for each USRN in the Nottinghamshire road network.

4.7.20 All roads have then been classified within the appropriate reinstatement category based on the thresholds set out above.

4.8 Traffic Sensitivity Classification

4.8.1 Traffic Sensitivity designation considers a broader range of criteria and requires a wider range of inputs. The table below summarises the data requirements and sets out the sources of this data, and any derivation processes required.

Classification Criteria	Data Sources
a) Traffic flow greater than 500 vehicles 500 vehicles per hour per lane of carriageway.	Traffic flow data Where hourly data is available, this is used. Otherwise hourly flows are factored from AADT (see below).
b) Single carriageway two-way road, the carriageway of which is less than 6.5 wide, having a traffic flow in both directions of not less than 600 vehicles per hour.	Traffic flow data Where hourly data is available, this is used. Otherwise hourly flows are factored from AADT.
c) Falls within an area covered by an order in respect of congestion charges.	Criteria not applicable.
d) More than 25% of traffic flow in both durations consists of heavy commercial vehicles.	Where disaggregated HGV flows are available, calculation is made. Otherwise these criteria are not calculated (as average HGV flows are below 25% so factoring not insightful).
e) Traffic flow in both directions includes more than eight buses per hour.	Council data
f) Designated by LHA as part of its winter maintenance programme	Council data
g) Within 100 metres of a critical signalised junction or a critical gyratory or roundabout system.	Local knowledge
h) Pedestrian traffic flow of at least 1300 people per hour, per metre width of footway	Local knowledge
i) On a tourist route or within an area where international, national or significant major local events take place	Local knowledge

4.8.2 Analysis of Nottinghamshire's traffic data has provided quantitative evidence to support a designation of criteria a), b), d) and e). Criteria c) does not apply to the Council.

4.8.3 Identifying streets that fall within criteria f) has been undertaken using the list of the Council's winter route maintenance roads.

4.8.4 Identifying streets that fall within criteria g), h) and i) has been undertaken manually drawing on the local knowledge of the network within the Council.

5 Using TrafficMaster Data for Analysis

5.1 Introduction to TrafficMaster Data

5.1.1 TrafficMaster data is made available to councils and their consultants under license by Teletrac Navman. This data is collected from vehicles equipped with the TrafficMaster GPS equipment and provides data on trips and on vehicle speeds when travelling on the highway network.

5.1.2 Teletrac Navman vehicles have Global Positioning System (GPS) units fitted. They are 'fixed' which means they are built in and cannot be removed (unlike a mobile phone or removable sat nav). This is also known as telematic data.

5.2 Using TrafficMaster Data to Estimate Traffic Flows

5.2.1 TrafficMaster data is primarily used by the DfT and by councils for the purpose of estimating travel times and network congestion. The records represent just a small sample of overall traffic flow, but vehicle speeds can be estimated with reasonable accuracy.

5.2.2 Whilst the data is collected for the main purpose of measuring traffic speeds (congestion), the recorded vehicle activity and location provides potential insight into the most commonly trafficked roads and hence into the scale of vehicle flow on these roads.

5.2.3 The use of this data to estimate traffic flow is beyond its typical application and as such it is important to establish the explanatory power of this dataset in an application for which it is not typically used.

5.2.4 Comparison of TrafficMaster recorded vehicle activity against known traffic flows provides the means of assessing the predictive power of TrafficMaster data to determine likely traffic flows on roads with no observed traffic flow data available.

5.2.5 Where local count data is available, *either manually counted or collected by automatic counters*, this represents the most robust source of traffic flow information. For roads which have no traffic count sites, there is a need to make best estimates of likely traffic volumes. For these roads, the TrafficMaster data is used as a means of estimating likely flows.

5.3 Process for expanding TrafficMaster Data

5.3.1 The initial step in the process of factoring the TrafficMaster data to make estimates of traffic flow is to establish the available sample size and how this compares to the traffic flow on roads with known flows, *i.e. those for which DfT or local count data is available.*

5.3.2 The TrafficMaster data provides details of each vehicle movement along a link. For the purposes of this analysis, the journey time/speed data is not required. Only the number of vehicle movements recorded along a particular link are of relevance.

5.3.3 A **strong correlation** between the number of TrafficMaster equipped vehicle movements recorded annually and the counted traffic volumes can be observed. The relationship is also observed to hold over roads with a wide range of traffic volumes.

5.3.4 To establish a better understanding of the relationship between TrafficMaster recorded activity and observed count data, further regression analysis has been undertaken by individual road type (A, B, C/U road), with outliers identified and removed.

5.3.5 The output of this analysis are individual expansion factors by road classification which provide the most accurate means of expanding annual TrafficMaster records to estimate AADT on any given road link.

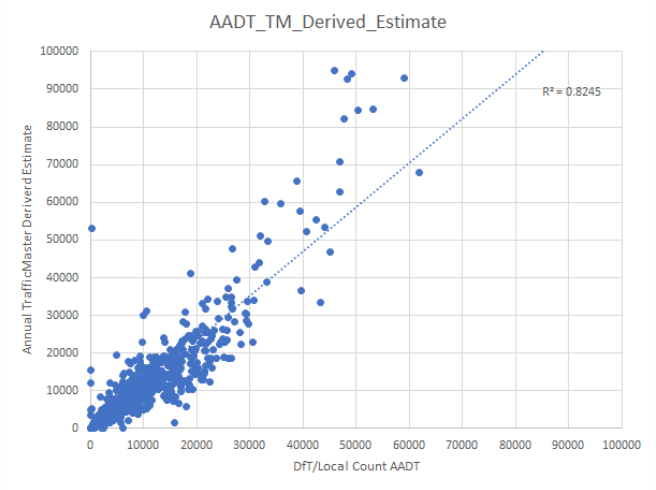
5.3.6 In order to compensate for the risk of outliers within the wider TrafficMaster dataset, the typical traffic volumes for different road classifications has been carefully reviewed, using DfT count site data.

5.3.7 From this analysis, a series of typical flow 'thresholds' has been established which are then used to screen resulting flow estimates based on TrafficMaster data. Applying these thresholds reduces the risk that outlier TrafficMaster records, *for example links with no data*, result in unlikely flow estimates.

5.4 Resulting TrafficMaster Explanatory Power

5.4.1 After applying the factors, the explanatory power of the TrafficMaster derived count estimates are found to improve. The plot below shows the comparison of DfT and local count site AADT compared with the TrafficMaster derived estimate at that location.

5.4.2 There remain some outliers in which TrafficMaster data derived estimates underestimate the true recorded traffic volume. It is considered preferable that where outliers occur, they lead to underestimated rather than overestimated flows. This avoids roads being classified as traffic sensitive or a greater reclassification status when the true flows does not justify this.



5.4.3 In the absence of observed count data, TrafficMaster derived flow estimates provide the most robust alternative means of estimating the likely true traffic flows.