ARUP

Technical Note

Project title	Museum St
Job number	271284-20
File reference	
cc	
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Date	23 June 2023
Subject	Update to modelling using ATC data commissioned by the applicant

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1. Introduction

This note is intended to accompany the Air Quality Assessment (AQA)[1] produced by Arup for the redevelopment of the land at Selkirk House, 166 High Holborn and 1 Museum Street, 10-12 Museum Street, 35-41 New Oxford Street and 16A-18 West Central Street, London, WC1A 1JR ('the site').

The AQA was carried out using data from the AECOM West End Project (WEP)[2]. Following the completion of the AQA, more recent data has become available from Automatic Traffic Counts (ATCs), which also includes data for two additional local roads that were not included in the WEP datasets. The ATC survey was undertaken to validate the WEP data and to include data collection on Shaftesbury Avenue, New Oxford Street, High Holborn, Museum Street, and West Central Street. The data was collected in mid-May 2023; it was not possible to commission the data earlier to inform the AQA as major works were taking place on Shaftesbury Avenue.

The dispersion models used in the original AQA have been rerun using the new ATC data in order to review any potential differences and this note reports the findings.

2. Methodology

The methodology for the dispersion modelling remains the same as that outlined in the AQA, including sensitive receptor locations and model setup. The exception to this is the modelled road network and traffic data, which are detailed below.

The ATC traffic data used in this note are provided in Table 1. The key difference between the ATC data and the WEP data used in the AQA is that ATC traffic flows on High Holborn are approximately 30% higher than the WEP data. It is possible some of this increase is due to the reopening of the onsite car park at the time of the ATCs but not at the time of the WEP surveys.

[1] Arup, 2023. Air Quality Assessment.

[2] AECOM, 2022. West End Project monitoring report.

There are also two additional roads in the modelled road network for the ATC data, which are West Central Street and Museum Street. The traffic counts are shown in Figure 1.

Table 1: ATC traffic data for the modelled road network

Traffic ID	Air Quality ID	Road Name	Baseline 2019			Do Minimum			Do Something		
			AADT	HGV (%)	Speed (kph)	AADT	HGV (%)	Speed (kph)	AADT	HGV (%)	Speed (kph)
13_1	13_1_1	A40 Oxford Street West	10,213	2%	32	10,213	2%	32	10,265	3%	32
13_1	13_1_5	A40 Oxford Street West	10,213	2%	20	10,213	2%	20	10,265	3%	20
12_2	12_2_1	A40 High Holburn (west of development)	12,726	5%	32	12,726	5%	32	12,778	5%	32
12_2	12_2_3	A40 High Holburn (west of development)	12,726	5%	20	12,726	5%	20	12,778	5%	20
2_5	2_5_1	Shaftesbury avenue	9,546	1%	20	9,546	1%	20	9,546	1%	20
2_5	2_5_2	Shaftesbury avenue	9,546	1%	20	9,546	1%	20	9,546	1%	20
12_2	12_2_4	A40 High Holburn (west of development)	12,726	5%	20	12,726	5%	20	12,778	5%	20
2_4	2_4_1	Bloomsbury Street	11,065	1%	20	11,065	1%	20	11,065	1%	20
1_4	1_4_2	Tottenham Court Road	8,407	1%	32	8,407	1%	32	8,407	1%	32
13_1	13_1_9	A40 Oxford Street West	10,213	2%	20	10,213	2%	20	10,265	3%	20
13_1	13_1_2	A40 Oxford Street West	10,213	2%	20	10,213	2%	20	10,265	3%	20
13_1	13_1_3	A40 Oxford Street West	10,213	2%	20	10,213	2%	20	10,265	3%	20
13_1	13_1_4	A40 Oxford Street West	10,213	2%	32	10,213	2%	32	10,265	3%	32

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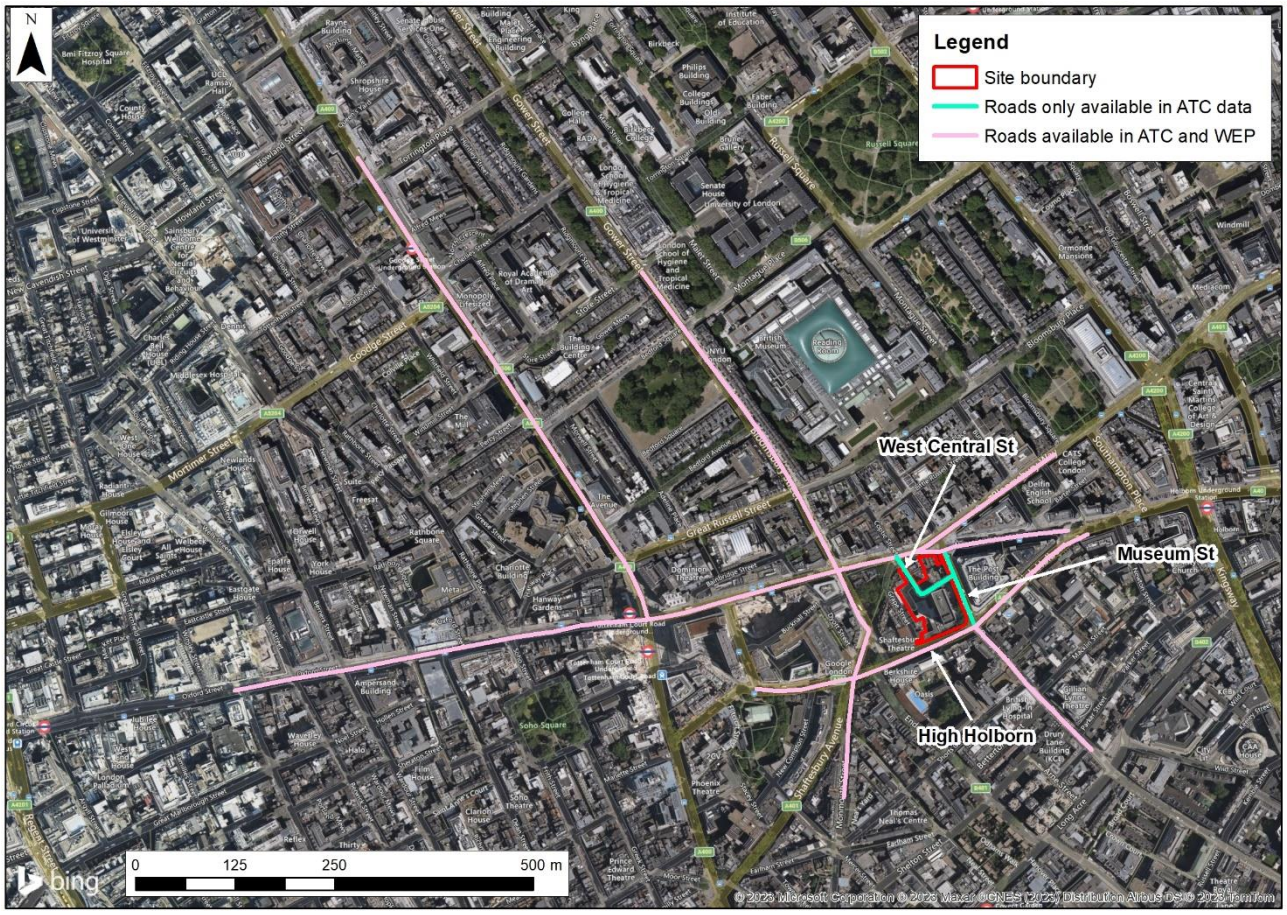
Traffic ID	Air Quality ID	Road Name	Baseline 2019			Do Minimum			Do Something		
			AADT	HGV (%)	Speed (kph)	AADT	HGV (%)	Speed (kph)	AADT	HGV (%)	Speed (kph)
13_1	13_1_6	A40 Oxford Street West	10,213	2%	20	10,213	2%	20	10,265	3%	20
13_1	13_1_7	A40 Oxford Street West	10,213	2%	32	10,213	2%	32	10,265	3%	32
13_1	13_1_8	A40 Oxford Street West	10,213	2%	20	10,213	2%	20	10,265	3%	20
1_4	1_4_3	Tottenham Court Road	8,407	1%	20	8,407	1%	20	8,407	1%	20
1_4	1_4_1	Tottenham Court Road	8,407	1%	20	8,407	1%	20	8,407	1%	20
12_2	12_2_2	A40 High Holburn (west of development)	12,726	5%	20	12,726	5%	20	12,778	5%	20
13_1	13_1_10	A40 Oxford Street West	10,213	2%	20	10,213	2%	20	10,265	3%	20
3_1	3_1	West Central Street	271	0%	20	271	0%	20	284	5%	20
2_1	2_1	Museum Street	3,586	1%	20	3,586	1%	20	3,652	2%	20

Figure 1: Modelled road network using ATC data



3. Model Results

3.1 Model Verification

In line with updating the traffic data on the modelled road network, the model verification has been updated. The methodology for the model verification exercise is the same as that used in the AQA.

It was found that there were minimal changes to the concentrations at the monitoring sites and the adjustment factor calculated remained the same to one decimal place (i.e. a factor of 2.1).

3.2 Model Results from ATC assessment

The following findings are consistent with the findings of the WEP assessment:

- The impact of the operational traffic associated with the proposed development on sensitive receptors was predicted to be negligible for all assessed pollutants when using ATC traffic data.
- Exceedances were predicted at the receptor locations for annual mean NO_2, for each of the three scenarios assessed, including the baseline scenario. It should be noted that the Defra background NO_2 concentrations used in this assessment exceed the air quality objective for receptors 4 to 26 and are close to exceeding for receptors 1 to 3.

- Predicted concentrations of $PM_{2.5}$ are above the Council's standard. As with NO_2, it should be noted that the background concentrations are already exceeding this standard for all receptors.

The predicted concentrations for both the Do-Minimum (DM) scenario (future year without the proposed development) and the Do-Something (DS) scenario (future year with the proposed development) are considered below.

3.2.1 NO_2 Results

Predicted concentrations are above the Council annual mean air quality objective (38µg/m^3) at all sensitive receptor locations for each modelled scenario. The highest concentration was predicted at receptor 16 (a future residential receptor at 1.5m high) and was 45.4µg/m^3 in the DM and 45.5µg/m^3 in the DS scenarios (to one decimal place). The predicted concentrations decrease with height and are highest at ground level. This is consistent with the findings of the AQA.

The greatest change in predicted concentrations was found at receptor 16 (future residential) and was an increase in annual mean NO_2 of 0.06µg/m^3 (to two decimal places).

The magnitude of change in predicted annual mean NO_2 concentrations at all receptor locations is considered to be negligible, according to EPUK/IAQM guidance[3].

3.2.2 PM_{10} Results

Predicted concentrations are below the annual mean air quality objective (20µg/m^3) at all of the sensitive receptor locations for each modelled scenario. The highest concentration was predicted at receptors 1 (an existing ground floor (1.5m high) residential receptor) and 16 (a future residential receptor at 1.5m high) and was 19.5µg/m^3 in the DM and DS scenarios (to one decimal place). This is consistent with the findings of the AQA.

The greatest change in predicted concentrations was found at receptors 16, 17, 22, 23 (all future residential), 28 (Pearson College) and 30 (residential) and was an increase in annual mean PM_{10} of 0.01µg/m^3 (to two decimal places).

The magnitude of change to annual mean PM_{10} concentrations at all receptor locations is considered to be negligible, according to EPUK/IAQM guidance[3].

3.2.3 $PM_{2.5}$ Results

Predicted concentrations are above the Council annual mean air quality objective (10µg/m^3) at all of the sensitive receptor locations for each modelled scenario. The highest concentration was predicted at receptor 1 (existing ground floor residential) and was 12.7µg/m^3 in the DM and DS scenarios (to one decimal place). This is consistent with the findings of the original AQA.

The greatest change in predicted concentrations was found at receptor 16 was an increase in annual mean $PM_{2.5}$ of 0.01µg/m^3 (to two decimal places).

The magnitude of change to annual mean $PM_{2.5}$ concentrations at all receptor locations is considered to be negligible, according to EPUK/IAQM guidance[3].

[3] EPUK/IAQM, 2017. Land-Use Planning & Development Control: Planning for Air Quality

3.3 Comparison of findings from WEP and ATC assessments

The DM and DS predicted concentrations from the WEP assessment and the ATC assessment are compared below.

These results show that the predicted concentrations of the ATC assessment are very similar to the results of the WEP assessment for the assessed pollutants.

3.3.1 Annual mean NO_2

Predicted concentrations of NO_2 are greater in the ATC assessment than the original WEP assessment, although this increase is less than 1.0µg/m^3 for all receptors except at receptor 28 (Pearson College) where there is a change in predicted concentration of 1.1µg/m^3 in both the DM and DS scenarios.

The results of this comparison are shown in Table 2.

Table 2: Annual mean NO_2 results comparison

Receptor ID	DM – original (µg/m^3)	DM – ATCs (µg/m^3)	Difference in DM (µg/m^3)	DS – original (µg/m^3)	DS – ATCs (µg/m^3)	Difference in DS (µg/m^3)
1	41.5	41.5	<0.1	41.5	41.5	<0.1
2	38.7	38.7	<0.1	38.7	38.7	<0.1
3	38.6	38.6	<0.1	38.6	38.6	<0.1
4	42.2	42.4	0.2	42.2	42.4	0.2
5	42.1	42.3	0.2	42.1	42.3	0.2
6	41.9	42.1	0.2	41.9	42.1	0.2
7	41.7	41.8	0.1	41.7	41.9	0.1
8	41.5	41.6	0.1	41.5	41.6	0.1
9	41.3	41.4	0.1	41.3	41.4	0.1
10	42.2	42.4	0.2	42.2	42.4	0.2
11	42.1	42.3	0.2	42.1	42.3	0.2
12	41.9	42.1	0.2	41.9	42.1	0.2
13	41.7	41.8	0.2	41.7	41.9	0.1
14	41.5	41.6	0.1	41.5	41.6	0.1
15	41.3	41.4	0.1	41.3	41.4	0.1
16	45.4	45.4	0.1	45.4	45.5	0.1
17	43.7	43.8	0.1	43.7	43.8	0.1
18	42.1	42.2	0.1	42.1	42.3	0.1
19	41.6	41.7	0.1	41.6	41.7	0.1
20	41.3	41.4	0.1	41.3	41.4	0.1
21	41.2	41.2	0.1	41.2	41.2	0.1
22	43.2	43.9	0.7	43.2	43.9	0.7
23	42.7	43.1	0.4	42.7	43.2	0.5
24	42.1	42.3	0.2	42.1	42.3	0.2
25	41.6	41.7	0.1	41.6	41.8	0.1

Receptor ID	DM – original (µg/m^3)	DM – ATCs (µg/m^3)	Difference in DM (µg/m^3)	DS – original (µg/m^3)	DS – ATCs (µg/m^3)	Difference in DS (µg/m^3)
26	41.3	41.4	0.1	41.3	41.4	0.1
27	41.2	41.2	0.1	41.2	41.2	0.1
28	44.1	45.2	1.1	44.1	45.3	1.1
29	44.2	44.5	0.3	44.2	44.5	0.3
30	43.1	43.8	0.7	43.1	43.8	0.7

3.3.2 Annual mean PM_{10}

PM_{10} concentrations are the same for the ATC and WEP assessments to one decimal place at the majority of receptors. The predicted concentrations of PM_{10} were greater in the ATC scenario at receptors 22 (future residential), 23 (future residential), 28 (Pearson College) and 30 (residential) for both the DM and the DS scenarios.

The results of this comparison are shown in Table 3.

Table 3: Annual mean PM_{10} results comparison

Receptor ID	DM – original (µg/m^3)	DM – ATCs (µg/m^3)	Difference in DM (µg/m^3)	DS – original (µg/m^3)	DS – ATCs (µg/m^3)	Difference in DS (µg/m^3)
1	19.5	19.5	<0.1	19.5	19.5	<0.1
2	19.2	19.2	<0.1	19.2	19.2	<0.1
3	19.2	19.2	<0.1	19.2	19.2	<0.1
4	19.1	19.1	<0.1	19.1	19.1	<0.1
5	19.1	19.1	<0.1	19.1	19.1	<0.1
6	19.1	19.1	<0.1	19.1	19.1	<0.1
7	19.0	19.0	<0.1	19.0	19.0	<0.1
8	19.0	19.0	<0.1	19.0	19.0	<0.1
9	19.0	19.0	<0.1	19.0	19.0	<0.1
10	19.1	19.1	<0.1	19.1	19.1	<0.1
11	19.1	19.1	<0.1	19.1	19.1	<0.1
12	19.1	19.1	<0.1	19.0	19.1	<0.1
13	19.0	19.0	<0.1	19.0	19.0	<0.1
14	19.0	19.0	<0.1	19.0	19.0	<0.1
15	19.0	19.0	<0.1	19.0	19.0	<0.1
16	19.5	19.5	<0.1	19.5	19.5	<0.1
17	19.3	19.3	<0.1	19.3	19.3	<0.1
18	19.1	19.1	<0.1	19.1	19.1	<0.1
19	19.0	19.0	<0.1	19.0	19.0	<0.1
20	19.0	19.0	<0.1	19.0	19.0	<0.1
21	19.0	19.0	<0.1	19.0	19.0	<0.1
22	19.2	19.3	0.1	19.2	19.3	0.1

Receptor ID	DM – original (µg/m^3)	DM – ATCs (µg/m^3)	Difference in DM (µg/m^3)	DS – original (µg/m^3)	DS – ATCs (µg/m^3)	Difference in DS (µg/m^3)
23	19.1	19.2	0.1	19.1	19.2	0.1
24	19.1	19.1	<0.1	19.1	19.1	<0.1
25	19.0	19.0	<0.1	19.0	19.0	<0.1
26	19.0	19.0	<0.1	19.0	19.0	<0.1
27	19.0	19.0	<0.1	19.0	19.0	<0.1
28	19.4	19.5	0.2	19.4	19.5	0.2
29	19.3	19.4	<0.1	19.3	19.4	<0.1
30	19.2	19.3	0.1	19.2	19.3	0.1

3.3.3 Annual Mean $PM_{2.5}$

$PM_{2.5}$ concentrations are the same for the ATC and WEP assessments to one decimal place at the majority of receptors. The predicted concentrations of $PM_{2.5}$ were greater in the ATC scenario at receptors 28 (Pearson College) and 30 (residential) for both the DM and DS scenarios, and also at receptor 22 (future residential) in the DS scenario.

The results of this comparison are shown in Table 4.

Table 4: Annual mean $PM_{2.5}$ results comparison

Receptor ID	DM – original (µg/m^3)	DM – ATCs (µg/m^3)	Difference in DM (µg/m^3)	DS – original (µg/m^3)	DS – ATCs (µg/m^3)	Difference in DS (µg/m^3)
1	12.7	12.7	<0.1	12.7	12.7	<0.1
2	12.5	12.5	<0.1	12.5	12.5	<0.1
3	12.5	12.5	<0.1	12.5	12.5	<0.1
4	12.3	12.4	<0.1	12.3	12.4	<0.1
5	12.3	12.3	<0.1	12.3	12.4	<0.1
6	12.3	12.3	<0.1	12.3	12.3	<0.1
7	12.3	12.3	<0.1	12.3	12.3	<0.1
8	12.3	12.3	<0.1	12.3	12.3	<0.1
9	12.3	12.3	<0.1	12.3	12.3	<0.1
10	12.3	12.4	<0.1	12.3	12.4	<0.1
11	12.3	12.3	<0.1	12.3	12.3	<0.1
12	12.3	12.3	<0.1	12.3	12.3	<0.1
13	12.3	12.3	<0.1	12.3	12.3	<0.1
14	12.3	12.3	<0.1	12.3	12.3	<0.1
15	12.3	12.3	<0.1	12.3	12.3	<0.1
16	12.6	12.6	<0.1	12.6	12.6	<0.1
17	12.4	12.4	<0.1	12.4	12.5	<0.1
18	12.3	12.3	<0.1	12.3	12.3	<0.1
19	12.3	12.3	<0.1	12.3	12.3	<0.1
20	12.3	12.3	<0.1	12.3	12.3	<0.1

Receptor ID	DM – original (µg/m^3)	DM – ATCs (µg/m^3)	Difference in DM (µg/m^3)	DS – original (µg/m^3)	DS – ATCs (µg/m^3)	Difference in DS (µg/m^3)
21	12.3	12.3	<0.1	12.3	12.3	<0.1
22	12.4	12.5	<0.1	12.4	12.5	0.1
23	12.4	12.4	<0.1	12.4	12.4	<0.1
24	12.3	12.3	<0.1	12.3	12.3	<0.1
25	12.3	12.3	<0.1	12.3	12.3	<0.1
26	12.3	12.3	<0.1	12.3	12.3	<0.1
27	12.3	12.3	<0.1	12.3	12.3	<0.1
28	12.5	12.6	0.1	12.5	12.6	0.1
29	12.5	12.5	<0.1	12.5	12.5	<0.1
30	12.4	12.5	0.1	12.4	12.5	0.1

3.4 Mitigation

Given the level of mitigation recommended in the AQA and that the changes in pollutant concentrations between the original WEP assessment and this ATC assessment are minimal, no additional mitigation is considered to be required beyond that recommended in the original AQA.

3.5 Conclusions

The following findings from the ATC assessment are consistent with those from the original WEP assessment:

- Exceedances were predicted at the receptor locations for annual mean NO_2, for each of the three scenarios assessed, including the baseline scenario. It should be noted that the Defra background NO_2 concentrations used in this assessment exceed the air quality objective for receptors 4 to 26 and are close to exceeding for receptors 1 to 3.
- Predicted concentrations of $PM_{2.5}$ are above the Council's standard. As with NO_2, it should be noted that the background concentrations are already exceeding this standard for all receptors.
- The impact of the operational traffic associated with the proposed development on sensitive receptors was predicted to be negligible for all assessed pollutants when using ATC traffic data.

The predicted concentrations of the ATC assessment are very similar to the results of the WEP assessment for the assessed pollutants. As a result, no additional mitigation is considered to be required beyond that recommended in the AQA.

ARUP

Job number	271284-20
Date	23 June 2023

DOCUMENT CHECKING

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