A34 Perry Barr Highway Improvement Scheme Air Quality Impact Assessment Summary

Contents

Figures

Tables

1 Introduction

1.1 Introduction

1.1.1 This air quality assessment considers the impact on local air quality from vehicle movements associated with the operation of the scheme in the first year of operation (2022) and in 2026.

1.1.2 The pollutants included in the assessment are particulate matter (PM_{10} and $PM_{2.5}$) and nitrogen dioxide (NO_2).

1.1.3 Perry Barr is currently part of an Air Quality Management Area (AQMA).

1.2 Air Quality Objective Values

1.2.1 The air quality objective values have been set down in regulation solely for the purposes of local air quality management (LAQM).

1.2.2 The UK's national air quality objective values for the pollutants of relevance to this assessment are displayed in **Table 1.1**.

Table 1.1: Air Quality Objective Values

Pollutant	Averaging Period	Objective (µg/m^3)	Date for Compliance
Nitrogen dioxide (NO_2) for human health	Annual mean	40	31 December 2010
	1-hour mean	200 (not to be exceeded more than 18 times a year)	31 December 2010
Particulate matter (PM_{10}) for human health	Annual mean	40	31 December 2010
	24-hour mean	50 (not to be exceeded more than 35 times a year)	31 December 2010
Particulate matter ($PM_{2.5}$) for human health	Annual mean	25	31 December 2020

1.3 Air Quality Receptors

1.3.1 Sensitive receptors are locations where members of the public may be exposed to and affected by air quality impacts. Where sensitive receptors are anticipated to be in a location for only a short period of time, these locations will be considered against relevant short-term air quality objectives.

1.3.2 The assessment considers the impact of road traffic emissions on the long-term (annual mean) concentrations of NO_2, $PM_{2.5}$ and PM_{10} at local air quality sensitive receptors in the vicinity of the scheme in 2022 and 2026. Short-term concentrations of NO_2 and PM_{10} are also calculated from relevant annual mean concentrations.

1.3.3 As the area of interest is frequently used by pedestrians, the locations of representative receptors selected for inclusion in the dispersion modelling are also selected to be representative of areas where short term (1-hour mean for NO_2 and 24-hour mean for PM_{10}) exposure to pedestrians may occur.

1.3.4 A total of 24 receptor points have been considered. The selected receptors are listed in **Table 1.2** and displayed on **Figure 1.1**. The receptors modelled are predominantly residential properties, with schools included.

Table 1.2: Selected Sensitive Receptors - Operational Assessment

ID	Description	OS Grid Reference		Height (m)
		X	Y	
R1	Closest sensitive receptor to diffusion tube 1	407067.1	291639.9	2.05
R2	Closest sensitive receptor to diffusion tube 2	406828.6	291581.1	2.26
R3	Closest sensitive receptor to diffusion tube 3	406939.8	291109.1	2.2
R4	Closest sensitive receptor to diffusion tube 4	406807.8	291241.4	2.25
R5	Closest sensitive receptor to diffusion tube 5	406510.2	290901.7	2.48
R6	Closest sensitive receptor to diffusion tube 6	407009.9	290764.9	2.3
R7	Closest sensitive receptor to diffusion tube 7	406762.4	290609.3	2.34
R8	Future housing development	406865.0	291208.1	1.5
R9	Residential property	406802.5	290908.3	4.5
R10	Residential property	406835.7	290822.8	1.5
R11	Residential property	406816.0	290823.6	1.5
R12	Place of worship	406731.4	290804.0	4.5
R13	Residential property	406655.5	290854.7	4.5
R14	Residential property	406929.5	290785.5	1.5
R15	Residential property	406778.4	290752.0	4.5
R16	Residential property	406739.3	290738.2	4.5
R17	Residential property	406724.1	290672.8	1.5
R18	Future housing development	406855.7	291106.8	1.5
R19	Residential property	406623.8	290887.5	1.5
R20	School	407163.4	290940.7	1.5
R21	Residential property	406798.4	291413.1	1.5
R22	Residential property	406799.1	291503.7	1.5
R23	Residential property	407124.8	291345.7	1.5
R24	Residential property	407152.3	291212.1	1.5

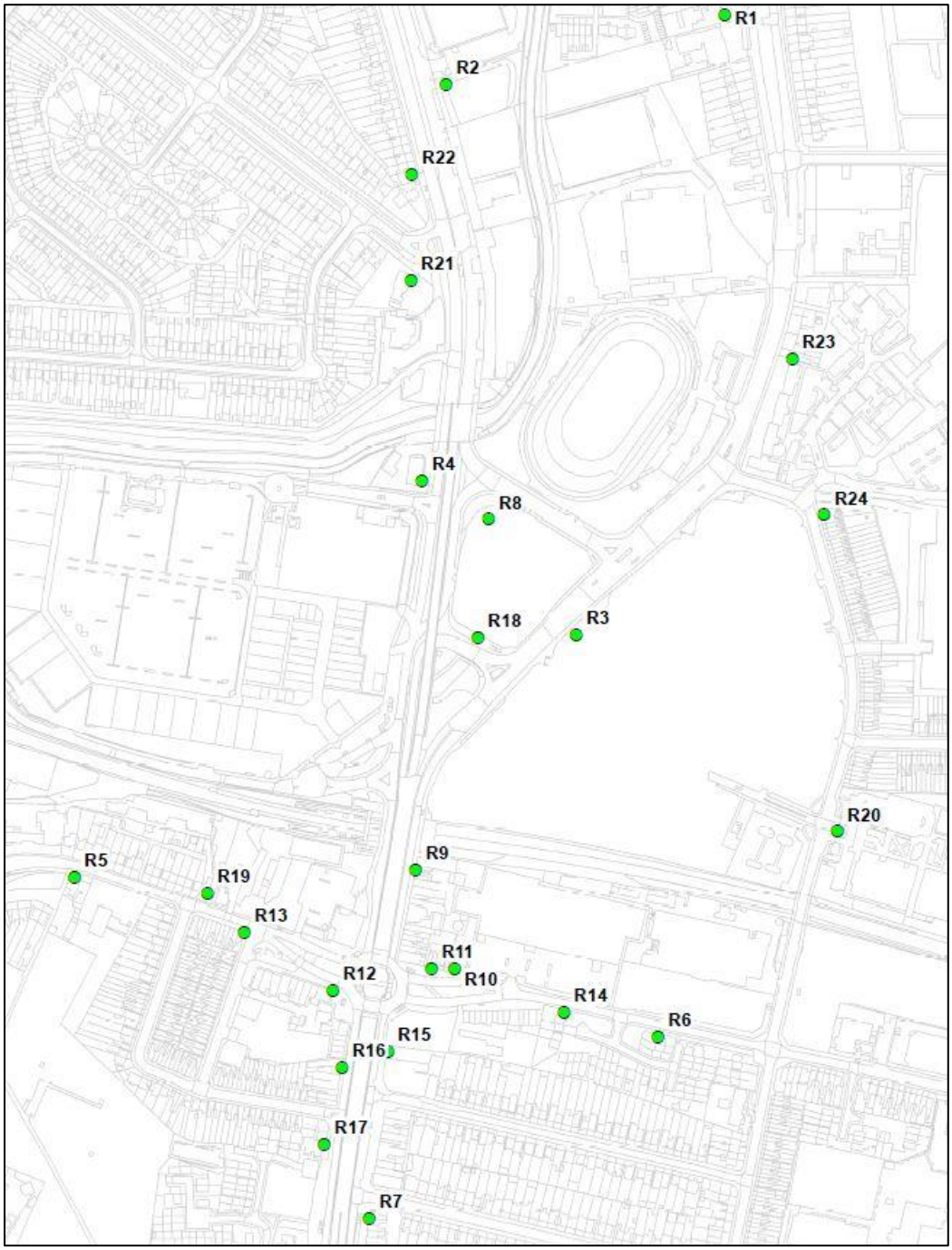

Figure 1.1: Sensitive receptors

1.4 Background Data

1.4.1 Background concentration data for PM_{10} and $PM_{2.5}$ have been sourced from DEFRA Background Maps. DEFRA background concentrations include contributions from a variety of sources, including roads, rail and industry.

1.4.2 For the NO_2 background concentration, a background diffusion tube located within the study area of the scheme, away from the main roads has been used for all scenarios, providing a conservative approach by assuming no decrease in the background concentration over time. The value used for all receptor locations is **32.6 µg/m^3**.

1.4.3 With regard to road traffic, the change in pollutant concentrations in the existing baseline and future with scheme scenarios have been quantified and these have been used to consider the risk of the air quality limit values being exceeded in each scenario. The magnitude of change is divided into four classes as defined in **Table 1.3**.

Table 1.3: Magnitude of Change in Ambient Pollution Concentrations

Magnitude of Change (µg/m^3)	**Value of Change in Annual mean NO_2 and PM_{10}**
Large (>4)	Greater than full measure of uncertainty (MoU) value of 10% of the air quality objective (4 µg/m^3)
Medium (>2 to 4)	Greater than half of the MoU (2 µg/m^3), but less than the full MoU (4 µg/m^3) of 10% of the air quality objective
Small (>0.4 to 2)	More than 1% of objective (0.4 µg/m^3) and less than half of the MoU i.e. 5% (2 µg/m^3). The full MoU is 10% of the air quality objective (4 µg/m^3)
Imperceptible (≤0.4)	Less than or equal to 1% of the objective (0.4 µg/m^3)

2 Baseline Conditions

2.1 Existing Baseline Pollutant Concentrations

2.1.1 Annual mean concentrations of NO_2, PM_{10} and $PM_{2.5}$ for the Existing Baseline have been predicted at all receptor points specified in **Table 1.2**.

2.1.2 Existing baseline conditions for the year 2018 without the scheme, referred to hereafter as the "Existing Baseline", are shown in **Table 2.1**.

Table 2.1: Existing Baseline Conditions

Receptor ID	**Annual Mean NO_2 (µg/m^3)**	**NO_2 1-hour mean 99.79th percentile (µg/m^3)**	**Annual Mean PM_{10} (µg/m^3)**	**PM_{10} 24-hour mean 98th percentile (µg/m^3)**	**Annual Mean $PM_{2.5}$ (µg/m^3)**
R1	**61.8**	129.4	23.6	31.0	15.0
R2	**48.3**	92.4	18.5	22.4	12.3
R3	**63.2**	**218.9**	20.3	27.8	13.5
R4	**54.4**	148.2	19.2	24.9	12.8
R5	**80.4**	**368.5**	24.3	39.7	16.0
R6	**66.0**	194.0	22.0	32.6	14.5
R7	**60.6**	156.3	21.5	28.0	14.2
R8	**54.1**	150.1	18.8	21.7	12.6
R9	**71.8**	**210.7**	23.4	31.5	15.3

Receptor ID	Annual Mean NO_2 ($\mu g/m^3$)	NO_2 1-hour mean 99.79th percentile ($\mu g/m^3$)	Annual Mean PM_{10} ($\mu g/m^3$)	PM_{10} 24-hour mean 98th percentile ($\mu g/m^3$)	Annual Mean $PM_{2.5}$ ($\mu g/m^3$)
R10	**60.6**	154.2	20.6	26.0	13.7
R11	**65.1**	160.5	21.7	27.8	14.3
R12	**58.6**	141.4	20.4	26.4	13.6
R13	**86.2**	**363.7**	25.7	40.3	16.8
R14	**81.4**	**334.8**	25.3	40.4	16.5
R15	**63.8**	157.9	22.0	28.5	14.5
R16	**63.7**	178.4	21.7	28.9	14.3
R17	**62.0**	193.9	21.4	29.4	14.1
R18	**59.3**	142.7	20.4	26.1	13.5
R19	**107.6**	**469.1**	30.3	48.0	19.6
R20	**48.1**	124.3	18.5	23.4	12.4
R21	**43.1**	93.2	17.1	20.1	11.6
R22	**46.9**	93.0	18.1	22.2	12.1
R23	**79.5**	**240.0**	28.0	42.5	17.6
R24	**56.5**	186.2	22.0	29.1	14.1

*Note: **Bold** indicates a value that is greater than the relevant national air quality objective.*

2.1.3 Predicted annual mean concentrations of NO_2 for the Existing Baseline scenario are above the annual mean air quality objective value at all receptors. The monitored background concentration of 32.6 $\mu g/m^3$ of NO_2 has also been used in this scenario, providing a conservative estimate of future background concentrations.

2.1.4 It is also predicted that the short-term objective of exceeding 200 $\mu g/m^3$ less than 18 times per year for NO_2 won't be attained for a few receptors that are particularly close to the road traffic (R3, R5, R9, R13, R14, R19 and R23).

2.1.5 For the Existing Baseline scenario, annual mean concentrations of PM_{10} are predicted to be below their relevant air quality objective values at all locations within the study area. The maximum concentration of PM_{10} predicted is 30.3 $\mu g/m^3$, at receptor R19 on Wellington Road; this is below the relevant annual mean objective value (40 $\mu g/m^3$).

2.1.6 The number of days where 24-hour PM_{10} concentrations are predicted to be above 50 $\mu g/m^3$ is below the 24-hour objective of 35 exceedances per year for all receptors.

2.1.7 Predicted annual mean concentrations of $PM_{2.5}$ are below the annual mean objective value of 25 $\mu g/m^3$ for all receptors. The maximum concentration of $PM_{2.5}$ predicted is 19.6 $\mu g/m^3$, at receptor R19.

3 Future year scenarios with the scheme

3.1 Annual Mean NO_2 – Comparison of 2018, 2022 and 2026

3.1.1 **Table 3.1** presents NO_2 annual mean concentrations at receptor locations, with the scheme in operation.

Table 3.1: Annual Mean NO2 (µg/m^3) - Baseline (2018), 2022 & 2026

Receptor	Existing Baseline (2018)	Future with scheme (2022)	Future with scheme (2026)	Baseline 2018 compared to 2022 with scheme	Baseline 2018 compared to 2026 with scheme
R1	**61.8**	**55.3**	**46.7**	-6.5 (LB)	-15.1 (LB)
R2	**48.3**	**52.1**	**44.2**	3.8 (MA)	-4.1 (LB)
R3	**63.2**	**41.4**	38.4	-21.8 (LB)	-24.8 (LB)
R4	**54.4**	**65.5**	**56.7**	11.1 (LA)	2.3 (MA)
R5	**80.4**	**71.0**	**59.9**	-9.4 (LB)	-20.5 (LB)
R6	**66.0**	**56.5**	**46.6**	-9.5 (LB)	-19.4 (LB)
R7	**60.6**	**53.8**	**45.2**	-6.8 (LB)	-15.4 (LB)
R8	**54.1**	**59.9**	**51.2**	5.8 (LA)	-2.9 (MB)
R9	**71.8**	**64.9**	**54.3**	-6.9 (LB)	-17.5 (LB)
R10	**60.6**	**52.2**	**46.0**	-8.4 (LB)	-14.6 (LB)
R11	**65.1**	**55.4**	**48.0**	-9.7 (LB)	-17.1 (LB)
R12	**58.6**	**51.2**	**44.8**	-7.4 (LB)	-13.8 (LB)
R13	**86.2**	**73.4**	**60.8**	-12.8 (LB)	-25.4 (LB)
R14	**81.4**	**74.4**	**61.4**	-7.0 (LB)	-20.0 (LB)
R15	**63.8**	**57.3**	**48.7**	-6.5 (LB)	-15.1 (LB)
R16	**63.7**	**58.4**	**49.2**	-5.3 (LB)	-14.5 (LB)
R17	**62.0**	**55.2**	**44.7**	-6.8 (LB)	-17.3 (LB)
R18	**59.3**	**51.6**	**45.2**	-7.7 (LB)	-14.1 (LB)
R19	**107.6**	**94.7**	**76.9**	-12.9 (LB)	-30.7 (LB)
R20	**48.1**	**45.7**	**41.6**	-2.4 (MB)	-6.5 (LB)
R21	**43.1**	**44.3**	**40.5**	1.2 (SA)	-2.6 (MB)
R22	**46.9**	**47.6**	**42.6**	0.7 (SA)	-4.3 (LB)
R23	**79.5**	**73.4**	**55.2**	-6.1 (LB)	-24.3 (LB)
R24	**56.5**	**52.6**	**46.0**	-3.9 (MB)	-10.5 (LB)

*Note: **Bold** indicates a value that is greater than the relevant national air quality objective (40 µg/m^3)*

Large Beneficial (LB), Medium Beneficial (MB), Small Beneficial (SB), Large Adverse (LA), Medium Adverse (MA), Small Adverse (SA), Imperceptible (I)

3.1.2 The magnitude of change in predicted annual mean NO_2 concentrations with the scheme in operation, relative to the 2018 baseline scenario can be described as large, medium, small or imperceptible based on the DMRB significance criteria defined in **Table 1.3** in **Section 1.4.3.**

3.1.3 In 2022 five receptors experience increases in annual mean NO_2 however by 2026 only one receptor experiences increases of NO_2 above the 2018 baseline. All other receptors see reductions in NO_2 in 2022 and 2026.

3.1.4 Predicted annual mean concentrations of NO_2 are above the annual mean objective value of 40 µg/m^3 for all receptors in 2018 baseline and 2022 with scheme. In 2026 all receptors except R3 are above the annual mean objective.

3.1.5 At receptor R3 (Aldridge Road) the largest beneficial reduction of 21.8 µg/m^3 is predicted, resulting in a total concentration that drops below the objective value for annual mean NO_2.

3.1.6 At receptor R4 a medium adverse increase of 2.3 µg/m^3 from the 2018 baseline is predicted in 2026 with the scheme.

3.1.7 Receptors R8 and R21 predict a medium beneficial decrease in NO_2 in 2026, with all other receptors, excluding R4, predicting a large beneficial decrease.

3.2 NO_2 1-hour mean (99.79th percentile) – Comparison of 2018, 2022 and 2026

3.2.1 **Table 3.2** shows the 1-hour mean of NO_2 for the 99.79th percentile at receptor locations, with the scheme in operation.

Table 3.2: 1-hour mean NO2 (µg/m^3) - Baseline (2018), 2022 & 2026

Receptor	Existing Baseline (2018)	Future with scheme (2022)	Future with scheme (2026)	Baseline 2018 compared to 2022 with scheme	Baseline 2018 compared to 2026 with scheme
R1	129.4	**120.2**	93.7	-9.2 (SB)	-35.7 (LB)
R2	92.4	**147.1**	103.2	54.7 (LA)	10.8 (MA)
R3	**218.9**	96.0	77.8	-122.9 (LB)	-141.1 (LB)
R4	148.2	**244.8**	193.5	96.6 (LA)	45.3 (LA)
R5	**368.5**	**302.8**	**226.7**	-65.7 (LB)	-141.8 (LB)
R6	194	**210.3**	126.7	16.3 (MA)	-67.3 (LB)
R7	156.3	126.4	80.8	-29.9 (LB)	-75.5 (LB)
R8	150.1	165.1	128.9	15.0 (MA)	-21.2 (LB)
R9	**210.7**	169.3	132.2	-41.4 (LB)	-78.5 (LB)
R10	154.2	120.6	94.8	-33.6 (LB)	-59.4 (LB)
R11	160.5	123.1	96.2	-37.4 (LB)	-64.3 (LB)
R12	141.4	111.7	87.8	-29.7 (LB)	-53.6 (LB)
R13	**363.7**	**264.5**	197.4	-99.2 (LB)	-166.3 (LB)
R14	**334.8**	**373.8**	**291.2**	39.0 (LA)	-43.6 (LB)
R15	157.9	135.2	106.8	-22.7 (LB)	-51.1 (LB)
R16	178.4	152.3	119.5	-26.1 (LB)	-58.9 (LB)
R17	193.9	166.3	94.1	-49.6 (LB)	-99.8 (LB)
R18	142.7	144.3	112.3	1.6	-30.4 (LB)
R19	**469.1**	**340.5**	**253.0**	-128.6 (LB)	-216.1 (LB)
R20	124.3	112.7	88.0	-11.6 (MB)	-36.3 (LB)
R21	93.2	111.1	91.0	17.9 (MA)	-2.2 (SB)
R22	93.0	114.3	92.7	21.3 (LA)	-0.3
R23	**240.0**	**275.9**	139.6	35.9 (LA)	-100.4 (LB)
R24	186.2	155.8	114.5	-30.4 (LB)	-71.7 (LB)

*Note: **Bold** indicates a value that is greater than the relevant national air quality objective (200 µg/m^3- not to be exceeded more than 18 times a year).*

Large Beneficial (LB), Medium Beneficial (MB), Small Beneficial (SB), Large Adverse (LA), Medium Adverse (MA), Small Adverse (SA) Imperceptible (I)

3.2.2 The magnitude of change in predicted 1-hour NO_2 concentrations with the scheme in operation, relative to the 2018 baseline scenario can be described as large, medium, small or imperceptible based on the DMRB significance criteria defined in **Table 1.3** in **Section 1.4.3.**

3.2.3 R5, R13, R14, R19 and R23 all exceed the objective value for 1-hour annual mean NO_2 in the 2018 baseline, and are predicted to stay above it with the scheme in operation in 2022. In 2026, R13 and R23 drop below the objective value for the 1-hour annual mean NO_2 however R5, R14 and R19 remain above the objective value.

3.2.4 At receptor R3 the 1-hour concentration of NO_2 has decreased 122.9 µg/m^3 in 2022 and 141.1 µg/m^3 in 2026 to drop below the 1-hour annual mean NO_2 in both years.

3.2.5 Receptors R2 and R4 are predicted to see increases in 1-hour annual mean NO_2 concentrations compared to the 2018 baseline, however both will remain below the objective

value in 2026.

3.2.6 The largest decrease in 1-hour annual mean NO_2 in 2026 is predicted at R19 with a decrease of 216.1 µg/m^3, however this still remains above the objective value.

3.3 Annual Mean PM_{10} – Comparison of 2018, 2022 and 2026

3.3.1 **Table 3.3** presents PM_{10} annual mean concentrations at receptor locations, with the scheme in operation.

Table 3.3: Annual Mean PM_{10} (µg/m^3) - Baseline (2018), 2022 & 2026

Receptor	Existing Baseline (2018)	Future with scheme (2022)	Future with scheme (2026)	Baseline 2018 compared to 2022 with scheme	Baseline 2018 compared to 2026 with scheme
R1	23.6	23.9	21.4	0.3 (I)	-2.2 (MB)
R2	18.5	18.2	17.5	-0.3 (I)	-1.0 (SB)
R3	20.3	24.0	15.8	3.7 (MA)	-4.5 (LB)
R4	19.2	18.5	18.8	-0.7 (SB)	-0.4 (I)
R5	24.3	16.4	22.0	-7.9 (LB)	-2.3 (MB)
R6	22.0	19.8	19.3	-2.2 (MB)	-2.7 (MB)
R7	21.5	23.4	19.6	1.9 (SA)	-1.9 (SB)
R8	18.8	20.8	19.6	2.0 (SA)	0.8 (SA)
R9	23.4	20.9	21.2	-2.5 (MB)	-2.2 (MB)
R10	20.6	20.7	18.5	0.1 (I)	-2.1 (MB)
R11	21.7	22.6	19.3	0.9 (SA)	-2.4 (MB)
R12	20.4	19.4	18.4	-1.0 (SB)	-2.0 (SB)
R13	25.7	20.4	22.8	-5.3 (LB)	-2.9 (MB)
R14	25.3	19.4	23.0	-5.9 (LB)	-2.3 (MB)
R15	22.0	24.4	20.1	2.4 (MA)	-1.9 (SB)
R16	21.7	24.7	19.8	3.0 (MA)	-1.9 (SB)
R17	21.4	21.4	19.1	0.0 (I)	-2.3 (MB)
R18	20.4	21.0	18.0	0.6 (SA)	-2.4 (MB)
R19	30.3	20.5	27.6	-9.8 (LB)	-2.7 (MB)
R20	18.5	19.0	17.5	0.5 (SA)	-1.0 (SB)
R21	17.1	29.6	16.2	12.5 (LA)	-0.9 (SB)
R22	18.1	18.1	17.0	0.0 (I)	-1.1 (SB)
R23	28.0	16.7	25.0	-11.3 (LB)	-3.0 (MB)
R24	22.0	17.7	20.9	-4.3 (LB)	-1.1 (SB)

*Note: **Bold** indicates a value that is greater than the relevant national air quality objective (40 µg/m^3)*

Large Beneficial (LB), Medium Beneficial (MB), Small Beneficial (SB), Large Adverse (LA), Medium Adverse (MA), Small Adverse (SA) Imperceptible (I)

3.3.2 The magnitude of change in predicted annual mean PM_{10} concentrations with the scheme in operation, relative to the 2018 baseline scenario can be described as large, medium, small or imperceptible based on the DMRB significance criteria defined in **Table 1.3** in **Section 1.4.3.**

3.3.3 There are no concentrations predicted to be above the objective value of 40 µg/m^3 for PM_{10} in 2022 or 2026 with the scheme in operation.

3.3.4 In 2022, eleven receptors are predicted to see slight increases in PM_{10} from the baseline. All other receptors are predicted to stay the same or see a reduction in PM_{10}.

3.3.5 In 2026, receptor R8 is predicted to see a slight increase of 0.8 µg/m^3 in PM_{10} from the baseline year. All other receptors are predicted to stay the same or see a reduction in annual mean PM_{10}.

3.4 PM_{10} 24-hour mean (98th percentile) – Comparison of 2018, 2022 and 2026

3.4.1 **Table 3.4** shows the 24-hour mean of PM_{10} for the 98th percentile at receptor locations, with the scheme in operation.

Table 3.4: 24-hour mean PM_{10} (µg/m^3) - Baseline (2018), 2022 & 2026

Receptor	Existing Baseline (2018)	Future with scheme (2022)	Future with scheme (2026)	Baseline 2018 compared to 2022 with scheme	Baseline 2018 compared to 2026 with scheme
R1	31.0	32.8	27.1	1.8	-3.9
R2	22.4	23.3	21.8	0.9	-0.6
R3	27.8	18.9	17.9	-8.9	-9.9
R4	24.9	26.8	25.1	1.9	0.2
R5	39.7	39.0	35.9	-0.7	-3.8
R6	32.6	30.5	27.2	-2.1	-5.4
R7	28.0	27.3	25.0	-0.7	-3.0
R8	21.7	26.0	24.3	4.3	2.6
R9	31.5	30.5	28.3	-1.0	-3.2
R10	26	24.2	22.6	-1.8	-3.4
R11	27.8	25.8	24.1	-2.0	-3.7
R12	26.4	24.7	23.0	-1.7	-3.4
R13	40.3	38.6	35.2	-1.7	-5.1
R14	40.4	39.0	35.3	-1.4	-5.1
R15	28.5	27.8	25.8	-0.7	-2.7
R16	28.9	28.4	26.2	-0.5	-2.7
R17	29.4	28.4	25.6	-1.0	-3.8
R18	26.1	24.2	22.6	-1.9	-3.5
R19	48.0	47.8	43.8	-0.2	-4.2
R20	23.4	23.0	22.1	-0.4	-1.3
R21	20.1	20.1	19.3	0.0	-0.8
R22	22.2	22.1	21.0	-0.1	-1.2
R23	42.5	44.4	37.4	1.9	-5.1
R24	29.1	29.1	27.3	0.0	-1.8

*Note: **Bold** indicates a value that is greater than the relevant national air quality objective (50 µg/m3 - not to be exceeded more than 35 times a year).*

3.4.2 There are no concentrations predicted to be above the objective value of 50 µg/m^3 more than 35 times a year for PM_{10} in 2022 and 2026 with the scheme in operation.

3.4.3 In 2022, five receptors are predicted to see a slight increase in 24-hour PM_{10} from the baseline. All other receptors are predicted to stay the same or see a reduction in PM_{10}.

3.4.4 In 2026, R4 and R8 are predicted to see slight increases in PM_{10} from the baseline by 0.2 µg/m^3 and 2.6 µg/m^3 respectively. All other receptors are predicted to stay the same or see a reduction in PM_{10}.

3.5 Annual Mean $PM_{2.5}$ – Comparison of 2018, 2022 and 2026

3.5.1 **Table 3.5** shows the annual mean of $PM_{2.5}$ at receptor locations, with the scheme in operation.

Table 3.5: Annual Mean $PM_{2.5}$ (µg/m^3) - Baseline (2018), 2022 & 2026

Receptor	Existing Baseline (2018)	Future with scheme (2022)	Future with scheme (2026)	Baseline 2018 compared to 2022 with scheme	Baseline 2018 compared to 2026 with scheme
R1	15.0	15.0	13.3	0.0	-1.7
R2	12.3	12.2	11.4	-0.1	-0.9
R3	13.5	11.0	10.5	-2.5	-3.0
R4	12.8	12.9	12.2	0.1	-0.6
R5	16.0	15.1	14.1	-0.9	-1.9
R6	14.5	13.6	12.5	-0.9	-2.0
R7	14.2	13.6	12.7	-0.6	-1.5
R8	12.6	13.5	12.6	0.9	00
R9	15.3	14.6	13.6	-0.7	-1.7
R10	13.7	12.8	12.1	-0.9	-1.6
R11	14.3	13.3	12.5	-1.0	-1.8
R12	13.6	12.7	12.0	-0.9	-1.6
R13	16.8	15.7	14.5	-1.1	-2.3
R14	16.5	15.9	14.6	-0.6	-1.9
R15	14.5	13.9	13.0	-0.6	-1.5
R16	14.3	13.7	12.8	-0.6	-1.5
R17	14.1	13.4	12.4	-0.7	-1.7
R18	13.5	12.4	11.7	-1.1	-1.8
R19	19.6	18.7	17.2	-0.9	-2.4
R20	12.4	12.0	11.5	-0.4	-0.9
R21	11.6	11.2	10.7	-0.4	-0.9
R22	12.1	11.7	11.1	-0.4	-1.0
R23	17.6	17.5	15.3	-0.1	-2.3
R24	14.1	13.7	13.0	-0.4	-1.1

*Note: **Bold** indicates a value that is greater than the relevant national air quality objective (25 µg/m^3)*

3.5.2 There are no concentrations predicted to be above the objective value of 25 µg/m^3 for $PM_{2.5}$ in 2022 and 2026 with the scheme in operation.

3.5.3 In 2022, R4 and R8 are predicted to see slight increases in $PM_{2.5}$ from the baseline by 0.1 µg/m^3 and 0.9 µg/m^3 respectively. All other receptors stay the same or see a reduction in $PM_{2.5}$.

3.5.4 In 2026 all receptors are predicted to stay the same or see a reduction in $PM_{2.5}$ from the 2018 baseline.

3.5.5 **Table 3.6** presents the number of existing receptors represented by the modelled receptor locations within each magnitude of change category, where they are currently above the annual mean objective value for NO_2 in the future with scheme scenarios.

Table 3.6: Evaluation of Air Quality Significance for Long Term Nitrogen Dioxide

Magnitude of Change in NO_2	**Number of Existing Receptors with:**			
	Worsening of air quality already above annual mean objective or creation of a new exceedance		**Improvement of air quality already above annual mean objective or the removal of an existing exceedance**	
	2022	**2026**	**2022**	**2026**
Large (>4 µg/m^3)	2	0	17	21
Medium (>2 to 4 µg/m^3)	1	1	2	2
Small (>0.4 to 2 µg/m^3)	2	0	0	0

3.5.6 **Table 3.7** presents the number of existing receptors represented by the modelled receptor locations within each magnitude of change category, where they are currently above the hourly mean objective value for NO_2 in the future with scheme scenarios.

Table 3.7: Evaluation of Air Quality Significance for Short Term Nitrogen Dioxide

Magnitude of Change in NO_2	**Number of Existing Receptors with:**			
	Worsening of air quality already above annual mean objective or creation of a new exceedance		**Improvement of air quality already above annual mean objective or the removal of an existing exceedance**	
	2022	**2026**	**2022**	**2026**
Large (>20 µg/m^3)	7	1	13	20
Medium (>10 to 20 µg/m^3)	2	1	1	0
Small (>2 to 10 µg/m^3)	0	0	1	1

3.5.7 The scheme is predicted to result in a mixed effect on local air quality in the 4 years after scheme opening in 2022. The number of properties experiencing large and medium worsening of annual mean concentrations of nitrogen dioxide decreases after the year of opening, with 19 receptors predicted to experience a medium or large improvement in 2022 and 1 property predicted to experience a comparable worsening in 2026. The hourly objective is highly likely to be achieved at any roadside location, where the annual mean objective value is achieved. In a location with existing poor air quality, the effect of improving exposure to hourly (short-term) concentrations of nitrogen dioxide is considered to represent worthwhile reductions in real world exposure of the travelling public and local residents.

3.5.8 PM_{10} and $PM_{2.5}$ concentrations are predicted to stay compliant with the objective values hence the scheme can be considered as not significant for those pollutants.

3.5.9 The concentrations of NO_2 are not currently compliant with the objective values in all locations and will most likely stay that way in 2022. The achievement of the hourly mean objective is the first milestone to be realised in improving conditions at locations where baseline annual mean nitrogen concentrations are very high and is indicative of improvements to wider air quality in the study area.

3.5.10 By 2026, the benefits of the scheme become even more apparent. Even if all but one receptor (R3) will still not be compliant with the objective values for NO_2, all but one of the receptors (R4) are likely to see a beneficial change of their annual mean NO_2 concentrations compared to the 2018 baseline.

4 Summary

4.1.1 It is important to note that the plans for Perry Barr are within an area of air quality action planning, incorporating measures that affect the City of Birmingham as a whole. The results of this study will be considered within the context of the wider scale improvements that are expected to result from the Council's air quality action plans.

4.1.2 The majority of receptors considered will continue to experience annual mean NO_2 concentrations above the annual mean objective value with the scheme in both 2022 and 2026, with the exception of receptor R3 which will be below the objective value in 2026.

4.1.3 The key comparative results from the 2018 baseline to the 2022 and 2026 with scheme show:

- Five of the 24 receptors are predicted to see increases in annual mean NO_2 in 2022 with the scheme.
- 19 of the remaining receptors are predicted to see reductions in annual mean NO_2 in 2022.
- One receptor is predicted to experience an increase in annual mean NO2 in 2026.
- 23 receptors are predicted to experience a reduction in annual mean NO_2 in 2026.
- PM_{10} or $PM_{2.5}$ concentrations are predicted to stay compliant with the objective values.

4.1.4 Overall there is a reduction in NO_2 concentrations at most receptors in the scheme area in 2022. By 2026 the predictions indicate the scheme will have a beneficial effect on air quality at most receptors.