Ricardo Energy & Environment

Air Quality Impact Assessment (AQIA) for the Eastleigh Borough Local Plan (EBLP)

Report for Eastleigh Borough Council

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Executive Summary

The Borough of Eastleigh is located in South Hampshire and borders the City of Southampton, Test Valley, the City of Winchester and the Borough of Fareham. There are approximately 130,000 people living within the Eastleigh Borough area of 80 km^2. The emerging Eastleigh Borough Local Plan (EBLP) sets the framework for future housing and employment development in Eastleigh Borough. The EBLP envisages the provision of an additional 14,580 homes in the 20-year period 2016 to 2036. This represents a significant increase in population, and associated increases in road traffic may have the potential for significant effects on air quality both within Eastleigh Borough and in surrounding areas.

This report contains the results of an air quality impact assessment (AQIA) of road traffic emissions associated with different Strategic Growth Options (SGOs) for housing development within Eastleigh Borough. A sub-regional air dispersion model (RapidAir) was used to model predicted air quality impacts at all locations within the EBLP study area at a resolution of 3m x 3m. This method of spatially detailed compliance modelling was used to assess air quality impacts in terms of potential effects on human health. The AQIA forms part of the robust evidence base supporting Eastleigh Borough Council (EBC) in connection with their emerging Eastleigh Borough Local Plan 2016-2036 (EBLP).

Traffic growth within the study area was provided by Solent Transport's Sub-Regional Transport Model (SRTM). In total, seven traffic scenarios were modelled: 2015 Reference Case, 2036 Baseline, and five 2036 Strategic Growth Option (SGO) development options. In addition to the 2015 and 2036 dispersion models, a series of pseudo-2030 models were developed by coupling 2036 traffic activity data (obtained from the Systra transport model datasets) with 2030 vehicle emission factors. This set of dispersion models was designed for sensitivity testing, to investigate the predicted air quality impacts of the proposed development options if vehicle emission rates do not improve as much as they are forecast to in the next eighteen years

Air quality impacts on human health were assessed based on predicted annual average airborne concentrations of nitrogen dioxide (NO_2) and particulate matter (PM_{10} and $PM_{2.5}$) for all seven traffic model scenarios. The air quality impacts were evaluated within existing Air Quality Management Areas (AQMAs), as well as any other locations within the study area predicted to have pollutant concentrations exceeding the Air Quality Objectives. Short-term concentrations of NO_2 and PM_{10} were also modelled as a component of the impact assessment.

The annual air quality modelling study indicates that ambient concentrations of NO_2, PM_{10} and $PM_{2.5}$ are forecast to improve over the course of the next two decades. At all locations within the AQMAs, concentrations will meet the applicable air quality objectives under the various SGO development options. Although all five SGO scenarios are predicted to result in similar air pollutant concentrations in the future year models, it is important to consider these results in the context of the number of dwellings included in each SGO. The results of this assessment indicate that the council's preferred development option, SGO B/C, can accommodate approximately 1,000 to 2,000 additional new dwellings, compared to the alternative SGOs, without introducing adverse impacts on local air quality.

While no exceedances of the air quality objectives at relevant locations are forecast to occur at these locations in 2030 or 2036, it will be important for all EBC to ensure planned developments are carefully phased to prevent their construction and/or operation affecting compliance with air quality standards in areas that currently do not comply with air quality objectives, or cause non-compliance to occur during the period leading up to 2036. It is recommended that guidance be produced to assist developers in complying with this requirement.

This study shows that overall the Eastleigh Borough region will experience an improvement in air quality over the assessment period, resulting from changes to the road fleet during this time. However, it is also important that EBC seeks further opportunities to avoid or reduce the impacts of vehicle emissions

on air quality, through the implementation of well-designed policies and plans that incorporate effective air quality and transport-related measures.

Table of contents

Abbreviations

Abbreviation	Explanation
AADT	Annual Average Daily Traffic
AQIA	Air Quality Impact Assessment
AQMA	Air Quality Management Area
ASR	Annual Status Report
AURN	Automatic Urban and Rural Network
CAZ	Clean Air Zone
COA	Census Output Areas
CW(s)	Census Ward(s)
EBC	Eastleigh Borough Council
EBLP	Eastleigh Borough Local Plan
EFT	Emissions Factor Toolkit
GDM	Gateway Demand Model
HGV(s)	Heavy Goods Vehicle(s)
HRA	Habitats Regulations Assessment
LAEI	London Atmospheric Emissions Inventory
LAQM	Local Air Quality Management
LEIM	Local Economic Impact Model
LES	Low Emission Strategy
LGV(s)	Light Goods Vehicle(s)
MDM	Main Demand Model
NAEI	National Atmospheric Emissions Inventory
NO_2	Nitrogen dioxide
NO_x	Nitrogen oxides (NO + NO_2)
NTEM	National Trip End Model
NTS	National Travel Survey
PM_{10}	Particulate matter 10 micrometres or less in diameter
$PM_{2.5}$	Particulate matter 2.5 micrometres or less in diameter
PTM	Public Transport Model
PUSH	Partnership for Urban South Hampshire
RMSE	Root Mean Square Error
RTM	Road Traffic Model
SGO(s)	Strategic Growth Option(s)
SRTM	Sub-Regional Transport Model

1 Introduction

The Borough of Eastleigh is located in South Hampshire and borders the City of Southampton, Test Valley, the City of Winchester and the Borough of Fareham. There are approximately 130,000 people living within the Eastleigh Borough area of 80 km^2. The emerging Eastleigh Borough Local Plan (EBLP) sets the framework for future housing and employment development in Eastleigh Borough. The EBLP envisages the provision of an additional 14,580 homes in the 20-year period 2016 to 2036. This represents a significant increase in population, and associated increases in road traffic may have the potential for significant effects on air quality both within Eastleigh Borough and in surrounding areas.

This report contains the results of an air quality impact assessment (AQIA) of road traffic emissions associated with different Strategic Growth Options (SGOs) for housing development within Eastleigh Borough. The AQIA forms part of the robust evidence base supporting Eastleigh Borough Council (EBC) in connection with their emerging Eastleigh Borough Local Plan 2016-2036 (EBLP).

A sub-regional air dispersion model (RapidAir) was used to model predicted air quality impacts at all locations within the EBLP study area at a resolution of 3m x 3m. Proposed development scenarios were compared against a baseline condition and against air quality objectives. The high resolution air dispersion model encompassing the entirety of Eastleigh Borough at a 3m x 3m resolution has enabled areas to be identified which could experience adverse impacts from air pollution as a result of the different development scenarios.

The report considers the implications of the model results on existing declared AQMAs and existing policy. Where adverse impacts are predicted to occur as a result of the proposed development scenario(s), advice and recommendations are provided on how these impacts may be addressed and mitigated.

2 Method Statement

This chapter describes the transport model on which the air quality model was based, using information from the traffic model developers (MVA Consultancy). It then goes on to describe the air quality modelling methodology.

2.1 Sub-Regional Transport Model (SRTM)

2.1.1 Transport model development

MVA Consultancy was commissioned by Solent Transport to develop a Sub-Regional Transport Model (SRTM) that covered the South Hampshire sub-region, including the areas of Southampton and Portsmouth. The SRTM was developed to support a wide-ranging set of interventions across the sub-region, and was specifically required to be capable of the following:[1]

- Forecasting changes in travel demand, road traffic, public transport patronage and active mode (walking and cycling) use over time as a result of changing economic conditions, land-use policies and development, and transport improvements and interventions;
- Testing the impacts of land-use and transport policies; and
- Testing the impacts of individual transport interventions in the detail necessary for preparing submissions for inclusions in funding programmes.

The SRTM includes four main model regions (core, marginal, buffer and external; Figure 2-1), which have been modelled to varying levels of detail. The core region includes Test Valley (in part), New Forest (in part), Southampton, Eastleigh, Winchester (in part), Fareham, Gosport, Portsmouth, Havant, East Hampshire (in part) and Isle of Wight. Each of the four main model regions is further broken down into model zones. The zones within the core and marginal model regions are mainly based on groups of Census Output Areas (COAs) and Census Wards (CWs), respectively. Zones are based on Districts immediately outside the marginal model area, and on Counties in the model areas farther away. Key transport model parameters such as land use are specified by zone, and consequently the core model region has been modelled at the highest resolution and with the greatest level of detail; model resolution and detail decrease in zones farther away from the model core.

The SRTM is a suite of linked models comprised of the following components:

- Main Demand Model (MDM) which predicts when (frequency and time of day), where (destination choice) and how (choice of mode) journeys are made. Mode choices include car, public transportation, park & ride (a combination of car and public transportation), and active modes (walking and cycling).
- Gateway Demand Model (GDM) which predicts demand for travel from ports and airports.
- Road Traffic Model (RTM) which determines the routes taken by vehicles through the road network and journey times, accounting for congestion.
- Public Transport Model (PTM) which determines routes and services chosen by public transport passengers.
- Local Economic Impact Model (LEIM) which uses inputs including transport costs to forecast quantities and locations of households, populations and jobs.

The model components interact as demonstrated in Figure 2-2.

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[1] MVA Consultancy, "Transport for South Hampshire Evidence Base Model Development Report: Report 2", MVA Project Number C39344, August 2011.

Figure 2-1 SRTM geographical coverage[2]

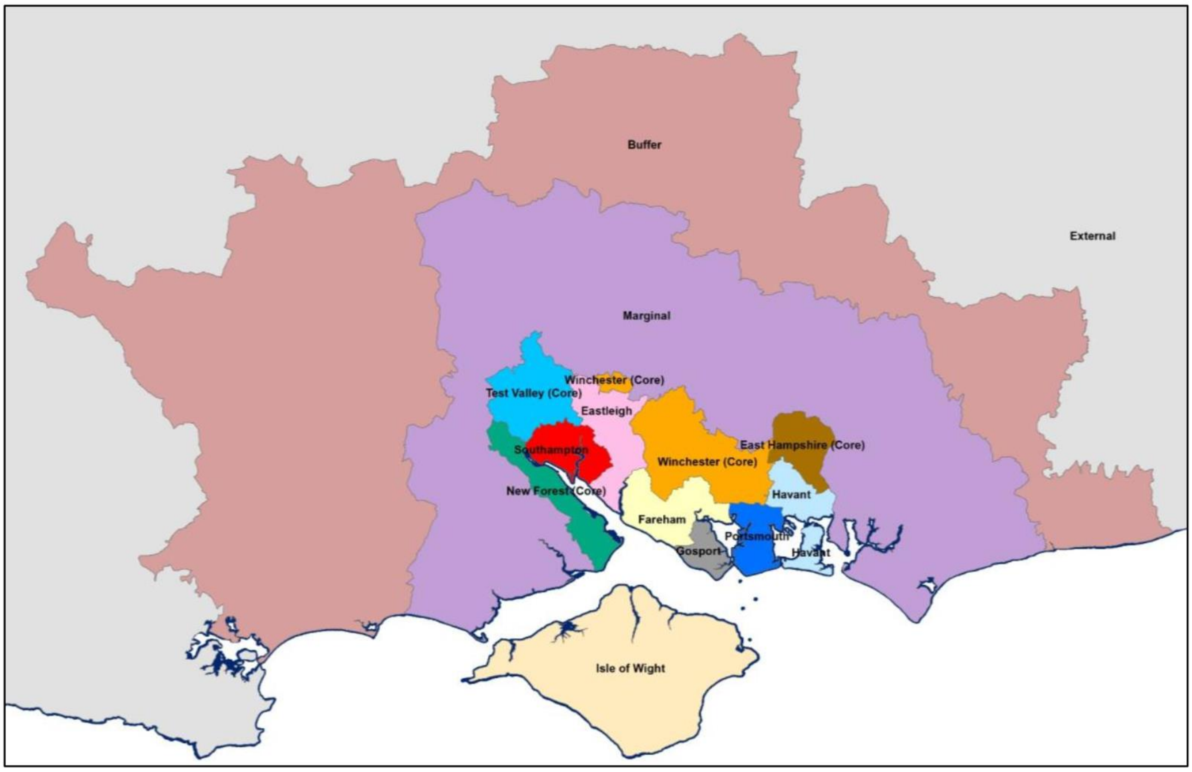
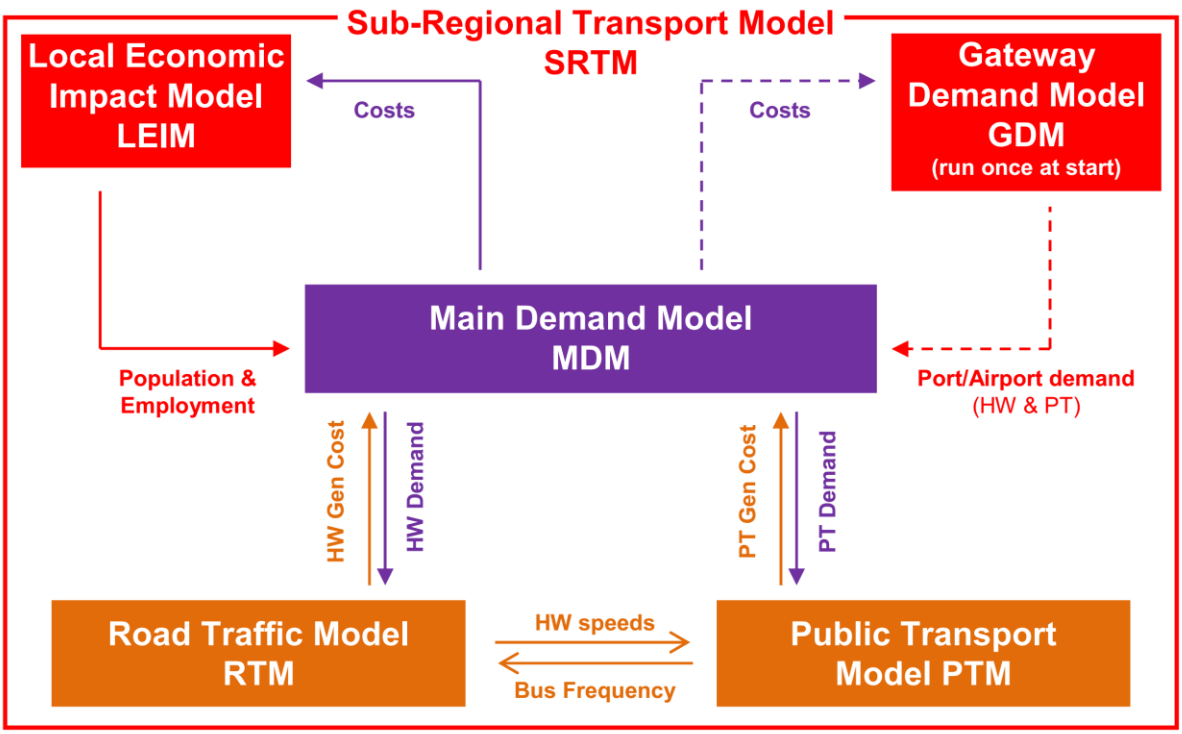


Figure 2-2 Interaction of models included in the SRTM[1]



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[2] Systra, "Technical Report: Push Development & Transport Interventions, 2036 PUSH Do Something Versus 2014 Base", Reference number 102827, 03/06/2016.

The SRTM is an evidence-based Land-Use and Transport Interaction model. The SRTM was originally developed, calibrated and validated against 2010 data and conditions, and included five forecast years: 2014, 2019, 2026, 2031, and 2036. Data sources included:

- Roadside interview survey data
- Rail Travel Survey
- Public transport origin destination data
- Ticket data for buses
- On board counts
- Manual and automatic traffic counts
- Journey time data
- Census Journey to Work Data
- National Travel Survey (NTS) Data
- National Trip End Model (NTEM) Data
- Population and Employment Data

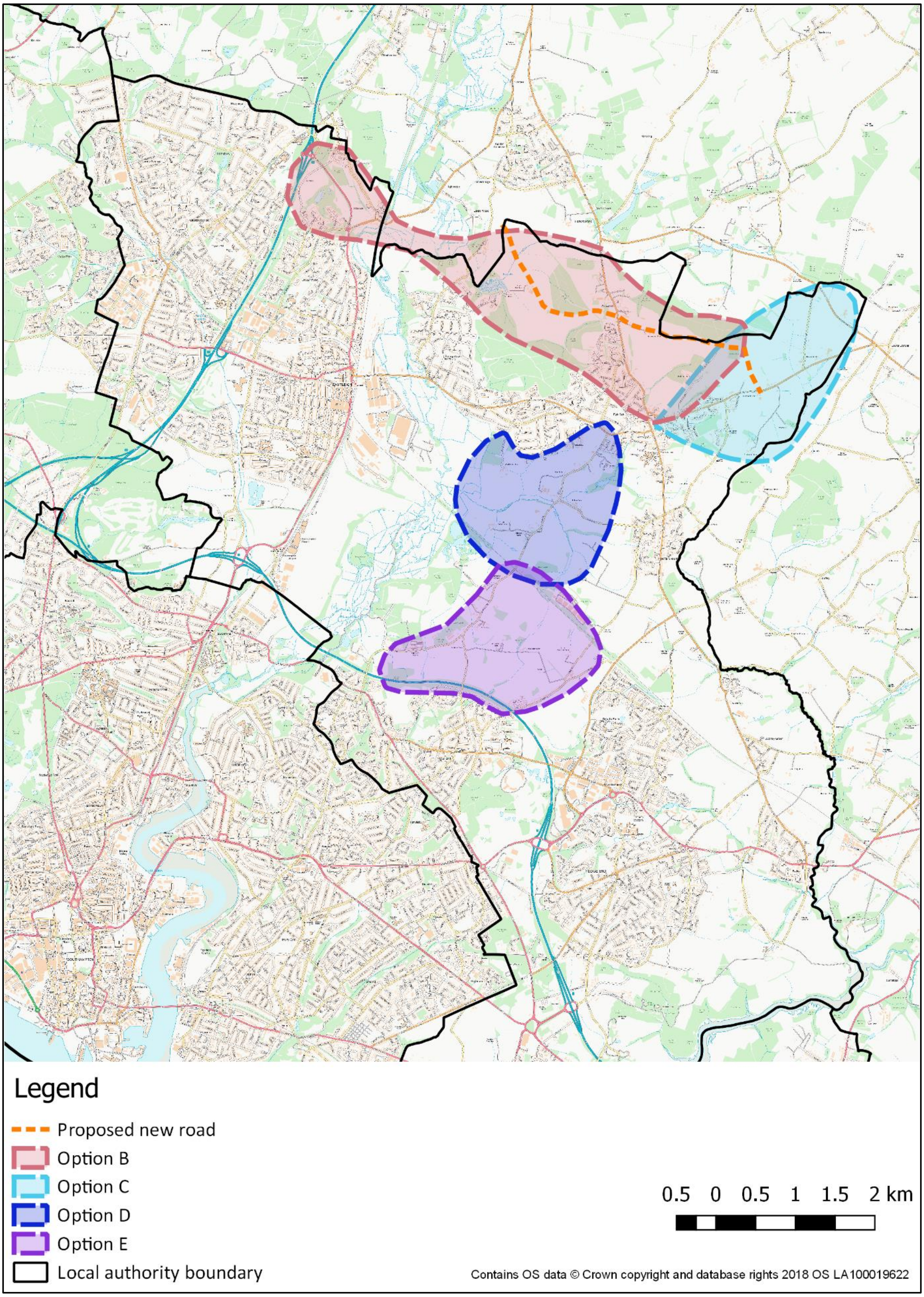
2.1.2 Transport model update for Eastleigh Borough Council

SYSTRA was recently commissioned by Eastleigh Borough Council to apply Solent Transport's Sub Regional Transport Model (SRTM) to examine the impacts of the Eastleigh Borough Local Plan (EBLP) through to 2036. Eastleigh Borough Council has considered a number of alternative options for accommodating strategic scale development in the borough,[3] and five strategic growth options (SGOs) have been carried forward for testing in this air quality impact assessment. In total, seven scenarios were modelled using the SRTM for this study:

- 2015 Reference Case: A transport model scenario designed to represent 2015 conditions and used for dispersion model verification.
- 2036 Baseline Scenario: This scenario includes committed development allocations and transport interventions up to 2036 but does not include any of the new strategic growth options (SGOs) under consideration for the Eastleigh Borough Local Plan. This provides a baseline in order to assess the effects of the new Local Plan allocations against a future development scenario without the SGOs.
- 2036 SGO Option B/C – Expansion of Fair Oak and Bishopstoke to the north/north-east with related development in Allbrook Village; the council's preferred option for new development in the EBLP. The scenario includes the provision of a new link road.
- 2036 SGO Option C – Expansion of Fair Oak to the east and north; an alternative SGO option for new development in the EBLP.
- 2036 SGO Option D1 – One variation for Option D, which involves expansion of Bishopstoke to the south and Horton Heath to the west; an alternative SGO option for new development in the EBLP. Option D includes a supplementary development of 606 dwellings. In Option D1, these dwellings are to be located immediately north east of Fair Oak.
- 2036 SGO Option D2 – A second variation for Option D, which involves expansion of Bishopstoke to the south and Horton Heath to the west; an alternative SGO option for new

[3] Eastleigh Borough Council, Eastleigh Borough Local Plan 2011-2036 Issues & Options, December 2015, https://www.eastleigh.gov.uk/media/1714/151217-issues-and-options_postcabformat.pdf, accessed 19/06/2018.

Figure 2-3 Map of broad spatial area covered by each strategic growth option and the potential new road link included in SGO Option B/C



development in the EBLP. Option D2 includes an additional 606 dwellings immediately south of the main development zone.

- 2036 SGO Option E – Extension of West End to the north of the M27; an alternative SGO option for new development in the EBLP.

Table 2-1 The total number of additional dwellings included in each modelled scenario and those which are specific to each strategic growth option

SGO Scenario	Total dwellings (2015 – 2036)	Dwellings within SGO
B/C	17,430	5,406
C	16,228	4,204
D	15,374	2,744
E	15,374	3,003

2.1.3 Factors which influence trip generation and road link speeds

Trip generation is determined at a zonal level and is a function of demographics and socio-economic characteristics. It is sensitive to changes in land use rather than changes in travel cost.[1] The SRTM accounts for 10 land use categories: residential, retail, office, industrial, warehousing, primary & secondary education, adult education, hotel & other accommodation, healthcare and leisure.

Cruise speeds between junctions in the core SRTM area were derived from GPS-based TrafficMaster data. Each modelled road link was allocated a link category, based on factors such as road type, number of lanes, speed limit, presence of buses, etc. For each link category, average speeds were calculated from all TrafficMaster data for that category. The averages were calculated such that links with high standard deviations for speeds received a lower weighting, and consequently had less influence on the average, than links with low standard deviations for average speed. In addition, major roads (dual carriageways and motorways) were coded with speed flow relationships which vary speeds on these links.

The average speeds on modelled road links, as determined by the SRTM, depend on the cruise speeds, the specified link capacity, and the occurrence of saturation conditions. Saturated conditions constrain traffic volumes at downstream locations, and queues with reduced journey speeds result at junctions which are over capacity.

2.2 Air dispersion modelling methodology

2.2.1 Air quality modelling system

The RapidAir Urban Air Quality Modelling Platform was used to predict air pollutant concentrations for this study. This is Ricardo Energy & Environment's proprietary modelling system developed for urban air pollution assessment, and the model that was used previously in Southampton for the Low Emission Strategy (LES) and Clean Air Zone (CAZ) studies, for an assessment of the Royal Borough of Windsor and Maidenhead local plan completed in March 2018, and for the Partnership for Urban South Hampshire (PUSH) air quality impact assessment (AQIA) completed in September 2018.

RapidAir has been developed to provide graphic and numerical outputs which are comparable with other models used widely in the United Kingdom. The model approach is based on loose-coupling of three elements:

- Road traffic emissions model conducted using fleet specific COPERT 5 (via the Defra EfT) algorithms to prepare grams/kilometre/second (g km^{-1} s^{-1}) emission rates of air pollutants originating from traffic sources.

- Combination of dispersion kernels derived from the USEPA (United States Environmental Protection Agency) AERMOD[4] model with an emissions grid, at resolutions ranging from 1 m to 20 m. AERMOD provides the algorithms which govern the dispersion of the emissions and is an accepted international model for road traffic air quality studies.
- The kernel based RapidAir model running in GIS software to prepare dispersion fields of concentration for further analysis with a set of decision support tools coded in Python/arcpy.

RapidAir includes an automated meteorological processor based on AERMET which obtains and processes meteorological data of a format suitable for use in AERMOD. Surface meteorological data is obtained from the NOAA online repository[5] and upper air data is downloaded from the NOAA (National Oceanic and Atmospheric Administration) Radiosonde database[6].

The model produces high resolution concentration fields at the city scale (down to a 1m scale) so is ideal for spatially detailed compliance modelling. The combination of an internationally recognised model code and careful parameterisation matching international best practice makes RapidAir ideal for this study. A validation study has been conducted in London using the same datasets as the 2011 Defra air quality model inter-comparison study[7]. Using the LAEI (London Atmospheric Emissions Inventory) 2008 data and the measurements for the same time period the model performance is consistent (and across some metrics performs better) than other modelling solutions currently in use in the UK.[8] This validation study has been published in *Environmental Modelling and Software*, in partnership with the University of Strathclyde[9].

2.2.2 Model domain

Dispersion modelling was carried out to forecast levels of air pollutants at a 3m x 3m grid resolution across the model domain (Figure 2-4). A grid height of 1.5 m was modelled to represent human exposure at ground level. Data were then extracted from the 3m x 3m grid results to provide a detailed evaluation of air quality impacts at relevant locations within the study area.

The main study area includes the entirety of Eastleigh Borough and extends 5km into Southampton, Test Valley, Winchester and Fareham in order to allow air quality impacts from the EBLP on neighbouring local authorities to be assessed.

Eastleigh Borough monitored NO_2 concentrations at numerous locations in the reference year (2015), which provided an adequate dataset for the NO_2 dispersion model verification process. However, the main study area, shown in green in Figure 2-4, includes only one PM_{10} monitoring location in 2015. In order to ensure a robust model verification process for the PM_{10} and $PM_{2.5}$ dispersion models, the model domain was extended to include small areas (1km diameter) around PM_{10} monitoring locations in Gosport and Portsmouth.

[4] https://www3.epa.gov/ttn/scram/dispersion_prefrec.htm#aermod

[5] ftp://ftp.ncdc.noaa.gov/pub/data/noaa

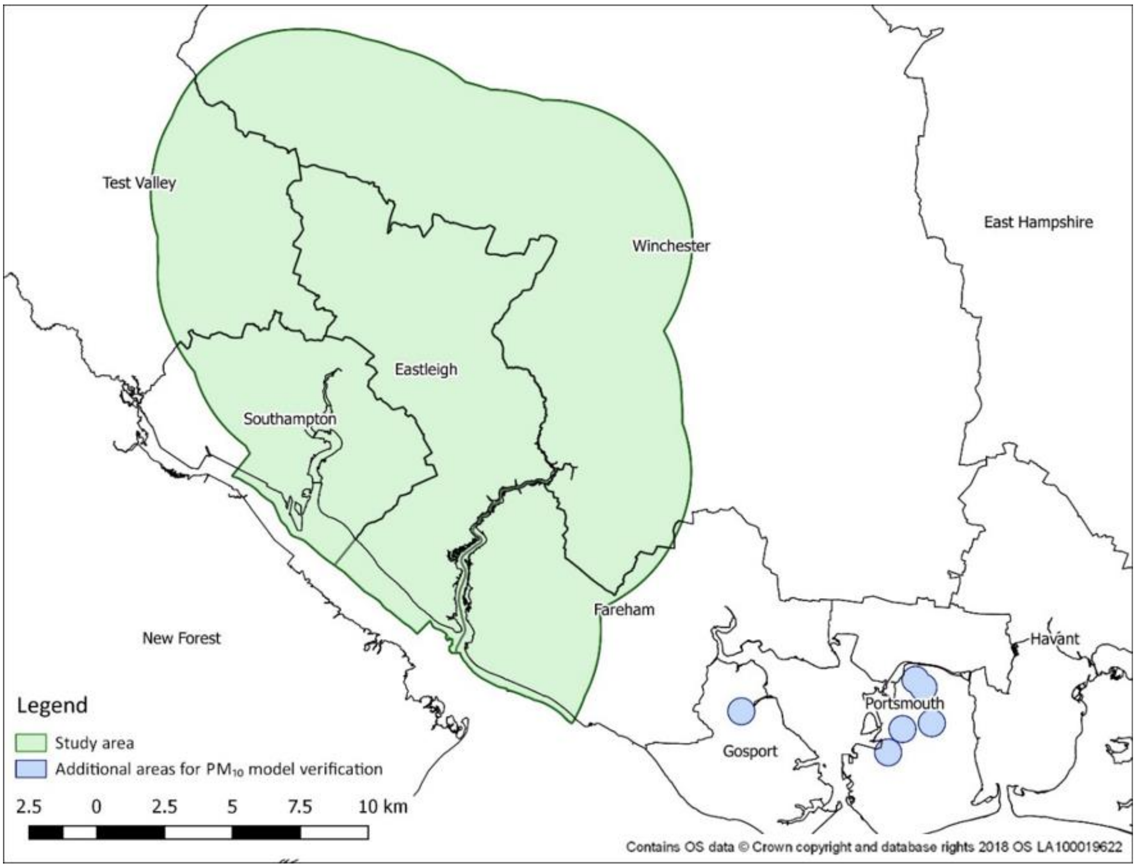
[6] https://www.esrl.noaa.gov/roabs/

[7] https://uk-air.defra.gov.uk/research/air-quality-modelling?view=intercomparison

[8] The 2008 LAEI dataset was used in this context as a benchmarking study, to compare the performance of RapidAIR to other modelling systems. The 2008 LAEI dataset was not used as an input in the current modelling study.

[9] Masey, Nicola, Scott Hamilton, and Iain J. Beverland. "Development and evaluation of the RapidAir® dispersion model, including the use of geospatial surrogates to represent street canyon effects." *Environmental Modelling & Software* (2018). DOI: https://doi.org/10.1016/j.envsoft.2018.05.014

Figure 2-4 Model domain, including the main study area and additional areas for PM_{10} model verification



2.2.3 Emission factors

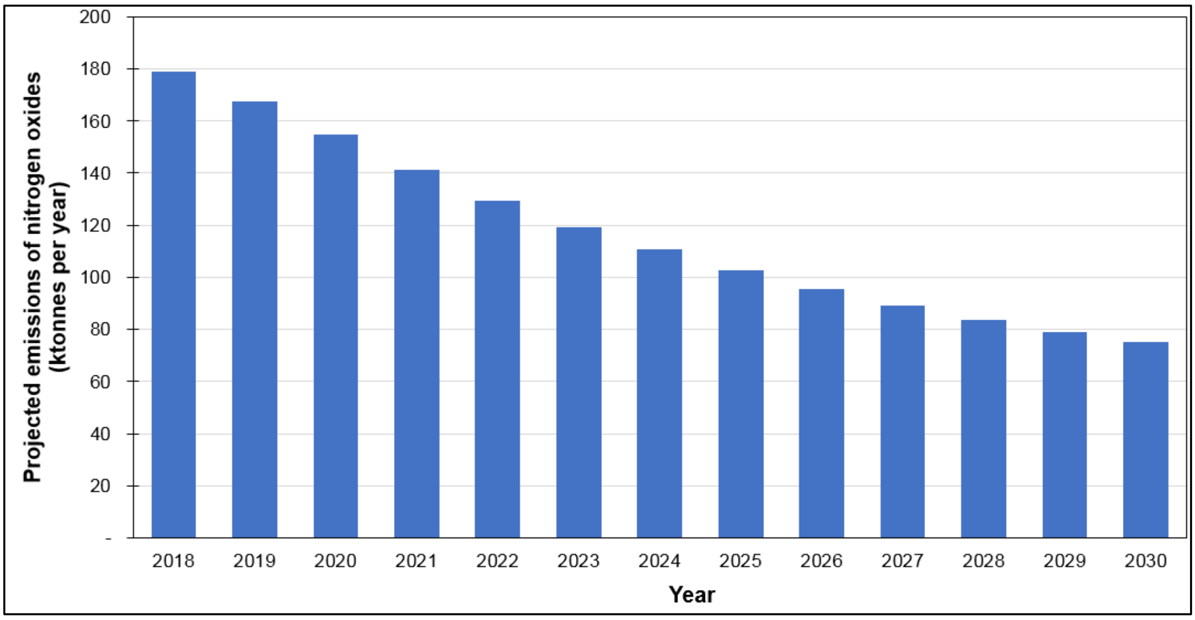
Vehicle emission factors for oxides of nitrogen (NOx) and particulate matter (PM_{10} and $PM_{2.5}$) were obtained from COPERT v5 emission functions.[13] Link specific emission factors were calculated with our in-house emission calculation tool RapidEms, which links directly to our RapidAir dispersion modelling system.

The input for RapidEms consists of a basic fleet split based on vehicle categories (diesel cars, petrol cars, LGVs, articulated HGVs, rigid HGVs, and buses) according to the traffic activity information specified in Section 2.2.4. RapidEms is used to provide a detailed parameterization of vehicle fleets, including all vehicles up to and including Euro 6/VI.

The emission factors for future scenarios are particularly important to understand in the context of declining emissions. Figure 2-5 presents projected road emissions of nitrogen dioxides for approximately 9,000 major UK roads from 2018 to 2030. The emissions in this figure are extracted from the Streamlined Pollution Climate Mapping model (SL-PCM)[10] for the baseline projection scenario, which assumes no further action beyond air quality measures that were committed across the UK by 2015. Although the emissions correspond to a subset of the UK's road network, the decrease in annual NOx emissions is indicative of the expected trend in NOx road emissions going forward, reflecting anticipated improvements in Euro emissions standards as well as changing vehicle fleet composition (see Section 2.2.4).

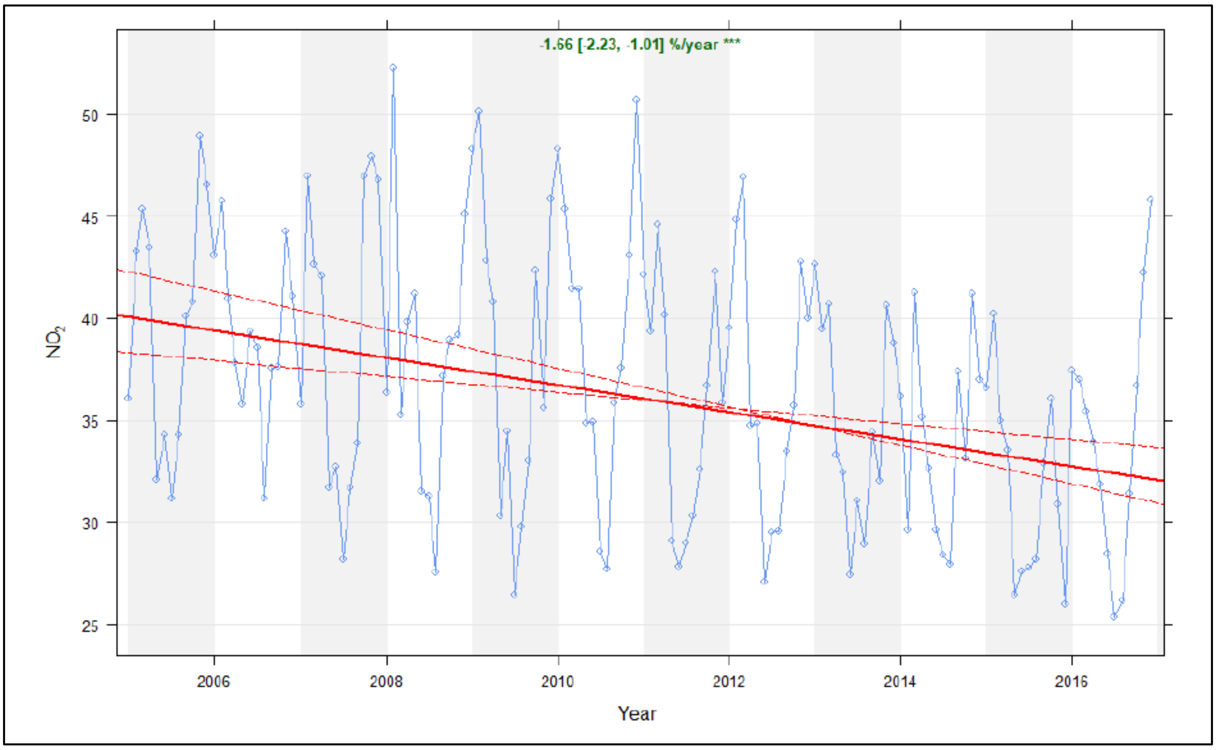
[10] SL-PCM has been developed specifically to model the effect of changes in fleet composition on NO_X emissions and NO_2 concentrations. See https://uk-air.defra.gov.uk/library/no2ten/2017-no2-projections-from-2015-data, accessed 20/09/2018.

Figure 2-5 Projected road emissions of nitrogen oxides (NOx) in ktonnes per year for major UK roads



Indeed, reductions are already being realised. In the study "Nitrogen Dioxide and Nitrogen Oxides Trends in the UK 2005 to 2016"[11] an analysis of NO_2 and NOx concentrations measured across the UK showed that a reduction in concentrations of approximately 1.7% per year has been seen on average between 2005 and 2016. Figure 2-6 presents results for monitoring sites in Southern England and Wales. The plot shows the best fit linear trend line, together with the lines representing the 90% confidence interval. The figure demonstrates a 1.66% reduction per year.

Figure 2-6. Overall NO_2 Trend across All Sites in Southern England and Southern Wales, with TheilSen Fit (% per yr)



[11] Nitrogen Dioxide and Nitrogen Oxides Trends in the UK 2005 to 2016, Air Quality Consultants, 2018. http://www.aqconsultants.co.uk/AQC/media/Reports/NO2-NOx-Trend-Report.pdf

2.2.4 Model scenarios and traffic activity data

Annual average daily traffic (AADT) vehicle numbers and average vehicle speeds were extracted from the SRTM datasets provided by Systra for the seven transport model scenarios (2015 Reference Case, 2036 Baseline, and five 2036 SGO development options, as summarized in Section 2.1.2). Dispersion modelling for the 2015 Reference Case was carried out using 2015 vehicle emission factors. As the COPERT v5 emission functions used to calculate vehicle emission factors are only forecast until the year 2035, dispersion modelling for the 2036 scenarios was carried out using 2035 vehicle emission factors. It is currently anticipated that there will be little difference between vehicle emission factors in 2035 and 2036.

In addition to the 2015 and 2036 dispersion models, a series of pseudo-2030 models were developed by coupling 2036 traffic activity data (obtained from the Systra transport model datasets) with 2030 vehicle emission factors. This set of dispersion models was designed for sensitivity testing, to investigate the predicted air quality impacts of the proposed development options if vehicle emission rates do not improve as much as they are forecast to in the next eighteen years.Table 2-2 provides a summary of the dispersion model scenarios included in this study. Dispersion modelling to predict annual mean concentrations of NO_2, PM_{10} and $PM_{2.5}$ was carried out for all scenarios. Dispersion modelling for comparison with short term air quality objectives (hourly NO_2 and daily PM_{10}) was also carried out for a subset of the scenarios, as indicated in the table.

Table 2-2 Summary of dispersion model scenarios

Dispersion model scenario	Year for vehicle emission factors	Year for transport model data (Systra reference)	Annual mean concentrations modelled?	Short term concentrations modelled?	Description
2015 Reference Case	2015	2015 (DKF)	Yes	Yes	Reference year used for model verification
Pseudo-2030 SGO B/C	2030	2036 (DS3_DPP)	Yes	Yes	Proposed development scenario modelled with higher vehicle emissions as a sensitivity test
Pseudo-2030 SGO C	2030	2036 (DS4_DQG)	Yes	No	
Pseudo-2030 SGO D1	2030	2036 (DS5_DQS)	Yes	No	
Pseudo-2030 SGO D2	2030	2036 (DS7_DQR)	Yes	No	
Pseudo-2030 SGO E	2030	2036 (DS6_DQQ)	Yes	No	
2036 Baseline	2035	2036 (BL_DOP)	Yes	Yes	Includes only those developments that are already committed, and provides a baseline to assess the air quality impacts of new Local Plan development allocations
2036 SGO B/C	2035	2036 (DS3_DPP)	Yes	Yes	Proposed development scenario modelled with

Dispersion model scenario	Year for vehicle emission factors	Year for transport model data (Systra reference)	Annual mean concentrations modelled?	Short term concentrations modelled?	Description
2036 SGO C	2035	2036 (DS4_DQG)	Yes	Yes	vehicle emissions anticipated at Local Plan end date
2036 SGO D1	2035	2036 (DS5_DQS)	Yes	Yes	
2036 SGO D2	2035	2036 (DS7_DQR)	Yes	Yes	
2036 SGO E	2035	2036 (DS6_DQQ)	Yes	Yes	

The SRTM provides a fleet composition breakdown into cars, light goods vehicles (LGVs), heavy goods vehicles (HGVs) and buses. NAEI (National Atmospheric Emissions Inventory) fleet split information can be used to further split cars into petrol and diesel categories, and HGVs into rigid HGV and articulated HGV categories, based on national average fleet composition information and depending on whether the road link is categorized as rural, urban or motorway. For this study, SRTM AADT numbers for cars and HGVs were further categorized based on mapping the SRTM road types onto the NAEI road types as shown in Table 2-3 and Table 2-4. Non-motorway SRTM road types (i.e., A road, B road, shopping, buffer and other) were categorized as either rural or urban based on their location as compared to the 2011 Area Classifications for Output Areas (2011 OAC).[12]

Table 2-3 Matching SRTM fleet composition to EFT (Emission Factor Toolkit) vehicle types for 2015 Reference Case

NAEI Road Type	Petrol Car	Diesel Car	Electric Car	Rigid HGV	Articulated HGV
Urban (not London)	58.60%	41.30%	0.10%	78.39%	21.61%
Rural	52.19%	47.81%	–	52.17%	47.83%
Motorway	42.88%	57.12%	–	31.12%	68.88%

Table 2-4 Matching SRTM fleet composition to EFT vehicle types for pseudo-2030 and 2036 model scenarios*

NAEI Road Type	Petrol Car	Diesel Car	Electric Car	Rigid HGV	Articulated HGV
Urban (not London)	59.72%	34.97%	5.31%	75.84%	24.16%
Rural	57.31%	42.69%	–	47.56%	52.44%
Motorway	49.64%	50.36%	–	28.68%	71.32%

*NAEI projections are available up to 2035, therefore the data in this table are based on fleet projections for 2035.

[12] The National Archives, "2011 Area Classifications", http://www.ons.gov.uk/ons/guide-method/geography/products/area-classifications/ns-area-classifications/ns-2011-area-classifications/index.html, accessed 12/12/2017.

The fleet compositions in Table 2-3 and Table 2-4 were calculated using the most recent set of NAEI fleet projection information available (base year 2016, published February 2017).[13] For years up to 2015, data are based on the actual road traffic statistics published by DfT; while for future years, data are based on DfT's Road Traffic Forecast for the UK, excluding London[14]. It is acknowledged that there is inherent uncertainty in these predictions, as with any look forward at future trends, but these are the most reliable forecasts available and are based on a broad range of expert research, evidence and data.

Since the publication of the 2016 NAEI dataset, the UK government has published a UK Air Quality Plan in 2017 and a draft UK Clean Air Strategy in 2018.[15] Both of these publications reaffirm the UK government's intention for the sale of new conventional petrol and diesel cars and vans to end by 2040, and for almost every car and van on the road to be a zero emission vehicle by 2050.[16] If the UK government is to achieve these objectives, by 2036 the proportion of full plug-in electric vehicles in the national fleet would be greater than the current fleet projection data indicates. Hence if the government is successful in its strategy, and the proportion of electric vehicles in the national fleet is greater in 2036 than indicated in Table 2-4, the transport pollutant emissions and resulting pollutant concentrations modelled in this study for the 2036 scenario are likely to be overpredicted to some extent.

2.2.5 Meteorological data

RapidAir includes an automated meteorological processor based on AERMET which obtains and processes meteorological data of a format suitable for use in AERMOD. Surface meteorological data is obtained from the NOAA online repository[17] and upper air data is downloaded from the NOAA Radiosonde database[18].

For this study, 2015 surface meteorological data was obtained from three stations (Southampton, Middle Wallop and Thorney Island) and upper air meteorological data was obtained from two stations (Larkhill and Herstmonceux). RapidMet was used to carry out data filling where necessary according to the methodology provided by the USEPA in its "Meteorological Monitoring Guidance for Regulatory Modelling Applications" guidance document[19]. Data gaps from the primary meteorological stations (Southampton and Larkhill) are first filled using data from the other nearby stations (Middle Wallop and Thorney Island for surface stations, and Herstomonceux for the upper air station). Remaining data gaps were filled based on the persistence method, where a missing value is replaced by the use of data from the previous hour(s), for data gaps up to and including three hours.

2.2.6 Modelling of annual mean concentrations for NO_2, PM_{10} and $PM_{2.5}$

2.2.6.1 Reference year modelling and model verification

This section provides a summary of the model verification process and the derivation of linear adjustment factors to improve model performance. A more detailed description of the model verification process is presented in Appendix 1.

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[13] National Atmospheric Emissions Inventory, "Emission factors for transport", http://naei.beis.gov.uk/data/ef-transport, accessed 28/06/2018.

[14] https://www.gov.uk/government/publications/road-traffic-forecasts-2015

[15] Department for Environment, Food & Rural Affairs, "Clean Air Strategy 2018", https://consult.defra.gov.uk/environmental-quality/clean-air-strategy-consultation/, accessed 20/07/2018.

[16] Ultra low emission vehicles: evidence review of uptake in the UK (2015), https://www.gov.uk/government/publications/ultra-low-emission-vehicles-evidence-review-of-uptake-in-the-uk

[17] ftp://ftp.ncdc.noaa.gov/pub/data/noaa

[18] https://www.esrl.noaa.gov/roabs/

[19] United States Environmental Protection Agency, "Meteorological Monitoring Guidance for Regulatory Modelling Applications" available via https://www3.epa.gov/scram001/guidance/met/mmgrma.pdf, accessed June 2017.

2.2.6.1.1 Nitrogen dioxide (NO_2) model verification and adjustment

Diffusion tube NO_2 measurements recorded in Eastleigh Borough in 2015 were used for model verification. NO_2 measurements were obtained from the Eastleigh Borough Council website.[20]

Two monitoring sites were excluded from the model verification for the following reasons:

- Southampton Road 1 (SR1) – Removed due to proximity to car park
- Campbell Road (CR) – Removed due to proximity to car park, and located on road not included in the traffic model

After exclusion of the above monitoring sites, a total of 27 NO_2 measurements were carried forward into the model verification step.

RapidAir was used to generate a map of NOx concentrations arising from road traffic sources across the entire study area at a 3m x 3m resolution, based on SRTM traffic activity data from the 2015 Reference Case and 2015 meteorological data. Background NOx values for 2015 were obtained from the 2015 reference year background maps available on the LAQM website.[21] NOx contributions arising from motorway, primary and trunk roads were removed from the background map values to avoid double-counting, and the background values were then added to the RapidAir road NOx results to compare the modelled vs measured concentrations at each of the monitoring locations. This initial comparison indicated that the model was over-predicting the NOx arising from road emissions at most locations. This was established through the comparison of modelled NO_2 concentrations arising from the 2015 NOx model with measured NO_2 concentrations at monitoring locations in 2015; the initial modelled concentrations were higher than the measured concentrations. Refinements were subsequently made to the model inputs to improve model performance where possible, and a linear adjustment factor of 0.8821 was calculated for the road emissions component of the NOx model (see Appendix 1).

Total NOx was calculated as the sum of the adjusted NOx road contribution from RapidAir and the Defra 2015 background maps (with main road sources removed from the background map). Total NO_2 concentrations were derived using the following equation (see Appendix 1 for further details):

$$(NO_2 \text{ in } \mu g/m^3) = -\ 0.001072\ (NOx \text{ in } \mu g/m^3)^2 + 0.5812\ (NOx \text{ in } \mu g/m^3) + 3.2565$$

To evaluate model performance and uncertainty, the Root Mean Square Error (RMSE) for the observed vs predicted NO_2 annual mean concentrations was calculated, as detailed in Technical Guidance LAQM.TG(16). This guidance indicates that an RMSE of up to 4 $\mu g/m^3$ is ideal, and an RMSE of up to 10 $\mu g/m^3$ is acceptable. In this case the RMSE was calculated at 3.74 $\mu g/m^3$, which is within "ideal" the range suggested by the guidance.

2.2.6.1.2 Particulate matter (PM_{10} and $PM_{2.5}$) model verification and adjustment

Automatic particulate matter (PM_{10}) monitoring measurements were used for model verification. A total of 6 PM_{10} measurements were obtained from the Annual Status Reports (ASRs) of Gosport BC, Portsmouth BC and Southampton CC.

RapidAir was used to generate a map of PM_{10} concentrations arising from road traffic sources across the study area at a 3m x 3m resolution, based on SRTM traffic activity data from the 2015 Reference Case and 2015 meteorological data. Background PM_{10} values for 2015 were obtained from the 2015 reference year background maps available on the LAQM website. PM_{10} contributions arising from motorway, trunk and primary roads and also emissions from brake and abrasion were removed from

[20] http://eastleigh.my-air.uk/diffusion-tube-data/

[21] Department for Environment, Food & Rural Affairs, Background maps, https://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html, accessed 20/06/2018.

the background map values to avoid double-counting, and the background values were then added to the RapidAir road PM_{10} results to compare the modelled vs measured concentrations at each of the monitoring locations. The model was under-predicting the PM_{10} arising from road emissions at all monitoring locations, and a linear adjustment factor of 3.3583 was calculated for the road emissions component of the PM_{10} model (see Appendix 1). Total PM_{10} was calculated as the sum of the adjusted PM_{10} road contribution from RapidAir and the Defra 2015 background maps (with main road sources removed from the background map).

To evaluate model performance and uncertainty, the Root Mean Square Error (RMSE) for the observed vs predicted PM_{10} annual mean concentrations was calculated, as detailed in Technical Guidance LAQM.TG(16). In this case the RMSE was calculated at 4.59 µg/m^3, which is acceptable, and close to the “ideal” range suggested by the guidance.

Due to the limited availability of $PM_{2.5}$ monitoring data within the model domain, the linear adjustment factor derived for the PM_{10} model (3.3583) was also used to adjust the road emission results from the RapidAir $PM_{2.5}$ model. Total $PM_{2.5}$ was calculated as the sum of the adjusted $PM_{2.5}$ road contribution from RapidAir and the Defra 2015 background maps (with main road sources removed from the background map).

2.2.6.2 Future scenario modelling

For the pseudo-2030 and 2036 scenarios, RapidAir was used to generate pollutant concentration map across the study area at a 3m x 3m resolution. These maps were generated using SRTM traffic activity data from the appropriate future scenario, emission factors calculated using RapidEms, and 2015 meteorological data.

Pollutant concentration maps for road-only contributions (NO_2, PM_{10}, and $PM_{2.5}$) were calculated using the adjustment factors described in Section 2.2.6.1. Maps for total pollutant concentrations (NO_2, PM_{10}, and $PM_{2.5}$) were calculated by adding the road-only concentration maps to the appropriate pollutant background map from the LAQM website. Background maps for the year 2030 were selected for the pseudo-2030 and 2036 air dispersion models, as this is the farthest year into the future for which background maps are available. 2015 base year maps were selected for consistency with the 2015 (base year 2015) map used in the model verification step.

2.2.7 Modelling of short-term mean concentrations for NO_2 and PM_{10}

This section describes the methodology used to carry out dispersion modelling for short-term air quality objectives using RapidAIR.

2.2.7.1 Short-term air quality objectives for NO_2 and PM_{10}

The air quality objectives for these pollutants are framed as an allowable number of hourly or daily exceedances of a given concentration, for a given averaging period. For NO_2, 18 exceedances of 200 µg/m^3 are allowed each year, based on the observed hourly mean. In the case of PM_{10}, 35 days per year are allowed to exceed an average of 50 µg/m^3. The key difference between the two standards is the averaging period used: hourly for NO_2 and daily for PM_{10}.

2.2.7.2 Configuring RapidAIR for short-term modelling

RapidAIR was configured to produce concentrations of the pollutants of interest which could be compared with the short-term standards described above. As RapidAIR works with dispersion kernels derived in AERMOD, this involves printing values for the kernel grid which align with the short-term standards. In practice this means that RapidAIR/AERMOD is set to provide the 18th highest concentration hour (the 99.8th % ile) in the year for the NOx/NO2 modelling and the 35th highest day (the 90.4th %ile) of the year for the PM_{10} modelling. These dispersion kernels can then be applied to the same emissions grids as the annual mean models, along with the same diurnal emission variation factors, to yield the appropriate concentrations for comparison with the standards.

The steps required to obtain short term concentrations in the study are as follows:

1) Run RapidAIR/AERMOD kernels which describe dispersion of NOx and PM_{10} at the appropriate percentiles
2) Obtain measured values from suitable automatic measurement stations for both pollutants
3) Compare the modelled values with the measured values of NOx and PM_{10}
4) Scale the model results using the relationship obtained in 3)
5) Combine the scaled results with background concentrations
6) Combine these with street canyon modelled concentrations
7) Convert NOx to NO_2
8) Perform a secondary adjustment to the NO_2 model results to account for over prediction and using relationships established at the AURN sites in the South of England.

2.2.7.3 Treatment of background NOx and PM_{10}

The annual mean background concentrations of NOx and PM_{10} were obtained for 2015 as described in Section 2.2.6 of this report. NOx background concentrations were doubled as per Environment Agency guidance for modelling short-term NO_2 in the UK. For PM_{10} we intended to use the same method but found that doubling the background values resulted in concentrations which were higher than those observed at the Southampton AURN station in 2015. Hence, we used the annual mean PM_{10} background concentrations as received. In each case the background concentrations were adjusted in RapidAIR to avoid double counting of road source contributions. Given the predictions for the short-term standards are inherently more uncertain, and so as to maintain conservatism, we used the 2015 background concentrations of NOx and PM_{10} rather than using the values from the future year.

2.2.7.4 Conversion of short-term NOx to NO_2

Whilst there are several ways to convert NOx concentrations from dispersion models to NO_2, these tend to focus on the conversion of annual mean values. Hence, we developed an empirical method based on observations which established a NO_2 conversion ratio that varies with concentration of NOx. In practice this yields a conversion ratio (NO_2:NOx) which approaches 1 at very low concentrations of NOx, and around 0.3 at very high concentrations. We derived the NO_2 ratio for concentrations of NOx ranging from < 2 to 575 µg/m^3 which represents the 1st to the 99.9th percentile of NOx concentrations observed at the AURN measurement station in Southampton. Then we obtained coefficients from a 3rd order polynomial regression of the NO_2 ratio, with total NOx as the only explanatory variable. This provided coefficients we used in the later processing of modelled NOx to obtain ratios that could be used to derive NO_2.

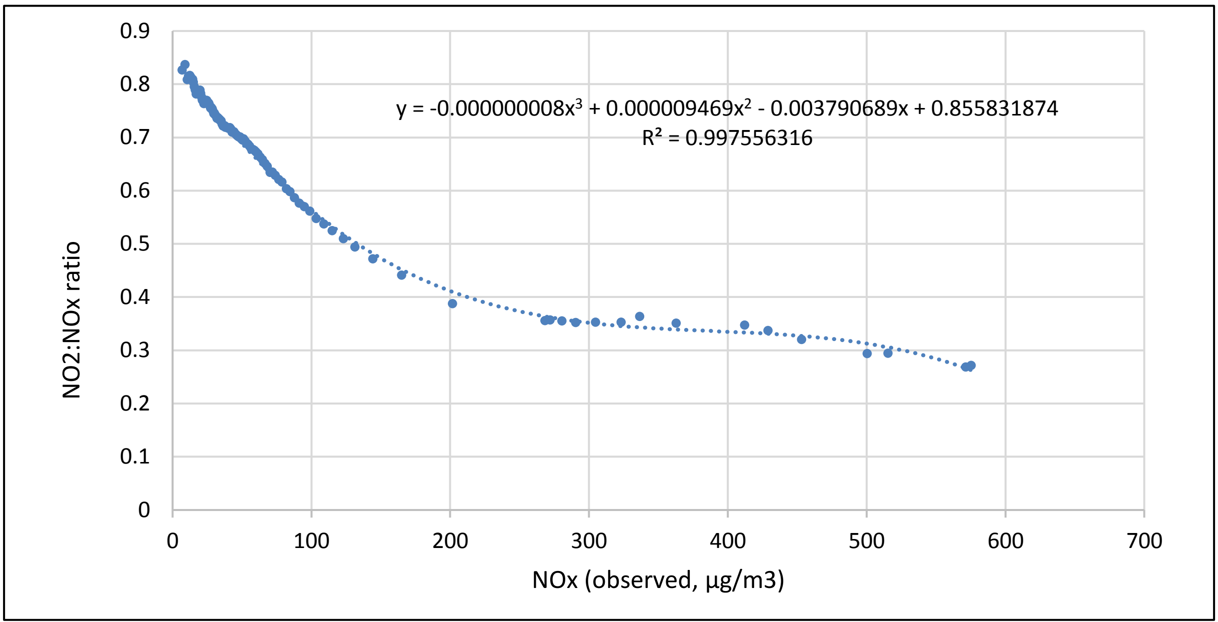
The polynomial expression describing the ratio of total 99.8th %ile NO_2 to total 99.8th %ile NOx is shown in Figure 2-7.

We used the expression in Equation 1 to derive 99.8th %ile NO_2 from 99.8th %ile modelled NOx. This expression was used up to a modelled NOx concentration of 575 µg/m^3. Values higher than this were converted using a fixed ratio of 0.27 (the ratio at the 99.9th%ile).

Equation 1

$$NO_2 = -0.000000008 * NOx^3 + 0.000009469 * NOx^2 - 0.003790689 * NOx + 0.855831874$$

Figure 2-7 Polynomial expression describing NO2 to NOx ratio



2.2.7.5 Model verification for short-term NOx and PM_{10}

In 2015 there was a single automatic air quality station in the modelling domain that could be used to check model performance against the short-term objectives. For NO_x and PM_{10}, we sampled the concentration fields produced by RapidAIR for the short-term standards at the AURN site and compared the result with the measured values (minus the background concentration). The model overpredicted the road traffic component of total NOx and was scaled by 0.37 to bring the results into alignment with the AURN station. For PM_{10} the scaling factor was 1.06.

Each of the modelled NOx and PM_{10} concentration fields for the baseline and scenarios were therefore scaled by 0.37 and 1.06 respectively, before adding background concentrations, street canyon contributions where appropriate, and finally converting to NO_2 and tabulating total PM_{10}.

The PM_{10} results had no further processing applied. In the case of NO_2, we observed that the model was predicting exceedances of the short-term NO_2 standard in the Eastleigh domain which from our experience of air quality measurements elsewhere were not reasonable. Consequently, a further correction was required. We obtained measured concentrations for 2015 from 12 AURN stations in the South of England and derived the 99.8th %ile NO_2 concentration at each. Then we compared this with the measured annual mean NO_2 to obtain a ratio of short-term to long-term NO_2. This yielded an average ratio of 3.75.

We repeated the same procedure at the NO_2 measurement sites in the model domain. This time we derived the ratio of measured annual mean NO_2 to short term modelled NO_2, yielding a ratio of 5.39. To provide a correction factor to apply to the modelled short-term NO_2 results we divided the ratios (3.75 / 5.39) yielding a correction factor of 0.7, which was used to scale all short-term NO_2 results in the study. Although this reduced the accuracy of model results compared to measured values at the single AURN site, this was considered to be a more robust method in the context of wider experience of measured nitrogen dioxide levels.

Table 2-5 Ratio of short-term to long-term NO_2 concentrations at 12 AURN stations

AURN station	NO_2 annual mean (µg/m³)	NO_2 99.8th %ile (µg/m³)	Ratio
Oxford	48.9	152.8	3.12
Southampton	32	143.1	4.47
Storrington	21.3	85.1	4.00
Plymouth	18.9	85	4.50
Portsmouth	18.8	89.5	4.76
Exeter	29.1	104.1	3.58
Bath	53.6	167.8	3.13
Southwark	42.5	159.1	3.74
Marylebone	88.3	219.1	2.48
Chatham	23.2	83.3	3.59
Stanford-le-Hope	23.6	83.7	3.55
Chepstow	36.8	150.6	4.09
		Average	**3.75**

Table 2-6 Ratio of short-term modelled NO_2 concentrations to long-term measured NO_2 concentrations in the Eastleigh model domain

Measurement site	Measured NO_2 (2015 annual mean)	Modelled NO_2 (2015 annual mean)	Modelled NO_2 (2015 short term)	Ratio
HL	32.0	31.7	157.6	4.98
HL2	30.5	30.5	154.9	5.08
HSB	31.5	25.7	117.5	4.58
HSB2	27.7	24.4	119.9	4.90
UNC	28.3	28.8	156.6	5.44
AL	26.1	28.7	155.4	5.41
FOR	21.7	20.4	86.7	4.25
BR	33.0	24.8	111.6	4.51
BR2	33.3	25.4	132.0	5.20
TW	25.2	22.1	105.9	4.78
MS	28.6	26.4	125.4	4.74
SRAN	34.1	27.9	139.0	4.99
CA	24.7	21.7	102.6	4.72
TP	23.5	22.1	106.9	4.83
LRPR	30.2	28.1	155.4	5.54
OX	19.9	24.5	142.3	5.81
HG	18.8	17.8	89.3	5.01
WA	34.1	32.5	160.3	4.94
SC	26.6	26.7	166.1	6.22
BEL	24.7	29.6	193.3	6.53
LR13	38.0	38.1	248.0	6.52

Measurement site	Measured NO_2 (2015 annual mean)	Modelled NO_2 (2015 annual mean)	Modelled NO_2 (2015 short term)	Ratio
MC	24.7	29.3	183.7	6.27
PC	25.5	29.9	193.2	6.47
NH	23.7	25.0	170.7	6.83
AR	10.5	11.3	55.4	4.90
CC	26.5	23.9	146.5	6.12
SSQ	26.6	31.0	172.2	5.56
DD	31.0	36.0	203.6	5.65
				Average = 5.39

The additional scaling step essentially snaps the short-term concentrations to follow a robust long-term vs. short-term relationship taken from the AURN network, whilst retaining the spatial variation provided by RapidAIR. The net effect of this was to reduce the 'raw' modelled concentrations of peak NO_2, so that exceedances were no longer predicted in the baseline results. This is sensible given the 2015 measured values in Eastleigh are below the annual mean NO_2 standard, which means the short-term values are almost certainly unlikely to exceed.

2.2.8 Sources of model uncertainty

There are a number of sources of model uncertainty inherent in this type of study, as discussed below:

- A monitoring site used to derive the linear adjustment factor might be located next to a large car park, bus stop, petrol station, or taxi rank that has not been explicitly modelled due to unknown activity data. This would have the effect of artificially inflating the calculated adjustment factor, resulting in an over-prediction of impacts. Where we have identified such locations, we have removed these from the model verification process.
- A monitoring site used to derive the linear adjustment factor might be located in an area where not all of the road sources contributing to pollutant concentrations have been modelled, i.e. at a junction. This would have the effect of artificially inflating the calculated adjustment factor, resulting in an over-prediction of impacts.
- Uncertainties in the traffic model outputs on modelled road links, with regards to number of vehicles, type of vehicles and vehicle speed. The number of low emission vehicles in the future development scenarios may also be underestimated if the UK government is successful in ending the sale of all conventional diesel and petrol cars and vans by 2040, which could result in a systematic over-estimation of future air quality impacts.
- Uncertainties in the real-world emissions from vehicles complying with the currently applicable Euro 6/VI vehicle emissions standards. Early real-world emission test results of Euro 6 vehicles indicate mixed results, ranging from vehicles which met the Euro 6 standards under real-world driving emissions to vehicles which displayed NOx emissions up to 12 times higher than the Euro 6 standard.[22,23] However, the increasing use of real-world emissions tests is likely to intensify pressure on vehicle manufacturers to comply with these more stringent Euro standards.

[22] The Real Urban Emissions Initiative, https://www.trueinitiative.org/, accessed 20/06/2018.

[23] Emissions Analytics, EQUA Index, https://equaindex.com/equa-air-quality-index/, accessed 20/06/2018.

- Uncertainties in the background maps used to develop model adjustment factors and predict total modelled concentrations, with regards to other sources of pollution, such as industrial sources, domestic heating, port activity and forest fires.
- Background maps for the year 2030 were used to calculate total pollutant concentrations in the 2036 scenarios, as that is the farthest year into the future for which background maps are available. Background concentrations in 2030 are not expected to differ significantly from background concentrations in 2036, taking into account the uncertainties associated with the interpolation process and forecasting 12-18 years into the future. If anything, the 2030 maps are expected to be slightly conservative (i.e. over-predict) NOx and NO_2 levels in 2036. There is no strong reason to anticipate that the 2030 maps for PM_{10} and $PM_{2.5}$ would be over- or under-predictions of the levels expected to occur in 2036.
- Uncertainties in the dispersion modelling process. These are accounted for so far as possible through the model verification process, but there inevitably remain some differences between modelled concentrations and the levels that would be measured in practice.

3 Assessment of air quality related to human health

This section describes the impact of the EBLP development options on air quality related to human health.

3.1 Overview of air quality standards for human health

Table 3-1 summarises the air quality objectives relevant in this study. For Local Air Quality Management purposes, and for the assessment of air quality against the air quality objectives, personal exposure is also important. Therefore, predicted concentrations greater than the values listed in Table 3-1 at a given location do not necessarily indicate an exceedance of the Air Quality Objective. Rather, the predicted concentrations should be considered in the context of personal exposure, with consideration given to the types of locations where the Air Quality Objectives should apply (Table 3-2).

Table 3-1 Air Quality Objectives in England

Pollutant	Air Quality Objective	Measured as
Nitrogen dioxide	200 µg/m^3 not to be exceeded more than 18 times a year; equivalent to a 99.8th percentile of hourly means not exceeding 200 µg/m^3	1-hour mean
	40 µg/m^3	Annual mean
Particulate Matter (PM_{10})	50 µg/m^3, not to be exceeded more than 35 times a year; equivalent to a 90.4th percentile of daily means not exceeding 50 µg/m^3	24-hour mean
	40 µg/m^3	Annual mean
Particulate Matter ($PM_{2.5}$); to be achieved by 2020 and maintained thereafter	25 µg/m^3	Annual mean

Table 3-2 Examples of where the Air Quality Objectives should apply[24]

Averaging Period	Objectives should apply at:	Objectives should generally not apply at:
Annual mean	All locations where members of the public might be regularly exposed. Building façades of residential properties, schools, hospitals, care homes etc.	Building façades of offices or other places of work where members of the public do not have regular access. Hotels, unless people live there as their permanent residence. Gardens of residential properties. Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short term.
1-hour mean	All locations where the annual mean and: 24 and 8-hour mean objectives apply. Kerbside sites (for example, pavements of busy shopping streets). Those parts of car parks, bus stations and railway stations etc. which are not fully enclosed, where members of the public might reasonably be expected to spend one hour or more.	Kerbside sites where the public would not be expected to have regular access.

[24] Department for Environment Food and Rural Affairs, "Local Air Quality Management: Technical Guidance (TG16)", April 2016.

Averaging Period	Objectives should apply at:	Objectives should generally not apply at:
	Any outdoor locations where members of the public might reasonably be expected to spend one hour or longer.	

There are no current legal obligations on local authorities in relation to compliance with the $PM_{2.5}$ air quality objective. However, local authorities are expected to make efforts to reduce emissions and/or concentrations of the pollutant through the application of measures, as described in their Annual Status Report.

3.2 Air Quality Management Areas (AQMAs) within Eastleigh Borough

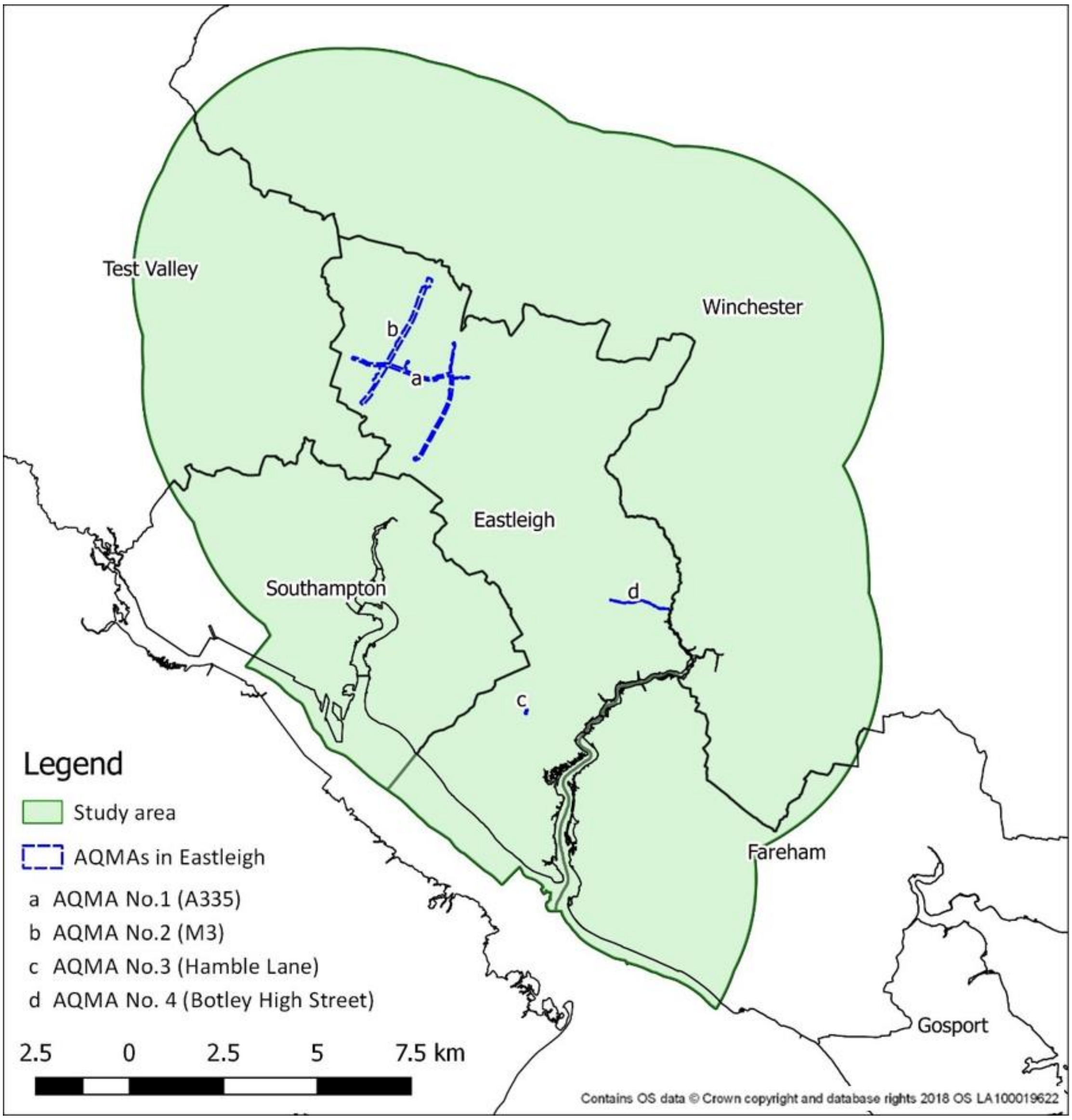
Each local authority in England has a responsibility under the Environment Act 1995 to assess and monitor, as required, nitrogen dioxide concentrations within its council area. If nitrogen dioxide (NO_2) concentrations either exceed the annual objective concentration of 40 µg/m^3 or there are more than 18 exceedances of the 1-hour objective of 200 µg/m^3 in a year, the local authority is required to declare an Air Quality Management Area (AQMA) and develop an Air Quality Action Plan to prevent further exceedances. Similarly, local authorities are also required to declare an AQMA and develop an Air Quality Action Plan if particulate matter (PM_{10}) concentrations exceed the objectives set out in Table 3-1.

As of January 2018, a total of four AQMAs have been declared in Eastleigh Borough. These are listed in Table 3-3 and displayed in Figure 3-1. All were declared on the basis of exceedance of the annual mean objective for nitrogen dioxide.

Table 3-3 Location of Air Quality Management Areas within Eastleigh Borough (as of January 2018)

Local Authority	AQMA ref	Title	Description	Area, Hectares
Eastleigh Borough Council (EBC)	1660	AQMA No.1 (A335)	A corridor of land 30m either side of the road from the Wide Lane roundabout at Southampton Airport Parkway Station northwards up Wide Lane, Southampton Road and Station Hill (A335) to the Station Hill, Romsey Road, Twyford Road, Coles Close and Bishopstoke Road roundabout and then west along Romsey Road and Leigh Road (A335) under the M3 to the junction of Leigh Road and Bournemouth Road (B3043).	41.9
	453	AQMA No.2 (M3)	An area extending either side of the M3 motorway between junctions 12 to 14.	39.5
	454	AQMA No.3 (Hamble Lane)	An area encompassing a number of properties along Hamble Lane, Bursledon between the junctions with Jurd Way and Portsmouth Road.	0.5
	1680	AQMA No. 4 (High Street Botley)	The designated area incorporates the A334 from the Borough boundary east of the junction with the B3354, Winchester Street, to its junction with Woodhouse Lane incorporating Broad Oak and a 5m corridor either side of it	2.7

Figure 3-1 Location of Air Quality Management Areas (AQMAs) within Eastleigh Borough



3.3 Modelled receptor points

In order to investigate the impact of different model scenarios on AQMAs and neighbouring local authorities, model results from the 3m x 3m grid were extracted at receptor points located within AQMAs and near key routes connecting Eastleigh with neighbouring local authorities. The locations of these modelled receptor points are shown in Figure 3-2 and Figure 3-3, and the reference IDs for the receptor points are summarized in Table 3-4.

While many of the modelled receptor points are located at existing NO_2 diffusion tube monitoring sites, additional modelled receptor points were added as appropriate to ensure a thorough assessment; the location of these additional points was selected to represent locations where human exposure to air pollution may occur (i.e., along pavements or near residential properties). Modelled receptor points that do not coincide with a diffusion tube location are marked with an asterisk in figures and tables.

Figure 3-2 Receptor points located within AQMAs and near key routes connecting Eastleigh with neighbouring local authorities (North)

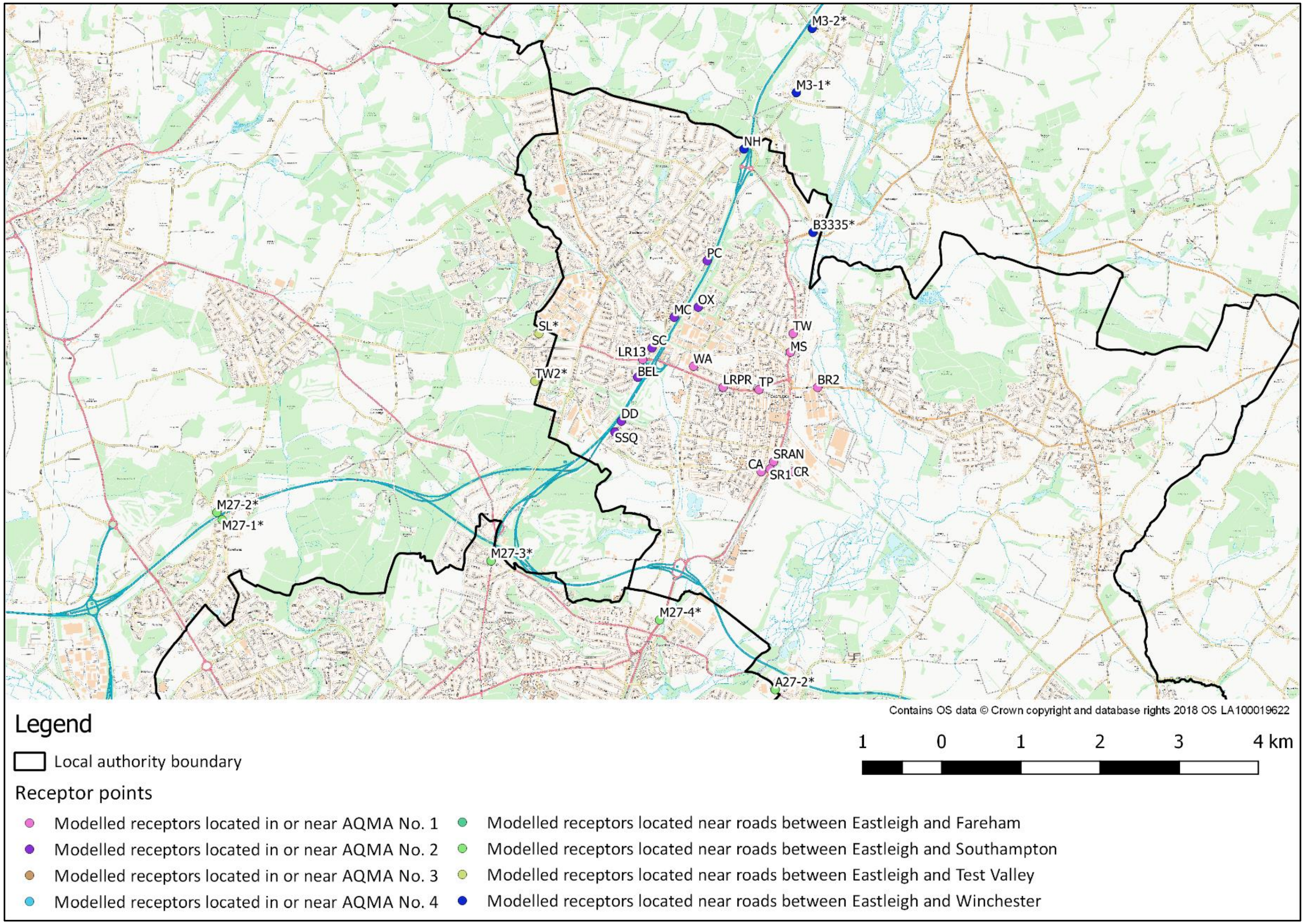


Figure 3-3 Receptor points located within AQMAs and near key routes connecting Eastleigh with neighbouring local authorities (South)

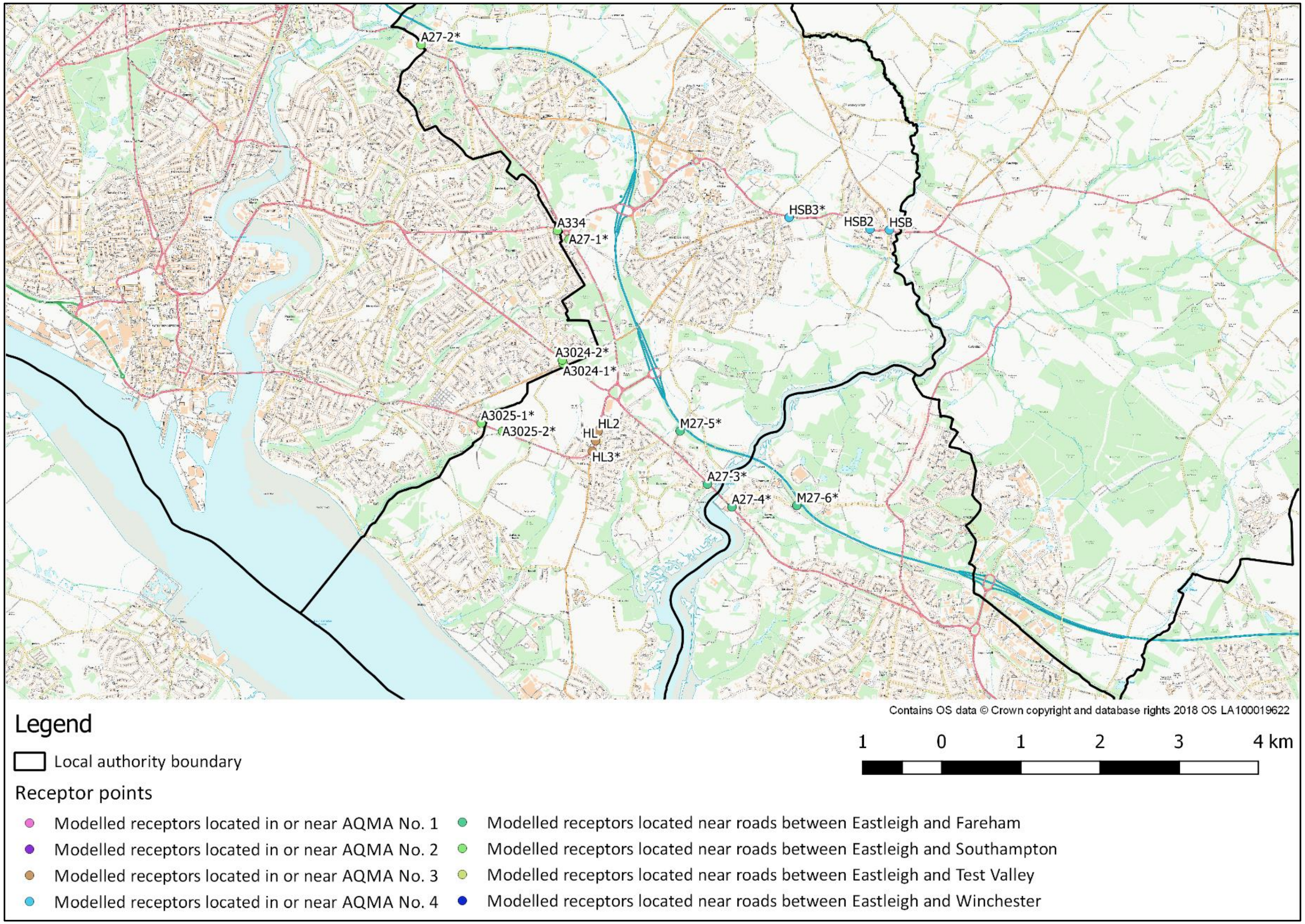


Table 3-4 References and descriptions for modelled receptor points

Modelled receptor reference	Full site name
Modelled receptors located in or near AQMA No. 1	
BR2	Bishopstoke Road 2
CA	Chestnut Avenue
CR	Campbell Road
LR13	Leigh Road / J13
LRPR	Leigh Road / Pluto Road
MS	Mill Street
SR1	Southampton Road 1
SRAN	Southampton Road / Analyser
TP	The Point
TW	Twyford Road
WA	Woodside Avenue
Modelled receptors located in or near AQMA No. 2	
BEL	Belmont Road
DD	Dove Dale
MC	Medina Close
OX	Oxburgh Close
PC	Porteous Crescent
SC	Steele Close
SSQ	Sparrow Square
Modelled receptors located in or near AQMA No. 3	
HL	Hamble Lane
HL2	Hamble Lane 2
HL3*	Hamble Lane 3
Modelled receptors located in or near AQMA No. 4	
HSB	High Street Botley
HSB2	High Street Botley 2
HSB3*	High Street Botley 3
Modelled receptors located near roads between Eastleigh and Southampton	
M27-1*	M27 1
M27-2*	M27 2
M27-3*	M27 Bassett Ave
M27-4*	M27 Stoneham Way
A3024-1*	A3024 Bursledon Rd 1
A3024-2*	A3024 Bursledon Rd 2
A27-1*	A27 1
A27-2*	A27 Mansbridge Rd
A3025-1*	A3025 Portsmouth Rd
A3025-2*	A3025 Sholing Football Club
A334*	A334
Modelled receptors located near roads between Eastleigh and Fareham	
M27-5*	M27 Dodwell Ln
M27-6*	M27 Swanwick Ln

Modelled receptor reference	Full site name
A27-3*	A27 Bridge Rd 1
A27-4*	A27 Bridge Rd 2
Modelled receptors located near roads between Eastleigh and Winchester	
B3335*	B3335 Allbrook Hill
NH	Nuffield Hospital
M3-1*	M3 Otterbourne Main Rd
M3-2*	M3 Poles Ln
Modelled receptors located near roads between Eastleigh and Test Valley	
TW2*	Templars Way
SL*	School Lane

*Denotes a custom location used for modelling purposes; this site is not a monitoring location.

3.4 Model results

The annual mean model results for NO_2, PM_{10} and $PM_{2.5}$ are summarized in Table 3-5, Table 3-6 and Table 3-7 respectively. The short-term model results, for 99.8th percentile of hourly mean NO_2 concentrations and 90.4th percentile of daily mean PM_{10} concentrations, are summarized in Table 3-8 and Table 3-9 respectively. These results are expressed in terms of a percentage change in air pollution concentration between the 2015 Reference Case and the future year scenarios. The modelled receptor points were grouped by location, according to the split provided in Table 3-4, and the average change in concentration was calculated for each location category. Negative values indicate that the pollutant concentration in the future year scenario is lower than in the 2015 Reference Case, and therefore correspond to an improvement in air quality. Detailed results, including modelled air pollutant concentrations (µg/m^3) at each receptor point, are included in Appendix 2.

Maps displaying the modelled annual mean concentration results for the 2015 Reference Case and the scenarios corresponding to the council's preferred option for new development (pseudo-2030 SGO B/C and 2036 B/C) are provided in Figure 3-4 to Figure 3-57. Maps displaying the short-term model results are provided in Figure 3-58 to Figure 3-93. Maps corresponding to the other modelled scenarios are provided in Appendix 3. In all maps, the colour schemes have been set so that areas predicted to exceed the air quality objective are displayed in orange or red.

Table 3-5 Summary of model results for annual mean NO_2 concentrations (road contribution + background concentration): average change in concentration (%) between 2015 Reference Case and future year scenarios

Location of modelled receptor points	Average change in concentration (%) between 2015 Reference Case and pseudo-2030 model scenarios					Average change in concentration (%) between 2015 Reference Case and 2036 model scenarios					
	P-2030 SGO B/C	P-2030 SGO C	P-2030 SGO D1	P-2030 SGO D2	P-2030 SGO E	2036 SGO B/C	2036 SGO C	2036 SGO D1	2036 SGO D2	2036 SGO E	2036 Baseline
In or near AQMA No. 1	-42.7%	-42.6%	-42.5%	-42.5%	-42.7%	-45.1%	-45.0%	-44.9%	-44.9%	-45.3%	-45.6%
In or near AQMA No. 2	-47.9%	-47.9%	-48.0%	-48.0%	-48.0%	-51.2%	-51.3%	-51.3%	-51.3%	-51.4%	-51.6%
In or near AQMA No. 3	-32.2%	-32.2%	-32.3%	-32.3%	-32.3%	-35.8%	-35.9%	-35.9%	-35.9%	-37.7%	-37.9%
In or near AQMA No. 4	-49.5%	-49.6%	-49.6%	-49.6%	-49.5%	-50.3%	-50.3%	-50.4%	-50.4%	-50.1%	-43.2%
Near roads between Eastleigh and Southampton	-38.5%	-38.6%	-38.6%	-38.7%	-38.6%	-40.8%	-40.9%	-40.9%	-40.9%	-41.2%	-41.2%
Near roads between Eastleigh and Fareham	-36.7%	-36.6%	-36.7%	-36.7%	-36.7%	-39.5%	-39.4%	-39.4%	-39.4%	-39.6%	-39.6%
Near roads between Eastleigh and Winchester	-47.7%	-46.1%	-46.2%	-46.2%	-46.3%	-50.6%	-49.3%	-49.4%	-49.4%	-49.3%	-49.7%
Near roads between Eastleigh and Test Valley	-36.7%	-36.5%	-36.5%	-36.5%	-36.5%	-38.6%	-38.4%	-38.4%	-38.4%	-38.3%	-38.4%

Table 3-6 Summary of model results for annual mean PM_{10} concentrations (road contribution + background concentration): average change in concentration (%) between 2015 Reference Case and future year scenarios

Location of modelled receptor points	Average change in concentration (%) between 2015 Reference Case and pseudo-2030 model scenarios					Average change in concentration (%) between 2015 Reference Case and 2036 model scenarios					
	P-2030 SGO B/C	P-2030 SGO C	P-2030 SGO D1	P-2030 SGO D2	P-2030 SGO E	2036 SGO B/C	2036 SGO C	2036 SGO D1	2036 SGO D2	2036 SGO E	2036 Baseline
In or near AQMA No. 1	-4.8%	-4.8%	-4.6%	-4.2%	-5.0%	-4.9%	-4.9%	-4.7%	-4.6%	-5.1%	-5.5%
In or near AQMA No. 2	-8.0%	-8.3%	-8.4%	-9.0%	-8.5%	-8.1%	-8.4%	-8.5%	-8.5%	-8.6%	-8.6%
In or near AQMA No. 3	2.0%	2.0%	2.0%	1.1%	1.9%	1.8%	1.9%	1.8%	1.8%	1.8%	1.3%
In or near AQMA No. 4	-26.1%	-26.3%	-26.4%	-26.8%	-26.3%	-26.1%	-26.4%	-26.4%	-26.5%	-26.3%	-6.4%
Near roads between Eastleigh and Southampton	-2.8%	-3.0%	-3.0%	-3.4%	-3.1%	-2.9%	-3.1%	-3.1%	-3.3%	-3.1%	-3.2%
Near roads between Eastleigh and Fareham	-2.2%	-2.0%	-2.1%	-2.9%	-2.1%	-2.3%	-2.1%	-2.2%	-2.2%	-2.2%	-2.2%
Near roads between Eastleigh and Winchester	-9.0%	-6.0%	-6.4%	-7.1%	-6.5%	-9.1%	-6.1%	-6.5%	-6.5%	-6.6%	-6.9%
Near roads between Eastleigh and Test Valley	-5.1%	-4.9%	-4.8%	-5.7%	-4.9%	-5.2%	-4.9%	-4.9%	-4.9%	-5.0%	-5.1%

Table 3-7 Summary of model results for annual mean $PM_{2.5}$ concentrations (road contribution + background concentration): average change in concentration (%) between 2015 Reference Case and future year scenarios

Location of modelled receptor points	Average change in concentration (%) between 2015 Reference Case and pseudo-2030 model scenarios					Average change in concentration (%) between 2015 Reference Case and 2036 model scenarios					
	P-2030 SGO B/C	P-2030 SGO C	P-2030 SGO D1	P-2030 SGO D2	P-2030 SGO E	2036 SGO B/C	2036 SGO C	2036 SGO D1	2036 SGO D2	2036 SGO E	2036 Baseline
In or near AQMA No. 1	-8.9%	-8.9%	-8.7%	-8.7%	-9.1%	-9.0%	-9.0%	-8.8%	-8.8%	-9.2%	-9.4%
In or near AQMA No. 2	-13.0%	-13.2%	-13.4%	-13.3%	-13.4%	-13.1%	-13.3%	-13.5%	-13.5%	-13.5%	-13.5%
In or near AQMA No. 3	-2.9%	-2.9%	-2.9%	-3.0%	-2.9%	-3.0%	-3.0%	-3.1%	-3.1%	-3.1%	-3.5%
In or near AQMA No. 4	-28.3%	-28.6%	-28.6%	-28.6%	-28.5%	-28.4%	-28.6%	-28.6%	-28.7%	-28.5%	-10.4%
Near roads between Eastleigh and Southampton	-7.8%	-8.0%	-8.0%	-8.1%	-8.0%	-7.9%	-8.1%	-8.1%	-8.2%	-8.1%	-8.1%
Near roads between Eastleigh and Fareham	-6.9%	-6.7%	-6.8%	-6.8%	-6.8%	-7.0%	-6.8%	-6.9%	-6.9%	-6.9%	-6.9%
Near roads between Eastleigh and Winchester	-13.1%	-10.4%	-10.6%	-10.6%	-10.7%	-13.2%	-10.5%	-10.7%	-10.7%	-10.8%	-11.1%
Near roads between Eastleigh and Test Valley	-8.4%	-8.1%	-8.1%	-8.1%	-8.2%	-8.4%	-8.2%	-8.1%	-8.1%	-8.2%	-8.3%

Table 3-8 Summary of model results for 99.8th percentile of hourly mean NO_2 concentrations (road contribution + background concentration): average change in concentration (%) between 2015 Reference Case and future year scenarios

Location of modelled receptor points	Average change in concentration (%) between 2015 Reference Case and pseudo-2030 model scenarios					Average change in concentration (%) between 2015 Reference Case and 2036 model scenarios					
	P-2030 SGO B/C	P-2030 SGO C	P-2030 SGO D1	P-2030 SGO D2	P-2030 SGO E	2036 SGO B/C	2036 SGO C	2036 SGO D1	2036 SGO D2	2036 SGO E	2036 Baseline
In or near AQMA No. 1	-46.8%	-46.7%	-46.4%	-46.4%	-46.8%	-50.7%	-50.7%	-50.4%	-50.4%	-50.8%	-51.1%
In or near AQMA No. 2	-52.0%	-52.0%	-52.1%	-52.2%	-52.2%	-56.1%	-56.1%	-56.2%	-56.2%	-56.2%	-56.3%
In or near AQMA No. 3	-41.3%	-41.3%	-41.3%	-41.4%	-41.3%	-45.4%	-45.5%	-45.5%	-45.5%	-45.5%	-45.7%
In or near AQMA No. 4	-59.9%	-60.1%	-60.1%	-60.2%	-60.0%	-62.5%	-62.7%	-62.8%	-62.8%	-62.6%	-49.1%
Near roads between Eastleigh and Southampton	-46.0%	-46.1%	-46.1%	-46.2%	-46.1%	-49.6%	-49.7%	-49.7%	-49.8%	-49.7%	-49.8%
Near roads between Eastleigh and Fareham	-45.7%	-45.5%	-45.6%	-45.6%	-45.5%	-49.5%	-49.4%	-49.5%	-49.5%	-49.4%	-49.5%
Near roads between Eastleigh and Winchester	-48.6%	-46.9%	-47.0%	-47.1%	-47.1%	-53.1%	-51.5%	-51.6%	-51.6%	-51.7%	-52.0%
Near roads between Eastleigh and Test Valley	-43.1%	-42.9%	-42.9%	-43.0%	-43.0%	-47.8%	-47.6%	-47.6%	-47.6%	-47.6%	-47.8%

Table 3-9 Summary of model results for 90.4th percentile of daily mean PM_{10} concentrations (road contribution + background concentration): average change in concentration (%) between 2015 Reference Case and future year scenarios

Location of modelled receptor points	Average change in concentration (%) between 2015 Reference Case and pseudo-2030 model scenarios					Average change in concentration (%) between 2015 Reference Case and 2036 model scenarios					
	P-2030 SGO B/C	P-2030 SGO C	P-2030 SGO D1	P-2030 SGO D2	P-2030 SGO E	2036 SGO B/C	2036 SGO C	2036 SGO D1	2036 SGO D2	2036 SGO E	2036 Baseline
In or near AQMA No. 1	-1.8%	-2.0%	-1.6%	-1.5%	-2.4%	-2.0%	-2.1%	-1.7%	-1.7%	-2.5%	-3.0%
In or near AQMA No. 2	-7.9%	-8.3%	-8.6%	-8.5%	-8.6%	-8.1%	-8.5%	-8.7%	-8.7%	-8.8%	-8.8%
In or near AQMA No. 3	6.3%	6.4%	6.3%	6.2%	6.3%	6.1%	6.2%	6.1%	6.0%	6.1%	5.5%
In or near AQMA No. 4	-32.3%	-32.7%	-32.8%	-32.9%	-32.6%	-32.4%	-32.8%	-32.9%	-32.9%	-32.7%	-3.8%
Near roads between Eastleigh and Southampton	1.1%	0.8%	0.8%	0.5%	0.7%	1.0%	0.6%	0.6%	0.4%	0.6%	0.4%
Near roads between Eastleigh and Fareham	1.3%	1.6%	1.5%	1.4%	1.5%	1.1%	1.4%	1.3%	1.2%	1.3%	1.3%
Near roads between Eastleigh and Winchester	-8.1%	-4.9%	-5.4%	-5.5%	-5.6%	-8.2%	-5.0%	-5.6%	-5.6%	-5.7%	-6.2%
Near roads between Eastleigh and Test Valley	-2.9%	-2.6%	-2.5%	-2.5%	-2.7%	-3.0%	-2.7%	-2.6%	-2.6%	-2.8%	-3.0%

Figure 3-4 Annual mean NO_2 concentration model results for 2015 Reference Case

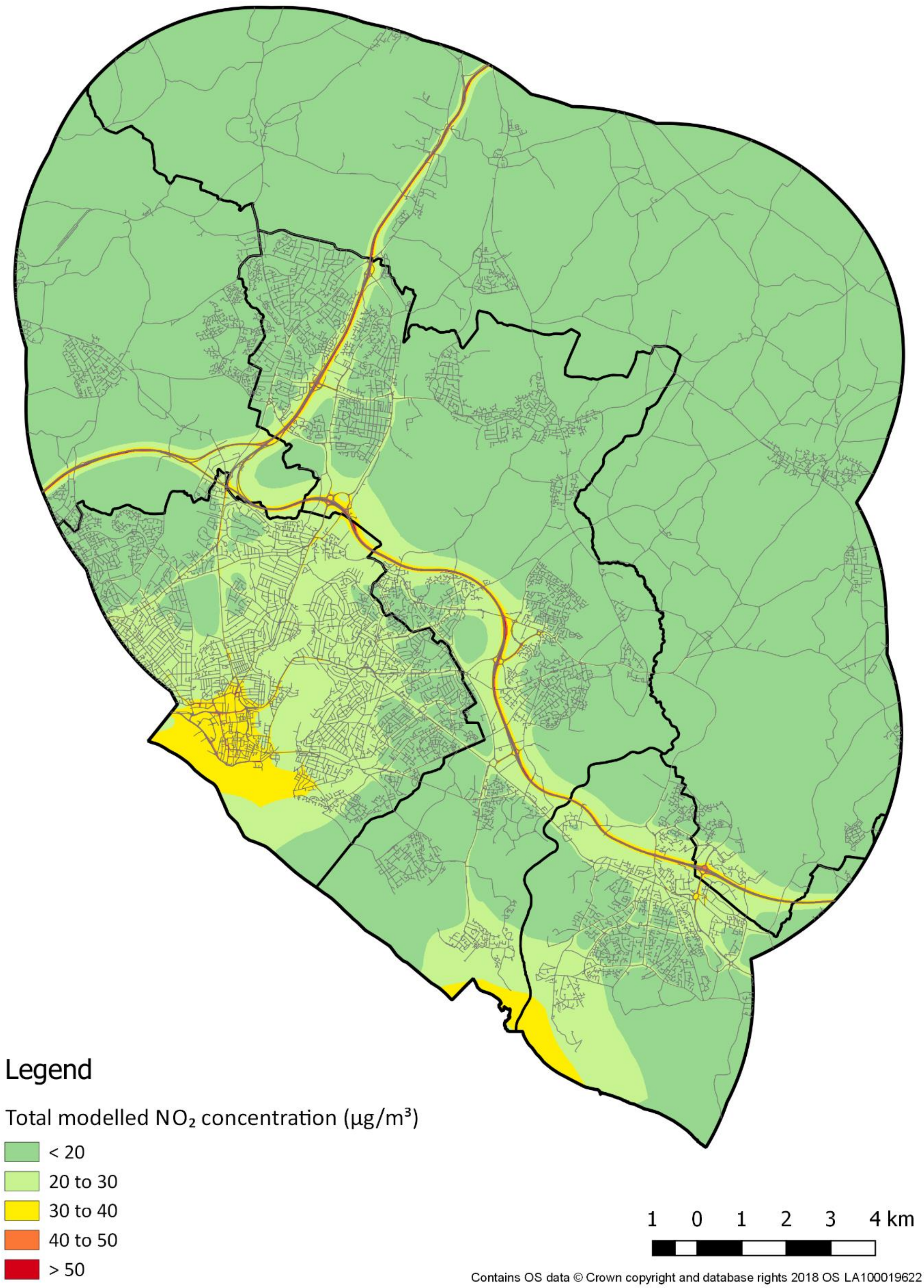


Figure 3-5 Annual mean NO_2 concentration model results for pseudo-2030 SGO B/C scenario

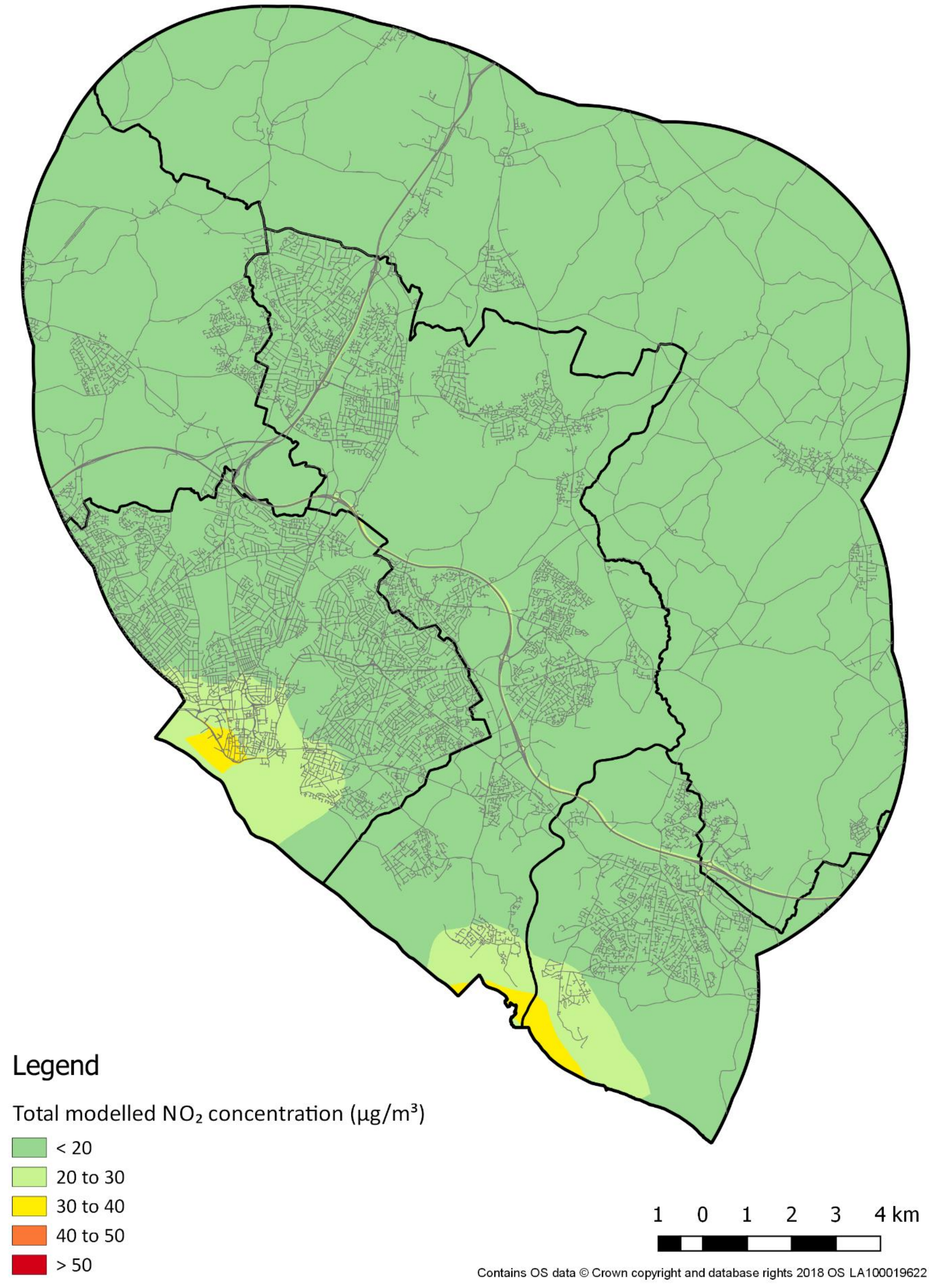


Figure 3-6 Annual mean NO_2 concentration model results for 2036 SGO B/C scenario

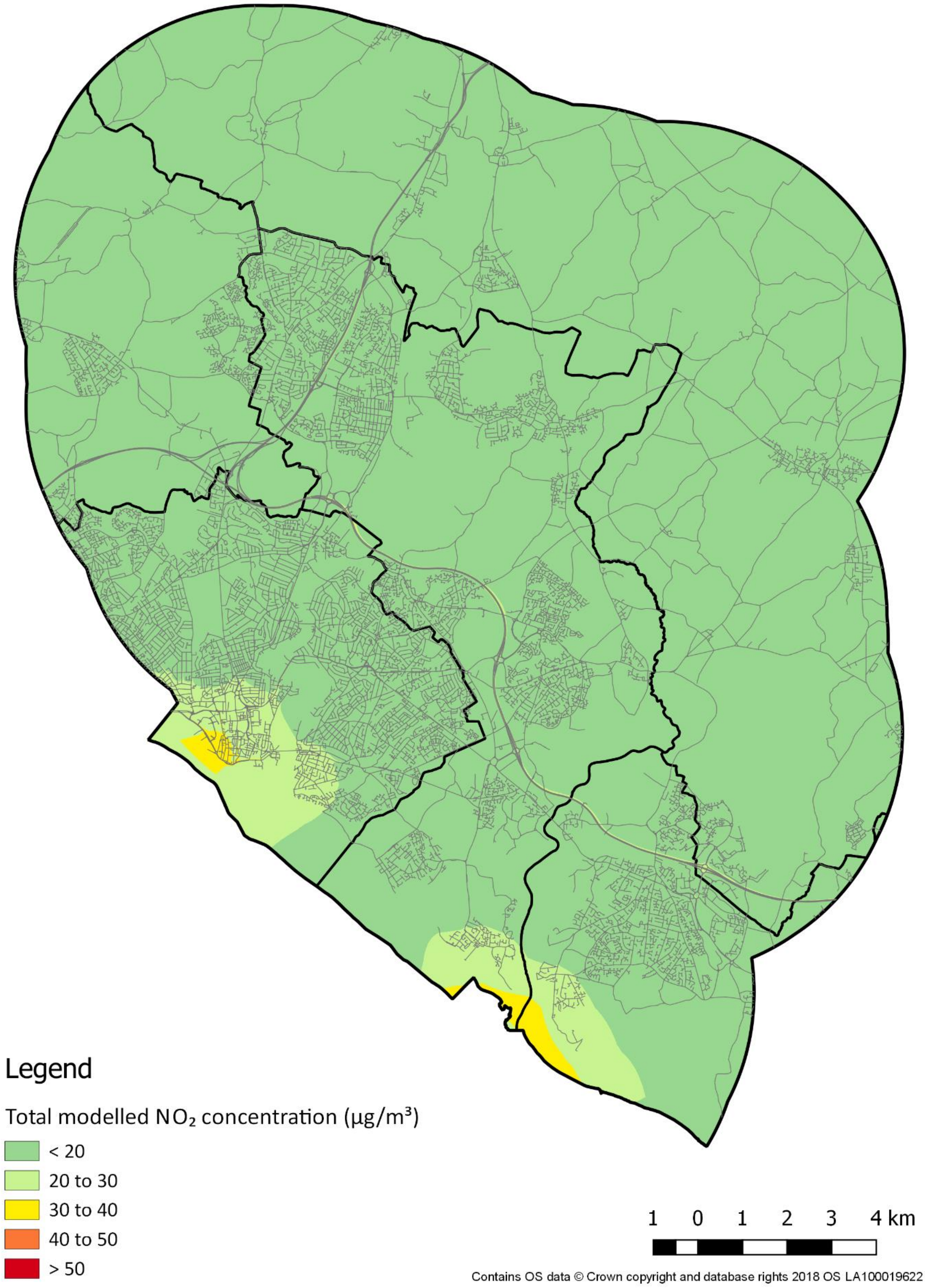


Figure 3-7 Annual mean PM_{10} concentration model results for 2015 Reference Case

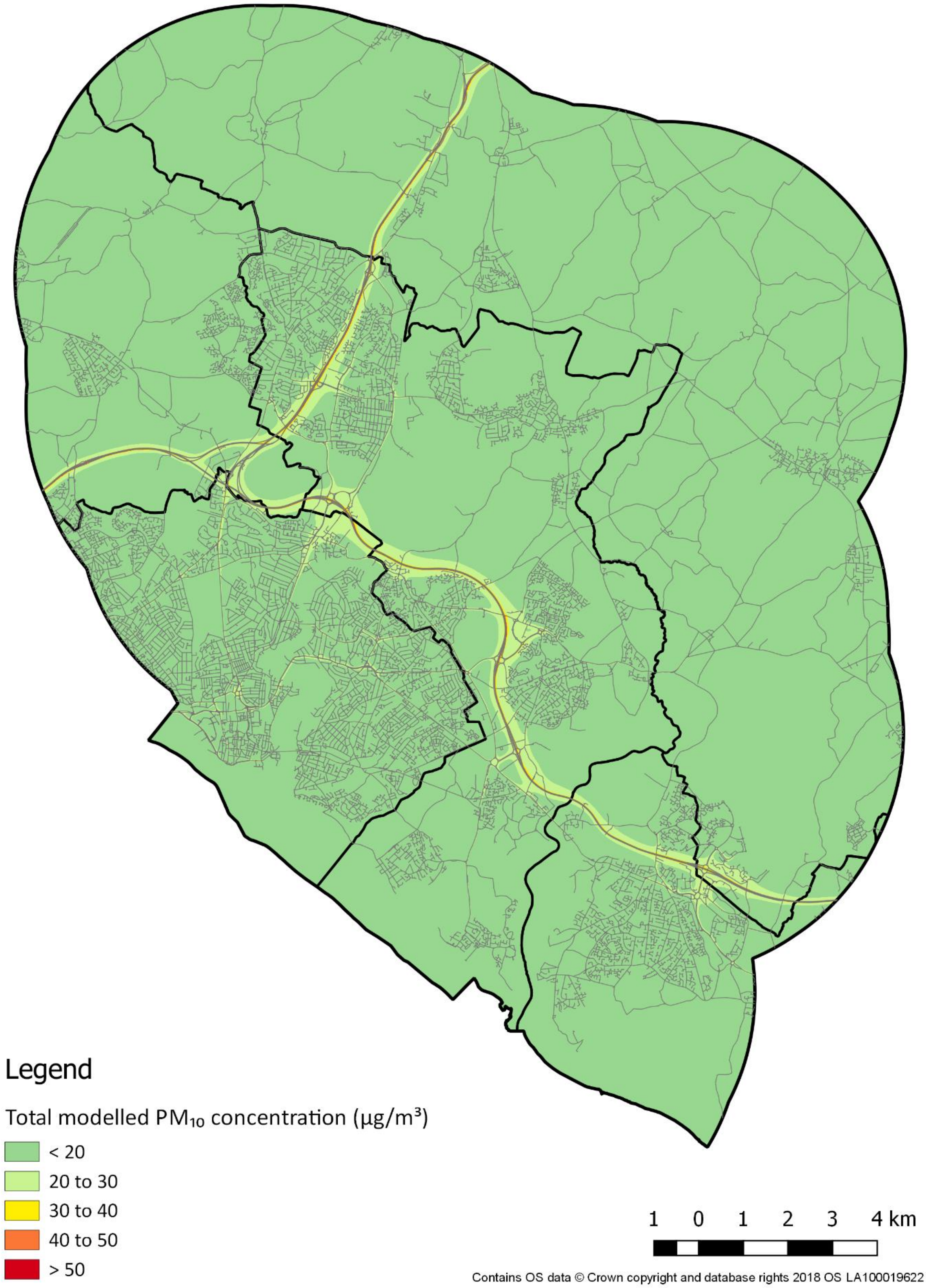


Figure 3-8 Annual mean PM_{10} concentration model results for pseudo-2030 SGO B/C scenario

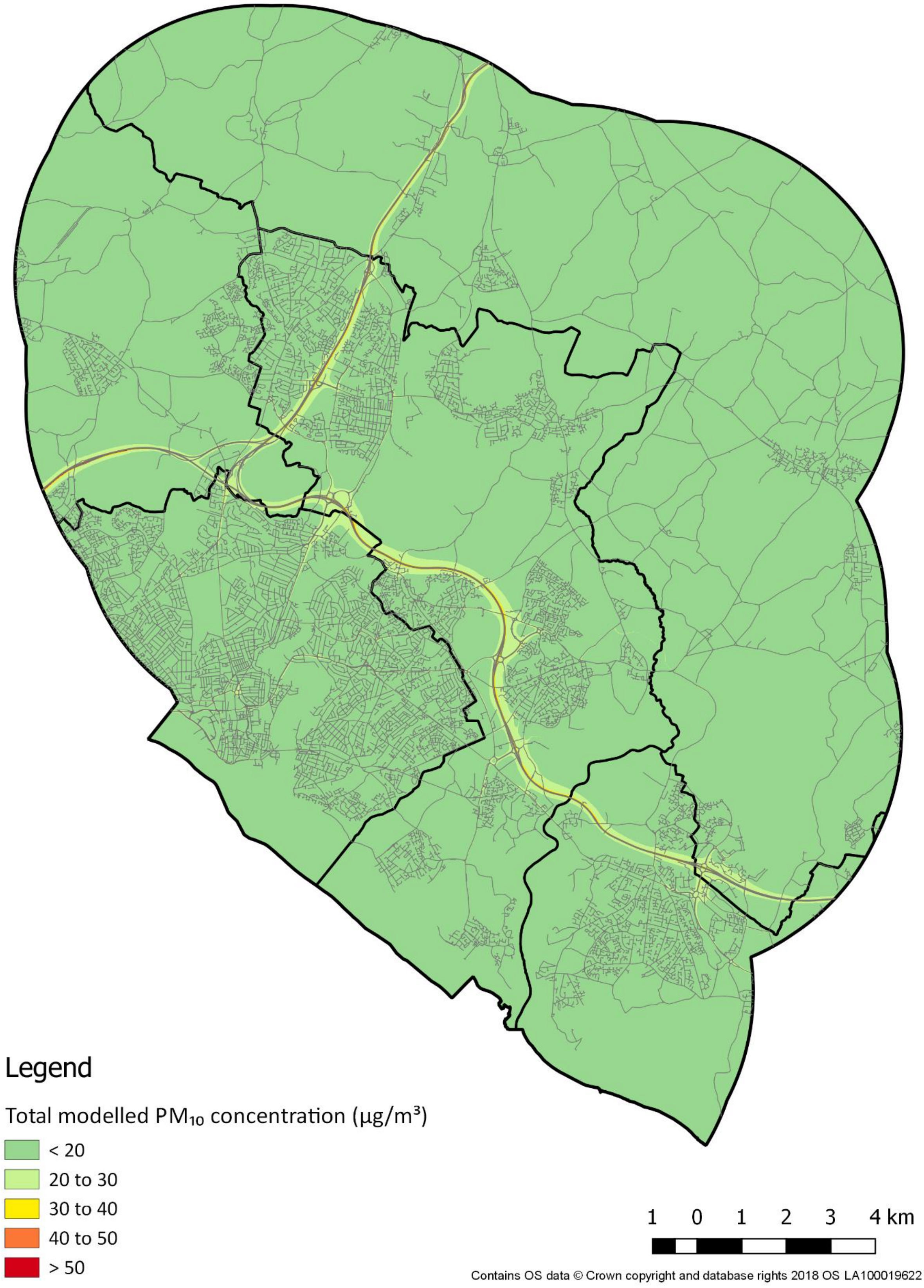


Figure 3-9 Annual mean PM_{10} concentration model results for 2036 SGO B/C scenario

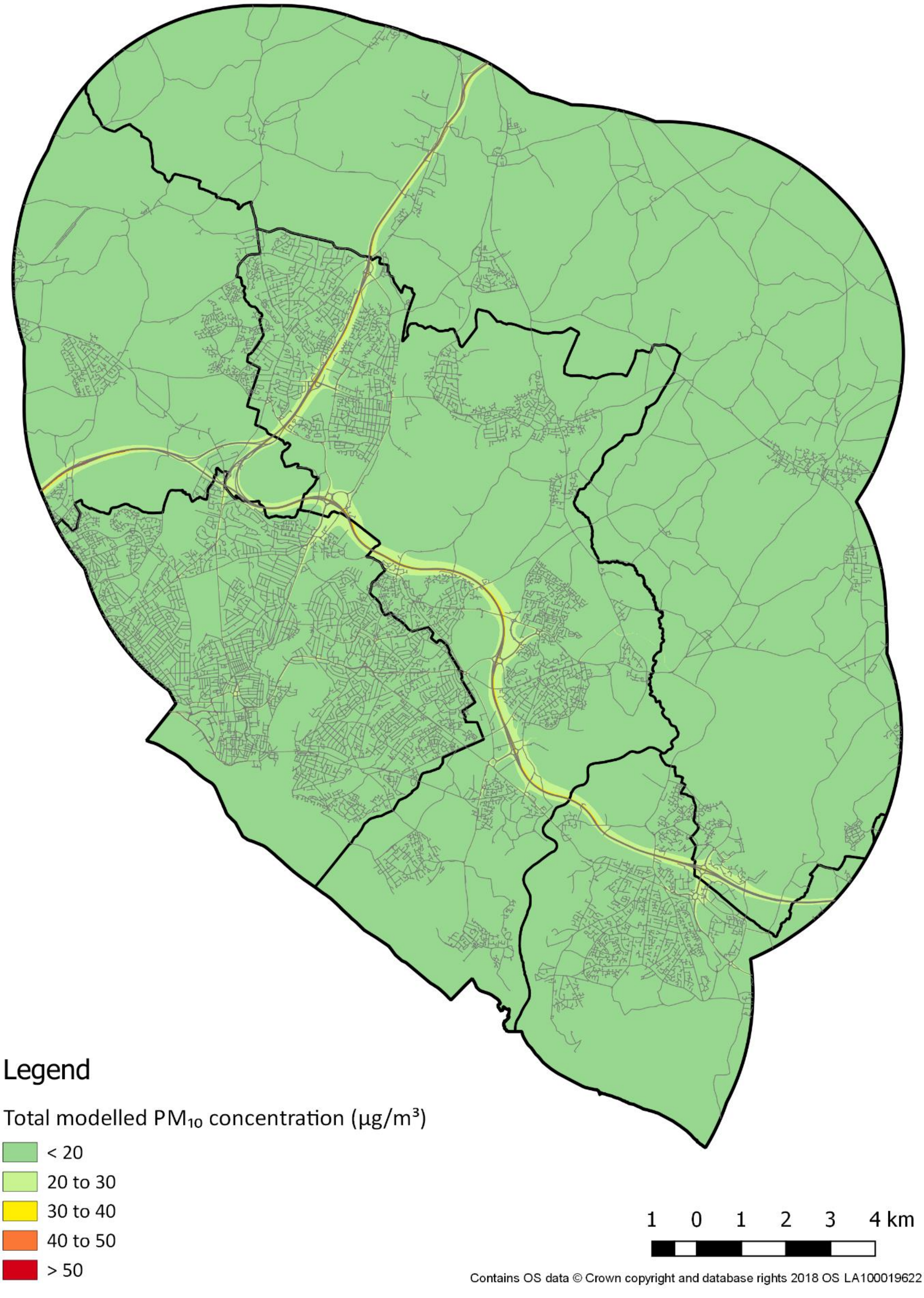


Figure 3-10 Annual mean $PM_{2.5}$ concentration model results for 2015 Reference Case

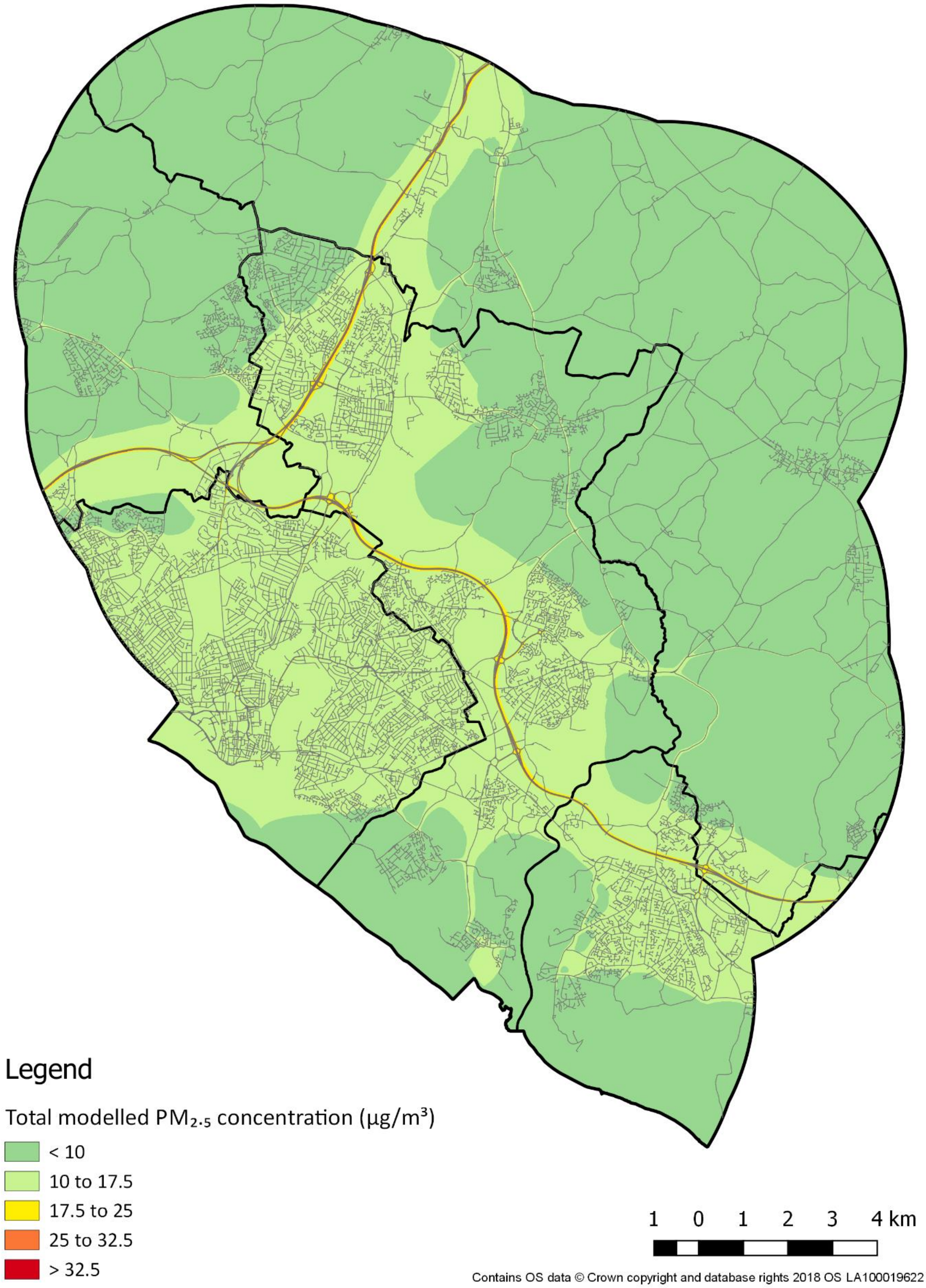


Figure 3-11 Annual mean $PM_{2.5}$ concentration model results for pseudo-2030 SGO B/C scenario

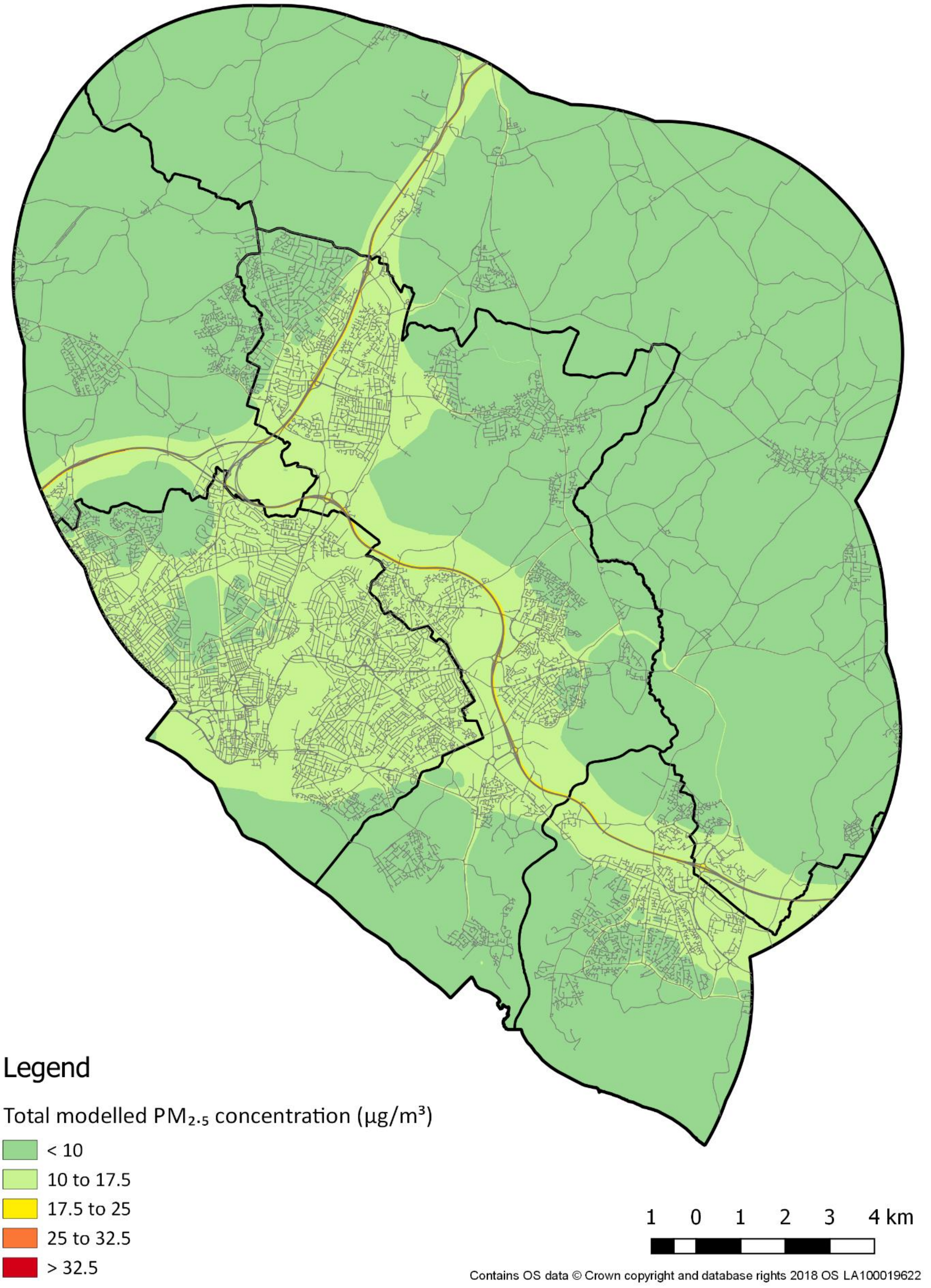


Figure 3-12 Annual mean $PM_{2.5}$ concentration model results for 2036 SGO B/C scenario

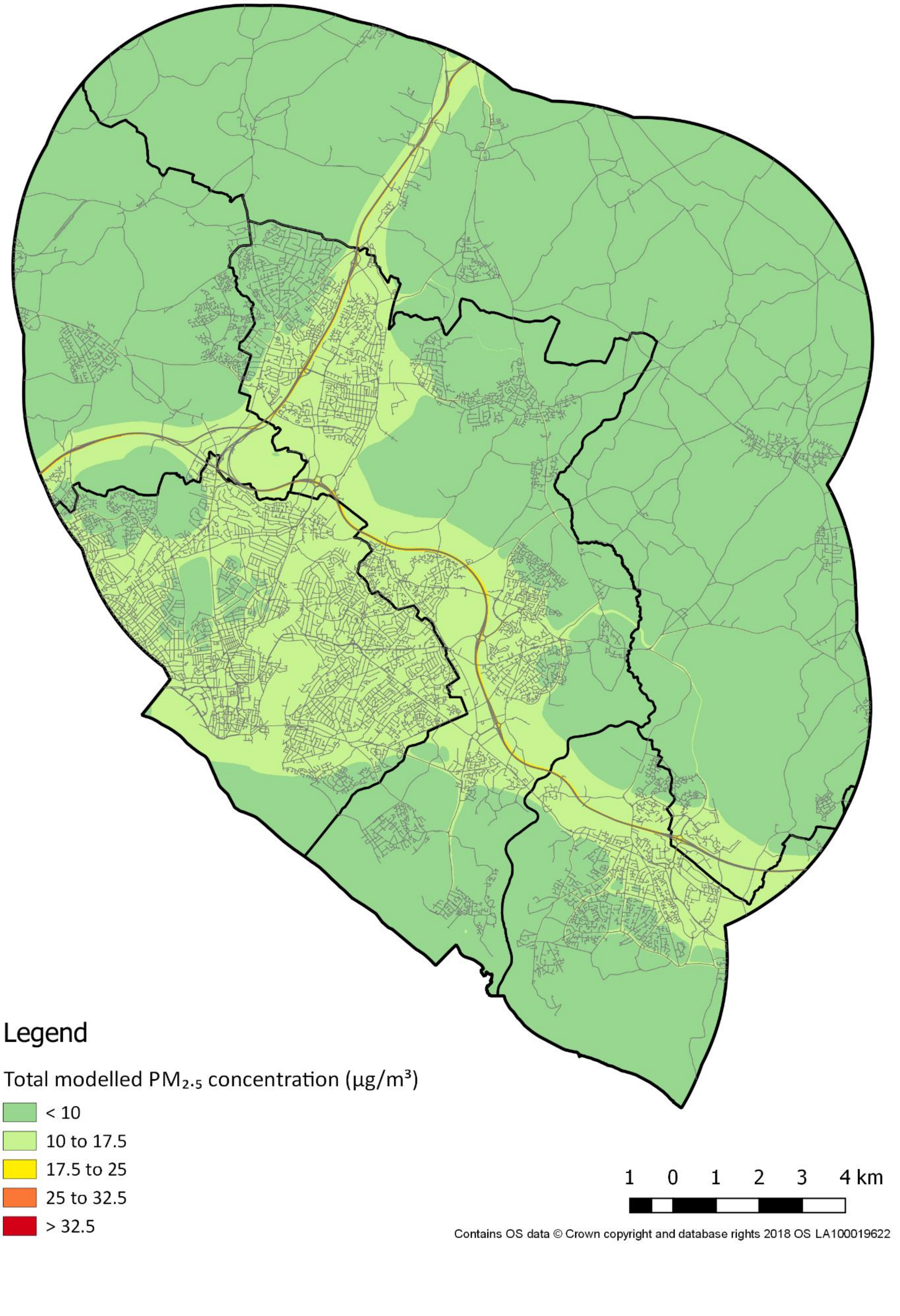


Figure 3-13 Annual mean NO_2 concentration model results for 2015 Reference Case AQMA No. 1 (East)

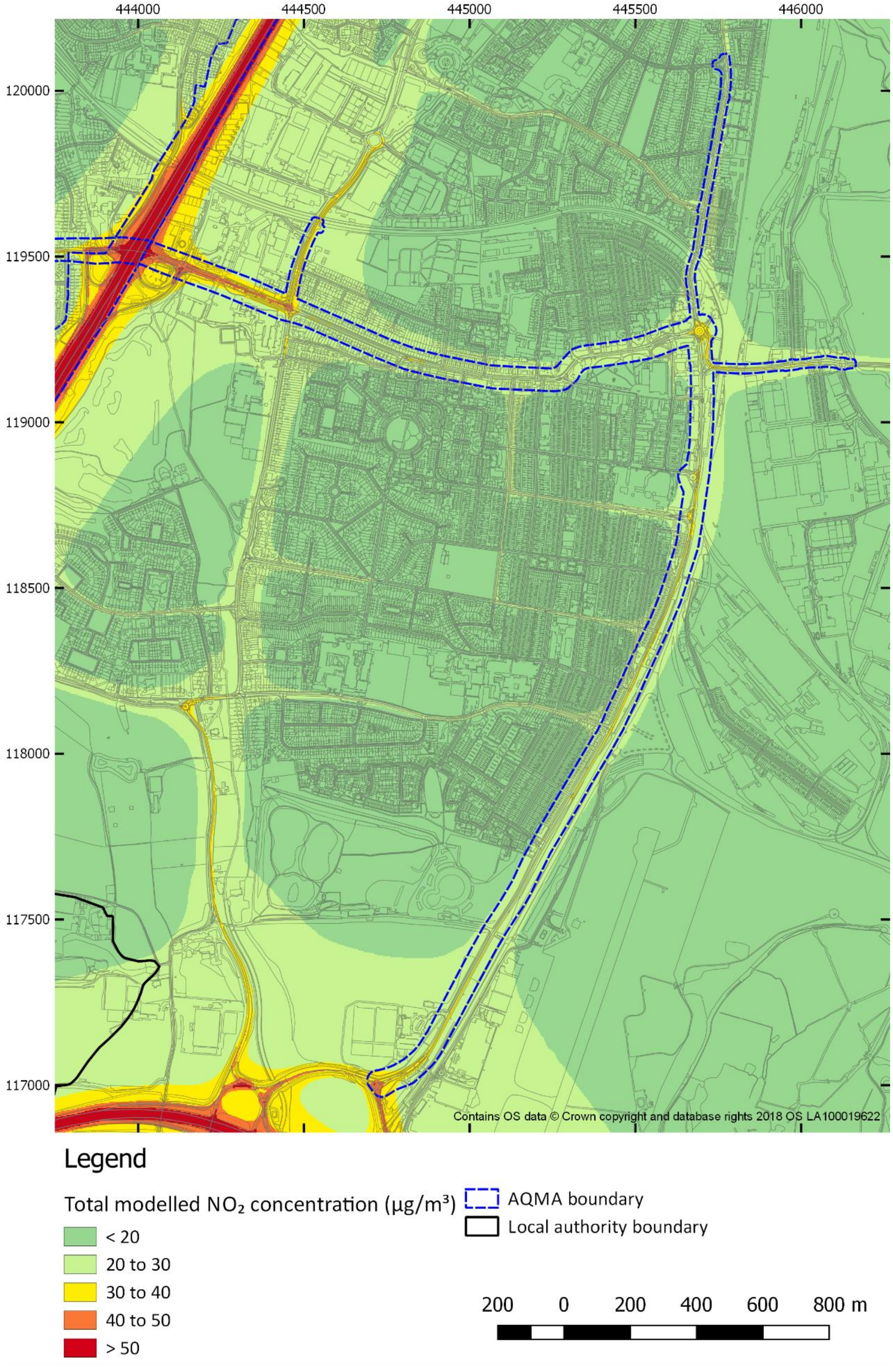


Figure 3-14 Annual mean NO_2 concentration model results for pseudo-2030 SGO B/C scenario AQMA No. 1 (East)

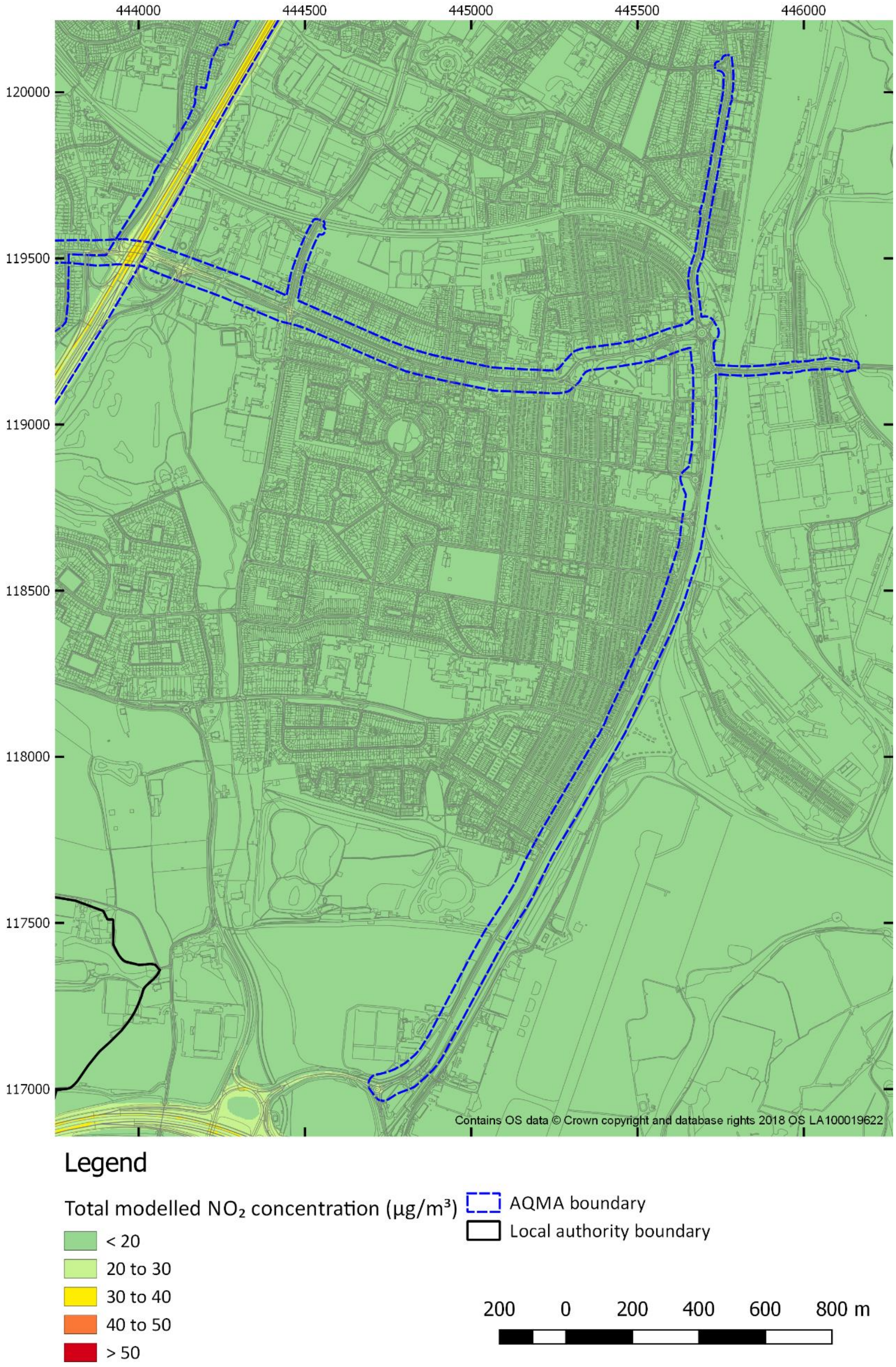


Figure 3-15 Annual mean NO_2 concentration model results for 2036 SGO B/C scenario AQMA No. 1 (East)

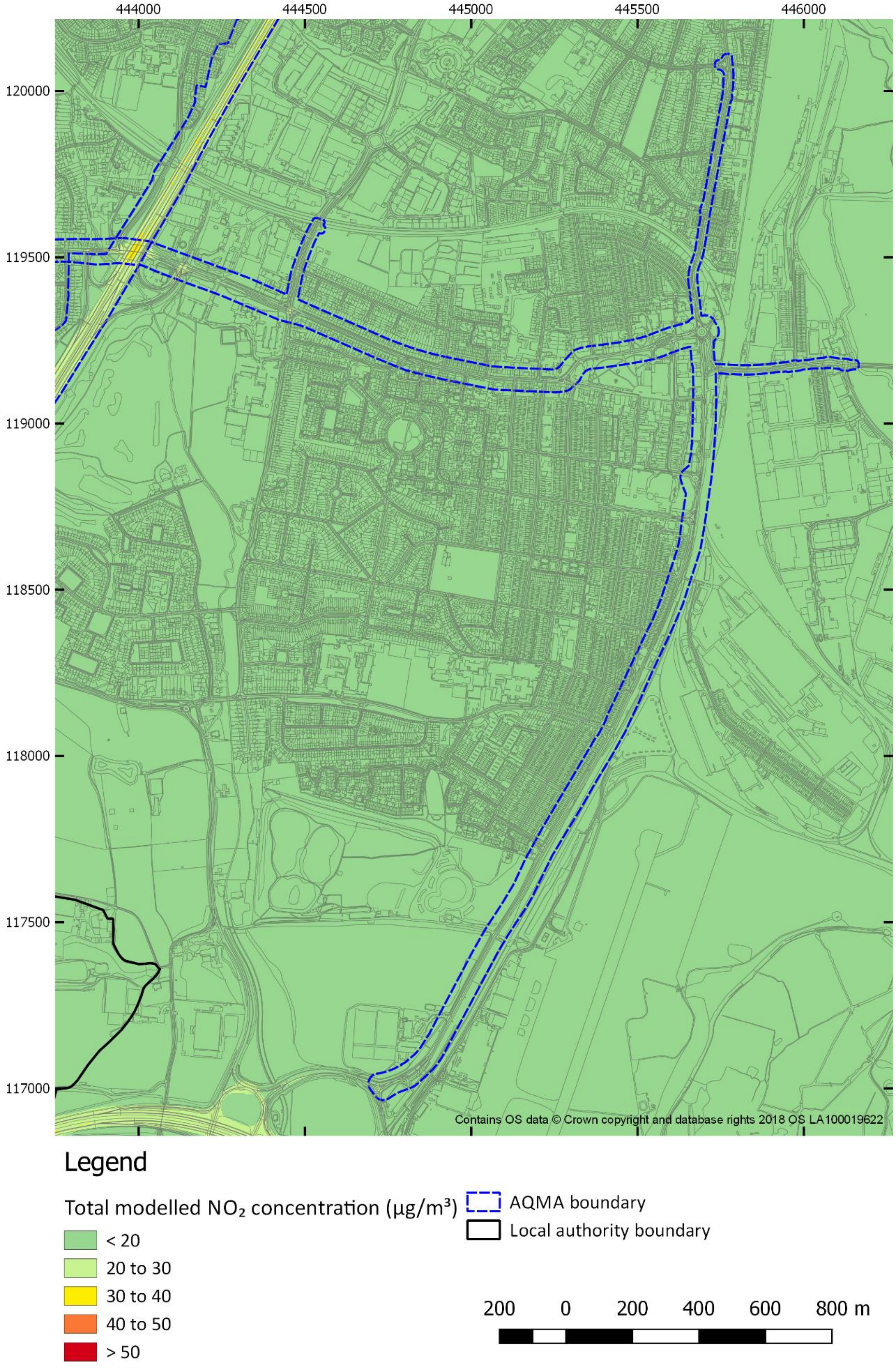


Figure 3-16 Annual mean PM_{10} concentration model results for 2015 Reference Case AQMA No. 1 (East)

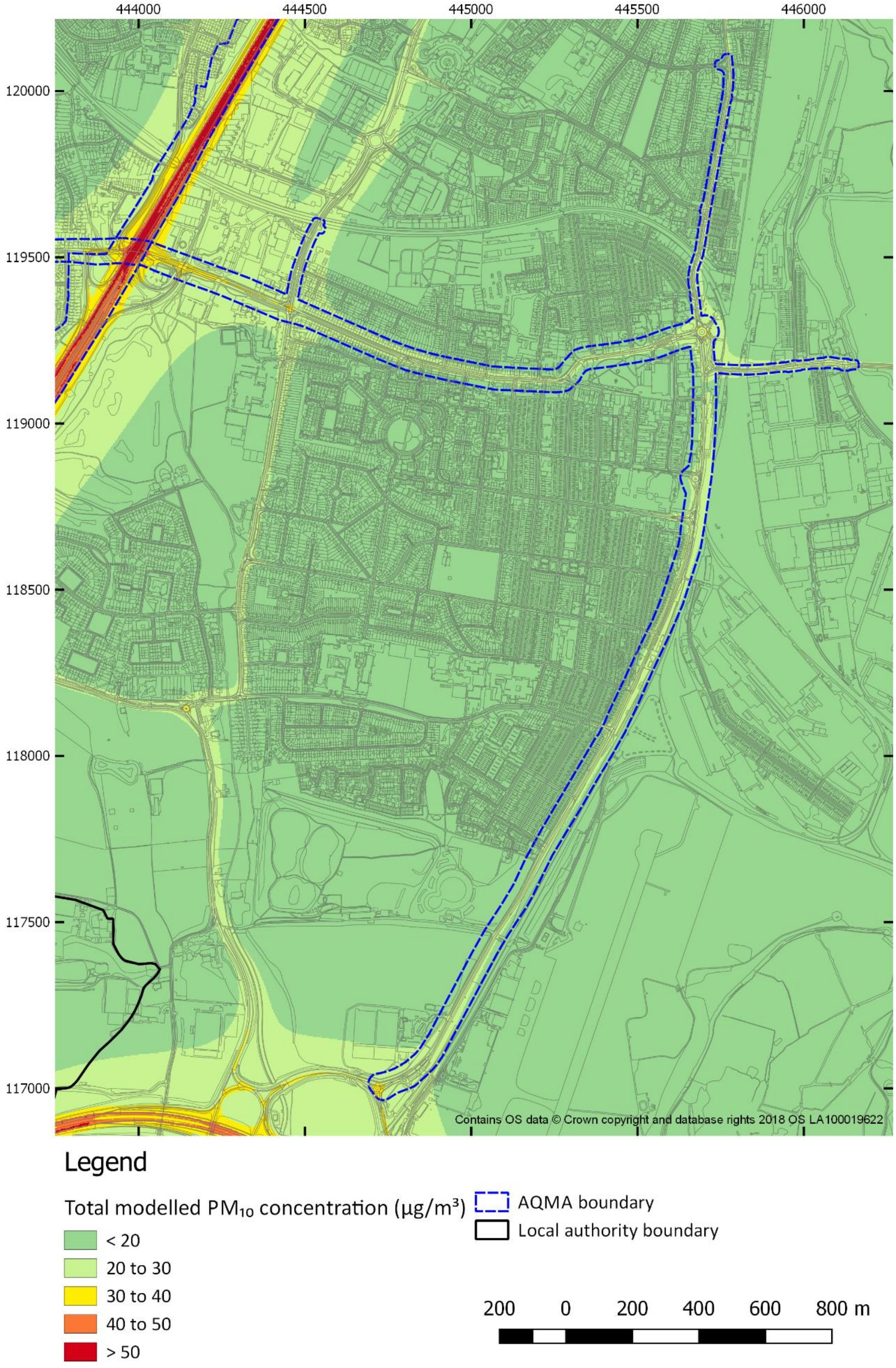


Figure 3-17 Annual mean PM_{10} concentration model results for pseudo-2030 SGO B/C scenario AQMA No. 1 (East)

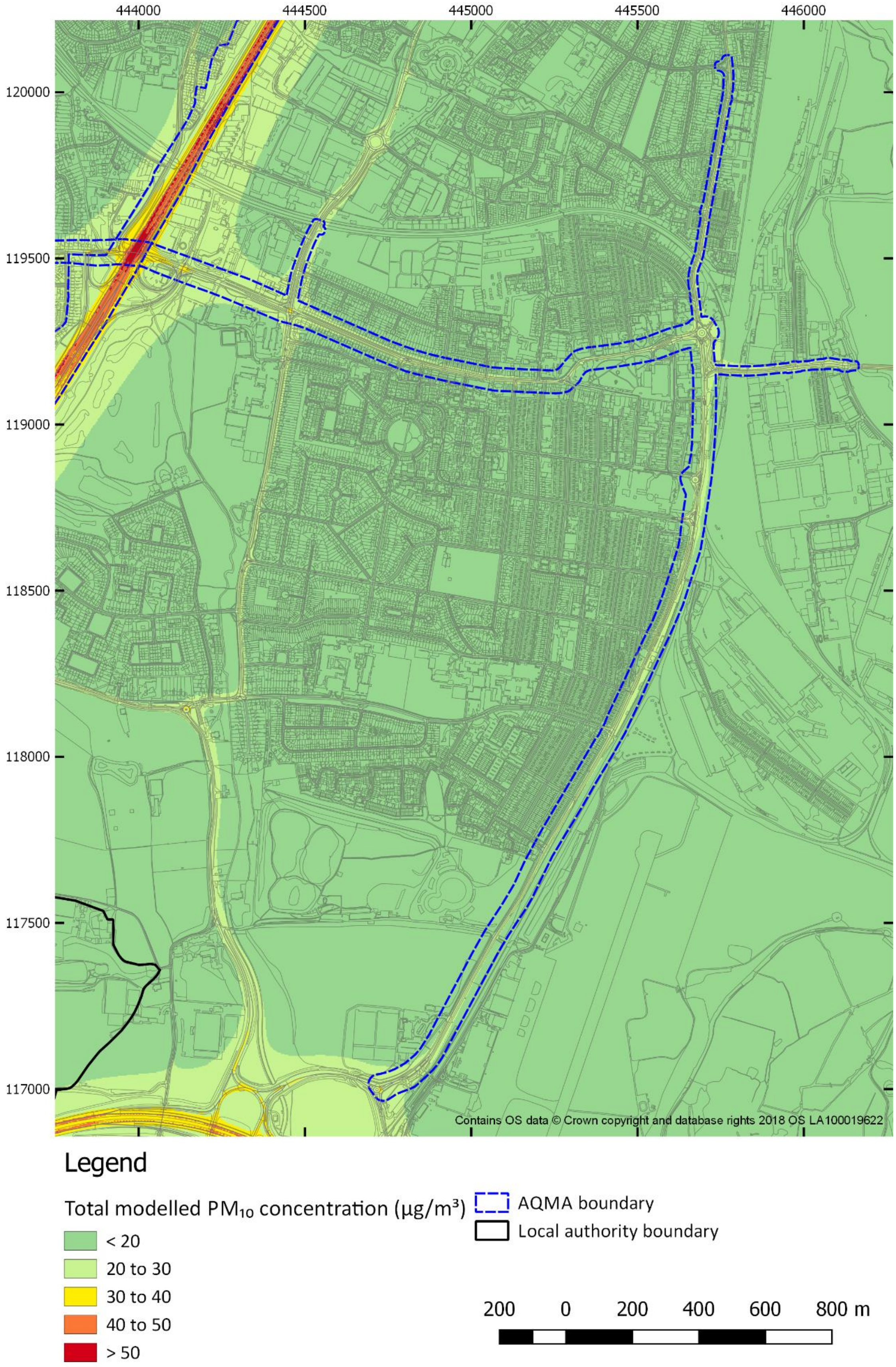


Figure 3-18 Annual mean PM_{10} concentration model results for 2036 SGO B/C scenario AQMA No. 1 (East)

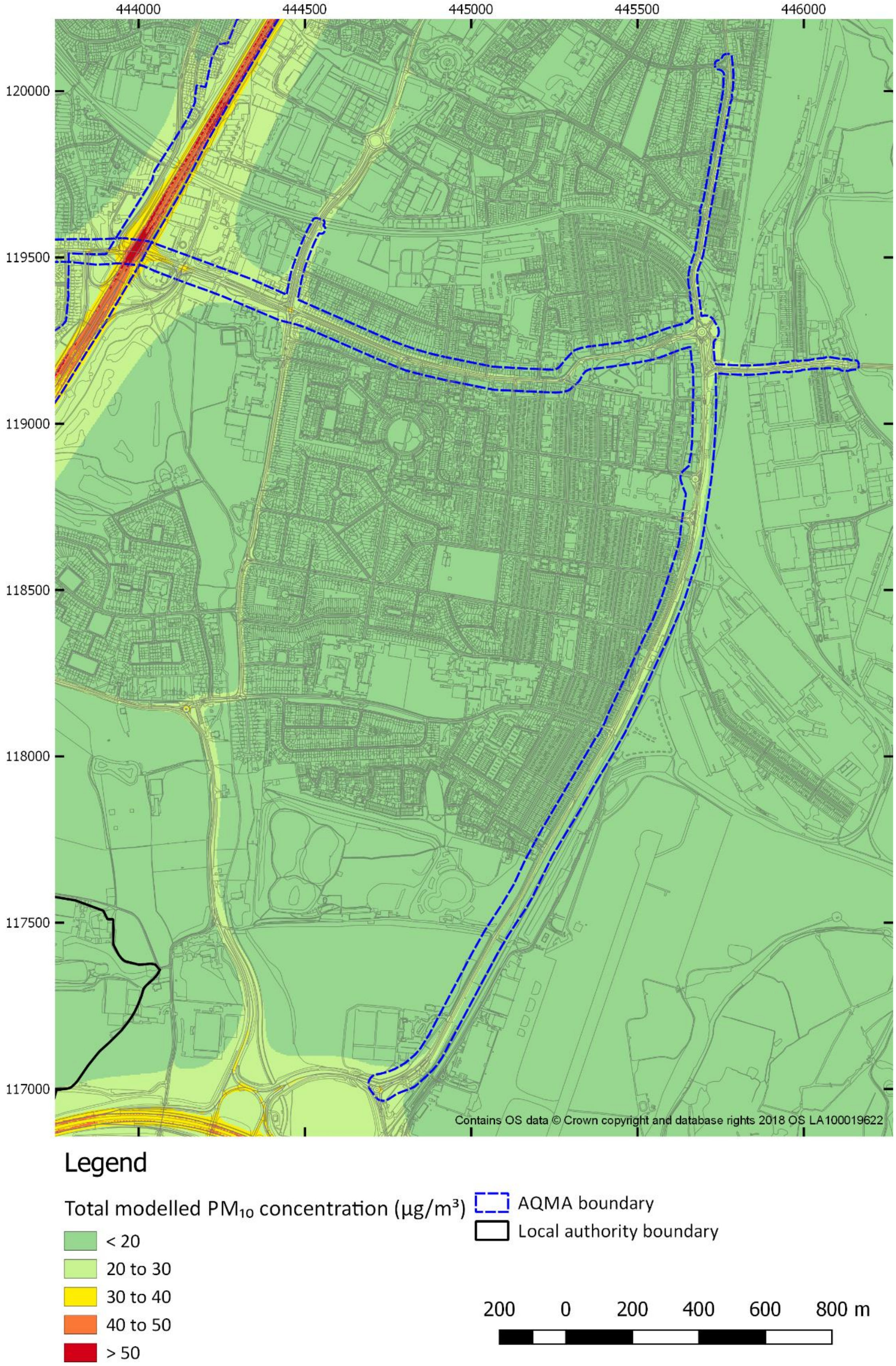


Figure 3-19 Annual mean $PM_{2.5}$ concentration model results for 2015 Reference Case AQMA No. 1 (East)

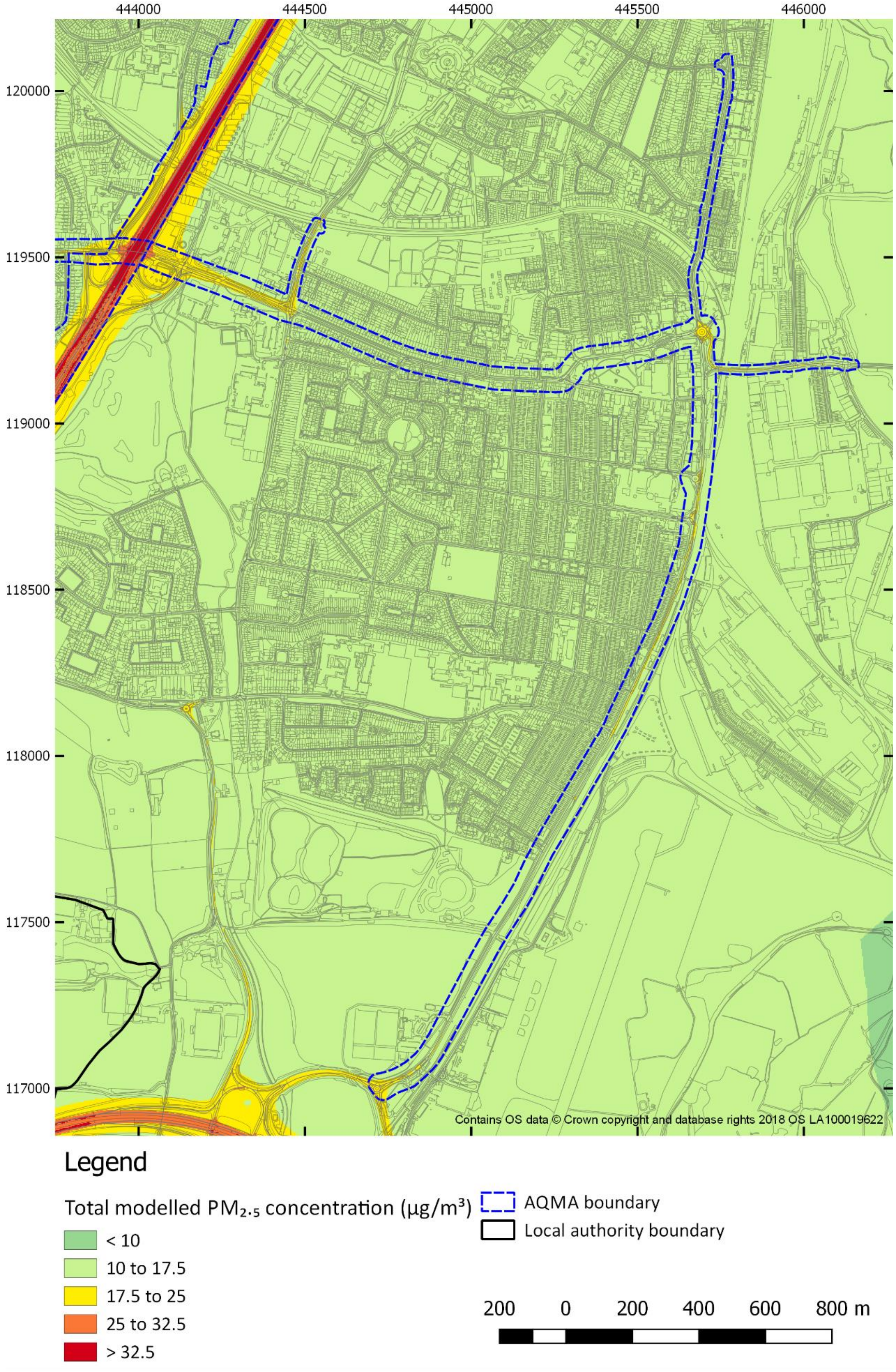


Figure 3-20 Annual mean $PM_{2.5}$ concentration model results for pseudo-2030 SGO B/C scenario AQMA No. 1 (East)

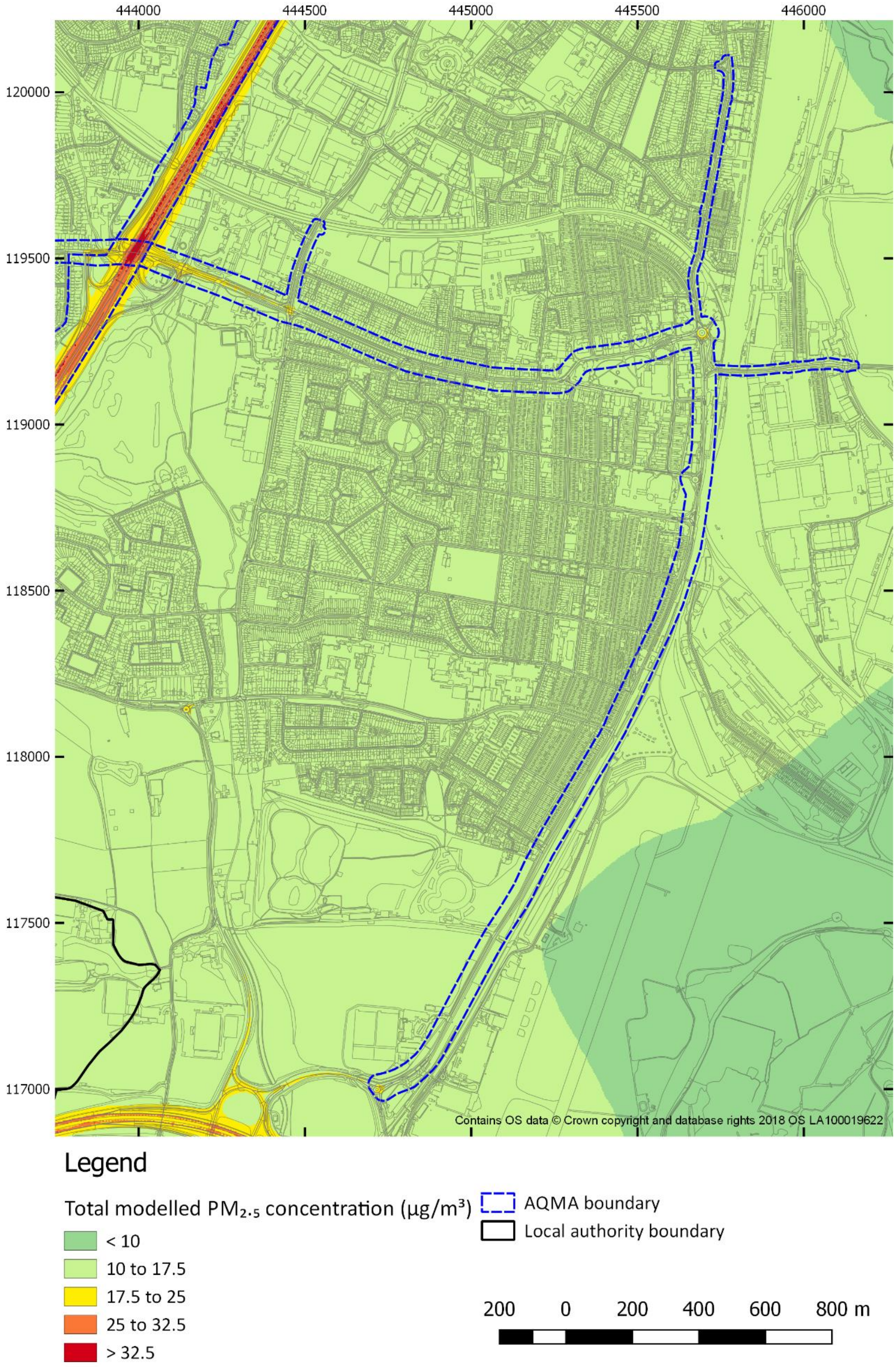


Figure 3-21 Annual mean $PM_{2.5}$ concentration model results for 2036 SGO B/C scenario AQMA No. 1 (East)

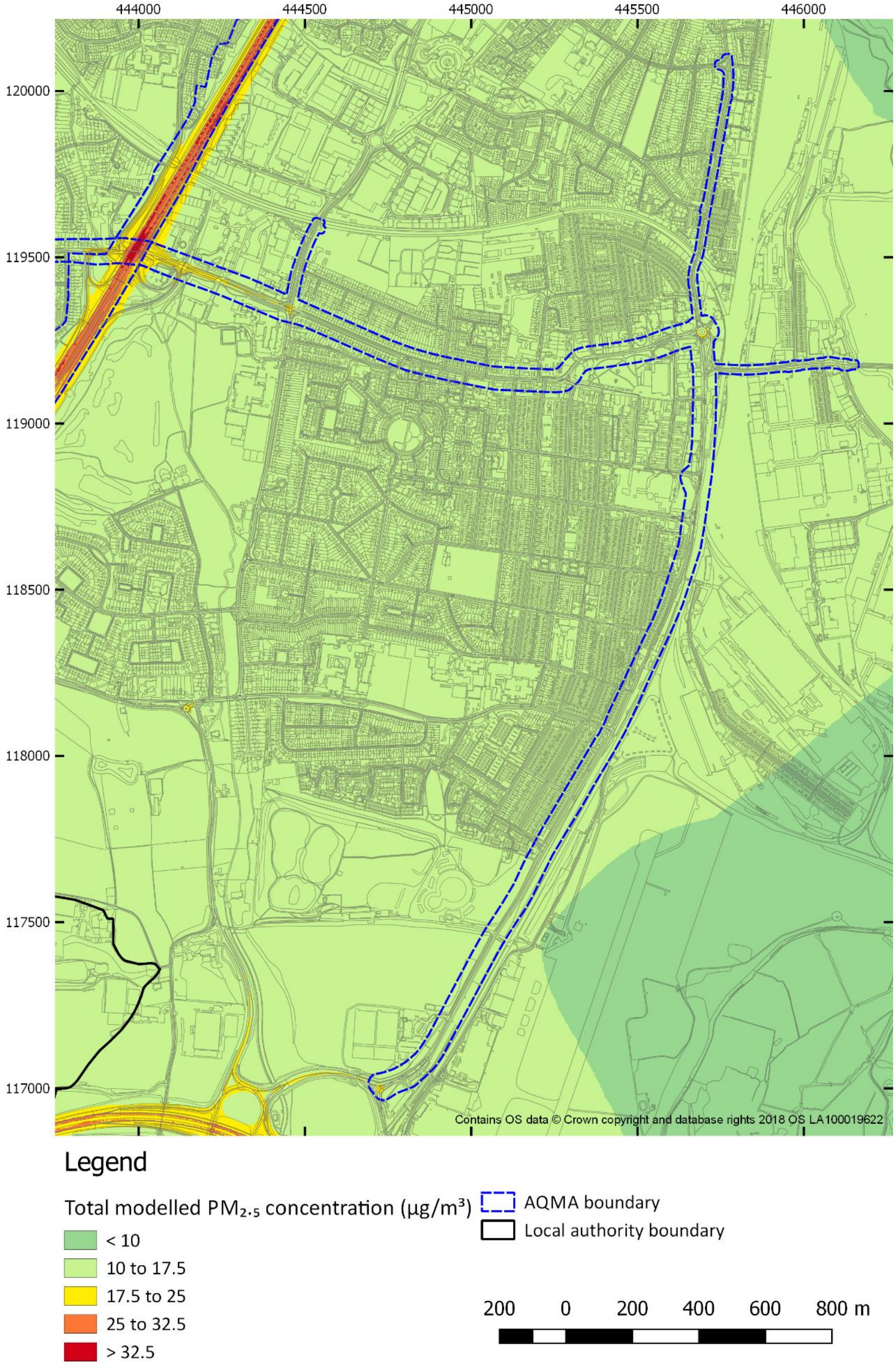


Figure 3-22 Annual mean NO_2 concentration model results for 2015 Reference Case AQMA No. 1 (West)

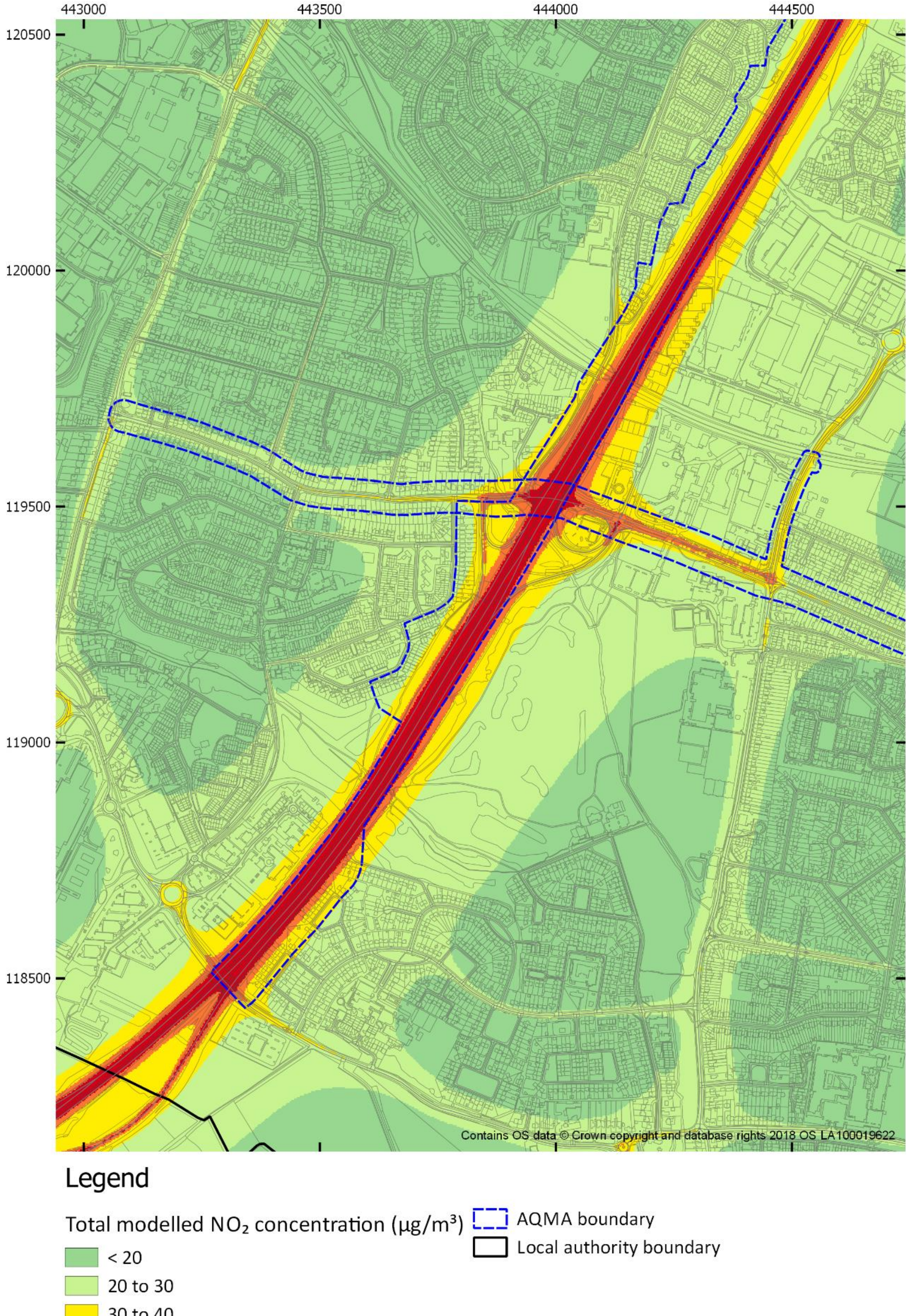


Figure 3-23 Annual mean NO_2 concentration model results for pseudo-2030 SGO B/C scenario AQMA No. 1 (West)

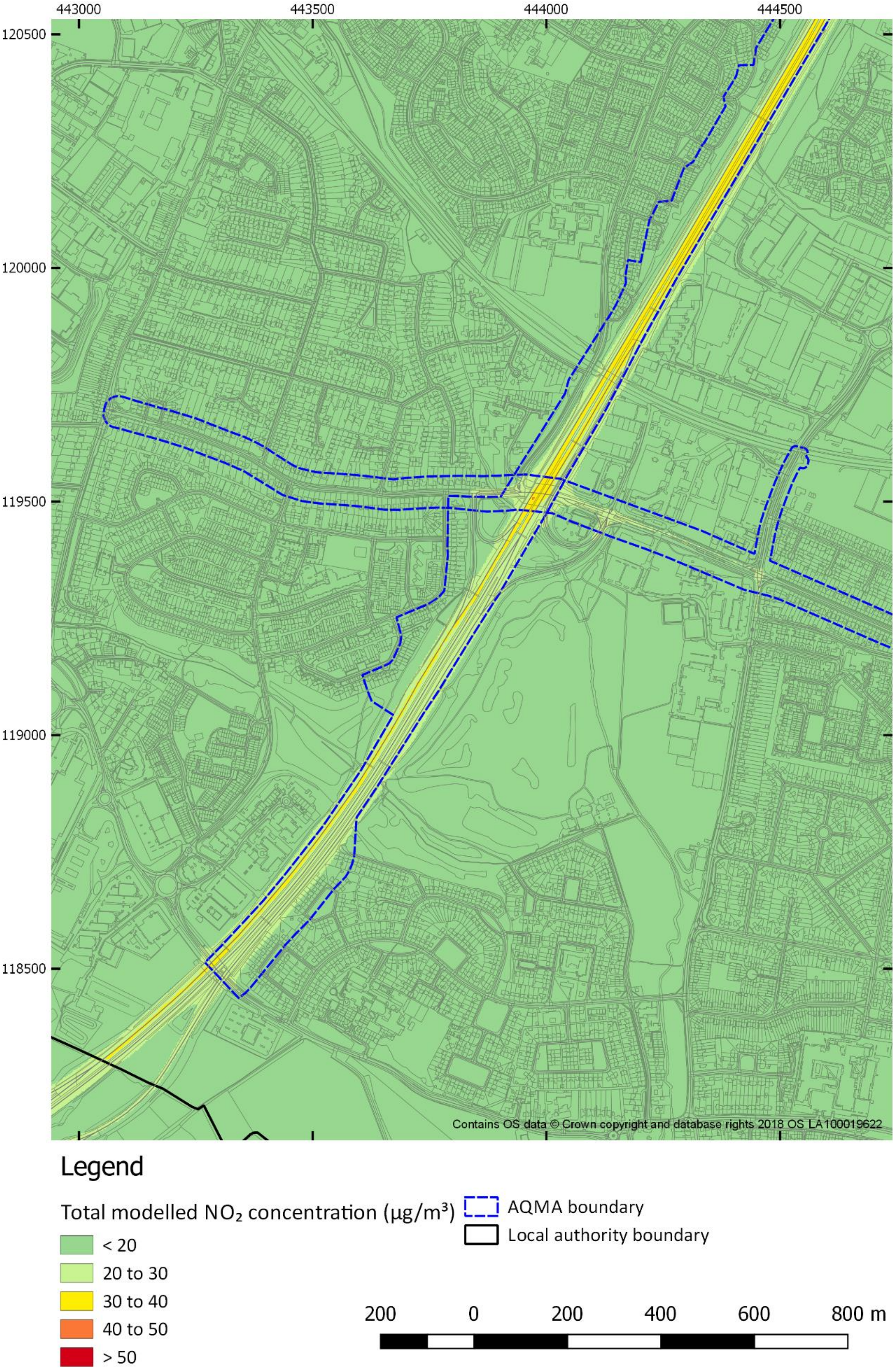


Figure 3-24 Annual mean NO_2 concentration model results for 2036 SGO B/C scenario AQMA No. 1 (West)

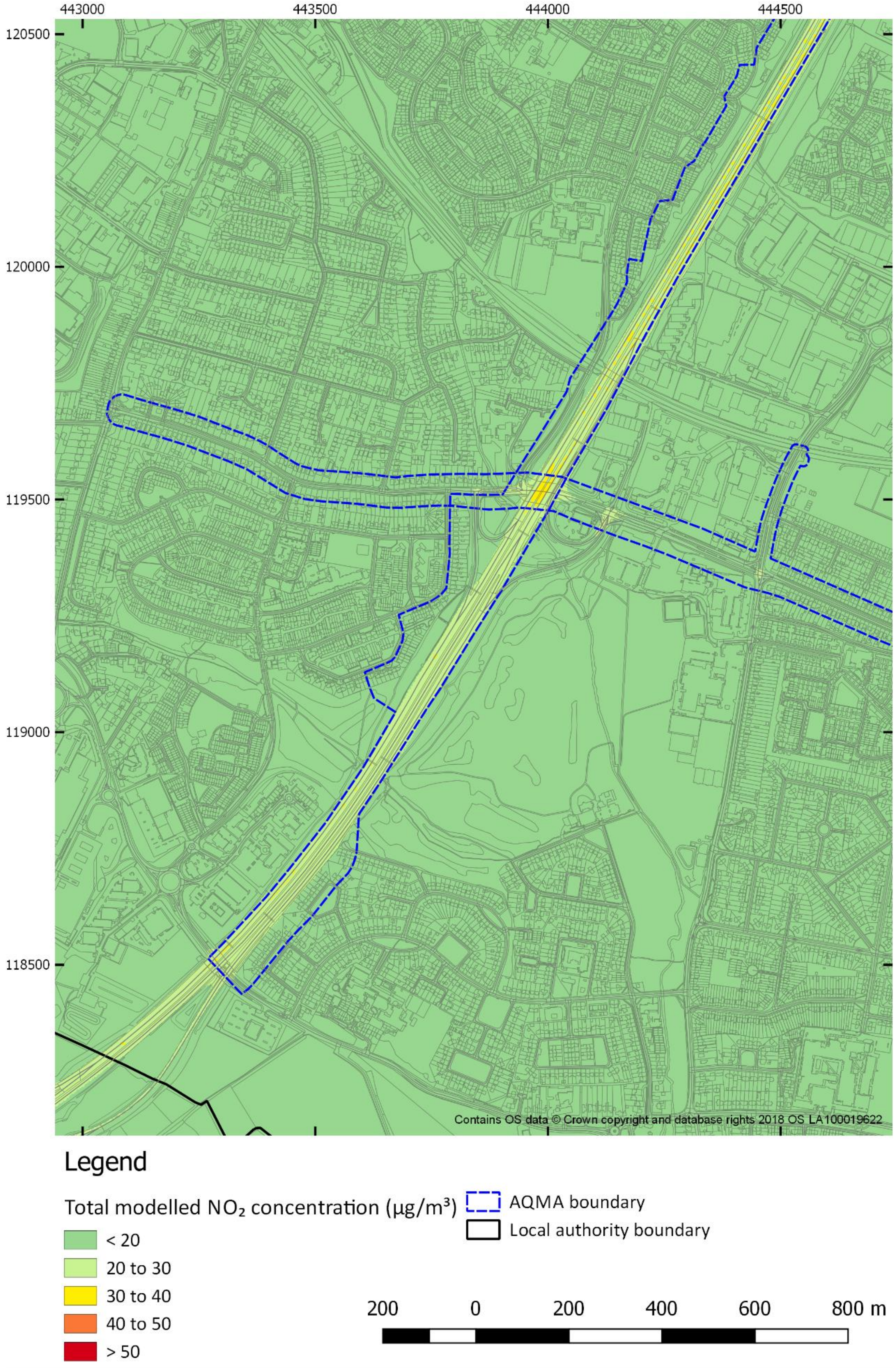


Figure 3-25 Annual mean PM_{10} concentration model results for 2015 Reference Case AQMA No. 1 (West)

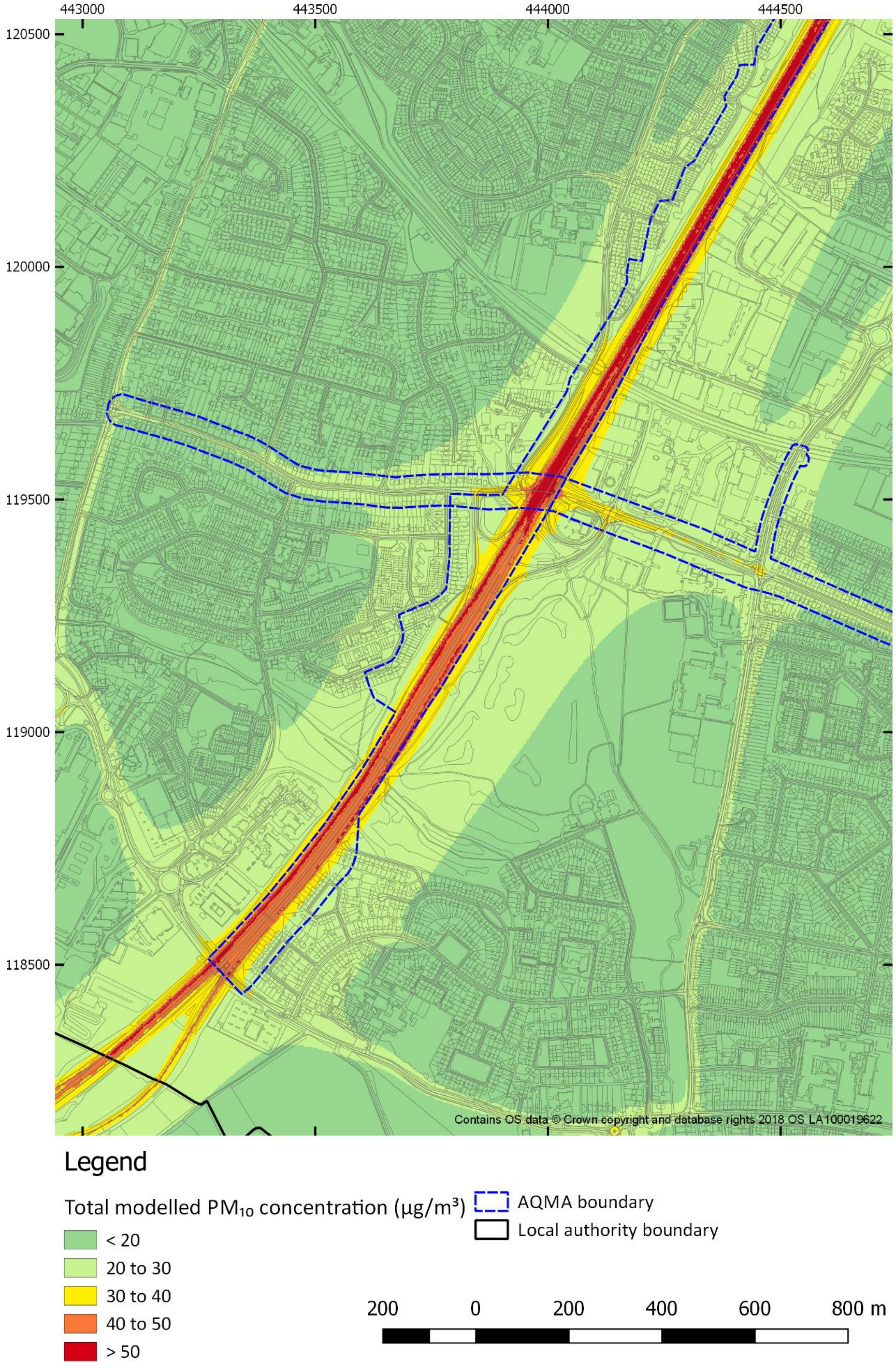


Figure 3-26 Annual mean PM_{10} concentration model results for pseudo-2030 SGO B/C scenario AQMA No. 1 (West)

Figure 3-27 Annual mean PM_{10} concentration model results for 2036 SGO B/C scenario AQMA No. 1 (West)

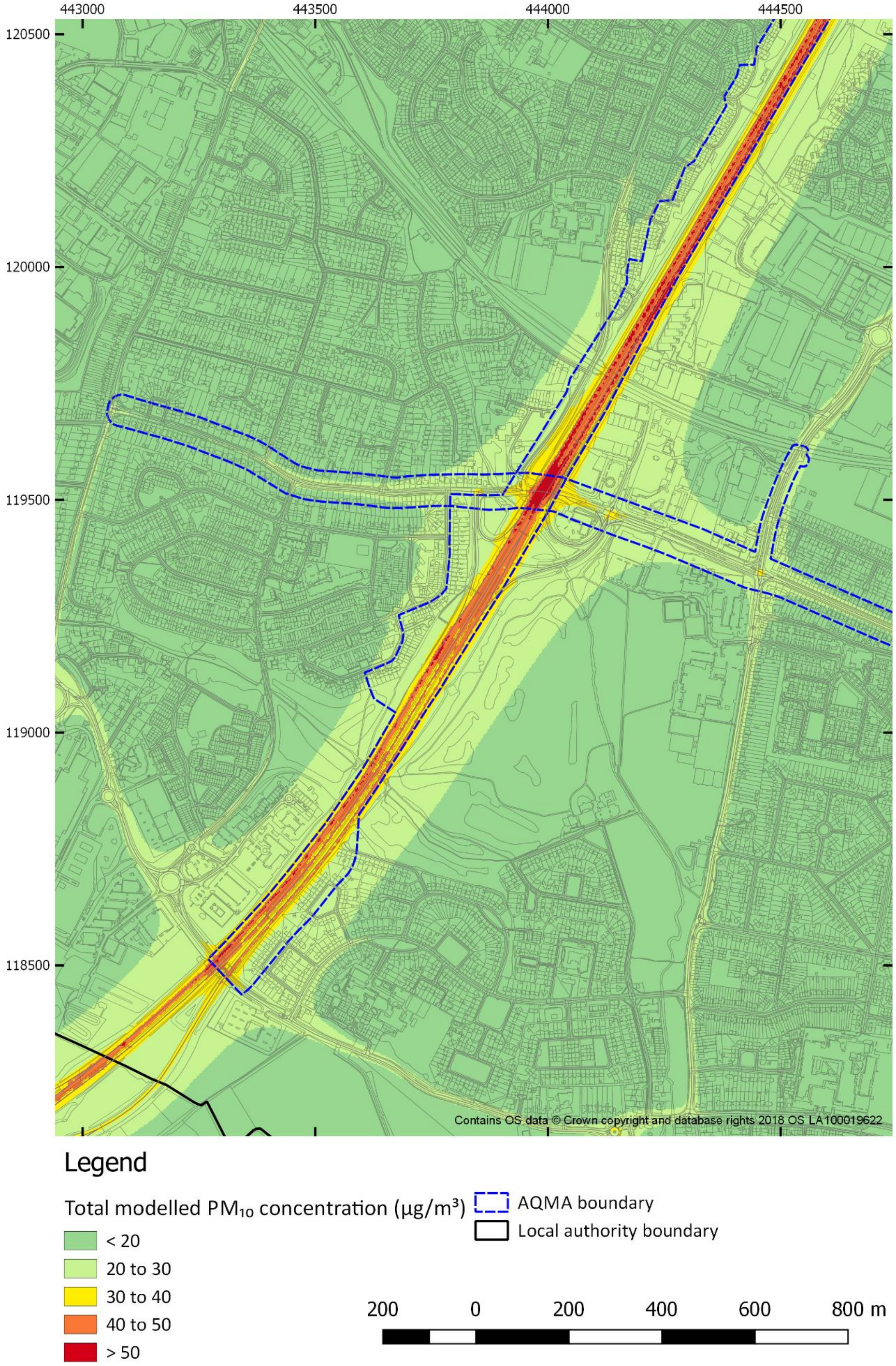


Figure 3-28 Annual mean $PM_{2.5}$ concentration model results for 2015 Reference Case AQMA No. 1 (West)

Figure 3-29 Annual mean $PM_{2.5}$ concentration model results for pseudo-2030 SGO B/C scenario AQMA No. 1 (West)

Figure 3-30 Annual mean $PM_{2.5}$ concentration model results for 2036 SGO B/C scenario AQMA No. 1 (West)

Figure 3-31 Annual mean NO_2 concentration model results for 2015 Reference Case AQMA No. 2 (North)

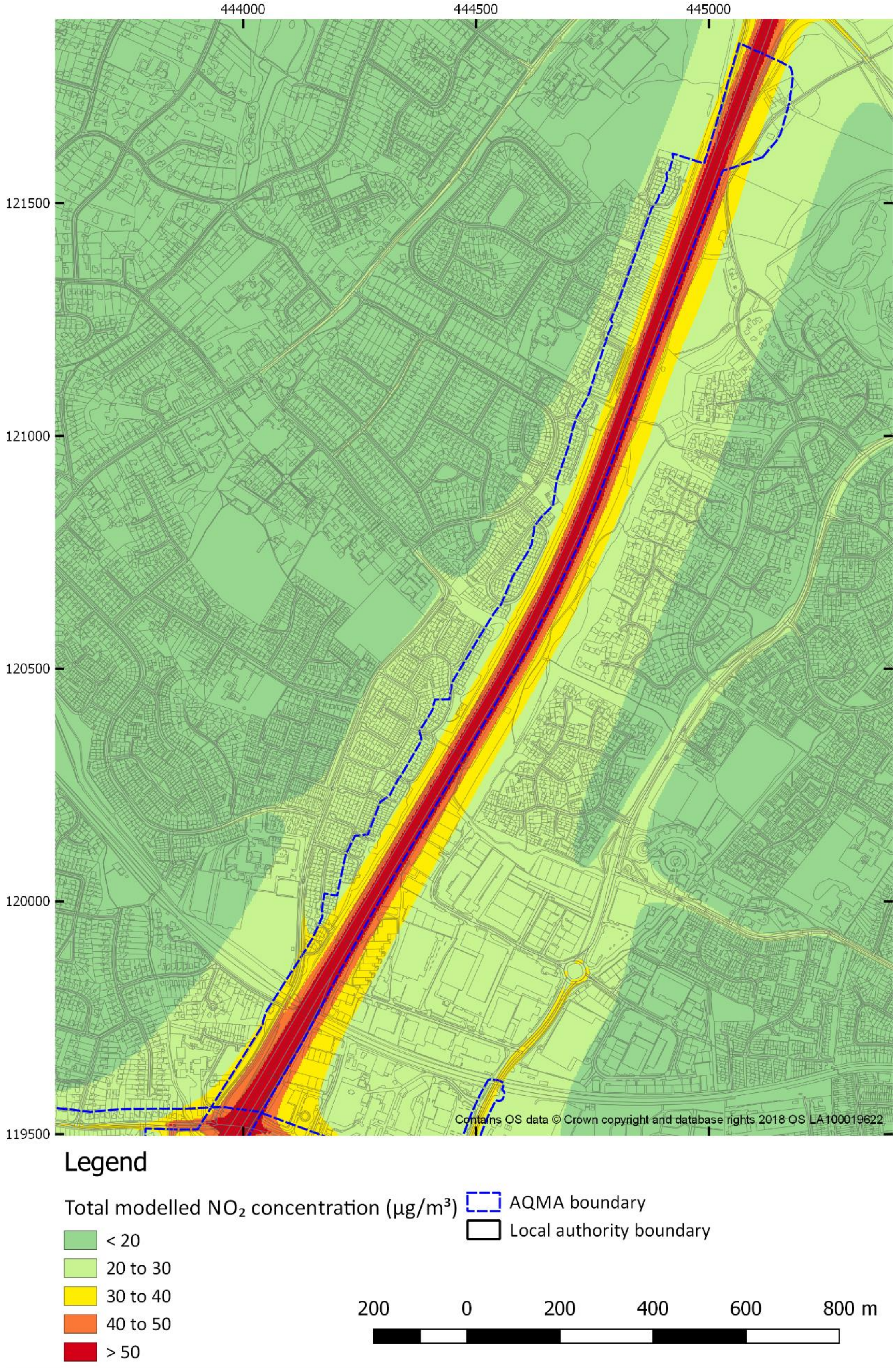


Figure 3-32 Annual mean NO_2 concentration model results for pseudo-2030 SGO B/C scenario AQMA No. 2 (North)

Figure 3-33 Annual mean NO_2 concentration model results for 2036 SGO B/C scenario AQMA No. 2 (North)

Figure 3-34 Annual mean PM_{10} concentration model results for 2015 Reference Case AQMA No. 2 (North)

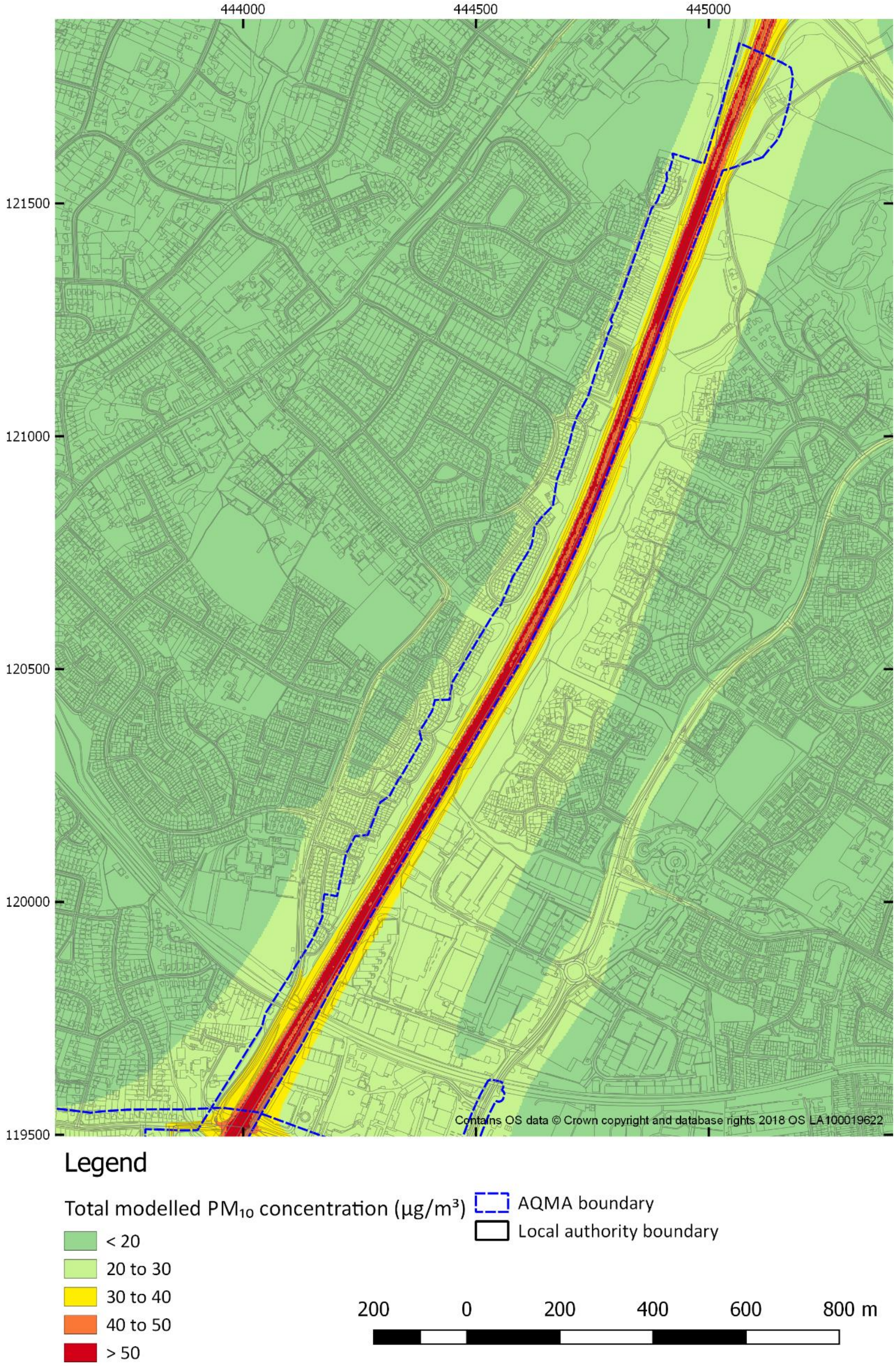


Figure 3-35 Annual mean PM_{10} concentration model results for pseudo-2030 SGO B/C scenario AQMA No. 2 (North)

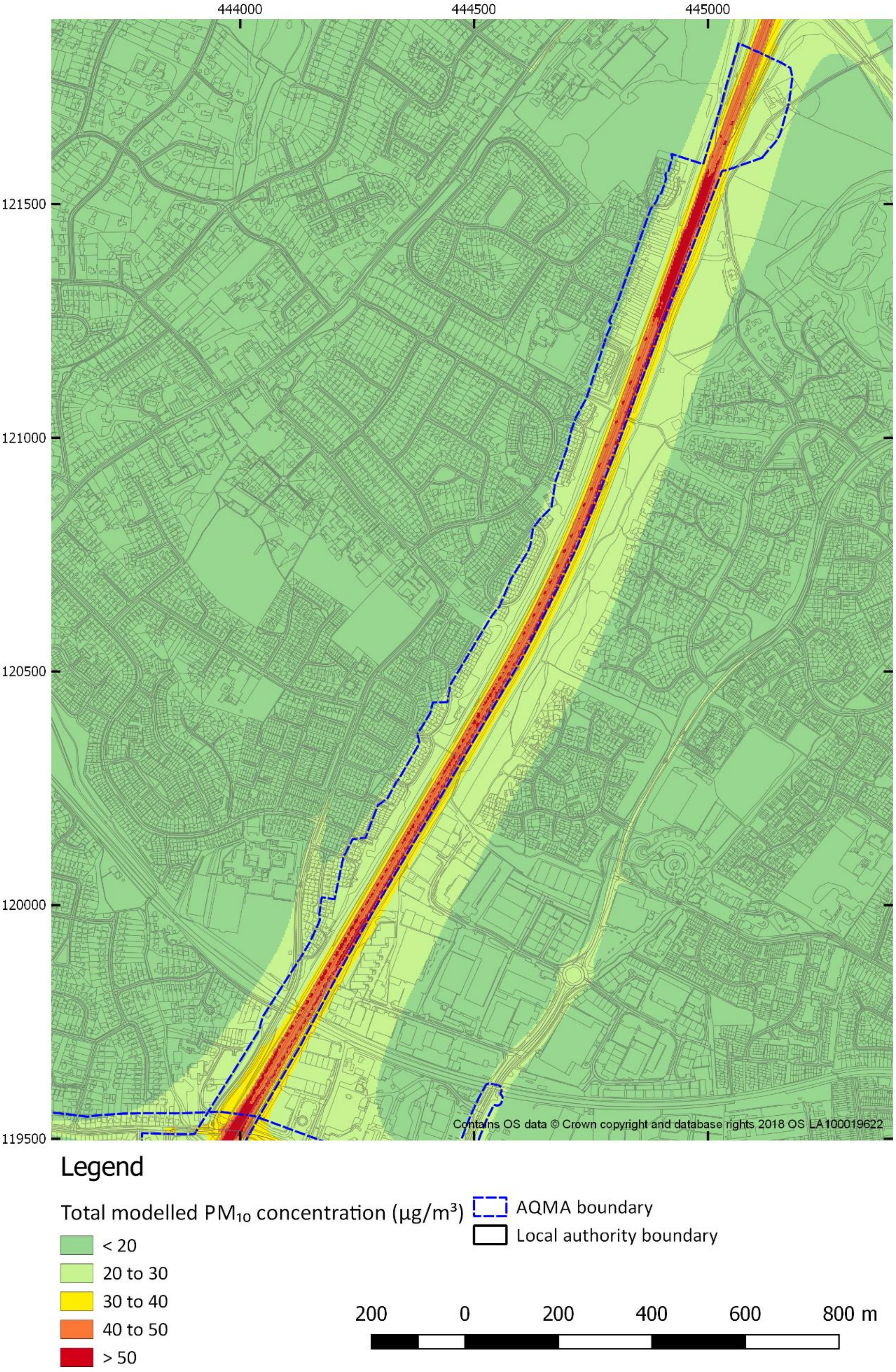


Figure 3-36 Annual mean PM_{10} concentration model results for 2036 SGO B/C scenario AQMA No. 2 (North)

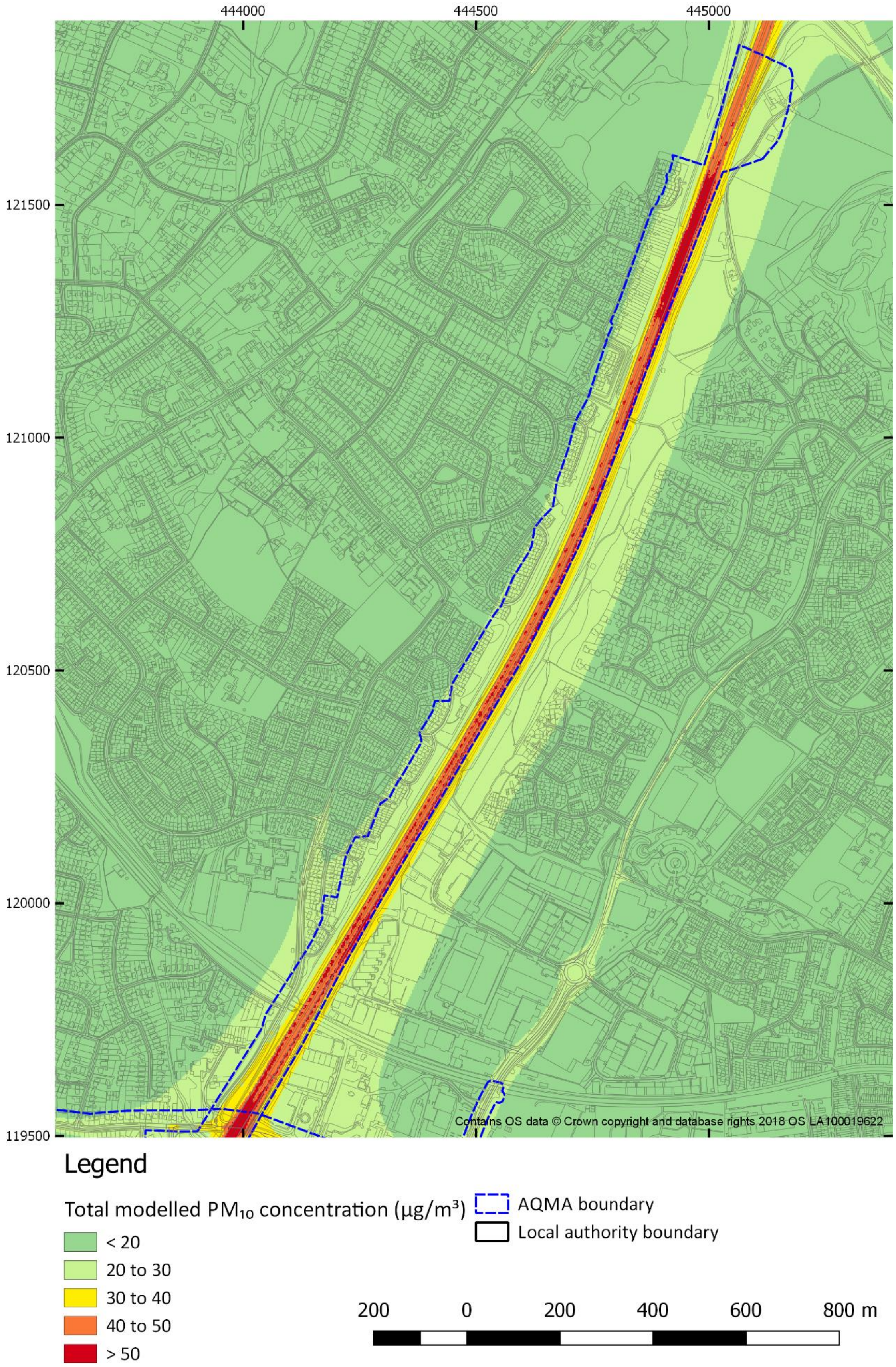


Figure 3-37 Annual mean $PM_{2.5}$ concentration model results for 2015 Reference Case AQMA No. 2 (North)

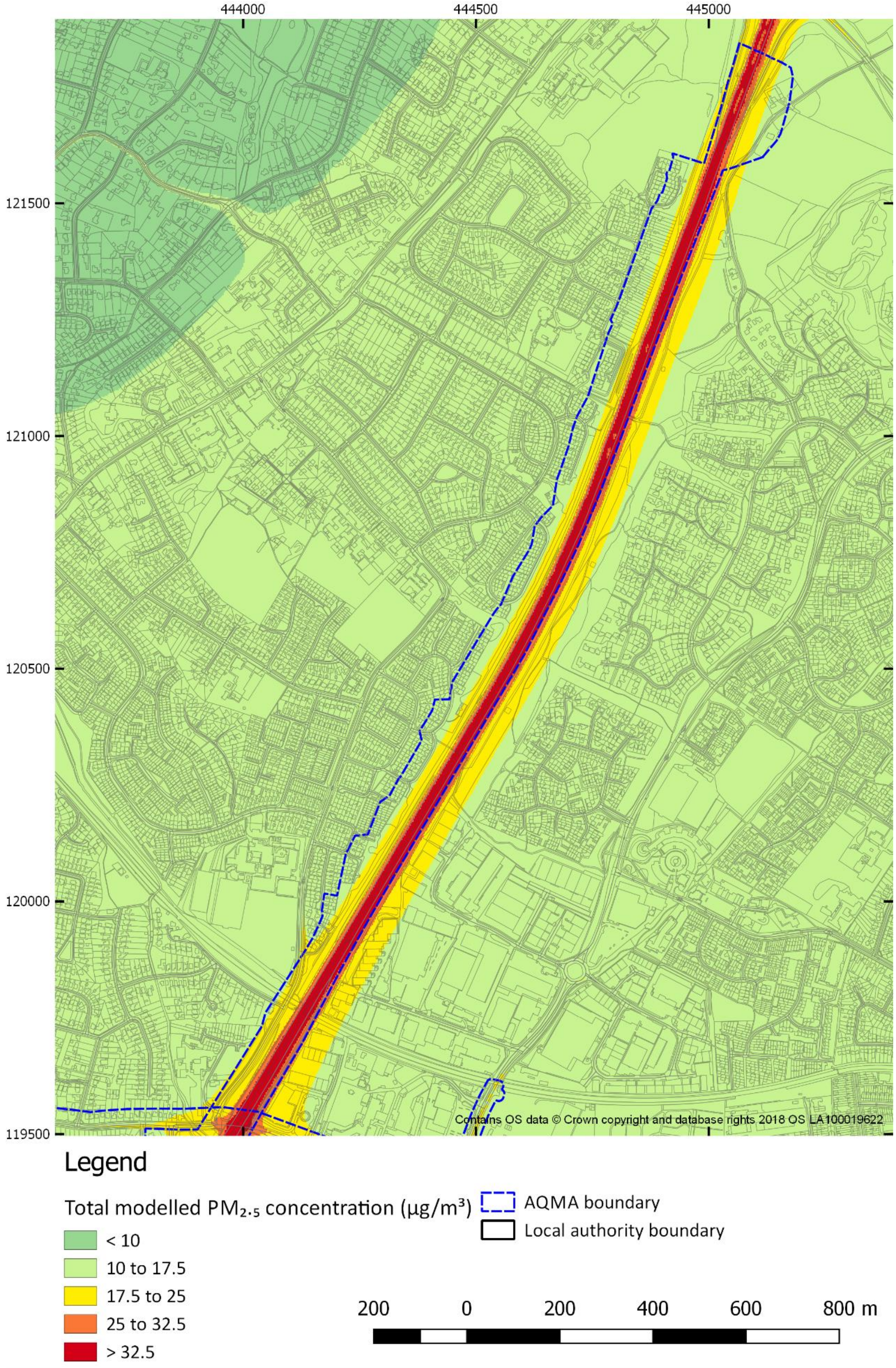


Figure 3-38 Annual mean $PM_{2.5}$ concentration model results for pseudo-2030 SGO B/C scenario AQMA No. 2 (North)

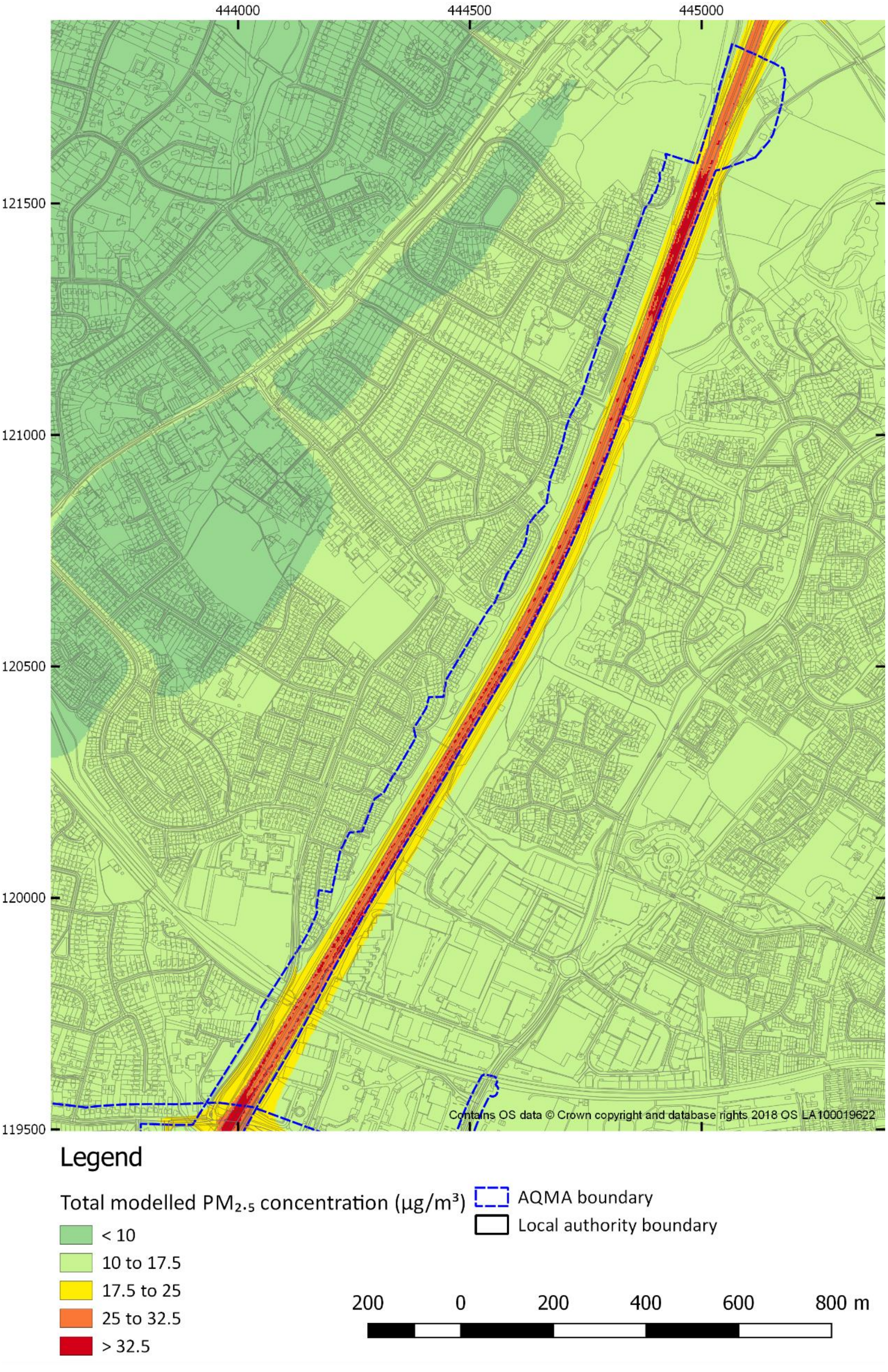


Figure 3-39 Annual mean $PM_{2.5}$ concentration model results for 2036 SGO B/C scenario AQMA No. 2 (North)

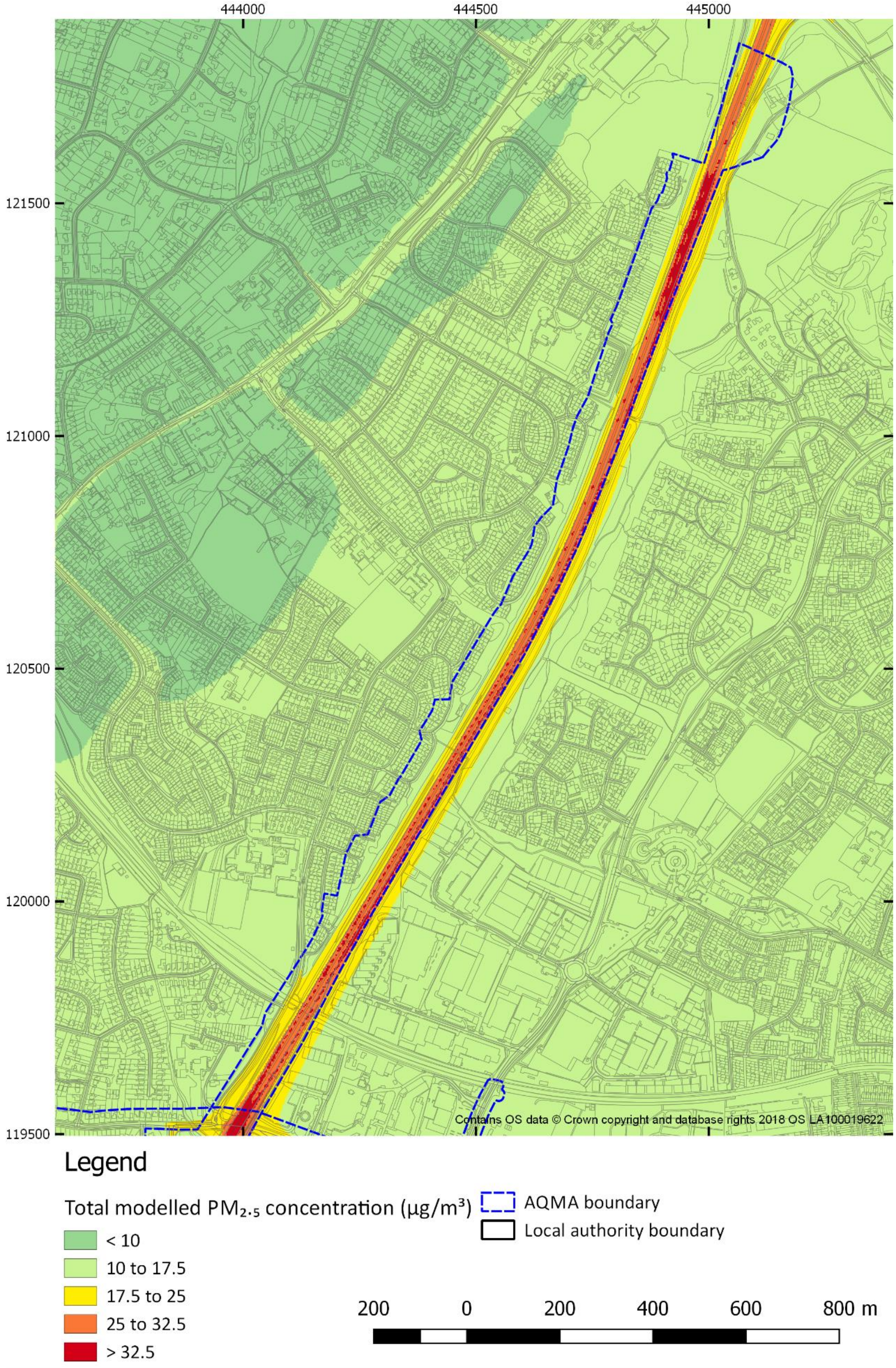


Figure 3-40 Annual mean NO_2 concentration model results for 2015 Reference Case AQMA No. 3

Legend

Total modelled NO_2 concentration (μg/m³)
- < 20
- 20 to 30
- 30 to 40
- 40 to 50
- > 50

AQMA boundary
Local authority boundary

50 0 50 100 150 200 m

Figure 3-41 Annual mean NO_2 concentration model results for pseudo-2030 SGO B/C scenario AQMA No. 3

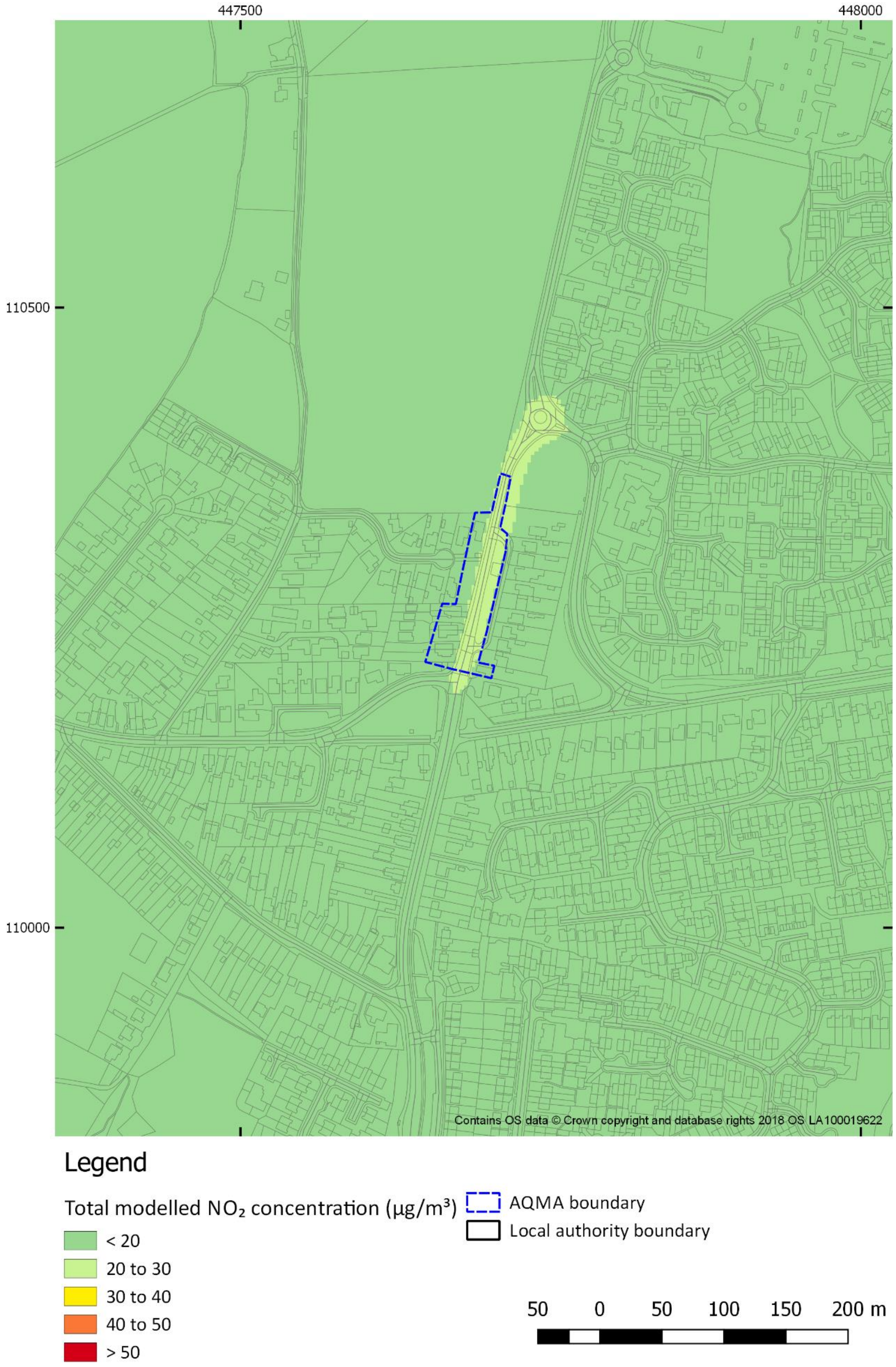


Figure 3-42 Annual mean NO_2 concentration model results for 2036 SGO B/C scenario AQMA No. 3

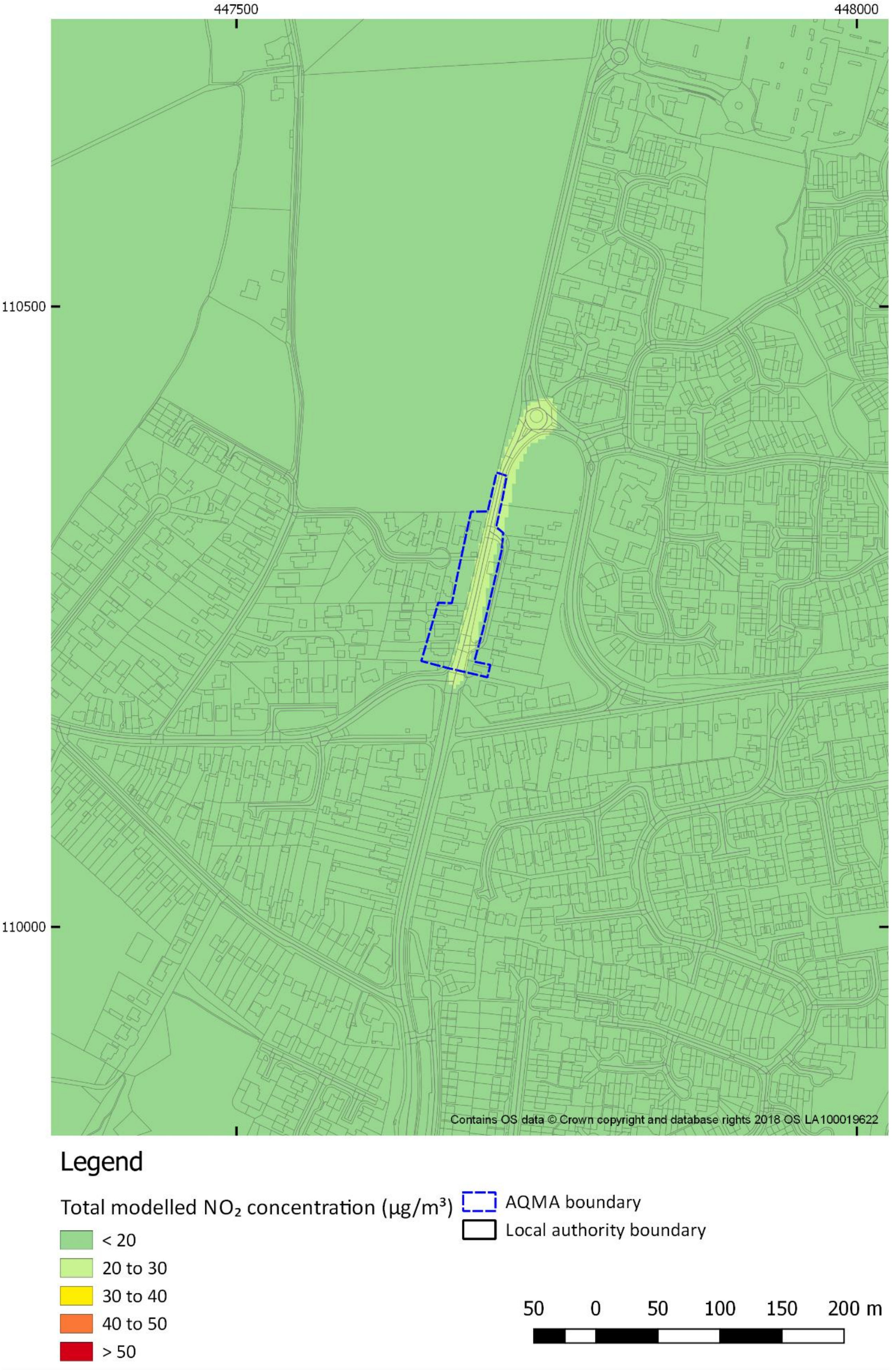


Figure 3-43 Annual mean PM_{10} concentration model results for 2015 Reference Case AQMA No. 3

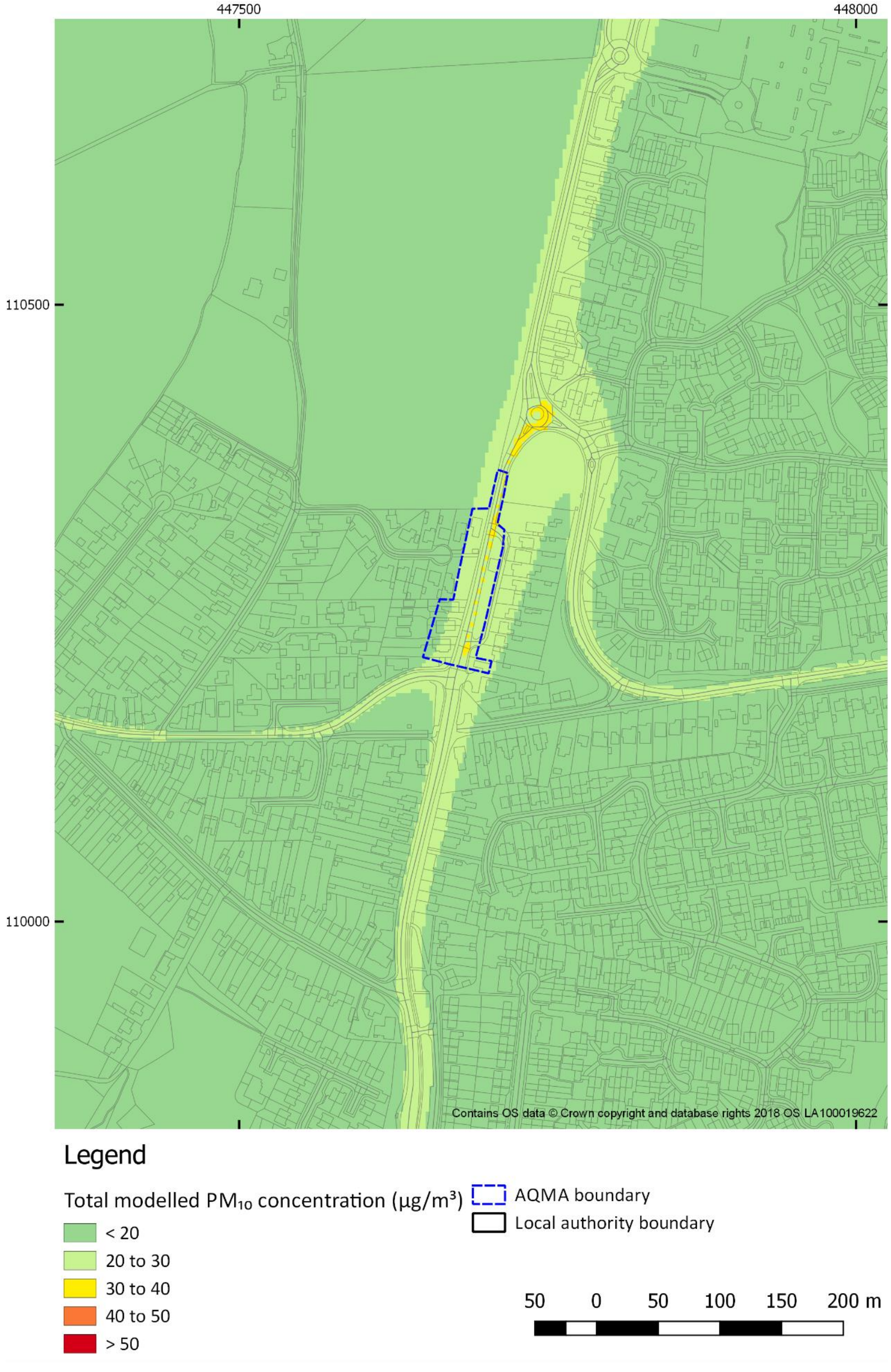


Figure 3-44 Annual mean PM_{10} concentration model results for pseudo-2030 SGO B/C scenario AQMA No. 3

Figure 3-45 Annual mean PM_{10} concentration model results for 2036 SGO B/C scenario AQMA No. 3

Figure 3-46 Annual mean $PM_{2.5}$ concentration model results for 2015 Reference Case AQMA No. 3

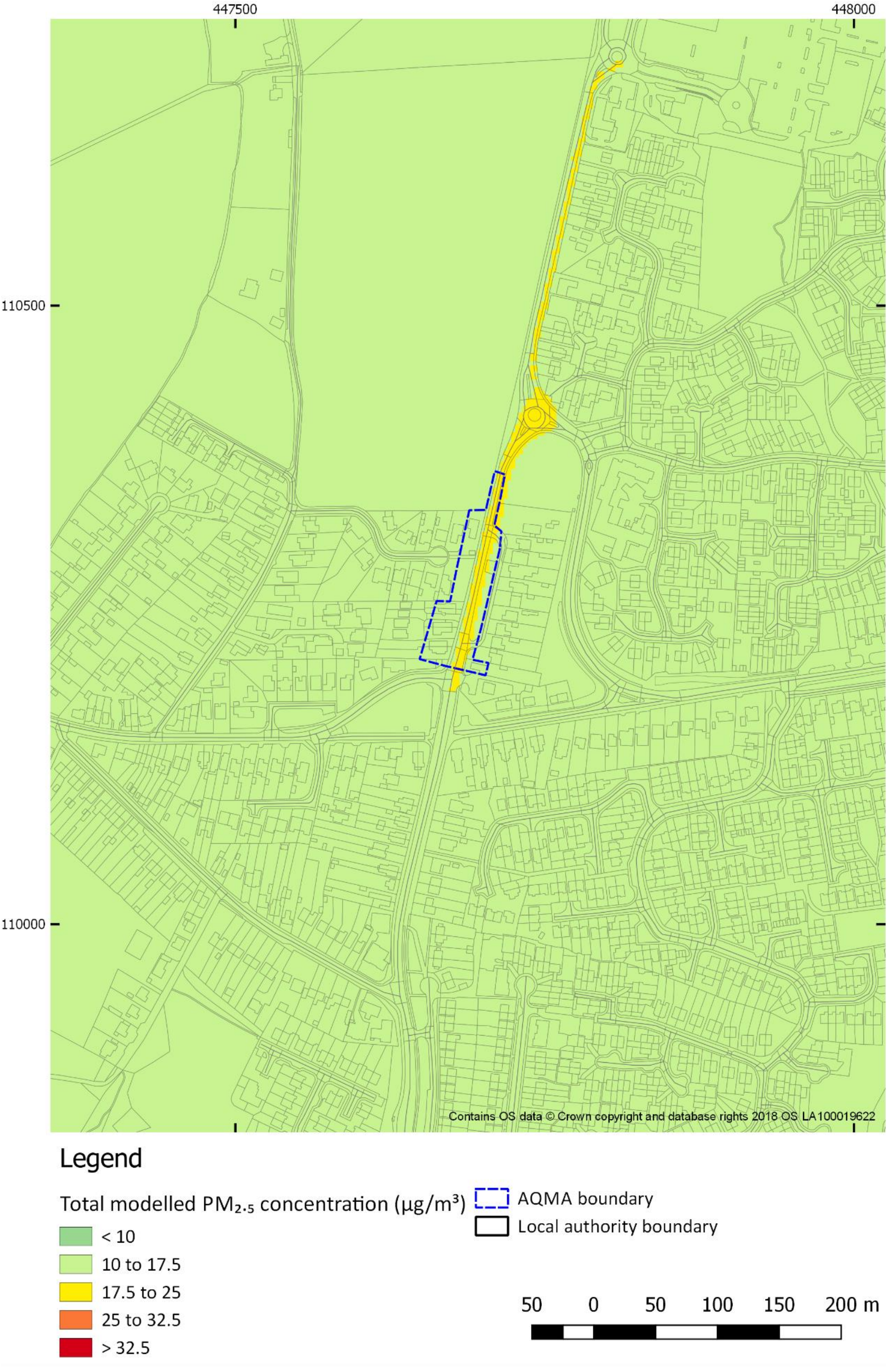


Figure 3-47 Annual mean $PM_{2.5}$ concentration model results for pseudo-2030 SGO B/C scenario AQMA No. 3

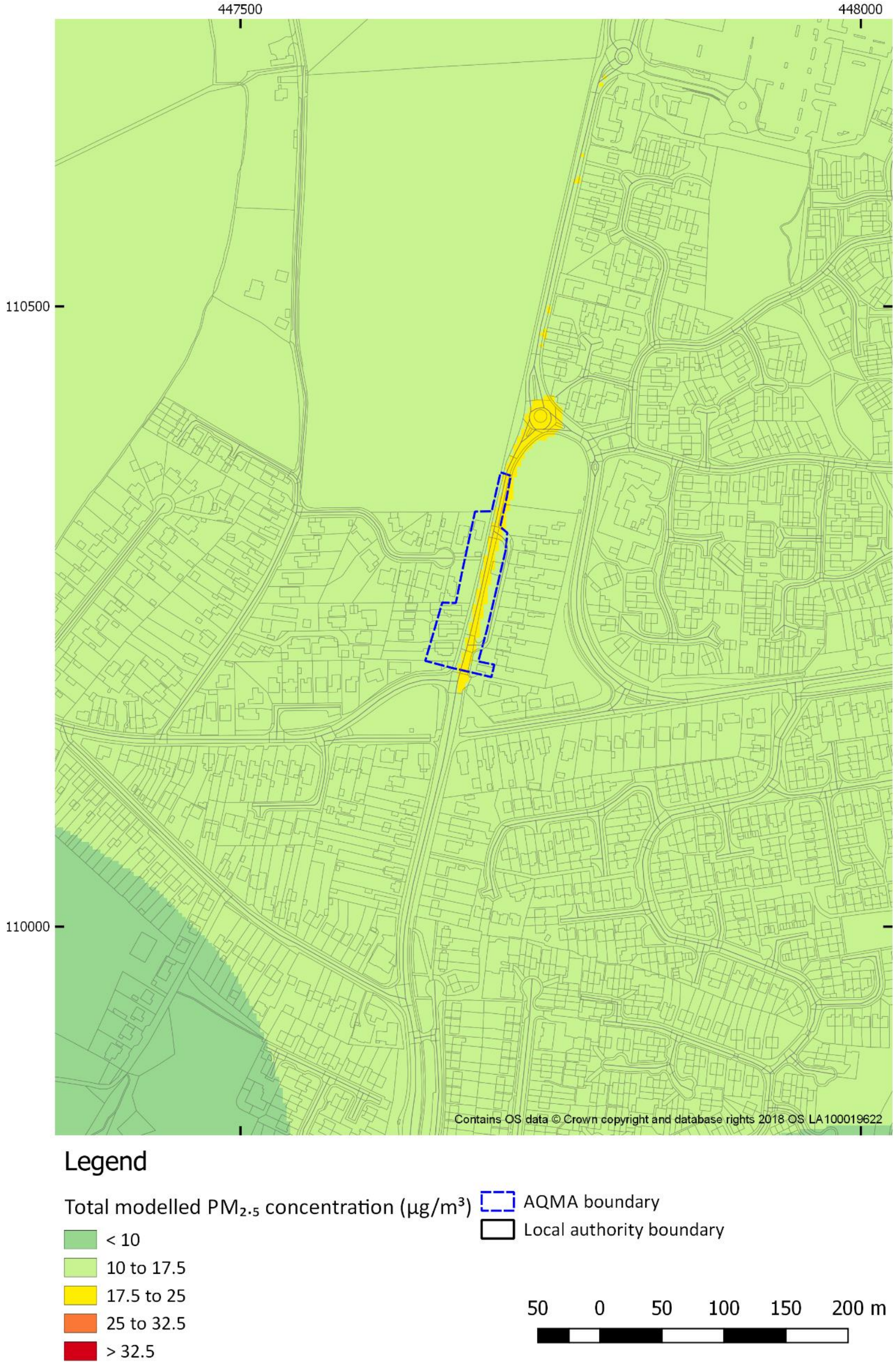


Figure 3-48 Annual mean $PM_{2.5}$ concentration model results for 2036 SGO B/C scenario AQMA No. 3

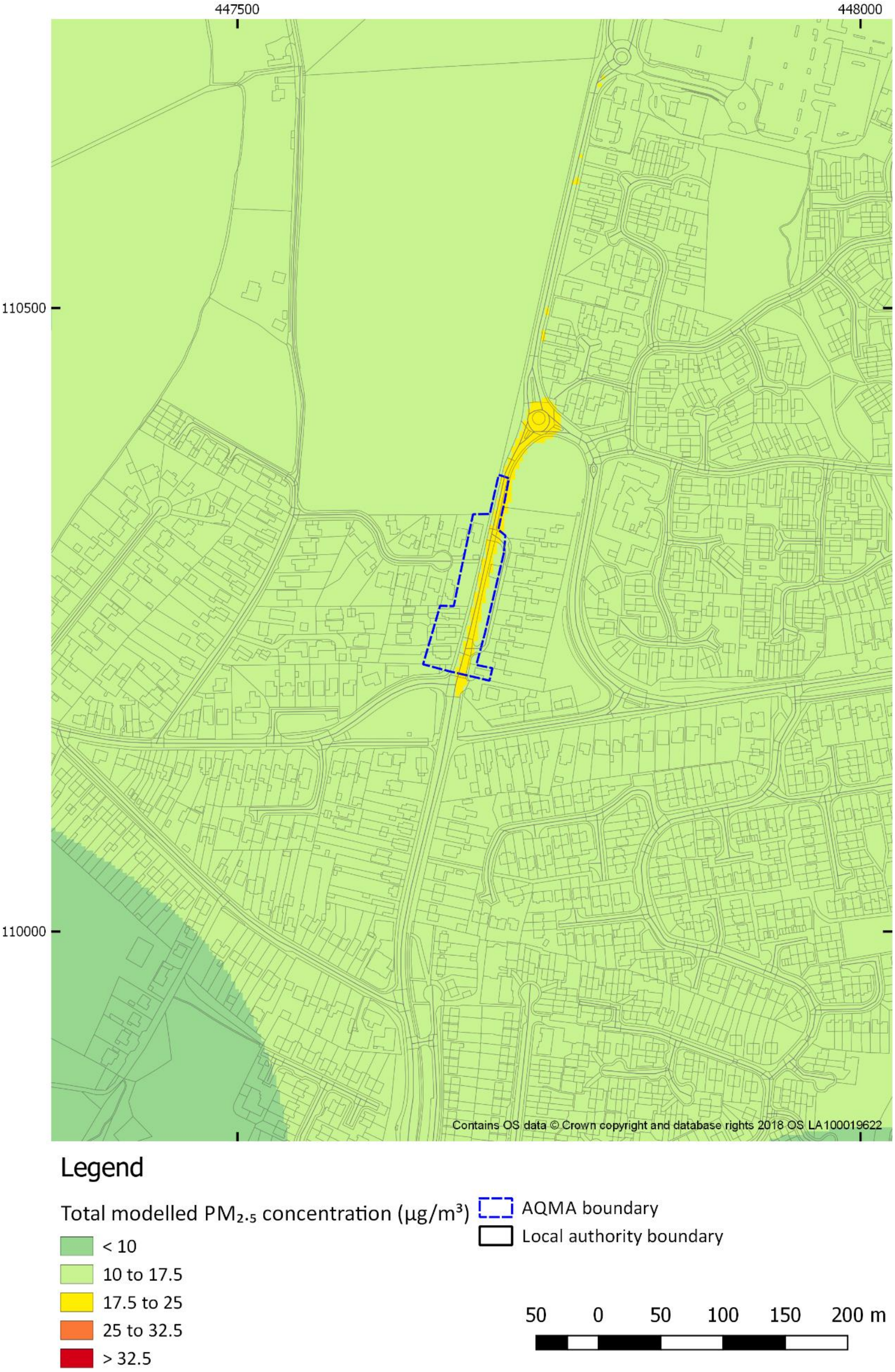


Figure 3-49 Annual mean NO_2 concentration model results for 2015 Reference Case AQMA No. 4

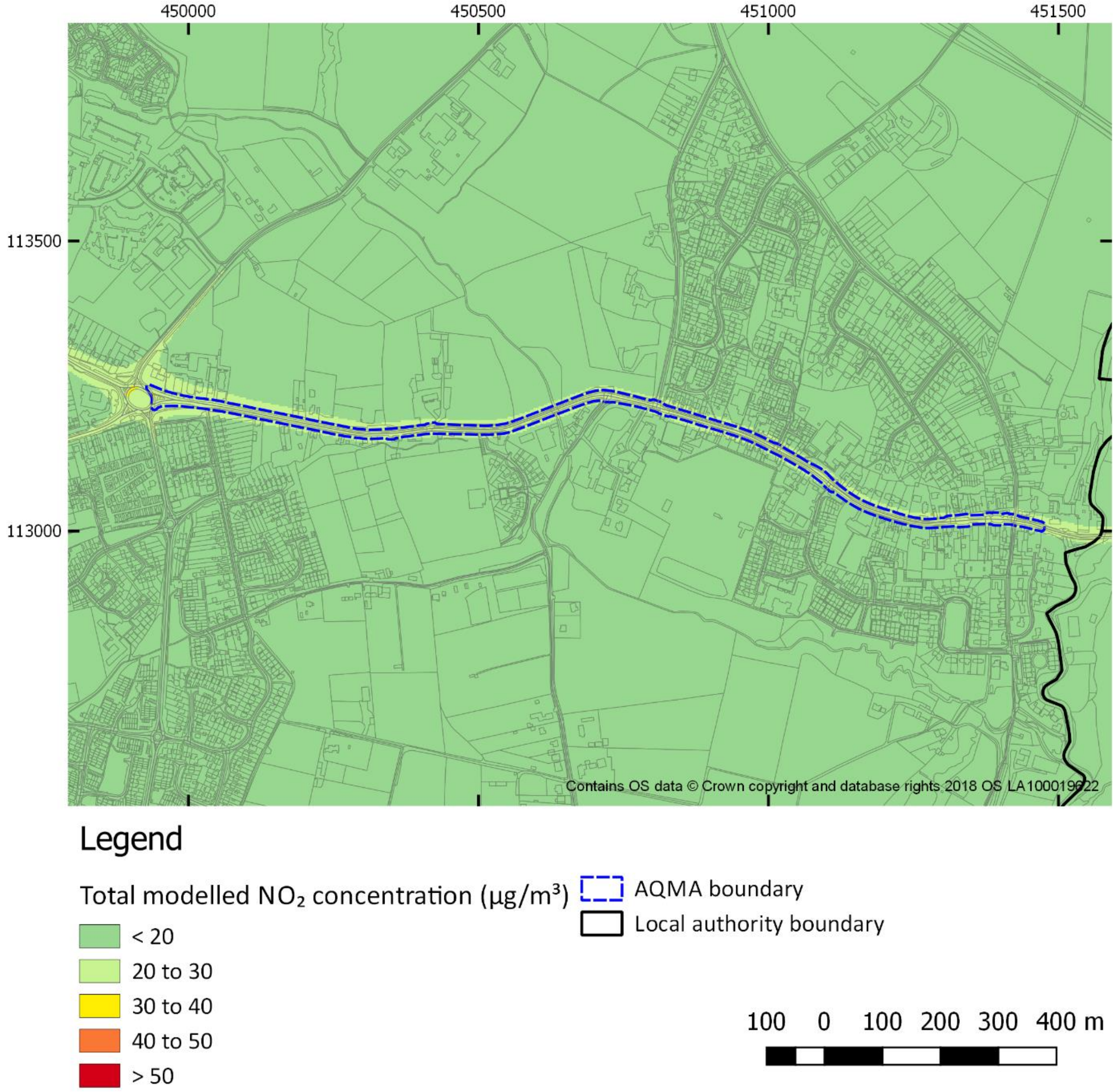


Figure 3-50 Annual mean NO_2 concentration model results for pseudo-2030 SGO B/C scenario AQMA No. 4

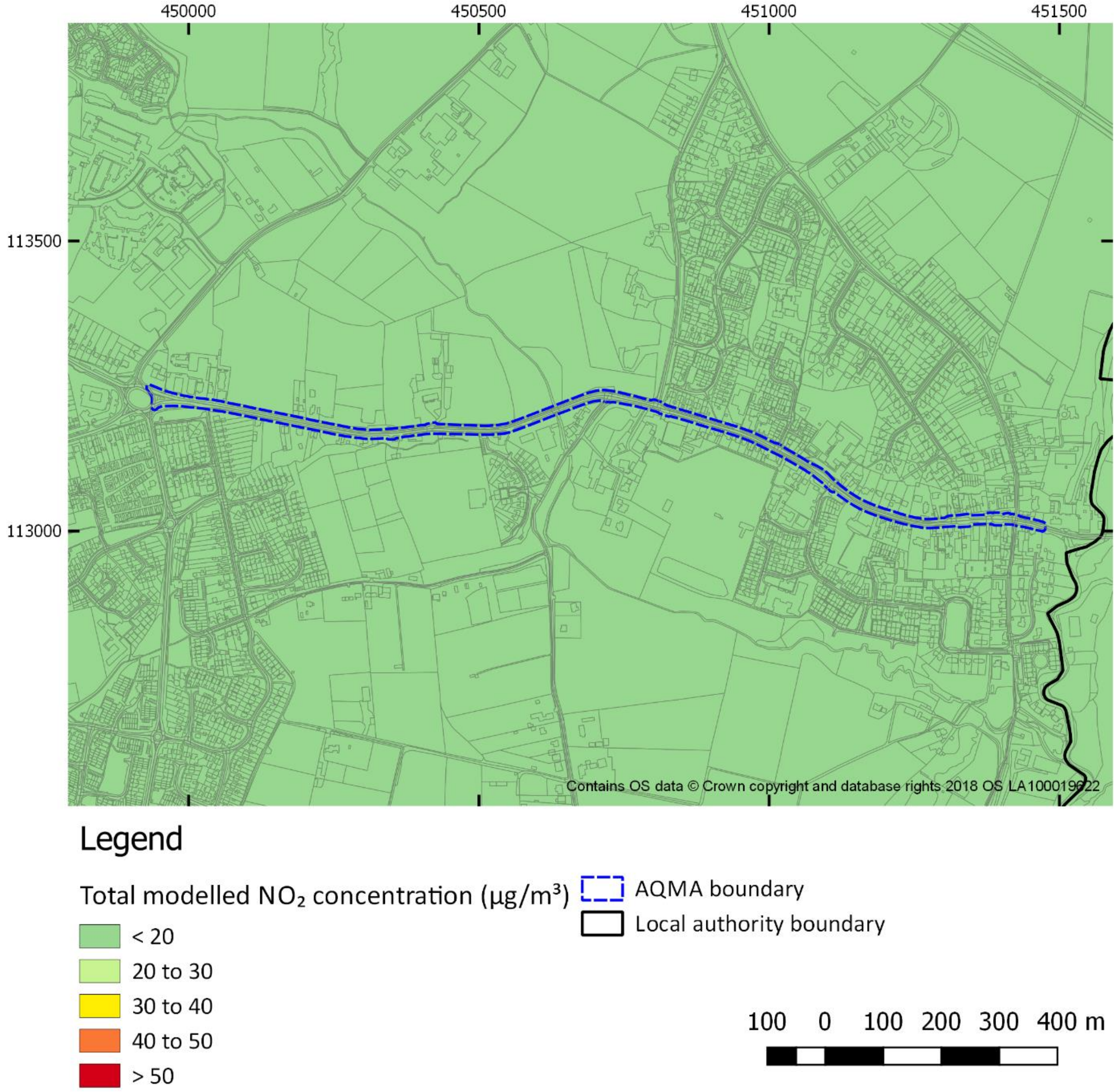


Figure 3-51 Annual mean NO_2 concentration model results for 2036 SGO B/C scenario AQMA No. 4

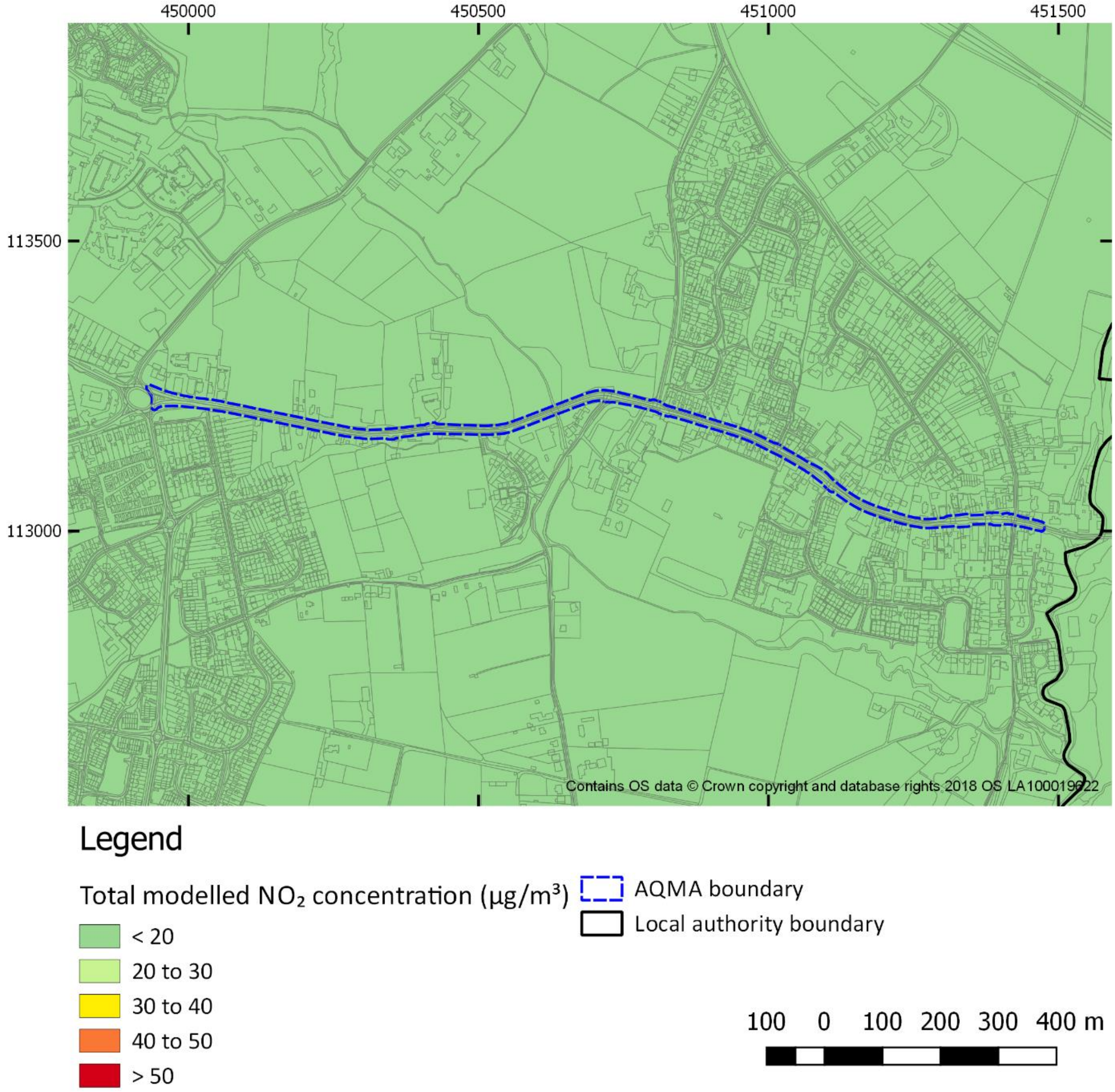


Figure 3-52 Annual mean PM_{10} concentration model results for 2015 Reference Case AQMA No. 4

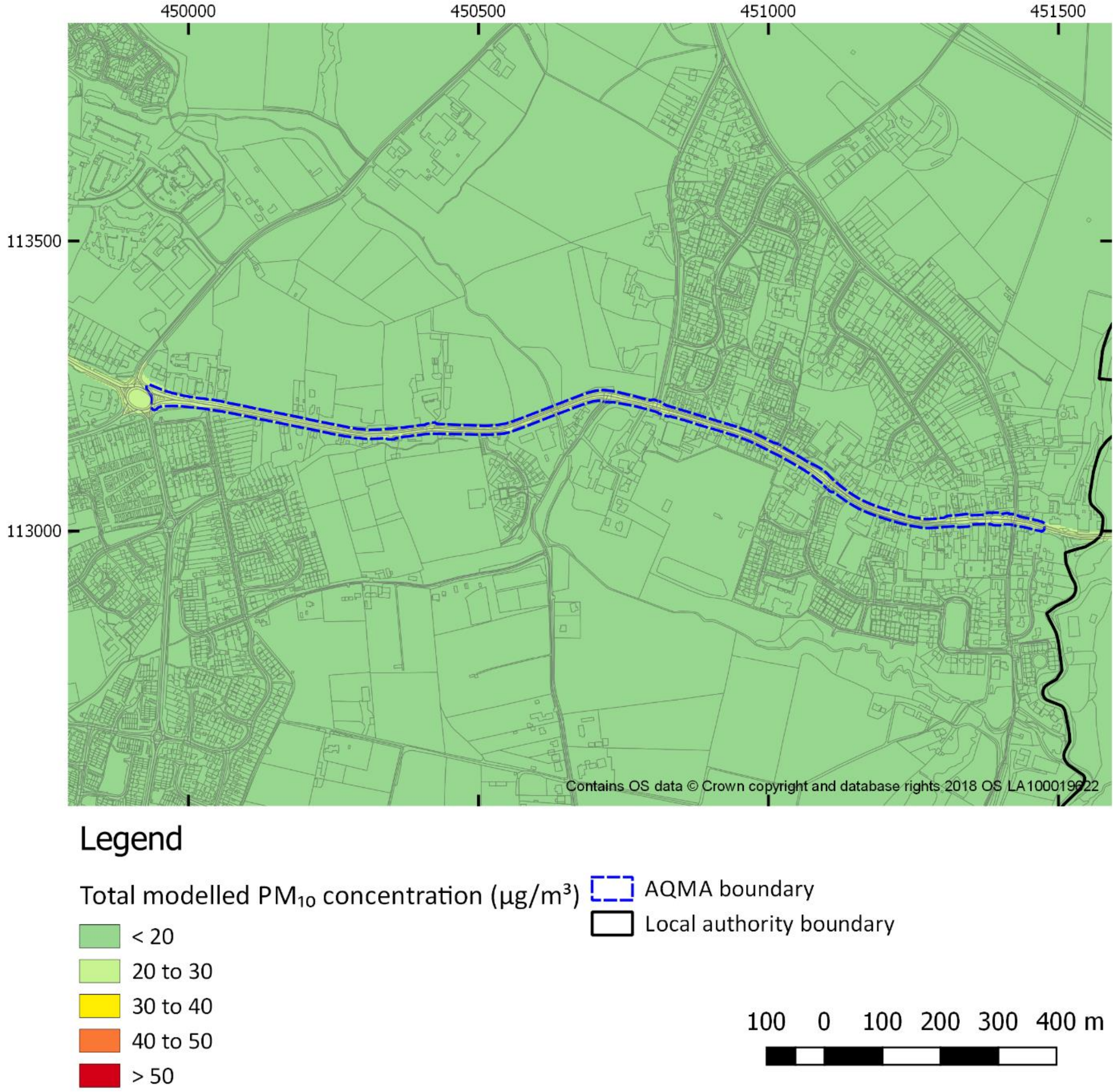


Figure 3-53 Annual mean PM_{10} concentration model results for pseudo-2030 SGO B/C scenario AQMA No. 4

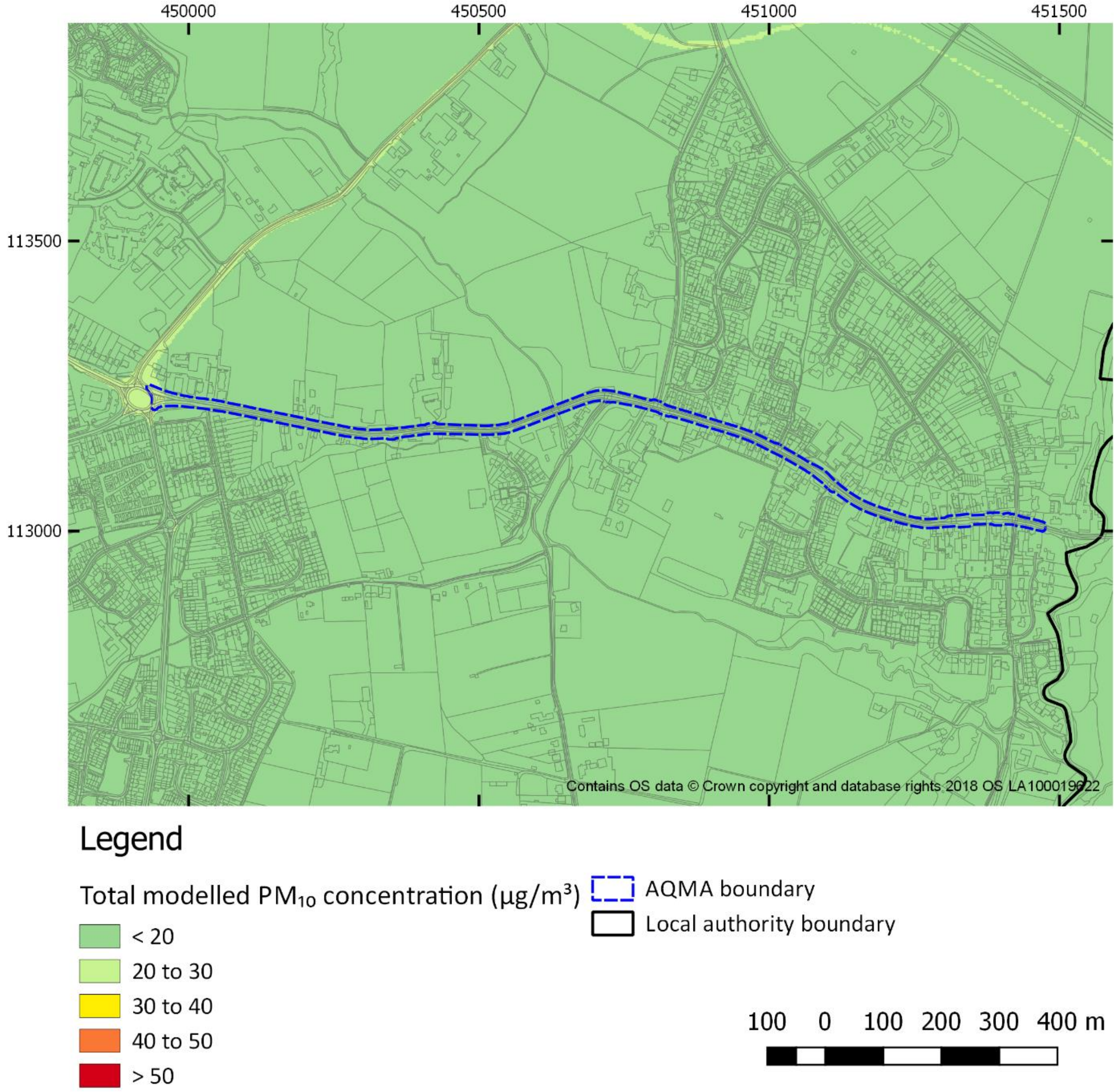


Figure 3-54 Annual mean PM_{10} concentration model results for 2036 SGO B/C scenario AQMA No. 4

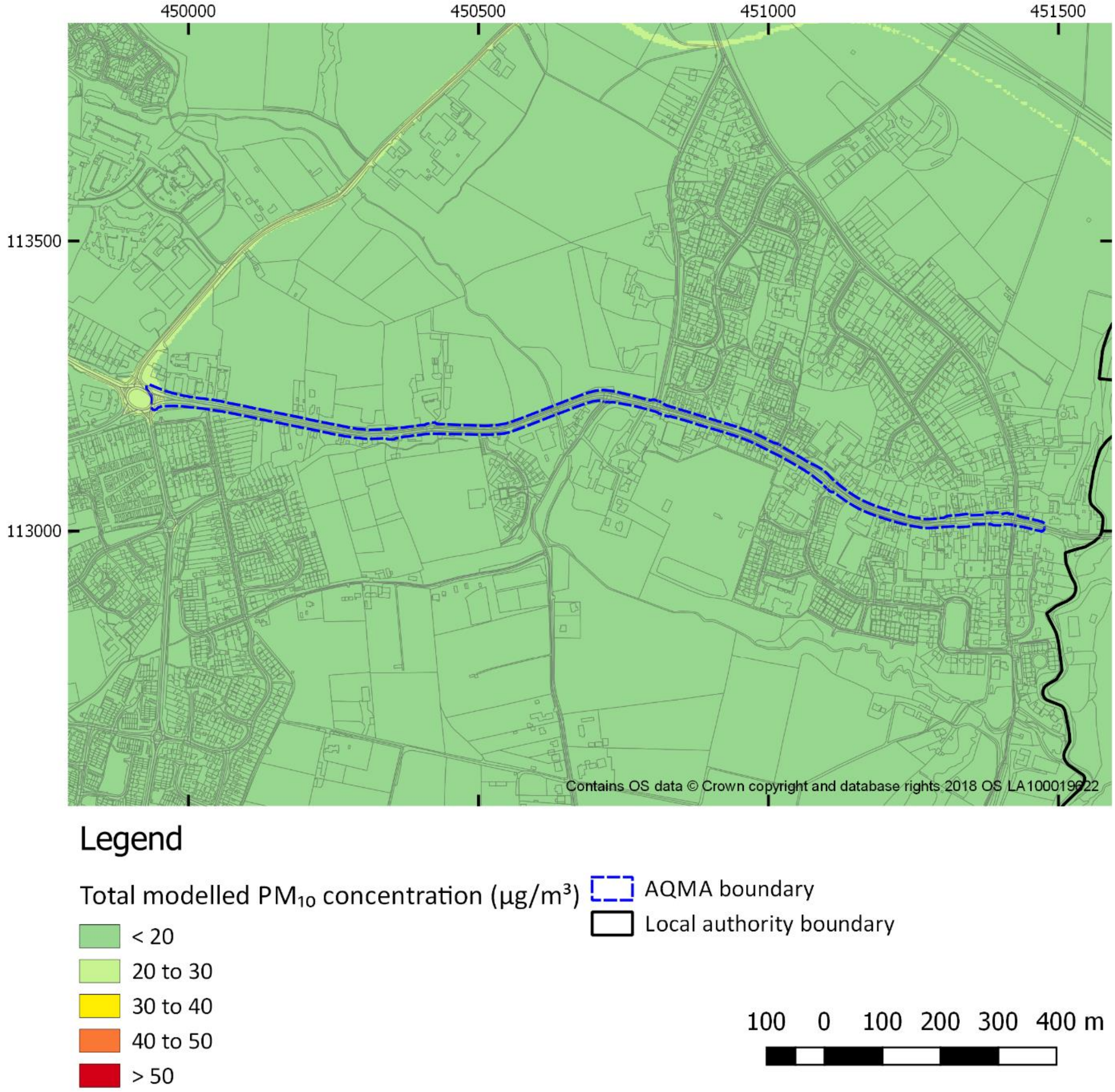


Figure 3-55 Annual mean $PM_{2.5}$ concentration model results for 2015 Reference Case AQMA No. 4

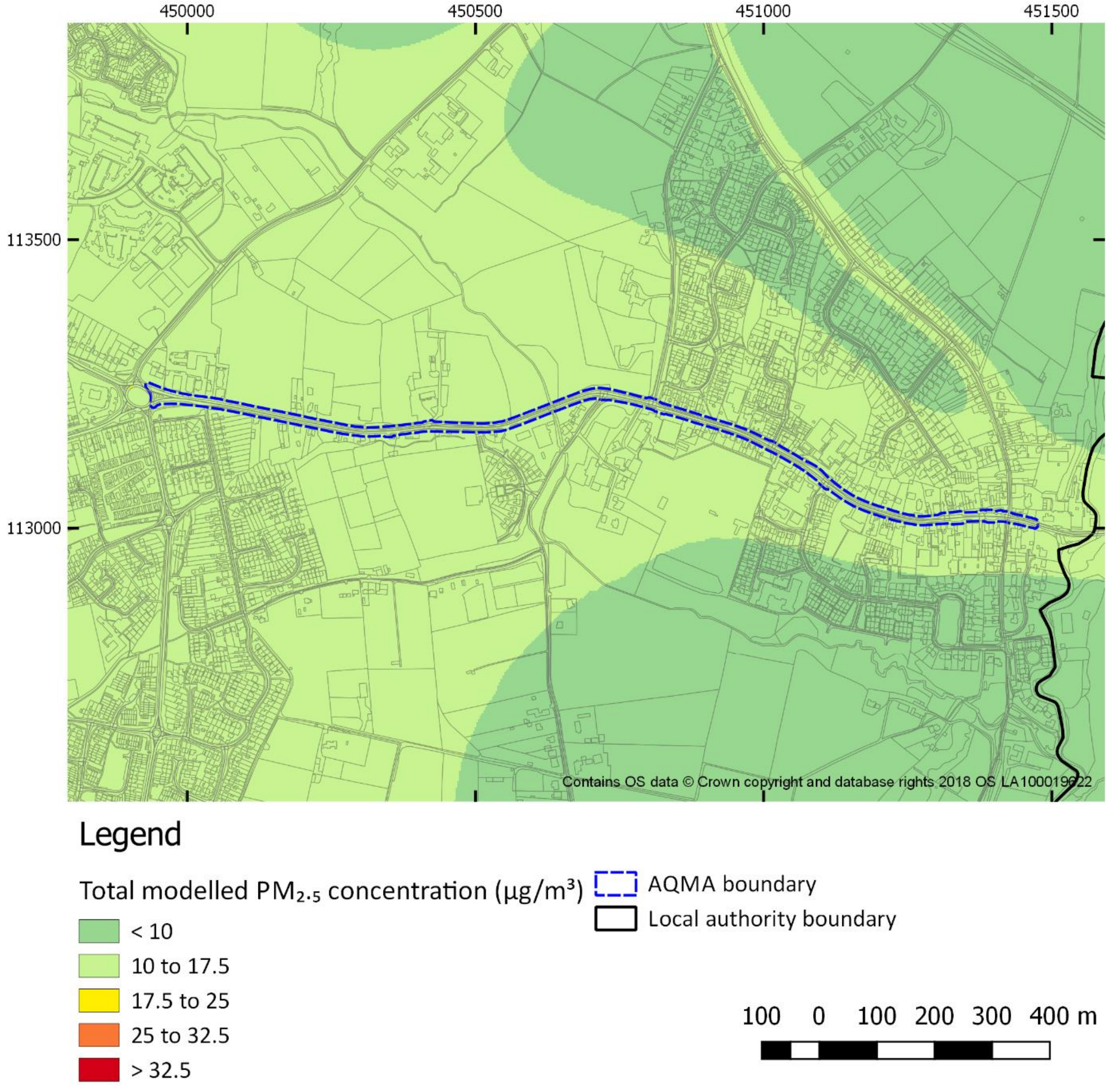


Figure 3-56 Annual mean $PM_{2.5}$ concentration model results for pseudo-2030 SGO B/C scenario AQMA No. 4

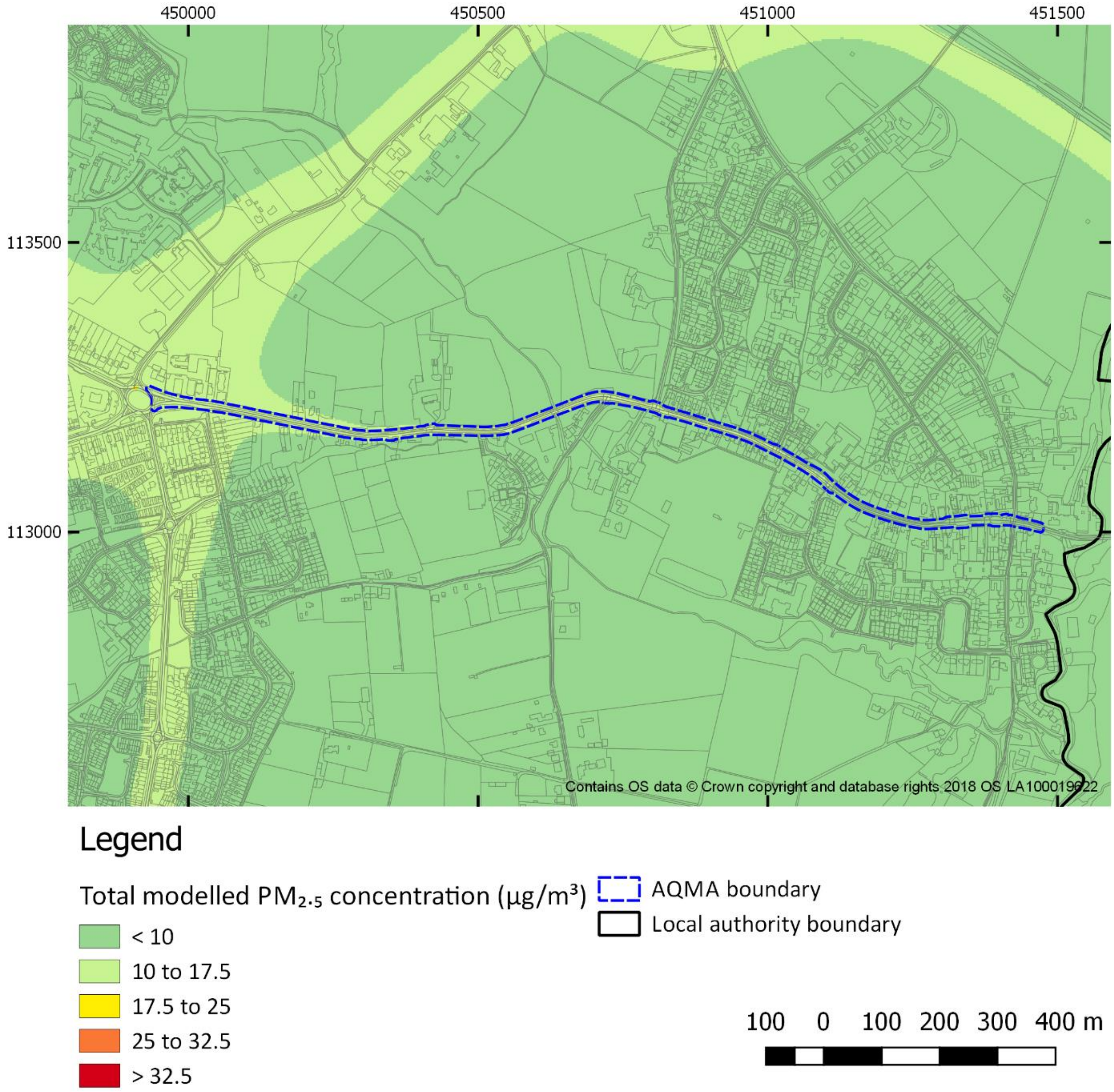


Figure 3-57 Annual mean $PM_{2.5}$ concentration model results for 2036 SGO B/C scenario AQMA No. 4

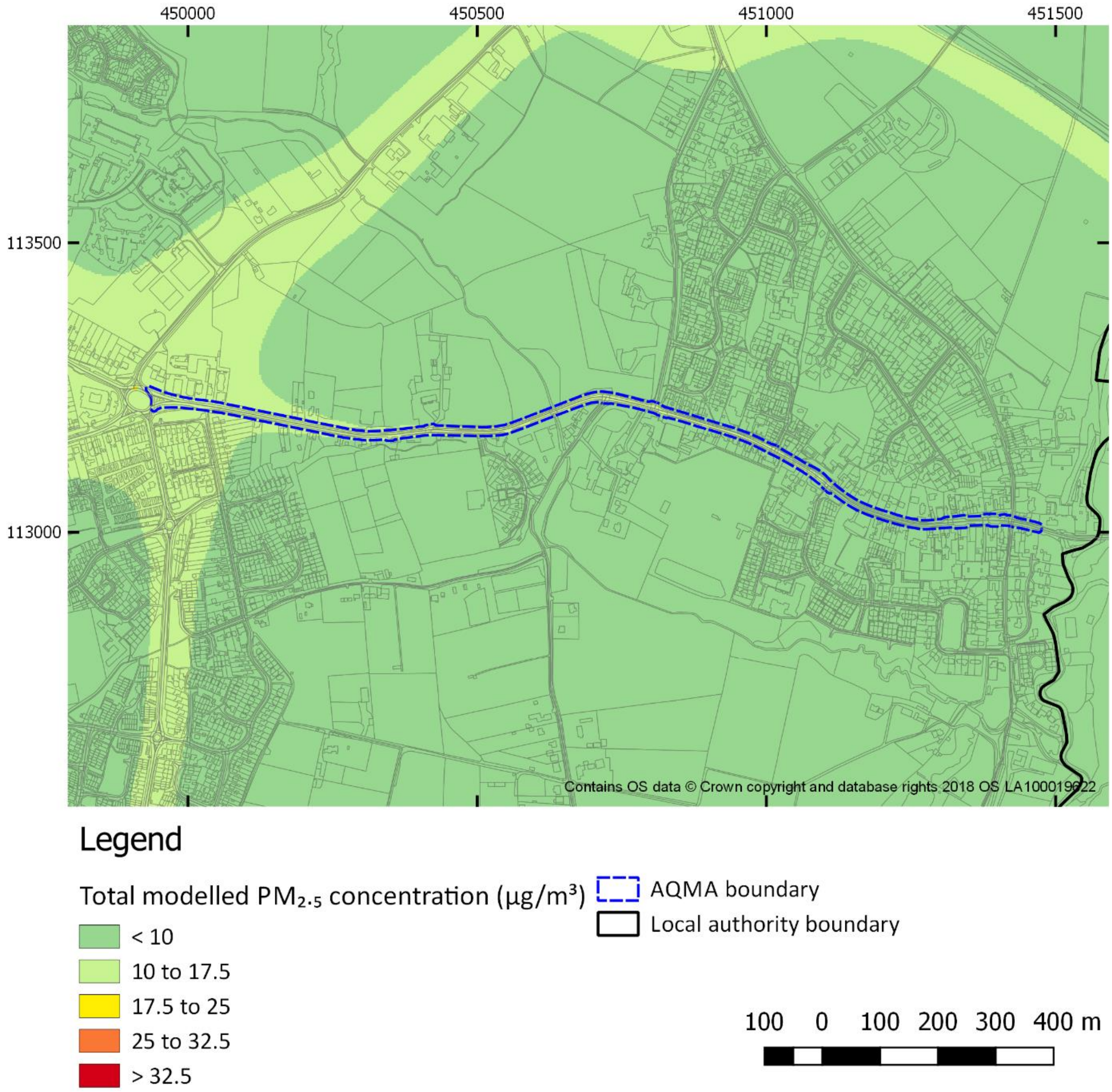


Figure 3-58 Short term NO_2 concentration model results for 2015 Reference Case

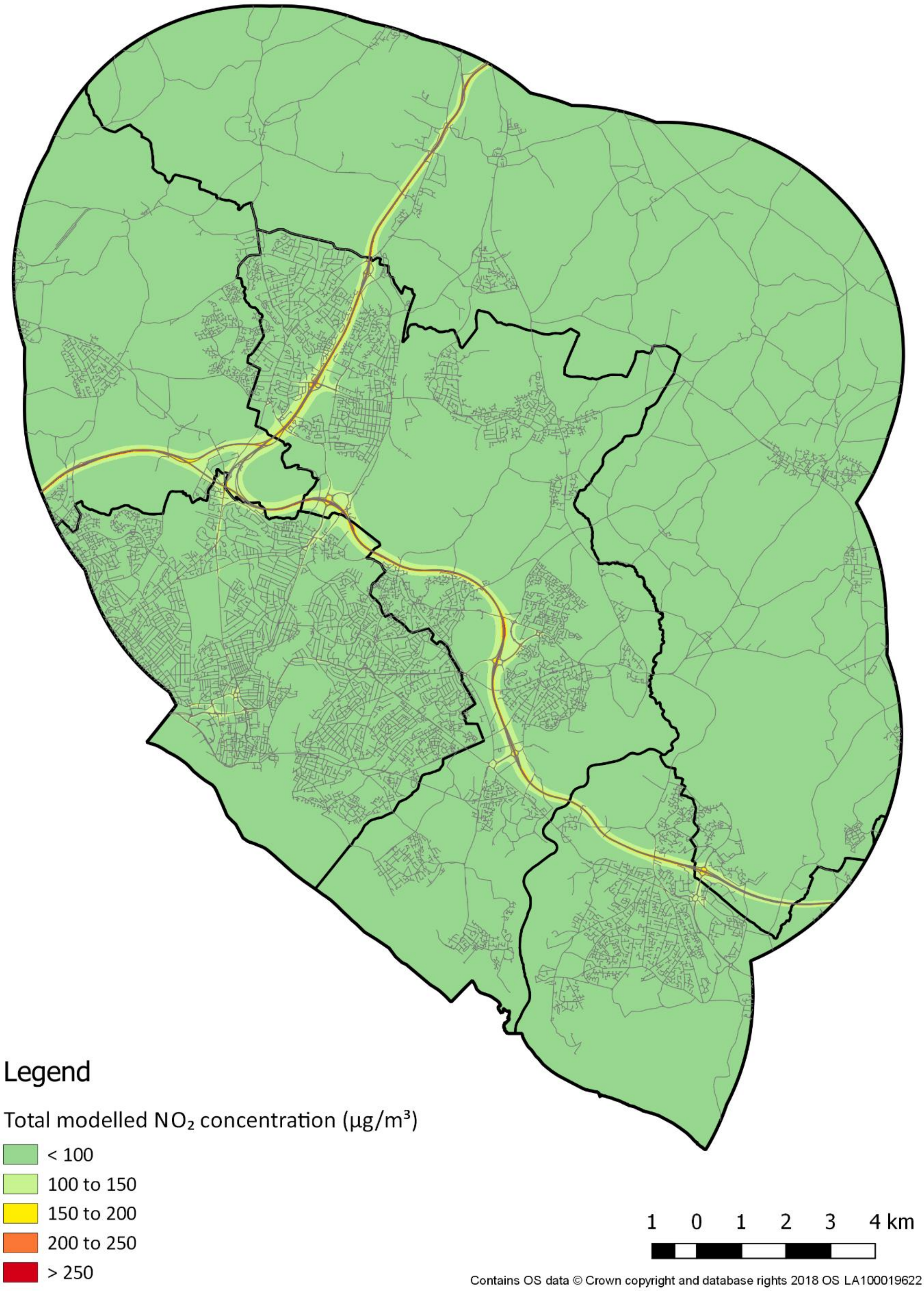


Figure 3-59 Short term NO_2 concentration model results for pseudo-2030 SGO B/C scenario

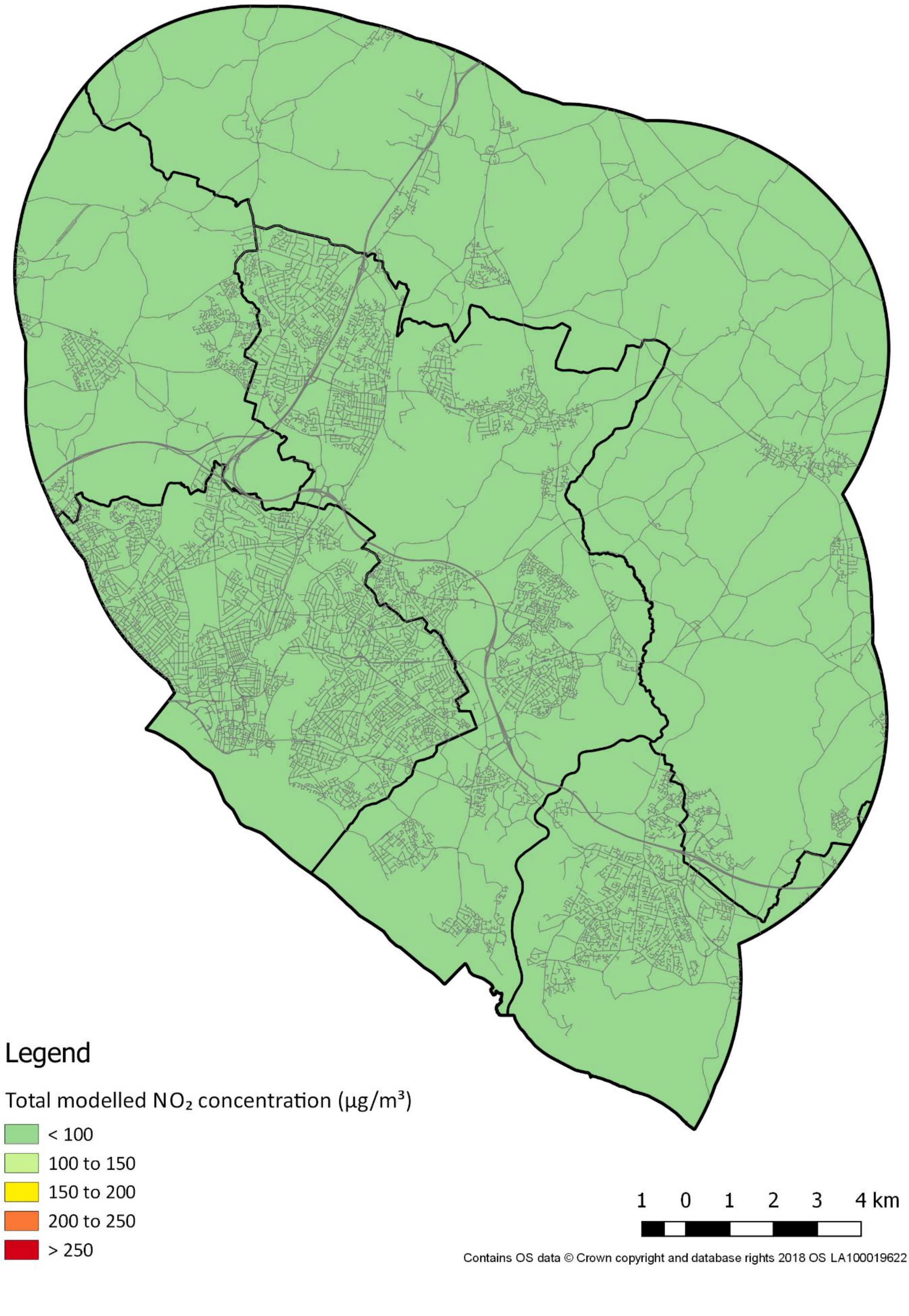


Figure 3-60 Short term NO_2 concentration model results for 2036 SGO B/C scenario

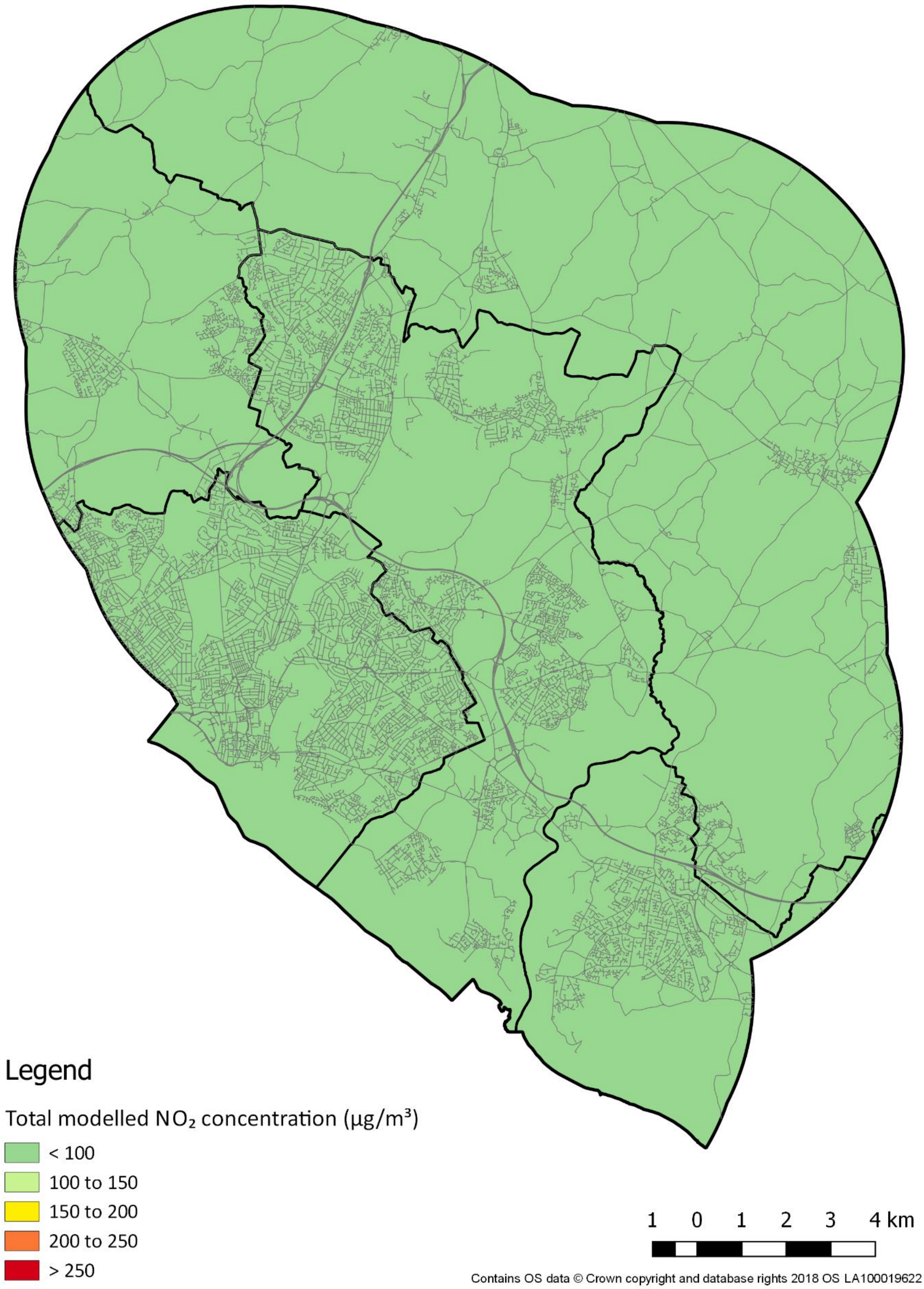


Figure 3-61 Short term PM_{10} concentration model results for 2015 Reference Case

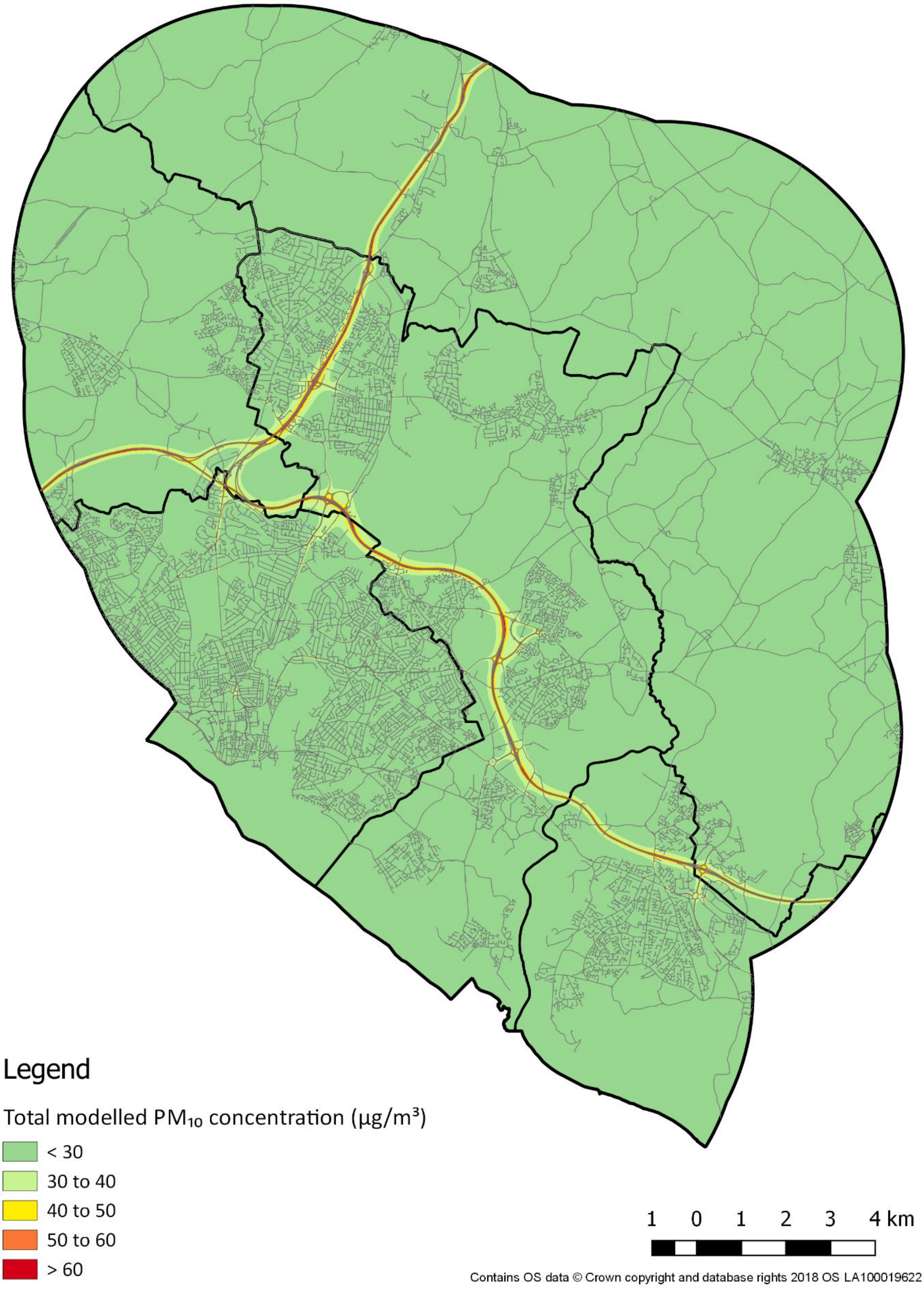


Figure 3-62 Short term PM_{10} concentration model results for pseudo-2030 SGO B/C scenario

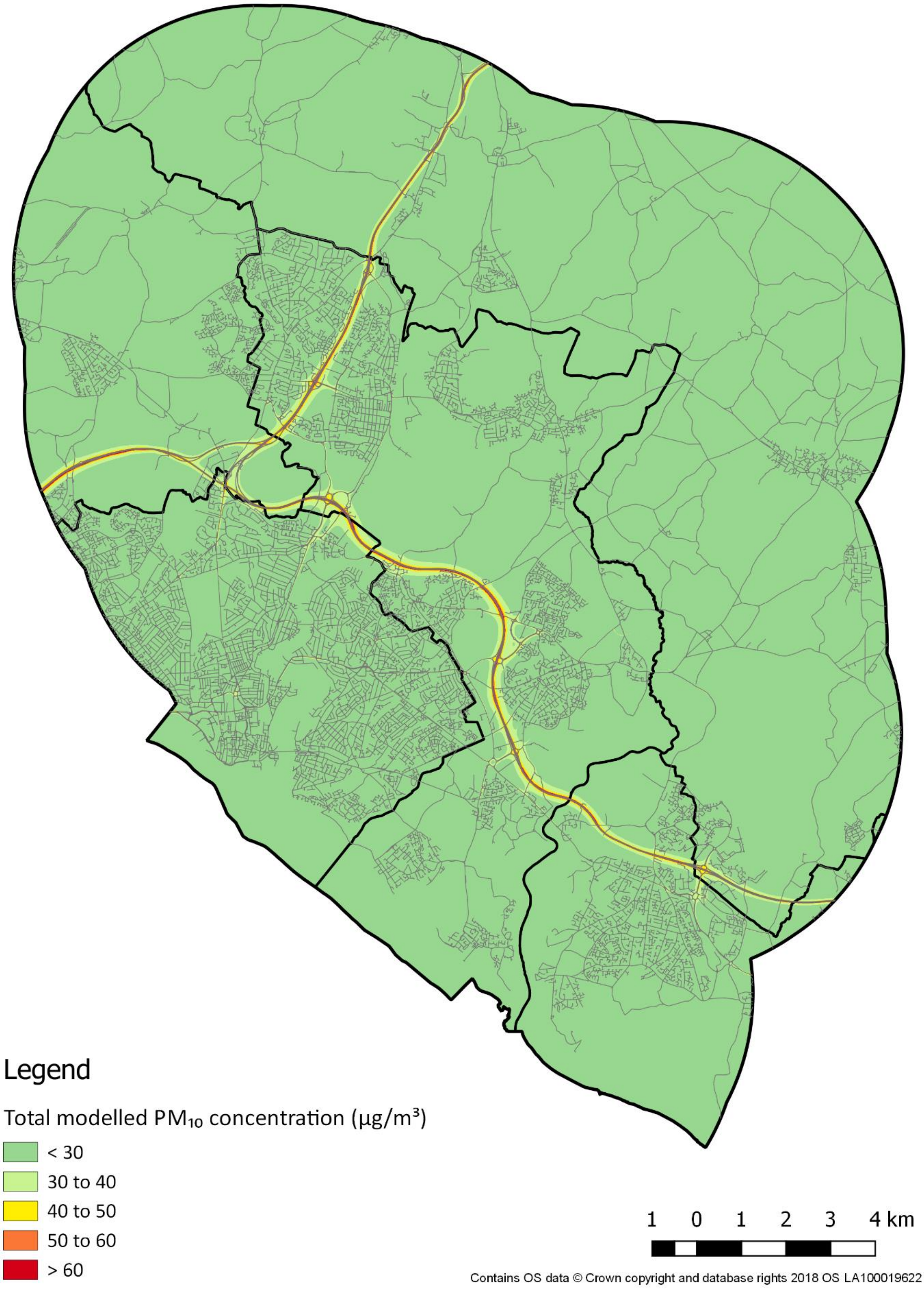


Figure 3-63 Short term PM_{10} concentration model results for 2036 SGO B/C scenario

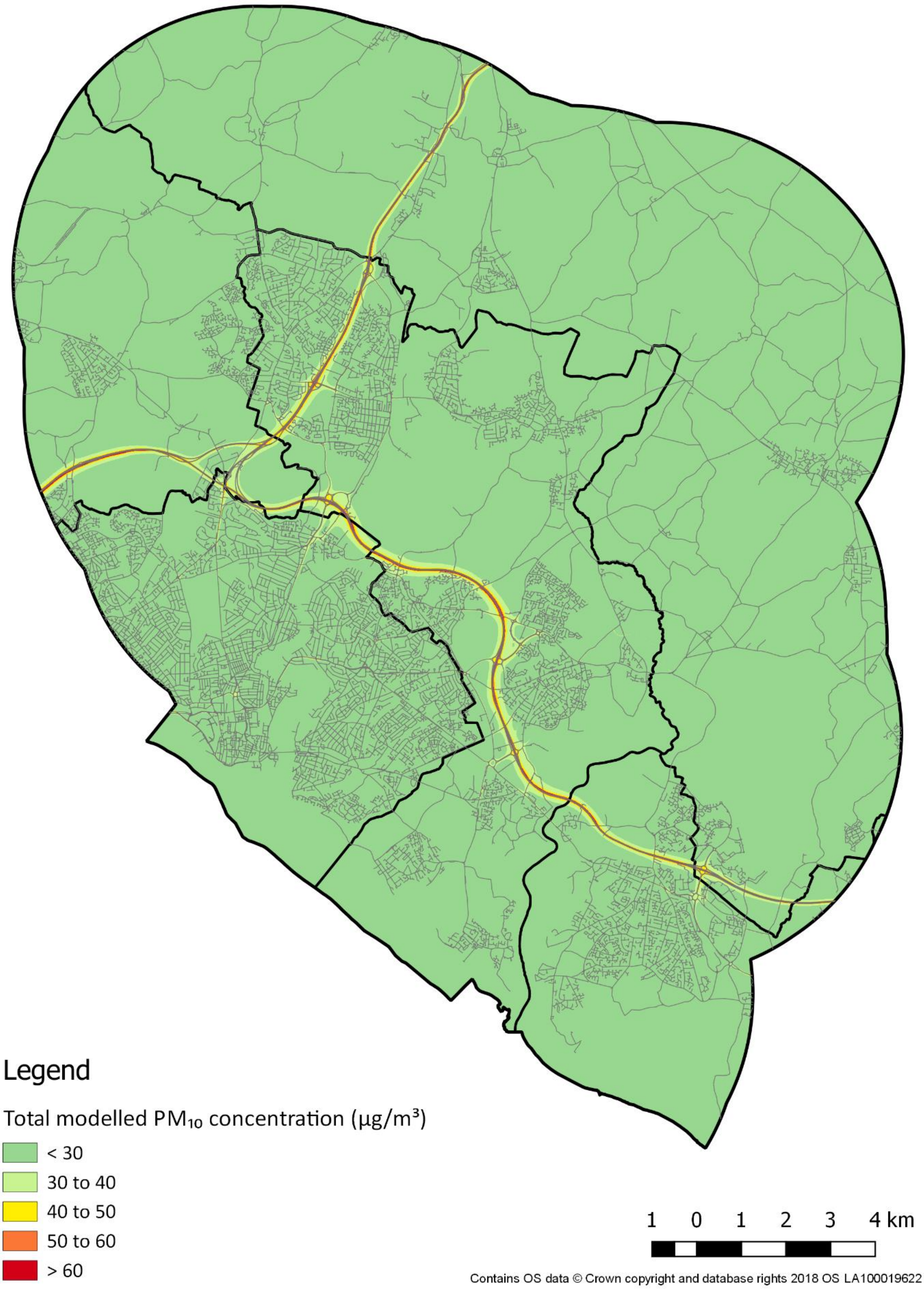


Figure 3-64 Short term NO_2 concentration model results for 2015 Reference Case AQMA No. 1 (East)

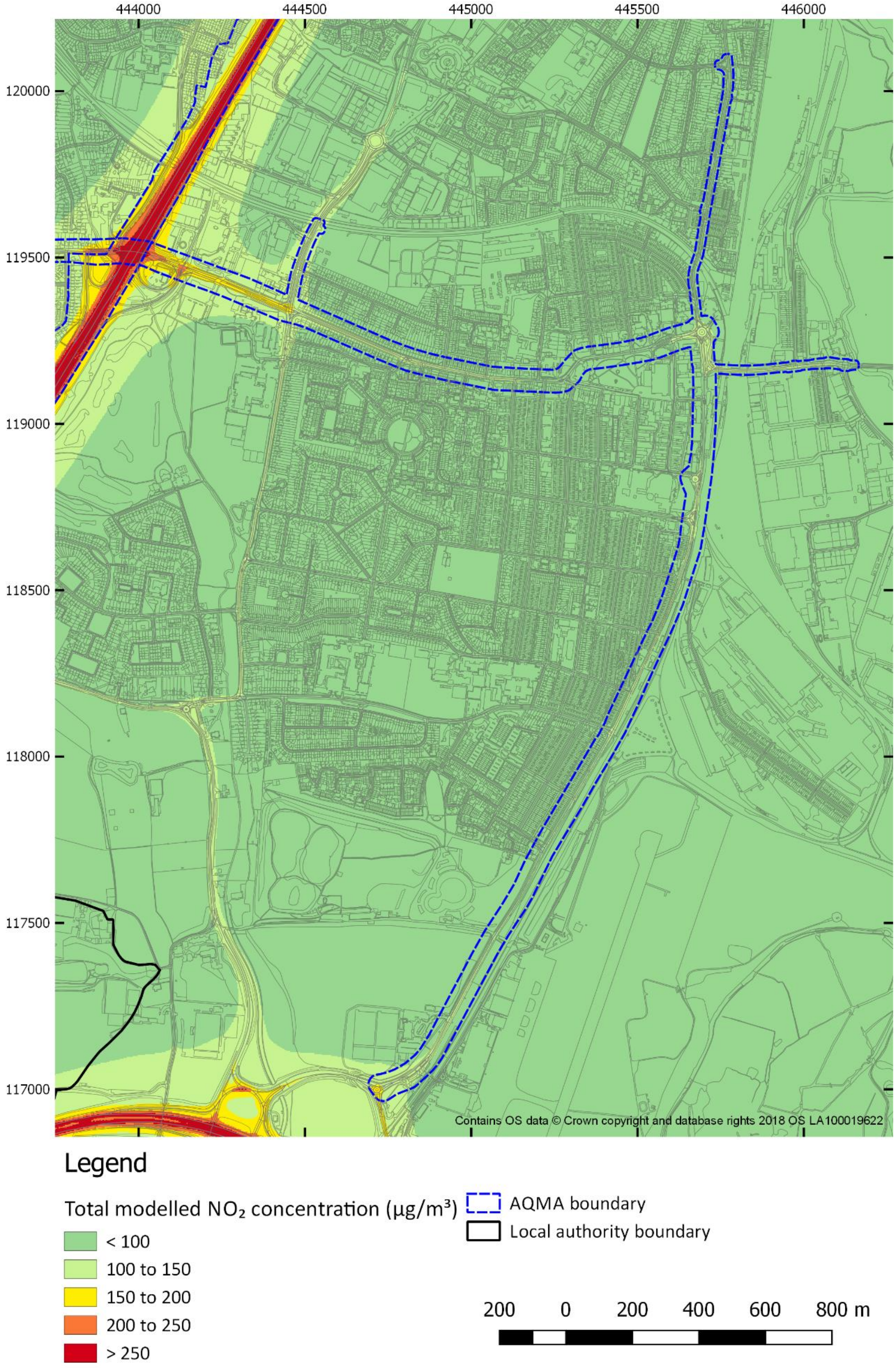


Figure 3-65 Short term NO_2 concentration model results for pseudo-2030 SGO B/C scenario AQMA No. 1 (East)

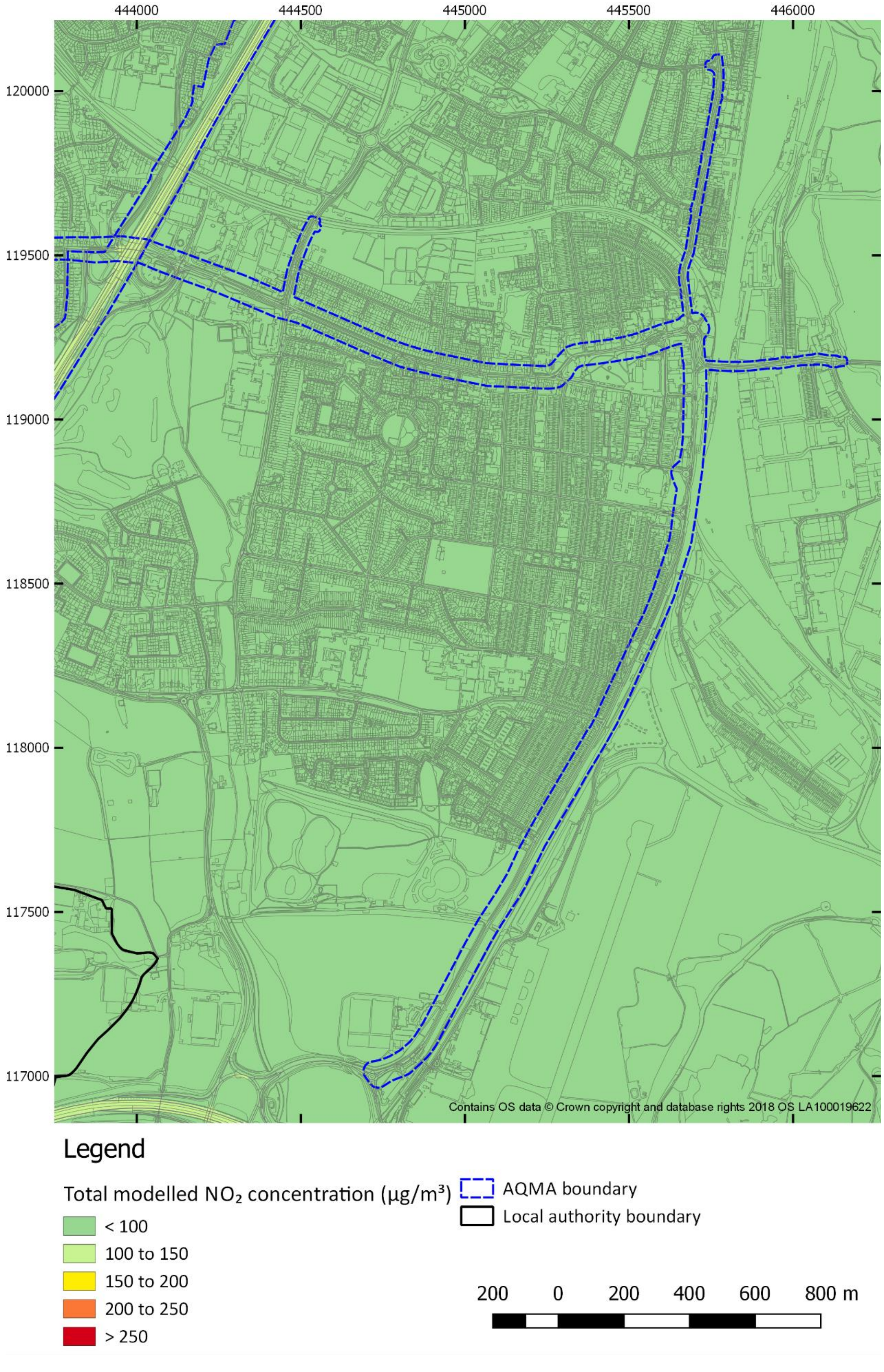


Figure 3-66 Short term NO_2 concentration model results for 2036 SGO B/C scenario AQMA No. 1 (East)

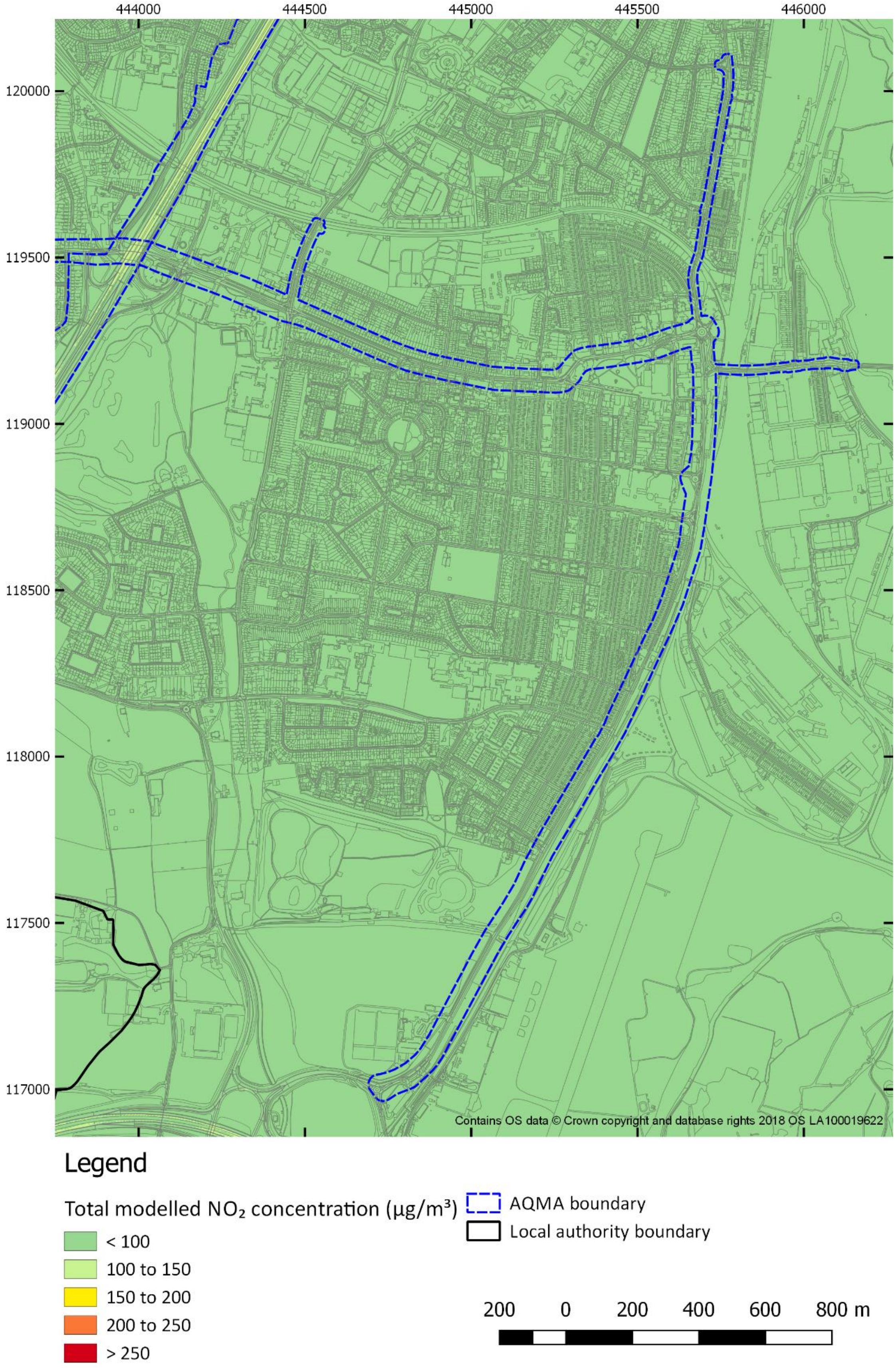


Figure 3-67 Short term PM_{10} concentration model results for 2015 Reference Case AQMA No. 1 (East)

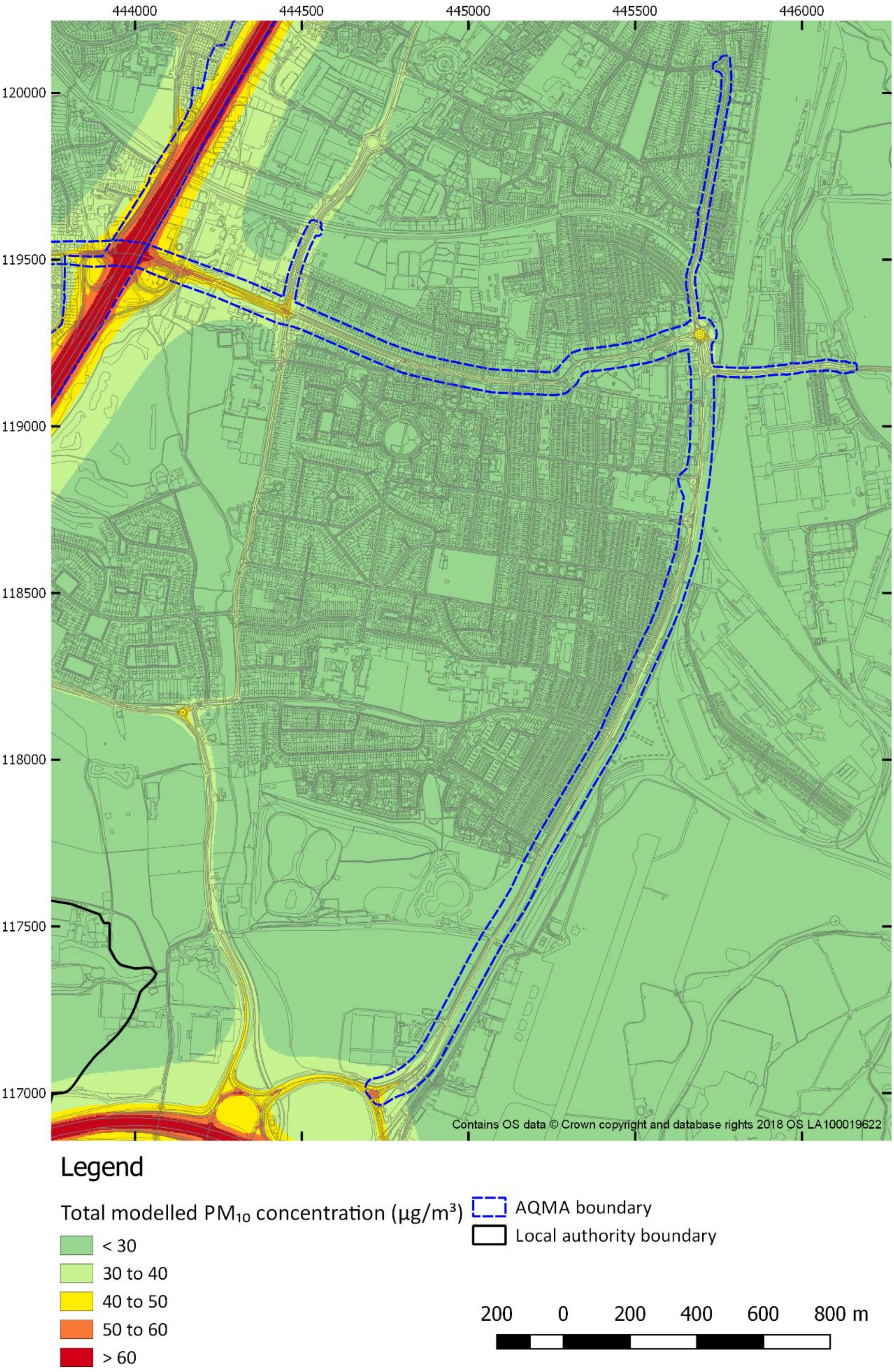


Figure 3-68 Short term PM_{10} concentration model results for pseudo-2030 SGO B/C scenario AQMA No. 1 (East)

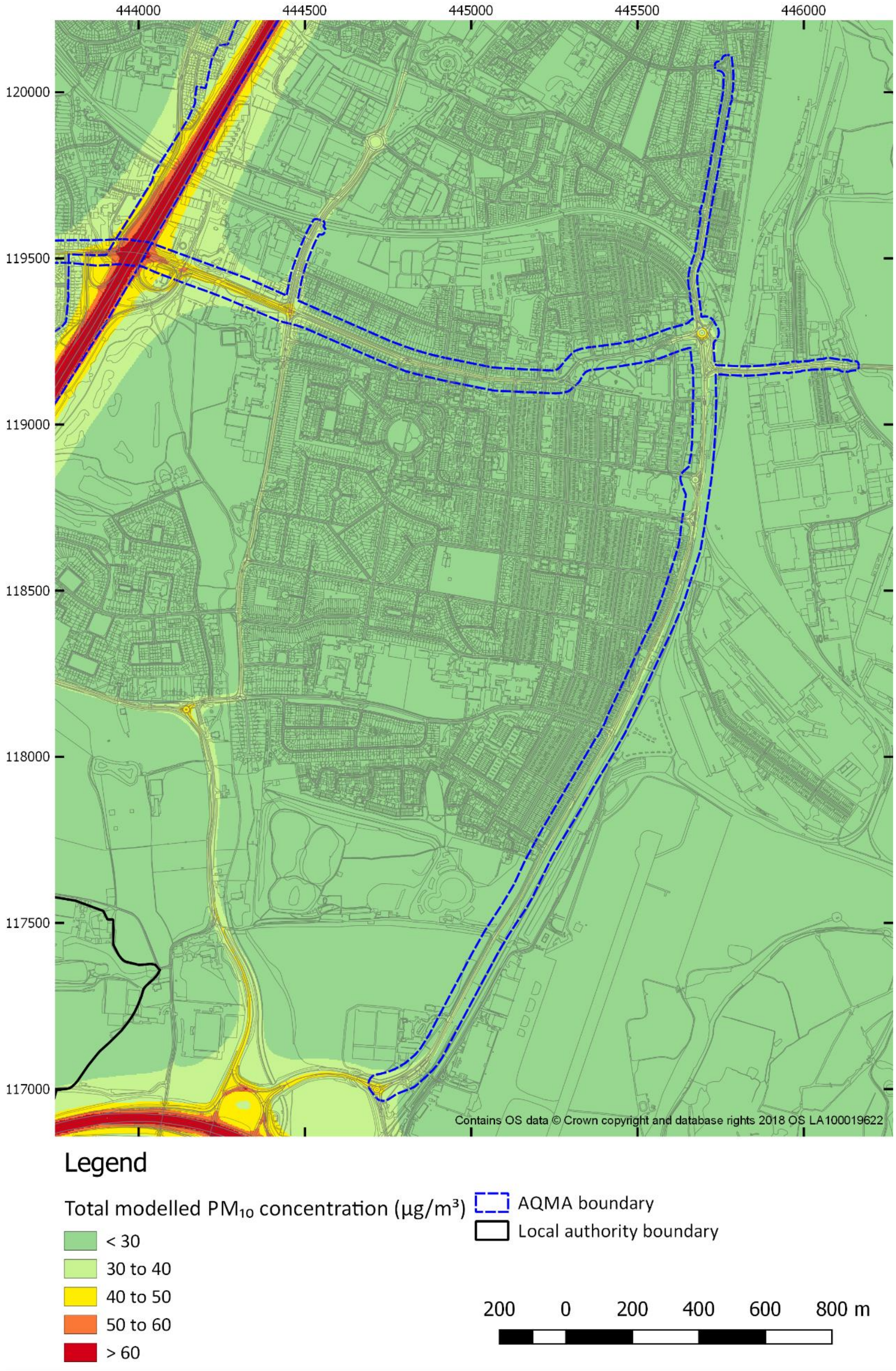


Figure 3-69 Short term PM_{10} concentration model results for 2036 SGO B/C scenario AQMA No. 1 (East)

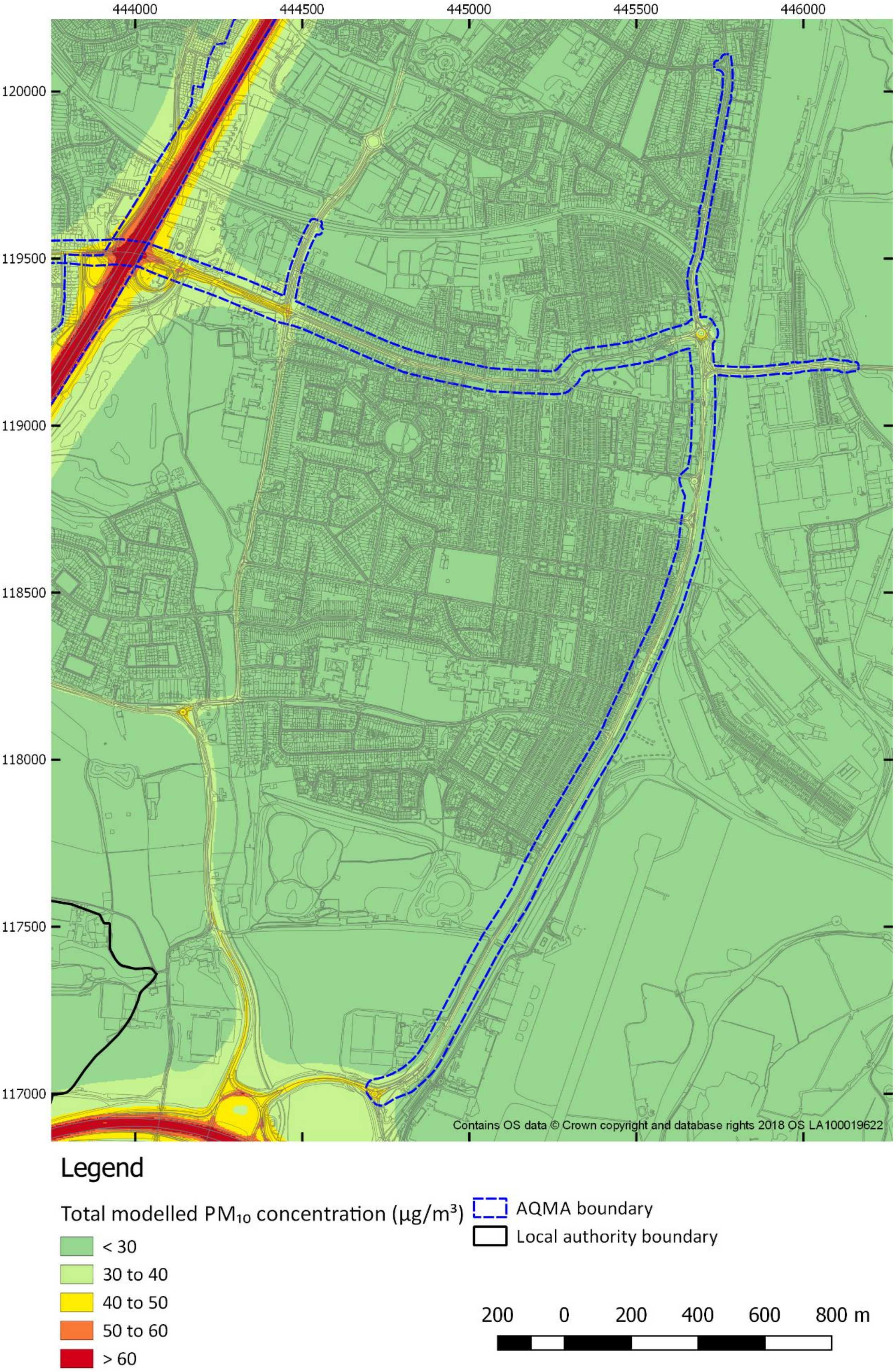


Figure 3-70 Short term NO_2 concentration model results for 2015 Reference Case AQMA No. 1 (West)

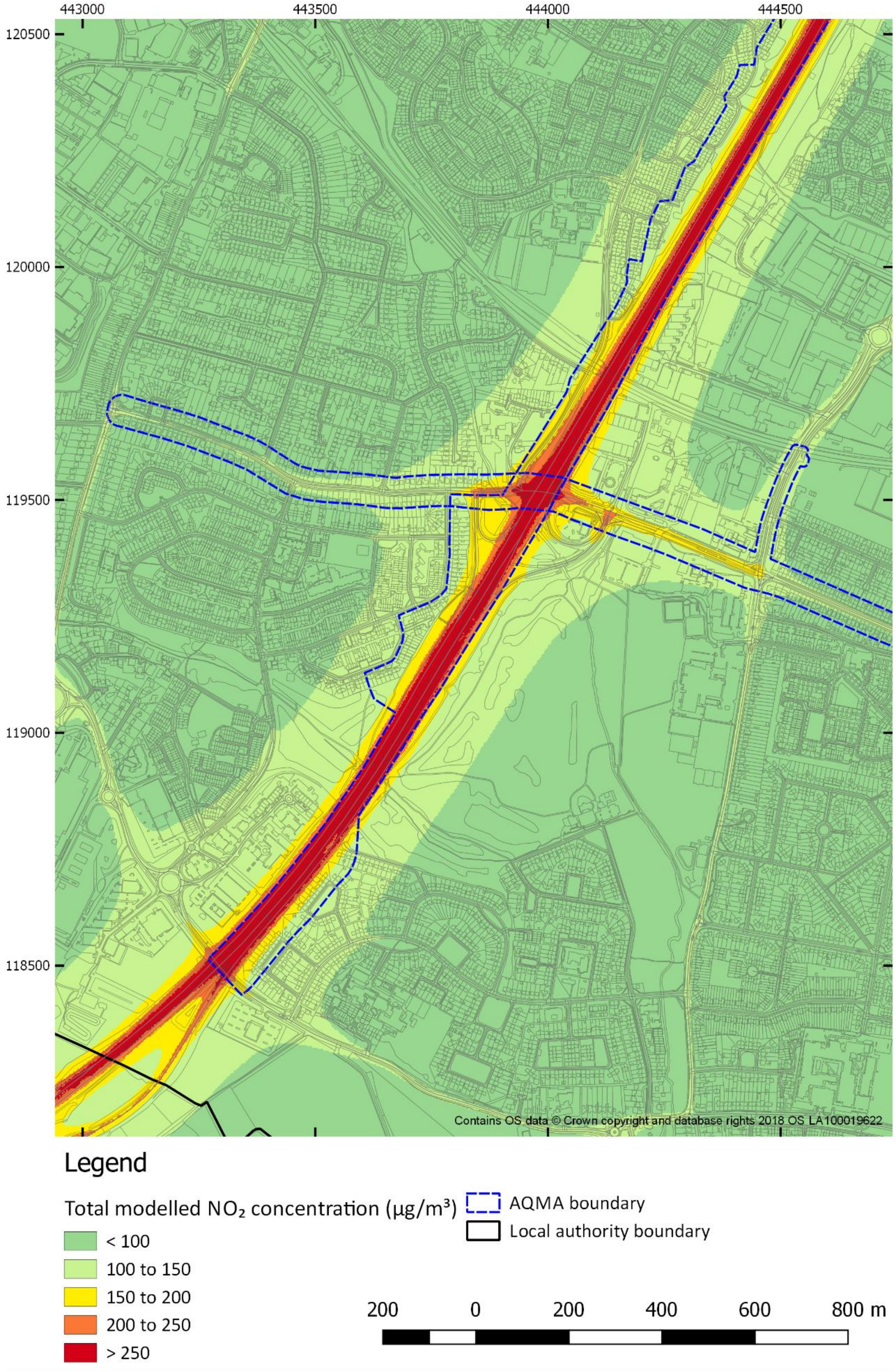


Figure 3-71 Short term NO_2 concentration model results for pseudo-2030 SGO B/C scenario AQMA No. 1 (West)

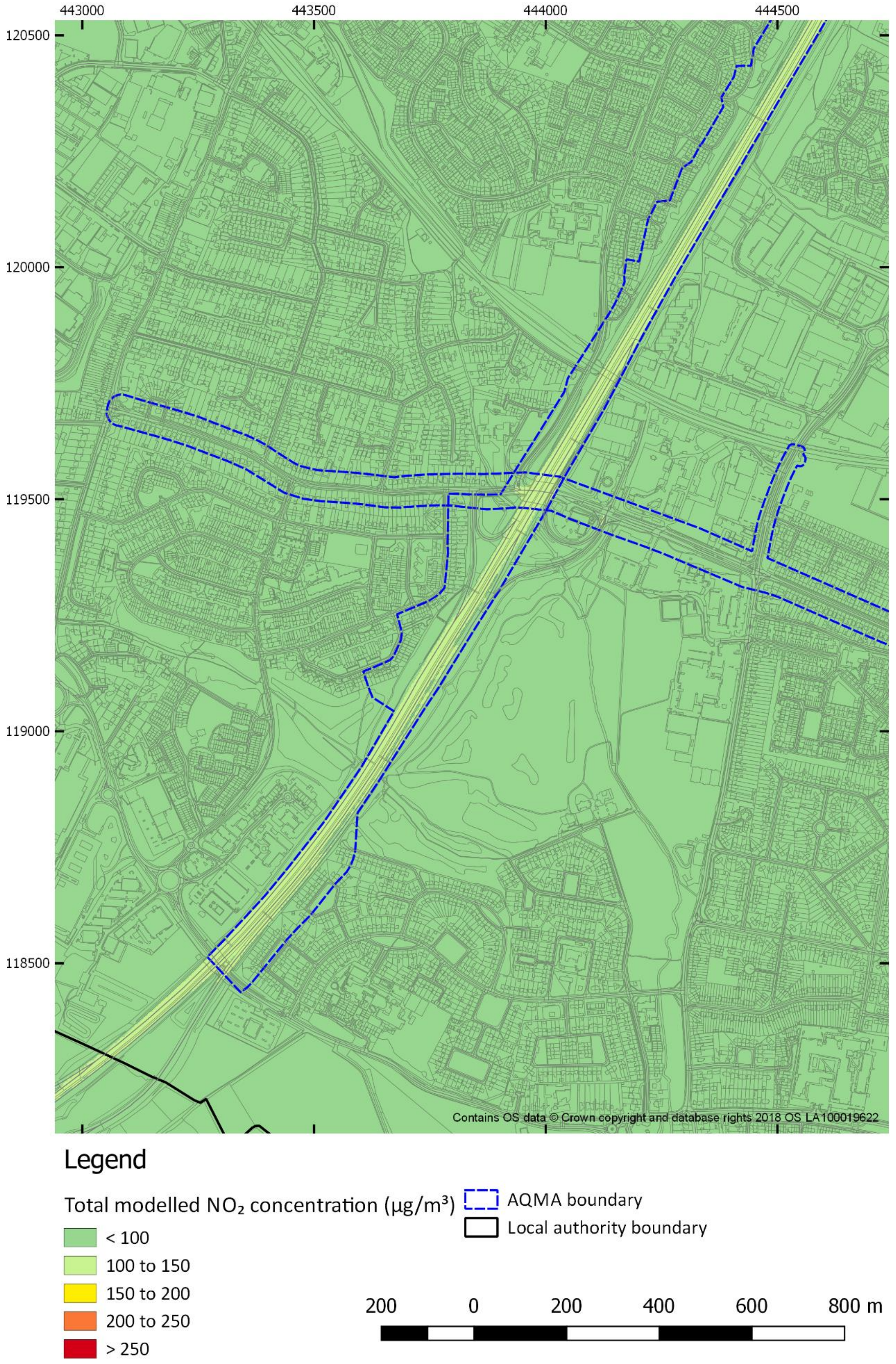


Figure 3-72 Short term NO_2 concentration model results for 2036 SGO B/C scenario AQMA No. 1 (West)

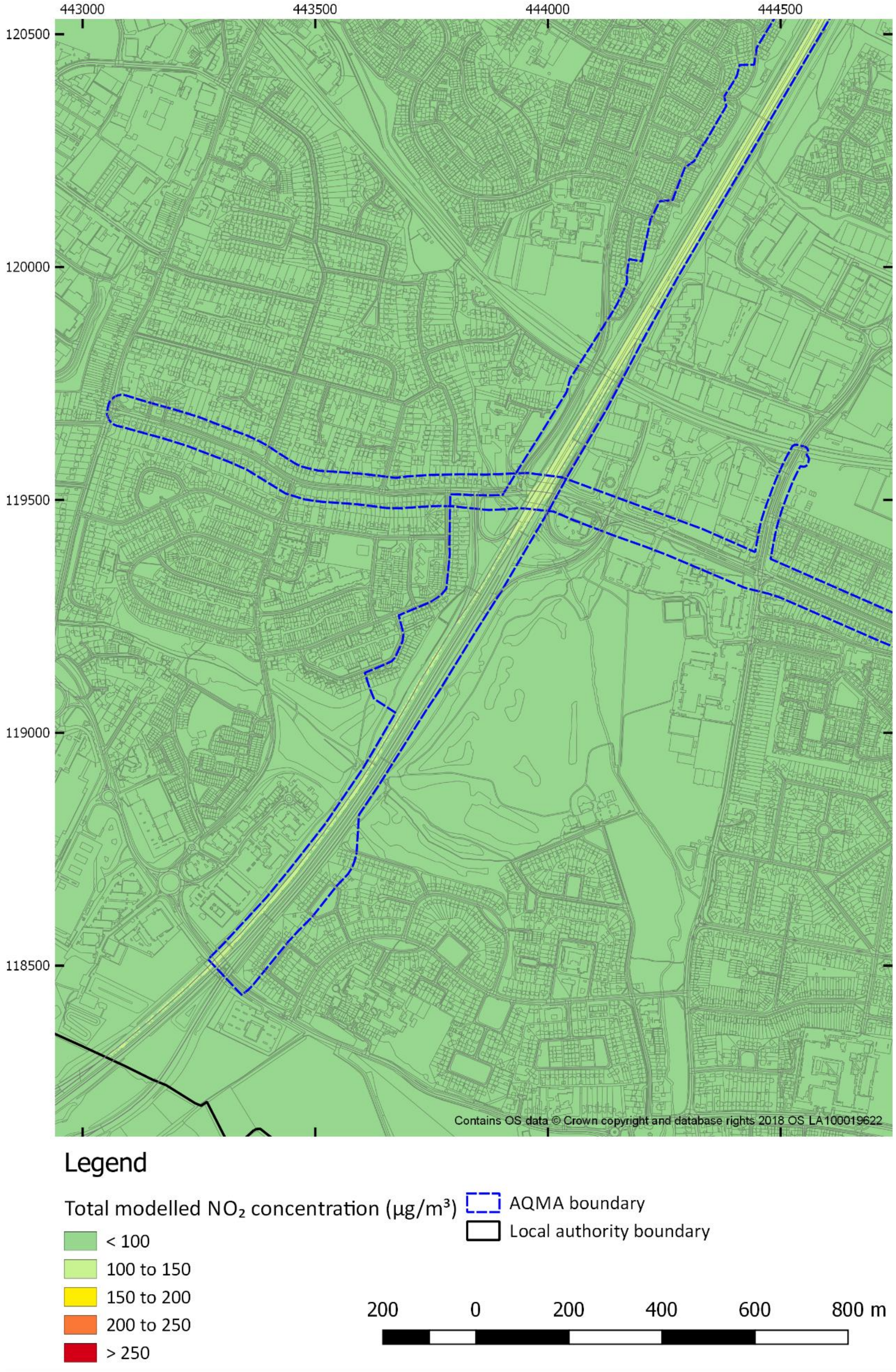


Figure 3-73 Short term PM_{10} concentration model results for 2015 Reference Case AQMA No. 1 (West)

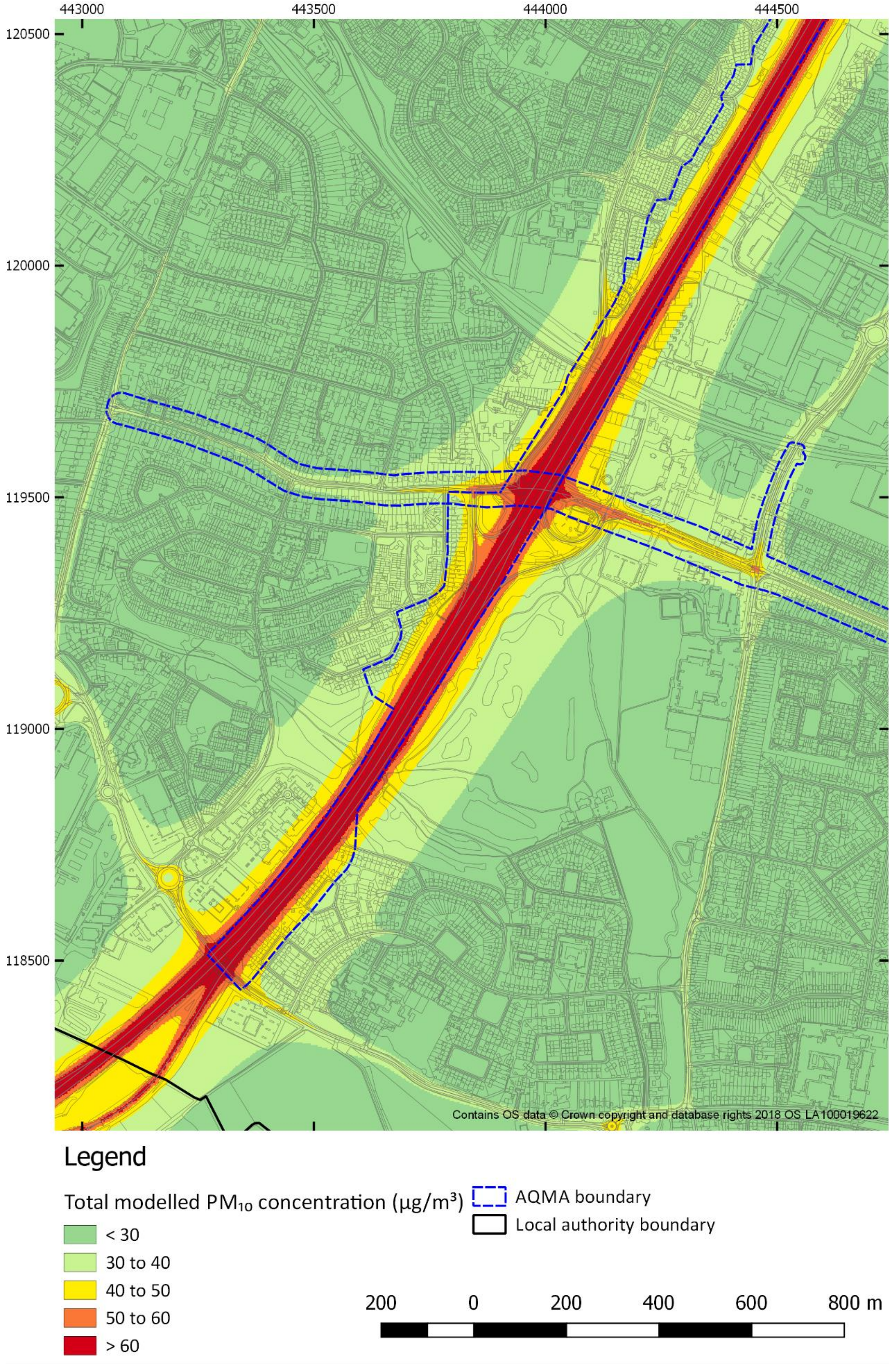


Figure 3-74 Short term PM_{10} concentration model results for pseudo-2030 SGO B/C scenario AQMA No. 1 (West)

Figure 3-75 Short term PM_{10} concentration model results for 2036 SGO B/C scenario AQMA No. 1 (West)

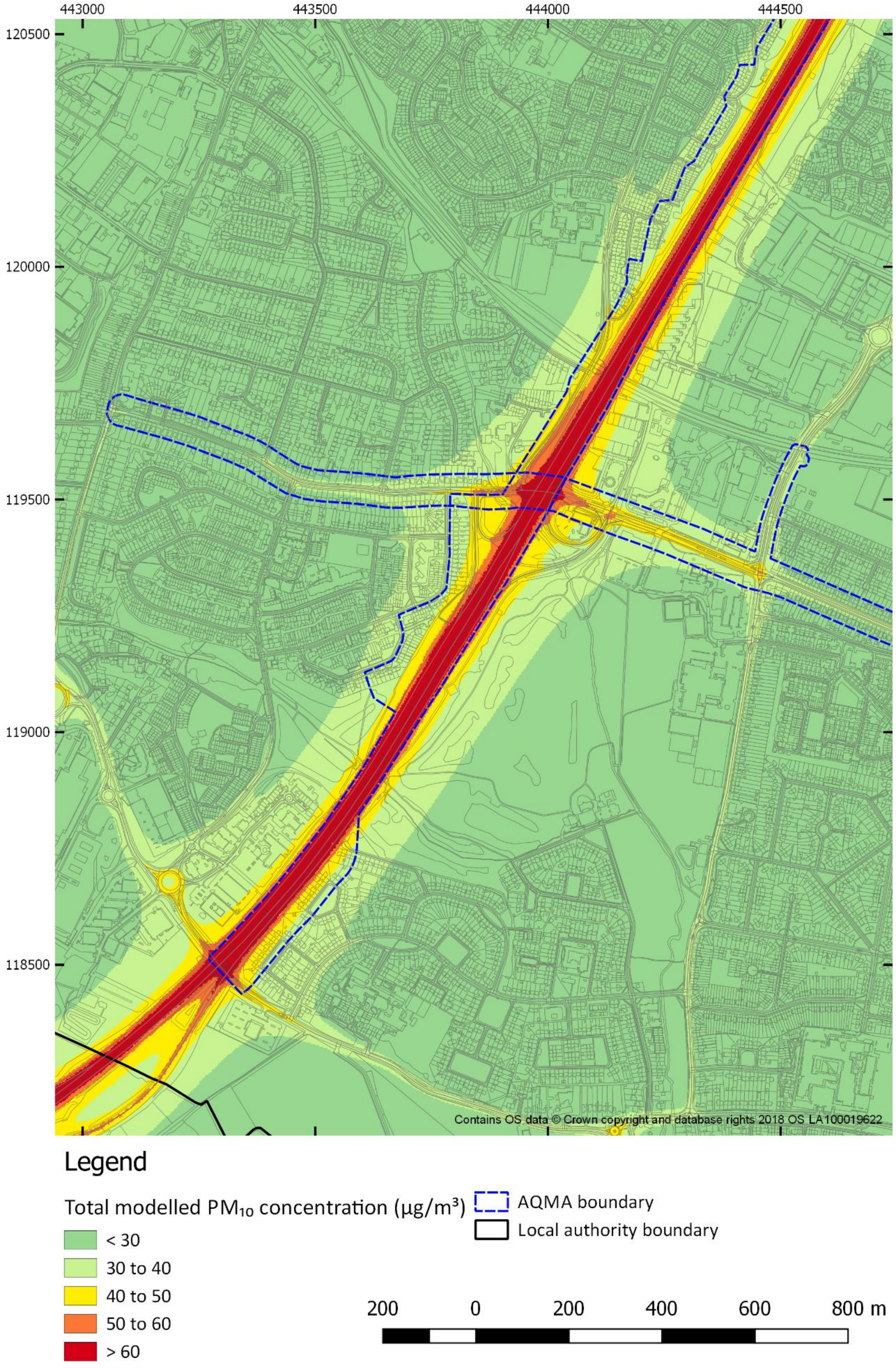


Figure 3-76 Short term NO_2 concentration model results for 2015 Reference Case AQMA No. 2 (North)

Figure 3-77 Short term NO_2 concentration model results for pseudo-2030 SGO B/C scenario AQMA No. 2 (North)

Figure 3-78 Short term NO_2 concentration model results for 2036 SGO B/C scenario AQMA No. 2 (North)

Figure 3-79 Short term PM_{10} concentration model results for 2015 Reference Case AQMA No. 2 (North)

Figure 3-80 Short term PM_{10} concentration model results for pseudo-2030 SGO B/C scenario AQMA No. 2 (North)

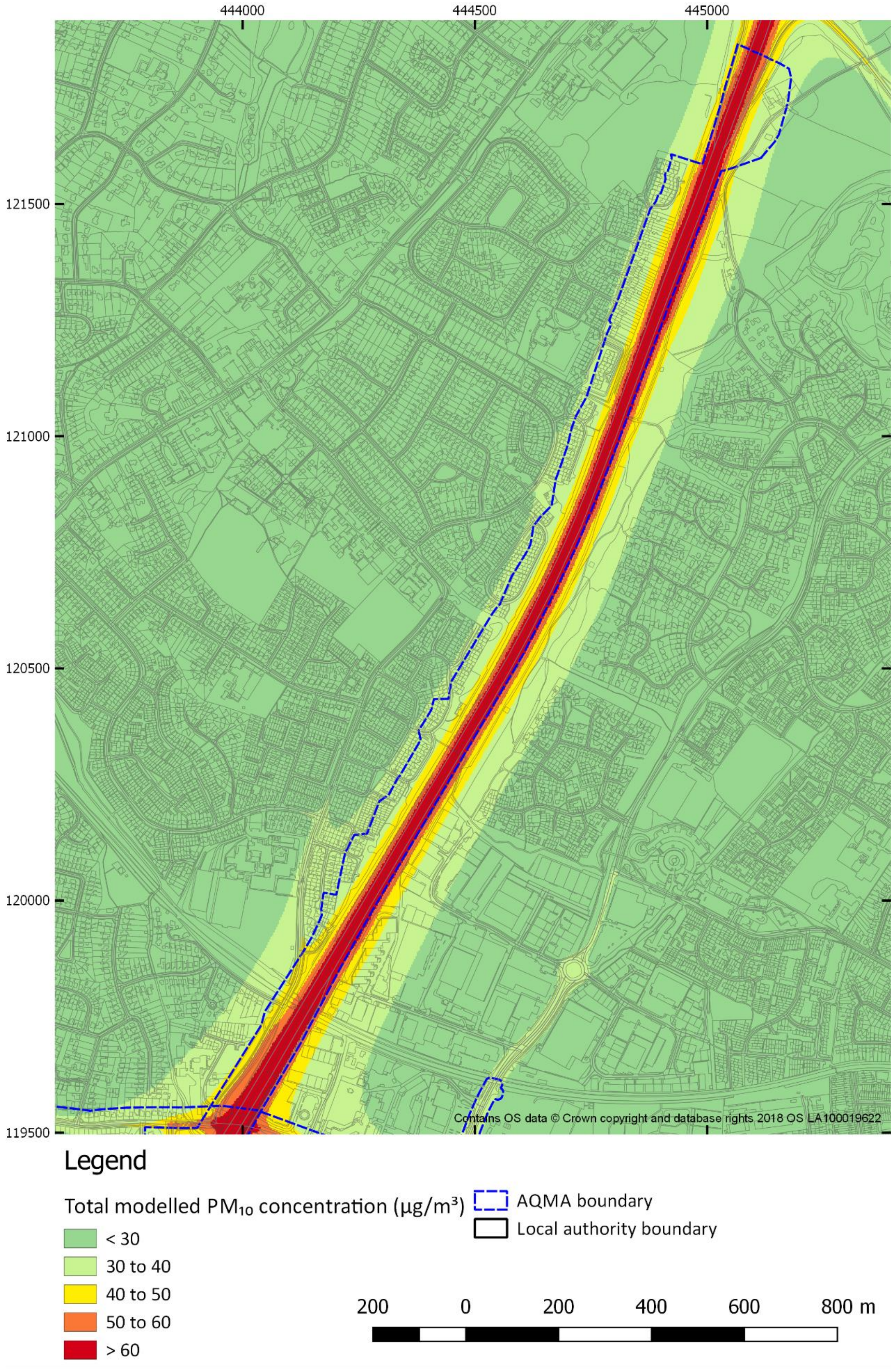


Figure 3-81 Short term PM_{10} concentration model results for 2036 SGO B/C scenario AQMA No. 2 (North)

Figure 3-82 Short term NO_2 concentration model results for 2015 Reference Case AQMA No. 3

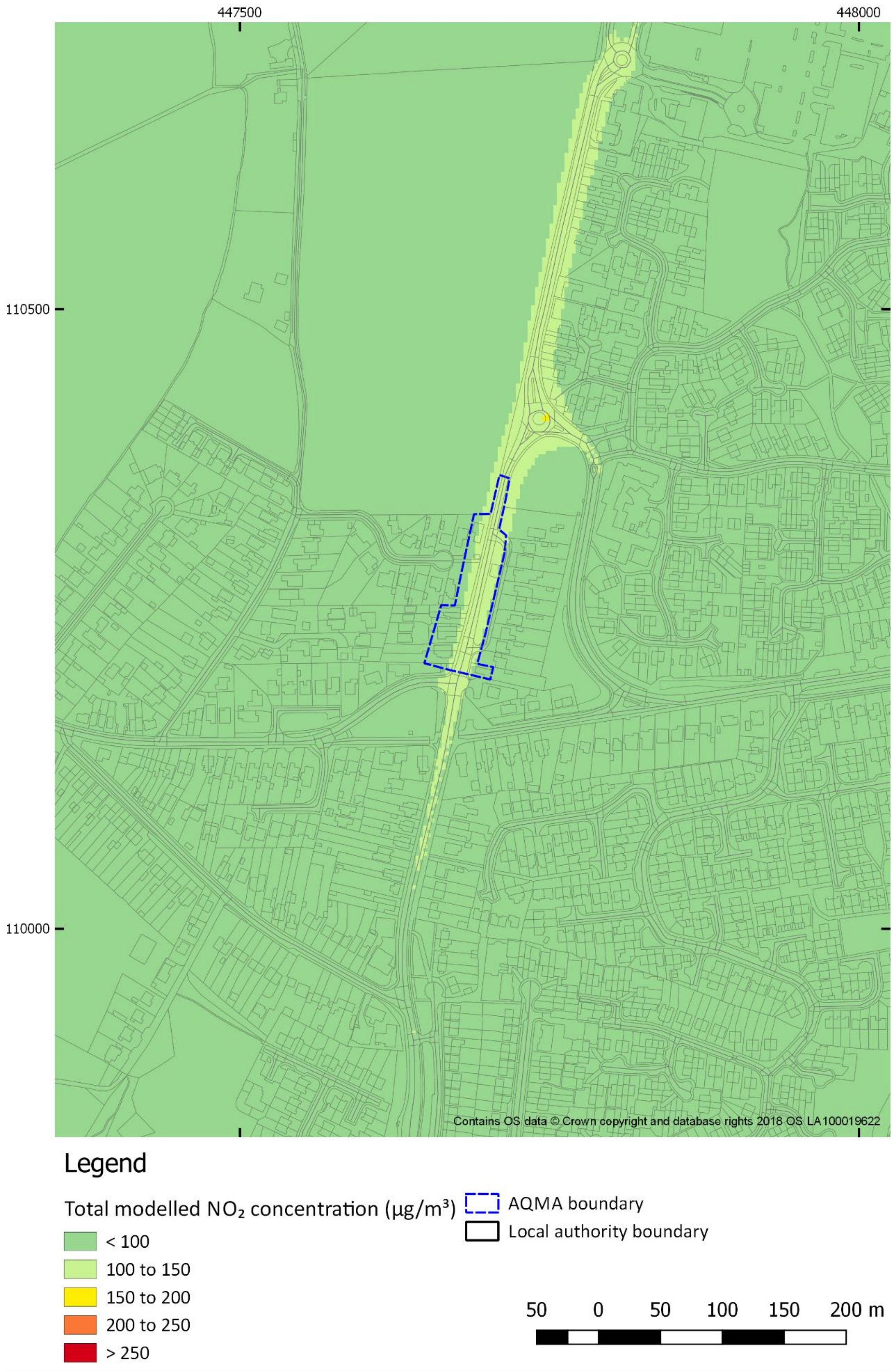


Figure 3-83 Short term NO_2 concentration model results for pseudo-2030 SGO B/C scenario AQMA No. 3

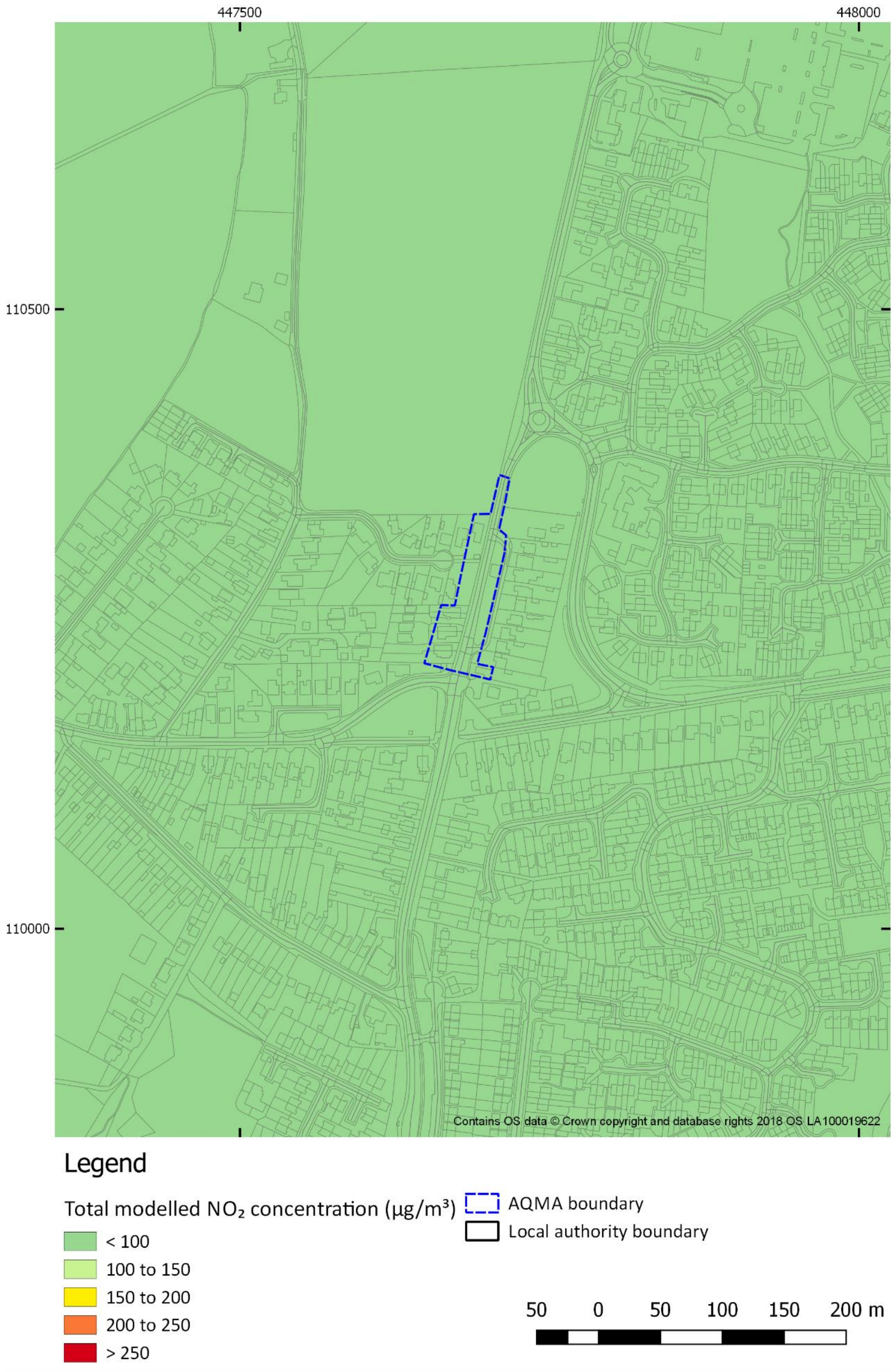


Figure 3-84 Short term NO_2 concentration model results for 2036 SGO B/C scenario AQMA No. 3

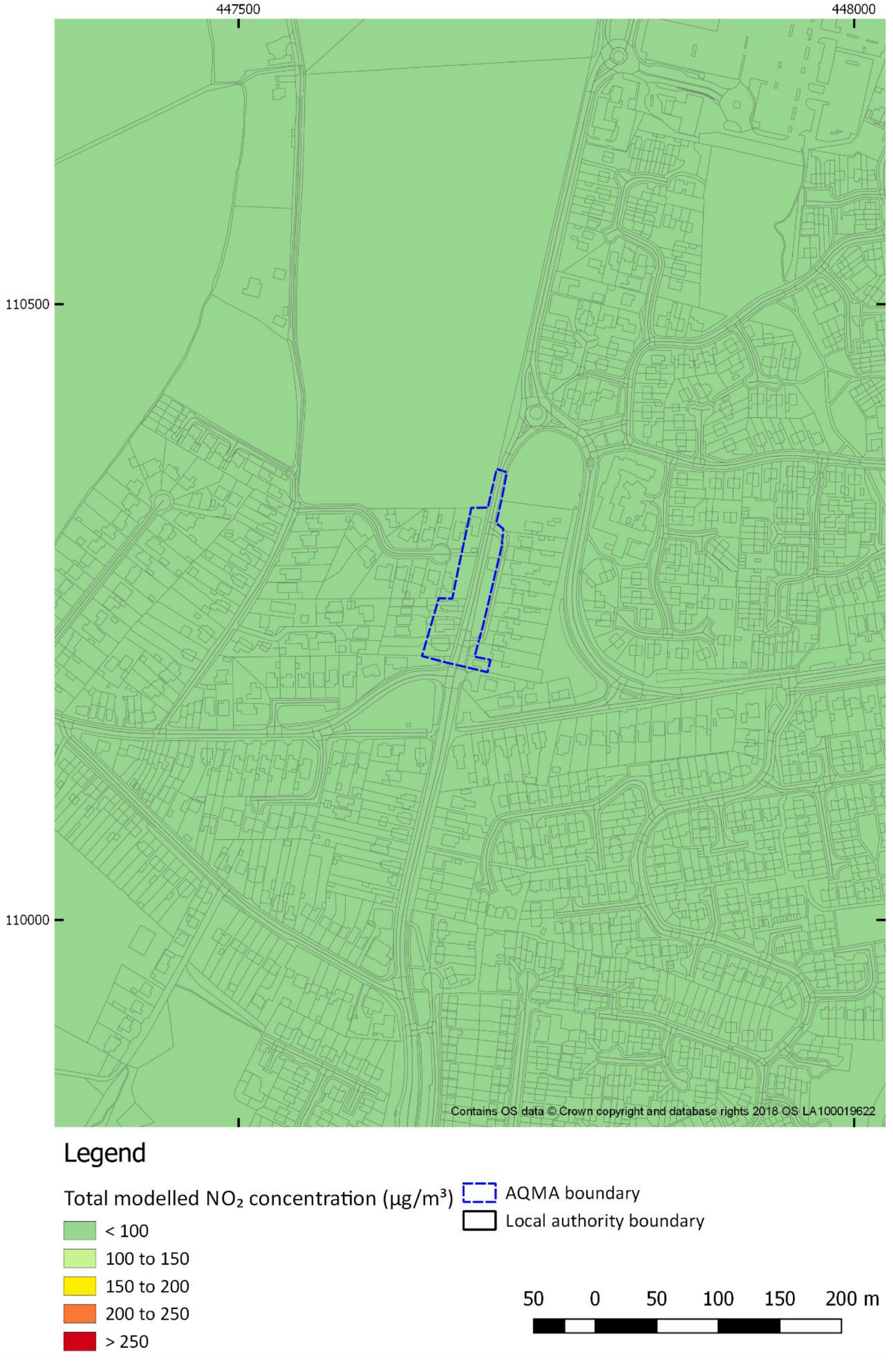


Figure 3-85 Short term PM_{10} concentration model results for 2015 Reference Case AQMA No. 3

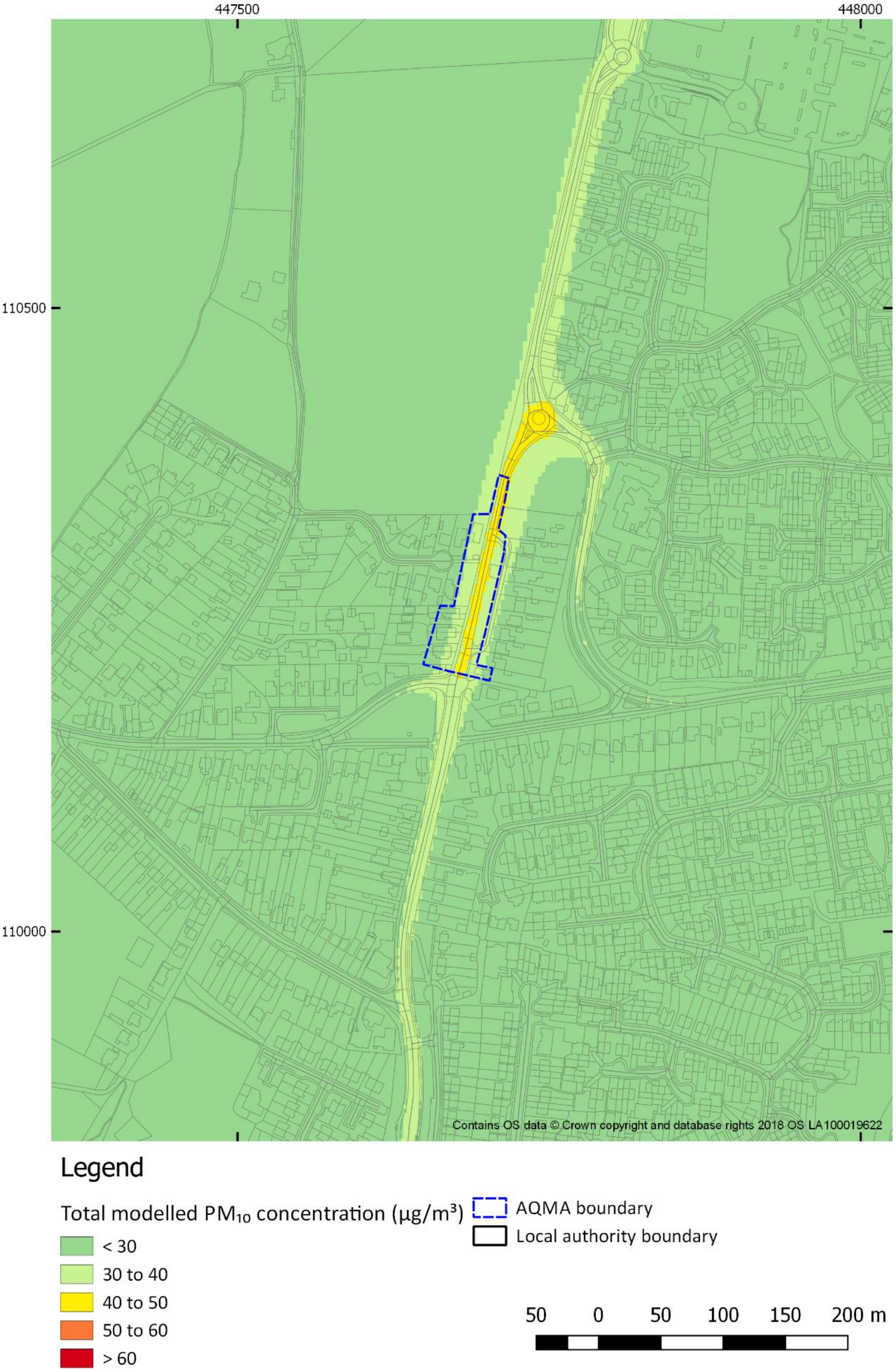


Figure 3-86 Short term PM_{10} concentration model results for pseudo-2030 SGO B/C scenario AQMA No. 3

Figure 3-87 Short term PM_{10} concentration model results for 2036 SGO B/C scenario AQMA No. 3

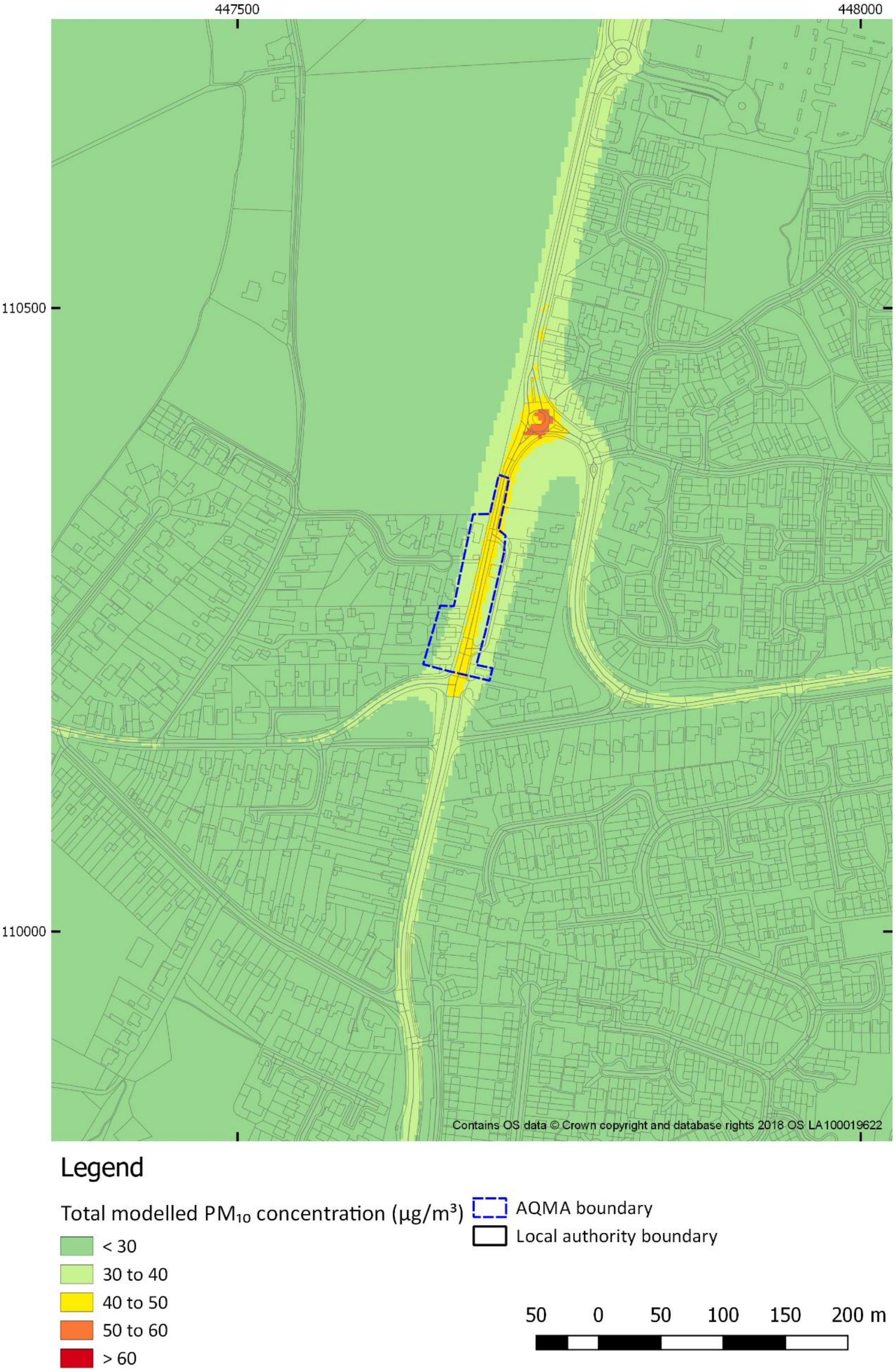


Figure 3-88 Short term NO_2 concentration model results for 2015 Reference Case AQMA No. 4

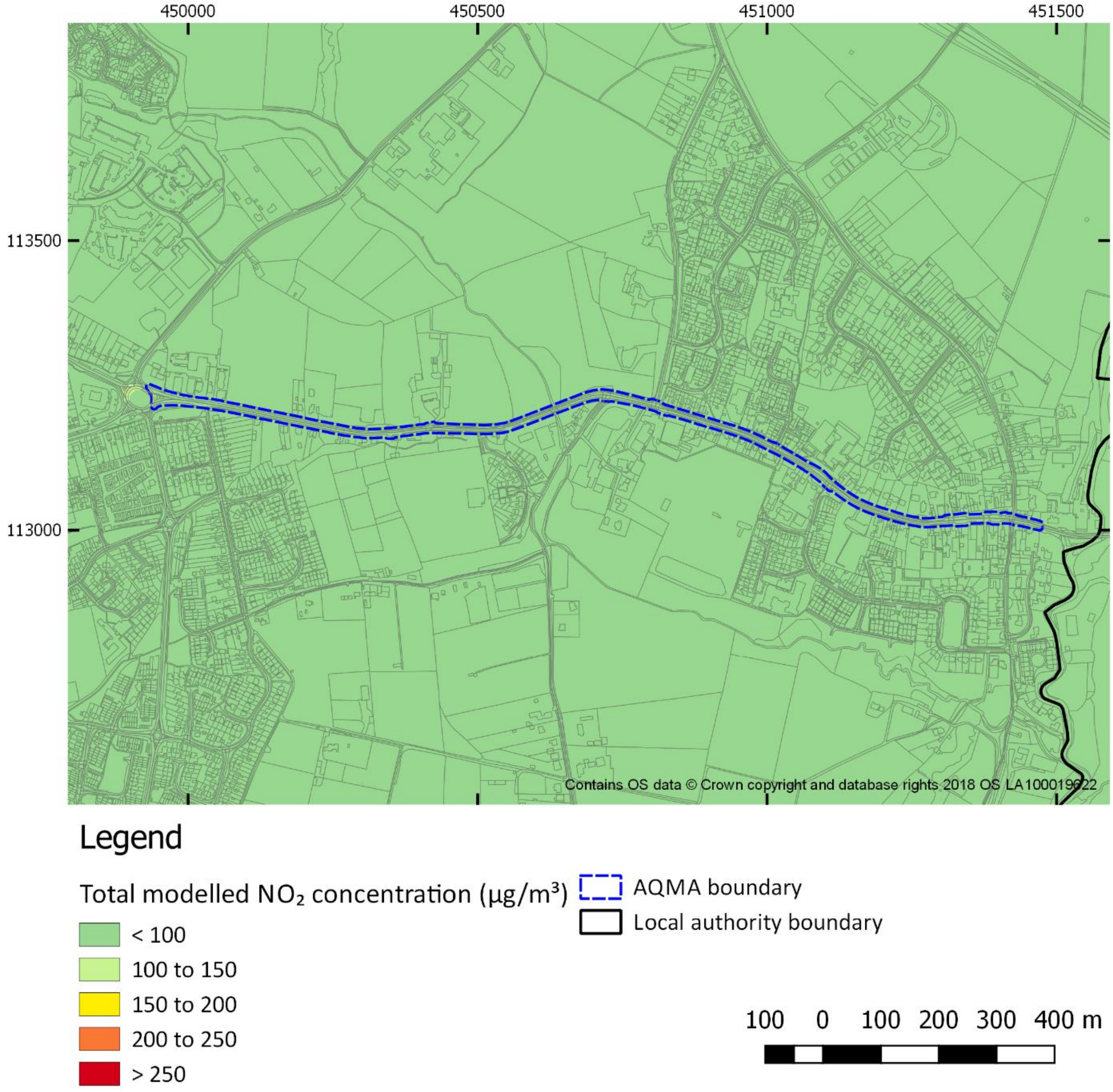


Figure 3-89 Short term NO_2 concentration model results for pseudo-2030 SGO B/C scenario AQMA No. 4

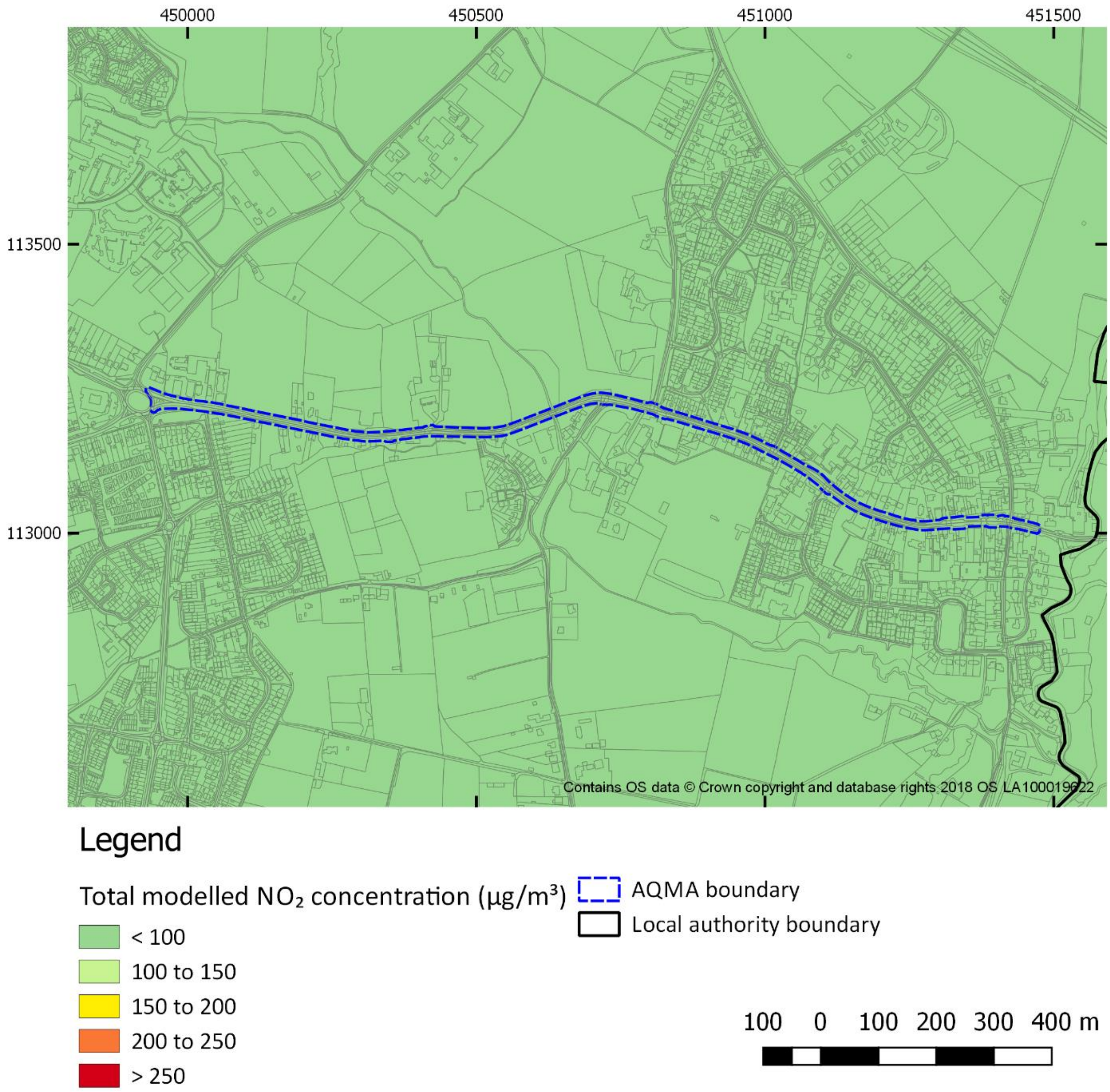


Figure 3-90 Short term NO_2 concentration model results for 2036 SGO B/C scenario AQMA No. 4

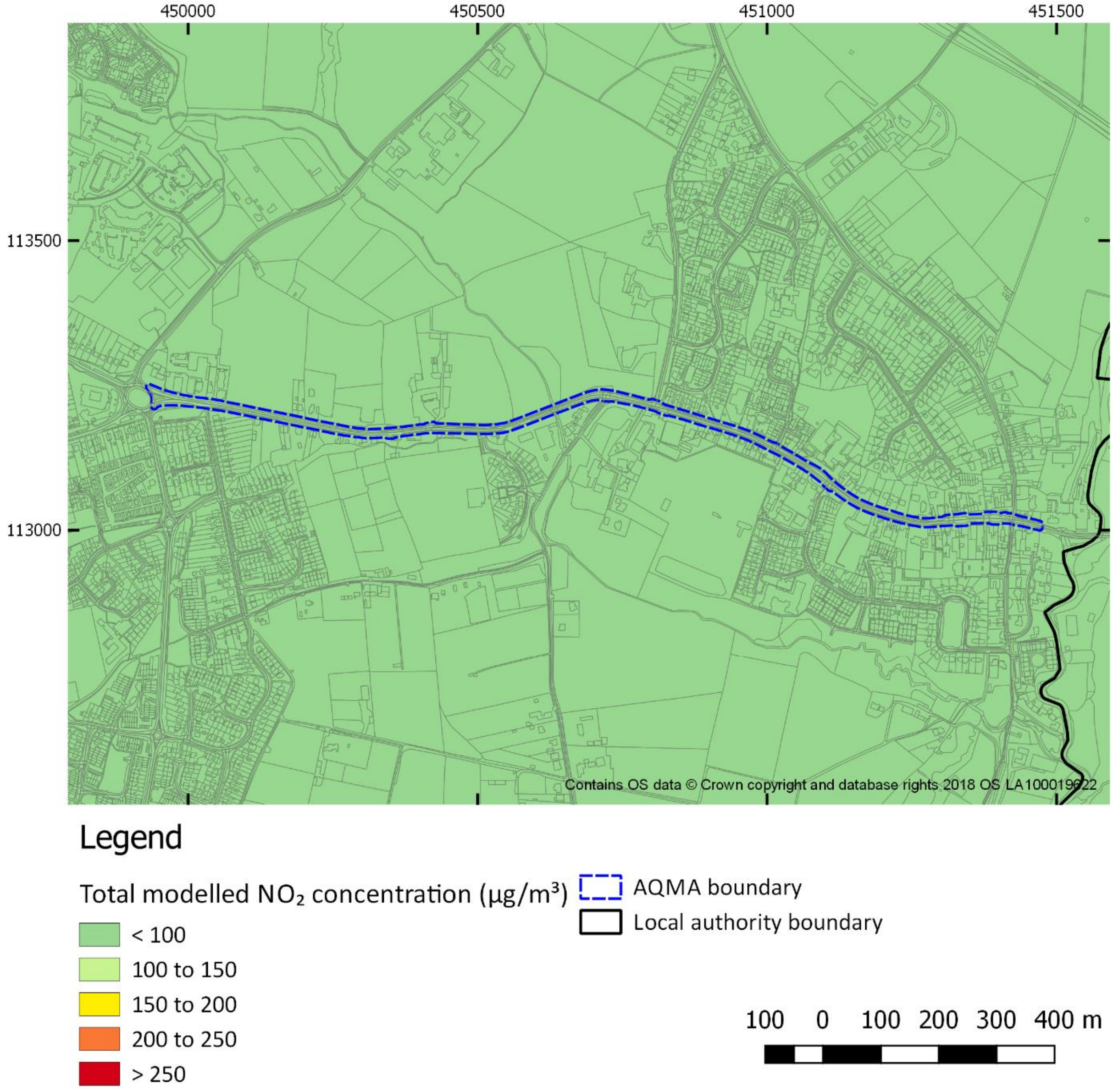


Figure 3-91 Short term PM_{10} concentration model results for 2015 Reference Case AQMA No. 4

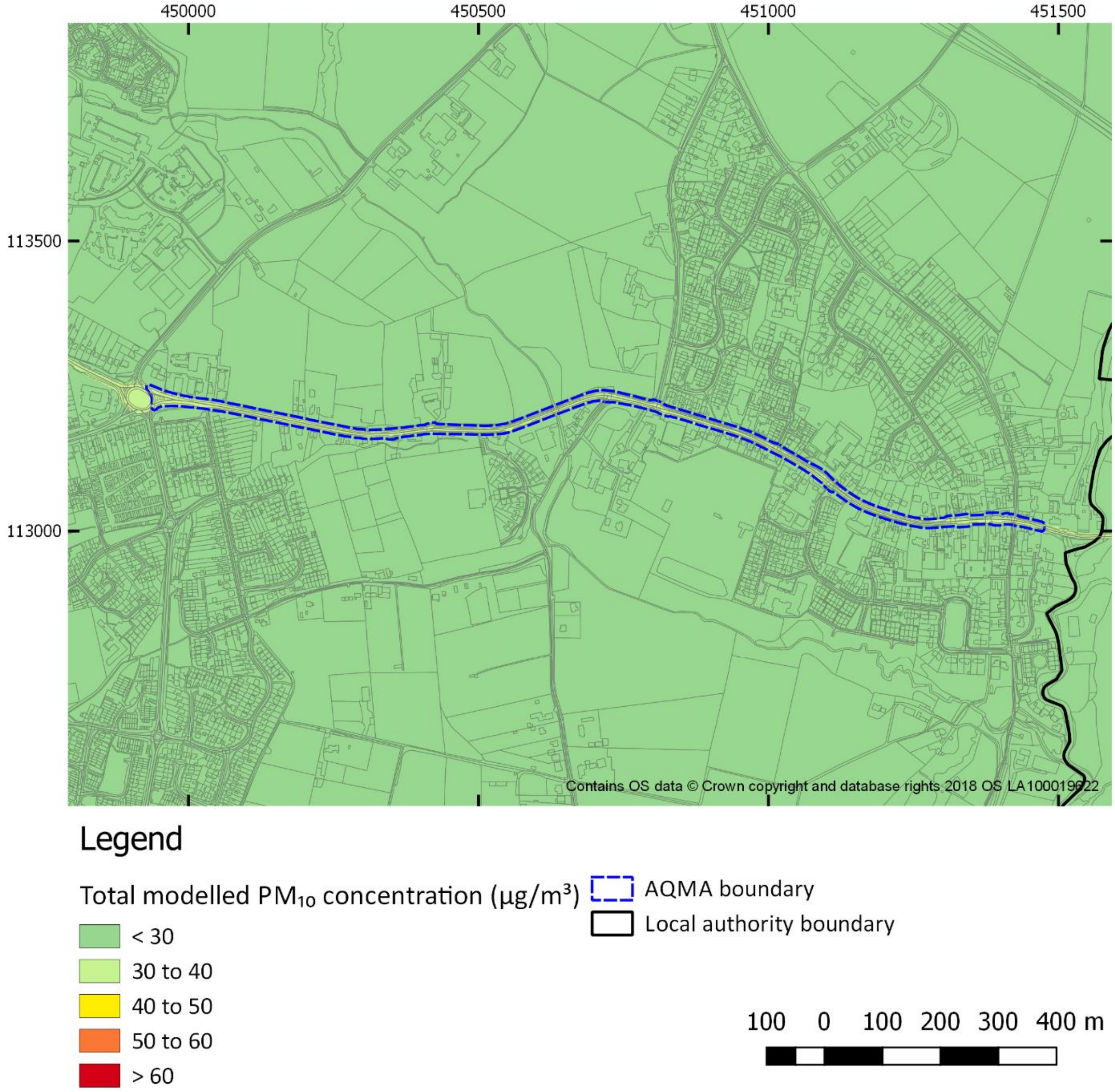


Figure 3-92 Short term PM_{10} concentration model results for pseudo-2030 SGO B/C scenario AQMA No. 4

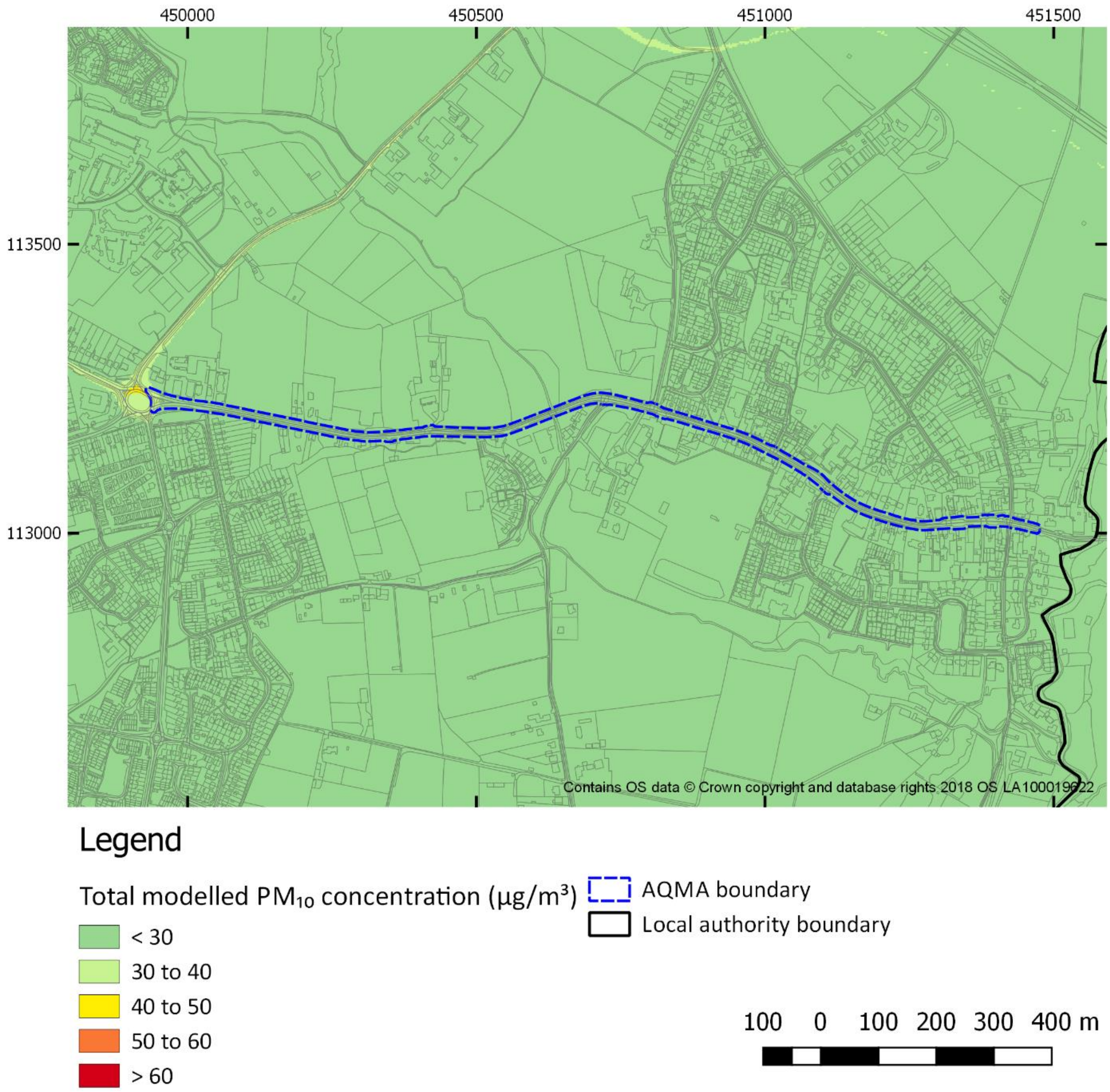
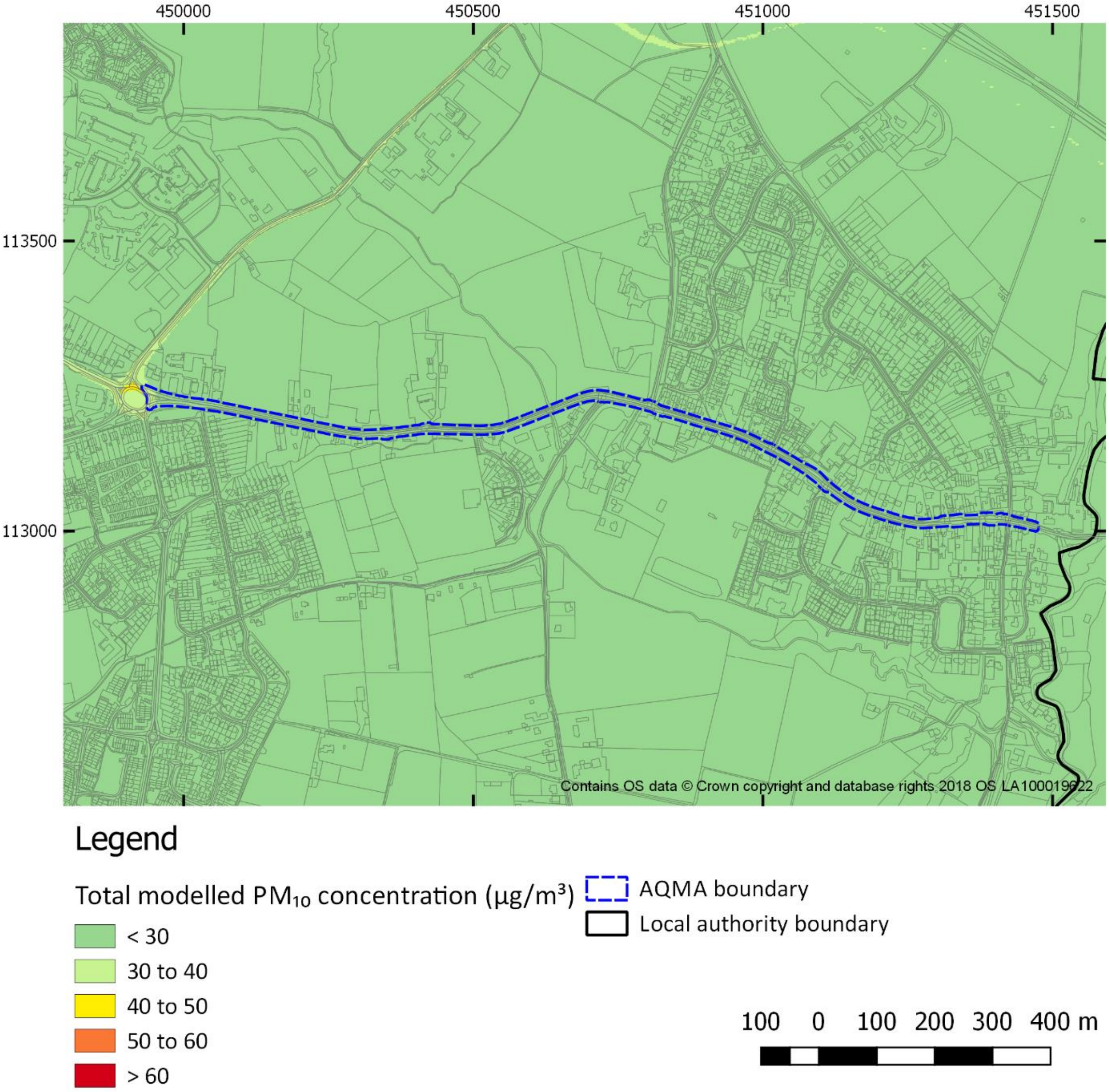


Figure 3-93 Short term PM_{10} concentration model results for 2036 SGO B/C scenario AQMA No. 4



3.5 Summary of model results

3.5.1 Air quality in 2015

The mapped results for the 2015 Reference Case confirm that:

- There are locations within the existing AQMAs where the modelled pollutant concentrations are close to or exceeding the applicable annual mean air quality objectives, particularly with respect to NO_2 concentrations. Modelled exceedances of the annual air quality objectives, where there is also a risk of public exposure, are located within the boundaries of existing AQMAs.
- The air quality modelling study indicates that there is minimal risk of exceeding air quality objectives in AQMA No.4.
- No exceedances of the short-term air quality objectives are predicted.

3.5.2 Air quality in future scenarios

The results in Table 3-5 to Table 3-9 and the more detailed results in Appendix 2 Table A2-1 to Table A2-10 confirm that:

- None of the modelled receptor points are predicted to exceed the annual air quality objectives for NO_2, PM_{10} or $PM_{2.5}$ in the pseudo-2030 or 2036 dispersion models.
- None of the modelled receptor points are predicted to exceed the short-term air quality objectives for NO_2 or PM_{10} in the pseudo-2030 or 2036 dispersion models.

The model results indicate an overall decrease in air pollutant concentrations in the future year scenarios. NO_2 concentrations are predicted to decrease significantly. PM_{10} and $PM_{2.5}$ concentrations are also generally predicted to decrease, though to a lesser extent. These trends are consistent with vehicle emission forecasts over the next two decades; NOx emissions are predicted to decrease significantly, while PM_{10} and $PM_{2.5}$ emissions are also predicted to decrease, but to a lesser extent.

Most of the modelled receptor points show a decrease in PM_{10} and $PM_{2.5}$ concentrations from 2015 to the future scenarios. However, within AQMA No. 3, the annual PM_{10} and $PM_{2.5}$ concentrations and the daily PM_{10} mean concentration are predicted to increase slightly, by approximately 1 to 2%, over that same timescale. The increase in concentration is due to an increased traffic flow on the road link running through AQMA 3.These increased concentrations are not predicted to result in exceedances of the applicable air quality objectives, however, the council may wish to investigate mitigation measures targeted to sources of PM_{10} and $PM_{2.5}$ emissions in the vicinity of AQMA No. 3.

3.5.3 Air quality with respect to the five SGO development options

As discussed in the previous section, none of the modelled receptor points are predicted to exceed the annual air quality objectives in any of the future year SGO development scenarios.

A closer examination of Table 3-5, Table 3-6 and Table 3-7 and the more detailed results in Appendix 2 indicates that all five SGO scenarios are predicted to result in similar air pollutant concentrations, both within the four AQMAs and when considering impacts on neighbouring local authorities. For each pollutant and each set of modelled receptors, the predicted % change in concentration typically varies by less than one percentage point when comparing different SGO scenarios. The model results generally show a marginally greater reduction in air pollution for the 2036 Baseline Scenario, which does not include any SGO development, as compared to the SGO development options; this is consistent with the increased level of housing development included in the SGO scenarios. However, within AQMA 4, this trend is reversed and a more significant decrease is observed for the SGO development scenarios than for the 2036 Baseline. This is most likely owing to a new road link located north of Botley, which is included in all of the SGO scenarios but not in the 2036 Baseline scenario.

Although all five SGO scenarios are predicted result in similar air pollutant concentrations in the future year models, it is important to consider these results in the context of the number of dwellings included in each SGO (Table 2-1). The council's preferred development option, SGO B/C, can accommodate 17,430 new dwellings, while the alternative development options can accommodate between 15,374 and 16,228 new dwellings. These dispersion model results indicate that the council's preferred option can accommodate approximately 1,000 to 2,000 additional new dwellings, compared to the alternative SGOs, without introducing adverse impacts on local air quality.

3.6 Linkages to other air quality modelling studies

This section summarizes two recent air quality studies focused on geographical areas overlapping Eastleigh Borough, and considers potential implications from those studies with respect to the current AQIA for Eastleigh Borough.

3.6.1 Partnership for Urban South Hampshire (PUSH) Air Quality Impact Assessment

The Partnership for Urban South Hampshire (PUSH) comprises a voluntary partnership of eleven authorities located on the south coast of England. The local authorities included in the study area include Portsmouth City Council, Southampton City Council, Isle of Wight Council, Eastleigh Borough Council, East Hampshire District Council (part), Fareham Borough Council, Gosport Borough Council, Havant Borough Council, New Forest District Council (part), Test Valley Borough Council (part) and Winchester City Council (part).

The PUSH Spatial Position Statement 2016 envisages the provision of an additional 104,350 homes by 2034. Local authorities within the PUSH sub-region are currently preparing supporting local plans, with timelines varying by authority and looking to either 2034 or 2036. Ricardo was commissioned by PUSH local authorities to carry out an Air Quality Impact Assessment (AQIA)[25] in order to assess the potential impacts of future housing development associated with the 2016 PUSH Spatial Position Statement, in the context of both human health and natural habitats. The RapidAIR modelling system was used to model predicted air quality impacts at all locations within the PUSH study area at a resolution of 3m x 3m. This included modelling the annual mean concentrations for NO_2, PM_{10} and $PM_{2.5}$.

Traffic growth within the study area was provided by Solent Transport's Sub-Regional Transport Model (SRTM). In total, four traffic scenarios were modelled: 2014 Reference Case, 2034 Baseline Scenario, 2034 Do Minimum (2034 DM) Scenario and 2034 Do Something (2034 DS) Scenario. Both 2034 DM and DS scenarios included development and growth within the PUSH region, equating to approximately 100,000 additional dwellings compared to the 2034 Baseline scenario. 2034 DS includes additional transport interventions which are aimed at helping to mitigate the impact of the proposed developments on the transport network.

The results of the PUSH AQIA, completed in 2018, are generally consistent with the model results contained in this current AQIA for the EBLP. Mapped model results for Eastleigh, from both studies, show similar results for annual mean NO_2, PM_{10} and $PM_{2.5}$ concentrations. Of the two studies, the current AQIA for the EBLP is considered to be more accurate with respect to development within Eastleigh Borough, as it is based on a more recent version of the SRTM and contains more specific details regarding the amount and location of proposed housing development.

[25] Ricardo Energy & Environment, "Partnership for Urban South Hampshire: Air Quality Impact Assessment", ED 10415100 Issue 3, September 2018.

3.6.2 Southampton Clean Air Zone (CAZ)

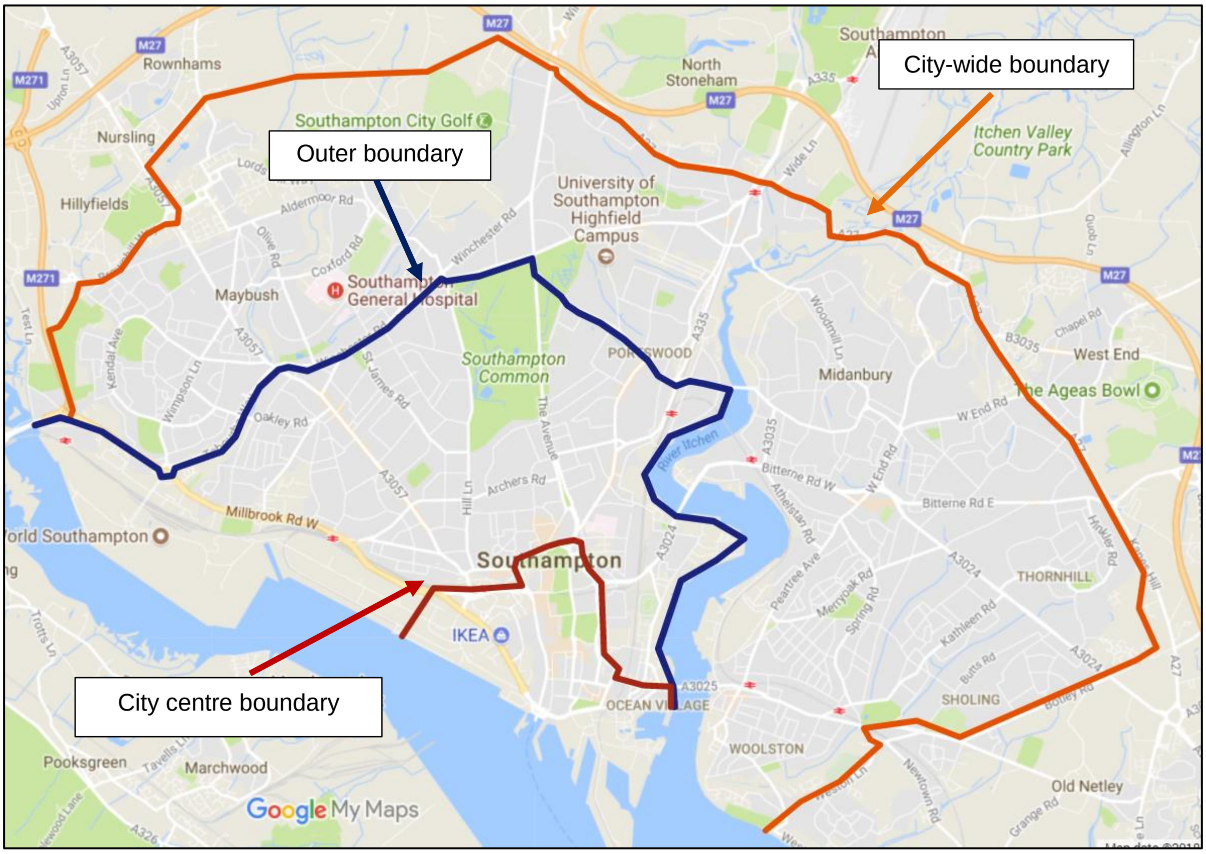
3.6.2.1 Introduction to the Southampton CAZ

Southampton, like many other urban areas, has elevated levels of Nitrogen Dioxide (NO_2) due mainly to road transport emissions; and as such Southampton City Council (SCC) has designated 10 Air Quality Management Areas (AQMA) across the City. Southampton was also identified as one of the 5 cities in the UK where the EU Limit Value for NO_2 is not expected to be met by 2020 in DEFRA's 2015 Air Quality Plan. The Plan stated that each of the cities identified are legally required to introduce a formal charging-based Clean Air Zone (CAZ), or equivalent, for specified classes of vehicles and European Vehicle Emission Standards (Euro Standards) as soon as practical but no later than 2020.

Southampton City Council have since assessed a number of options to achieve compliance with the EU Limit Value for NO_2, and have recently consulted[26] on the introduction of a citywide Class B CAZ charging scheme covering buses, taxis and HGVs.

This section of the report contains a summary of the CAZ B measure currently being proposed in Southampton and, based on the currently available information, how that may impact on traffic and air quality in neighbouring Eastleigh. It should be noted that at this time, the Southampton CAZ B scheme is still under discussion and may not be implemented in practice. The alternative to a CAZ would be a number of non-charging measures.

Figure 3-94 Illustrative CAZ boundaries



Note: the outer and city centre boundaries were considered but not taken forward.

[26] Southampton City Council (2018) Clean Air Zone Consultation; available at https://www.southampton.gov.uk/council-democracy/have-your-say/clean-air-consultation.aspx

3.6.2.2 CAZ B Scheme

The City-wide CAZ option currently being considered is a formal Class B charging CAZ covering the whole Southampton city area as illustrated in Figure 3-94. The Class B CAZ covers buses (including coaches), taxis and HGVs, where vehicles not meeting the Euro 6/VI standard for diesel (or Euro 4 for Petrol) would be charged for entering the city. Vehicles passing through the city would have the option of diverting around the CAZ, which in this case would essentially be a diversion using the M27.

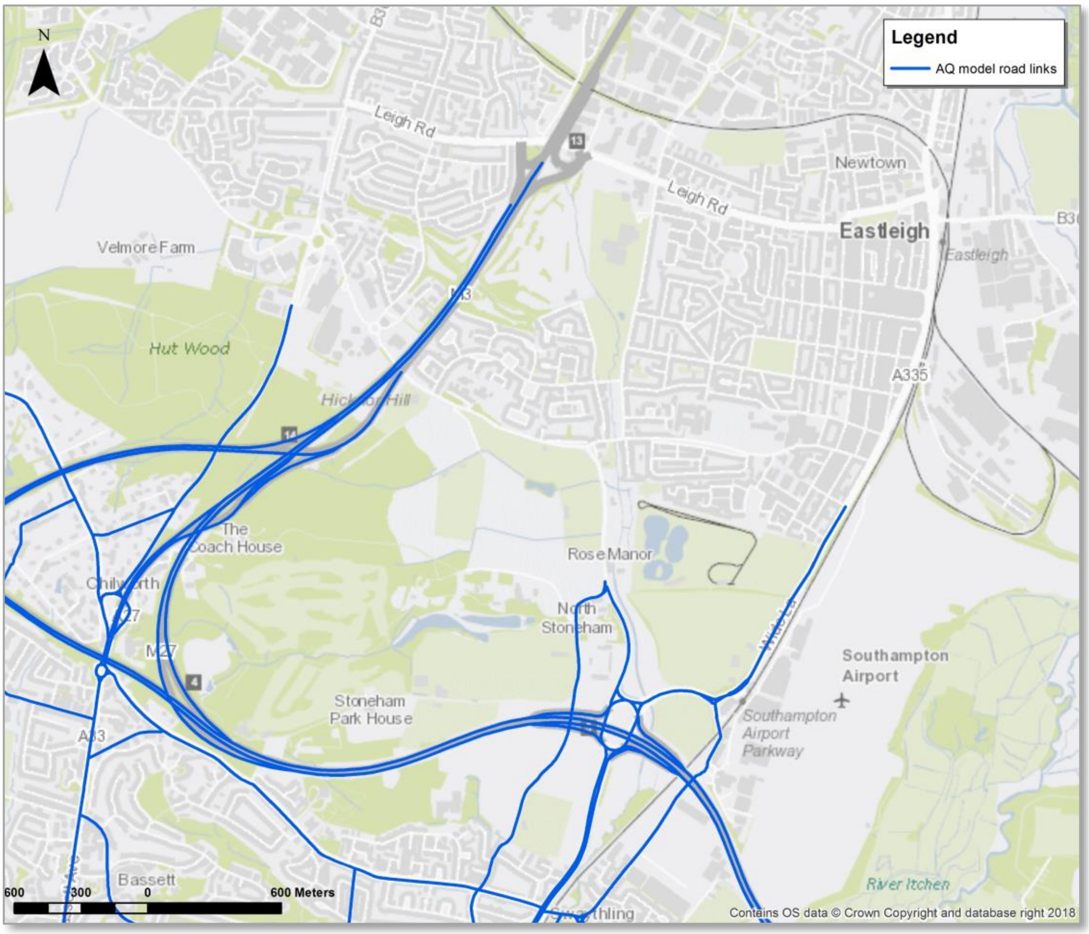
The charge for assessment purposes has been set at the same level as the London ULEZ: £100/day for HGVs and buses, and £12.50 per day for taxis. This charge has been used since the modelling uses vehicle upgrade assumptions provided by JAQU and based on the evidence from the London ULEZ.

3.6.2.3 Potential effect on traffic flows, traffic emissions and air quality in Eastleigh Borough

Traffic modelling was used to assess potential diversionary or destination shifts as a result of the CAZ B scheme. The modelling was conducted using the Sub-Regional Transport Model (SRTM) that covers the areas of Southampton, Portsmouth and South Hampshire. The traffic model outputs were then used to calculate the change in vehicle emissions for all routes; and atmospheric dispersion modelling conducted to estimate the likely change in NO_2 annual mean concentrations throughout the study area.

Although the traffic model was sub-regional, and therefore included all major roads in the Eastleigh area, the air quality model was restricted to a smaller domain which covered roads within the Southampton City boundary and New Forest area. The main road links north of Southampton that connect the city with Eastleigh were also included in the air quality model. A map showing the northern extent of the Southampton air quality model domain and links included is presented in Figure 3-95. The main roads connecting Southampton and Eastleigh are the M3 motorway and A335 trunk road.

Figure 3-95 Southampton CAZ air Quality modelling - links close to Eastleigh



The available coverage of the Southampton air quality model in the area close to Eastleigh enables some information about the predicted change in traffic flows, traffic composition and vehicle emissions to be identified. This is presented in Table 3-10 as a percentage change between the 2020 baseline and the 2020 CAZ B scheme for both the M3 motorway and A335 trunk road.

Table 3-10 Percentage change between 2020 baseline and 2020 CAZ B scheme

Road name	AADT traffic flow (%)	HGV daily average flow (%)	All vehicles NOx emission rate (%)	Annual mean NO_2 concentration ($\mu g/m^3$)
M3	-3%	-34%	-5%	-1.0
A335	-3%	-34%	-11%	data not available

The data in Table 3-10 indicates that implementation of the Southampton CAZ B would result in a reduction in annual average daily traffic (AADT), average daily HGV and total NOx emissions from road traffic. The results indicate that implementation of a CAZ B scheme in Southampton may have a beneficial effect on air quality in Eastleigh as average daily traffic flow, daily HGV trips, and NOx emissions are forecast to decrease. The greater reduction in overall vehicle emissions on the A335 compared to the change in flows on the M3 is due to a combination of gradient effects and uneven northbound/southbound average daily traffic flows on the M3.

When considering these projections, it is important to be aware that they are based on forecasts for 2020. In the longer term, vehicle emissions and associated impacts are forecast to reduce, so there is likely to be less impact of the CAZ compared to the business as usual/future baseline beyond 2025.

In the short term, the implementation of a CAZ in Southampton introduces some uncertainty regarding the air quality in Eastleigh in the near future, in part because the CAZ is still under discussion and the details of the CAZ are not yet finalized. If a Class B CAZ is implemented in Southampton, the greatest impact on traffic flow is likely to be related to HGVs, buses and taxis, which are the vehicle types affected by the charging scheme of a Class B CAZ. However, as the transport modelling that underpins the current AQIA for the EBLP does not account for a CAZ in Southampton, uncertainty remains regarding the combined effects of a Southampton CAZ and the EBLP SGO development scenarios on traffic forecasts and local air quality. In order to ensure that local air quality within Eastleigh Borough complies with the air quality objectives in the shortest time possible, it is recommended that forecast traffic flows and associated air quality impacts are re-evaluated once the implementation details of the Southampton CAZ are confirmed.

4 Recommendations for mitigation measures

This chapter considers the key influences on air quality within the AQMAs in Eastleigh Borough and suggests options for mitigation to help ensure the Eastleigh Borough meet the Air Quality Objectives. It also highlights the importance of the planning process in mitigating the impacts of development on air quality.

The four AQMAs have been declared for exceedances of the AQOs for annual mean NO_2 concentrations. No exceedances of the AQOs for PM_{10} were predicted in the 2015 baseline or the pseudo-2030/2036 future scenarios. Consequently, this section focuses on measures for managing emissions and airborne concentrations of oxides of nitrogen.

4.1 General mitigation options for consideration

There is a wide range of potential measures available to Eastleigh Borough Council to reduce emissions, and these need to be tailored to specific causes of the NO_2 exceedances. Source apportionment has been used to identify the sources of NOx emissions in each of the four AQMAs, and this in turn has been used to help suggest which mitigation options are likely to be the most effective.

A wide range of potential air quality mitigation measures or options are available to reduce emissions of NOx in an AQMA. These are often used in combination although typically one measure has the dominant effect. Available measures would in principle include:

- Tackling the mode of transport through modal shift,
- Controlling the volume of vehicles through demand management, and
- Limiting access to vehicles with specific emission standards through emission control approaches.

The modes of transport that Eastleigh could potentially consider include the following:

- Cars
- Freight
- Taxis
- Buses
- Trains and trams

The management measures available to address the impacts and opportunities presented by these transport modes and management controls include:

- Enhancing public transport availability and uptake
- Enhancing cycling and walking facilities and opportunities
- Demand management
- Congestion control
- Low or ultra-low emission zones
- Other behavioural change measures.

For each measure, or combination of measures, it is important to consider the way in which the measure will act. The following criteria should be considered:

- Will the measure help bring the 2020 compliance forward?
- Is the measure likely to be effective?
- What is the timescale?
- Can the measure be delivered?
- Is the measure achievable?

- What is the likely uptake?
- What are the positive direct and indirect air quality benefits?
- What are the co-benefits (for example, are there reductions in greenhouse gas emissions or noise impacts?)
- What might be the negative impacts?
- Is it a "complementary measure"?
- Is the effect quantifiable?
- Has it already been implemented / planned?

By considering these criteria, and by assigning a weighting factor to each, Eastleigh Borough Council could consider carrying out a simplified multi criteria assessment (MCA) to evaluate candidate mitigation options and identify the optimum solution.

4.2 Current AQMAs within Eastleigh Borough

4.2.1 Key features of the existing AQMAs and their emission sources

Table 3-3 summarises the AQMAs in Eastleigh. Figure 4-1 presents additional information to help Eastleigh consider key questions regarding mitigation of potential impacts in these areas:

- Is there a need for additional AQMAs, extensions to existing AQMAs or the designation of a Clean Air Zone (CAZ) or Zones and revisions to any AQAPs;
- The need for, and suitable forms of, mitigation which might be implemented to address any problems identified;
- Advice on the adequacy or otherwise of existing draft policies in the EBLP to address any problems identified; and
- Recommendations for any new, additional or revised policies should these be required.

Figure 4-1 shows the source apportionment of NOx emissions in the four AQMAs. AQMA 1 has a relatively high proportion of emissions from HGVs. Emissions from diesel cars and LGVs are at a lower level, but also significant.

The emission profiles in AQMAs 2, 3, and 4 are slightly different in nature to those in AQMAs 1: in these areas, emissions from diesel cars dominate; emissions from HGVs and LGVs are at a lower level, but also significant. It should be noted that sources impacting AQMA 2 are not under Eastleigh's control and that responsibility lies with Highways England.

4.2.2 Mitigation of impacts

Using the information in Figure 4-1, it was possible to make suggestions about mitigation measures based on emissions from the current sources. These mitigation measures are considered in Table 4-1. These are high level suggestions, made to the extent possible within the remit of this study. Further in-depth analysis would be needed of each AQMA to provide a comprehensive list of potential measures.

At present, a Clean Air Zone (CAZ) to include all of these AQMAs is not a workable solution because of the geographically separate nature of these AQMAs and different traffic patterns in each area. Eastleigh Borough Council are currently commissioning a set of 2020 transport models to allow assessment of air quality impacts in the near future. As the modelling results predict that air pollutant concentrations will be below the applicable air quality objectives before 2030 / 2036, it would be beneficial to have the 2020 transport modelling scenarios available before full consideration is given to a major strategic intervention such as a Clean Air Zone. The results of the air quality modelling study for the 2020 scenarios will also beneficial in developing other mitigation measures to improve air quality in the near future.

Figure 4-1 Source apportionment of NOx emissions in the 4 AQMAs

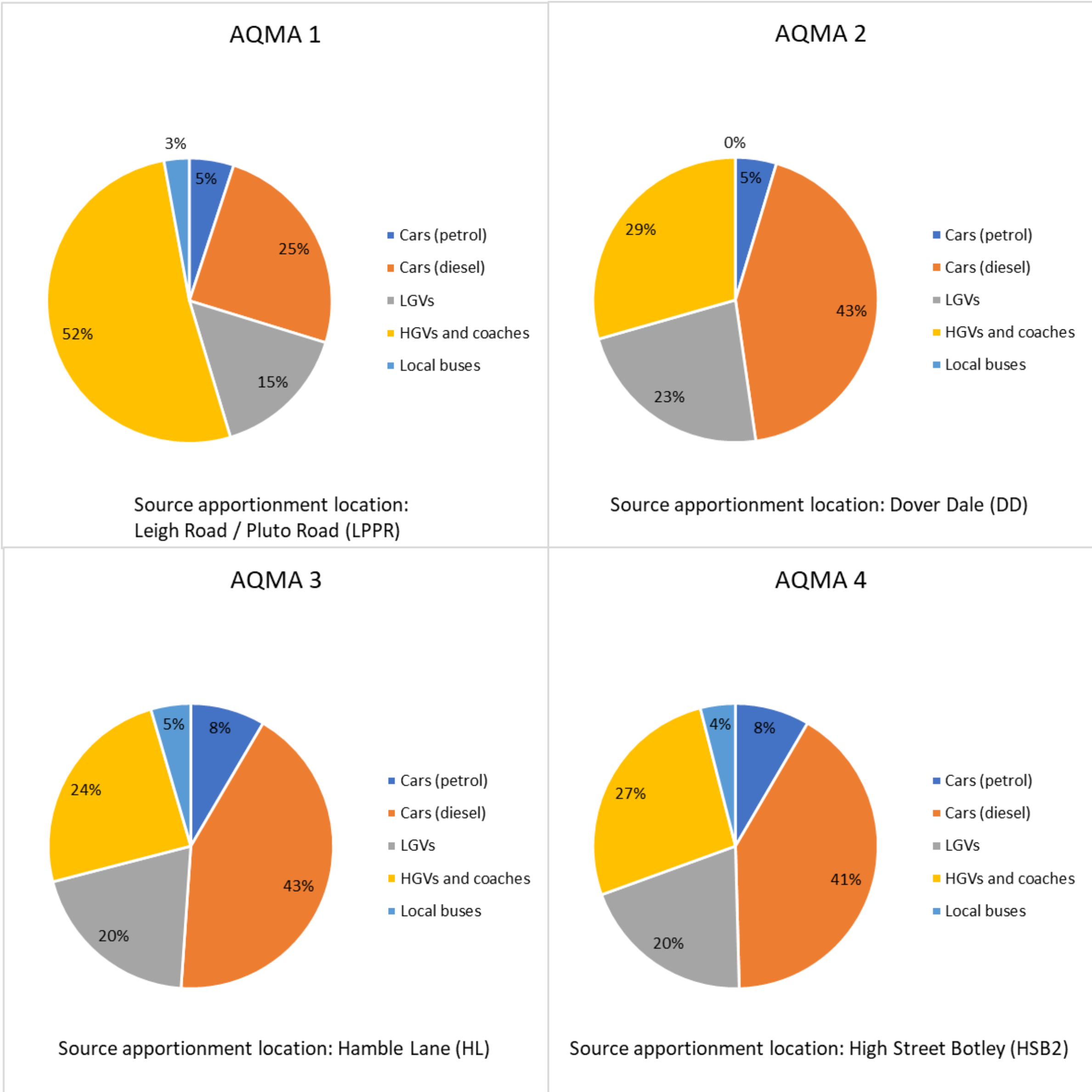


Table 4-1 Possible mitigation measures in each Eastleigh AQMA

AQMA	Description of emission sources	Existing policy in the EBLP	Options for emission mitigation policies/further information gathering to consider

AQMA No.1 (A335)	A corridor of land 30m either side of the A335 from Southampton Airport Parkway Station to the junction of Leigh Road and Bournemouth Road (B3043).	**Policy Bi1, E7**	• Assessment of origin/destination of HGV and purpose of use of the AQMA to determine if it is possible to limit HGV activity through, for example:
			  ○ Re-routing of HGVs
			  ○ Better coordination of loading/unloading activities (if applicable)
			• Congestion management particularly at Bishopstoke Road, Woodside Avenue and Twyford Road junctions
			• Consideration of by-pass linking M3 to airport
			• Improving the attractiveness of public transport options for accessing Southampton Airport

AQMA No.2 (M3)	An area extending either side of the M3 motorway between junctions 12 to 14.	[complex interlinkages with EBLP]	<u>Source of emissions not under Eastleigh's control. Principally Highways England issue</u> • Investigate options to reduce impact of EBLP on M3 traffic
AQMA No.3 (Hamble Ln)	An area encompassing a number of properties along Hamble Lane, Bursledon	**Policy HA3, Hamble Airfield**	Very localised issue – queuing traffic likely to be causing elevated emissions. Need to consider congestion management. • Congestion management through smoothing traffic flows or reducing vehicle numbers • Investment in public transport and non-motorised transport infrastructure • Active promotion of modal shift from cars to public transport/walking/cycling • Parking management
AQMA No.4 (High Street Botley)	The A334 from the Borough boundary east of the junction with the B3354, Winchester Street, to its junction with Woodhouse Lane	**Botley bypass**	Local traffic likely to be dominating this AQMA. Need to consider congestion management • Congestion management through smoothing traffic flows or reducing vehicle numbers • Investment in public transport and non-motorised transport infrastructure • Active promotion of modal shift from cars to public transport/walking/cycling • Parking management

4.3 Impact of the Eastleigh Local Borough Plan on air quality

The Eastleigh Borough Local Plan (EBLP) sets out the policies and plans to guide future development to 2036[27]. It identifies how much development is required and key locations for this development, the infrastructure and services needed to support new and existing communities and areas which will be protected from development.

In this section we look at policies addressing air pollution and transport. For transport, we look at policies specifically addressing congestion, since congestion could have a major negative impact on air quality. The section finishes with a strong recommendation to use the planning process to help mitigate air quality impacts of development.

4.3.1 EBLP policies directly relevant to air pollution

Policy DM8 addressing "Pollution" is set out in Box 1 below.

Box 1

Policy DM8, Pollution

Development will not be permitted if it is likely to cause loss of amenity or other unacceptable environmental impacts through:

i. air pollution (including odours or particulate emissions);

ii. pollution of surface, underground, coastal waters or other watercourses;

iii. noise or vibration;

iv. light intrusion; or

v. land contamination.

Development susceptible to particular forms of pollution will not be permitted:

a. where it will be affected by such pollution, unless measures can be taken that adequately mitigate the polluting effects; or

b. where it would inhibit existing economic or other activities giving rise to acceptable polluting effects.

Where a development site is known or suspected to be contaminated, before the site is developed the Borough Council will require the contamination to be remediated to a standard where as a minimum it cannot be defined as 'contaminated land' under Part IIA of the Environmental Protection Act 1990.

Appendix C "Monitoring Framework" of the EBLP sets out the metrics that are proposed to monitor the first of the Councils three strategic priorities, "A Green Borough".

- Objective i – Tackling congestion – is connected to policies including DM8: S1, S6, S12, S13, **DM8**, DM13, and DM14. A key target is to "Reduce number, size and level of pollution" with an indicator of "Status of AQMAs (number, area, pollution levels)."
- Objective v – Excellent environment for all - is connected to policies including DM8: S1, S7, S11, DM1, **DM8**, DM12. Again, a key target is to "Reduce number, size and level of pollution" with an indicator of "Status of AQMAs (number, area, pollution levels)."

In particular for air quality there is a commitment to consider air pollution:

[27] Eastleigh Borough Local Plan. 2016-2036. December 2017. Recommended to Council on 11 December 2017

"*The Council has an on-going duty to review and assess air quality and has declared a number of air quality management areas (AQMAs) associated with traffic. Air quality will be a material consideration:*

- *within and adjacent to such area, or*
- *where development could give rise to the need for such an area to be designated, or*
- *where development would prevent an air quality action plan being implemented.*"

The Borough Council will require developers to address means of mitigating air pollution, in particular measures to reduce traffic congestion. While the provision of green infrastructure such as trees has been shown to have some beneficial effects on ambient air quality (and the Council) will seek the replacement of at least two trees for each one lost in Eastleigh), this cannot be regarded as a measure that will be effective on its own in addressing air pollution in the designated AQMAs. Planning Practice Guidance states that measures should be specific to the location and development and proportionate to the likely impact. It provides a list of examples of mitigation that could be used to address air pollution."

4.3.2 EBLP policies relevant to transport and congestion

Transport, and by extension congestion, are topics that are considered in various sections of the emerging EBLP.[27] Transport is considered at the strategic level in Chapter 4 with the following two Strategic Policies:

- **Policy S12, Transport infrastructure**: "*In conjunction with new development and having regard to the associated transport assessments the Borough Council will, in consultation with the highway authority and the Highways Agency, safeguard routes/sites, and work with partners to deliver, the following new and improved transport infrastructure..."*
- **Policy S13, Strategic footpath, cycleway and bridleway links**: "*The Borough Council in partnership with the highway authority will seek to create new and improve existing footpath, cycle and bridleway links throughout the Borough, including connecting the country parks, increasing access along the coast and to the South Downs National Park and improving connections between the parishes and Eastleigh Town Centre. The Council will seek the provision of the following new and strategic footpath/ cycleway/ bridleway routes as shown on the key diagram and the policies map:...*"

In addition to setting out new and improved infrastructure under the two strategic policies, Chapter 4 refers to Council's Infrastructure Delivery Plan (IDP), which includes additional information regarding these improvements and their timing. It is specified that the IDP will be kept under review in future updates of the IDP.

Transport and congestion are considered in the context of development in Chapter 5, which states "*The Borough Council seeks to support Hampshire County Council's Local Transport Plan and address local issues of road congestion and related air quality issues…"* and then goes onto list several approaches to achieve this support. These include:

- Seeking to manage and reduce car use
- Continuing to pursue its strategies to improve public transport and pedestrian and cycle routes
- Seeking investment in improvements to transport systems, including road and junction improvements, public transport and footpaths, cycleways and bridleways
- Safeguarding routes for potential transport improvements
- Having regard to the requirements of rail and bus operators

- Ensuring the provision of parking including opportunities for park and ride
- Providing encouragement and support to enable individuals and organisations to plan their travel requirements
- Ensuring that comprehensive and up-to-date information is provided regarding prevailing conditions on the transport network.

There are two Development Management Policies related to transport and congestion, summarized below:

- **Policy DM13, General development criteria - transport**: *"All new development must have safe and convenient access to the highway network and make provision for access to, and by, other transport modes including public transport and cycle and pedestrian routes as appropriate."*

  Policy DM13 also describes the required access arrangements between new developments and the highway network; specifies that new development will be assessed to establish whether it should contribute to off-site improvements to transport infrastructure; and the circumstances under which development proposals might be subject to Transport Assessment.

- **Policy DM14, Parking**: This policy describes the requirements for parking provision within new residential development as well as within other areas.

  "Within town, district and local centres and in neighbourhood parades, parking needs will be assessed in relation to wider needs within the centre/ parade. Where existing provision is inadequate, the provision of additional parking may be permitted subject to a financial contribution towards measures to assist on-street parking management, public transport, cycling and walking."

  "Proposals to provide new car parks, extend existing car parks or provide workplace park and ride facilities will be permitted within the urban edge if: ... iii. transport and other environmental assessments demonstrate that the benefits of the proposal (e.g. reduction of on-street parking pressures, reduction of traffic congestion) outweigh any adverse effects;"

Chapter 6 provides more detailed information regarding transport considerations at the local level, with a subsection for each of Eastleigh Borough's five areas:

1. Bishopstoke, Fair Oak and Horton Heath
2. Bursledon, Hamble-le-Rice and Hound
3. Chandler's Ford and Hiltingbury
4. Eastleigh
5. Hedge End, West End and Botley

Examples of policies related to transport at the local level are as follows:

- **Policy Bi1, South of Stokewood Surgery, Bishopstoke**: "*The Council has previously proposed improvements to junctions on the Bishopstoke Road corridor to help relieve peak-hour traffic congestion*."
- **Bursledon Parish**: "*Road access to the parish from the motorway is via a link from junction 8 to the Windhover roundabout. The A27 West End Road and the A3024 Bursledon Road and Hamble Lane to the south also converge at this roundabout, where there are problems of congestion at peak times. To the south, the A3025 Portsmouth Road also links to Hamble Lane. Hamble Lane is the main access to the Hamble peninsula and suffers serious congestion. Traffic improvements are set out in the Eastleigh Borough Transport Statement and will be included in the Council's Infrastructure Delivery Plan*."

- **Policy HA3, Hamble Airfield**: "*The parish is served by Hamble Lane and some other road links to Southampton, including the A3025 Portsmouth Road, the A3024 Bursledon Road and the A27 West End Road. Hamble Lane, the A27 and the A3024 converge at Windhover roundabout, where there is congestion at peak hours. An air quality management area has been defined in this area including the northern end of Hamble Lane because of vehicle emissions arising from congestion.*"
- **Policy E5, Public realm improvements in and adjoining Eastleigh town centre**: "… *These access arrangements mean that much traffic for the site has to pass through or close to Eastleigh town centre, with associated problems of congestion and poor air quality." "…problems of peak-hour congestion, in particular on Bishopstoke Road*."
- **Policy E7, Development opportunities adjoining Eastleigh River Side. Twyford Road/ Romsey Road/ Bishopstoke Road/Station Hill roundabout**. "*There is a significant issue of peak hour congestion in the area. Contributions have been received for improvements to this roundabout.*"
- **Policy AL1, Land east of Allbrook Way**. "*Highway and parking strategy shall be prepared and implemented in consultation with the Council and the highway authority designed to reduce traffic congestion on Allbrook Hill, enhance the amenities of existing occupiers and maintain highway safety.*"
- **Hedge End Parish:** "*Hedge End gains vehicular access primarily from the M27 junctions 7 and 8. The main route to Southampton is via the A334 from junction 7. There are problems of peak hour congestion on the M27, at junctions 7 and 8 and on the approach roads to these junctions, including routes through the industrial and commercial area at Hedge End such as Tollbar Way.*"
- **Botley bypass**: "*The village of Botley has suffered from increasing vehicular traffic and congestion in recent years*."

4.3.3 Planning policy recommendations

Alongside specific policies for environmental improvement and in relation to traffic congestion, the EBLP envisages extensive residential development. This development brings the risk of impacts on air quality, as evaluated in this study.

Eastleigh already has mechanisms to connect air quality and planning which are summarised in the EBLP (paragraph 5.45): "*The Council has an on-going duty to review and assess air quality and has declared a number of air quality management areas (AQMAs) associated with traffic. Air quality will be a material consideration".*

Appendix 1 of the Eastleigh Air Quality Management Area Action Plan summarises the progress made on measures which are being taken to improve air quality. Some of these measures are related to planning. It is important to ensure clarity and consistency between the EBLP and the Air Quality Management Area Action Plans.

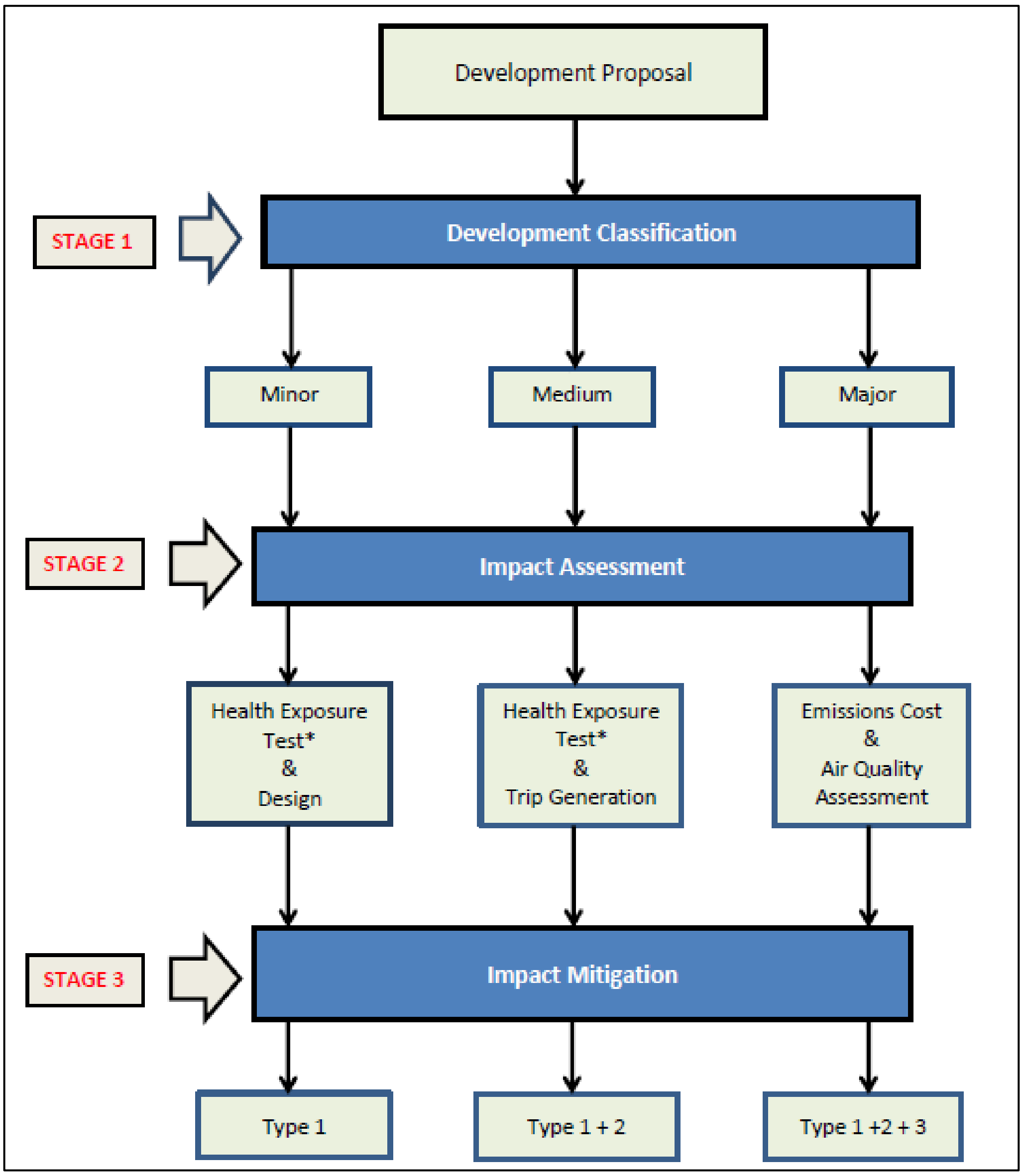
The linkages between planning and air quality are very important and integral for achieving compliance with air quality objectives, particularly within existing AQMAs and avoiding the need to declare new AQMAs. Therefore, ensuring all new developments are subject to a high level of scrutiny in this respect is essential. Policy DM8 cited above goes a significant way to provide the mechanism to achieve this, however this would be strengthened by an explicit requirement "*to provide additional information on the impact of their proposed development on air quality"* and that *"development will not be supported where it is not possible to mitigate the adverse effects of that development on air quality effectively or where development proposals cause unacceptable air quality impacts*", or similar provisions.

It is also recommended that supplementary guidance is prepared for developers and their consultants subsequent to the publishing of the EBLP. This would include guidance for:

- The circumstances under which an air quality impact assessment is required;
- What should be included in an assessment;
- Mitigation options.

As an example, the West Yorkshire authorities, Sussex Air Quality Partnership and Kent & Medway Air Quality Partnership have produced supplementary planning guidance (SPG) which might be worth reviewing to provide an indication of how supplementary guidance can work in practice.

Figure 4-2 West Yorkshire authorities: Air quality assessment and mitigation flow chart



The SPG follows a three stage process for integrating air quality considerations into land-use planning and development management policies that can influence the reduction of road transport emissions and to be used to inform air quality action planning:[28]

STAGE 1- Determining the classification of the development proposal;

STAGE 2- Assessing and quantifying the impact on local air quality;

STAGE 3- Establishing the level of mitigation required by the proposal to meet National Planning Policy, Local Plan requirements and WYLES objectives.

[28] West Yorkshire Air Quality & Emissions Technical Planning Guidance

5 Conclusions

5.1 Summary

This study describes an assessment of air quality impacts to support Eastleigh Borough Council (EBC) in connection with their emerging EBLP. A sub-regional air dispersion model (RapidAir) was used to model predicted air quality impacts at all locations within the EBLP study area at a resolution of 3m x 3m. This method of spatially detailed compliance modelling was used to assess air quality impacts in terms of potential effects on human health.

Traffic growth within the study area was provided by Solent Transport's Sub-Regional Transport Model (SRTM). In total, seven traffic scenarios were modelled: 2015 Reference Case, 2036 Baseline, and five 2036 Strategic Growth Option (SGO) development options. In addition to the 2015 and 2036 dispersion models, a series of pseudo-2030 models were developed by coupling 2036 traffic activity data (obtained from the Systra transport model datasets) with 2030 vehicle emission factors. This set of dispersion models was designed for sensitivity testing, to investigate the predicted air quality impacts of the proposed development options if vehicle emission rates do not improve as much as they are forecast to in the next eighteen years.

Analysis of the 2015 Reference Case indicated that there are locations within the existing AQMAs where the modelled pollutant concentrations are close to or exceeding the applicable annual mean air quality objectives, particularly with respect to NO_2 concentrations. Modelled exceedances of the annual air quality objectives, where there is also a risk of public exposure, are located within the boundaries of existing AQMAs. No exceedances of the short-term air quality objectives are predicted for the 2015 Reference Case.

Analysis of the future year scenarios indicated that none of the modelled receptor points are predicted to exceed the annual air quality objectives for NO_2, PM_{10} or $PM_{2.5}$ in the pseudo-2030 or 2036 dispersion models. Additionally, none of the modelled receptor points are predicted to exceed the short-term air quality objectives for NO_2 or PM_{10} in the pseudo-2030 or 2036 dispersion models.

The model results indicate an overall decrease in air pollutant concentrations in the future year scenarios. NO_2 concentrations are predicted to decrease significantly. PM_{10} and $PM_{2.5}$ concentrations are also generally predicted to decrease, though to a lesser extent.

The model results indicate that all five SGO scenarios are predicted to result in similar air pollutant concentrations, both within the four AQMAs and when considering impacts on neighbouring local authorities. Although all five SGO scenarios are predicted to result in similar air pollutant concentrations in the future year models, it is important to consider these results in the context of the number of dwellings included in each SGO. The results of this assessment indicate that the council's preferred development option, SGO B/C, can accommodate approximately 1,000 to 2,000 additional new dwellings, compared to the alternative SGOs, without introducing adverse impacts on local air quality.

5.2 Recommendations

Based on the results of this study, we recommend the following:

1. **Continue investigation and implementation of measures to improve local air quality**

   - We recommend that the existing AQMA designations are maintained until there is sufficient monitored data within the AQMA boundaries to demonstrate that the air quality objectives are being met. Subject to availability of monitoring data, it may be possible to withdraw AQMA No. 4 in the near future.

   - The implementation of measures included in existing Air Quality Action Plans, and the exploration of additional measures, should continue so as to achieve compliance with the air quality objectives in the shortest time possible. Dispersion model results derived from the 2020 set of transport model scenarios may provide additional insight into mitigation methods that would be beneficial in the near future.

- The possible implementation of a Clean Air Zone (CAZ) in Southampton introduces uncertainty with regards to traffic flow and fleet composition within neighbouring local authorities, including Eastleigh Borough. Once the details of the Southampton CAZ are confirmed, possible effects from the Southampton CAZ on local air quality within Eastleigh should be studied and, if appropriate, targeted mitigation measures should be developed.

2. Develop planning policy measures

- The EBLP already contains mechanisms to connect air quality and planning. The EBLP also envisages the development of Supplementary Planning Document (SPD) to provide guidance on assessing pollution, criteria that will be used in assessing the likely pollution impacts of development proposals, and preferred measures to prevent, minimize or mitigate impacts. A SPD will be a valuable tool for managing air quality impacts associated with future development.
- We recommend that, where possible, Eastleigh Borough leverage the joint resources and knowledge of the PUSH group of local authorities in developing content for the SPD.
- Planning conditions should also be utilized to ensure that developments are phased accordingly up to 2036, in order to minimize the risk of significant adverse impacts in the short and medium term.
- Other air quality management and improvement measures such as those referenced in Chapter 4 should also be considered for more detailed evaluation and implementation where appropriate.
- The effects of construction can be controlled and mitigated by planning condition, normally requiring a Construction Environmental Management Plan to be agreed with the local planning authority prior to construction commencing.

Appendices

Appendix 1 - Air dispersion model verification and adjustment

NO_2 model verification

Verification of the model involves comparison of the modelled results with any local monitoring data at relevant locations; this helps to identify how the model is performing and if any adjustments should be applied. The verification process involves checking and refining the model input data to try and reduce uncertainties and produce model outputs that are in better agreement with the monitoring results. This can be followed by adjustment of the modelled results if required. The LAQM.TG(16) guidance recommends making the adjustment to the road contribution of the pollutant only and not the background concentration these are combined with.

The approach outlined in LAQM.TG(16) section 7.508 – 7.534 (also in Box 7.14 and 7.15) has been used in this case. To verify the model, the predicted annual mean Road NOx concentrations were compared with concentrations measured at the various monitoring sites during 2015.

The model output of Road NOx (the total NOx originating from road traffic) was compared with measured Road NOx, where the measured Road NOx contribution is calculated as the difference between the total measured NOx and the background NOx value. Total measured NOx for each monitoring site was calculated from the measured NO_2 concentration using Version 6.1 of the Defra NOx/NO_2 calculator available from the LAQM website[29]. Background NOx values for 2015 were obtained from the 2015 reference year background maps available on the LAQM website.

The initial comparison of the modelled vs measured Road NOx identified that the model was over-predicting the Road NOx contribution at most locations. Refinements were subsequently made to the model inputs to improve model performance where possible.

The gradient of the best fit line for the modelled Road NOx contribution vs. measured Road NOx contribution was then determined using linear regression and used as a global/domain wide Road NOx adjustment factor. This factor was then applied to the modelled Road NOx concentration at each discretely modelled receptor point to provide adjusted modelled Road NOx concentrations. A primary NOx adjustment factor (PAdj) of **0.8821** based on model verification using all of the included 2015 NO_2 measurements was applied to all modelled Road NOx data prior to calculating an NO_2 annual mean.

The total annual mean NO_2 concentrations were then determined at points within the model domain using the NOx/NO_2 calculator to combine background and adjusted road contribution concentrations. For this step of the process, regional concentrations of ozone, oxides of nitrogen and nitrogen dioxide were set to those of the local authority where the calibration point was located. The following relationship was determined for conversion of total NOx concentrations to total NO_2 concentrations:

$$(NO_2 \text{ in } \mu g/m^3) = -0.001072\ (NOx \text{ in } \mu g/m^3)^2 + 0.5812\ (NOx \text{ in } \mu g/m^3) + 3.2565$$

A plot comparing modelled and monitored total NO_2 concentrations during 2015 is presented in Figure A1-1.

To evaluate the model performance and uncertainty, the Root Mean Square Error (RMSE) for the observed vs predicted NO_2 annual mean concentrations was calculated, as detailed in Technical Guidance LAQM.TG(16). The calculated RMSE is presented in Table A1-1. In this case the RMSE was calculated at **3.74 µg/m³**.

[29] https://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html

Figure A1-1: Predicted annual average NO_2 concentrations against measured concentrations at monitoring locations. The 30% confidence intervals are also plotted.

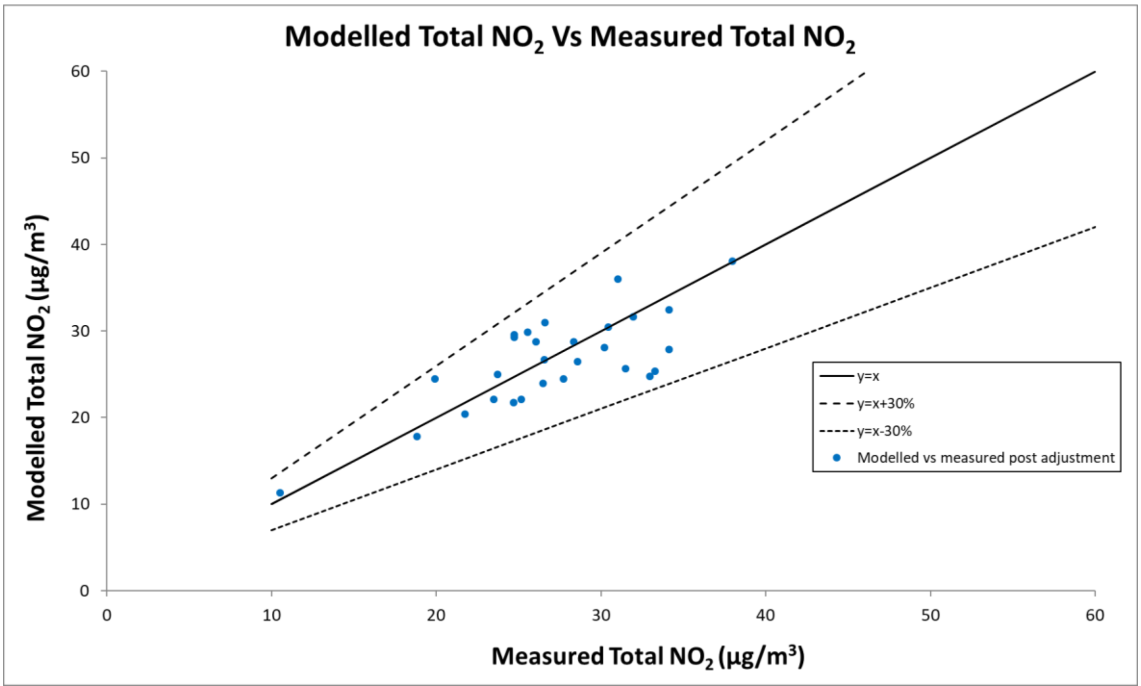


Table A1-1: Modelled and measured NO_2 concentrations for the 2015 reference year and calculated RMSE value

Site ID	Site name	Site type	Location (m) X	Location (m) Y	Location (m) Z	Annual average NO_2 concentrations, µg.m^{-3} Measured	Annual average NO_2 concentrations, µg.m^{-3} Modelled
AL	Allington Lane	Roadside	445912	115544	2.4	26.1	28.7
AR	Ashdown Road	Urban Background	443291	122842	1.5	10.5	11.3
BEL	Belmont Road	Urban Background	443778	119303	2.2	24.7	29.6
BR	Bishopstoke Road	Roadside	446604	119149	2	33.0	24.8
BR2	Bishopstoke Road 2	Roadside	446051	119175	1.9	33.3	25.4
CA	Chestnut Avenue	Roadside	445339	118110	2.1	24.7	21.7
CC	Chestnut Close	Roadside	443054	118962	2.1	26.5	23.9
DD	Dove Dale	Urban Background	443559	118751	2	31.0	36.0
FOR	Fair Oak Road	Roadside	447427	118774	2.2	21.7	20.4
HG	Hadleigh Gardens	Urban Background	445347	120367	2.7	18.8	17.8
HL	Hamble Lane	Roadside	447720	110360	2	32.0	31.7
HL2	Hamble Lane 2	Roadside	447746	110479	2.3	30.5	30.5
HSB	High Street Botley	Roadside	451431	113025	2.1	31.5	25.7
HSB2	High Street Botley 2	Roadside	451185	113032	2.4	27.7	24.4
LR13	Leigh Road / J13	Roadside	443842	119527	2.1	38.0	38.1
LRPR	Leigh Road / Pluto Road	Roadside	444861	119175	2	30.2	28.1
MC	Medina Close	Urban Background	444239	120060	1.5	24.7	29.3
MS	Mill Street	Roadside	445708	119619	2.8	28.6	26.4
NH	Nuffield Hospital	Urban Background	445121	122183	2.2	23.7	25.0
OX	Oxburgh Close	Urban Background	444543	120187	2.3	19.9	24.5
PC	Porteous Crescent	Urban Background	444656	120775	2.5	25.5	29.9

Site ID	Site name	Site type	Location (m)			Annual average NO_2 concentrations, $\mu g.m^{-3}$	
			X	Y	Z	Measured	Modelled
SC	Steele Close	Urban Background	443959	119673	3.5	26.6	26.7
SRAN	Southampton Road / Analyser	Roadside	445495	118237	2	34.1	27.9
TP	The Point	Roadside	445311	119147	2.3	23.5	22.1
TW	Twyford Road	Roadside	445742	119856	2.4	25.2	22.1
UNC	Upper Northam Close	Urban Background	448090	112635	2.1	28.3	28.8
WA	Woodside Avenue	Roadside	444484	119441	2	34.1	32.5
						RMSE (all sites in this table)	**3.74**

PM_{10} model verification

The model output of Road PM_{10} (the total PM_{10} originating from road traffic) was compared with measured Road PM_{10}, where the measured Road PM_{10} contribution is calculated as the difference between the total measured PM_{10} and the background PM_{10} value.

The initial comparison of the modelled vs measured Road PM_{10} identified that the model was under-predicting the Road PM_{10} contribution at most locations. Refinements were subsequently made to the model inputs to improve model performance where possible.

The gradient of the best fit line for the modelled Road PM_{10} contribution vs. measured Road PM_{10} contribution was then determined using linear regression and used as a global/domain wide Road PM_{10} adjustment factor. This factor was then applied to the modelled Road PM_{10} concentration at each discretely modelled receptor point to provide adjusted modelled Road PM_{10} concentrations. A primary PM_{10} adjustment factor (PAdj) of **3.3583** based on model verification using all of the included 2015 PM_{10} measurements was applied to all modelled Road PM_{10} data prior to calculating an PM_{10} annual mean.

A plot comparing modelled and monitored total PM_{10} concentrations during 2015 is presented in Figure A1-2.

To evaluate the model performance and uncertainty, the Root Mean Square Error (RMSE) for the observed vs predicted PM_{10} annual mean concentrations was calculated, as detailed in Technical Guidance LAQM.TG(16). The calculated RMSE is presented in Table A1-2. In this case the RMSE was calculated at **4.59 $\mu g/m^3$**.

Limited measurement data was available for the verification of the modelled Road $PM_{2.5}$ data. Using PM_{10} and NOx as an example, the TG16 guidance states that 'in the absence of any PM_{10} data for verification, it may be appropriate to apply the road NOx adjustment to the modelled road-PM_{10}'.

In this case, the primary PM_{10} adjustment factor (PAdj) of **3.5318** was applied to all modelled Road $PM_{2.5}$ data prior to calculating their respective annual means.

Figure A1-2: Predicted annual average PM_{10} concentrations against measured concentrations at monitoring locations. The 30% confidence intervals are also plotted.

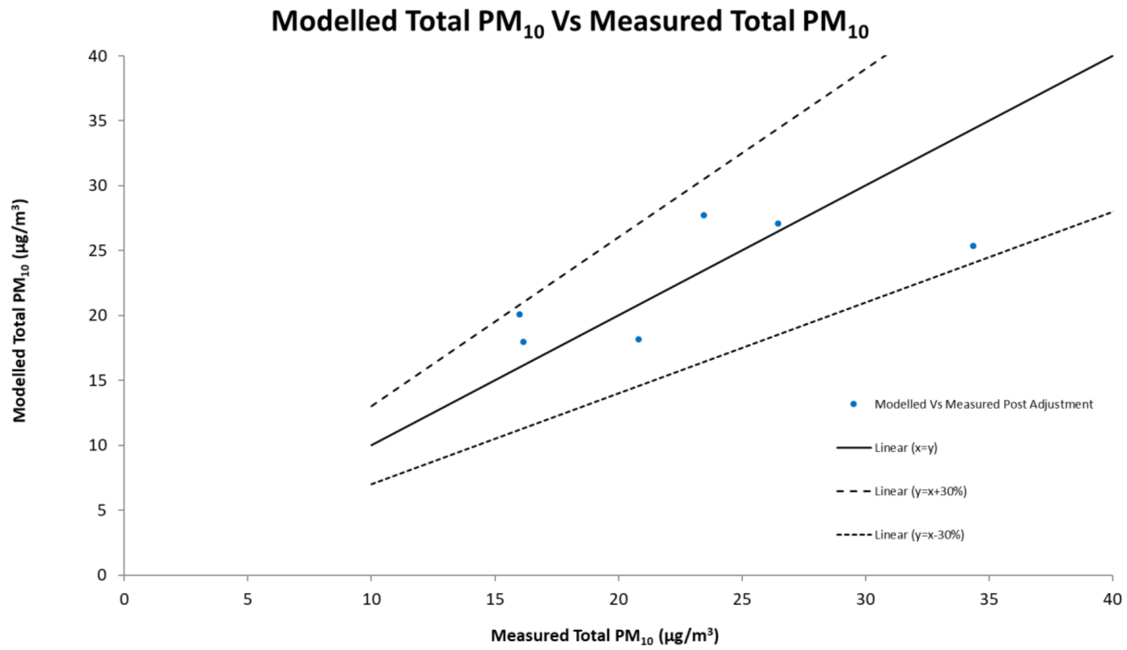


Table A1-2 Modelled and measured PM_{10} concentrations for the 2015 reference year and calculated RMSE value

Site Name	Site type	Location (m)		Annual average PM_{10} concentrations, $\mu g.m^{-3}$	
		X	Y	Measured	Modelled
AURN Brintons Rd	Urban background	442579	112248	16.0	20.1
GOS1 Tichborne Way	Roadside	458987	102786	20.8	18.2
London Road	Kerbside	464925	102129	34.4	25.4
Gatcombe Park Primary School	Urban background	465695	103666	16.2	18.0
Burrfields Road	Roadside	466004	102348	26.5	27.1
Mile End Road	Roadside	464397	101270	23.5	27.7
				RMSE (all sites in this table)	**4.59**

Appendix 2 - Tabulated detailed results for modelled receptor points

Table A2-1: Detailed model results for annual mean NO_2 concentrations (road contribution + background concentration, μg/m^3) at receptor points for pseudo-2030 model scenarios

Receptor	2015 Reference Case concentration (μg/m^3)	P-2030 SGO B/C		P-2030 SGO C		P-2030 SGO D1		P-2030 SGO D2		P-2030 SGO E	
		μg/m^3	% change	μg/m^3	% change	μg/m^3	% change	μg/m^3	% change	μg/m^3	% change
Modelled receptors located in or near AQMA No. 1											
BR2	25.7	14.7	-42.8%	14.7	-42.9%	15.0	-41.7%	15.0	-41.7%	14.6	-43.2%
CA	21.2	13.2	-37.5%	13.3	-37.0%	13.3	-37.0%	13.3	-37.0%	13.3	-37.2%
CR	18.1	12.2	-32.7%	12.2	-32.7%	12.2	-32.7%	12.2	-32.7%	12.2	-32.7%
LR13	37.1	18.6	-50.0%	18.9	-49.2%	18.7	-49.7%	18.7	-49.7%	18.8	-49.4%
LRPR	28.5	14.0	-51.1%	13.9	-51.4%	13.9	-51.4%	13.9	-51.4%	13.9	-51.4%
MS	26.6	15.5	-41.9%	15.1	-43.2%	15.3	-42.7%	15.3	-42.6%	15.2	-43.0%
SR1	25.9	14.7	-43.4%	14.8	-42.9%	14.8	-43.0%	14.8	-43.0%	14.7	-43.2%
SRAN	26.3	14.8	-43.7%	14.9	-43.2%	14.9	-43.3%	14.9	-43.3%	14.9	-43.5%
TP	21.9	13.1	-40.1%	13.1	-40.3%	13.1	-40.2%	13.1	-40.2%	13.1	-40.4%
TW	21.1	13.6	-35.7%	13.7	-35.2%	13.8	-34.8%	13.8	-34.7%	13.7	-35.1%
WA	32.9	16.1	-51.1%	16.1	-51.0%	16.2	-50.7%	16.2	-50.7%	16.2	-50.6%
Average			**-42.7%**		**-42.6%**		**-42.5%**		**-42.5%**		**-42.7%**
Modelled receptors located in or near AQMA No. 2											
BEL	29.7	15.3	-48.5%	15.3	-48.6%	15.3	-48.6%	15.3	-48.7%	15.3	-48.6%
DD	36.7	17.7	-51.8%	17.6	-52.0%	17.6	-52.1%	17.6	-52.1%	17.6	-52.1%
MC	29.3	15.4	-47.3%	15.5	-47.2%	15.4	-47.3%	15.4	-47.3%	15.4	-47.3%
OX	24.3	13.5	-44.4%	13.5	-44.4%	13.5	-44.5%	13.5	-44.5%	13.5	-44.5%
PC	29.9	15.6	-47.8%	15.6	-47.9%	15.5	-48.0%	15.5	-48.0%	15.5	-48.0%
SC	26.6	14.2	-46.6%	14.3	-46.4%	14.2	-46.5%	14.2	-46.5%	14.2	-46.5%
SSQ	31.2	15.9	-49.0%	15.9	-49.1%	15.9	-49.2%	15.9	-49.2%	15.9	-49.2%
Average			**-47.9%**		**-47.9%**		**-48.0%**		**-48.0%**		**-48.0%**
Modelled receptors located in or near AQMA No. 3											
HL	32.4	23.2	-28.5%	23.2	-28.6%	23.2	-28.6%	23.1	-28.6%	23.2	-28.6%

Receptor	2015 Reference Case concentration (µg/m³)	P-2030 SGO B/C		P-2030 SGO C		P-2030 SGO D1		P-2030 SGO D2		P-2030 SGO E	
		µg/m³	% change	µg/m³	% change	µg/m³	% change	µg/m³	% change	µg/m³	% change
HL2	31.2	17.1	-45.0%	17.1	-45.1%	17.1	-45.1%	17.1	-45.1%	17.1	-45.1%
HL3*	27.3	21.0	-23.0%	21.0	-23.1%	21.0	-23.1%	21.0	-23.1%	21.0	-23.1%
Average			**-32.2%**		**-32.2%**		**-32.3%**		**-32.3%**		**-32.3%**
Modelled receptors located in or near AQMA No. 4											
HSB	25.5	11.6	-54.5%	11.6	-54.6%	11.6	-54.6%	11.6	-54.6%	11.6	-54.6%
HSB2	25.0	11.7	-53.3%	11.7	-53.4%	11.7	-53.4%	11.7	-53.4%	11.7	-53.3%
HSB3*	20.5	12.2	-40.7%	12.2	-40.7%	12.1	-40.8%	12.1	-40.8%	12.2	-40.7%
Average			**-49.5%**		**-49.6%**		**-49.6%**		**-49.6%**		**-49.5%**
Modelled receptors located near roads between Eastleigh and Southampton											
M27-1*	29.4	15.1	-48.7%	15.0	-49.1%	15.0	-49.0%	15.0	-49.1%	15.0	-49.1%
M27-2*	32.2	15.9	-50.6%	15.8	-50.9%	15.8	-50.8%	15.8	-50.9%	15.8	-50.9%
M27-3*	33.3	16.7	-49.9%	16.8	-49.7%	16.7	-49.7%	16.7	-49.8%	16.7	-49.9%
M27-4*	28.1	16.9	-40.0%	16.9	-40.0%	16.9	-39.9%	16.9	-40.0%	16.9	-40.0%
A3024-1*	24.4	15.7	-35.8%	15.7	-35.8%	15.7	-35.8%	15.7	-35.8%	15.7	-35.7%
A3024-2*	24.4	15.7	-35.8%	15.7	-35.7%	15.7	-35.7%	15.7	-35.8%	15.7	-35.7%
A27-1*	21.8	14.3	-34.3%	14.3	-34.3%	14.3	-34.3%	14.3	-34.4%	14.3	-34.4%
A27-2*	26.0	15.5	-40.5%	15.2	-41.4%	15.2	-41.4%	15.2	-41.7%	15.3	-41.2%
A3025-1*	20.3	15.1	-25.4%	15.1	-25.4%	15.1	-25.4%	15.1	-25.4%	15.1	-25.4%
A3025-2*	20.0	14.8	-26.0%	14.8	-25.9%	14.8	-25.9%	14.8	-26.0%	14.8	-26.0%
A334*	24.3	15.4	-36.6%	15.4	-36.6%	15.4	-36.6%	15.4	-36.5%	15.4	-36.5%
Average			**-38.5%**		**-38.6%**		**-38.6%**		**-38.7%**		**-38.6%**
Modelled receptors located near roads between Eastleigh and Fareham											
M27-5*	28.5	17.4	-38.8%	17.5	-38.7%	17.5	-38.7%	17.4	-38.7%	17.4	-38.7%
M27-6*	28.0	17.9	-36.3%	17.9	-36.2%	17.9	-36.2%	17.9	-36.2%	17.9	-36.2%
A27-3*	27.1	17.8	-34.2%	17.8	-34.2%	17.8	-34.2%	17.8	-34.3%	17.8	-34.2%
A27-4*	27.9	17.5	-37.5%	17.5	-37.5%	17.5	-37.5%	17.5	-37.6%	17.5	-37.5%
Average			**-36.7%**		**-36.6%**		**-36.7%**		**-36.7%**		**-36.7%**

Receptor	2015 Reference Case concentration (µg/m³)	P-2030 SGO B/C		P-2030 SGO C		P-2030 SGO D1		P-2030 SGO D2		P-2030 SGO E	
		µg/m³	% change	µg/m³	% change	µg/m³	% change	µg/m³	% change	µg/m³	% change
Modelled receptors located near roads between Eastleigh and Winchester											
B3335*	20.7	10.9	-47.1%	12.4	-39.8%	12.3	-40.4%	12.3	-40.5%	12.3	-40.6%
NH	25.7	13.4	-47.7%	13.2	-48.7%	13.2	-48.7%	13.2	-48.7%	13.2	-48.7%
M3-1*	20.1	11.0	-45.4%	11.0	-45.3%	11.0	-45.2%	11.0	-45.2%	11.0	-45.2%
M3-2*	27.5	13.6	-50.6%	13.6	-50.5%	13.6	-50.5%	13.6	-50.5%	13.6	-50.5%
Average			**-47.7%**		**-46.1%**		**-46.2%**		**-46.2%**		**-46.3%**
Modelled receptors located near roads between Eastleigh and Test Valley											
TW2*	20.7	12.5	-39.6%	12.6	-39.3%	12.6	-39.3%	12.6	-39.3%	12.5	-39.3%
SL*	17.2	11.4	-33.7%	11.4	-33.7%	11.4	-33.7%	11.4	-33.7%	11.4	-33.7%
Average			**-36.7%**		**-36.5%**		**-36.5%**		**-36.5%**		**-36.5%**

Table A2-2: Detailed model results for annual mean NO_2 concentrations (road contribution + background concentration, µg/m³) at receptor points for 2036 model scenarios

Receptor	2015 Reference Case concentration (µg/m³)	2036 SGO B/C		2036 SGO C		2036 SGO D1		2036 SGO D2		2036 SGO E		2036 Baseline	
		µg/m³	% change	µg/m³	% change	µg/m³	% change	µg/m³	% change	µg/m³	% change	µg/m³	% change
Modelled receptors located in or near AQMA No. 1													
BR2	25.7	14.0	-45.4%	14.0	-45.4%	14.3	-44.4%	14.3	-44.4%	14.0	-45.4%	13.9	-46.0%
CA	21.2	12.8	-39.5%	12.9	-39.1%	12.9	-39.0%	12.9	-39.1%	12.9	-39.1%	12.7	-39.8%
CR	18.1	12.0	-33.8%	12.0	-33.8%	12.0	-33.8%	12.0	-33.8%	12.0	-33.8%	12.0	-33.9%
LR13	37.1	17.3	-53.4%	17.6	-52.7%	17.4	-53.1%	17.4	-53.1%	16.6	-55.4%	16.4	-55.8%
LRPR	28.5	13.4	-53.0%	13.3	-53.3%	13.3	-53.3%	13.3	-53.3%	13.9	-51.3%	13.9	-51.2%
MS	26.6	14.6	-45.1%	14.3	-46.2%	14.4	-45.8%	14.5	-45.7%	14.3	-46.2%	14.6	-45.2%
SR1	25.9	14.0	-45.9%	14.1	-45.4%	14.1	-45.5%	14.1	-45.5%	14.1	-45.4%	14.0	-46.2%
SRAN	26.3	14.1	-46.2%	14.3	-45.8%	14.2	-45.9%	14.2	-45.9%	14.3	-45.8%	14.1	-46.5%
TP	21.9	12.7	-41.9%	12.7	-42.1%	12.7	-42.0%	12.7	-42.0%	12.7	-42.1%	12.7	-42.1%
TW	21.1	13.0	-38.5%	13.1	-38.1%	13.2	-37.8%	13.2	-37.7%	12.6	-40.5%	12.5	-40.8%
WA	32.9	15.3	-53.6%	15.3	-53.5%	15.4	-53.2%	15.4	-53.3%	15.2	-53.7%	15.3	-53.6%

Receptor	2015 Reference Case concentration (µg/m³)	2036 SGO B/C		2036 SGO C		2036 SGO D1		2036 SGO D2		2036 SGO E		2036 Baseline	
		µg/m³	% change	µg/m³	% change	µg/m³	% change	µg/m³	% change	µg/m³	% change	µg/m³	% change
Average			**-45.1%**		**-45.0%**		**-44.9%**		**-44.9%**		**-45.3%**		**-45.6%**
Modelled receptors located in or near AQMA No. 2													
BEL	29.7	14.4	-51.7%	14.3	-51.8%	14.3	-51.8%	14.3	-51.9%	14.3	-51.9%	14.3	-52.0%
DD	36.7	16.3	-55.5%	16.3	-55.7%	16.2	-55.8%	16.2	-55.8%	16.3	-55.7%	16.2	-55.8%
MC	29.3	14.4	-50.6%	14.5	-50.6%	14.4	-50.7%	14.4	-50.7%	14.3	-51.0%	14.3	-51.1%
OX	24.3	12.8	-47.2%	12.8	-47.3%	12.8	-47.3%	12.8	-47.4%	12.8	-47.3%	12.8	-47.4%
PC	29.9	14.5	-51.6%	14.4	-51.6%	14.4	-51.8%	14.4	-51.8%	14.2	-52.4%	14.2	-52.5%
SC	26.6	13.5	-49.4%	13.5	-49.2%	13.5	-49.3%	13.5	-49.3%	13.5	-49.2%	13.5	-49.3%
SSQ	31.2	14.8	-52.5%	14.8	-52.6%	14.8	-52.6%	14.8	-52.6%	14.8	-52.6%	14.8	-52.7%
Average			**-51.2%**		**-51.3%**		**-51.3%**		**-51.3%**		**-51.4%**		**-51.6%**
Modelled receptors located in or near AQMA No. 3													
HL	32.4	21.8	-32.7%	21.8	-32.7%	21.8	-32.7%	21.8	-32.8%	21.8	-32.7%	21.8	-32.9%
HL2	31.2	16.3	-47.7%	16.3	-47.7%	16.3	-47.7%	16.3	-47.8%	16.3	-47.7%	16.2	-47.9%
HL3*	27.3	19.9	-27.2%	19.9	-27.2%	19.9	-27.2%	19.9	-27.2%	18.3	-32.8%	18.3	-32.9%
Average			**-35.8%**		**-35.9%**		**-35.9%**		**-35.9%**		**-37.7%**		**-37.9%**
Modelled receptors located in or near AQMA No. 4													
HSB	25.5	11.5	-55.1%	11.4	-55.2%	11.4	-55.2%	11.4	-55.2%	11.5	-55.1%	13.8	-46.0%
HSB2	25.0	11.5	-53.9%	11.5	-54.0%	11.5	-54.0%	11.5	-54.0%	11.7	-53.5%	13.7	-45.4%
HSB3*	20.5	11.9	-41.8%	11.9	-41.8%	11.9	-41.9%	11.9	-41.9%	11.9	-41.8%	12.7	-38.2%
Average			**-50.3%**		**-50.3%**		**-50.4%**		**-50.4%**		**-50.1%**		**-43.2%**
Modelled receptors located near roads between Eastleigh and Southampton													
M27-1*	29.4	14.1	-51.9%	14.0	-52.3%	14.1	-52.2%	14.0	-52.3%	14.0	-52.3%	14.1	-52.0%
M27-2*	32.2	14.8	-54.0%	14.7	-54.3%	14.7	-54.2%	14.7	-54.3%	14.7	-54.3%	14.8	-54.1%
M27-3*	33.3	15.7	-52.8%	15.8	-52.6%	15.8	-52.6%	15.8	-52.7%	15.2	-54.3%	15.1	-54.5%
M27-4*	28.1	16.2	-42.3%	16.2	-42.3%	16.3	-42.2%	16.2	-42.3%	16.2	-42.3%	16.2	-42.3%
A3024-1*	24.4	15.3	-37.5%	15.3	-37.5%	15.3	-37.5%	15.3	-37.5%	15.0	-38.5%	15.0	-38.5%
A3024-2*	24.4	15.2	-37.8%	15.2	-37.7%	15.2	-37.7%	15.2	-37.7%	15.2	-37.7%	15.2	-38.0%

Receptor	2015 Reference Case concentration (µg/m³)	2036 SGO B/C		2036 SGO C		2036 SGO D1		2036 SGO D2		2036 SGO E		2036 Baseline	
		µg/m³	% change	µg/m³	% change	µg/m³	% change	µg/m³	% change	µg/m³	% change	µg/m³	% change
A27-1*	21.8	13.9	-36.2%	13.9	-36.2%	13.9	-36.2%	13.9	-36.3%	13.9	-36.3%	13.9	-36.4%
A27-2*	26.0	14.9	-42.8%	14.7	-43.6%	14.7	-43.6%	14.6	-43.8%	14.6	-43.8%	14.7	-43.3%
A3025-1*	20.3	14.8	-26.9%	14.8	-26.9%	14.8	-26.9%	14.8	-26.9%	14.7	-27.5%	14.7	-27.6%
A3025-2*	20.0	14.5	-27.4%	14.5	-27.3%	14.5	-27.3%	14.5	-27.3%	14.6	-27.0%	14.6	-27.1%
A334*	24.3	14.8	-39.0%	14.8	-39.0%	14.8	-39.0%	14.8	-38.9%	14.7	-39.4%	14.6	-39.8%
Average			**-40.8%**		**-40.9%**		**-40.9%**		**-40.9%**		**-41.2%**		**-41.2%**
Modelled receptors located near roads between Eastleigh and Fareham													
M27-5*	28.5	16.6	-41.7%	16.6	-41.6%	16.6	-41.6%	16.6	-41.7%	16.7	-41.3%	16.7	-41.4%
M27-6*	28.0	17.1	-39.1%	17.1	-39.0%	17.1	-39.0%	17.1	-39.0%	17.2	-38.6%	17.2	-38.6%
A27-3*	27.1	17.1	-37.1%	17.1	-37.0%	17.1	-37.1%	17.0	-37.1%	16.4	-39.3%	16.5	-39.3%
A27-4*	27.9	16.8	-40.0%	16.8	-40.0%	16.8	-40.0%	16.8	-40.0%	17.0	-39.1%	17.0	-39.2%
Average			**-39.5%**		**-39.4%**		**-39.4%**		**-39.4%**		**-39.6%**		**-39.6%**
Modelled receptors located near roads between Eastleigh and Winchester													
B3335*	20.7	10.6	-48.9%	11.8	-42.8%	11.7	-43.3%	11.7	-43.4%	11.8	-42.8%	11.5	-44.3%
NH	25.7	12.5	-51.2%	12.3	-52.0%	12.3	-52.0%	12.3	-52.0%	12.2	-52.4%	12.2	-52.5%
M3-1*	20.1	10.5	-48.0%	10.5	-48.0%	10.5	-47.8%	10.5	-47.8%	10.5	-48.0%	10.5	-47.8%
M3-2*	27.5	12.5	-54.5%	12.6	-54.4%	12.6	-54.4%	12.6	-54.4%	12.6	-54.1%	12.7	-54.1%
Average			**-50.6%**		**-49.3%**		**-49.4%**		**-49.4%**		**-49.3%**		**-49.7%**
Modelled receptors located near roads between Eastleigh and Test Valley													
TW2*	20.7	12.0	-41.8%	12.1	-41.6%	12.1	-41.6%	12.1	-41.6%	12.1	-41.6%	12.1	-41.7%
SL*	17.2	11.1	-35.3%	11.1	-35.3%	11.1	-35.3%	11.1	-35.3%	11.2	-35.0%	11.2	-35.1%
Average			**-38.6%**		**-38.4%**		**-38.4%**		**-38.4%**		**-38.3%**		**-38.4%**

Table A2-3: Detailed model results for annual mean PM_{10} concentrations (road contribution + background concentration, µg/m³) at receptor points for pseudo-2030 model scenarios

Receptor	2015 Reference Case concentration (µg/m³)	P-2030 SGO B/C		P-2030 SGO C		P-2030 SGO D1		P-2030 SGO D2		P-2030 SGO E	
		µg/m³	% change	µg/m³	% change	µg/m³	% change	µg/m³	% change	µg/m³	% change
Modelled receptors located in or near AQMA No. 1											
BR2	22.6	21.8	-3.6%	21.0	-7.1%	21.5	-4.9%	21.0	-7.0%	20.8	-7.8%
CA	18.7	18.2	-2.8%	18.4	-1.7%	18.4	-1.7%	18.4	-1.5%	18.3	-2.2%
CR	16.8	15.8	-5.8%	15.8	-5.8%	15.8	-5.7%	15.8	-5.9%	15.8	-5.9%
LR13	27.8	25.7	-7.6%	25.9	-6.9%	25.7	-7.4%	26.1	-5.8%	25.8	-7.2%
LRPR	23.7	22.9	-3.5%	22.7	-4.4%	22.6	-4.5%	22.2	-6.5%	22.6	-4.5%
MS	23.5	22.5	-4.5%	22.5	-4.6%	22.7	-3.5%	22.3	-5.2%	22.5	-4.1%
SR1	21.9	21.1	-3.7%	21.4	-2.6%	21.3	-3.0%	22.2	1.1%	21.2	-3.3%
SRAN	22.4	21.6	-3.4%	21.8	-2.4%	21.8	-2.7%	22.7	1.4%	21.7	-3.1%
TP	19.6	18.6	-5.2%	18.5	-5.5%	18.5	-5.3%	18.4	-6.2%	18.5	-5.7%
TW	19.8	18.8	-4.9%	19.0	-4.2%	19.1	-3.6%	19.5	-1.4%	19.0	-4.0%
WA	25.4	23.3	-8.2%	23.4	-7.8%	23.3	-8.0%	23.1	-8.9%	23.4	-7.6%
Average			**-4.8%**		**-4.8%**		**-4.6%**		**-4.2%**		**-5.0%**
Modelled receptors located in or near AQMA No. 2											
BEL	25.3	23.4	-7.5%	23.4	-7.6%	23.3	-7.9%	23.2	-8.5%	23.3	-7.9%
DD	29.1	25.9	-10.7%	25.8	-11.1%	25.8	-11.3%	25.5	-12.4%	25.8	-11.3%
MC	24.4	22.5	-7.8%	22.5	-7.9%	22.4	-8.1%	22.3	-8.4%	22.4	-8.2%
OX	21.8	20.3	-6.9%	20.2	-7.3%	20.2	-7.4%	20.1	-7.9%	20.2	-7.4%
PC	25.0	23.1	-7.6%	23.0	-8.2%	22.9	-8.3%	22.9	-8.5%	22.9	-8.4%
SC	22.9	21.3	-7.1%	21.3	-6.9%	21.3	-7.1%	21.2	-7.6%	21.3	-7.1%
SSQ	25.4	23.2	-8.6%	23.2	-8.8%	23.1	-8.9%	22.9	-9.7%	23.1	-9.0%
Average			**-8.0%**		**-8.3%**		**-8.4%**		**-9.0%**		**-8.5%**
Modelled receptors located in or near AQMA No. 3											
HL	26.6	27.3	2.6%	27.3	2.7%	27.3	2.6%	26.5	-0.3%	27.2	2.6%
HL2	23.6	24.0	1.8%	24.0	1.8%	24.0	1.7%	23.5	-0.6%	24.0	1.7%
HL3*	23.0	23.4	1.6%	23.4	1.6%	23.3	1.5%	23.9	4.1%	23.3	1.5%

Receptor	2015 Reference Case concentration (µg/m³)	P-2030 SGO B/C		P-2030 SGO C		P-2030 SGO D1		P-2030 SGO D2		P-2030 SGO E	
		µg/m³	% change	µg/m³	% change	µg/m³	% change	µg/m³	% change	µg/m³	% change
Average			**2.0%**		**2.0%**		**2.0%**		**1.1%**		**1.9%**
Modelled receptors located in or near AQMA No. 4											
HSB	21.9	14.7	-32.6%	14.7	-33.0%	14.7	-33.0%	14.6	-33.1%	14.7	-32.8%
HSB2	21.7	15.2	-30.1%	15.1	-30.4%	15.1	-30.5%	15.0	-31.0%	15.1	-30.3%
HSB3*	18.6	15.7	-15.5%	15.7	-15.7%	15.7	-15.8%	15.6	-16.1%	15.7	-15.7%
Average			**-26.1%**		**-26.3%**		**-26.4%**		**-26.8%**		**-26.3%**
Modelled receptors located near roads between Eastleigh and Southampton											
M27-1*	24.1	25.0	3.8%	24.8	3.0%	24.8	3.2%	24.4	1.6%	24.8	3.0%
M27-2*	25.4	26.0	2.7%	25.8	1.9%	25.9	2.2%	25.9	2.1%	25.8	2.0%
M27-3*	25.2	23.4	-7.2%	23.4	-7.2%	23.3	-7.4%	23.5	-6.9%	23.3	-7.3%
M27-4*	23.1	21.8	-5.5%	21.8	-5.5%	21.8	-5.6%	21.8	-5.5%	21.8	-5.6%
A3024-1*	20.1	18.3	-9.1%	18.3	-9.1%	18.3	-9.1%	18.4	-8.8%	18.3	-9.1%
A3024-2*	20.5	19.7	-3.8%	19.7	-3.6%	19.7	-3.6%	19.5	-4.5%	19.7	-3.6%
A27-1*	19.6	19.0	-2.9%	19.0	-3.0%	19.0	-3.0%	18.8	-3.9%	19.0	-3.1%
A27-2*	22.9	21.7	-4.9%	21.3	-6.8%	21.3	-6.9%	21.0	-8.1%	21.4	-6.5%
A3025-1*	17.5	17.5	0.0%	17.6	0.2%	17.6	0.1%	17.6	0.6%	17.6	0.1%
A3025-2*	17.2	17.3	0.5%	17.3	0.7%	17.3	0.6%	17.5	1.4%	17.3	0.6%
A334*	21.3	20.5	-3.9%	20.5	-3.9%	20.5	-3.9%	20.1	-5.6%	20.5	-3.9%
Average			**-2.8%**		**-3.0%**		**-3.0%**		**-3.4%**		**-3.1%**
Modelled receptors located near roads between Eastleigh and Fareham											
M27-5*	24.2	23.5	-2.9%	23.5	-2.6%	23.5	-2.7%	23.2	-3.8%	23.5	-2.7%
M27-6*	21.5	21.4	-0.7%	21.4	-0.4%	21.4	-0.4%	21.2	-1.6%	21.5	-0.4%
A27-3*	21.6	20.9	-3.0%	20.9	-3.0%	20.9	-3.0%	20.9	-3.2%	20.9	-3.0%
A27-4*	21.9	21.4	-2.2%	21.4	-2.0%	21.4	-2.2%	21.2	-2.9%	21.4	-2.1%
Average			**-2.2%**		**-2.0%**		**-2.1%**		**-2.9%**		**-2.1%**
Modelled receptors located near roads between Eastleigh and Winchester											
B3335*	19.8	17.1	-14.0%	19.9	0.2%	19.6	-1.4%	18.9	-4.8%	19.5	-1.7%

Receptor	2015 Reference Case concentration (µg/m³)	P-2030 SGO B/C		P-2030 SGO C		P-2030 SGO D1		P-2030 SGO D2		P-2030 SGO E	
		µg/m³	% change	µg/m³	% change	µg/m³	% change	µg/m³	% change	µg/m³	% change
NH	21.9	20.5	-6.2%	20.0	-8.6%	20.0	-8.6%	19.8	-9.4%	20.0	-8.6%
M3-1*	20.1	18.8	-6.7%	18.8	-6.6%	18.8	-6.4%	19.3	-4.1%	18.8	-6.4%
M3-2*	23.6	21.4	-9.2%	21.5	-9.1%	21.5	-9.1%	21.2	-10.0%	21.5	-9.0%
Average			**-9.0%**		**-6.0%**		**-6.4%**		**-7.1%**		**-6.5%**
Modelled receptors located near roads between Eastleigh and Test Valley											
TW2*	19.2	18.2	-5.3%	18.3	-4.9%	18.3	-4.8%	18.2	-5.5%	18.3	-4.9%
SL*	16.7	15.8	-4.9%	15.8	-4.8%	15.8	-4.8%	15.7	-5.8%	15.8	-4.9%
Average			**-5.1%**		**-4.9%**		**-4.8%**		**-5.7%**		**-4.9%**

Table A2-4: Detailed model results for annual mean PM_{10} concentrations (road contribution + background concentration, µg/m³) at receptor points for 2036 model scenarios

Receptor	2015 Reference Case concentration (µg/m³)	2036 SGO B/C		2036 SGO C		2036 SGO D1		2036 SGO D2		2036 SGO E		2036 Baseline	
		µg/m³	% change	µg/m³	% change	µg/m³	% change	µg/m³	% change	µg/m³	% change	µg/m³	% change
Modelled receptors located in or near AQMA No. 1													
BR2	22.6	21.8	-3.6%	21.0	-7.2%	21.5	-5.0%	21.5	-4.9%	20.8	-7.9%	21.4	-5.2%
CA	18.7	18.1	-2.9%	18.3	-1.8%	18.3	-1.8%	18.3	-1.9%	18.3	-2.3%	17.9	-4.0%
CR	16.8	15.8	-5.8%	15.8	-5.8%	15.8	-5.8%	15.8	-5.8%	15.8	-5.9%	15.7	-6.1%
LR13	27.8	25.6	-7.7%	25.8	-7.0%	25.7	-7.5%	25.7	-7.5%	25.7	-7.3%	25.7	-7.6%
LRPR	23.7	22.9	-3.5%	22.7	-4.5%	22.6	-4.6%	22.6	-4.5%	22.6	-4.6%	22.7	-4.4%
MS	23.5	22.4	-4.7%	22.4	-4.7%	22.7	-3.6%	22.7	-3.5%	22.5	-4.3%	22.4	-4.9%
SR1	21.9	21.1	-3.8%	21.4	-2.7%	21.3	-3.0%	21.3	-3.1%	21.2	-3.4%	20.9	-4.8%
SRAN	22.4	21.6	-3.5%	21.8	-2.5%	21.7	-2.8%	21.7	-2.8%	21.7	-3.2%	21.4	-4.5%
TP	19.6	18.6	-5.2%	18.5	-5.6%	18.5	-5.4%	18.5	-5.3%	18.5	-5.7%	18.5	-5.4%
TW	19.8	18.8	-4.9%	19.0	-4.3%	19.1	-3.7%	19.1	-3.6%	19.0	-4.1%	18.8	-5.1%
WA	25.4	23.3	-8.3%	23.4	-7.8%	23.3	-8.0%	23.3	-8.0%	23.4	-7.7%	23.3	-8.1%
Average			**-4.9%**		**-4.9%**		**-4.7%**		**-4.6%**		**-5.1%**		**-5.5%**
Modelled receptors located in or near AQMA No. 2													

Receptor	2015 Reference Case concentration (µg/m³)	2036 SGO B/C		2036 SGO C		2036 SGO D1		2036 SGO D2		2036 SGO E		2036 Baseline	
		µg/m³	% change	µg/m³	% change	µg/m³	% change	µg/m³	% change	µg/m³	% change	µg/m³	% change
BEL	25.3	23.4	-7.6%	23.3	-7.7%	23.3	-8.0%	23.3	-7.9%	23.3	-8.0%	23.3	-8.0%
DD	29.1	25.9	-10.8%	25.8	-11.2%	25.8	-11.4%	25.8	-11.4%	25.7	-11.4%	25.7	-11.4%
MC	24.4	22.5	-7.9%	22.4	-8.0%	22.4	-8.2%	22.4	-8.2%	22.4	-8.3%	22.4	-8.2%
OX	21.8	20.3	-7.0%	20.2	-7.4%	20.2	-7.5%	20.2	-7.5%	20.1	-7.5%	20.2	-7.5%
PC	25.0	23.1	-7.7%	23.0	-8.3%	22.9	-8.4%	22.9	-8.4%	22.9	-8.5%	22.9	-8.4%
SC	22.9	21.2	-7.2%	21.3	-7.0%	21.2	-7.2%	21.2	-7.2%	21.2	-7.2%	21.2	-7.2%
SSQ	25.4	23.2	-8.7%	23.1	-8.9%	23.1	-9.1%	23.1	-9.0%	23.1	-9.1%	23.1	-9.2%
Average			**-8.1%**		**-8.4%**		**-8.5%**		**-8.5%**		**-8.6%**		**-8.6%**
Modelled receptors located in or near AQMA No. 3													
HL	26.6	27.2	2.5%	27.2	2.5%	27.2	2.4%	27.2	2.4%	27.2	2.4%	27.1	1.9%
HL2	23.6	24.0	1.6%	24.0	1.7%	24.0	1.6%	24.0	1.5%	24.0	1.6%	23.9	1.1%
HL3*	23.0	23.3	1.4%	23.3	1.5%	23.3	1.4%	23.3	1.4%	23.3	1.4%	23.2	1.0%
Average			**1.8%**		**1.9%**		**1.8%**		**1.8%**		**1.8%**		**1.3%**
Modelled receptors located in or near AQMA No. 4													
HSB	21.9	14.7	-32.6%	14.6	-33.0%	14.6	-33.0%	14.6	-33.1%	14.7	-32.8%	20.2	-7.8%
HSB2	21.7	15.2	-30.1%	15.1	-30.4%	15.1	-30.5%	15.1	-30.5%	15.1	-30.3%	20.3	-6.4%
HSB3*	18.6	15.7	-15.6%	15.7	-15.7%	15.6	-15.8%	15.6	-15.8%	15.7	-15.7%	17.7	-4.9%
Average			**-26.1%**		**-26.4%**		**-26.4%**		**-26.5%**		**-26.3%**		**-6.4%**
Modelled receptors located near roads between Eastleigh and Southampton													
M27-1*	24.1	24.9	3.7%	24.7	2.9%	24.8	3.1%	24.8	2.9%	24.7	2.9%	24.9	3.5%
M27-2*	25.4	26.0	2.6%	25.8	1.8%	25.9	2.1%	25.8	1.8%	25.8	1.8%	26.0	2.4%
M27-3*	25.2	23.3	-7.3%	23.4	-7.3%	23.3	-7.5%	23.3	-7.5%	23.3	-7.5%	23.3	-7.7%
M27-4*	23.1	21.8	-5.6%	21.8	-5.6%	21.7	-5.7%	21.7	-5.7%	21.7	-5.7%	21.7	-5.8%
A3024-1*	20.1	18.3	-9.2%	18.3	-9.2%	18.3	-9.2%	18.3	-9.2%	18.3	-9.2%	18.3	-9.2%
A3024-2*	20.5	19.7	-3.9%	19.7	-3.7%	19.7	-3.7%	19.7	-3.8%	19.7	-3.7%	19.6	-4.0%
A27-1*	19.6	19.0	-3.0%	19.0	-3.1%	19.0	-3.0%	18.9	-3.3%	19.0	-3.2%	18.9	-3.3%
A27-2*	22.9	21.7	-5.0%	21.3	-6.9%	21.3	-7.0%	21.1	-7.6%	21.4	-6.6%	21.4	-6.2%

Receptor	2015 Reference Case concentration (µg/m³)	2036 SGO B/C		2036 SGO C		2036 SGO D1		2036 SGO D2		2036 SGO E		2036 Baseline	
		µg/m³	% change	µg/m³	% change	µg/m³	% change	µg/m³	% change	µg/m³	% change	µg/m³	% change
A3025-1*	17.5	17.5	-0.1%	17.6	0.1%	17.6	0.1%	17.5	0.0%	17.6	0.0%	17.5	-0.2%
A3025-2*	17.2	17.3	0.4%	17.3	0.6%	17.3	0.5%	17.3	0.5%	17.3	0.5%	17.3	0.3%
A334*	21.3	20.5	-4.0%	20.5	-4.0%	20.5	-4.0%	20.5	-4.0%	20.5	-4.0%	20.3	-4.6%
Average			**-2.9%**		**-3.1%**		**-3.1%**		**-3.3%**		**-3.1%**		**-3.2%**
Modelled receptors located near roads between Eastleigh and Fareham													
M27-5*	24.2	23.4	-3.0%	23.5	-2.7%	23.5	-2.8%	23.5	-2.8%	23.5	-2.8%	23.5	-2.9%
M27-6*	21.5	21.4	-0.8%	21.4	-0.5%	21.4	-0.5%	21.4	-0.6%	21.4	-0.5%	21.4	-0.5%
A27-3*	21.6	20.9	-3.1%	20.9	-3.1%	20.9	-3.1%	20.9	-3.2%	20.9	-3.1%	20.9	-3.1%
A27-4*	21.9	21.4	-2.3%	21.4	-2.1%	21.4	-2.3%	21.4	-2.4%	21.4	-2.3%	21.4	-2.2%
Average			**-2.3%**		**-2.1%**		**-2.2%**		**-2.2%**		**-2.2%**		**-2.2%**
Modelled receptors located near roads between Eastleigh and Winchester													
B3335*	19.8	17.1	-14.0%	19.8	0.1%	19.5	-1.5%	19.5	-1.7%	19.5	-1.8%	19.2	-3.4%
NH	21.9	20.5	-6.3%	20.0	-8.7%	20.0	-8.7%	20.0	-8.7%	20.0	-8.7%	20.0	-8.7%
M3-1*	20.1	18.7	-6.7%	18.8	-6.6%	18.8	-6.4%	18.8	-6.4%	18.8	-6.5%	18.8	-6.3%
M3-2*	23.6	21.4	-9.3%	21.4	-9.2%	21.4	-9.2%	21.4	-9.1%	21.4	-9.1%	21.5	-9.1%
Average			**-9.1%**		**-6.1%**		**-6.5%**		**-6.5%**		**-6.6%**		**-6.9%**
Modelled receptors located near roads between Eastleigh and Test Valley													
TW2*	19.2	18.2	-5.4%	18.3	-5.0%	18.3	-4.9%	18.3	-4.9%	18.3	-5.0%	18.3	-5.1%
SL*	16.7	15.8	-5.0%	15.8	-4.9%	15.8	-4.9%	15.8	-4.9%	15.8	-4.9%	15.8	-5.1%
Average			**-5.2%**		**-4.9%**		**-4.9%**		**-4.9%**		**-5.0%**		**-5.1%**

Table A2-5: Detailed model results for annual mean $PM_{2.5}$ concentrations (road contribution + background concentration, µg/m³) at receptor points for pseudo-2030 model scenarios

Receptor	2015 Reference Case concentration (µg/m³)	P-2030 SGO B/C		P-2030 SGO C		P-2030 SGO D1		P-2030 SGO D2		P-2030 SGO E	
		µg/m³	% change	µg/m³	% change	µg/m³	% change	µg/m³	% change	µg/m³	% change
Modelled receptors located in or near AQMA No. 1											
BR2	15.4	14.2	-7.6%	13.7	-10.9%	14.0	-8.9%	14.0	-8.8%	13.6	-11.3%
CA	12.8	11.9	-6.7%	12.0	-5.8%	12.0	-5.8%	12.0	-5.9%	12.0	-6.2%
CR	11.5	10.5	-9.0%	10.5	-8.9%	10.5	-8.9%	10.5	-8.9%	10.5	-9.0%
LR13	18.8	16.4	-12.7%	16.5	-12.0%	16.4	-12.5%	16.4	-12.5%	16.5	-12.3%
LRPR	15.8	14.5	-8.3%	14.3	-9.3%	14.3	-9.4%	14.3	-9.3%	14.3	-9.3%
MS	16.1	14.7	-8.4%	14.7	-8.3%	14.9	-7.3%	14.9	-7.2%	14.8	-8.0%
SR1	15.0	13.8	-8.0%	13.9	-7.0%	13.9	-7.3%	13.9	-7.3%	13.8	-7.6%
SRAN	15.3	14.1	-7.8%	14.2	-6.7%	14.2	-7.0%	14.2	-7.0%	14.2	-7.4%
TP	13.3	12.1	-8.9%	12.1	-9.2%	12.1	-9.1%	12.1	-9.1%	12.1	-9.3%
TW	13.6	12.4	-8.3%	12.5	-7.6%	12.6	-7.0%	12.6	-7.0%	12.6	-7.5%
WA	16.9	14.8	-12.6%	14.8	-12.2%	14.8	-12.4%	14.8	-12.4%	14.9	-12.1%
Average			**-8.9%**		**-8.9%**		**-8.7%**		**-8.7%**		**-9.1%**
Modelled receptors located in or near AQMA No. 2											
BEL	17.0	14.9	-12.4%	14.9	-12.5%	14.9	-12.7%	14.9	-12.7%	14.9	-12.7%
DD	19.7	16.5	-16.3%	16.4	-16.7%	16.4	-16.8%	16.4	-16.8%	16.4	-16.8%
MC	16.5	14.5	-12.6%	14.4	-12.7%	14.4	-12.9%	14.4	-12.9%	14.4	-12.9%
OX	14.7	13.0	-11.2%	13.0	-11.6%	12.9	-11.7%	12.9	-11.7%	12.9	-11.7%
PC	17.0	14.8	-12.8%	14.8	-13.3%	14.7	-13.4%	14.7	-13.4%	14.7	-13.4%
SC	15.4	13.6	-11.5%	13.7	-11.3%	13.6	-11.5%	13.6	-11.5%	13.6	-11.5%
SSQ	17.1	14.7	-14.1%	14.7	-14.3%	14.7	-14.4%	14.7	-14.4%	14.7	-14.4%
Average			**-13.0%**		**-13.2%**		**-13.4%**		**-13.3%**		**-13.4%**
Modelled receptors located in or near AQMA No. 3											
HL	17.7	17.3	-2.2%	17.3	-2.2%	17.3	-2.2%	17.3	-2.3%	17.3	-2.2%
HL2	16.0	15.4	-3.7%	15.4	-3.7%	15.4	-3.7%	15.4	-3.8%	15.4	-3.7%
HL3*	15.3	14.9	-2.8%	14.9	-2.8%	14.9	-2.8%	14.9	-2.9%	14.9	-2.9%

Receptor	2015 Reference Case concentration (µg/m³)	P-2030 SGO B/C		P-2030 SGO C		P-2030 SGO D1		P-2030 SGO D2		P-2030 SGO E	
		µg/m³	% change	µg/m³	% change	µg/m³	% change	µg/m³	% change	µg/m³	% change
Average			**-2.9%**		**-2.9%**		**-2.9%**		**-3.0%**		**-2.9%**
Modelled receptors located in or near AQMA No. 4											
HSB	14.6	9.5	-34.8%	9.5	-35.1%	9.5	-35.1%	9.5	-35.2%	9.5	-34.9%
HSB2	14.4	9.8	-32.0%	9.7	-32.3%	9.7	-32.3%	9.7	-32.3%	9.7	-32.2%
HSB3*	12.4	10.1	-18.2%	10.1	-18.3%	10.1	-18.4%	10.1	-18.4%	10.1	-18.3%
Average			**-28.3%**		**-28.6%**		**-28.6%**		**-28.6%**		**-28.5%**
Modelled receptors located near roads between Eastleigh and Southampton											
M27-1*	16.2	15.4	-4.8%	15.3	-5.5%	15.3	-5.3%	15.3	-5.5%	15.3	-5.5%
M27-2*	17.2	16.1	-6.2%	16.0	-6.9%	16.0	-6.7%	16.0	-6.9%	16.0	-6.9%
M27-3*	16.7	14.6	-12.6%	14.6	-12.5%	14.6	-12.7%	14.6	-12.7%	14.6	-12.6%
M27-4*	15.5	14.0	-9.9%	14.0	-9.9%	14.0	-9.9%	14.0	-10.0%	14.0	-10.0%
A3024-1*	13.7	12.0	-12.4%	12.0	-12.4%	12.0	-12.4%	12.0	-12.4%	12.0	-12.4%
A3024-2*	13.9	12.8	-7.8%	12.8	-7.7%	12.8	-7.7%	12.8	-7.8%	12.8	-7.7%
A27-1*	13.3	12.4	-6.9%	12.4	-6.9%	12.4	-6.9%	12.3	-7.2%	12.4	-7.1%
A27-2*	15.4	13.9	-9.4%	13.7	-11.1%	13.6	-11.3%	13.5	-11.8%	13.7	-10.9%
A3025-1*	11.8	11.4	-4.0%	11.4	-3.8%	11.4	-3.9%	11.4	-3.9%	11.4	-3.9%
A3025-2*	11.5	11.1	-3.5%	11.1	-3.4%	11.1	-3.4%	11.1	-3.5%	11.1	-3.5%
A334*	14.5	13.3	-8.1%	13.3	-8.0%	13.3	-8.0%	13.3	-8.0%	13.3	-8.0%
Average			**-7.8%**		**-8.0%**		**-8.0%**		**-8.1%**		**-8.0%**
Modelled receptors located near roads between Eastleigh and Fareham											
M27-5*	16.4	15.2	-7.5%	15.2	-7.2%	15.2	-7.2%	15.2	-7.3%	15.2	-7.3%
M27-6*	14.6	13.6	-6.4%	13.7	-6.2%	13.7	-6.2%	13.7	-6.2%	13.7	-6.2%
A27-3*	14.5	13.4	-7.3%	13.4	-7.2%	13.4	-7.3%	13.4	-7.4%	13.4	-7.3%
A27-4*	14.6	13.7	-6.4%	13.7	-6.2%	13.7	-6.3%	13.7	-6.4%	13.7	-6.3%
Average			**-6.9%**		**-6.7%**		**-6.8%**		**-6.8%**		**-6.8%**
Modelled receptors located near roads between Eastleigh and Winchester											
B3335*	13.3	11.0	-17.0%	12.7	-4.1%	12.6	-5.3%	12.6	-5.4%	12.5	-5.7%

Receptor	2015 Reference Case concentration (µg/m³)	P-2030 SGO B/C		P-2030 SGO C		P-2030 SGO D1		P-2030 SGO D2		P-2030 SGO E	
		µg/m³	% change	µg/m³	% change	µg/m³	% change	µg/m³	% change	µg/m³	% change
NH	14.7	13.1	-11.0%	12.8	-13.1%	12.8	-13.1%	12.8	-13.1%	12.8	-13.1%
M3-1*	13.2	11.8	-10.1%	11.9	-10.0%	11.9	-9.7%	11.9	-9.7%	11.9	-9.9%
M3-2*	16.0	13.7	-14.2%	13.7	-14.2%	13.7	-14.2%	13.7	-14.1%	13.7	-14.1%
Average			**-13.1%**		**-10.4%**		**-10.6%**		**-10.6%**		**-10.7%**
Modelled receptors located near roads between Eastleigh and Test Valley											
TW2*	12.6	11.5	-8.8%	11.5	-8.4%	11.5	-8.3%	11.5	-8.3%	11.5	-8.5%
SL*	11.0	10.1	-7.9%	10.1	-7.8%	10.1	-7.8%	10.1	-7.8%	10.1	-7.8%
Average			**-8.4%**		**-8.1%**		**-8.1%**		**-8.1%**		**-8.2%**

Table A2-6: Detailed model results for annual mean $PM_{2.5}$ concentrations (road contribution + background concentration, µg/m³) at receptor points for 2036 model scenarios

Receptor	2015 Reference Case concentration (µg/m³)	2036 SGO B/C		2036 SGO C		2036 SGO D1		2036 SGO D2		2036 SGO E		2036 Baseline	
		µg/m³	% change	µg/m³	% change	µg/m³	% change	µg/m³	% change	µg/m³	% change	µg/m³	% change
Modelled receptors located in or near AQMA No. 1													
BR2	15.4	14.2	-7.7%	13.7	-10.9%	14.0	-9.0%	14.0	-8.9%	13.6	-11.4%	14.0	-8.8%
CA	12.8	11.9	-6.8%	12.0	-5.9%	12.0	-5.9%	12.0	-5.9%	12.0	-6.3%	11.8	-7.6%
CR	11.5	10.5	-9.0%	10.5	-9.0%	10.5	-9.0%	10.5	-9.0%	10.5	-9.1%	10.5	-9.2%
LR13	18.8	16.4	-12.8%	16.5	-12.2%	16.4	-12.7%	16.4	-12.6%	16.4	-12.4%	16.4	-12.7%
LRPR	15.8	14.5	-8.4%	14.3	-9.4%	14.3	-9.5%	14.3	-9.4%	14.3	-9.4%	14.4	-9.1%
MS	16.1	14.7	-8.5%	14.7	-8.4%	14.9	-7.4%	14.9	-7.3%	14.8	-8.1%	14.7	-8.4%
SR1	15.0	13.8	-8.1%	13.9	-7.1%	13.9	-7.4%	13.9	-7.4%	13.8	-7.7%	13.7	-8.7%
SRAN	15.3	14.1	-7.9%	14.2	-6.8%	14.2	-7.1%	14.2	-7.1%	14.1	-7.5%	14.0	-8.5%
TP	13.3	12.1	-8.9%	12.1	-9.3%	12.1	-9.2%	12.1	-9.1%	12.1	-9.4%	12.1	-9.0%
TW	13.6	12.4	-8.4%	12.5	-7.7%	12.6	-7.1%	12.6	-7.0%	12.5	-7.5%	12.4	-8.3%
WA	16.9	14.8	-12.7%	14.8	-12.3%	14.8	-12.5%	14.8	-12.5%	14.9	-12.2%	14.8	-12.5%
Average			**-9.0%**		**-9.0%**		**-8.8%**		**-8.8%**		**-9.2%**		**-9.4%**
Modelled receptors located in or near AQMA No. 2													

Receptor	2015 Reference Case concentration (µg/m³)	2036 SGO B/C		2036 SGO C		2036 SGO D1		2036 SGO D2		2036 SGO E		2036 Baseline	
		µg/m³	% change	µg/m³	% change	µg/m³	% change	µg/m³	% change	µg/m³	% change	µg/m³	% change
BEL	17.0	14.9	-12.5%	14.9	-12.6%	14.9	-12.8%	14.9	-12.8%	14.9	-12.8%	14.8	-12.9%
DD	19.7	16.5	-16.5%	16.4	-16.8%	16.4	-17.0%	16.4	-16.9%	16.4	-17.0%	16.4	-17.0%
MC	16.5	14.4	-12.7%	14.4	-12.8%	14.4	-13.0%	14.4	-13.0%	14.4	-13.1%	14.4	-13.0%
OX	14.7	13.0	-11.3%	12.9	-11.7%	12.9	-11.8%	12.9	-11.8%	12.9	-11.8%	12.9	-11.8%
PC	17.0	14.8	-12.9%	14.7	-13.4%	14.7	-13.6%	14.7	-13.5%	14.7	-13.6%	14.7	-13.5%
SC	15.4	13.6	-11.6%	13.6	-11.4%	13.6	-11.6%	13.6	-11.6%	13.6	-11.6%	13.6	-11.6%
SSQ	17.1	14.7	-14.2%	14.7	-14.4%	14.7	-14.5%	14.7	-14.5%	14.6	-14.6%	14.6	-14.6%
Average			**-13.1%**		**-13.3%**		**-13.5%**		**-13.5%**		**-13.5%**		**-13.5%**
Modelled receptors located in or near AQMA No. 3													
HL	17.7	17.3	-2.3%	17.3	-2.3%	17.3	-2.4%	17.3	-2.4%	17.3	-2.4%	17.2	-2.8%
HL2	16.0	15.4	-3.8%	15.4	-3.8%	15.4	-3.8%	15.3	-3.9%	15.3	-3.8%	15.3	-4.3%
HL3*	15.3	14.9	-3.0%	14.9	-2.9%	14.9	-3.0%	14.9	-3.0%	14.9	-3.0%	14.8	-3.3%
Average			**-3.0%**		**-3.0%**		**-3.1%**		**-3.1%**		**-3.1%**		**-3.5%**
Modelled receptors located in or near AQMA No. 4													
HSB	14.6	9.5	-34.8%	9.5	-35.1%	9.5	-35.1%	9.5	-35.2%	9.5	-35.0%	12.8	-12.2%
HSB2	14.4	9.8	-32.1%	9.7	-32.3%	9.7	-32.4%	9.7	-32.4%	9.7	-32.2%	12.9	-10.5%
HSB3*	12.4	10.1	-18.3%	10.1	-18.4%	10.1	-18.4%	10.1	-18.5%	10.1	-18.4%	11.3	-8.6%
Average			**-28.4%**		**-28.6%**		**-28.6%**		**-28.7%**		**-28.5%**		**-10.4%**
Modelled receptors located near roads between Eastleigh and Southampton													
M27-1*	16.2	15.4	-5.0%	15.3	-5.6%	15.3	-5.4%	15.3	-5.6%	15.3	-5.6%	15.4	-5.1%
M27-2*	17.2	16.1	-6.4%	16.0	-7.0%	16.0	-6.8%	16.0	-7.0%	16.0	-7.0%	16.1	-6.6%
M27-3*	16.7	14.6	-12.7%	14.6	-12.7%	14.6	-12.8%	14.6	-12.8%	14.6	-12.7%	14.5	-13.0%
M27-4*	15.5	14.0	-10.0%	14.0	-10.0%	14.0	-10.0%	14.0	-10.1%	13.9	-10.1%	13.9	-10.1%
A3024-1*	13.7	12.0	-12.5%	12.0	-12.5%	12.0	-12.5%	12.0	-12.5%	12.0	-12.5%	12.0	-12.5%
A3024-2*	13.9	12.8	-7.9%	12.8	-7.8%	12.8	-7.8%	12.8	-7.9%	12.8	-7.8%	12.8	-8.0%
A27-1*	13.3	12.4	-7.0%	12.4	-7.0%	12.4	-7.0%	12.3	-7.3%	12.3	-7.1%	12.3	-7.2%
A27-2*	15.4	13.9	-9.5%	13.6	-11.2%	13.6	-11.3%	13.5	-11.9%	13.7	-11.0%	13.8	-10.4%

Receptor	2015 Reference Case concentration (µg/m³)	2036 SGO B/C		2036 SGO C		2036 SGO D1		2036 SGO D2		2036 SGO E		2036 Baseline	
		µg/m³	% change	µg/m³	% change	µg/m³	% change	µg/m³	% change	µg/m³	% change	µg/m³	% change
A3025-1*	11.8	11.4	-4.1%	11.4	-3.9%	11.4	-3.9%	11.4	-4.0%	11.4	-4.0%	11.3	-4.2%
A3025-2*	11.5	11.1	-3.6%	11.1	-3.5%	11.1	-3.5%	11.1	-3.6%	11.1	-3.5%	11.1	-3.8%
A334*	14.5	13.3	-8.2%	13.3	-8.1%	13.3	-8.1%	13.3	-8.1%	13.3	-8.1%	13.2	-8.6%
Average			**-7.9%**		**-8.1%**		**-8.1%**		**-8.2%**		**-8.1%**		**-8.1%**
Modelled receptors located near roads between Eastleigh and Fareham													
M27-5*	16.4	15.2	-7.6%	15.2	-7.3%	15.2	-7.4%	15.2	-7.4%	15.2	-7.4%	15.2	-7.4%
M27-6*	14.6	13.6	-6.5%	13.6	-6.3%	13.6	-6.3%	13.6	-6.4%	13.6	-6.3%	13.6	-6.3%
A27-3*	14.5	13.4	-7.4%	13.4	-7.4%	13.4	-7.4%	13.4	-7.5%	13.4	-7.4%	13.4	-7.3%
A27-4*	14.6	13.7	-6.5%	13.7	-6.3%	13.7	-6.4%	13.7	-6.5%	13.7	-6.4%	13.7	-6.4%
Average			**-7.0%**		**-6.8%**		**-6.9%**		**-6.9%**		**-6.9%**		**-6.9%**
Modelled receptors located near roads between Eastleigh and Winchester													
B3335*	13.3	11.0	-17.1%	12.7	-4.2%	12.6	-5.4%	12.6	-5.5%	12.5	-5.8%	12.3	-7.2%
NH	14.7	13.1	-11.1%	12.8	-13.2%	12.8	-13.2%	12.8	-13.2%	12.8	-13.2%	12.8	-13.2%
M3-1*	13.2	11.8	-10.2%	11.8	-10.1%	11.9	-9.8%	11.9	-9.8%	11.9	-9.9%	11.9	-9.7%
M3-2*	16.0	13.7	-14.4%	13.7	-14.3%	13.7	-14.3%	13.7	-14.3%	13.7	-14.3%	13.7	-14.2%
Average			**-13.2%**		**-10.5%**		**-10.7%**		**-10.7%**		**-10.8%**		**-11.1%**
Modelled receptors located near roads between Eastleigh and Test Valley													
TW2*	12.6	11.5	-8.9%	11.5	-8.5%	11.5	-8.4%	11.5	-8.4%	11.5	-8.6%	11.5	-8.6%
SL*	11.0	10.1	-7.9%	10.1	-7.9%	10.1	-7.9%	10.1	-7.9%	10.1	-7.9%	10.1	-8.0%
Average			**-8.4%**		**-8.2%**		**-8.1%**		**-8.1%**		**-8.2%**		**-8.3%**

Table A2-7: Detailed model results for 99.8th percentile of hourly mean NO_2 concentrations (road contribution + background concentration, µg/m³) at receptor points for pseudo-2030 model scenarios

Receptor	2015 Reference Case concentration (µg/m³)	P-2030 SGO B/C		P-2030 SGO C		P-2030 SGO D1		P-2030 SGO D2		P-2030 SGO E	
		µg/m³	% change	µg/m³	% change	µg/m³	% change	µg/m³	% change	µg/m³	% change
Modelled receptors located in or near AQMA No. 1											
BR2	92.4	49.0	-47.0%	48.8	-47.1%	50.3	-45.6%	50.3	-45.6%	48.5	-47.5%
CA	71.8	42.7	-40.6%	43.2	-39.8%	43.3	-39.8%	43.2	-39.8%	43.0	-40.2%
CR	55.6	34.4	-38.1%	34.4	-38.0%	34.5	-37.9%	34.5	-37.9%	34.3	-38.3%
LR13	173.6	70.8	-59.2%	71.9	-58.6%	71.2	-59.0%	71.2	-59.0%	71.6	-58.8%
LRPR	108.8	50.5	-53.6%	50.0	-54.0%	50.0	-54.0%	50.1	-54.0%	50.0	-54.0%
MS	87.8	49.3	-43.9%	48.0	-45.4%	48.5	-44.8%	48.5	-44.7%	48.0	-45.3%
SR1	96.4	49.6	-48.6%	50.2	-47.9%	50.1	-48.0%	50.1	-48.0%	49.9	-48.3%
SRAN	97.3	49.8	-48.9%	50.4	-48.2%	50.3	-48.3%	50.3	-48.3%	50.0	-48.6%
TP	74.8	42.4	-43.4%	42.0	-43.8%	42.2	-43.6%	42.1	-43.7%	41.8	-44.1%
TW	74.1	43.9	-40.8%	44.3	-40.2%	44.7	-39.7%	44.8	-39.6%	44.4	-40.1%
WA	112.2	55.6	-50.5%	55.6	-50.5%	55.9	-50.2%	55.9	-50.2%	56.0	-50.1%
Average			**-46.8%**		**-46.7%**		**-46.4%**		**-46.4%**		**-46.8%**
Modelled receptors located in or near AQMA No. 2											
BEL	135.3	62.6	-53.7%	62.5	-53.8%	62.4	-53.9%	62.3	-53.9%	62.4	-53.9%
DD	142.5	64.2	-55.0%	63.9	-55.2%	63.8	-55.2%	63.8	-55.3%	63.7	-55.3%
MC	128.6	62.0	-51.8%	62.0	-51.8%	61.8	-51.9%	61.8	-51.9%	61.8	-51.9%
OX	99.6	49.9	-49.9%	49.8	-50.0%	49.8	-50.1%	49.8	-50.1%	49.7	-50.1%
PC	135.2	64.3	-52.5%	64.1	-52.6%	63.9	-52.8%	63.9	-52.8%	63.8	-52.8%
SC	116.3	57.8	-50.3%	57.9	-50.2%	57.8	-50.3%	57.8	-50.3%	57.8	-50.3%
SSQ	120.5	59.5	-50.7%	59.3	-50.8%	59.2	-50.9%	59.2	-50.9%	59.2	-50.9%
Average			**-52.0%**		**-52.0%**		**-52.1%**		**-52.2%**		**-52.2%**
Modelled receptors located in or near AQMA No. 3											
HL	110.3	71.4	-35.2%	71.4	-35.3%	71.3	-35.3%	71.3	-35.4%	71.3	-35.4%
HL2	108.4	53.4	-50.8%	53.3	-50.8%	53.3	-50.8%	53.3	-50.9%	53.3	-50.8%
HL3*	107.6	66.9	-37.8%	66.9	-37.8%	66.9	-37.8%	66.9	-37.9%	66.9	-37.8%

Receptor	2015 Reference Case concentration (µg/m³)	P-2030 SGO B/C		P-2030 SGO C		P-2030 SGO D1		P-2030 SGO D2		P-2030 SGO E	
		µg/m³	% change	µg/m³	% change	µg/m³	% change	µg/m³	% change	µg/m³	% change
Average			**-41.3%**		**-41.3%**		**-41.3%**		**-41.4%**		**-41.3%**
Modelled receptors located in or near AQMA No. 4											
HSB	82.2	29.2	-64.5%	29.0	-64.8%	29.0	-64.8%	28.9	-64.8%	29.1	-64.6%
HSB2	83.9	30.5	-63.7%	30.3	-63.9%	30.3	-63.9%	30.3	-63.9%	30.4	-63.8%
HSB3*	70.5	34.1	-51.6%	34.1	-51.6%	34.0	-51.7%	34.0	-51.7%	34.1	-51.6%
Average			**-59.9%**		**-60.1%**		**-60.1%**		**-60.2%**		**-60.0%**
Modelled receptors located near roads between Eastleigh and Southampton											
M27-1*	120.9	60.4	-50.0%	59.9	-50.5%	60.0	-50.4%	59.9	-50.5%	59.9	-50.5%
M27-2*	133.9	63.3	-52.7%	62.8	-53.1%	62.9	-53.0%	62.8	-53.1%	62.8	-53.1%
M27-3*	154.8	64.1	-58.6%	64.5	-58.4%	64.3	-58.5%	64.3	-58.5%	64.1	-58.6%
M27-4*	107.9	54.8	-49.2%	54.7	-49.3%	54.8	-49.2%	54.6	-49.4%	54.7	-49.3%
A3024-1*	88.5	48.6	-45.1%	48.6	-45.1%	48.6	-45.1%	48.5	-45.2%	48.7	-45.0%
A3024-2*	91.7	50.9	-44.5%	51.0	-44.4%	51.0	-44.4%	50.9	-44.5%	51.0	-44.4%
A27-1*	84.2	47.9	-43.1%	47.9	-43.1%	47.9	-43.1%	47.7	-43.3%	47.8	-43.2%
A27-2*	102.5	52.3	-49.0%	51.5	-49.8%	51.4	-49.9%	51.1	-50.1%	51.6	-49.7%
A3025-1*	57.4	38.3	-33.4%	38.3	-33.3%	38.3	-33.3%	38.3	-33.4%	38.3	-33.3%
A3025-2*	57.4	38.4	-33.0%	38.5	-32.9%	38.5	-32.9%	38.5	-33.0%	38.5	-32.9%
A334*	98.1	51.9	-47.1%	51.9	-47.1%	51.9	-47.1%	52.0	-47.0%	52.0	-47.0%
Average			**-46.0%**		**-46.1%**		**-46.1%**		**-46.2%**		**-46.1%**
Modelled receptors located near roads between Eastleigh and Fareham											
M27-5*	110.9	61.5	-44.6%	61.7	-44.4%	61.7	-44.4%	61.7	-44.4%	61.7	-44.4%
M27-6*	111.2	63.0	-43.4%	63.1	-43.2%	63.2	-43.2%	63.1	-43.2%	63.2	-43.1%
A27-3*	108.1	55.3	-48.8%	55.4	-48.8%	55.3	-48.8%	55.3	-48.8%	55.4	-48.8%
A27-4*	98.2	53.1	-45.9%	53.2	-45.8%	53.2	-45.9%	53.1	-45.9%	53.2	-45.8%
Average			**-45.7%**		**-45.5%**		**-45.6%**		**-45.6%**		**-45.5%**
Modelled receptors located near roads between Eastleigh and Winchester											
B3335*	73.0	38.4	-47.4%	44.3	-39.4%	43.6	-40.2%	43.5	-40.4%	43.4	-40.5%

Receptor	2015 Reference Case concentration (µg/m³)	P-2030 SGO B/C		P-2030 SGO C		P-2030 SGO D1		P-2030 SGO D2		P-2030 SGO E	
		µg/m³	% change	µg/m³	% change	µg/m³	% change	µg/m³	% change	µg/m³	% change
NH	119.5	59.7	-50.1%	58.5	-51.1%	58.5	-51.0%	58.5	-51.1%	58.5	-51.1%
M3-1*	79.9	42.3	-47.1%	42.2	-47.1%	42.4	-46.9%	42.4	-46.9%	42.3	-47.0%
M3-2*	110.3	55.2	-50.0%	55.2	-50.0%	55.2	-49.9%	55.3	-49.9%	55.3	-49.9%
Average			**-48.6%**		**-46.9%**		**-47.0%**		**-47.1%**		**-47.1%**
Modelled receptors located near roads between Eastleigh and Test Valley											
TW2*	80.2	43.9	-45.2%	44.1	-44.9%	44.1	-44.9%	44.1	-44.9%	44.1	-45.0%
SL*	63.0	37.2	-41.0%	37.2	-40.9%	37.2	-41.0%	37.2	-41.0%	37.2	-41.0%
Average			**-43.1%**		**-42.9%**		**-42.9%**		**-43.0%**		**-43.0%**

Table A2-8: Detailed model results for 99.8th percentile of hourly mean NO_2 concentrations (road contribution + background concentration, µg/m³) at receptor points for 2036 model scenarios

Receptor	2015 Reference Case concentration (µg/m³)	2036 SGO B/C		2036 SGO C		2036 SGO D1		2036 SGO D2		2036 SGO E		2036 Baseline	
		µg/m³	% change	µg/m³	% change	µg/m³	% change	µg/m³	% change	µg/m³	% change	µg/m³	% change
Modelled receptors located in or near AQMA No. 1													
BR2	92.4	45.3	-50.9%	45.4	-50.9%	46.7	-49.5%	46.7	-49.5%	45.0	-51.3%	44.5	-51.8%
CA	71.8	39.5	-45.0%	40.0	-44.3%	40.0	-44.2%	40.0	-44.3%	39.8	-44.6%	39.0	-45.7%
CR	55.6	32.0	-42.4%	32.1	-42.3%	32.1	-42.2%	32.1	-42.2%	32.0	-42.5%	31.8	-42.8%
LR13	173.6	64.3	-63.0%	65.2	-62.5%	64.6	-62.8%	64.6	-62.8%	64.9	-62.6%	64.5	-62.9%
LRPR	108.8	47.1	-56.7%	46.6	-57.2%	46.6	-57.1%	46.7	-57.1%	46.6	-57.2%	46.6	-57.1%
MS	87.8	45.5	-48.2%	44.2	-49.7%	44.7	-49.1%	44.7	-49.1%	44.3	-49.6%	45.2	-48.5%
SR1	96.4	46.0	-52.2%	46.6	-51.7%	46.5	-51.8%	46.5	-51.8%	46.3	-52.0%	45.6	-52.7%
SRAN	97.3	46.2	-52.5%	46.7	-51.9%	46.6	-52.1%	46.6	-52.1%	46.4	-52.3%	45.8	-52.9%
TP	74.8	39.3	-47.5%	39.0	-47.9%	39.1	-47.7%	39.1	-47.8%	38.8	-48.1%	38.9	-48.0%
TW	74.1	40.3	-45.6%	40.7	-45.1%	41.1	-44.6%	41.1	-44.5%	40.8	-45.0%	40.3	-45.7%
WA	112.2	51.9	-53.7%	51.9	-53.8%	52.2	-53.4%	52.2	-53.5%	52.3	-53.4%	51.9	-53.7%
Average			**-50.7%**		**-50.7%**		**-50.4%**		**-50.4%**		**-50.8%**		**-51.1%**
Modelled receptors located in or near AQMA No. 2													

Receptor	2015 Reference Case concentration (µg/m³)	2036 SGO B/C		2036 SGO C		2036 SGO D1		2036 SGO D2		2036 SGO E		2036 Baseline	
		µg/m³	% change	µg/m³	% change	µg/m³	% change	µg/m³	% change	µg/m³	% change	µg/m³	% change
BEL	135.3	57.3	-57.7%	57.2	-57.8%	57.1	-57.8%	57.0	-57.9%	57.1	-57.8%	56.9	-57.9%
DD	142.5	58.4	-59.0%	58.2	-59.2%	58.1	-59.2%	58.1	-59.2%	58.0	-59.3%	58.0	-59.3%
MC	128.6	56.6	-56.0%	56.6	-56.0%	56.5	-56.1%	56.5	-56.1%	56.4	-56.1%	56.4	-56.1%
OX	99.6	45.9	-53.9%	45.8	-54.0%	45.7	-54.1%	45.7	-54.1%	45.7	-54.1%	45.6	-54.2%
PC	135.2	58.3	-56.9%	58.1	-57.0%	58.0	-57.2%	58.0	-57.2%	57.9	-57.2%	57.9	-57.2%
SC	116.3	53.2	-54.2%	53.4	-54.1%	53.3	-54.2%	53.3	-54.2%	53.3	-54.2%	53.2	-54.3%
SSQ	120.5	54.5	-54.8%	54.4	-54.9%	54.3	-54.9%	54.3	-54.9%	54.3	-55.0%	54.2	-55.0%
Average			**-56.1%**		**-56.1%**		**-56.2%**		**-56.2%**		**-56.2%**		**-56.3%**
Modelled receptors located in or near AQMA No. 3													
HL	110.3	66.0	-40.2%	66.0	-40.2%	65.9	-40.2%	65.9	-40.3%	65.9	-40.2%	65.7	-40.4%
HL2	108.4	49.8	-54.0%	49.8	-54.1%	49.8	-54.1%	49.7	-54.1%	49.8	-54.1%	49.5	-54.3%
HL3*	107.6	62.3	-42.1%	62.3	-42.1%	62.2	-42.2%	62.2	-42.2%	62.2	-42.2%	62.0	-42.3%
Average			**-45.4%**		**-45.5%**		**-45.5%**		**-45.5%**		**-45.5%**		**-45.7%**
Modelled receptors located in or near AQMA No. 4													
HSB	82.2	27.4	-66.7%	27.2	-67.0%	27.2	-67.0%	27.1	-67.0%	27.3	-66.8%	41.3	-49.7%
HSB2	83.9	28.6	-66.0%	28.4	-66.2%	28.3	-66.2%	28.3	-66.2%	28.5	-66.1%	41.0	-51.2%
HSB3*	70.5	31.8	-54.9%	31.7	-55.0%	31.7	-55.1%	31.6	-55.1%	31.8	-54.9%	37.8	-46.4%
Average			**-62.5%**		**-62.7%**		**-62.8%**		**-62.8%**		**-62.6%**		**-49.1%**
Modelled receptors located near roads between Eastleigh and Southampton													
M27-1*	120.9	55.8	-53.8%	55.3	-54.2%	55.5	-54.1%	55.3	-54.2%	55.3	-54.2%	55.7	-53.9%
M27-2*	133.9	58.2	-56.5%	57.7	-56.9%	57.9	-56.8%	57.7	-56.9%	57.7	-56.9%	58.0	-56.7%
M27-3*	154.8	59.1	-61.8%	59.4	-61.6%	59.3	-61.7%	59.2	-61.8%	59.1	-61.9%	59.0	-61.9%
M27-4*	107.9	51.1	-52.6%	51.1	-52.7%	51.2	-52.6%	51.0	-52.7%	51.1	-52.7%	51.0	-52.7%
A3024-1*	88.5	45.9	-48.1%	45.9	-48.1%	46.0	-48.1%	45.9	-48.2%	46.0	-48.0%	45.8	-48.3%
A3024-2*	91.7	47.9	-47.8%	48.0	-47.7%	48.0	-47.7%	47.9	-47.8%	48.0	-47.7%	47.5	-48.1%
A27-1*	84.2	44.5	-47.1%	44.5	-47.1%	44.5	-47.1%	44.4	-47.3%	44.5	-47.2%	44.2	-47.5%
A27-2*	102.5	48.7	-52.5%	47.9	-53.3%	47.9	-53.3%	47.6	-53.5%	48.1	-53.1%	48.5	-52.7%

Receptor	2015 Reference Case concentration (µg/m^3)	2036 SGO B/C		2036 SGO C		2036 SGO D1		2036 SGO D2		2036 SGO E		2036 Baseline	
		µg/m^3	% change	µg/m^3	% change	µg/m^3	% change	µg/m^3	% change	µg/m^3	% change	µg/m^3	% change
A3025-1*	57.4	35.9	-37.4%	36.0	-37.3%	36.0	-37.3%	36.0	-37.4%	36.0	-37.3%	35.9	-37.6%
A3025-2*	57.4	36.1	-37.1%	36.2	-36.9%	36.2	-37.0%	36.1	-37.0%	36.2	-37.0%	36.0	-37.3%
A334*	98.1	48.3	-50.8%	48.3	-50.7%	48.3	-50.8%	48.3	-50.7%	48.4	-50.7%	47.6	-51.5%
Average			**-49.6%**		**-49.7%**		**-49.7%**		**-49.8%**		**-49.7%**		**-49.8%**
Modelled receptors located near roads between Eastleigh and Fareham													
M27-5*	110.9	56.8	-48.8%	57.0	-48.6%	57.0	-48.6%	57.0	-48.6%	57.0	-48.6%	56.9	-48.8%
M27-6*	111.2	58.2	-47.7%	58.3	-47.5%	58.4	-47.5%	58.3	-47.5%	58.4	-47.5%	58.3	-47.6%
A27-3*	108.1	51.6	-52.2%	51.7	-52.2%	51.7	-52.2%	51.6	-52.2%	51.7	-52.2%	51.7	-52.1%
A27-4*	98.2	49.6	-49.5%	49.7	-49.4%	49.6	-49.5%	49.6	-49.5%	49.6	-49.5%	49.6	-49.5%
Average			**-49.5%**		**-49.4%**		**-49.5%**		**-49.5%**		**-49.4%**		**-49.5%**
Modelled receptors located near roads between Eastleigh and Winchester													
B3335*	73.0	35.1	-51.9%	40.6	-44.4%	40.0	-45.3%	39.9	-45.4%	39.8	-45.5%	38.9	-46.7%
NH	119.5	54.6	-54.3%	53.6	-55.2%	53.6	-55.1%	53.6	-55.2%	53.6	-55.2%	53.5	-55.3%
M3-1*	79.9	38.4	-51.9%	38.4	-51.9%	38.6	-51.7%	38.6	-51.7%	38.5	-51.8%	38.6	-51.7%
M3-2*	110.3	50.3	-54.4%	50.4	-54.3%	50.4	-54.3%	50.4	-54.3%	50.4	-54.3%	50.4	-54.3%
Average			**-53.1%**		**-51.5%**		**-51.6%**		**-51.6%**		**-51.7%**		**-52.0%**
Modelled receptors located near roads between Eastleigh and Test Valley													
TW2*	80.2	40.4	-49.6%	40.6	-49.3%	40.6	-49.3%	40.6	-49.3%	40.6	-49.4%	40.5	-49.5%
SL*	63.0	34.1	-45.9%	34.1	-45.8%	34.1	-45.8%	34.1	-45.9%	34.1	-45.9%	34.0	-46.0%
Average			**-47.8%**		**-47.6%**		**-47.6%**		**-47.6%**		**-47.6%**		**-47.8%**

Table A2-9: Detailed model results for 90.4th percentile of daily mean PM_{10} concentrations (road contribution + background concentration, µg/m³) at receptor points for pseudo-2030 model scenarios

Receptor	2015 Reference Case concentration (µg/m³)	P-2030 SGO B/C		P-2030 SGO C		P-2030 SGO D1		P-2030 SGO D2		P-2030 SGO E	
		µg/m³	% change	µg/m³	% change	µg/m³	% change	µg/m³	% change	µg/m³	% change
Modelled receptors located in or near AQMA No. 1											
BR2	32.4	32.5	0.3%	30.8	-5.0%	31.9	-1.5%	31.9	-1.4%	30.4	-6.0%
CA	25.3	25.6	1.5%	26.0	3.0%	26.0	3.1%	26.0	3.0%	25.8	2.3%
CR	20.4	20.2	-1.1%	20.2	-1.1%	20.2	-0.9%	20.2	-1.0%	20.1	-1.3%
LR13	46.5	42.9	-7.6%	43.3	-6.7%	43.0	-7.4%	43.0	-7.4%	43.1	-7.1%
LRPR	34.9	34.5	-1.1%	34.0	-2.5%	33.9	-2.6%	34.0	-2.5%	33.9	-2.7%
MS	31.4	30.8	-1.8%	30.6	-2.5%	31.1	-1.0%	31.1	-0.9%	30.8	-2.0%
SR1	31.7	31.7	0.2%	32.2	1.7%	32.1	1.3%	32.0	1.2%	31.9	0.7%
SRAN	32.2	32.3	0.3%	32.8	1.7%	32.6	1.3%	32.6	1.3%	32.4	0.7%
TP	26.0	25.5	-2.2%	25.3	-2.8%	25.4	-2.5%	25.4	-2.4%	25.2	-3.2%
TW	27.2	26.7	-1.7%	27.0	-0.8%	27.3	0.3%	27.3	0.4%	27.1	-0.4%
WA	36.8	34.1	-7.2%	34.3	-6.8%	34.2	-7.0%	34.2	-7.0%	34.3	-6.7%
Average			**-1.8%**		**-2.0%**		**-1.6%**		**-1.5%**		**-2.4%**
Modelled receptors located in or near AQMA No. 2											
BEL	42.0	38.9	-7.4%	38.8	-7.7%	38.6	-8.0%	38.7	-7.9%	38.6	-8.0%
DD	46.1	41.0	-11.1%	40.8	-11.6%	40.7	-11.8%	40.7	-11.8%	40.6	-11.9%
MC	40.2	37.1	-7.7%	36.9	-8.2%	36.8	-8.4%	36.8	-8.4%	36.7	-8.5%
OX	31.2	29.3	-6.1%	29.1	-6.7%	29.1	-6.9%	29.1	-6.9%	29.0	-7.0%
PC	41.8	38.6	-7.7%	38.2	-8.6%	38.1	-8.9%	38.1	-8.8%	38.0	-9.0%
SC	36.9	34.3	-7.0%	34.4	-6.7%	34.3	-7.1%	34.3	-7.1%	34.3	-7.1%
SSQ	39.7	36.4	-8.5%	36.3	-8.8%	36.2	-8.9%	36.2	-8.9%	36.1	-9.0%
Average			**-7.9%**		**-8.3%**		**-8.6%**		**-8.5%**		**-8.6%**
Modelled receptors located in or near AQMA No. 3											
HL	37.5	40.0	6.6%	40.1	6.7%	40.0	6.6%	40.0	6.5%	40.0	6.6%
HL2	32.7	34.6	5.9%	34.6	5.9%	34.6	5.8%	34.5	5.7%	34.6	5.8%
HL3*	35.1	37.4	6.5%	37.4	6.6%	37.4	6.5%	37.4	6.5%	37.4	6.5%

Receptor	2015 Reference Case concentration (µg/m³)	P-2030 SGO B/C		P-2030 SGO C		P-2030 SGO D1		P-2030 SGO D2		P-2030 SGO E	
		µg/m³	% change	µg/m³	% change	µg/m³	% change	µg/m³	% change	µg/m³	% change
Average			**6.3%**		**6.4%**		**6.3%**		**6.2%**		**6.3%**
Modelled receptors located in or near AQMA No. 4											
HSB	29.7	18.3	-38.5%	18.1	-39.0%	18.1	-39.0%	18.1	-39.1%	18.2	-38.8%
HSB2	30.8	19.1	-38.0%	19.0	-38.5%	18.9	-38.6%	18.9	-38.6%	19.0	-38.4%
HSB3*	25.9	20.6	-20.4%	20.5	-20.7%	20.5	-20.9%	20.5	-20.9%	20.5	-20.7%
Average			**-32.3%**		**-32.7%**		**-32.8%**		**-32.9%**		**-32.6%**
Modelled receptors located near roads between Eastleigh and Southampton											
M27-1*	38.6	42.5	10.2%	42.1	9.0%	42.2	9.3%	42.1	9.0%	42.1	9.0%
M27-2*	39.8	43.4	9.0%	43.0	7.9%	43.1	8.2%	43.0	7.9%	43.0	7.9%
M27-3*	44.1	40.9	-7.2%	41.0	-7.1%	40.9	-7.3%	40.8	-7.4%	40.9	-7.3%
M27-4*	34.1	33.0	-3.5%	33.0	-3.5%	32.9	-3.5%	32.9	-3.5%	32.9	-3.6%
A3024-1*	28.5	26.2	-7.8%	26.3	-7.7%	26.3	-7.7%	26.3	-7.7%	26.3	-7.7%
A3024-2*	30.0	29.9	-0.2%	30.1	0.2%	30.0	0.1%	30.0	-0.1%	30.0	0.1%
A27-1*	28.4	28.7	1.1%	28.7	1.0%	28.7	1.0%	28.5	0.5%	28.6	0.8%
A27-2*	33.3	33.0	-0.8%	32.2	-3.4%	32.1	-3.7%	31.8	-4.5%	32.3	-3.1%
A3025-1*	22.0	23.3	5.8%	23.4	6.1%	23.4	6.0%	23.3	5.9%	23.4	6.0%
A3025-2*	21.7	23.2	6.6%	23.2	6.9%	23.2	6.8%	23.2	6.7%	23.2	6.8%
A334*	32.3	32.0	-1.0%	32.0	-0.9%	32.0	-0.9%	32.0	-1.0%	32.0	-1.0%
Average			**1.1%**		**0.8%**		**0.8%**		**0.5%**		**0.7%**
Modelled receptors located near roads between Eastleigh and Fareham											
M27-5*	38.6	38.6	0.0%	38.7	0.4%	38.7	0.3%	38.7	0.3%	38.7	0.3%
M27-6*	35.3	36.3	3.0%	36.5	3.4%	36.5	3.4%	36.5	3.3%	36.5	3.4%
A27-3*	33.8	33.9	0.4%	33.9	0.4%	33.9	0.3%	33.8	0.2%	33.9	0.3%
A27-4*	31.8	32.4	1.8%	32.5	2.0%	32.4	1.9%	32.4	1.7%	32.4	1.9%
Average			**1.3%**		**1.6%**		**1.5%**		**1.4%**		**1.5%**
Modelled receptors located near roads between Eastleigh and Winchester											
B3335*	26.7	23.6	-11.5%	27.9	4.7%	27.3	2.3%	27.2	2.1%	27.2	1.9%

Receptor	2015 Reference Case concentration (µg/m³)	P-2030 SGO B/C		P-2030 SGO C		P-2030 SGO D1		P-2030 SGO D2		P-2030 SGO E	
		µg/m³	% change	µg/m³	% change	µg/m³	% change	µg/m³	% change	µg/m³	% change
NH	37.5	35.4	-5.7%	34.1	-9.3%	34.0	-9.3%	34.1	-9.3%	34.0	-9.3%
M3-1*	27.7	26.1	-5.8%	26.1	-5.8%	26.2	-5.5%	26.2	-5.5%	26.1	-5.6%
M3-2*	35.9	32.6	-9.3%	32.6	-9.2%	32.6	-9.2%	32.6	-9.2%	32.6	-9.2%
Average			**-8.1%**		**-4.9%**		**-5.4%**		**-5.5%**		**-5.6%**
Modelled receptors located near roads between Eastleigh and Test Valley											
TW2*	27.2	26.2	-3.5%	26.4	-2.9%	26.4	-2.8%	26.4	-2.8%	26.4	-3.0%
SL*	22.1	21.6	-2.3%	21.6	-2.2%	21.6	-2.2%	21.6	-2.3%	21.6	-2.3%
Average			**-2.9%**		**-2.6%**		**-2.5%**		**-2.5%**		**-2.7%**

Table A2-10: Detailed model results for 90.4th percentile of daily mean PM_{10} concentrations (road contribution + background concentration, µg/m³) at receptor points for 2036 model scenarios

Receptor	2015 Reference Case concentration (µg/m³)	2036 SGO B/C		2036 SGO C		2036 SGO D1		2036 SGO D2		2036 SGO E		2036 Baseline	
		µg/m³	% change	µg/m³	% change	µg/m³	% change	µg/m³	% change	µg/m³	% change	µg/m³	% change
Modelled receptors located in or near AQMA No. 1													
BR2	32.4	32.4	0.2%	30.7	-5.1%	31.8	-1.7%	31.9	-1.5%	30.4	-6.2%	31.6	-2.3%
CA	25.3	25.6	1.4%	26.0	2.9%	26.0	3.0%	26.0	2.8%	25.8	2.2%	25.1	-0.5%
CR	20.4	20.2	-1.2%	20.2	-1.1%	20.2	-1.0%	20.2	-1.0%	20.1	-1.4%	20.0	-2.0%
LR13	46.5	42.9	-7.7%	43.3	-6.9%	42.9	-7.6%	43.0	-7.5%	43.1	-7.3%	42.9	-7.6%
LRPR	34.9	34.4	-1.2%	33.9	-2.6%	33.9	-2.8%	33.9	-2.7%	33.9	-2.8%	34.0	-2.5%
MS	31.4	30.8	-2.0%	30.6	-2.6%	31.0	-1.2%	31.1	-1.1%	30.7	-2.2%	30.6	-2.5%
SR1	31.7	31.7	0.1%	32.1	1.6%	32.0	1.1%	32.0	1.1%	31.8	0.5%	31.2	-1.6%
SRAN	32.2	32.2	0.2%	32.7	1.6%	32.6	1.2%	32.6	1.2%	32.4	0.5%	31.7	-1.5%
TP	26.0	25.4	-2.3%	25.3	-2.9%	25.3	-2.6%	25.4	-2.6%	25.2	-3.3%	25.3	-2.8%
TW	27.2	26.7	-1.8%	26.9	-0.9%	27.2	0.2%	27.3	0.3%	27.0	-0.6%	26.6	-2.3%
WA	36.8	34.1	-7.4%	34.2	-7.0%	34.1	-7.2%	34.2	-7.2%	34.3	-6.8%	34.1	-7.4%
Average			**-2.0%**		**-2.1%**		**-1.7%**		**-1.7%**		**-2.5%**		**-3.0%**
Modelled receptors located in or near AQMA No. 2													

Receptor	2015 Reference Case concentration (µg/m³)	2036 SGO B/C		2036 SGO C		2036 SGO D1		2036 SGO D2		2036 SGO E		2036 Baseline	
		µg/m³	% change	µg/m³	% change	µg/m³	% change	µg/m³	% change	µg/m³	% change	µg/m³	% change
BEL	42.0	38.8	-7.5%	38.7	-7.8%	38.5	-8.2%	38.6	-8.1%	38.6	-8.2%	38.5	-8.3%
DD	46.1	40.9	-11.3%	40.7	-11.8%	40.6	-12.0%	40.6	-12.0%	40.6	-12.1%	40.5	-12.1%
MC	40.2	37.0	-7.9%	36.8	-8.3%	36.7	-8.6%	36.7	-8.6%	36.7	-8.7%	36.7	-8.6%
OX	31.2	29.3	-6.2%	29.1	-6.8%	29.0	-7.0%	29.0	-7.0%	29.0	-7.1%	29.0	-7.1%
PC	41.8	38.5	-7.9%	38.1	-8.8%	38.0	-9.0%	38.0	-9.0%	38.0	-9.1%	38.0	-9.1%
SC	36.9	34.3	-7.1%	34.4	-6.9%	34.2	-7.3%	34.3	-7.2%	34.2	-7.3%	34.2	-7.3%
SSQ	39.7	36.3	-8.6%	36.2	-8.9%	36.1	-9.1%	36.1	-9.1%	36.1	-9.2%	36.0	-9.3%
Average			**-8.1%**		**-8.5%**		**-8.7%**		**-8.7%**		**-8.8%**		**-8.8%**
Modelled receptors located in or near AQMA No. 3													
HL	37.5	40.0	6.4%	40.0	6.5%	39.9	6.4%	39.9	6.3%	39.9	6.4%	39.7	5.7%
HL2	32.7	34.5	5.7%	34.5	5.7%	34.5	5.7%	34.5	5.6%	34.5	5.7%	34.3	5.0%
HL3*	35.1	37.3	6.3%	37.3	6.4%	37.3	6.3%	37.3	6.3%	37.3	6.3%	37.1	5.7%
Average			**6.1%**		**6.2%**		**6.1%**		**6.0%**		**6.1%**		**5.5%**
Modelled receptors located in or near AQMA No. 4													
HSB	29.7	18.3	-38.6%	18.1	-39.1%	18.1	-39.0%	18.1	-39.2%	18.2	-38.8%	28.5	-4.1%
HSB2	30.8	19.1	-38.1%	19.0	-38.5%	18.9	-38.6%	18.9	-38.6%	19.0	-38.4%	29.4	-4.6%
HSB3*	25.9	20.6	-20.5%	20.5	-20.8%	20.4	-20.9%	20.4	-21.0%	20.5	-20.8%	25.2	-2.6%
Average			**-32.4%**		**-32.8%**		**-32.9%**		**-32.9%**		**-32.7%**		**-3.8%**
Modelled receptors located near roads between Eastleigh and Southampton													
M27-1*	38.6	42.5	10.0%	42.0	8.8%	42.1	9.2%	42.0	8.8%	42.0	8.8%	42.4	9.7%
M27-2*	39.8	43.4	8.8%	42.9	7.7%	43.0	8.0%	42.9	7.7%	42.9	7.7%	43.2	8.5%
M27-3*	44.1	40.9	-7.4%	40.9	-7.3%	40.8	-7.5%	40.8	-7.6%	40.8	-7.5%	40.7	-7.8%
M27-4*	34.1	32.9	-3.6%	32.9	-3.6%	32.9	-3.7%	32.9	-3.7%	32.9	-3.8%	32.8	-4.1%
A3024-1*	28.5	26.2	-7.9%	26.2	-7.9%	26.2	-7.9%	26.2	-7.9%	26.2	-7.8%	26.2	-8.0%
A3024-2*	30.0	29.9	-0.4%	30.0	0.0%	30.0	-0.1%	29.9	-0.2%	30.0	-0.1%	29.9	-0.5%
A27-1*	28.4	28.7	0.9%	28.6	0.8%	28.7	0.9%	28.5	0.4%	28.6	0.6%	28.5	0.3%
A27-2*	33.3	33.0	-1.0%	32.1	-3.6%	32.1	-3.8%	31.8	-4.7%	32.2	-3.2%	32.3	-3.1%

Receptor	2015 Reference Case concentration (µg/m³)	2036 SGO B/C		2036 SGO C		2036 SGO D1		2036 SGO D2		2036 SGO E		2036 Baseline	
		µg/m³	% change	µg/m³	% change	µg/m³	% change	µg/m³	% change	µg/m³	% change	µg/m³	% change
A3025-1*	22.0	23.3	5.7%	23.4	6.0%	23.3	5.9%	23.3	5.8%	23.3	5.9%	23.2	5.5%
A3025-2*	21.7	23.1	6.5%	23.2	6.8%	23.2	6.7%	23.2	6.5%	23.2	6.6%	23.1	6.2%
A334*	32.3	31.9	-1.2%	32.0	-1.1%	32.0	-1.0%	31.9	-1.2%	31.9	-1.1%	31.6	-2.2%
Average			**1.0%**		**0.6%**		**0.6%**		**0.4%**		**0.6%**		**0.4%**
Modelled receptors located near roads between Eastleigh and Fareham													
M27-5*	38.6	38.5	-0.2%	38.7	0.2%	38.6	0.1%	38.6	0.1%	38.6	0.1%	38.6	0.0%
M27-6*	35.3	36.3	2.8%	36.4	3.2%	36.4	3.2%	36.4	3.2%	36.4	3.3%	36.4	3.3%
A27-3*	33.8	33.9	0.2%	33.9	0.3%	33.8	0.1%	33.8	0.0%	33.8	0.2%	33.9	0.3%
A27-4*	31.8	32.3	1.6%	32.4	1.9%	32.4	1.7%	32.3	1.6%	32.4	1.7%	32.4	1.7%
Average			**1.1%**		**1.4%**		**1.3%**		**1.2%**		**1.3%**		**1.3%**
Modelled receptors located near roads between Eastleigh and Winchester													
B3335*	26.7	23.6	-11.6%	27.9	4.5%	27.3	2.2%	27.2	1.9%	27.2	1.8%	26.5	-0.6%
NH	37.5	35.3	-5.9%	34.0	-9.4%	34.0	-9.4%	34.0	-9.4%	34.0	-9.5%	34.0	-9.5%
M3-1*	27.7	26.1	-5.9%	26.1	-5.9%	26.1	-5.6%	26.1	-5.6%	26.1	-5.8%	26.2	-5.5%
M3-2*	35.9	32.5	-9.5%	32.5	-9.4%	32.5	-9.4%	32.6	-9.3%	32.6	-9.3%	32.6	-9.2%
Average			**-8.2%**		**-5.0%**		**-5.6%**		**-5.6%**		**-5.7%**		**-6.2%**
Modelled receptors located near roads between Eastleigh and Test Valley													
TW2*	27.2	26.2	-3.6%	26.4	-3.0%	26.4	-2.9%	26.4	-2.9%	26.3	-3.1%	26.3	-3.2%
SL*	22.1	21.6	-2.4%	21.6	-2.3%	21.6	-2.3%	21.6	-2.4%	21.6	-2.4%	21.5	-2.7%
Average			**-3.0%**		**-2.7%**		**-2.6%**		**-2.6%**		**-2.8%**		**-3.0%**

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