NATS (En Route) plc Airspace & Technology Programmes 2017
Independent Reviewer Report

Grant Bremer, Chase Partners Limited

12 May 2017

NOTE

This document has been produced for the CAA as part of Condition 10 to the NATS (En Route) [NERL] Licence and is based on ongoing observations and research by the CAA Independent Reviewer Grant Bremer.

This report summarises the author's findings and opinions and represents a snapshot of the situation as of 12 May 17.

Background

Condition 10(3) of the NATS (En Route) plc [NERL] Air Traffic Services Licence dated 29 June 2016 requires NERL to prepare a Service and Investment Plan (SIP) that refers to the most recent business plan and the related airspace and technology programmes each year. Condition 10(5) and (7) then required NERL to provide detailed technology and airspace programmes by 31 March 2017 to cover the period to 31 December 2019. Furthermore, Condition 10(9) stipulates that the technology and airspace programmes shall have been subject to consultation with users, including airports (as far as reasonably practical) within the context of the SIP. The programmes should include:

a. Proposed ATM system upgrades as set out in the FAS Deployment Plan and the Pilot Common Project;
b. How the programme furthers airspace and ATM modernisation in the key performance areas of safety, capacity (as measured by ATFM delay), the environment (as measured by flight efficiency and enabled fuel saving) and cost efficiency;
c. Significant delivery milestones, dependencies and risks; and
d. An explanation of where training and deployment activities may impact service quality.

Condition 10(11) requires that the SIP shall provide (by reference to the most recent business plan and technology and airspace programmes) an update of NERL's investment plans with an update of delivery against previously provided programme milestones and any material changes in the expected levels and quality of services provided by NERL as well as any likely implications for User charges beyond the current Reference Period (RP2).

In accordance with Condition 10 of the Licence NERL submitted their SIP17 on 23 December 2016. The CAA subsequently expressed[1] some concerns with the SIP17 that should be "addressed with real clarity" in the end of March documents [the technology and airspace programmes]. These concerns were:

• There was insufficient detail on what are the actual constituent projects of SIP17, and what benefits will be delivered by implementing SIP17;
• There was no delivery plan nor dependencies for airspace milestones;
• There was insufficient detail to assess the viability of the technology plan;
• It was unclear whether the deployment points for the airspace and technology programmes articulated in the document were the only delivery milestones that NERL had committed to in SIP17;
• There were no linkages between planned investment and how the performance targets would be delivered;
• SIP17 did not specifically highlight progress against SIP16 milestones; and
• The changes between SIP16 and SIP17 had been given little analysis or discussion given their financial significance. In particular, NERL had not provided project level detail to explain the £130-160m additional expenditure in RP2. This includes how much was due to scope changes versus more mature budgeting.

Airspace and Technology Programmes

NERL submitted Airspace and Technology Programme details within their "RP2 Capital Investment Plan (2015-2019) for Condition 10" on 31 March 2017 to the CAA. The document details the

---

1. Letter from Andrew Haines (Chief Executive, CAA) to Martin Rolfe (Chief Executive, NATS) dated 26 January 2017.

objectives of the plan; the business environment update and the rationale for change before describing the NERL Investment Programme for both Airspace and Technology.

The headline objectives of NERL's plans are stated to be:
- Meet the RP2 regulatory targets;
- To maintain a resilient ATM infrastructure;
- Undertake "mandated" changes to comply with Single European Sky (SES) deployment legislation and meet the NERL Licence requirements;
- Undertake changes that deliver high benefits and VfM to customers during RP2;
- Invest in future capabilities that deliver high value benefits to customers in the longer term that are compliant with SESAR trajectory based operations and make use of industry standards.

The plan also highlights a range of completed investment activity that contributes towards NERL's achievement of the RP2 targets. These include:
- LAMP Phase 1A;
- Swanwick Temporary Operations Room to support SESAR. This is a key enabler for later improvements to En-Route and TC Lower airspace;
- Deployment of Time Based Separation at Heathrow;
- First installation of new Flight Data Processing System (iTEC) for Prestwick Upper Airspace – a key step towards the full replacement of the current 40-year old NAS;
- Initial introduction of electronic flight progress strips (ExCDS) into London TC.

Additionally, in 2013 NERL introduced a voluntary redundancy scheme for ATCOs and Engineers, which has made significant contributions towards operating cost reductions. NERL has also developed a "People Plan" which will develop and agree procedures and working practices for operational staff aiming to improve the flexibility for managing operational staff during the transition periods involved with Deploying SESAR and also to improve future performance and efficiency.

In the submitted paper, the changes in the business environment are rehearsed and the significant changes since the RP2 Plan was developed and approved in 2013 are:
- Fuel costs have halved;
- Traffic is growing significantly beyond forecasts;
- Summer 2016 traffic growth exceeded the February 2014 RP2 forecast causing greater than usual delays.

Based on these factors, NERL decided that future plans should focus on increasing capacity to service future demand whilst making the service more resilient to unexpected outages and planned training/transition activities in response to the Independent Enquiry recommendations. Furthermore, a range of airspace considerations including increased public sensitivity to noise patterns, the potential new SE runway development and policy changes from DfT and the CAA have all driven the industry to a consensus that lower airspace changes, particularly in the London area, during RP2 was no longer sensible and many of the planned lower airspace changes have been re-planned into RP3.

The final, and pressing, challenge for NERL relates to the ageing, legacy systems that support ATM operations. The NAS was introduced into service in 1974, with many other core systems of a similar vintage. Despite considerable investment in these legacy systems it is increasingly difficult

to upgrade them and it now seems that they will no longer be capable of meeting SESAR goals and requirements. These legacy systems also present an increasing risk to the long-term resilience of the service.

These factors have previously been exposed and discussed during the SIP17 consultation, which resulted in SIP17 that was submitted to the CAA in December 2016. SIP17 sought to deliver the Deploying SESAR Programme earlier than initially planned. Additionally, a more rigorous planning process provided a much more robust understanding of the time and costs associated with delivery of the proposed plans that saw a revised cost of delivery of £750m-£780m in outturn prices.

Airspace Programme

The NERL Airspace Programme seeks to deliver revised airspace and route network structures including:

- London Airspace Modernisation Programme (LAMP);
- Prestwick Lower Airspace Systemisation (PLAS);
- Free Route Airspace (FRA);
- A range of airspace changes including modular enhancements to Swanwick operations, Independent Parallel Approaches and others;
- AIRIC to ensure compliance with ICAO standards

The Airspace Plan (completed milestones in blue, planned in black) is:
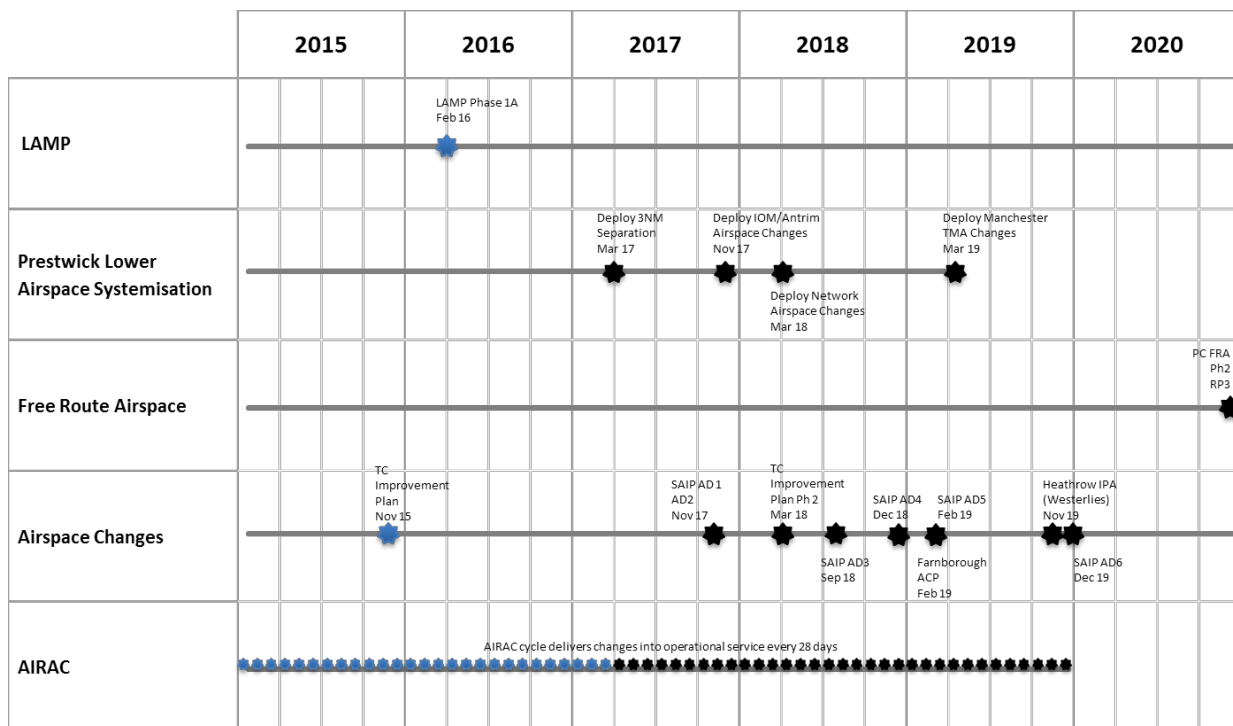
Technology Programmes

NERL's Technology Programmes essentially cover two major areas: Deploying SESAR and Current Systems/Common Infrastructure.

Deploying SESAR
The Deploying SESAR projects will provide new capabilities that will enable the transformation of NERL's current and legacy systems and provide a future-proofed capability. The projects include:

- Platform & Deployment: projects that will design ATC operational services including validation, training and transition;
- Trajectory Services: projects enabling the migration to iTEC platform and changes including Common Working Position and Flight Data Processing Capabilities;
- Communications, Information & Surveillance Services: projects that will provide new Voice Platform (VOIP) plus operational support systems;
- Critical Facilities: projects to provide underpinning hardware and infrastructure;
- Foundation Services: projects to deliver core underlying compute, network and storage infrastructure and connectivity.

The Deploying SESAR plan (completed milestones in blue, planned in black) is:
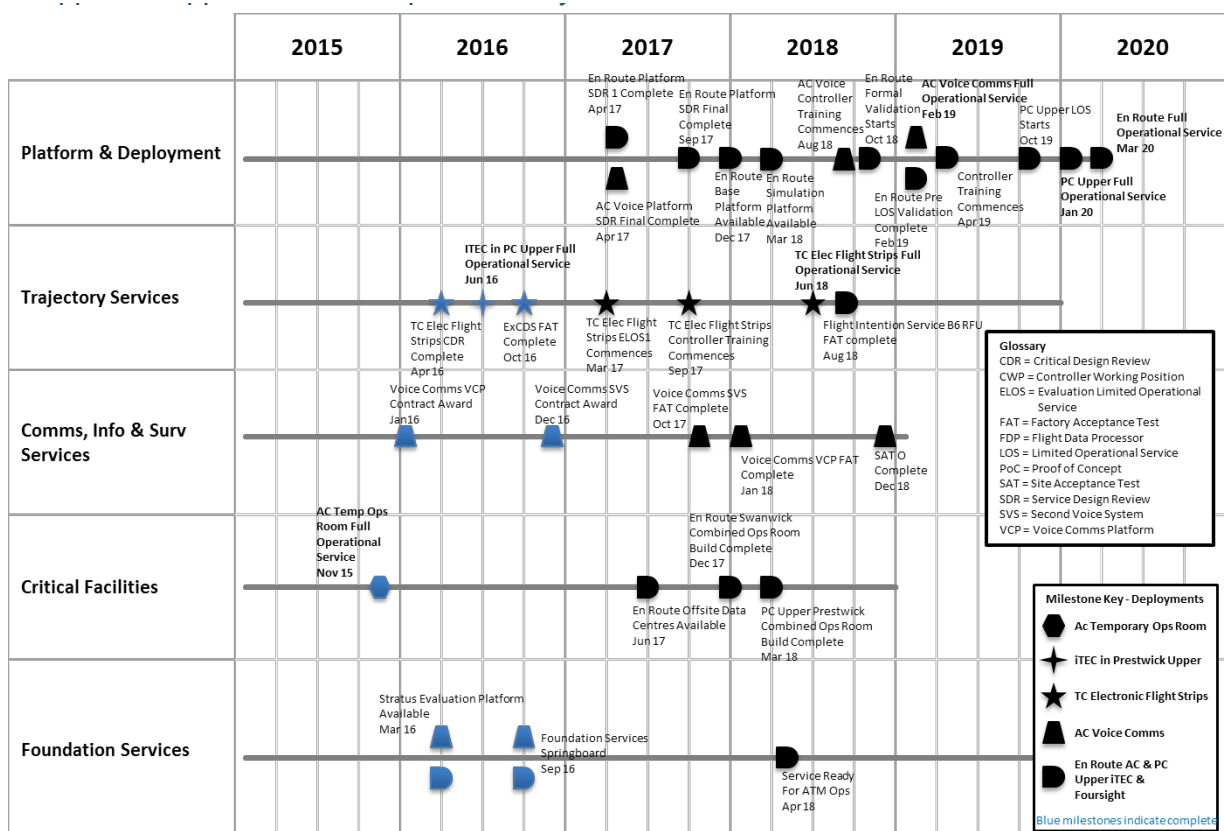
Current Systems/Common Infrastructure
Although there will be a considerable focus on replacing legacy systems, many will continue in use and will require sustaining and upgrading to ensure resilience and regulatory compliance. The key projects that will support this element of NERL's Technology Programme are:

- Non-Legacy Escape Facilities & Services: projects supporting the current, core systems that are not planned to be replaced through SESAR Deployment;

- Legacy Systems: projects to sustain existing systems that will eventually be replaced following full SESAR deployment;
- Facilities Management: projects to maintain estate and associated facilities across NERL;
- CO_2 & Fuel Savings: projects to provide more efficient flight trajectories;
- Oceanic: ongoing projects to develop the Oceanic systems to support North Atlantic operations;
- Military: projects to support MoD requirements.

The Current Systems and Common Infrastructure plan (completed milestones in blue, planned in black) is:
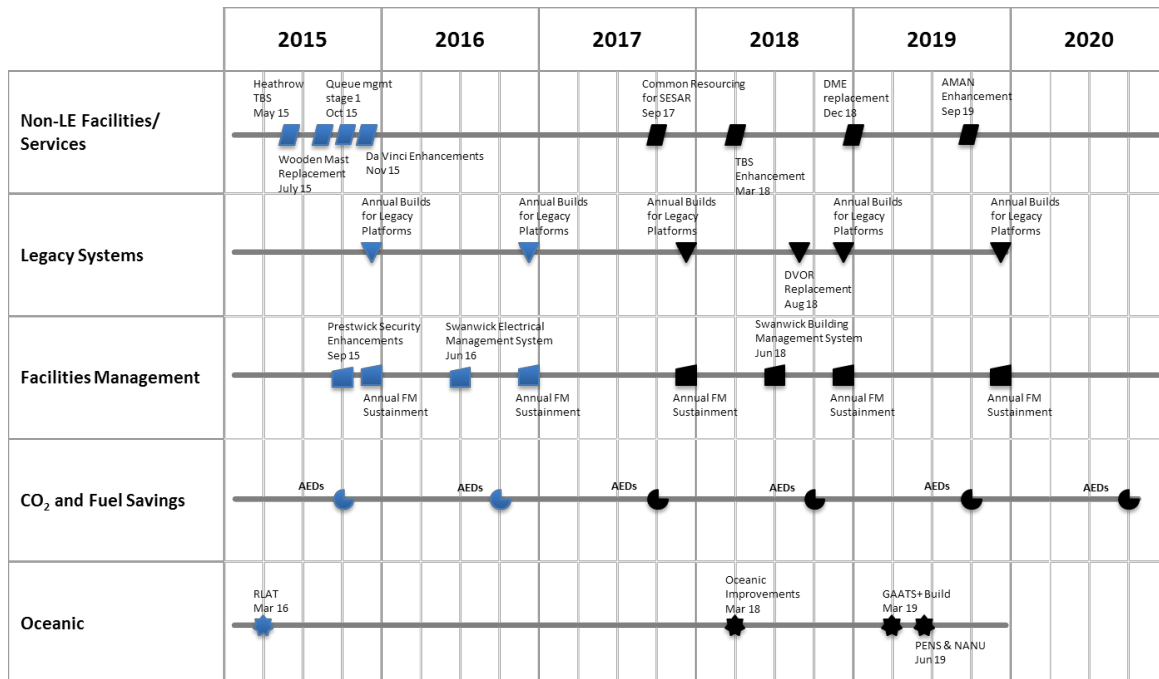
Dependency Management

NERL has applied a Service Integration Framework approach to manage the cross-Programme dependencies and risks. NERL also uses Deployment Points on key programmes to manage the introduction of new capabilities into service as the various contributing programmes achieve the required milestones. At the highest level this shows:
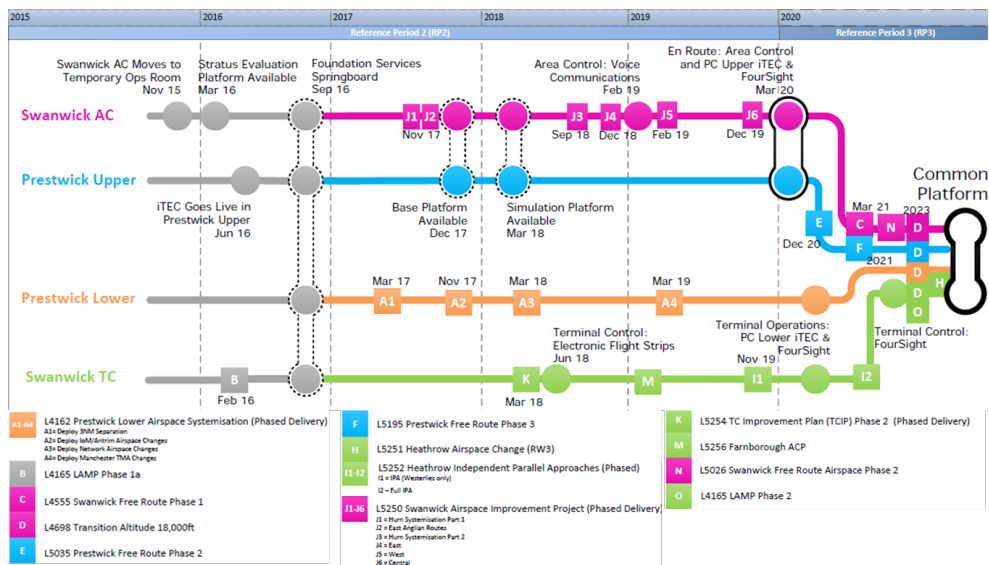
The key planning milestones are summarised as being:
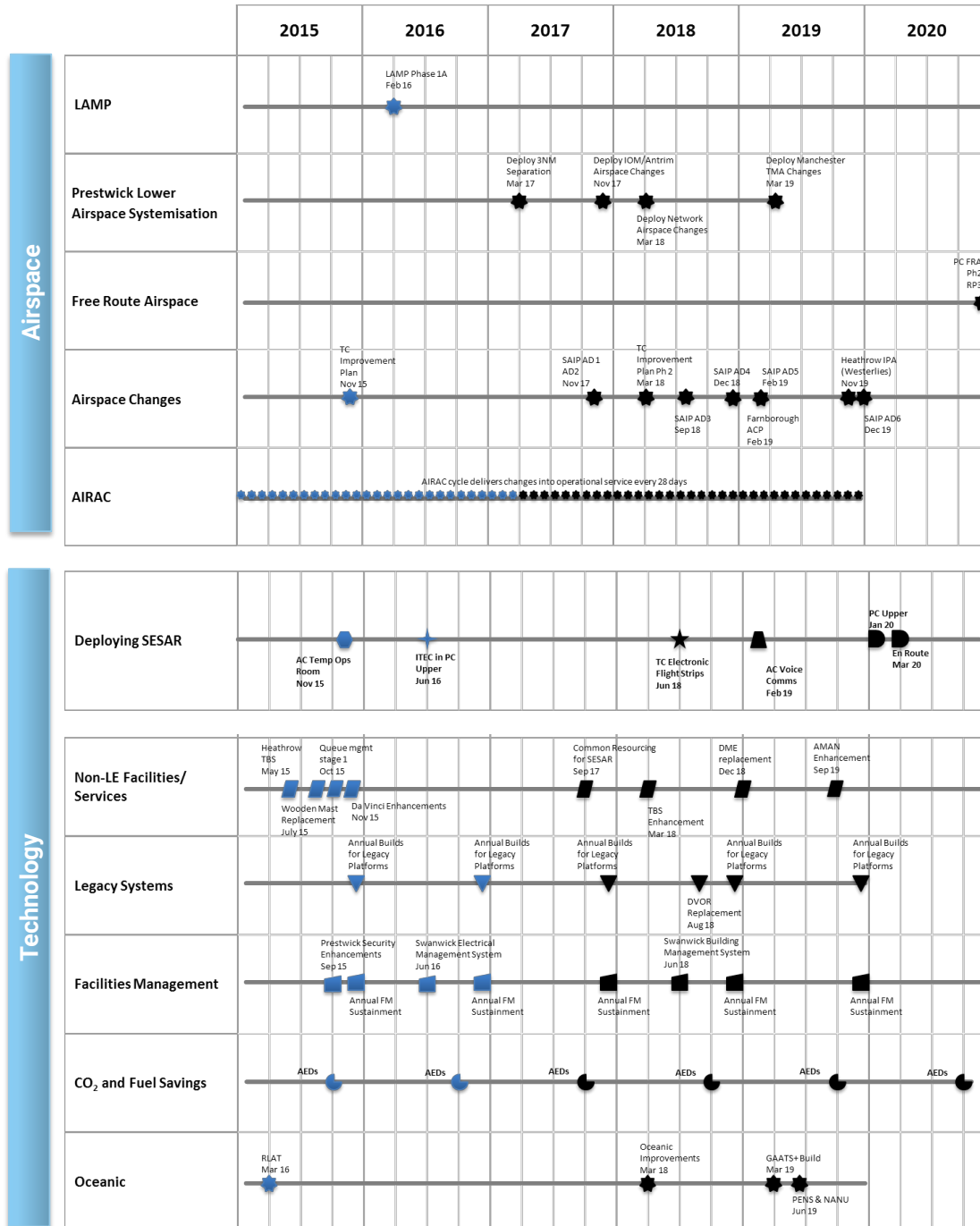
		2015	2016	2017	2018	2019	2020
Airspace	**LAMP**		LAMP Phase 1A Feb 16				
	Prestwick Lower Airspace Systemisation			Deploy 3NM Separation Mar 17	Deploy IOM/Antrim Airspace Changes Nov 17 / Deploy Network Airspace Changes Mar 18	Deploy Manchester TMA Changes Mar 19	
	Free Route Airspace						PC FRA Ph2 RP3
	Airspace Changes	TC Improvement Plan Nov 15		SAIP AD2 Nov 17	TC Improvement Plan Ph 2 Mar 18 / SAIP AD3 Sep 18	SAIP AD4 Dec 18 / SAIP AD5 Feb 19 / Farnborough ACP Feb 19	Heathrow IPA (Westerlies) Nov 19 / SAIP AD6 Dec 19
	AIRAC	AIRAC cycle delivers changes into operational service every 28 days					
Technology	**Deploying SESAR**	AC Temp Ops Room Nov 15	ITEC in PC Upper Jun 16		TC Electronic Flight Strips Jun 18	AC Voice Comms Feb 19	PC Upper Jan 20 / En Route Mar 20
	Non-LE Facilities/ Services	Heathrow TBS May 15 / Wooden Mast Replacement July 15	Queue mgmt stage 1 Oct 15 / Da Vinci Enhancements Nov 15		Common Resourcing for SESAR Sep 17 / TBS Enhancement Mar 18	DME replacement Dec 18	AMAN Enhancement Sep 19
	Legacy Systems		Annual Builds for Legacy Platforms	Annual Builds for Legacy Platforms	Annual Builds for Legacy Platforms / DVOR Replacement Aug 18	Annual Builds for Legacy Platforms	Annual Builds for Legacy Platforms
	Facilities Management	Prestwick Security Enhancements Sep 15 / Annual FM Sustainment	Swanwick Electrical Management System Jun 16 / Annual FM Sustainment		Annual FM Sustainment	Swanwick Building Management System Jun 18 / Annual FM Sustainment	Annual FM Sustainment
	CO_2 and Fuel Savings	AEDs	AEDs	AEDs	AEDs	AEDs	AEDs
	Oceanic	RLAT Mar 16			Oceanic Improvements Mar 18	GAATS+ Build Mar 19 / PENS & NANU Jun 19	

More details of these plans have been provided in the Appendices of the submitted plans. NERL has committed to delivering the overall programme and reporting transparently on all milestones detailed in the submitted plans – both the headline ones shown above and all milestones detailed in the supporting Appendices.

Delivery Assurance

Following the SIP17 process NERL has sought to improve delivery assurance and overall confidence in deliverability of the plans. Internal reorganisation has seen the establishment of a new Technical Services Organisation that directly support programme delivery with clear accountability and defined delivery roles. The addition of a Portfolio, Programme and Project Office (P3O) will provide consistent approach in project management across NERL, with improved governance, risk

management and most critically, a benefits-led integrated change portfolio. NERL is confident that the combination of these initiatives, coupled with a step change in "intensity" across the business will put new drive behind programme delivery.

Benefits Management

All programmes and projects in the NERL Investment portfolio are planned to deliver benefits. For planning and programme management these benefits are defined within seven "benefit categories". The categories are:

- Safety: Investments that reduce the likelihood of an incident or accident in UK controlled airspace;
- Service: Investments that deliver additional capacity, provide service resilience, maintain runway servicing rates or reduce delay;
- Cost Reduction: Investments that enable NERL cost reductions;
- Fuel Savings: Investments that enable NERL customers to reduce their fuel burn by enabling more direct routings, less holding and more optimal flight levels;
- Obligations: Investments that allow NERL to meet its licence obligations, international mandates or Implementing Rules;
- Sustainment (System Resilience): Investment to maintain or upgrade NERL assets if the financial impact assigned to the risk is greater than the investment cost (capital and revenue);
- Technology: Investments that introduce IT industry standard technologies that enhance the flexibility, adaptability, resilience, security and cost of ownership of NERL assets.

In order to ensure that the investment portfolio delivers the planned benefits six delivery panels, each chaired by a senior member of NERL management, have been created. The six panels are:

- Safety;
- Capacity;
- Environment;
- Value;
- Legislative Compliance;
- Sustainment.

The benefits panels identify which projects are needed for the panel's targets to be met with any shortfall requiring a mitigation plan to be created and applied. The NERL governance of the portfolio is shown as being:
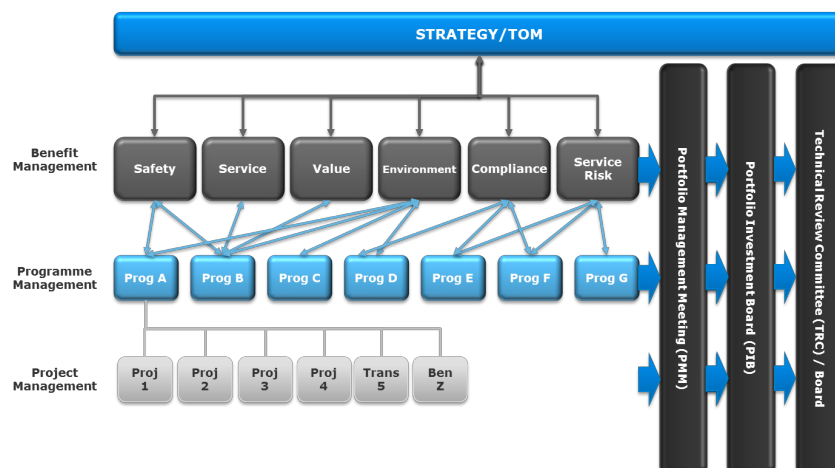
NERL has provided a summary of the forecast benefits that are expected to enable NERL to meet the agreed Key Performance Areas (KPAs) as per the RP2 Plan. NERL's view is that investment benefits are only part of the process of achieving the required KPAs since there are many external factors as well as other aspects of business management that are linked into the KPA achievements.
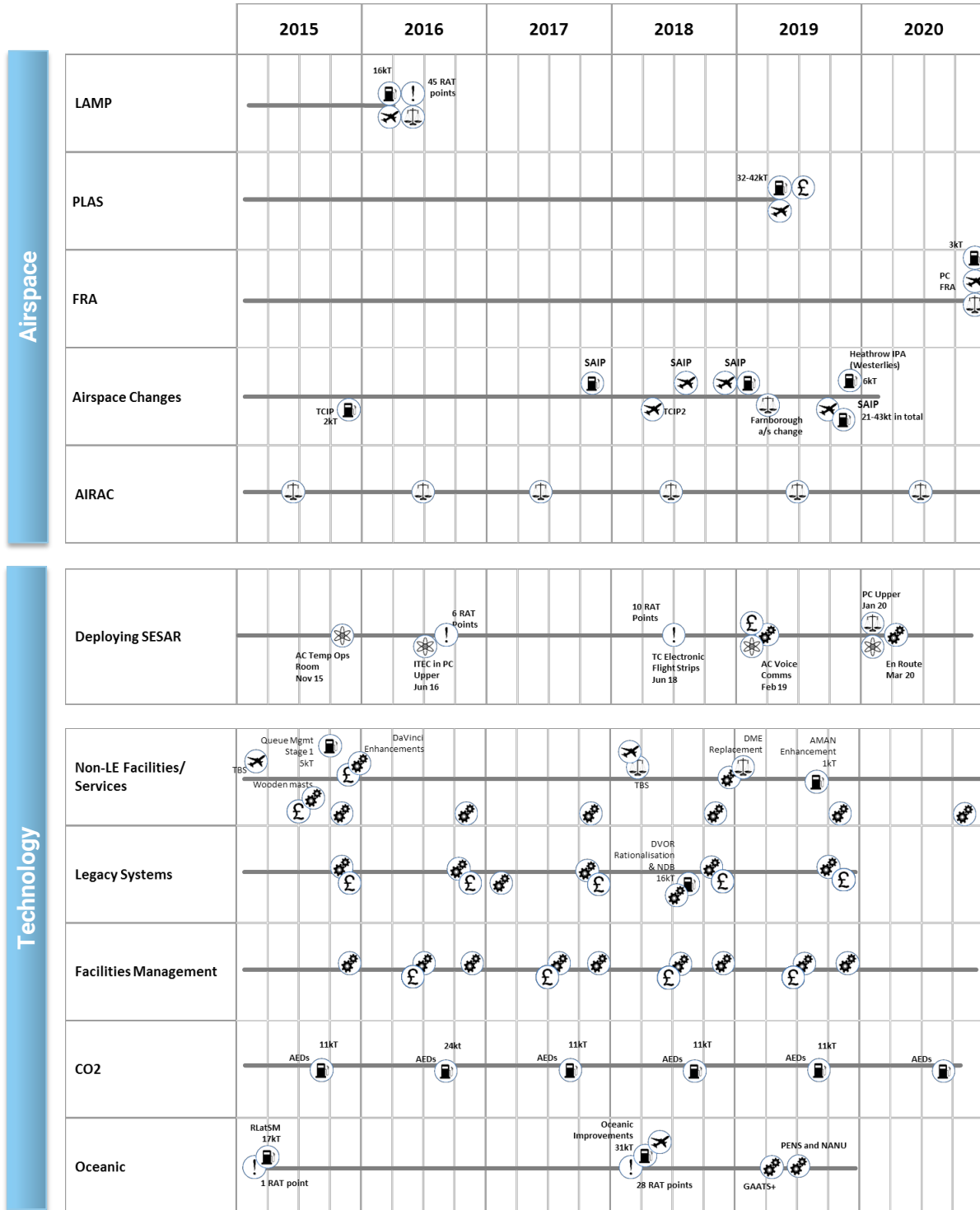
NERL has also provided a summary of the overall programme, as per SIP17, with sunk costs and forecast costs clearly identified.

Programme	Actual 2015	Actual 2016	Fcast 2017	Fcast 2018	Fcast 2019	Fcast RP2
Airspace	**10**	**5**	**8**	**13**	**21**	**57**
Platform & Deployment	3	21	32	32	12	**100**
Trajectory Services	50	51	43	39	31	**214**
Comms, Info & Surv Services	2	15	13	24	6	**60**
Critical Facilities	8	1	12	12	2	**35**
Foundation Services	5	20	25	13	9	**72**
DSESAR Total	**68**	**108**	**125**	**120**	**60**	**481**
Non-Legacy Escape (LE) Facilities/Services	22	15	21	12	13	**83**
Legacy Systems	25	13	13	12	11	**74**
Facilities Management	7	5	4	4	1	**21**
CO_2 and Fuel Saving					5	**5**
*Oceanic^*	3	4	7	4		**18**
Current Systems	**57**	**37**	**45**	**32**	**30**	**201**
Total NERL	**135**	**150**	**178**	**165**	**111**	**739**
Military*	*6*	*1*	*1*	*2*	*1*	***11***
Total	**141**	**151**	**179**	**167**	**112**	**750**
Contingency						30
Total including Contingency						**780**

Consultation
Condition 10(9) of NERL's Licence requires that the Technology and Airspace Programmes shall have been subject to consultation with users (including airports). As a follow up to SIP17, NERL hosted a Deep Dive Workshop for customers, but not airports, on 1 March 2017 in Swanwick. Despite an extensive invitation list, support from customers was disappointingly limited with only representatives from BA, Monarch and IATA attending. Subsequently there was a consultation during FASIIG 25 on 15 February 2017 when a wide range of users and airport representatives attended. NERL has also offered bilateral meetings with customers with some uptake. Supporting these face:face sessions, other consultation has been via the NATS/NERL customer-facing website and by email/teleconference. Throughout the consultation NERL discussed and explained the overall programmes rather than detailed planning, unless more detail was requested in which case it was made available.

Analysis

The Airspace and Technology programmes submitted by NERL to CAA on 31 March 2017 are considerably more robust and detailed than any previously provided. There is improved clarity on what the constituent programmes/projects are and how they link together. That being said there are some areas that warrant further consideration.

Airspace and Technology Programmes

The submitted programmes provide a detailed account of NERL's investment plans for the remainder of RP2 and indicate likely follow on work in RP3. The level of planning is considerably more detailed than in previous submissions and the confirmation on the constituent projects is very helpful. In the Airspace plan there are now delivery plans, with some dependency mapping, for airspace development with confirmation of completed milestones in the constituent programmes. Additionally, the detail now provided for the Technology plans do provide some confidence in the viability of the plans. The link between Deployment Points and programme milestones has also been clarified.

The submitted plans do set out proposed ATM system upgrades to support parts of FAS and PCP, as required by the Licence 10 requirements, but since the full detail of FAS and PCP is sensibly not replicated here, whether the submitted plans will fully satisfy NATS' obligations under FAS and PCP is hard to say at this point. However, it would help if NERL could confirm to what extent its obligations under FAS and PCP will be met by these plans and when the remaining elements will be delivered.

The plans also confirm delivery milestones with "top level" identification of dependencies and a clear risk management approach. The plans also state that there are more detailed plans and dependency mapping available. Whilst these plans are, of necessity, forward looking it would have been helpful if there was a commentary or confirmation of the relationship between previously declared milestones and, apart from the confirmation of completed milestones, progress against those previous milestones. NERL did provide this commentary during the Deep Dive workshop noted above, but it would have been helpful for those who did not attend that workshop if a brief review or update in this regard were provided, maybe in a short appendix.

Programme Costs

Although the changes in the business environment have been highlighted once again, there is still no real comment in the submitted plans on why the forecasts for fuel prices and traffic levels were so wrong. NERL did provide comments in this regard at their Deep Dive workshop, and it might have been helpful if some of that detail had been reflected in the submitted plans. Whilst it is recognised that these forecast are out of NERL's control, confirmation that the submitted plans are robust enough to survive future variations in fuel, traffic and the like without incurring delays or further cost increases would aid confidence in the deliverability of the programmes.

Despite the greater clarity in planning, benefits and dependencies, there is limited analysis or comment on why the costs have risen by £130m-£160m over the original SIP 16 plans in the submitted plans. The investment summary, shown above, detailing sunk and forecast costs is very helpful and will provide a useful benchmark to track spending through the programme delivery cycle, but there was little detail in the submitted plans on why the costs have risen against either the RP2 baseline or the SIP16, or indeed what spend has been to date against previous budgets and plans, although once again this issue was discussed at the Deep Dive workshop. Whilst recognising that some information in this area is commercially sensitive, more details concerning

the cost growths, and their provenance would be helpful. Moreover, given the robust internal governance of costs and programme delivery going forward, this detail would give assurance to both the CAA and customers, that costs are now fully understood so that further growth will not develop through delivery.

It is understood that the Licence requirements only require a view on the likely implications of future charges beyond RP2, which has been provided, a high-level indication of NERL's future programme plans that underpin that assessment would be beneficial.

Dependency Management
There is a greater degree of clarity concerning cross-programme dependencies and risk management than has previously been available. In the submitted programme plans the dependencies are indicative rather than conclusive. At the Deep Dive Workshop of 1 March 2017 NERL discussed many of the dependencies in more detail, but for the wider customer base (and airports) that did not attend that session a more detailed exposition of the major cross-programme dependencies would have been helpful. The management of dependencies and programme/project risks is closely coupled and NERL appear to have appropriate mechanisms in place for both. However, the plan frequently refers to operational risks rather than programme delivery risks, which is understandable but provides possible confusion. It is understood that some risk funding is included in project costs, with an additional contingency of £30m (or c4% of programme cost), and some information on how risk money might be committed would improve customer confidence. It would also have been helpful if the major dependency/risk impacts had been articulated to help customers understand the potential problems if delays or unforeseen problems materialise.

Delivery Assurance
The recent changes to P3O in NERL offer considerable confidence in the successful delivery of the submitted plans. The more visible and forensic approach to programme management, and in particular cross-programme/project dependencies and risks, provides a clearer view on how NERL will recognise emerging threats to success and manage them before they become issues or "show stoppers". NERL will need to make sure that the approach receives constant attention and resourcing if it is to succeed.

Benefits Management
NERL's approach to benefit management and the link to KPAs would benefit from further development. The articulated benefits are categorised in seven areas, with six benefits panels to manage the overall portfolio of benefits. This use of Benefits Panels should provide a sensible balancing mechanism across the portfolio but this should not detract from ensuring individual accountability that will be essential to build confidence in the delivery of the anticipated benefits.

There is a key question concerning the link between the investment programme benefits and the Key Performance Areas (KPAs). The submitted plans do not show a full correlation of how the programme benefits will support delivery of the KPAs. As noted above, the NERL Licence Condition 10(9) requires NERL to show how the Technology and Airspace programmes "furthers airspace and ATM modernisation in the key performance areas of safety, capacity (as measured by ATFM delay), the environment (as measured by flight efficiency and enabled fuel saving) and cost efficiency". The submitted plans notes that "the investment programme has been created to enable NERL to sustain current operations and enhance services to aid with achievement of the performance targets" but the links between the programme benefits and the KPAs is unclear. Also,

some of the planned benefits require more detailed analysis to quantify them individually, either using NPV methodology or measurable and quantified cost savings/efficiencies etc, as well as confirm how they will contribute to NERL's overall success criterion. Discussion with NERL has demonstrated that these linkages do exist and are understood, but they have not been adequately explained in the submitted plans.

Consultation

The consultation between NERL and its customers and users remains a matter of concern. NERL has invited customers and users to Deep Dive and Consultation sessions with limited engagement by the customer and user community. It would be beneficial for all concerned if customer and user support to NERL's consultation were better supported and CAA might be able to assist in this by reminding the customers and users of the importance of positive engagement throughout the consultations. Equally, NERL could consider even more open and proactive consultation, possibly with provision of emerging draft documents ahead of formal consultation sessions, roadshows to customers and users, to complement their planned Deep Dives and Consultation events.

Oceanic

The investment summary notes that the Oceanic programme will require £18m, including £7m sunk costs and that it is the subject of Oceanic specific customer consultation, conducted on 4 April 2017. In that consultation the Oceanic figure was proposed to be £14.9m. It is understood that the £14.9m is the additional investment for new capabilities and once this has been clarified through the ongoing consultation it will be folded back into the into the routine SIP process as soon as possible to limit any potential confusion. In order to minimise potential confusion, it is essential that such separation of consultations and investments be avoided wherever possible.

Programme Delivery and Service Provision

In the submitted plans NERL indicated that there is a "People Plan" in place to improve operational flexibility and to reduce the operational impact during periods of transition. This "People Plan" is not a capital investment one so no detail has been provided in the Airspace or Technology programmes. However, since it is such a key enabler for NERL it would seem sensible to include the People Plan, or the key elements of it, within the gambit of the Airspace and Technology plans. This would ensure that the plans are developed and delivered in full alignment and also allow a view on likely "pinch points" ahead of time. Condition 10 requires the submitted plans to explain "where training and deployment activities may impact on service quality" and whilst this is touched on in many places, a clearer exposition of the potential impact and what NERL will be doing to monitor and ameliorate it would be helpful. Recognising the sensitivities regarding staff engagement it would be inappropriate to publish too much detail at this point but an exposition of when and where the likely impacts of programme delivery, ameliorated by the "People Plan", on service quality should be feasible.

CAA Concerns from SIP17

In addition to the Licence Condition 10 requirements, and as already noted above, the CAA identified a number of points/concerns after SIP17 had been received and considered:
- There was insufficient detail on what are the actual constituent projects of SIP17, and what benefits will be delivered by implementing SIP17;
  - Comment: considerably more detail has been provided on constituent projects and benefits;
- There was no delivery plan nor dependencies for airspace milestones;
  - Comment: delivery plan for airspace and limited dependencies noted;

- There was insufficient detail to assess the viability of the technology plan;
    - Comment: Much improved detail that suggest a viable technology programme is now in place;
- It was unclear whether the deployment points for the airspace and technology programmes articulated in the document were the only delivery milestones that NERL had committed to in SIP17;
    - Comment: clarity on milestones has been provided;
- There were no linkages between planned investment and how the performance targets would be delivered;
    - Comment: Linkages have been presented between planned investment and KPAs but these could be made clearer;
- SIP17 did not specifically highlight progress against SIP16 milestones; and
    - Comment: delivered milestones (as per current plans) are annotated but no link to SIP16 milestones or commentary to explain links/changes although this was covered in detail in the customer deep dive workshop;
- The changes between SIP16 and SIP17 had been given little analysis or discussion given their financial significance. In particular, NERL had not provided project level detail to explain the £130-160m additional expenditure in RP2. This includes how much was due to scope changes versus more mature budgeting.
    - Comment: as detailed above, more information than before, but still limited analysis on costs and causes of increase provided in the condition 10 report, although substantially more detail provided in the customer deep dive workshop.

Conclusion

The Airspace and Technology plans submitted by NERL on 31 March 2017 to follow their SIP17 submission in December 2016 represent a major step forward. The form of the submitted plans (document rather than slide deck) is a significant improvement on previous plans and makes the detail much easier to access and understand. There is considerably greater detail and clarity on the constituent programmes and projects. The dependency management and risk management approaches offer considerable confidence in the overall deliverability of the portfolio although as noted above there remain some areas that require further development.

The "golden thread" that exists to link programmes/projects, benefits delivery and the relationship with KPAs would benefit from further clarity and development. Additionally, the management of benefits will need careful application and monitoring if accountability is not to suffer.

Finally, CAA and NERL might jointly consider how the consultation process could be improved. Effective stakeholder engagement is one of the cornerstones of successful programme delivery. Any measures that can be taken to improve the consultation process with customers and users, as well as other appropriate stakeholders, will only aid the understanding and delivery for this complex investment portfolio.