NATS

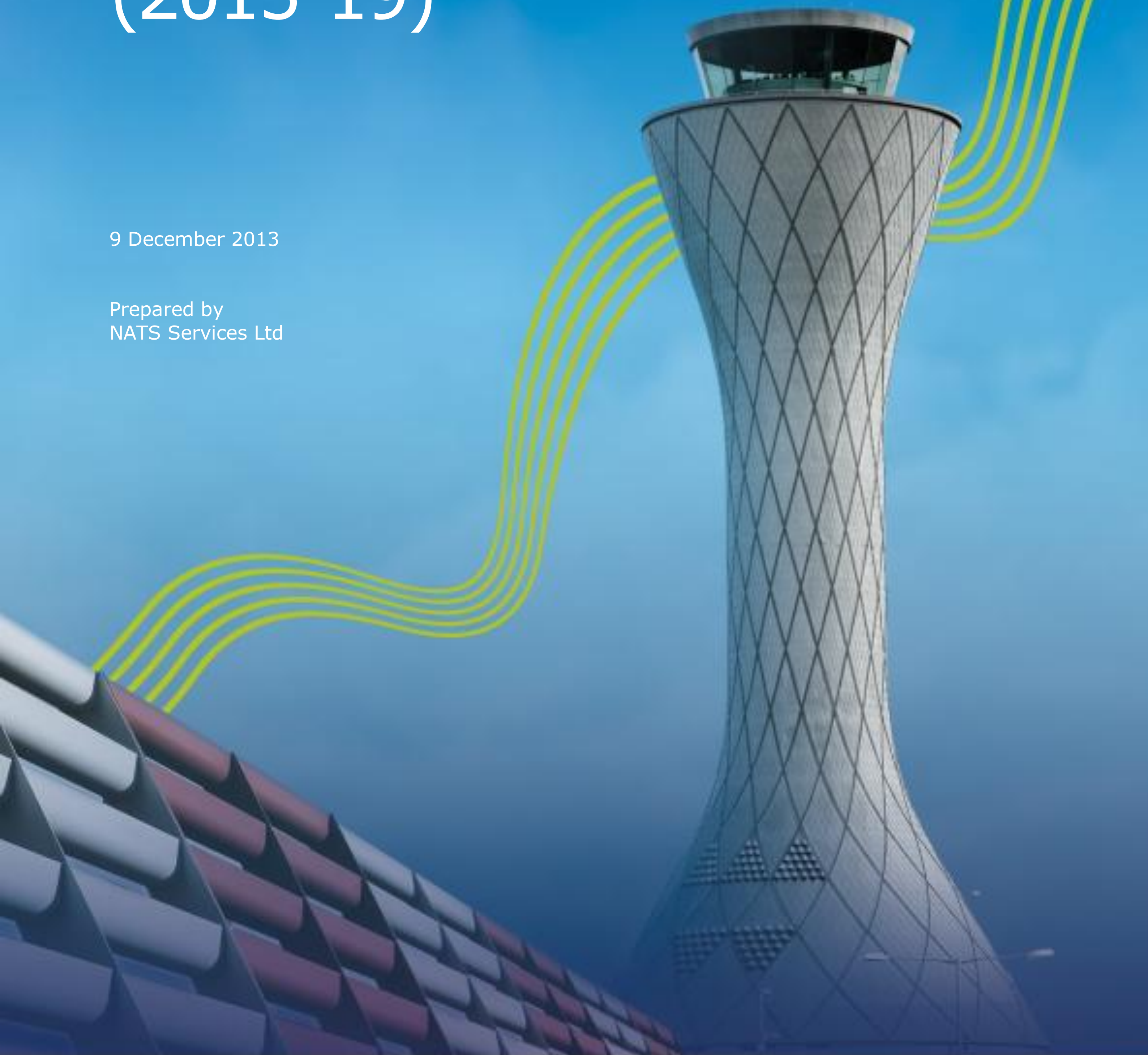
Performance
through Innovation

Terminal Air Navigation Services (TANS)

Draft RP2 Business Plan (2015-19)

9 December 2013

Prepared by
NATS Services Ltd



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1 Introduction

Mike Stoller Director Operations (Airports)

The European Commission's Single European Sky (SES) performance scheme is being extended in the next reference period which starts in 2015 (RP2) to include targets for Terminal Air Navigation Services (TANS).

Therefore, this is the first time NSL has prepared a business plan covering the 7 major airports that fall within the TANS criteria where NATS Services Ltd (NSL) provides air traffic services under contracts with the airport operator. The plan serves as a basis for the CAA to set performance targets in RP2 for safety, capacity, environment and cost efficiency for these TANS airports.

Our plan is framed against a background of our current good performance at these airports. We are meeting key airport and airline requirements to safely handle high-intensity operations that maximise runway utilisation and reduce fuel burn / CO_2 emissions, while also being as resilient as possible to delaying factors such as weather and network disruptions.

The plan is also in the context of our contracts with airport operators where we have excellent working relationships, backed by strong commercial incentives, to deliver the service performance they require. This UK model of TANS providers operating exclusively via private contracts remains unique in Europe.

Within this context, this document sets out our strategic plans and predicted outcomes for RP2 which maintains today's good performance while also catering for increased traffic levels. Specifically it delivers:

- Safety – risk per flight reducing year-on-year
- Environment – a contribution to NATS-wide strategic target and plan to reduce air traffic related CO_2 by an average 10% per flight by 2020 (compared to 2006)
- Capacity – the service levels required by our airport customers with minimal ATFM delays due to NSL
- Cost efficiency – a 2% average annual real reduction in unit costs per flight as traffic grows during RP2 (compared to 2014).

However, we are only a part of the overall picture. Our plans recognise that there is a great opportunity for the whole UK airport and airline community to work together to deliver on-going improvements in performance. This is particularly the case in relation to the CAA's Future Airspace Strategy (FAS) that will implement new capabilities during RP2 to improve the efficiency of airport operations and mitigate environmental impacts.

NSL is one of many parties that contribute to the performance of airport air traffic operations in the UK. NSL will work in partnership with airport operators, airlines, NERL and the CAA to help unlock future performance improvement.

2 Executive Summary

SES context

The European Commission's (EC's) second Single European Sky package (SES II) is based on a total system, gate-to-gate approach for air navigation services (ANS). Accordingly, the scope of the performance scheme for RP2 (2015-19) is being extended to include binding EU-wide targets for terminal ANS provided at airports (TANS).

The full suite of RP2 targets will apply to TANS except for:

- Airports with less than 70,000 IFR movements per year
- Airports subject to 'market conditions' for supply of ANS, which can be excluded from application of cost efficiency targets.

NSL TANS Airports in this Plan

- Heathrow
- Gatwick
- Stansted
- Luton
- Manchester
- Edinburgh
- Glasgow

While TANS provision at UK airports is subject to commercial arrangements, the CAA concluded in 2013 that the balance of available evidence did not support the existence of market conditions (against the five SES criteria). The CAA found that while there were no statutory barriers to airport operators changing their TANS supplier, there were perceptions about potential economic factors affecting the ability of airport operators to do so. These included perceptions both about the transparency of the relationship between NERL and NSL, and the risks associated with transferring TANS supplier.

Therefore, in addition to SES targets in the key performance areas (KPAs) of **safety**, **capacity** and **environment** that will apply to 7 NSL TANS airports from January 2015 anyway, these airports' TANS may also be economically regulated from 2015 onwards via SES **cost efficiency** targets subject to the CAA concluding differently on its 'market conditions' assessment.

Our current performance based landscape

The plan covers 7 of the 15 UK airports where we provide air traffic services under contracts with the airport operator, these 7 major airports accounting for c. 70% of the airport traffic volumes we manage.

Our airport ATC towers operate in a performance-based environment, centred on market-based contractual arrangements with individual airport operators. These contracts include service performance measures typically relating to:

- Safety – reducing safety risk, including playing a leading role in ground and runway safety initiatives
- Capacity – operating runway and taxiway systems efficiently in line with airport scheduling
- Delay – minimising delay and being as resilient as possible to abnormal events such as weather and airport / network disruptions
- Environment – providing an environmentally efficient service that includes continuous climb and descent operations.

Cost efficiency is driven by the commercial contracting process, recognising an appropriate level of transparency of costs and efficiencies consistent with safeguarding NSL's commercial position.

Our plan for RP2

Our strategic plans are centred on:

- **Safety:** in line with our NATS-wide approach to improve continually our already excellent safety record, reducing risk per flight year-on-year.
- **Capacity:** deploying our staff and capabilities to deliver the service levels required by our airport customers, including:
  - collaborating for better performance
  - improving airport resilience and efficiency through new procedures
  - supporting airport decisions on peak capacity and scheduling.

  Against the limited options for capacity growth, we will also support airport operators in deploying FAS where needed to optimise existing airport capacity, in particular in achieving efficient traffic sequencing on busy runways, improving arrival / departure efficiency and eliminating stack holding in normal operations.

  In particular, we will work in partnership with NERL and other parties who are working to increase runway capacity resilience at Heathrow and Gatwick by introducing Time Based Separation (TBS) that will reduce weather related delays caused by strong wind conditions.

  Additionally, NATS is working with airports, airlines and the CAA to develop solutions using new technologies, such as enhancing runway capacity through advanced deployment of performance based navigation (PBN), and these enhancements are core to FAS. These solutions will start to become available through RP2 but may not be fully realised until RP3. In addition, while NATS will have solutions available, investment decisions and funding rests with the airport.
- **Environment:** improvements are driven by our NATS-wide strategic target and plan to reduce air traffic related CO_2 by an average 10% per flight by 2020 (from a 2006 baseline), which includes implementing more efficient use of stands, taxi routings and continuous descents / climbs.
- **Cost Efficiency:** we have had commercial contracts in place for many years that have driven cost efficiencies across our TANS operation. In RP2, we will continue to lower our operating cost base through new operational efficiencies and technological innovation, reducing real cost per unit as traffic grows in RP2.

How this Plan aligns with the emerging SES performance scheme

KPA	Indicator	Target / Monitoring Level			Plan Outcome
		EU KPI	National KPI/PI	Airport Level PI	
Safety	Effectiveness of safety management	√ *			Safety management approach consistent with targets
	Application of Risk Analysis Tool (RAT) methodology	√ *			
	Application of Just Culture	√ *			
Capacity	Airport arrival ATFM delay / flight		√ KPI	√	Delays increase slightly as the limited scope for improvement is outweighed by forecast increases in airport traffic. Exception is Heathrow weather related delays which reduce by 20% through implementing TBS
	ATFM slot adherence		√ PI	√	
	Average pre-departure delay caused by take-off restrictions		√ PI	√	
Environment	Additional taxi-out time		√ PI	√	
	Additional ASMA time		√ PI	√	
Cost Efficiency	Determined Unit Cost for TANS		√ KPI		Average annual real unit cost reduction of 2.0% pa

* KPIs are also measured at a local (Functional Airspace Block – FAB) level

Further development of the TANS market

The majority of NSL's existing airport customers have expressed a desire to undertake competitive tender for their airport ATC services when the existing contract expires. NATS has offered to the CAA commitments to:

- Provide additional transparency around the NSL/NERL interface so that airports opting not to continue with NSL as ATC provider are assured that they will get the same standard of service from NERL
- Reduce transitional risk by providing NSL staff (covered by the Trust of a Promise) to the airport for an extended transition period.

A draft statement of these commitments is provided in Appendix A, and we would be happy to discuss with the CAA the form of these commitments.

3 Plan Context

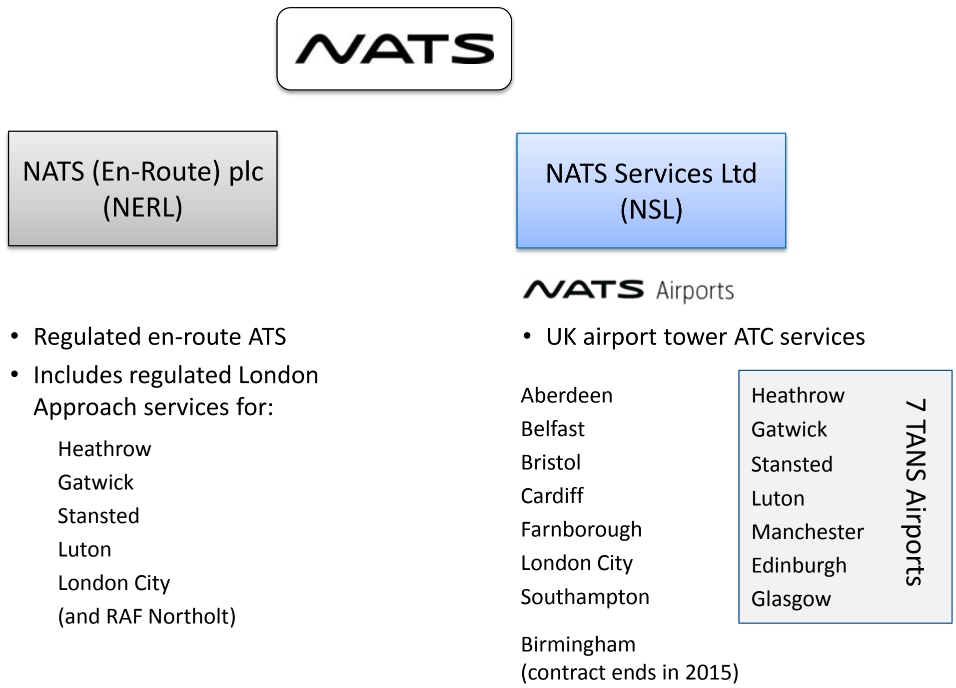
3.1 Background on UK TANS

NATS Services Ltd (NSL) is NATS' non-regulated subsidiary which competes for commercial outsource contracts, currently providing ATC services at 15 UK airports including many of the major airports. The contracts which are typically for 5-7 years include related ATC engineering support services (for airport ATC infrastructure) as a package with the ATC service.

ATC tower operations at airports with >70,000 IFR movements pa fall within the TANS criteria – which are the 7 major airports shown in the diagram. Note that Birmingham Airport is excluded from the list of NSL TANS airports as it will be providing its own ATS in RP2.

In the case of London's airports, the approach service is provided centrally by NATS (En-Route) plc (NERL) from its Swanwick Terminal Control operation. This centralised approach service, which is paid for by airspace users (not airports), ensures that these airports' runways and surrounding airspace are managed in an integrated way. For the RP2 performance scheme, the London Approach service will continue to be regulated under NERL's Licence.

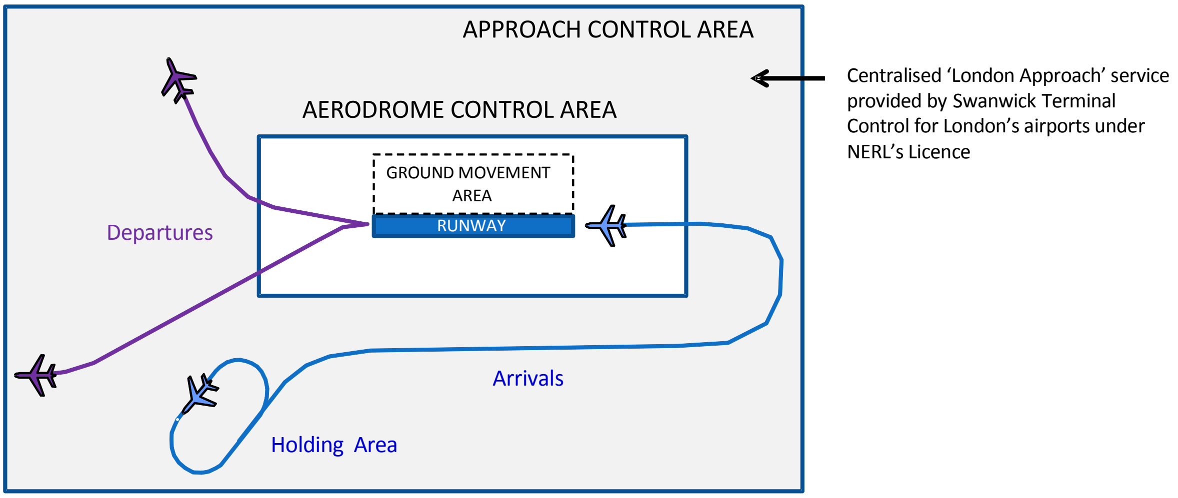
Figure 1: TANS within NATS Organisation



3.1.1 What is in the scope of TANS?

TANS are defined as the approach and aerodrome control services provided at an airport as illustrated in the diagram.

Figure 2: Scope of Terminal Air Navigation Services (TANS)



3.1.2 The UK TANS Market

NSL has built its Airport ATC services business around NATS' long-standing reputation and track record for safely handling high-intensity, complex operations at the major UK airports, as well as the level of operating efficiency achieved at smaller, cost-sensitive airports. This market position reflects the commercial value to airports and airlines of the safety, flight efficiency, additional capacity and airport resilience enabled by NATS' distinctive capabilities.

In providing these services, the assets (control towers, radars, radios, etc.) are mostly provided by the airport operator (or finance company). NATS essentially provides the people and intellectual property to provide an agreed level of service as defined in the contract, the contractual requirements and associated performance measures varying airport-by-airport (see 3.1.7). However, as part of its obligations under a number of its airport ATC contracts, NSL also delivers ATC infrastructure replacement projects at airports. It should be noted that investment decisions in new tools, procedures and equipment are the responsibility of the airport.

The 15 UK airports served by NSL do not have identical operational and economic requirements for their ATC services; each varies depending on its own operational and financial circumstances. Therefore, we do not provide a 'one size fits all' solution for airports, instead tailoring the precise package of services to suit individual customers.

However, there is an overriding customer requirement (airport operators and airlines) for cost reduction. While all of our airport customers report a good or excellent working relationship with NSL, the majority have expressed a desire to undertake competitive tender for their airport ATC services when the existing contract expires.

3.1.3 Market Conditions

While recent public procurement exercises (at Birmingham and Luton airports) demonstrate the competitiveness of the UK market, the CAA decided there was insufficient evidence that the SES market conditions were satisfied at this time, in part because there were perceptions of a number of potential economic barriers, notably:

- A lack of transparency of the NSL/NERL interface
- Transfer arrangements in the event of losing a contract, in particular how NATS would deal with its 'Trust of a Promise' (ToaP) regarding NATS staff.

We have proposed steps to strengthen the prospects for market conditions in the future by offering to the CAA specific commitments to:

- Provide additional transparency around the NSL/NERL interface (via an operational interface agreement) so that airports opting not to continue with NSL as ATC provider can see that they will still get the same standard of service from NERL
- Reduce transitional risk by providing NSL staff covered by ToaP to the airport for an extended transition period, including seconding staff to the airport for an agreed period where necessary.

A draft statement of these commitments is provided in Appendix A, and we would be happy to discuss with the CAA the form of these commitments.

However, future market conditions also depend on the competitive landscape at the TANS airports, the commercial and operational pressures the airports face and their procurement strategies for their main outsourced service contracts.

3.1.4 What Drives Airport ATM Performance?

Airport operations performance has complex interactions between many participants with interdependent influencing factors. Most types of airport delay have causal factors that are beyond the TANS provider's immediate control and therefore require action by all network partners to deliver improvements.

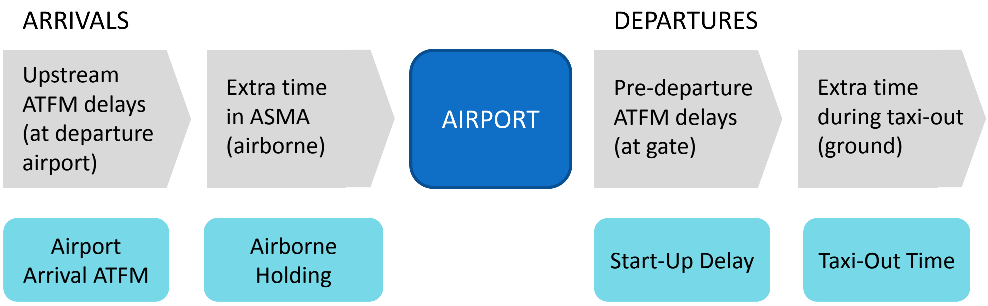
This complexity is acknowledged in the TANS related indicators used by Eurocontrol's Performance Review Body (PRB) which reflect performance areas where 'ANS has a substantial influence' (ie. not directly controllable), namely:

- Airport Arrival ATFM delay – these are delays on the ground at the departure airport due mainly to weather at the destination airport including strong winds, low visibility and snow (strong wind being the most significant factor, especially at Heathrow). Arrival delays can

also be caused by ATC staffing and technical issues, but these reflect a small proportion of total actual delays.
More significantly, arrival delays can be caused by other factors such as the schedule (including schedule smoothness/peaks, changes to aircraft wake vortex mix, night jet bans and operator adherence to arrival times) and the airport's operating rules /constraints. For example Heathrow is scheduled to 98-99% of available capacity and against a 10 minute average airborne holding delay. This makes Heathrow inherently more susceptible to ATFM delay because it is used to manage airborne holding within acceptable levels;

- Airborne holding and sequencing delay (known as arrival sequencing and metering area – ASMA time) which is also affected by scheduling policy for the airport
- Departure ground delay – measured as start-up delay and excess taxi out time due to a range of factors including airfield ground congestion, local airspace factors (e.g. SID constraints), weather, schedule and airfield infrastructure (e.g. gate constraints);

Figure 3: Gate-to-Gate Airport ANS Performance Indicators

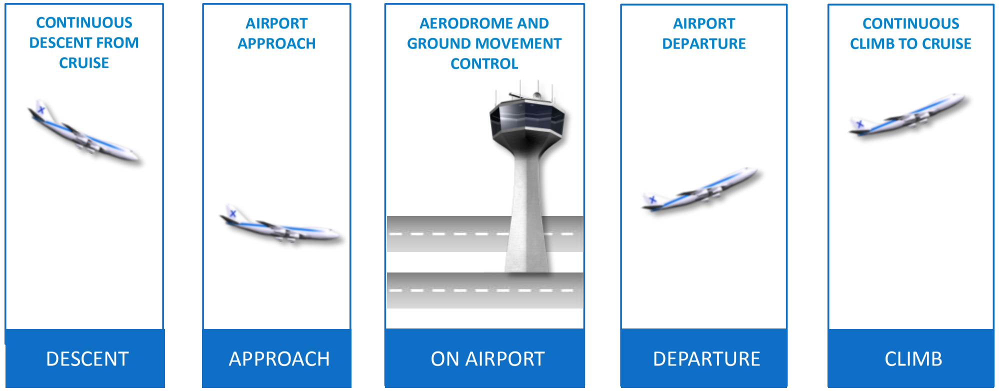


The diagram overleaf illustrates the various contributions to airport ANS performance in a UK context. In particular, major drivers are the amount of ground infrastructure (runways, taxiways and stands) and how the airport is scheduled. The TANS provider has to operate inside the parameters of these constraints. As a result, the diagram highlights that many of the factors affecting airport ANS performance are outside the direct influence of the TANS provider.

Further explanation of the factors affecting airport ANS performance is provided in Appendix D.

Contribution to Airport ANS Performance

Phase of Operation



RP2 Performance Indicator

- Airborne Holding (DESCENT)
- Airport Arrival ATFM (APPROACH)
- Start-Up Delay and Taxi-Out Time (ON AIRPORT, DEPARTURE)

What Drives Performance [who responsible]

Capacity-Demand Balancing

- Local and National airport operating rules [Government, CAA and Airport Operator]
- Declared capacity, airport resilience [Airport Operator & Slot Coordinator]
- Weather [exogenous factor]
- ANS factors – **staffing [TANS]**, equipment/technical [Airport / **TANS**]
- Airport collaborative decision making (A-CDM) [All – **including TANS**]

Inbound Flow Management

- Queue management [NERL]
- Slot adherence [Airlines]

Runway / Surface Operations

- Airport / runway infrastructure [Airport Operator]
- **Runway and ground movement control [TANS]**

Resilient Arrival Operations

- **Optimised sequence [TANS]**
- Final approach spacing {NERL/**TANS**]
- Time based separation [NERL]

Outbound Flow Management

- **Optimised sequence [TANS]**
- Queue management [NERL]
- Slot adherence [Airlines]

3.1.5 Current Airport Performance

Current airport-level performance against the key indicators is summarised below, highlighting those elements that can be attributed to the TANS provider's performance.

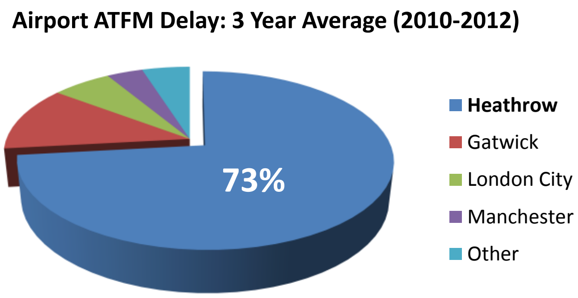
Airport ATFM Arrival delay – this category of delay includes a wide range of causes (as shown in the table) most of which are outside the TANS provider's direct influence. Eurocontrol PRU defines a broader set of causes as 'ANSP attributable' whereas NSL records only those causes that it can control as ANSP attributable (ie staffing and technical).

CFMU Airport ATFM Delays

Delay Code	Cause	ANSP Attributable
WA 84	Weather - Approach	
AA 83	Accident/Incident - Approach	
MA 83	Military Activity - Approach	
OA 83	Other - Approach	
PA 83	Special Event - Approach	
EA 87	Equipment non-ATC - Approach	
CA 83	ATC Capacity - Approach	PRU
GA 87	Aerodrome Capacity - Approach	PRU
SA 83	ATC Staffing - Approach	PRU, NSL
TA 83	ATC Equipment - Approach	PRU, NSL

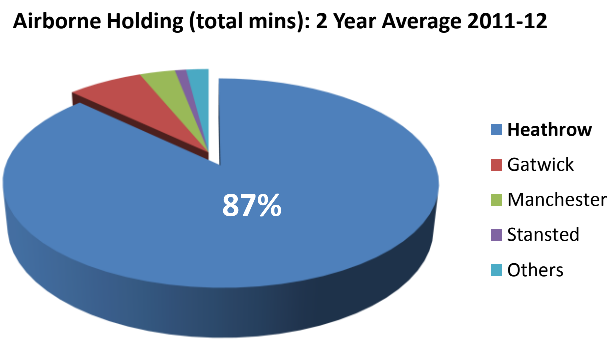
At an average 650,000 minutes of delay pa due to 'all causes', weather at the destination airport is the biggest contributor (of which high wind and low visibility are the most significant factors). Those factors most directly controlled by the TANS provider are ATC Staffing and ATC Equipment (SA83 and TA83 codes). Together, these represent less than 5% of total Airport ATFM Arrival delays.

Heathrow has by far the largest proportion of Airport ATFM Arrival delays (73%) with weather being the biggest cause.



Airborne Holding (ASMA time) – amounts to an average of 1.4 million minutes pa at UK TANS airports. ASMA time reflects the amount of queuing (airborne holding) to land on saturated runways due to airport scheduling.

Heathrow accounts for the vast majority (87%) of all airborne holding at UK airports due to the airport operating at its capacity limit. Furthermore, the additional sequencing time at Heathrow is influenced by



decisions taken during the airport scheduling process where the airport plans an average holding time (10 mins) to manage inbound demand and achieve high runway utilisation. The TANS provider manages arrivals as efficiently as possible to ensure it operates inside the parameters of this constraint, reporting 'holding stack' delays in NATS' monthly customer reports.

Start Up Delay and Additional Taxi Out Time – total start-up delay is c.700,000 minutes pa, and excess taxi time amounts to c.3 minutes per flight. Most of the causes of this additional ground departure are largely outside the TANS provider's control, the ATM-related causes of both including:

- Congestion on standard instrument departure (SID) routes which is influenced by the airport schedule and aircraft wake vortex mix together with SID infrastructure.
- Airfield and taxiway issues
- 'Push and hold' due to downstream flow restrictions
- Weather avoidance (thunderstorms)
- Network congestion in the TMA where multiple airfields feed into the same route
- Downstream ATFM delays in en-route and at the arrival airport
- Short Term Air Traffic Flow and Capacity Measures (STAM) to protect airspace/routes from demand spikes.

At Heathrow, the intensive use of the runways requires the airport operator to include in the schedule a maximum of 10 minutes delay at the holding point to maximise departure capacity.

3.1.6 Relevant Performance Benchmarks

In terms of service delivery, at a headline level NATS sets some key benchmarks as a TANS provider for:

- The world's busiest dual-runway airport (Heathrow) and the world's busiest single runway airport (Gatwick)
- The world's busiest city airport system (London) as measured by passenger traffic from all airports combined (by ACI).

The PRB publishes data on operational ANS performance at airports, in the UK for Heathrow, Gatwick, Stansted and Manchester only as summarised in the table below.

Figure 4: 2012 Airport ANS Operational Performance Data (PRU data)

Mins per arrival or departure	European Average	Heathrow	Gatwick	Manchester	Stansted
Airport ATFM delay (all causes)	0.7	2.6	0.9	0.4	0.1
Start-up delays	0.4	0.8	0.6	0.6	0.3
ASMA delay	1.4	9.1	2.6	1.8	0.5
Taxi-out time	2.2	8.3	5.0	3.4	2.9

Performance at Heathrow and Gatwick is affected by the airport's traffic saturation which leaves little head-room to respond to daily fluctuations in the demand-capacity balance caused by weather and airport-related issues.

However, given the interdependence of these performance indicators, the PRB's assessment of overall airport ANS performance at Heathrow shows a relatively stable performance in managing arrival and departure flows in 2012 with a less than 1% change on 2011.

On cost efficiency, the PRU publishes data on ATM cost-effectiveness. However, differences in airport sizes / traffic levels and the allocation of costs between en-route and terminal ANS makes comparison at TANS level more difficult. The latest PRU data shows NATS as having the 8th lowest unit costs (out of 31 TANS ANSPs), and 3rd lowest for London's Airports (where approach costs are excluded). In both cases, NATS is placed best of the big five European ANSPs.[1]

3.1.7 Contractual Performance Obligations at TANS Airports

NSL's contracts with airport operators include a variety of performance measures for provision of ANS which vary airport-by-airport. Generally, failure to achieve a performance level results in a contract penalty with few airports including bonus incentives for over achievement.

The table summarises typical performance measures included in contracts to incentivise airport ANS performance.

Performance Area	Measure
Safety	Risk Assessment Tool events, in particular runway incursions
Capacity: Staffing Delay	ANS staffing in line with airport scheduling
Capacity: Other Delay	Pre-departure delays Material event which has major impact on airport operations (ie. arrival / departure flow restrictions above a set level) for example due to: • Critical equipment failure • Industrial action
Environment	Achievement of continuous descent approaches (CDAs) and Continuous Climb Departures (CCDs)
ATM/CNS Systems Availability	Engineering response to critical and non-critical system failures • Including day / night response times
Customer Satisfaction (airport airline community)	Customer satisfaction survey score shows continuous improvement from an initial baseline

[1] See page 39 of: http://www.eurocontrol.int/sites/default/files/ace2011-benchmarking-report.pdf

3.2 Service Requirements

3.2.1 Airport Traffic Forecasts

The airport traffic forecast for RP2 is a fundamental planning assumption. Good levels of airport ANS service are tightly coupled to traffic demand which influences decisions on operational staffing. The EC's calculation methodology for Determined Unit Cost (DUC) is also linked to the forecast (terminal service units).

SES guidelines recommend that ANS providers use Eurocontrol's STATFOR Medium Term Forecast (MTF) as the basis for RP2 planning, the latest version for airports being MTF13 published in September 2013 (shown below). This forecast underpins NATS' RP2 planning.

Figure 5: STATFOR MTF13 Forecast for Terminal Service Units (TSUs)

('000 TSUs)	2012 Actual	RP2		RP2 Annual Average Growth
		2015	2019	
Edinburgh	53	53	57	1.9%
Gatwick	171	176	196	2.8%
Glasgow	40	42	47	2.8%
Heathrow	493	499	513	1.2%
Luton	53	56	65	4.0%
Manchester	110	117	130	2.9%
Stansted	91	94	108	3.6%
TOTAL	*1,011*	*1,038*	*1,117*	*2.0%*

The above table excludes units in respect of Birmingham Airport. NSL have been notified formally by the airport that its ANS contract will not be extended beyond 31st March 2015.

The STATFOR forecast is influenced by current expectations that, in the near-term, UK and European economic indicators remain weak and airport / airline operators will maintain a cautious approach to expansion.

Traffic forecasts at an airport level exhibit more uncertainty than national forecasts due to changeability of local factors (such as shifts in airline strategy, aircraft deployment, and competition between airlines and airports) which are more relevant at the local level.

Regarding the overall picture for the UK, the historical accuracy of the STATFOR and NATS' own forecasts is similar, with our latest RP2 forecast (August 2013) being well aligned with STATFOR. We will continue to monitor changes in economic events and produce our own forecasts to enable accuracy and assurance checks on the robustness of STATFOR forecasts in a UK context.

3.2.2 Customer Priorities for TANS

Our customers – the airport operators and airlines user community – primarily require a high quality air traffic services at UK airports in terms of safety, capacity, resilience and delays. Against this, our current understanding of customer priorities for TANS in RP2 is:

- First and foremost, they are safe. They expect continuous improvement in our excellent safety record backed by a comprehensive approach to safety management and with a leading role in runway safety initiatives, all providing a high level of safety assurance;
- The ATC service maximises the utilisation of airport and aircraft assets – by maximising operation of existing runway and taxiway systems in order to sustainably meet projected traffic growth, especially in high intensity operations;
- An efficient ATC service that imposes no delay and is as resilient as possible to abnormal events such as weather (eg. thunderstorms, strong winds) and airport / network disruptions;
- An environmentally efficient ATC service that reduces airport CO_2 emissions and airlines' fuel burn, including continuous climb and descent operations;
- Lower total costs in the form of both 'direct' contract costs charged to airport operators and the 'indirect' ATC related flight inefficiency (fuel and delay) costs that airlines could incur due to TANS.

3.2.3 Airports Commission and Aviation Capacity in the UK

The Airports Commission's remit is to make recommendations on how to maintain the UK's position as a hub for international air traffic. It will provide an interim report before the end of 2013 setting out its views on short-term measures that might be taken to make better use of existing airport capacity. Its final report in mid-2015 is likely to propose a short-list of options for new or expanded capacity in the longer term.

NATS is maintaining a close dialogue with the Airports Commission on interim and longer-term measures to alleviate airport capacity / resilience constraints. We will also support our airport customers in implementing the Commission's recommendations as appropriate.

Meanwhile, there are uncertainties surrounding future airport infrastructure or operations that could affect our TANS plan during RP2. Therefore, this plan might need to be revisited in light of the Airports Commission's recommendations.

3.2.4 Regulatory Priorities – RP2 targets

Performance targets for RP2 are in four areas, safety, capacity, environment and cost efficiency.

This is the first time that targets have been set for TANS. The SES RP2 performance scheme comprises 'key performance indicators' (KPIs) used for target setting and 'performance indicators' (PIs) to be used for the purpose of performance monitoring, benchmarking and reviewing. The applicability of KPIs and PIs to TANS is shown below.

Given the diverse nature of the 7 NSL TANS airports, a 'one-size' solution to KPIs and PIs will not necessarily fit individual airport's operational requirements for its ATC service.

Figure 6: SES Key Performance Areas and Indicators for TANS in RP2

KPA	Indicator	EU KPI	National KPI/PI	Airport Level PI
Safety	Effectiveness of safety management	✓		
	Application of Risk Analysis Tool (RAT) methodology	✓		
	Application of Just Culture	✓		
Capacity	Airport arrival ATFM delay / flight		✓KPI	✓
	ATFM slot adherence		✓ PI	✓
	Average pre-departure delay caused by take-off restrictions		✓ PI	✓
Environment	Additional taxi-out time		✓ PI	✓
	Additional ASMA time		✓ PI	✓
Cost Efficiency	Determined Unit Cost for TANS	✓KPI (potentially from 2017)	✓KPI	

3.3 Scope of this Plan

Set against this context, this document now sets out:

> Chapter 4 – Plan for RP2: the high level plan for the 7 TANS Airports as a whole, but including some key actions / milestones at specific airports;

> Chapter 5 – Plan Outcomes for RP2: the predicted outcomes against SES KPIs / PIs during RP2 on an airport-by-airport basis.

Specific detail and supporting information is provided in the Appendices.

London Approach services are excluded from this plan as they presently form part of NATS En-Route business (NERL).

4 Plan for RP2

Our overarching strategy is to deliver TANS that ensures the highest levels of safety while working with airport and airline customers in finding better solutions to drive airport efficiencies and capacity in a cost effective manner.

Key strategies include:

- Continually improving on our already high safety performance – with risk per flight reducing year-on-year;
- Delivering service levels expected by our customers, including maximising the operation of existing runway and taxiway systems;
- Supporting airport operators where necessary in deployment of the CAA's Future Airspace Strategy (FAS) programme to implement new ATM capabilities and optimised network operations that reduce CO_2 emissions, mitigate environmental impacts and support airport capacity;
- Improving the cost efficiency of TANS through new operational efficiencies and technological innovation that reduces the labour intensity of our operation.

4.1 Safety

Strategic Plan

Our core responsibility is to run a safe ATC operation. NATS' strategic aim is to deliver a 13% reduction in accident risk per flight across its operations during RP2.

With airport traffic growth over RP2 in the range 8%-20% (except Heathrow), this target requires safety to be maintained or improved at a proportionate rate at TANS airports to ensure that risk per aircraft falls.

This target recognises the significant improvement achieved in airport ATC safety performance that has led us to a position where NSL is responsible for an ever decreasing proportion of safety risk and improvement becomes ever more challenging.

This target risk reduction will be achieved through six strategic goals:

1. Measuring safety performance both from things that go wrong (events, safety concerns or lessons learned) and things that go right (good practice);
2. Monitoring the right risks;
3. Optimising our contribution to minimising the risk of an aircraft accident;
4. Designing our operations and systems to optimise safety benefit;
5. Everyone having a personal responsibility for safety;
6. Achieving the right balance between automation and the human task.

In line with these goals, we have a published NATS Strategic Plan for Safety[2] (SPfS) which is designed to mitigate risks in the operation and to deliver safety performance improvements to all operations. This strategic plan continually evolves to ensure we are achieving our targets.

The SPfS is supported by each airport unit having an Airport Safety Plan (developed with the airport operator) which identifies the risks at each particular airport and details an action plan to address and mitigate them.

The key elements of our plan in RP2 are:

- *Tactical Safety Improvement:* on-going unit-led safety improvement projects to focus directly on tackling specific sources of our safety events;
- *Strategic Safety Improvement:* safety improvement projects to increase the overall resilience and safety margins in our operation, including a leading role in ground and runway safety initiatives, developing human performance, procedure design and enhancing technology;
- *Safety Management Improvement:* continuing to enhance our Safety Management System (SMS) capability and our understanding of safety performance and risk;
- *Working with Others:* we will continue to be engaged with industry through the Safety Partnership Agreement (SPA) which maintains a joint Safety Plan detailing how NATS, airports and airlines collaboratively tackle key risk areas. This reinforces our continued focus on the risk generated at airports by non-NATS sources.

Specific Actions

Date	TANS Airport	Action / Key Milestone
Through RP2	All	Implement Airport Safety Plan targeted at key risk areas
		Level Busts: Extended deployment / evolution of the barometric pressure setting advisory tool (BAT) to further enhance our ability to prevent Level Busts caused by altimeter setting errors
		Controlled Airspace Infringements: Further deployment of technology enhancement and specific initiatives to further improve detection of potential airspace intruders
		Runway Safety: Continued development of procedures and deployment of technology to reduce 'runway incursions' and 'confusion on the ground' events
		Improved capability: systemise the TANS operation to share best practice risk avoidance amongst airports and reduce its vulnerability to human error.
		Safety management: implement competence management scheme to meet EoSM Level 4 KPI

[2] NATS Strategic Approach to Safety –June 2011

4.2 Service Capacity and Quality

Strategic Plan

1. Delivering services levels expected by airport customers

Our overall objective is to improve the punctuality and efficiency of flights at TANS airports. Therefore, we plan to work with all airport, airline and ATM network partners to achieve a reduction in airport delays.

We are also contractually required to provide ATC service capacity to our airport customers through the service performance arrangements in contracts (explained in section 3.1.7).

Central to our strategy to deliver a high quality air traffic service day-to-day at UK airports (in terms of capacity, resilience and delays) are:

- Provision of high calibre staff that contribute significantly to the safety and efficiency of our operations, with appropriate staffing levels that ensure good resilience to weather and airport disruptions such that delays due to all causes are at an absolute minimum;
- Our proven capability to maximise operation of existing runway and taxiway systems in order to sustainably meet projected traffic growth, especially in high intensity operations;
- Working together with the airport community at a tactical level:
  - to collaborate for better performance through timely and accurate information sharing, and
  - to improve the airport's resilience to potentially disruptive events, especially bad weather.

At a strategic level, we will also work with airport operators where they want us to in:

- Improving airport resilience through delivery of new procedures – such as new low visibility procedures and time based separation;
- Increasing the capacity of airspace surrounding airports – via changes to approach routes and SIDs – to support airport efficiency (eg. the departure efficiency programme);
- Providing expert advice to help inform decisions on capacity declarations and scheduling, including runway capacity studies;
- Helping to decide when a strategic improvement in peak hour runway capacity will be required and how to provide it;
- Managing key airport ATC infrastructure projects, as well as ensuring that normal runway operation can be maintained during other major airport construction projects.

2. Supporting deployment of the CAA's Future Airspace Strategy

Where needed, we will support airport operators in deploying the CAA's FAS which is focused on tackling the key areas of inefficiency in the UK's airspace and airport system to deliver a modernised system in line with the SES ATM Research (SESAR) programme.

Additional capacity benefits are expected through improved airport / terminal procedures in particular:

- Arrival / departure management tools (AMAN / DMAN)
- Airport collaborative decision making (A-CDM)
- Improvements to arrival and departure procedures through use of performance based navigation (PBN).

However, FAS is an industry-wide programme which requires joint and co-ordinated action by its many participants to deploy improvements into airport operations. For example, NERL will have a role in ATM improvements in en-route airspace and for London Approach operations, whereas airports will have a role in their allocated airspace (or below 4,000' in London airspace) which will include actions by TANS providers.

Specific improvements in the terminal and runway environment are planned in the RP2 period as part of industry's joint response under FAS, many of which support the capacity and quality of TANS, including:

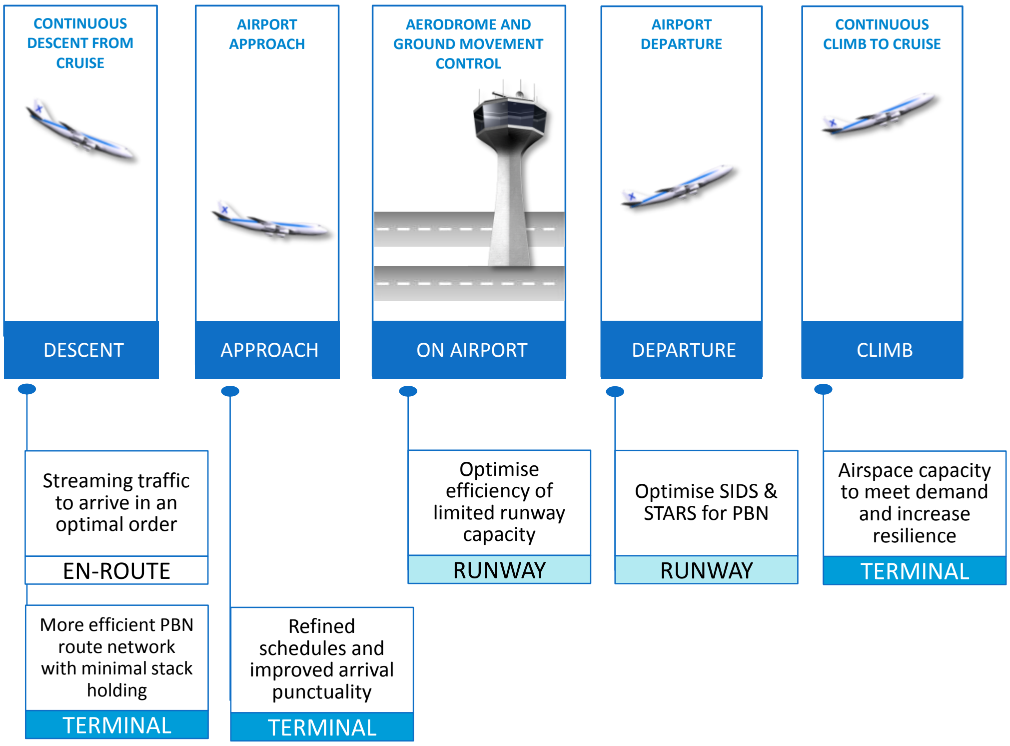
- Optimising the capacity of terminal airspace (London, Northern and Scottish TMAs) to ensure resilient airport operations;
- Re-designing airport routes (SIDs & STARs) and procedures using PBN to optimise airport performance;
- Introducing arrival and departure management techniques that provide an efficient flow of aircraft on busy runways without airborne holding or departure delays;
- Integrating airports electronically into the European ATM network so that runway capacity is used effectively – based on real-time information to balance demand / capacity, particularly when and where there are mismatches due to weather, demand surges and airport issues;
- Implementing A-CDM at capacity constrained airports to improve the turnaround process, reduce taxi times and maximise runway efficiency;
- Introducing Time Based Separation (TBS) where appropriate to enable closer approach spacing in strong wind conditions, increasing runway resilience and reducing weather related delays (currently planned to be introduced at Heathrow and Gatwick in RP2).

Additionally, we will support our airport customers in implementing the Airports Commission's recommendations on short-term measures that might be taken to make better use of existing airport capacity.

However, deployment of these improvements will involve complex interactions, requiring joint industry action with many interdependent influencing factors. We will work with airport operators on FAS where they want us to, but much of the joint action is outside the direct control and influence of TANS providers.

It should be noted that investment decisions rest with the airport, with the CAA also having a key role to play with airspace changes and approving revisions to technical guidance material and procedures which will enable performance improvements (e.g. PBN procedures, RNAV SID/STAR route spacing and wake vortex rules).

Figure 7: Key FAS Improvements in the TANS Environment



Key Assumptions

Our capacity plan is based on the following assumptions in the RP2 period:

- No major change in airport ground infrastructure
- No major change in Government policy on airspace or runway operations (eg. mixed mode)
- No major change to current scheduling patterns
- The main elements of FAS airport and airspace changes are not fully delivered until the last year of RP2 and therefore delay performance is unlikely to improve year-on-year across all London airports in RP2.

Specific Actions

Date	TANS Airport	Action / Key Milestone
2015 onwards	Heathrow, Gatwick	Phase 1 Time Based Separation (by NERL) – airport system changes, local safety case and controller training by TANS provider (airport funded)
Through RP2	Heathrow, Gatwick and Manchester	PBN SID optimisation – linked to NERL's departure efficiency programme *
Through RP2	Heathrow	Operational enhancements: > A-CDM enhancement > night noise alleviation arrivals procedures > independent parallel approaches – trial deployment > ground-based augmentation system (GBAS) for precision approaches – trial deployment
Through RP2	Gatwick and Manchester	A-CDM deployment
Through RP2	All	Approach procedures with vertical guidance (APV) in line with FAS Deployment Plan
		PBN arrival and departure routes (SIDs/STARs) in line with FAS Deployment Plan – changes to departure routes subject to airport decision *
		Deploy queue management tools at airports – enhanced arrival manager, departure manager, surface manager
		Integrate airports electronically into the European ATM network – departure planning information (DPI) integrated into CFMU systems

Note: Use of PBN for departure efficiency programme and for arrival efficiencies is dependent on changes to regulatory guidance being developed through FAS.

4.3 Environment

NATS' on-going 'Acting Responsibly' environment programme is focused on minimising the environmental impact of ATM so as to enable the sustainable growth of the aviation industry.

NATS was the first ATM organisation in the world to set environmental targets for reducing ATM-related CO_2 (in 2008). We were also the first to develop ways of measuring our performance via a 3Di metric (which measures the difference between the 'actual' and 'ideal' flight profile in UK airspace).

Our goal is to ensure that consideration of the environment is part of our culture, embedded in our DNA in the same way that safety already is.

Strategic Plan

We are contractually required to deliver environmental performance improvements to our airport customers through the service performance arrangements in contracts (explained in section 3.1.7).

This performance is underpinned by NATS' overall ambition to achieve its strategic target to reduce air traffic related CO_2 by an average 10% per flight by 2020 (from a 2006 baseline).

Building on the expectation that NATS as a whole will achieve a 4% per flight reduction by the start of RP2, our environment plan for TANS in RP2 is based around the following themes:

1. Reducing CO_2 emissions through procedure and airspace changes: in collaboration with airport operators, we will continue to develop, at an airport level, operational improvements in fuel burn and CO_2 performance to support NATS' 10% reduction target by 2020 (taking 2006 as a baseline). This includes implementing more efficient use of stands, taxi routings, continuous descents and climbs – all leading to reduced emissions and fuel costs for airline customers, as well as lower carbon emissions at the airport level. This efficiency improvement is important in the context of the SES Environment PI for reducing 'taxi out time'.

The major improvement for TANS in RP2 will come from extending the scope of Continuous Descent Approaches (CDAs) and Continuous Climb Departures (CCDs). Flight data has shown that a CCD can save up to 1.5 tonnes of fuel (4.5 tonnes of CO_2) compared to a typical stepped-climb profile. A CDA from 7,000ft can save up to 0.3 tonnes of fuel (nearly 1 tonne of CO_2) and a CDA from the top of the descent has the potential offer even bigger savings.

Additionally, NERL's investment in RP2 in strategic airspace programmes (LAMP and NTCA) will enable in the longer-term more efficient trajectories in terminal airspace, enabling:

- Routes to be located where they best meet the needs of airports and flight profiles;
- Continuous climbs and descents to be flown to/from significantly higher altitudes than today
- Far better use of finite terminal airspace, thereby providing greater opportunities to mitigate environmental impacts.

2. Technology and innovation: NATS will deploy new technology and tools across its operation (including TANS airports) including:

- Queue management (arrival and departure management) to achieve efficient traffic sequencing on busy runways, improving flight profiles and eliminating stack holding in normal operations
- Time based separation (TBS) to increase runway resilience to strong wind conditions and reduce weather related airborne holding delays.

This technology enabled improvement is important in the context of the SES Environment PI for reducing 'ASMA time'. While most investment relates to NATS' en-route operations (NERL), there will be key interdependencies with TANS airports and associated investment decisions.

3. Mitigating aircraft noise: We will undertake innovative work with airports, airlines and communities to reduce noise, eg the current Heathrow noise respite trials.

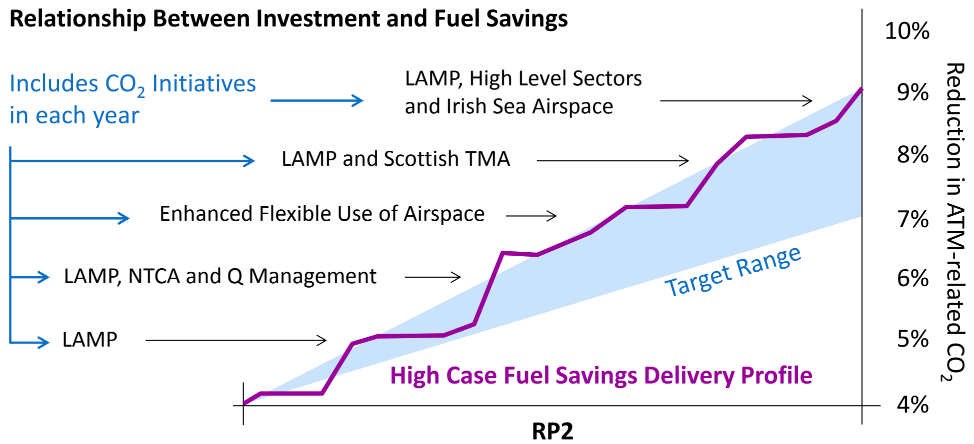
4. Working in partnership: Our work to deliver environmental improvements cannot be achieved by us alone. We will work with airport operators, airlines and ANSPs to deliver the environmental performance improvements, and to find new and quicker ways of implementing environmental solutions.

5. Reducing our carbon footprint: While most CO_2 savings lie in the management of air traffic, we will continue to reduce our impact on the local environment by extending our initiatives to reduce the amount of energy and water we use, the amount of waste that goes to landfill, and the miles we travel.

Specific Actions

Environment is therefore a key theme across a number of NATS strategic investment programmes in line with FAS and with implications for TANS.

The relationship between key NATS-wide programmes and fuel savings is illustrated in the chart below, highlighting that the majority of fuel saving benefits during RP2 will predominantly be delivered by NERL's investment in the LAMP, NTCA and Scottish TMA projects. These NERL airspace programmes will have interdependencies with TANS airports in order to deliver their full benefits, for example in revising / replacing SIDs and STARs with RNAV routes.



We will work with airport operators on local implementation of FAS, LAMP, NTCA and ScTMA where they want us to perform some or all of the work on their behalf. On this basis, the key TANS actions are summarised below.

Date	TANS Airport	Action / Key Milestone
Through RP2	London Airports	Support airport operators on local implementation of FAS and LAMP
	Manchester	Support airport operator on local implementation of FAS and NTCA
	Scottish Airports	Support airport operator on local implementation of FAS and ScTMA

4.4 Cost Efficiency

Recognising the continuing customer requirement (airport operators and airlines) for cost reduction in the TANS contracts, NSL has already delivered a challenging cost saving programme which achieved annual savings in excess of £10m by 2012/13 (relative to NSL's 2009 Business Plan). A further programme of costs reductions will run to 2014/15 (ahead of RP2), principally focusing on exploiting technology changes as well as further changes to productivity linked working practices, pay and conditions (across NATS) and reductions in back office overheads.

Strategic Plan

For RP2, our strategy is to continue to improve our operational productivity by smarter working through further adjusting working practices and implementing new technology /automation in our control towers.

We plan to improve the cost efficiency of our ATC operations by:

> *Leveraging technology enabled solutions* – to reduce headcount, increase productivity, achieve economies of scale, and improve service resilience – e.g. a fully automated MET system to reduce ATSA support, using technology to reduce ATC manning at night and quiet periods, utilising our remote 'virtual tower' operations, and emerging surface management tools.

> *Systemisation of airport ATC* – harmonising and optimising all aspects of the ATC system across TANS airport contracts in order to deliver a predictable service to customers and the efficiency benefits associated with using best practice across all units.

> *Systems integration* – to deliver further automation which minimises or removes human intervention thereby reducing staff costs, minimising human errors and increasing capacity without the need for more staff.

Most of our airport customers also contract for engineering support services for their ATC infrastructure as a package with the ATC service. We have developed a reputation for excellence in this field, providing highly competent, experienced and responsive engineers at all airports.

By the start of RP2 we will have fully implemented a new engineering service delivery model at TANS airports to increase the capacity and flexibility of airport based engineering resources, and thereby improve cost efficiency.

We will continue further rationalisation and automation of engineering tasks as new technology is deployed which, combined with risk based asset maintenance and improved service management tools, will enable 'more with less'.

4.5 Investment

Continual investment in ATM infrastructure and capabilities is critical for airports to deliver valuable improvements in reliability and consistency of airport operations. Airports and airlines have tangibly benefited from this investment in TANS through the high number of movements safely enabled on saturated runways and in the congested airspace immediately surrounding airports.

Airport ATM assets are usually owned by the airport operator or subject to operating lease agreements. In a few exceptional circumstances the assets are owned by NSL.

Strategic Plan

As required under NSL's contracts with airport customers, we will continue to support airport operators in developing an affordable investment plan that delivers the benefits of improved ATM infrastructure and capabilities to their operations. This includes the timely replacement of assets at end-of-life to ensure continued delivery of the operational service.

Our safety, capacity and environment plans are predicated on continued ATM related investment at airports, in particular to implement FAS improvements (subject to a robust industry-level business case).

We will also deliver a number of key ATM asset projects and investments to reduce the implementation risk associated with integrating new technologies and systems into the airport's existing operational infrastructure, avoiding any potential impact on the airport's day-to-day operations.

Investment in ATM infrastructure and capabilities will enable TANS to provide services that deliver benefits to the airport operator and achieve performance targets. Investment can therefore be categorised in a number of project areas linked to benefits, as summarised below.

Project Area	Type of Investment	Benefits	Link to European ATM Masterplan	Link with SES Interoperability IRs/common projects
Safety nets	Automatic monitoring and detection tools – eg. runway incursions, airspace infringement, level busts	Reduce safety risk	OI Steps: AO-0104-A Airport Safety Nets for Controllers in Step 1	Pilot Common Project: AF2 – Airport Safety Nets
Landing rate resilience	Time Based Separation ILS upgrades / replacement	Improve weather resilience	OI Steps: AO-0303 - Time Based Separation for Final Approach - full concept	Pilot Common Project: AF2 - Time Based Separation
Runway and ground movement efficiency	Queue management tools (arrival manager, departure manager, surface manager)	Optimise efficiency of limited runway / airport capacity Improved arrival / departure punctuality	OI Steps: TS-0203 - Departure Management supported by Route Planning and Monitoring TS-0303 - Arrival Management into Multiple Airports	Pilot Common Project: AF1 - Extended AMAN
Local airspace development	Re-design SIDs and STARs for performance based navigation (PBN)	Improve arrival / departure efficiency Fuel / CO_2 savings Mitigate environmental impacts	ESSIP Objectives: NAV03 - Implementation of P-RNAV OI Steps: AOM-0603 - Enhanced Terminal Airspace for RNP-based Operations	Pilot Common Project: AF1 - PBN in high density TMAs
Comms, navigation and surveillance infrastructure	Radar / radio upgrades and replacement Satellite-based navigation Fully automated met observation system	Resolve obsolescence and regulatory issues Assured operational capability with reduced operating and manpower costs	ESSIP Objectives: NAV10 - Implement APV procedures	

Project Area	Type of Investment	Benefits	Link to European ATM Masterplan	Link with SES Interoperability IRs/common projects
Control tower infrastructure	New control towers or major re-equipment projects	Improve airport capabilities and flexibility / efficiency – ‘more with less’ Reduce through-life costs ‘Future-proofing’ assured		

5 Plan Outcomes: Delivery v. RP2 Targets

5.1 Safety

NATS will use its headline internal safety target (to deliver a 13% reduction in accident risk per flight during RP2 across its operations) to drive safety performance improvement in RP2.

Additionally, the SES Performance Scheme aims to stimulate and ensure proactive safety management, with emphasis on automatic reporting / monitoring together with a climate where people feel confident in reporting safety issues.

The PRB has published 'indicative performance ranges' for ANSP safety KPI targets as shown in the table. Additionally, there is a sub-set of PIs to be monitored at national level.

The KPIs / PIs reflect a relative lack of maturity of many ANSPs' approach to safety management, whereas NATS' approach to safety improvement remains consistent with achieving these targets in RP2.

KPI	Measure	Target	Target Expected to be Achieved
Effectiveness of Safety Management	ANSP score (level 1-5) v. Eurocontrol Safety Maturity Framework and ICAO Level of Effective Implementation	Level 4 by 2019	√
Application of Severity Classification Scheme	Application of the severity classification based on the Risk Analysis Tool (RAT) methodology to the reporting of occurrences – as a minimum Separation Minima Infringements, Runway Incursions and ATM-specific occurrences	100% by 2019	√
Just Culture	Developed and successfully implemented a Just Culture Implementation Plan	National target set by CAA	(TBD)

PI (National Monitoring)	NSL TANS Compliant in RP2
Separation infringements – and automatic data recording for monitoring	√ [1]
Runway incursions – and automatic data recording for monitoring	√ [2]
Airspace infringements	√
ATM specific occurrences at ATS units	√
Level of occurrence reporting	√

[1] Subject to published rule on exact means of compliance with automatic monitoring

[2] We will report data where it is available

5.2 Service Capacity and Quality

In RP2 we will continue to improve the punctuality and efficiency of flights at TANS airports through our contractual relationship with airport operators and the agreed service performance measures.

Airport ATFM delay and pre-departure delay are a function of service delivery, flight schedule (including aircraft types and direction bias) airport infrastructure and operating rules, and local airspace constraints. Performance against SES KPIs / PIs in RP2 is therefore divided between multiple stakeholders – airports, TANS provider, NERL, airlines and the CAA.

The table below indicates that the lead accountability for the various aspects of performance is in many (but not all) cases with parties other than the TANS provider. We will, however, provide full support and co-operation to those parties to help achieve required performance.

Figure 8: ATFM & Pre-Departure Delay – Performance and Lead Accountability

KPI/PI	Cause	Mitigation / RP2 Action	Lead Accountability for Mitigating Action
Airport ATFM Delays			
Weather Delay	Strong winds	Time based separation	NERL
	Low visibility	Alternatives to ILS (eg. MLS or satellite-based)	Airport
	Thunderstorms	Improved met forecasting and data	Airport / NERL
	Snow / ice	Clearance plan / equipment	Airport
Capacity Delay	Arrival demand exceeds declared capacity (landing rate)	Arrival management and delivery of consistent arrival separation	**TANS** / NERL
		Airline adherence to slot times	Airlines
		Changes to airport operating rules	Airports
		New airport infrastructure to increase landing rate (runways, RETs)	Airports
		Impact of new aircraft on runway capacity (increased vortex spacing and runway occupancy time of eg A380)	Airport / Airlines
Airport Facility Delay	Ground congestion affects landing capacity	Ground infrastructure and gate management	Airports
Staffing / Technical Delay	ATC service levels impaired	Resilience of staffing levels and technical systems (where equipment is provided by NATS) – incentivised by contract service quality regime	**TANS**
		Timely replacement of end-of-life TANS assets (where equipment is provided by airport operator)	Airport

KPI/PI	Cause	Mitigation / RP2 Action	Accountability for Mitigating Action
Start Up Delay (ATC Pre-Departure Delay)			
Departure Delay	SID / departure route congestion	Scheduling process based on allocation to departure routes	Airports
		Optimised SID / terminal airspace redesign to PBN	FAS / Airports / NERL
	Ground congestion affects departure capacity	Ground infrastructure and gate management	Airports
		Scheduling including aircraft types	Airports / Airlines
		Departure management and consistent delivery of efficient departure sequence	**TANS** / NERL

RP2 Outcomes

Our modelling outcomes are shown in the tables. It suggests that delay reduction measures and the forecast traffic growth seem to be inter-related, in that improvements to reduce delays on current traffic levels are ameliorated by forecast increases in airport traffic.

Additionally, airports are simply not the same and initiatives to reduce delays at one will not, necessarily, work at another. Further, the 'law of diminishing returns' is starting to bite, in that most of what can be done to reduce delay within the confines of existing airport size, configuration and location has or will be done.

However, in the longer-run, there is more that can be done in the context of FAS which will require action by all stakeholders – airports, TANS provider, NERL, airlines and the CAA.

1. Average Airport ATFM Arrival Delay

The tables below shows average Airport ATFM arrival delay for 'all causes' and 'ANSP attributable'. The majority of 'all causes' are not ANSP attributable (weather, impact of ground or scheduling capacity). As explained earlier in section 3.1.5, the Eurocontrol PRU defines a broader set of causes as 'ANSP attributable' which include airport capacity causes which are largely outside the influence of NSL in the UK, especially at capacity constrained airports. NSL therefore records only those causes that are genuinely its control as ANSP attributable, namely staffing and technical (although in the UK the ANSP does not control the assets since they are generally airport operator owned).

Figure 9: NSL Attributable

Average Airport Arrival ATFM Delay - NSL Attributable (S&T Causes)

Mins / flight	Historic Performance **Average 2008-12**	Current Performance **2013 YTD**	RP2 Predicted Outcome **Average 2015-19**
Manchester	0.03	0.02	0.05
Luton	0.01	0.01	0.05
Gatwick	0.01	0.00	0.05
Heathrow	0.02	0.01	0.05
Glasgow	0.00	0.00	0.05
Edinburgh	0.14	0.02	0.05
Stansted	0.01	0.02	0.05
All Airports	*0.02*	*0.01*	*0.05*

The projected slight increase in NSL's ANSP attributable delay in RP2 reflects that, until the benefits of FAS are realised, ANSP delay reduction measures in RP2 are outpaced by forecast increases in airport traffic.

Figure 10: ANSP Attributable (PRU)

Average Airport Arrival ATFM Delay - ANSP Attributable (PRU C,G,S&T Causes)

Mins / flight	Historic Performance **Average 2008-12**	Current Performance **2013 YTD**	RP2 Predicted Outcome **Average 2015-19**
Manchester	0.19	0.01	0.19
Luton	0.10	0.01	0.10
Gatwick	0.40	0.15	0.40
Heathrow	0.74	0.17	0.74
Glasgow	0.01	0.00	0.10
Edinburgh	0.21	0.02	0.21
Stansted	0.03	0.02	0.10
All Airports	*0.28*	*0.10*	*0.28*

Taking the broader set of PRU ANSP attributable causes results in a much higher level of delay, notably at Heathrow due to capacity constraints. RP2 outcomes are expected to broadly maintain historic levels of performance while catering for increased traffic levels.

Figure 11: All Delay Causes

Average Airport Arrival ATFM Delay - All Causes

Mins / flight	Historic Performance **Average 2008-12**	Current Performance **2013 YTD**	RP2 Predicted Outcome **Average 2015-19**
Manchester	0.38	0.31	0.38
Luton	0.41	0.03	0.41
Gatwick	0.93	0.58	0.93
Heathrow	4.33	2.62	3.47
Glasgow	0.02	0.00	0.20
Edinburgh	0.26	0.03	0.26
Stansted	0.27	0.02	0.27
All Airports	*1.57*	*1.08*	*1.57*

All causes Airport ATFM delay in RP2 is expected to be in line with historic levels of performance while catering for increased traffic levels. The exception is an estimated 20% reduction in weather delays at Heathrow expected from introducing TBS (being implemented by NERL jointly with the airport).

2. Average ATC Pre-Departure Delay

As explained in section 3.1.5, ATM-related causes of Pre-Departure Delay cover a wide range of factors that are largely outside the ANSP's control, such as:

- Airfield and taxiway issues
- Weather avoidance (thunderstorms) and low visibility (reduced traffic flow around the airport taxiway system)
- Congestion on standard instrument departure (SID) routes which is influenced by the airport schedule and aircraft wake vortex mix together with SID infrastructure
- Short Term Air Traffic Flow and Capacity Measures (STAM) to protect airspace/routes from demand spikes
- Downstream ATFM delays in en-route and at the arrival airport.

At Heathrow, the scheduling baseline includes a maximum of 10 minutes delay at the holding point to maximise departure capacity.

Therefore, pre-departure delays are difficult to quantify and are to some extent unpredictable due to their causes. The major cause for most NATS airports will be weather related, with delays due to en-route capacity contributing a lesser value. NSL attributable causes (such as staff shortages and equipment failures) have not produced any significant pre-departure delay in recent years and are projected to contribute only a very minor value in RP2.

3. ATFM Slot Adherence

ANSPs are required to ensure aircraft adhere to ATFM departure slots (Approved Departure Time or ADT) so that overall network capacity is used to the maximum extent possible, and to ensure network predictability and prevent overloading the downstream ATC sectors and airports. Consequently, ANSPs place a high priority on ensuring aircraft are ready for departure to meet their ADT.

EU regulations set a threshold of 80% of departures operating within their 'slot tolerance window' as the minimum level of performance. The table shows that current performance by UK TANS airports is consistently above the EU threshold and is expected to further improve in RP2 as A-CDM and departure management techniques are deployed.

ATFM Slot Adherence

(%)	September 2013
Manchester	82%
Luton	84%
Heathrow	86%
Edinburgh	87%
Gatwick	88%
Stansted	91%
Glasgow	>95%

Source: Eurocontrol Network Operations Report

5.3 Environment

Our environmental performance in RP2 will be driven by NATS' overall ambition to achieve its strategic target to reduce air traffic related CO_2 by an average 10% per flight by 2020 (from a 2006 baseline).

As with capacity, performance against SES KPIs / PIs in RP2 has to be set in the context of who has lead accountability for specific types of delay and, accordingly, any actions to improve performance – as summarised in the table below. However, we will provide our full support and co-operation to achieve required performance.

Note that most additional taxi out time and ASMA time in the UK occurs at Heathrow where additional delay is factored into the scheduling rate (at 10 minutes per flight), reflecting the intensity with which airport runways are used.

Performance and Lead Accountability

KPI/PI	Cause	Mitigation / RP2 Action	Lead Accountability for Mitigating Action
Taxi Out Time			
	Planned delay at runway holding point (eg Heathrow)	Scheduling process	Airports
	Ground congestion affects taxi time	(As for Capacity Departure Delay above)	Airports / **TANS**
ASMA Time			
	Planned airborne holding delay (eg Heathrow)	Scheduling rate	Airports
	Weather, capacity and airport facility delays	(As for Capacity above)	(As for Capacity above)

RP2 Outcomes

The table below shows current performance. As with capacity targets, ASMA time and taxi-out time are likely to increase by c.10% by the end of RP2 as improvement measures are ameliorated by forecast increases in airport traffic. No change is expected at Heathrow as the scheduling baseline includes a maximum of 10 minutes arrival and departure delay to maximise capacity. Towards the end of RP2, the benefits of FAS are expected to improve both ASMA time and taxi-out time.

Figure 12: Additional Taxi-Out and ASMA Time

	Additional Taxi Out Time		Additional ASMA Time	
	Unimpeded taxi time (mins/departure)	2013 YTD	*Unimpeded ASMA time (mins/arrival)*	2013 YTD
Edinburgh	10.0	2.0	13.5	0.6
Gatwick	12.0	4.2	14.0	2.6
Glasgow	9.5	1.6	n/a	n/a
Heathrow	13.0	7.9	13.5	9.2
Luton	9.5	2.6	n/a	n/a
Manchester	11.2	3.3	13.5	2.1
Stansted	10.2	2.0	14.0	0.5

Note: PRU does not currently publish ASMA time data for Glasgow and Luton Airports

5.4 Cost Efficiency

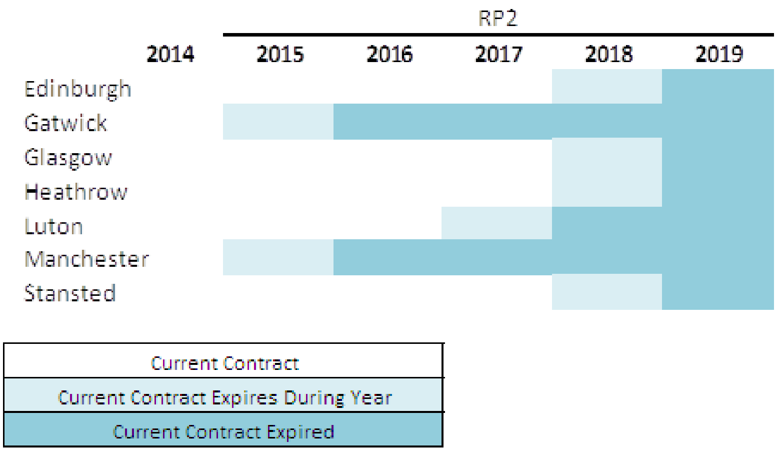
The EC's performance scheme does not intend to set a binding EU-wide TANS cost efficiency target until mid RP2 in 2017. Cost efficiency targets will be set at a national level from the start of RP2. Meanwhile, the PRB has proposed "notional" target range to help stakeholders prepare performance plans for RP2. The range is from 0% to -2.1% annual real reduction in determined costs over RP2.

DETERMINED COST (DC) / **FORECAST TRAFFIC (Service Units)** **= DETERMINED UNIT COST (DUC)**

> Cost incurred by TANS Provider for the benefit of service users
> As per EC ANS cost base rules

We have calculated DC and DUC based on NSL's existing contracts with the relevant airport operator. However, as shown in the chart below, these contracts do not currently extend for the full RP2 period. Therefore, purely for the purpose of calculating DC and DUC over the whole of RP2, we have assumed that contracts continue to be based on the existing scope of service beyond the end of the contract. In practice, the actual terms of any future contract and associated costs will be a product of the commercial procurement process run by the airport operator.

Figure 13: Contract Periods
(DC and DUC calculations in shaded areas are based on assumed costs)



In addition to the above is Birmingham airport, where NSL have been notified that the contract will not be extended beyond 31st March 2015.

Compared to 2014 and after adjustment for the cessation of the Birmingham contract, NSL's plan remains constant in real terms over the period to 2019 and supports an average annual increase in service units of 2.0% over the same period. This results in an average annual real reduction in unit cost of 2.0% over the period(compared to 2014).

This DC/DUC reduction is within the PRB's "notional" target range and reflects:

> The number of contract cycles at these airports that has driven improved efficiency into the service through the contracting process
> Decisions made by airport operators about investment in equipment and property costs arrangements
> The further efficiency improvements during the course of RP2 as set out in this plan.

Further explanation of cost efficiencies and DUC is provided in the next section.

5.5 Financial Outcomes

The table below sets out the projected determined costs for the periods 2015 to 2019.

Cost details	2015	2016	2017	2018	2019
Detail by nature (in nominal terms)					
Staff	62,663	62,676	64,395	66,024	67,670
Other operating costs	46,443	47,945	49,214	50,367	51,291
Depreciation	1,345	1,100	881	837	854
Cost of capital	19,892	19,707	20,358	20,523	20,688
Exceptional items	286	282	288	290	290
Total costs	130,628	131,710	135,136	138,041	140,793
Total % n/n-1	-2.4%	0.8%	2.6%	2.1%	2.0%
Staff % n/n-1	-6.8%	0.0%	2.7%	2.5%	2.5%
Other op. % n/n-1	4.4%	3.2%	2.6%	2.3%	1.8%
Cost-efficiency KPI - Determined/Actual Unit Cost (in real terms)					
Inflation %	2.25%	2.07%	1.92%	1.97%	1.99%
Price index	107.6	109.8	111.9	114.2	116.4
Total costs real terms	**121,400**	**119,917**	**120,714**	**120,920**	**120,923**
Total % n/n-1	-4.5%	-1.2%	0.7%	0.2%	0.0%
Total Service Units	**1,051**	**1,060**	**1,078**	**1,098**	**1,117**
Total % n/n-1	-1.0%	0.9%	1.6%	1.9%	1.7%
Unit cost	**115.49**	**113.09**	**112.01**	**110.13**	**108.28**
Total % n/n-1	-3.5%	-2.1%	-1.0%	-1.7%	-1.7%

Costs and asset base items in '000 - Service units in '000

The costs included in the reporting tables are based on NSL's Board approved business plan for the period to the end of 31st March 2015 and thereafter from best estimates. These include costs and service units in respect of Birmingham Airport until March 2015. Note these are based on NSL's latest view and therefore may differ from the RP2 figures submitted to the EC in June 2013.

NSL provides Terminal ANS at airports under commercial contract to the airport company. Each of these contracts has a defined period of validity, which, in all cases, expires before the end of RP2. NSL has therefore had to assume that the contracts at each of the relevant airports will be renewed.

The cost included in the reporting table for the period beyond expiry are based on estimates of the costs and price for the renewal period and assuming an identical scope of work as the existing contract.

An exception to this assumption is Birmingham, where, as NSL has been notified formally by the airport that its ANS contract at the airport will not be extended beyond 31st March 2015, the airport has been removed from NSL's reported costs for the Zone with effect from this date. All direct costs associated with the delivery of the contract have been assumed to cease with effect from the expiry date however c£0.4m of fixed support costs, has been re-apportioned across NSL's entire airport portfolio.

Staff Costs

The amounts reported include the anticipated employment costs of local airport staff and other, non-airport based support staff that have been attributed to the relevant airport contract activities. The attribution of cost to each contract is derived from the anticipated staff effort required to resource the delivery of each contract and the anticipated employment cost of each hour of effort for the different staff types resourcing the contract. The anticipated hourly employment cost is calculated using business approved assumptions on the cost of pensions and pay increments and include:

- Pay increments - the latest pay settlement NATS has agreed with its Trade Union partners expires at the end of calendar year 2015; best estimates for pay inflation have been assumed thereafter.
- Pension costs – these are included at the estimated blended employer's cash contributions to both the company's defined benefit and defined contribution scheme.

Costs include the recurring savings from operational staff efficiencies being delivered in RP1 and sustained over the period despite a forecast increase in traffic volumes. The efficiencies are being delivered through initiatives to better systemise and simplify the ATC task and to increase automation of a number of tasks carried out by support staff.

Despite these savings, staff costs for the zone are expected to remain generally flat in real prices over the period of the plan reflecting the current assumptions on pensions and pay. The staff numbers also reflect the transfer of the Birmingham TANS services to the airport operator.

Other Operating Costs

The costs reported include non-labour expenditure incurred which directly relates to the provision of the services covered by the ANS contract at each specific airport. Examples of these costs are radar and data feeds, communication circuit costs, and insurance costs.

In addition a number of NSL's airport contracts include, within the agreed scope, the provision of ANS related assets. These are normally financed under operating leases with a 3rd party with the associated rental charges incurred by NSL being recovered from the airport company at cost plus a small administration fee. The estimated future costs of these leases are included in this line item.

Similarly a number of NSL's ANS contracts include the provision of, and costs associated with, property assets. This includes NSL owned properties but also airport owned properties for which the airport makes charges to NSL e.g. rent, utilities etc. which are then recharged to the airport company through the ANS contract price. These costs are usually traded on a cost pass through basis. The estimated future costs associated with these property charges are included in this line item.

Overall costs under this line item are expected to increase generally in line with CPI over the period of the Plan. It should be noted that of the c40% of the costs reported on this line relate to the provision of assets or are property related both of which are generally traded on a cost pass through basis by NSL.

Depreciation

The majority of assets used in the NSL provision of the terminal ANS services are owned either by 3rd party lessor or by the airport company. A number of assets are however, usually due to their nature / characteristics, owned by NSL. In these circumstances the assets are depreciated on a straight line, historical cost basis over the estimated useful life of each asset.

These costs are expected to reduce over the period of the Plan as assets owned by NSL reach the end of their useful life and the majority of investments are financed through operating lease or by the airport company.

Cost of Capital (pre-tax)

Cost of capital represents the difference between the expected revenue earned from airport contracts and the operating costs incurred in delivering them. Taking into account the related business and financial risks, cost of capital compensates NSL's shareholders for their investment in these highly complex services which are fundamental to the successful operation of our customers' airports. NSL will pay corporation tax on this compensation. Cost of capital is expected to remain broadly stable over the reporting period.

Exceptional Costs

These include provisions for restructuring costs apportioned against the contracts.

Total Costs

This line item represents the anticipated contract revenues NSL will earn from the relevant airport contracts over the period of the plan. These have been derived from the agreed contract terms up until the contract expiry dates and thereafter from an estimate of the contract price on renewal, assuming an identical scope to the existing contract. Assumptions on the following variables have been included in the estimated revenue figures:-

- Indexation – a number of NSL's ANS contracts contain an annual inflation indexation term agreed through negotiation.
- Traffic – a number of NSL's ANS contracts include an indexation term which is calculated with reference to any growth in traffic / landed tonnage.
- Service Quality Penalties – a number of contracts include penalty payments associated with NSL's performance against a number of

specific service quality measures agreed with the airport customers. An estimate based on historical actuals has been included in the planned revenues.

- Service Quality Incentives – NSL is entitled to earn additional revenues on a number of contracts through the achievement of targets agreed with its airport customers on a set of agreed service quality measures. An estimate based on historical actuals has been included in the planned revenues.
- Cost Pass Through – As mentioned in previously, some costs incurred by NSL on specific contracts are treated as cost pass through items in respect of the contract revenues. These are property costs and asset lease/depreciation costs. The anticipated costs and matching revenues have been included based on latest estimates.

Overall, revenues across the period of the Plan are expected to rise generally in line with the indexation terms included in the ANS contracts which, it has been anticipated, will continue on renewal.

Unit costs in real prices

Compared to 2014, unit costs in real prices are expected to decrease by an average of 2.0% across the period to 2019 (after adjustment for Birmingham costs in 2014 and 2015). This reflects an increase in charging units of 2.0% per annum across this period (after adjustment for Birmingham) while real prices remain constant.

Draft RP2 Business Plan for TANS

Appendices:

Appendix A – UK TANS Market Conditions Assessment: NATS' Proposed Commitments

The proposed dimension of the Commitments is set out below:

Dimension	
A.	The Commitments shall be binding upon NATS Group of companies including both NERL and NSL in the UK.
B.	The Commitments shall apply to the whole of UK civil ATC operations only and shall exclude any NATS overseas operations.
C.	The Commitments shall apply to NERL En Route Centres for Terminal and Area Control services and to all civil UK Airports that have an operational interface with En Route services.
D.	The Commitments shall be consistent with the obligations of the Transport Act 2000 and the NERL Licence, in particular with the need to maintain the efficiency of the overall ATM network, and competition law as it applies to NSL.
E.	The Commitments will be cognisant of any planned or anticipated changes from RP2 and SES.
F.	The Commitments should not prejudice NSL's ability to bid for Tower ATS contracts, compared to its competitors.
G.	The Commitments will be consistent with the obligations of NATS' Certification as an ANSP and the NATS Safety Management Manual (SMM).
H.	The life of the Commitments should be commensurate with the maturity of the developing Terminal ANS market and be in place for as long as it is required to support contestability of the UK TANS market.

Proposed Commitments Number One: relating to the Operational Interface between NERL and Civil Airports (including those operated by NSL):

Proposed Commitment Number One	
1.	All interfaces between NERL En Route Centres and all civil UK Airports of over 30,000 IFR movements per annum shall be detailed in an operational "Interface Agreement" between the parties based upon equivalence and transparency. Pursuant to NERL Licence Conditions 5.19c, 9, 12.1 and 14.1a, NATS shall, within [12] months of these Commitments taking effect, provide full transparency of these "Interface Agreements".
2.	All operational interfaces between NERL En Route Centres and civil Airports of less than 30,000 IFR movements where NSL provides tower ATC services shall be operated on the basis of equivalence and transparency as detailed in the "Interface Agreement" between the parties. Pursuant to NERL Licence conditions 5.19c, 9, 12.1 and 14.1a, NATS shall, within [6] months of these Commitments taking effect, provide full transparency of these "Interface Agreements".
3.	For interfaces between NERL En Route Centres and all other civil UK Airports of greater than 10,000 IFR movements per annum an operational "Interface Agreement" may be provided at the request of the Airport operator.
4.	NERL may determine at its sole discretion that it is in the interests of the overall efficient operation of ATM network to delegate some airspace to a third-party provider on a commercial basis – a "Delegated Function" (DF). Pursuant to NERL Licence Conditions 5.19c, 9, 12.1 and 14.1a, such delegations shall be transparent and established on an "arms length" basis to ensure the efficiency of the ATM network in terms of safety, capacity, service, value and environment. The life of a contract for a Delegated Function will be for a minimum of 12 months and a maximum not exceeding the life of the relevant contract for supply of tower ATC services.

Proposed Commitment Number Two: relating to the Trust of a Promise (ToaP):

Proposed Commitment Number Two:	
1.	NSL shall ensure that all its Airport contracts have an "Extended Break Clause" that will allow the current ATS contract to be extended on current commercial terms by up to 1 year to allow transition to a new ATC provider. All new contracts shall have this contract added at the renewal point or by agreement with the Airport Operator.
2.	NSL shall, within [6] months of these Commitments taking effect, provide to Airport Operators and prospective providers of tower ATC services at the point of commercial tender (or following written notice from an Airport Operator of its intention to move to self-supply) a clear view on what NATS understands the practical consequences of the ToaP to be.
3.	Subject to non-disclosure agreements (NDA) and at the time of a competitive tender (or following written notice from an Airport Operator of its intention to move to self-supply), NSL shall provide on request to prospective providers of Tower ATC services, or to an Airport Operator, redacted information regarding how many and what category of staff are covered by ToaP.
4.	Following a formal decision by an Airport Operator to change ANSP or move to self-supply, NSL will provide the new supplier or Airport Operator with reasonable access to NSL staff in order to ascertain their possible intentions under the ToaP.
5.	Upon request and in order to support transition, NSL shall agree to train, subject to the limits of the available training capacity, an agreed number of ATCO staff employed by the new provider of tower ATC services (including the Airport Operator in the case of self-supply) over an agreed period of time, on reasonable commercial terms. Such staff would be trained under NATS' ANSP Certification and Safety Management Manual (SMM).
6.	Upon request and in order to support transition, NSL shall agree to second an agreed number of ATCO staff that are covered by the Trust of a Promise over an agreed period of time to the new provider of tower ATC services (including the Airport Operator in the case of self-supply). This will be undertaken under the third-party ANSP Certification and SMM, on reasonable commercial terms. Such staff would operate and train under the third-party ANSP Certification and Regulatory approvals.

Appendix B – Plan Risks

Key risks to the plan include:

- *Performance of other parties* – as explained elsewhere in the plan, the actions of other parties (including airport operators, airlines and NERL) have a major impact on the performance of TANS services.

- *Competition*– the customer (airport owners and airlines) requirement for cost reduction which will create intense competitive pressure during contract tenders to further cut costs. The majority of NATS Airport's existing customers have told the CAA they intend to competitively tender the airport ATC contract when the existing contract expires.

- *Pension liabilities* – an escalation in defined benefit pensions costs due to economic factors outside the company's control puts an untenable squeeze on the business which relies on its contract pricing to recover these. The company does not have a pension cost pass through mechanism. The company has sought to mitigate the impact of deterioration in market conditions, and real gilt yields in particular, which has affected many similar defined benefit schemes. Actions taken include:

  - a re-negotiation with trades unions of a reduction to the cap on the increase in pensionable pay introduced in 2009, which has the benefit of reducing the size of the funding deficit;

  - acceptance by the Scheme Trustees of a recommendation from the company, supported by its trades unions, that the indexation of future service benefits be linked to CPI instead of RPI, which reduces the future service cost; and

  - consultation with Trustees to establish funding assumptions which ensure affordable contributions through the remainder of RP1 and RP2 taking account of the strength of the employer's covenant, the long-term nature of pension provision and the unusual market conditions today. These contribute to both a reduction in the funding deficit and to lower cash contributions during the RP2 period.

- *External cyber security threat* – affecting our systems and disrupting our operations, potentially closing our operations with a disproportionate effect on customers. Mitigation is provided by our recent review of cyber security risk and the programme of work in place to strengthen system access and security controls.

Appendix C – TANS Performance Context

Introduction

This appendix explains what drives performance – and who is accountable for performance – in the KPIs and PIs for TANS, namely:

> Arrival ATFM delay	KPI
> ATC Pre-departure delay	PI
> Additional time in Taxi-out Phase	PI
> Additional time in arrival sequencing and metering area (ASMA)	PI

Arrival ATFM Delay

Current Causes

Delay Cause	UK Airports Annual minutes of ATFM delay (average 2010/11)	Percentage of total
Weather Approach	476,368	83%
Capacity Approach	43,474	7.6%
Airport Facilities	34,169	6%
Other	18,767	3.3%
Staffing & Technical Approach/Tower	72	0.01%

By TANS Airport

	Weather Approach	Capacity Approach	Staffing & Technical	Airfield Facilities	Other
Heathrow	353,130	42,860	0	24,760	11,276
Gatwick	62,240	78	0	5,237	101
Stansted	1,872	0	0	39	444
Manchester	17,580	0	0	368	4,336
Luton	2,432	0	0	0	918
Edinburgh					
Glasgow	442	0	0	18	0

Weather Delays

Coded as IATA code 84 and CFMU "WA" reason for regulation

Weather Approach regulations represent the largest single impact on Airfield ATFM delays accounting for circa 83% of the overall delay in the UK. Regulations are applied as a result of the impact of Headwinds, Low Visibility Procedures (LVPs), Snow and Thunderstorms. Of these causes headwinds were the root cause of circa 45% of Heathrow weather approach delays in 2010/11 due to the fact that Heathrow is a segregated mode (separate arrival and departure runways) with an operation running very near capacity and arrivals operating close to wake vortex separation minimums. Single runway airports are less susceptible as they operate in mixed mode (landings and arrivals) so can close-up arrival spacing in headwind conditions. LVPs are the next order of delay and result from the need to employ greater approach spacing due to increased runway occupancy times as the aircraft take longer to exit the runway and the need to protect the Instrument Landing System beam in foggy conditions. Typically arrival capacity in LVPs is circa 50% of the normal runway capacity.

Snow is primarily an airfield constraint but arrival regulations applied for snow are usually coded as weather approach. Thunderstorms can be hazardous for flight and hence can result in stoppage to arrivals when in the airport vicinity.

Accountability for weather delays

By their nature, weather delays are largely outside of ANSP control. The extent of the delay is primarily a factor of the severity of the weather, the airfield facilities and the schedule (i.e. higher demand leaves less opportunity to recover from a loss of capacity). It is also affected by the operating rules for the airfield and regulatory guidance – for example tactical use of mixed mode arrivals and departures at Heathrow would have the potential to increase runway capacity by between 5-15% but is prohibited under current operating rules for the airfield.

Mitigations such as Microwave Landing System (and in future Satellite landing systems) can be used to reduce the impact of LVPs but cannot fully recover the loss in capacity (typically the increase would be of the order of 10-15% over the current LVP runway capacity). Equipping with MLS and/or Satellite Landing Systems is not an ANSP decision as the main costs lay with the airport and the operators.

Time Based Separation is currently being developed by NERL under the regulated business which is expected to help mitigate part (circa 20%) of the loss of capacity at Heathrow due to headwinds. The concept has been developed via SESAR but has yet to be deployed anywhere in the world and Heathrow will be the first implementation. Single runway airports including Gatwick will also benefit but to a lesser extent as they can already reduce spacing in headwind conditions.

Improved met forecasting and data quality in network tools will enable fine tuning of the ATFM flow decisions but will not remove the underlying cause of the loss of capacity.

Capacity Approach Delays

Coded as IATA code 83 with CFMU sub-code CA.

Other 83 sub-codes AA, OA, PA are included in the "Other" delays below, SA and TA causes in "Staffing and Technical"

Capacity Approach regulations represented 7.6% of the total Airport ATFM delay in 2010/11. Capacity approach regulations are applied when the number of arrivals exceeds the capacity of the runway and/or will result in excessive airborne holding with resultant increase in ATC workload and risk of aircraft diversion.

In the case of Heathrow, the airport is scheduled based on an average 10 minute airborne holding delay in order to maximise the runway capacity. As a result, changes to schedule have an impact on delay and particularly if aircraft arrive off-schedule resulting in a demand peak which is well in excess of the runway capacity, regulations have to be applied to meter the inbound demand to maintain holding within acceptable safe levels.

In addition, the wake vortex mix (i.e. types of aircraft) directly influences the runway capacity. Airport (runway) slots are not type specific, hence increasing numbers of Heavy (e.g. 747, A340 and 777) and Super Heavy (A380) movements have the effect of reducing the runway capacity and this is not mitigated by reduction in the number of scheduled movements within the Airport and Airline scheduling process and is outside of the ANSP control. Of particular concern is increasing numbers of Super-Heavy movements which require larger wake vortex gaps on final approach (ICAO requires 7nm gap between an A380 and a medium (737 or A320)) meaning that each A380 arrival effectively uses 2 runway slots. There are currently 9 daily A380 movements at Heathrow and this is forecast to increase to 21 by 2014 and 30 daily by 2016.

Night curfews and operating rules at the airport are also a factor. For example, the 0600 curfew drives increased airborne holding as any aircraft arriving early at the holding stacks cannot land resulting in holding peaks which can require regulation to be applied in the following hours in order to reduce the airborne holding to manageable levels.

Accountability for Capacity Delays

PRU delay analysis is calculated on the basis that all IATA "83" delay codes are attributable to the ANSP. In NATS view, this information should be supplemented with the CFMU sub-cause and attributed at that level, taking into account that the accountability for CA delays can be split between airlines, airports, ANSP and the state.

The primary cause of capacity regulations is a mismatch between arrival demand and the runway capacity (landing rate) hence mitigations include increase in runway capacity due to changes to airfield operating rules or new infrastructure (runways or Rapid Exit Taxiways etc.), optimisation of the schedule and airline adherence to scheduled arrival times (which is generally viewed by airlines as secondary to on-time or early departure). Airline Standard Operating Procedures and equipment also factor as they affect runway occupancy and the ability to minimise separation between arrivals.

ANSP influence on capacity delays is primarily related to delivery of consistent arrival separation, accurate and effective application of ATFM regulations and arrival management techniques to reduce airborne holding.

Heathrow and Gatwick achieved arrivals regularly exceed the declared runway capacity by a significant margin and have the highest movement rates of any single or dual runway operation anywhere in the world. Hence, whilst NATS has a number of initiatives under way to further improve upon the current good performance, the ANSP influence on these delays is much less than the factors under the control of the airports and airlines together with policy decisions on operating rules and runway infrastructure.

Staffing & Technical Delay

Coded as IATA code 83 with CFMU sub-codes SA 'ATC Staffing – Approach' and TA 'ATC Equipment – Approach'

Staffing and technical regulations represented 0.01% of the Airport ATFM regulations applied in 2010/11. Airfield staffing and technical regulations are applied when staff numbers fall below the standard roster due to sickness or other factors or where an ATC equipment failure results in the need to reduce capacity.

Accountability for Staffing & Technical Delays

The accountability for ATC staffing delays rests with the tower and in many cases is already incentivised through the Service Quality regime in force at the airport, the details of which will vary between airport customers. Where the tower has an approach function, this will also apply to the approach. For London Approach delays due to technical of staffing reasons are already incentivised through the NERL licence.

Airport Facilities Delays

Coded as IATA code 87 with sub causes of GA – ground, stand and taxiway congestion and EA – non ATC equipment such as baggage systems

Airfield Facility delays represented 6% of the total airfield ATFM delay in 2010/11. Regulations are applied for this cause code when airport facilities such as stands, taxiways and runways result in a loss of landing capacity or airfield restrictions which require arrival demand to be managed to avoid excessive ground or stand congestion. Additionally, technical failures of non ATC systems affecting the airfield fall into this category.

Accountability for Airport Facilities delays

In the UK, Airports have responsibility for ground infrastructure and gate management is in some cases managed by the airlines. ATC has no direct responsibility in this management chain so has little or no influence on this source of delay.

However, PRB proposals for Airfield ATFM appear to include these delay attributions in ANSP attributable despite the fact that the delays are almost entirely outside of ANSP control.

Other Airport Delay

Other delays represent 3.3% of the Airfield ATFM delay total and include the following sub causes:

Cause	Sub-cause code	IATA Code	Accountability
Aircraft Accident / Incident	AA	83	Dependent on incident
Other Approach	OA	83	Works such as runway resurfacing typically airport decision
Special Flights	PA	83	Special Flights, Royal Flights, Air Displays accountability dependent on event
Industrial Action	IA	83	ANSP if ATC action but none recorded in sample

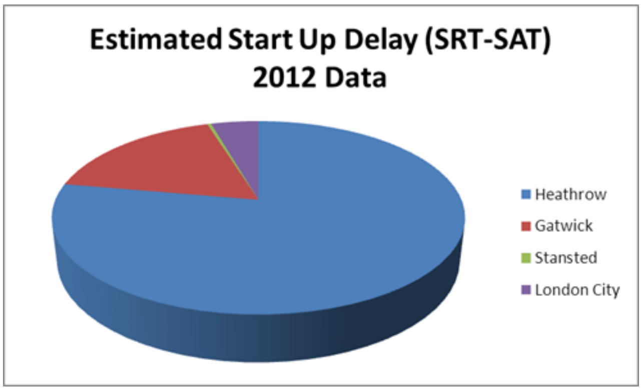
Military Activity	MA/ME	82	MA if affects airfield or approach. Accountability military/agency or state.

ATC Pre-departure delay

Start-up delays are driven by a number of factors including:

- Airport schedule – For example Heathrow has 10 minutes delay at the runway holding point built in to its schedule baseline
- Airline and Airport stand planning and management and infrastructure (e.g. cul-de-sacs)
- Departure route congestion – if the majority of flights want to depart in the similar directions, with the current design of Standard Instrument Departures this reduces the runway capacity significantly as ATC have to space take-offs by 2 minutes rather than one minute due to wake vortex and separation criteria. The schedule process takes little or no account of departure direction so there is nothing to prevent the airlines scheduling a majority of flights to depart in one direction or axis despite the fact that the runway capacity declaration is based on a split of departure routes.
- Schedule shift on flight rotations leading to a spike in departure demand
- Airfield, taxiway and runway issues
- Weather – predominantly thunderstorms which may block some or all departure routes and LVPs which increase runway occupancy time.
- Coordination between adjacent airfields in the TMA due to conflicting routes

Data for the UK shows that start-up delay on stand is in excess of 700k minutes per annum. A breakdown of the estimated start up delay by airfield within the LTMA is as follows:



Data is based on Electronic Flight Progress Strips (EFPS) data and represents the difference between aircraft start requested time (SRT) and start approved time (SAT). Whilst this is an indication of start-up delay it is not an entirely reliable measure – as delays start to build up (for example due to weather on departure), crews tend to call early and even before ready to “book a place in the queue”. As a result, this measure can significantly over record start up delay at times of disruption.

Additionally, the basis on which PRU is captured is not fully transparent at present. Use of CODA data would be unreliable if airlines attribute the entirety of start-up delay to the last delay cause. For example if an aircraft that is delayed for other causes (e.g. baggage, aircraft technical delay or ATC en-route slot) and is therefore late putting in a start request but is then delayed for a short period due to an aircraft pushing back on an adjacent stand, the entirety of the delay can be attributed to IATA "AM" delay cause. Further, IATA define "AM" as restrictions airport of departure with or without ATFM restrictions including Air Traffic Services, start up and push back, airport and/or runway closed due to obstruction or weather, industrial action, staff shortage, political unrest, noise abatement, night curfew, special flights. This is a broad definition of delay with multiple accountable agencies and causes.

Accountability for Start-Up Delay

The accountability for start-up delay is split between airports, airlines, weather, ANSP actions (enroute and tower), state and local operating rules and other causes.

Mitigations for Start-Up Delay

There are a number of elements that influence this delay pot including introduction of Airport Collaborative Decision Making tools and procedures, improvements to airport infrastructure and optimisation of the schedule and stand planning.

The use of Performance Based Navigation (PBN) has the potential to offer significant benefits and is a cornerstone of the UK and Ireland Future Airspace Strategy. Departure routes below 4000ft are the responsibility of the airport and not the ANSP and it is the routing close to the airport which dictates the minimum runway spacing that can be employed on given route combinations. Routes between 4000ft and 7000ft are jointly managed by ANSP and airport and beyond this point we can consider the accountability to be in the en-route.

The biggest single opportunity to improve the delay performance in this area is the joint work with CAA, airport and airlines on the departure efficiency programme and optimised SIDs together with the enroute airspace programmes LAMP and NTCA. LAMP/NTCA will enable this change by redesigning the network but the decision to change SIDs and carry out local environmental consultation resides with the airports.

Analysis suggests that departure capacity could be increased by up to 15% by re-design using PBN and adopting the new standards for route separation and divergence being developed through the NATS, industry & CAA activity on the Future Airspace Strategy. However, delivery of these benefits is dependent upon changes being made by multiple stakeholders (primarily Airports' funding and commitment to SID changes together with CAA approval of revised guidance material).

NATS is working with airports, airlines and CAA through the Departure Efficiency Programme which is intended to support the required changes to CAA guidance material. NERL is also consulting with Airports, as part of the LAMP and NTCA programmes and via FAS, to ensure that airports are aware of the potential benefits from SID re-design and NATS has asked airports to confirm their requirements for re-design of their departure routes.

Additional time in Taxi-out Phase

The taxi-out time indicator provides an approximate measure of departure runway queuing time. However, taxi-out times can be influenced by many factors including:

- Scheduling – the number of scheduled hourly departures which determines queue lengths, for example Heathrow has 10 minutes delay at the runway holding point built into its schedule baseline
- The distance from terminal gates to the active runway – which depends on wind direction and time of day (eg runway alternation procedures)
- Time taken during push-back operations – including "push and hold" (to clear gates for incoming flights) which could be recorded as excess taxi time
- Apron and taxiway layout – which might result in extra time / distance before joining the runway queue
- Weather – for example freezing conditions or snow which slows the ground movement process.

The ANSP role is primarily balancing the number of aircraft that are allowed to enter the taxiway system and runway holding point against the potential to hold aircraft at the gate.

Accountability for Additional Taxi Out Time

The accountability for additional taxi out time is split between airports, airlines, weather, ANSP actions and local operating rules.

Mitigations for Additional Taxi Out Time

- Optimising departure schedules – for departure route, wake vortex, etc.
- Optimum departure routes – using performance based navigation (PBN) as per NATS departure efficiency programme
- A-CDM to ensure an efficient departure sequencing process
- NATS taxi time monitoring tool to detect trends and share data with airlines / airports
- Surface management tools (SMAN) to generate efficient taxi routes taking into account current traffic situation with time constraints (taxi speeds, time for reaching positions at airport).

ASMA Time

The ASMA time indicator provides an approximate measure of airport inbound queuing time.

It is generally accepted that some airborne holding is unavoidable to achieve the very high runway utilisation required at the major airports, Heathrow especially. Furthermore, basing runway scheduling rates on agreed delay criteria implies a regular degree of airborne holding for arrivals (e.g. Heathrow has 10 minutes holding incorporated into its schedule).

Controllers use holding stacks (close to the airport) during peak traffic periods as a short-term buffer to store aircraft so that there is a constant reservoir of aircraft to maximise runway usage and ensure that the scheduling rate is achieved.

However, the variability in duration of airborne holding remains a major issue for airlines.

ASMA time is inextricably linked with runway scheduling and the landing rate achieved versus the schedule. The maximum landing rates achievable are affected by traffic mix, runway occupancy time of aircraft during landing, separation minima, wake vortex, weather conditions, runway configuration, airport layout, ATC procedures and interactions with other nearby airports.

Specifically, additional ASMA time is influenced by:

- Scheduling patterns – maintaining a smooth flow of aircraft and avoiding schedule peaks which tend to increase delays. However, peaks in Heathrow's schedule are of lengthy duration to the extent that the airport's flexibility within the schedule to absorb any operating problems is extremely limited
- Airport infrastructure – the number of runways, their configuration to reduce runway occupancy for arrivals, and their operating modes to maximise overall runway efficiency
- Excess demand – occurring because of differences between an aircraft's actual and scheduled arrival time, caused by weather affecting long-haul flights, for aircraft technical problems, or for ATFM reasons. Here, relatively small increases in hourly demand above the scheduling rate (or any decrease in the landing rate below the scheduling rate) cause traffic to back-up very quickly to the point where long queues develop and – with more aircraft waiting for longer and longer periods – average holding delays in stacks rise rapidly and exponentially. It should be stressed that controllers can and do handle more aircraft where there are favourable weather conditions and an ideal mix of aircraft.
- Ground movement congestion – where delays to aircraft parking on stands leads to congested taxiways. If the taxiway system becomes blocked, there is nowhere for arriving aircraft to go, leaving no option but to reduce the landing rate until the taxiway congestion eases.
- Weather – low visibility and strong winds both reduce the landing rate that can be achieved. During low visibility procedures landing rates are reduced to keep aircraft clear of the localiser sensitive area on the ground in order to protect the ILS localiser signal. Strong winds with a high headwind component reduce groundspeed, lowering the rate at which safely separated aircraft will land on the runway.
- Abnormal operations – fewer aircraft will be handled if there is an interruption to normal service delivery (e.g. an emergency runway closure).

Accountability for Additional ASMA Time

The accountability for additional ASMA time is split between airports, airlines, weather, ANSP actions and local operating rules.

Mitigations for Additional ASMA Time

- Scheduling – which is essentially a trade-off between demand to use the runway and the acceptable level of delay
- Time based separation (TBS) – enabling increased landing rates in difficult wind conditions
- Enhanced arrival management (AMAN) – basing delay absorption mainly on airspeed control over a longer time horizon
- Precision area navigation arrival routes – to improve the efficiency of arrival flows by using sequencing legs (e.g. point merge, trombone) rather than holding stacks
- Runway operating modes – relaxation of environmental constraints to enable greater predictability and reliability in arrival delay.