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NATS Support to the Airports Commission

Support to the Assessment of Potential Long Term Measures

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NATS Protected

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Support to the Assessment of Potential Long Term Measures

This briefing note brings together into a single document the material provided to the Airports Commission Secretariat to assist its review of the various proposals submitted to provide potential measures to identify Long Term measures to increase airport capacity in south-east England.

The following aspects of input that have been provided are now collated in this submission:

- A review of the Capacity Estimates provided to the Airports Commission by a third party.
- A radar analysis comprising recorded radar tracks for various current and potential new airports in the south-east of England and allied concentration/density plots (‘heat plots’).
- A review of the potential impact on overall Air Transport Movements for various new runways in south-east England (including location, quantity & orientation).
- Predominant traffic flows and holds of traffic arriving at the main London airports.
- Predominant traffic flows of aircraft departing from the main London airports.

The content of each of these five main deliverables is explained in greater detail below to provide the context in which these have been developed.

A Review of the Capacity Estimates Provided to the Airports Commission by a Third Party.

NATS was asked to give its views on the number of Air Transport Movements that had been provided to the Airport Commission Secretariat by a third party.

Our views are set out in Annex A.

A Radar Analysis Comprising Recorded Radar Tracks for Various Current and Potential New Airports in the South-East of England and Allied Concentration / Density Plots.

1. A set of radar plots were provided that set out observed traffic patterns on 5th August 2011 operating to / from the following locations below 25,000ft:

   - Birmingham Airport.
   - Luton Airport.
   - Gatwick Airport.
   - London City Airport.
   - Heathrow Airport.
   - Stansted Airport.
   - A combined plot of all of the above.

2. A set of traffic density plots were provided that set out observed traffic patterns on 5th August 2011 comprising:

   - All traffic operating in south-east England operating below 6,000ft.
   - All traffic operating in south-east England operating between 6,000ft and 25,000ft.
   - All traffic operating in south-east England operating below 25,000ft.
   - Traffic operating in south-east England below 6,000ft departing to or arriving from Brussels Airport and Schiphol airport.

- Traffic operating in south-east England between 6,000ft and 25,000ft departing to or arriving from Brussels Airport and Schiphol Airport.

- Traffic operating in south-east England below 25,000ft departing to or arriving from Brussels Airport and Schiphol Airport.

- All traffic operating in south-east England except that operating to and from Heathrow below 25,000ft.

- A representation of traffic operating from an airport in the Thames Estuary with the same traffic patterns as that at Heathrow below 25,000ft (i.e. the Heathrow plot 'offset' to a location in the Thames Estuary).

- A representation of all traffic in the south-east of England from existing London Airports except Heathrow and with traffic flows from an airport in the Thames Estuary with the same traffic patterns as that at Heathrow below 25,000ft.

- A representation of traffic operating from an airport in north Bedfordshire with the same traffic patterns as that at Heathrow below 25,000ft (i.e. the Heathrow plot 'offset' to a location in the Thames Estuary).

- A representation of all traffic in the south-east of England from existing London Airports except Heathrow and with traffic flows from an airport in north Bedfordshire with the same traffic patterns as that at Heathrow below 25,000ft.

It should be noted that these plots set out a two dimensional plan view of a three dimensional traffic situation and that the various interactions that are apparent in the horizontal plane are de-conflicted through appropriate vertical separation.

The various plots are set out in Annex B.

A Review of the Potential Impact on Overall Air Transport Movements for Various New Runways in South-East England.

A review was undertaken to consider the impact on overall network capacity within south-east England for various configurations of additional runways. The number of additional runways, their location and orientation were considered.

The analysis was primarily focused on the impact of neighbouring airports within south-east England (including Birmingham) to enable a view of the net increase in capacity of the region could be presented. This was a high level assessment based on expert opinion and operational judgement to enable the relative merits of various possibilities and mutual interactions to be seen.

The analysis concluded that the overall Air Transport Movement (ATM) capacity in south-east England is sensitive to all the factors considered, with proximate airports being more affected due to the nature of the increase traffic arrival and departure flows.

The report is presented in Annex C.

Predominant Traffic Flows and Holds of Traffic Arriving at the Main London Airports.

NATS was asked to provide a pictorial representation of the predominant traffic flows of aircraft arriving at the main London airports and Birmingham.

Schematic were provided for:

- Heathrow.
- Gatwick.
- Stansted.
- Luton.
- London City.
- Birmingham.

These are presented in Annex D.

Predominant Traffic Flows of Aircraft Departing from the Main London Airports.

NATS was asked to provide a pictorial representation of the predominant traffic flows of aircraft departing from the large London airports.

Schematics were provided for:

- Heathrow.
- Gatwick.
- Stansted.
- Luton.

The schematics show the departure routes for ‘westerly’ operations (i.e. arriving and departing to the west).

These are presented in Annex E.

Annex A: A Review of the Capacity Estimates Provided to the Airports Commission by a Third Party.

NATS Support to the Airports Commission

Task 3.2a – Early Assessment of Long Term Options

Tasking

This briefing note responds to the action placed on NATS to:

> *Provide a sense check on the number of ATMs for airports & runways identified in the Airports Commission table supplied below:*

	Ref No.	Submitted by:	Description	Pos. Close/Reduce	Rwys	ATM
Dispersed	39	Birmingham Airport	Second runway		2	455,400
	40	Gatwick Airport	Second runway			
		Option 1			2	375,000
		Option 2			2	470,000
		Option 3			2	500,000
	41	Kent CC & Medway LA (LGW & STN)	Dispersed model of extra runways at LGW an	LTN (pos)	2	1,077,500
	42	Manchester Airports Group (STN)	Stansted second runway	LTN (pos)		
		Northwest Runway			2	500,000
		East Runway			2	575,000
	43	Western Gateway (Cardiff)	Expanded Cardiff		1	150,000
Heathrow	34	Heathrow Airport	North		3	702,000
	35	Heathrow Airport	Northwest		3	740,000
	36	Heathrow Airport	Southwest		3	740,000
	37	Heathrow Hub				
		Phase 1: north runway			3	670,000
		Phase 2: south runway			4	850,000
	38	Centre Forum/Policy Exchange			4	960,000
New	44	AC Sect - Milton Keynes/Bedford	New 4 runway hub	LTN, STN(pos)	4	715,000
	45	AC Sect - West London Heathrow	New 4 runway hub	LHR	4	715,000
	46	Fosters and partners (Inner)	New 4 runway hub	LHR, SEN, LCY (pos)		
		Phase 1			4	600,000
		Phase 2			4	830,000
	47	IAAG (Inner)	London Gateway Airport	LHR, SEN, LCY (pos)	3	780,000
	48	Metrotidal & Thames Reach (inner)	Thames Reach Airport	LHR, SEN, LCY (pos)	4	900,000
	49	Pleiade Associates (Oxford)	LOX	LHR	4	720,000
	50	TESTRAD (outer)	London Jubilee International Airport	LHR, SEN, LCY (pos)	6	950,000
	51	Mayor of London (inner)	Isle of Grain	LHR, SEN, LCY (pos)	4	1,000,000
	52	Mayor of London (outer)	Outer Estuary	LHR, SEN, LCY (pos)	4	1,000,000
Existing	54	AC Sect - Gatwick 4 r'ways	Expand LGW to 4 runway airport	LHR		
		Phase 1: 3 runways			3	640,000
		Phase 2: 4 runways			4	880,000
	55	MAG and Mayor of London (Stansted)	Expand STN to 4 runway airport	LHR, LTN, LCY(pos)		
		Manchester Airports Group			4	950,000
		Mayor of London			5	1,250,000
	56	MSP Solutions (STN)	Expand STN to 4 runway airport	LHR, LTN, LCY(pos)	4	980,000
	57	Policy Exchange (LTN)	Expand LTN to 4 runway airport	LHR, STN, LCY (pos)	4	900,000
	53	Weston Williamson (LTN)	Expans LTN to 4 runway airport	LHR, STN, LCY (pos)	4	900,000

Context

This assessment considers a high level review of the identified airports based on the information provided above.

Assumptions

- That for each scenario a “Heathrow like” traffic mix is assumed (e.g. 40% Heavy);
- That all new runways would be able to support independent parallel operations;
- That they would operate with a night curfew similar to that which currently exists at Heathrow.

Conclusions

NATS has reviewed the table that the Airports Commission supplied, detailing forecast airport annual ATM capacities for the main airport / runway development options, the following comments summarise our view.

It should be noted that the predicted type and mix of traffic has a significant influence on the overall forecast airfield capacity. For example the current wake mix served by Gatwick Airport (approx 10% heavy jets) is very different to that served at Heathrow Airport (approx 40% heavy aircraft). This dependency is present across the full range of possible operating modes but is most sensitive for segregated modes of operation where one runway is dedicated to just arrivals or just departures. For a detailed review of the forecast capacity numbers it will be necessary to have a complete understanding of the traffic mix assumptions, operating hours and methods of operations of the runways. This information was not available for this simple review and so only a high level assessment has been undertaken.

In the review below, benchmark figures of 480K-500K ATMs for twin runway segregated mode operations similar to Heathrow and 250-260K ATMs for single mixed operations similar to Gatwick have been used to inform the NATS comments.

- The Birmingham figure of 455K ATMs is within the current Heathrow benchmark of 480K ATMs and therefore may be a conservative estimate.
- The Gatwick options 1, 2 are broadly consistent with NATS benchmark values whilst option 3 appears to be slightly conservative.
- The NW option for Stansted runway 2 appears consistent with NATS benchmarks, the E option is potentially somewhat ambitious at 575K ATMs.
- The Heathrow R3 options, the P1 North - 3 runway option and P2 south 4 runway option appear broadly consistent with NATS benchmarks.
- The remaining "new" developments of 3, 4, 5 and 6 runway airports together with Stansted 4 and 5 runway airports appear to show a fair degree of variability across options with the same number of runways, potentially suggesting that the demand mix assumptions, hours of operation or concept of operations are quite different.
- Whilst it is theoretically possible to achieve in excess of 1 million ATMs, airspace complexity and airport proximity may restrict what it is possible to achieve in practice.

Annex B: A Radar Analysis Comprising Recorded Radar Tracks for Various Current and Potential New Airports in the South-East of England and Allied Concentration / Density Plots.

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Performance through Innovation

Airports Commission

Radar Analysis

October 2013

NATS PRIVATE-CONFIDENTIAL *Operational Analysis*

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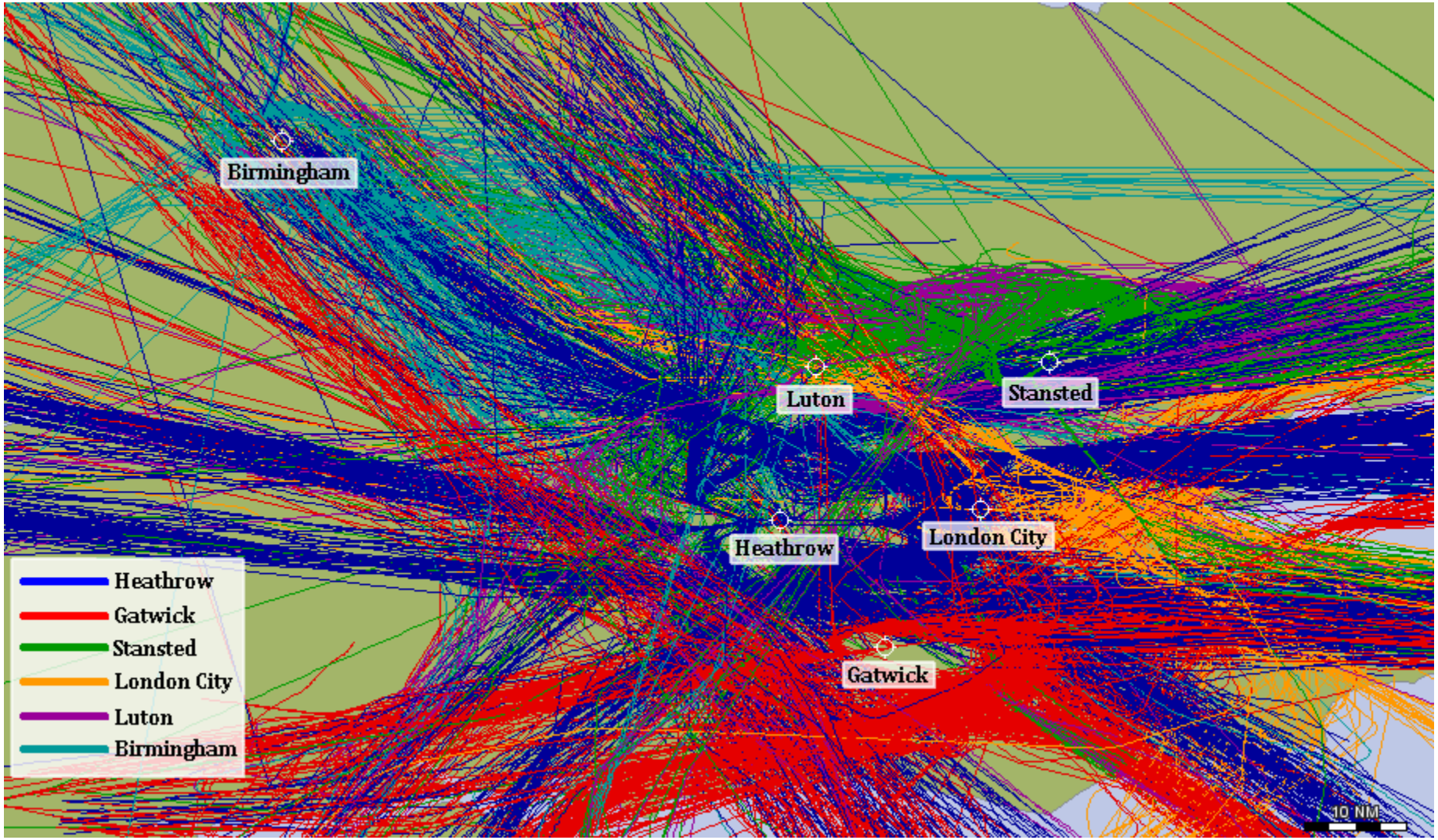
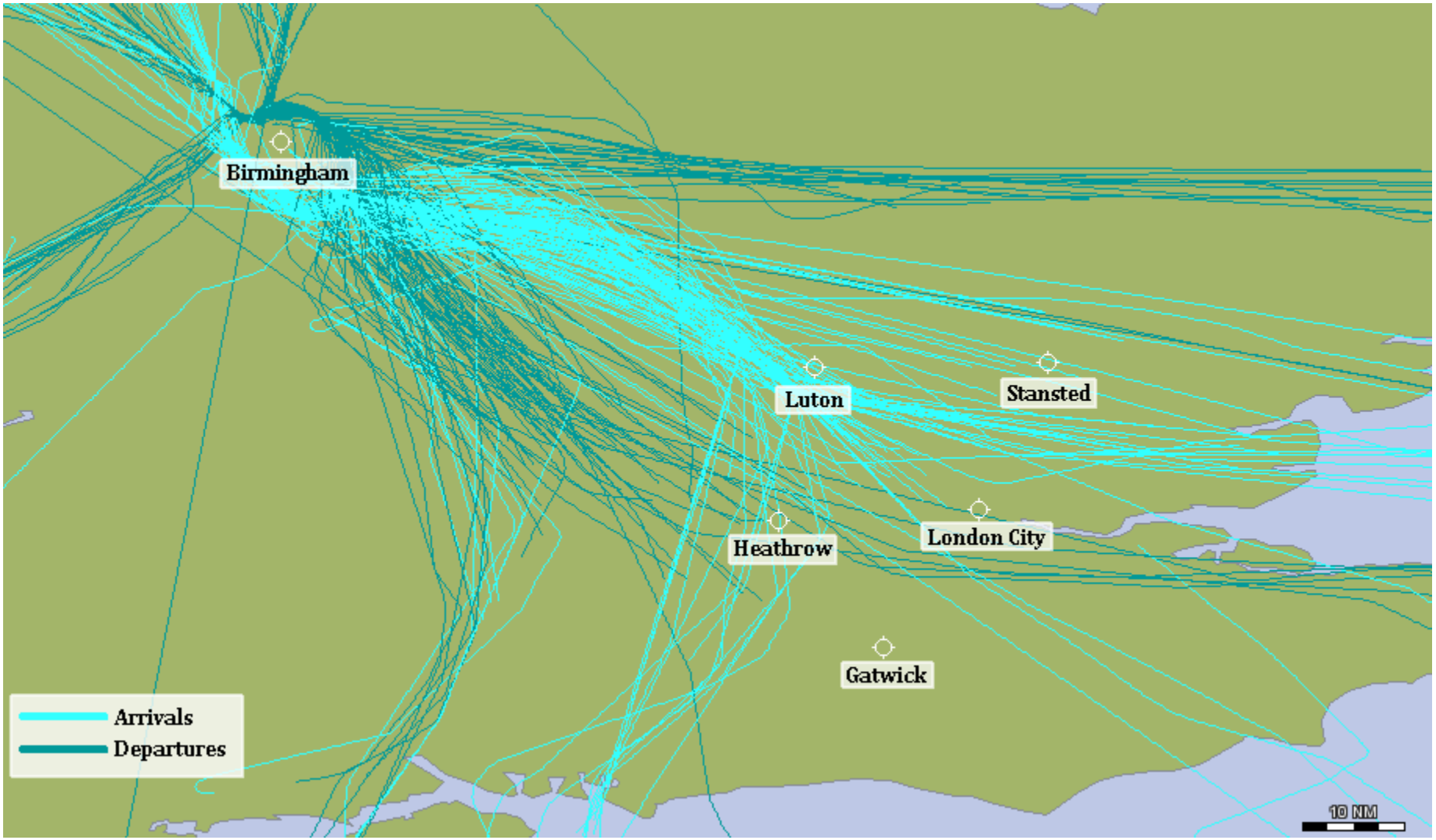
Radar Tracks

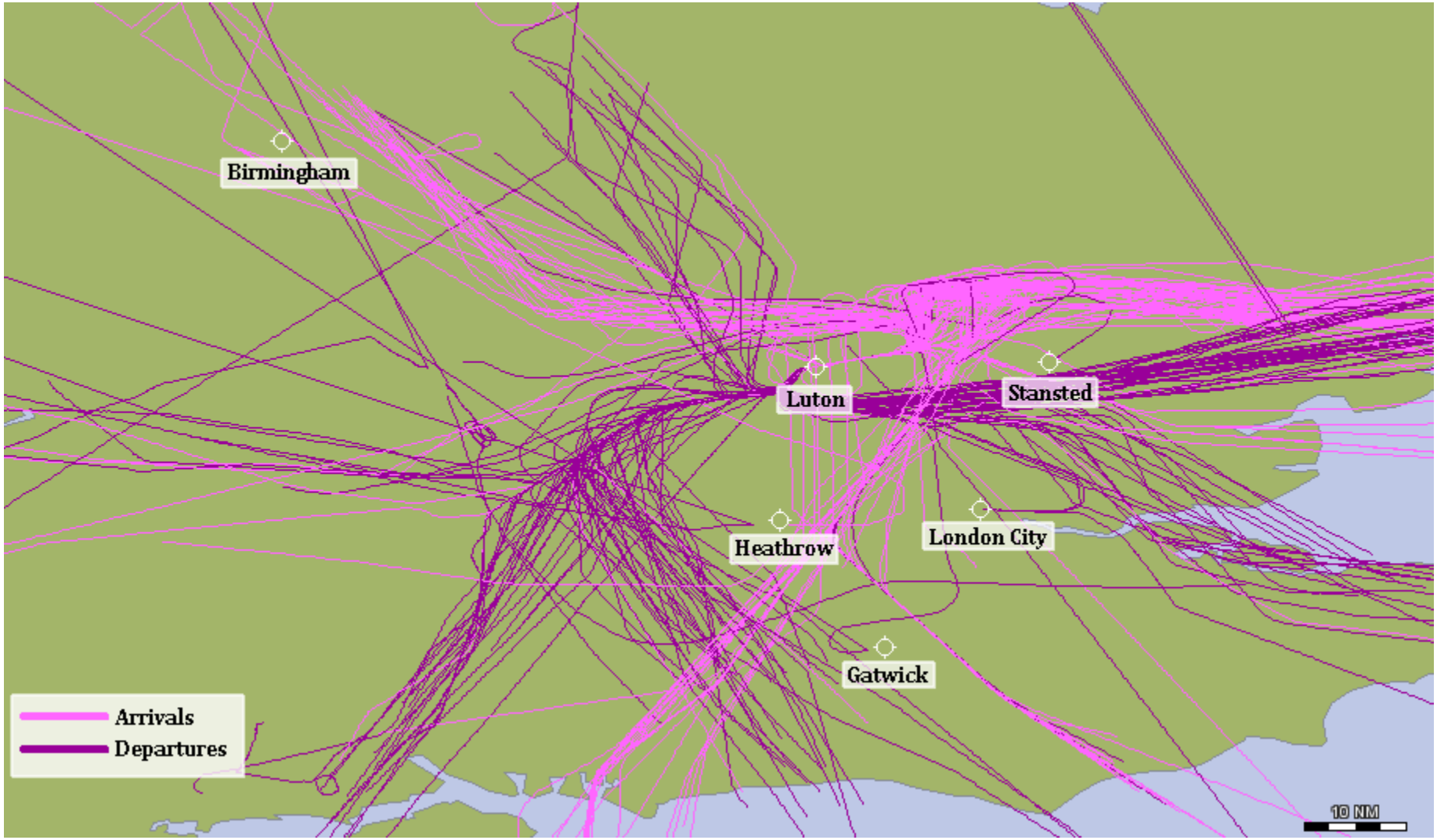
Traffic below 25,000ft – Combined



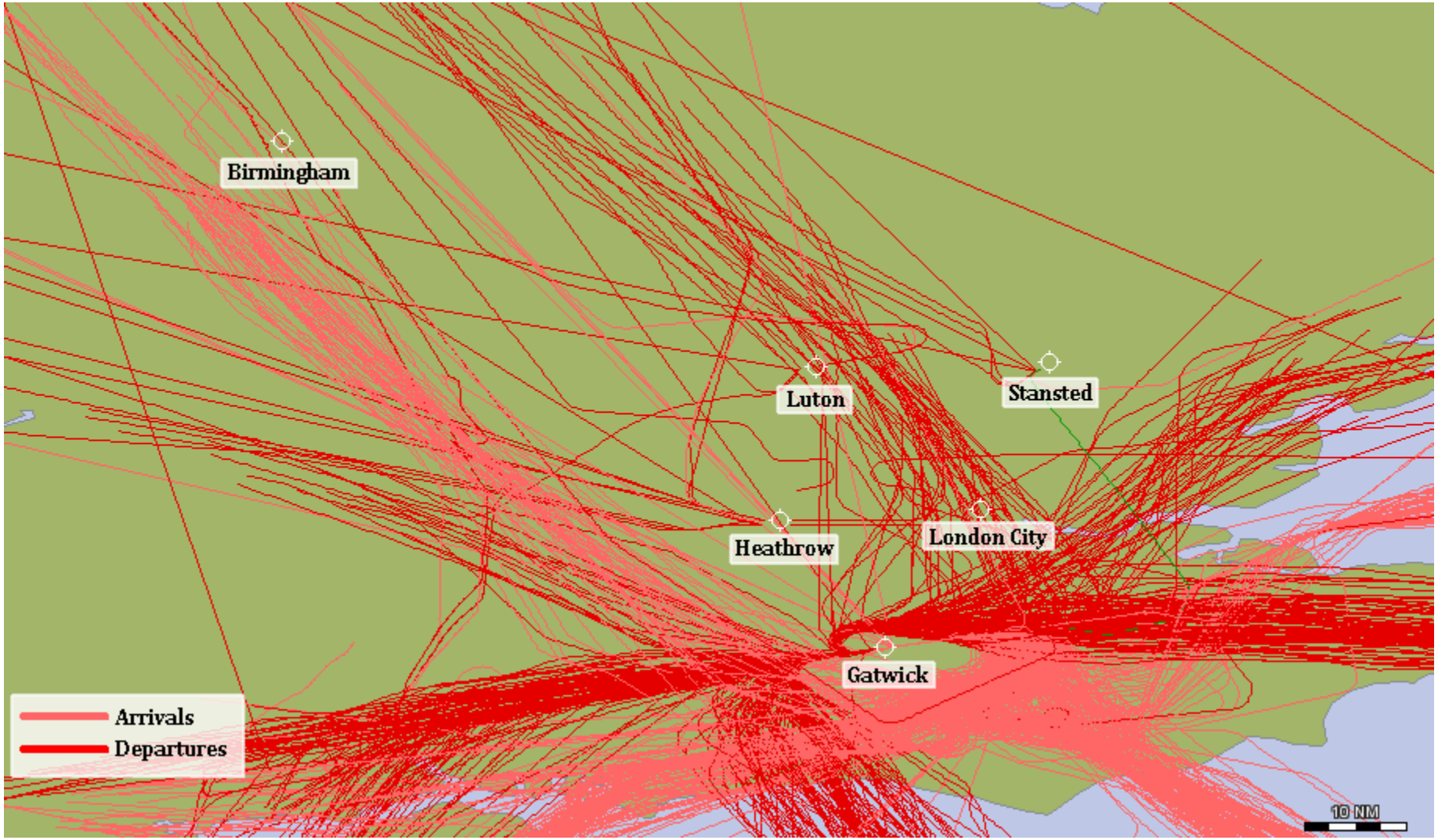
Traffic below 25,000ft – Birmingham



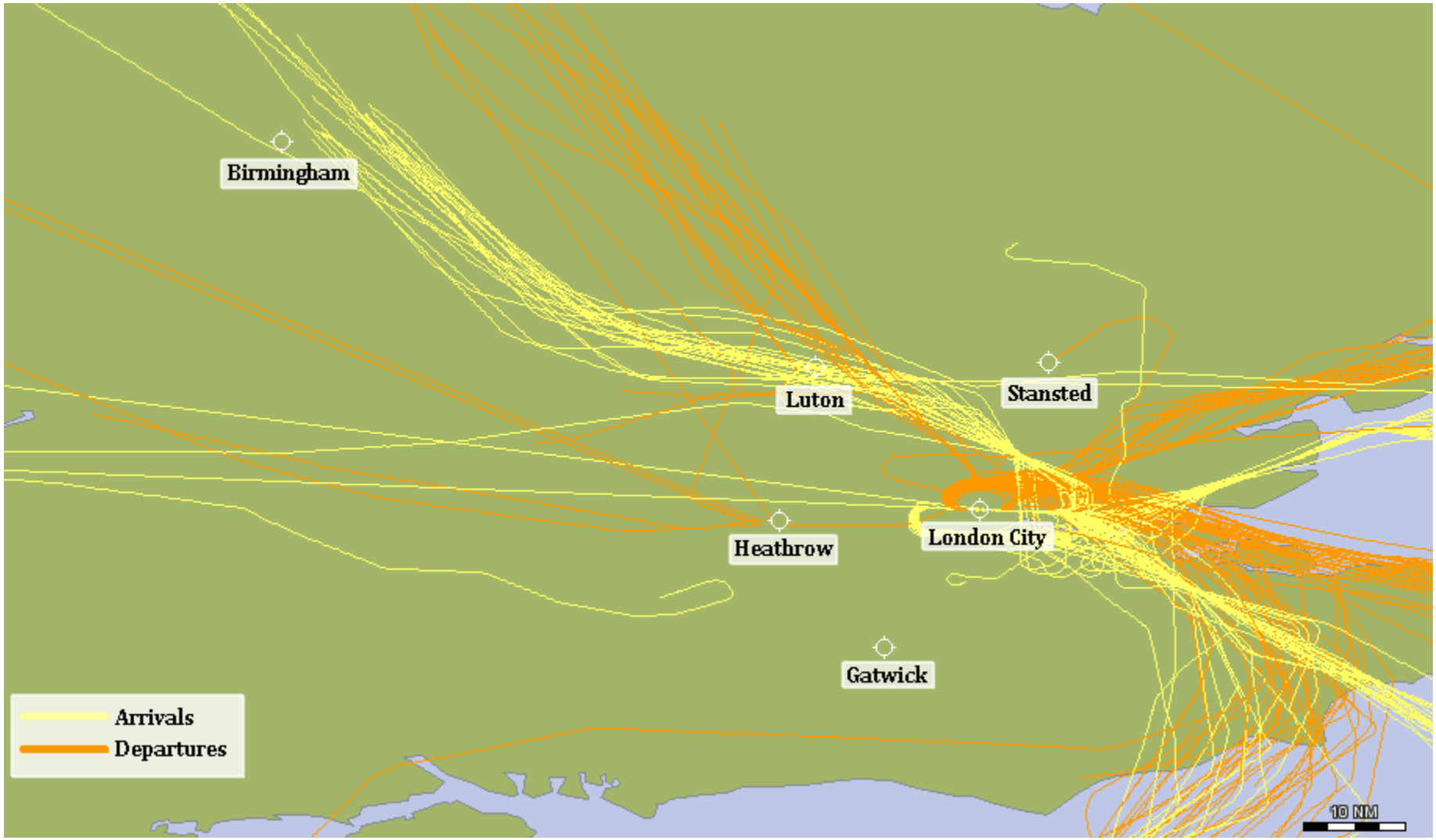
Traffic below 25,000ft – Luton



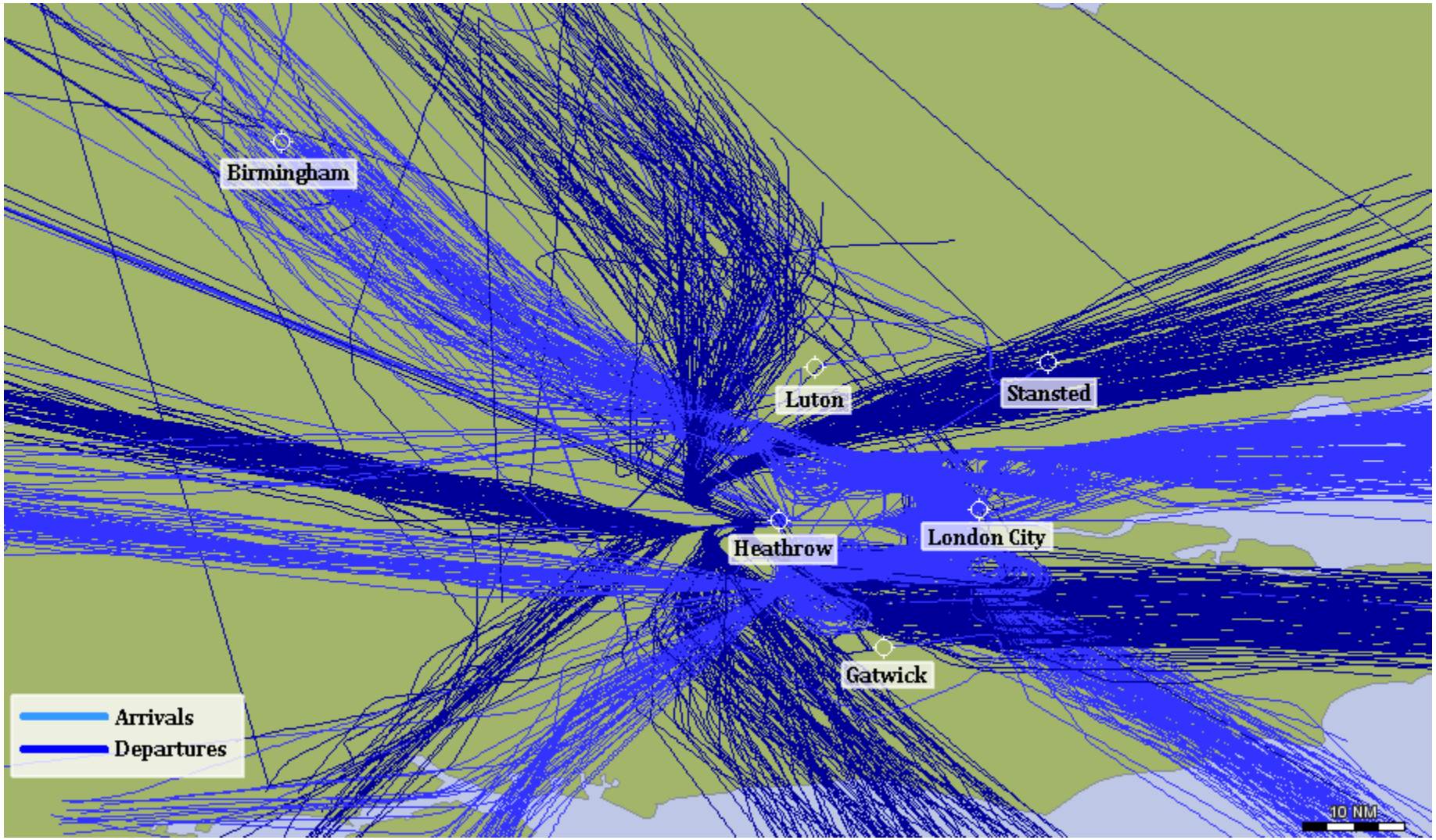
Traffic below 25,000ft – Gatwick



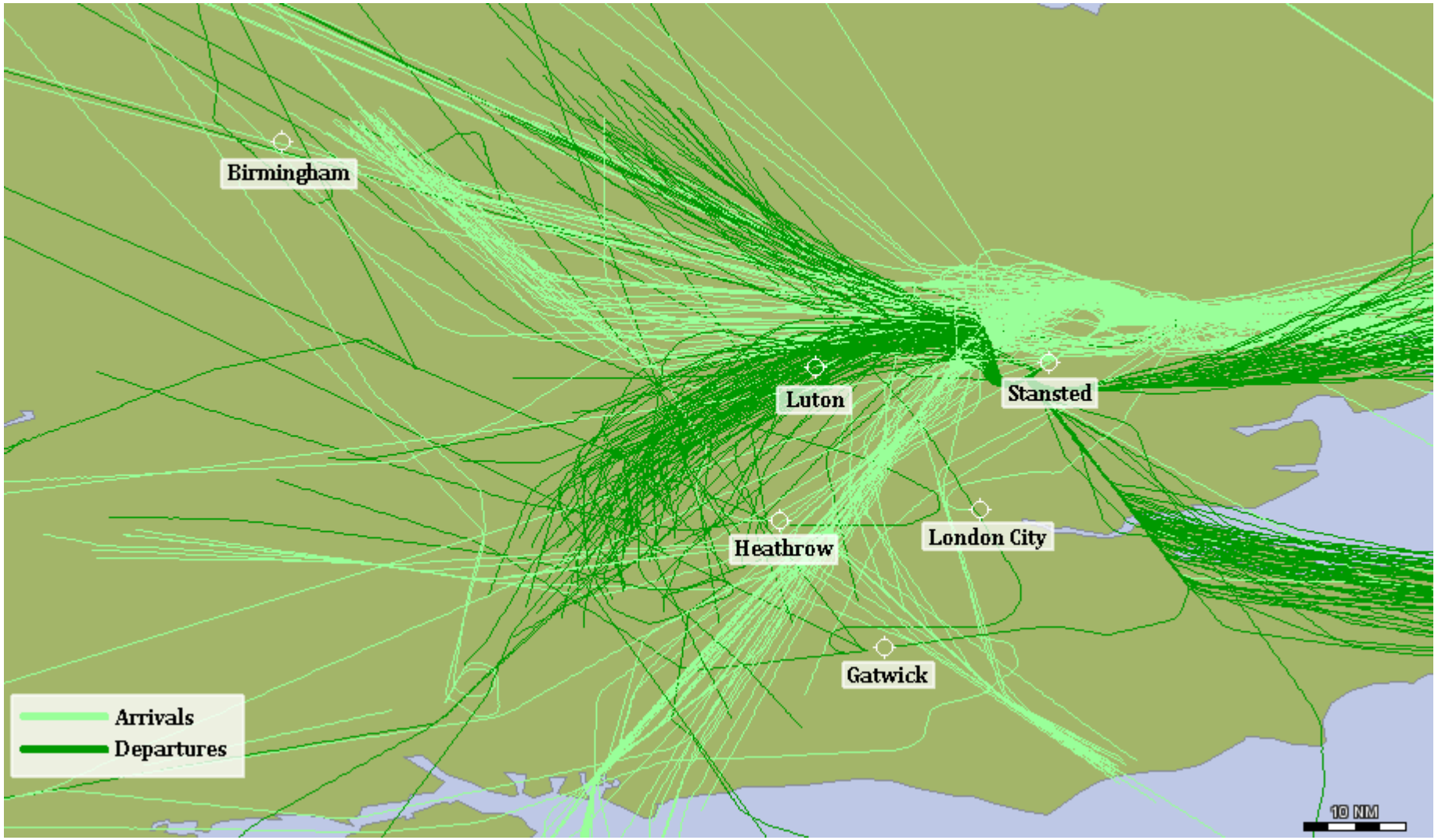
Traffic below 25,000ft – London City



Traffic below 25,000ft – Heathrow

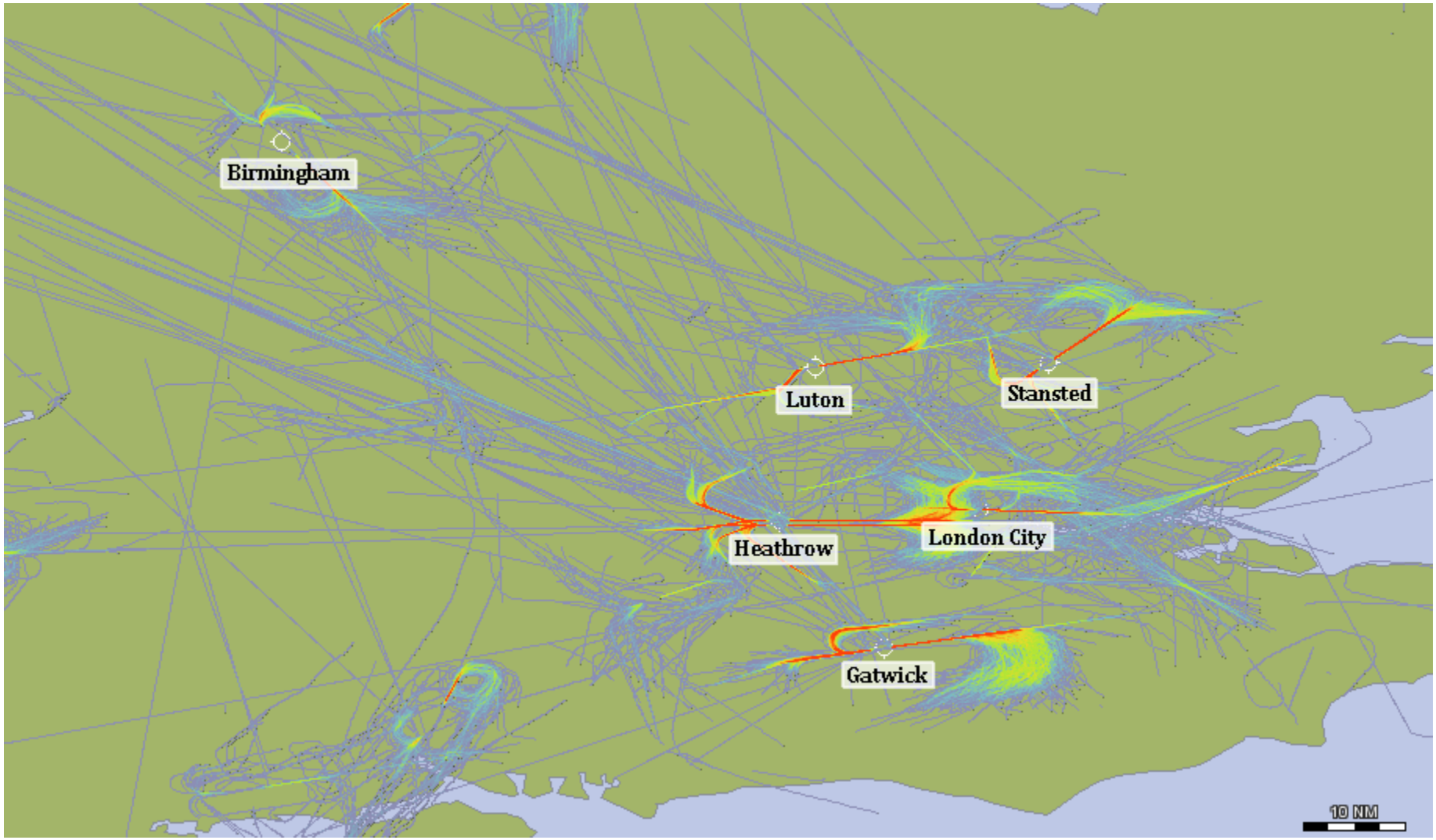


Traffic below 25,000ft – Stansted

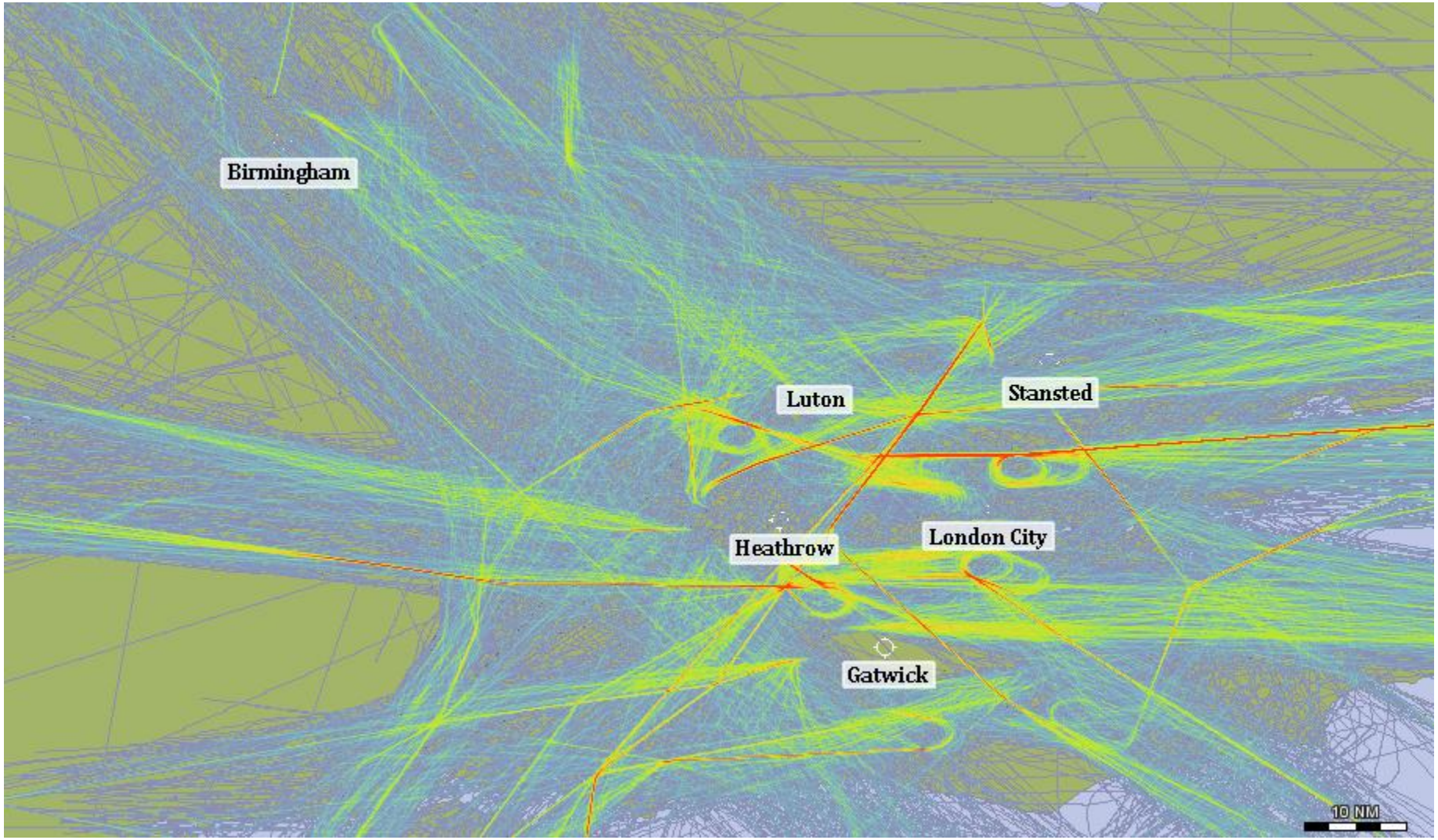


Heat Maps

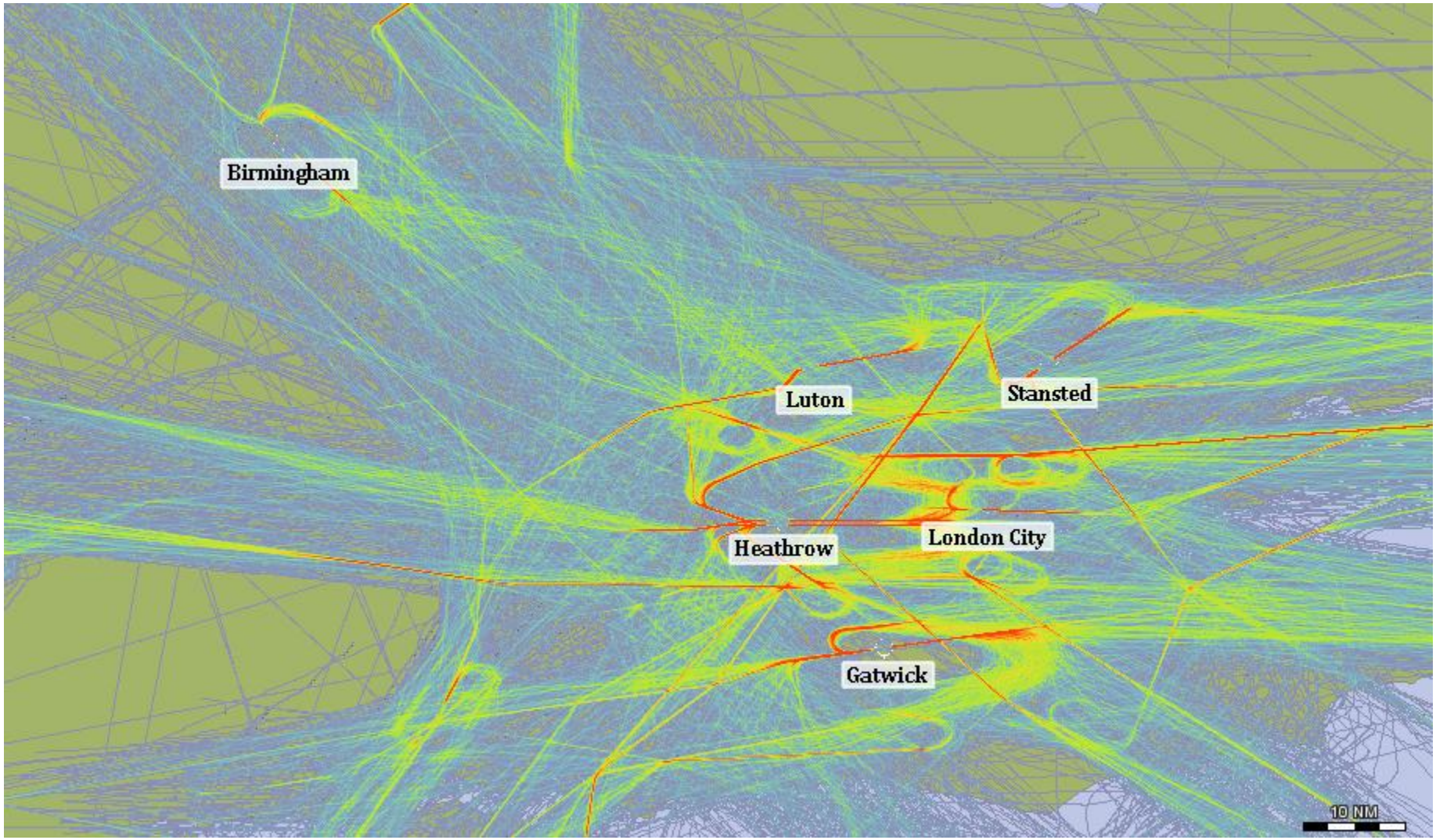
Density Plot - < 6,000ft – All SE Traffic



Density Plot - 6,000ft to 25,000ft – All SE Traffic

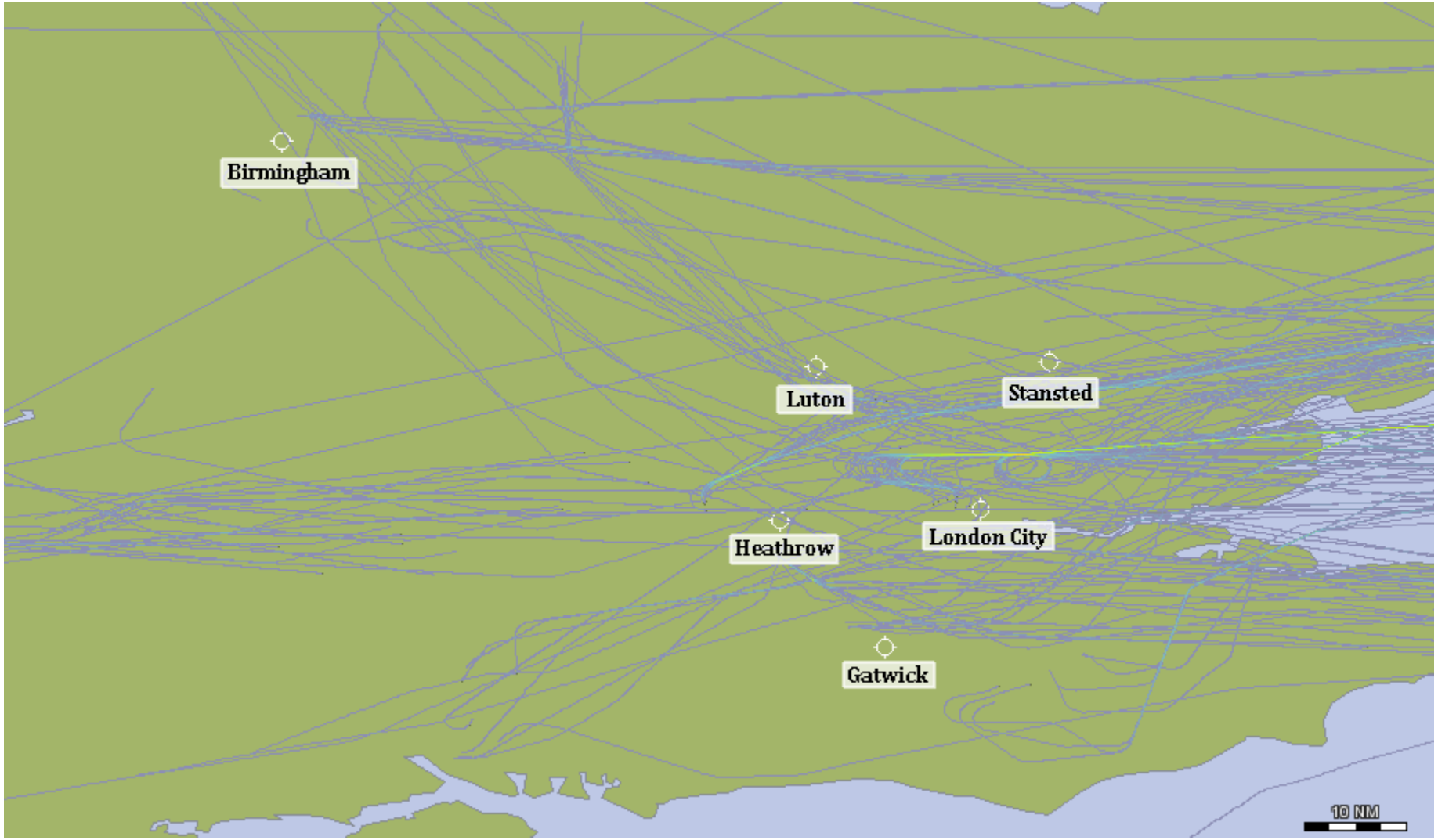


Density Plot - < 25,000ft – All SE Traffic

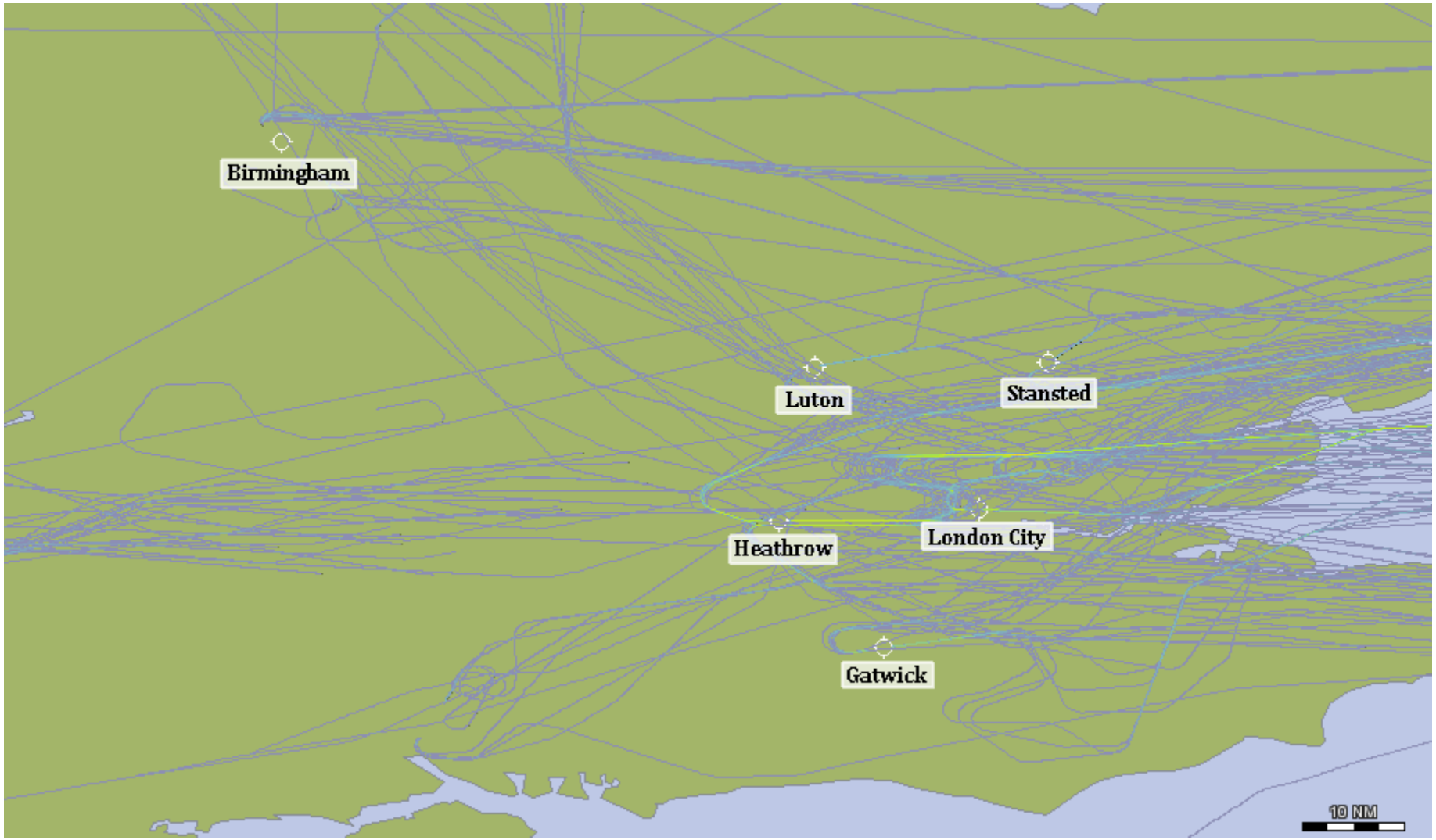


Density Plot - < 6,000ft – EHAM & EBBR Traffic

Density Plot - 6,000ft to 25,000ft – EHAM & EBBR Traffic

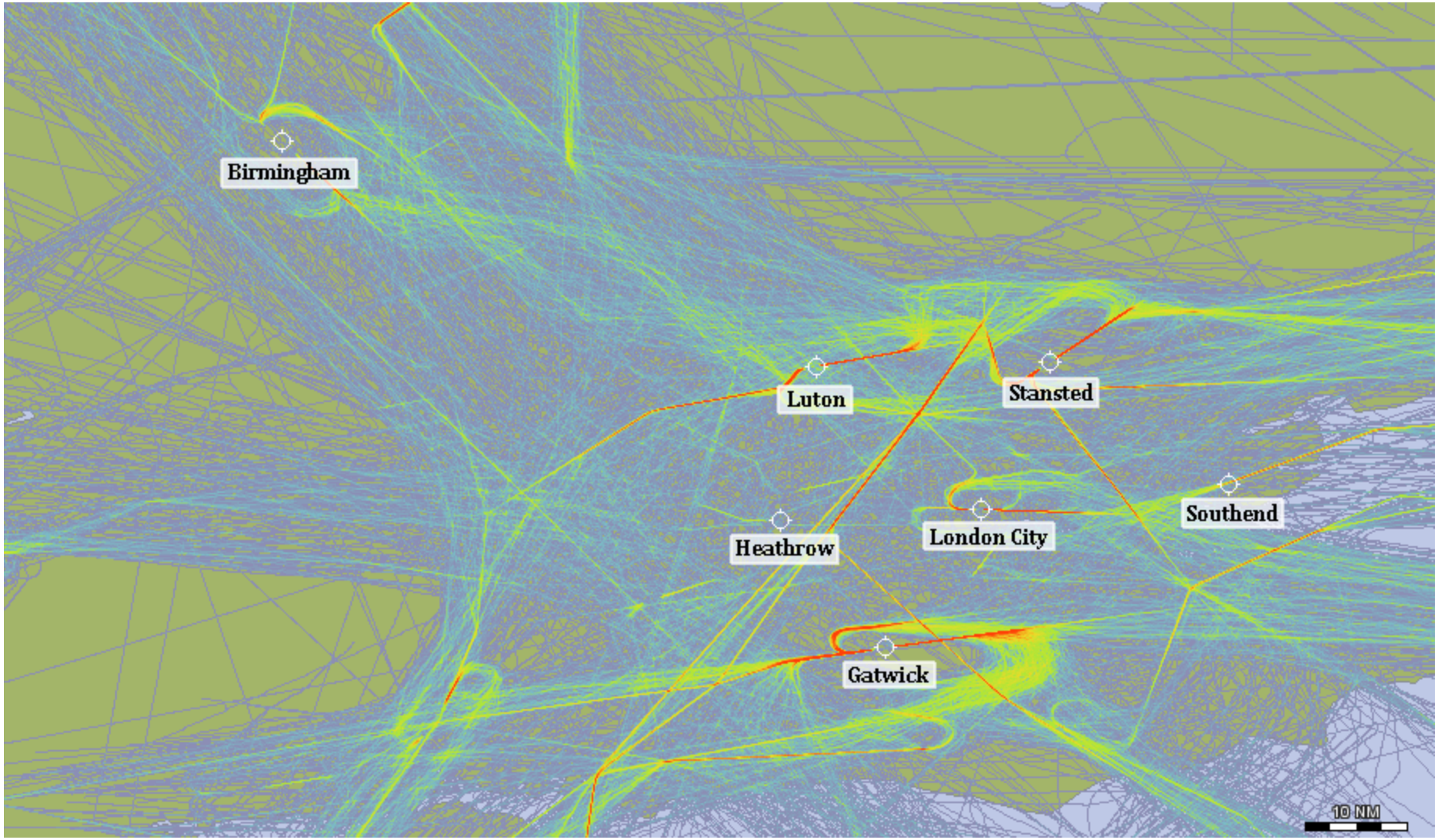


Density Plot - < 25,000ft – EHAM & EBBR Traffic

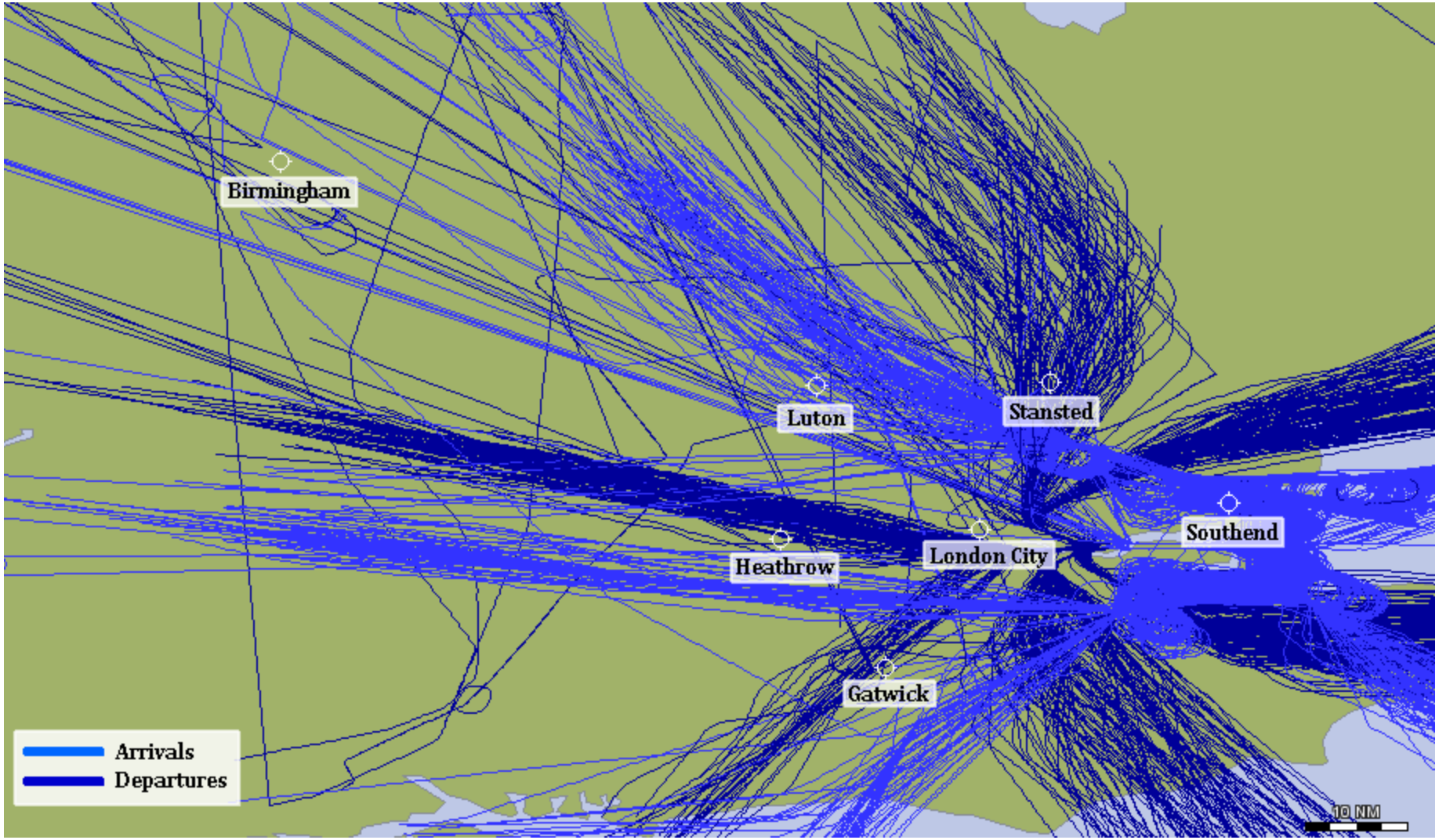


Additional Requests

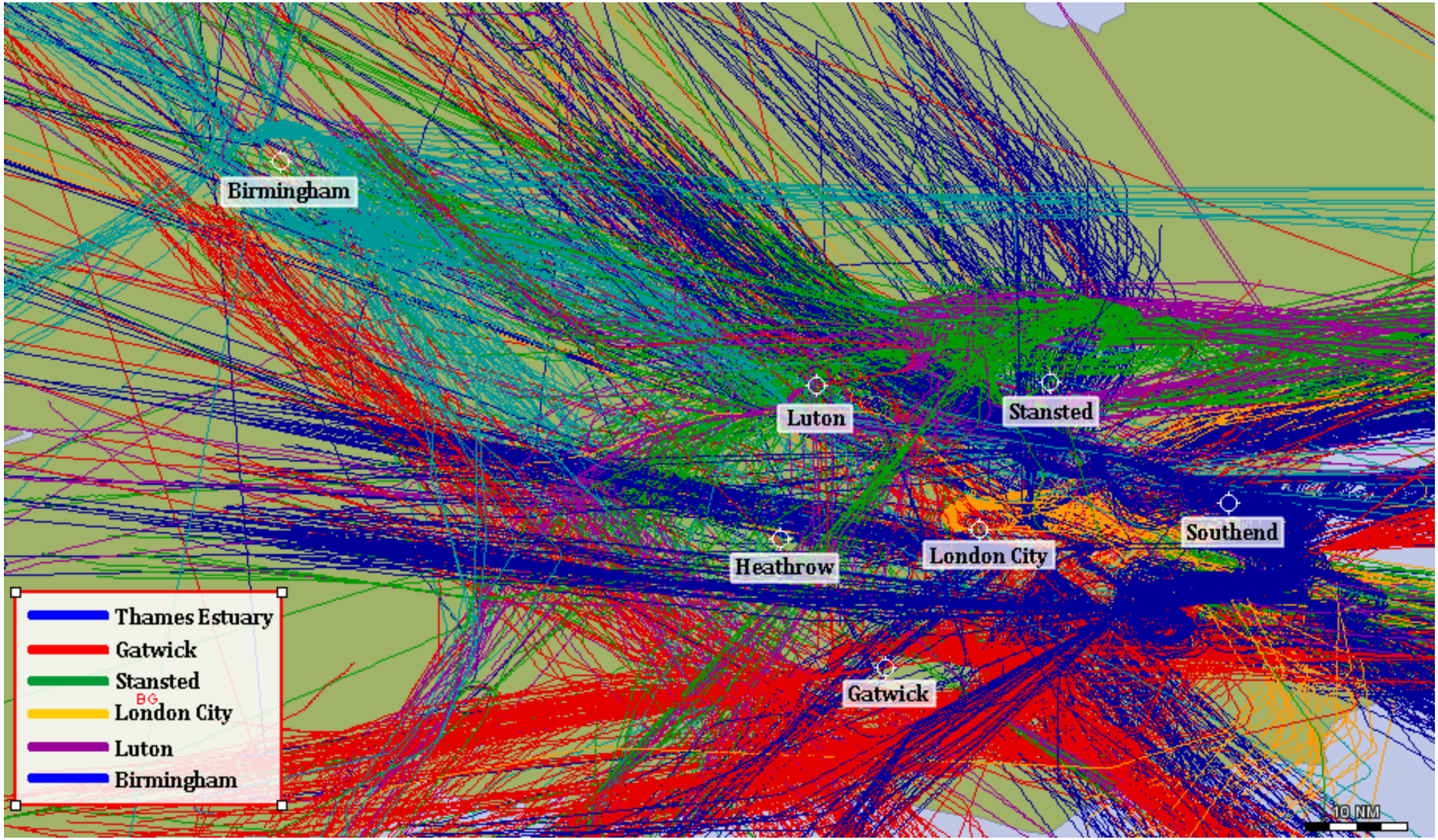
Density Plot - <25,000ft – All SE Traffic (excluding Heathrow)



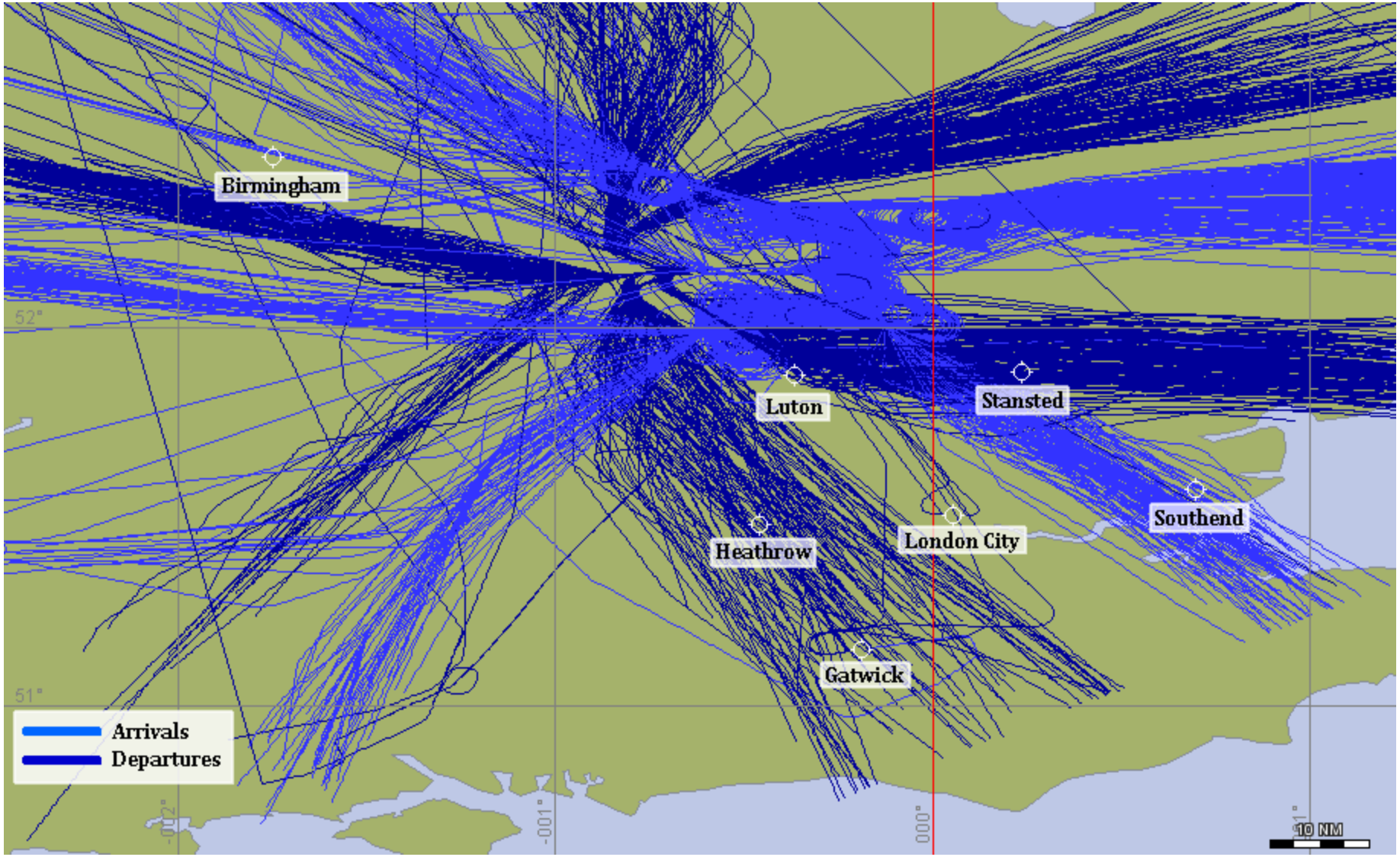
Traffic <25,000ft – Thames Estuary only



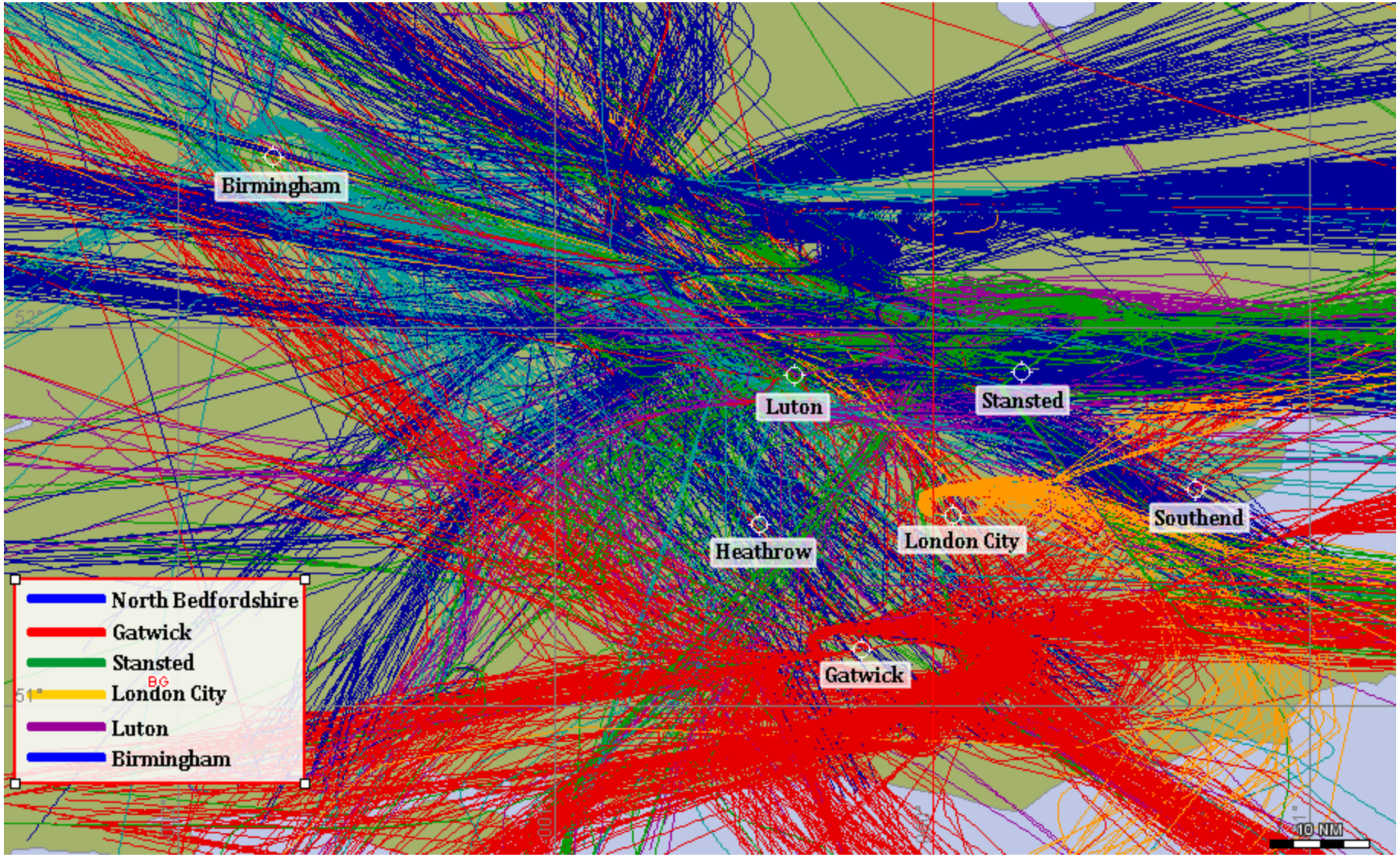
Traffic <25,000ft – SE Traffic (Thames Estuary)



Traffic <25,000ft – North Bedfordshire only



Traffic <25,000ft – SE Traffic (North Bedfordshire)



Annex C: A Review Of The Potential Impact on Overall Air Transport Movements for Various New Runways in South-East England.

NATS Support to the Airports Commission

Task 3.2a – Early Assessment of Long Term Options

Tasking

This briefing note responds to the action placed on NATS to:

> *Expand on the 'Summary of Impact on ATM Movements' slide to include: i) Southend; ii) London City; and, iii) Birmingham, and all these with a 5 Runway Stansted, supported by a Net Increase/Decrease column, supported by explanatory / justifying rationale.*

Context

This initial assessment considers from an 'airspace' perspective the impact on the overall capacity on the current (and potential future) main airports serving the London area that could result from various developments that are being considered by the Airports Commission as part of the Long Term measures. The impact on both Birmingham and Southend are included in this particular assessment.

The analysis is required due to the inter-related and dependant nature of existing operations, which is in part determined by their respective sizes (in terms of number of runways), their runway orientations, and their locations. The purpose of this analysis is thus to illustrate the comparative effects on overall network capability for various changes to the existing runway infrastructure and the provision of new runway infrastructure, as opposed to providing definitive statements on absolute capability.

Only by taking such an holistic view that considers mutual interactions can an overall picture be developed of the change in overall ATM capacity be developed. Detailed analysis using Fast Time Simulation to test predicted/expect traffic interactions would be required to take this analysis to the next level of detail to inform definitive recommendations.

Assumptions

Due to the long term planning horizon and potential for change/refinement of the various Long Term possibilities, a number of assumptions have to be made about the future operation in c.2025:

1. That any new hub airport would be subject to a night curfew and would operate as Heathrow does today (06:00 – 23:00hrs).
2. That the fleet mix would remain, such that c.40% of aircraft would be type Heavy.
3. That an airport with four parallel runways that are capable of independent operations (as specific by SOIR[1]) would be capable of supporting 800,000 Air Traffic Movements (ATMs) per annum (pa).
4. That an airport with five parallel runways is capable of least 900,000 ATMs pa (a figure used in the subsequent analysis).

[1] Simultaneous Operations on Parallel or Near Parallel Instrument Runways, ICAO Document 9643.

5. Where additional runways are provided at existing airports, these would be parallel to the existing runways and be sufficiently separated to support independent operations.

Furthermore, this assessment considers only the impact & feasibility of the options considered from the viewpoint of ATM service delivery: other factors, such as political, economic and social will be considered by different groups.

Constraints

NATS main airspace development – the London Airspace Management Programme – will undertake a complete redesign of the London TMA, delivering revised arrival and departure flows from the five London airports. This revised airspace and route structure is based upon the existing location, number and orientation of runways within the London TMA. Changes to such a baseline of ground infrastructure would have a significant impact on the supporting airspace infrastructure and changes would be subject to consultation in accordance with the Airspace Change Process. The drivers for the LAMP investment are set out in the next section.

There is also a diminishing return in the number of ATMs that an airport can accommodate as its number of runways increase (as set out in the Assumptions, we estimate that a four runway airport can handle 800k ATMs pa whereas a five runway airport can accommodate at least a further 100k ATMs pa). This is because at this level of operation, the limitations of the surrounding airspace infrastructure to effectively supply the arrival flows and accept the departure flows assumes greater significance and could ultimately constrain the maximum number of movements within small confines of airspace (i.e. in and around the airport).

The Current Airspace Design

The London Terminal Manoeuvring Area (TMA) covers airspace in the south-easterly part of England up to 24,500ft. The existing airspace design and route network structures have evolved over 40 years to support the growth of all five London airports and it now presents one of the most complex and busy operational environments in the world. During busy periods, controller workload is intense, mitigated through a highly structured and systemised operation to deliver the level of traffic throughput required whilst maintaining high safety levels. The piecemeal nature in which the airspace has evolved had resulted in a route structure that has some significant operational limitations and inefficiencies.

NATS has established an investment programme (the London Airspace Management Programme (LAMP)) to provide a complete redesign of the London TMA to provide more efficient operations to all the airports in a manner that reflects progressive advances in aircraft capabilities (both avionics and performance) and addresses forecast future demand. LAMP will re-design and implement the new airspace infrastructure in a manner that underpins, and in part delivers, the CAA's Future Airspace Strategy (FAS) to modernise the UK's airspace system. NATS, the CAA, Airline Operators and other stakeholders are working closely to develop and deliver the concepts set out in the FAS in a coordinated and collaborative manner. It is a key building block for implementing the advanced concepts being validated by SESAR for operations within Terminal airspace.

The plans for revised airspace and route network structures, including PBN-based Standard Instrument Departures (SIDs) and Standard Terminal Arrival Routes (STARs), are being developed and consulted upon on the existing number, location and orientation of runways in the south-east of England. The additional ground infrastructure that will ultimately come from the review of the Long Term Possibilities will require these designs to be revised to maximise the overall network capabilities & efficiency of airspace supporting south-east England.

Assessment

Methodology

This assessment takes an incremental approach to the impact of overall ATM capacity of airports operating in south-east England by considering the overall net impact on traffic movements generated by additional ground-infrastructure. Where considered material, various orientations of new runways are considered as this may have varying degrees on impact on adjacent airports due to the nature of the arrival and departure flows and the potential for conflict. The estimated impact is presented both as a percentage increase (or decrease) in baseline capability resulting from the revised ground infrastructure and the impact that would have on the amount of ATMs that could be accommodated.

The impact of the expansion of existing airports (or establishment of new airports) on the operation of neighbouring airports is informed by the current concept of operation, separation minima and the need for and use of surrounding airspace. In the longer term, ground and airborne technological developments would seek to reduce such impacts and thus mitigate the risks of the reductions in the overall network capacity. A further point to consider is that the estimated reductions are based upon the estimated maximum capacity; in reality, in several cases (e.g. Stansted, Luton, City & Southend) the current and forecast demand is such that the reduced/constrained capacity figure are unlikely to be experienced, becoming manifest in a constraint on future capability, as opposed to a reduction in existing operations.

The Baseline

The baseline capability against which incremental change is considered is set out below in terms of the number of air traffic movements that could be sustainably handled. This is different from the current or future expected level of movements that could be handled (i.e. the demand), which results from various factors including operator business models & preferences, caps, restrictions & curfews, and passenger preference. The baseline is taken to be the capability after the LAMP investment has delivered and sets out the maximum sustainable amount of ATMs per annum, with arrival and departure flows established to support such existing ground-infrastructure.

Furthermore, the capabilities below set out the uncapped (be it ATMs or Passengers) capability of the airport based upon airspace capacity. National or regional constraints may result in a lesser number being applied even if the airspace could accommodate a greater number.

Configuration	LHR	LGW	STN	LTN	BMG	LCY	SEN	Total	Change
Baseline %	100%	100%	100%	100%	100%	100%	100%	100%	N/A
Baseline ATMs	500k	250k	250k	250k	250k	100k	100k	1,680k	N/A

The following factors/constraints influence this baseline estimate:

1. Small single runway airports such as London City & Southend are capable of supporting 100k ATMs pa.
2. Large & medium size single runway airports are estimated to be able to sustainably support 250k Air Transport Movements pa (noting that Gatwick has in the past supported slightly greater movements and that the market demands or operating restriction on Stansted, Luton and Birmingham result is lesser movements being observed).
3. A two runway airport capable of supporting independent operations can support 500k ATMs pa. Heathrow is currently capped to 480k ATMs pa, is constrained by a night time flying ban, and cannot support fully independent operations. Additional Air Traffic Management facilities & procedures could however be implemented (at cost) to enable such a capability to be supported.

A Third Runway at Heathrow

A third runway at Heathrow would increase capacity to 700k ATM pa and such an increase could be accommodated without an adverse impact on other airports.

Configuration	LHR	LGW	STN	LTN	BMG	LCY	SEN	Total	Change
LHR3 %	140%	100%	100%	100%	100%	100%	100%	112%	12%
LHR3 ATMs	700	250	250	250	250	100	100	1,900	200

A Fourth Runway at Heathrow

A fourth runway at Heathrow would further increase capacity to 800k ATM pa, but would be subject to extensive modelling to assess the impact on the London airports due to the conflict arrival & departure flows. This analysis indicates that there would be a significant impact on Gatwick, Luton, City and Stansted airports. The overall effect would be to reduce the number of ATMs that could be supported.

Configuration	LHR	LGW	STN	LTN	BMG	LCY	SEN	Total	Change
LHR4 %	160%	50%	50%	50%	100%	25%	100%	91%	-9%
LHR4 ATMs	800	125	125	125	250	25	100	1,550	-150

Stansted with a Second Runway

A second runway at Stansted would double capacity from that airport but have an adverse impact on neighbouring Luton airport, estimated to be c.20% reduction provided that additional airspace to the north of Luton and Stansted is secured. Other airports are considered to be sufficiently distant to not be effected.

Configuration	LHR	LGW	STN	LTN	BMG	LCY	SEN	Total	Change
STN2 %	100%	100%	200%	80%	100%	100%	100%	112%	12%
STN2 ATMs	500	250	500	200	250	100	100	1,900	200

Gatwick with a Second Runway

This would double the capacity at Gatwick and, due to its southerly location and runway orientation, would not have an impact on other airports. There may be some impact on French airspace due to additional traffic presenting at lowers levels at the UK/French border. Currently all traffic arriving at Gatwick approaches from the south. To operate two runways efficiently it is preferable to be able to have two arrival streams from the north and south similar to today's Heathrow operation. If Gatwick required an additional arrival stream from the north of the airport that may impact on Heathrow's arrival stream from the south.

Configuration	LHR	LGW	STN	LTN	BMG	LCY	SEN	Total	Change
LGW2 %	100%	200%	100%	100%	100%	100%	100%	115%	15%
LGW2 ATMs	500	500	250	250	250	100	100	1,950	250

The 2:2:2 Constellation

This configuration provides double the capacity at Gatwick and Stansted airports, the latter of which would have an impact on neighbouring Luton, estimated to halve its capacity (for reasons given for the 'Second Runway at Luton' configuration).

Configuration	LHR	LGW	STN	LTN	BMG	LCY	SEN	Total	Change
2:2:2 %	100%	200%	200%	80%	100%	100%	100%	126%	26%
2:2:2 ATMs	500	500	500	200	250	100	100	2,150	450

A Four Runway Hub Airport at Stansted

This configuration would significantly increase capacity at Stansted to 800k movements pa (see Assumptions) but would have a substantial impact on Luton, which to all intents and purposes would see it not being able to operate due to its proximity and the conflicting arrival and traffic flows. Heathrow would be affected due to the relative location and runway orientations (Stansted being NE/SW), estimated to reduce its capacity to that of a single runway airport. It is assumed here that the existing runway orientation (NE/SW) would exist. An E/W orientation would not have such an effect on Heathrow. Other airports would not be affected.

Configuration	LHR	LGW	STN	LTN	BMG	LCY	SEN	Total	Change
STN4 %	50%	100%	320%	20%	100%	100%	100%	106%	6%
STN4 ATMs	250	250	800	50	250	100	100	1,800	100

A Five Runway Hub Airport at Stansted

A further runway at Stansted would impact other airports, estimated to half the capacity at London City and Southend. Overall, this would not increase network capacity over the Four Runway Stansted configuration, as the additional capacity of the additional runway at Stansted would be correspondingly offset by the reduction in capability at London City & Southend. As for a Four runway Stansted, it is assumed here that the existing runway orientation (NE/SW) would exist. An E/W orientation would not have such an effect on Heathrow.

Configuration	LHR	LGW	STN	LTN	BMG	LCY	SEN	Total	Change
STN5 %	50%	100%	360%	20%	100%	50%	50%	106%	6%
STN5 ATMs	250	250	900	50	250	50	50	1,800	100

Thames Estuary Hub (E/W Orientation)

The runway orientation of a new hub airport in the Thames Estuary make a significant difference on the impact such operations would have on neighbouring airports. Operating an East / West configuration would have a significant impact Heathrow, which would not be able to operate as it currently does, due to the fact that both sites are roughly on the same latitude and both would operate runways in the East / West orientation. The same reasons/impact would exist for London City, and the same impact would exit at Southend, which would be some 10 to 15 miles away to the north east and which operates a North East / South West runway orientation.

Configuration	LHR	LGW	STN	LTN	BMG	LCY	SEN	Estuary	Total	Change
TE (E/W) %	0%	100%	100%	100%	100%	0%	0%	100%	106%	6%
TE (E/W) ATMs	0	250	250	250	250	0	0	800	1,800	100

Thames Estuary Hub (NE/SW Orientation)

A North East / South West orientation would substantially reduce the impact on both Heathrow and City airports due as the arrival and departure flows would be de-conflicted. Such an orientation would however have a substantial impact on Gatwick; the impact on Southend would remain.

Configuration	LHR	LGW	STN	LTN	BMG	LCY	SEN	Estuary	Total	Change
TE (NE/SW) %	100%	0%	100%	100%	100%	50%	0%	100%	124%	24%
TE (NE/SW) ATMs	500	0	250	250	250	50	0	800	2,100	400

North Bedfordshire (E/W Orientation)

This configuration sees a new hub airport in north Bedfordshire with an East / West runway orientation. Due to its location at the northern part of the London TMA, there would be a substantial impact on Luton airport and a significant impact on Stansted airport. Furthermore, to the north-west, there would be an impact on Birmingham (estimated as a 50% reduction) and a similar impact would be expected on East Midlands airport.

Configuration	LHR	LGW	STN	LTN	BMG	LCY	SEN	Bedford	Total	Change
BED (E/W) %	100%	100%	50%	20%	50%	100%	100%	100%	121%	21%
BED (E/W) ATMs	500	250	125	50	125	100	100	800	2,050	350

A Third Runway at Heathrow & a Second Runway at Stansted

This configuration would see two additional runways, delivering a third runway at Heathrow and a second runway at Stansted. The overall impact is assessed as being the combined impact of the contributions of the provision of an additional runway at these two airports with the corresponding reduction on the capability of Luton airport.

Configuration	LHR	LGW	STN	LTN	BMG	LCY	SEN	Total	Change
LHR3, STN2 %	140%	100%	200%	80%	100%	100%	100%	141%	41%
LHR3, STN2 ATMs	700	250	500	200	250	250	250	2,400	700

A Third Runway at Heathrow & a Second Runway at Gatwick

This configuration would see two additional runways, delivering a third runway at Heathrow and a second runway at Gatwick. The overall impact is assessed as being the combined impact of the contributions of the provision of an additional runway at these two airports with no corresponding impact on the capabilities of the other airports.

Configuration	LHR	LGW	STN	LTN	BMG	LCY	SEN	Total	Change
LHR3, LGW2 %	140%	200%	100%	100%	100%	100%	100%	144%	44%
LHR3, LGW2 ATMs	700	500	250	250	250	250	250	2,450	750

Conclusions

The mutual interactions of airports in close proximity (c.50 miles) means that an increase in the operation of one can have an impact on the operations of neighbouring airports others due to the additional potential interacts between traffic on the arrival & departure routes. Thus the overall impact on the network as a whole has to be considered: whilst additional runways at existing location or new hub locations would increase capacity at that local/regional level, the impact on the ability of other airports to operate also needs to be considered.

Detailed analysis using Fast Time Simulation to test predicted/expect traffic interactions would be required to take this analysis to the next level of detail to inform definitive recommendations.

A further matter that warrants consideration is the impact on overall network resilience that the various topologies of runway locations have and the impact that localised situations resulting in airport unavailability (e.g. temporary closure necessitating diversion) would have on the capability of the overall network. Operating a distributed network would reduce the impact of localised incidents and result in a network which is more resilient to such temporary or longer term outages.

Summary of Impact for Various Ground Infrastructure Configurations

Percentage Impact on Baseline Capability (Percentage of Existing Capability)

	LHR	LGW	STN	LTN	BMG	LCY	SEN	NEW	CHANGE
BASELINE	100%	100%	100%	100%	100%	100%	100%	0%	N/A
LHR3	140%	100%	100%	100%	100%	100%	100%	0%	12%
LHR4	160%	50%	50%	50%	100%	25%	100%	0%	-9%
STN2	100%	100%	200%	80%	100%	100%	100%	0%	12%
LGW2	100%	200%	100%	100%	100%	100%	100%	0%	15%
2:2:2	100%	200%	200%	80%	100%	100%	100%	0%	26%
STN4	50%	100%	320%	20%	100%	100%	100%	0%	6%
STN5	50%	100%	360%	20%	100%	50%	50%	0%	6%
LHR3, STN2	140%	100%	200%	80%	100%	100%	100%	0%	41%
LHR3, LGW2	140%	200%	100%	100%	100%	100%	100%	0%	44%
TE (E/W)	0%	100%	100%	100%	100%	0%	0%	100%	6%
TE (NE/SW)	100%	0%	100%	100%	100%	50%	0%	100%	24%
BED (E/W)	100%	100%	50%	20%	50%	100%	100%	100%	21%

‘New’ = a new hub airport, either in the Thames Estuary (TE) or in north Bedfordshire (BED).

Resultant Impact on ATM Capability (Thousand Air Transport Movements pa)

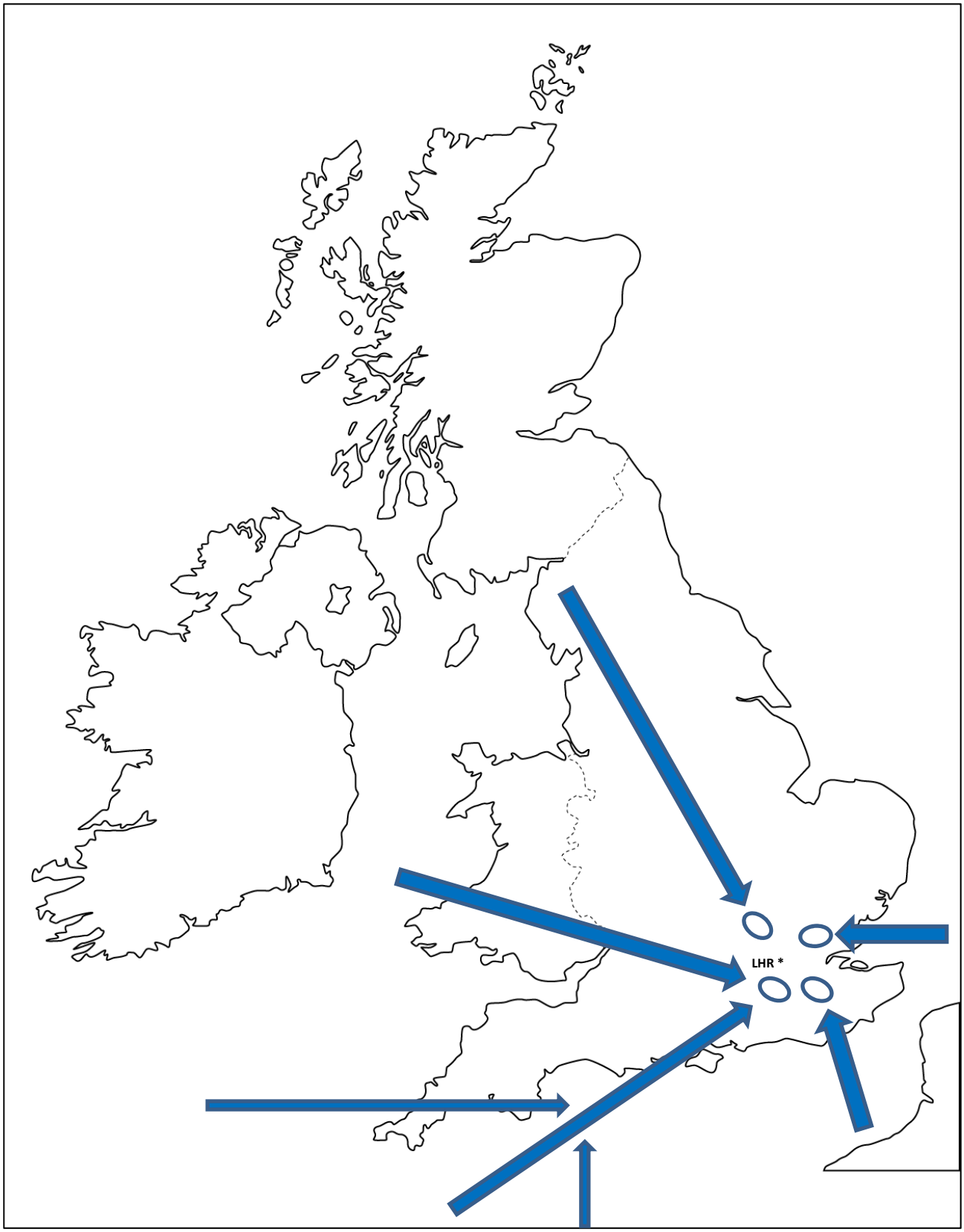
	LHR	LGW	STN	LTN	BMG	LCY	SEN	NEW	TOTAL	CHANGE
BASE	500	250	250	250	250	100	100	0	1,700	N/A
LHR3	700	250	250	250	250	100	100	0	1,900	200
LHR4	800	125	125	125	250	25	100	0	1,550	-150
STN2	500	250	500	200	250	100	100	0	1,900	200
LGW2	500	500	250	250	250	100	100	0	1,950	250
2:2:2	500	500	500	200	250	100	100	0	2,150	450
STN4	250	250	800	50	250	100	100	0	1,800	100
STN5	250	250	900	50	250	50	50	0	1,800	100
LHR3, STN2	700	250	500	200	250	250	250	0	2,400	700
LHR3, LGW2	700	500	250	250	250	250	250	0	2,450	750
TE (E/W)	0	250	250	250	250	0	0	800	1,800	100
TE (NE/SW)	500	0	250	250	250	50	0	800	2,100	400
BED (E/W)	500	250	125	50	125	100	100	800	2,050	350

'New' = a new hub airport, either in the Thames Estuary (TE) or in north Bedfordshire (BED).

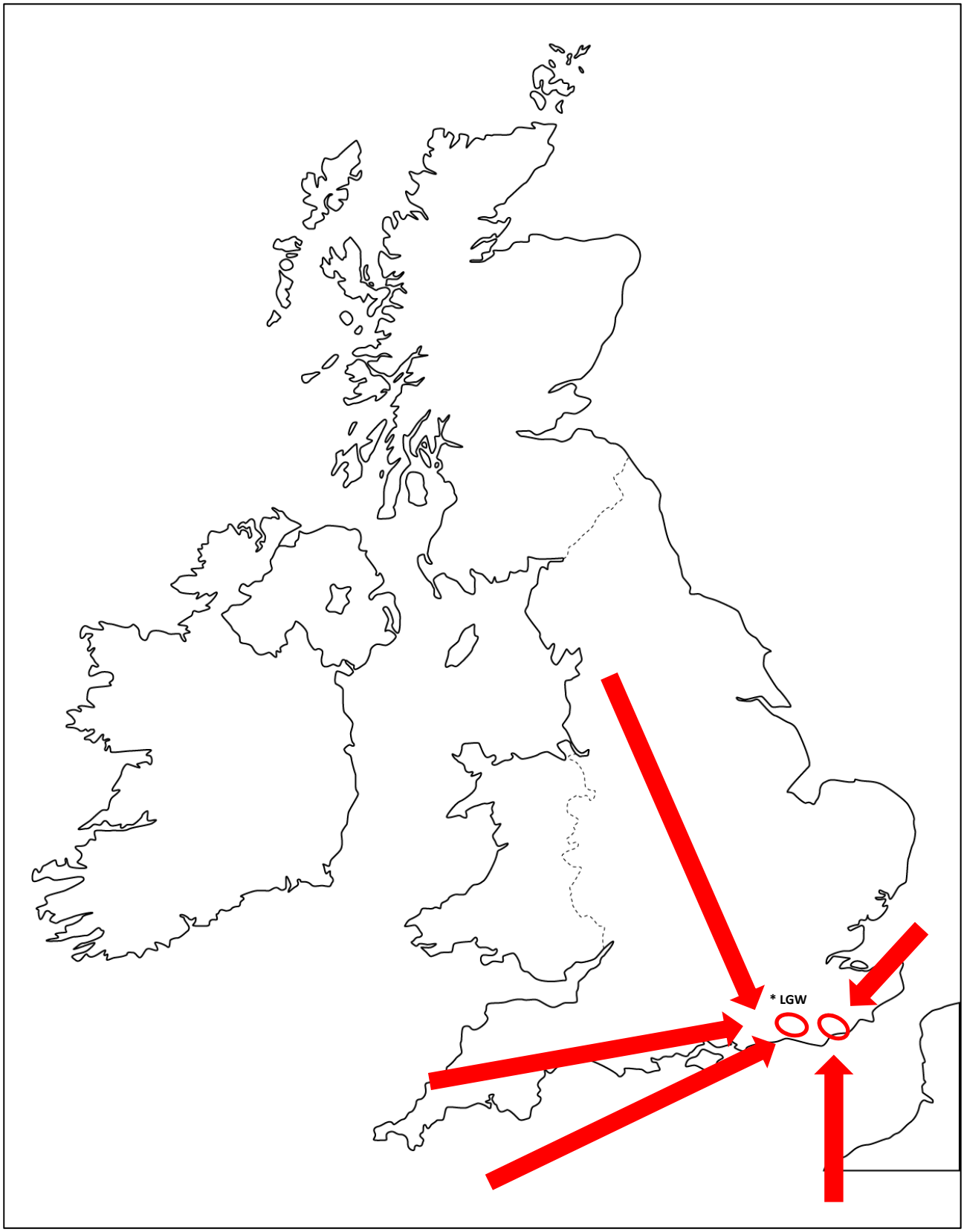
Annex D: A Review of the Potential Impact on Overall Air Transport Movements for Various New Runways in South-East England.

Location of Airports (Illustrative)

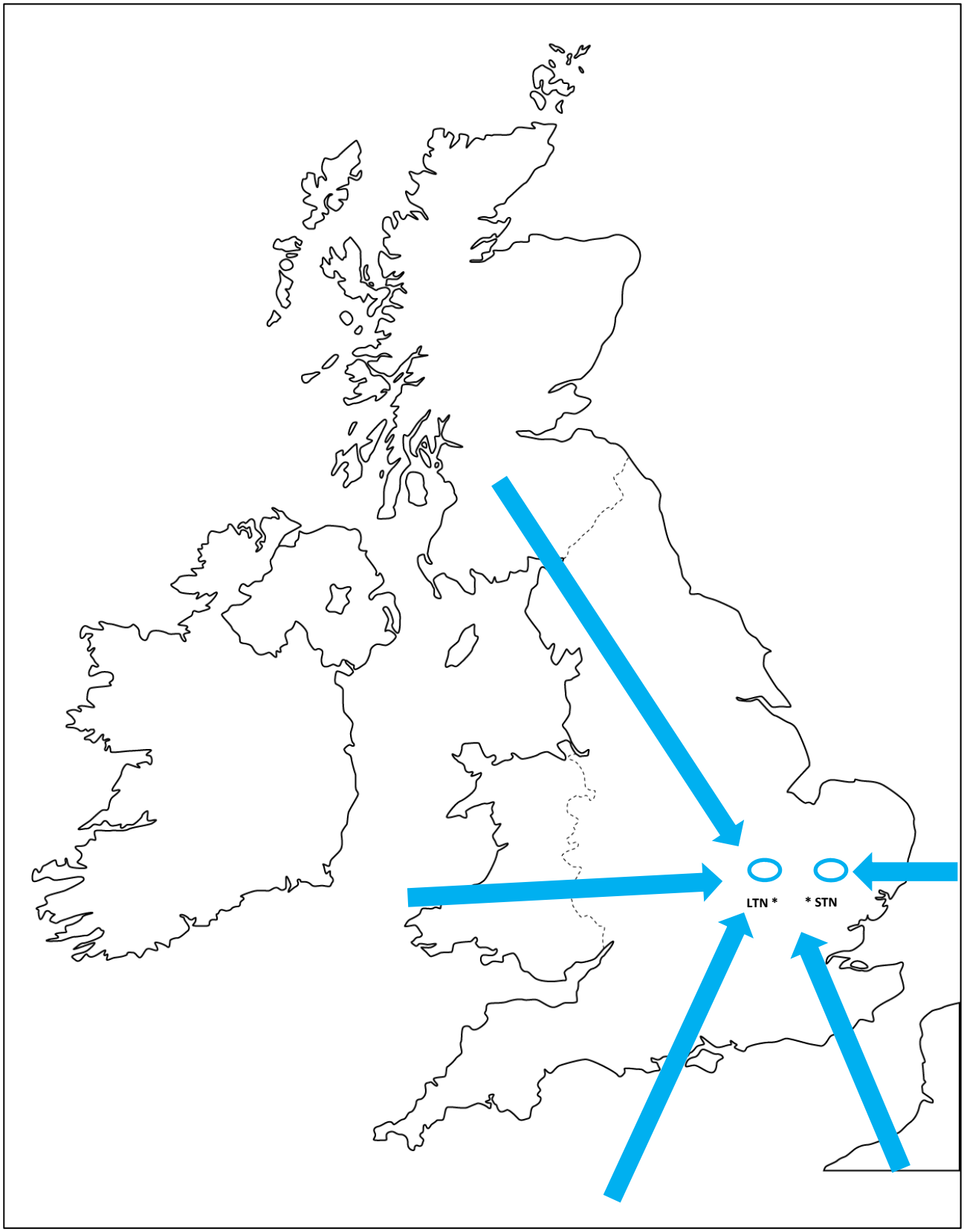
Predominate Arrival Flows - Heathrow



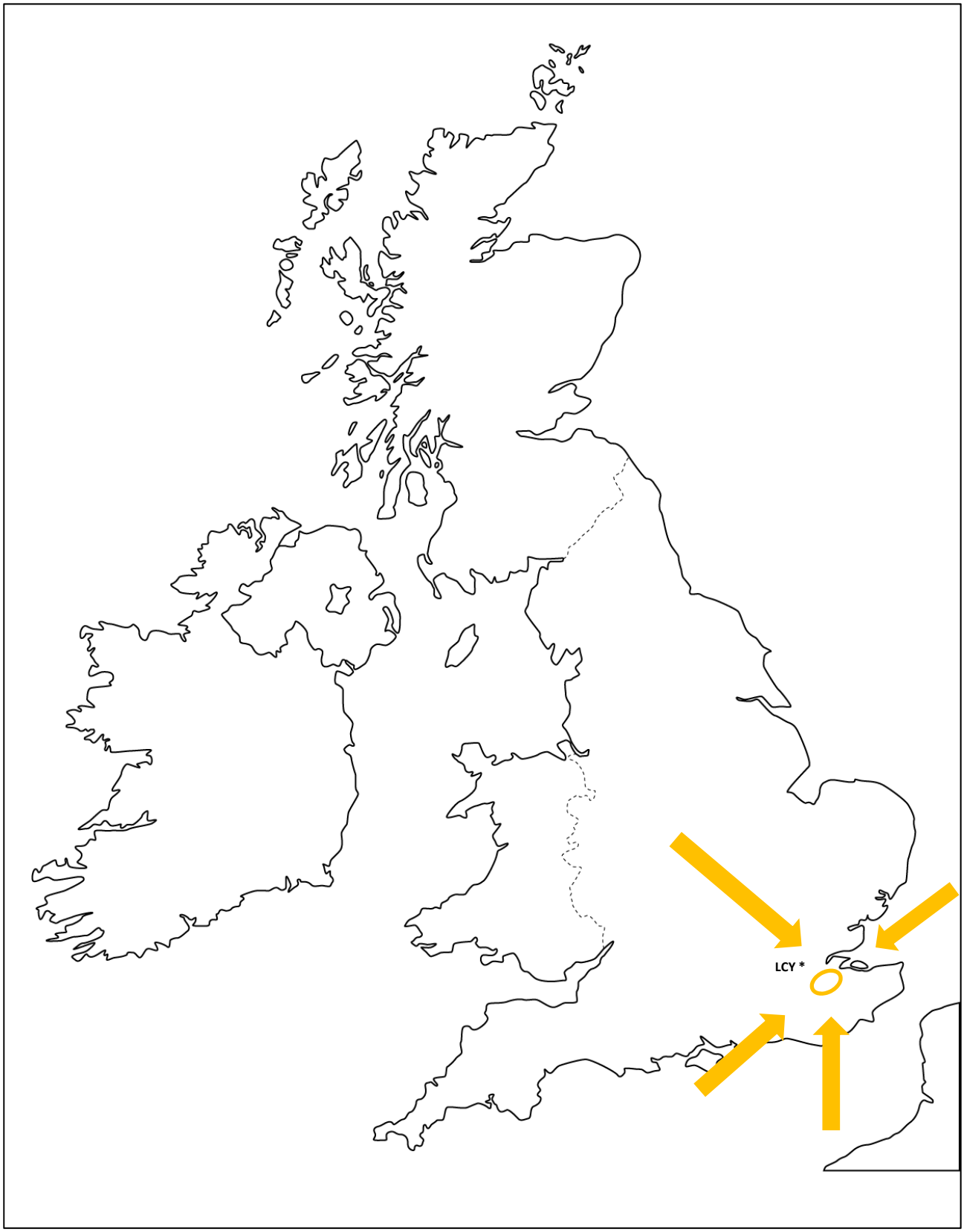
Predominate Arrival Flows - Gatwick



Predominate Arrival Flows – Luton & Stansted (common holds)

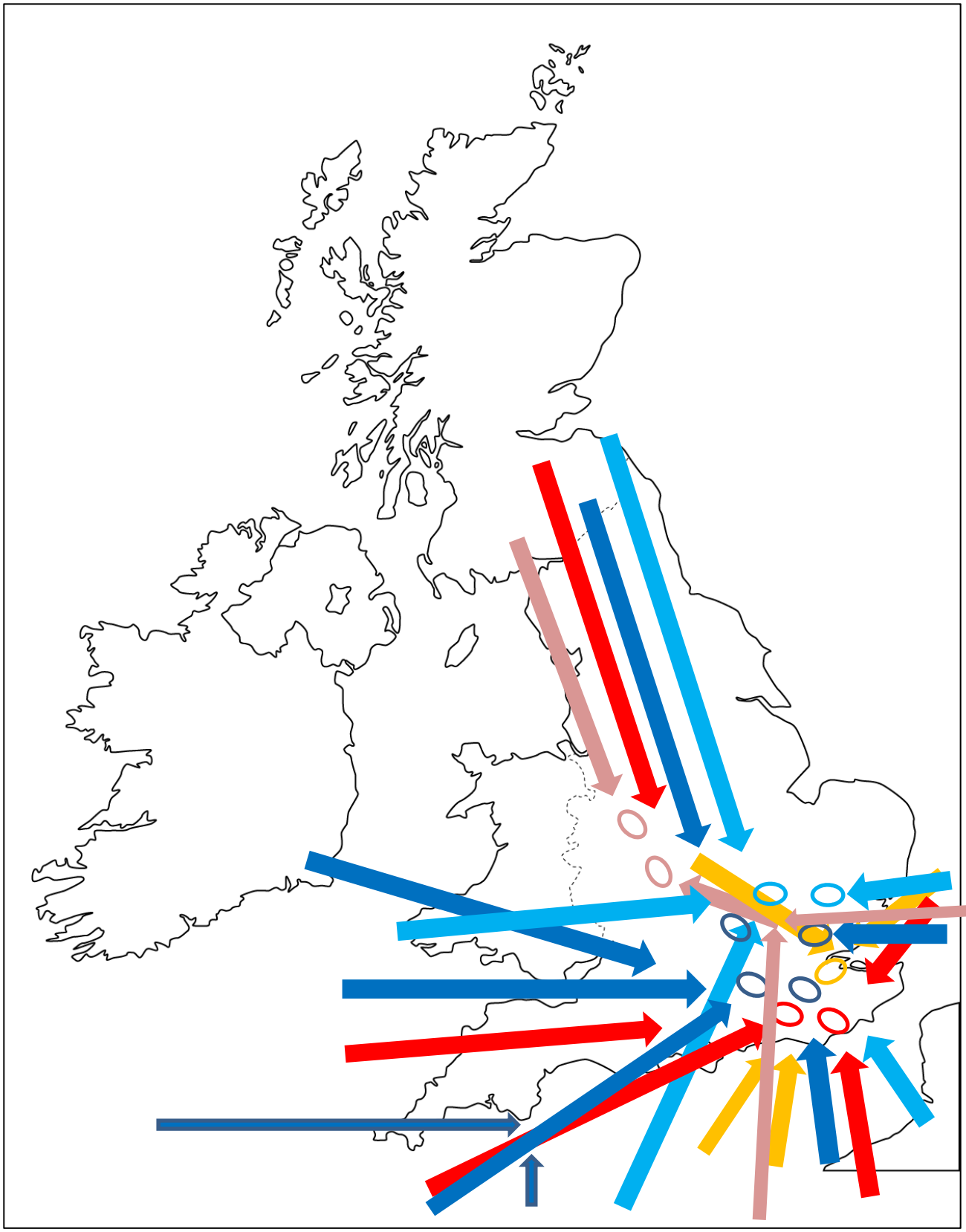


Predominate Arrival Flows - City



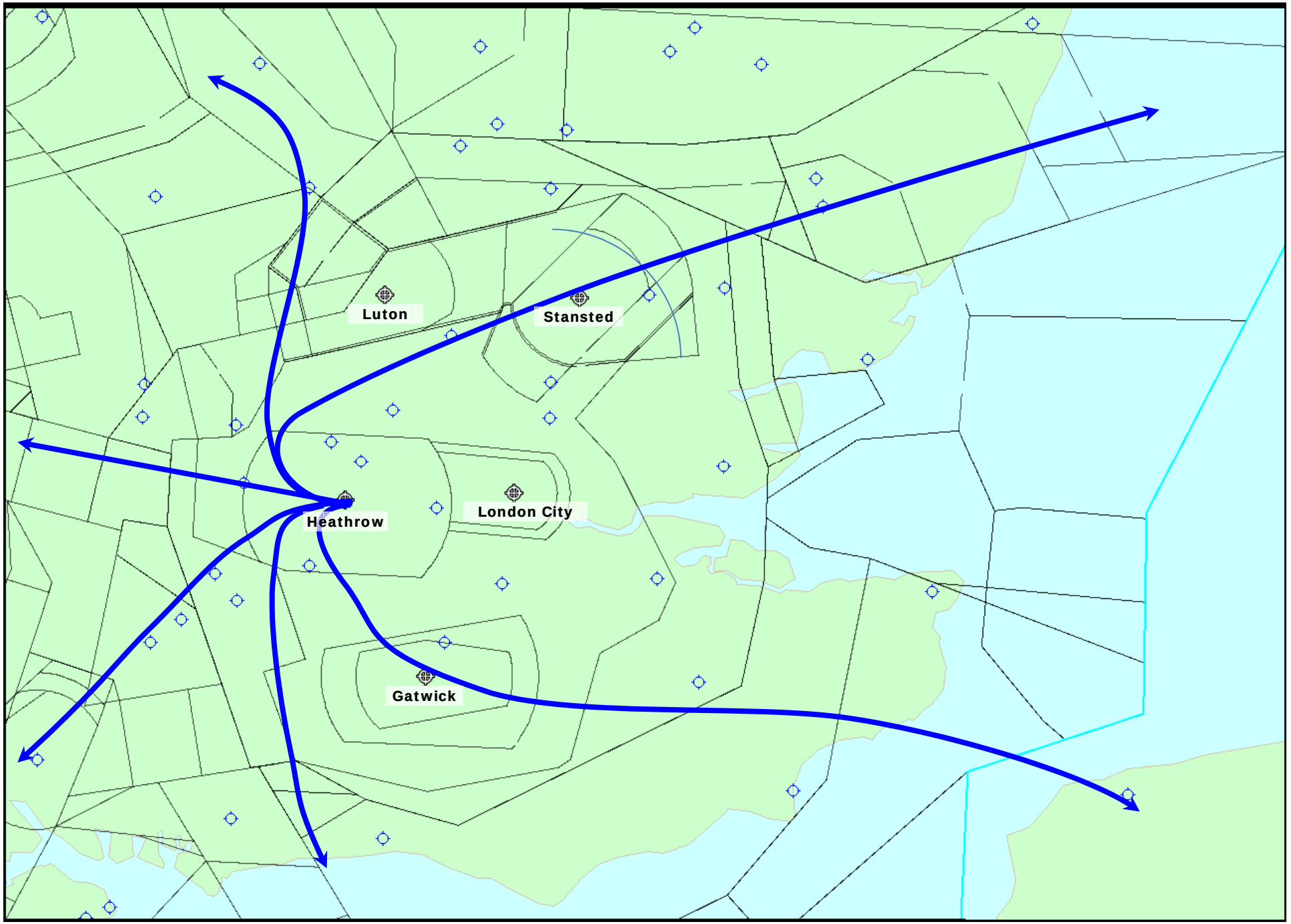
Predominate Arrival Flows - Birmingham

Predominate Arrival Flows – Combined View

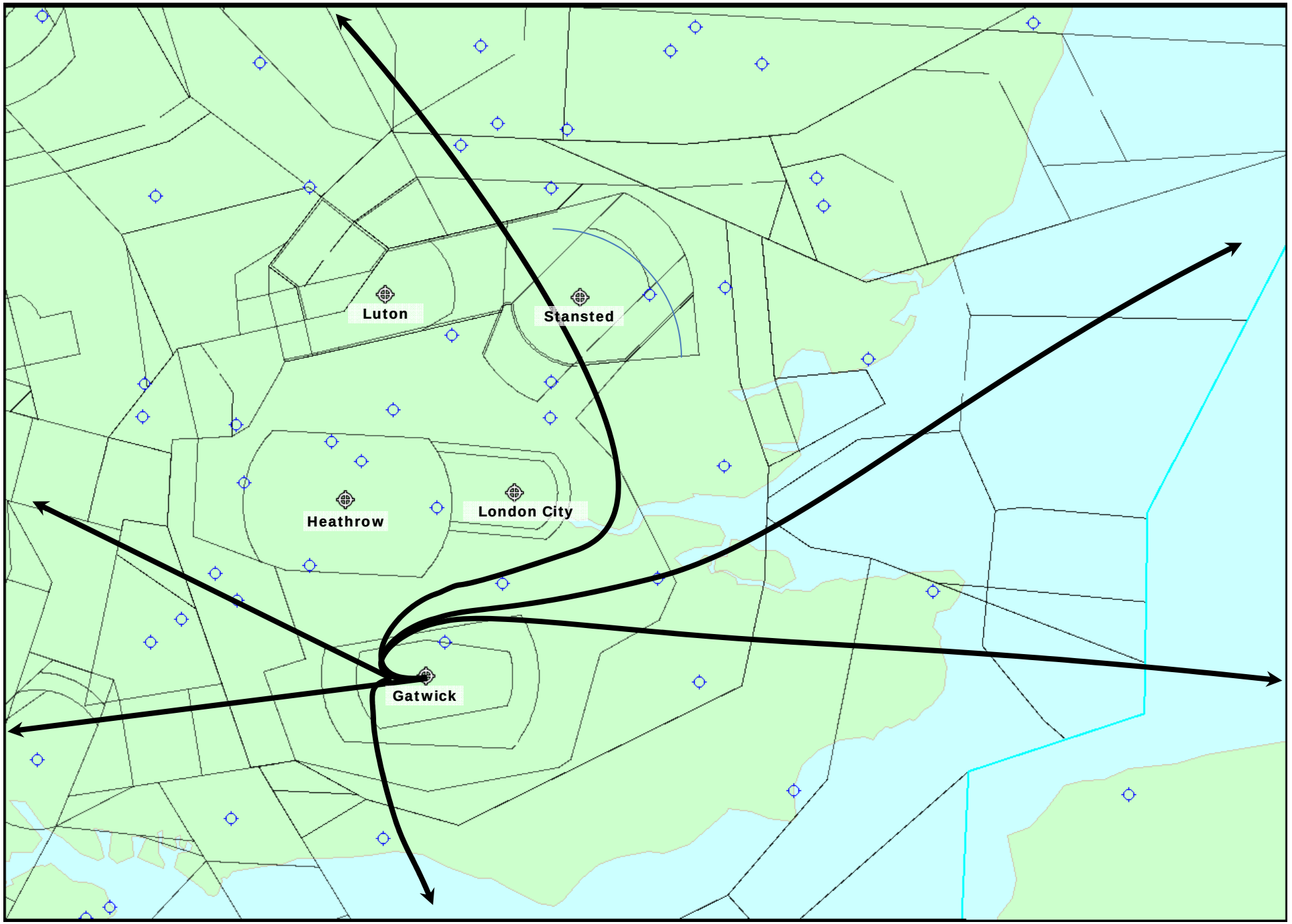


Annex E: Predominant Traffic Flows of Aircraft Departing from the Main London Airports.

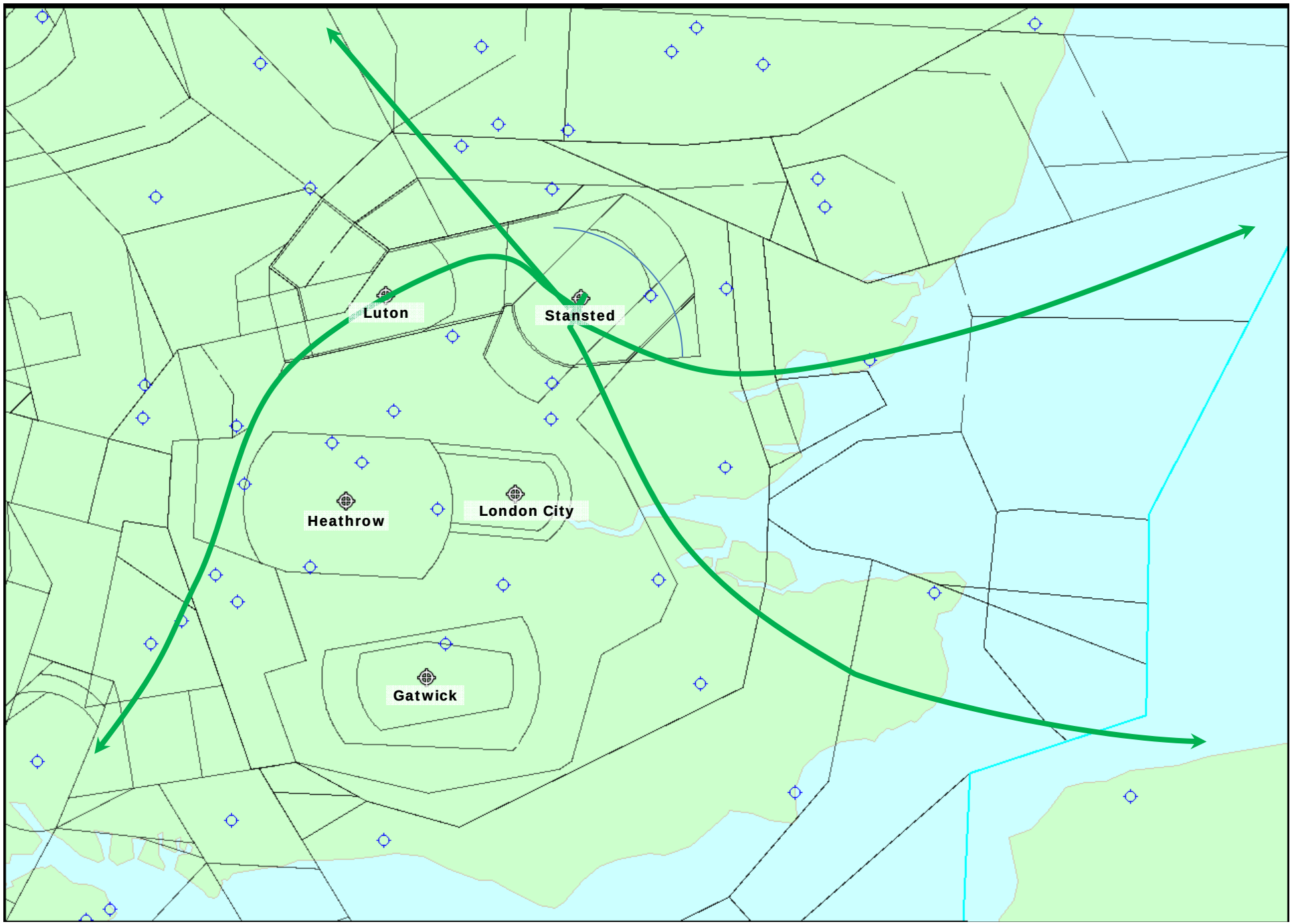
Partial Schematic of Flows – Heathrow Departures (Westerly Operations)



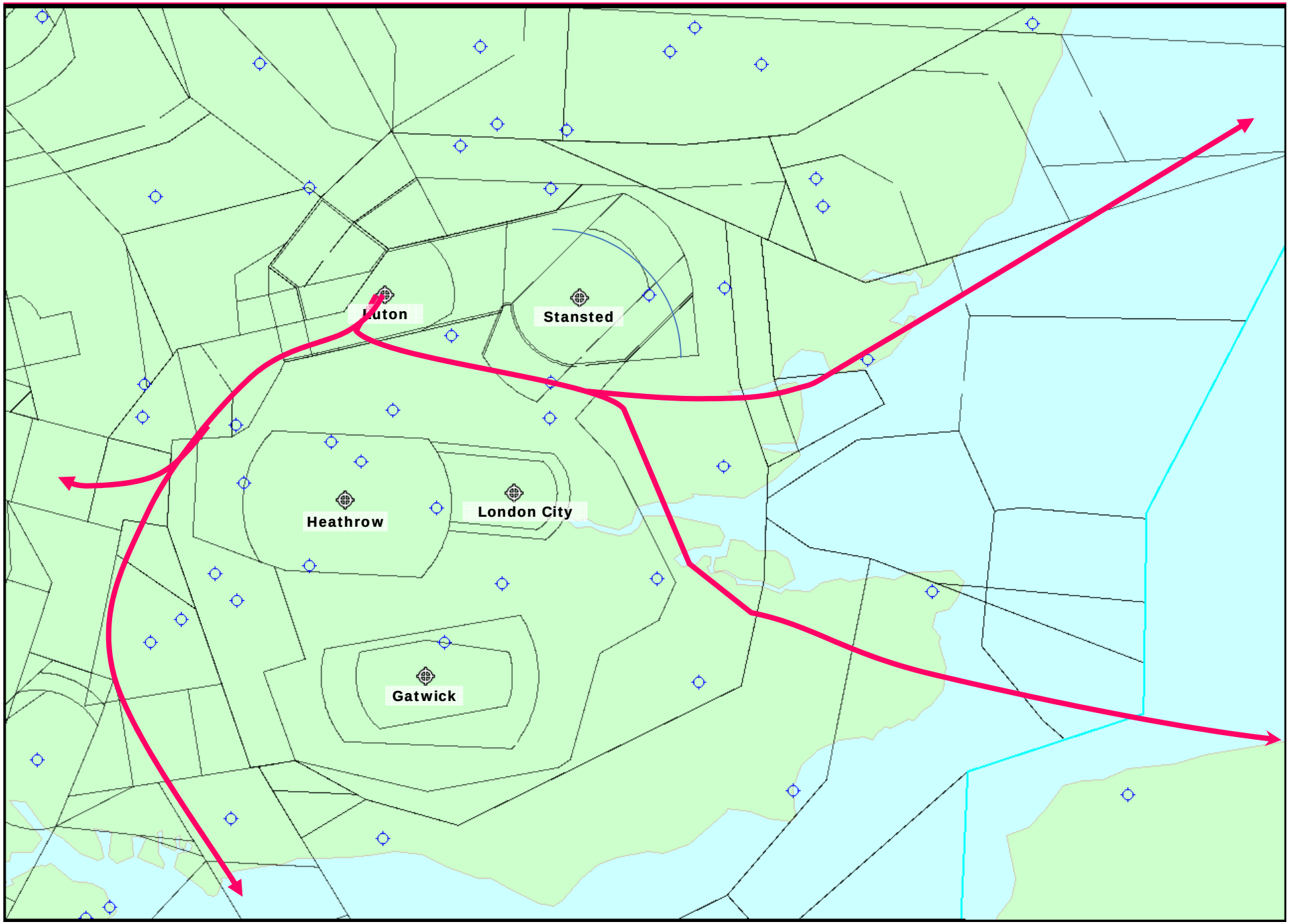
Partial Schematic of Flows – Gatwick (Westerly Operations)



Partial Schematic of Flows – Stansted Departures (South-Westerly Operations)



Partial Schematic of Flows – Luton Departures (South-Westerly Operations)



Partial Schematic of Flows – Main London Airport Departures (Westerly Operations)