

JACOBS®

**Module 6: Air Quality
Local Assessment**

**Detailed Emissions Inventory & Dispersion Modelling
Figures Appendix**

**Prepared for the
Airports Commission**

May 2015

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Heathrow - NWR

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 All at risk PCM links (>32ug/m³) within 2km of the airport boundary and at risk PCM links (>32ug/m³) within 200m of “Affected Roads”.

Heathrow - ENR

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 All at risk PCM links (>32ug/m³) within 2km of the airport boundary and at risk PCM links (>32ug/m³) within 200m of “Affected Roads”.

Appendix B

Figure B1 – MCAT Assignments Heathrow Baseline 2009. MCAT group shown along top axis. Aircraft ID shown along bottom axis. Lead aircraft shown as shaded bar.

Figure B2 – MCAT Assignments Gatwick Baseline 2009 MCAT group shown along top axis. Aircraft ID shown along bottom axis. Lead aircraft shown as shaded bar.

Figure B3 – MCAT Assignments Heathrow Do-Minimum, NWR and ENR MCAT group shown along top axis. Aircraft ID shown along bottom axis. Lead aircraft shown as shaded bar.

Figure B4 – MCAT Assignments Gatwick Do-Minimum and 2R MCAT group shown along top axis. Aircraft ID shown along bottom axis. Lead aircraft shown as shaded bar.





Appendix E

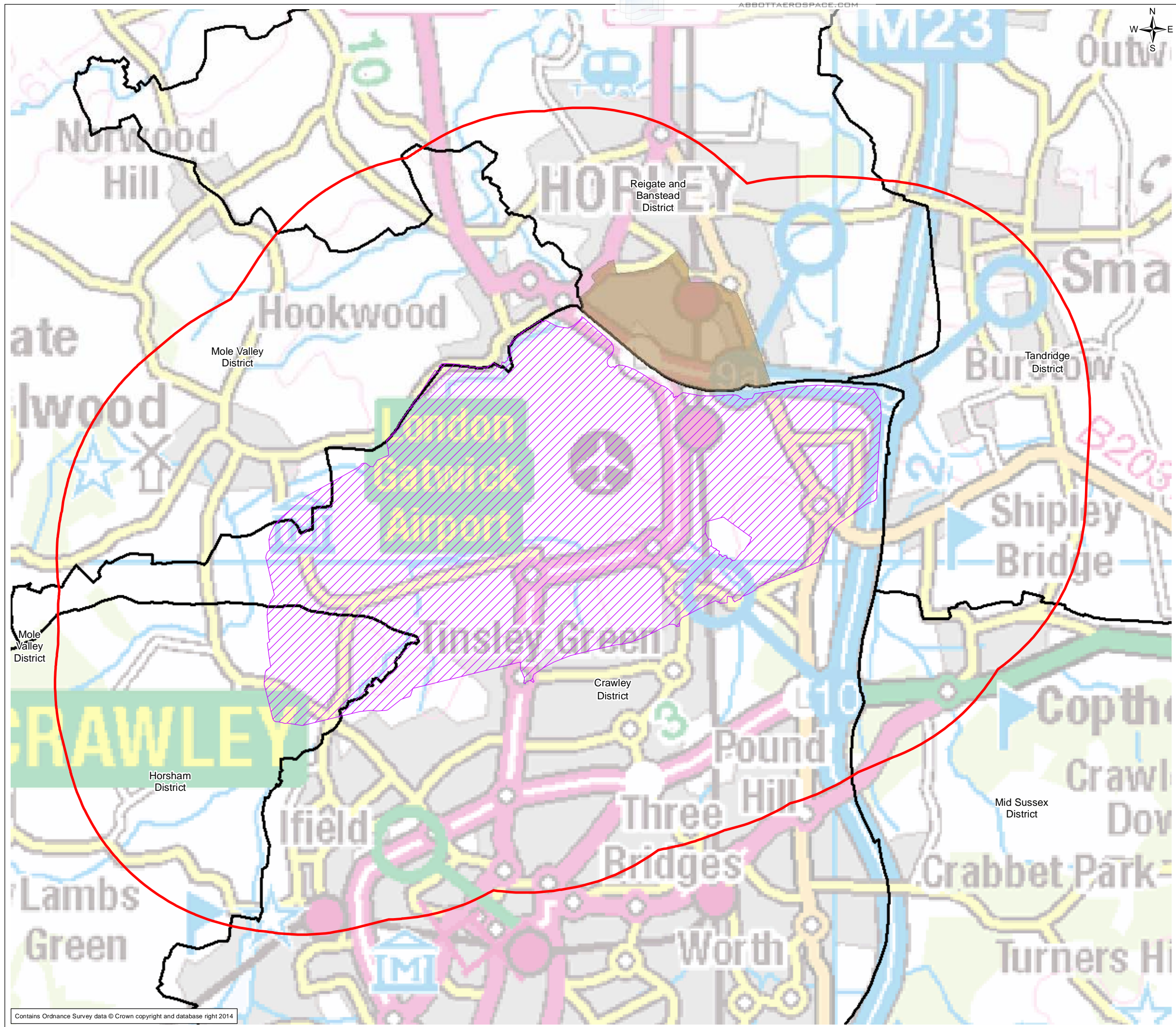
Figure E1 – Location of Monitoring Sites in Gatwick Study Area used for 2009 Model Verification

Figure E2 – Location of Monitoring Sites in Heathrow Study Area used for 2009 Model Verification



FIGURE 4.1

- Legend
-  Gatwick 2R boundary
 -  Principal study area
 -  Administrative boundaries
 -  Air Quality Management Areas



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 Principal Study Area and AQMA Boundaries - Gatwick 2R

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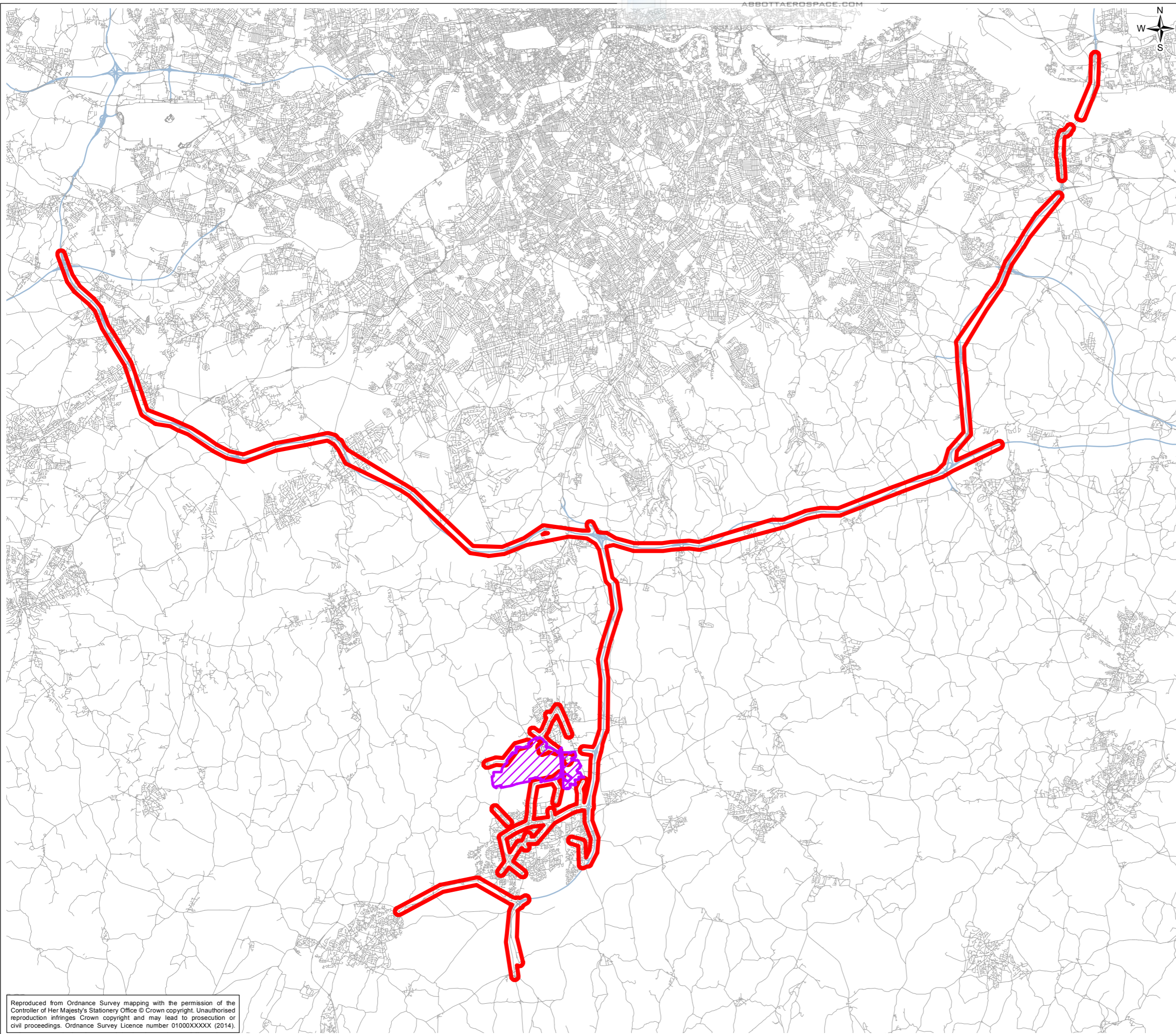


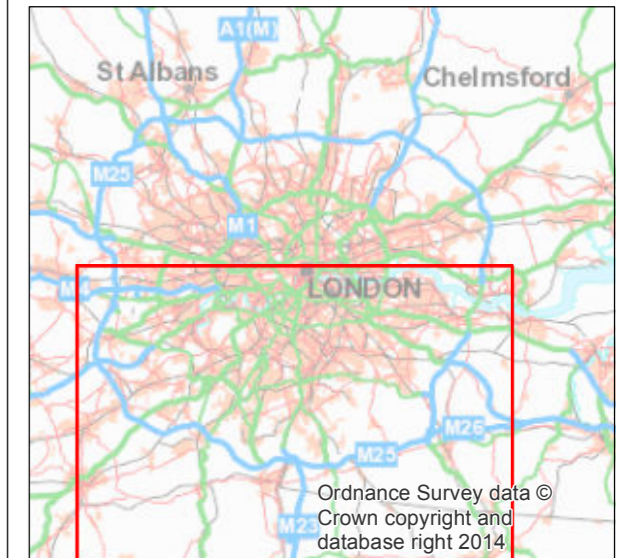


FIGURE 4.2

Legend

-  Gatwick Wider Study Area (Road Links Affected by the Scheme)
-  Gatwick Existing Boundary



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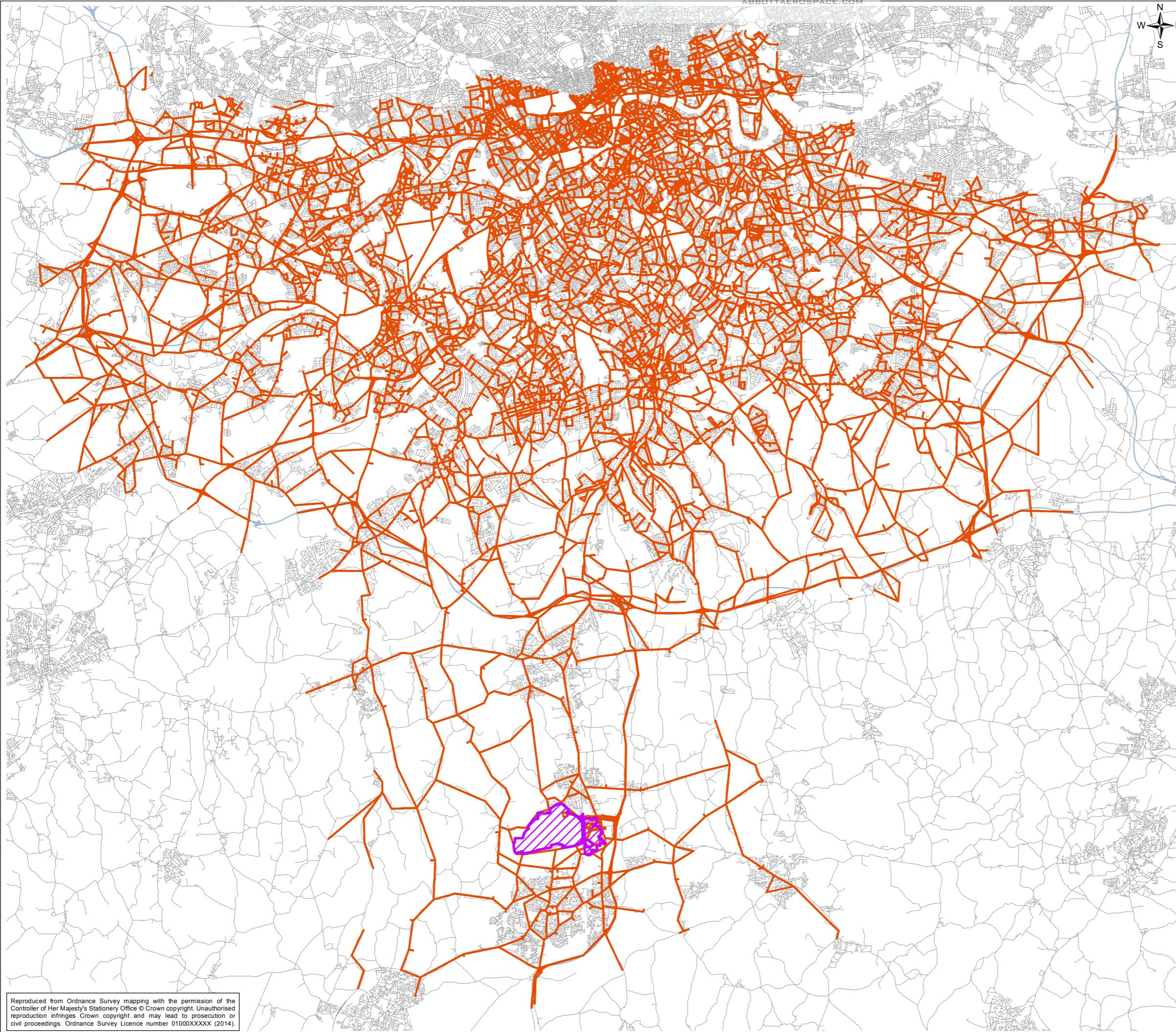
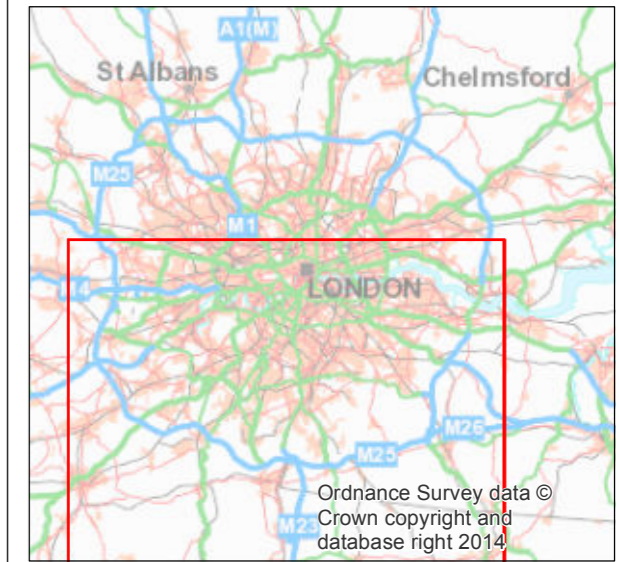


FIGURE 4.3

- Legend**
- 2R Traffic Simulation Area
 - Gatwick Existing Boundary



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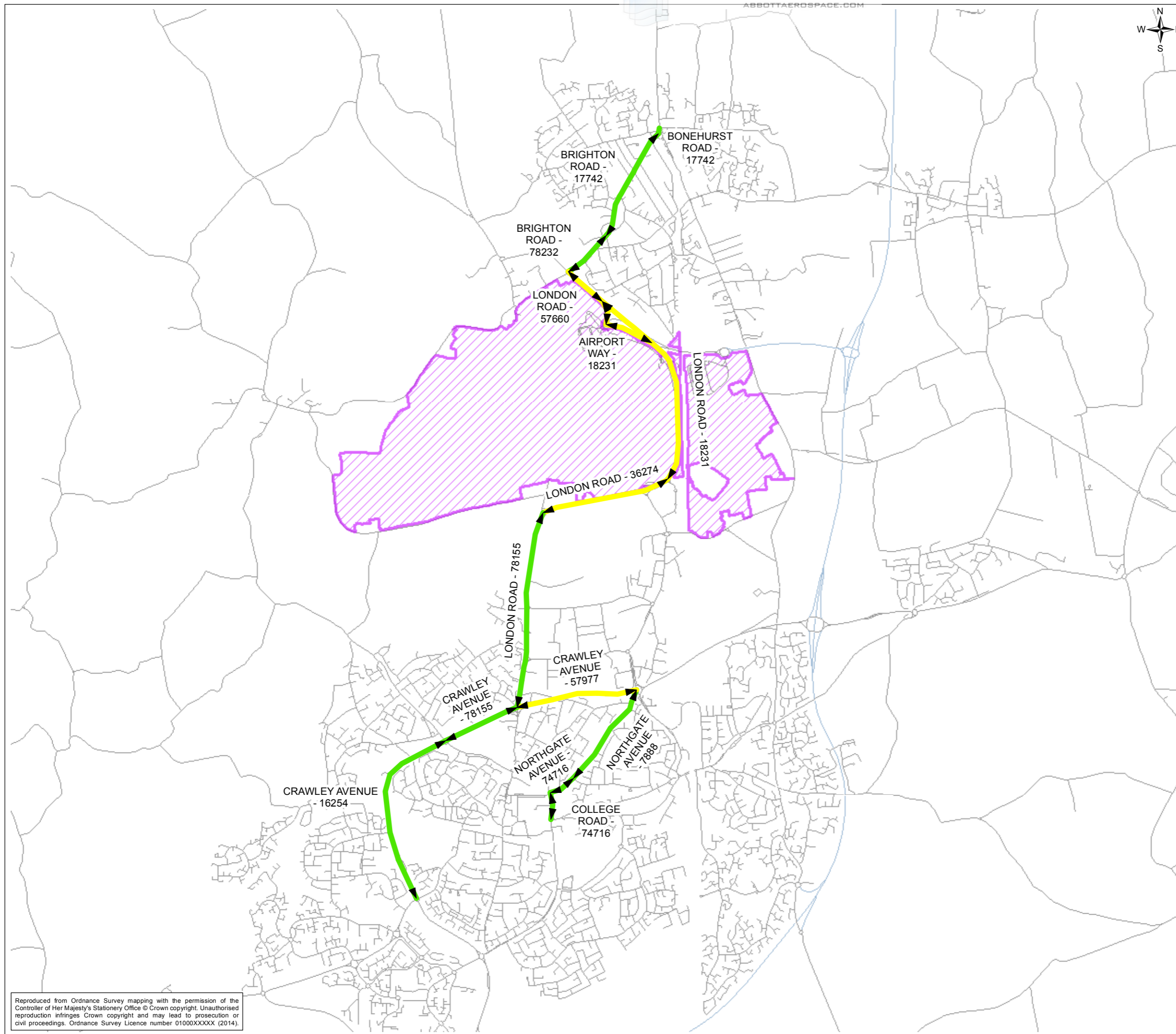
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FIGURE 4.4

- Legend
- 32 - 40 At Risk of Exceeding the Limit Value
 - >40 Exceeding the Limit Value
 - Gatwick Existing Boundary

The numbers displayed are the Census Area Identification Numbers.



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PCM Annual Mean Roadside NO₂ Concentrations (µg/m³) – 2009

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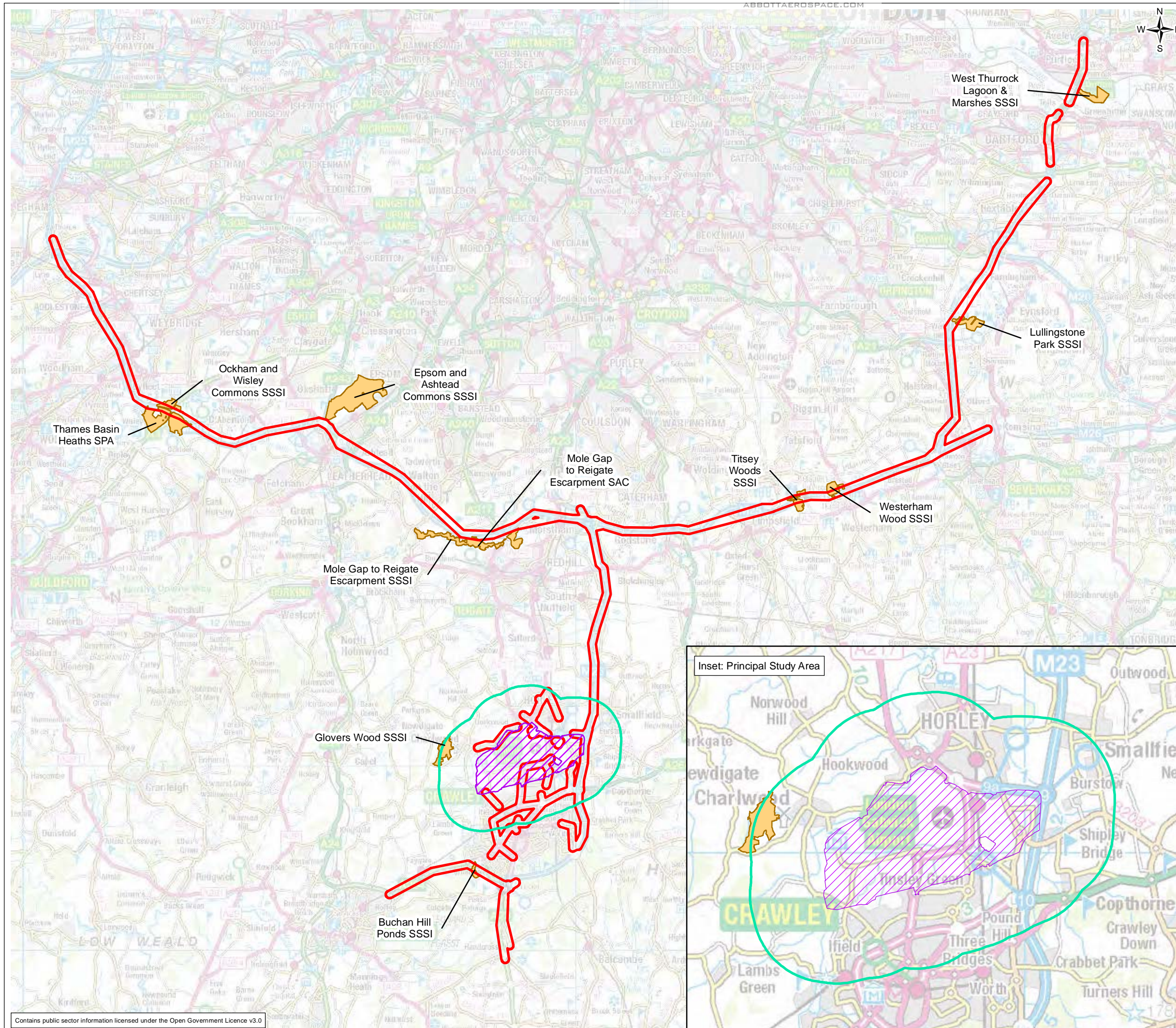
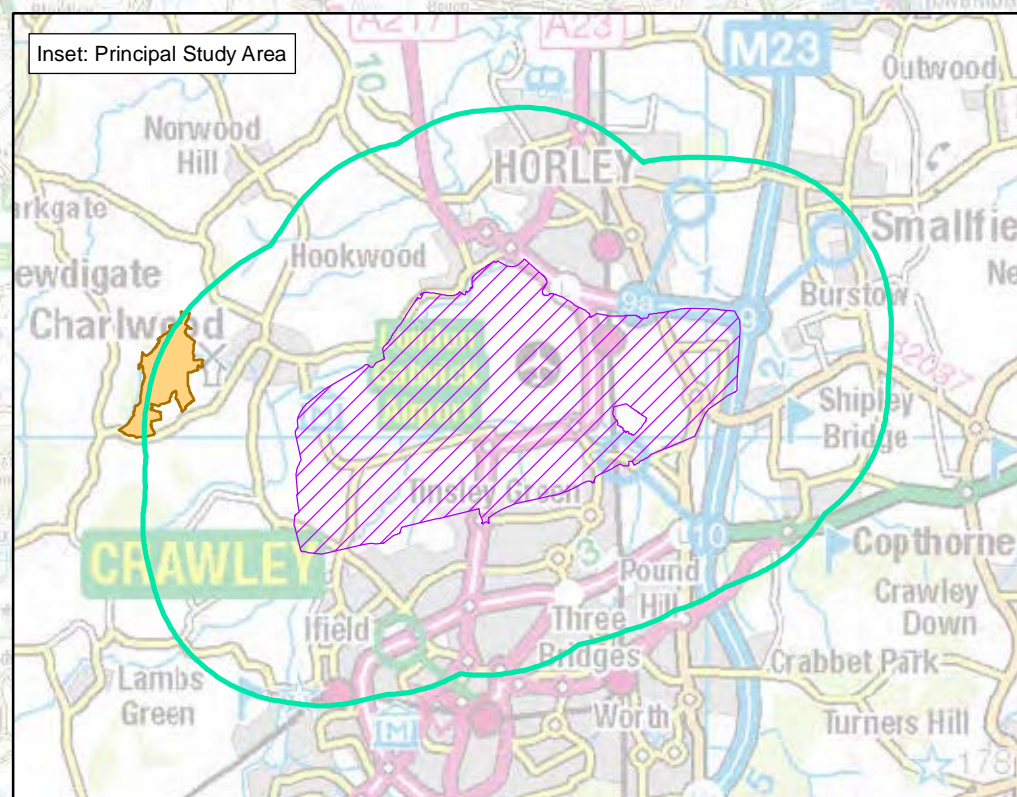


FIGURE 4.5

Legend

- Gatwick 2R boundary
- Wider Study Area
- Principal Study Area
- Statutory Designated Nature Conservation sites of International/European and National importance*

*Explanatory note:
 These sites include Ramsar sites, Special Areas of Conservation (SAC), Special Protection Areas (SPA), Sites of Special Scientific Interest (SSSI) and National Nature Reserves (NNR) where they are located within or adjacent to the Principal and Wider study areas (with the exception of sites identified as not sensitive to N deposition and NOx concentrations).



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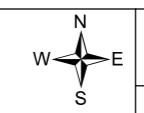
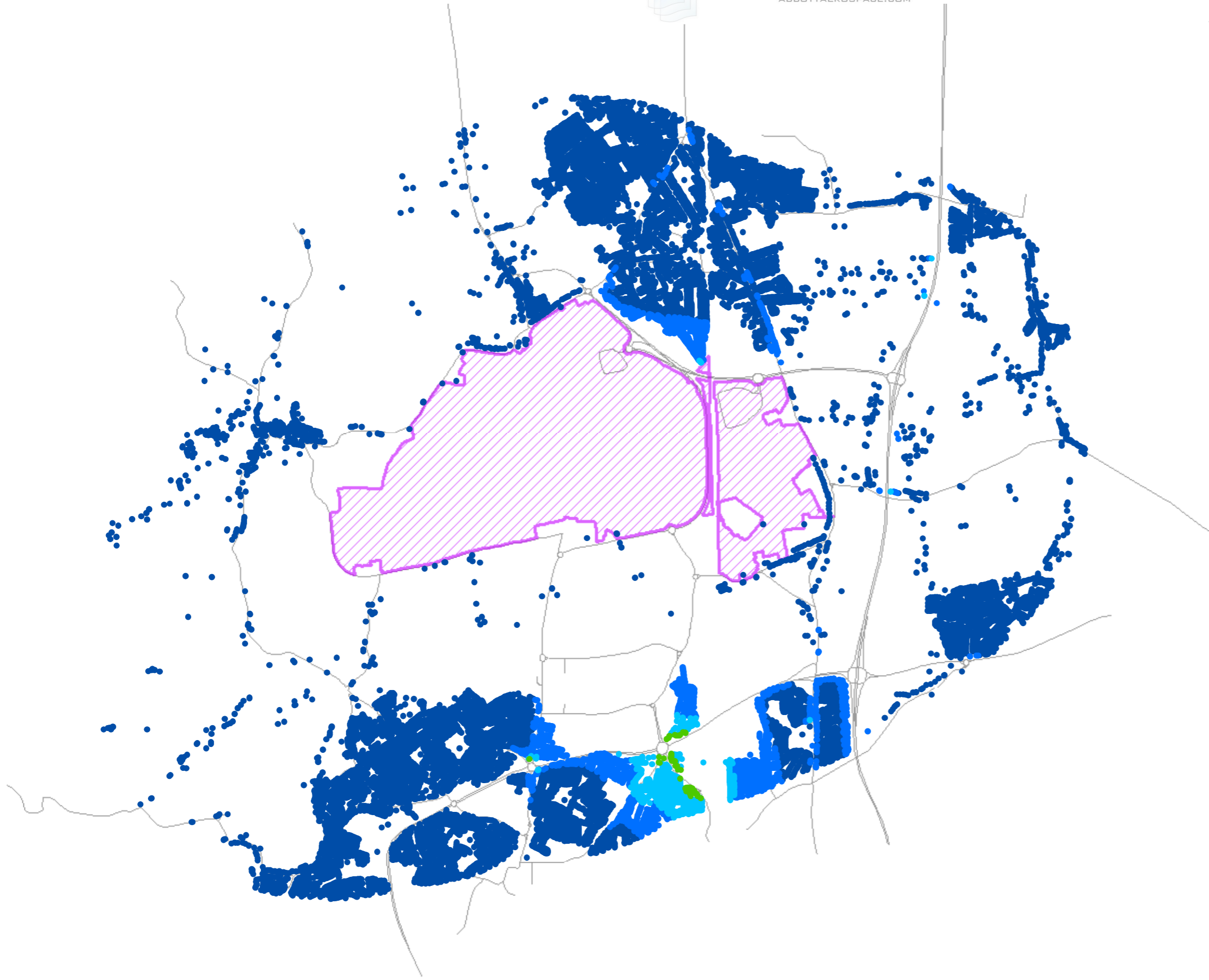


FIGURE 4.6

- Legend
- Predicted Annual Mean NO₂ Concentrations (µg/m³) - 2030**
- < 20
 - 20 - 25
 - 25 - 30
 - 30 - 35
 - 35 - 40
 - 40 - 45
 - 45 - 50
- ▨ Gatwick Existing Boundary



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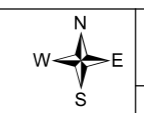
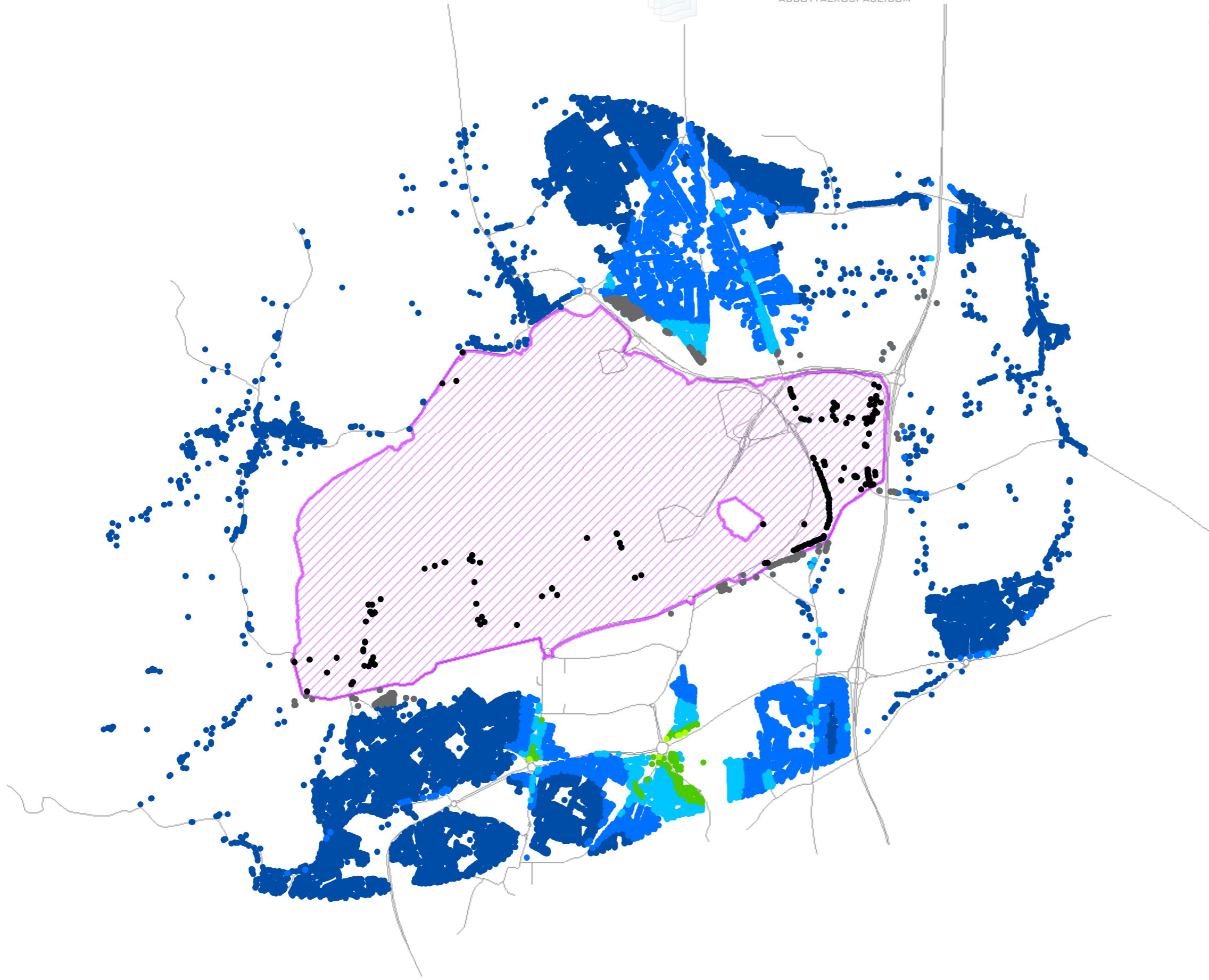


FIGURE 4.7

- Legend
- Predicted Annual Mean NO₂ Concentrations (µg/m³) - 2030**
- < 20
 - 20 - 25
 - 25 - 30
 - 30 - 35
 - 35 - 40
 - 40 - 45
 - 45 - 50
- Receptors within 200m of modelled indicative new road alignment
 - Receptors Directly Impacted by Scheme
- Gatwick 2R Scheme Boundary



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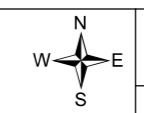
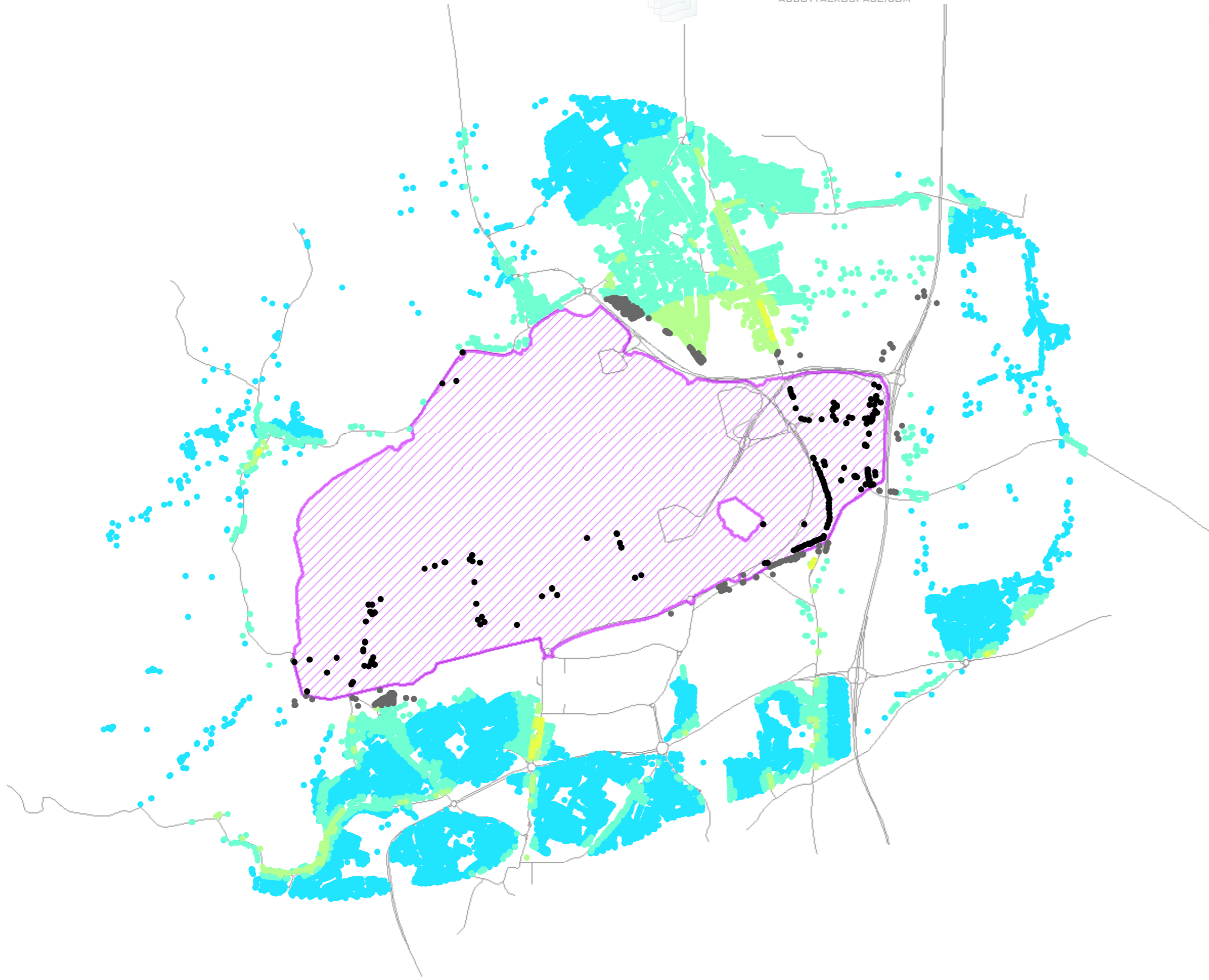


FIGURE 4.8

- Legend**
- Incremental Change to Annual Mean NO₂ Concentrations (ug/m³) - 2030**
- -6 - -4
 - -4 - -2
 - -2 - 0
 - 0 - 2
 - 2 - 4
 - 4 - 6
 - 6 - 8
 - 8 - 10
 - 10 - 12
 - 12 - 14
 - 14 - 16
 - Receptors within 200m of modelled indicative new road alignment
 - Receptors Directly Impacted by Scheme
 - ▨ Gatwick 2R Scheme Boundary



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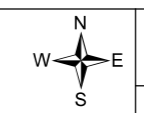
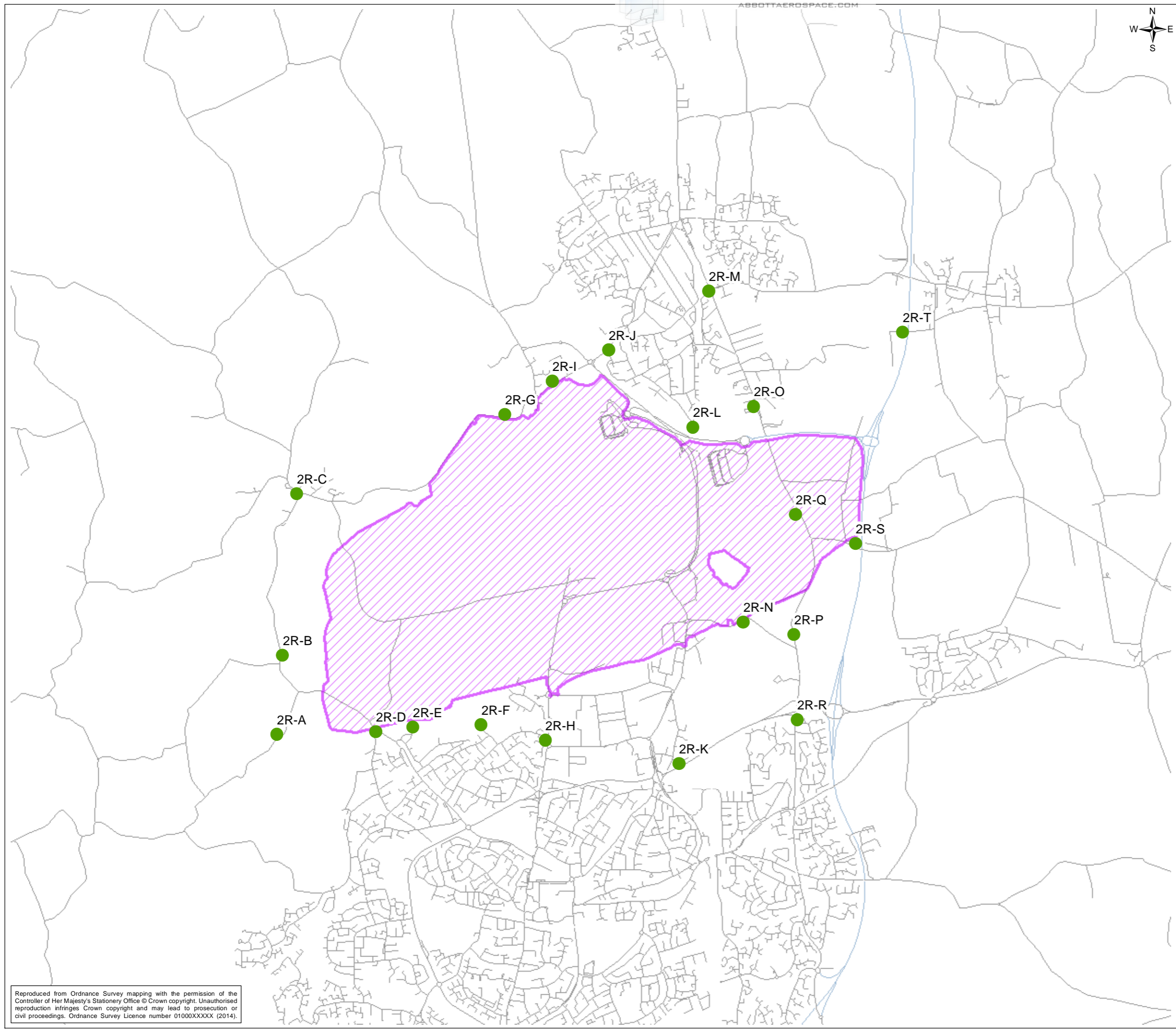


FIGURE 4.9

- Legend**
- Source Apportionment Receptors
 - Gatwick 2R Scheme Boundary



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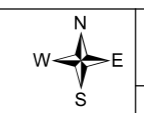
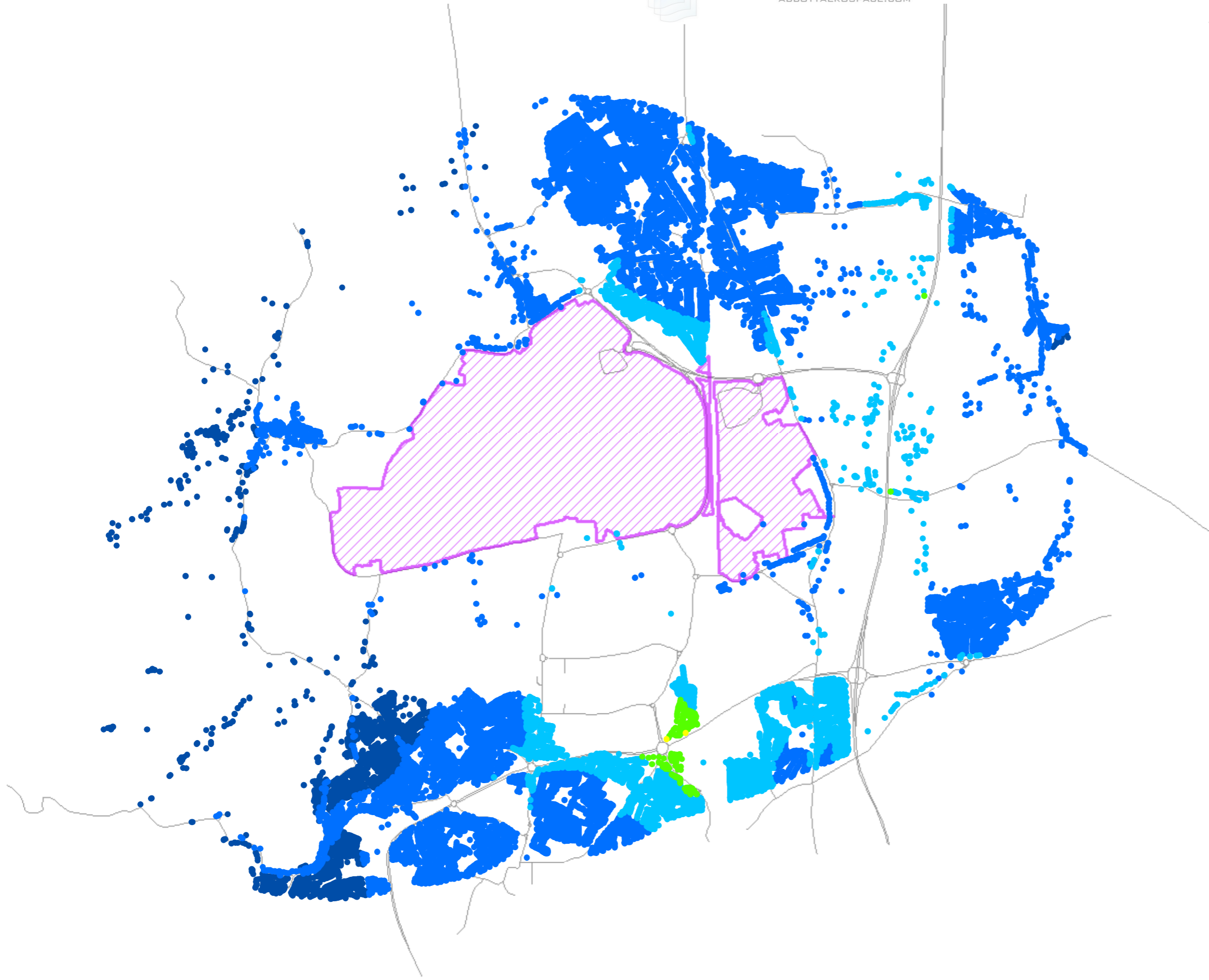


FIGURE 4.10

- Legend
- Predicted Annual Mean PM₁₀ Concentrations (µg/m³) - 2030**
- < 16
 - 16 - 18
 - 18 - 20
 - 20 - 22
 - 22 - 24
 - 24 - 26
- ▨ Gatwick Existing Boundary



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 Do-Minimum Predicted Annual Mean PM₁₀ Concentrations (µg/m³) - 2030

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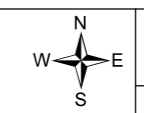
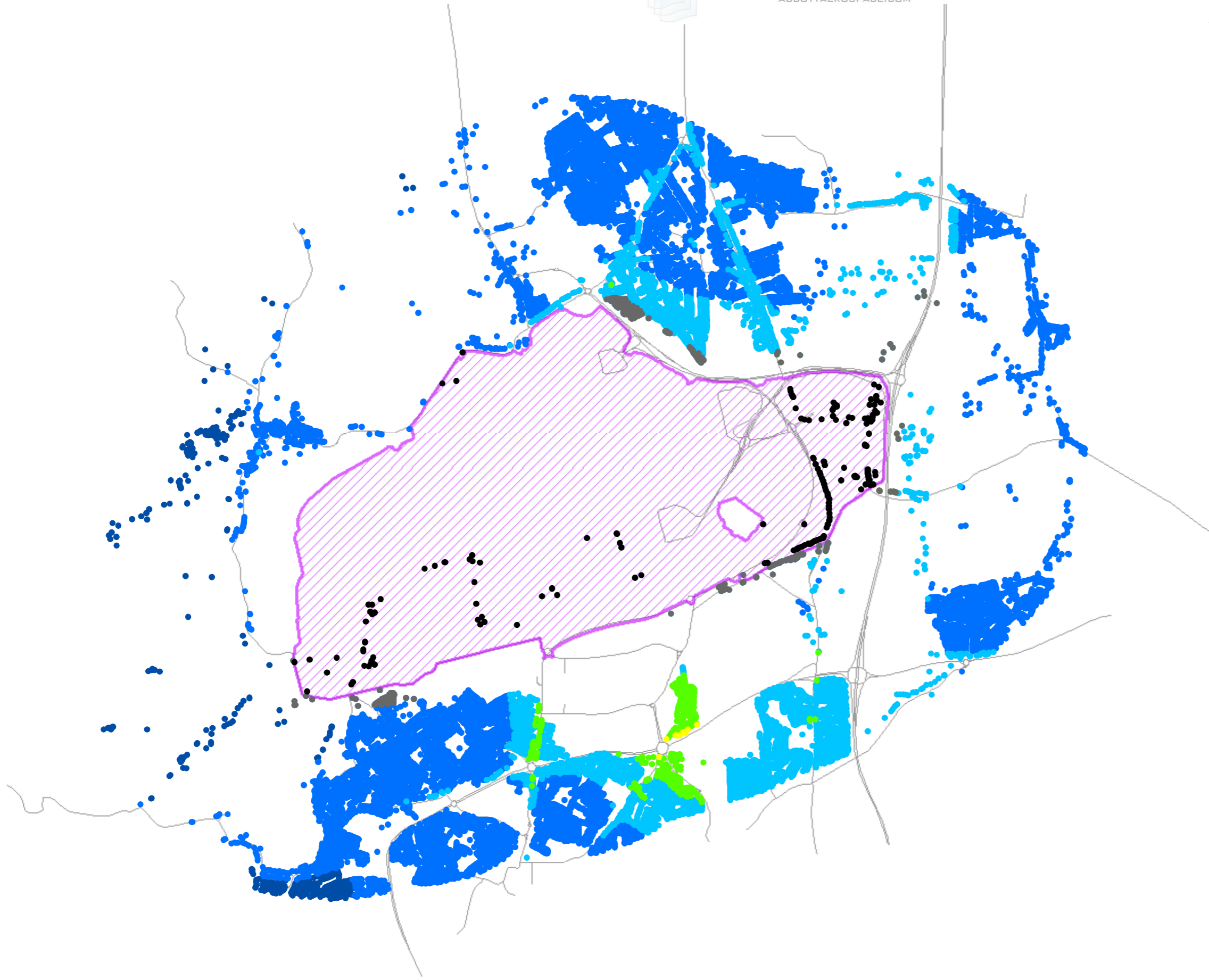


FIGURE 4.11

- Legend
- Predicted Annual Mean PM₁₀ Concentrations (µg/m³) - 2030**
- < 16
 - 16 - 18
 - 18 - 20
 - 20 - 22
 - 22 - 24
 - 24 - 26
- Receptors within 200m of modelled indicative new road alignment
 - Receptors Directly Impacted by Scheme
- Gatwick 2R Scheme Boundary



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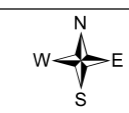
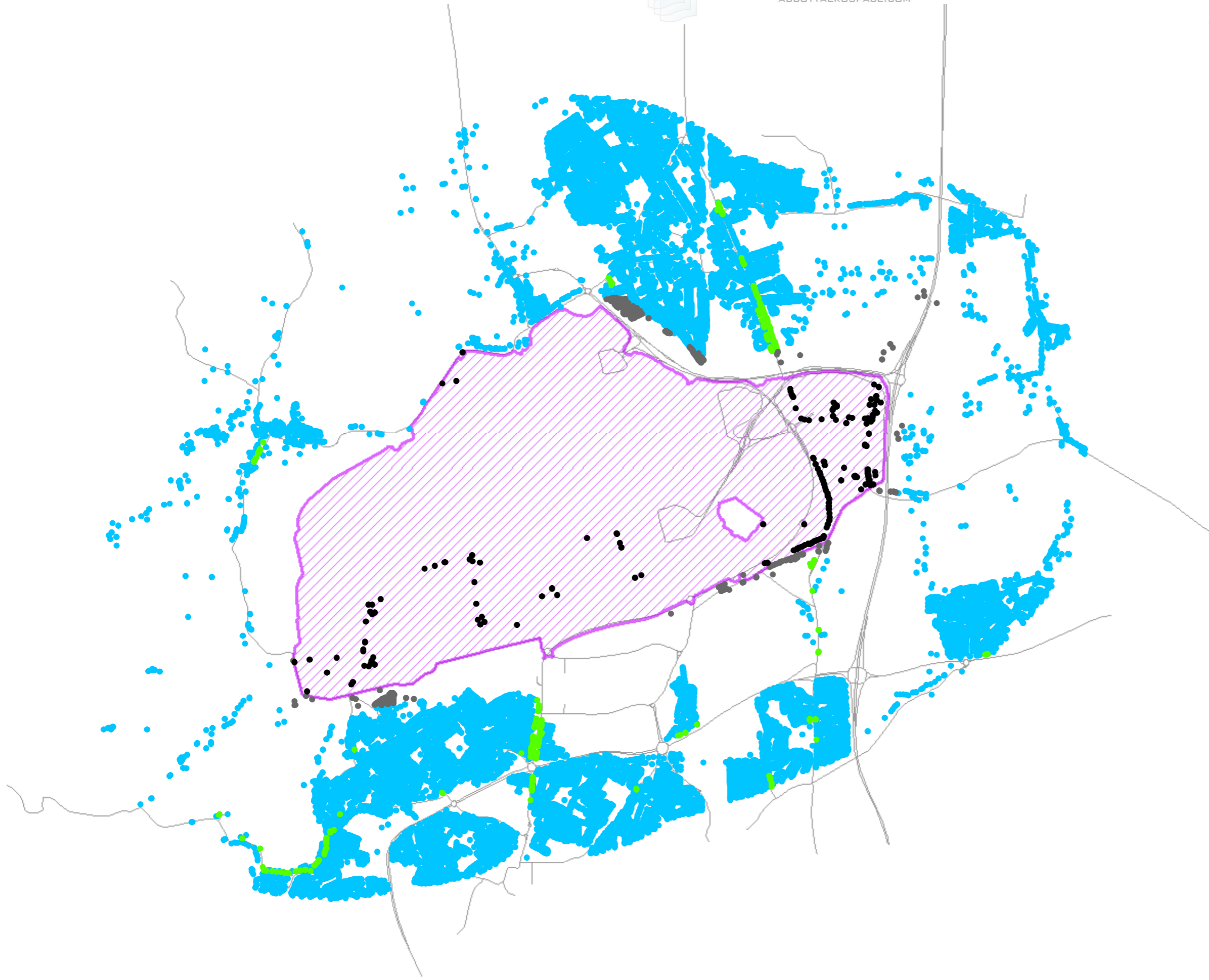


FIGURE 4.12

- Legend
- Incremental Change to Annual Mean PM₁₀ Concentrations (ug/m³) - 2030**
- -1 - 0
 - 0 - 1
 - 1 - 2
 - 2 - 3
 - 3 - 4
 - 4 - 5
 - Receptors within 200m of modelled indicative new road alignment
 - Receptors Directly Impacted by Scheme
 - ▨ Gatwick 2R Scheme Boundary



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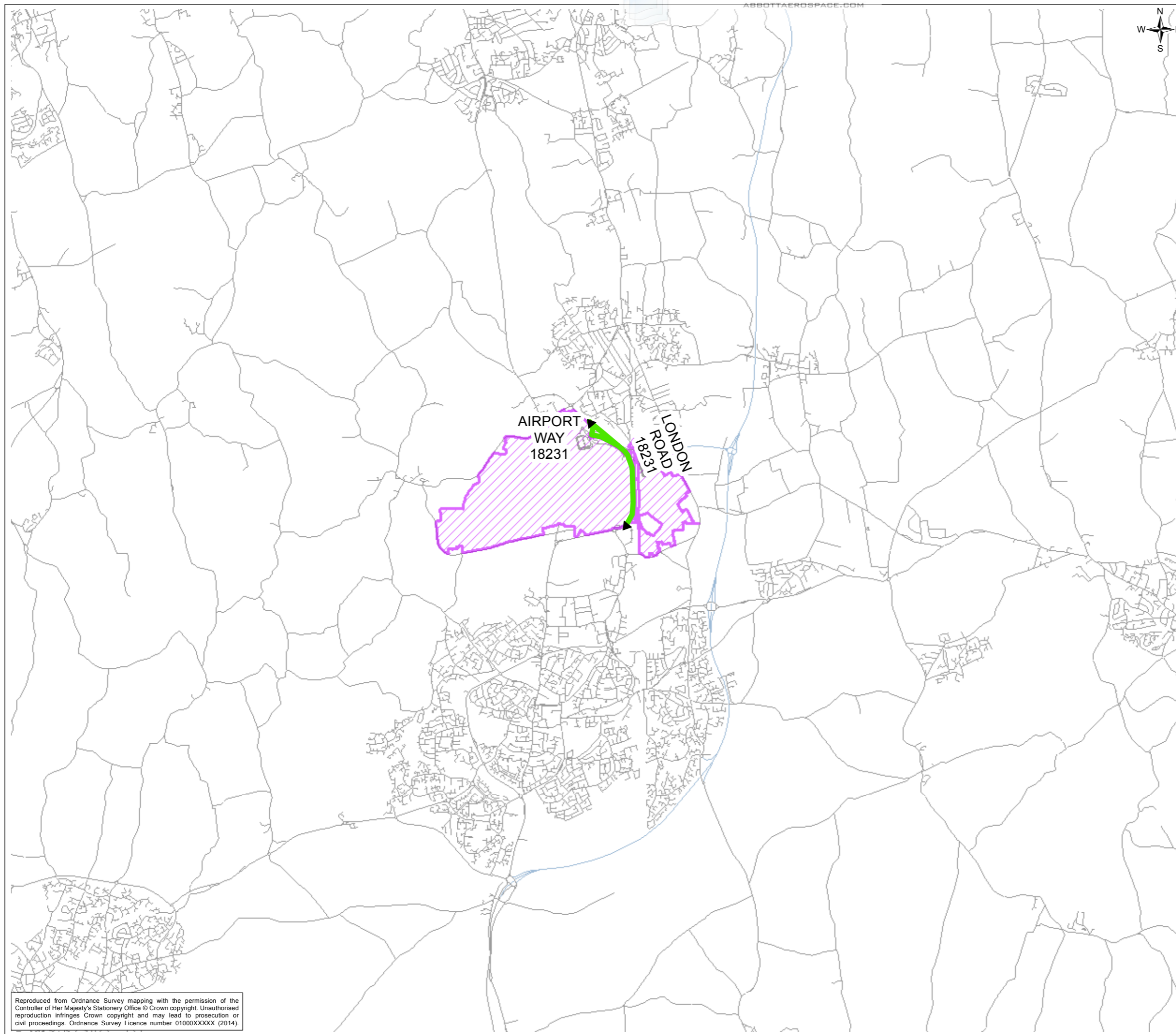
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FIGURE 4.13

- Legend
- 32 - 40 At Risk of Exceeding the Limit Value
 - >40 Exceeding the Limit Value
 - Gatwick Existing Boundary

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 B4160007 - DfT Airports Commission Environmental Support

Drawing Title
 PCM Annual Mean Roadside NO₂ Concentrations (µg/m³) – 2030

Drawing Status
 Scale @ A3: 1:70,000 DO NOT SCALE

Jacobs No. B4160007
 Client No.





Drawing No.
 FIGURE 4.13

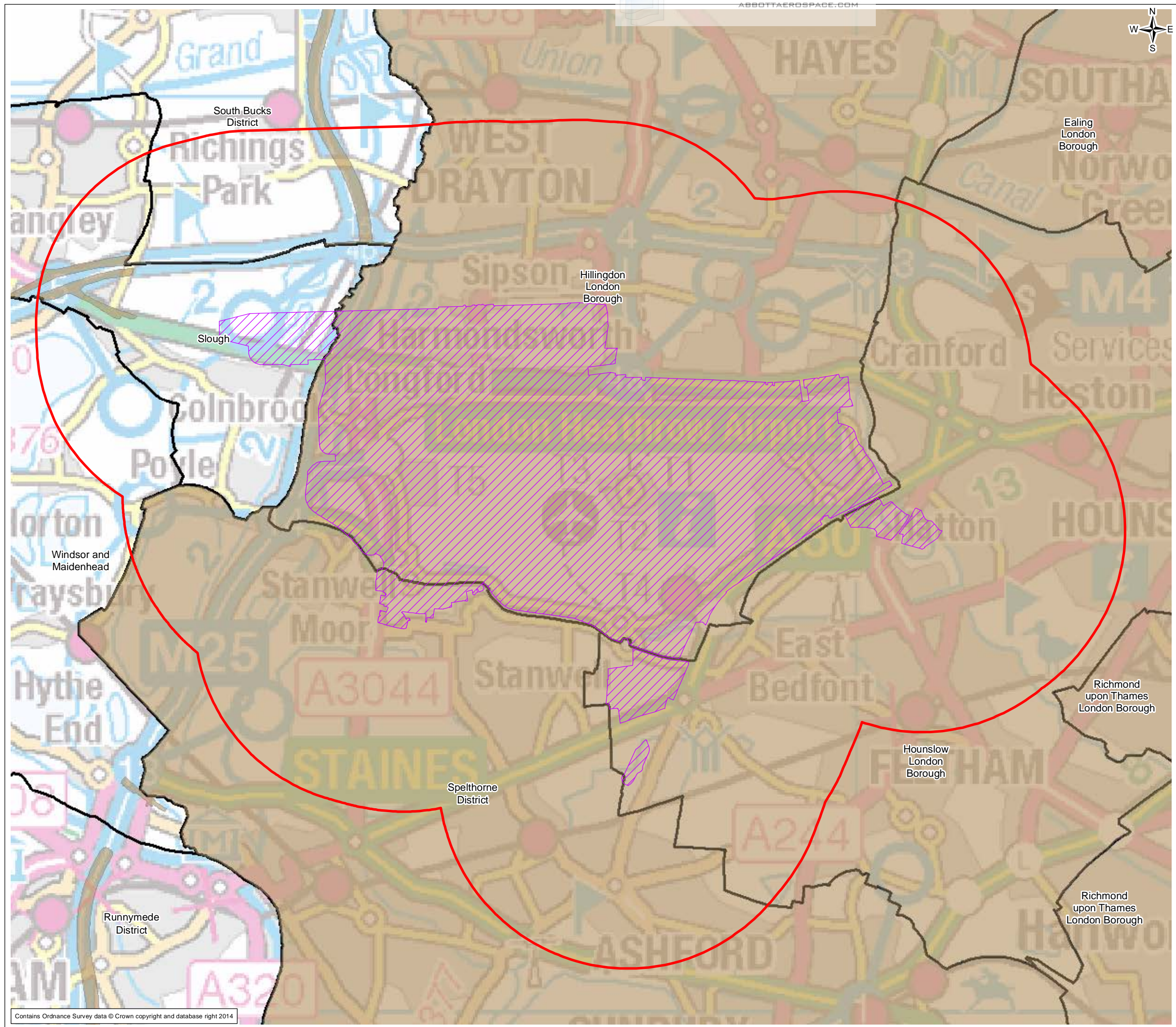
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FIGURE 5.1

- Legend
-  Heathrow NWR boundary
 -  Principal study area
 -  Administrative boundaries
 -  Air Quality Management Areas



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Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd



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Project
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Drawing Title
 Principal Study Area and AQMA Boundaries - Heathrow NWR

Drawing Status
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Drawing No.: **FIGURE 5.1**

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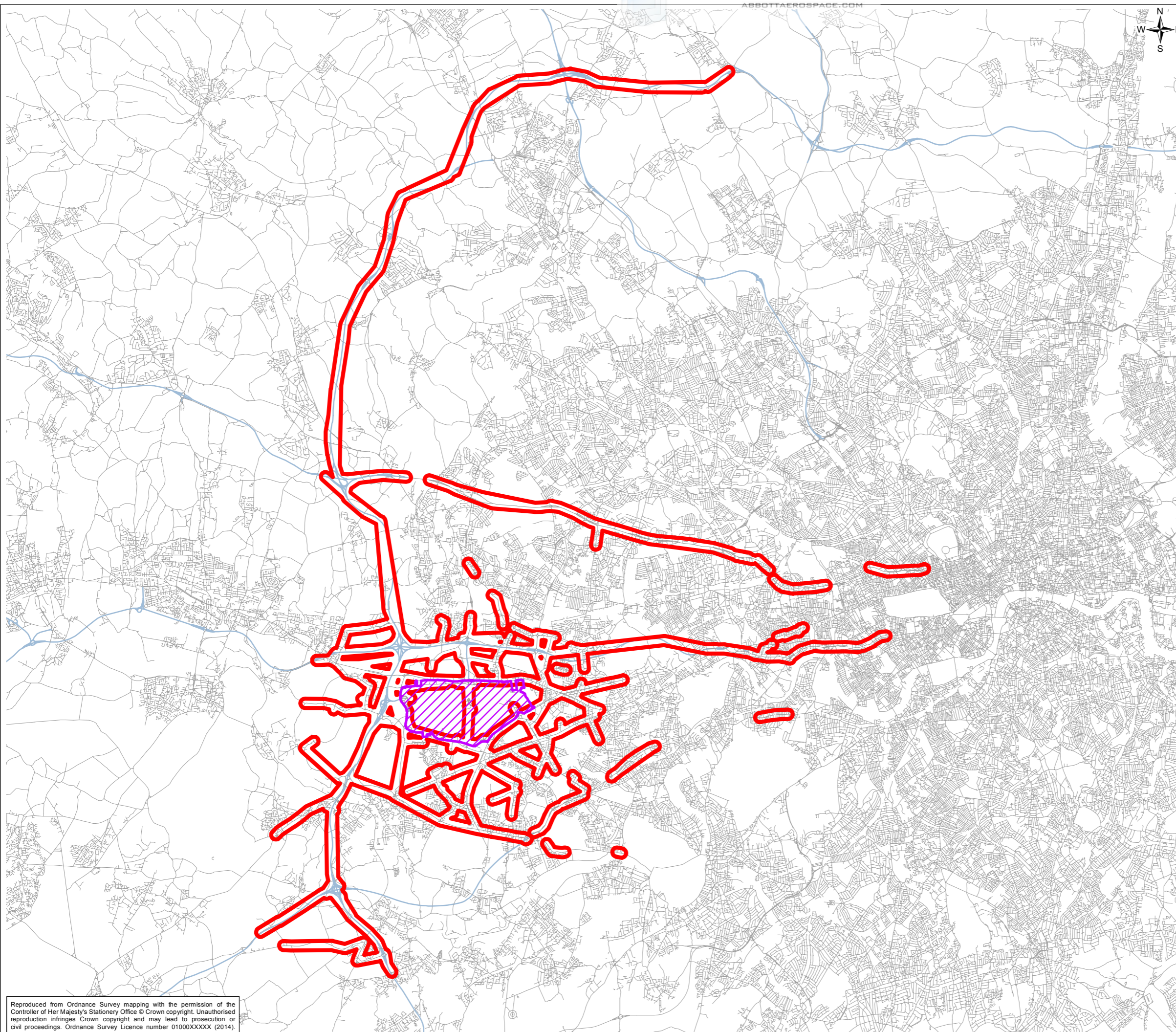
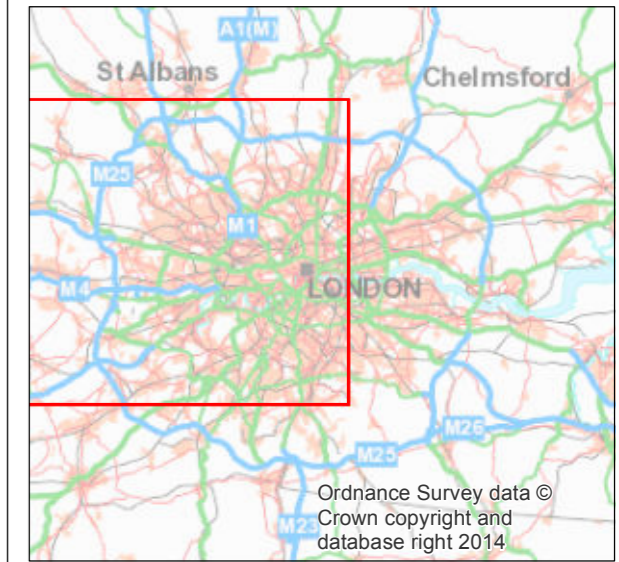


FIGURE 5.2

- Legend**
- NWR Wider Study Area (Road Links Affected by the Scheme)
 - Heathrow Existing Boundary



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Wider Study Area – Heathrow NWR

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 Scale @ A3: 1:160,000 DO NOT SCALE
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 Client No.:

Drawing No.
FIGURE 5.2

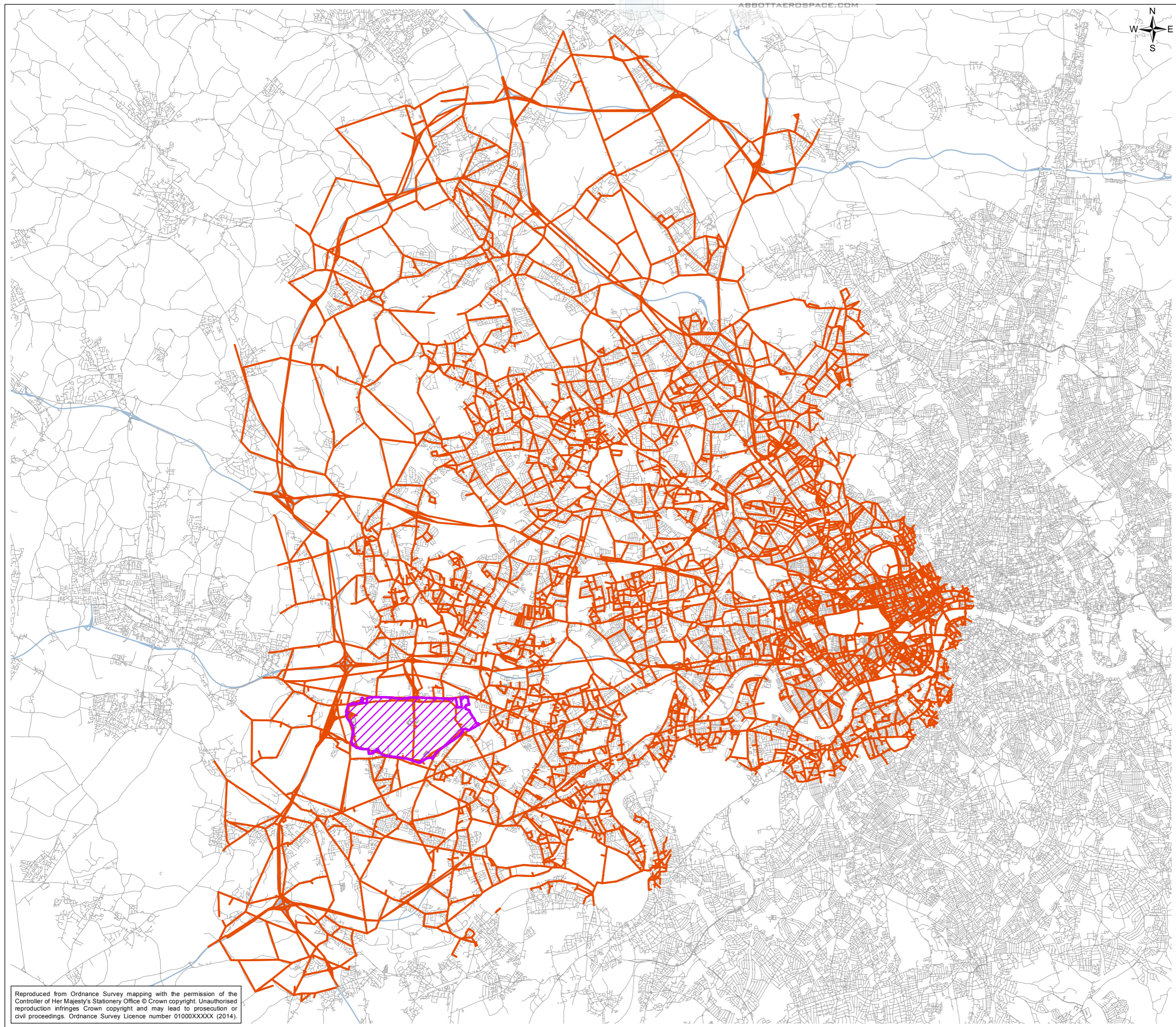
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FIGURE 5.3

- Legend**
- NWR Traffic Simulation Area
 - Heathrow Existing Boundary



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Drawing No.
FIGURE 5.3

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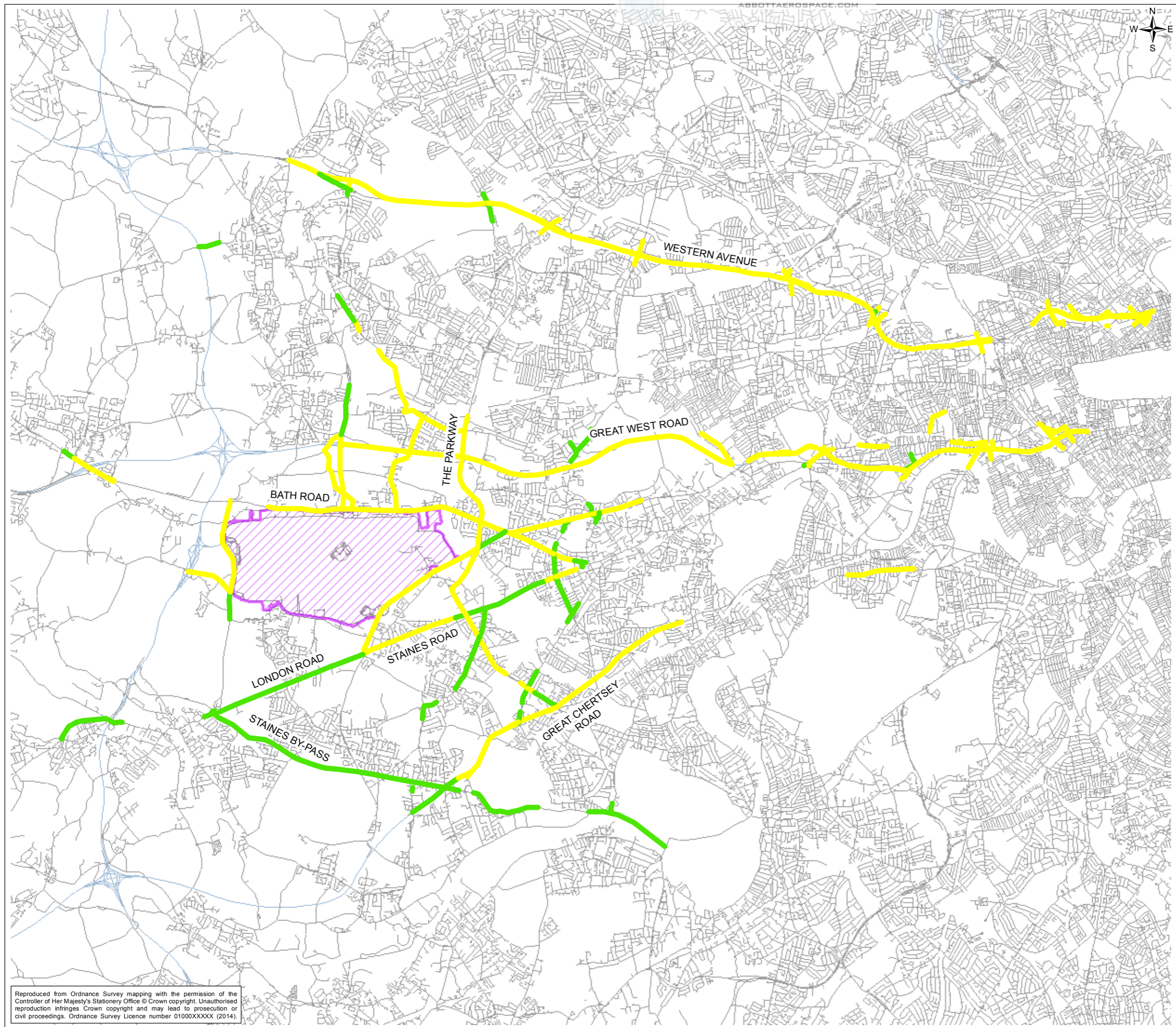


FIGURE 5.4

- Legend
- 32 - 40 At Risk of Exceeding the Limit Value
 - >40 Exceeding the Limit Value
 - Heathrow Existing Boundary



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FIGURE 5.4





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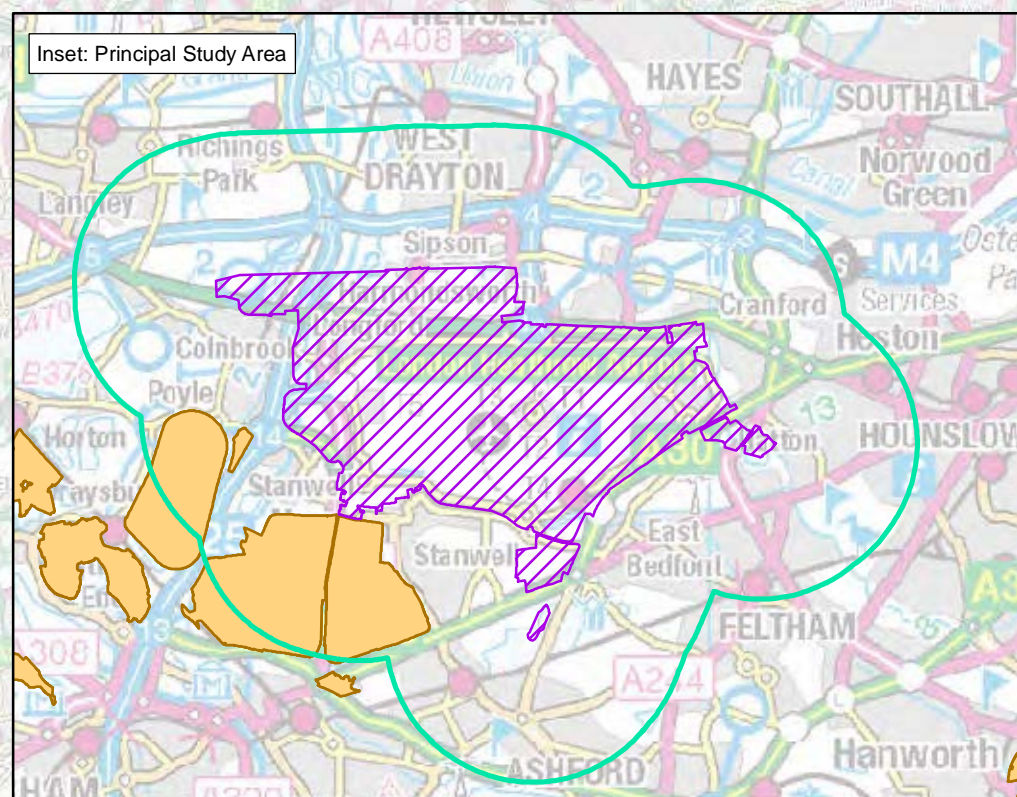
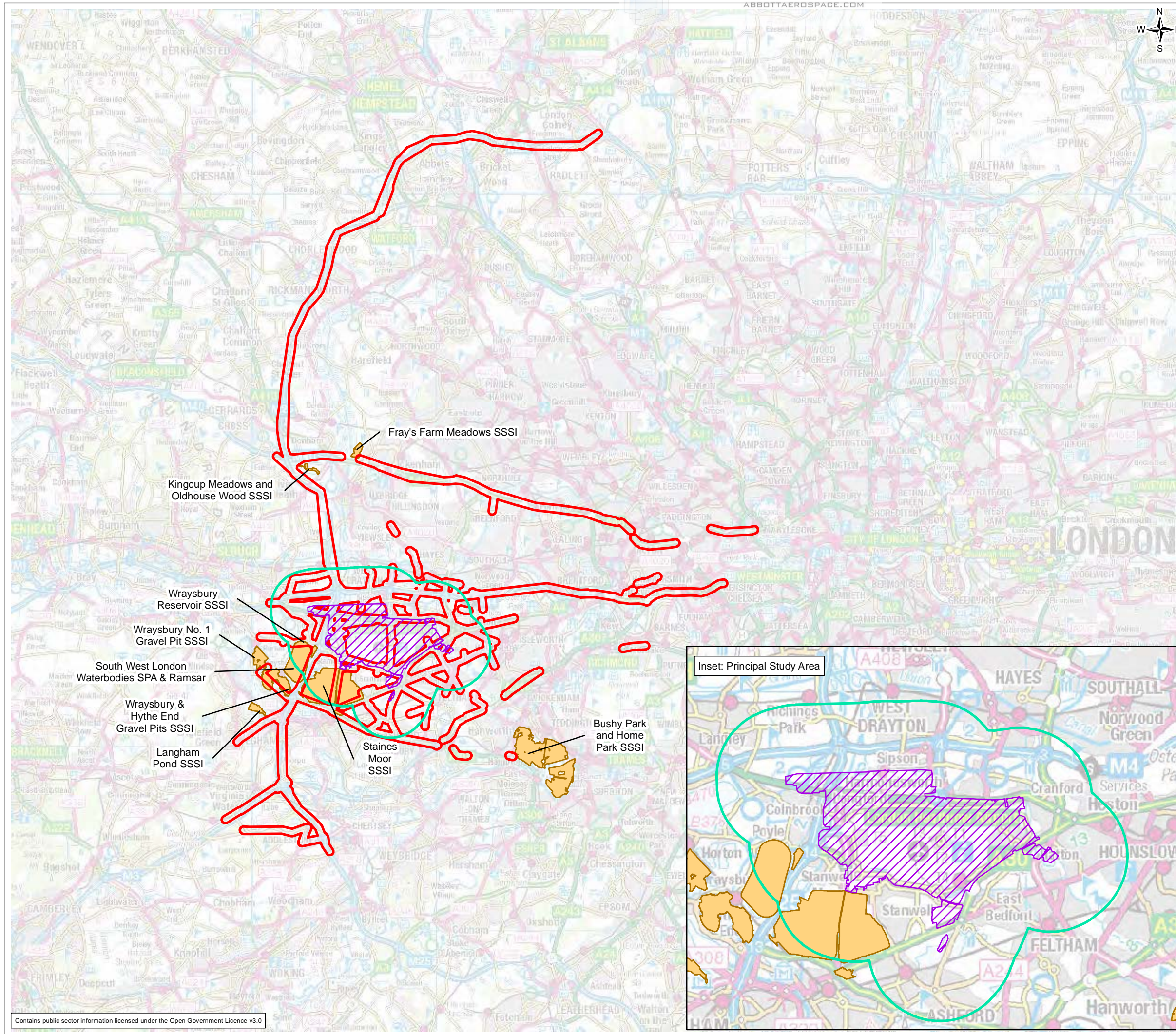


FIGURE 5.5

Legend

-  Heathrow NWR boundary
-  Wider Study Area
-  Principal Study Area
-  Statutory Designated Nature Conservation sites of International/European and National importance*

*Explanatory note:
 These sites include Ramsar sites, Special Areas of Conservation (SAC), Special Protection Areas (SPA), Sites of Special Scientific Interest (SSSI) and National Nature Reserves (NNR) where they are located within or adjacent to the Principal and Wider study areas (with the exception of sites identified as not sensitive to N deposition and NOx concentrations).



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Drawing Title
 International and National Statutory Nature Conservation Designations: Heathrow NWR

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Drawing No. **FIGURE 5.5**

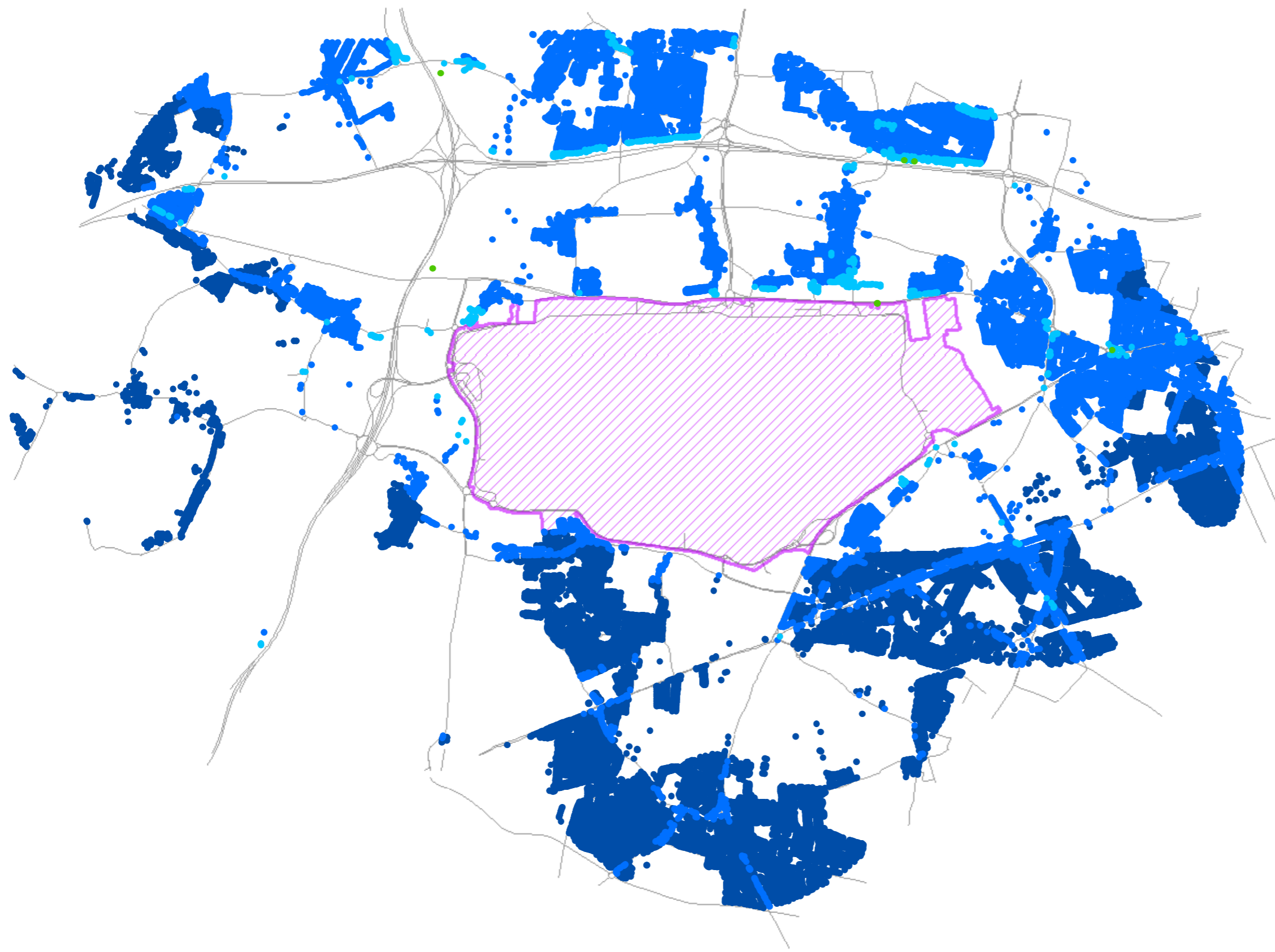
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FIGURE 5.6

Legend
Predicted Annual Mean NO₂ Concentrations (µg/m³) - 2030

- < 20
- 20 - 25
- 25 - 30
- 30 - 35
- 35 - 40
- 40 - 45
- 45 - 50
- ▨ Heathrow Existing Boundary



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Drawing Status
 Scale @ A3: 1:45,000 DO NOT SCALE
 Jacobs No.: B4160007
 Client No.:

Drawing No.
FIGURE 5.6

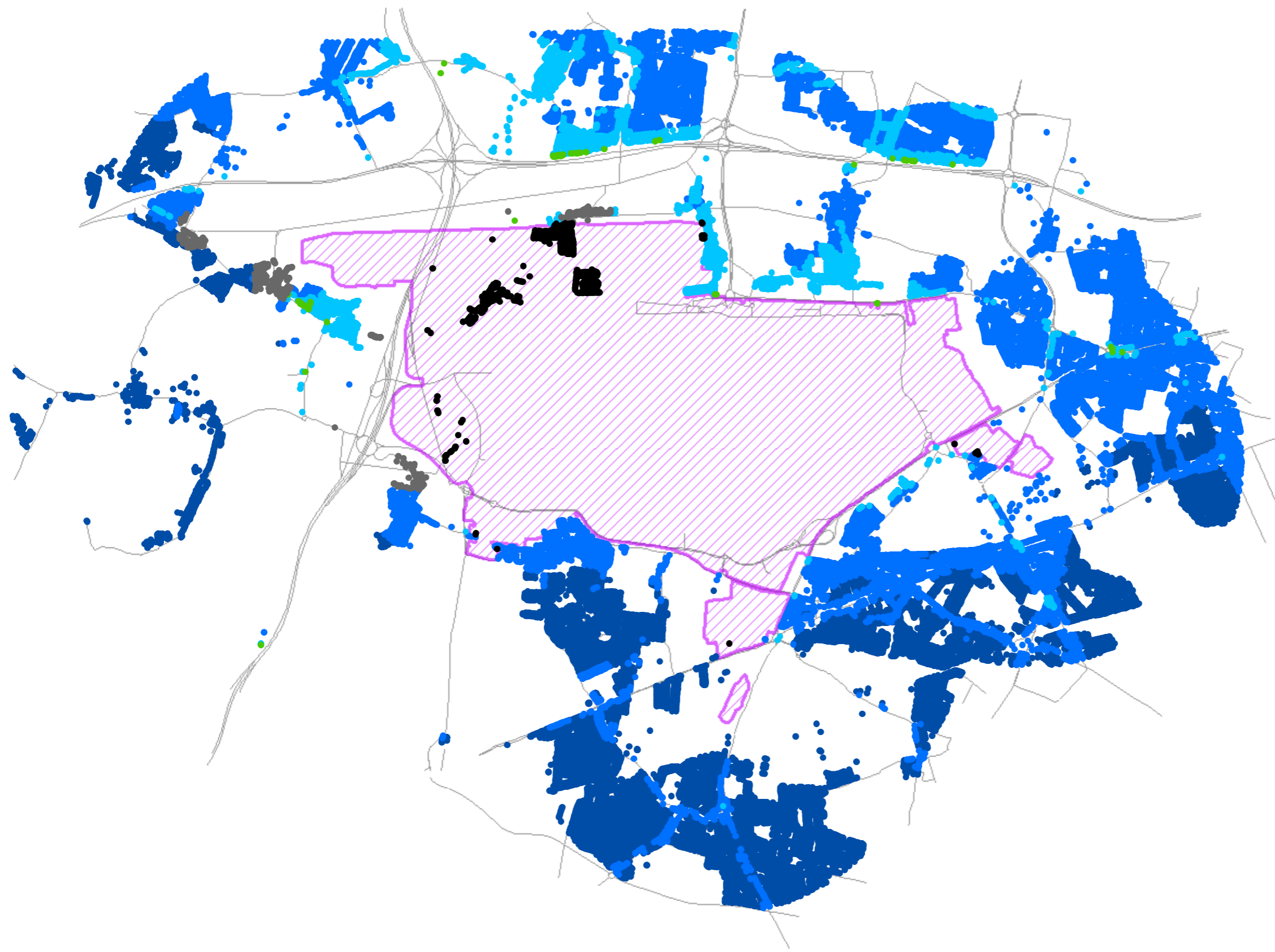
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FIGURE 5.7

- Legend
- Predicted Annual Mean NO₂ Concentrations (µg/m³) - 2030**
- < 20
 - 20 - 25
 - 25 - 30
 - 30 - 35
 - 35 - 40
 - 40 - 45
 - 45 - 50
 - Receptors within 200m of modelled indicative new road alignment
 - Receptors Directly Impacted by Scheme
 - ▨ Heathrow NWR Scheme Boundary



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Drawing Title
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Drawing No. **FIGURE 5.7**

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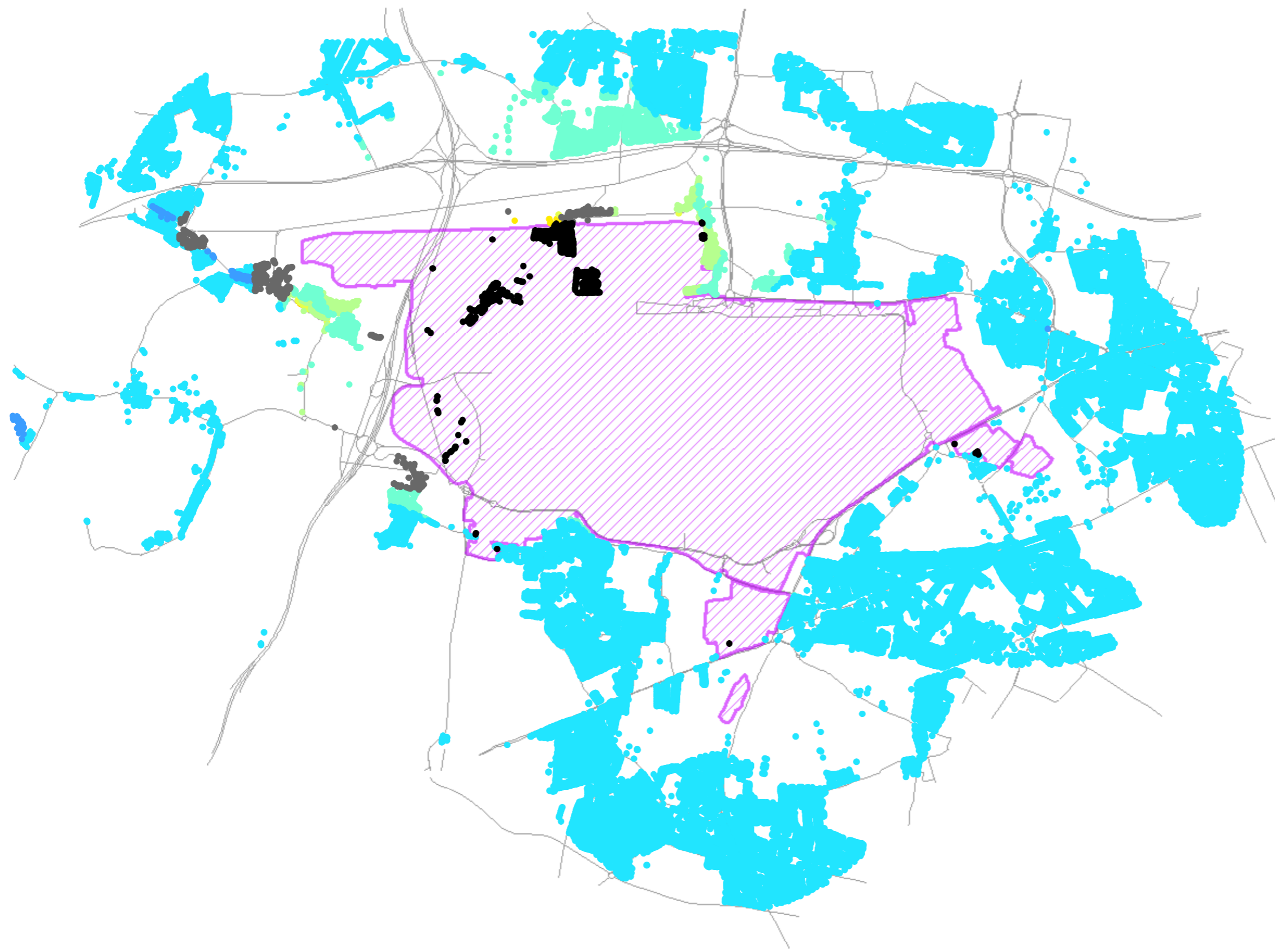


FIGURE 5.8

Legend

Incremental Change to Annual Mean NO₂ Concentrations (ug/m³) - 2030

- -6 - -4
- -4 - -2
- -2 - 0
- 0 - 2
- 2 - 4
- 4 - 6
- 6 - 8
- 8 - 10
- 10 - 12
- 12 - 14
- 14 - 16
- Receptors within 200m of modelled indicative new road alignment
- Receptors Directly Impacted by Scheme
- ▨ Heathrow NWR Scheme Boundary



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Jacobs No. B4160007

Drawing No. **FIGURE 5.8**

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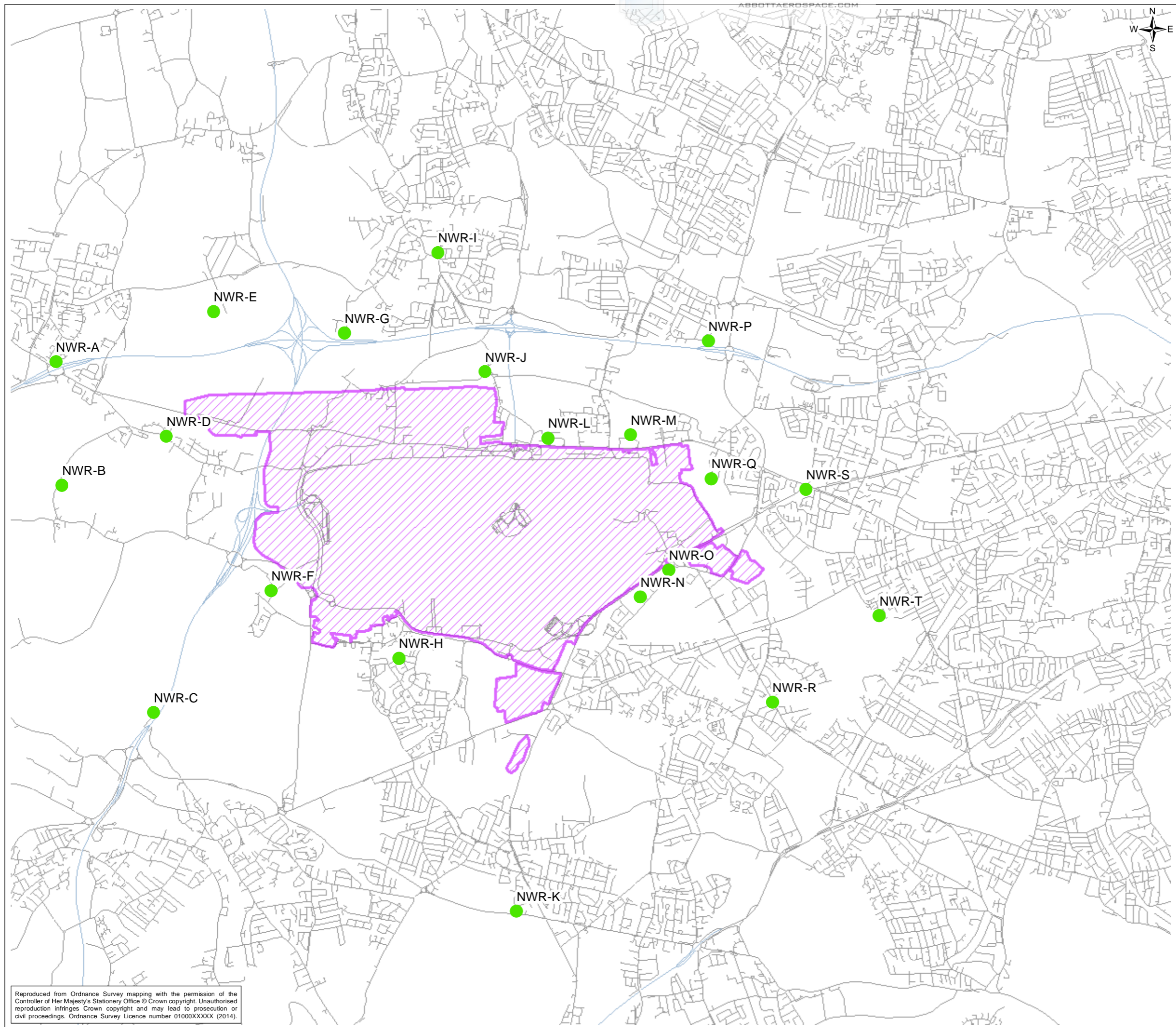


Figure 5.9

- Legend**
- Source Apportionment Receptors
 - Heathrow NWR Scheme Boundary



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FIGURE 5.9

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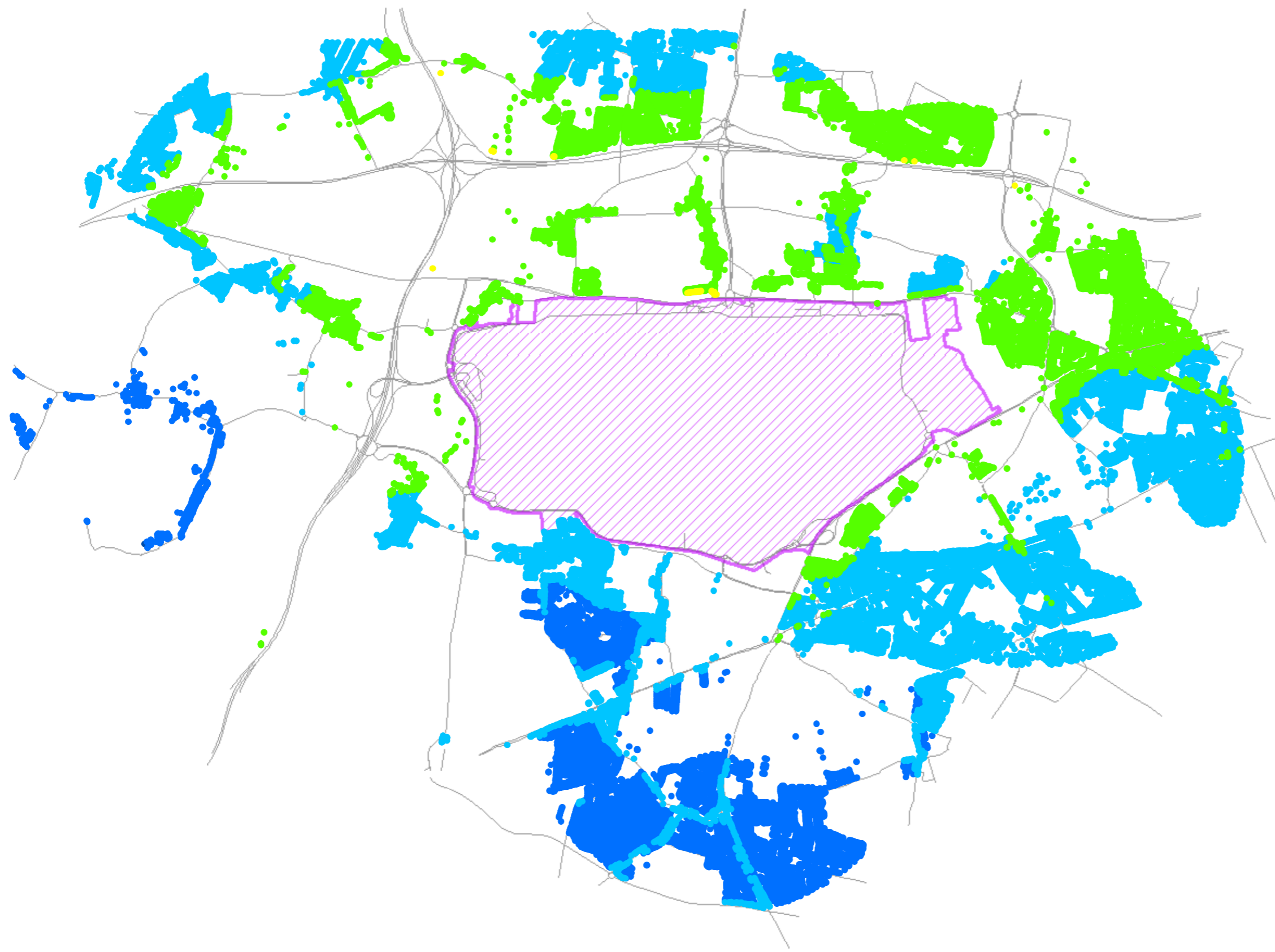


FIGURE 5.10

Legend

Predicted Annual Mean PM₁₀ Concentrations (µg/m³) - 2030

- < 16
- 16 - 18
- 18 - 20
- 20 - 22
- 22 - 24
- 24 - 26
- ▨ Heathrow Existing Boundary



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Do-Minimum Predicted Annual Mean PM₁₀ Concentrations (µg/m³) - 2030

Drawing Status		
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Client No.		
Drawing No.	FIGURE 5.10	

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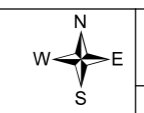
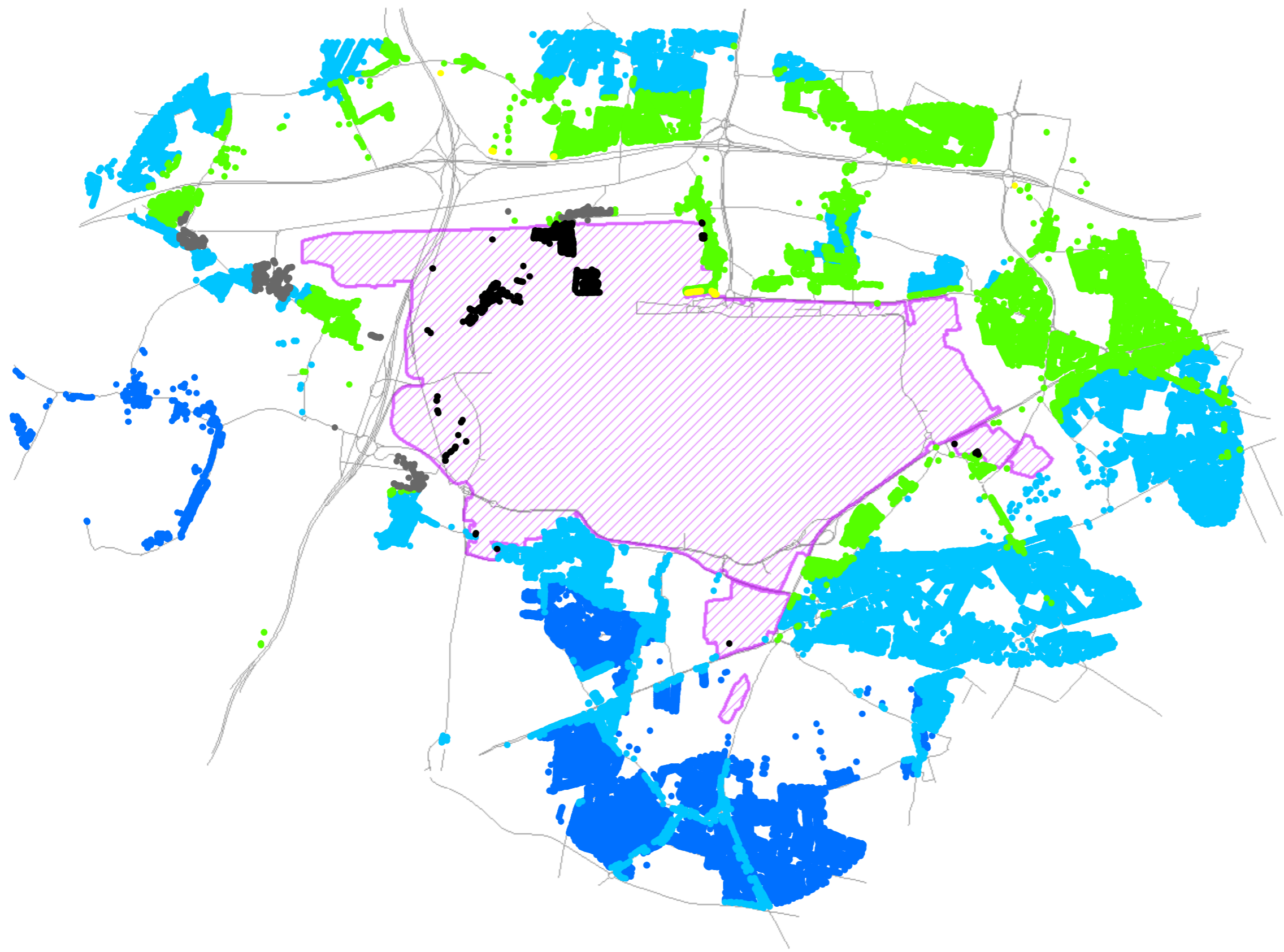


FIGURE 5.11

- Legend
- Predicted Annual Mean PM₁₀ Concentrations (µg/m³) - 2030**
- < 16
 - 16 - 18
 - 18 - 20
 - 20 - 22
 - 22 - 24
 - 24 - 26
 - Receptors within 200m of modelled indicative new road alignment
 - Receptors Directly Impacted by Scheme
 - ▨ Heathrow NWR Scheme Boundary



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Drawing Status
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 Client No.:

Drawing No.
FIGURE 5.11

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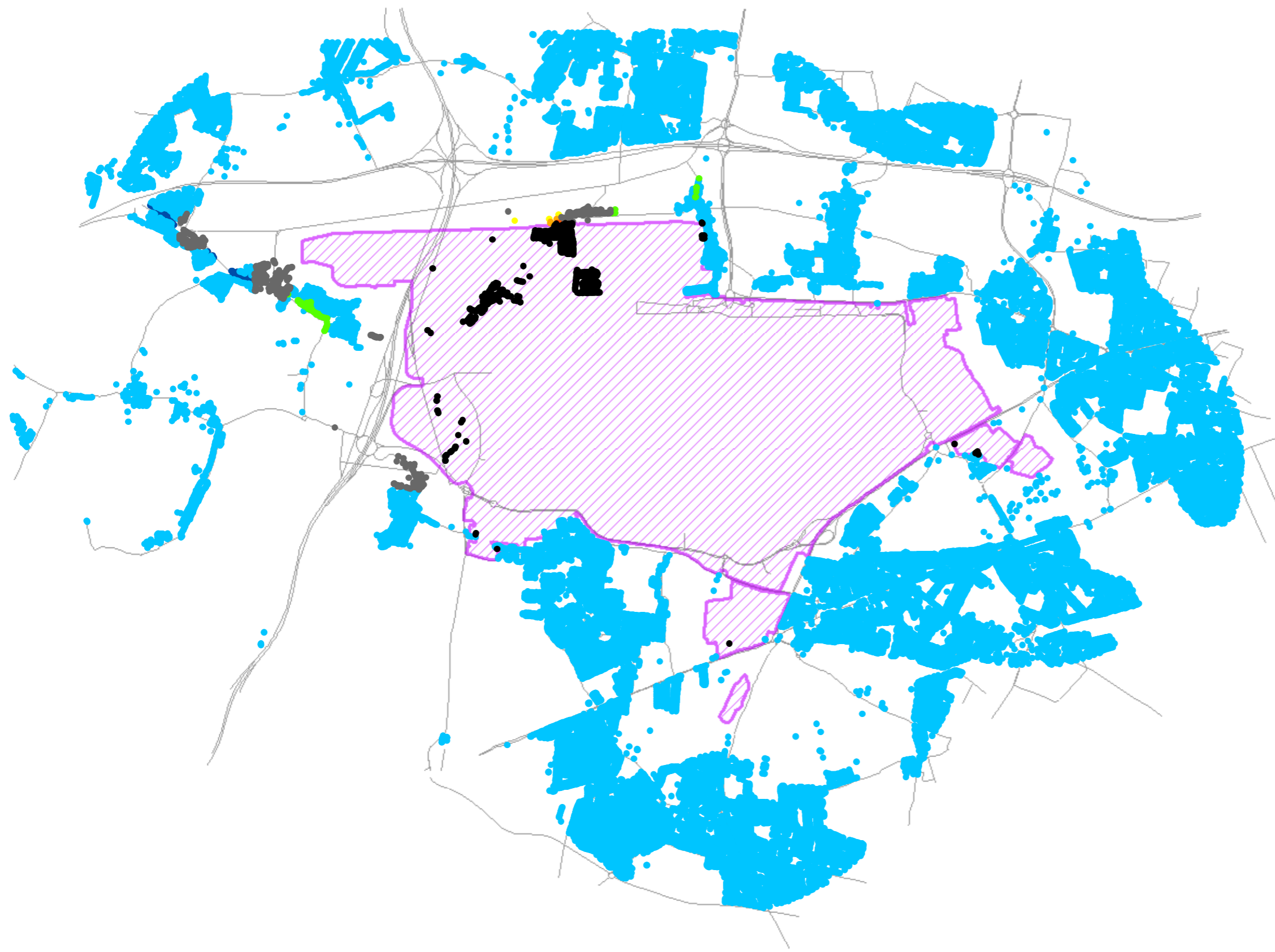


FIGURE 5.12

Legend

Incremental Change to Annual Mean PM₁₀ Concentrations (ug/m³) – 2030

- -1 - 0
- 0 - 1
- 1 - 2
- 2 - 3
- 3 - 4
- 4 - 5
- Receptors within 200m of modelled indicative new road alignment
- Receptors Directly Impacted by Scheme
- ▨ Heathrow NWR Scheme Boundary



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Drawing Title
Incremental Change to Annual Mean PM₁₀ Concentrations (ug/m³) – 2030

Drawing Status
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Drawing No.
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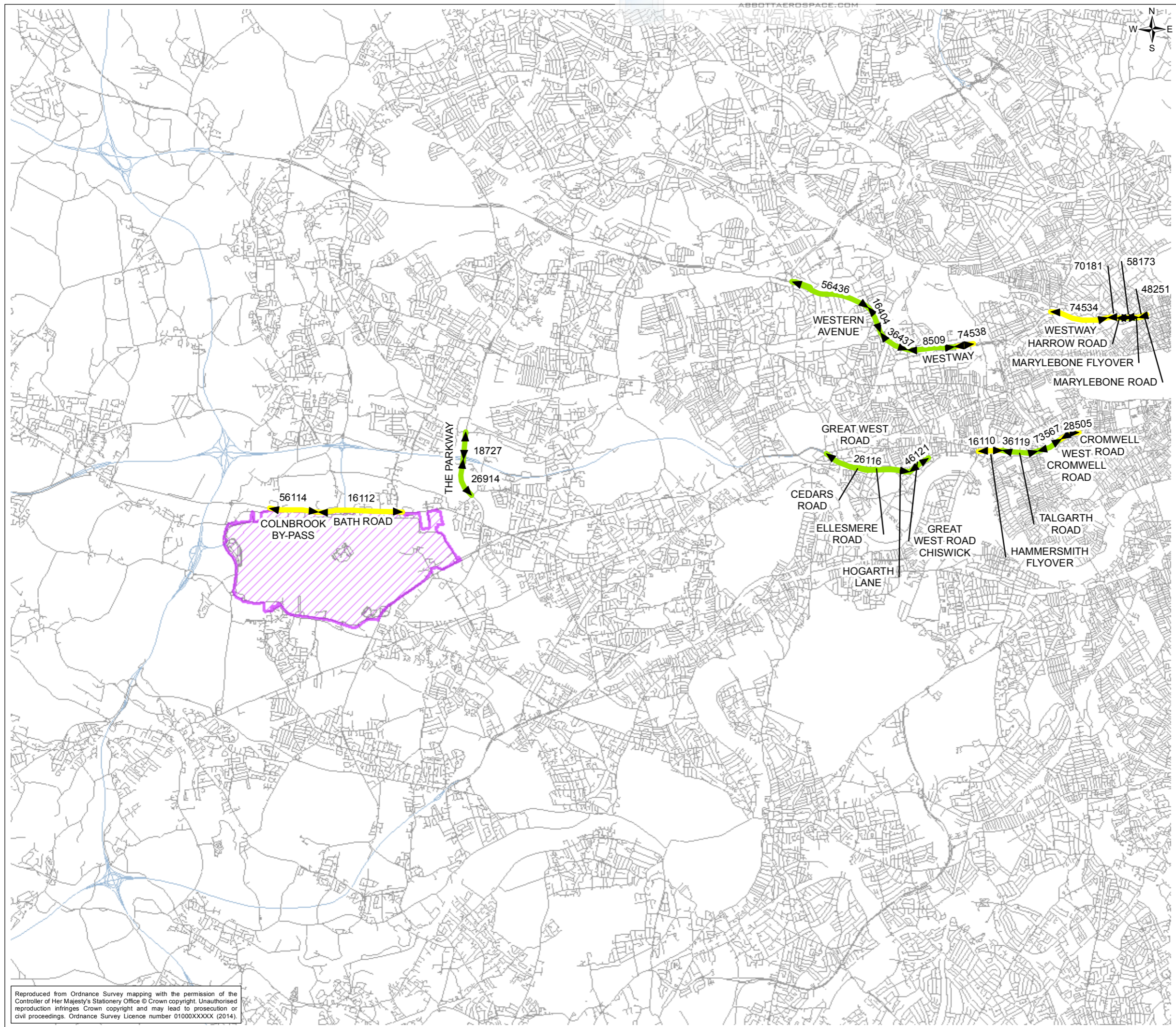
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FIGURE 5.13

- Legend**
- 32 - 40 At Risk of Exceeding the Limit Value
 - >40 Exceeding the Limit Value
 - Heathrow Existing Boundary

The numbers displayed are the Census Area Identification Numbers.



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Drawing Title
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Drawing Status

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Drawing No.
FIGURE 5.13

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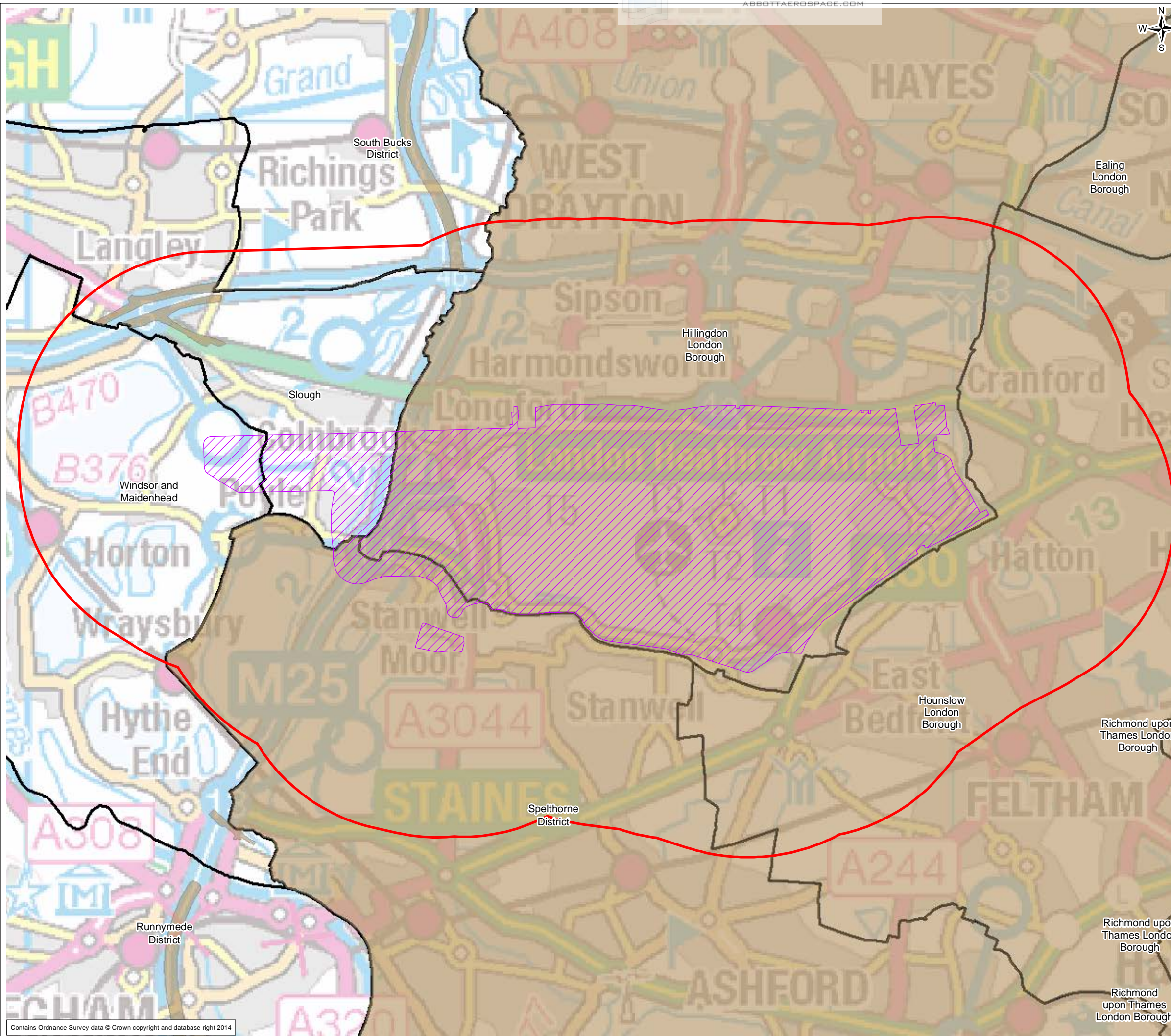






FIGURE 6.1

- Legend
-  Heathrow ENR boundary
 -  Principal study area
 -  Administrative boundaries
 -  Air Quality Management Areas

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 Principal Study Area and AQMA Boundaries - Heathrow ENR

Drawing Status

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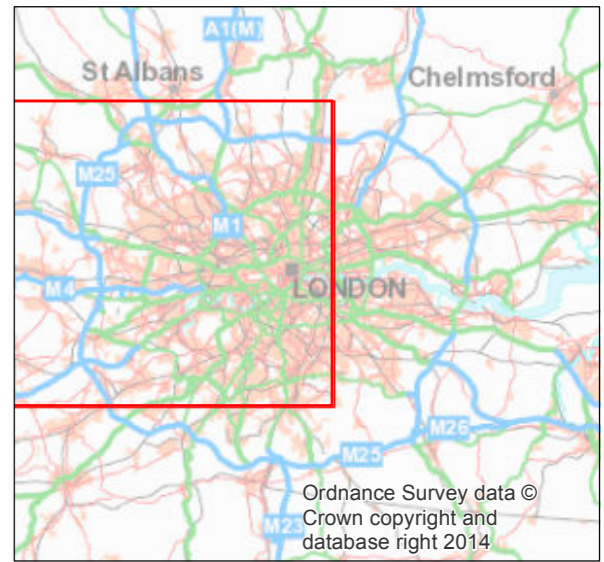
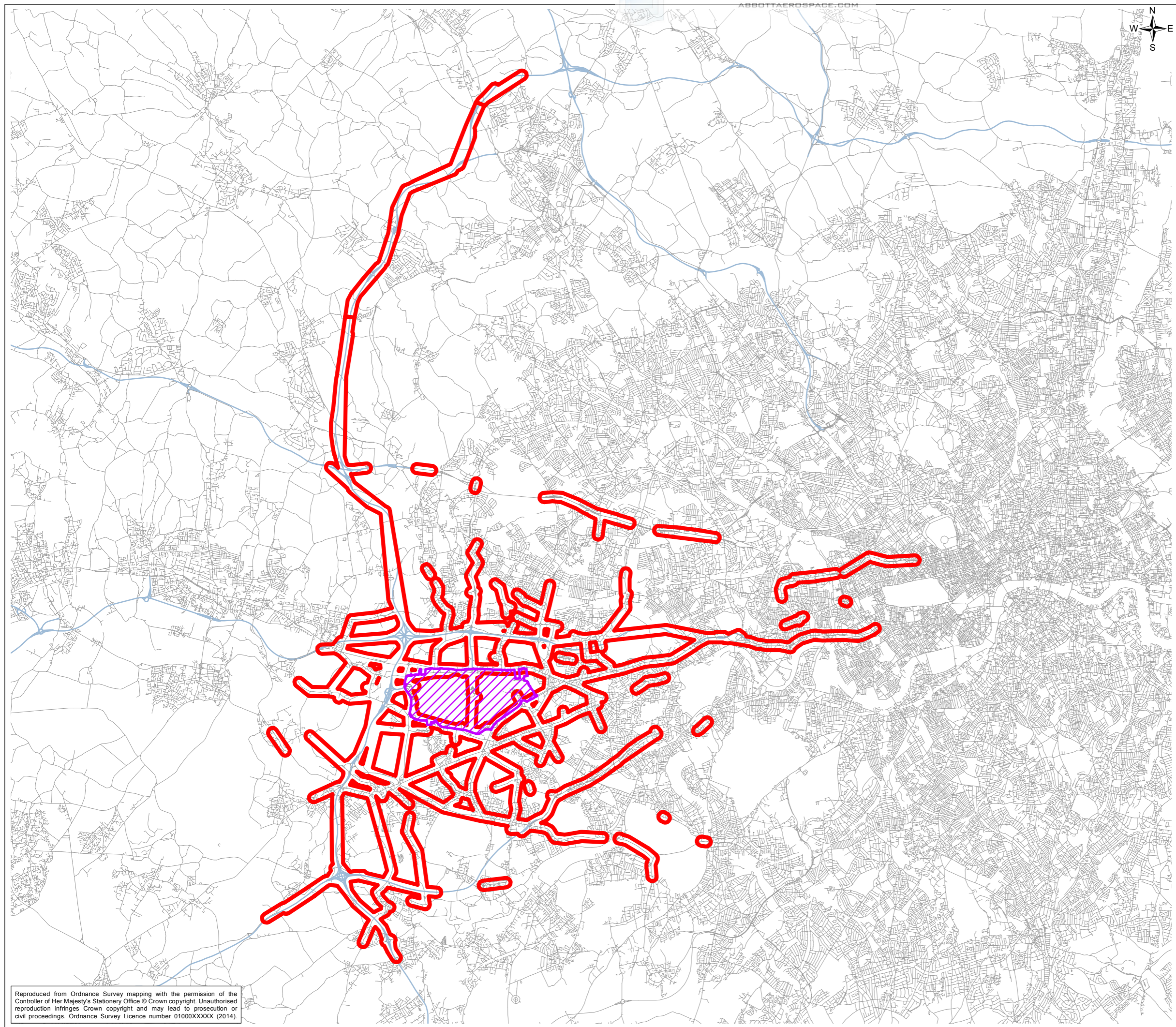
Drawing No.
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FIGURE 6.2

- Legend**
- ENR Wider Study Area (Road Links Affected by Scheme)
 - Heathrow Existing Boundary



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Wider Study Area – Heathrow ENR

Drawing Status
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 Client No.

Drawing No.
FIGURE 6.2

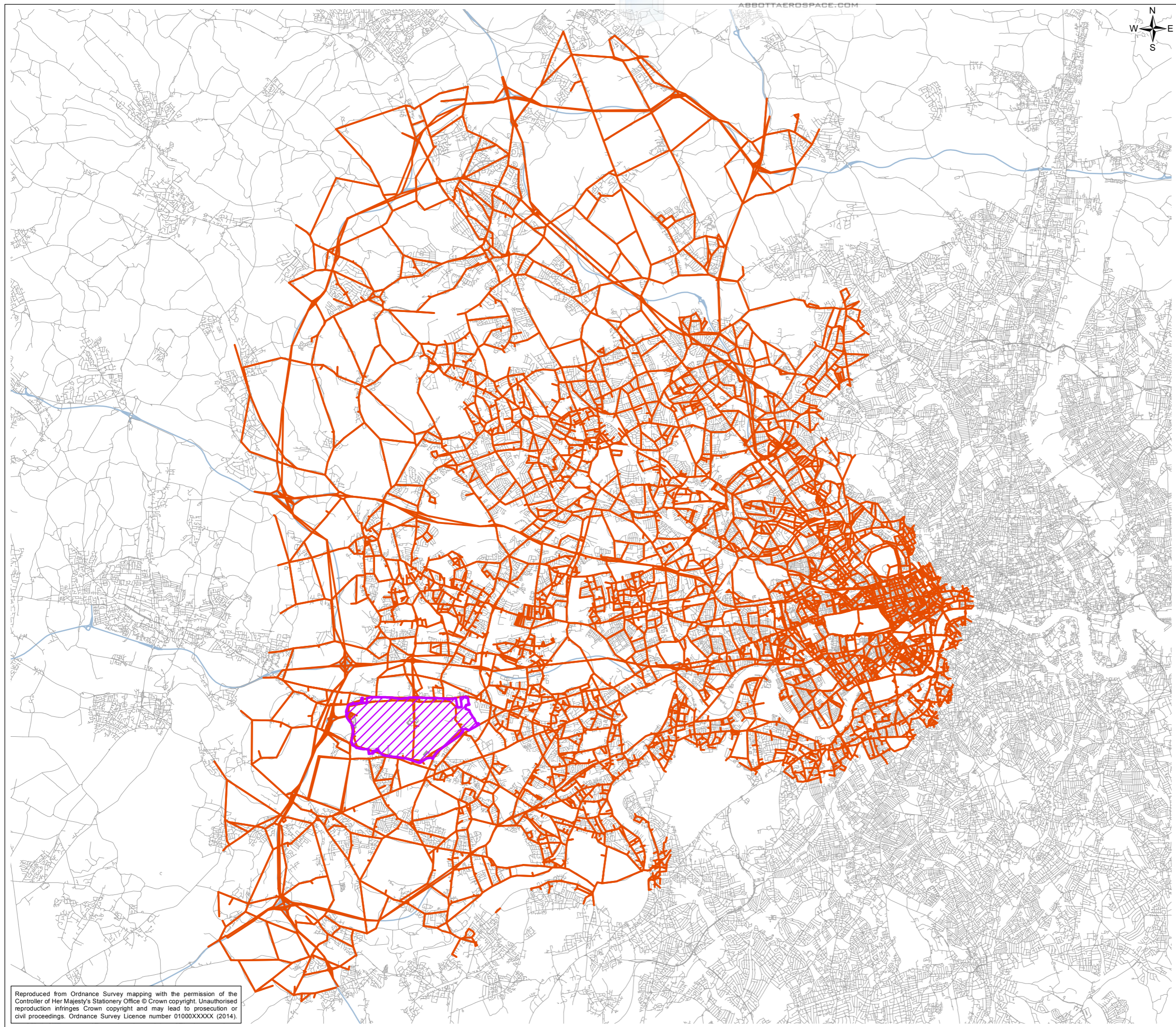
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FIGURE 6.3

- Legend**
- ENR Traffic Simulation Area
 - Heathrow Existing Boundary



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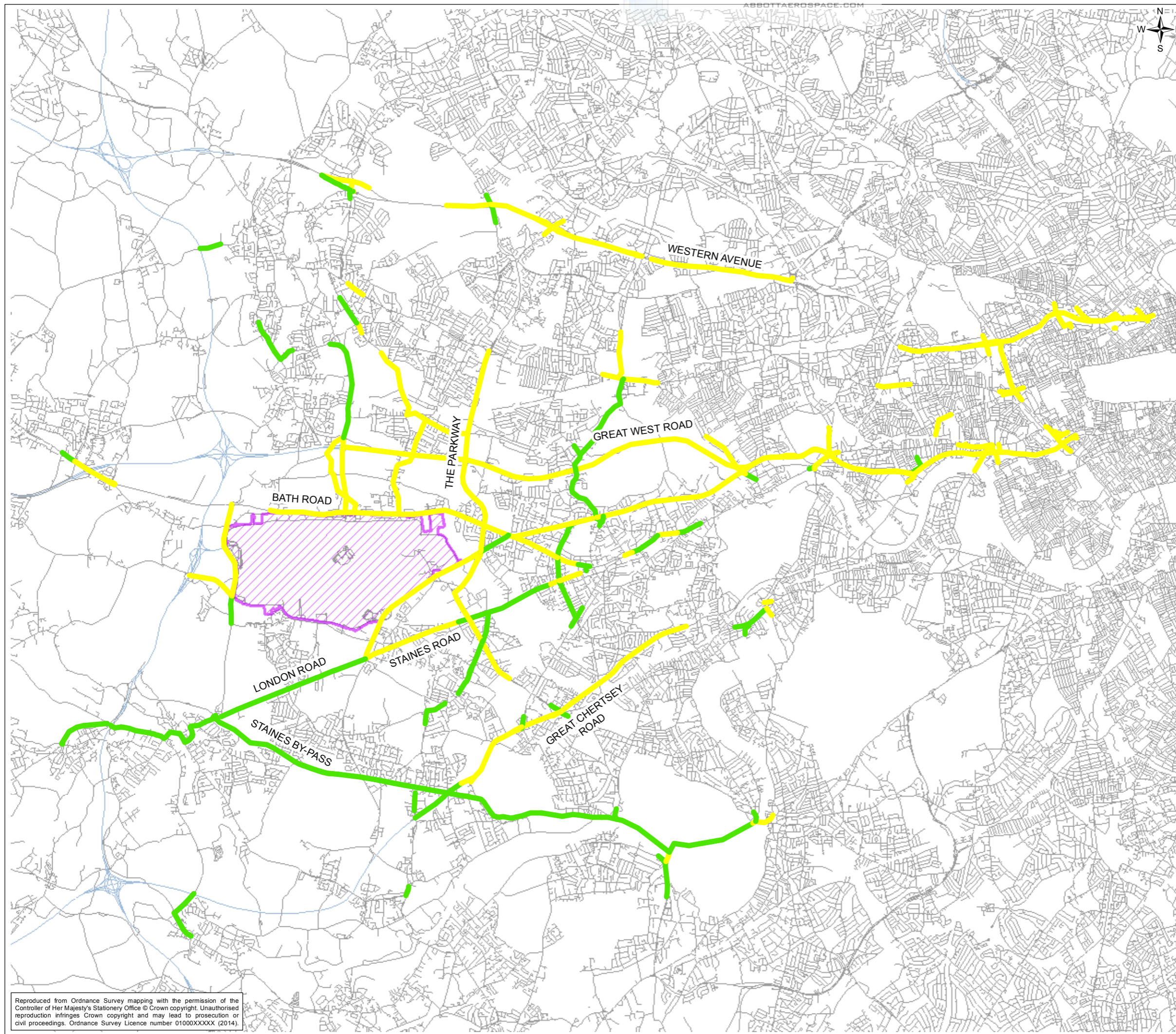


FIGURE 6.4

- Legend
- 32 - 40 At Risk of Exceeding the Limit Value
 - >40 Exceeding the Limit Value
 - Heathrow Existing Boundary



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Drawing Status
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 Client No.:

Drawing No.
 FIGURE 6.4

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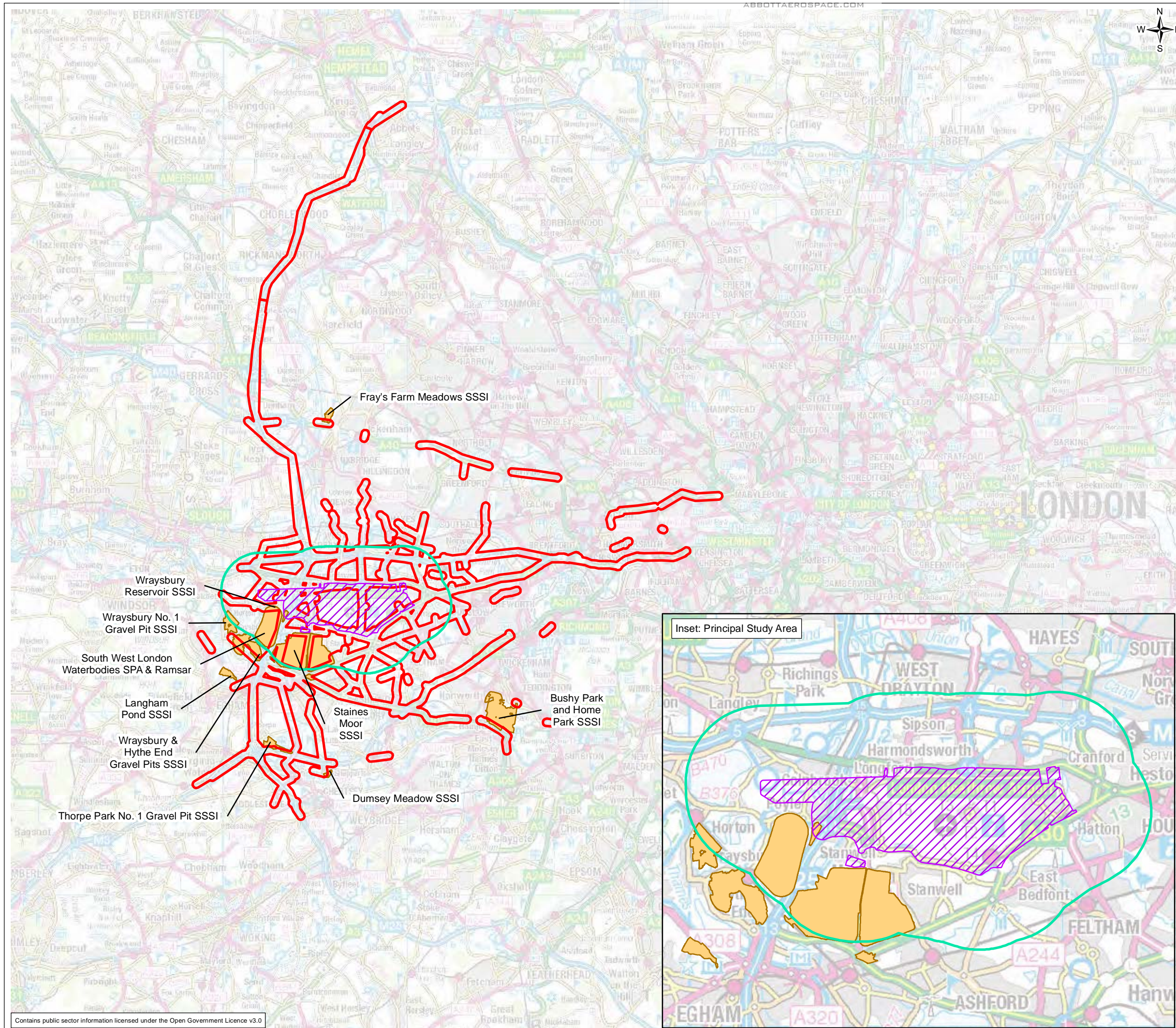
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FIGURE 6.5

- Legend**
- Heathrow ENR boundary
 - Wider Study Area
 - Principal Study Area
 - Statutory Designated Nature Conservation sites of International/European and National importance*

*Explanatory note:
 These sites include Ramsar sites, Special Areas of Conservation (SAC), Special Protection Areas (SPA), Sites of Special Scientific Interest (SSSI) and National Nature Reserves (NNR) where they are located within or adjacent to the Principal and Wider study areas (with the exception of sites identified as not sensitive to N deposition and NOx concentrations).



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Drawing Title
 International and National Statutory Nature Conservation Designations: Heathrow ENR

Drawing Status
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 Jacobs No.: B4160007

Drawing No.
 FIGURE 6.5

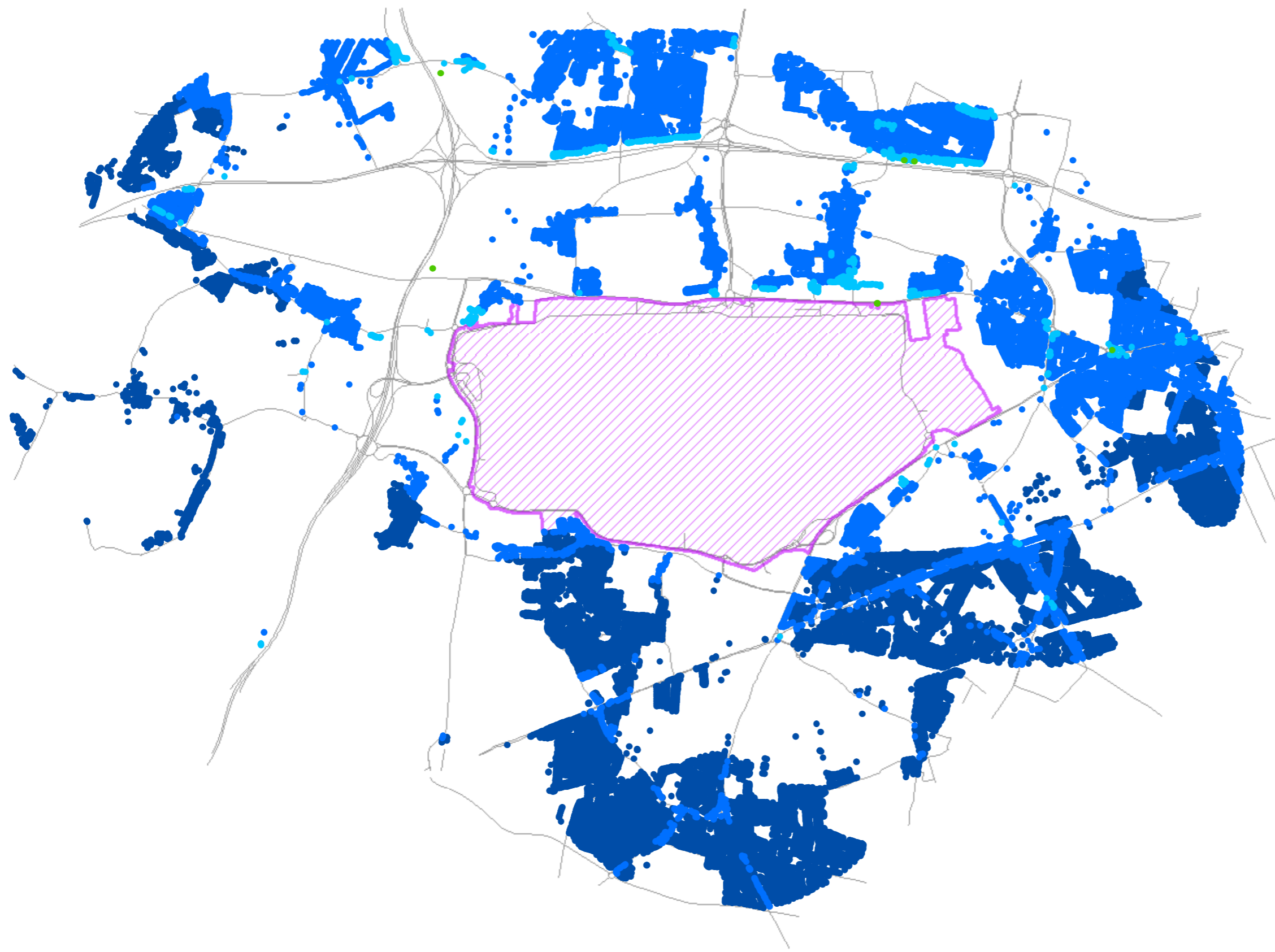
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FIGURE 6.6

Legend
Predicted Annual Mean NO₂ Concentrations (µg/m³) - 2030

- < 20
- 20 - 25
- 25 - 30
- 30 - 35
- 35 - 40
- 40 - 45
- 45 - 50
- ▨ Heathrow Existing Boundary



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Drawing Title
 Do-Minimum Predicted Annual Mean
 NO₂ Concentrations (µg/m³) - 2030

Drawing Status
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Drawing No. **FIGURE 6.6**

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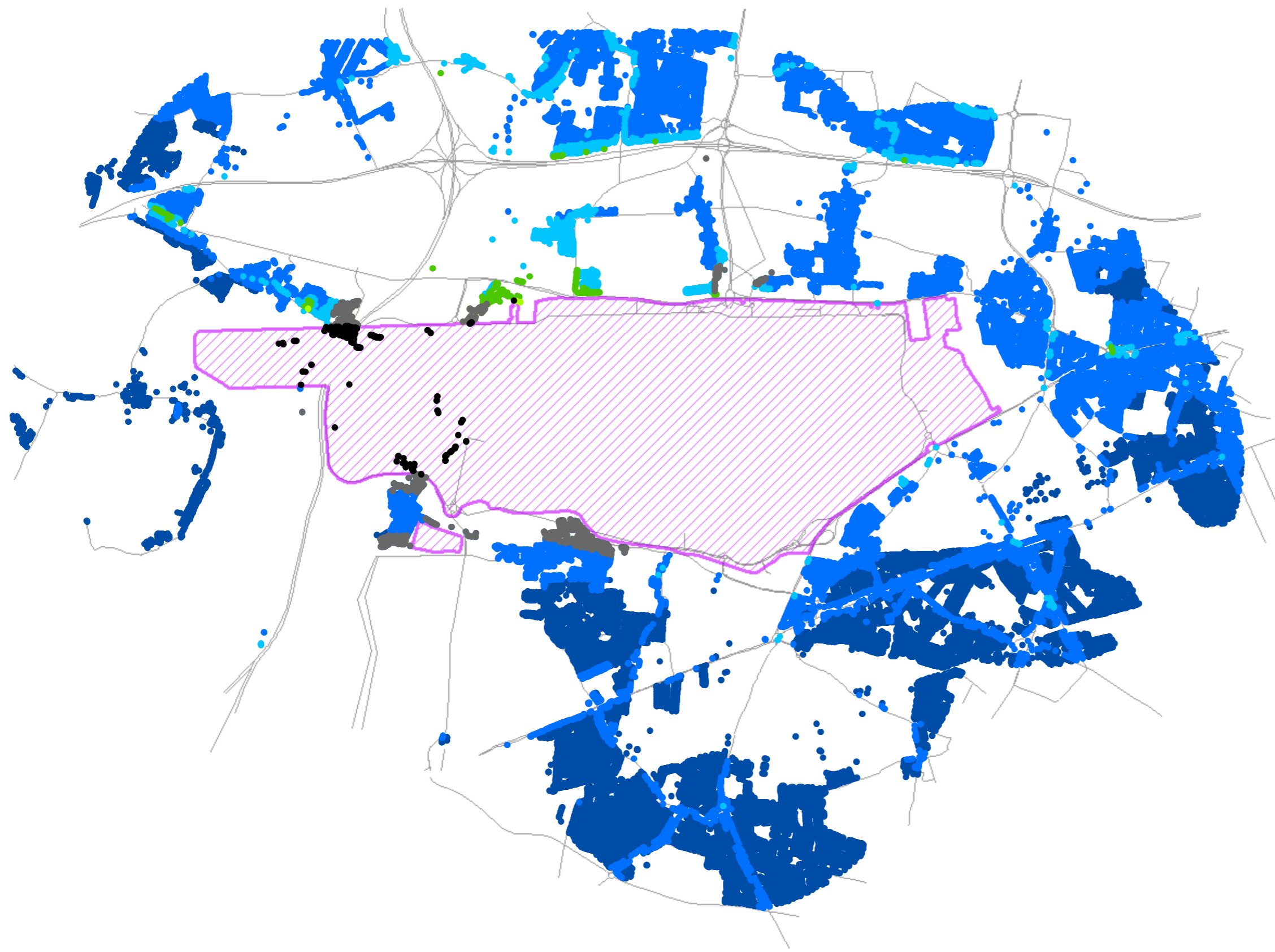


FIGURE 6.7

Legend

Predicted Annual Mean NO₂ Concentrations (µg/m³) - 2030

- < 20
- 20 - 25
- 25 - 30
- 30 - 35
- 35 - 40
- 40 - 45
- 45 - 50
- Receptors within 200m of modelled indicative new road alignment
- Receptors Directly Impacted by Scheme
- ▨ Heathrow ENR Scheme Boundary



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Drawing No.	FIGURE 6.7	

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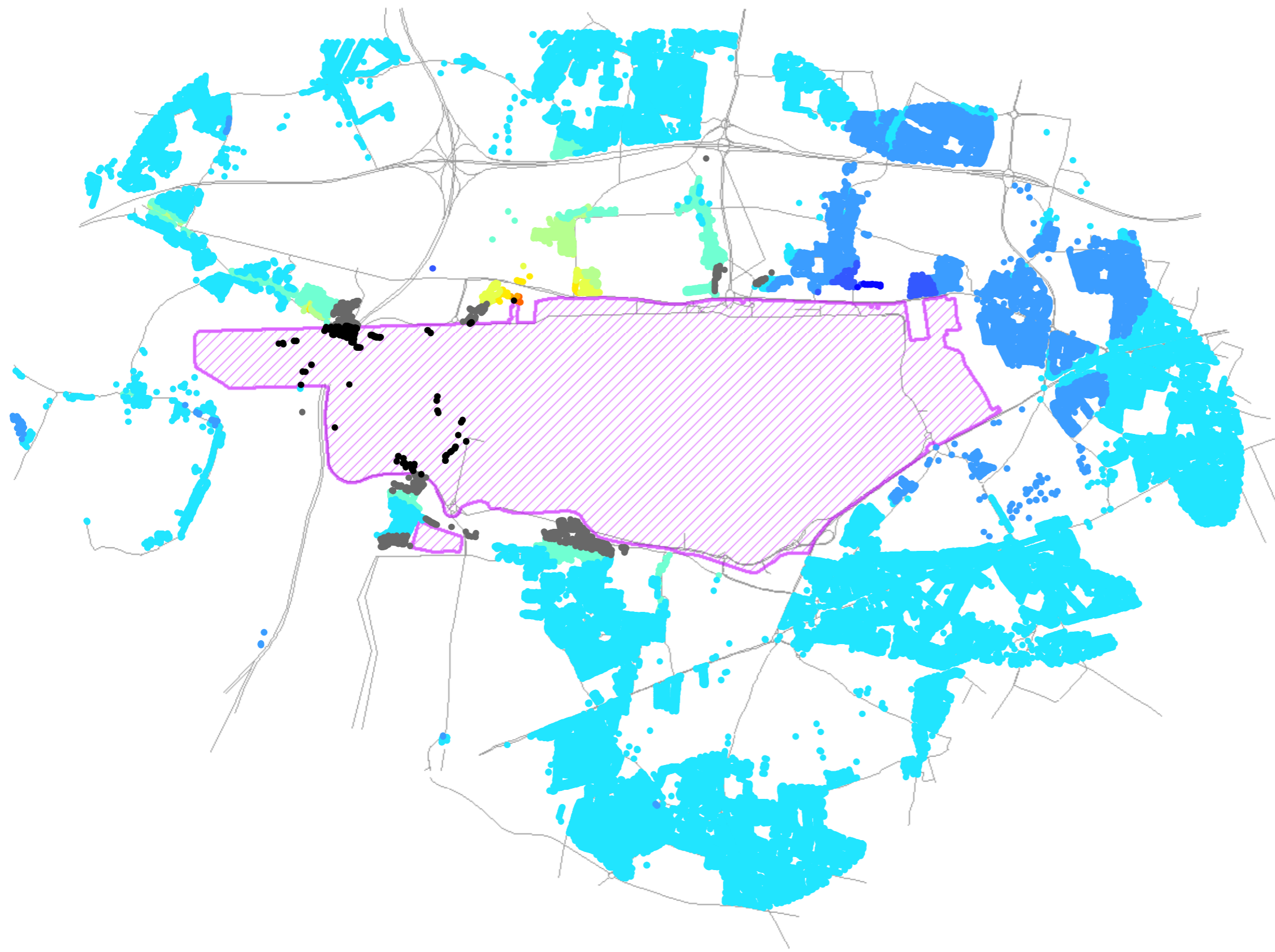


FIGURE 6.8

Legend

Incremental Change to Annual Mean NO₂ Concentrations (ug/m³) - 2030

- -6 - -4
- -4 - -2
- -2 - 0
- 0 - 2
- 2 - 4
- 4 - 6
- 6 - 8
- 8 - 10
- 10 - 12
- 12 - 14
- 14 - 16
- Receptors within 200m of modelled indicative new road alignment
- Receptors Directly Impacted by Scheme
- ▨ Heathrow ENR Scheme Boundary



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Drawing Title
Incremental Change to Annual Mean NO₂ Concentrations (ug/m³) - 2030

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Drawing No. **FIGURE 6.8**

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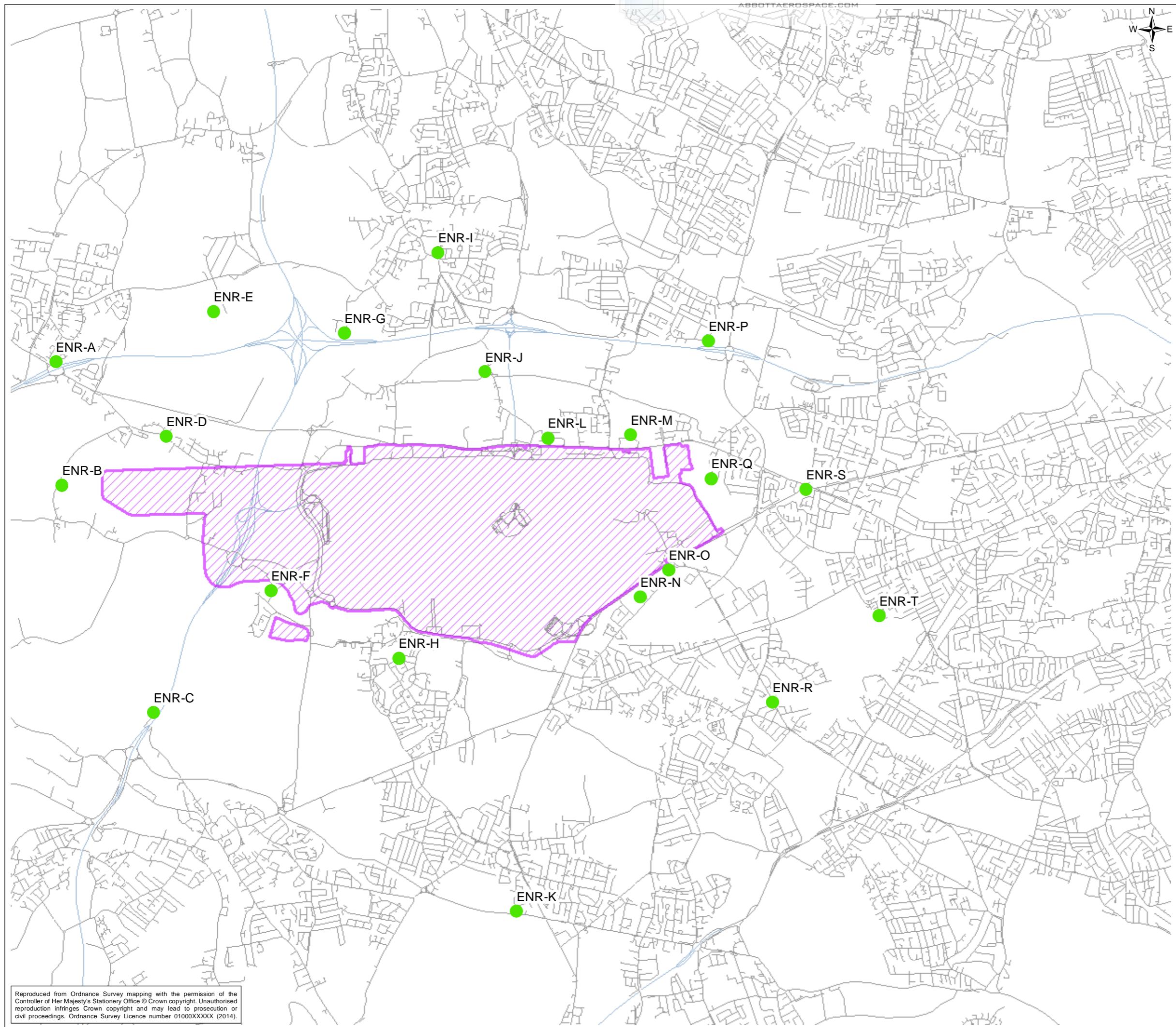


FIGURE 6.9

- Legend**
- Source Apportionment Receptors
 - Heathrow ENR Scheme Boundary



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 Source Apportionment Receptors Heathrow ENR

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FIGURE 6.9

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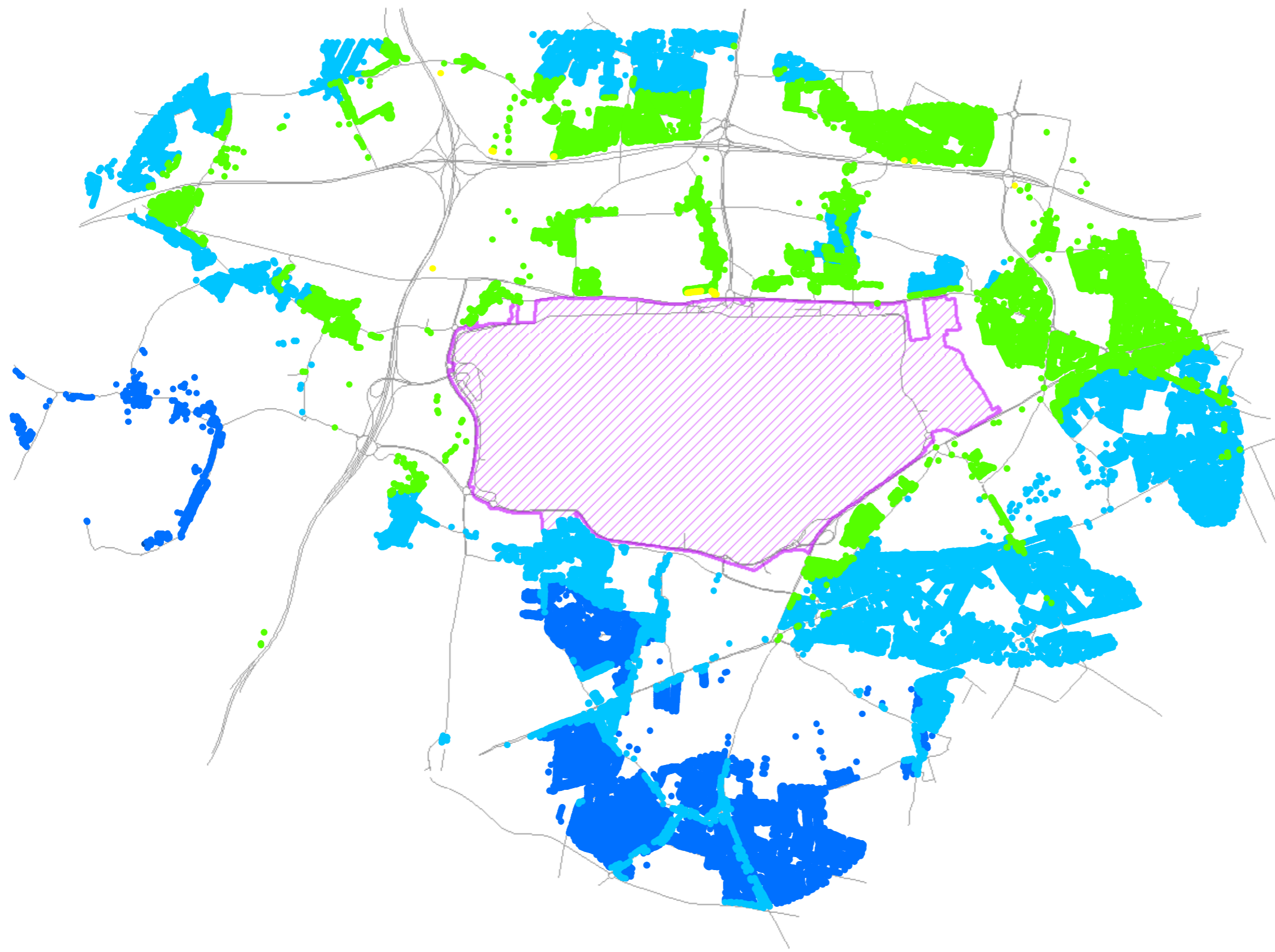
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FIGURE 6.10

Legend
Predicted Annual Mean PM₁₀ Concentrations (µg/m³) - 2030

- < 16
- 16 - 18
- 18 - 20
- 20 - 22
- 22 - 24
- 24 - 26
- ▨ Heathrow Existing Boundary



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Drawing Title
Do-Minimum Predicted Annual Mean PM₁₀ Concentrations (µg/m³) - 2030

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Drawing No. **FIGURE 6.10**

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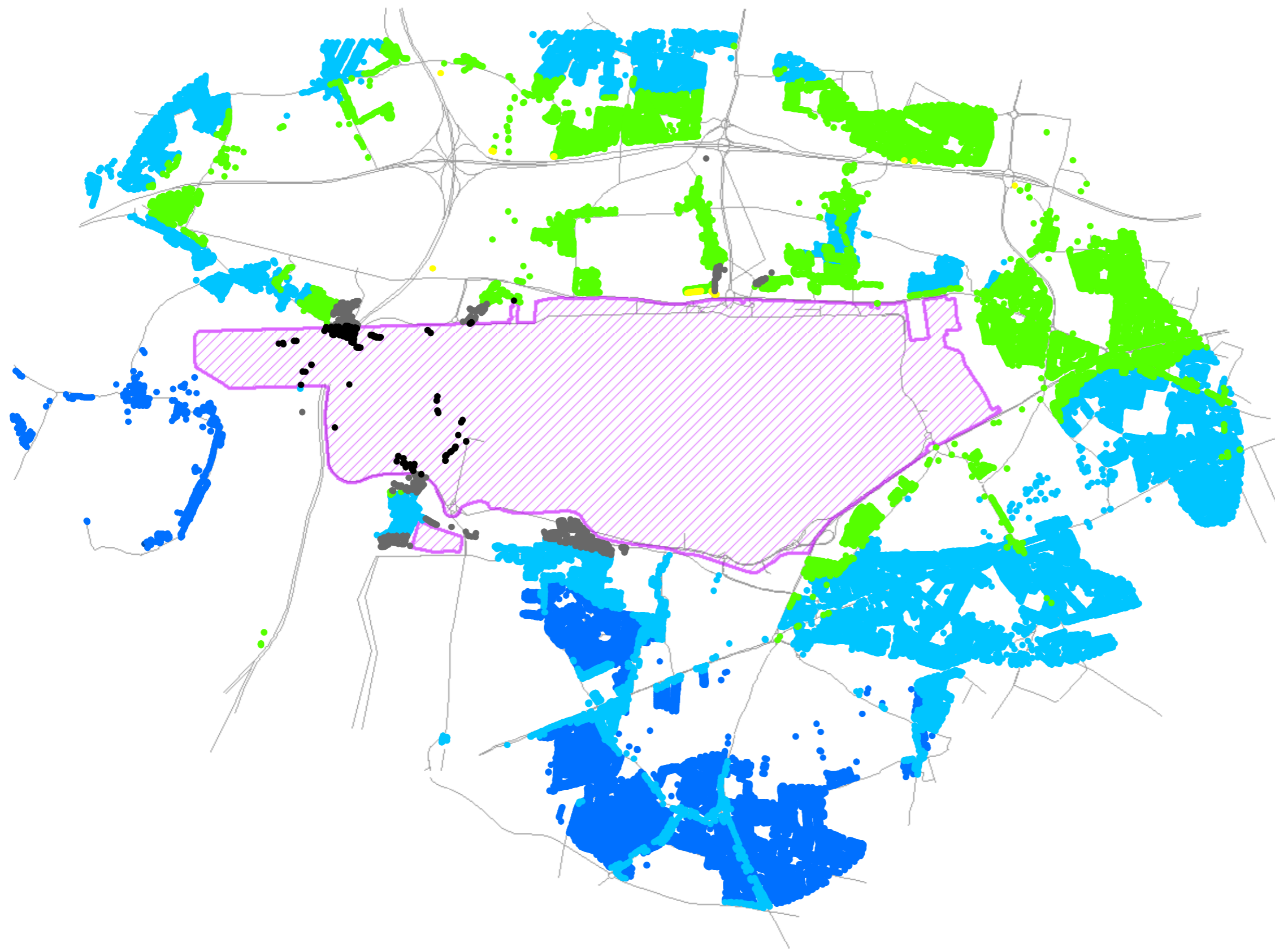


FIGURE 6.11

Legend

Predicted Annual Mean PM₁₀ Concentrations (µg/m³) - 2030

- < 16
- 16 - 18
- 18 - 20
- 20 - 22
- 22 - 24
- 24 - 26
- Receptors within 200m of modelled indicative new road alignment
- Receptors Directly Impacted by Scheme
- ▨ Heathrow ENR Scheme Boundary



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Heathrow ENR Predicted Annual Mean PM₁₀ Concentrations (µg/m³) - 2030

Drawing Status		
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Client No.		
Drawing No.	FIGURE 6.11	

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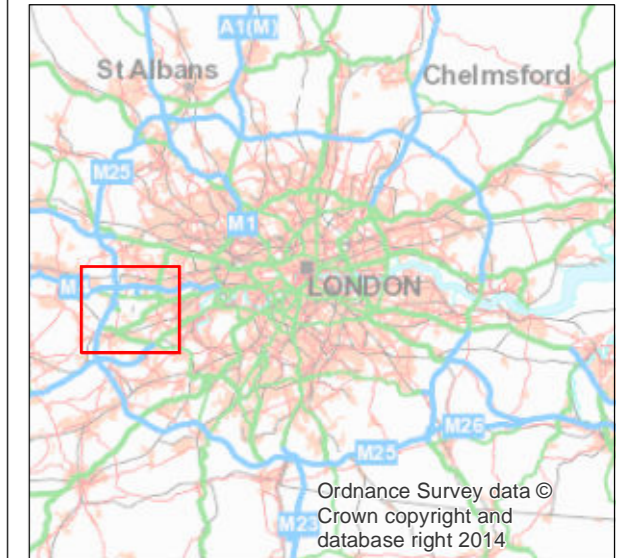
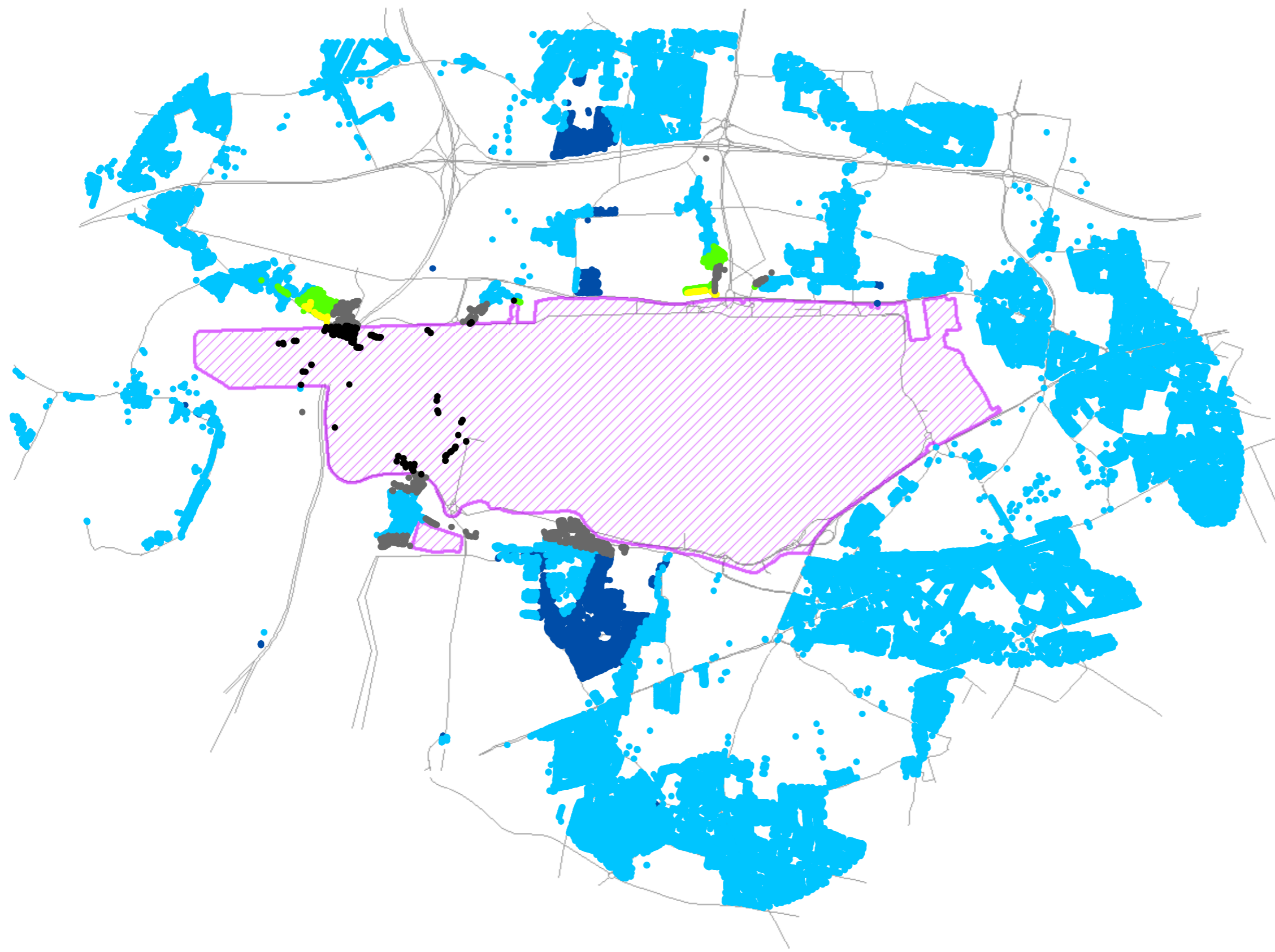


FIGURE 6.12

Legend

Incremental Change to Annual Mean PM₁₀ Concentrations (ug/m³) - 2030

- -1 - 0
- 0 - 1
- 1 - 2
- 2 - 3
- 3 - 4
- 4 - 5
- Receptors within 200m of modelled indicative new road alignment
- Receptors Directly Impacted by Scheme
- ▨ Heathrow ENR Scheme Boundary



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Drawing Title
Incremental Change to Annual Mean PM₁₀ Concentrations (ug/m³) - 2030

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Drawing No. **FIGURE 6.12**

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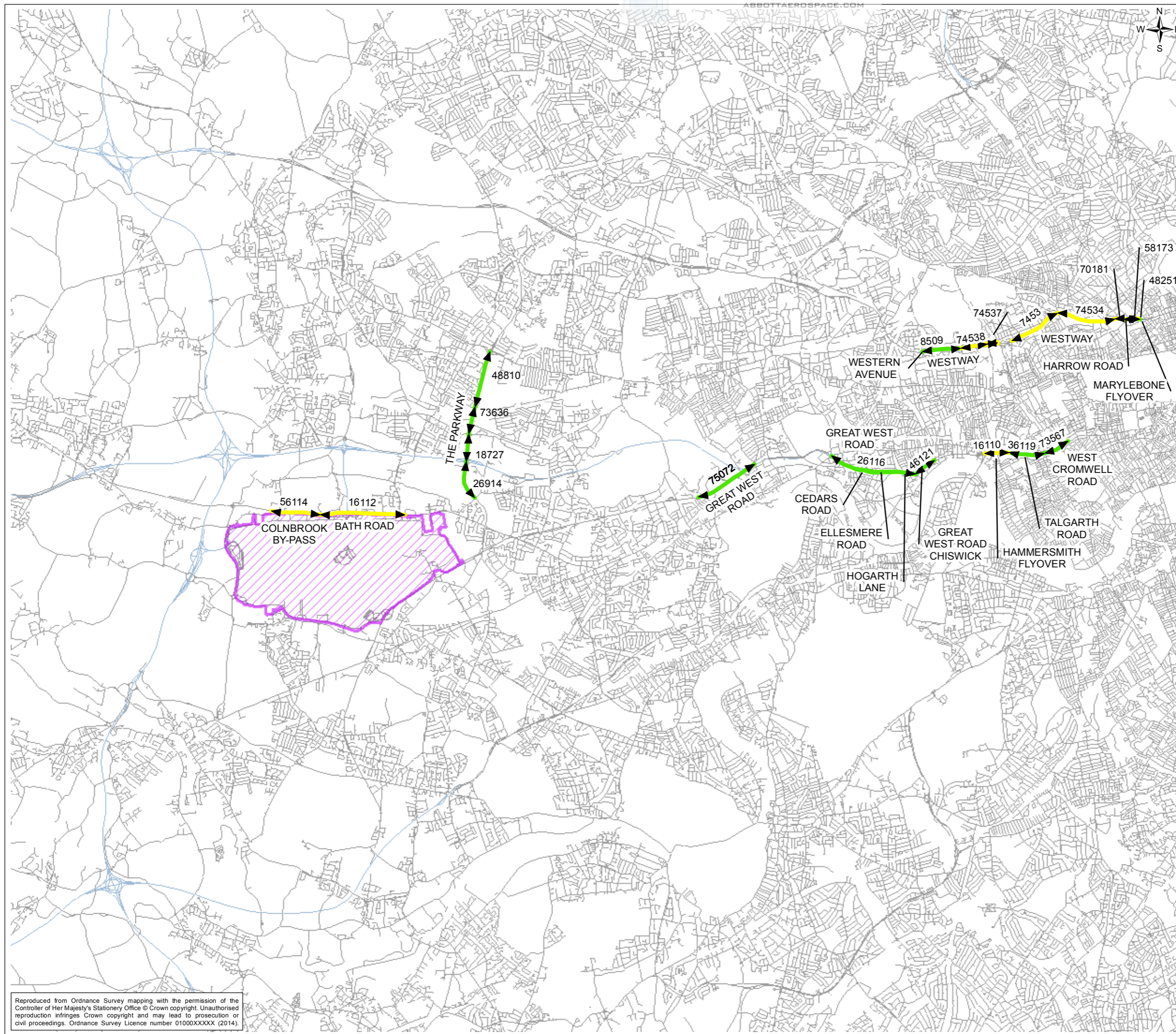


FIGURE 6.13

- Legend
- 32 - 40 At Risk of Exceeding the Limit Value
 - >40 Exceeding the Limit Value
 - Heathrow Existing Boundary

The numbers displayed are the Census Area Identification Numbers.



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Drawing Title
PCM Annual Mean Roadside NO₂ Concentrations (µg/m³) – 2030

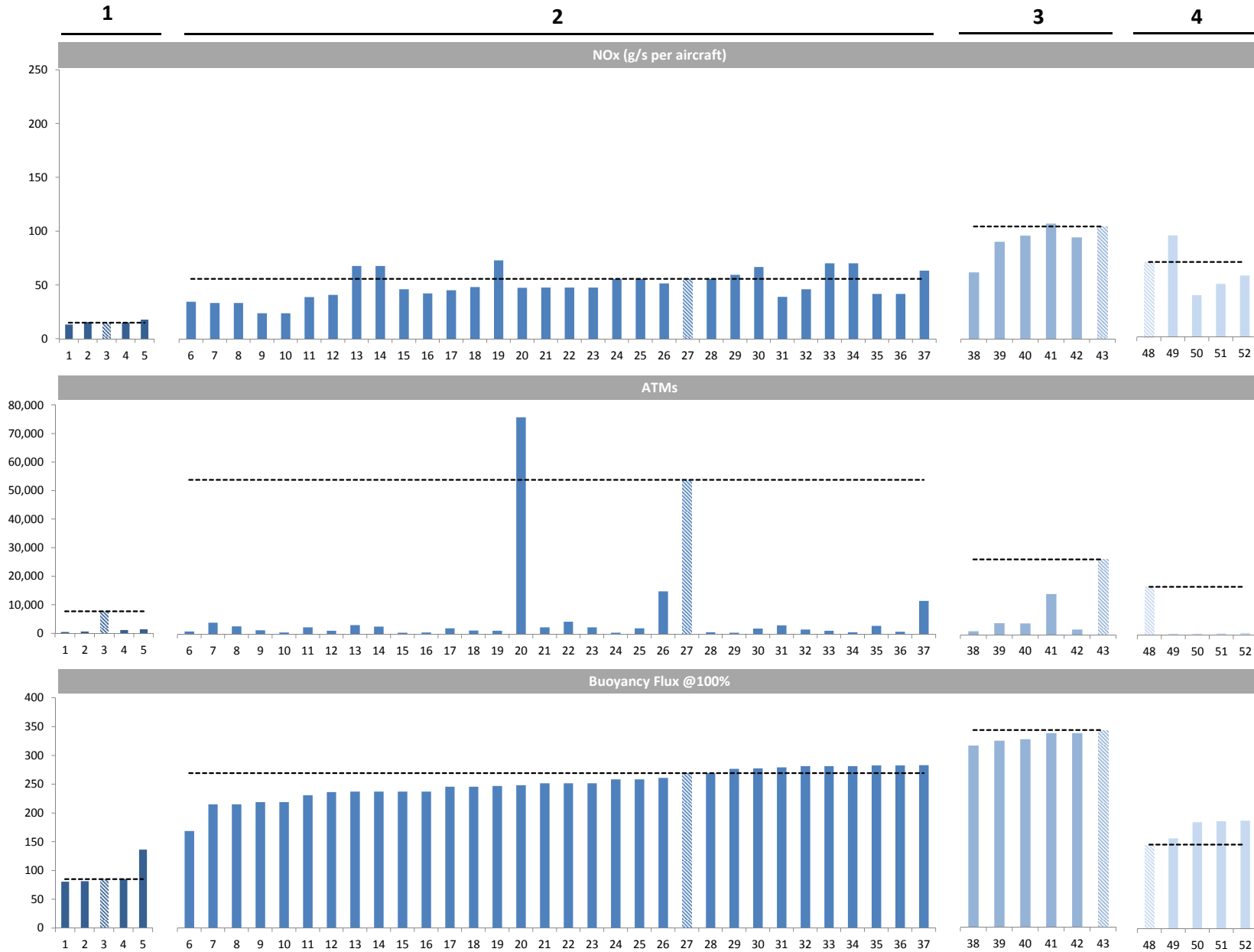
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FIGURE 6.13

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Figure B1 – MCAT Assignments Heathrow Baseline 2009. MCAT group shown along top axis. Aircraft ID shown along bottom axis. Lead aircraft shown as bar with hatched shading.



5

6

7

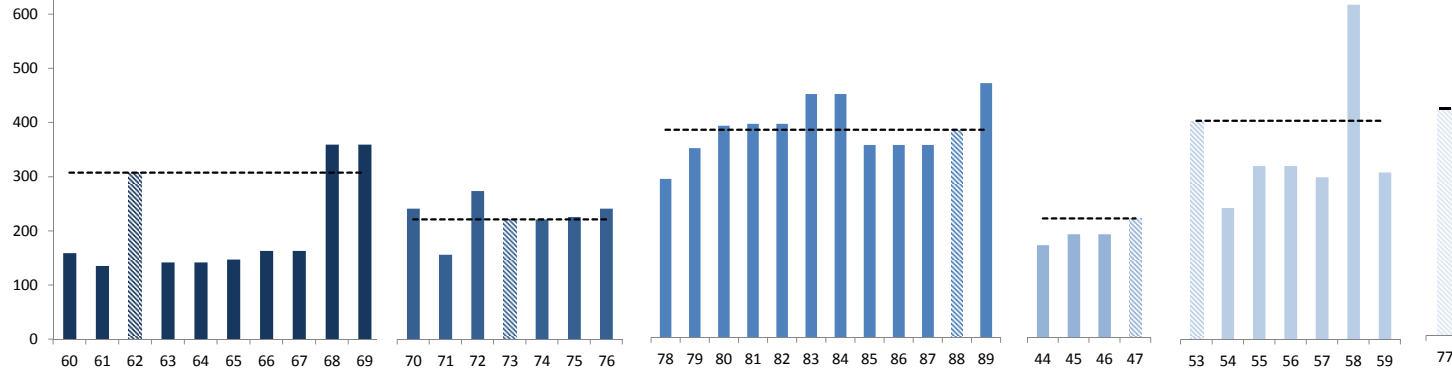
8

9

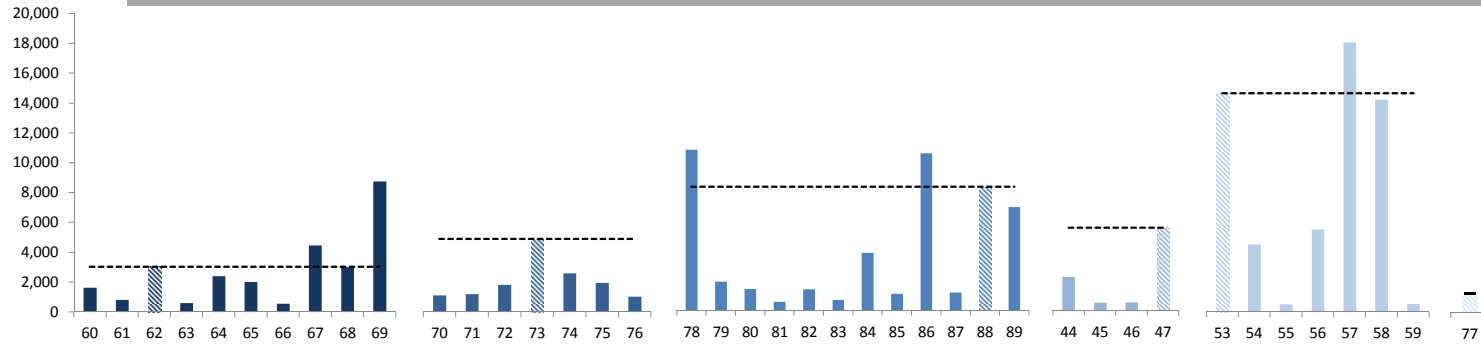
10

NOx (g/s per aircraft)

4 engines



ATMs



Buoyancy Flux @100%

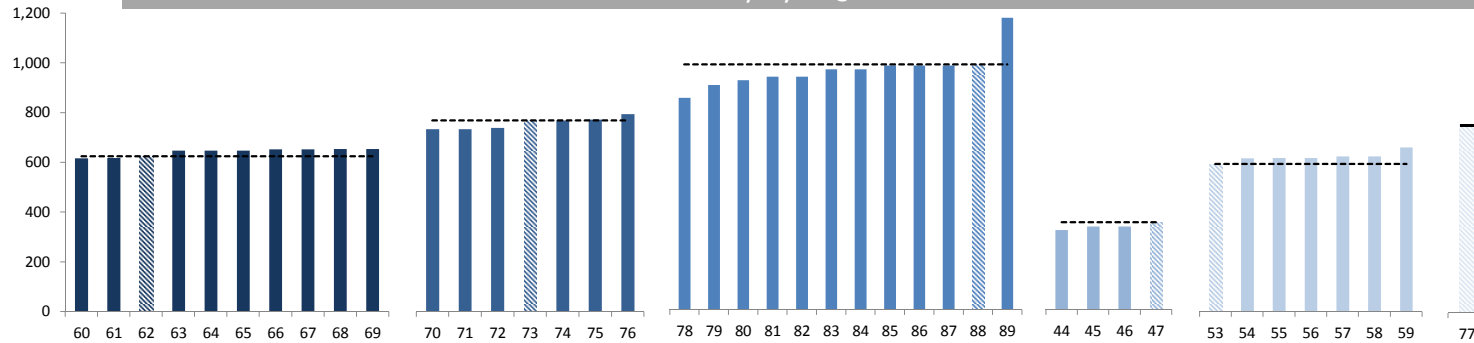


Figure B2 - MCAT Assignments Gatwick Baseline 2009 MCAT group shown along top axis. Aircraft ID shown along bottom axis. Lead aircraft shown as bar with hatched shading.

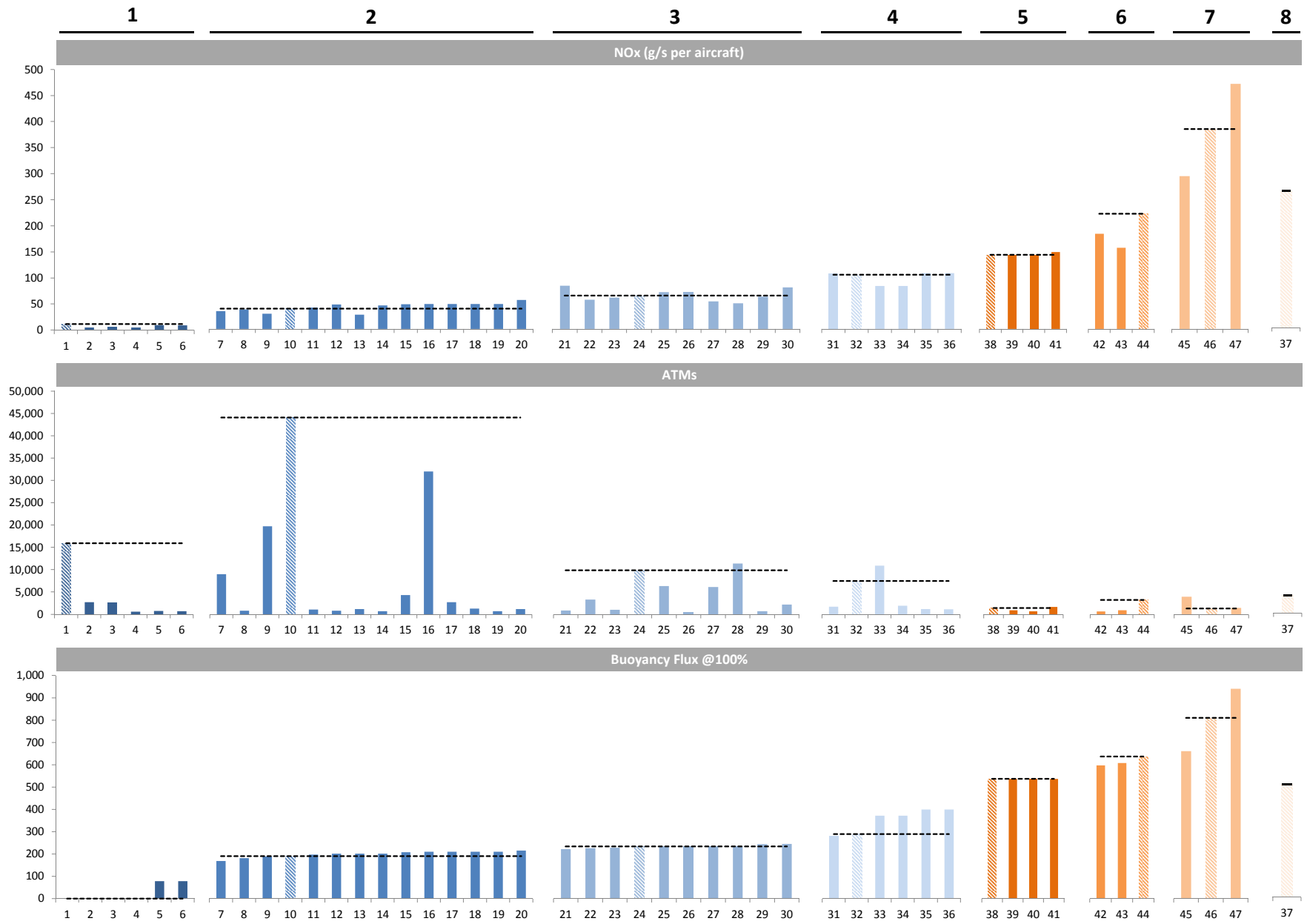


Figure B3 – MCAT Assignments Heathrow Do-Minimum, NWR and ENR MCAT group shown along top axis. Aircraft ID shown along bottom axis. Lead aircraft shown as bar with hatched shading.

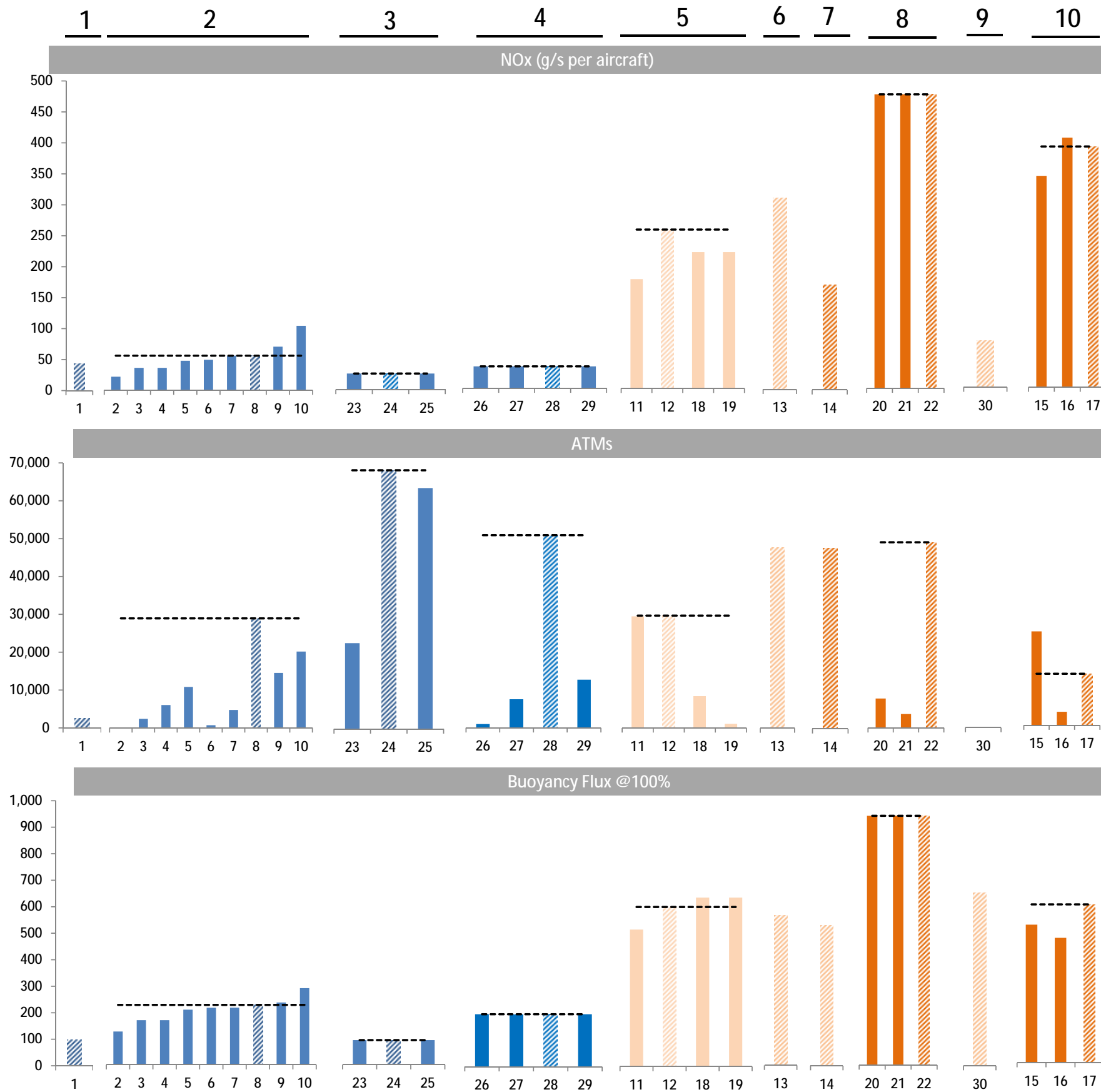
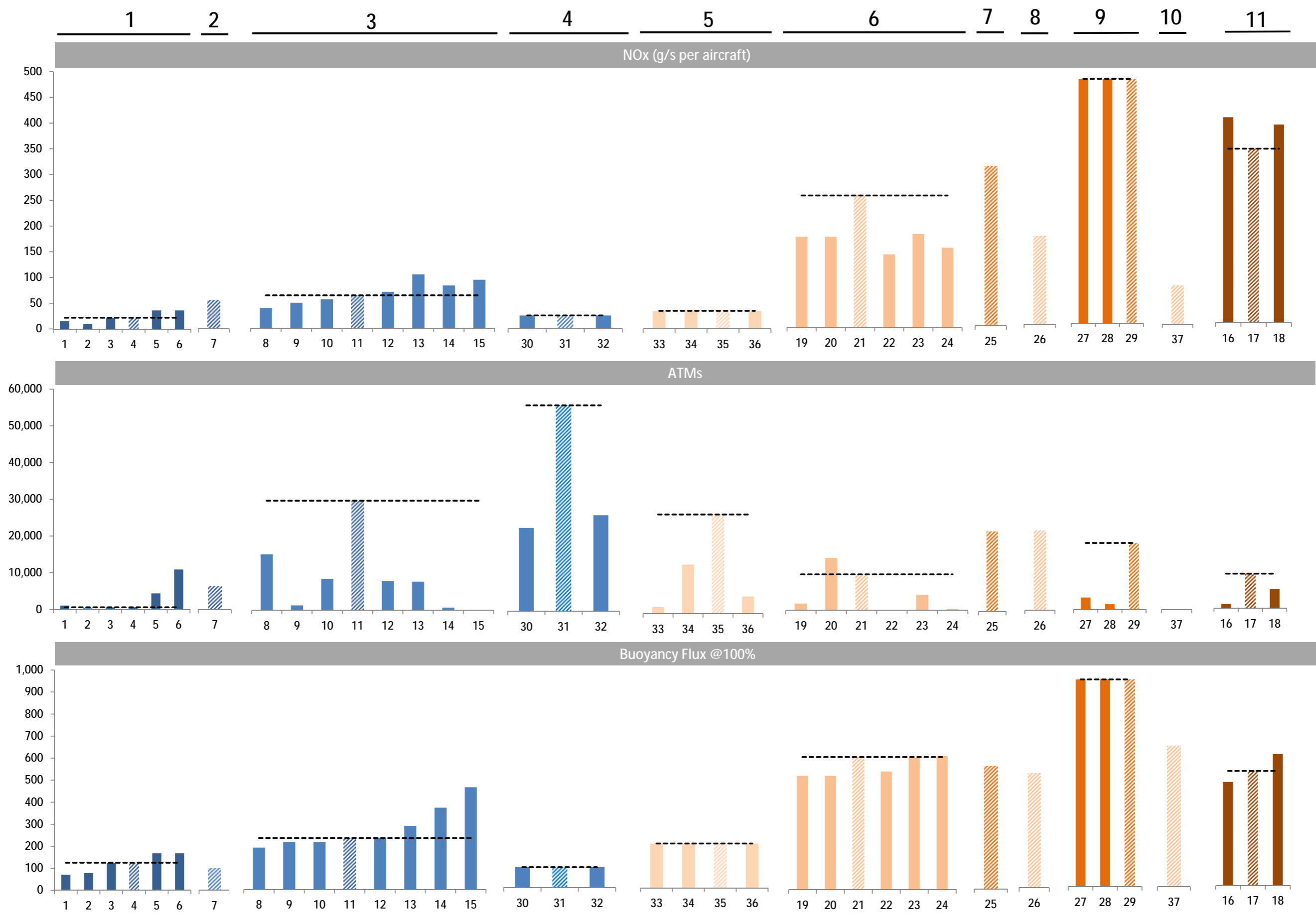


Figure B4 - MCAT Assignments Gatwick Do-Minimum and 2R MCAT group shown along top axis. Aircraft ID shown along bottom axis. Lead aircraft shown as bar with hatched shading.



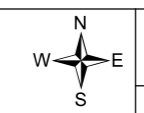
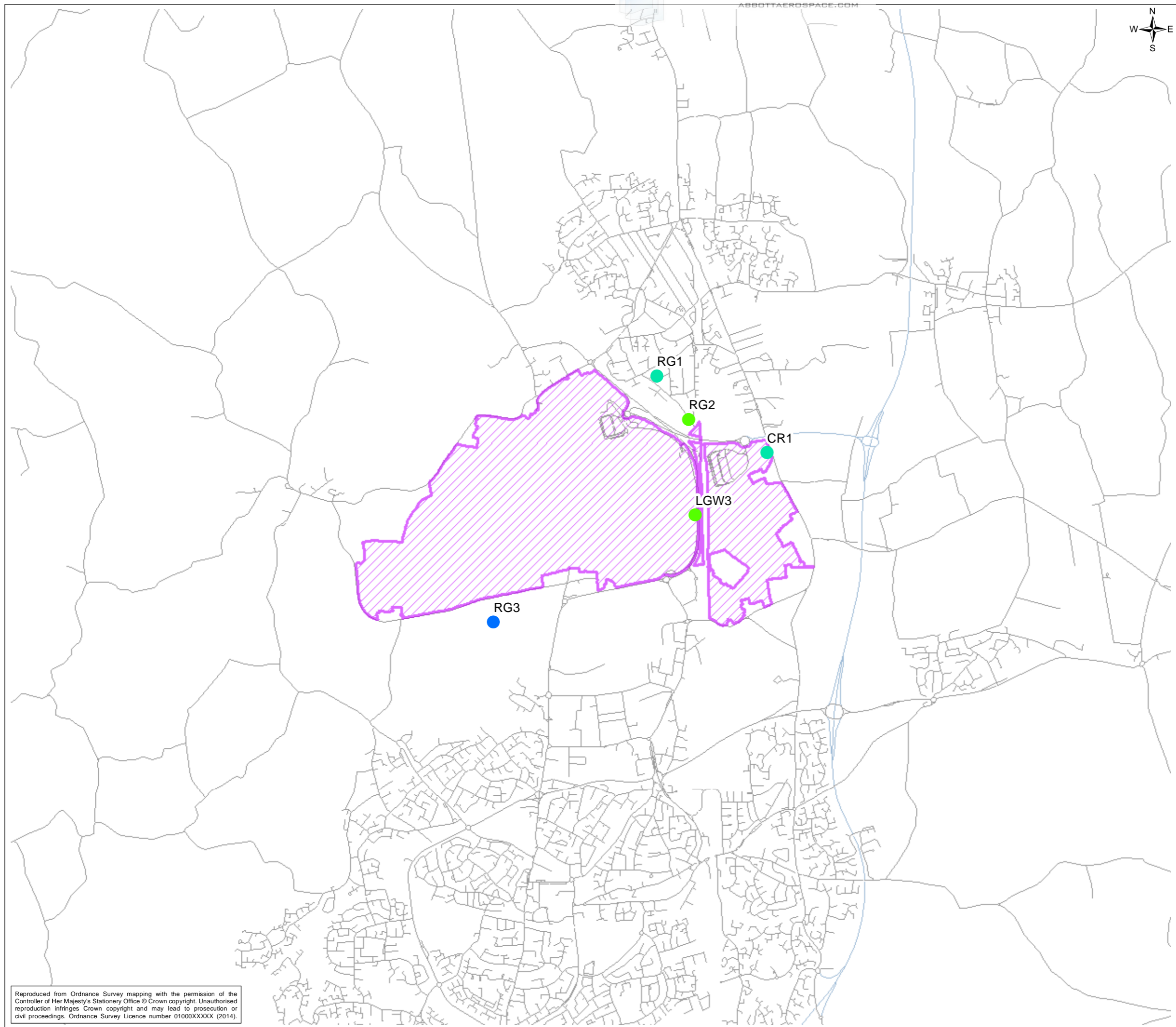


FIGURE E1

- Legend**
- Measured Annual Mean NO₂ Concentrations (µg/m³) - 2009**
- < 10
 - 10 - 20
 - 20 - 30
 - 30 - 40
 - 40 - 50
 - 50 - 60
 - > 60
- Gatwick Existing Boundary



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 Location of Monitoring Sites in the Gatwick Study Area Used for 2009 Model Verification

Drawing Status
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Drawing No. **FIGURE E1**

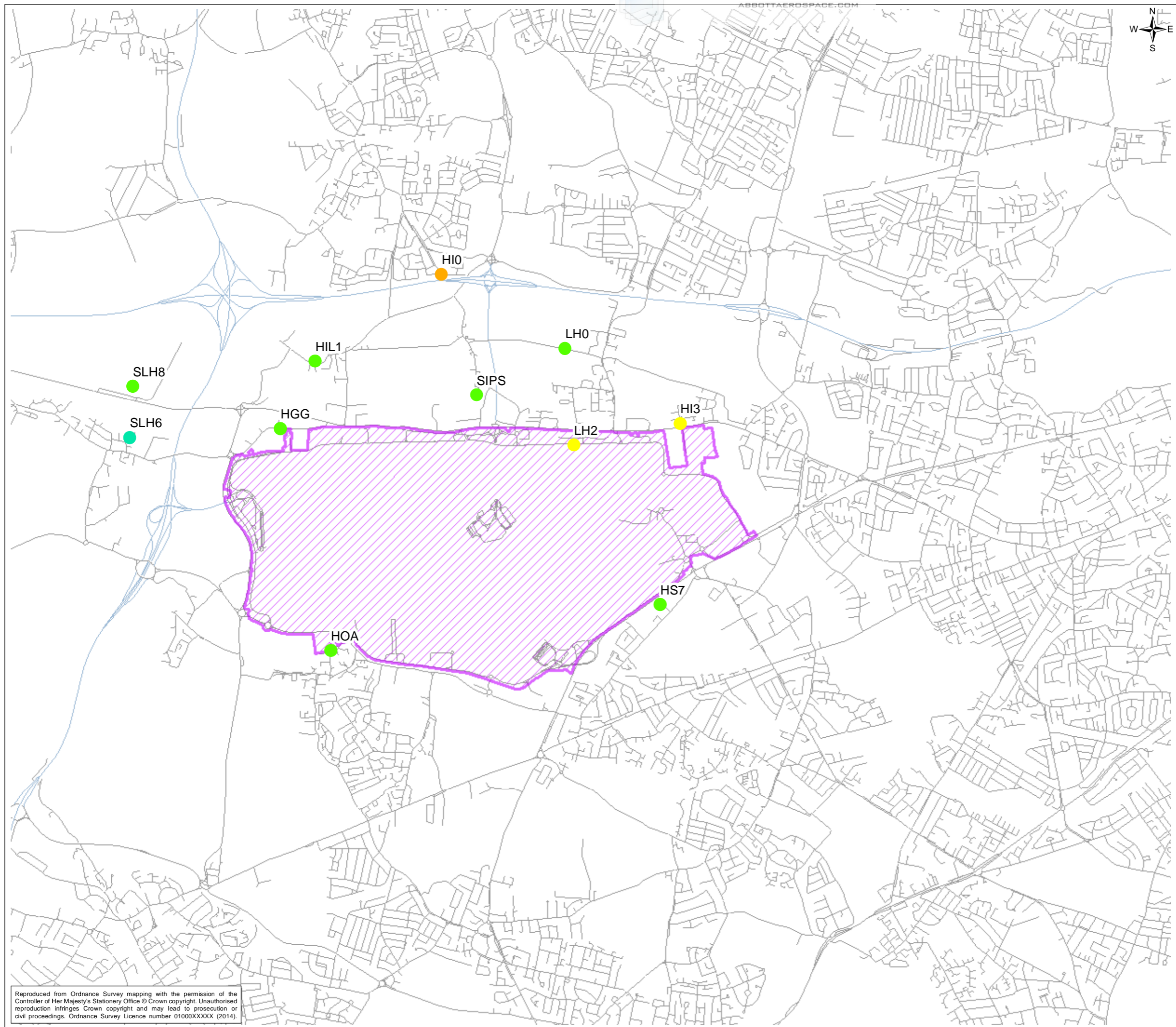
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FIGURE E2

- Legend**
- Measured Annual Mean NO₂ Concentrations (µg/m³) - 2009**
- < 10
 - 10 - 20
 - 20 - 30
 - 30 - 40
 - 40 - 50
 - 50 - 60
 - > 60
- ▨ Heathrow Existing Boundary



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Drawing Title
 Location of Monitoring Sites in the Heathrow Study Area Used for 2009 Model Verification

Drawing Status
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