

TECHNICAL NOTE

DATE:	08 November 2021	CONFIDENTIALITY:	Public
SUBJECT:	Stage 4 hearing (air quality) – Response to Inspector Questions		
PROJECT:	Calderdale Local Plan Examination	AUTHOR:	Lee Shelton
CHECKED:	Tom Randall	APPROVED:	Stuart Bennett

BACKGROUND

This technical note has been produced in response to questions and requests for clarification raised by the Inspector at the Calderdale Local Plan - Stage 4 Hearing Air Quality (documents CC132/132a/151) held on the 29th of September 2021. The requests for clarification relate to the following:

- The results presented in Table 4-5 of CC132 '*Air Quality Assessment*' and the specific location and reason behind the 12 predicted exceedances in Bradford/Cleckheaton described in paragraphs 4.2.3 and 4.2.21 and associated Figure 6-12 (Do-Something without Local Plan) and Figure 6-13 (Do-Something with Local Plan) shown in CC132a.
- The reason why HGVs reduce in Brighouse on road link A643 Wakefield Road producing a reduction in annual mean concentration of NO₂ as reported in Table 3-2 of document CC151 '*Air Quality Assessment-Supplementary Information*'.
- Clarification as to why the Calderdale Strategic Transport Model (CSTM) census /verification zone drawing in Appendix A Figure B.1 of CC151 '*Air Quality Assessment-Supplementary Information*' does not appear to correspond to the verification zones described in Table B.3 of that Appendix.

A separate technical note¹ has been provided in response to question 4 which was:

4. *Air quality assessment results in CC132 and CC151*
 - *Impact of the Plan on compliance with the EU Directive*

COUNCIL RESPONSES

The results presented in Table 4-5 of CC132 '*Air Quality Assessment*' and the specific location and reason behind the 12 predicted exceedances in Bradford/Cleckheaton described in paragraphs 4.2.3 and 4.2.21 and associated Figure 6-12 (Do-Something without Local Plan) and Figure 6-13 (Do-Something with Local Plan) shown in CC132a.

The location of the 12 predicted exceedances on Tong Street in the south-west of Bradford and on the M62 to the north of Cleckheaton are shown in **Figure 1** and **Figure 2** which for regional context can be viewed in conjunction with Figure 6-9 of CC132 showing the Affected Road Network Screened Study Area.

¹ WSP (2021). Stage 4 hearing (air quality) – compliance with EU Directive. 30th September 2021.

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Figure 1 Location of Exceedances on Tong Street, Bradford (outside Calderdale)

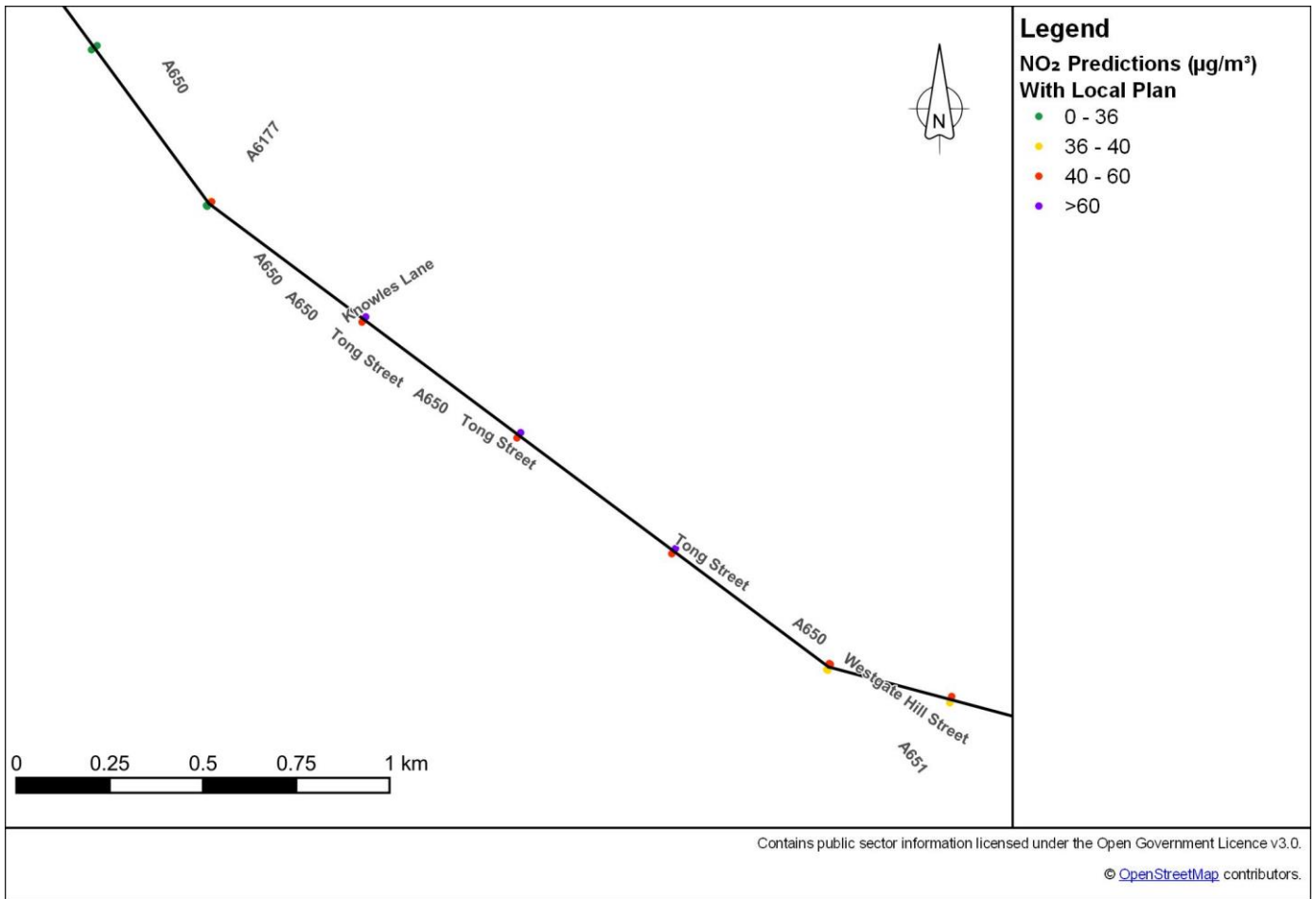


Figure 1 shows the location of 7 exceedances at the roadside of Tong Street in south-east Bradford. Tong Street is on the section of road between Bradford and Morley as shown in Figure 6-9 of CC132.

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Figure 2 Location of Exceedances on the M62, Cleckheaton (outside Calderdale)

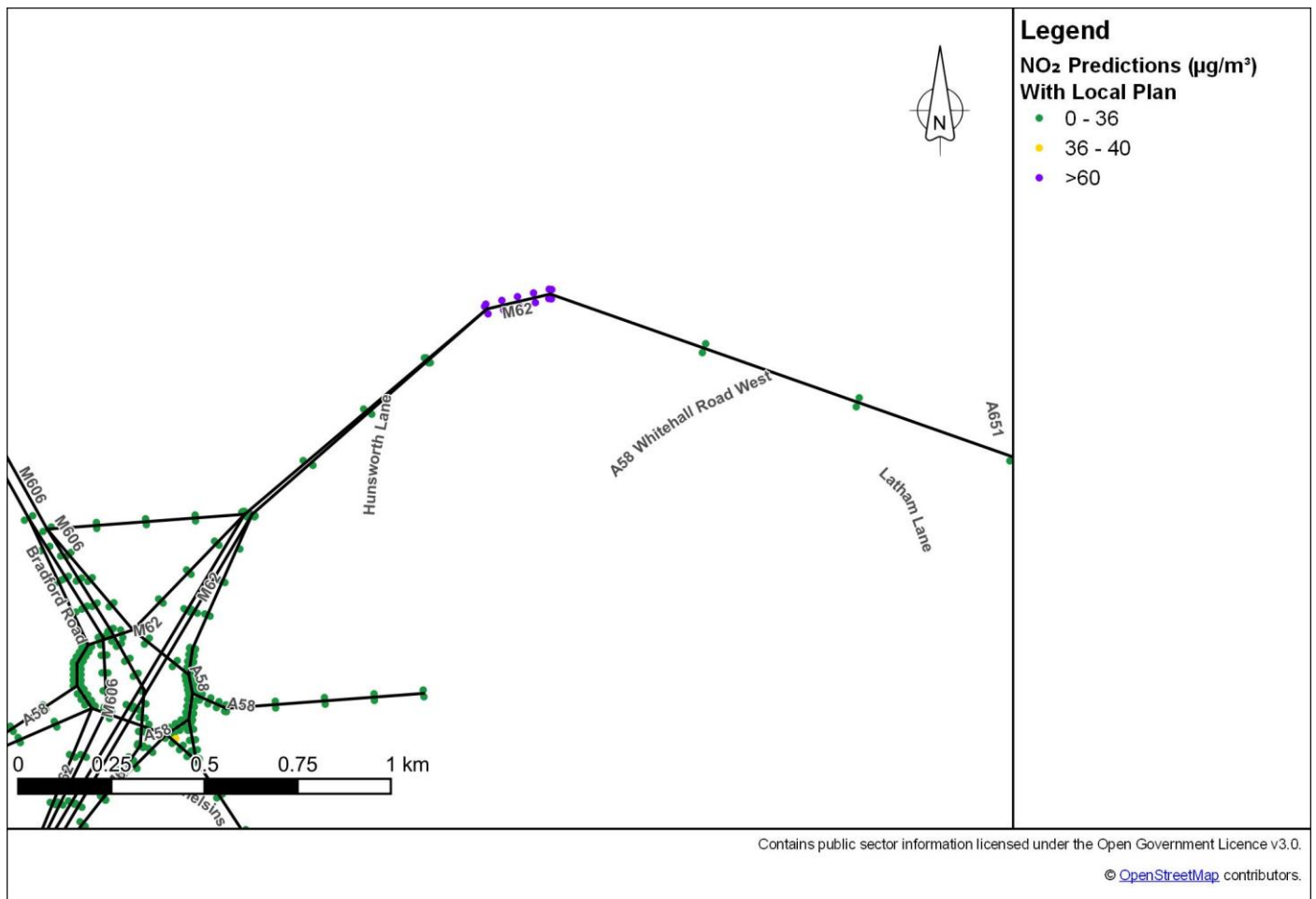


Figure 2 shows 5 exceedances predicted adjacent to the M62 north of the Chain Bar Interchange roundabout. Figure 6-9 of CC132 shows the modelled exceedance areas are located where there are no human exposures.

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It is important to note that all locations where the 40ug/m³ objective for NO₂ is exceeded are both outside Calderdale and outside the verified or ‘buffer’ traffic model area. Traffic flow data for road links which lie outside are subject to high levels of uncertainty, the reasons for which were explained in detail in the following response to a question under item 4. of the Stage 4 Hearing by Mr. Tom Randall:

As shown in the Local Model Validation Report (EV 56.1), under section 2.8 (Figure 4.1), there is a distinction between the detailed area modelled within Calderdale and the northern part of Kirklees and the buffer area outside where only key links are represented. This is a standard approach to traffic modelling to provide accurate routing of traffic into the detailed model area without needing to model all roads and the associated characteristics. In this buffer area there are no junctions or capacity constraints built in as it is purely intended to be a way of feeding traffic in and representing key route choices between strategic roads, for example the M62 or A58.

As such, the exceedances reported outside Calderdale are not a true reflection of future issues as the network here is not intended to be used in this way. Calibration and validation of the model is not undertaken on these model links as shown in Figures 3.2 and 3.3 of the LMVR.

The points shown by the AQ modelling to be exceedances are shown to be on buffer links representing the A650 radial route from Bradford and on the M62 to the east of junction 26, both of which are not key routes into or out of Calderdale. As shown by Tables 4-1 and 4-5 of CC132, the exceedances are shown in the scenarios with and without the CMBC Local Plan and are therefore related to predicted growth for Bradford, Kirklees and elsewhere.

As a result of these limitations, little weight should be afforded to these results as they lie outside the geographical scope of the assessment which is confined to the area inside the Calderdale district boundary. This boundary is depicted by the thick blue line in **Figure 6-12** and **Figure 6-13**.

I note that despite the low weight afforded to predicted results outside the borough, Calderdale Council has informed Bradford Council of the exceedances produced by the predictive model under its statutory duty to co-operate.

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The reason why HGVs reduce in Brighouse on road link A643 Wakefield Road producing a reduction in annual mean concentration of NO₂ as reported in Table 3-2 of document CC151 ‘Air Quality Assessment-Supplementary Information’.

Predicted Concentrations in Brighouse

The predicted concentrations presented in Table 3-2 of report CC151 are reproduced below.

Table 3-2 – Local Annual Mean Concentrations (µg/m³) (supplementary results)

Location	Maximum Annual Mean Concentration (2032)			Average Annual Mean Concentration (2032)		
	Without Local Plan	With Local Plan	Impact	Without Local Plan	With Local Plan	Impact
Nitrogen dioxide (NO₂) (objective = 40 µg/m³)						
West Vale	22.6	23.4	0.8	11.5	12.0	0.4
Clifton	29.3	30.1	0.8	17.3	17.8	0.5
Brighouse	33.7	32.7	-1.0*	15.6	16.1	0.6
Particulate matter (PM₁₀) (objective = 40 µg/m³)						
West Vale	19.4	20.0	0.6	12.9	13.3	0.4
Clifton	33.2	33.3	0.1	17.2	17.5	0.3
Brighouse	19.2	19.9	0.7	15.2	15.5	0.3
Particulate matter (PM_{2.5}) (objective = 25 µg/m³)						
West Vale	10.4	10.6	0.2	7.5	7.6	0.1
Clifton	14.9	14.9	<0.1	9.5	9.6	0.1
Brighouse	10.7	10.9	0.2	9.1	9.2	0.1

* The reduction in concentration is a result of the reduction in HGVs predicted with the Local Plan in place.

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The results show that the maximum concentration, which is predicted on the A643 Wakefield Road, will reduce in 2032 in the scenario with the local plan growth included.

HGV re-routing on the A643

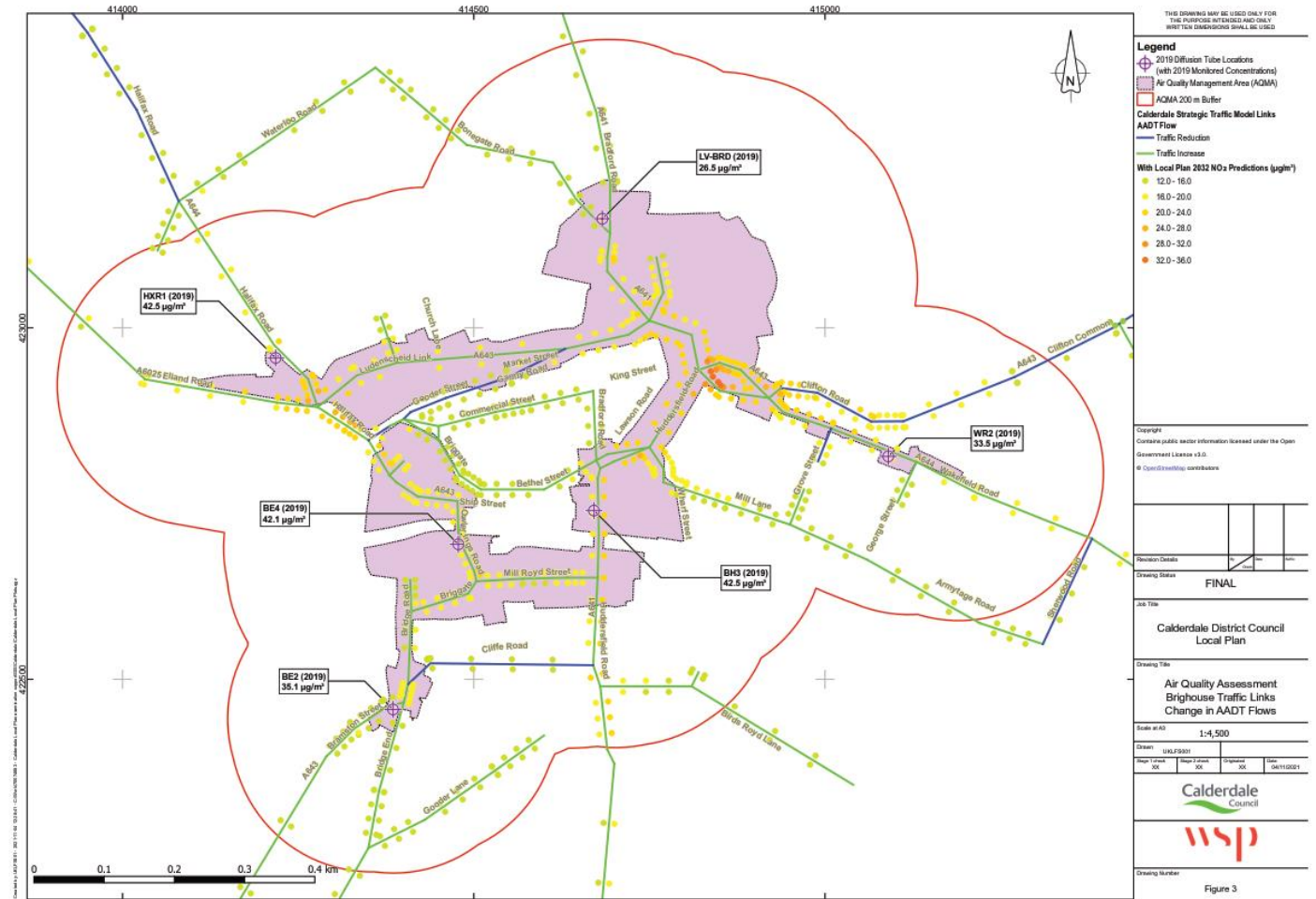
Figure 3 shows changes to total traffic flows when comparing conditions with and without the Local Plan. The position of the receptor points on the A643 westbound approach to Brighouse are shown by orange and yellow dots. At these locations there is predicted to be a reduction in the annual average NO₂ concentration in 2032. The reduction in the maximum annual mean concentration of 1.0 µg/m³ represents a slight beneficial effect.

Figure 4 provides the changes to numbers of HGVs caused by the Local Plan and shows a predicted reduction on the A643.

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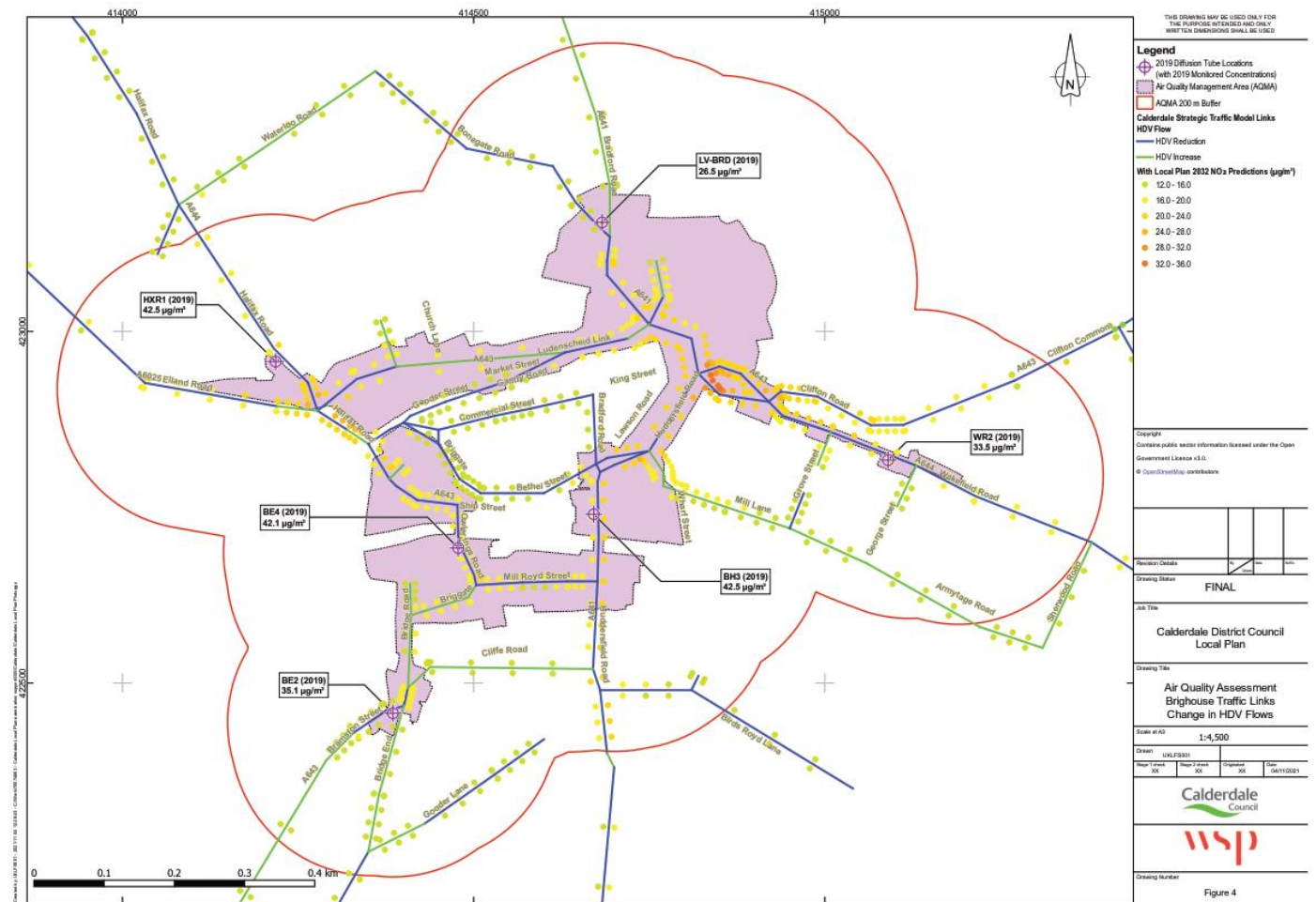
Figure 3 - Flow difference (All traffic) - With and without Calderdale Local plan (AADT)



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Figure 4 - Flow difference (HGV) - With and without Calderdale Local plan (AADT)



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Figure 3 shows that on the A643 and the majority of Brighouse, the Local Plan will cause traffic increases. Furthermore, additional congestion will occur at the junctions of the A644/A643 and A643/A629. This can be expected as a result of traffic generated by housing developments such as that proposed at Thornhills.

In **Figure 4** HGV routing has been examined for the A643 and reveals that HGVs from the A644 Wakefield Road and the M62 will re-route to the Armytage Road industrial estate causing increases on the parallel Armytage Road. Decreases in HGVs on the westbound A643 are predicted due to this re-routing. Overall, the same number of HGVs will enter Brighouse under the with Local Plan scenario. However, as a result of additional congestion caused by LGV traffic, primarily from the Thornhills site, fewer HGVs will access Brighouse via the A643.

The reason for the reduction in emissions on the A643 as a result of the Local Plan is the difference in emissions produced by LGVs and HGVs. This is summarised by the model data inputs in **Table 1** used to predict NO₂ on the road link adjacent to the maximum prediction (westbound A643 approach to Brighouse town centre).

Table 1 - Comparison of flows and emissions on the A643 westbound into Brighouse

Modelled scenario (2032)	Traffic Flows (AADT)			NO _x Emission (kg/year) *			Predicted maximum NO ₂ concentration (µg/m ³)
	LDV	HDV	Total	LDV	HDV	Total	
Without Local Plan	14,825	1,571	16,396	2,687	11,352	14,039	33.7
With Local Plan	16,717	1,289	18,006	3,030	9,314	12,344	32.7
Difference	+1,892	-282	+1,610	+343	-2,038	-1,695	-1.0

* modelled link length 42m and speed 5km/h

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Table 1 shows that the Local Plan will produce an increase in traffic on the A643 of 1,610 vehicles producing an additional 343 kg of NO_x in 2032. However, the re-routing of 282 HDVs into the Armytage Road industrial estate will produce a reduction of 2,038 kg of NO_x in 2032. As emissions from HGVs are estimated to be approximately 40 times higher than those from LDVs in 2032 (2030, EFT v10.1), there is predicted to be an overall reduction in emissions of 1,695 kg/annum on this road link as a result of the Local Plan. This leads to a reduction in the predicted maximum NO₂ concentration on the receptor adjacent to this link of 1.0 µg/m³.

It should be noted that the average concentration across Brighouse will be higher in the with Local Plan assessment scenario because of LDV traffic increases as shown in **Figure 1**. HGV movements are largely concentrated in the Armytage Road industrial estate area where the peak maximum prediction (A643) is predicted.

Reason for HGV Re-routing

A strategic traffic model such as the CSTM, built using the SATURN software suite, is an equilibrium model. This means that the modelled traffic flows between origins and destinations can be routed via any available set of links in the network whilst aiming to reduce the generalised cost of travel (a balance of time and distance). The model performs numerous iterations of the routing and analyses costs of travel until there is minimal change between iterations and the model has found an 'equilibrium' based on the multitude of flows it is attempting to model.

This approach means that when changes in demand (volumes of traffic) or supply (new or amended road links) are applied to the model, a different set of routings can occur and the equilibrium point can be found with a different set of optimal routes.

Given their differing physical characteristics and purpose of travel, the values of time and distance applied in the model are different for cars and HGVs and as such, different routing can occur. Generally, HGVs are less sensitive to distance given that timely deliveries are more important than minimising travel distance.

With any re-routing in the model, it is difficult to pinpoint the exact reason, as it can be a secondary or tertiary impact based on a route becoming congested and therefore modelled with extra delay.

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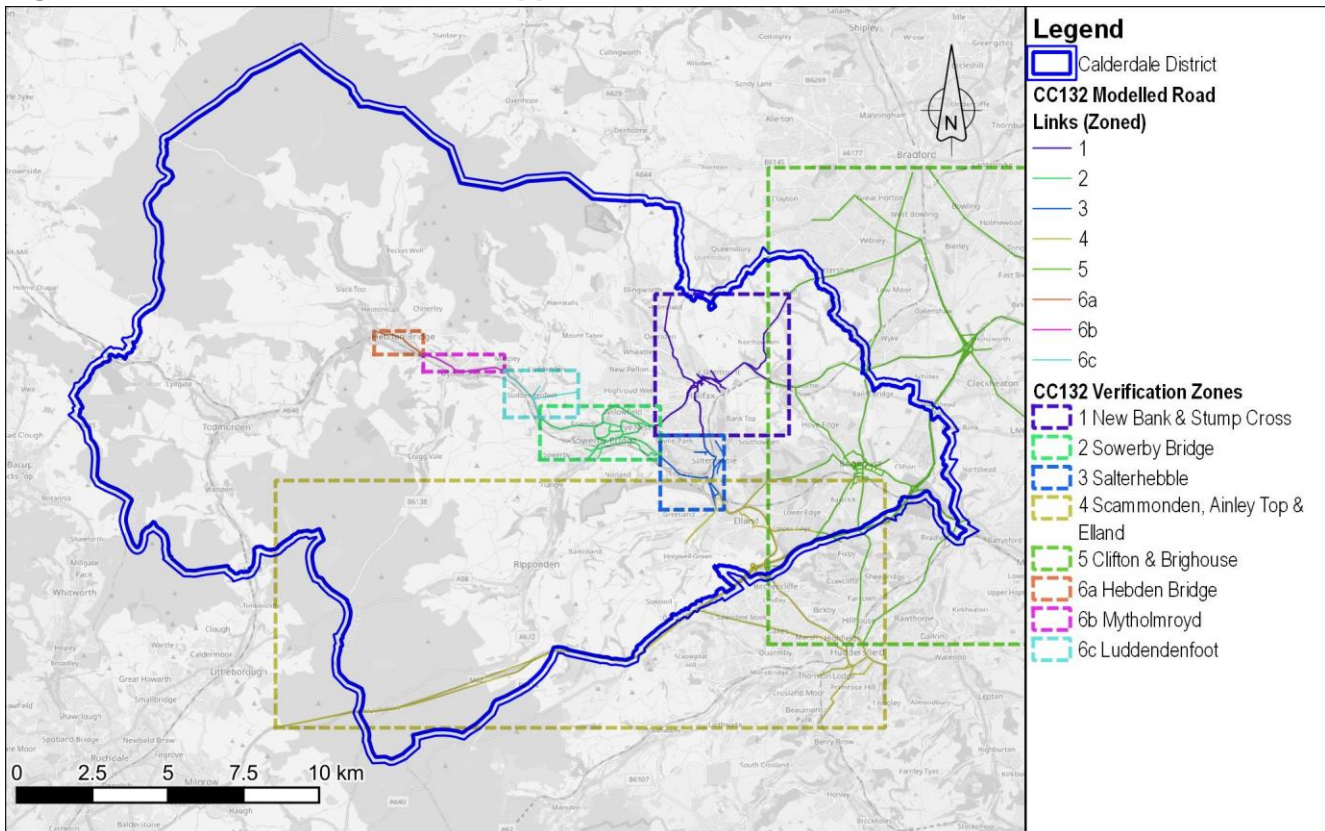
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Clarification as to why the Calderdale Strategic Transport Model (CSTM) census /verification zone drawing in Appendix A Figure B.1 of CC151 ‘Air Quality Assessment-Supplementary Information’ does not appear to correspond to the verification zones described in Table B.3 of that Appendix.

The CSTM census/verification zone drawing in Appendix A Figure B.1 of CC151 ‘Air Quality Assessment-Supplementary Information’ does not correspond to the verification zones described Table B.3. This is a simple copy error. **Figure 3** shows the air quality model verification zone areas applied in CC132.

For reference the corresponding road-NO_x adjustment factors presented in Table B.3 of CC151 are reproduced in **Table 2**.

Figure 1 – Model verification zones applied in CC151



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Table 2 – Road-NO_x Adjustment Factors Applied in CC132

Site ID	Monitoring Site Location	Zone	Verification Adjustment Factor	Site ID	Monitoring Site Location	Zone	Verification Adjustment Factor
LV-NBN	New Bank	Zone 1	3.0	LV-62W	Clifton	Zone 5	2.3
LV-NBS	New Bank			LV-62E	Clifton		
NB-NB1	New Bank			WR2	Brighouse		
NB-GR	New Bank			BH3	Brighouse		
SC5	Stump Cross			BE4	Brighouse		
SB3	Sowerby Bridge	Zone 2	1.0	BE2	Brighouse	Zone 6a	4.3
AQC1	Salterhebble	Zone 3	1.9	HQ1	Hebden Bridge		
AQC2	Salterhebble			HB6	Hebden Bridge		
AQC3	Salterhebble			HQ9	Hebden Bridge		
CRH1	Salterhebble			BS1 HB	Hebden Bridge		
AQ21	Salterhebble			MY-04	Mytholmroyd		
LV-SCA	Scammonden	Zone 4	1.1	MY-05	Mytholmroyd	Zone 6b	1.9
LV-SAA	Ainley Top			MY02	Mytholmroyd		

