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# **Advice to the CAA on NERL's Approach to Capital Investment Planning and Implementation – Report on Stage 1**

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# 1 Executive Summary

## 1.1 Context

This document has been prepared by Logica for the Civil Aviation Authority (CAA) Economic Regulation Group (ERG). It concerns advice to the CAA on NATS En-Route plc's (NERL's) approach to capital investment planning and implementation. It will provide input to the process of setting NERL's charges to users for the next charge control period.

This review has been based around the NERL Service and Investment Plan (SIP) 2009, Final – Versions 1 and 2, and NERL Baseline Plan for CP3 Customer Consultation, April 2009. In addition, internal NATS documentation has been examined and a number of meetings have been held with NATS staff.

As part of its assessment of NERL's cost base and business plan, the CAA requires advice on certain aspects of NERL's approach to planning and implementing its capital investment programme. In particular, the terms of reference for Logica's work were to:

- Stage 1: Form a view and provide advice to the CAA on NERL's current and prospective ability to deliver investment projects efficiently and effectively, taking account of NERL's performance to date in CP2 in putting in place strengthened programme and project management.
- Stages 2 and 3: Obtain a detailed understanding of NERL's investment plan for CP3, conduct a risk assessment of that plan and provide advice on the costs/benefits of possible alternative investment plan scenarios.

The scope of this report is Stage 1. Stages 2 and 3 will be reported on at a later date.

## 1.2 Evolution of the Investment Plan

NATS' investment plans were reviewed by Logica in 2004 as part of the process of setting the charges for CP2. The 2004 review focused on the Future Centres Programme because it was by far the largest element of the investment programme and included the most high risk projects. The table below summarises the 2004 Future Centres Programme.

Date	Event
2007	London TC and LMARS moved to Swanwick using the existing architectures, technology and method of operation.
2007	iFACTS controller tools, incorporating electronic flight data, implemented on the NERC platform at Swanwick (London AC).
2009	Scottish and Manchester consolidated onto the CASPIAN system at ScACC.
2010/11	London AC moved onto the CASPIAN system at Swanwick.
2011/12	London TC moved onto the CASPIAN system at Swanwick.

The move of London TC to Swanwick was delivered in November 2007 and that of LMARS in January 2008 as planned (the LMARS date was rescheduled to January 2008 in consultation with the MoD to meet their

operational requirements). The most significant change in the programme has been the change from using the Spanish SACTA system as the basis for NATS' new centres system (CASPIAN) in favour of a revised NERL Roadmap. The revised NERL Roadmap is centred around the iTEC flight data processing (FDP) system being developed by AENA, DFS and NATS and a new, Common Workstation. It delivers systems and benefits progressively over CP3 and CP4. The second significant change has been a considerable increase in size of the iFACTS programme and extension of the programme timescales to incorporate a phased delivery into operation now due to complete in early 2011.

Despite the significant changes in the Future Centres Programme, the overall objectives have remained consistent, for example the two centre / one system strategy. The way which in this will be achieved has changed since 2004 with the SACTA solution being replaced by the revised NERL Roadmap. However, even this major change has elements of continuity with the key iTEC FDP element being retained. The changes in the Future Centres Programme thus represent an evolution in the way the objectives are achieved and in the timing of the programme elements, rather than a discontinuous change of objectives or strategy.

### 1.3 Delivery of the Investment Plan

Looking at the investment plan at a high level, based on NATS' data presented in its SIPs for capex projects over £10m, just over 50% of these projects (10 out of 19) have slipped in time over the period 2004 to 2009. However, looking at the detailed history of each project:

- Many of these slippages are as a result of necessary changes in scope, proactive major replans or tactical tuning of 'O' dates to meet operational constraints in consultation with customers.
- The majority of the replans had completed by the end of 2007.
- Since those replans projects have been largely delivered to time, with a number of delivery dates being accelerated.

So while the high level data from NATS' SIPs indicates significant slippage in the original programme, looking below these "headline figures" shows that much of the slippage can be explained as replans of what were probably optimistic original plans which were formulated before NATS improved its project management capability. Since those replans things have progressed broadly on time and NATS' current performance in delivering the plan is assessed as good. A similar analysis provided by NATS, which in addition includes capex projects of £10m or less, shows that just under 30% of projects (19 out of 65) have slipped in time over the period 2005 to 2009.

Since January 2006, NATS has set Contract with the Board milestones ("CWB milestones") which are set out in the annual Programmes Business Plan. To date, NATS has achieved 33 out of 34 CWB milestones (97%) on time or early against the CWB date and 26 out of 34 (76%) on time or early against the original date for the milestone. While the original milestone date is typically set at the start of a project, the CWB milestone is set a few months to just over a year ahead. Performance against the CWB milestone dates thus reflects NATS' more recent project delivery performance and does not reflect slippage from the original milestone dates since this slippage generally took place before the CWB milestones were set. This is consistent with the observation in the paragraph immediately above that while there has been slippage in the programme, since projects have been replanned things have progressed broadly on time. While performance against CWB milestone dates provides a useful measure of short term delivery performance (up to just over a year), going forward it will be

important for NATS to track and report its longer term delivery performance against original or baseline milestone dates in order to provide a more complete picture of its delivery performance.

#### **1.4 Customer Consultation Process**

NATS' process for consultation with its customers is assessed as much improved during CP2. In particular:

- A well structured and well maintained customer consultation web site has been set up.
- The customer consultation process has become more structured.
- The format and content of the SIP has been adjusted as a result of customer feedback.

NATS' customer consultation process has been subject to positive comment from a number of customer organisations.

#### **1.5 SIP and Business Plan Documents**

NATS reports its investment programme year on year through successive SIP and Business Plan documents and through its Customer Consultation Process. In conducting the analysis of how the investment plan has evolved over time, it was very difficult to track changes and understand what factors had driven them, including changes to scope, costs and project timescales. The principal reasons for this were:

- The detailed structure and presentation of some content varies from year to year.
- No clear baseline is established and changes are not reconciled to that baseline on an annual basis.
- The basis of the costs is not stated clearly.

It is acknowledged that Logica was not part of the customer consultation process which would provide customers with a degree of continuity from year to year, and that the format of the SIP has evolved as a result of customer feedback and is subject to CAA approval. Nevertheless, it is concluded that greater clarity in the SIP and Business Plan documents in respect of the bullet points above would further inform the consultation process and assist customers in tracking progress year on year over the medium to long term. Improved clarity would also benefit NATS because there are a number of cases where cost and timescale increases have been driven by necessary increases in scope but although covered as part of the consultation process, this does not come across clearly in the SIP and Business Plan documents.

#### **1.6 Alternative Investment Options**

Logica's review of NATS' investment plan in 2004 concluded that the Business Plan document presented a single investment plan with no discussion of alternative approaches, assumptions, uncertainties, risks and sensitivity analysis.

Review of SIPs from 2005 to 2009 shows evidence of more open communication with customers about risks than there was in 2004 and some of the SIPs discuss possible options for 'O' dates, for example, on which customer feedback is sought. The latest CP3 baseline plan is open about the uncertainties around traffic forecasts etc. and there is some sensitivity analysis on pricing. Despite these changes, the 2009 SIP and Business Plan documents do not cover alternative investment plan options, assumptions, uncertainties, risks and sensitivity analysis in any depth.

In discussions, NATS explained that internally, it does carry out a thorough investigation of options including an analysis of risks for the major elements of the investment programme. Where appropriate, an alternative or

“plan B” is identified should the preferred option not prove viable for some reason. NATS explained that while this level of analysis is not reflected in the SIP and Business Plan documents, it does form part of the consultation process and is worked through at the customer consultation meetings and documented on the customer consultation web site. While acknowledging that this is a matter for NATS and its customers, it is suggested that it might aid transparency if these aspects were more explicitly documented.

## 1.7 Benefits Delivery

NATS' benefits delivery process shows evidence of improvement over time and is assessed as broadly consistent with good practice in benefits management. Benefits are now defined and tracked as part of NATS' project Phase Review Process and also through Project/Programme Boards. Responsibility for benefits delivery is well defined and managed through the appointment of benefits owners and benefits delivery managers. Lessons learned are captured and incorporated in to a database to make them available across the organisation. Key lessons are used to drive process improvement thus ensuring that those key lessons are, in effect, mandated across the organisation.

The following observations are made based on the examples examined in this review:

- The examples seen were of variable quality and thoroughness, although this was improving over time with more recent examples being better in this regard.
- The full process is not consistently applied, particularly with regard to reviewing post-delivery and following up beyond a first benefits delivery review.
- While in general the benefits are considered well specified, the specification and measurement of more complex, overlapping benefits (where similar benefits accrue from more than one project or where benefits result from the output of more than one project) is not yet fully mature or proven.

The evidence examined in this review suggests that the process would benefit from increased precision and consistency in the way in which benefits are defined and baselined and then tracked through to completion.

In the context of the customer consultation process, the outputs of a mature benefits management process should enable customers to:

- Understand clearly the baseline benefits of proposed investment projects they were being consulted on.
- Understand the trends in forecast benefits with any associated changes in project scope, cost and timescales on an annual basis.
- Understand what benefits were delivered at the end of the project.

NATS shares its business cases and benefits with customers through the consultation process but based on the material examined for this review, the systematic tracking of benefits through the project lifecycle is not automatically reported to customers.

## 1.8 NATS Capability

Overall, NATS' capability to plan and deliver investment projects efficiently and effectively has improved significantly since Logica's last review in 2004. This is a result of the improved experience and capability of the management team and key staff in the Project Management area of the organisation and significant process

improvements. These changes have resulted in improved delivery performance over the latter years of CP2, as discussed in Section 1.3 above.

NATS has chosen to use Capability Maturity Model Integration (CMMI) as a framework to measure its capability. CMMI is a process improvement maturity model for the development of products and services. It consists of best practices that address development and maintenance activities that cover the product lifecycle from conception through to delivery and maintenance.

NATS' biggest improvement effort has, quite rightly, been focused in the Project Management area which is stated by NATS as at a level consistent with CMMI Level 4. In contrast, Asset Engineering is stated by NATS at around Level 2 and Engineering Service Delivery at just under Level 3. Since the planning and delivery of NATS' investment programme will require contributions from across the whole of NATS' business, the overall capability to deliver the programme, as measured by CMMI Level, is assessed as lower than indicated by looking at the Project Management area alone. Within the time available to it, NATS has focused improvement effort in the appropriate area (project management) and is now driving improvements in other areas of the business. This approach is assessed as entirely appropriate.

## 1.9 Investment Plan Delivery

NATS' investment plan includes different types of project which require different skills for their successful delivery. NATS' improving delivery capability across this range of project types can be seen from a review of a sample of recently completed and ongoing projects. This has indicated that NATS has a mature, proven capability for defining, estimating and delivering:

- airspace development projects,
- projects which deliver and roll out products which exist in close to "off the shelf" form, e.g. radars,
- projects which relocate operational facilities and staff.

NATS has also demonstrated that it can deliver relatively small, well defined centre systems tools projects.

The challenge for NATS – and the industry in general – has always been large, complex, new centre systems which involve:

- major new components (e.g. FDP),
- significant integration of component parts,
- new operational concepts.

NATS' new centre system to be delivered via the revised NERL Roadmap falls into this category. Benchmark data shows that amongst ANSPs worldwide, such programmes regularly exceed cost (typically by a factor of 1.3 – 1.8) and budget (typically by a factor of around 1.7).

While the evidence indicates that NATS is now well placed to deliver such a programme successfully, the challenge of this task is assessed as representing a step change in difficulty compared with the programmes NATS has delivered to date, including the TC/LMARS relocation and the SAATS oceanic system. Its successful delivery to time and budget is therefore assessed as carrying a high level of risk.

The ITEC programme to provide the FDP system (including all the infrastructure, integration and training) for the revised NERL Roadmap is a complex, software intensive programme involving NATS, two other European

ANSPs (AENA and DFS) and a Spanish contractor (Indra). It is the single largest element of NATS' investment programme. It is the means by which NATS will migrate off of the existing NAS FDP system. There is evidence that lessons from NERC and from the AENA/SACTA programme have been learned and fed into the iTEC programme and to date, all iTEC milestones have been achieved on time. Nevertheless, iTEC will provide a major test of NATS delivery capability if it is to be delivered to specification, cost and timescales.

## 2 Introduction

### 2.1 Introduction

This document has been prepared by Logica for the Civil Aviation Authority (CAA) Economic Regulation Group (ERG). It concerns advice to the CAA on NATS En-Route plc's (NERL's) approach to capital investment planning and implementation. It will provide input to the process of setting NERL's charges to users for the next charge control period.

### 2.2 Context

In October 2008 the CAA published an initial consultation paper [Ref 1] which set the scene for the review of the price controls applying to NERL for 2011 to 2015, the third price control period (CP3). The paper provided context on the legal framework for economic regulation of UK air traffic services and on NERL's recent performance against the projections made at the CP2 review.

The CAA updated this analysis in February 2009 by setting out in more detail its regulatory approach for setting NERL's price control for CP3 [Ref 2]. In particular, that document described the CAA's plans to scrutinise NERL's cost base and business plan.

### 2.3 Aims / Terms of Reference

As part of its assessment of NERL's cost base and business plan, the CAA requires advice on certain aspects of NERL's approach to planning and implementing its capital investment programme. In particular, the terms of reference for Logica's work were to:

- Stage 1: Form a view and provide advice to the CAA on NERL's current and prospective ability to deliver investment projects efficiently and effectively, taking account of NERL's performance to date in CP2 in putting in place strengthened programme and project management.
- Stages 2 and 3: Obtain a detailed understanding of NERL's investment plan for CP3, conduct a risk assessment of that plan and provide advice on the costs/benefits of possible alternative investment plan scenarios.

The scope of this report is Stage 1. Stages 2 and 3 will be reported on at a later date.

### 2.4 Information Sources

This review has been based around the NERL Service and Investment Plan (SIP) 2009, Final – Versions 1 and 2, and NERL Baseline Plan for CP3 Customer Consultation, April 2009. In addition, internal NATS documentation has been examined and a number of meetings have been held with NATS staff. References to specific information sources are given in the body of the report.

### 2.5 Structure of Report

Section 1 presents an executive summary of the report.

Section 2 (this section) is the introduction.

Section 3 presents an analysis of how NERL's investment plan has evolved since the start of CP2 together with a review of projects in order to form a view on the extent to which NERL is completing projects on time and to budget and absorbing lessons from its previous experience.

Section 4 presents an assessment of NERL's progress in managing benefits delivery. It is based on an appraisal of NERL's report on its progress in implementing the recommendations made in an Office of Government Commerce (OGC) report on NERL's Benefits Delivery Phase Review Process which was prepared for the CAA.

Section 5 assesses NERL's organisation, processes and capability to develop and deliver investment projects.

Section 6 presents the conclusions.

Supporting material is presented in Sections 7 (Appendix A) and 8 (Appendix B).

## **2.6 Terminology**

For simplicity, the terms NATS is used throughout the remainder of this report to refer to both NERL and the wider NATS organisation.

## 3 Review of Investment Plans and Projects

### 3.1 Introduction

This section discusses how NATS' CP2 investment plan has evolved over time and then presents an analysis of a number of completed and ongoing investment projects based on information provided by NATS.

### 3.2 Evolution of CP2 Investment Plan

Section 3.2 examines how NATS' investment plan has evolved since Logica's previous review conducted in 2004, based on NATS' Business Plan 2004/5 [Ref 1]. The data given here are based on that provided in the SIPs from 2005 to 2009 [Refs 2-6].

#### 3.2.1. NATS Investment Plan 2004/5

NATS' investment plan comprised three main elements: Future Centres Programme (FCP), Communications, Navigation and Surveillance (CNS) and other investment. The 2004 review focused on the Future Centres Programme because it was by far the largest element of the investment programme, accounting for 58% of the external capex, and it included the most high risk projects.

At the time, NATS had three major civil Air Traffic Services (ATS) units: Scottish located at Prestwick; London Area Control located at Swanwick and London Terminal Control located at West Drayton. There was also a sub-centre at Manchester. The joint NATS / MoD military operation (London Military Area Radar Service, or LMARS) was provided from West Drayton.

#### **CASPIAN / SACTA**

NATS proposed a common centre system termed CASPIAN as the basis for its FCP. NATS intended to collaborate with AENA, the Spanish ANSP, to make use of AENA's SACTA system as the basis for CASPIAN. Since SACTA included its own flight data processing (FDP) system, this would provide a means of migrating off the NAS FDP system.

The level of development required to make SACTA suitable for London AC and TC was likely to be considerable because:

- These operations were significantly larger than SACTA could cope with at the time.
- These operations were considerably more complex (in airspace terms) than those served by the SACTA system.
- NATS intended that the SACTA system deployed in London AC and TC would include a new, advanced FDP system, electronic flight data (removing the need for paper flight strips), and controller tools.

NATS intended to develop the SACTA system to be deployed in London AC and TC (known as SACTA v4) in collaboration with AENA.

#### **iFACTS**

Based on existing and ongoing research, NATS intended to develop area control tools to improve controller productivity and reduce the need for Air Traffic Services Assistants. The toolset to be included in CASPIAN was termed FACTS (Future Area Control Tools Support). NATS intended to introduce an interim version of

FACTS which it termed iFACTS onto the existing NERC platform before that platform was replaced by CASPIAN in due course.

**iTEC**

NATS and AENA had decided to adopt the iTEC FDP system for SACTA v4. iTEC was a European collaborative FDP programme being conducted by Germany and Spain. The contractor for the system was Indra. AENA and Indra involvement partly explained why iTEC had been selected as the FDP system for SACTA v4. NATS intended to collaborate with AENA and DFS in the development of iTEC.

**Relocation of TC / LMARS to Swanwick**

NATS planned to move its London TC and LMARS operations to Swanwick in 2007, principally because:

- It would enable NATS to consolidate the operations to Swanwick and close its operations at the West Drayton site, with associated cost savings.
- It would relocate London TC and LMARS with no change in technology or method of operation. TC and LMARS would then transfer onto the CASPIAN system in the future with no change of location. This approach of reducing the amount of simultaneous change was one of the lessons learned from NERC.

**New Prestwick Centre**

Work on the New Prestwick Centre building was planned to complete in spring 2006; this would become the centre for ScACC and MACC.

Some work was also planned to increase capacity and reduce costs at Swanwick.

In summary, NATS' Future Centres Programme was as follows as at 2004:

<b>Date</b>	<b>Event</b>
2007	London TC and LMARS moved to Swanwick using the existing architectures, technology and method of operation.
2007	iFACTS controller tools, incorporating electronic flight data, implemented on the NERC platform at Swanwick (London AC).
2009	Scottish and Manchester consolidated onto the CASPIAN system at ScACC.
2010/11	London AC moved onto the CASPIAN system at Swanwick.
2011/12	London TC moved onto the CASPIAN system at Swanwick.

Logica's review of the Business Plan concluded that NATS' Business Plan presented a highly ambitious Future Centres Programme, through which it hoped to deliver a range of significant benefits particularly in terms of capacity increase, safety improvements and cost savings. However these benefits came at considerable risk, in particular through:

- very ambitious timescales with a large degree of concurrency between programme elements,
- strong reliance on collaboration with European partners and suppliers,
- a series of changes to both systems and methods of operation.

It was concluded that NATS would need to summon considerable management and technical resources to complete this plan successfully whilst maintaining operational capability in a dynamic environment.

### 3.2.2. Evolution of NATS' Investment Plan

The 2008 SIP summarised key changes between the 2005 and 2008 Business Plans (BPs). This summary is given here as an overview of changes across the investment programme. It is intended simply to provide a high level summary of the changes based on NATS' data.

- A collection of CASPIAN projects formed the SACTA based strategy of Joint Venture with AENA.
- In early 2007, there was a change from using the Spanish SACTA system as the basis for NATS' new centres system (CASPIAN) in favour of a revised NERL Roadmap. The revised NERL Roadmap is centred around the iTEC flight data processing (FDP) system being developed by AENA, DFS and NATS and a new, Common Workstation. It includes iFACTS as well as extended reliance on NERC, NAS, & NODE.
- An Electronic Flight Data (EFD) project was planned in BP05 within the SACTA based systems programme (above) but was later planned independently in the wake of the revised NERL Roadmap.
- The Airspace Development portfolio of projects increased in size in response to rising traffic levels and capacity requirements. A need was subsequently identified for more extensive airspace revisions to match capacity to forecast demand, including TC North and Northern Upper Sectors, as well as Manchester TMA and increased spend in Central Airspace.
- During BP05 the training strategy was to retain operations at Hurn until CP3. It was subsequently deemed more cost effective to relocate the training facilities to the CTC during CP2. The Hurn programme will cover the transfer, re-location and disposal of the training facilities.
- The Alert & Fix project was originally planned to include a NATS owned direction finding infrastructure, however the latest plan is to utilise and upgrade the military 243MHz infrastructure for use at 121.5MHz.
- The Voice Communications and Control System project (VCCS) began ahead of BP05 expectations and has also been condensed, bringing investment forward from the beginning of CP3.
- The Prestwick Centre projects changed significantly in scope since BP05. The Atlantic House re-location was postponed from the end of CP2 to CP3, and elements of work planned for the beginning of CP2 were completed at the end of CP1.
- The NIBS2 project was originally envisaged in 2003 as a replacement of the Business Information System Database system. The business need evolved to a requirement for a fully integrated, company-wide set of processes supported by an Enterprise Resource Planning system, rolled out in line with the business cycle.

By far the most significant change has been the change from using the Spanish SACTA system as the basis for NATS' new centres system (CASPIAN) in favour of a revised NERL Roadmap. The costs associated with these programmes dwarf the other changes described above.

### 3.2.3. Assessment

This section has focused on the Future Centres Programme. There have been significant changes in the programme since 2004. The major change to the programme has been the change from using the Spanish

SACTA system as the basis for NATS' new centres system (CASPIAN) in favour of a revised NERL Roadmap. A second significant change has been the considerable increase in size of the iFACTS programme. This programme has continued to expand even since a recent, major re-plan.

Despite the significant changes in the Future Centres Programme, the overall aims have remained consistent, for example the two centre / one system strategy. The way which in this will be achieved has changed since 2004 with the SACTA solution being replaced by the revised NERL Roadmap. However, even this major change has elements of continuity with the key iTEC FDP element being retained.

Data in Section 7 shows the progress reported in the SIPs where the project costs are over £10m. Just over 50% of these projects (10 out of 19) have slipped in time over the period 2004 to 2009. However, looking at the detailed history of each project:

- Many of these slippages are as a result of necessary changes in scope, proactive major replans or tactical tuning of 'O' dates to meet operational constraints in consultation with customers.
- The majority of the replans had completed by the end of 2007.
- Since those replans projects have been largely delivered to time, with a number of delivery dates being accelerated.

So while the high level data from NATS' SIPs indicates significant slippage in the original programme, looking below these "headline figures" shows that much of the slippage can be explained as replans of what were probably optimistic original plans which were formulated before NATS improved its project management capability. Since those replans things have progressed broadly on time. A similar analysis provided by NATS, which in addition includes capex projects of £10m or less, shows that just under 30% of projects (19 out of 65) have slipped in time over the period 2005 to 2009.

The Relocation of TC / LMARS to Swanwick has been a success. After an initial extension of the timescales to reduce risk, the project proceeded and completed to plan, and the final costs reported are lower than initial forecasts.

Since January 2006, NATS has set Contract with the Board milestones ("CWB milestones") which are set out in the annual Programmes Business Plan. To date, NATS has achieved 33 out of 34 CWB milestones (97%) on time or early against the CWB date and 26 out of 34 (76%) on time or early against the original date for the milestone. While the original milestone date is typically set at the start of a project, the CWB milestone is set a few months to just over a year ahead. Performance against the CWB milestone dates thus reflects NATS' more recent project delivery performance and does not reflect slippage from the original milestone dates since this slippage generally took place before the CWB milestones were set. This is consistent with the observation in the paragraph immediately above that while there has been slippage in the programme, since projects have been replanned things have progressed broadly on time.

### 3.3 Customer Consultation Process

NATS' process for consultation with its customers is assessed as much improved during CP2. In particular:

- A well structured and well maintained customer consultation web site has been set up.
- The customer consultation process has become more structured.
- The format and content of the SIP has been adjusted as a result of customer feedback.

NATS' customer consultation process has been subject to positive comment from a number of customer organisations.

### 3.4 SIP and Business Plan Documents

NATS reports its investment programme year on year through successive SIP and Business Plan documents and through its Customer Consultation Process. In conducting this analysis of how the investment plan has evolved over time, it was very difficult to track changes and understand what factors had driven them, including changes to scope, costs and project timescales. The principal reasons for this were:

- The detailed structure and presentation of some content varies from year to year.
- No clear baseline is established and changes are not reconciled to that baseline on an annual basis.
- The basis of the costs is not stated clearly.

It is acknowledged that Logica was not part of the customer consultation process which would provide customers with a degree of continuity from year to year, and that the format of the SIP has evolved as a result of customer feedback and is subject to CAA approval. Nevertheless, it is concluded that greater clarity in the SIP and Business Plan documents in respect of the bullet points above would further inform the consultation process and assist customers in tracking progress year on year over the medium to long term. Improved clarity would also benefit NATS because there are a number of cases where cost and timescale increases have been driven by necessary increases in scope but although covered as part of the consultation process, this does not come across clearly in the SIP and Business Plan documents.

### 3.5 Alternative Investment Options

Review of SIPs from 2005 to 2009 shows evidence of more open communication with customers about risks than there was in 2004 and some of the SIPs discuss possible options for 'O' dates, for example, on which customer feedback is sought. The latest CP3 baseline plan is open about the uncertainties around traffic forecasts etc. and there is some sensitivity analysis on pricing. Despite these changes, the 2009 SIP and Business Plan documents do not cover alternative investment plan options, assumptions, uncertainties, risks and sensitivity analysis in any depth. NATS often presents project plans that come across as definitive in nature before completion of Project Definition. That is, project plans are presented as definitive before sufficient work has been conducted to justify that status.

In discussions, NATS explained that internally, it does carry out a thorough investigation of options including an analysis of risks for the major elements of the investment programme. Where appropriate, an alternative or "plan B" is identified should the preferred option not prove viable for some reason. NATS explained that while this level of analysis is not reflected in the SIP and Business Plan documents, it does form part of the consultation process and is worked through at the customer consultation meetings and documented on the customer consultation web site. While acknowledging that this is a matter for NATS and its customers, it is suggested that it might aid transparency if these aspects were more explicitly documented.

### 3.6 Projects

#### 3.6.1. Project Information

A number of recently completed and ongoing projects were selected by Logica for analysis. NATS' 2009 investment plan includes a range of projects of different types and hence requires a range of capabilities to

deliver it. The rationale for the selection was to include projects which covered the range of skills and capabilities that NATS would require to deliver its 2009 investment plan in order to enable a balanced assessment of NATS' capability to deliver its investment portfolio. In particular:

- Completed projects so that NATS' project delivery performance could be examined over the complete project lifecycle.
- Ongoing projects since these would indicate NATS' current practice and because such projects form a significant fraction of the 2009 investment plan.
- Airspace development projects because such projects involve different skill sets to those involved in procuring or developing equipment and they are an important means by which NATS delivers additional capacity.
- A radar project which would provide an example of buying a well defined product that largely exists "off the shelf" but which is not a commodity.
- A relocation project since this involves skills in the logistics of relocating equipment and staff, while maintaining an ongoing operation.
- A centre build and commissioning project since this involves coordination of a wide range of skills from managing buildings construction and fit out to staff training and relocation.
- Centre systems projects, because centre systems projects are the key deliverers of capacity and other benefits, constitute the largest part of NATS investment plan, and have historically proved difficult to deliver not just for NATS but for ANSPs worldwide. Centre systems do not really exist as "off the shelf" products. NATS and most major ANSPs have struggled to deliver such systems to time and budget and to realise the claimed benefits. These systems do not deliver benefits in their own right, they deliver them in combination with processes and people (controllers, etc.). They represent the most challenging projects that NATS has to deliver.

The following projects were selected by Logica for analysis:

- Three completed airspace development projects:
  - Central Airspace Development,
  - TC Southwest Airspace Development,
  - Hurn Airspace Development.
- Radar Site Services Programme (radar replacement).
- TC, LMARS and NAS Relocation Programme – an infrastructure and staff relocation project.
- iFACTS Programme – an ongoing, state of the art centre systems (tools) programme.
- iTEC Programme – an ongoing programme to provide flight data processing (including all the infrastructure, integration and training), central to NATS' centre systems programme, involving European collaboration. It is NATS' largest capital investment.
- AMAN Programme – a completed centre systems (tools) project.
- The New Prestwick Centre Programme.

- SACTA Project – a completed (terminated) centre systems project involving European collaboration. This project may have lessons for the iTEC programme.

The table below provides an overview of the performance of the projects [Ref 7].

Project	Benefits		Timescales	
	Original Plan	Actual	Original Plan	Actual
L4161: Central airspace Development	Avoided delay costs to NATS' customers	Ref 7 states awaiting post investment appraisal. BDPR scheduled for Feb 2010	March 2009	Completed March 2009 on time
L3075: TC Southwest Airspace Development	Avoided delay costs to NATS' customers	Ref 7 states that a post investment review is currently being conducted that will confirm the realisation of benefits	April 2008	Completed April 2008 on time
L3061: Hurn Airspace Development	Avoided delay costs to NATS' customers	Not stated	Not stated	March 2007
Radar Site Services Programme	Sustainment Regulatory compliance Improved capability enabling capacity increases	Benefits are being delivered progressively as the individual radars are replaced	By 2013	Current plan shows completion during 2012.  8 of 15 primary radars and 15 of 23 secondary radars will have been replaced and operational by end Sep 09
TC, LMARS and NAS Relocation	For TC/LMARS relocation quantified headcount reduction	For TC/LMARS relocation headcount reduction and	TC/LMARS mid 2007 [Ref 1]	TC: 24 Nov 07 LMARS: 27 Jan 08 (the

Project	Benefits		Timescales	
	Original Plan	Actual	Original Plan	Actual
Programme (4 sub-projects)	and relocation of operations	relocation of operations achieved [Ref 8]. A BDPR is expected for NAS move in Dec 09		LMARS date was rescheduled to January 2008 in consultation with the MoD to meet their operational requirements)
iFACTS Programme (5 sub-projects)	Reduction of 60 ATSAs by Feb 2011  12% increase in Monitoring Values of Swanwick (AC) sectors by Feb 2012  20% reduction in Swanwick (AC) Safety Risk Index by 2011	Benefits not yet expected	Original plan was deployment in London AC in 2007  Following replan staged implementation as follows:  Stage 1: Feb 2009  Stage 2: Sep 2009  Stage 3: Jan 2010  Stage 4: initial spring 2010; full Feb 2011	Stage 1: 12 Feb 2009  Stage 2: On schedule  Stage 3: On schedule  Stage 4: On Schedule
iTEC (5 or more sub-projects)	Replacement of NAS and EDDUS  Modern platform for tools  European interoperability	Benefits not yet expected	Delivery 2014 (following replan in 2007)	On schedule

Project	Benefits		Timescales	
	Original Plan	Actual	Original Plan	Actual
	Enables reduced operating costs Low cost of ownership			
AMAN	Improved traffic flows to the TMA environments Holding delays absorbed into en-route	Awaiting measurement	Q1 2009	2009
New Prestwick Centre	Sustainment Part of two centre strategy	Not yet operational	Winter 2008/09 'O' date	Jan 2010 'O' date
SACTA	Not available	Not applicable	First operational date 2009/10	Programme terminated August 2006

### 3.6.2. SACTA

The SACTA project is discussed in more detail as it may have lessons for iTEC – NATS' largest capital programme - since both are software intensive, centre systems projects based on European collaboration.

NATS' original strategy, set out for CP2, was to collaborate with AENA, the Spanish ANSP, to make use of AENA's SACTA centre system as the basis for NATS' new centre system, known as CASPIAN. Indra is the supplier of the SACTA system. The collaboration was to be by means of a joint venture company, with AENA and NATS sharing the development costs and IPR. The SACTA based system (Version 3.6) was to be deployed first at the New Prestwick Centre (NPC) in 2009/10. The system was then to be developed further to meet the needs of London AC and TC and to incorporate the iTEC FDP system. This version was known as SACTA Version 4.

In August 2006, NATS took the decision to terminate the SACTA project based on the following factors:

- A change of management in AENA, resulting in new objectives and priorities for AENA.
- Failure to agree the joint venture as a result of financial, commercial and IPR issues.
- The risk to the NPC "O" date because of delays to the development of SACTA Version 3.6 because of AENA's immediate priorities with their own Version 3.5.
- Revised NATS priorities principally for conformance checking and for tools deployment in the London Terminal operation.

Project Definition had revealed that compared with the original estimates the amount of software code required to develop SACTA Version 3.6 for NPC was higher and less of the software could be re-used in Version 4.0.

NATS has conducted a programme of work to identify lessons from the SACTA project. This identified two themes:

- The way in which NATS approaches working with partner organisations. Key lessons concerned alignment of business strategy, executive engagement, commercials and IPR.
- Specific process improvements around cultural awareness and language skills when collaborating with non-UK organisations.

These lessons have been fed into the iTEC programme. For example, NATS took time to develop an appropriate iTEC collaborative agreement, it has a "relationship roadmap" with the supplier Indra, and it has staff working in Madrid.

### 3.6.3. Assessment

Airspace development is a mature area of NATS capability and this is reflected in the project performance. All three airspace projects completed within time and on or under budget. Two of the three projects have achieved their benefits and the benefits achieved by the third are under review.

The radar replacement programme is on time and budget and demonstrates NATS' capability in the procurement and rollout of products which exist in close to "off the shelf" form.

The TC, LMARS and NAS relocation programme delivered successfully on time and under budget. This indicates that NATS has learned from the experience of relocating facilities and staff from West Drayton to Swanwick for NERC.

These programmes/projects indicate that NATS' delivery capability is relatively mature for these areas. This maturity leads to a virtuous circle – because NATS understands these areas well, it means that NATS' estimates of implementation timescales and budgets are likely to be realistic and NATS is likely to be able to deliver against those estimates.

The AMAN project appears to have gone well, and indicates that for a relatively small project in a well defined area, NATS has the capability to deliver tools.

The New Prestwick Centre programme is progressing well. Although there has been some slippage in the 'O' date since that reported in the 2005 SIP this has accommodated the change from the SACTA based solution to the revised NERL Roadmap. The programme is being transitioned in a phased manner: Oceanic (Oct 09), Military (Nov 09), Scottish domestic (Dec 09) and finally Manchester operations in Jan 2010. Assuming the remainder of the programme goes according to plan, NATS has demonstrated the capability to deliver and bring into operation a new centre building and systems, including the associated staff training, and relocations. This indicates that NATS has learned and applied key lessons from its experiences with NERC/Swanwick.

The iFACTS project was the subject of a major replanning exercise in 2007 because the scope and complexity had increased significantly since the CP2 capex plan. The SACTA programme was halted due to difficulties in the collaboration with AENA, previous underestimates of the amount of software development required and changes in NATS' priorities. While acknowledging that NATS has learned lessons from NERC and from the SACTA programme and that these have been incorporated into the iTEC programme and that to date, all iTEC milestones have been achieved on time, the historical evidence indicates that NATS has not yet proven the capability to define, estimate and deliver large, complex, centre system programmes and in particular those which depend on collaboration with European partners. This needs to be balanced against the significant improvements in NATS' project management capability over CP2.

## 4 NATS' Progress on Benefits Delivery

### 4.1 Introduction

This section presents an assessment of NATS' progress in managing benefits delivery. It is based on an appraisal of NATS' progress in implementing the recommendations made in an Office of Government Commerce (OGC) report on NATS' Benefits Delivery Phase Review Process which was prepared for the CAA. Full details of the background and Logica's appraisal can be found in Section 8.

### 4.2 Background

NATS divides its investment projects into phases with a Phase Review at the end of each project phase. The Benefits Delivery Phase Review (BDPR) is the final review and takes place once the investment has entered into operation. NATS conducted BDPRs on five investment projects between September and November 2006. As part of the previous CP2 review, OGC carried out a review of these Benefits Delivery Phase Reviews.

OGC was asked by the CAA to provide external assurance on the process being followed. OGC reviewed documentation concerning the Phase Review process, the specific BDPRs and a NATS Benefits Delivery Review Summary Report, discussed the emerging findings from the above with some of the NATS assessors, and reported on the findings to the CAA in November 2006 [Ref 1].

OGC's terms of reference covered four main areas:

- (i) To advise if the process adopted by NATS for each of the BDPRs was reasonable when compared with industry standards but allowing for any special features of NATS' business.

OGC concluded that the process was broadly compatible with published best practice and that being used elsewhere, taking into account the specific requirements of NATS' business. Three specific recommendations were made relating to the checklists used in the phase reviews.

- (ii) To advise if NATS has properly followed the documented process in each BDPR.

OGC concluded that the reviewers had followed the process in the main, with certain exceptions. OGC recommended that the conclusions and recommendations NATS had made in its Summary Report should be followed up and actioned.

- (iii) To advise, where appropriate, on how the lessons learned in a previous project have been applied in one or more of the projects covered by the BDPRs.

OGC noted that this had been investigated as part of the NATS reviews, and some indicative evidence found of improvements across NATS projects generally, and the West End Airspace Development project specifically, from lessons learned from previous projects. OGC recommended that the conclusions and recommendations made by the NATS reviewers in the five BDPRs reviewed were followed up and actioned.

- (iv) To advise if the conclusions of each BDPR have been reasonably drawn.

OGC concluded that the general approach taken by NATS, and implications for the validity of the findings, was covered under the conclusions/recommendations above. The specific observations on each of the individual BDPRs were detailed in the report.

In January 2007 NATS accepted all the recommendations in the OGC report. In its subsequent response [Ref 2] dated 31<sup>st</sup> December 2008, NATS provided a table listing the OGC recommendations, comments and planned actions, target dates, and the status at the end of December 2008. For many of the recommendations an embedded document was included as evidence of actions undertaken in response to the recommendation. NATS' response stated that all actions were proposed closed and that no further updates to the report were planned.

Logica assessed NATS' response to each recommendation given in the OGC report. Where relevant, and where information was made available within the time constraints of this review, Logica examined wider documentary evidence to better understand progress since the OGC review. Further details can be found in Section 8.

### 4.3 Assessment

NATS' benefits management process has continued to evolve over the past few years, and there is evidence that for new investment projects the benefits identification is more formalised and complete, and the identified benefits are generally SMART (Specific, Measurable, Achievable, Realistic and Time-bound) through the introduction of the Benefits Realisation Contract. Responsibility for benefits delivery is well defined and managed through the appointment of benefits owners and benefits delivery managers. Computer based training on benefits management has been available since September 2007 to NATS staff involved in benefits management.

While in general the benefits are considered well specified, the specification of more complex and overlapping benefits (where similar benefits accrue from more than one project or where benefits result from the output of more than one project) is not yet fully mature or proven. Benefits Realisation Plans have the potential to be a useful tool in planning the delivery and measurement of more complex sets of benefits. Whilst these are not mandated by the process, there is no evidence that Benefits Realisation Plans have been produced even where recommended through NATS own reviews (four out of six of the example Phase Review reports recommended that a Benefits Realisation Plan be produced or considered). Understanding whether projects have delivered the planned benefits is key information for NATS and its customers.

Benefits Tracking Sheets should exist and be used to track the predicted benefits at regular points during the project lifecycle. However the evidence examined does not give confidence that these are being consistently and effectively used; a number of the example phase review reports seen identified that the Benefits Tracking Sheet did not exist or needed review, and the example Benefits Tracking Sheets seen were of variable quality (although the more recent sheets were more thoroughly completed). More effort may be required to formalise the benefits tracking process and to educate the relevant managers in its use to ensure the process is applied consistently and effectively.

BDPRs are required to be held for the top 20 LTIP projects. Not all these projects deliver in a particular year and so one would not expect to see 20 BDPRs per year until a steady state has been reached. NATS is currently conducting around 6 BDPRs per year. There is little evidence that the benefits are tracked directly beyond any initial BDPR. In a number of cases a follow up benefits review has been recommended, and actioned by NATS, but not carried out (e.g. the West End Airspace Development project). Whilst relatively minor residual benefits might reasonably be absorbed into ongoing "business as usual", any significant

benefits should be tracked until they are realised. A key part of the feedback both within NATS and to customers is the extent to which planned benefits have been realised, since this will inform future investment.

The various Benefits Management process documents and checklists have been updated and improved recently, although a few inconsistencies remain. The latest checklists are generally consistent in checking lessons learnt and benefits tracking. However, there is evidence from the example documentation that the latest versions of processes and checklists are not always used. Some of the examples seen were of inconsistent quality and thoroughness, although more recent examples were better. Some basics of configuration control were missing or implemented incompletely. For example, the Benefits Tracking Sheet template included in NATS' response did not have an issue number and the Phase Review Checklist included was not dated. Also, some phase reviews referenced out of date versions of the Phase Review Process. However, the most recent process documents seen demonstrate improved configuration control, and it is understood that standard checks are now in place with the aim of ensuring that the latest processes are used throughout the organisation.

The Lessons Learnt process has developed positively, and an online database with search facilities is now available through the NATS intranet enabling managers to review relevant lessons from other projects at each stage of the lifecycle, and feed back their own lessons. Usage of the Lessons Learnt database is measured monthly and reported to the NATS Head of Quality. The number of times the sub-web has been viewed and the number of individual members of staff viewing the site are recorded. The data are also broken down by Division to show which staff are accessing the database, and these are also reviewed and tracked monthly.

Key lessons are used to drive process improvement through a Lessons Learnt Review Committee thus ensuring that those key lessons are, in effect, mandated across the organisation.

#### **4.4 Detailed Observations for NATS**

Although not a required output from Logica's review, a number of detailed observations which NATS may wish to consider have emerged from the review of progress in Benefits Delivery. These are listed below:

Benefits Delivery reviews:

- It would be appropriate for benefits delivery reviews to be continued until all benefits have been delivered (or accepted as not deliverable).

Benefits Tracking:

- The Benefit Tracking Sheet template would benefit from amendments to (a) record the date of the previous review/forecasts, and (b) record a full audit trail of previous forecasts for each benefit on the sheet to allow trend analysis.
- The criteria for red, amber or green traffic light status should be defined within the Benefits Tracking Sheet to ensure consistent and effective use.
- Ensure that the process for regularly reviewing and updating Benefit Tracking Sheets is clear and is being carried through effectively.

Benefits Management process:

- Consider reviewing the Benefits Management Process and Phase Review Checklists with respect to the use of a Benefits Realisation Plan, to encourage and standardise the use of the plan for non-trivial benefits realisation and/or measurement.
- Consider revising the Benefits Management Process section on Benefits Identification to emphasise the need for benefits to be Specific, Measurable, Achievable, Realistic and Time-bound (SMART).

Phase Review process:

- Consider amending the Phase Review checklists to separate any sub-questions into itemised questions to ensure that every question is considered by the reviewers.
- Consider amending the Phase Review checklist questions to ensure that the reviewer considers how effectively the delivery of benefits is being managed, and that consideration is given to maximising benefits at each stage.
- Consider adding benefit delivery checks to the Operational Deployment Readiness and Technical Acceptance Phase Review checklists, consistent with the checks at earlier phase reviews.

General:

- Ensure that all process documents, including checklists, include the document issue number and date, and that the latest versions are used by projects and reviewers.

## 5 NATS Organisation, Processes and Capability

### 5.1 Introduction

This section assesses the capability of the NATS organisation in the areas required to deliver the proposed capital investment programme.

### 5.2 Approach to Investment Management

NATS provided a summary of how it quantifies its investment appraisals and benefits [Ref 1]. An appraisal includes both the development cost of the investment and the delivery costs of operating the resultant asset over its lifetime. The investment appraisal process addresses both the customer and shareholder points of view.

From a customer point of view, the following benefit areas are considered:

- Safety, which is assessed quantitatively via risk index, number of Safety Significant Events, and number of Cat A and Cat B Airprox.
- Service/sustainment/contingency, which is assessed quantitatively based on the reduction in both level and variability of delay using the Eurocontrol cost benefit analysis methodology.
- Value/cost efficiency, which is assessed quantitatively based on operating cost saving and modelled as a reduction in Eurocontrol ATM charges based on the regulatory rate of return.
- Environment, which is quantified in terms of the expected reduction in CO<sub>2</sub> and NO<sub>x</sub> emissions using Eurocontrol standard values.

From a shareholder point of view, investments are expected to produce a return in line the regulatory rate of return.

This approach to investment management is entirely reasonable.

### 5.3 People

#### 5.3.1. Organisation

NERL's organisation [Ref 2] is assessed as appropriate for an organisation of NERL's size and taking account of the particular requirements of NERL's business.

#### 5.3.2. Experience within the Organisation

NATS provided details of the experience of key individuals in those parts of the organisation relevant to planning and delivering the SIP / investment plans [Ref 3] and a statement of the levels of qualifications within the Programmes organisation [Ref 4].

Each of the key individuals is appropriately qualified and experienced. As a group, they have a good mix of longer term NATS employees who would have an in-depth understanding of NATS and its business and newer joiners who would bring their experiences from other organisations.

Out of 119 staff in the Programmes Division, 24 are identified as having leadership and management roles. Of these, 71% are reported as having a professional qualification and 43% as qualified to degree level. This is a reasonable level of qualifications.

## 5.4 Processes

### 5.4.1. Project Management Process

NATS has provided details of its project management process [Ref 5]. Key features are:

- There has been a common set of project management processes since 2006 as part of NATS Project Management Improvement Roadmap.
- Each process has a nominated Process Expert.
- Processes can be updated through a number of routes.
- Processes are stored in the NATS Management System which is an online searchable repository.
- Ref 5 lists 28 key processes. These are typical of industry good practice.
- NATS' main project management tool is the Project system module in SAP.
- Risks are stored in an online database LTIPRAMP.

Ref 5 describes both a "Project Management Process" and a "Project Engineering Process". The relationship between these processes is well defined within the project lifecycle.

On the assumption that there are detailed materials such as process documents, procedures and checklists to support the high level description examined, NATS' Project Management Process appears typical of an appropriate project management process for an organisation of NATS' size and area of business.

### 5.4.2. Benefits Management Process

NATS' Benefits Management Process [Ref 6] states that Benefit Management applies to all LTIP investments. It refers to "NERL Investment Management Process NERL020106" and "Strategic Project Requirements Process NERL020112".

NATS' benefits delivery process shows evidence of improvement over time and is assessed as broadly consistent with good practice in benefits management. Benefits are now defined and tracked as part of NATS' project Phase Review Process. Responsibility for benefits delivery is well defined and managed through the appointment of benefits owners and benefits delivery managers. Lessons learned are captured and incorporated in to a database to make them available across the organisation

Based on the examples of benefits management described in Section 4 of this report, NATS' benefits delivery process shows evidence of improvement over time and is assessed as broadly consistent with good practice in benefits management although there are examples where it has not been applied consistently or with precision.

## 5.5 Capability

### 5.5.1. Capability Improvement

NATS provided details of its Capability Improvement Roadmaps [Ref 7]. These are based on the CMMI model. There are roadmaps for different areas of the organisation and those for Project Management, Asset Engineering and Engineering Service Delivery were discussed with NATS. Further details of the Project Management Roadmap were provided [Ref 8].

CMMI enables organisations to approach process improvement and appraisals using two different representations: continuous and staged. The continuous representation enables an organisation to select a process area (or group of process areas) and improve processes related to it. This representation uses capability levels to characterise improvement relative to an individual process area. The staged representation uses predefined sets of process areas to define an improvement path for an organisation. This improvement path is characterised by maturity levels. Each maturity level provides a set of process areas that characterise different organisational behaviours. It is deduced that NATS has adopted the continuous representation because its Roadmap is focused on nine process areas listed in Section 5.5.2 below and because NATS uses the term “capability” rather than “maturity”.

The approach of a system based on CMMI but tailored to NATS’ requirements is a sensible, pragmatic approach providing the rigour of CMMI is not diluted – there is no evidence that it has been.

**5.5.2. Project Management Improvement Roadmap**

NATS has engaged an independent, qualified assessor to advise on the development of its Project Management Roadmap and to witness parts of the internal assessments carried out by NATS.

The roadmap considers nine areas of project management capability:

- Integration Management
- Scope Management
- Time Management
- Cost Management
- Quality Management
- Human Resource Management
- Communication Management
- Risk Management
- Contract Management

These are high level areas. It is a reasonable list. The high level areas would need to be underpinned by capability in specific disciplines such as requirements management, software development, testing, etc in order to deliver the investment programme.

The table below shows NATS’ project management capability over time as set out in the Project Management Roadmap.

Capability Level	Date
1.4	Oct 04
2.0	Dec 05
2.5	Mar 06

Capability Level	Date
3.4	Dec 06
3.7	Mar 08
4.0	Mar 09
5.0	End CP3 (end 2015)

NATS' Project Management Roadmap is thus currently at Level 4.

### 5.5.3. Asset Engineering and Engineering Improvement Roadmaps

The tables below show NATS' capability over time in the areas of Asset Engineering and Engineering Service Delivery.

Asset Engineering	
Capability Level	Date
1.3	Sep 08
1.9	Mar 09
2.5	Mar 10 (Target)

Engineering Service Delivery	
Capability Level	Date
2.4	Mar 08
2.7	Mar 09
3.0	Mar 10 (Target)

## 5.6 Assessment

NATS' project management capability has improved significantly since Logica's previous assessment in 2004 for the CP2 investment plan review. It has improved in both the capability and experience of the key staff and in organisational/process capability as measured by progress along its Project Management Improvement Roadmap.

NATS' biggest improvement effort has, quite rightly, been focused in the Project Management area which is stated by NATS as at a level consistent with CMMI Level 4. In contrast, Asset Engineering is stated by NATS at around Level 2 and Engineering Service Delivery at just under Level 3. Since the planning and delivery of NATS' investment programme will require contributions from across the whole of NATS' business, the overall capability to deliver the programme, as measured by CMMI Level, is assessed as lower than indicated by looking at the Project Management area alone. Within the time available to it, NATS has focused improvement effort in the appropriate area (project management) and is now driving improvements in other areas of the business. This approach is assessed as entirely appropriate.

## 6 Conclusions

### 6.1 Evolution of the Investment Plan

There have been significant changes in the investment programme since 2004 but despite these changes the overall aims of the programme have remained consistent, for example the two centre / one system strategy. The way which in this will be achieved has changed since 2004 with the SACTA solution being replaced by the revised NERL Roadmap. However, even this major change has elements of continuity with the key iTEC FDP element being retained. It is concluded that the changes in the investment programme represent an evolution in the way the objectives are achieved and in the timing of the programme elements, rather than a discontinuous change of objectives or strategy.

Data in Section 7 shows the progress reported in the SIPs where the project costs are over £10m. Just over 50% of these projects (10 out of 19) have slipped in time over the period 2004 to 2009. However, looking at the detailed history of each project shows that much of the slippage can be explained as replans of what were probably optimistic original plans which were formulated before NATS improved its project management capability. Since those replans things have progressed broadly on time. A similar analysis provided by NATS, which in addition includes capex projects of £10m or less, shows that just under 30% of projects (19 out of 65) have slipped in time over the period 2005 to 2009. Since January 2006, NATS has set Contract with the Board milestones ("CWB milestones") which are set a few months to just over a year ahead. The CWB milestones thus reflect NATS' more recent project delivery performance. To date, NATS has achieved 33 out of 34 CWB milestones (97%) on time or early against the CWB date and 26 out of 34 (76%) on time or early against the original date for the milestone. It is concluded that this is evidence of NATS' improving project management and investment delivery capability over the period.

### 6.2 Customer Consultation Process

NATS reports its investment programme year on year through successive SIP and Business Plan documents and through its Customer Consultation Process. NATS' process for consultation with its customers is assessed as much improved during CP2.

In conducting this analysis of how the investment plan has evolved over time, it was very difficult to track changes and understand what factors had driven them, including changes to scope, costs and project timescales. The principal reasons for this were:

- The detailed structure and presentation of some content varies from year to year.
- No clear baseline is established and changes are not reconciled to that baseline on an annual basis.
- The basis of the costs is not stated clearly.

It is acknowledged that Logica was not part of the customer consultation process which would provide customers with a degree of continuity from year to year, and that the format of the SIP has evolved as a result of customer feedback and is subject to CAA approval. Nevertheless, it is concluded that greater clarity in the SIP and Business Plan documents in respect of the bullet points above would further inform the consultation process and assist customers in tracking progress year on year over the medium to long term.

Review of SIPs from 2005 to 2009 shows evidence of more open communication with customers about risks than there was in 2004 and some of the SIPs discuss possible options for 'O' dates, for example, on which

customer feedback is sought. The latest CP3 baseline plan is open about the uncertainties around traffic forecasts etc. and there is some sensitivity analysis on pricing. Despite these changes, the 2009 SIP and Business Plan documents do not cover alternative investment plan options, assumptions, uncertainties, risks and sensitivity analysis in any depth. In discussions, NATS explained that internally, it does carry out a thorough investigation of options including an analysis of risks for the major elements of the investment programme and that while this level of analysis is not reflected in the SIP and Business Plan documents, it does form part of the consultation process and is worked through at the customer consultation meetings and documented on the customer consultation web site. While acknowledging that this is a matter for NATS and its customers, it is suggested that it might aid transparency if these aspects were more explicitly documented

### 6.3 Benefits Delivery

NATS' benefits delivery process shows evidence of improvement over time and is assessed as broadly consistent with good practice in benefits management. Benefits are now defined and tracked as part of NATS' project Phase Review Process. Responsibility for benefits delivery is well defined and managed through the appointment of benefits owners and benefits delivery managers. Lessons learned are captured and incorporated in to a database to make them available across the organisation. The lessons learned are used to drive process improvement.

The evidence examined in this review suggests that the process would benefit from increased precision and consistency in the way in which benefits are defined and baselined and then tracked through to completion, in particular in the specification and measurement of more complex, overlapping benefits (where similar benefits accrue from more than one project or where benefits result from the output of more than one project).

### 6.4 NATS Capability

It is concluded that NATS' project management capability has improved significantly since Logica's previous assessment in 2004 for the CP2 investment plan review. It has improved in both the capability and experience of the key staff and in organisational/process capability as measured by progress along its Project Management Improvement Roadmap. NATS' biggest improvement effort has, quite rightly, been focused in the Project Management area which is stated by NATS as at a level consistent with CMMI Level 4. The evidence indicates that NATS has learned and applied lessons from its previous experience including its experience with NERC/Swanwick and from the SACTA programme.

Review of a sample of recently completed and ongoing projects has indicated that NATS has a mature capability for defining, estimating and delivering:

- airspace development projects,
- projects which deliver and roll out products which exist in close to "off the shelf" form,
- projects which relocate operational facilities and staff.

NATS has also demonstrated that it can deliver relatively small, well defined centre systems tools projects.

While acknowledging that NATS has learned lessons from NERC and from the SACTA programme and that these have been incorporated into the iTEC programme and that to date, all iTEC milestones have been achieved on time, the historical evidence indicates that NATS has not yet proven the capability to define, estimate and deliver large, complex, centre system programmes and in particular those which depend on

collaboration with European partners. The iTEC FDP programme, which is central to the revised NERL Roadmap is just such a programme and delivering it to specification, cost and timescales is assessed as high risk. It will provide a major test of NATS' capability to deliver its investment programme. This statement needs to be balanced against the significant improvements in NATS' project management capability over CP2 and the on time performance of the iTEC programme to date.

In order to deliver the revised NERL Roadmap to specification, cost and timescales, NATS will also need to successfully demonstrate capability as a system integrator. While the evidence indicates that NATS is now well placed to deliver such a programme successfully, the challenge of this task is assessed as representing a step change in difficulty compared with the programmes NATS has delivered to date, including the TC/LMARS relocation and the SAATS oceanic system. Its successful delivery to time and budget is therefore assessed as carrying a high level of risk.

## 7 Appendix A: Evolution of NATS' Investment Plan

### 7.1 Introduction

This section reviews progress on the projects which comprise NATS' capital investment plan as reported by NATS in the annual SIPs. Only projects with initial value over £10m have been included.

The diagrams show the progress year on year as reported by NATS, including:

- The target total cost (outturn, including sunk costs and full risk and contingency provisions):
  - the basis of the cost quoted was not defined for the 2005 and 2006 SIPs,
  - for the 2007 SIP onwards, the cost was either as baselined in the previous year's SIP, or as most recently approved.
- Whether the project is on target against this cost, indicated by 'traffic light' highlighting of the "cost cell".
- The target delivery / 'O' date (or in some cases 'O' date window) – this is generally taken as the date baselined in the previous year's SIP, or the approved plan date.
- Whether the project is on track against this target date, indicated by 'traffic light' highlighting of the timeline.
- The current forecast delivery / 'O' date (or 'O' date window).

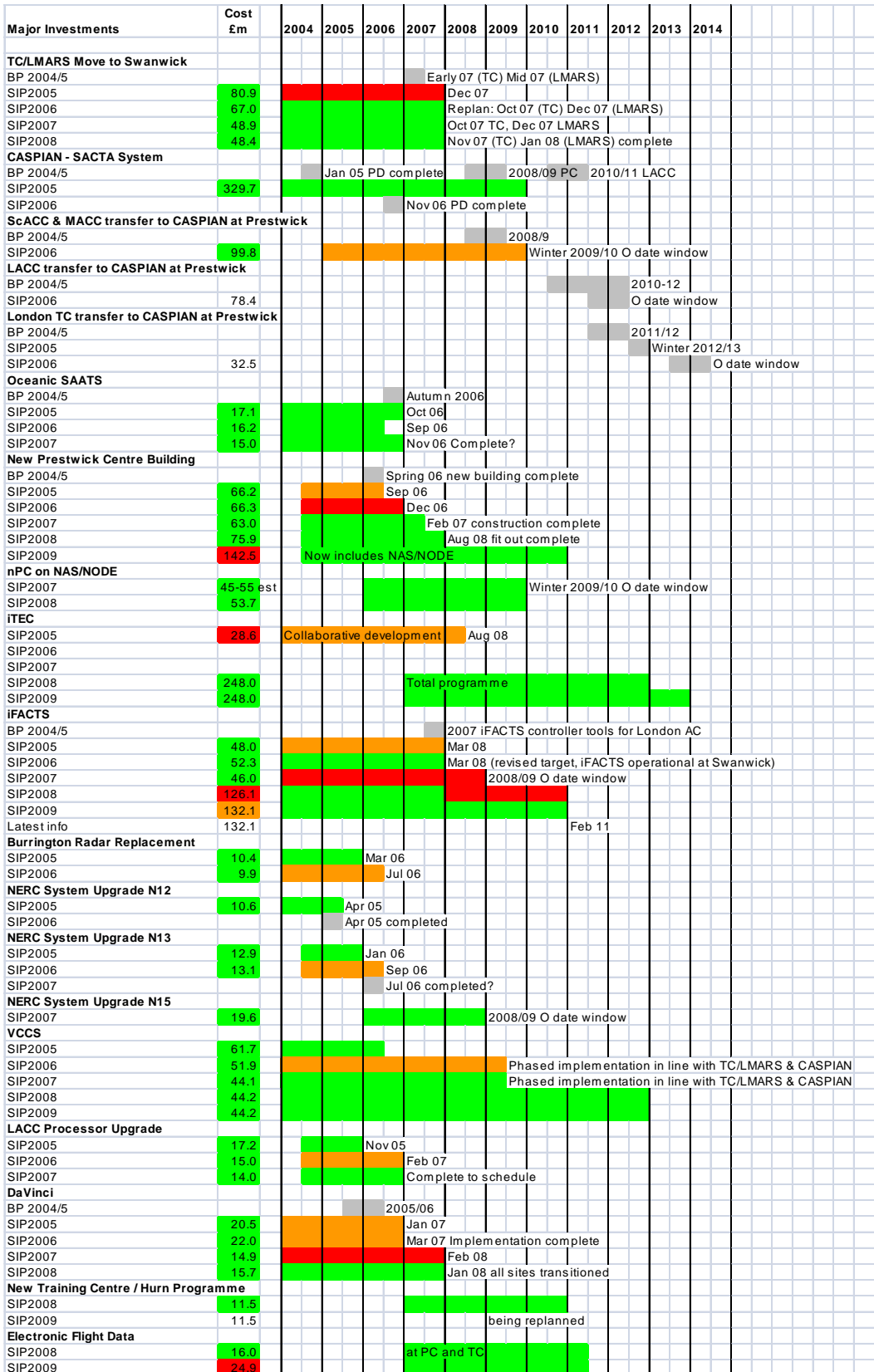
All the data and traffic light reporting are as defined by NATS in each SIP. The basis of the traffic light reporting is set out below.

SIP	NATS Cost Traffic Light			NATS Timescale Traffic Light		
	GREEN	AMBER	RED	GREEN	AMBER	RED
2005	Forecast at completion $\leq$ Approval	Forecast at completion $>$ Approval	Actual spend to date $>$ Approval	To Plan	Current phase later than Plan. Overall completion still to Plan	Completion later than Plan
2006	Forecast at completion $\leq$ Approval	Forecast at completion $>$ Approval by no more than 5%	Forecast at completion $>$ Approval by more than 5%	To Plan	Later than Plan, but overall completion to a Revised Target	Completion later than Plan
2007 onwards	Unchanged or less than previous SIP	Within 5% of previous SIP	More than 5% of previous SIP	Within 2 months of previous SIP baseline	Within 6 months of previous SIP baseline	More than 6 months of previous SIP baseline

It is worth noting that the traffic light reporting is generally carried out against the previous year's SIP baseline, rather than against the original plan. Whilst the basis of the reporting changed somewhat over the years, it still gives an indication of whether the project was progressing to plan.

## 7.2 Overview

The diagram below shows progress for projects with an initial value over £10m.



### 7.3 Evolution of Key Projects

This section describes in more detail how the plans have evolved since the 2004/5 Business Plan for some of the key 2005 investment projects.

#### CASPIAN / SACTA

Major Investments	SIP Cost £m	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
<b>CASPIAN - SACTA System</b>												
BP 2004/5			Jan 05 PD complete					2008/09 PC		2010/11 LACC		
SIP2005	329.7											
SIP2006					Nov 06 PD complete							
<b>ScACC &amp; MACC transfer to CASPIAN at Prestwick</b>												
BP 2004/5							2008/9					
SIP2006	99.8							Winter 2009/10 O date window				
<b>LACC transfer to CASPIAN at Prestwick</b>												
BP 2004/5										2010-12		
SIP2006	78.4									O date window		
<b>London TC transfer to CASPIAN at Prestwick</b>												
BP 2004/5										2011/12		
SIP2005										Winter 2012/13		
SIP2006	32.5											O date window

Collaboration with AENA continued through 2004 and 2005, with assessment simulations in Spain completed in May 2004. In the 2005 SIP, the upgrade of London TC to CASPIAN (SACTA) was deferred by a year as a key risk reduction measure for the most complex and demanding TC operational environment, with consequent delays to the final move to a common system and the associated operating cost benefits.

Difficulties with gaining agreement with AENA on the common future systems were first reported in the 2006 SIP. A memorandum of cooperation was signed with AENA in July 2005, and a Joint Venture with AENA created in February 2006 through which the SACTA system would be developed and funded. There was felt to now be greater understanding of the complexity and challenges of the CASPIAN programme and work continued during 2006 to refine and document this. Some early milestones had been delayed, but SACTA was reported to be meeting revised milestones. 'O' dates were now expressed as 'windows' to be confirmed at end of CASPIAN Project Definition in November 2006. NATS continued to develop and optimise its CASPIAN delivery strategy, including ways of accelerating elements of the programme.

By the time the 2007 SIP was published, the roadmap for achieving the CASPIAN programme had been significantly changed. There had been delays in agreeing the Joint Venture with AENA, leading to risk to the New Prestwick Centre 'O' date, due to NATS' and AENA's short term needs diverging: AENA were focused on delivering the current SACTA platform to meet existing service delivery commitments, rather than the common NATS / AENA platform, whilst NATS were committed to opening the New Prestwick Centre and consolidating the Manchester Area operation in 2009/10. The strategy of collaborating with AENA and developing SACTA for NATS' use was halted and replaced by a revised NERL Roadmap.

The aims remained unchanged, with the New Prestwick Centre to go live in 2009/10 in support of the Two Centres / One System strategy, and iTEC-FDP concepts to be used as the foundation for the future systems strategy. There would be a simpler transition, and no impact on either iFACTS or the TC/LMARS move to Swanwick. The New Prestwick Centre would initially use some existing NATS modules – NODE (radar) and NAS/EDDUS (flight data) processing systems. Other new elements of the common system would be adopted,

e.g. Workstation, Voice Communications, Support Information, Enhanced Short Term Conflict Alert (ESTCA) MODE S tools.

### New Prestwick Centre

Major Investments	Cost £m	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
<b>New Prestwick Centre Building</b>												
BP 2004/5												
SIP2005	66.2											
SIP2006	66.3											
SIP2007	63.0											
SIP2008	75.9											
SIP2009	142.5											
<b>nPC on NAS/NODE</b>												
SIP2007	45-55 est											
SIP2008	53.7											

In the 2005 SIP, delays to the start of the main contract phase were reported, but early works were in progress. The delayed start resulted in a delayed completion date, but was not expected to affect the winter 2008/09 'O' date. An option to bring the 'O' date forward by a year to winter 07/08 was presented, enabling early use of the SACTA system (CASPIAN was then thought to be making good progress) and NATS to gain more experience of the SACTA system ahead of introduction into the more demanding London AC environment, reducing technical & programme risks.

In the 2006 SIP, the New Prestwick Centre building was said to be progressing well, although the timeline progress indicated the end date had slipped by a few months to December 2006. In the 2007 SIP, the target end date had apparently moved to March 2007, and the building was completed in February 2007. It is not clear what is included in the timeline for the project reported on in the 2008 SIP, with an end date shown in early 2008; the text states that the fit out of the building is forecast to complete in August 2008. In the 2009 SIP the progress reporting combines the data for the building and NAS/NODE, making direct comparisons difficult.

### iFACTS

Major Investments	Cost £m	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
<b>iFACTS</b>												
BP 2004/5												
SIP2005	48.0											
SIP2006	52.3											
SIP2007	46.0											
SIP2008	126.1											
SIP2009	132.1											
Latest info	132.1											

iFACTS was first approved in 2003 at a total estimated cost of £52.0m. In the 2005 SIP, delivery of iFACTS had already been delayed by a year to winter 2007/08: it was proving to be a challenging project, NATS being the first ANSP to deploy first generation automation tools operationally. The delay was due to increased scope reflecting fallback issues and the need for architecture resilience. iFACTS was re-approved for an increased cost of £67.1m comprising £46.0m specifically for the development and delivery of the iFACTS application and £21.1m for NERC software build N16, required to enable the NERC platform to host the application.

The SIP for 2006 reported progress, including hardware purchases and the software implementation contract being placed with PRAXIS. Although the project was technically challenging, the detailed design was said to be progressing well, with technical issues being solved at an acceptable rate. However, the Swanwick system upgrade programme was congested, so additional resources were needed to ensure that the required changes to existing systems would be made in time for the PRAXIS delivery. iFACTS was to be delivered to Swanwick TDU in Mar 2007 for simulations and proving MOP prior to ATC training, and was on track for a spring 2008 'O' date.

The 2007 SIP reported a decision by the NATS board to put back the 'O' date for iFACTS to 2008/09, due to the size of the iFACTS software increasing (due to contingency and fallback modes), and the congested Swanwick support programme. Test facilities for the iFACTS project had been doubled in size and the development teams expanded to contain the schedule impact.

The business case for iFACTS was re-approved by the NATS Board in January 2008, which approved a revised cost, delivery and benefits profile. iFACTS was now expected to be ready for deployment in May 2010, although customers were to be consulted over whether to delay this to winter 2010/11. The board approved a revised cost of £126.1m. The drivers for the increase were:

- Increase in like-for-like project costs of £36.1m, required as a result of underestimating the complexity of the software development and integration.
- The inclusion of ATCO training and ATSA redundancy costs at £12.5m, hitherto provisioned within the LACC Unit training budget.
- Additional Risk and Contingency of £10.4m.

In May 2008, the opportunity was taken to accelerate a mid-life processor upgrade at a cost of £4m (to avoid otherwise greater costs and upgrade whilst in operational service), increasing the approval level to £130.1m. In November 2008, an additional £2.0m funding for a change request was agreed to implement the interim fallbacks solution and to complete the project definition of full fallbacks, resulting in the current approval of £132.1m.

The latest SIP (2009) states that the programme remains on track to meet a winter 2010/11 'O' date.

**iTEC**

Major Investments	SIP Cost £m	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
<b>iTEC</b>												
SIP2005	28.6		Collaborative development				Aug 08					
SIP2006												
SIP2007												
SIP2008	248.0				Total programme							
SIP2009	248.0											

The 2005 SIP reports that the iTEC Memorandum of Understanding (MOU) was agreed with Spain and Germany (AENA and DFS) in October 2004. Whilst the system design phase had been completed successfully, the overall project had been delayed by the time taken to conclude collaborative agreement between partners.

In the 2006 SIP, it was noted that it had taken longer than forecast to gain agreement with AENA/DFS on common future systems. The 2004 iTEC MOU had delivered an agreed set of user requirements for an advanced FDP system and tools, but NATS, AENA and DFS were continuing to seek the optimum arrangements that would enable each partner to conclude a commercial position with the common supplier. All three parties were committed to working within iTEC on common deliverables.

The revised NERL Roadmap was introduced in the 2007 SIP. NATS remained committed to the development of a replacement flight data processing system through iTEC introduced first at Swanwick. The development path with Indra had been agreed in outline between the sponsoring collaborative partners (AENA, DFS & NATS).

The overall iTEC programme within the revised NERL Roadmap was described in the 2008 SIP:

- In 2013 the NATS iTEC programme would provide the modern, resilient Flight Data Processing system needed to replace NAS as the final stage of Tranche 6 of the revised NERL Roadmap. iTEC would also be essential to enable deployment of advanced tools in later Roadmap Tranches, and was expected to be one of only a very few common European systems at the heart of SESAR.
- iTEC was being developed with DFS and AENA under an iTEC Collaboration Agreement signed in May 2007. The three parties' timescales were aligned. Other ANSPs were already expressing interest in adopting iTEC as their FDP solution, providing further collaboration and interoperability opportunities. In August 2007 Indra, the iTEC supplier, had been contracted by NATS to provide the key 'middleware' element of the new FDP system (iMAS) and in December 2007 Indra was awarded a major NATS contract to develop the iTEC software itself and ensure its integration with existing NATS systems including NERC.
- As well as undertaking a major software procurement/system development, the iTEC programme also entails an extensive systems integration and deployment element. Work on these other elements had just commenced. Indra would deliver the new FDP by the end of 2011. NATS would then complete integration, training and transition by the end of 2013.

The breakdown of the overall iTEC programme was also given:

- Procurement of iTEC from Indra:
  - F&O and iMAS Project Definition,
  - iMAS (the iTEC Middleware),
  - Core iTEC software for all three partners,
  - NATS specific software components.
- Integrating iTEC FDP into NATS' Infrastructure:
  - Project Definition,
  - Procurement of hardware and support,
  - Integrating iTEC with existing systems, making the necessary infrastructure changes to accommodate iTEC and deployment at Centres.
- Overall programme management.

The latest SIP (2009) reports that the initial development of the iTEC ‘middleware’ (iMAS) was completed in November 2007, one month ahead of schedule, and that work on the development of the iTEC software continues to progress within schedule. An Integrated Project Team (comprising expertise from NATS, Indra and Lockheed Martin) is working on the development of the iTEC and Swanwick (AC) interface and has now established a joint office. The team are completing the High Level Design. Work is progressing to schedule on the ‘iTEC Enabling’ projects to define, plan and implement the extensive integration activities necessary to transition iTEC within NATS ATM environment.

**Relocation of TC / LMARS to Swanwick**

Major Investments	SIP Cost £m	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
<b>TC/LMARS Move to Swanwick</b>												
BP 2004/5						Early 07 (TC) Mid 07 (LMARS)						
SIP2005	80.9					Dec 07						
SIP2006	67.0					Replan: Oct 07 (TC) Dec 07 (LMARS)						
SIP2007	48.9					Oct 07 TC, Dec 07 LMARS						
SIP2008	48.4					Nov 07 (TC) Jan 08 (LMARS) complete						

The relocation of TC was moved back in SIP2005 from spring to October 2007 to reduce risks to the project caused by the demanding timetable. Confidence in new ‘O’ date was expressed. Resolving programme issues had taken longer so the Project Definition phase had been extended, increasing timescale pressures. A major review had been undertaken to optimise the then current plan.

The 2006 SIP reported that the milestone for the transfer of London TC to Swanwick had been maintained. The move of LMARS now had an ‘O’ date of December 2007, but the option of an earlier ‘O’ date was being discussed with the MOD. The project had been subject to a ‘get well’ plan, but was now ‘green’ rated with a ‘stretch plan’ that was ahead of schedule. Major milestones were being achieved on or ahead of schedule, giving a high degree of confidence in the Oct 2007 ‘O’ date.

The 2008 SIP confirmed that the move of TC to Swanwick had been delivered in November 2007, and that of LMARS in January 2008 (the LMARS date was rescheduled to January 2008 in consultation with the MoD to meet their operational requirements).

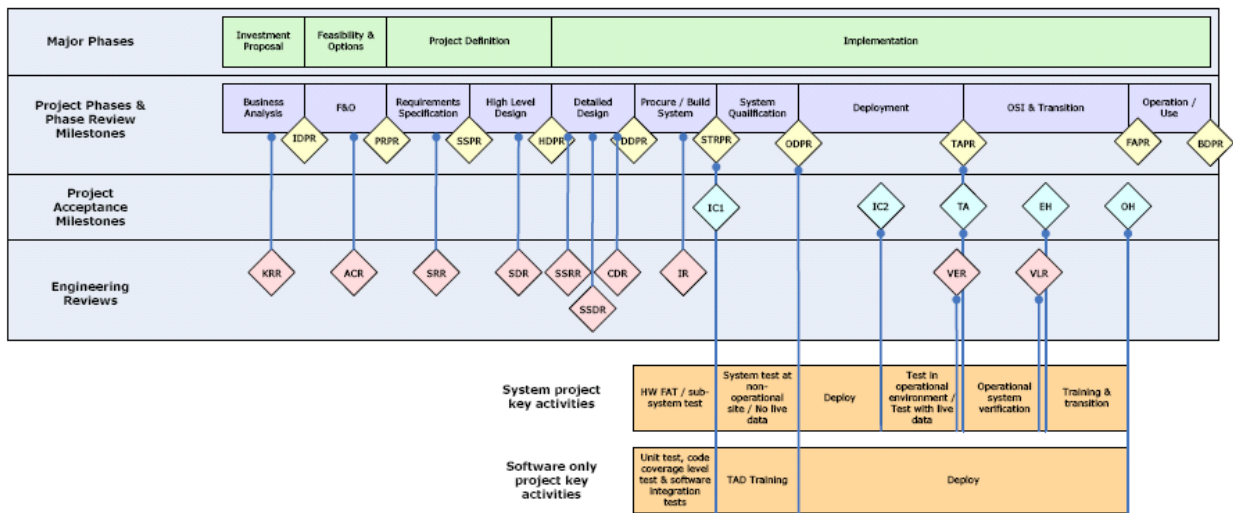
## 8 Appendix B: NATS' Progress on Benefits Delivery

### 8.1 Background

#### 8.1.1. Context

This section presents an appraisal of NATS' progress in implementing the recommendations made in an Office of Government Commerce (OGC) report on NATS' Benefits Delivery Phase Review Process which was prepared for the CAA.

NATS divides its investment projects into phases with a Phase Review at the end of each project phase. The Benefits Delivery Phase Review (BDPR) is the final review and takes place once the investment entered into operation. The diagram below shows how these project phases and Phase Review milestones fit into the full project lifecycle.



Checklists are currently defined [Ref 1] for the following phase reviews:

- Project Requirements Phase Review – PRPR,
- System Specification Phase Review – SSPR,
- High Level Design Phase Review – HDPR,
- Detailed Design Phase Review – DDPR,
- System Test Readiness Phase Review – STRPR,
- Operational Deployment Readiness Phase Review – ODRPR,
- Technical Acceptance Phase Review – TAPR,
- Final Acceptance Phase Review – FAPR,
- Benefits Delivery Phase Review – BDPR.

#### 8.1.2. OGC Report

NATS conducted BDPRs on five investment projects between September and November 2006. The five projects were:

- Pease Pottage Radar replacement (implemented Oct 2005),
- NAS software upgrade 30.01 (implemented Dec 2005),
- Mode S tools in terminal control (implemented Dec 2005),
- West End Airspace development (implemented Mar 2006),
- Emergency Dispersal Facility at Heathrow (implemented Aug 2005).

As part of the previous CP2 review, OGC were asked by the CAA to carry out a review of these five Benefits Delivery Phase Reviews to provide external assurance on the process being followed. OGC reviewed relevant documentation about the Phase Review process, the specific BDPRs and a NATS Benefits Delivery Review Summary Report, discussed the emerging findings from the above with some of the NATS assessors, and reported on the findings to the CAA in November 2006 [Ref 2].

### 8.1.3. NATS' Response

In January 2007 NATS accepted all the recommendations in the OGC report. In its subsequent response [Ref 3], dated 31<sup>st</sup> December 2008, NATS provided a table listing the OGC recommendations, comments and planned actions, target dates, and the status at the end of December 2008. For many recommendations an embedded document was included as evidence of actions undertaken in response to recommendations. The following documents were included:

- Phase Review Checklist Questions [Ref 4],
- LTIP Benefits Management [Ref 5],
- NERL Benefit Realisation Contract template [Ref 6],
- Project Lessons Learnt [Ref 7],
- Benefits Management: Briefing to Asset Management Workshop [Ref 8],
- Phase Review Process [Ref 9],
- Operational Review: Introduction of Mode S at TC [Ref 10],
- West End Delays: Delay Figures [Ref 11],
- Benefits Delivery Review of NAS Software Build 30.01 [Ref 12].

The report stated that all actions were proposed closed and that no further updates to the report were planned.

## 8.2 Logica's Approach

Logica reviewed the OGC report [Ref 2] and NATS' response [Ref 3], along with the embedded NATS documents [Refs 4 – 12]. The following additional material provided by NATS was also assessed to better understand progress since the OGC review: examples of project Benefits Delivery Phase Review reports [Refs 13-17], NATS Assessors' reports from other project phase reviews [Refs 18-23], examples of Benefit

Realisation Contracts [Refs 24-28] and Benefits Tracking Sheets [Refs 29-32], the latest versions of various process documents [Refs 33-36].

## **8.3 Assessment**

### **8.3.1. Benefits Delivery Management**

The NATS report [Ref 3] recommended that Benefits Delivery Managers and Project Managers should be educated in the way that benefits are to be defined, tracked, maximised and managed from their initial identification, through the project lifecycle and post implementation.

NATS provided a slide set covering the basic benefits management process at a high level, outlining the rationale, process (identification, tracking and delivery) and responsibilities. The slide set was produced for an Asset Management workshop in June 2007, and indicates within the slides that the General Managers were briefed in February 2007.

Computer based training on benefits management has been available since September 2007 to NATS staff involved in benefits management including project managers, investment managers, asset managers, benefits delivery managers and benefits owners.

### **8.3.2. Phase Review Process**

The NATS report [Ref 3] recommended that NATS' Phase Review process and guidance should be amended such that it reflects the particular needs of the benefits delivery review.

The Phase Review Process documentation includes separate sections which explicitly address the BDPR. There is a concern that the latest process document was not being followed in all of the 2008 BDPRs as a previous version was referenced in many cases.

### **8.3.3. Phase Review Checklists**

Three recommendations referred to the checklists used within NATS' Phase Review process.

#### **Standard Questions**

OGC recommended that some of the standard questions as currently expressed could usefully be expanded to ensure that they draw out more meaningful information than might otherwise be the case; an example was given.

NATS has changed the specific question given as an example by OGC, but the additional question has been added as a sub-question rather than creating a new checklist question. To gauge the effectiveness of the revised checklist, Logica examined the response to the revised question in each of the five BDPRs carried out in 2008. It was found that two out of four of the reviews failed to answer the sub-question.

As a general point, the use of multiple sub-questions within a single checklist 'question' is not ideal, as the reviewer may inadvertently omit to respond to one or more of the sub-questions, concentrating instead on what is perceived to be the 'main' question.

#### **Lessons Learned Checks**

OGC recommended that checklist questions be added to determine what lessons, if any, were learnt from previous projects, and what benefits consequently accrued.

NATS commented that the most appropriate time to ensure that lessons were learned from previous projects is in the early phases of a project rather than the benefits delivery review; this is a valid comment.

The latest version of the Phase Review Checklists issued in April 2009 includes questions at every phase to ensure that existing relevant lessons learnt data have been analysed, and that any new lessons are identified and recorded.

It should also be noted that NATS has introduced a Lessons Learnt Database where lessons emerging from projects can be recorded, then viewed and searched by staff via an intranet site. The current database (as of 30<sup>th</sup> June 2009) contains 85 lessons covering areas relating to cost, people, process & procedure and technical areas. Easy access to such a database by project managers should help to ensure that lessons are disseminated widely. Staff are also able to comment on lessons in the database, allowing lessons to be built on and recorded here. Usage of the Lessons Learnt database is measured monthly and reported to the NATS Head of Quality. The number of times the sub-web has been viewed and the number of individual members of staff viewing the site are recorded. The data is also broken down by Division to show which staff are accessing the database, and these are also reviewed and tracked monthly. Key lessons are used to drive process improvement through a Lessons Learnt Review Committee thus ensuring that those key lessons are, in effect, mandated across the organisation.

#### **Documentation Checks**

OGC noted a lack of linkage in some instances between the questions asked at the different review points.

Logica reviewed the checklists provided in the NATS response, and found that there was inconsistency between what is checked through the phase review checklists and what is mandated by the process. For example, the Benefits Realisation Plan is checked at every phase review, but it is not mandated in the Benefits Management Process.

The latest version of the Phase Review Checklists issued in April 2009 has been modified significantly. In this version:

- The Business Case, Benefits Contract and Benefits Tracking Sheet are now checked consistently through most of the phase reviews.
- The Benefits Realisation Plan is checked in some, but not all phase reviews.
- There are no benefit delivery checks at all in the Operational Deployment Readiness or Technical Acceptance Phase Reviews.

Thus there remain some slight inconsistencies and missing links relating to benefits in the phase review checklists which should be addressed.

#### **8.3.4. Benefits Realisation Plans**

In the six Phase Review Assessor Reports seen, none could report the existence of Benefits Realisation Plans, and four of the six recommended that the project produce (or consider producing) one. Whilst it is clearly not always necessary to produce a separate plan for the realisation of benefits, there will be cases where the benefits delivery is more complex and merits a standalone plan. Typical examples might be where benefits are forecast across a programme of projects, or where similar/related benefits are forecast across

multiple projects in overlapping timeframes, and therefore consideration needs to be given to how the benefits accruing from each project will be measured and validated.

### 8.3.5. Identification of Benefits

The NATS report [Ref 3] recommended that the manner in which benefits are defined in Business Cases should be improved to ensure that they are expressed as the benefits to customers and NATS, are complete, and are, where possible Specific, Measurable, Achievable, Realistic and Time-bound (SMART).

Logica assessed the degree to which planned benefits are SMART by looking at the example Benefits Realisation Contracts provided by NATS. In general, the benefits are considered well specified. The main concern is in the complexities of measuring some benefits, especially where similar or related benefits arise from different projects in an overlapping timescale. For example, both the EFD Project and the Scottish Programme show planned reductions in the risk index for Prestwick Centre in 2010. Safety benefits in particular can be affected by many factors, so determining the cause of changes in metrics can be very difficult, and needs to be carefully thought through. A Benefits Realisation Plan could be very useful in such circumstances.

### 8.3.6. Tracking Benefits

The NATS report [Ref 3] recommended that processes for tracking, managing and maintaining project benefits throughout the project lifecycle should be formalised to ensure that a focus is maintained on maximising the benefits and managing risks that could prevent this.

The processes for tracking, managing and maintaining project benefits have been formalised through the Benefits Management Process, particularly the use of Benefits Tracking Sheets which are to be reviewed and updated regularly.

The latest Phase Review checklists include a check at most phase reviews (there are two exceptions) that the Benefits Tracking Sheet is up to date. Whilst the benefits are considered at each phase review, these questions do not focus on either 'maximising the benefits' or 'managing risks' as identified in the original recommendation.

Examination of the Benefits Tracking Sheet template and some example Benefits Tracking Sheets shows some shortcomings with the template:

- The two earlier example Tracking Sheets (from 2007) do not record the date of the current review of benefits; the only indication of the current review date is the file name provided for each example Tracking Sheet. However, the later examples (from 2009), and the current template, now include the review date.
- The template includes both the current prediction of benefits and the prediction at the last review, but there is no indication of when the last review took place. It would be useful, in analysing trends for example, to understand the time period over which the prediction had changed. It would similarly be useful to have an audit trail showing the history of predictions on a single sheet, again so that trends (such as a constantly decreasing value of benefit) can be more easily picked up.
- There is no indication of the basis on which the traffic light status is assigned to each benefit. In the Tracking Sheet for Swanwick and Manchester Contingency, for example, the predicted dates for realisation of all benefits had slipped by several months, but green traffic lights were still shown for all

benefits. There should be some indication in the template, or on individual Tracking Sheets if more appropriate, on the rules for assigning the traffic light status.

A review of the example Benefits Tracking Sheets showed considerable inconsistency in how the sheets were completed, although later Tracking Sheets from 2009 were completed much more fully than the earlier two from 2007, reflecting the maturing process.

A check on some example NATS assessor reports from phase reviews did not provide convincing evidence that Tracking Sheets are being used consistently and effectively. It is somewhat encouraging that recent Tracking Sheet examples are more thought through than earlier ones, reflecting the evolving process.

### **8.3.7. Planning Benefits Delivery**

#### **Mode S into TC Project**

The NATS BDPR report for the Mode S into TC project recommended that the Benefits Delivery Manager should produce a consolidated benefits delivery plan which establishes how and when the updated set of benefits will be delivered and the measures to be used.

The Mode S review provided as evidence identified one benefit which was only partially achieved, due to dependence on the future introduction of tools and the equipage of more aircraft with appropriate Mode S capability. However, no benefits delivery plan has been seen and no further benefits review specific to Mode S is scheduled.

#### **West End Airspace Development Project**

The NATS West End Airspace Development BDPR report recommended that the Benefits Delivery Manager should produce a consolidated benefits delivery plan which establishes how and when the remaining set of benefits will be delivered and the measures to be used; this might be a separate document, or within some other vehicle such as the Unit Business Plan.

This recommendation was not carried through; some statistical analysis of delays in the region has been produced, but this has not been clearly related back to the airspace development planned benefits.

### **8.3.8. Additional Benefits Review**

#### **West End Airspace Development project**

The NATS West End Airspace Development BDPR report recommended that a further benefits review is completed approximately one year after implementation and when the review with the CAA Directorate of Airspace Policy has been completed.

The recommendation was not carried through, and no reason was given in the NATS response document. In discussions NATS has stated that it does not believe that the time and effort required would be justified by the added value of carrying out a full follow-up BDPR.

#### **NAS Software Build 30.01 Project**

The NATS NAS Software Build 30.01 BDPR report recommended that the post-project appraisal should be conducted as per the commitment in the Business Case.

The BDPR report provided shows that not all planned benefits were delivered, and states that a further benefit review is required for residual aspects, and will be carried out as part of the BDPR for the next NAS build. It

also states that *'plans are in place to deliver remaining functionality, but these do not relate to the realisation of expected benefits...Coordination and consolidation of all benefits provided by NAS 30.01 has not been conducted, and there are no plans relating to the tracking and realisation of individual benefits.'*

It therefore appears that functionality, but not benefits, has been transferred to subsequent builds.

#### **8.3.9. Lessons Learned Process**

The NATS report [Ref 3] recommended that the Project Lessons Learned procedure should be updated to reflect the current practices which have improved upon the documented procedure.

The process document provided was reviewed, and a request made to see the annual report of key lessons learnt, referred to in document. It is understood from NATS that no such report is produced; rather the review of lessons learnt is a live process which is updated more frequently. It appears therefore that the version of the process document provided was not quite in line with the process at the time. The latest version of the process no longer refers to an annual report of lessons learned.

## Abbreviations

AC	Area Control
AENA	Aeropuertos Espanoles y Navegacion Aerea (the Spanish ANSP)
ANSP	Air Navigation Services Provider
ATC	Air Traffic Control
ATM	Air Traffic Management
ATS	Air Traffic Services
BDPR	Benefits Delivery Phase Review
BP	Business Plan
CAA	Civil Aviation Authority
CNS	Communications, Navigation and Surveillance
CP2	Price Control Period 2
CP3	Price Control Period 3
CTC	(NATS) Corporate and Technical Centre
CWB	Contract with the Board
DFS	Deutsche Flugsicherung GmbH (the German ANSP)
ERG	Economic Regulation Group
ESTCA	Enhanced Short Term Conflict Alert
FACTS	Future Area Control Tools Support
FCP	Future Centres Programme
FDP	Flight Data Processing
iFACTS	interim Future Area Control Tools Support
IPR	Intellectual Property Rights
LMARS	London Military Area Radar Services
LTIP	Long Term Investment Plan
MACC	Manchester Area Control Centre
MoD	Ministry of Defence
Mode S	Mode Select
MOP	Method of Operation
MOU	Memorandum of Understanding

NAS	National Airspace System
NATS	National Air Traffic Services
NERC	New En-Route Centre
NERL	NATS En-Route plc
NODE	NATS Operational Display Equipment
NPC	New Prestwick Centre
'O' date	Operational date
OGC	Office of Government Commerce
ScACC	Scottish Area Control Centre (Prestwick)
SESAR	Single European Sky ATM Research Programme
SIP	Service and Investment Plan
STCA	Short Term Conflict Alert
TC	Terminal Control
TDU	Training and Development Unit
VCCS	Voice Communications and Control System

## References

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### Section 1 References

There are no references in Section 1

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### Section 2 References

Ref 1 *NATS (En Route) plc price control review for Control Period 3, 2011-2015, CAA Consultation, October 2008*

Ref 2 *NATS (En Route) plc price control review for Control Period 3, 2011-2015, CAA Policy Update, February 2009*

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### Section 3 References

Ref 1 *NATS En-Route plc (NERL) Business Plan 2004/05, Final Version (v1.0), 4 May 2004*

Ref 2 *NATS En-Route Plc (NERL) Service & Investment Plan (SIP) 2005, Final Issue – Post Consultation, 30 March 2005*

Ref 3 *NATS En-Route Plc (NERL) Service & Investment Plan (SIP) 2006, Provisional Issue – Post Consultation, 28 Feb 2006*

Ref 4 *NATS En-Route Plc (NERL) Service & Investment Plan (SIP) 2007, Final, Version 1.0*

Ref 5 *NATS En-Route Plc (NERL) Service & Investment Plan (SIP) 2008, Final, Version 1.0*

Ref 6 *NATS En-Route Plc (NERL) Service & Investment Plan (SIP) 2009, Final, Version 2*

Ref 7 *Information Request 6.1: Request 6-1 Project Overviews.pdf*

Ref 8 *L2901 - TC LMARS Relocation - Benefits Delivery Phase Review.pdf*

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### Section 4 References

Ref 1 *Final Report for Civil Aviation Authority: Quality Assurance of NATS Benefits Delivery Phase Reviews (BDPR's), draft version 0.2, dated 27<sup>th</sup> November 2006*

Ref 2 *NATS Response to Recommendations from CAA on NATS Benefits Delivery Phase Reviews, dated 31<sup>st</sup> December 2008*

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### Section 5 References

Ref 1 *Information Request 3.13: Investment Appraisals Benefits.pdf*

Ref 2 *Information Request 3.14: Org Charts.pdf*

Ref 3 *Information Request 3.15a: Summary Biographies.pdf*

Ref 4 *Information Request 3.15b: Professional Statistics.pdf*

Ref 5 *Information Request 3.16: Request 3-16 Project Mgt Processes.pdf*

Ref 6 *NERL020111.doc\_LTIP Benefits Management.pdf*

Ref 7 *09 06 22 Logica Capex Study Kick off Meeting.pdf*

Ref 8 *Request 3.17: Project Management Improvement Roadmap.pdf*

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### Section 6 References

There are no references in Section 6

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### Section 7 References

There are no references in Section 7

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### Section 8 References

Ref 1 *NERL020132F3 Phase Review Checklist Questions, dated April 2009*

Ref 2 *Final Report for Civil Aviation Authority: Quality Assurance of NATS Benefits Delivery Phase*

	<i>Reviews (BDPR's), draft version 0.2, dated 27<sup>th</sup> November 2006</i>
Ref 3	<i>NATS Response to Recommendations from CAA on NATS Benefits Delivery Phase Reviews, dated 31<sup>st</sup> December 2008</i>
Ref 4	<i>Wi107f03 Phase Review Checklist Questions, undated</i>
Ref 5	<i>NP020111 LTIP Benefits Management, Issue 1 dated Oct 2007</i>
Ref 6	<i>NATS4148 NERL Benefit Realisation Contract template, dated Oct 2007</i>
Ref 7	<i>X-PROJ-WI/116 Project Lessons Learnt, Issue 2, dated August 2007</i>
Ref 8	<i>Benefits Management: Briefing to Asset Management Workshop, presentation dated June 2007</i>
Ref 9	<i>TP-XPROJ-WI-107 Phase Review Process, Issue 3, dated July 2007</i>
Ref 10	<i>Operational Review: Introduction of Mode S at TC, Version 1.00, dated February 2007</i>
Ref 11	<i>West End Delays: Delay Figures, undated</i>
Ref 12	<i>Benefits Delivery Review of NAS Software Build 30.01, Issue 1, dated November 2006</i>
Ref 13	<i>Benefits Delivery Review of Debden Radar, Issue 1, dated May 2008</i>
Ref 14	<i>Benefits Delivery Review of Project 3061 – Hurn Airspace Development, Issue 1, dated June 2008</i>
Ref 15	<i>Davinci Benefits Review, Issue 1, dated June 2008</i>
Ref 16	<i>Benefits Delivery Review of Project 3029 (NIBS2), Issue 1, dated July 2008</i>
Ref 17	<i>Benefits Delivery Review of Project 2901 – TC LMARS Relocation, Issue 1, dated December 2008</i>
Ref 18	<i>Swanwick and Manchester Contingency TRPR Assessor Report, Issue 1, dated August 2007</i>
Ref 19	<i>VCCS TTPR Assessor Report, Issue 1, dated September 2007</i>
Ref 20	<i>nPC Building C3 DDP &amp; C4 IQPR Assessor Report, Draft B, dated September 2007</i>
Ref 21	<i>TC South West Airspace Development DDP &amp; C4 IQPR Assessor Report, Issue 1, dated September 2007</i>
Ref 22	<i>iFACTS DDP &amp; C4 IQPR Assessor Report, Issue 1, dated April 2008</i>
Ref 23	<i>iFACTS TTPR for Stage 1 LOS, DDP &amp; C4 IQPR Assessor Report, Issue 1, dated April 2009</i>
Ref 24	<i>L2749 (iFACTS) Benefits Realisation Contract, Issue 3.0, dated May 2009</i>
Ref 25	<i>L2999 (WD Closure) Benefits Realisation Contract, v1.0, dated December 2007</i>
Ref 26	<i>L4040 (NAS Build 33.01) Benefit Realisation Contract, v1.0, dated February 2008</i>
Ref 27	<i>L4193 (EFD) Benefits Realisation Contract, v2, dated September 2008</i>
Ref 28	<i>Scottish Benefit Realisation Contract, v0.5, dated January 2009</i>
Ref 29	<i>Hurn Benefits Tracking Sheet -130309</i>
Ref 30	<i>L2999 Benefits Tracking – 290807</i>
Ref 31	<i>L3070 Benefits Tracking – 130907</i>
Ref 32	<i>L4161 Benefit Tracking Sheet 19-02-09</i>
Ref 33	<i>NERL020111 LTIP Benefit Management, Issue 5, dated December 2008</i>
Ref 34	<i>NERL020132F3 Phase Review Checklist Questions, dated April 2009</i>
Ref 35	<i>NERL020111F2 Benefits Tracking Sheet template, 021007</i>
Ref 36	<i>NERL020132 Phase Reviews, Issue 2, dated April 2009</i>

## Version History

Version	Status	Date	Details of Changes	Author(s)
1.0	Draft	14 Jul 2009	Draft issued to CAA	Anne Hutchings Robert McCulloch
1.1	Draft	24 Jul 2009	Second draft issued to CAA following review by CAA	Anne Hutchings Robert McCulloch
2.2	Draft	31 Jul 2009	Restructured plus other smaller changes	Anne Hutchings Robert McCulloch
3.0	Draft	18 Aug 2009	Incorporates changes following comments from NATS	Anne Hutchings Robert McCulloch
4.0	Issued	21 Aug 2009	Incorporates changes following comments from NATS	Anne Hutchings Robert McCulloch
4.1	Issued	8 Sep 2009	C-in-C caveat removed	Anne Hutchings Robert McCulloch