Oxford Zero Emission Zone Pilot Scheme

Year 1 Monitoring Report

March 2024

OXFORDSHIRE COUNTY COUNCIL

Contents

1 Key Findings

This report sets out monitoring and operational information gained from the first year of operating the Oxford zero emission zone (ZEZ) pilot scheme.

Oxfordshire County Council and Oxford City Council have introduced the ZEZ to improve air quality, cut carbon emissions, and move towards zero emission travel in the city. The ZEZ has been operating in Oxford city centre since 28 February 2022.

Key findings from the first year of the ZEZ's operation are below.

Comparing 2022 data to 2021 data in the 12-month period that included the launch and subsequent operation of the scheme:

- overall vehicle movements in the ZEZ reduced during the scheme's operating hours (7am to 7pm) by approximately **28%.** This figure includes vehicles exempt from ZEZ charges such as buses, taxis and emergency vehicles;
- overall vehicle movements in the ZEZ excluding exempt vehicles reduced during the scheme's operating hours by approximately **37%**;
- vehicle movements in the ZEZ outside of the 7am to 7pm operating hours have reduced overall, although by less than the reduction within the 7am to 7pm period;
- there has been an overall shift towards the use of vehicles in the ZEZ with less polluting engines and with lower CO2 emissions.

In addition:

- air pollution levels decreased overall in the ZEZ in 2022 by more than the average decrease across Oxford;
- the scheme has encouraged adoption of zero and low emission vehicles;
- the proportion of vehicles used that are zero emission is higher in the pilot area than in other areas of Oxford
- the scheme's concept and operating systems work;
- surplus income is being generated that will support the delivery of local transport objectives;
- there is demand particularly from businesses for simpler ways to pay ZEZ charges via accounts.

2 Introduction

Air quality in Oxford

The city of Oxford, like many other urban areas in the UK, has some locations where nitrogen dioxide (NO_2) concentrations are identified as in exceedance or at risk of exceeding national and European air quality standards. This is particularly in locations with high levels of road traffic. Data from Oxford City Council's monitoring campaign in 2019 (the last "*Business as Usual*" reporting year before COVID19), showed exceedances of the NO_2 annual mean limit value at six of the 71 monitored locations in the city, with all of these being in and around the city centre: St Clement's Street, The Plain, St Clement's Street East, George Street, St Aldates, High Street and Long Wall Street. The entire city of Oxford has been a designated an Air Quality Management Area (AQMA) for NO_2 since 2010.

In the city, road transport continues to be the single most significant source of emissions of oxides of nitrogen (NOx). According to the city's latest Source Apportionment Study[1], the road transport sector in Oxford accounts for 40% of total NOx emissions.

Oxfordshire County Council and Oxford City Council are both committed to reducing exposure to poor air quality in Oxford, with the city council also setting its own local voluntary target for a 30 $\mu g/m^3$ NO_2 annual mean to be achieved by 2025 at the latest, and which goes beyond the current 40 $\mu g/m^3$ legal target set out by the UK Government.

The County and City councils have jointly introduced a zero emission zone (ZEZ) pilot scheme in Oxford to improve air quality, cut carbon emissions, and move towards zero emission travel in the city.

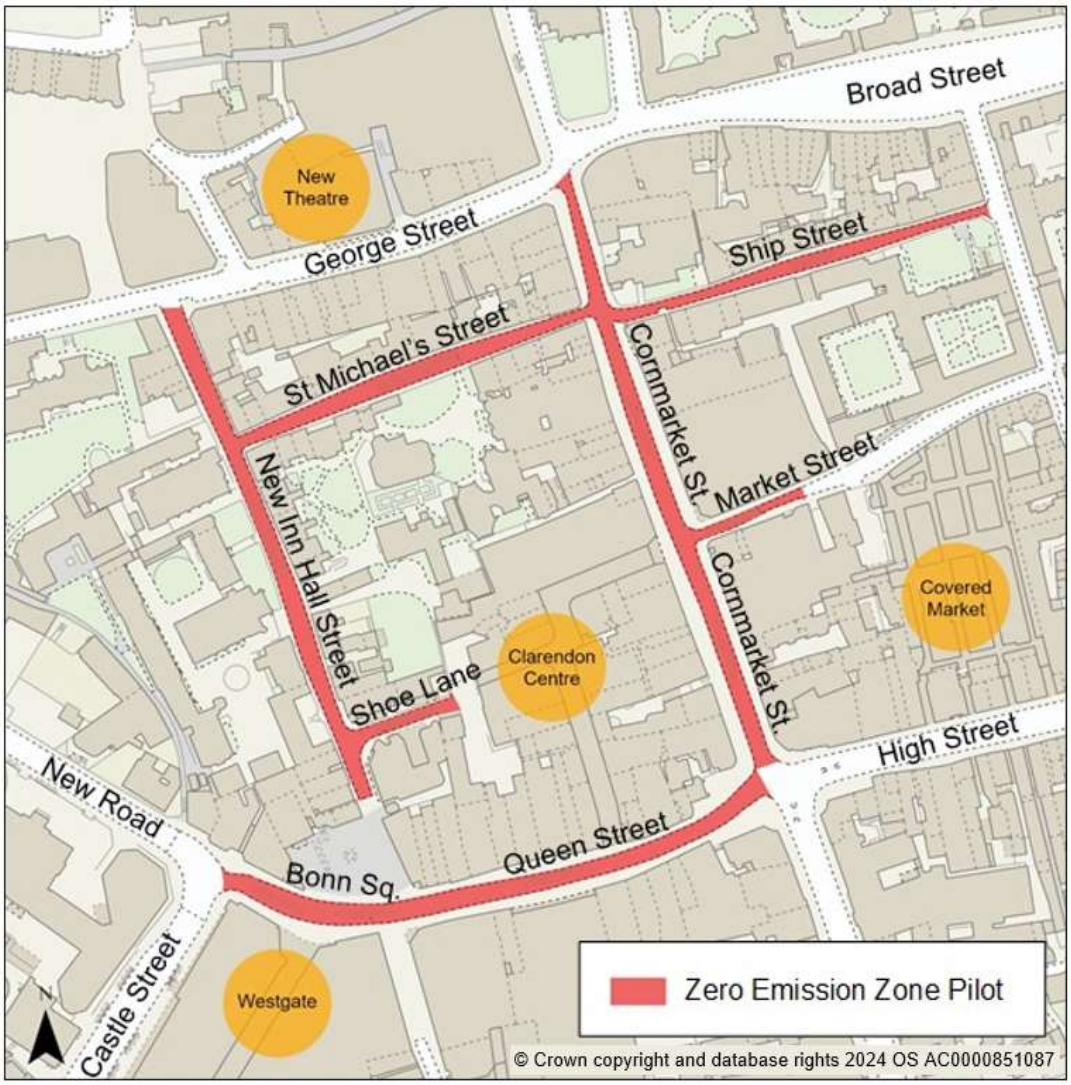
The ZEZ Pilot scheme

The ZEZ Pilot scheme became operational on 28th February 2022 and is the first phase of the ZEZ. It is intended to help improve air quality and reduce carbon emissions and also enable the county council to test how the scheme works before expanding the ZEZ to a wider area in Oxford in a potential future phase.

A ZEZ is an area where zero emission vehicles (such as fully electric motorcycles, cars and vans) can be used without incurring a charge but where other motor vehicles may be charged. The ZEZ Pilot covers a small number of roads in Oxford city centre and is as shown in Figure 1.1:

[1] Ricardo Energy & Environment - Oxford Source Apportionment Study, July 2020

Figure 1.1: ZEZ Pilot Roads



All petrol and diesel vehicles, including hybrids, incur a daily charge if they are driven in the ZEZ Pilot area between 7am and 7pm unless they have a 100 per cent discount or exemption. The ZEZ Pilot's daily charges are shown in Table 1.1. The scheme's discounts and exemptions are shown at Annex A.

Table 1.1: ZEZ Pilot daily charges by vehicle band and emissions

Vehicle band	Emissions	Daily charge
Zero emission vehicle (ZEV)	0 g/km CO2	£0
Ultra-low emission vehicle (ULEV)	Emits less than 75 g/km CO2. Any two or three-wheeled vehicle emitting more than 0g/km CO2. National ultra-low emission truck standard will be adopted for HGVs when defined.	£2
Low emission vehicle (LEV)	Vehicles with four or more wheels that meet the Euro 4/IV petrol or Euro 6/VI diesel standard.	£4
All other vehicles	Any vehicle not meeting any of the above standards.	£10

Purpose of monitoring report

Introducing the ZEZ Pilot before deciding whether to expand the scheme to a larger area allows the councils to gain experience and information, particularly in terms of the scheme's payment and enforcement systems. It is also an opportunity to gather views and experiences from those directly affected by the scheme including residents and businesses within the zone. This includes information on whether the ZEZ Pilot has led to behavioural responses such as the uptake of zero or lower emissions vehicles and increased use of sustainable travel modes.

The ZEZ pilot area was chosen because it is small and has low traffic volumes. Although the scheme provides some useful insights, these may not in all cases be directly relevant to a larger area with more traffic, where the impacts may be somewhat different.

Air quality and traffic levels and active travel have been monitored pre- and post-implementation of the ZEZ Pilot. Given the size of the scheme any changes directly brought about by the Pilot are always likely to be small. Furthermore, some of the impacts of the ZEZ Pilot may be obscured by changes in transport activity linked to residual impacts on travel of Covid-19 lockdown restrictions that were lifted a few months before the scheme became operational and by some major building projects in the area, for example, at the former Northgate House in Cornmarket Street / Market Street and more recently the Frewin development in New Inn Hall Street.

3 Air Quality Monitoring

Oxford City Council monitors and assesses air quality in the city, which is reported annually in the Air Quality Annual Status Report. In the area affected by the ZEZ Pilot there are several nitrogen dioxide (NO_2) diffusion tube monitors which have been in place since at least 2021, or longer. These are located on the following streets:

- St Aldates near High Street (DT39)
- Queen Street (site reference DT40)
- Bonn Square (DT41)
- New Road (DT42)
- George Street near Magdalen Street (DT47)
- George Street near Gloucester Green (DT48)
- Cornmarket Street (DT49)
- New Inn Hall Street (DT87)
- St Michael's Street (DT88
- Market Street/Turl Street (DT89)

The city council's latest annual air quality monitoring report covering 2022 shows that in comparison with 2021:

- monitoring of nitrogen dioxide (NO_2) showed a citywide decrease of **8%** compared with the previous monitoring year despite traffic levels increasing on average by 8.2% in Oxford.
- Cornmarket Street, St. Michael's Street and George Street (near Magdalen Street) have all observed reductions in nitrogen dioxide levels of 3µg/m3.
- George Street (near Gloucester Green) and New Inn Hall Street both have seen reductions in NO_2 levels of 2µg/m3.
- recorded NO_2 reduced by **12%**, **14%** and **18%** on New Inn Hall Street, Cornmarket Street and St Michael's Street respectively in the Pilot area in 2022 – notably greater improvements than the 8% overall citywide improvement.
- NO_2 levels at monitoring sites on Queen Street, Bonn Square and New Road are the same as levels observed in 2021. This is unsurprising as these streets are already restricted in terms of access by private car, particularly Queen Street and Bonn Square, and all form part of the city's bus network. Buses are a major emission source in those areas and have continued to operate, so no major air quality improvements were to be expected in those areas in 2022. However, bus emissions in the ZEZ are expected to reduce in 2023/24 with the introduction of electric buses in Oxford.

4 Traffic Surveys

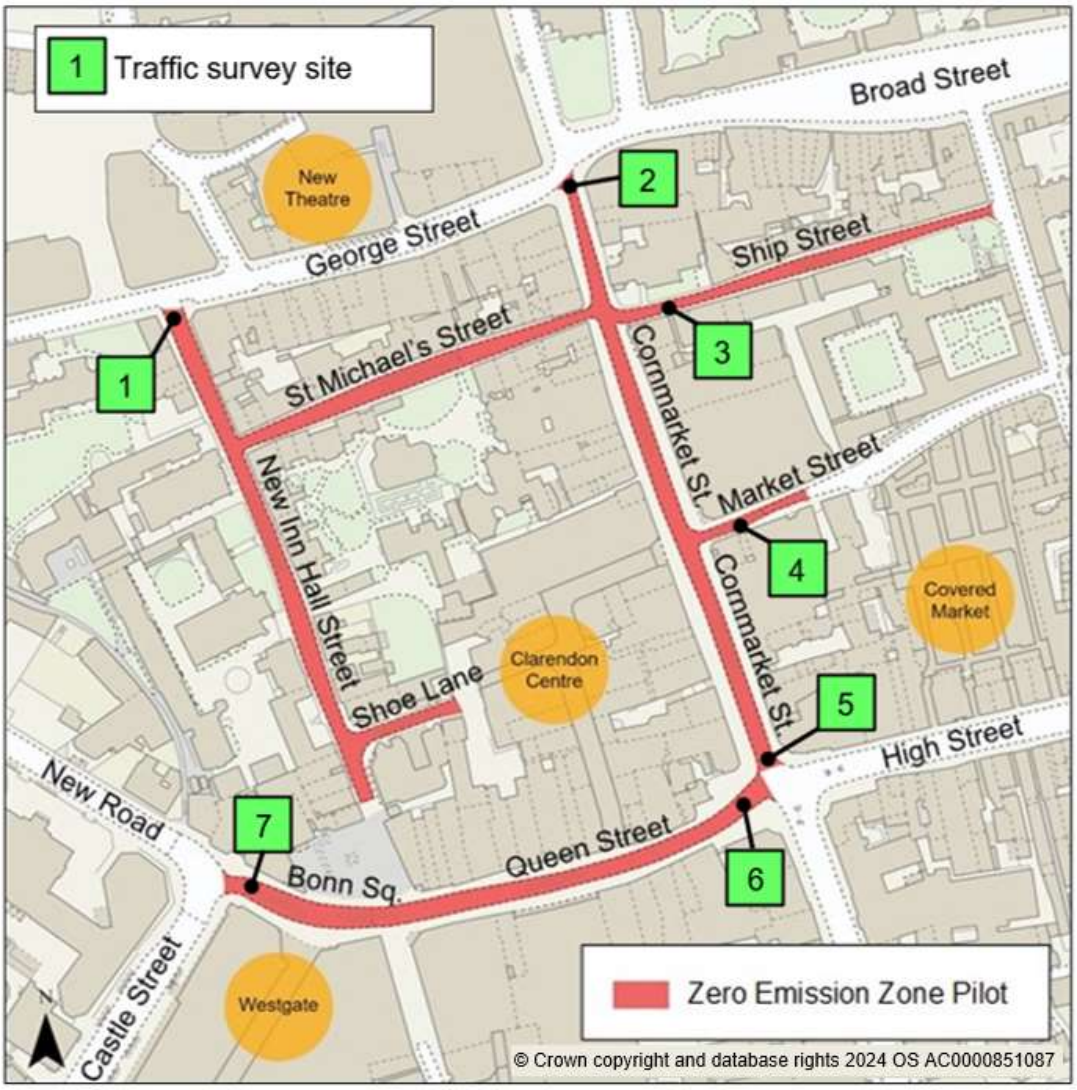
Traffic surveys at the ZEZ pilot boundary

Traffic surveys of motor vehicles have been undertaken by manual classified counts (MCC) and Automatic Number Plate Recognition (ANPR) surveys in April 2019, November 2021 and November 2022 at vehicular entry/exits to the Pilot area. The surveys undertaken in 2021 and in 2022 cover all seven days of the week. The 2021 covered the 7am-7pm period only; the 2019 and 2022 surveys covered 24-hour periods. The 2019 survey was undertaken on a Wednesday and a Thursday only.

The 2019 and 2021 surveys were undertaken prior to launch of the ZEZ pilot scheme. The 2022 surveys were undertaken after the pilot scheme had been operating for approximately nine months.

The locations of the survey sites are shown below in Figure 4.1:

Figure 4.1: Traffic survey site locations



The traffic survey sites and data availability are shown below in Table 4.1:

Table 4.1: Traffic surveys sites and data availability

Site no	Location	Data available 2019	Data available 2021	Data available 2022
1	New Inn Hall Street (by George Street)	y	y	y
2	Cornmarket Street (N) (by Broad Street)	y	y	y
3	Ship Street (by Cornmarket Street)	n	n	y
4	Market Street (by Cornmarket Street)	n	n	n
5	Cornmarket Street (S) (by Carfax)	y	y	y
6	Queen Street (by Carfax)	y	y	y
7	Bonn Square (by New Road)	y	y	y

Ship Street was surveyed only in 2022. Its data is not considered in the following analysis as there is no earlier data with which it can be compared.

MCC data has been used to factor the ANPR survey data where appropriate to enable valid comparisons to be made of traffic volumes and vehicle attributes (vehicle class, Euro emissions standards, CO_2 emissions etc) recorded by the surveys.

There are potential integrity issues with data collected in the Pilot traffic surveys for motorcycles (vehicle class L) and so analysis of those vehicles is omitted. Other motorcycle data recorded by manual classified counts on Tuesday 25 June 2019 at the eastern end of Ship Street and from 23-29 January 2024 at the western end of Ship Street has been assessed. The June 2019 survey recorded 181 motorcycle movements on Ship Street in the 7am to 7pm period and the January 2024 survey recorded 5 motorcycle movements (7am to 7pm) on Tuesday 23 January 2024 and a mean weekday total from 23-29 January 2024 of 4 motorcycle movements for the same time period. Whilst the introduction of the ZEZ may have contributed to the reduction in motorcycle movements on Ship Street shown in the 2022 Pilot surveys, other factors may have had a greater effect such as changes in travel patterns since the Covid-19 pandemic and the closure of the eastern end of St Michael's Street to motor vehicles.

Outline of Survey Analysis

The survey analysis in this report sets out and compares the vehicle movements, vehicle classes and vehicle emissions recorded before and after the ZEZ Pilot scheme became operational.

In the analysis a vehicle movement represents a vehicle entering or exiting the pilot area at the survey sites. A vehicle entering the pilot area is one vehicle movement, A vehicle exiting the pilot area is another movement. Therefore, one vehicle can be associated with multiple vehicle movements.

Analysis of the 7am to 7pm period covers the operating hours of the scheme. It uses data recorded by the 2021 and 2022 surveys. This 12 hour analysis is presented for an average survey day using data for all days of the week (Monday to Sunday). The 12 hour analysis is used for comparison of data recorded during the 7am to 7pm period before and after the ZEZ Pilot scheme became operational.

The 24 hour midnight to midnight surveys use data recorded by the 2019 and 2022 surveys. The 24 hour analysis is presented for an average of Wednesday and Thursday survey days as those were the only two survey days recorded by the 2019 data. The 24 hour analysis enables comparison of data recorded during and outside the 7am to 7pm period before and after the ZEZ Pilot scheme became operational and enables assessment of potential transfer of vehicle movements to the hours outside of the 7am-7pm period in response to the scheme.

Vehicles recorded by the traffic surveys have been analysed for the classes and subclasses shown in Table 4.2:

Table 4.2: Vehicle classifications

Class	Subclass	Description
L		Motor vehicles with fewer than four wheels
M		Power-driven vehicles having at least four wheels and used for the carriage of passengers
M	M1	Cars: Vehicles used for the carriage of passengers and comprising not more than eight seats in addition to the driver's seat
M	M2	Minibuses: Vehicles used for the carriage of passengers, comprising more than eight seats in addition to the driver's seat, and having a maximum mass not exceeding 5 tonnes
M	M3	Buses and coaches: Vehicles used for the carriage of passengers, comprising more than eight seats in addition to the driver's seat, and having a maximum mass exceeding 5 tonnes
N		Power-driven vehicles having at least four wheels and used for the carriage of goods
N	N1	Predominantly vans and small trucks: Vehicles used for the carriage of goods and having a maximum mass not exceeding 3.5 tonnes.
N	N2	Predominantly large vans and up to medium-size lorries: Vehicles used for the carriage of goods and having a maximum mass exceeding 3.5 tonnes but not exceeding 12 tonnes
N	N3	Predominantly large lorries: Vehicles used for the carriage of goods and having a maximum mass exceeding 12 tonnes

These vehicles classes are based on those used and defined by the Vehicle Certification Agency:

Classification of Power-driven Vehicles & Trailers | Vehicle Certification Agency (vehicle-certification-agency.gov.uk)

Surveyed total numbers of vehicles, 7am – 7pm, 2021 and 2022

The total numbers of vehicle movements and their classes as derived from the 2021 and 2022 surveys between 7am and 7pm are summarised in Table 4.3 below. The percentage change in trips between the two surveys is also shown in Table 4.3. The results indicate a reduction of approximately **28%** in total surveyed mean daily vehicle movements and of **37%** for vehicle classes M1, N1, N2, N3 only. The latter reduction results mostly from reductions in the numbers of M1 and N1 vehicle movements (42% and 36% respectively).

Table 4.3: Mean Daily Vehicle Movements 2021 & 2022, All Vehicles 7am-7pm, Sites 1,2,5,6,7, Mon-Sun

Vehicle class	Nr 2021	% of all vehicles*	Nr 2022	% of all vehicles*	2021-22 % change*
L*	3	n/a*	30	n/a*	n/a*
M1	347	25%	201	20%	-42%
Taxi	24	2%	20	2%	-17%
M2	0	0%	0	0%	0%
M3	541	39%	460	46%	-15%
N1	348	25%	224	22%	-36%
N2	34	2%	29	3%	-15%
N3	48	4%	32	3%	-34%
Ambulance	7	1%	3	0%	-64%
Fire engine	4	0%	3	0%	-30%
Not classified	30	2%	30	3%	-3%
Total All Vehicles excl class L*	**1385**	**100%**	**1002**	**100%**	**-28%**
Total M1, N1, N2, N3	**777**	**56%**	**487**	**49%**	**-37%**

* Class L vehicles excluded from analysis.

The 24 hour mean daily (mean of Wednesday and Thursday only) total numbers of vehicle movements and their classes as derived from the 2019 and 2022 are summarised in Table 4.4 below. The percentage change in trips between the two surveys is also shown in Table 4.4. The results indicate a reduction of approximately 26% in total vehicle movements and of 41% for vehicle classes M1, N1, N2, N3 only. The latter reduction results mostly from reductions of M1 vehicles of 57% and of N1 vehicles of 30%.

Table 4.5 below shows the mean daily vehicle movements for the 7am to 7pm period on Wednesday and Thursday only for 2019, 2021 and 2022.

Table 4.4: Mean Daily Vehicle Movements 2019 & 2022, All vehicles, 24 hours, Sites 1,2,5,6,7, Wed & Thur

Vehicle class	Nr 2019	% of all vehicles*	Nr 2022	% of all vehicles*	2019-22 % change*
L*	10	n/a*	48	n/a*	n/a*
M1	721	25%	308	15%	-57%
Taxi	305	11%	335	16%	10%
M2	2	0%	0	0%	-100%
M3	945	33%	792	37%	-16%
N1	664	23%	462	22%	-30%
N2	58	2%	64	3%	12%
N3	107	4%	83	4%	-22%
Ambulance	8	0%	1	0%	-82%
Fire engine	8	0%	5	0%	-32%
Not classified	44	2%	66	3%	50%
Total All Vehicles excl class L*	**2861**	**100%**	**2116**	**100%**	**-26%**
Total M1,N1,N2,N3	**1549**	**54%**	**917**	**43%**	**-41%**

* Class L vehicles excluded from analysis.

Table 4.5: Mean Daily Vehicle Movements 2019, 2021 & 2022, All Vehicles, 12 hours, Sites 1,2,5,6,7, Wed & Thur

Vehicle class	Nr 2019	% of all vehicles *	Nr 2021	% of all vehicles *	Nr 2022	% of all vehicles *
L*	4	n/a*	4	n/a*	32	n/a*
M1	453	26%	320	21%	174	16%
Taxi	38	2%	25	2%	23	2%
M2	0	0%	0	0%	0	0%
M3	646	37%	576	39%	473	44%
N1	492	28%	417	28%	303	28%
N2	45	3%	61	4%	36	3%
N3	69	4%	56	4%	40	4%
Ambulance	2	0%	9	1%	0	0%
Fire engine	7	0%	2	0%	4	0%
Not classified	13	1%	24	2%	34	3%
Total All Vehicles excl class L*	**1764**	**100%**	**1490**	**100%**	**1086**	**100%**
Total M1,N1,N2,N3	**1059**	**60%**	**855**	**57%**	**553**	**51%**

* Class L vehicles excluded from analysis.

Table 4.6 below shows the percentage change in the mean daily vehicle movements that are shown in Table 4.5 for the 7am to 7pm period on Wednesday and Thursday only for 2019, 2021 and 2022. The results indicate a reduction of approximately 38% in total vehicle movements and of 48% for vehicle classes M1, N1, N2, N3 only. The latter reduction results mostly from reductions of M1 vehicles of 62% and of N1 vehicles of 38%.

Table 4.6: Change in Mean Daily Vehicle Movements 2019, 2021, 2022, All Vehicles, 7am-7pm, Sites 1,2,5,6,7, Wed & Thur

Vehicle class	2019-2021 % change	2021-2022 % change	2019-2022 % change
L*	n/a*	n/a*	n/a*
M1	-29%	-46%	-62%
Taxi	-35%	-7%	-39%
M2	0%	0%	0%
M3	-11%	-18%	-27%
N1	-15%	-27%	-38%
N2	35%	-41%	-21%
N3	-18%	-29%	-42%
Ambulance	324%	-100%	-100%
Fire engine	-74%	123%	-43%
Not classified	88%	45%	172%
Total All Vehicles excl class L*	**-16%**	**-27%**	**-38%**
Total M1,N1,N2,N3	**-19%**	**-35%**	**-48%**

* Class L vehicles excluded from analysis.

Table 4.7 below shows the mean daily vehicle movements in 2019 and 2022 outside of the scheme's operating hours for all vehicles for a Wednesday and a Thursday combined – these were the only days for which data was available for that assessment. It shows that the number of vehicles in the ZEZ outside of the 7am to 7pm period was lower in 2022 than 2019 by 6% for all vehicles and by 26% for vehicles M1, N1, N2 and N3 combined. These reductions are notably less than those within the 7am to 7pm period.

Table 4.7: Mean Daily Vehicle Movements 2019 and 2022 outside of 7am-7pm, All Vehicles, Sites 1,2,5,6,7, Wed & Thur

Vehicle class	Nr 2019	2019 % of all vehicles*	Nr 2022	2022 % of all vehicles*	2019-2022 % change*
L*	6	n/a*	16	n/a*	n/a*
M1	268	24%	134	13%	-50%
Taxi	267	24%	312	30%	17%
M2	2	0%	0	0%	-100%
M3	299	27%	319	31%	7%
N1	172	16%	159	15%	-7%
N2	12	1%	28	3%	134%
N3	38	3%	43	4%	14%
Ambulance	5	1%	1	0%	-75%
Fire engine	2	0%	2	0%	13%
Not classified	31	3%	31	3%	1%
Total All Vehicles excl class L*	**1096**	**100%**	**1030**	**100%**	**-6%**
Total M1,N1,N2,N3	**490**	**45%**	**364**	**57%**	**-26%**

* Class L vehicles excluded from analysis.

Analysis of vehicle classes M1, N1, N2, N3

Movements by vehicles in classes M1, N1, N2 and N3 derived from the surveys are summarised in Tables 4.8 to 4.12 below. These vehicle classes are of most relevance to the ZEZ scheme as taxis (registered by Oxford City Council), buses and emergency service vehicles are all exempt from ZEZ charges. Vehicle class M1 in this analysis excludes vehicles recognised by the Driver Vehicle & Licensing Agency (DVLA) as taxis. The mean number of movements per day by M2 vehicles in all of the surveys was minimal: a mean of fewer than 0.5 movements per day by M2 vehicles was recorded in the 2021 and 2022 surveys and a mean of two movements by M2 vehicles was recorded in the 2019 surveys.

The results in Tables 4.8 to 4.12 indicate a reduction of approximately 19% (for mean of Wednesday and Thursday) in movements of vehicles in classes M1, N1, N2 and N3 between 7am and 7pm in the ZEZ pilot area took place between the 2019 and 2021 surveys prior to the launch of the ZEZ scheme (likely affected by Covid-19 restrictions). A reduction in total vehicle movements of approximately 37% (for mean of all days Monday – Sunday) between 7am and 7pm is shown to have occurred between the 2021 and 2022 surveys during which period the ZEZ was launched and operated for around nine months.

Table 4.8: Mean Daily Vehicle Movements, 2021 & 2022, Vehicle classes M1, N1, N2, N3, 7am-7pm, at Sites 1,2,5,6,7 Mon-Sun

Vehicle class	Nr 2021	% 2021	Nr 2022	% 2022	2021-2022 % change
M1	347	45	201	41	-42%
N1	348	45	224	46	-36%
N2	34	4	29	6	-15%
N3	48	6	32	7	-34%
Total M1,N1,N2,N3	**797**	**100**	**487**	**100**	**-37%**

Figure 4.2: 2021, 2022; 7am-7pm; Mean daily vehicle movements by vehicle class M1, N1, N2, N3; Mon-Sun; Sites 1,2,5,6,7

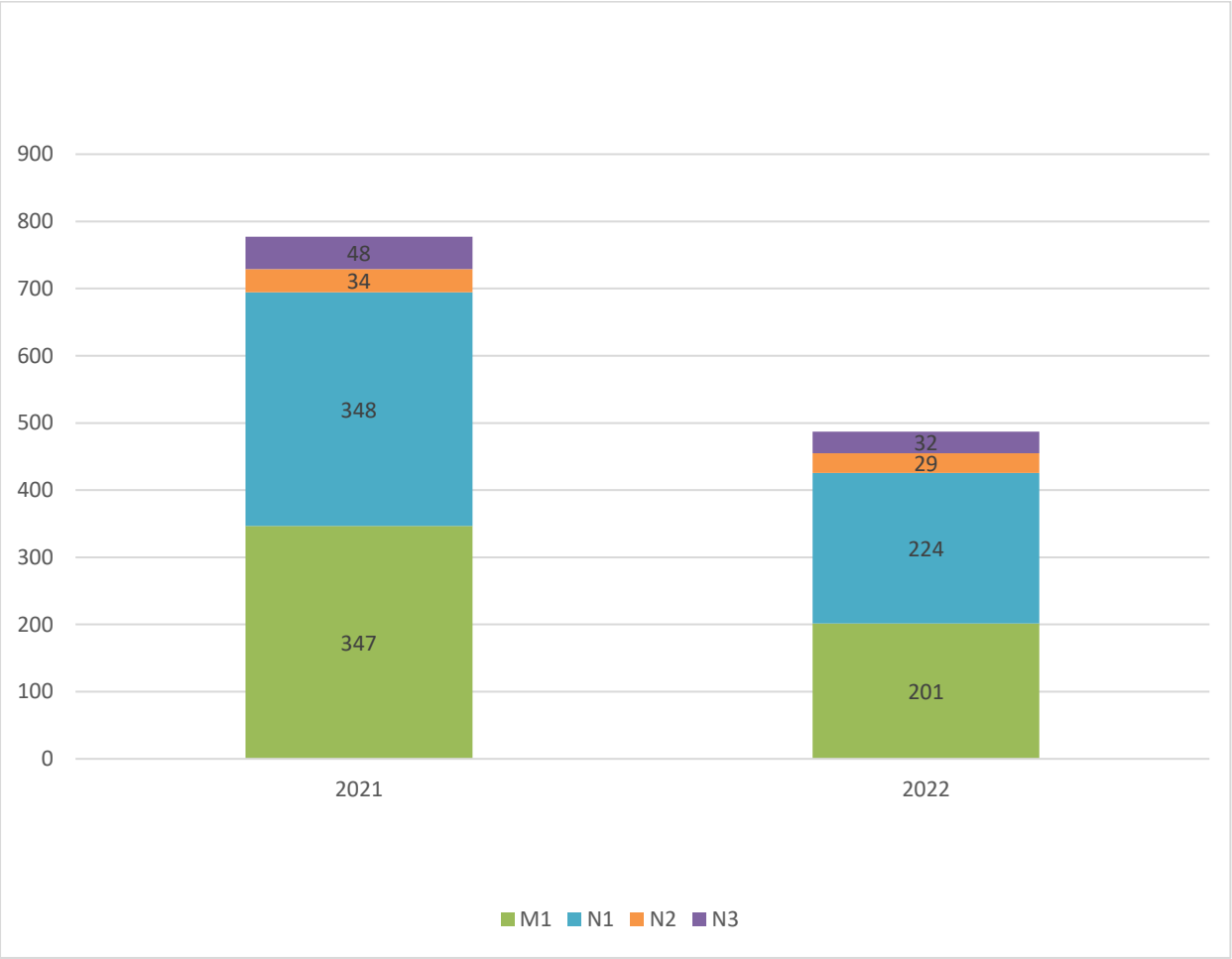


Table 4.9: Mean Daily Vehicle Movements, 2019, 2021, 2022, M1, N1, N2, N3 vehicles, 7am-7pm, Sites 1,2,5,6,7, Wed and Thur

Vehicle class	Nr 2019	% 2019	Nr 2021	% 2021	Nr 2022	% 2022
M1	453	43	320	37	174	31
N1	492	46	417	49	303	55
N2	45	4	61	7	36	7
N3	69	7	56	7	40	7
Total M1,N1,N2,N3	**1059**	**100**	**855**	**100**	**553**	**100**

Figure 4.3: 2019, 2021, 2022; 7am-7pm; Mean number of daily vehicle movements by vehicle class M1, N1, N2, N3; Sites 12567, Wed & Thur

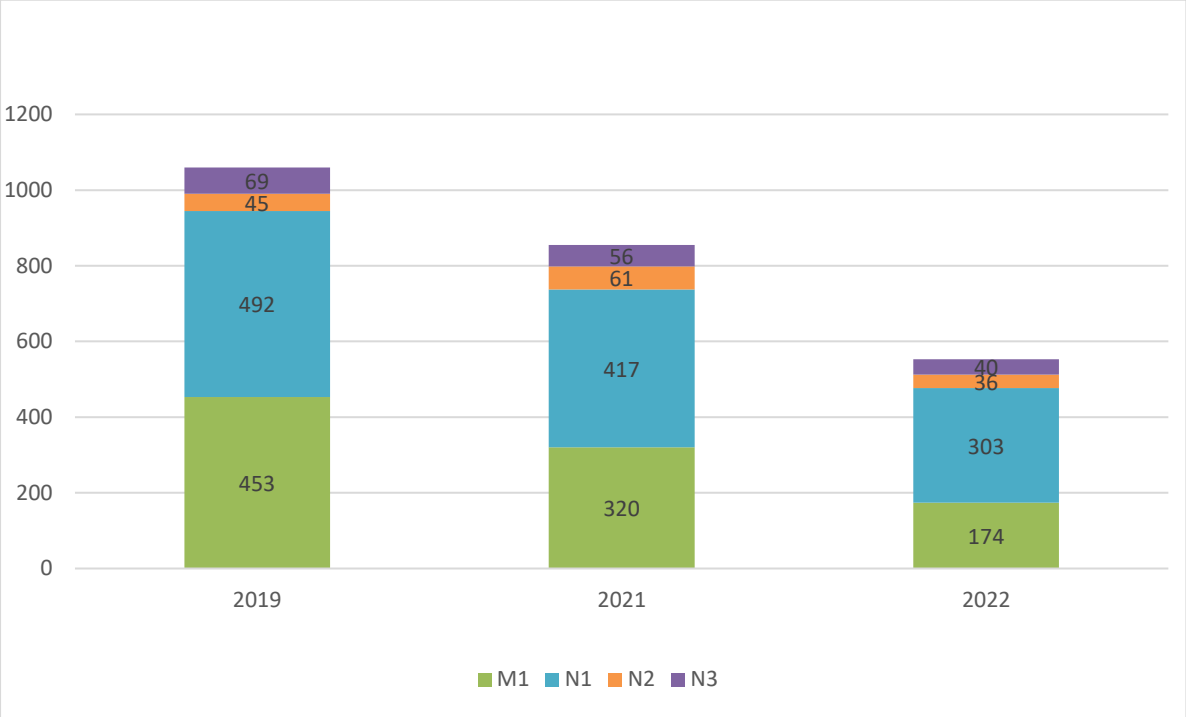


Table 4.10: Change in Mean Daily Vehicle Movements, 2019, 2021, 2022, Vehicle classes M1, N1, N2, N3, 7am-7pm, at Sites 1,2,5,6,7, Wed & Thur

Vehicle class	2019-2021 % change	2021-2022 % change	2019-2022% change
M1	-29%	-46%	-62%
N1	-15%	-27%	-38%
N2	35%	-41%	-21%
N3	-18%	-29%	-42%
Total M1, N1, N2, N3	**-19%**	**-35%**	**-48%**

Table 4.11: Mean Daily Vehicle Movements, 2019 & 2022, Vehicle classes M1, N1, N2, N3, 24hours, Sites 1,2,5,6,7, Wed & Thur

Vehicle class	Nr 2019	% 2019	Nr 2022	% 2022	2019-2022 % change
M1	721	46	308	34	-57%
N1	664	43	462	50	-30%
N2	58	4	64	7	12%
N3	107	7	83	9	-22%
Total M1,N1,N2,N3	**1551**	**100**	**917**	**100**	**-41%**

Figure 4.4: 2019 & 2022; 24 hour; Mean number of daily vehicle movements by vehicle class M1, N1, N2, N3; Sites 12567, Wed & Thur

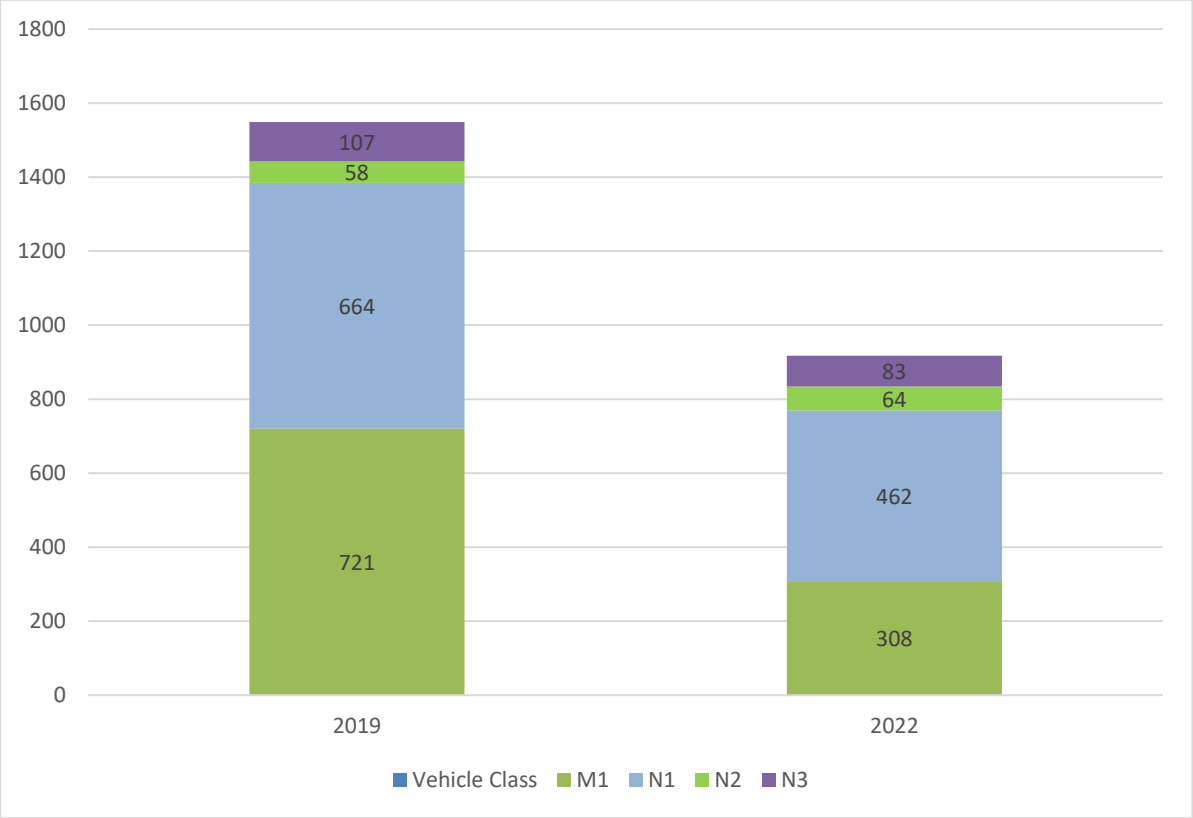
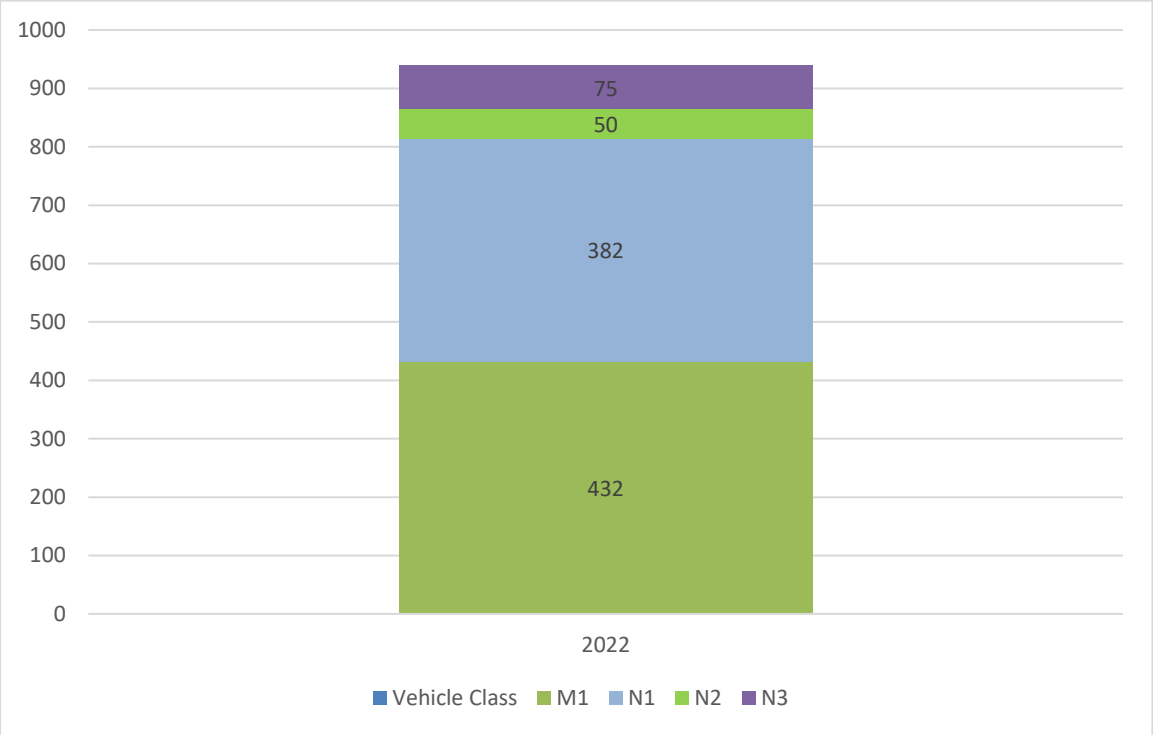


Table 4.12: Mean Daily Vehicle Movements, 2022, Vehicle classes M1, N1, N2, N3, 24hours, at Sites 1,2,5,6,7, Mon-Sun

Vehicle class	Nr 2022	% 2022
M1	432	46
N1	382	41
N2	50	5
N3	75	8
Total M1, N1, N2, N3	**940**	**100**

Figure 4.5: 2022; 24 hour; Mean number of daily vehicle movements (by vehicle class M1, N1, N2, N3; Sites 12567, Mon-Sun



Vehicle emissions analysis – Fully zero emission motor vehicles

Movements recorded by the traffic surveys of fully zero emission vehicles entering and exiting the ZEZ Pilot area have been analysed for vehicle classes M1, N1, N2 and N3. The results show that the use of these vehicles in the ZEZ was highest in the 2022 survey and lowest in the 2019 survey. The analysis results are summarised in Tables 4.13 to 4.16 below.

Table 4.13: 2021, 2022; mean number and percentage of movements by fully zero emission vehicles, vehicle classes M1, N1, N2, N3, 7am-7pm; Sites 1,2,5,6,7; Mon-Sun

Vehicle class	2021 Nr	2021 %	2022 Nr	2022 %
M1	10	3.0%	9	4.5%
N1	41	11.7%	51	22.6%
N2	0	0.0%	0	1.4%
N3	3	6.8%	2	6.9%

Table 4.14: 2019, 2021, 2022; mean number and percentage of movements by fully zero emission vehicles, vehicle classes M1, N1, N2, N3, 7am-7pm; Sites 1,2,5,6,7; Wed & Thur

Vehicle class	2019 Nr	2019 %	2021 Nr	2021 %	2022 Nr	2022 %
M1	0	0.0%	8	2.6%	10	5.8%
N1	0	0.0%	34	8.2%	70	23.2%
N2	0	0.0%	0	0.0%	1	4.1%
N3	0	0.0%	4	6.5%	2	4.9%

Table 4.15 2019, 2022; mean number and percentage of movements by fully zero emission vehicles, vehicle classes M1, N1, N2, N3, 24 hour; Sites 1,2,5,6,7; Wed & Thur

Vehicle class	2019 Nr	2019 %	2022 Nr	2022 %
M1	0	0%	17	5.4%
N1	0	0%	77	16.6%
N2	0	0%	1	2.2%
N3	0	0%	5	5.7%

Table 4.16: 2022; mean number and percentage of movements by fully zero emission vehicles, vehicle classes M1, N1, N2, N3, 24 hour; Sites 1,2,5,6,7; Mon-Sun

Vehicle class	2022 Nr	2022 %
M1	14	3.2%
N1	58	15.3%
N2	0	0.8%
N3	5	6.5%

Tables 4.13 to 4.16 show that the overall number and percentage of movements by fully zero emission vehicles in the ZEZ Pilot area increased from the years 2019 to 2021 and increased again from the years 2021 to 2022.

Traffic surveys carried out in Oxford in October 2021 and March 2023 has been analysed to compare the use of zero emission vehicles in the area between the Oxford ring road and the ZEZ Pilot area with their use in pilot area. Data from those surveys for zero emission vehicles in classes M1 and N1 is summarised below in Tables 4.17 and 4.18. Vehicle classes M1 and N1 are the vehicle classes that account for the greatest number of movements by zero emission vehicles and for which comparable data is available. The zero emission vehicle use percentage for a mean survey day (7am to 7pm) has been derived from the data in Tables 4.17 and 4.18 and adjusted to November 2021 and November 2022 for comparison with the pilot survey data. Table 4.19 shows the results of that analysis and indicates that the percentage of vehicles that were zero emission in the pilot area in 2021 and 2022 was notably higher than in the area between the pilot area and the ring road.

Table 4.17: Percentage of movements by fully zero emission vehicles, vehicle classes M1, N1, between Pilot area and Oxford ring road, October 2021

Vehicle class	Weekday 8.00-9.00hrs	Weekday 17.00-18.00hrs	Weekday 10.00-16.00hrs	Weekend 7.00-19.00hrs
M1	3.2%	2.6%	1.9%	2.2%
N1	2.7%	3.8%	4.2%	2.4%

Table 4.18: Percentage of movements by fully zero emission vehicles, vehicle classes M1, N1, between Pilot area and Oxford ring road, March 2023

Vehicle class	Weekday 8.00-9.00hrs	Weekday 17.00-18.00hrs	Weekday 10.00-16.00hrs	Weekend 7.00-19.00hrs
M1	4.9%	5.2%	4.4%	4.4%
N1	7.1%	12.5%	9.6%	11.6%

Table 4.19 Percentage of movements by fully zero emission vehicles in vehicle classes M1 and N1 between ZEZ Pilot area and Oxford ring road for mean day, 07.00-19.00hrs, November 2021 and November 2022, compared with equivalent movements in ZEZ Pilot area.

Vehicle class	Between Pilot area and ring road, November 2021	Within Pilot area November 2021	Between Pilot area and ring road November 2022	Within Pilot area November 2022
M1	2.3%	3.0%	3.9%	4.5%
N1	3.9%	11.7%	8.6%	22.6%

Vehicle emissions analysis - Euro Emissions Standards Analysis

Vehicle engine euro emission standards have been analysed for vehicle classes M1, N1, N2 and N3 and combined for all hybrid, petrol and diesel powered engines in those vehicle classes. Fully electric vehicles are excluded from the analysis.

Currently the highest achievable Euro standard for vehicles with petrol or diesel engines, including hybrids, is Euro 6. Compliance with the Euro 4 petrol / Euro 6 diesel standards or better would place the vehicle in the ZEZ's LEV (Low Emission Vehicle) category unless the vehicle also emits less than 75g of C02/km in which case it would be placed in the ZEZ's ULEV (Ultra Low Emission Vehicle) category.

The results of the Euro standards analysis are summarised in Tables 4.20 to 4.27 below. They indicate a shift over time to an increase in use of vehicles with less polluting engines.

Table 4.20: Mean Euro standard and LEV compliance by vehicle fuel type, 2019, 2021, 2022, Vehicle classes M1, N1, N2, N3, 7am-7pm; Sites 1,2,5,6,7; Wed & Thur

Vehicle fuel type	Mean Euro standard 2019	Mean Euro standard 2021	Mean Euro standard 2022	LEV compliance or better** 2019	LEV compliance or better** 2021	LEV compliance or better** 2022
Hybrid	5.58	5.80	5.66	100%	100%	100%
Petrol*	5.01	5.35	5.58	97%	98%	100%
Diesel*	5.26	5.50	5.67	41%	61%	71%

* excludes hybrids
** LEV (Low Emission vehicle) standard compliance or better (ie Euro 4 petrol / Euro 6 diesel compliance or better)

Table 4.21: Mean Euro standard and LEV compliance by vehicle class, 2019, 2021, 2022, Vehicle classes M1, N1, N2, N3, 7am-7pm; Sites 1,2,5,6,7; Wed & Thur

Vehicle Class	Mean Euro standard 2019	Mean Euro standard 2021	Mean Euro standard 2022	LEV compliance or better* 2019	LEV compliance or better* 2021	LEV compliance or better* 2022
M1	5.21	5.39	5.59	70%	74%	82%
N1	5.20	5.52	5.67	33%	64%	71%
N2	5.29	5.44	5.71	46%	55%	74%
N3	5.64	5.88	5.77	70%	88%	87%
Total M1, N1, N2, N3	**5.24**	**5.49**	**5.65**	**51%**	**69%**	**76%**

* LEV (Low Emission vehicle) standard compliance or better (ie Euro 4 petrol / Euro 6 diesel compliance or better)

Table 4.22: Mean Euro standard and LEV compliance by vehicle fuel type, 2021 & 2022, Vehicle classes M1, N1, N2, N3, 7am-7pm; Sites 1,2,5,6,7; Mon-Sun

Vehicle fuel type	Mean Euro standard 2021	Mean Euro standard 2022	LEV compliance or better** 2021	LEV compliance or better** 2022
Hybrid	5.67	5.77	100%	100%
Petrol*	5.41	5.56	99%	100%
Diesel*	5.51	5.65	61%	70%

* excludes hybrids
** LEV (Low Emission vehicle) standard compliance or better (ie Euro 4 petrol / Euro 6 diesel compliance or better)

Table 4.23: Mean Euro standard and LEV compliance by vehicle class, 2021 & 2022, Vehicle classes M1, N1, N2, N3, 7am-7pm; Sites 1,2,5,6,7; Mon-Sun

Vehicle Class	Mean Euro standard 2021	Mean Euro standard 2022	LEV compliance or better* 2021	LEV compliance or better* 2022
M1	5.42	5.59	75%	83%
N1	5.53	5.66	63%	71%
N2	5.50	5.67	58%	68%
N3	5.86	5.84	87%	92%
Total M1, N1, N2, N3	**5.50**	**5.64**	**70%**	**77%**

* LEV (Low Emission vehicle) standard compliance or better (ie Euro 4 petrol / Euro 6 diesel compliance or better)

Table 4.24: Mean Euro standard and LEV compliance by vehicle fuel type, 2019 & 2022, Vehicle classes M1, N1, N2, N3; 24 hours; Sites 1,2,5,6,7; Wed & Thur

Vehicle fuel type	Mean Euro standard 2019	Mean Euro standard 2022	LEV compliance or better** 2019	LEV compliance or better** 2022
Hybrid	5.57	5.72	100%	100%
Petrol*	5.01	5.47	97%	100%
Diesel*	5.27	5.63	41%	68%

* excludes hybrids
** LEV (Low Emission vehicle) standard compliance or better (ie Euro 4 petrol / Euro 6 diesel compliance or better)

Table 4.25: Mean Euro standard and LEV compliance by vehicle class, 2019 & 2022, Vehicle classes M1, N1, N2, N3; 24 hours; Sites 1,2,5,6,7; Wed & Thur

Vehicle Class	Mean Euro standard 2019	Mean Euro standard 2022	LEV compliance or better* 2019	LEV compliance or better* 2022
M1	5.18	5.53	65%	79%
N1	5.23	5.60	35%	66%
N2	5.27	5.80	44%	82%
N3	5.74	5.83	78%	88%
Total M1, N1, N2, N3	**5.24**	**5.61**	**52%**	**74%**

* LEV (Low Emission vehicle) standard compliance or better (ie Euro 4 petrol / Euro 6 diesel compliance or better)

Table 4.26: Mean Euro standard and LEV compliance by vehicle fuel type, 2022, Vehicle classes M1, N1, N2, N3, 24 hours, Sites 1,2,5,6,7, Mon-Sun

Vehicle fuel type	Mean Euro standard	LEV compliance or better*
Hybrid	5.76	100%
Petrol*	5.36	100%
Diesel*	5.62	68%

* excludes hybrids
** LEV (Low Emission vehicle) standard compliance or better (ie Euro 4 petrol / Euro 6 diesel compliance or better)

Table 4.27: Mean Euro standard and LEV compliance by vehicle class, 2022, Vehicle classes M1, N1, N2, N3, 24 hours, Sites 1,2,5,6,7, Mon-Sun

Vehicle Class	Mean Euro standard	LEV compliance or better*
M1	5.52	80%
N1	5.59	67%
N2	5.72	73%
N3	5.87	91%
Total M1, N1, N2, N3	**5.59**	**75%**

* LEV (Low Emission vehicle) standard compliance or better (ie Euro 4 petrol / Euro 6 diesel compliance or better)

Vehicle emissions analysis - CO2 emissions analysis

CO2 data has been analysed for vehicle classes M1 and N1. The analysis excludes fully zero emission vehicles. Vehicles that emit less than 75g/km of CO2 meet the emission requirement of the ZEZ's ULEV (Ultra Low Emission Vehicle) category.

The results of the CO2 analysis are summarised in Tables 4.28 to 4.31 below. They indicate a shift over time to an increase in use of vehicles with lower CO2 emissions.

Table 4.28: 2021 and 2022: Vehicle classes M1 and N1, 7am-7pm, Sites 1,2,5,6,7, Mon-Sun

Vehicle Class	Mean CO2 (g/km) 2021	Mean CO2 (g/km) 2022	Vehicles with CO2<75g/km 2021	Vehicles with CO2<75g/km 2022
M1	134	128	1.2%	2.8%
N1	177	176	0.2%	1.6%

Table 4.29: 2019, 2021 and 2022: Vehicle classes M1 and N1, 7am-7pm, Sites 1,2,5,6,7, Wed & Thur

Vehicle Class	Mean CO2 (g/km) 2019	Mean CO2 (g/km) 2021	Mean CO2 (g/km) 2022	Vehicles w. CO2<75g /km 2019	Vehicles w. CO2<75g /km 2021	Vehicles w. CO2<75g /km 2022
M1	135	131	133	1.9%	1.6%	2.6%
N1	180	176	179	0.0%	0.4%	0.6%

Table 4.30: 2019 and 2022: Vehicle classes M1 and N1, 24 hours, Sites 1,2,5,6,7, Wed & Thur

Vehicle Class	Mean CO2 (g/km) 2019	Mean CO2 (g/km) 2022	Vehicles with CO2<75g/km 2019	Vehicles with CO2<75g/km 2022
M1	135	134	2.5%	2.7%
N1	180	179	0.0%	0.4%

Table 4.31: 2022: Vehicle classes M1 and N1, 24 hours, Sites 1,2,5,6,7, Mon-Sun

Vehicle Class	Mean CO2 (g/km)	Vehicles with CO2<75g/km
M1	127	3.1%
N1	178	0.9%

5 Cycle and Pedestrian Movements

Cycle and pedestrian movements recorded in 2021 and 2022 in the ZEZ Pilot area have been assessed and compared.

Cycle movements

Cycle movements derived from surveys recorded from 9th-15th November 2021 and 8th-14th November 2022 at New Inn Hall Street, Cornmarket Street (north), Cornmarket Street (south) and Queen Street have been compared.

The combined cycle movements for the sites are summarised in Table 5.1 below.

Table 5.1: Mean daily number of cycle movements, 7am-7pm, 2021 and 2022, Sites 1,2,5,6

2021	2022	% change 2021 to 2022
6,318	8,170	29%

The introduction of the ZEZ pilot scheme is unlikely to have contributed significantly to the increase in cycle movements shown in Table 5.1. Other factors are likely to have had a greater effect such as changes in travel patterns since the Covid-19 pandemic.

Pedestrian movements

Pedestrian movement data for the time periods 10.30-11.30am and 2.30-3.30pm recorded in 2021 on Thursday 30 September and Thursday October 7 has been compared with weekday (ie excluding Saturday and Sunday) data recorded for the same time periods from Tuesday 8 to Monday 14 November 2022 at Cornmarket Street (north), Cornmarket Street (south) and Queen Street. The 2021 data for Queen Street was recorded at its western end, the 2022 data was recorded at its eastern end.

The combined pedestrian movements for the sites are set out and compared in Table 5.2 below.

Table 5.2: Number of pedestrian movements, 10.30-11.30am and 2.30-3.30pm, 2021 and 2022, Sites 2,5,6

	Thursday 30 September and Thursday 7 October 2021	Thursday 10 November 2022	All weekdays 8-14 November 2022
Mean Number of movements	14,595	16,762	17,808
% change compared with 2021	n/a	15%	22%

The introduction of the ZEZ pilot scheme is unlikely to have contributed significantly to the increase in pedestrian movements shown in Table 5.2. Other factors are likely to have had a greater effect such as changes in travel patterns since the Covid-19 pandemic including increased tourism-related footfall in the city centre.

6 Discount Applications

This section provides an overview of data collected regarding applications for discounts and exemptions.

ZEZ Pilot Discount Applications

Discounts from daily ZEZ charges are available for certain vehicles and users.

Table 6.1 below sets out the number of applications approved by the type of ZEZ Pilot discount during the period February 2022 to February 2023.

Table 6.1: Number and Percentage of ZEZ Pilot discount applications approved (February 2022 to February 2023)

Discount type	Number of approved applications	% of total
Blue Badge holders	1908	84%
Health or care workers	175	8%
Low emission hybrid private hire and Hackney carriage vehicles	66	3%
Disabled tax vehicles	62	3%
Businesses in the zero emission zone	42	2%
Residents in the zero emission zone	7	<1%
Students in financial hardship moving in or out of the zero emission zone	5	<1%
Community transport vehicles	2	<1%
Total	**2267**	**100%**

7 Income

ZEZ income comes from:

- payments of the daily ZEZ charges, and
- payments in connection with penalty charge notices (PCNs) issued in cases of non-compliance with the requirements of the scheme.

Daily charges

Use of a vehicle in the ZEZ between 7am and 7pm will incur a daily charge unless the vehicle is zero emission, exempt or has a 100 per cent discount. ZEZ charges apply every day. ZEZ charges do not apply to vehicles that are parked within the ZEZ and do not move.

The ZEZ Pilot scheme's daily charges are shown in Table 1.1. They can be paid:

- up to six days in advance of the day the vehicle is used in the ZEZ;
- on the day the vehicle is used in the ZEZ; and
- on any of the six days following the day the vehicle is used in the ZEZ.

Penalty Charge Notices

ZEZ income also comes penalty charge notices (PCNs) issued in cases of non-payment of the daily ZEZ charge. At the time of writing the penalty charge fine is £60 although the amount is reduced to £30 for payment made within 14 days of the PCN's date of service.

Table 7.1 sets out the number of PCNs issued each month from April 2022, when PCNs started to be issued, to March 2023. It is expected that as more road users become familiar with the scheme that the number of PCNs will broadly stabilise albeit with some seasonal variability.

Table 7.1 Penalty Charge Notices (PCNs) issued by month

Month/Year	Penalty Charge Notices issued
April 2022*	1,624
May 2022	1,482
June 2022	1,832
July 2022	1,759
August 2022	1,629
September 2022	848
October 2022	1,046
November 2022	1,390
December 2022	808
January 2023	1,296
February 2023	1,282
March 2023	1,399
Total	**16,395**

**The ZEZ Pilot scheme came into effect on 28th February 2022. Warning notices were issued for non-compliance with the requirements of the scheme for the first six weeks of its operation. PCNs have been issued for non-compliance since 11th April 2022.*

Table 7.2 below shows the percentage of the total number of PCNs issued, for the period April 2022 to March 2023, by ANPR camera location. Most PCNs were issued following ANPR camera observations at New Inn Hall Street. This is to be expected with New Inn Hall Street being accessible at all times by any vehicle including for loading/deliveries, and on street parking whilst the streets at the other ANPR camera locations are subject to substantial vehicle access restrictions.

Table 7.2 Percentage of Total ZEZ Penalty Charge Notices issued by ANPR camera location.

ZEZ ANPR camera location	% of total Penalty Charge Notices issued
New Inn Hall Street junction with George Street	68%
Cornmarket Street junction with Broad Street	12%
Ship Street junction with Cornmarket Street	9%
Castle Street junction with New Road	7%
Cornmarket Street junction with Carfax	4%
Total	**100%**

Total Income

The total income raised by the scheme over its first full financial year of operation (April 2022-March 2023) is £702,940 with around 47% of this coming from daily charges and the rest from PCN income. The scheme also raised a total of £25,432 in February and March 2022.

Income from the scheme is used to pay for its development and operation as well as to fund schemes that support the transport objectives of the County and City councils.

8 Service User Feedback and Experience

In most cases users interact with the ZEZ without providing feedback on their experience. The following changes to the scheme's operation have been suggested a number of times by those who have provided feedback:

- Some users, particularly businesses, have asked that user accounts are made available to simplify the process for payment of the ZEZ daily charges.
- Some users have asked for a facility to be provided for users to check whether they have driven in the ZEZ.

As well as providing valuable lessons for future ZEZ expansion, the Pilot is having the following positive impacts:

- It is helping to be a catalyst for accelerating the transition to zero emission vehicles in the city, with several businesses, who regularly operate within the city already shifting towards zero emission vehicles within their fleets and often citing Oxford as a test city for these initiatives. Examples include DPD and Royal Mail;
- It has provided support for both Councils in successful applications to funding streams and opportunities that help accelerate the delivery of other city air quality/net zero related projects. Examples include the Energy Super Hub Oxford.
- It is encouraging the growth of sustainable delivery businesses in the city, including OxWash, Pedal&Post and Velocity, enabling companies to adopt more sustainable delivery services;
- It is supporting projects that directly help businesses in the city to transition to using zero emission vehicles. Examples include the ECObike electric cargo bike project.

Annex A – ZEZ Pilot Discounts and Exemptions

Discounts are available for:

- Blue Badge holders
- Disabled tax vehicles
- Selected low emission hybrid private hire and Hackney carriage vehicles.
- Residents in the zero-emission zone
- Health or care workers
- Community transport vehicles
- Businesses in the zero-emission zone
- Students in financial hardship moving in or out of the zero emission zone

The following vehicles are exempt from the daily charge:

- Hackney carriages licensed by Oxford City Council
- Registered local buses.
- Emergency service vehicles
- Historic vehicles
- Military vehicles
- Agricultural and similar vehicles (includes tractors, mowing machines, steam-powered vehicles, snowploughs and gritters)
- Special vehicles (includes mobile cranes, pumping vehicles, digging machines, road rollers, and works trucks, e.g. forklift trucks)
- Hearses
- Certain recovery vehicles