Tickenham Road Action Group (TRAG)

B 3130 Traffic Analysis with view to the new roads proposed in JSP 3 documentation

Impact Assessment of JSP3/JLTP 4- Traffic on B3130 through Tickenham

1. Introduction,

This report has been produced by the Tickenham Road Action Group in response to the proposed future road schemes that will adversely affect and impact on the B3130 through Tickenham.

The purpose of this high-level research is to understand the current traffic flows on the B3130 through Tickenham and to assess the likely effects of additional traffic arising from the 3200 houses and 10.5 hectares of employment land being proposed in Nailsea and Backwell and any natural generic growth. In addition, to also assess the impact of interconnecting link roads outlined in the JLTP 4 proposal. This analysis predominately considers traffic movements during morning peak hours.

2. Summary

1. Traffic data from North Somerset Council (Feb 2019) has been used as the basis of this analysis. DfT modelling tools have been used to calculate capacity (section 5).
2. The calculated maximum capacity (per carriageway) of the B3130 is 856 vehicles per hour (section 5). Exceeding this volume will lead to significant traffic capacity issues and increased journey times, combined with the resultant impact on safety and environmental measures.
3. Current peak usage (North Somerset Council survey February 2019) is 798 vehicles per hour (Eastbound - Appendix A). Therefore, the B3130 can be currently deemed as 'near capacity'.
4. There has been natural generic growth in daily traffic volumes of 15% within 18 months, between N/S surveys undertaken in Sept 2017 and Feb 2019. (Appendix A and B)
5. The impact of an additional 3200 new homes and additional link roads joining the B3130 (W4 and W5) at peak hours is estimated as (section 7) :-
    - Westbound traffic on the B 3130 at peak times: an additional 332 vehicles per hour (section 7). This increases (742 current + 332 projected = 1074 vehicles/hour).
    - Eastbound traffic on the B 3130 at peak times: an additional 565 vehicles per hour (section 7). This increases (798 current + 565 projected = 1363 vehicles/hour).

    Both these values exceed the calculated maximum capacity of the B3130 (max capacity 856 vehicles per hour per carriageway)
6. Increasing traffic flows joining the B3130 via the W4/W5 link roads will cause significant backing up of traffic through Tickenham. Delays/congestion will occur

on both the upstream/downstream B3130 traffic, due to the effects of this merging traffic.

7. Traffic growth of approximately 20% by 2036 (section 6) further exacerbates (1074 x 1.2 = 1288 vehicles per hour) and (1363 x 1.2 = 1635 vehicles per hour)
8. Further estimated growth through interconnected roads (A370, Backwell, Nailsea) and Bristol Airport (planned on doubling its capacity in the next decade) is estimated to contribute to at least a further 400 vehicles per hour at peak times. Section 7
9. It is clear through this analysis that the B3130 is not a suitable route for additional traffic to support the JSP.
10. This analysis focuses on the impact of an increase in traffic through Tickenham, it is recognized that there will be other submissions that will contribute further to this analysis.
11. In preparing this analysis it is recognised that no detail has been published as to plans/usage of the 10.5 hectares of business estate. This business estate will generate additional traffic volumes which will directly impact B3130 usage and future capacity projections.
12. Within the Tickenham village settlement, current B3130 road capacity and traffic flow is further impacted as a result of no laybys for public transport. Buses halt on the carriageway to pick-up and drop-off passengers, frequently causing tailbacks. It is not feasible to construct future laybys off the carriageway, therefore this impact will remain into the future.

3. Methodology

- Identify relevant DfT standards applicable to calculating capacity using data modelling techniques.
- Analysis of current traffic flows at peak times, extracted from N/S traffic data Feb 2019 at Appendix “A”, and TRACSiS s data sets (N/Som survey September 2017. Appendix “B”). Compare these results with DfT Standards for data modelling.
- Project estimated traffic levels arising from the JLTP 4 strategic plan and proposed Nailsea and Backwell 3000+ houses /industrial developments.
- Understand the likely impact of future traffic flows through Tickenham emanating from a wider geographical area, due to the interconnection of road networks.

4. Documents

- DfTt TAG Unit M3.1 Highways Assignment modelling (Transport Analysis Guidance January 2014)
- DfT Forge Document (April 2005)
- DfT letter dated recommendation re data modelling
- North Somerset data set February 2019 Appendix A
- TRACSiS Data Set September 2017 Appendix B

- DfT DMRB (Design manual for Roads and bridges TD9/93)

5. Data Modelling - Flow Capacity Calculations

DfT standards Tag 3.1 and Forge are the two standards used in traffic modelling for calculating capacity. In discussion with DfT Tag 3.1 is the preferred method, to be used, as this formula includes factors for HGVs and road width. The Forge method has been applied to TRACSiS data 2017 and is included at Appendix C for reference.

5.1 Model Formula

With reference to Appendix D of the DfT TAG Unit M 3.1 2014 document (see Table E3, page 56); defines the formula to calculate the capacity of a rural single carriageway per direction as:

QC = {2400(CWID - 3.65)/CWID} x { (92 - PHV)/80 } vehicles/hour

QC Capacity: defined as the maximum realistic value of Q (vehicles/hour/direction)

CWID Average carriageway width between white line edge markings, excluding

any painted out portion. ***(B 3130 width taken as 5.6 M)***

*PHV Percentage of heavy vehicles (OGV1 + OGV2 + PSV) (**default condition taken as 10%)**.*

Therefore from the above formula max flows/lane is calculated as:

{2400(5.6-3.65)/5.6} x { (92-10)/80} = **856 vehicles/hour**

Notes

(1) The above TAG M 3.1 document formula includes variances for HGV and road width

(2) PHV is defined as: vehicles with double rear wheels, two or more axles, including ambulances, box vans, trailers etc (Ref 1)

(3) The TAG M3.1 formula allows for ranges 2 to 30% and suggests a 2% value for PHV based upon a rural road. For the purpose of this exercise a value of 10% has been chosen as this is a truer representation of heavy vehicles from/to J20 M5.

(4) Local factors such as geometry of the road, buses, tractors, cyclists, school, pedestrians, road works, delivery vehicles etc. will decrease the calculated capacity of 856 veh/hr.

5.2 Alternative DfT FORGE (2010) Approach (Appendix "C")

The FORGE approach requires that the source data needs to be modified, to include number of HGVs and weightings for other types of vehicles.

6. Results from the North Somerset data February 2019 and TRACSiS survey 22nd September 2017

6.1 Appendix ”A”; North Somerset data Feb 2019; Extracted current peak flows and daily flows, as can be seen the current max peak flows (798) is approaching the maximum capacity figure as derived from the TAG 3.1 method (QC = 856 vehicles/hour), only 6.7% from calculated capacity. Other peak hourly data flows are also nearing this value.

The maximum number of vehicles passing through Tickenham is currently nearly 15,000 per day

The North Somerset classification of HGVs identifies about 50 vehicles over a 24 hour period. This figure appears to be underestimated as the number of HGVs observed passing through Tickenham are considered significantly greater. The HGV figure may be attributable to the Loop profiler classification technology.

6.2 Appendix “B”, TRACSiS (survey 2017) this data set is somewhat historical but is useful to compare the increase in traffic flows through the village. Comparing daily flows from 2017 to 2019 shows an increase of about 15%. The Clevedon Lodge site represents the best location to record traffic flows through Tickenham.

6.3 Appendix “C”, these shows TRACSiS data (2017) at peak times incorporating the FORGE data methodology, this being implemented to calculate the maximum capacity, a factor of 10% has been introduced for HGVs this is further modified by an additional weighting factor of 3 being applied for each type of heavy vehicle.

Note due to its somewhat historical nature, Appendix C has been included for reference only

7 Future Estimated Vehicle Journeys

These estimates are separated into two parts: commuting journeys; and vehicles per hour at peak times. This conversion is necessary to harmonise with the peak vehicle hour flows as recorded in traffic surveys.

7.1 Estimated vehicle journeys arising from the proposed new development 3200 Houses

Government publications confirm that:

In the South West, vehicles/household is 1.35 (Ref 2 - GOV UK) of these 66% are used for commuting (Ref 3 – DfT Statistics)

At the junction of the proposed W4 link and the B3130, route choice suggests that 37% of traffic will route towards Clevedon and 63% towards Bristol (Ref – 3) Trip generation and Trip distribution using the TRICS database have also been considered (Ref 4 - North Somerset D&E Highways).

Table 1 Vehicles commuting as a result of the new development of 3200 houses

New House development	Veh/ household (1.35)	Vehicles commuting (66%)	To B3130 via W4 link (70%)	Westbound To J20 traffic 37% - B3130	Eastbound To Bristol traffic 63% - B3130
3200	4320	2851	1995	738	1257

This above estimation shows the number of increased commuting journeys joining the B3130 (column 4 – via W4 link) and the distribution of commuting vehicles (col 5 and 6), both eastbound and westbound through Tickenham.

Notes:

- It is estimated that 70% of commuters from Nailsea are envisaged to travel on the new road links as this route offers the best access to Bristol and M5 J20. This additional traffic will significantly add to the existing volumes of traffic through Tickenham.
- The above commuter journeys do not take into account heavy vehicles, private and heavy vehicles travelling to/from the proposed 10.5 Hectares of development land, or any other natural generic growth in traffic.

7.2 Peak Hourly traffic flows from commuter traffic from Table 1..

For the 3200 new build houses resulting in commuter traffic it is necessary to calculate the percentage of these commuter vehicles that will travel within peak times, these results can then be shown as vehicles/hour, in line with the other recorded flow data.

The simplified conversion method, was to take the peak flow 798 and divide by the summation of traffic flows (from North Somerset data Appendix A) at peak time from 6 am to 9 am

In summary 45% of commuter traffic from the 3200 houses, will travel during peak travel times.

7.3 Inter connection of proposed links

The wider picture concerns the additional flow of traffic resulting from the interconnection of proposed new link roads (W4/W5), leading to increased traffic flows from A370, Bristol Airport and other Industrial and residential developments along these corridors. There are also planned major housing developments in Weston super Mare, the traffic from these developments will potentially further add to the traffic through Tickenham

For example the A370 traffic that now travels westwards at peak times to join the M5 J21. This route is laborious and provides slow journey times, especially through the small villages of Backwell, Cleeve, Congresbury and Hewish. Initial assessment of traffic on the A370 (westbound) is measured at 600 vehicles/hour during peak times. It is estimated that 60% (360) plus other local traffic (40) will divert on the B 3130 via Tickenham to join the M5 at junction 20.

Table 2 Vehicle flows at peak times for new developments and Interconnection of Networks (vehicles/hour).

B3130	Nailsea Development (45% of commuters)	A370 linking to the B3130 + local traffic	Sub Total	Projected 20% increase in traffic (see Note 1)	Estimated Total (Vehicles/ hour)
Eastbound	565	nil	565	113	678 v/hr
Westbound	332	(360+40) 400	732	146	878 v/hr

Note 1: A 20% factor has been included for the predicted growth of journeys JSP suggests a 24% increase in journeys to 2036 and DfT suggests 17 to 50% by 2050. (Ref 5 – JSP SD16 Table 3.2 and DfT forecasts 2018)

7.4 Overall summary of increase in Traffic flows at peak times through Tickenham – (Table 2 with Current peak flows).

The estimates of vehicles travelling at Peak times are shown in the table below, these figures relate to vehicles/hour

Table 3 Cumulative predictive flows of traffic at peak hours through Tickenham

B 3130	Current pk Veh/hr	Estimated Veh/hr	Total Veh/hr		TAG 3.1 Max capacity Limit
Eastbound	798	678	1476	To J20 M5	856
Westbound	742	878	1620	To Bristol	856

These resultant flow rates at peak times are demonstrated to be excessively above the calculated capacity of the B 3130 through Tickenham.

As previously mentioned, no account has been taken for Heavy vehicles and Industrial developments arising from the proposed 10.5 hectare developments.

8.Conclusions

8.1 Traffic Analysis

TAG 3.1 traffic data modelling has been used as the preferred option to calculate capacity.

The TAG 3.1 formula used to calculate maximum capacity (856) is dependent upon variables of road width and number of HGVs. HGV traffic has a significant effect on capacity; a higher number of HGVs will lower capacity.

As can be seen from the recent traffic survey data at Appendix "A, the current peak traffic flows through Tickenham are already approaching the maximum capacity levels (856) as defined in the DfT TAG 3.1 formula

From the results obtained, comparing daily traffic flows from the recent N/Som data (2019) to the TRACSiS data (2017) represents an increase in Traffic through Tickenham of about 15% over the 18 month period.

Predicted peak traffic flows (Table 3) when added to the current peak traffic flows, will significantly exceed the capacity of the B3130. It can therefore be concluded that the B 3130 through Tickenham is unable to facilitate this increase in levels of Traffic.

Future developments including housing and industrial units in Nailsea and Backwell, the expansion of Bristol International Airport and the linking of the A370 to the B 3130 (to provide a route direct to the M5 J20 through Tickenham) will generate a substantial increase in vehicle movements.

The B3130 through Tickenham already suffers from frequent delays/congestion caused by ; recycling vehicles, cyclists, school pedestrian crossing, tractors, right turns, buses stopping on the highway, road maintenance and M5 diversionary routing. Any further increase in traffic would further worsen an already difficult situation.

Emergency services frequently use the B3130 from their HQ in Nailsea and require uncongested routes for their emergency vehicles, any proposed increase in traffic will further reduce their ability to provide a fast response.

Within these results no consideration has been given to the number of HGVs on the B3130, observations indicate a much higher number than those reported in N/Som classification Feb 2019 (50 /day). In general these vehicles are at the high end of the classification in

terms of weight, length number of axles. The damage caused to services/properties by weight/vibration levels is apparent by the frequent number of road works taking place in the village. This frequency is likely to increase as a result of the planned 10.5 Hectares of employment land likely to attract growth in heavy vehicles.

Within the Tickenham village settlement, current B3130 road capacity and traffic flow is impacted as a result of no laybys for public transport. Therefore buses halt only on the carriageway to pick-up and drop-off passengers, frequently causing tailbacks. It is not feasible to construct future laybys off the carriageway therefore this impact will remain into the future.

8.2 Road Safety/Environmental

A considerable area for concern is associated with the School at the centre of the village, there is already a significant risk to parents/children walking to and from the school on narrow pavements as a result of enforced remote parking in the village hall. It is obvious that this already high risk situation will substantially increase with an increase in traffic.

Existing traffic levels on the B3130 already impact upon the village of Tickenham, environmental issues such as pollution, noise, air quality and the social effects of not being able to safely walk/cycle through the village.

Road safety in general needs to be taken into account when considering road schemes, many factors including road layout and geometry as well as traffic levels are seen as fundamental inputs to an overall assessment.

9. References

Ref 1 – PHV, (OGV! OGV2, PSV); Standard UK Vehicle Classification Scheme COBA 7

http://www.videodatapad.com/faq/standard-uk-vehicle-classification

Ref 2 –Vehicles/Household – GOV UK NTS 9902 2016/17

Ref 3 – 66% Commuting vehicles - DfT Road User Statistics 2016

Ref 4 – North Somerset D&E Highways and Transport 10 February 2016 re 16/P/0032/O

Ref 5 – Predicted Traffic Growth - DfT Road Traffic Forecasts 2018 and JSP SD16 F Table 3.2

DfT DMRB (Design manual for Roads and bridges TD9/93)

http://www.standardsforhighways.co.uk/ha/standards/dmrb/

DfT Forge Document (1996)

https://webarchive.nationalarchives.gov.uk/20110203141514/http://www.DfT.gov.uk/pgr/economics/ntm/etheroadcapacityandcosts3031.pdf

DfT TAG Unit M3.1 Highways Assignment modelling (Transport Analysis Guidance) .

https://www.gov.uk/government/publications/webtag-tag-unit-m3-1-highway-assignment-modelling

DfT letter dated recommends for data modelling a flow rate of **1000** PCUs

North Somerset Data sets; February 2019 Appendix A

TRACSis Data Set September 2017 Appendix B

FORGE assessment on TRACSiS data Appendix C

10. Document Ownership

This report has been prepared by Alan Raines (retired Highways Agency Engineer) for the Tickenham Road Action Group with input from numerous Road Traffic experts.

The Tickenham Road Action Group can be contacted at info@trag.org.uk.

I confirm that the traffic information in this report is accurate and taken from independent surveys. The calculations and formulae used are recognised by the DfT. My purpose in preparing this report has been to present an objective and accurate analysis to the Examiner

A G Raines I Eng FIET; HA (Highways Agency) Senior Engineer (retired) – Working in ITS (intelligence transport systems). Experience in transport data modelling and architecture implementations. Member of UK/ European Commission on research and development

programmes incorporating traffic management projects and the UK representative on other EC Commission groups and committees dealing with traffic-related issues.