JACOBS®

Ultra Low Emission Zone Integrated Impact Assessment

Environmental Assessment

October 2014

(a) Exposure to pollutant concentrations exceeding AQOs

7.2.2 The baseline data used in this assessment has been sourced from TfL and KCL's atmospheric emissions model of London for the 'without ULEZ' scenario in the years 2020 and 2025.

7.2.3 The data shows that in 2020, approximately 34,000 sensitive receptors (including residential properties, care homes, health facilities and schools) across London would be exposed to NO_2 concentrations which exceed the annual mean AQO.

7.2.4 For PM_{10}, approximately 34 sensitive receptors in London would be exposed to concentrations which exceed the annual mean AQO.

(b) Vehicle sources of pollutant emissions

7.2.5 As the ULEZ is aimed at tackling air pollutants in central London, the baseline conditions established for the air quality assessment were primarily based on forecasted pollutant emissions in central London between 2020 and 2025.

7.2.6 The proportion of central London's total NO_x, NO_2, PM_{10} and $PM_{2.5}$ emissions attributable to various transport modes are shown in Table 7-B and Figures 7-A to 7-H. Further information on the model and methodology which underpins it can be found in Appendix B.

Vehicle Type	Total emissions (tonnes per annum)											
	NO_x			NO_2			PM_{10}			$PM_{2.5}$		
	2020	2025	% (+/-)	2020	2025	% (+/-)	2020	2025	% (+/-)	2020	2025	% (+/-)
Motorcycle	5	3	-31%	0	0	0%	2	2	0%	1	1	0%
Taxi	125	96	-23%	53	37	-30%	14	10	-29%	8	5	-38%
Car	167	121	-28%	53	32	-40%	27	27	0%	12	11	-8%
LGV	95	71	-25%	33	22	-33%	11	10	-9%	5	4	-20%
Bus	162	73	-55%	38	24	-37%	25	24	-4%	5	5	0%
Coach	59	28	-53%	7	3	-57%	6	6	0%	1	1	0%
HGV	75	41	-45%	8	4	-50%	21	10	-52%	4	4	0%
Total	687	433	-37%	191	122	-36%	106	89	-16%	37	30	-19%

Table 7-B Total NO_x, NO_2, PM_{10} and $PM_{2.5}$ emissions in central London by vehicle type (2020 and 2025)

(Source: TfL / King's College London, 2014)

7.2.7 As shown in Table 7-B, in the baseline 'without ULEZ' scenario total emissions of NO_x from all vehicle types would reduce between 2020 and 2025 by 37 per cent or 254 tonnes per annum. The greatest percentage reductions would be seen in bus emissions (55 per cent or 89 tonnes per annum), coach emissions (53 per cent or 31 tonnes per annum) and HGV emissions (45 per cent equivalent to 34 tonnes per annum). The greatest reductions in total NO_x would come from buses (89 tonnes per annum).

7.2.8 Similar to NO_x, NO_2 emissions would also decrease for all vehicle types by 2025 in the baseline scenario. The greatest reductions as a percentage would come from Coach (57 per cent or 4 tonnes per annum) and HGV (50

Zone	Average Change in AM NO_2 conc. ($\mu g/m^3$)	Change in no. properties exceeding AM NO_2 objective	Average Change in AM PM_{10} conc. ($\mu g/m^3$)	Change in no. properties exceeding AM PM_{10} objective	Average Change in AM $PM_{2.5}$ conc. ($\mu g/m^3$)	Change in no. properties exceeding AM $PM_{2.5}$ objective
CCZ	-4.6	-4,579	-0.2	0	-0.1	0
IRR	-3.8	-2,435	-0.1	0	-0.1	0
Inner	-1.6	-10,472	0.0	0	0.0	0
Outer	-0.9	-2,848	0.0	0	0.0	0
Non GLAA	-0.6	-124	0.0	0	0.0	0
Total	-1.1	-18,023	0.0	0	0	0

***Table 7-C** Anticipated zone-wide average changes in NO_2, PM_{10} and $PM_{2.5}$ concentrations in 2020*

(Source: Jacobs derived from TfL / King's College London, 2014)

Zone	Average Change in AM NO_2 conc. ($\mu g/m^3$)	Change in no. properties exceeding AM NO_2 objective	Average Change in AM PM_{10} conc. ($\mu g/m^3$)	Change in no. properties exceeding AM PM_{10} objective	Average Change in AM $PM_{2.5}$ conc. ($\mu g/m^3$)	Change in no. properties exceeding AM $PM_{2.5}$ objective
CCZ	-2.3	-456	0.0	0	0.0	0
IRR	-1.8	-304	0.0	0	0.0	0
Inner	-0.6	-1,115	0.0	0	0.0	0
Outer	-0.3	-309	0.0	0	0.0	0
Non GLAA	-0.2	-12	0.0	0	0.0	0
Total	-0.4	-1,892	0.0	0	0.0	0

***Table 7-D** Anticipated zone-wide average changes in NO_2, PM_{10} and $PM_{2.5}$ concentrations in 2025*

(Source: Jacobs, derived from TfL / King's College London, 2014)

Zone	2020		2025	
	Change in CO_2 emissions	Equivalent tonnes per annum	Change in CO_2 emissions	Equivalent tonnes per annum
CCZ	-15%	-39,000	-16%	-43,000
IRR	-4%	-4,000	-6%	-5,000
Inner	-3%	-55,000	-4%	-62,000
Outer	-0.6%	-25,000	-1%	-59,000
Non GLAA	-0.05%	-1,000	-0.7%	-21,000
Total	-1%	-124,000	-2%	-190,000

Table 8-A Impacts of the ULEZ on CO_2 emissions by zone

(Source: TfL / King's College London, 2014)

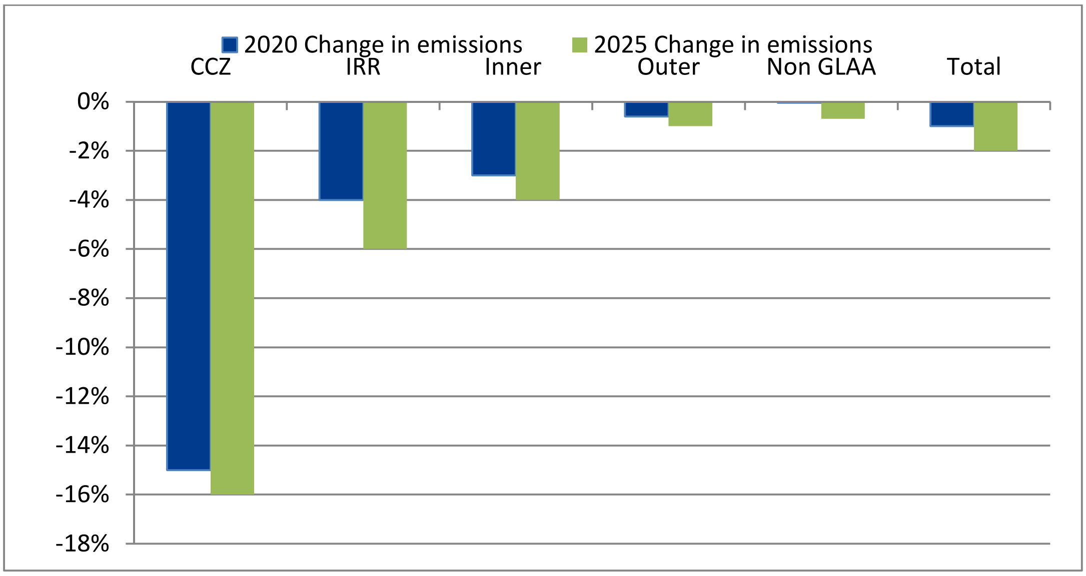

Figure 8-A Zonal reductions in CO_2 emissions compared to 'without ULEZ' baseline (percentage)

(Source: TfL / King's College London, 2014)

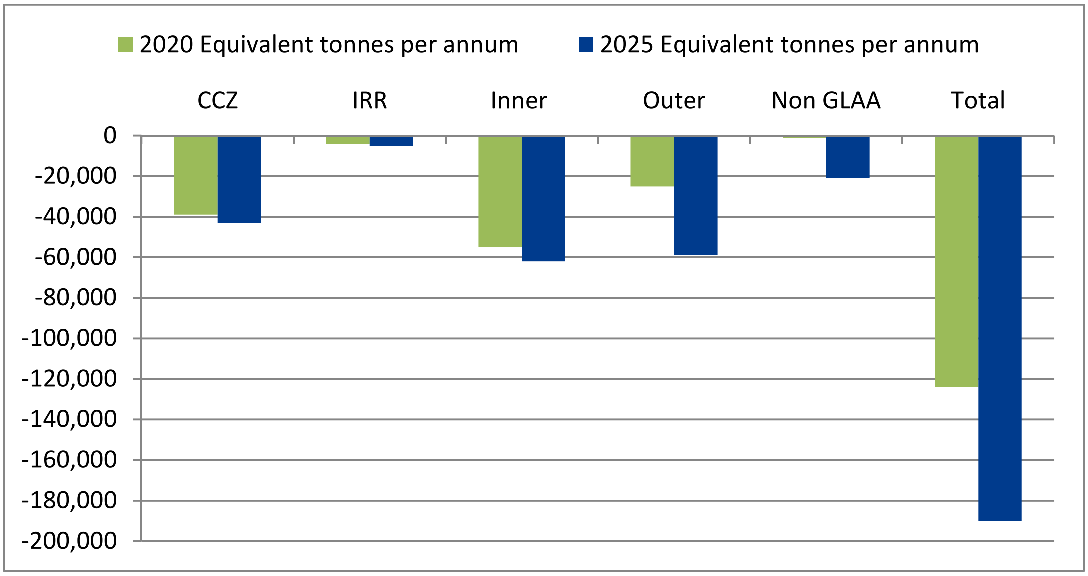

Figure 8-B Zonal reductions in CO_2 emissions compared to 'without ULEZ' baseline (tonnes per annum)

(TfL / King's College London, 2014)

2020	Taxi		Cars		LGVs		Buses and Coaches		HGVs	
Zone	Change in CO_2 emissions	Tonnes per annum	Change in CO_2 emissions	Tonnes per annum	Change in CO_2 emissions	Tonnes per annum	Change in CO_2 emissions	Tonnes per annum	Change in CO_2 emissions	Tonnes per annum
CCZ	-36%	-17,029	-6%	-5,319	-7%	-2,209	-22%	-13,150	-3%	-899
IRR	-35%	-2,057	0%	-3,147	-2%	-334	-8%	-1,276	0%	-502
Inner	-35%	-31,008	0%	-62	-1%	-3,000	-8%	-16,667	0%	-27
Outer	-36%	-32,138	+1%	+19,459	0%	-93	-7%	-21,215	0%	+8
Non-GLAA	-37%	-16,368	+1%	+28,420	0%	+13	-7%	-4,448	0%	-10
Total	-36%	-98,601	+1%	+40,000	-0.5%	-5,700	-9%	-57,000	0%	-1,430

Table 8-C Impacts of the ULEZ on CO_2 emissions by vehicle type (2020)

(Source: TfL / King's College London, 2014)

2025	Taxi		Cars		LGVs		Buses and Coaches		HGVs	
Zone	Change in CO_2 emissions	Tonnes per annum	Change in CO_2 emissions	Tonnes per annum	Change in CO_2 emissions	Tonnes per annum	Change in CO_2 emissions	Tonnes per annum	Change in CO_2 emissions	Tonnes per annum
CCZ	-56%	-27,202	-3%	-2,262	-4%	-1,307	-20%	-12,060	-1%	-145
IRR	-56%	-3,410	-1%	-384	-1.5%	-222	-7%	-1,193	0%	-25
Inner	-56%	-51,070	0%	+3,890	0%	-32	-7%	-14,873	0%	0
Outer	-58%	-26,553	+1%	+13,946	0%	+196	-7%	-20,148	0%	0
Non-GLAA	-60%	-52,832	+1%	+9,685	0%	+166	-7%	-4,192	0%	0
Total	-57%	161,000	+0.5%	+24,876	-0.1%	-1,200	-8%	52,000	0%	-170

Table 8-D Impacts of the ULEZ on CO_2 emissions by vehicle type (2025)

(Source: TfL / King's College London, 2014)

(c) Acid grasslands

11.3.6 Acid grasslands are among the most thoroughly studied habitats with regards to nitrogen deposition.

11.3.7 National and European surveys have demonstrated clear declines in species richness of acid grasslands with increasing levels nitrogen deposition (Stevens and Duprè et al, 2008). Surveys have also found changes in species composition and changes in soil chemistry, primarily related to acidification (Stevens et al, 2006).

(d) Heathlands

11.3.8 Heathlands were one of the first ecosystems in which the deleterious impacts of nitrogen deposition were recognised, with heathlands in areas of high nitrogen deposition showing increasing dominance by competitive grasses at the expense of common heather (Stevens et al, 2006).

11.3.9 As part of the atmospheric emissions modelling undertaken by TfL and KCL, NO_x emissions changes were calculated for both with ULEZ (Do Something) and without ULEZ (Do Minimum) scenarios. Further information on the methodology which underpins this modelling can be found in Appendix B. The results are shown in Tables 11-B and 11-C and Figures 11-B and 11-C.

Year	2020		2025	
Zone	Change in NO_x emissions	Equivalent tonnes per annum	Change in NO_x emissions	Equivalent tonnes per annum
CCZ	-51%	350	-35%	150
IRR	-21%	50	-14%	20
Inner	-16%	700	-9%	240
Outer	-10%	890	-4%	90
Non GLAA	-8%	450	-2%	20
Total	-12%	2440	-5%	720

Table 11-B Impacts of the ULEZ on NO_x emissions by zone

(Source: TfL / King's College London, 2014)

12.3 Impacts on cultural heritage

(a) Archaeological remains

12.3.2 Implementation of the ULEZ would not require any construction, demolition or otherwise intrusive works. Therefore, archaeological remains would not be disturbed as part of the ULEZ.

(b) Historic buildings and landscape

(i) Changes in air emissions

12.3.3 As part of the atmospheric emissions modelling undertaken by TfL and KCL, PM_{10} emission changes were calculated for both with ULEZ (Do Something) and without ULEZ (Do Minimum) scenarios. Further information on the methodology which underpins this modelling can be found in Appendix B. The results are shown in Tables 12-A and 12-B and Figures 12-B and 12-C.

Zone	2020		2025	
	Change in PM_{10} emissions	Equivalent tonnes per annum	Change in PM_{10} emissions	Equivalent tonnes per annum
CCZ	-9%	-10	-3%	-3
IRR	-2%	-1	-1%	-0.3
Inner	-2%	-13	-0.2%	-2
Outer	0.2%	4	0%	0
Non GLAA	0%	0	0%	0
Total	-0.7%	-28	-0.1%	-5

Table 12-A Impacts of the ULEZ on total PM_{10} emissions by zone
(Source: TfL / King's College London, 2014)

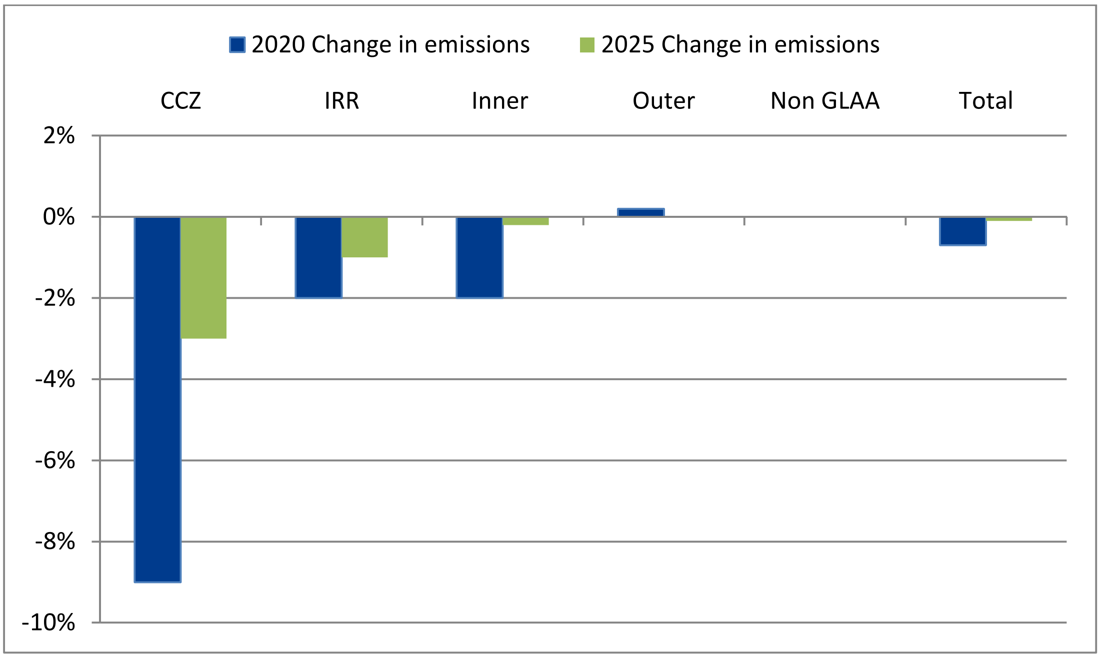

Figure 12-B Zonal changes in total PM_{10} emissions (percentage)
(TfL / King's College London, 2014)

Borough	2020		2025	
	Change in PM_{10} emissions	Equivalent tonnes per annum	Change in PM_{10} emissions	Equivalent tonnes per annum
Redbridge	0%	0	0%	0
Richmond	0%	0	0%	0
Southwark	-2%	-2	-1%	0
Sutton	0%	0	0%	0
Tower Hamlets	-2%	-1	0%	0
Waltham Forest	0%	0	0%	0
Wandsworth	-1%	-1	0%	0

Table 12-B: Impacts of the ULEZ on total PM_{10} emissions by borough
(Source: TfL / King's College London, 2014)

12.3.4 It should be noted that these results show the anticipated impacts of the ULEZ in terms of total PM_{10} emissions, including both those from vehicle exhausts and those from non-exhaust sources such as tyres and brakes.

12.3.5 Looking exclusively at PM_{10} emissions from vehicle exhausts, the intended target of the ULEZ, gives a different set of results. These are shown in Tables 12-C and 12-D and Figures 12-D and 12-E.

Zone	2020		2025	
	Change in exhaust PM_{10} emissions	Equivalent tonnes per annum	Change in exhaust PM_{10} emissions	Equivalent tonnes per annum
CCZ	-64%	-7	-46%	-2
IRR	-29%	-1	-17%	0
Inner	-18%	-8	-9%	-2
Outer	-4%	-4	0%	0
Non GLAA	0%	0	+2%	+1
Total	-9%	-20	-3%	-3

Table 12-C Impacts of the ULEZ on exhaust PM_{10} emissions by zone
(Source: TfL / King's College London, 2014)

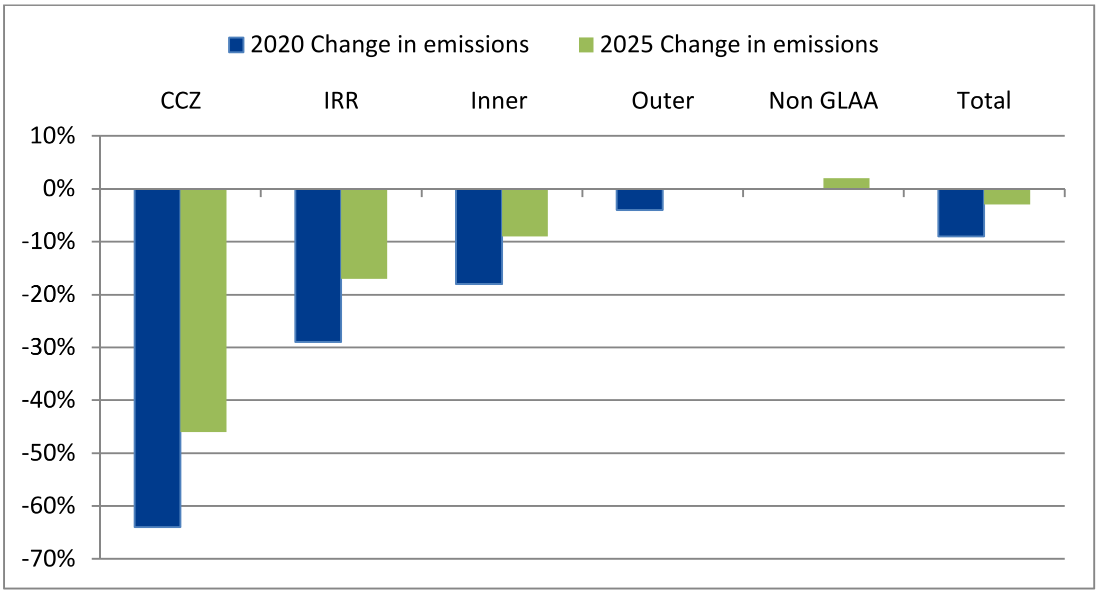

Figure 12-D: Zonal Changes in PM_{10} Emissions from Vehicle Exhausts (Percentage)