

TECHNICAL NOTE

DATE:	30 September 2021	CONFIDENTIALITY:	Public
SUBJECT:	Stage 4 hearing (air quality) – compliance with EU Directive		
PROJECT:	Calderdale Local Plan Examination	AUTHOR:	Lee Shelton
CHECKED:	Stuart Bennett	APPROVED:	Stuart Bennett

INTRODUCTION

This technical note provides additional information to inform the Council response to question 4 at the Calderdale Local Plan Stage 4 hearing to be held on Wednesday 29th September 2021. Question 4. On the agenda¹ is:

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

The additional information includes time-series which show the highest nitrogen dioxide (NO₂) predicted concentrations at human receptors in West Vale, Clifton, Brighouse and Ainley Top for the period 2019-2032. This additional analysis has been completed to:

- Demonstrate the impact of the Local Plan during (2019-2032) and at full build out as represented by the modelling results reported for 2032 in reports CC132 and CC151
- To enable the comparison of the maximum NO₂ concentration with the EU Directive for which the annual average air quality objective is 40 µg/m³
- To show the impact of the Local Plan on NO₂ concentrations in the build out period and whether it is likely that it will cause exceedances of the EU Directive NO₂ annual mean objective.

The note does not focus on fine particles PM₁₀ and PM_{2.5} for which the risk of exceedance of the EU Directive objectives is lower than that for NO₂.

To comply with the EU Directive the government is also required to report to the European Commission on compliance with the EU Directive at non-human exposure locations adjacent to 'Pollution Climate Mapping' road links. Further context to the results presented in Section 4.4 of CC132 addressing the impact of the Local Plan on compliance with the EU Directive at Pollution Climate Mapping road links is provided.

METHODOLOGY

The methodology applied to the interpolation of annual mean NO₂ modelling results between the years 2019 and 2032 is as follows:

- 2032 maximum Do-Minimum, Do-Something (Bradford and Kirklees Local Plans) and Do-Something (Bradford, Kirklees and Calderdale Local Plans) model results (CC151) were used as the final point in a 2019-2032 time series
- The 2032 Do-Something maximum prediction modelled road NO₂ contribution was increased for all years back to the 2019 base-year based on the Defra NO₂ roadside projection factors (**Appendix**

¹ Calderdale Local Plan (Stage 4 Hearings Programme and Agenda (v.2 – 16/9/2021) (INS25b)

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1). The roadside NO₂ factors are simplified adjustment factors which can be used to predict the reduction over time in roadside NO₂ due to reduced vehicle emissions and, conversely, the increase when moving back in time

- The 2019 maximum concentration is checked against the annual average monitoring data for the area as a form of local calibration to modelled and monitored data
- The time series plots include the proposed trajectory of Local Plan build-out (option 6) described in the update to CC125c under Matter 22 Housing Trajectory Five Year Housing Land Supply² and the Defra background concentration applicable to the receptor location.

The resulting time series (**Figures 1-4**) as presented are not intended to be a replacement for full detailed modelling of annual mean NO₂ for interim years because modelling would be based on a specific fleet mix appropriate to the assessment year which are embedded in the Emission Factors Toolkit. The time series projections are weighted according to the trajectory build out rate which is expected to be greater in the period 2026-2032 than 2019-2025 (**Appendix 2**). Background concentrations are represented by Defra national pollutant mapping data with reference to base year 2018³.

The results provide a robust, visual indication as to the anticipated year of compliance with the EU Directives at human receptors and the likelihood that the Local Plan will trigger an exceedance of the NO₂ annual average objective during progressive build-out based on anticipated roadside NO₂ trends published by the government.

RESULTS

Compliance with the EU Directive (Human Health receptors)

This section provides maximum predicted annual mean NO₂ concentration time-series for the 15-year Local Plan period at the top three locations of human exposure (receptors) in West Vale, Clifton, Brighouse and Ainley Top as follows:

- The NO₂ annual mean concentration in the Do-Minimum scenario (blue line)
- The NO₂ annual mean concentration in the Do-Something scenario (green line) with Bradford and Kirklees local plans ('without Local Plan')
- The NO₂ annual mean concentration in the Do-Something scenario (orange line) with the Bradford, Kirklees and Calderdale local plans ('with Local Plan')

² Calderdale Council (2021). Calderdale Local Plan Hearings Matter 22. Update to CC125c Housing Trajectory Five Year Housing Land Supply. July 2021.

³ To provide conservative results the background concentrations were not corrected using the Defra sector removal tool.



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- The cumulative housing trajectory (purple line)
- Background NO₂ concentration (green bars).

The results include the nearest monitored concentration to the three highest predicted human exposure locations as reported in the Calderdale Council Annual Status Report (ASR)⁴.

It should also be noted that the NO₂ roadside projection factors do not extend beyond 2030. Therefore, for the last two years of the Local Plan period, the time series do not include the reduction in NO₂ due to improved vehicle emissions and background concentrations to offset the increase in traffic relating to the final build out years of the Local Plan. The increase in the NO₂ concentration beyond 2030 is therefore conservatively and unrealistically represented in the time-series. In reality, it is likely that the downward trend in NO₂ concentration in all modelling scenarios will continue.

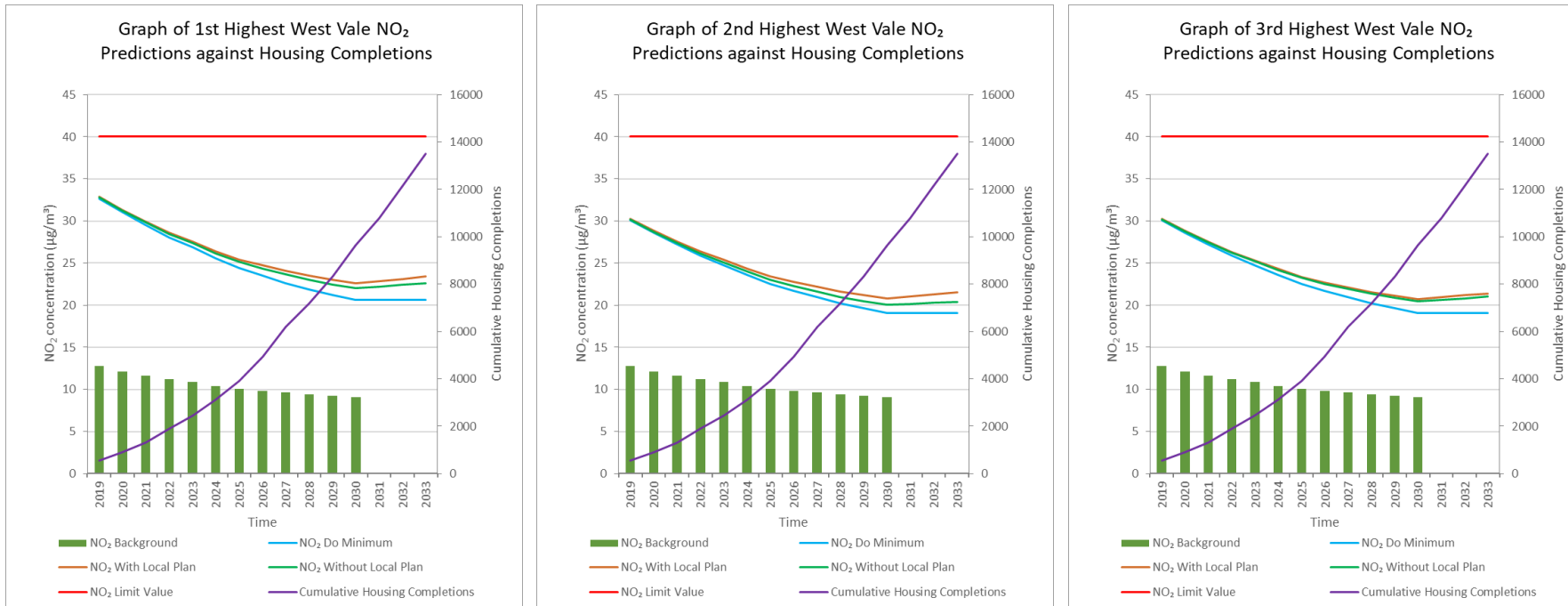
⁴ Calderdale Council (2020). 2020 Air Quality Status Report (ASR). June 2020.

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Figure 1. West Vale Time Series

Maximum proximate monitored concentration in 2019 **38.0 $\mu\text{g}/\text{m}^3$** at tube WV-SR1 on Stainland Road

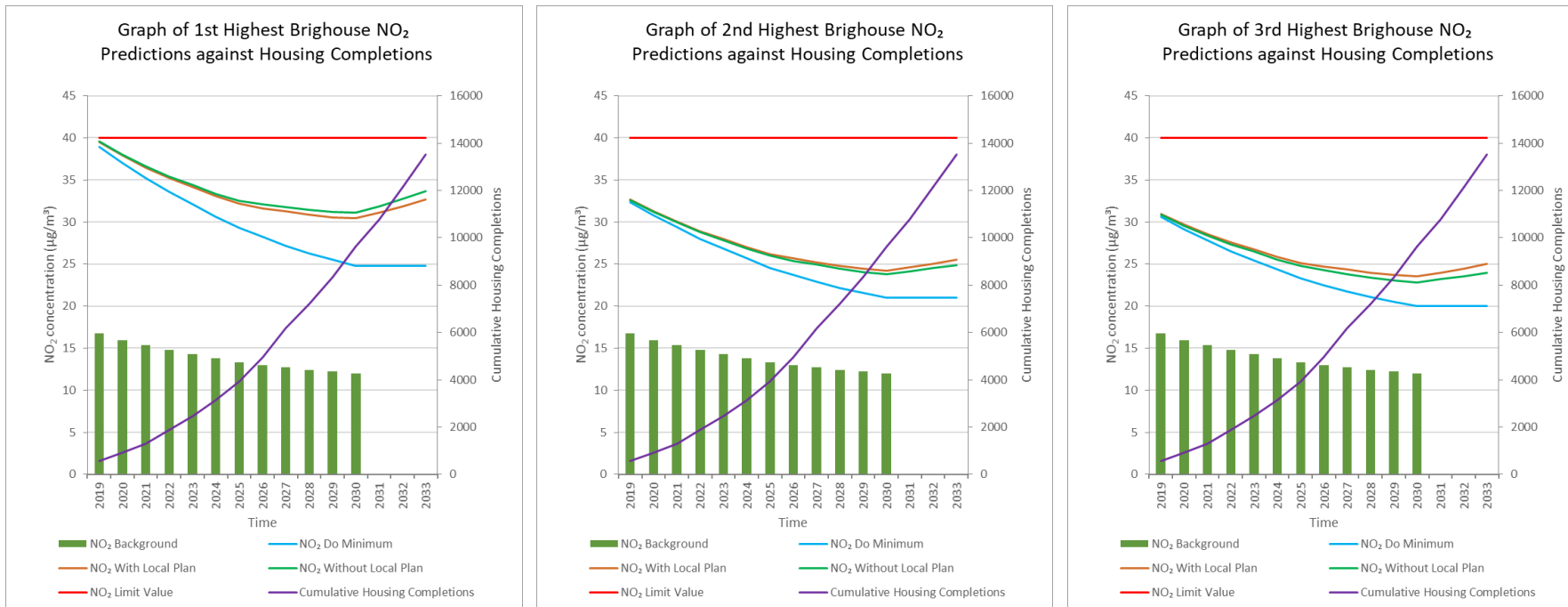


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Figure 2. Brighouse Time Series

Maximum proximate monitored concentration in 2019 **43.0 $\mu\text{g}/\text{m}^3$** at tube BH3 on A641 Huddersfield Road

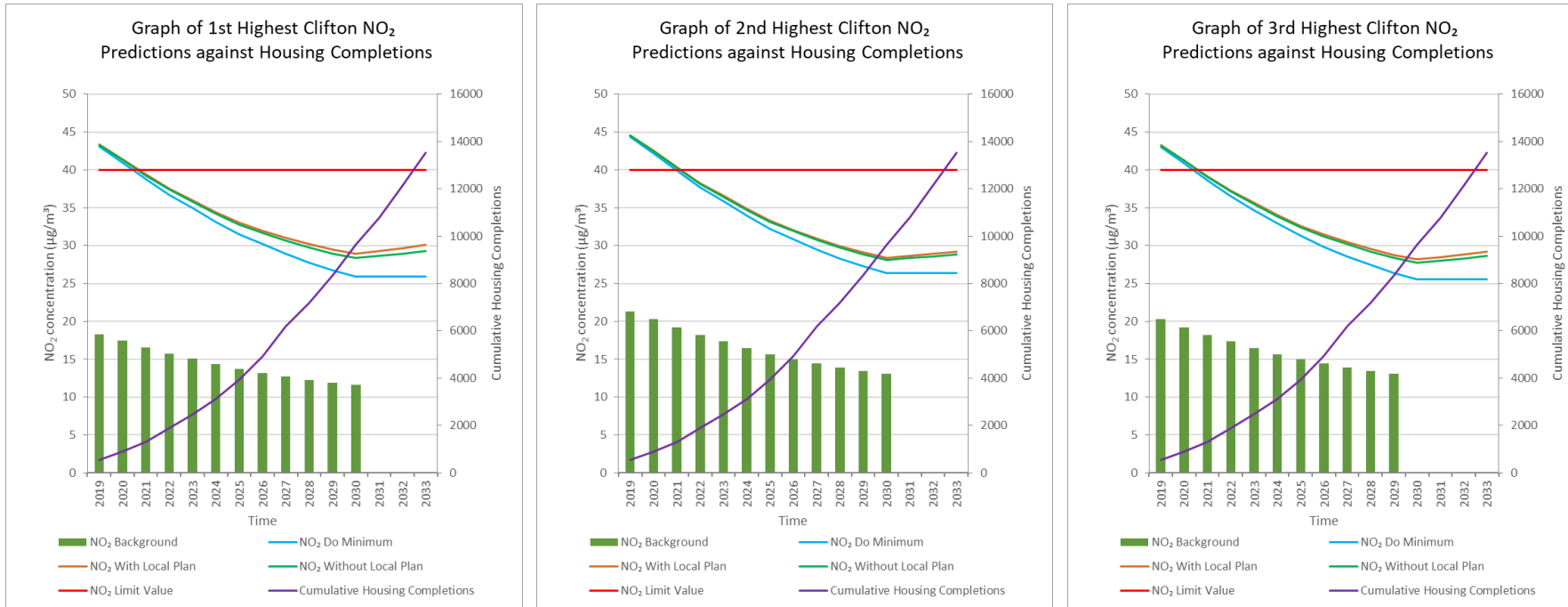


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Figure 3. Clifton Time Series

Maximum proximate monitored concentration in 2019 $33.0 \mu\text{g}/\text{m}^3$ at tube WR2 on the A644 Wakefield Road

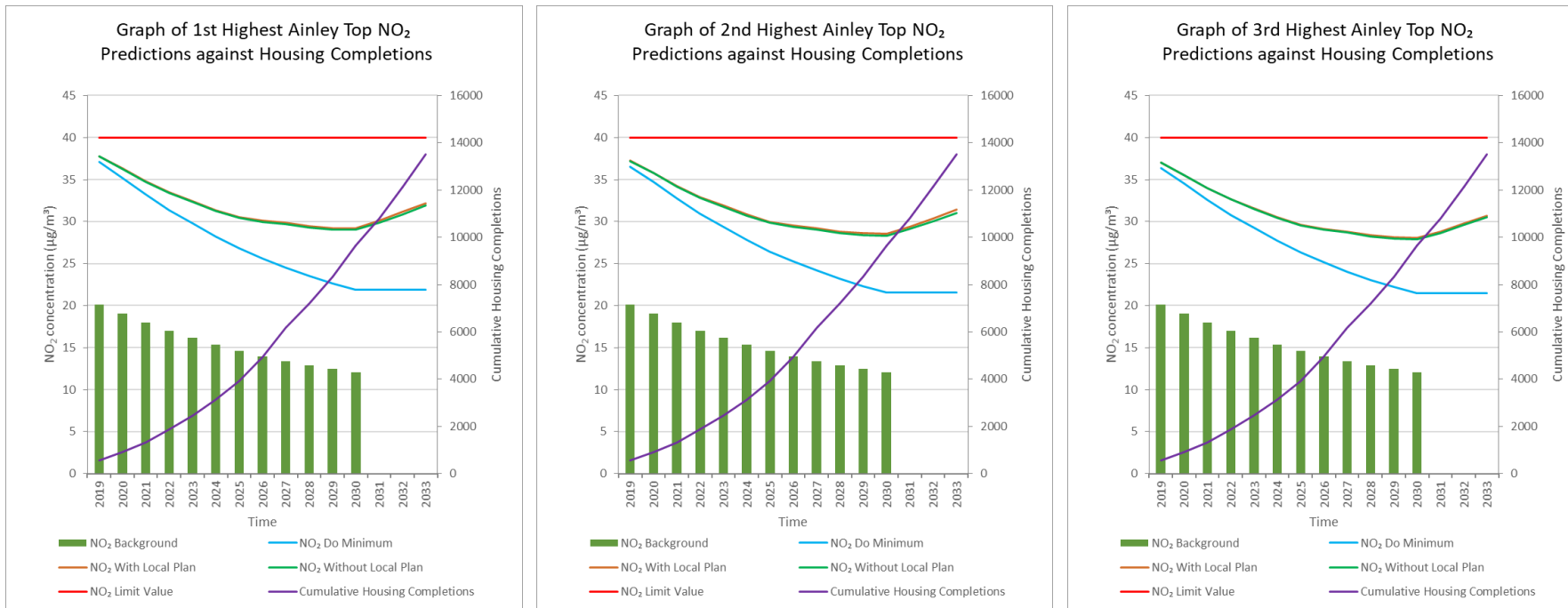


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Figure 4. Ainley Top Time Series

Maximum proximate monitored concentration in 2019 **28.0 $\mu\text{g}/\text{m}^3$** at tube AT-BR on Branch Road



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SUMMARY

Compliance with the EU Directive (Human Health receptors)

For West Vale, Brighouse, Clifton and Ainley Top a back calculation from the maximum annual mean NO₂ prediction has been made for each year of the Local Plan. The annual mean NO₂ prediction in 2032 is represented by the maximum modelled prediction in the area represented by the results in CC132 for Ainley Top and the supplementary result presented in CC151 for West Vale, Clifton and Brighouse. Interim year predictions have been estimated through the application of correction factors, derived from the government's roadside NO₂ projection factors, and the Local Plan housing supply trajectory.

It should be noted that factored maximum concentrations for 2019 do not equal the maximum monitored concentration because the monitors are not located in the same place that maximum human exposure occurs on the strategic road network. However, the results provide a visual indication as to the relationship between build out progression and maximum NO₂ concentration for the Do-Minimum Do-Something (Bradford and Kirklees local plans) and Do-Something (Bradford, Kirklees and Calderdale Local Plan) scenarios.

In West Vale (**Figure 1**), the maximum Do-Something (Bradford, Kirklees and Calderdale Local Plan) factored concentration for 2019 (32.8 µg/m³) is between the monitored concentrations on Stainland Road of 38.0 µg/m³ (WV-SR1) and 28.0 µg/m³ (WV-SR2) and is below the EU Directive annual mean limit for NO₂.

In Brighouse (**Figure 2**), the maximum Do-Something (Bradford, Kirklees and Calderdale Local Plan) factored concentration prediction for 2019 (39.5 µg/m³) which is below the maximum monitored concentration of 43.0 µg/m³ and the 40.0 µg/m³ EU Directive annual mean limit for NO₂. At this receptor, in the DM scenario no exceedances are expected as the benefit of the reduction in vehicle emissions and background concentrations will be greater than the disbenefit from growth traffic. Additional traffic caused by the Bradford, Kirklees and Calderdale Local Plans will not cause any non-compliance during the Local Plan period.

In Clifton (**Figure 3**), the maximum Do-Something (Bradford, Kirklees and Calderdale Local Plan) factored concentration prediction for 2019 (44.6 µg/m³) is above the maximum monitored concentration of 33.0 µg/m³ on A644 Wakefield Road and 1.6 µg/m³ above the monitor on A641 Huddersfield Road in Brighouse. It is estimated to be under the 40.0 µg/m³ EU Directive at the end of 2021. The Local Plan will not prolong exceedances beyond 2022 in Clifton.

At Ainley Top (**Figure 4**), the maximum Do-Something (Bradford, Kirklees and Calderdale Local Plan) factored concentration prediction for 2019 (37.8 µg/m³) which is approximately 4.8 µg/m³ above the monitored concentration of 33.0 µg/m³ but below the 40.0 µg/m³ EU Directive annual mean limit value. The impact of the Local Plan is in Ainley Top and compliance will be achieved throughout the Local Plan period.

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No exceedances are predicted throughout the Local Plan period at the maximum receptor locations outside Clifton. Compliance will be achieved in Clifton in 2022 and thereafter additional traffic caused by the Calderdale Local Plan will not impact compliance in all four areas.

The factoring exercise provides indicative results which show that in all scenarios, the increase in NO₂ pollution caused by traffic growth will be off-set by improvements in vehicle emissions and background concentrations such that the net effect on NO₂ pollution over the life of the Local Plan is a year on year reduction.

The results show that the difference between Bradford and Kirklees local plans and the Calderdale Local Plan are small at the top three receptor locations in West Vale, Brighouse, Clifton and Ainley Top. The Local Plan will not delay compliance with the EU Directive limit values in these locations of human exposure and no specific mitigation is proposed as a result of the assessment at the strategic level. However, it should be noted that this conclusion does not exclude the requirement for specific local air quality mitigation should the results of fine detailed impact assessment informing detailed planning applications indicate the risk of non-compliance.

Compliance with the EU Directive (PCM Model receptors)

An assessment of compliance with the EU Directive limit values at the Defra PCM compliance links is reported in Table 4-13 of Section 4.4 of CC132. The Projected Compliance Year described in Table 4-13 references the estimates for agglomeration zone UK0004 (West Yorkshire Area) and non-agglomeration zone UK0034 (Yorkshire & Humberside) is based on the superseded IAN 175/13 technical note⁵. Compliance year estimates have been superseded by datasets supporting the Defra Air Pollution in the UK 2020⁶ report which shows that compliance is expected in 2019 in UK0004 and 2020 in UK0034.

The PCM network is shown in Figure 6-17 of CC132a and the boundary of reporting zones UK0004 and UK0034 occurs on link ID802006604 (Cooper Bridge Road) north-west of Mirfield and outside Calderdale. The assessment results show the maximum predicted concentration caused by the Bradford and Kirklees local plans will be 38.7 µg/m³ (zone UK0004) and 38.1 µg/m³ (zone UK0034). The Local Plan will cause the maximum change on this compliance link to increase by 0.6 µg/m³ (zone UK0004) and 1.5 µg/m³ (zone UK0034).

Figure 5 presents time-series developed applying the same methodology as that applied to the top three highest human receptors to the compliance link predictions.

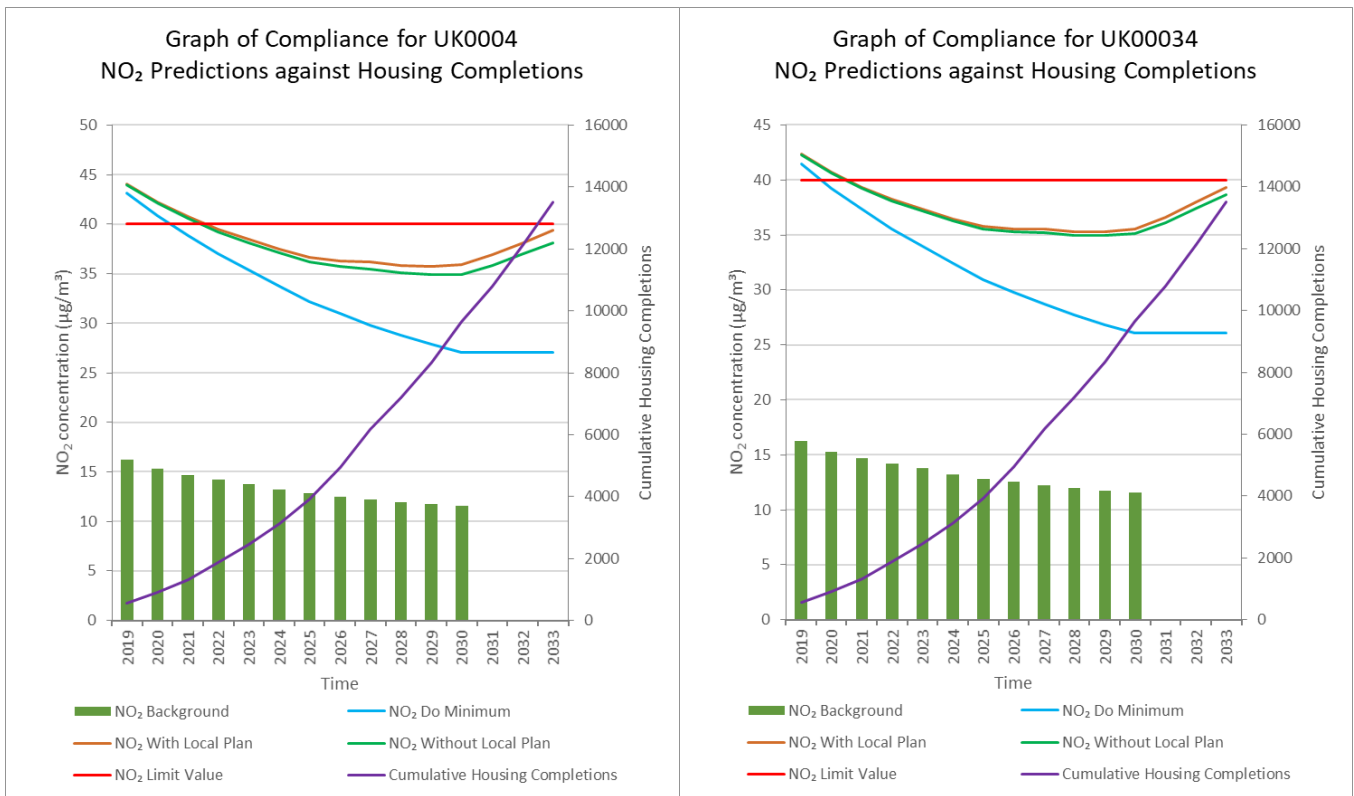
⁵ Interim Advice Note LA175/13. Risk assessment of compliance with the EU Directive on ambient air quality and production of Scheme Air Quality Action Plans.

⁶ Defra (2020). Air Pollution in the UK 2019. September 2020.

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Figure 5. Compliance Link Receptor Time Series



The modelling results representing the Local Plan in 2032 do not indicate an exceedance of the 40 µg/m³ objective in either the 2032 Do-Minimum (Bradford and Kirklees) or 2032 Do-Something (Local Plan) scenarios. The Local Plan will yield NO₂ concentrations which are higher than the Defra projected concentrations for the compliance link on Cooper Bridge Road in zone UK0004 and zone UK0034.

When applying the NO₂ projection factors to the Local Plan interim years, **Figure 5** indicates that compliance can be expected in 2022 (UK004) and 2021 (UK0034). Further improvements in air quality beyond compliance would be slowed but the maximum increases predicted in 2022 (0.3 µg/m³) and 2021 (0.1 µg/m³) are so low that the delay would be temporary.

The increase in concentrations beyond 2030 is because the NO₂ roadside projection factors and background concentration datasets do not extend beyond 2030.



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APPENDIX 1 - DEFRA ROADSIDE PROJECTION FACTORS

Roadside NO₂ Projection Factors^{7, 8}

Year	Roadside NO ₂ projection factor
2018	1.000
2019	0.953
2020	0.906
2021	0.855
2022	0.807
2023	0.765
2024	0.724
2025	0.686
2026	0.653
2027	0.622
2028	0.595
2029	0.571
2030	0.550
2031	0.550
2032	0.550

⁷ (<https://laqm.defra.gov.uk/wp-content/uploads/2021/08/Roadside-NO2-Projection-Factors.pdf> accessed 27th September 2021)

⁸ The projection factors used represent 'Rest of UK (HDV = <10%)'



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APPENDIX 2 - HOUSING TRAJECTORY

Year	Cumulative Unit Completions
2019	557
2020	905
2021	1,312
2022	1,888
2023	2,462
2024	3,129
2025	3,927
2026	4,939
2027	6,187
2028	7,191
2029	8,341
2030	9,645
2031	10,782
2032	12,149
2033	13,516