THIRD WAVE LOCAL AUTHORITIES – TARGETED FEASIBILITY STUDY TO DELIVER NITROGEN DIOXIDE CONCENTRATION COMPLIANCE IN THE SHORTEST POSSIBLE TIME

Local authorities covered	Burnley Borough Council

Further information on the content of each section is set out in the guidance.

Part 1: Understanding the problem

This section should set out background on the information about the road links projected to have exceedances in the PCM national model, in combination with source apportionment data, to provide a description of the severity of the NO2 exceedance and its possible sources and causes. It should set out the scale of the problem and the case for change. Maps and local data should be included. ***Each road link should be addressed in turn.***

Burnley Borough Council currently has no Air Quality Management Areas (AQMAs) within its Borough.

Burnley has been highlighted by Defra as one of a number of Local Authorities where the UK's national air quality assessment had identified road links that are currently exceeding the annual mean nitrogen dioxide (NO_2) limit value, with exceedances predicted to continue in 2019 and in some cases beyond.

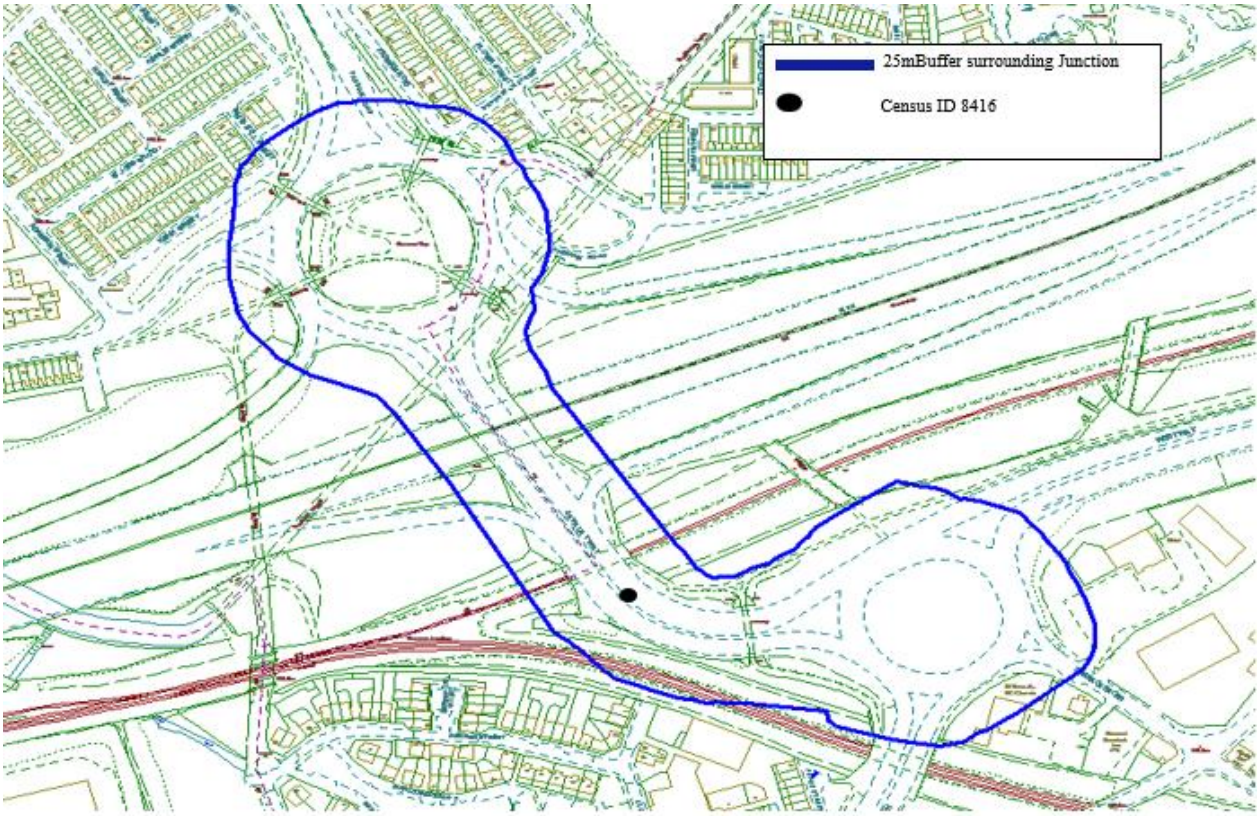
The Council, along with 32 other Local Authorities, received a Ministerial Direction on the 23rd March 2018 to undertake a feasibility study into nitrogen dioxide compliance. This is the 'third wave' of Local Authorities charged with undertaking such a study. Previously 5 Local Authorities (the so called 'first wave') were directed to undertake a feasibility study, these were followed by a second wave of 23 Local Authorities directed to undertake a local study in 2017.

The UK's national air quality plan has identified a 271m length of the A671 (Cavalry Way) within Burnley Borough Council, at Junction 10 of the M65, as in exceedance of the annual mean NO_2 Air Quality Directive Limit value.

This section of road identified as being in exceedance forms a key part of the major circulatory junction that connects Burnley & Padiham to the M65 motorway at Junction 10. The large motorway junction spans 500 m. It comprises two islands, the northerly island does not permit traffic to circumvent it, instead all traffic arriving at the northerly island is directed to the southerly island and doubles back. Similarly, all traffic exiting the M65 westbound must turn left and negotiate the southerly island in order to travel north west. The large junction has two motorway entry slips, two motorway exit slips and six two-way local roads bringing traffic on & off the junction. All entries are by stop & go junctions (traffic lights or give-ways). The carriageway between the islands forms a bridge over the motorway. The circulatory junction is elevated above the motorway and any pollutants are likely to be dissipated quickly. A map of the circulatory junction is provided at Figure 1 indicating a 25m clearance from the major junction (as per AAQD Annex III C).

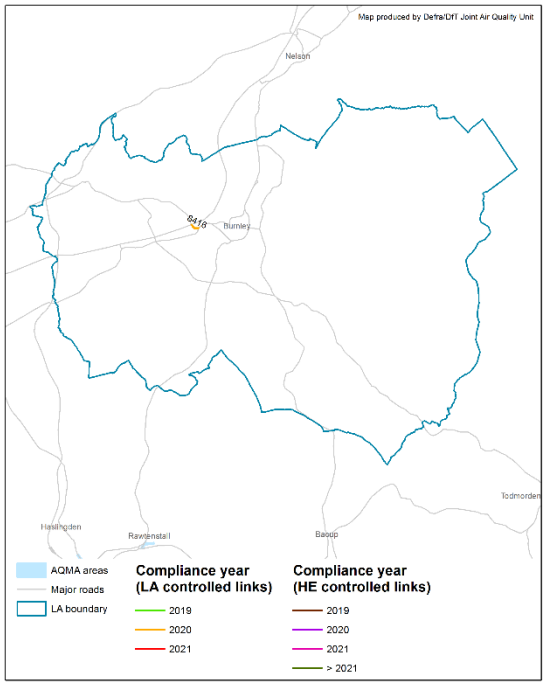
The census ID is located within the major circulatory junction, between the point where the A671 meets the westbound M65 slip-roads and the southerly island.

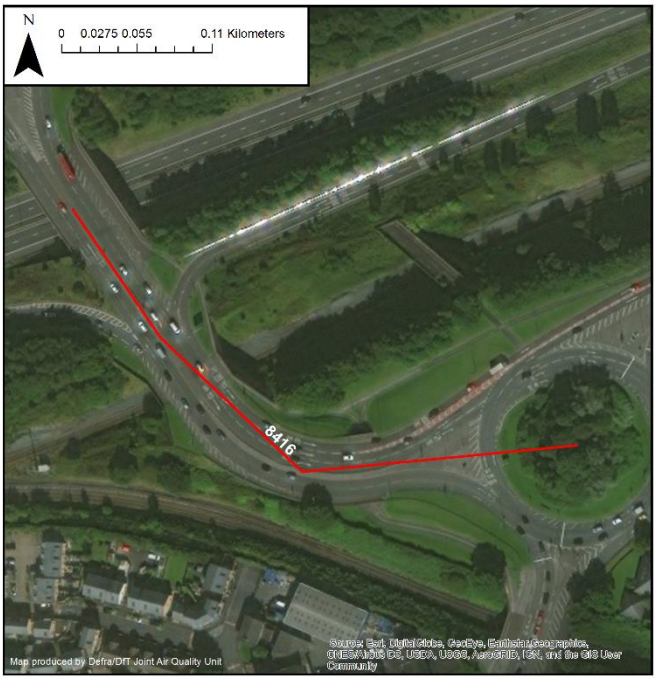
Figure 1: J10 M65 Circulatory Junction



A map of the road link highlighted as in exceedance within the UK's national air quality assessment is shown in Figure 2. The road link starts at the southerly roundabout (A679), passes the westbound M65 slip roads and terminates midway across the motorway bridge.

Figure 2: Map of Burnley Borough Council showing the non-compliant links for NO_2 that are the focus of this feasibility study.





The exceedance on this road is identified at one link location, the start point is the A679 and the end point is the M65 (Census ID 8416). The concentration of NO_2 along this road link is predicted to demonstrate compliance in 2020 (Table 1). In order to achieve compliance in 2019, the concentration needs to reduce by at least 1 µg/m^3.

Table 1: Predicted concentrations of NO_2 on A671 road link for 2017 – 2021. Cells highlighted in red exceed the NO_2 limit value, while green cells show the road links are compliant. The A671 demonstrates compliance in 2020.

Road in exceedance	Census ID	2017	2018	2019	2020	2021
A671	8416	45	43	41	39	37

The Department for Transport (DfT) has one traffic count location along the A671 where the NO_2 exceedances occur. Census ID 8416 (road length 0.3 km) is located between the A671 junction and the M65 (Figure 3).

Figure 3: Location of DfT traffic count points along the non-compliant A671 road link.

As described, the nature of the major circulatory junction means that all traffic destined for the M65 westbound entering the junction at the northerly island, together with traffic leaving the M65 westbound for onward travel north, must navigate the southerly island loop and double back, passing the census ID location twice.

The two slip roads are to the north of the DfT census ID count point. These slip roads carry significant volumes of traffic off and onto the M65. Therefore, the DfT link road does not have uniform flows along its length. Traffic flows north of the slip roads within the DfT road link are significantly lower than those at the count point.

The DfT made the following traffic counts during recent years at the count location shown below (Table 2). It should be noted that the Defra national modelling used 2015 as the baseline. Projections into future years are based on national traffic growth factors and from 2015 to 2016 this was in the region of 2%. Traffic counts for Census ID 8416 shows similar traffic flows between 2015 (base year for the national modelling) and the latest data in 2016.

Table 2: Traffic counts at DfT sites along the A671 road links of interest for 2012 – 2016

8416					
Year	**Total traffic**	**Cars**	**LGV**	**HGV**	**Bus**
2012	51480	44606	5283	917	484
2013	49563	42396	5489	932	600
2014	54186	46974	5693	929	398
2015	53615	46112	5988	925	394
2016	53951	45777	6211	1338	445

In the time available new local traffic counts could not be made and therefore source apportionment information for the non-complaint road links was used from the Defra PCM model (Table 3).

Diesel cars contribute the largest proportion of total NO_x from road sources, followed by diesel LGV's. A significant (13%) of the total NO_x concentrations are from traffic urban background sources. The high background could be in part attributed to the motorway located in the immediate proximity of Census ID 8416. The M65 provides a strategic link between key Lancashire employment centres, connecting Preston with Blackburn, Burnley and Colne, as well as linking with the M6 and M61 to the west. Burnley is served by junctions 8, 9, 10, and 11 of the M65 with junction 9 being an east only exit from the M65/west only entry onto the M65 and junction 11 being a west only exit from the M65/east only entry onto the M65. The section from junction 10 to its eastern terminus at junction 14 is operated and maintained by Lancashire County Council. The largest proportion of NO_X is from cars (43 % of NOx concentrations) suggesting that these links are used for business and personal journeys gaining access to the strategic motorway network with much of it likely to be through traffic rather than being associated with access to the town centre.

Table 3: Source apportionment for total NO_x (%) from Defra PCM model

Census ID	**Regional BG**	**Urban BG (non-traffic)**	**Urban BG (traffic)**	**Diesel Cars**	**Petrol Cars**	**Diesel LGV**	**Petrol LGV**	**HGVr**	**HGVa**	**Bus**
8416	5	7	13	35	8	17	0	7	2	5

Burnley Council monitors NO_2 concentrations at 25 sites across the borough using diffusion tubes. There are no recorded exceedances of the annual average objective at locations of relevant personal exposure, and accordingly the Council have not been required to declare an Air Quality Management Area. Figure 4 shows the diffusion tube monitoring location adjacent to the A671 road link of interest. A decrease in the annual average concentrations has been observed at many of the diffusion tube locations since 2012 (Table 4), with exception of location 1, where concentrations have slightly increased in 2017, remaining in compliance and well below the limit value.

While the reference method associated with the Air Quality Directive is a chemiluminescence analyser, diffusion tubes are acceptable as supplementary indicative monitoring, under the Directive (Article 6 paragraph 2) as a CEN standard for these has been approved[1].

[1] https://standards.cen.eu/dyn/www/f?p=204:110:0::::FSP_PROJECT,FSP_ORG_ID:27825,6245&cs=1A6A1A397263F833B684A720C2B07D3BB

Figure 4: Map showing Burnley Borough Council location of NO_2 diffusion tubes sites within the adjacent the non-compliant A671 road link

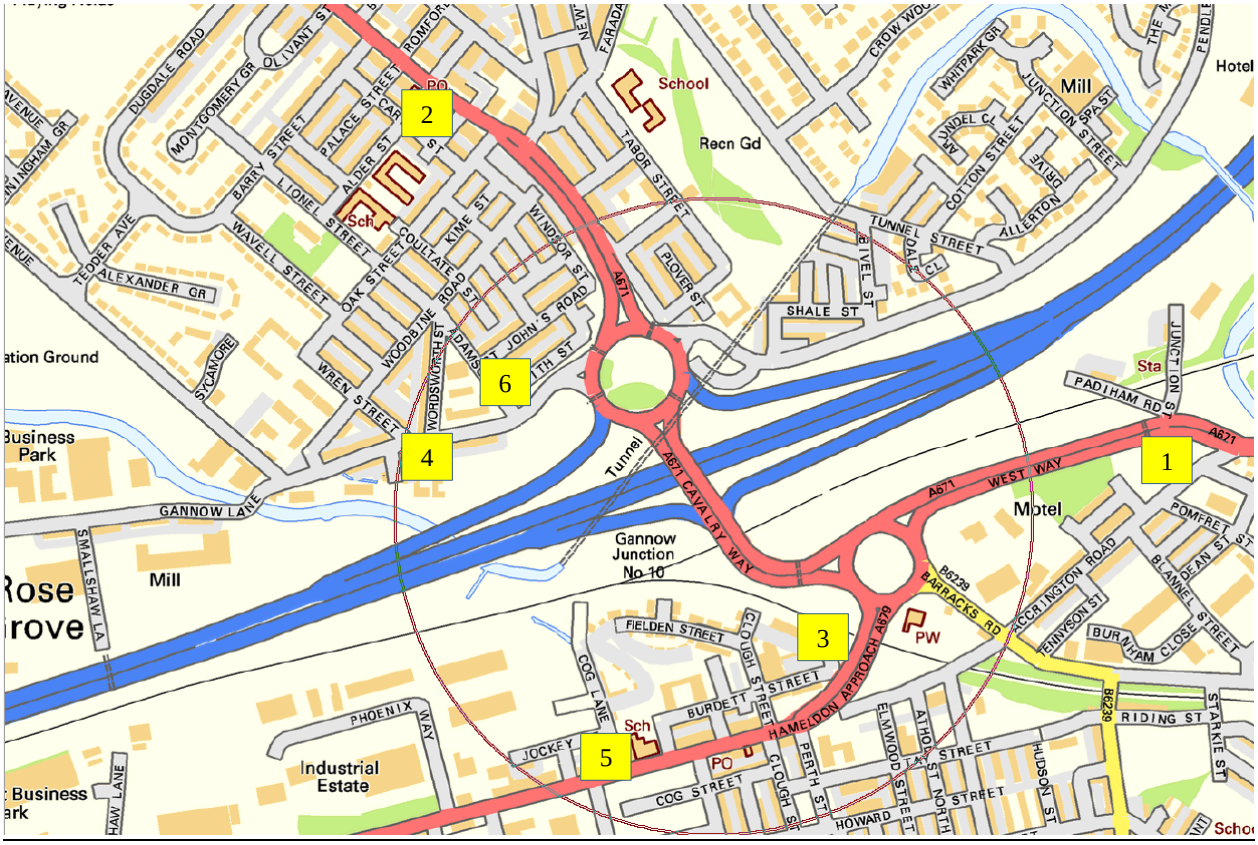
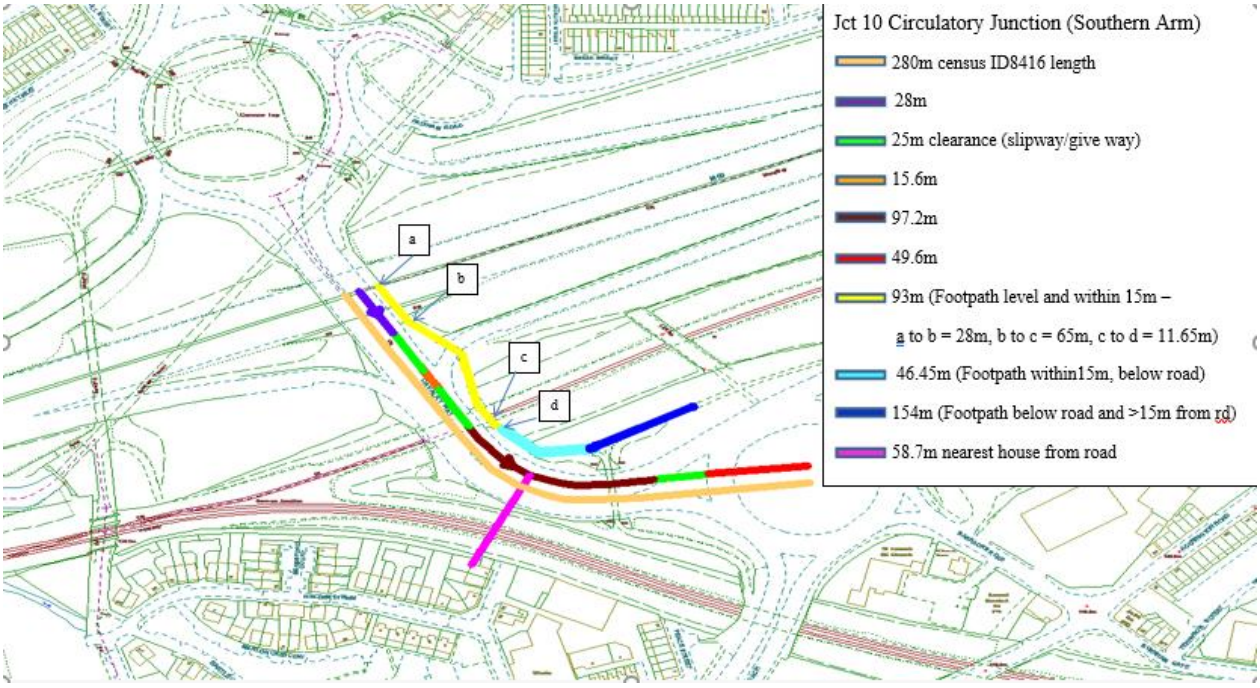


Table 4: Annual average diffusion tubes data for NO_2 ($\mu g\ m^{-3}$)

	ANNUAL MEAN BIAS ADJUSTED					
LOCATION	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**
(1) Wilfield St					29.55	29.67
(2) Alder St					24.51	21.27
(3) Peace Street					24.95	
(4) Gannow Lane	27.79	25.31	23.60	22.01		
(5) Accrington Rd/Cog Lane	28.94	27.39	27.96			
(6) Gannow Lane/Adamson St	31.06	32.37	27.89			

Figure 5: Map of M65 Junction 10 Southern circular arm showing road and footpath lengths, and distances and gradient to road alongside the non-compliant A671



The Council notes that there is a footpath near to parts of the A671, and the nearest receptor (fixed habitation) is 58 m. This junction has a series of underpasses that provide pedestrian and cycling routes with a footpath on the southbound carriageway across the bridge. There is no footpath on the northbound carriageway. Figure 5 shows the location of the footpath adjacent to the A671 and includes road lengths and distances to road. Additional photographic evidence is included in Annex 1.

The total length of the footpath highlighted in Figure 5 is 285 m. A stretch of the footpath is at road level and adjacent to the road for 93 m (in yellow). This section of footpath runs alongside the carriageway across the motorway bridge. As previously described the section of the road-link to the north of the slip roads is subject to lower traffic counts than those at the census ID. Additionally the M65 westbound slip joins the A671 within this stretch, the map indicates an allowance for the slip entrance and a 25m clearance either side of the exit slip (shown in green & orange).

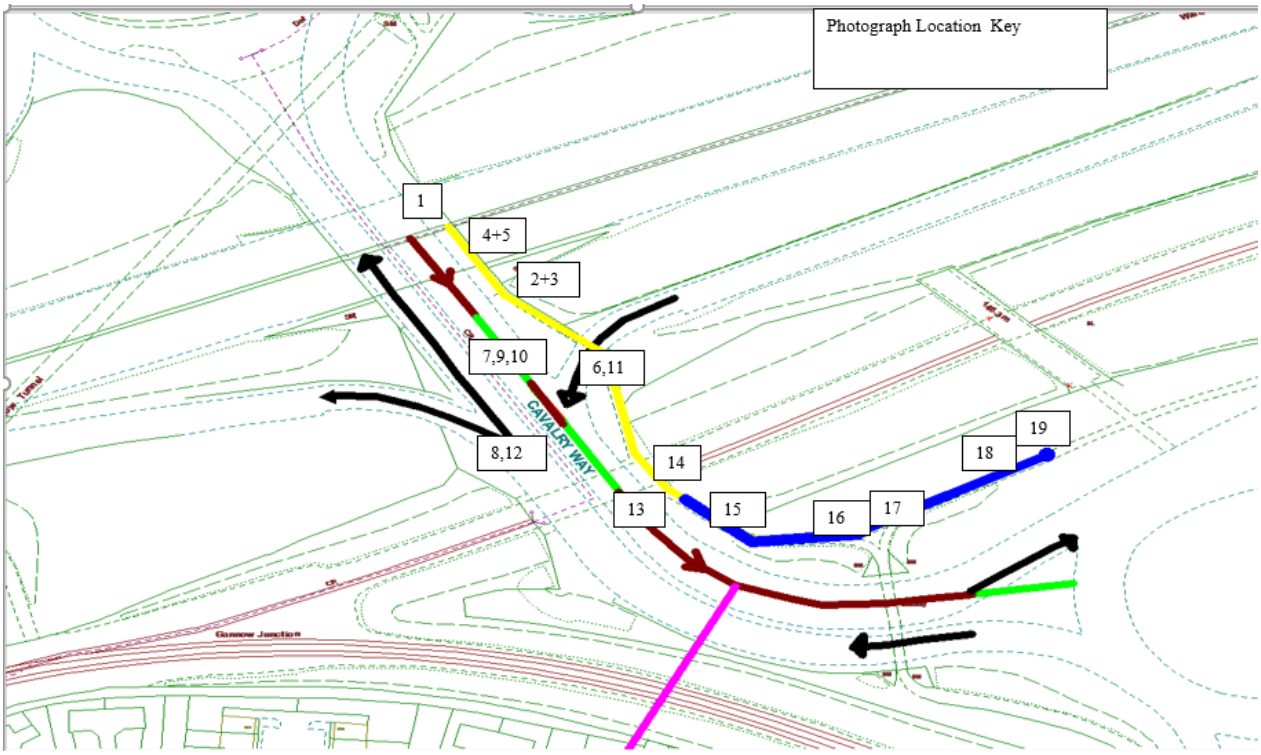
On the section of the A671 between the slip road and the southerly roundabout there are two sections of footpath that are below road level, one stretch (46 m – light blue) within 15 m and the other one (154 m – dark blue) is greater than 15 m from the road. This leaves 11m of footpath which is within 15m of the road and level with the road.

The road link in question is part of the M65 J10 circulatory junction, i.e. a major junction, where traffic does stop and go approaching the roundabouts at both ends of the link. Traffic joining the link from the motorway exit slip road also does so via a give way, and consequently stops and goes, and the road link is not representative of the A671 as it continues beyond this major junction.

Furthermore, the traffic counts at the census ID are not representative of the section of link road between the M65 (motorway bridge) and the motorway slip roads because it is situated on the loop, counting traffic

twice as it flows from/to the M65 slip roads. Counts on the section over the motorway bridge itself will be less.

Annex 1: Photographs taken at numbered locations in relation to the A671



1 M65 Bridge Footpath South

2 M65 Bridge Footpath North

3 M65 Bridge Footpath North (Wide)

4 M65 Bridge Footpath looking onto M65 from start of measurement point

5 M65 Bridge Height

6 M65 West bound Slip exit

7 A671 south

8 A671 North and M65 West bound entry

9 A671 South facing showing West exit & entry slip roads onto M65

10 A671 South Facing showing M65 west bound entry slip road

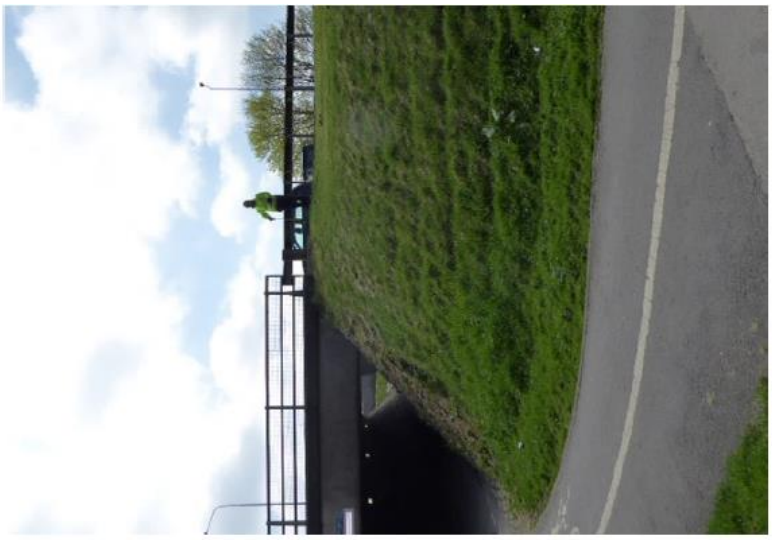
11 M65 West exit slip road onto A671

12 M65 west bound entry slip road

13 M65 entry and exit slip roads North facing

14 Footpath to side of A671 southwards showing gradient drop

15 Continuaton of footpath showing drop from road



16 Footpath at highest drop from roadside over 15m from roadside

17 Continuation of footpath over 15m from kerbside

18 A671 giveway and footpath over 15m from kerb

19 A671 showing giveway

Part 2: Developing a long list of measures for addressing the exceedances

This section should provide a long list of possible measures to be considered for each road link. Local authorities should consider the source apportionment set out in part 1.

See parts 3-5 that show road link is already compliant. Existing measures to further improve air quality are listed below for information.

Existing General Measures:

- As part of the Burnley/ Pendle Growth Corridor Improvements Scheme significant infrastructure works were undertaken to a number of locations within the Borough. One of the improvement scheme locations was the A671 and this included alterations to junction layout and signalisation of the Barracks (southerly) Roundabout at Junction 10 of the M65 to include MOVA operated control. The aim was to reduce congestion on the A671 and this was completed in spring 2015. The scheme also included improvements to the A671 at the junction with Trafalgar Street. This major project complimented similar signalisation work completed previously at the Gannow (northerly) Roundabout at junction 10. Priority bus lanes were also a part of the scheme. Additional work to signalise the junction of Active Way and Westgate (A671) at the roundabout towards the town centre has also just be completed with signalisation becoming live just this month. The aim is that traffic lights will be coordinated to improve traffic flow right through these junctions and onto the arterial routes around Burnley centre. It is anticipated that this significant investment into the infrastructure across the growth corridor will bring substantial improvements to traffic flow and air quality. Full details on the improvement schemes can be found at http://www.lancashirelep.co.uk/lep-priorities/transport-and-connectivity/burnley-pendle-growth-corridor.aspx

- Ensure regard to air quality in all planning applications with appropriate mitigation measures

  Other local measures in place to support improvements to air quality within the Borough include:

  - The Lancashire Climate Change Strategy 2009-2020
  - Burnley green Infrastructure Strategy
  - East Lancashire Electric Vehicle Charger Scheme
  - Burnley cycle scheme
  - Padiham Greenway
  - Adoption of Lancaster City Council/ Low Emissions Partnership AQ Planning Guidance Templates
  - Lancashire Cycling and Walking Strategy, 2016–2026 (2016 Jacobs report)
  - Pennine Reach Scheme
  - East Lancashire Strategic Cycleway Network funding
  - East Lancashire Highways and Transport Masterplan
  - Burnley-Pendle Growth Corridor Strategy
  - Burnley Renewable and Low Carbon Energy Study (2010)
  - Taking Forward the Development of renewable Energy: A final report Lancashire County Council
  - Burnley EV Charging Policy on New Developments
  - Taxi licensing policy – Age limit on vehicles to meet EU emissions
  - Planning condition for EV charging points for all residential developments and large commercial developments

Part 3: Assessing deliverability/feasibility and delivering a short list

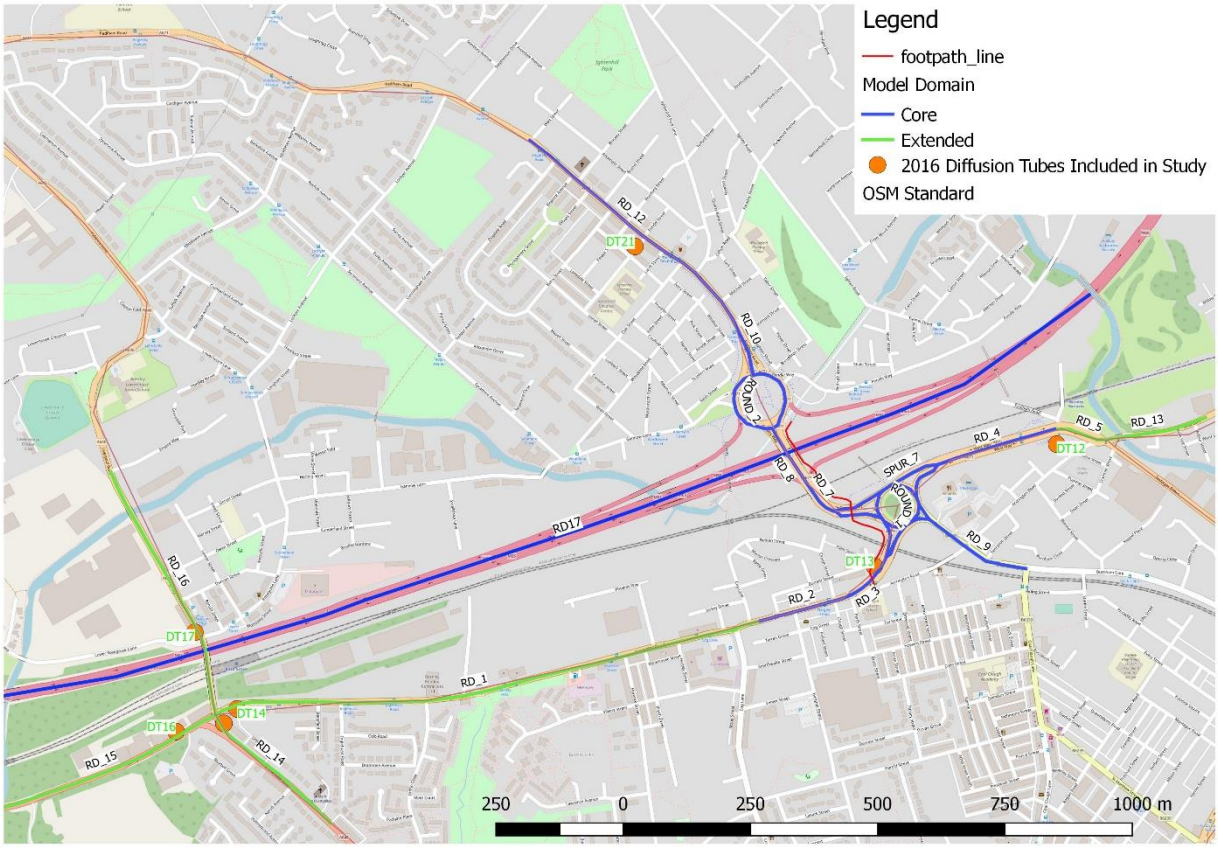
For each of the measures identified in part 2, local authorities should set out an assessment of deliverability including how long it would take to deliver each measure and whether it is practicably feasible to deliver. Based on this assessment of deliverability and feasibility, the local authority should develop a short list of measures to take forward to part 4 of the report.

2016 Baseline modelling

The model domain has been extended beyond the A671, to include roads adjacent to diffusion tubes in order to allow model verification to be carried out. The core model domain for the baseline air quality was centred on the footpath where the PCM modelling predicted an exceedance. This core model domain included Cavalry Way (A671) and the roads leading to and away from the southern roundabout. The modelled roads are shown in Figure 6 which includes the following roads:

- The footpath running down from the M65 to Hameldon Approach;
- Cavalry Way and the southern roundabout of the Interchange;
- West Way (A671);
- The location of the diffusion tubes at Wilfield Street, Alder Street and Accrington Road/Rosegrove Lane junction;
- Hameldon Approach;
- Barracks Lane; and
- The M65.

Figure 6 – Modelling Domain



Model Selection

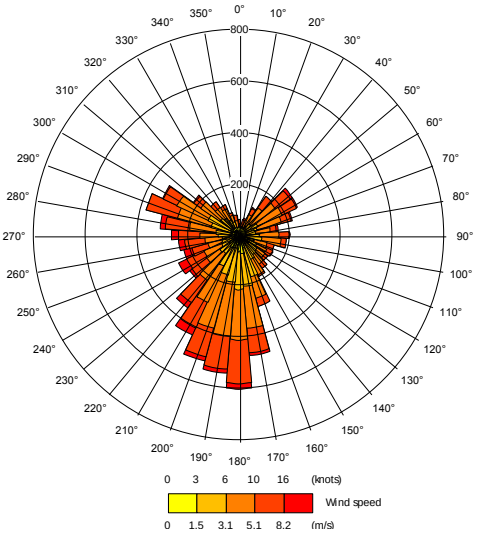
ADMS Roads version 4.1.1 was used for the study. This is a proprietary AQ model developed by Cambridge Environmental Research Consults (CERC) for urban air pollution assessment. The model is typically the model of choice for such air quality assessment studies. Details of the validation are available from the CERC website:

http://www.cerc.co.uk/environmental-software/model-validation.html

Base year and meteorological dataset

The majority of 2016 meteorological data was obtained from Manchester Airport, with Lytham and Bingley meteorological stations being used to gap fill missing data. The wind rose is shown in Figure 7.

Figure 7 – Wind rose used in dispersion modelling



Road traffic modelling

Average daily vehicle flows and speeds

Baseline annual average daily traffic (AADT) 2-way link flows and speeds were provided by Lancashire County Council. After a comparison with the DfT's national traffic count information, DfT traffic flows were considered more representative of the roads within the study area. Lancashire County Council traffic surveys for the area were based on 2012 and 2014 counts which was prior to the traffic improvement works on the PCM non-compliance (A671 Calvalry Way) road link that were completed in 2015. When the local County traffic data was projected to 2016 data based on the DfT Tempro forecasts they were significantly (>10,000 AADT) lower than the DfT count data for 2016. The most recent available traffic counts from DfT were therefore considered most accurate. DfT AADT traffic flows are derived either from estimation or from observations, the 2016 AADT traffic flows along Cavalry way for DfT count point 8416 is from observed traffic flows. Consequently, there is high confidence that traffic flows along Cavalry Way accurately represent the number of vehicles in 2016.

Speeds were assigned based upon a roads speed limit as this better represents the speed over a day. In addition, the 2-way traffic flows were divided by two to better represent actual traffic flows on the roundabout spurs. The links which are roundabout spurs can be identified from 'SPUR' in the source ID column in Table 6. Roads were broken down into greater detail approaching roundabouts/junction to reduce speeds in line within LAQM.TG (16) guidance, identified by links with 'speed' in the source ID column in Table 6.

Table 6 – Traffic data used in 2016 Baseline Model

Source ID	Road Name	Traffic flow, AADT	Speed (kph)
SPUR_1	Hameldon Approach	4824	38
SPUR_6	Barracks Road	6674	38
SPUR_5	Barracks Road	6674	38
SPUR_3	Cavalry Way_S_of_M65	26976	38
ROUND_2	Padiham Road	6238	38
RD_5	Westway	21625	38
SPUR_4	Cavalry Way_S_of_M65	26976	48
SPUR_7	Westway	16659	38
RD_4	Westway	33317	48
SPUR_2	Hameldon Approach	4824	38
RD_9	Barracks Road	13347	48
RD_10	Padiham Road	12475	38
RD_2	Hameldon Approach	9647	48
ROUND_1	S_Roundabout	26976	38
SPUR_8	Westway	16659	48
RD_7	Cavalry Way_S_of_M65	53951	48
RD_12	Padiham Road	12475	48
RD_8_Speed	Cavalry Way_N_of_M65	12475	38
RD_11	Hameldon Approach	9647	48
RD_3	Hameldon Approach	9647	38
RD_1_Speed	Hameldon Approach	9647	48
RD_1	Hameldon Approach	9647	48
RD_2_Speed	Hameldon Approach	9647	38
SPUR_1_Speed	Hameldon Approach	4824	38
SPUR_4_Speed	Cavalry Way_S_of_M65	26976	38
SPUR_8_Speed	Westway	16659	38
RD_13_Speed	A671, Westgate	21625	38
RD_13	A671, Westgate	21625	48
RD_8	Cavalry Way_N_of_M65	12475	48
RD_1Speed_2	Hameldon Approach	9647	20
RD_14_Speed	A646, Rossendale Road	19371	20
RD_15_Speed	A679, Accrington Road West of Rossendale Road	18168	20
RD_15	A679, Accrington Road West of Rossendale Road	18168	48
RD_14	A646, Rossendale Road	19371	48
RD_16_Speed	A646, Rosegrove Lane	5262	20
RD_16	A646, Rosegrove Lane	5262	48
M65	M65	56965	113

Time-varying traffic flows were modelled, using national statistics for 2016 published by the DfT.[2]

Vehicle fleet composition

The split between light-goods vehicles (LGVs), rigid and articulated heavy-goods vehicles (HGVs), buses, and motorcycles was taken from the Department for Transport website:

https://www.dft.gov.uk/traffic-counts/area.php?region=North+West&la=Lancashire

The vehicle splits are presented in Table 7.

Table 7: Vehicles splits applied to vehicle fleet

SourceID	% Car	% LGV	% Rigid HGV	% Artic HGV	% Bus and Coach	% Motorcycle
8416	84.8	11.5	2.0	0.5	0.8	0.3
17389	84.3	11.7	1.4	0.5	1.5	0.6
38502	84.0	12.2	0.8	0.0	2.5	0.5
47474	76.7	20.4	2.7	0.6	0.6	0.2
56575	81.8	18.7	2.5	0.7	1.0	0.3
47435	75.5	20.4	2.7	0.6	0.6	0.3

*** - Please note that due to rounding the total % may not add up to 100%**

Vehicle emission rates for the vehicle categories buses, taxis, coaches, rigid HGVs, articulated HGVs, LGVs, cars and motorcycles can be calculated using the latest COPERT v5 NOx emission functions. Emission calculations for each vehicle category were based on the default vehicle age split by Euro classification in the Emission Factor Toolkit (EFT v8).

Measurement data for model verification

Model verification was carried out for 2016. The monitoring locations used within this verification can be seen in Figure 6. All the monitoring locations included within the verification process met the requirements of JAQU's modelling requirements, this being a bias adjusted roadside location with greater than 75% data capture. There is no monitoring data along the non-compliance link; as such, the model has been extended to include sufficient monitoring data for model verification where sufficient traffic data for the diffusion tube locations was available.

Table 8 – Monitoring data used in Model verification

ID	X	Y	Site Description	2016 Annual Mean	Data Capture
DT12	383107	432684	Willfield St	27.8	100
DT14	381498	432164.44	Accrington Rd	31.5	91.7
DT15	381472	432136	Rossendale Rd	39.7	100
DT21	382279	433072	Alder Street	23.0	100
DT17	381415	432315	Liverpool Rd	30.60	100
DT16	381378	432120	Accrington Rd/Rourkes	35.7	100
DT13	382749	432445	Peace Street	25.0	100

After the initial comparison of primary modelled Road NOx a review of model performance is undertaken to establish if the baseline model can better represent the emission environment that resulted in the 2016 measured concentrations. This review identified some monitoring locations for exclusion:

[2] https://www.gov.uk/government/statistical-data-sets/tra03-motor-vehicle-flow

1. DT12 – this is a roadside location. However, no traffic data was available for the adjacent minor road.
2. DT21 – this is a roadside location. However, like DT12, no traffic data were available for the adjacent minor road.
3. DT16 – Accrington Road/Rourkes. Street furniture that monitoring locations are typically affixed to could not be identified in a desk-based review. In addition, this location was within an industrial unit car park, where traffic data are not available to best represent the emission environment at this location.
4. DT17 – Rosegrove Lane. Street furniture that monitoring locations are typically affixed to could not be identified in a desk based review. In addition, this location was close to a large industrial park which emission sources could not be best represented in this modelling exercise.

Model verification

Figure 8 – Modelled total NO_2 vs. measured total NO_2 (2016)

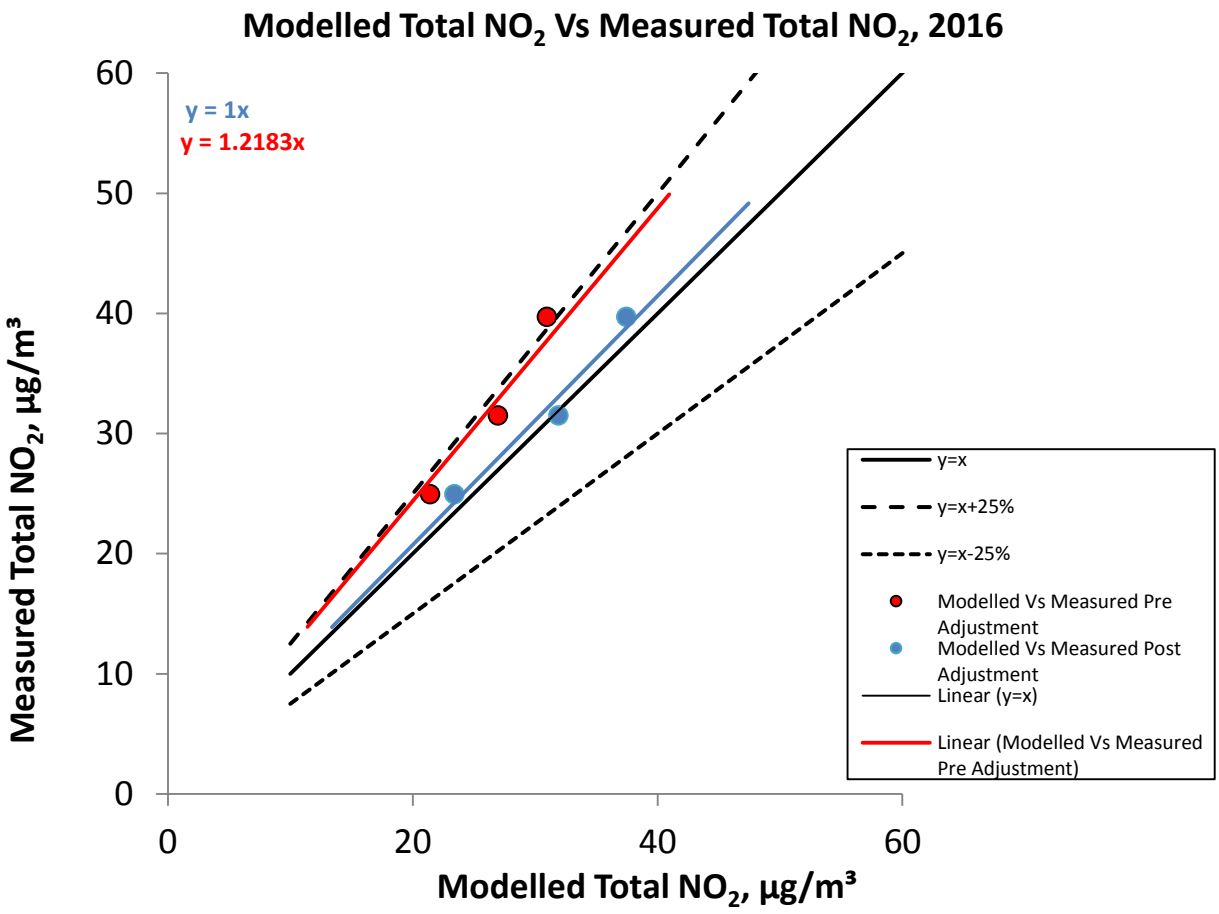


Figure 8 shows that all modelled NO_2 concentrations at verification locations are approximately 25% below the measured concentrations of NO_2 before adjustment, demonstrating that the model has a tendency to under-predict. Based on this initial verification, a model adjustment factor of 1.47 for the road contribution to NOx concentrations was calculated. Application of this adjustment factor leads to good agreement at all three monitoring locations. Prior to adjustment the Root Mean Square Error (RMSE) is 6.035, with adjustment reducing the RMSE to 1.6, bringing about substantial improvement in the statistical performance of the model. As such the adjusted model meets the model verification requirements of

LAQM.TG (16).

The model performance is good at all monitoring locations which brings added confidence in the overall results.

Modelled receptors

Within the model, receptors were located along the footpaths and were modelled at a height of 2 m. In addition, a receptor file was created which follows the same methodology as the PCM model; placing receptors 4 metres from the kerb of the non-compliant road link, and at a 5 metre resolution. The PCM-equivalent receptors were modelled at a height of 2 metres.

Defra's modelled 2016 background concentrations with a 2015 base year were used in the modelling. The primary road contribution was removed from these background concentrations to prevent double counting roads included in the dispersion model such as the A671.

Model results for 2016 base year

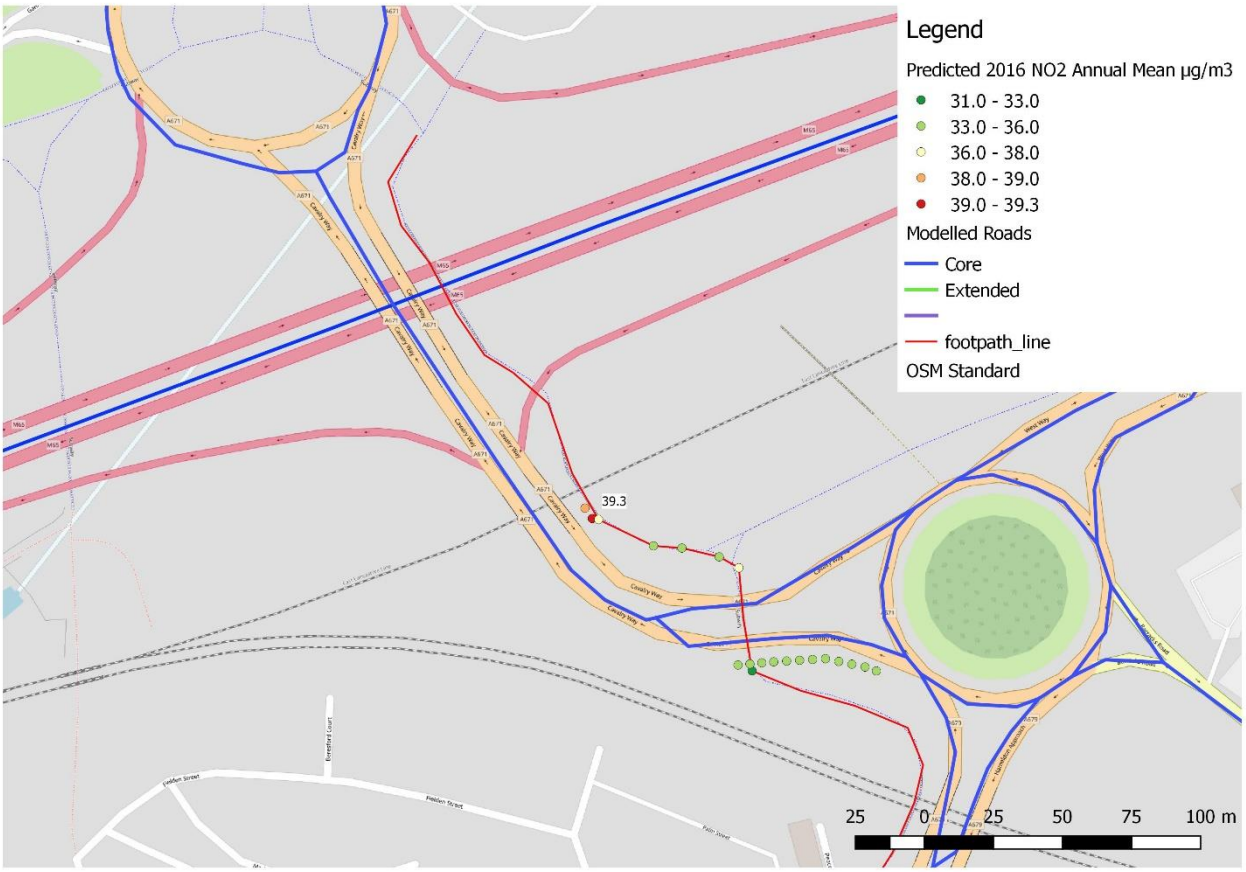
Local model results

Table 9 – Maximum NO_2 concentrations predicted according to the local model and PCM (2017)

Census ID	Local Authority	NO_2 2016 (Local)	NO_2 2017 (PCM)
8416	Burnley Borough Council	39.3	**45**

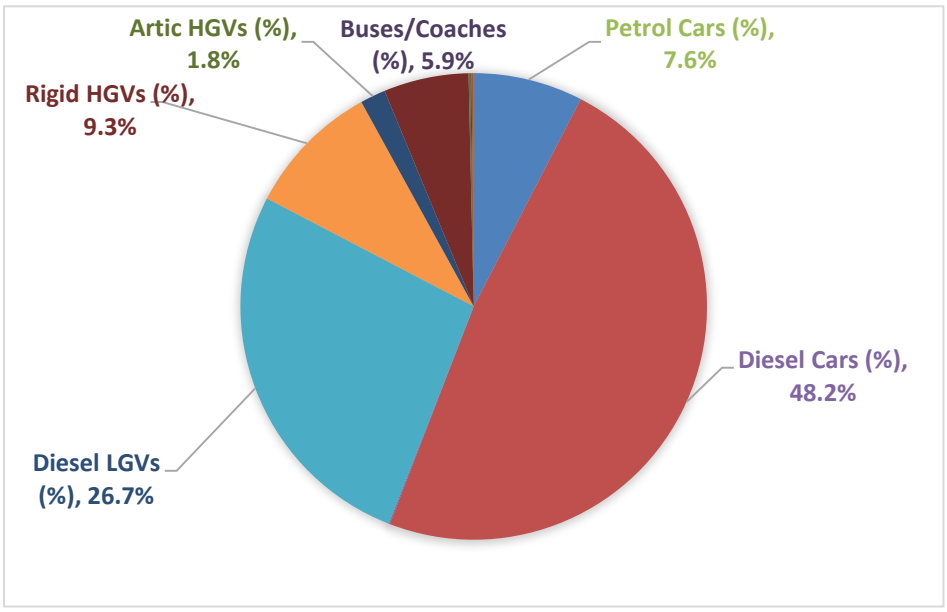
Table 9 shows the maximum modelled concentration from this local modelling study in the **NO_2 2016 (local)** column and allows for comparison against PCM projections in the **NO_2 2017 (PCM)** column. For all identified receptors along the A617, the maximum predicted annual mean NO_2 concentrations is 39.3 $\mu g/m^3$. Figure 9 shows predicted concentrations for all footpath receptors along the main road link, including the location of the predicted maximum. All areas of relevant exposure are in compliance with the NO_2 annual mean EU limit value.

Figure 9 – NO_2 annual means predicted by the local model (2016)



Source apportionment results

Figure 10 – Road NO_x source apportionment from RD7, A671 Cavalry Way (2016)



For the location of RD7, refer to Figure 6. The above figure shows that diesel cars and diesel LGVs are the first and second largest contributor of Road NOx, respectively.

Conclusions

A detailed baseline air quality model was developed for the non-compliant road link, a 271m segment of the A671 (Cavalry Way) at Junction 10 of the M65. The model included road emissions from the A671, M65, and surrounding roads. All modelling was carried out using ADMS-Roads version 4.1.1, using emission factors from the Emission Factor Toolkit version 8.0.1, published by Defra.

The model was verified in accordance with LAQM.TG (16) using a number of sites close to the non-compliant link. Following verification, a model adjustment factor of 1.47 was applied to road contributions to NO_x concentrations. Use of this adjustment factor led to strong agreement at all monitoring sites, lending confidence to model predictions across the domain.

NO_2 concentrations for 2016 were predicted at locations along a footpath adjacent to the non-compliant link, and at PCM-equivalent receptor locations 4m from the kerbside and 2m above ground level of the non-compliant link. The maximum predicted annual average NO_2 concentration at PCM equivalent receptors is 39.3µg/m³, below the EU limit value of 40µg/m³; as such, Burnley Borough Council is predicted to be in compliance with the relevant limit values.

As compliance with the NO_2 limit value has been demonstrated in 2016, and further reductions in emissions would be expected in later years as the vehicle fleet improves with lower emission technology, no additional mitigation measures are required as part of this study beyond those that have been recently and successfully implemented as part of the Council's on-going measures to promote lower emissions.

Burnley Borough Council has installed air quality monitoring equipment along the non-compliance link and will be able to use this to validate conclusions from the modelling exercise.

As stated in Part 2 of this report the most effective measures have been implemented as part of the Burnley/ Pendle Growth Corridor Improvements Scheme, where significant infrastructure works were undertaken to a number of locations within the Borough. One of the improvement scheme locations was the A671 and this included alterations to junction layout and signalisation of the Barracks (southerly) Roundabout at Junction 10 of the M65 to include MOVA operated control. The aim was to reduce congestion on the A671 and this was completed in spring 2015. The scheme also included improvements to the A671 at the junction with Trafalgar Street. This major project complemented similar signalisation work completed previously at the Gannow (northerly) Roundabout at junction 10. Priority bus lanes were also a part of the scheme. Additional work to signalise the junction of Active Way and Westgate (A671) at the roundabout towards the town centre has also just been completed with signalisation becoming live in June 2018. The aim is that traffic lights will be coordinated to improve traffic flow right through these junctions and onto the arterial routes around Burnley centre. It is anticipated that this significant investment into the infrastructure across the growth corridor will bring substantial improvements to traffic flow and air quality.

The Council, with Lancashire County Council, continues its on-going commitment to good air quality for all within the borough through the implementation and improvement in policy, particularly in planning and transport.

Part 4: Evidencing the short listed measures to identify options that could bring forward compliance

In this section, local authorities should set out the likely effectiveness of the shortlisted measures in bringing forward compliance. Local authorities should assess each option against the Primary Critical Success Factor.

Part 4 is not required as compliance with the Limit Value has been demonstrated in Part 3 above.

Part 5: Setting out a preferred option

In this section, local authorities should set out a summary of their preferred option to bringing forward compliance (where such measures exist). Where new measures have been identified that could bring forward compliance, local authorities should also assess a range of Secondary Critical Success Factors in order to identify the preferred option.

Part 5 is not required as compliance with the Limit Value has been demonstrated in Part 3 above.