Final Report

Health Impacts from Domestic Burning in the UK

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global action plan

Hertfordshire

RICARDO

Health Impacts from Domestic Burning in the UK

Final Report

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1.0	16 May 2025	First issue
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3.0	04 July 2025	Third issue

Contents

Introduction

Air Quality in the UK

- Air pollution is the biggest environmental risk to public health in the UK, with outdoor and indoor air pollution both shown to be drivers of serious and potentially fatal disease in children and adults.
- There is no safe level of air pollution and despite concentrations of many pollutants falling rapidly in the last three decades, it remains a major cause of chronic ill health as well as premature mortality.
- A recent report by the RCP[1] estimates that the equivalent of around 30,000 deaths a year in the UK are attributed to air pollution in 2025.
- The health impacts of air pollution were estimated to have an economic cost of £27 billion annually in the UK in 2019, and may be as much as £50 billion when wider impacts, such as dementia, are accounted for.
- The air pollutants with the greatest effect on the health of the UK population are particulate matter, nitrogen dioxide (NO_2) and ozone (O_3).
- Particulate matter is dangerous because its small particle size means it can get into our lungs and pass into our bloodstream. Using a stove or open fire at home is a major contributor of $PM_{2.5}$ (less than 2.5 micrometres in size).
- In the UK, people spend around 80–90% of their time indoors[2] and the WHO[3] linked 154,000 deaths in Europe to household air pollution in 2019.

[1] https://www.rcp.ac.uk/media/0yia2peh/rcp-summary-for-policymakers-a-breath-of-fresh-air-responding-to-the-health-challenges-of-modern-air-pollution.pdf
[2] Air Quality Expert Group. Indoor air quality. AQEG, Dept for Environment, Food and Rural Affairs, 2022.
[3] https://www.who.int/europe/news-room/fact-sheets/item/air-quality

Addressing Domestic Burning in the UK

- Domestic burning, particularly the burning of wood and coal, has significant negative impacts on public health due to air pollution.
- Fine particulate matter ($PM_{2.5}$) released during combustion has the ability to penetrate deep into the lungs and bloodstream, affecting every organ in the body[1], and leading to or exacerbating various health issues.
- Air pollution in the UK has seen significant improvements in recent decades due to the introduction of policies and measures designed to reduce pollutant emissions from transport, industry, and homes. However, although ambient air quality in the UK is generally considered good, elevated pollution levels still occur in many towns and cities across the country.
- The Environment Improvement Plan (2023)[2] is the most recent plan providing an outline of the UK Government's broad air quality aspirations including the action taken to date, government targets and commitments, and how the future delivery of these aims will be achieved.
- One key target is to achieve a maximum annual concentration of particulates in the air of 10 $\mu g/m^3$ $PM_{2.5}$ or below by 2040, with an interim target to not exceed 12 $\mu g/m^3$ by 2028. In addition, legal targets have also been set to restrict public exposure to $PM_{2.5}$, which has been defined as a reduction of 35% relative to 2018 exposure levels by 2040, and 22% by 2028. In terms of other pollutants, the Plan sets out an aim to achieve compliance with a 40 $\mu g/m^3$ limit for nitrogen dioxide.
- To meet these targets, a diverse delivery plan is being implemented which targets pollution from a range of sources including transport and industrial emissions, and domestic burning.
- On 1st July 2025 the Clean Air (Human Rights) Bill had its first reading in Parliament[3]. If brought forward into law, the Bill would see more stringent limit levels for nitrogen dioxide and fine particulate matter.

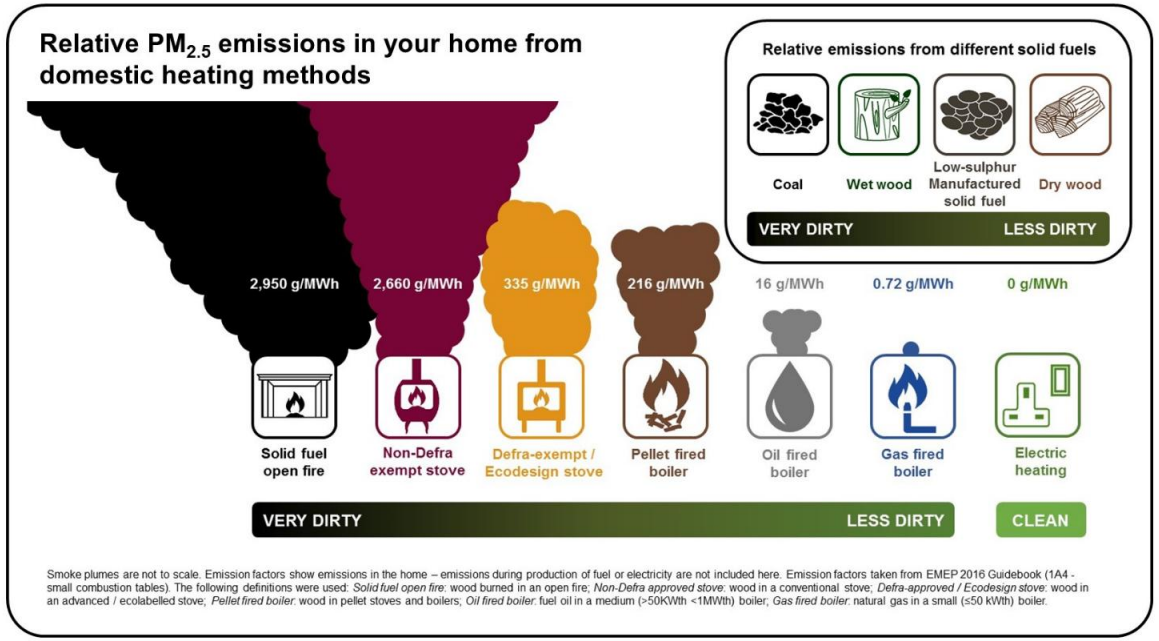
[1] Air Pollution and Noncommunicable Diseases: A Review by the Forum of International Respiratory Societies' Environmental Committee, Part 2: Air Pollution and Organ Systems. Chest. 2019 Feb;155(2):417-426. doi: 10.1016/j.chest.2018.10.041

[2] https://www.gov.uk/government/publications/environmental-improvement-plan

[3] Clean Air (Human Rights) Bill, https://bills.parliament.uk/bills/3998

Addressing Domestic Burning in the UK

- Burning domestic solid fuels at home is a key source of $PM_{2.5}$ emissions. The main solid fuels burned in the home include:
  - Traditional house coal (or bituminous coal) – a naturally occurring mined product
  - Smokeless coal (or anthracite) – a form of naturally occurring, mined, high-purity coal
  - Manufactured solid fuels – fuels manufactured from coal products with other ingredients that have low smoke emissions
  - Wet wood – a naturally occurring product
  - Seasoned wood – wood that has been left for at least two years to naturally air dry
  - Kiln dried wood – wood that has been kiln dried to below 20% moisture
- Different methods of domestic burning emit different amounts of $PM_{2.5}$ relative to each other, as shown in the Figure[1]. The burning of solid fuels in an open fire releases the highest relative proportion of $PM_{2.5}$, and within this, coal is the dirtiest fuel to burn whereas dry wood is the least dirty (but still significantly more polluting than alternative fuels such as gas, oil and electric).



[1] https://consult.defra.gov.uk/airquality/domestic-solid-fuel-regulations/

Project Overview

- Clean Air Night is an annual campaign, organized by Global Action Plan with Hertfordshire County Council as a founding member, that aims to raise awareness about the health and environmental impacts of wood burning.
- It is an opportunity to share information to ensure everyone can make informed decisions about how to heat their homes.
- The most recent event took place on 22nd January 2025 and focused on the harmful effects of domestic wood burning and its contribution to fine particle air pollution.
- To inform the public campaign and reinforce the evidence for policy makers, this report provides results of a health economic assessment to quantify the financial burden of domestic burning emissions on health and healthcare both at a UK-wide scale and broken down to explore health impacts specifically in Hertfordshire.
- The report also quantifies the impact of two emissions mitigation scenarios representing the impact if smoke control areas were applied in urban areas across the UK, and if all secondary burning (i.e., burning not as a primary heat source) ceased to occur across the UK.

Overview of scenarios

Overview of Scenarios

The following model scenarios were developed for this study:

- **2023 Baseline:** *This scenario represents the emissions and concentrations arising from domestic combustion in the UK, for the year 2023.*
- **Scenario 1 (SCAs):** *This scenario aims to represent the case if smoke control areas (SCAs) were applied in all urban areas across the UK.*
- **Scenario 2 (No secondary burning):** *This scenario aims to represent the case if all secondary burning (i.e., burning not as a primary heat source) ceased to occur.*

Scenario 1 essentially represents the potential impact if the full force of existing legislation on domestic burning (implementation and enforcement of SCAs) were implemented in all urban areas across the UK, while Scenario 2 represents significant behavioural change to eradicate secondary burning.

The comparison between scenarios 1 and 2 can be considered a comparison between what is possible under current legislation, and what is possible with a significant change in mindset around domestic burning. However, according to a consultation undertaken by Defra in 2018[1], local authorities have advised that awareness of and compliance with SCA orders is low, and that few people make the link between domestic burning and air pollution. Therefore, education and engagement are extremely important supporting tools to reduce and/or improve domestic burning practices.

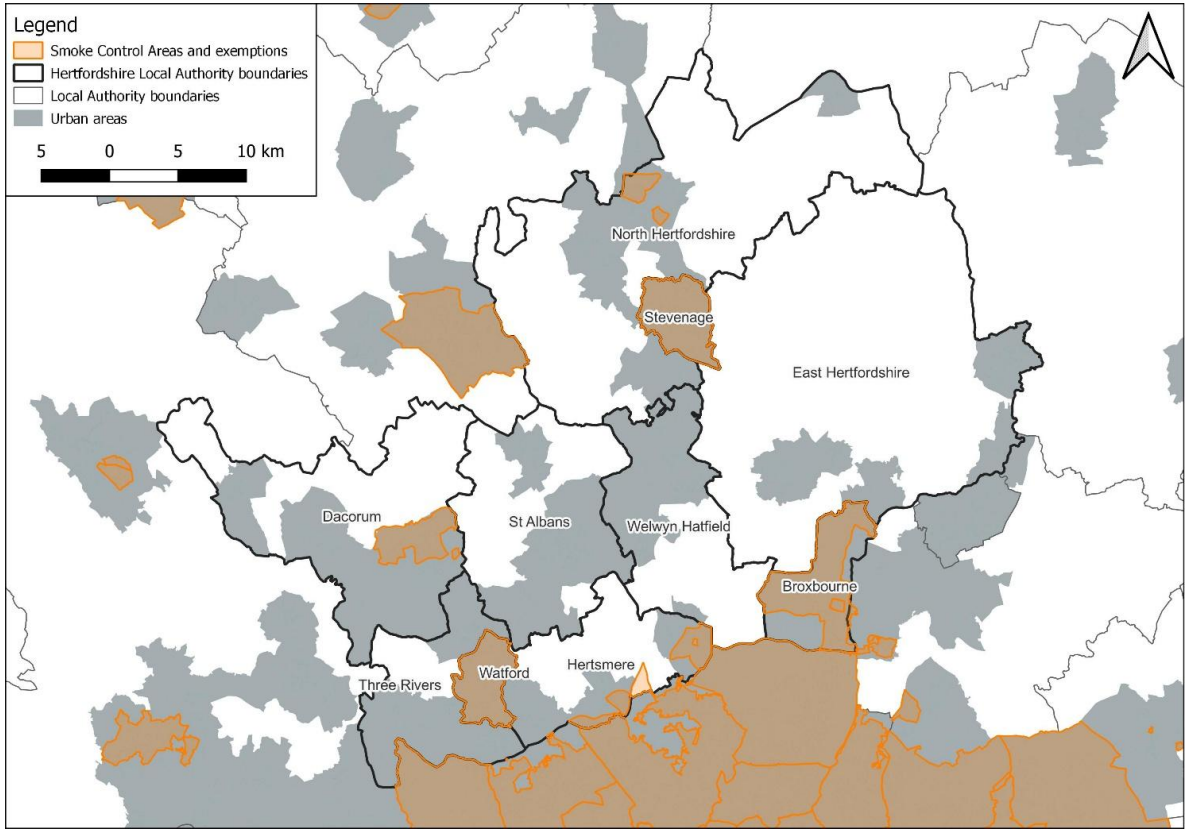
[1] Consultation on cleaner domestic burning of solid fuels and wood, Defra, 2018, https://consult.defra.gov.uk/airquality/domestic-solid-fuel-regulations/

Model scenario assumptions

- **2023 Baseline:** ***This scenario represents the emissions and concentrations arising from domestic combustion in the UK, for the year 2023.***
  - The scenario is representative of emissions in the model year (2023) with no changes applied and has been used to provide a baseline situation from which to assess the impact of the proposed schemes. The main input is the UK National Atmospheric Emissions Inventory (NAEI) emissions as maps, which are available at a 1 km resolution.
  - In our proposal we stated that we would likely model a 2022 baseline, as this is the most recent year of NAEI emissions maps available. However, through discussions with our NAEI and SMT teams we learnt that in the 2023 NAEI emissions inventory (which is available as total emissions, but not yet as maps) there have been a number of updates to the domestic burning sector to incorporate recent work carried out by Ricardo for Defra.
  - This work has led has to a substantial revision to domestic combustion $PM_{2.5}$ emissions in the NAEI 2023 compared to NAEI 2022. As such, the NAEI team recommended that the 2023 emissions inventory should be incorporated so that our study uses the most up to date data possible.
  - As the mapped version of the inventory is not yet available (and may not become available until the end of 2025), on advice from our NAEI team we scaled the NAEI 2022 maps (with the geographical distribution of emissions) to 2023.
  - Scenarios A and B have subsequently been developed from the 2023 Baseline scenario.

Model scenario assumptions

- **Scenario 1 (SCAs):** ***This scenario aims to represent the case if smoke control areas (SCAs) were applied in all urban areas across the UK.***
  - While there is no readily available data on the effectiveness of SCAs in reducing $PM_{2.5}$ emissions, we have scaled the relevant emission sectors to reflect our best estimate of changes in domestic burning habits inside vs outside SCAs in the UK. This uses Annexe B of the 'Quantification of the 2022-2023 Defra Domestic Burning Survey'.
  - The scenario assumes that a certain proportion of the population comply with the SCA rules based on existing compliance data (see above).
  - We have applied the scenario across all urban areas (which are defined by national data, provided as a GIS shapefile).
  - We have recalculated the $PM_{2.5}$ emissions for wood and solid fuel burning for the areas where we have modelled 'new' SCAs across the UK (i.e., any urban area in the UK that is not currently a SCA). Existing SCAs were obtained using the most recent shapefile data available (for England, Scotland, and Wales); for Northern Ireland, the most up to date information available online was used.



Model scenario assumptions

- **Scenario 2 (No secondary burning):** ***This scenario aims to represent the case if all secondary burning (i.e., burning not as a primary heat source) ceased to occur.***
  - According to the Statistical Digest of Rural England: 8 – Energy, November 2024, “In Predominantly Rural areas one in four properties (24.5%) were off the gas grid in 2022 compared to 11.5% in Predominantly Urban areas.”
  - We have therefore applied an assumption that in rural areas, 75% of domestic wood and solid fuel burning is secondary, and in urban areas, 90% of domestic wood and solid fuel burning is secondary and therefore reduced the relevant emission components of the NAEI by those proportions in rural and urban areas, respectively.
  - As with Scenario A above, the rural and urban areas were assigned via the national classifications.

Emissions modelling results

Emissions Modelling Results Summary

The following slides present the results of the emissions modelling for Scenarios 1 and 2, for both $PM_{2.5}$ and NOx emissions. Results are presented as tables showing total emissions arising from domestic combustion (in tonnes/yr) at the UK level and for each district in Hertfordshire, for each scenario. The difference from the baseline is then quantified in terms of change in absolute emissions and percentage change. It is also compared to total emissions of $PM_{2.5}$ and NOx (from all sources) for the UK in 2023.

Larger percentage reductions are observed for $PM_{2.5}$ compared to NOx, as wood and solid fuels make up 52.17% and 34.16%, respectively, of total $PM_{2.5}$ domestic combustion emissions in the UK, compared to 8.44% and 6.58% of total domestic combustion emissions of NOx.

Emissions Modelling Results UK: $PM_{2.5}$

Scenario 1

If SCAs were applied in all urban areas across the UK, there would be a decrease in $PM_{2.5}$ emissions of 1,591 tonnes/year, equal to 14.6% of total annual domestic combustion emissions of $PM_{2.5}$.

This is equivalent to **2.4% of total annual UK emissions** of $PM_{2.5}$.

Scenario 2

If all secondary burning ceased to occur across the UK, a decrease in $PM_{2.5}$ emissions of 7,985 tonnes/year would be achieved, equal to 73.1% of total annual domestic combustion emissions of $PM_{2.5}$.

This is equivalent to **12.3% of total annual UK emissions** of $PM_{2.5}$.

Scenario / Region	Total $PM_{2.5}$ emissions from domestic combustion (tonnes/yr)			Difference from baseline (tonnes/yr)		Difference from baseline (%)	
	2023 Baseline	Scenario 1 (SCAs)	Scenario 2 (No secondary burning)	Scenario 1 (SCAs)	Scenario 2 (No secondary burning)	Scenario 1 (SCAs)	Scenario 2 (No secondary burning)
UK	10,927	9,336	2,942	-1,591	-7,985	-14.6%	-73.1%

Emissions Modelling Results Hertfordshire: $PM_{2.5}$

Scenario 1

The Hertfordshire districts with the largest percentage reductions of total annual domestic combustion emissions of $PM_{2.5}$ are St Albans (30.9%) and Welwyn Hatfield (30.5%). Stevenage and Watford see no reduction in emissions as both districts are already entirely designated as SCAs. Much of Broxbourne is also already a SCA, hence small changes in emissions are observed there.

Scenario 2

The Hertfordshire districts see a reduction in total annual domestic combustion emissions of $PM_{2.5}$ of between 73.1% and 79.5%.

Scenario / Region	Total $PM_{2.5}$ emissions from domestic combustion (tonnes/yr)			Difference from baseline (tonnes/yr)		Difference from baseline (%)	
	2023 Baseline	Scenario 1 (SCAs)	Scenario 2 (No secondary burning)	Scenario 1 (SCAs)	Scenario 2 (No secondary burning)	Scenario 1 (SCAs)	Scenario 2 (No secondary burning)
Broxbourne	7.9	7.8	1.7	-0.14	-6.20	-1.7%	-78.6%
Dacorum	21.7	17.5	5.3	-4.16	-16.35	-19.2%	-75.4%
East Hertfordshire	32.9	25.8	8.9	-7.03	-24.03	-21.4%	-73.1%
Hertsmere	17.3	14.8	4.3	-2.47	-12.98	-14.3%	-75.2%
North Hertfordshire	26.6	21.2	6.7	-5.40	-19.86	-20.3%	-74.7%
St Albans	24.5	16.9	5.9	-7.56	-18.62	-30.9%	-76.1%
Stevenage	6.3	6.3	1.3	0.00	-5.02	0.0%	-79.5%
Three Rivers	19.8	16.0	4.5	-3.80	-15.30	-19.2%	-77.4%
Watford	8.4	8.4	1.8	0.00	-6.64	0.0%	-78.9%
Welwyn Hatfield	18.6	12.9	4.4	-5.66	-14.22	-30.5%	-76.4%

Emissions Modelling Results UK: NOx

Scenario 1
If SCAs were applied in all urban areas across the UK, a decrease in NOx emissions of 579 tonnes/year would be achieved, equal to 2.5% of the total annual domestic combustion emissions of NOx.
This is equivalent to **0.1% of total annual NOx emissions** in the UK.

Scenario 2
Scenario 2 shows that if all secondary burning ceased to occur across the UK, there would be a decrease in NOx emissions of 2,966 tonnes/year, equal to 12.7% of the total annual domestic combustion emissions of NOx.
This is equivalent to **0.4% of total annual NOx emissions** in the UK.

Scenario / Region	Total NOx emissions from domestic combustion (tonnes/yr)			Difference from baseline (tonnes/yr)		Difference from baseline (%)	
	2023 Baseline	Scenario 1 (SCAs)	Scenario 2 (No secondary burning)	Scenario 1 (SCAs)	Scenario 2 (No secondary burning)	Scenario 1 (SCAs)	Scenario 2 (No secondary burning)
UK	23,342	22,767	20,377	-576	-2,966	-2.5%	-12.7%

Emissions Modelling Results Hertfordshire: NOx

Scenario 1
The Hertfordshire districts with the largest percentage reductions of total annual domestic combustion emissions of NOx are St Albans (4.4%) and Welwyn Hatfield (4.8%). Again, there are small or no changes in Broxbourne, Stevenage and Watford as these districts are already (mostly or fully) designated as SCAs.

Scenario 2
The Hertfordshire districts see a reduction in total annual domestic combustion emissions of NOx of between 7.3% and 12.6%.

Scenario / Region	Total NOx emissions from domestic combustion (tonnes/yr)			Difference from baseline (tonnes/yr)		Difference from baseline (%)	
	2023 Baseline	Scenario 1 (SCAs)	Scenario 2 (No secondary burning)	Scenario 1 (SCAs)	Scenario 2 (No secondary burning)	Scenario 1 (SCAs)	Scenario 2 (No secondary burning)
Broxbourne	31.0	31.0	28.7	-0.05	-2.28	-0.2%	-7.3%
Dacorum	55.0	53.5	48.9	-1.52	-6.09	-2.8%	-11.1%
East Hertfordshire	72.4	69.8	63.4	-2.56	-8.97	-3.5%	-12.4%
Hertsmere	50.3	49.4	45.5	-0.90	-4.83	-1.8%	-9.6%
North Hertfordshire	58.6	56.7	51.2	-1.97	-7.40	-3.4%	-12.6%
St Albans	62.3	59.6	55.4	-2.75	-6.92	-4.4%	-11.1%
Stevenage	24.2	24.2	22.4	0.00	-1.83	0.0%	-7.6%
Three Rivers	52.6	51.2	46.9	-1.39	-5.70	-2.6%	-10.8%
Watford	32.4	32.4	30.0	0.00	-2.43	0.0%	-7.5%
Welwyn Hatfield	42.9	40.8	37.6	-2.06	-5.30	-4.8%	-12.4%

Concentrations modelling results: UK

Concentrations Modelling Results Summary: $PM_{2.5}$

Concentrations were calculated at a 1 km resolution across the UK and will therefore not fully capture localized impacts, for example specific sources or complex urban terrain. The results represent ambient (outdoor) annual average concentrations so do not account for indoor air pollution within properties where burning is taking place. The average exposure impact indoors is likely to be significantly higher, increasing ill health potential.

Scenario 1

- Scenario 1 shows that if SCAs were applied in all urban areas across the UK, there would be a decrease in $PM_{2.5}$ concentrations of 0.019 µg/m^3, which is equivalent to 0.10% of the annual UK air quality limit value for $PM_{2.5}$ (20 µg/m^3) and 0.39% of the annual WHO air quality guideline (5 µg/m^3).

Scenario 2

- Scenario 2 shows that if all secondary burning (i.e., burning not as a primary heat source) ceased to occur across the UK, there would a decrease in $PM_{2.5}$ concentrations of 0.1 µg/m^3, which is equivalent to 0.5% of the annual UK air quality limit value for $PM_{2.5}$ and 2% of the annual WHO air quality guideline for $PM_{2.5}$.

Scenario / Region	Mean $PM_{2.5}$ concentrations (µg/m^3)			Difference from baseline (µg/m^3)			% of WHO AQG	
	2023 Baseline	Scenario 1 (SCAs)	Scenario 2 (No secondary burning)	Scenario 1 (SCAs)	Scenario 2 (No secondary burning)	WHO Air Quality Guideline (Annual, µg/m^3)	Scenario 1 (SCAs)	Scenario 2 (No secondary burning)
UK	**0.136**	**0.117**	**0.036**	**0.019**	**0.100**	5	**0.39%**	**2.00%**

Concentrations Modelling Results Summary: NO_2

Scenario 1

- Scenario 1 shows that if SCAs were applied in urban areas across the UK, there would be a decrease in NO_2 concentrations of 0.006 µg/m^3, which is equivalent to 0.015% of the annual UK air quality limit value for NO_2 (40 µg/m^3) and 0.06% of the annual WHO air quality guideline (10 µg/m^3).

Scenario 2

- Scenario 2 shows that if all secondary burning ceased to occur across the UK, there would a decrease in NO_2 concentrations of 0.03 µg/m^3, which is equivalent to 0.075% of the annual UK air quality limit value for NO_2 and 0.3% of the annual WHO air quality guideline for NO_2.

Scenario / Region	Mean NO_2 concentrations (µg/m^3)			Difference from baseline (µg/m^3)			% of WHO AQG	
	2023 Baseline	Scenario 1 (SCAs)	Scenario 2 (No secondary burning)	Scenario 1 (SCAs)	Scenario 2 (No secondary burning)	WHO Air Quality Guideline (Annual, µg/m^3)	Scenario 1 (SCAs)	Scenario 2 (No secondary burning)
UK	**0.266**	**0.261**	**0.236**	**0.006**	**0.030**	10	**0.06%**	**0.30%**

Concentrations Modelling Results: UK, $PM_{2.5}$ Baseline minus Scenarios

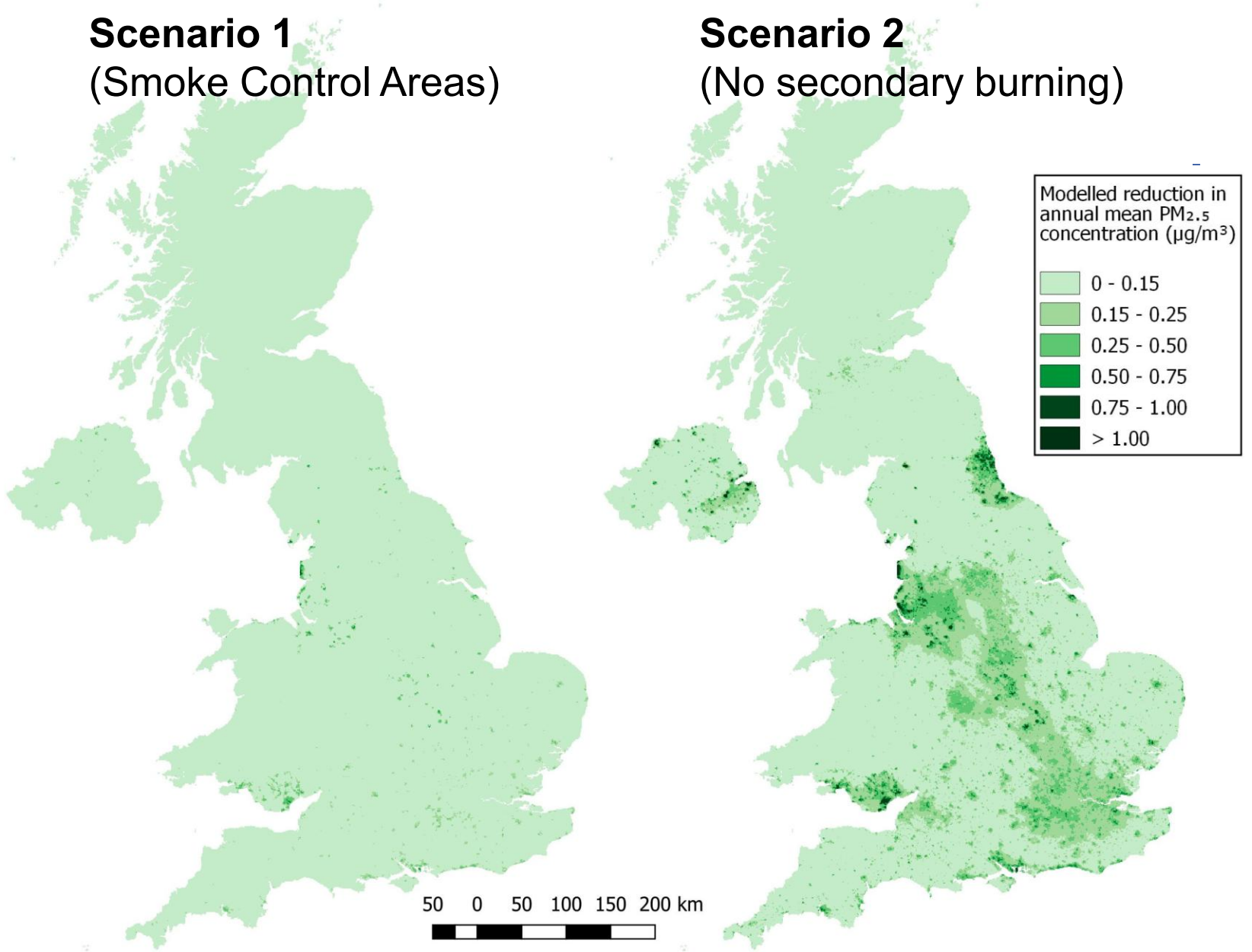
The maps show the impact of the modelled scenarios on $PM_{2.5}$ concentrations across the UK.

Scenario 1 (SCAs): *This scenario represents the case if smoke control areas (SCAs) were applied in all urban areas across the UK.*

Scenario 2 (No secondary burning): *This scenario represents the case if all secondary burning (i.e., burning not as a primary heat source) ceased to occur.*

Scenario 1
(Smoke Control Areas)

Scenario 2
(No secondary burning)



Concentrations modelling results: Hertfordshire

Annual Mean Concentrations Modelling Results: Hertfordshire, $PM_{2.5}$

Scenario 1

- The mean $PM_{2.5}$ concentration across Hertfordshire would improve by 0.053 µg/m^3.
- The Hertfordshire districts with the greatest mean concentration reductions for $PM_{2.5}$ are St Albans (0.077 µg/m^3), Three Rivers (0.074 µg/m^3), and Welwyn Hatfield (0.075 µg/m^3). Stevenage and Broxbourne see smaller concentration reductions as these districts are already (at least partially) designated as SCAs; however, they still show a greater improvement than the UK average.

Scenario 2

- The mean $PM_{2.5}$ concentration across Hertfordshire would improve by 0.216 µg/m^3.
- The Hertfordshire districts see a reduction in mean $PM_{2.5}$ concentrations between 0.181 µg/m^3 and 0.363 µg/m^3.

Scenario / Region	Mean $PM_{2.5}$ concentrations (µg/m^3)			Difference from baseline (µg/m^3)		WHO Air Quality Guideline (Annual, µg/m^3)	% of WHO AQG	
	2023 Baseline	Scenario 1 (SCAs)	Scenario 2 (No secondary burning)	Scenario 1 (SCAs)	Scenario 2 (No secondary burning)		Scenario 1 (SCAs)	Scenario 2 (No secondary burning)
Hertfordshire	**0.288**	**0.236**	**0.072**	**0.053**	**0.216**		**1.06%**	**4.32%**
Broxbourne	0.320	0.280	0.076	0.040	0.244		0.79%	4.87%
Dacorum	0.279	0.231	0.070	0.049	0.210		0.97%	4.19%
Hertsmere	0.363	0.301	0.091	0.062	0.272		1.23%	5.44%
North Hertfordshire	0.253	0.209	0.064	0.044	0.188		0.88%	3.77%
Three Rivers	0.362	0.288	0.086	0.074	0.276	5	1.48%	5.52%
Watford	0.470	0.419	0.107	0.052	0.363		1.04%	7.26%
St Albans	0.343	0.266	0.084	0.077	0.258		1.53%	5.17%
Welwyn Hatfield	0.335	0.260	0.082	0.075	0.253		1.50%	5.07%
East Hertfordshire	0.245	0.201	0.064	0.044	0.181		0.88%	3.62%
Stevenage	0.365	0.329	0.084	0.036	0.281		0.72%	5.61%

Maximum Concentrations Modelling Results: Hertfordshire, $PM_{2.5}$

Scenario 1

- The maximum $PM_{2.5}$ concentration across Hertfordshire would improve by 0.068 µg/m^3.
- The greatest changes in maximum $PM_{2.5}$ concentrations are seen for Welwyn Hatfield (0.194 µg/m^3), East Hertfordshire (0.160 µg/m^3) and St Albans (0.132 µg/m^3).

Scenario 2

- The maximum $PM_{2.5}$ concentration across Hertfordshire would improve by 0.604 µg/m^3.
- The greatest changes in maximum $PM_{2.5}$ are seen for Three Rivers (0.632 µg/m^3), Dacorum (0.530 µg/m^3) and East Hertfordshire (0.527 µg/m^3).

Scenario / Region	Maximum modelled $PM_{2.5}$ concentrations (µg/m^3)			Difference from baseline (µg/m^3)		WHO Air Quality Guideline (Annual, µg/m^3)	% of WHO AQG	
	2023 Baseline	Scenario 1 (SCAs)	Scenario 2 (No secondary burning)	Scenario 1 (SCAs)	Scenario 2 (No secondary burning)		Scenario 1 (SCAs)	Scenario 2 (No secondary burning)
Hertfordshire	**0.814**	**0.746**	**0.211**	**0.068**	**0.604**		**1.37%**	**12.08%**
Broxbourne	0.476	0.430	0.109	0.046	0.368		0.93%	7.35%
Dacorum	0.689	0.580	0.158	0.108	0.530		2.16%	10.60%
Hertsmere	0.678	0.557	0.194	0.121	0.484		2.43%	9.69%
North Hertfordshire	0.625	0.521	0.142	0.104	0.483		2.08%	9.66%
Three Rivers	0.814	0.746	0.182	0.068	0.632	5	1.37%	12.64%
Watford	0.587	0.538	0.130	0.049	0.457		0.98%	9.14%
St Albans	0.732	0.601	0.211	0.132	0.522		2.64%	10.43%
Welwyn Hatfield	0.661	0.468	0.148	0.194	0.513		3.87%	10.26%
East Hertfordshire	0.730	0.569	0.203	0.160	0.527		3.21%	10.54%
Stevenage	0.462	0.426	0.104	0.035	0.358		0.71%	7.16%

Annual Mean Concentrations Modelling Results: Hertfordshire, NO_2

Scenario 1

- For NO_2, the mean concentration across Hertfordshire would improve by 0.016 µg/m^3.
- The Hertfordshire districts with the largest mean concentration reductions for NO_2 are St Albans (0.023 µg/m^3), Three Rivers (0.022 µg/m^3), and Welwyn Hatfield (0.022 µg/m^3). Again, Stevenage and Broxbourne see smaller concentration reductions as these districts are already (at least partially) designated as SCAs.

Scenario 2

- The mean NO_2 concentration for Hertfordshire would improve by 0.065 µg/m^3.
- The Hertfordshire districts see a reduction in mean NO_2 concentrations between 0.055 µg/m^3 and 0.107 µg/m^3.

Scenario / Region	Mean NO_2 concentrations (µg/m^3)			Difference from baseline (µg/m^3)		WHO Air Quality Guideline (Annual, µg/m^3)	% of WHO AQG	
	2023 Baseline	Scenario 1 (SCAs)	Scenario 2 (No secondary burning)	Scenario 1 (SCAs)	Scenario 2 (No secondary burning)		Scenario 1 (SCAs)	Scenario 2 (No secondary burning)
Hertfordshire	**0.659**	**0.644**	**0.594**	**0.016**	**0.065**	10	**0.16%**	**0.65%**
Broxbourne	0.916	0.904	0.843	0.012	0.073		0.12%	0.73%
Dacorum	0.666	0.652	0.603	0.014	0.063		0.14%	0.63%
Hertsmere	0.989	0.971	0.908	0.018	0.082		0.18%	0.82%
North Hertfordshire	0.502	0.489	0.445	0.013	0.057		0.13%	0.57%
Three Rivers	0.927	0.905	0.844	0.022	0.083		0.22%	0.83%
Watford	1.424	1.409	1.317	0.015	0.107		0.15%	1.07%
St Albans	0.813	0.790	0.735	0.023	0.078		0.23%	0.78%
Welwyn Hatfield	0.767	0.745	0.691	0.022	0.076		0.22%	0.76%
East Hertfordshire	0.501	0.489	0.447	0.013	0.055		0.13%	0.55%
Stevenage	0.955	0.944	0.871	0.011	0.083		0.11%	0.83%

Maximum Concentrations Modelling Results: Hertfordshire, NO_2

Scenario 1

- For NO_2, the maximum concentration across Hertfordshire would improve by 0.020 µg/m^3.
- When considering the maximum modelled concentrations in each district, the greatest changes in maximum NO_2 concentrations are seen for East Hertfordshire (0.070 µg/m^3), St Albans (0.068 µg/m^3) and Welwyn Hatfield (0.061 µg/m^3).

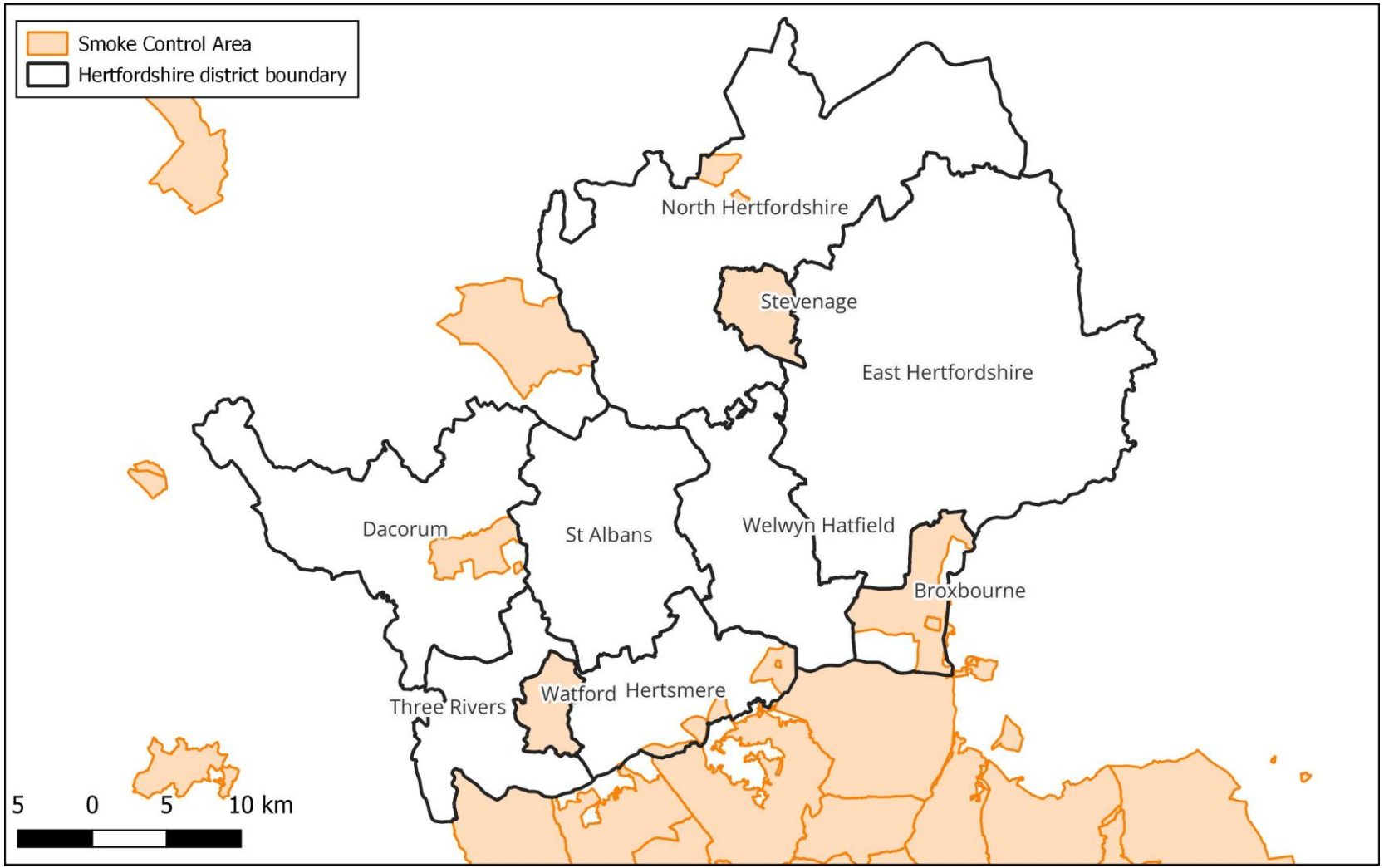
Scenario 2

- The maximum NO_2 concentration across Hertfordshire would improve by 0.137 µg/m^3.
- The greatest changes in maximum modelled NO_2 concentrations in each district are seen for Three Rivers (0.188 µg/m^3), East Hertfordshire (0.168 µg/m^3) and St Albans (0.167 µg/m^3).

Scenario / Region	Maximum modelled NO_2 concentrations (µg/m^3)			Difference from baseline (µg/m^3)		WHO Air Quality Guideline (Annual, µg/m^3)	% of WHO AQG	
	2023 Baseline	Scenario 1 (SCAs)	Scenario 2 (No secondary burning)	Scenario 1 (SCAs)	Scenario 2 (No secondary burning)		Scenario 1 (SCAs)	Scenario 2 (No secondary burning)
Hertfordshire	**1.785**	**1.765**	**1.648**	**0.020**	**0.137**		**0.20%**	**1.37%**
Broxbourne	1.473	1.462	1.369	0.011	0.104		0.11%	1.04%
Dacorum	1.519	1.466	1.360	0.053	0.159		0.53%	1.59%
Hertsmere	1.785	1.738	1.648	0.046	0.137		0.46%	1.37%
North Hertfordshire	1.183	1.164	1.047	0.019	0.136		0.19%	1.36%
Three Rivers	1.757	1.737	1.569	0.020	0.188	10	0.20%	1.88%
Watford	1.779	1.765	1.645	0.014	0.134		0.14%	1.34%
St Albans	1.676	1.607	1.508	0.068	0.167		0.68%	1.67%
Welwyn Hatfield	1.310	1.249	1.158	0.061	0.152		0.61%	1.52%
East Hertfordshire	1.349	1.279	1.181	0.070	0.168		0.70%	1.68%
Stevenage	1.242	1.232	1.136	0.010	0.106		0.10%	1.06%

Concentrations Modelling Results: Hertfordshire

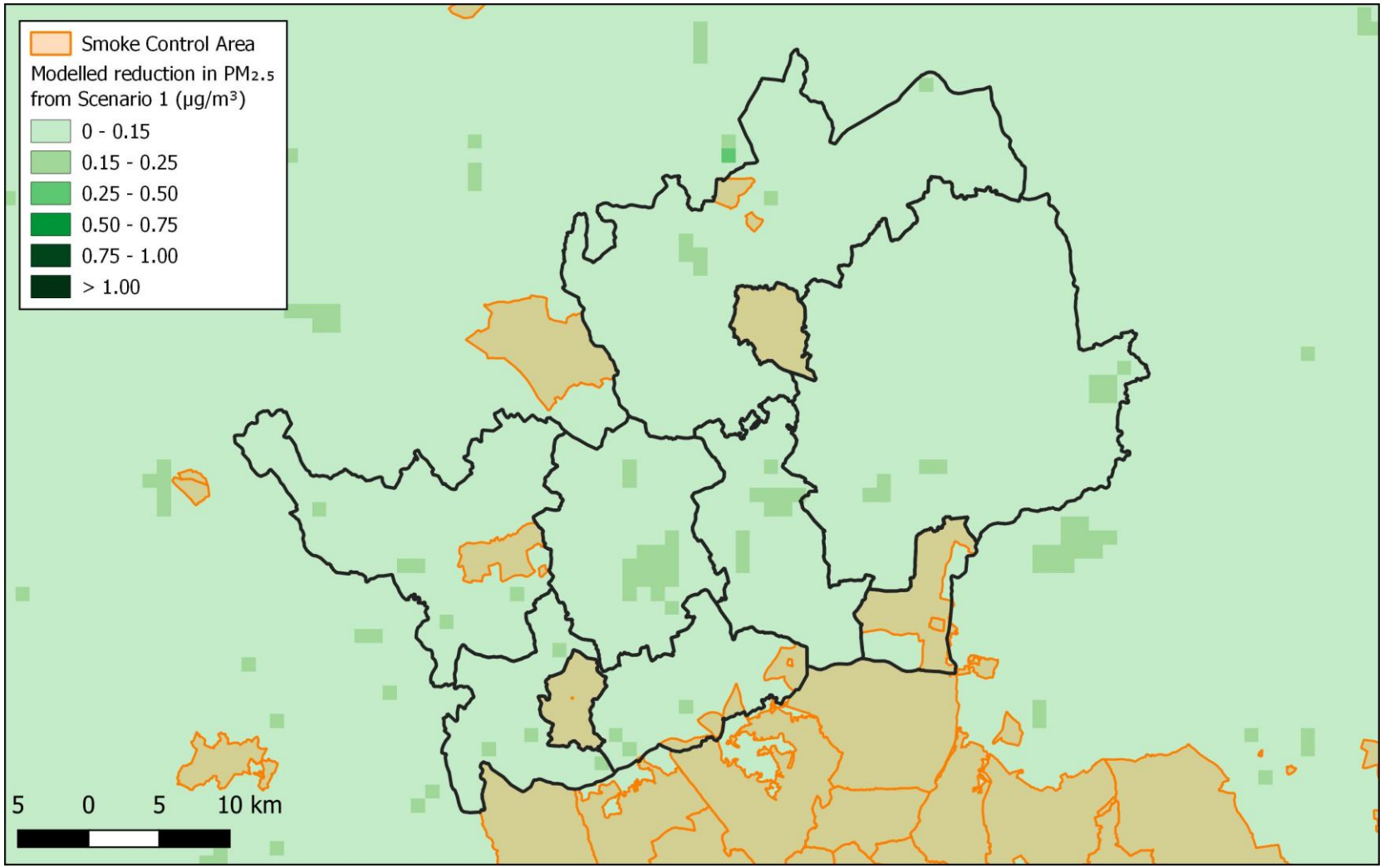
The following maps present the impact of the modelled scenarios on $PM_{2.5}$ concentrations across the 10 districts in Hertfordshire.



Concentrations Modelling Results: Hertfordshire, $PM_{2.5}$ Baseline minus Scenario 1 (SCA)

This map shows the impact of implementation of SCAs in all urban areas on $PM_{2.5}$ concentrations across Hertfordshire.

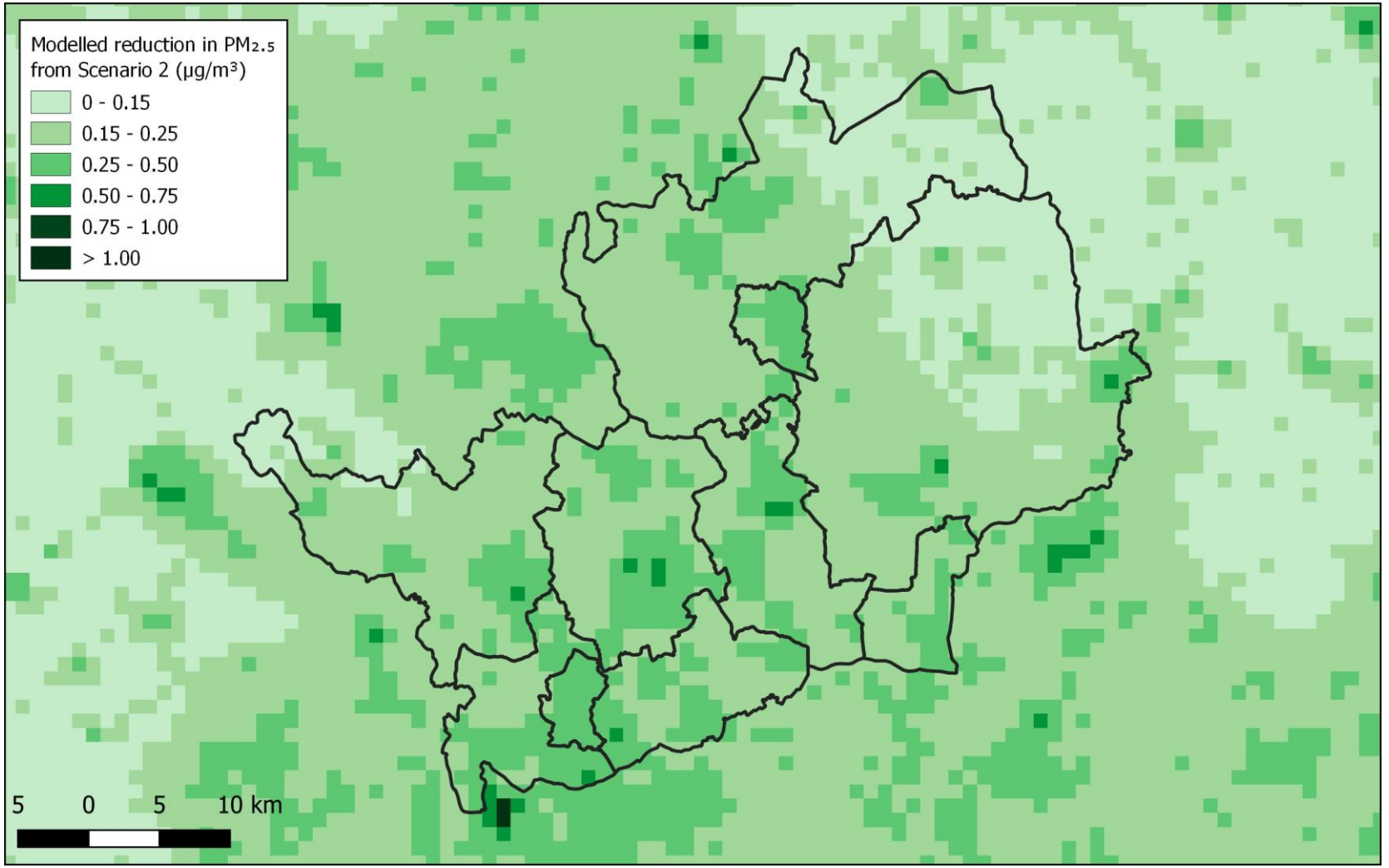
The greatest improvements are observed in urban areas that do not currently have a SCA in place, whereas no improvements are predicted for locations where a SCA is already implemented.



Concentrations Modelling Results: Hertfordshire, $PM_{2.5}$ Baseline minus Scenario 2 (No secondary burning)

This map shows the impact if all secondary burning (i.e., burning not as a primary heat source) ceased to occur, on $PM_{2.5}$ concentrations across Hertfordshire.

In each district, the largest improvements are observed in areas producing the most domestic burning emissions. Urban areas see greater improvements than rural areas, as the proportion of domestic burning in these areas that is secondary, is higher.



Health Impact Assessment

Health Impact Assessment: Scope and Objectives

The objective of the health impact assessment (HIA) is to understand the **impact upon human health**, and **associated monetary value** (£), as a result of the implementation of the proposed policy scenarios compared to a baseline businesses as usual (BAU) scenario. The results of the health assessment are intended to highlight the potential impact of implementation of smoke control areas (SCAs) in all urban areas in the UK (Scenario 1) or a complete removal of secondary burning (Scenario 2) compared to the existing policy environment.

The health assessment has assumed that the policy scenarios have been fully implemented in preceding years and therefore **presents the average corresponding impacts for one year**, 2023, as a result of each policy.

To achieve this, the study has applied the results from the air quality modelling (as presented in the previous slides) to **determine the change in population weighted mean concentrations** (PWMC) resulting from a change in emissions of **$PM_{2.5}$ and NO_2**. The PWMCs illustrate the change in human exposure to pollution owing to the policy scenarios. Applying these findings, the HIA has:

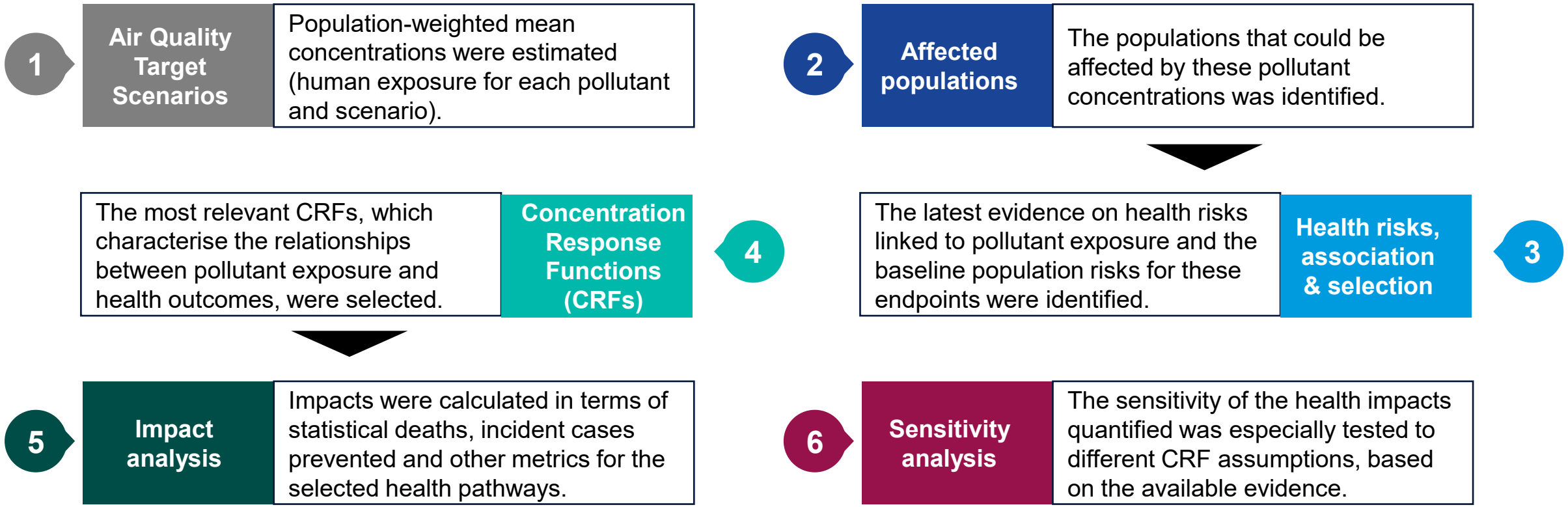
- Quantified the **reduction in the health burden of air pollution** as a result of the policy scenarios for selected health pathways following UK government best practice guidance.
- Estimated the **associated economic impact** reflecting the non-market disease burden, healthcare costs, and productivity value, resulting from a change in health conditions of the affected population.
- Presented the **results per policy scenario** as a change from the baseline for **each relevant geography**.

The health metrics covered within the scope of the study include mortality and morbidity impacts:

- Mortality metrics including avoided '**Statistical Deaths**' and '**Life-Years Lost (LYL)'** representing the number of deaths which have been attributed to exposure to air pollution generated by domestic wood burning.
- Morbidity metrics such as **Quality-Adjusted Life Years (QALYs)** indicating the years lived in non-perfect health.
- The impact upon the **number of cases** and **hospital admissions** of impacted health pathways.

Health Impact Assessment: Methodological Approach

The methodological approach [1] followed to estimate the health and subsequent economic impacts resulting from the implementation of the policy scenarios has been illustrated in the figure below:



[1] https://www.gov.uk/government/publications/assess-the-impact-of-air-quality/air-quality-appraisal-impact-pathways-approach

Health Metrics Overview

The assessment of the impacts upon human health has been provided across a range of metrics. These metrics are used to quantify the impact across a population which can be attributed to exposure to air pollution. The table below provides definitions of the key metrics which have been used in the presentation of the results of the assessment.

Impact	Metric	Description
Deaths avoided (mortality)	Statistical deaths	This represents the number of deaths that could be attributed to air pollution at a point in time, and/or the number of deaths that could be delayed (or avoided at a point in time) if air pollution were to cease. These estimates are based on scientific studies exploring the relationship between air pollution and mortality risk. It is a statistical or risk-based estimate, which means that air pollution is a risk factor that can contribute to higher rate of deaths at a moment in time, rather than air pollution being the only responsible cause. This calculation is not an estimate of the number of people whose untimely death is caused entirely by air pollution but a way of representing the effect across the whole population of air pollution when considered as a contributory factor to many more individual deaths.
Burden of disease (mortality and morbidity)	Years of Life Lost (YLL) from premature mortality.	YLL measures the years of life lost due to premature deaths, i.e., deaths occurring prematurely when compared to baseline or average life expectancy in each geography. Air pollution is a risk factor that is associated with higher mortality rates also at younger ages, directly linked to a higher rate of premature deaths, and thus, years of life lost. Air pollution reductions could result in a reduction in premature deaths, and as such, a reduction in YLLs. An average of around 11 life years lost due to premature deaths has been assumed, based on the available evidence.
	Quality-or Disability-Adjusted Life Years impacted by morbidity	Quality-Adjusted Life Years and Disability-Adjusted Life Years are measures of life years adjusted for quality of life, that is measuring quantity and quality of life. One QALY (or, approximately, one DALY avoided) is equivalent to a year lived in good health. One DALY (or, approximately, QALY lost) is equivalent to a year lost to disability and/or premature death. QALYs are typically used when considering potential gains in quality of life, whereas DALYs are typically used to measure the disease burden. A DALY is the sum of Years of Life Lost and Years Lived with Disability, and a QALY is approximately (although not quite) equivalent to avoided DALY.
Illness prevented (morbidity)	Statistical cases of different health conditions (asthma, diabetes, IHD, etc)	These metrics represent the number of cases and hospital admissions across different health endpoints attributed to air pollution (or air pollution exposure more precisely). These estimates are based in scientific studies exploring the relationship between air pollution, ill-health risk and healthcare demand. These are statistical or risk-based estimates, which means that air pollution is a risk factor that can contribute to higher rates of illness and/or hospital care demand at a moment in time, rather than air pollution being the only responsible cause.
Healthcare activity reduced	Respiratory and/or cardiovascular hospital admissions	

Health Impact Assessment: Quantification of health impacts and economic impacts

Following the quantification of the health impacts (as shown in Step 5 in Slide 34) the associated economic impacts have been estimated through the use of values representing the willingness to pay to avoid a Life Year Lost (LYL) or a year lived in imperfect health (QALY). The approach to estimate these values, referred to an 'Non-Market Disease Burden' is presented below.

Quantification of potential health impacts

Change in air pollutant concentration (μg/m^3) by air pollutant

×

Concentration Response Functions, by 'health endpoint'

=

Number of 'statistical' **cases of ill health** avoided, by 'health endpoint'

Morbidity impacts (Quality-Adjusted Life Years avoided)

Mortality impacts (No. of premature 'statistical' deaths avoided)

Monetisation of these potential health impacts

Number of statistical cases OR Deaths OR QALYs avoided

×

Value of £/case OR £/death OR £/QALY

=

Monetary valuation of health benefits (£)

per endpoint/impact, attributable to each pollutant, comparable)

Air Quality Population Weighted Mean Concentrations

	Population Weighted Mean Concentrations: Change from Baseline					
	NO_2			$PM_{2.5}$		
Location	**Baseline**	**Scenario 1 (SCAs)**	**Scenario 2 (No secondary burning)**	**Baseline**	**Scenario 1 (SCAs)**	**Scenario 2 (No secondary burning)**
United Kingdom	**1.102**	**0.020**	**0.095**	**0.420**	**0.068**	**0.321**
Hertfordshire	***1.049***	***0.025***	***0.098***	***0.430***	***0.084***	***0.329***
Broxbourne	1.067	0.012	0.083	0.364	0.040	0.279
Dacorum	1.016	0.020	0.094	0.411	0.068	0.315
Hertsmere	1.251	0.022	0.103	0.457	0.074	0.346
North Hertfordshire	0.774	0.026	0.091	0.396	0.087	0.302
Three Rivers	1.161	0.028	0.106	0.461	0.096	0.354
Watford	1.496	0.015	0.112	0.493	0.052	0.381
St Albans	1.134	0.039	0.110	0.483	0.133	0.369
Welwyn Hatfield	0.982	0.037	0.105	0.458	0.126	0.351
East Hertfordshire	0.780	0.029	0.088	0.387	0.099	0.292
Stevenage	1.032	0.011	0.090	0.393	0.036	0.303

Summary Baseline Health Impacts $PM_{2.5}$ and NO_2

Impact	Health Metrics	UK	Hertfordshire	Broxbourne	Dacorum	Hertsmere	North Hertfordshire	Three Rivers	Watford	St Albans	Welwyn Hatfield	East Hertfordshire	Stevenage
Quality-Adjusted Life Years	Life-Years-Lost from deaths	**27,048**	***486***	35	60	48	48	41	50	67	50	53	34
	Quality-Adjusted Life Years impacted by morbidity	**25,861**	***458***	35	57	46	43	39	50	62	46	48	32
	Total Quality-Adjusted Life Years Impacted	**52,909**	***944***	70	117	94	90	80	100	129	96	101	66
Deaths avoided (mortality)	Statistical deaths	**2,490**	***45***	3	6	4	4	4	5	6	5	5	3
Illness prevented (morbidity)	Statistical cases of asthma	**1,493**	***26***	2	3	3	2	2	3	4	3	3	2
	Statistical cases of COPD	**138**	***3***	0	0	0	0	0	0	0	0	0	0
	Statistical cases of Lung Cancer	**317**	***6***	0	1	1	1	0	1	1	1	1	0
	Statistical cases of Stroke	**415**	***8***	1	1	1	1	1	1	1	1	1	1
	Statistical cases of IHD	**339**	***6***	0	1	1	1	1	1	1	1	1	0
	Statistical cases of Diabetes	**3,741**	***66***	5	8	7	6	6	7	9	7	7	5
Healthcare activity reduced	Respiratory and/or cardiovascular hospital admissions	**2,174**	***38***	3	5	4	3	3	4	5	4	4	3

Health and Economic Impacts: UK

Impact	Indicators and units (average annual figures)	Scenario 1 (SCAs)	Scenario 2 (No secondary burning)
Quality-Adjusted Life Years gained	LYs gained from deaths avoided	3,491	16,430
	QALY gained from morbidity avoided	2,427	11,433
	Total QALY gains	5,918	27,863
Deaths avoided (mortality)	Statistical deaths avoided	321	1,512
Illness prevented (morbidity)	Statistical cases avoided of asthma	113	534
	Statistical cases avoided of COPD	22	106
	Statistical cases avoided of Lung Cancer	35	163
	Statistical cases avoided of Stroke	67	317
	Statistical cases avoided of IHD	55	259
	Statistical cases avoided of Diabetes	301	1,420
Healthcare activity reduced	Respiratory and/or cardiovascular hospital admissions prevented	156	737

Note: All health impacts are rounded to the nearest whole figure, As such, a '0' does not necessarily represent no impact.

Monetised Savings	Non-market disease burden (GBP 2025)	£ 411,057,000	£ 1,935,541,100
	Healthcare costs (NHS) (GBP 2025)	£ 11,554,950	£ 54,427,030
	Productivity impacts (GBP 2025)	£ 34,850,800	£ 164,034,900

Note: It is not possible to aggregate economic impacts due to potential overlap between metrics

Health and Economic Impacts: Hertfordshire

Impact	Indicators and units (average annual figures)	Scenario 1 (SCAs)	Scenario 2 (No secondary burning)
Quality-Adjusted Life Years gained	LYs gained from deaths avoided	77	300
	QALY gained from morbidity avoided	54	209
	Total QALY gains	131	509
Deaths avoided (mortality)	Statistical deaths avoided	7	28
Illness prevented (morbidity)	Statistical cases avoided of asthma	3	10
	Statistical cases avoided of COPD	0	2
	Statistical cases avoided of Lung Cancer	1	3
	Statistical cases avoided of Stroke	1	6
	Statistical cases avoided of IHD	1	5
	Statistical cases avoided of Diabetes	7	26
Healthcare activity reduced	Respiratory and/or cardiovascular hospital admissions prevented	3	13

Note: All health impacts are rounded to the nearest whole figure, As such, a '0' does not necessarily represent no impact.

Monetised Savings	Non-market disease burden (GBP 2025)	£ 9,072,800	£ 35,391,700
	Healthcare costs (NHS) (GBP 2025)	£ 254,790	£ 994,230
	Productivity impacts (GBP 2025)	£ 768,400	£ 2,996,000

Note: It is not possible to aggregate economic impacts due to potential overlap between metrics

Health and Economic Impacts: Broxbourne

Impact	Indicators and units (average annual figures)	Scenario 1 (SCAs)	Scenario 2 (No secondary burning)
Quality-Adjusted Life Years gained	LYs gained from deaths avoided	3	21
	QALY gained from morbidity avoided	2	15
	Total QALY gains	5	36
Deaths avoided (mortality)	Statistical deaths avoided	0	2
Illness prevented (morbidity)	Statistical cases avoided of asthma	0	1
	Statistical cases avoided of COPD	0	0
	Statistical cases avoided of Lung Cancer	0	0
	Statistical cases avoided of Stroke	0	0
	Statistical cases avoided of IHD	0	0
	Statistical cases avoided of Diabetes	0	2
Healthcare activity reduced	Respiratory and/or cardiovascular hospital admissions prevented	0	1

Note: All health impacts are rounded to the nearest whole figure, As such, a '0' does not necessarily represent no impact.

Monetised Savings	Non-market disease burden (GBP 2025)	£ 357,300	£ 2,471,500
	Healthcare costs (NHS) (GBP 2025)	£ 10,030	£ 69,420
	Productivity impacts (GBP 2025)	£ 30,300	£ 209,200

Note: It is not possible to aggregate economic impacts due to potential overlap between metrics

Health and Economic Impacts: Dacorum

Impact	Indicators and units (average annual figures)	Scenario 1 (SCAs)	Scenario 2 (No secondary burning)
Quality-Adjusted Life Years gained	LYs gained from deaths avoided	8	37
	QALY gained from morbidity avoided	6	26
	Total QALY gains	14	63
Deaths avoided (mortality)	Statistical deaths avoided	1	3
Illness prevented (morbidity)	Statistical cases avoided of asthma	0	1
	Statistical cases avoided of COPD	0	0
	Statistical cases avoided of Lung Cancer	0	0
	Statistical cases avoided of Stroke	0	1
	Statistical cases avoided of IHD	0	1
	Statistical cases avoided of Diabetes	1	3
Healthcare activity reduced	Respiratory and/or cardiovascular hospital admissions prevented	0	2

Note: All health impacts are rounded to the nearest whole figure, As such, a '0' does not necessarily represent no impact.

Monetised Savings	Non-market disease burden (GBP 2025)	£	944,200	£	4,393,500
	Healthcare costs (NHS) (GBP 2025)	£	26,520	£	123,420
	Productivity impacts (GBP 2025)	£	80,000	£	371,900

Note: It is not possible to aggregate economic impacts due to potential overlap between metrics

Health and Economic Impacts: Hertsmere

Impact	Indicators and units (average annual figures)	Scenario 1 (SCAs)	Scenario 2 (No secondary burning)
Quality-Adjusted Life Years gained	LYs gained from deaths avoided	6	28
	QALY gained from morbidity avoided	4	20
	Total QALY gains	10	48
Deaths avoided (mortality)	Statistical deaths avoided	1	3
Illness prevented (morbidity)	Statistical cases avoided of asthma	0	1
	Statistical cases avoided of COPD	0	0
	Statistical cases avoided of Lung Cancer	0	0
	Statistical cases avoided of Stroke	0	1
	Statistical cases avoided of IHD	0	0
	Statistical cases avoided of Diabetes	1	2
Healthcare activity reduced	Respiratory and/or cardiovascular hospital admissions prevented	0	1

Note: All health impacts are rounded to the nearest whole figure, As such, a '0' does not necessarily represent no impact.

Monetised Savings	Non-market disease burden (GBP 2025)	£	712,400	£	3,352,100
	Healthcare costs (NHS) (GBP 2025)	£	20,000	£	94,170
	Productivity impacts (GBP 2025)	£	60,300	£	283,700

Note: It is not possible to aggregate economic impacts due to potential overlap between metrics

Health and Economic Impacts: North Hertfordshire

Impact	Indicators and units (average annual figures)	Scenario 1 (SCAs)	Scenario 2 (No secondary burning)
Quality-Adjusted Life Years gained	LYs gained from deaths avoided	9	31
	QALY gained from morbidity avoided	6	21
	Total QALY gains	15	52
Deaths avoided (mortality)	Statistical deaths avoided	1	3
Illness prevented (morbidity)	Statistical cases avoided of asthma	0	1
	Statistical cases avoided of COPD	0	0
	Statistical cases avoided of Lung Cancer	0	0
	Statistical cases avoided of Stroke	0	1
	Statistical cases avoided of IHD	0	0
	Statistical cases avoided of Diabetes	1	3
Healthcare activity reduced	Respiratory and/or cardiovascular hospital admissions prevented	0	1

Note: All health impacts are rounded to the nearest whole figure, As such, a '0' does not necessarily represent no impact.

Monetised Savings	Non-market disease burden (GBP 2025)	£	1,039,300	£	3,626,500
	Healthcare costs (NHS) (GBP 2025)	£	29,190	£	101,880
	Productivity impacts (GBP 2025)	£	88,000	£	307,000

Note: It is not possible to aggregate economic impacts due to potential overlap between metrics

Health and Economic Impacts: Three Rivers

Impact	Indicators and units (average annual figures)	Scenario 1 (SCAs)	Scenario 2 (No secondary burning)
Quality-Adjusted Life Years gained	LYs gained from deaths avoided	7	25
	QALY gained from morbidity avoided	5	18
	Total QALY gains	12	43
Deaths avoided (mortality)	Statistical deaths avoided	1	2
Illness prevented (morbidity)	Statistical cases avoided of asthma	0	1
	Statistical cases avoided of COPD	0	0
	Statistical cases avoided of Lung Cancer	0	0
	Statistical cases avoided of Stroke	0	0
	Statistical cases avoided of IHD	0	0
	Statistical cases avoided of Diabetes	1	2
Healthcare activity reduced	Respiratory and/or cardiovascular hospital admissions prevented	0	1

Note: All health impacts are rounded to the nearest whole figure, As such, a '0' does not necessarily represent no impact.

Monetised Savings	Non-market disease burden (GBP 2025)	£	803,800	£	2,982,300
	Healthcare costs (NHS) (GBP 2025)	£	22,570	£	83,780
	Productivity impacts (GBP 2025)	£	68,100	£	252,400

Note: It is not possible to aggregate economic impacts due to potential overlap between metrics

Health and Economic Impacts: Watford

Impact	Indicators and units (average annual figures)	Scenario 1 (SCAs)	Scenario 2 (No secondary burning)
Quality-Adjusted Life Years gained	LYs gained from deaths avoided	4	30
	QALY gained from morbidity avoided	3	21
	Total QALY gains	7	50
Deaths avoided (mortality)	Statistical deaths avoided	0	3
Illness prevented (morbidity)	Statistical cases avoided of asthma	0	1
	Statistical cases avoided of COPD	0	0
	Statistical cases avoided of Lung Cancer	0	0
	Statistical cases avoided of Stroke	0	1
	Statistical cases avoided of IHD	0	0
	Statistical cases avoided of Diabetes	0	3
Healthcare activity reduced	Respiratory and/or cardiovascular hospital admissions prevented	0	1

Note: All health impacts are rounded to the nearest whole figure, As such, a '0' does not necessarily represent no impact.

Monetised Savings	Non-market disease burden (GBP 2025)	£	476,100	£	3,504,600
	Healthcare costs (NHS) (GBP 2025)	£	13,370	£	98,430
	Productivity impacts (GBP 2025)	£	40,300	£	296,700

Note: It is not possible to aggregate economic impacts due to potential overlap between metrics

Health and Economic Impacts: St Albans

Impact	Indicators and units (average annual figures)	Scenario 1 (SCAs)	Scenario 2 (No secondary burning)
Quality-Adjusted Life Years gained	LYs gained from deaths avoided	15	41
	QALY gained from morbidity avoided	10	29
	Total QALY gains	25	70
Deaths avoided (mortality)	Statistical deaths avoided	1	4
Illness prevented (morbidity)	Statistical cases avoided of asthma	0	1
	Statistical cases avoided of COPD	0	0
	Statistical cases avoided of Lung Cancer	0	0
	Statistical cases avoided of Stroke	0	1
	Statistical cases avoided of IHD	0	1
	Statistical cases avoided of Diabetes	1	4
Healthcare activity reduced	Respiratory and/or cardiovascular hospital admissions prevented	1	2

Note: All health impacts are rounded to the nearest whole figure, As such, a '0' does not necessarily represent no impact.

Monetised Savings	Non-market disease burden (GBP 2025)	£	1,761,400	£	4,894,500
	Healthcare costs (NHS) (GBP 2025)	£	49,460	£	137,500
	Productivity impacts (GBP 2025)	£	149,200	£	414,300

Note: It is not possible to aggregate economic impacts due to potential overlap between metrics

Health and Economic Impacts: Welwyn Hatfield

Impact	Indicators and units (average annual figures)	Scenario 1 (SCAs)	Scenario 2 (No secondary burning)
Quality-Adjusted Life Years gained	LYs gained from deaths avoided	11	32
	QALY gained from morbidity avoided	8	22
	Total QALY gains	19	54
Deaths avoided (mortality)	Statistical deaths avoided	1	3
Illness prevented (morbidity)	Statistical cases avoided of asthma	0	1
	Statistical cases avoided of COPD	0	0
	Statistical cases avoided of Lung Cancer	0	0
	Statistical cases avoided of Stroke	0	1
	Statistical cases avoided of IHD	0	1
	Statistical cases avoided of Diabetes	1	3
Healthcare activity reduced	Respiratory and/or cardiovascular hospital admissions prevented	1	1

Note: All health impacts are rounded to the nearest whole figure, As such, a '0' does not necessarily represent no impact.

Monetised Savings	Non-market disease burden (GBP 2025)	£	1,351,400	£	3,777,500
	Healthcare costs (NHS) (GBP 2025)	£	37,950	£	106,120
	Productivity impacts (GBP 2025)	£	114,500	£	319,800

Note: It is not possible to aggregate economic impacts due to potential overlap between metrics

Health and Economic Impacts: East Hertfordshire

Impact	Indicators and units (average annual figures)	Scenario 1 (SCAs)	Scenario 2 (No secondary burning)
Quality-Adjusted Life Years gained	LYs gained from deaths avoided	11	34
	QALY gained from morbidity avoided	8	23
	Total QALY gains	19	57
Deaths avoided (mortality)	Statistical deaths avoided	1	3
Illness prevented (morbidity)	Statistical cases avoided of asthma	0	1
	Statistical cases avoided of COPD	0	0
	Statistical cases avoided of Lung Cancer	0	0
	Statistical cases avoided of Stroke	0	1
	Statistical cases avoided of IHD	0	1
	Statistical cases avoided of Diabetes	1	3
Healthcare activity reduced	Respiratory and/or cardiovascular hospital admissions prevented	1	2

Note: All health impacts are rounded to the nearest whole figure, As such, a '0' does not necessarily represent no impact.

Monetised Savings	Non-market disease burden (GBP 2025)	£	1,338,400	£	3,964,200
	Healthcare costs (NHS) (GBP 2025)	£	37,590	£	111,380
	Productivity impacts (GBP 2025)	£	113,300	£	335,500

Note: It is not possible to aggregate economic impacts due to potential overlap between metrics

Health and Economic Impacts: Stevenage

Impact	Indicators and units (average annual figures)	Scenario 1 (SCAs)	Scenario 2 (No secondary burning)
Quality-Adjusted Life Years gained	LYs gained from deaths avoided	2	21
	QALY gained from morbidity avoided	2	14
	Total QALY gains	4	35
Deaths avoided (mortality)	Statistical deaths avoided	0	2
Illness prevented (morbidity)	Statistical cases avoided of asthma	0	1
	Statistical cases avoided of COPD	0	0
	Statistical cases avoided of Lung Cancer	0	0
	Statistical cases avoided of Stroke	0	0
	Statistical cases avoided of IHD	0	0
	Statistical cases avoided of Diabetes	0	2
Healthcare activity reduced	Respiratory and/or cardiovascular hospital admissions prevented	0	1

Note: All health impacts are rounded to the nearest whole figure, As such, a '0' does not necessarily represent no impact.

Monetised Savings	Non-market disease burden (GBP 2025)	£	288,500	£	2,425,000
	Healthcare costs (NHS) (GBP 2025)	£	8,100	£	68,110
	Productivity impacts (GBP 2025)	£	24,400	£	205,300

Note: It is not possible to aggregate economic impacts due to potential overlap between metrics

Summary of Health Impacts: Smoke Control Areas (Scenario 1)

Impact	Health Metrics	UK	Hertfordshire	Broxbourne	Dacorum	Hertsmere	North Hertfordshire	Three Rivers	Watford	St Albans	Welwyn Hatfield	East Hertfordshire	Stevenage
Quality-Adjusted Life Years	LYs gained from deaths avoided	3,491	77	3	8	6	9	7	4	15	11	11	2
	QALY gained from morbidity avoided	2,427	54	2	6	4	6	5	3	10	8	8	2
	Total QALY gains	5,918	131	5	14	10	15	12	7	25	19	19	4
Deaths avoided (mortality)	Statistical deaths avoided	321	7	0	1	1	1	1	0	1	1	1	0
Illness prevented (morbidity)	Statistical cases avoided of asthma	113	3	0	0	0	0	0	0	0	0	0	0
	Statistical cases avoided of COPD	22	0	0	0	0	0	0	0	0	0	0	0
	Statistical cases avoided of Lung Cancer	35	1	0	0	0	0	0	0	0	0	0	0
	Statistical cases avoided of Stroke	67	1	0	0	0	0	0	0	0	0	0	0
	Statistical cases avoided of IHD	55	1	0	0	0	0	0	0	0	0	0	0
	Statistical cases avoided of Diabetes	301	7	0	1	1	1	1	0	1	1	1	0
Healthcare activity reduced	Respiratory and/or cardiovascular hospital admissions prevented	156	3	0	0	0	0	0	0	1	1	1	0

Note: All health impacts are rounded to the nearest whole figure, As such, a '0' does not necessarily represent no impact.

Summary of Health Impacts: Removal of Secondary Burning (Scenario 2)

Impact	Health Metrics	UK	Hertfordshire	Broxbourne	Dacorum	Hertsmere	North Hertfordshire	Three Rivers	Watford	St Albans	Welwyn Hatfield	East Hertfordshire	Stevenage
Quality-Adjusted Life Years	LYs gained from deaths avoided	16,430	300	21	37	28	31	25	30	41	32	34	21
	QALY gained from morbidity avoided	11,433	209	15	26	20	21	18	21	29	22	23	14
	Total QALY gains	27,863	509	36	63	48	52	43	50	70	54	57	35
Deaths avoided (mortality)	Statistical deaths avoided	1,512	28	2	3	3	3	2	3	4	3	3	2
Illness prevented (morbidity)	Statistical cases avoided of asthma	534	10	1	1	1	1	1	1	1	1	1	1
	Statistical cases avoided of COPD	106	2	0	0	0	0	0	0	0	0	0	0
	Statistical cases avoided of Lung Cancer	163	3	0	0	0	0	0	0	0	0	0	0
	Statistical cases avoided of Stroke	317	6	0	1	1	1	0	1	1	1	1	0
	Statistical cases avoided of IHD	259	5	0	1	0	0	0	0	1	1	1	0
	Statistical cases avoided of Diabetes	1,420	26	2	3	2	3	2	3	4	3	3	2
Healthcare activity reduced	Respiratory and/or cardiovascular hospital admissions prevented	737	13	1	2	1	1	1	1	2	1	2	1

Note: All health impacts are rounded to the nearest whole figure, As such, a '0' does not necessarily represent no impact.

Health Impact Assessment: Sensitivity Ranges

Health and Economic Impacts: UK Sensitivity Range

Impact	Indicators and units (average annual figures)	Scenario 1 (SCAs)	Scenario 2 (No secondary burning)
Quality-Adjusted Life Years gained	LYs gained from deaths avoided	3491 [2587-3912]	16430 [12175-18419]
	QALY gained from morbidity avoided	2427 [736-4401]	11433 [3467-20730]
	Total QALY gains	5918 [3324-8315]	27863 [15642-39149]
Deaths avoided (mortality)	Statistical deaths avoided	321[238-360]	1512 [1121-1695]
Illness prevented (morbidity)	Statistical cases avoided of asthma	113 [51-194]	534 [238-917]
	Statistical cases avoided of COPD	23 [24-25]	106 [110-115]
	Statistical cases avoided of Lung Cancer	35 [15-54]	163 [68-253]
	Statistical cases avoided of Stroke	68 [0-153]	317 [0-721]
	Statistical cases avoided of IHD	55 [0-126]	259 [0-593]
	Statistical cases avoided of Diabetes	301 [68-527]	1421 [321-2483]
Healthcare activity reduced	Respiratory and/or cardiovascular hospital admissions prevented	156 [26-346]	737 [125-1630]

Monetised Savings	Non-market disease burden (M, GBP 2025)	411.06 [230.28-577.5]	1935.54 [1083.82-2719.22]
	Healthcare costs (NHS) (M, GBP 2025)	11.55 [6.41-16.23]	54.43 [30.19-76.43]
	Productivity impacts (M, GBP 2025)	34.85 [19.74-48.98]	164.03 [92.91-230.56]

Note: It is not possible to aggregate economic impacts due to potential overlap between metrics

Health and Economic Impacts: Hertfordshire Sensitivity Range

Impact	Indicators and units (average annual figures)	Scenario 1 (SCAs)	Scenario 2 (No secondary burning)
Quality-Adjusted Life Years gained	LYs gained from deaths avoided	76.9 [57-86.3]	300 [222.3-336.3]
	QALY gained from morbidity avoided	53.6 [16.3-97.3]	209.3 [63.6-379.5]
	Total QALY gains	130.6 [73.3-183.5]	509.4 [285.9-715.8]
Deaths avoided (mortality)	Statistical deaths avoided	7.1 [5.2-7.9]	27.6 [20.5-31]
Illness prevented (morbidity)	Statistical cases avoided of asthma	2.5 [1.1-4.3]	9.8 [4.4-16.9]
	Statistical cases avoided of COPD	0.5 [0.5-0.5]	1.9 [2-2.1]
	Statistical cases avoided of Lung Cancer	0.8 [0.3-1.2]	3 [1.2-4.6]
	Statistical cases avoided of Stroke	1.5 [0-3.4]	5.8 [0-13.2]
	Statistical cases avoided of IHD	1.2 [0-2.8]	4.7 [0-10.8]
	Statistical cases avoided of Diabetes	6.6 [1.5-11.6]	25.9 [5.9-45.4]
Healthcare activity reduced	Respiratory and/or cardiovascular hospital admissions prevented	3.4 [0.6-7.6]	13.5 [2.3-29.8]
Monetised Savings	Non-market disease burden (M, GBP 2025)	9.07 [5.08-12.75]	35.39 [19.81-49.73]
	Healthcare costs (NHS) (M, GBP 2025)	0.25 [0.14-0.36]	0.99 [0.55-1.4]
	Productivity impacts (M, GBP 2025)	0.77 [0.44-1.08]	3 [1.7-4.21]

Note: It is not possible to aggregate economic impacts due to potential overlap between metrics

Health and Economic Impacts: Broxbourne Sensitivity Range

Impact	Indicators and units (average annual figures)	Scenario 1 (SCAs)	Scenario 2 (No secondary burning)
Quality-Adjusted Life Years gained	LYs gained from deaths avoided	3 [2.2-3.4]	21 [15.5-23.5]
	QALY gained from morbidity avoided	2.1 [0.6-3.8]	14.6 [4.4-26.5]
	Total QALY gains	5.1 [2.9-7.2]	35.6 [20-50]
Deaths avoided (mortality)	Statistical deaths avoided	0.3 [0.2-0.3]	1.9 [1.4-2.2]
Illness prevented (morbidity)	Statistical cases avoided of asthma	0.1 [0-0.2]	0.7 [0.3-1.2]
	Statistical cases avoided of COPD	0 [0-0]	0.1 [0.1-0.1]
	Statistical cases avoided of Lung Cancer	0 [0-0]	0.2 [0.1-0.3]
	Statistical cases avoided of Stroke	0.1 [0-0.1]	0.4 [0-0.9]
	Statistical cases avoided of IHD	0 [0-0.1]	0.3 [0-0.8]
	Statistical cases avoided of Diabetes	0.3 [0.1-0.5]	1.8 [0.4-3.2]
Healthcare activity reduced	Respiratory and/or cardiovascular hospital admissions prevented	0.1 [0-0.3]	0.9 [0.2-2.1]
Monetised Savings	Non-market disease burden (M, GBP 2025)	0.36 [0.2-0.5]	2.47 [1.38-3.47]
	Healthcare costs (NHS) (M, GBP 2025)	0.01 [0.01-0.01]	0.07 [0.04-0.1]
	Productivity impacts (M, GBP 2025)	0.03 [0.02-0.04]	0.21 [0.12-0.29]

Note: It is not possible to aggregate economic impacts due to potential overlap between metrics

Health and Economic Impacts: Dacorum Sensitivity Range

Impact	Indicators and units (average annual figures)	Scenario 1 (SCAs)	Scenario 2 (No secondary burning)
Quality-Adjusted Life Years gained	LYs gained from deaths avoided	8 [5.9-9]	37.2 [27.6-41.8]
	QALY gained from morbidity avoided	5.6 [1.7-10.1]	26 [7.9-47.1]
	Total QALY gains	13.6 [7.6-19.1]	63.2 [35.5-88.9]
Deaths avoided (mortality)	Statistical deaths avoided	0.7 [0.5-0.8]	3.4 [2.5-3.8]
Illness prevented (morbidity)	Statistical cases avoided of asthma	0.3 [0.1-0.4]	1.2 [0.5-2.1]
	Statistical cases avoided of COPD	0.1 [0.1-0.1]	0.2 [0.3-0.3]
	Statistical cases avoided of Lung Cancer	0.1 [0-0.1]	0.4 [0.2-0.6]
	Statistical cases avoided of Stroke	0.2 [0-0.4]	0.7 [0-1.6]
	Statistical cases avoided of IHD	0.1 [0-0.3]	0.6 [0-1.3]
	Statistical cases avoided of Diabetes	0.7 [0.2-1.2]	3.2 [0.7-5.6]
Healthcare activity reduced	Respiratory and/or cardiovascular hospital admissions prevented	0.4 [0.1-0.8]	1.7 [0.3-3.7]

Monetised Savings	Non-market disease burden (M, GBP 2025)	0.94 [0.53-1.33]	4.39 [2.46-6.17]
	Healthcare costs (NHS) (M, GBP 2025)	0.03 [0.01-0.04]	0.12 [0.07-0.17]
	Productivity impacts (M, GBP 2025)	0.08 [0.05-0.11]	0.37 [0.21-0.52]

Note: It is not possible to aggregate economic impacts due to potential overlap between metrics

Health and Economic Impacts: Hertsmere Sensitivity Range

Impact	Indicators and units (average annual figures)	Scenario 1 (SCAs)	Scenario 2 (No secondary burning)
Quality-Adjusted Life Years gained	LYs gained from deaths avoided	6 [4.5-6.8]	28.4 [21.1-31.9]
	QALY gained from morbidity avoided	4.2 [1.3-7.6]	19.8 [6-35.9]
	Total QALY gains	10.3 [5.8-14.4]	48.2 [27.1-67.8]
Deaths avoided (mortality)	Statistical deaths avoided	0.6 [0.4-0.6]	2.6 [1.9-2.9]
Illness prevented (morbidity)	Statistical cases avoided of asthma	0.2 [0.1-0.3]	0.9 [0.4-1.6]
	Statistical cases avoided of COPD	0 [0-0]	0.2 [0.2-0.2]
	Statistical cases avoided of Lung Cancer	0.1 [0-0.1]	0.3 [0.1-0.4]
	Statistical cases avoided of Stroke	0.1 [0-0.3]	0.5 [0-1.2]
	Statistical cases avoided of IHD	0.1 [0-0.2]	0.4 [0-1]
	Statistical cases avoided of Diabetes	0.5 [0.1-0.9]	2.5 [0.6-4.3]
Healthcare activity reduced	Respiratory and/or cardiovascular hospital admissions prevented	0.3 [0-0.6]	1.3 [0.2-2.8]
Monetised Savings	Non-market disease burden (M, GBP 2025)	0.71 [0.4-1]	3.35 [1.88-4.71]
	Healthcare costs (NHS) (M, GBP 2025)	0.02 [0.01-0.03]	0.09 [0.05-0.13]
	Productivity impacts (M, GBP 2025)	0.06 [0.03-0.08]	0.28 [0.16-0.4]

Note: It is not possible to aggregate economic impacts due to potential overlap between metrics

Health and Economic Impacts: North Hertfordshire Sensitivity Range

Impact	Indicators and units (average annual figures)	Scenario 1 (SCAs)	Scenario 2 (No secondary burning)
Quality-Adjusted Life Years gained	LYs gained from deaths avoided	8.8 [6.5-9.9]	30.7 [22.8-34.5]
	QALY gained from morbidity avoided	6.1 [1.9-11.1]	21.5 [6.5-38.9]
	Total QALY gains	15 [8.4-21]	52.2 [29.3-73.3]
Deaths avoided (mortality)	Statistical deaths avoided	0.8 [0.6-0.9]	2.8 [2.1-3.2]
Illness prevented (morbidity)	Statistical cases avoided of asthma	0.3 [0.1-0.5]	1 [0.4-1.7]
	Statistical cases avoided of COPD	0.1 [0.1-0.1]	0.2 [0.2-0.2]
	Statistical cases avoided of Lung Cancer	0.1 [0-0.1]	0.3 [0.1-0.5]
	Statistical cases avoided of Stroke	0.2 [0-0.4]	0.6 [0-1.3]
	Statistical cases avoided of IHD	0.1 [0-0.3]	0.5 [0-1.1]
	Statistical cases avoided of Diabetes	0.8 [0.2-1.3]	2.7 [0.6-4.6]
Healthcare activity reduced	Respiratory and/or cardiovascular hospital admissions prevented	0.4 [0.1-0.9]	1.4 [0.2-3.1]

Monetised Savings	Non-market disease burden (M, GBP 2025)	1.04 [0.58-1.46]	3.63 [2.03-5.1]
	Healthcare costs (NHS) (M, GBP 2025)	0.03 [0.02-0.04]	0.1 [0.06-0.14]
	Productivity impacts (M, GBP 2025)	0.09 [0.05-0.12]	0.31 [0.17-0.43]

Note: It is not possible to aggregate economic impacts due to potential overlap between metrics

Health and Economic Impacts: Three Rivers Sensitivity Range

Impact	Indicators and units (average annual figures)	Scenario 1 (SCAs)	Scenario 2 (No secondary burning)
Quality-Adjusted Life Years gained	LYs gained from deaths avoided	6.8 [5.1-7.6]	25.3 [18.7-28.3]
	QALY gained from morbidity avoided	4.8 [1.4-8.6]	17.6 [5.4-32]
	Total QALY gains	11.6 [6.5-16.3]	42.9 [24.1-60.3]
Deaths avoided (mortality)	Statistical deaths avoided	0.6 [0.5-0.7]	2.3 [1.7-2.6]
Illness prevented (morbidity)	Statistical cases avoided of asthma	0.2 [0.1-0.4]	0.8 [0.4-1.4]
	Statistical cases avoided of COPD	0 [0-0]	0.2 [0.2-0.2]
	Statistical cases avoided of Lung Cancer	0.1 [0-0.1]	0.3 [0.1-0.4]
	Statistical cases avoided of Stroke	0.1 [0-0.3]	0.5 [0-1.1]
	Statistical cases avoided of IHD	0.1 [0-0.2]	0.4 [0-0.9]
	Statistical cases avoided of Diabetes	0.6 [0.1-1]	2.2 [0.5-3.8]
Healthcare activity reduced	Respiratory and/or cardiovascular hospital admissions prevented	0.3 [0.1-0.7]	1.1 [0.2-2.5]
Monetised Savings	Non-market disease burden (M, GBP 2025)	0.8 [0.45-1.13]	2.98 [1.67-4.19]
	Healthcare costs (NHS) (M, GBP 2025)	0.02 [0.01-0.03]	0.08 [0.05-0.12]
	Productivity impacts (M, GBP 2025)	0.07 [0.04-0.1]	0.25 [0.14-0.35]

Note: It is not possible to aggregate economic impacts due to potential overlap between metrics

Health and Economic Impacts: Watford Sensitivity Range

Impact	Indicators and units (average annual figures)	Scenario 1 (SCAs)	Scenario 2 (No secondary burning)
Quality-Adjusted Life Years gained	LYs gained from deaths avoided	4 [3-4.5]	29.7 [22-33.3]
	QALY gained from morbidity avoided	2.8 [0.9-5.1]	20.7 [6.3-37.6]
	Total QALY gains	6.9 [3.8-9.6]	50.4 [28.3-70.9]
Deaths avoided (mortality)	Statistical deaths avoided	0.4 [0.3-0.4]	2.7 [2-3.1]
Illness prevented (morbidity)	Statistical cases avoided of asthma	0.1 [0.1-0.2]	1 [0.4-1.7]
	Statistical cases avoided of COPD	0 [0-0]	0.2 [0.2-0.2]
	Statistical cases avoided of Lung Cancer	0 [0-0.1]	0.3 [0.1-0.5]
	Statistical cases avoided of Stroke	0.1 [0-0.2]	0.6 [0-1.3]
	Statistical cases avoided of IHD	0.1 [0-0.1]	0.5 [0-1.1]
	Statistical cases avoided of Diabetes	0.3 [0.1-0.6]	2.6 [0.6-4.5]
Healthcare activity reduced	Respiratory and/or cardiovascular hospital admissions prevented	0.2 [0-0.4]	1.3 [0.2-2.9]

Monetised Savings	Non-market disease burden (M, GBP 2025)	0.48 [0.27-0.67]	3.5 [1.96-4.92]
	Healthcare costs (NHS) (M, GBP 2025)	0.01 [0.01-0.02]	0.1 [0.05-0.14]
	Productivity impacts (M, GBP 2025)	0.04 [0.02-0.06]	0.3 [0.17-0.42]

Note: It is not possible to aggregate economic impacts due to potential overlap between metrics

Health and Economic Impacts: St Albans Sensitivity Range

Impact	Indicators and units (average annual figures)	Scenario 1 (SCAs)	Scenario 2 (No secondary burning)
Quality-Adjusted Life Years gained	LYs gained from deaths avoided	14.9 [11.1-16.7]	41.5 [30.7-46.5]
	QALY gained from morbidity avoided	10.4 [3.2-18.9]	29 [8.8-52.5]
	Total QALY gains	25.4 [14.2-35.6]	70.4 [39.5-99]
Deaths avoided (mortality)	Statistical deaths avoided	1.4 [1-1.5]	3.8 [2.8-4.3]
Illness prevented (morbidity)	Statistical cases avoided of asthma	0.5 [0.2-0.8]	1.4 [0.6-2.3]
	Statistical cases avoided of COPD	0.1 [0.1-0.1]	0.3 [0.3-0.3]
	Statistical cases avoided of Lung Cancer	0.1 [0.1-0.2]	0.4 [0.2-0.6]
	Statistical cases avoided of Stroke	0.3 [0-0.7]	0.8 [0-1.8]
	Statistical cases avoided of IHD	0.2 [0-0.5]	0.7 [0-1.5]
	Statistical cases avoided of Diabetes	1.3 [0.3-2.3]	3.6 [0.8-6.3]
Healthcare activity reduced	Respiratory and/or cardiovascular hospital admissions prevented	0.7 [0.1-1.5]	1.9 [0.3-4.1]

Monetised Savings	Non-market disease burden (M, GBP 2025)	1.76 [0.99-2.48]	4.89 [2.74-6.88]
	Healthcare costs (NHS) (M, GBP 2025)	0.05 [0.03-0.07]	0.14 [0.08-0.19]
	Productivity impacts (M, GBP 2025)	0.15 [0.08-0.21]	0.41 [0.23-0.58]

Note: It is not possible to aggregate economic impacts due to potential overlap between metrics

Health and Economic Impacts: Welwyn Hatfield Sensitivity Range

Impact	Indicators and units (average annual figures)	Scenario 1 (SCAs)	Scenario 2 (No secondary burning)
Quality-Adjusted Life Years gained	LYs gained from deaths avoided	11.5 [8.5-12.8]	32 [23.7-35.9]
	QALY gained from morbidity avoided	8 [2.4-14.5]	22.3 [6.8-40.5]
	Total QALY gains	19.5 [10.9-27.3]	54.4 [30.5-76.4]
Deaths avoided (mortality)	Statistical deaths avoided	1.1 [0.8-1.2]	2.9 [2.2-3.3]
Illness prevented (morbidity)	Statistical cases avoided of asthma	0.4 [0.2-0.6]	1 [0.5-1.8]
	Statistical cases avoided of COPD	0.1 [0.1-0.1]	0.2 [0.2-0.2]
	Statistical cases avoided of Lung Cancer	0.1 [0-0.2]	0.3 [0.1-0.5]
	Statistical cases avoided of Stroke	0.2 [0-0.5]	0.6 [0-1.4]
	Statistical cases avoided of IHD	0.2 [0-0.4]	0.5 [0-1.2]
	Statistical cases avoided of Diabetes	1 [0.2-1.7]	2.8 [0.6-4.8]
Healthcare activity reduced	Respiratory and/or cardiovascular hospital admissions prevented	0.5 [0.1-1.1]	1.4 [0.2-3.2]

Monetised Savings	Non-market disease burden (M, GBP 2025)	1.35 [0.76-1.9]	3.78 [2.11-5.31]
	Healthcare costs (NHS) (M, GBP 2025)	0.04 [0.02-0.05]	0.11 [0.06-0.15]
	Productivity impacts (M, GBP 2025)	0.11 [0.06-0.16]	0.32 [0.18-0.45]

Note: It is not possible to aggregate economic impacts due to potential overlap between metrics

Health and Economic Impacts: East Hertfordshire Sensitivity Range

Impact	Indicators and units (average annual figures)	Scenario 1 (SCAs)	Scenario 2 (No secondary burning)
Quality-Adjusted Life Years gained	LYs gained from deaths avoided	11.4 [8.4-12.7]	33.6 [24.9-37.7]
	QALY gained from morbidity avoided	7.9 [2.4-14.3]	23.5 [7.1-42.5]
	Total QALY gains	19.3 [10.8-27.1]	57.1 [32-80.2]
Deaths avoided (mortality)	Statistical deaths avoided	1 [0.8-1.2]	3.1 [2.3-3.5]
Illness prevented (morbidity)	Statistical cases avoided of asthma	0.4 [0.2-0.6]	1.1 [0.5-1.9]
	Statistical cases avoided of COPD	0.1 [0.1-0.1]	0.2 [0.2-0.2]
	Statistical cases avoided of Lung Cancer	0.1 [0-0.2]	0.3 [0.1-0.5]
	Statistical cases avoided of Stroke	0.2 [0-0.5]	0.6 [0-1.5]
	Statistical cases avoided of IHD	0.2 [0-0.4]	0.5 [0-1.2]
	Statistical cases avoided of Diabetes	1 [0.2-1.7]	2.9 [0.7-5.1]
Healthcare activity reduced	Respiratory and/or cardiovascular hospital admissions prevented	0.5 [0.1-1.1]	1.5 [0.3-3.3]

Monetised Savings	Non-market disease burden (M, GBP 2025)	1.34 [0.75-1.88]	3.96 [2.22-5.57]
	Healthcare costs (NHS) (M, GBP 2025)	0.04 [0.02-0.05]	0.11 [0.06-0.16]
	Productivity impacts (M, GBP 2025)	0.11 [0.06-0.16]	0.34 [0.19-0.47]

Note: It is not possible to aggregate economic impacts due to potential overlap between metrics

Health and Economic Impacts: Stevenage Sensitivity Range

Impact	Indicators and units (average annual figures)	Scenario 1 (SCAs)	Scenario 2 (No secondary burning)
Quality-Adjusted Life Years gained	LYs gained from deaths avoided	2.4 [1.8-2.7]	20.6 [15.2-23]
	QALY gained from morbidity avoided	1.7 [0.5-3.1]	14.3 [4.4-26]
	Total QALY gains	4.2 [2.3-5.8]	34.9 [19.6-49]
Deaths avoided (mortality)	Statistical deaths avoided	0.2 [0.2-0.3]	1.9 [1.4-2.1]
Illness prevented (morbidity)	Statistical cases avoided of asthma	0.1 [0-0.1]	0.7 [0.3-1.2]
	Statistical cases avoided of COPD	0 [0-0]	0.1 [0.1-0.1]
	Statistical cases avoided of Lung Cancer	0 [0-0]	0.2 [0.1-0.3]
	Statistical cases avoided of Stroke	0 [0-0.1]	0.4 [0-0.9]
	Statistical cases avoided of IHD	0 [0-0.1]	0.3 [0-0.7]
	Statistical cases avoided of Diabetes	0.2 [0-0.4]	1.8 [0.4-3.1]
Healthcare activity reduced	Respiratory and/or cardiovascular hospital admissions prevented	0.1 [0-0.2]	0.9 [0.2-2]

Monetised Savings	Non-market disease burden (M, GBP 2025)	0.29 [0.16-0.41]	2.43 [1.36-3.41]
	Healthcare costs (NHS) (M, GBP 2025)	0.01 [0-0.01]	0.07 [0.04-0.1]
	Productivity impacts (M, GBP 2025)	0.02 [0.01-0.03]	0.21 [0.12-0.29]

Note: It is not possible to aggregate economic impacts due to potential overlap between metrics

Conclusions

Conclusions

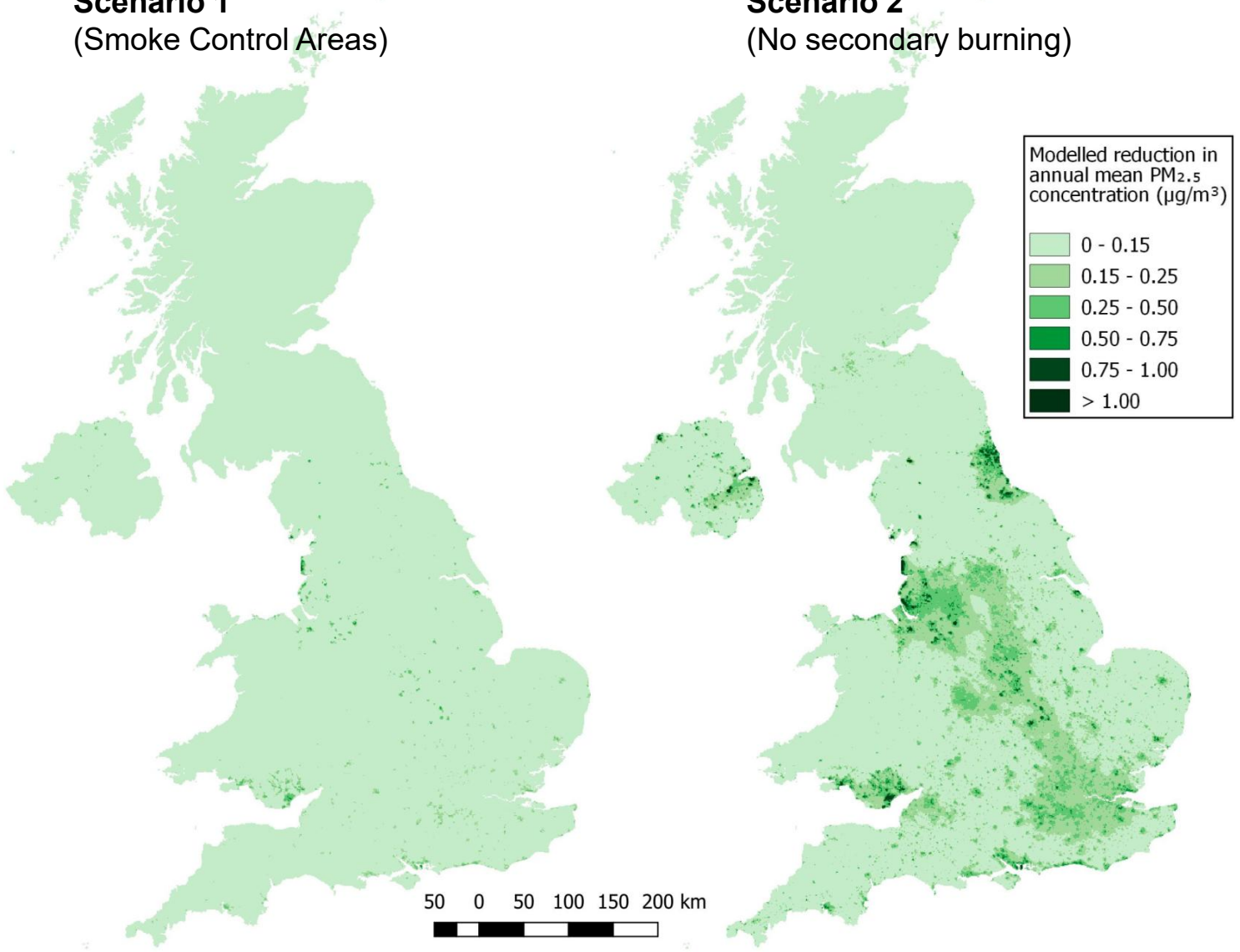
Air Quality Assessment

- If smoke control areas (SCAs) were applied in all urban areas across the UK, there would be a decrease in $PM_{2.5}$ emissions of 1,591 tonnes/year, equal to 14.6% of total annual domestic combustion emissions of $PM_{2.5}$.
  - This is equivalent to 2.4% of total annual UK emissions of $PM_{2.5}$.
- If all secondary burning ceased to occur across the UK, there would be a decrease in $PM_{2.5}$ emissions of 7,985 tonnes/year, equal to 73.1% of total annual domestic combustion emissions of $PM_{2.5}$.
  - This is equivalent to 12.3% of total annual UK emissions of $PM_{2.5}$.

- The maps show the impact of the SCA and secondary burning scenarios on $PM_{2.5}$ concentrations across the UK.

Scenario 1
(Smoke Control Areas)

Scenario 2
(No secondary burning)



Health Impact Assessment Findings

Exposure to $PM_{2.5}$ and NO_2 pollutant concentrations is associated with significant detrimental health impacts

- Up to 27,000 life years lost and 2,500 deaths annually in the UK are attributable, in part, to exposure to pollutants generated by wood and solid fuel burning.
- In Hertfordshire, the annual life years lost, and deaths, are estimated to approximately 490 and 50, respectively.

The introduction of SCAs or stopping all secondary burning results in health savings, with removal of secondary burning having a greater impact

- The implementation of SCAs is expected to result in approximately 3,500 life years gained annually across the UK.
- Ceasing all secondary burning results in approximately 16,500 life years gained across the UK.
- A greater benefit is expected if all secondary burning stopped, when compared to the use of SCAs, for all mortality and morbidity metrics assessed.

Avoiding these detrimental health impacts has associated economic savings

- The health benefits of both scenarios have resulted in associated economic savings linked to the burden of disease, NHS healthcare costs, and productivity.
- The economic savings are greater if secondary burning ceased to occur, compared to the implementation of SCAs in all urban areas.
- Economic savings can be expected as a result of improved health outcomes for populations in each geography.

Further analysis is needed to appropriately compare these estimated economic savings with implementation and other costs

- However, it is important to note that the assessment is not a cost-benefit analysis, and as such has not considered the potential for incurred costs, such as to implement or operate the policies, or the potential to substitute domestic burning for other activities.
- In addition, as the concentration results represent ambient (outdoor) annual average concentrations they do not account for indoor air pollution within properties where burning is taking place. The average exposure impact indoors is likely to be significantly higher, increasing ill health potential.