Civil Aviation Authority

NERL RP2 Capex Review

Arup and Helios Phase 1 Report

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1 Executive Summary

1.1 Introduction and project brief

Arup, together with Helios, were appointed by the CAA to undertake an independent review of capital expenditure plans developed by NATS (en route) plc (NERL) for the next regulatory reference period (RP2), taking into account NERL's delivery of its capital expenditure plan during the current regulatory control period (CP3).

The CAA's objective for this review was to assess whether NERL's capital expenditure plans satisfy user needs, requirements of the Single European Sky performance scheme (SES) and the UK's Future Airspace Strategy. We were also asked to assess whether these requirements are being met in an efficient and cost effective manner.

We are grateful to NERL, airlines and the CAA for the time they have made available to us to undertake our work and the responses submitted to requests for information.

STAGE A – CP3 CAPITAL INVESTMENT

1.2 CP3 capital investment cost overview

In its latest CP3 business plan (2011-2014) NERL is planning to have spent capital expenditure of £499m (in outturn prices). This compares to a baseline expenditure projected at the time of the CP3 settlement - reflected in the 2011 Service and Investment Plan (SIP) - of £548m. The reduction is as a result of the downward revision of traffic growth projections.

We set out a breakdown of actual vs. baseline spend across the eleven SIP categories in the table overleaf.

SIP programme	Baseline plan (SIP 11)	Actual plan (BP13)	Variance actual vs. baseline	Variance actual vs. baseline (%)
Centre Systems Software Devt	£102m	£167m	+£64m	+63%
iTEC FDP and New Common Workstation	£208m	£110m	-£98m	-47%
CNS Infrastructure	£90m	£88m	-£2m	-2%
Airspace Development	£27m	£29m	+£2m	+7%
SNets and Airspace Efficiency	£29m	£29m	0	0%
Radar Site Services	£29m	£29m	0	0%
Facilities Management	£25m	£20m	-£5m	-20%
Military	£0m	£14m	+£14m	--
Development of SAATS	£9m	£9m	0	0%
CO2 and Fuel Saving	£10m	£5m	-£5m	-50%
Risk and Contingency	£19m	£0m	-£19m	-100%
Total	**£548m**	**499m**	**-£49m**	**-9%**

Table 1: CP3 capital expenditure breakdown (baseline vs. actual)

We consider there to be scope for an improved degree of transparency in relation to NERL's capital expenditure costs. A granular and comprehensive view of capital plan changes and movements would support a clearer orientation of the plan toward target outcomes and a more rigorous oversight of costs.

1.3 Delivery of benefits and outputs in CP3

NERL has invested in a number of projects that are expected to deliver benefits over CP3. NERL committed to an overall cost envelope and a set of targets in four key performance areas (KPAs). The four KPA targets are:

- Safety
- Capacity
- Environment
- Cost efficiency

NERL met its CP3 targets for 2011 and 2012. From the information it has provided to us, it is on track to meet or exceed all the CP3 targets, except for the internal environment target on CO_2.

For CP3, planned project-level information was provided by NERL for two metrics, CO_2 and safety:

- CO_2: The information is in the form of a CO_2 saving and it cannot be readily related to the 3Di score (in which the target is set).
- Safety: Benefits are given in terms of percentage reduction of risk indices at three ATC units (but not the overall weighted safety target).

It was not possible for us to determine the contribution of individual projects to NERL's targets for CP3. We note that doing this is not NERL's stated intention. NERL has indicated that to move to this approach would have been of limited value given the re-focusing of projects away from capacity and towards cost-efficiency during CP3.

KPA targets are applied 'top down'. NERL analyses the gap between planned benefits of the capex plan and targets. NERL has a comprehensive approach to assessing safety and also suitable tools (such as KERMIT and AirTOp) for assessing environmental changes. We consider that NERL has appropriate tools for assessing benefits.

1.4 CP3 programme governance and delivery

1.4.1 Programme structuring and governance

NERL explained and demonstrated to us the various stages of its capital investment planning, approval and delivery processes. Processes and accountabilities appeared to be defined to the level of individual projects, with clear procedures in place for controlling and managing costs and (subject to the findings noted in our report) the delivery of benefits and outputs.

We consider the internal review processes to be indicative of a rigorous and controlled approach to capital programme delivery.

1.4.2 Airline user consultations

NERL has in place an established process of annual SIP consultations with the airline user group. We found the overall format and structure of the SIP consultations to be a reasonable process for engaging with airline users. There was evidence that NERL has responded to the priorities and feedback of the airline users, particularly in the prioritisation of the airspace programmes and TBS following from the SIP 2013 process.

A consistent message emerging from users during CP3 has been the desire for further improvements in the availability of analysis and evidence that underpins the capital investment narrative presented in the SIP.

We consider that NERL should focus on improving both the transparency and granularity of cost information to explain key elements and movements in its plan. It should also provide business case justification and details of benefits calculations. This would help to improve further the robustness of the user consultation and challenge process and increased confidence in the plan.

1.4.3 Supply chain management and procurement strategy

Arup reviewed NERL's SCM strategy for external procurement. Whilst only undertaken at a high level, we found that many NERL initiatives aligned with good practice in terms of how overarching policy is developed into strategies and specific procurement activity.

Internal resources are considered and evaluated using alternative processes or policies. We found that this is an area that would benefit from further review, clarification and possible improvement.

In terms of implementation of strategy, we concluded that improvements can be made in the drafting of individual procurement strategy documents.

Risks and their causes and (as a separate category) potential benefits were not clearly articulated in procurement strategy documents. It is unclear to what extent this may affect delivery of value for money. We understand these processes are currently under review and are being updated.

We consider that NERL's SCM function is represented appropriately in the business and at a number of strategic levels. From our review it is clear that SCM has clear strategy, direction and leadership and its approach to supplier relationship and performance management compares favourably with examples of best practice in the regulated utilities.

It is recommended that NERL monitors and records the benefits of these strategies to provide greater confidence in future reviews.

1.4.4 Programme delivery management

NERL has sought to improve project management capability through the Projects Academy and accreditation with the APM. A suite of project management processes exist of a good quality. From our review of four very different high value projects, it was clear that these processes are implemented on a consistent basis.

1.4.5 Risk management

We have reviewed NERL's policies, systems and processes used for identifying, managing and monitoring risk.

We consider that the processes and procedures provided represent a robust set of risk management guidance documents. Additional evidence was provided during project reviews demonstrating - at a high level - that risk was managed appropriately. Without access to detailed project risk information, it was difficult for us to provide further comment on the appropriateness of this risk allowance.

Programme level risk allowances were comparatively low in value considering the complexity and size of the programme and individual projects. However, risk allowances at project level were less well defined. This means that the overall risk allowance is likely to be greater than that stated at programme level.

STAGE B – RP2 CAPITAL INVESTMENT

1.5 RP2 capital investment costs

1.5.1 RP2 cost overview

In its initial RP2 business plan proposals NERL presented two variants of its capital investment programme. Plan 1 entails a total RP2 capital investment sum

over the five years of £653m (in outturn prices). Plan 2 presents a slightly lower RP2 total investment of £603m. This is broken down into the ten programme areas summarised in the table below.

Programme and sub-programme	RP2 Plan 1 capex (£m)	RP2 Plan 2 capex (£m)
iTEC FDP/CWP	193.1	166.4
Centre systems software development	191.9	190.8
CNS infrastructure	108.3	100.5
Airspace development	66.5	51.5
Facilities management	36.9	36.9
Military	20.5	20.5
Development of SAATS	11.4	11.4
Safety Nets and Airspace efficiency	9.7	9.7
Risk and contingency	9.3	9.3
Plan total	**653.2**	**602.5**

Table 2: RP2 capital expenditure Plans 1 & 2 by programme area

1.5.2 RP2 cost breakdown and detail

Generally the level of breakdown and detail in terms of sub-programme descriptions, timescales and costs, appears reasonable to us. The main exception to this is the iTEC programme, for which very limited cost detail was provided.

Providing a cost breakdown and structure that harmonises both “live” programme and sub-programme spend during CP3 and its linkage with continued or associated spend during RP2 could form an effective basis to allow such comparisons to be made.

1.5.3 RP2 capital investment cost developments and drivers

The main differences between spend levels in the RP2 plan compared to CP3 were:

- Reduction in the levels of planned investment in Centre System and Software Development (c.14% lower than in CP3).
- Higher investment in iTEC FDP and NCW (c.40% higher than in CP3 in Plan 1, and c. 20% higher than CP3 in Plan 2
- Higher investment in Airspace Development (c. 80% higher than in CP3 in Plan 1, and c. 40% higher than CP3 in Plan 2).
- Ca. 70% reduction in spend on the SNETS and airspace efficiency programme, and discontinuation of the Radar Site Services programme following completion of radar renewals in mid-CP3.

We consider the justification provided by NERL for the levels of investment proposed across the different areas of spend within the RP2 plan to be reasonable.

1.5.4 RP2 programme efficiency

NERL provided details of the way in which cost optimisation measures are defined at individual project level and tracked through the LMM review process. NERL has also highlighted that it is committed to achieving top-down efficiency savings during RP2 that are embedded within the target KPAs, which require it to continually improve its efficiency in all areas including capex delivery.

Notwithstanding this, we consider that developing a concept for defining and progressively targeting efficiency improvements for the capital investment plan as a whole, based (initially) on top-down high level targets, would be beneficial in supporting the efficient and cost effective delivery of the RP2 plan.

1.6 Delivery of benefits and outputs in RP2

1.6.1 RP2 benefits and output measures

NERL presented the following nine types of benefits for the RP2 programmes and sub-programmes:

- Safety: Reducing the likelihood of an incident or accident in UK controlled airspace
- Service: Additional capacity, additional service resilience or reduced delay
- Cost reduction: Enable the NERL cost reductions outlined in the RP2 business plan
- Fuel savings: Reduce customer fuel burn
- Estate CO_2 savings: Reduce NERL Estate Carbon
- Sustainment: Reduce the risk of service failure
- Obligations: Investments that allow NERL to meet its licence and legal obligations
- SES/SESAR alignment: Investments that implement changes required to support or increase NERL alignment with SES/SESAR
- Enabler: Investments that provide technology or capabilities that enable other investments to deliver the benefits above

Benefits were only quantified across the core measures of safety, service, cost reduction and environment (fuel and CO_2 savings) and sustainment. In all other areas benefits are described qualitatively in the business cases.

1.6.2 RP2 target metrics

NERL presented quantified overall targets for RP2 in the four key performance areas of safety, capacity (service), environment (fuel and CO_2 savings) and cost efficiency (cost reduction), with targets are presented for the Plan 1 and Plan 2 variants of the business plan. These metrics differ from the metrics presented at programme / sub-programme level and also differ from the target metrics for the SES performance scheme over RP2.

NERL's view is that both Plan 1 and Plan 2 will achieve SES performance targets over RP2. NERL did not provide information to determine the contribution of individual programmes and sub-programmes to the SES targets.

1.6.3 Benefits expected for RP2

NERL has provided information on planned benefits for the RP2 programmes and sub-programmes. The expected benefits for Plan 1 and Plan 2 are as follows:

- **Safety:** Safety benefits are expected to be delivered from 2016, reaching steady state from 2022 onwards. The greatest benefits are expected from the airspace development programme (NTCA, LAMP), NCW and iTEC-FDP programmes.
    - Plan 1 is expected to deliver a 42 point reduction in the risk index by 2022;
    - Plan 2 is expected to deliver 20 fewer points off the safety risk index compared to Plan 1. This is because of a delay to the LAMP sub-programme within the airspace development programme.
    - NERL presented both Plan 1 and Plan 2 as achieving a 13% reduction in accident risk per flight. NERL would ensure it maintains the same target for Plan 2 as Plan 1, despite less structural safety improvement, by allowing for a higher risk of delays.
- **Capacity:** Benefits are expected to be delivered from 2017 onwards, through North Sea improvements, NTCA and queue management. Benefits plateau at 23 additional flights per busy hour in 2020 (beyond RP2). Plans 1 & 2 are expected to deliver the same capacity benefits.
- **Cost efficiency:** The largest cost efficiency benefits are expected to be delivered through the interim multi-sector planner project (around £5m saved per year in RP2), with another £4m of savings delivered by the end of RP2 through projects in facilities management, NTCA, centre systems software developments and CNS infrastructure programmes. Savings are expected to reach a plateau of £10.7m p.a from 2021 onwards (beyond RP2). Plan 1 & 2 are expected to deliver the same cost efficiency benefits.
- **CO_2 benefits** from Plans 1 and 2 are measures in kilotonnes (kt) per annum, whereby:
    - Plan 1 delivers increasing savings during RP2 up to 870kt CO_2 saving p.a. by the end of RP2;
    - Plan 2 delivers a total of 590kt of CO_2 savings, fewer than Plan 1 during RP2, due to delays in the airspace developments programme and changes in the CO_2 and fuel savings programme.

1.6.4 Realization of RP2 benefits

NERL provided planned project benefits for each quantified metric in RP2 from its individual project estimates.

From the information we received, we concluded that NERL is anticipating appropriately future European requirements in its capital programme. However, there is a risk that the Implementing Rules could change before publication, and this could impact on NERL's benefits. NERL's plans appeared to align well with SESAR requirements, e.g. through the Pilot Common Projects.

Some of the largest capex projects are significantly dependent on external parties to deliver benefits. For example, LAMP is dependent on airline and airport activities and - potentially - European regulations. iTEC is dependent on European partners. These dependencies form some of the largest risks to benefit delivery in RP2.

Project delays (e.g. to iTEC) could also compromise NERL's ability to comply with European requirements. Although NERL appeared to articulate the risks in "dependency agreements", it did not appear to assess the impact on benefits delivery.

1.7 RP2 programme planning and delivery

1.7.1 Development of the RP2 plan

The description provided by NERL of the development of the RP2 capital investment plan suggested a reasonably robust and transparent process. The overall structuring of the RP2 plan was based on the same programme areas CP3.

Whilst the overall scope and structure of the RP2 plan was presented clearly, there was limited visibility of the detailed structure and interrelationship between the elements of each programme at project level from the information provided.

1.7.2 Risk management

The RP2 capital investment plan document set out the following allowances (in outturn prices) for risk and contingency:

- Plan 1 = £9.3m risk on £653.2m expenditure (1.4%)
- Plan 2 = £9.3m risk on £602.5m expenditure (1.5%)

In addition the capital cost for each project included an element of risk and contingency. The total allowance for risk within projects was less clear.

We consider that the risk identified at programme level may be understated.

Risk and contingency is stored within each project budget as well as in the overarching RP2 risk and contingency value of £9.3m. The overall allowance for programme and project risk combined was not evidenced. Going forward, we consider that it is important that NERL provides a clearer statement on the overall value of risk and contingency in the plan.

1.8 RP2 programme value for money

Notwithstanding the limitations of our review in terms of scope and approach, we consider there is reasonable evidence to support a view that the RP2 Plan can be expected to offer value for money for airline users. Whilst there is room for

improvement – as reflected in our recommendations – we consider that on the whole, NERL has the capability to manage effectively the delivery of its capital investment projects and to control costs. We consider that NERL has procurement and supply chain management processes in place that should ensure it delivers its capital programme in a cost-effective manner.

NERL takes an active approach to the modelling and tracking of project benefits, which we consider should help ensure the programme elements it invests in deliver the expected benefits for the end users, relative to the cost invested.

We note that the focus of our review has been around NERL's current and prospective ability to manage and deliver its programme, and its planning and strategy for the RP2 programme. It has not been within the scope of this review to undertake any *detailed* validation or benchmarking of the costs of the RP2 programme.

1.9 Revised Business Plan (RBP) – updated capital expenditure proposals

1.9.1 RBP capital expenditure costs

We reviewed the updated RP2 capital expenditure proposals in NERL's Revised Business Plan (RBP), provided for review on 18th October 2013.

The RBP proposals are the same in terms of capital investment by programme area as the "Plan 2" capex presented in the initial business plan for all programme areas apart from airspace development for which investment proposed in the RBP is £15m[1] higher than Plan 2.

1.9.2 Revised benefits projects in the RBP

NERL's revised RBP capex is projected to achieve the same benefit targets for both environment / CO_2 and capacity metrics as the original Plan 1.

In terms of cost savings, these are at levels that lie between Plan 1 and Plan 2. Relative to the EU-wide cost efficiency target set by the EC, NERL's plan goes further in terms of both efficiencies in determined costs and efficiencies in determined unit costs.

We consider that NERL's process of user consultation around its RP2 capital expenditure proposals leading up to the release of the RBP have been reasonable, with an appropriate level of engagement with airline users and a clear and open discussions and exchange of views.

We consider NERL's adoption of higher spend "Plan 1" proposals for airspace development capex in its RBP to be reflective of responsiveness to airline feedback in relation to this aspect of the programme.

NERL has based RBP capital expenditure proposals for the remaining programmes on the "Plan 2" version of the capital expenditure plan, which entails significantly lower investment in the iTEC programme and reduced CNS

[1] Airspace development capex in the RBP totals £66.5m. This is the same amount that was included within the "Plan 1" proposals in the initial business plan.

infrastructure spend. We consider it is reasonable that NERL has a lower priority in its RBP for investments such as iTEC.

1.10 Conclusions and key recommendations

1.10.1 Key findings

We consider the following to be strengths of the NERL capital investment programme:

- NERL's capital investment plan is a complex, multi-faceted programme with multiple internal and external dependencies. NERL has shown it has the capability to effectively manage the delivery of the plan. NERL's internal management processes and systems were found to be consistent with good practice.
- NERL has prioritised its capital investment programme effectively, to ensure the benefits and outputs are delivered in way that will ensure both CAA and EC targets for the control period are met.
- The change in focus of NERL's capital investment plan during CP3 and reduced capital spend volumes appeared a logical and appropriate response to lower than expected traffic volumes during the period.
- We consider the airline user consultations were a useful and transparent process. NERL demonstrated a reasonable level of responsiveness to airline user feedback.
- NERL's RP2 capital investment plan was appropriately structured with a clear orientation toward delivery of benefits that will enable CAA and PRB targets to be fulfilled. We consider the benefits presented by NERL to be realistic, with robust underlying modelling and analysis.
- We consider NERL has demonstrated a reasonable degree of responsiveness to airline user feedback in its RP2 investment plans.

We consider the following aspects require development and / or further improvement:

- Transparency of costs underpinning the programme, including the reasons for variances and clear traceability from programmes to individual projects.
- Improved visibility and granularity of benefits and outputs, enabling the incremental impact of programme / sub-programme / project elements to be better understood.
- Stronger evidence around investment cost efficiency, particularly in relation internally procured projects.
- Harmonisation and clearer linkage of programme activities, costs and benefits between regulatory periods, with a consolidated overview of programme elements, their delivery timescales, costs, cross-linkages and benefits.

- Consistency in the metrics utilised for benefits and outputs measurement – to allow for a common form of measurement across regulatory periods.

1.10.2 Summary of recommendations

In this section we summarise the recommendations made from our Stage A and Stage B reviews.

- We recommend NERL discusses with the CAA and the airline user group potential options for developing a capital expenditure model for the purposes of regulatory review and analysis, which captures year-on-year capex spend during the control period.
- In the future, we recommend that NERL provides more details on project benefits to help explain the contribution of individual capex projects to the overall targets.
- We recommend NERL presents the fuel savings of initiatives. Where project level savings are presented as CO_2 benefits, these should be given as fuel savings and, if appropriate, should be linked to the associated benefits in flight efficiency improvement.
- We recommend that NERL identifies those projects that are enablers for procedural changes that then contribute to the 3Di metric, and those that directly contribute to it (e.g. LAMP).
- We recommend that NERL discusses with the CAA and the airline user group potential options for the independent review of the capital investment plan on a cyclical basis for the purposes of providing assurance to the CAA and airline users.
- We recommend that NERL explores options for carrying out its own programme of benchmarking activities, in order to gain comparative understanding and insights from other organisations into the cost and efficiency of different aspects of capital programme delivery.
- We recommend that RP2 projects are presented in a way that shows their contribution to the top-level performance targets.
- We recommend that a "do nothing" case for benefits is presented for new price control periods, showing only the benefits of projects that have been continued from the previous price control period and for which additional investment has been made in the new control period. This would then enable the incremental impact of any new projects to be shown and compared to the results of previous initiatives.
- We recommend that names and definitions of metrics, e.g. for environmental benefits, are standardised, using the same terms and definitions across all presentations.

Ove Arup & Partners Limited

6 January 2014

2 Introduction

Please note: for reasons of commercial confidentiality, a small number of redactions have been made to this version of the document. Redacted items are marked as such in the report.

2.1 CAA project brief

Arup, together with Helios, has been appointed by the CAA to undertake an independent review of capital expenditure plans developed by NATS (en route) plc (NERL) for the next regulatory reference period (RP2), taking into account NERL's delivery of its capital expenditure plan during the current regulatory control period (CP3). We present in this report the first full draft of our findings.

The CAA's objective for this review is to assess whether NERL's capital expenditure plans satisfy user needs, requirements of the Single European Sky performance scheme (SES) and the UK's Future Airspace Strategy. We have also been asked to assess whether the plans enable these requirements to be satisfied in an efficient and cost effective manner.

The review comprises two stages: Stage A focuses on NERL's track record and capability in delivering its investment projects during CP3. Stage B focuses on NERL's capital expenditure proposals set out in its initial RP2 business plan.

The key requirements of the CAA brief are set out, together with a reference to the relevant section(s) of the report in which each requirement is addressed, in Appendix A.

We would like to thank NERL for the support and assistance given in providing documentation, clarifications and explanatory meetings to support the delivery of our work.

2.2 Our approach

We have adopted a risk-based approach to our review. We define this as an approach driven by the relevance and implications of key expenditure positions within the investment plan, and the risk they represent in terms of levels of expenditure and delivery of benefits and outputs. For areas for which we assess there to be a higher degree of risk, we have carried out a more detailed review and provide more extensive commentary than for lower risk areas.

Our methodology has been based first and foremost around the desktop review of relevant documentation and data, principally provided through NERL. We provide a full list of documentation received as Appendix F to this document.

Throughout our review we have set out our requests for data, along with key areas we require clarification on, by means of an issues and queries log. This has been a "live" document that is continually updated and shared with NERL / CAA. The log has been used to keep track of responses received from NERL to give an overall record of progress of the review. We reproduce items raised under the issues & queries in Appendix D of this document.

Alongside the desktop review of project documentation, we have held a number of meetings with the NERL management teams responsible for development and delivery of the capital expenditure plans. A full list of meetings attended under this review is included in Appendix E of this document.

2.3 Report structure

The remainder of this report document is structured in two main parts.

Chapters 3 – 5 contain the Stage A review, focusing on NERL's capital investment during the current regulatory control period, CP3.

Chapters 6 – 8 contain our Stage B review. This focuses on NERL's proposed capital investment plan for the next control period, RP2.

We have also added a number of appendices that contain supporting information / analysis to the main report.

2.3.1 Stage A review – CP3

Stage A of our review focuses on NERL's capital investment for the current regulatory control period, CP3, which covers the four years from 2011 to 2014. The main objective of our Stage A review, as defined in the project brief, is to "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 from 2011 to date."

CP3 was originally defined as a five-year period running from 2011 to 2015, but was later revised to be in line with reference period 1 (RP1) of SES, which runs over the three year period 2012-14.

We begin Stage A with a review of the capital investment costs for the delivery of the CP3 investment plan in Chapter 3.

This is followed by a review of the delivery of benefits and outputs during CP3, which we set out in Chapter 4.

We conclude our Stage A review with Chapter 5, which focuses on programme governance, delivery and risk.

2.3.2 Stage B review – RP2

Stage B of our review focuses on NERL's capital investment plan for the next regulatory control period, RP2, which starts in 2015. RP2 has been defined by the EC as a harmonised reference period for all European ANSPs, and will cover five years from 2015 to 2019.

We begin stage B by reviewing NERL's proposed capital investment costs for the period, in Chapter 6.

Chapter 7 focuses on the planned benefits and outputs to be delivered from the RP2 capital investment plan.

This is followed by Chapter 8, focusing on RP2 programme planning and risk.

We conclude our Stage B review with Chapter 9, which provides a review of updated capital expenditure proposals within NERL's RP2 Revised Business Plan (RP2), where we focus on specific changes or developments to the initial business plan proposals.

STAGE A – CP3 CAPITAL INVESTMENT

3 Capital investment costs – CP3

3.1 Introduction

We review in this section the costs associated with NERL's delivery of CP3 capital investment within its Long Term Investment Plan (LTIP). We focus on the CP3 capital investment costs set out in NERL's latest business plan, comparing these to the costs planned at the time of the CP3 settlement. We highlight the key variances emerging, and their underlying drivers.

Note: NERL presents its capital expenditure plans in outturn prices, reflecting the inflation assumptions valid at point in time at which the given plan was produced. Differences between forecast and actual inflation levels as well as changes to forward-looking inflation have resulted in adjustments to versions of the LTIP.[2]

3.2 CP3 capital investment plan overview

NERL's latest CP3 business plan projects total capital expenditure of £499m.[3] NERL breaks down its CP3 investment plan into eleven programme areas, which are set out in the chart below.

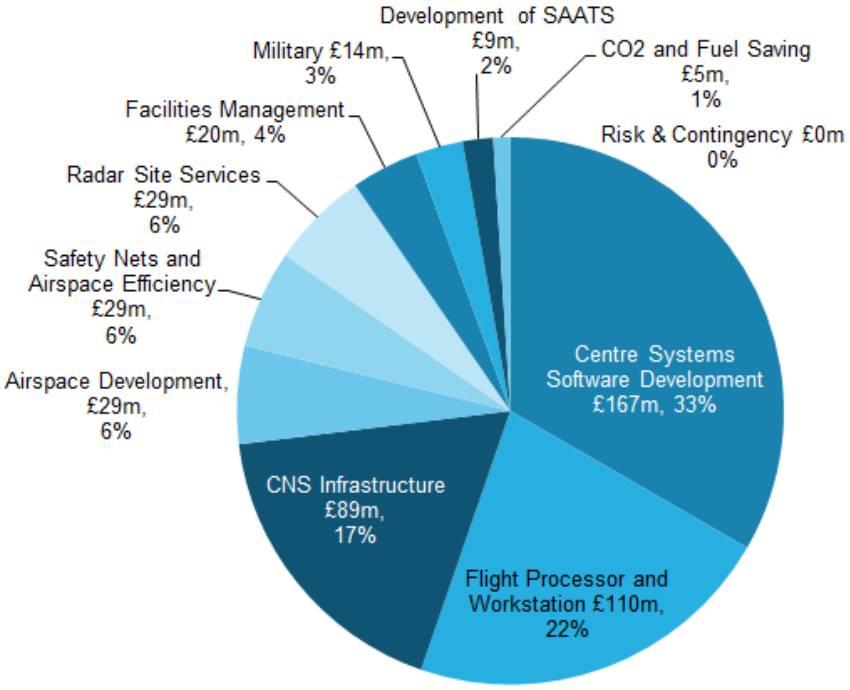


Figure 1: NERL breakdown of CP3 expenditure[4]

[2] Unless otherwise stated, all references to CP3 investment spend in this chapter reflect outturn prices as presented by NERL, based on the assumed inflation levels valid at the time the given version of the plan was produced.
[3] We note that the £14m military capex is provided to the Ministry of Defence under a separate contract, and is not funded as part of the regulatory asset base.

As indicated in the previous chart, of the eleven areas of expenditure, the following three account for the bulk of the plan:

- **Centre Systems Software Development** (33% of total CP3 spend): continued investment in developing / upgrading core centre systems (NAS, NODE, NERC and their replacements iTEC & NCW) to incorporate new functionality in line with airspace developments and tool deployments including iFACTS capability.
- **iTEC Flight Data Processor (FDP) and New Common Workstation** (22% of total CP3 spend): this expenditure category represents a major long-term development programme to upgrade core operating systems, encompassing:
    - iTEC Flight Data Processing (FDP) system, which will replace the NAS legacy system via a phased programme of implementation. iTEC will be compliant with the System Wide Information Management (SWIM) network that is the information infrastructure "backbone" of the SESAR concept; and
    - New Common Workstation (NCW): initial introduction of a new controller working environment at Swanwick TC and PC (a 'SESAR' first generation controller workstation) to be put into place across NERL operations once iTEC FDP is in place. NCW will lead to lower development / operating costs and greater operational staffing flexibility
- **CNS (Communications, Navigation and Surveillance) infrastructure** (17% of total CP3 spend): projects that sustain and enhance the remote infrastructure facilities and allied ground data distribution networks including:
    - replacement of voice communications (VCCS) infrastructure
    - upgrade of DaVinci digital data network "ring-main" to accommodate higher data flows in the SESAR concept; and
    - Other CNS Infrastructure: expected transition towards a satellite-based navigation infrastructure and the use of Automatic Dependent Surveillance (ADS) and Multi-lateration to augment radar

The remaining eight areas of spend (in order of size) are:

- **Airspace Development** (6% of CP3 spend): projects that revise airspace and route network structures, including those investments that are required to deliver airspace concepts supporting the NERL/IAA FAB, FAS, FABEC and the FAB4/Borealis alliances. These include LAMP and NTCA.
- **Safety Nets and Airspace Efficiency** (6% of CP3 spend): projects primarily focused at providing controllers with automated safety nets and tools to maintain, and where possible improve, the safety of the operation.

[4] Source figures provided in presentation slides, "Capital Expenditure", 14.08.2013

- **Radar Site Services** (6% of CP3 spend): conclusion of the major replacement of radar infrastructure in order to overcome processing capacity limitations, deploy Mode S SSR and reduce ownership costs).
- **Facilities Management** (4% of CP3 spend): projects that maintain building, accommodation and allied facilities across the NERL estate to enable other services to be provided. The estate consists of control centres at Swanwick and Prestwick, the corporate and technical centre and over 150 remote navigation, surveillance and communications sites.
- **Military** (3% of CP3 spend): this capex is delivered under NERL's "FMARS" commercial contract with the Ministry of Defence. This spend is not included within NERL's Regulated Asset Base.
- **Development of SAATS (Shanwick Automated Air Traffic System)** (2% of CP3 spend): development of the Oceanic flight data processing system used to support operations in the North Atlantic region (jointly with NAV CANADA).
- **CO2 and Fuel Saving** (1% of CP3 spend): Provision of capital expenditure to implement additional measures that will provide aircraft with more efficient flight trajectories thereby reducing operator fuel costs, with the aim thereby of achieving the 4% target CO2 reduction by the end of CP3.
- **Risk & Contingency** (0% of CP3 spend): NERL's current CP3 capital expenditure plan does capture risk and contingency as a standalone category presented alongside other programme areas. Risk amounts are accounted for at project level. We review the risk provision within the CP3 plan in Section 5.7 of our report.

3.3 Evolution of the plan

3.3.1 Baseline position

Our assessment of the CP3 capital expenditure "baseline" position is based on the NERL's SIP 2011 consultation document. The SIP 2011 was finalised following conclusion of the CAA's CP3 Price Control Review in December 2010 and therefore represents NERL's final proposals for capital expenditure prior to commencement of the control period. Total projected CP3 capex in the SIP 2011 is £548m.

Changes applied to NERL's capex proposals during the CP3 consultation process in the run-up to the final SIP 2011 included:

- Alteration of the CP3 timescale from a 5-year period (2011-2015) to a 4-year period (2011-2014), in order to align the end date of CP3 (and the start of the subsequent control period, CP4) with European Reference Period timescales (end of RP1 in 2014, start of RP2 in 2015). This resulted in the revision of proposed capex spend from a 5-year total of £670m proposed in the original BP10 business plan, to a 4-year total of £563m encompassed within NERL's revised BP10 business plan.

- Further reduction of CP3 planned spend, at the request of airline users. This entailed a reduction from £563m in NERL's 2010 business plan to £548m in the SIP 2011, enabled mainly by amendment and slowing down elements of the iTEC programme.[5]

For the remainder of our review and commentary on CP3 capital expenditure, we have taken the capex proposals in the SIP 2011 as the baseline against which actual and projected spend in the current plan is compared.

3.3.2 Investment plan variances

We depict in the charts below the variances in total CP3 spend and year-on-year spend profile between the following successive business plan documents:

- SIP 2011: baseline CP3 capital expenditure plan
- SIP 2012: updated plan presented for 2012 airline user consultations
- SIP 2013: updated plan presented for 2013 airline user consultations
- Actual business plan: further updates to planned spend, presented August 2013

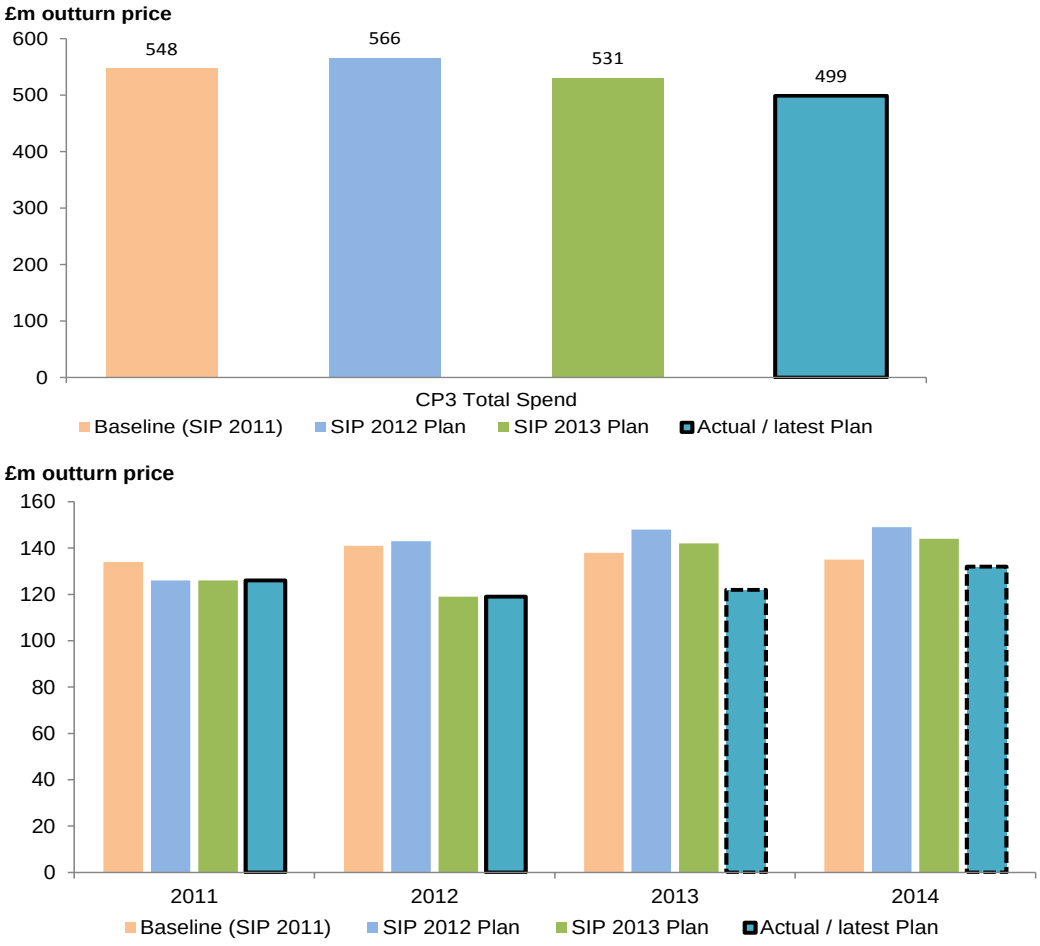


Figure 2: CP3 capex spend – comparison between SIP / business plan versions

[5] Source: "Action 16 - CP3 versus 2011 SIP.pdf"

As indicated above, the actual CP3 total capex projection of £499m is 9% (£49m) lower than baseline. Following SIP 2012, total planned investment has been subject to downward adjustment in both subsequent plans.

In terms of the year-on-year spend profile, annual capex levels in BP13 do not show major year-on-year fluctuations. Whilst a slightly higher annual spend level is now projected in BP13 for the final two years of CP3, total annual spend remains well below the levels projected in the baseline plan.

NERL has indicated that it has revised downwards its total CP3 capital expenditure as a result of reduced projections of traffic growth. Actual traffic volumes have fallen below forecast levels during the control period, resulting in downward adjustment of forecasts of future traffic growth within successive plans of CP3 capital expenditure.

The most notable impacts of the downward revision of forecast traffic have been:

- Significantly reduced spend on the iTEC FDP and New Common Workstation since SIP 2012, the main capacity-enhancing element of NERL's investment plan.
- Increase in expenditure on legacy operational systems to compensate for non-deployment of iTEC in the interim.

We explore in the next section of the report the changes in spend for the different elements of the plan, and the extent to which the above factors can be attributed to the variations in the plan compared to the original baseline position.

3.4 Programme breakdown and cost detail

3.4.1 SIP expenditure overview

The main analysis that NERL has provided documenting the scope and costs of its CP3 capex plan is contained within the SIP and supporting documentation. The SIP provides narrative of key developments, mainly at the level of the eleven programme areas detailed above, with high-level numerical information provided for review. The most recent SIP summarised the changes in CP3 projected capex profile since the original SIP 2011 in the chart that we reproduce overleaf.

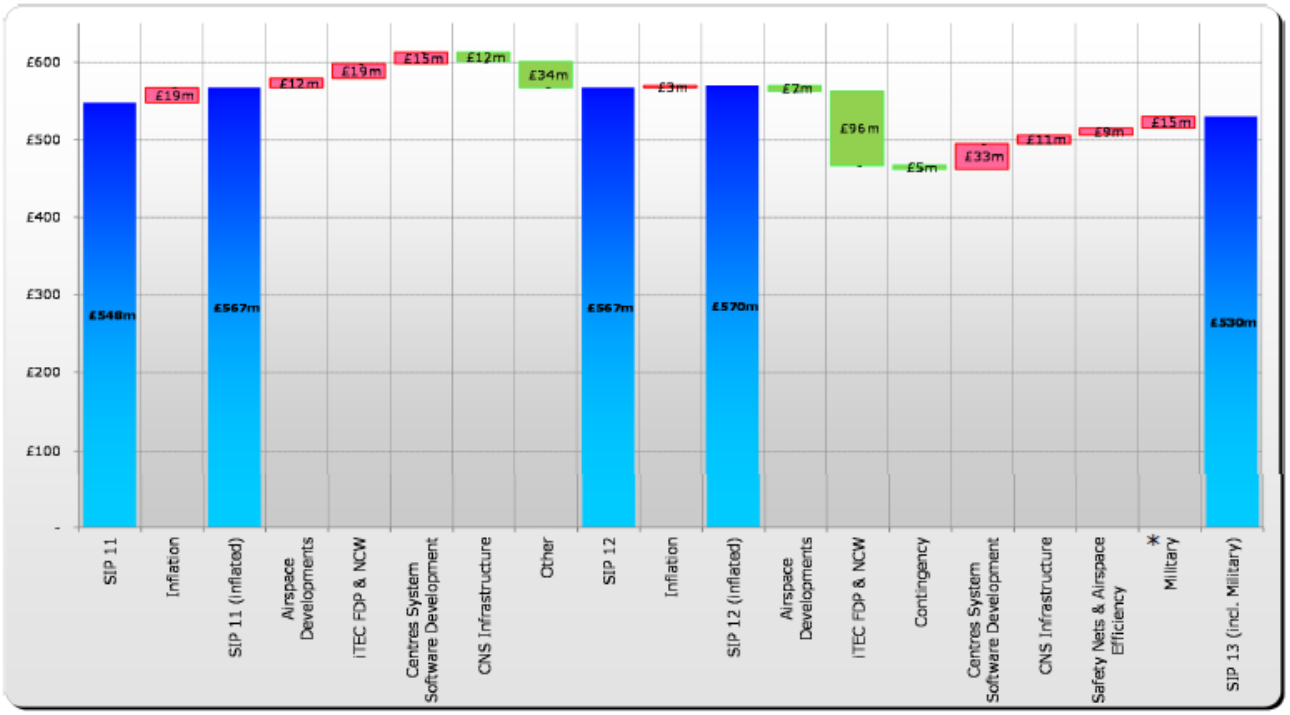


Figure 3: Evolution of CP3 capex plan SIP 11 – SIP 13[6]

As well as providing variance analysis at the programme area level, the SIP also documents developments / variances in expenditure and delivery for a selection of "key projects". These are major projects that comprise a significant portion of spend within the relevant programme areas[7] – although there is limited level of quantified analysis and tie-in within the SIP between the narrative on key projects and the wider, consolidated view of variances within the overall plan.

3.4.2 CP3 Project Breakdown

NERL has provided a spreadsheet breaking down spend by programme area, together with details of individual project costs for 130 projects that make up the programmes.[8] This compares planned CP3 spend between the original business plan, successive versions of the SIP and the latest plan. The programme areas for which a breakdown by individual project is given are as follows:

- Centre systems software development (88 individual projects)
- Airspace development (18 individual projects)
- Radar replacement (RSS) (12 individual projects)
- Facilities management (12 individual projects)

[6] Source: SIP 2013, p.28
[7] The SIP 2013 provided details for six key projects: iTEC FDP, Surveillance Programme Step 1 AC Deployment, Swanwick AC NERC System Upgrades, RSS, CNS Infrastructure – New Data Network and Centres Infrastructure. The six selected key projects account for £182m of CP3 total spend.
[8] This detail was provided in the spreadsheet "Capex 55 – Project level data for CP3 with comments.pdf"

For the remaining areas of capital investment (iTEC FDP and New Common Workstation, CNS infrastructure, SNets and Airspace efficiency, Military, Development of SAATS) that account for half of the total plan spend, a breakdown of expenditure by project has not been provided.[9]

For each of the 130 line items captured in the project-level cost breakdown referenced above, NERL provided a short commentary of the given movement in cost between the respective plans. In most cases this narrative gives an indication of the reason for the given cost movement, e.g. whether it is due to scope increase / decrease, cost overrun or efficiency, a new requirement or a deferral. Whilst the project level breakdown provides a high degree of granularity in some areas, such as centre systems projects, for other areas showing high spend and significant expenditure variation – iTEC being the most notable example – only a high level summary of the main reason for the variance in the given area has been provided.[10] .

3.4.3 LMM monthly dashboard reports

NERL has also provided samples of its more detailed internal programme dashboards presented over the last six months at the monthly LMM review meetings. These contain tables of cost variances, changes to schedules / milestones and risks at individual project level. The plan also gives up to date snapshot of the overall plan cost levels and documents specific factors driving any adverse (or favourable) variances. The degree of detail provided in the dashboard documentation is high, giving a clear view of the "live" status of the plan is given through this process. We comment further on the LMM dashboard documentation in Section 5.6.

3.4.4 Live review of projects in the NIBS system

In addition to the above documentation, NERL also provided project-level documentation detailing budget, control and approval processes for four individual sample projects agreed in discussion with Arup. These were provided alongside a "live" demonstration by NERL of project processes in the NATS Integrated Business System (NIBS). The projects concerned were:

- EFD (part of centre systems software development);
- Datalink (also part of centre systems software development);
- NERC Build L4330 (also part of centre systems software development); and
- Dover-Lydd (part of airspace development).

These were identified as projects that are material in terms of overall spend, and which – in the case of EFD and Datalink – had experienced changes / increases actual cost compared to baseline plan. The documentation provided for these

[9] NERL has stated that it believes it has provided material at a representative level of detail that is sufficient for the purposes of the project terms of reference.
[10] Taking iTEC as an example, NERL has attributed the £98m variance to the revised iTEC development and deployment strategy. Although NERL has provided various documents relating to iTEC / NCW development and deployment, this has not included quantified analysis of the cost breakdown and cost impact of the revised strategy.

projects included details of original and updated cost estimations through the respective project stages, commentary on cost variances and a breakdown of cost amounts between internally and externally procured capex. NERL also provided an on-screen overview of change control documentation, including the system documentation, such as the "CR2" form, utilised for justification and approval of drawdown on project risk allocation, which included commentary and analysis of the basis for cost escalations / revisions to delivery schedules experienced on those projects. (We review these examples within the context of project management and control processes later in this report.) Although the examples provided are a useful indicator of project control process, NERL has not provided any consolidated view of cost escalations / revisions that the project-level data may feed into.[11]

3.4.5 Our opinion

Overall, NERL's CP3 programme documentation provides some high-level analysis of the principal developments in the programme and the cost impacts. However, beyond the overall commentary of variances at programme level and the information relating to specific key projects and sample projects requested by Arup, there is limited quantified information explaining the movements in projected CP3 costs at a more detailed level.

The SIP level documentation remains high-level, and does not present a direct tie-in with the highly granular, system-based data informing the LMM dashboard. Whilst key drivers in the various programme areas are documented in some detail, it is not entirely evident what magnitude these have in the overall programme scope, and tie-back to wider cost movements is limited. Different terminology is used in different parts of analysis provided (e.g. programmes, key projects, projects) and linking between them at a quantified level is often challenging.

The internal LMM documentation does provide a clear and granular overview of changes and developments in capital investment costs. However, this analysis presents only a snapshot of detailed project movements and developments for the given month, and does not tie-back to a longer-term macro-level view of changes to the cost profile for the duration of CP3, except in relation to the programme-level movements that are shown.

NERL has stated that its approach to delivering the capital expenditure plan is focused on reference period target outcomes, and that scrutiny of actual vs. baseline spend at individual project level may not necessarily add value for its customers. NERL has also highlighted the importance of being able to flex project benefits in service of achieving targeted outcomes delivers better value to customers than alternative approaches.[12]

Notwithstanding this, we consider there to be scope for an improved degree of transparency in relation to NERL's capital expenditure costs. We recognise the need for NERL to retain flexibility in its approach to orient its plan to higher-level

[11] NERL has stated that it considers the samples provided, illustrating how changes in project costs have been managed through the system, are sufficient in explaining cost escalations / revisions for the purposes of the project terms of reference.
[12] NERL has described how, "if a particular project seems unlikely to deliver the desired cost benefit analysis then we substitute alternative projects/activities aimed at delivering equivalent benefits more quickly and smoothly than would otherwise be the case."

outcomes, but we do not consider that provided more detailed scrutiny would detract from this aim. We consider that a granular and comprehensive view of capital plan changes and movements would support a clearer orientation of the plan toward target outcomes and a more rigorous oversight of costs.

3.4.6 Recommendation

We recommend NERL discusses with the CAA and the airline user group potential options for developing a capital expenditure model for the purposes of regulatory review and analysis, which captures year-on-year capex spend during the control period. We anticipate this would entail grouping of project cost elements by programme with a clear differentiation of internal and external cost, together with a function by which cost variances and their underlying causality can be monitored and analysed. This would include a clear differentiation between scope increase / decrease, cost overrun or efficiency, new requirement or deferral. We consider NERL may wish to emulate the programme / sub-programme cost breakdown structure provided within its RP2 capital expenditure document (discussed later in this report), as the basis for breaking down and monitoring spend at an appropriate level of granularity.

3.5 Programme costs and variances

We review in this section the cost levels and variances vs. baseline for each of the programmes that make up the capex plan. We provide an opinion on the transparency and robustness of NERL's evidence and rationale provided by NERL to explain the respective cost movements.

3.5.1 Overview

We set out in the table below the variances by programme area. This compares baseline vs. actual (BP 13) spend (in outturn values) in each of the eleven SIP programme areas, together with the high-level explanation of the respective variances provided by NERL. We also provide a brief commentary, where relevant, of the profile of year-on-year spend over the course of the control period. A full breakdown of year-on-year CP3 spend by programme is included in Appendix A.

SIP programme	Baseline plan (SIP 11)	Actual plan (BP13)	Variance actual vs. baseline	Variance actual vs. baseline (%)	NERL comment
Centre Systems Software Devt	£102m	£167m	**+£64m**	**+63%**	Increase in Datalink, new implementing rules, and new requirements. Increase in spend on legacy systems to prolong life in line with revised ITEC strategy. Spend increased by ca. 20% (£10m) above previous CP3 average for final year.
iTEC FDP and New Common Workstation	£208m	£110m	**-£98m**	**-47%**	Revised strategy for development and deployment and reduction in spend to match customer requirements. Deferment of NCW development to RP2.

SIP programme	Baseline plan (SIP 11)	Actual plan (BP13)	Variance actual vs. baseline	Variance actual vs. baseline (%)	NERL comment
CNS Infrastructure	£90m	£88m	**-£2m**	**-2%**	Investment in underlying critical infrastructure in line with original estimates
Airspace Development	£27m	£29m	**+£2m**	**+7%**	Revised strategy, late CP3 ramp up in spend (ca. £4m) to accelerate LAMP and other customer priorities concentrating on Fuel savings and hotspots. New requirements.
SNets and Airspace Efficiency	£29m	£29m	**0**	**0%**	Delivered later in CP3 than originally projected due to revised iTEC strategy.
Radar Site Services	£29m	£29m	**0**	**0%**	Programme substantially complete in line with plan.
Facilities Management	£25m	£20m	**-£5m**	**-20%**	Reduced spend particularly during latter part of CP3 to target savings.
Military	£0m	£14m	**+£14m**	--	Increased spend as agreed under FMARS contract; not part of the RAB
Development of SAATS	£9m	£9m	**0**	**0%**	Acceleration of SAATS replacement into CP3[13] in line with customer request to enable Oceanic savings.
CO2 and Fuel Saving	£10m	£5m	**-£5m**	**-50%**	2011 / 2012 CO2 contingency being drawn to fund projects delivering the savings remaining £5m to target the 4% CO2 reduction.
Risk and Contingency	£19m	£0m	**-£19m**	**-100%**	NERL has removed spend under the general risk & contingency category in the latest plan. Risk & contingency provision is captured at individual project level (see Section 5.7).
Total	**£548m**	**499m**	**-£49m**	**-9%**	

Table 3: CP3 planned & actual capital expenditure by programme area[14]

As indicated in the table above, the most significant variances in cost relate to the two largest programmes, Centre Systems Software Development and iTEC FDP and New Common Workstation. We focus upon these two programmes in the sections that follow, before commenting on variances in the remaining programme areas in the final sections of this chapter.

3.5.2 Centre System Software Development

Centre Systems Software Development is the largest CP3 programme area in terms of total spend, accounting for a third of CP3 capex in the latest business

[13] We note that NERL's comment here relates to the higher spend in the SIP 11 and subsequent versions of the CP3 plan, compared to the originally proposed spend in the 2010 business plan of £4m for this programme area.
[14] Source: "Capex 55 - Project level data for CP3 with comments.pdf"

plan. This wide-ranging area encompasses a wide range of core operational systems and tools in the air traffic control centres. Spend in this area is predominantly for the purposes of sustainment. Some expenditure is also associated with completion of long-running enhancement and improvement programmes such as ARTAS, iFACTS and EFD, all of which reach completion during CP3, as well as with upgrades to core systems that act as a platform for enhancements in other areas such as iTEC and airspace developments.

NERL's latest investment plan shows that total CP3 planned spending for Centre Systems Software Development amounts to £166 million, a £64 million (64%) increase from the original planned spending in the SIP 2011 of £102 million. The chart overleaf shows the evolution of CP3 planned spending on Centre Systems Software Development since SIP 2011.

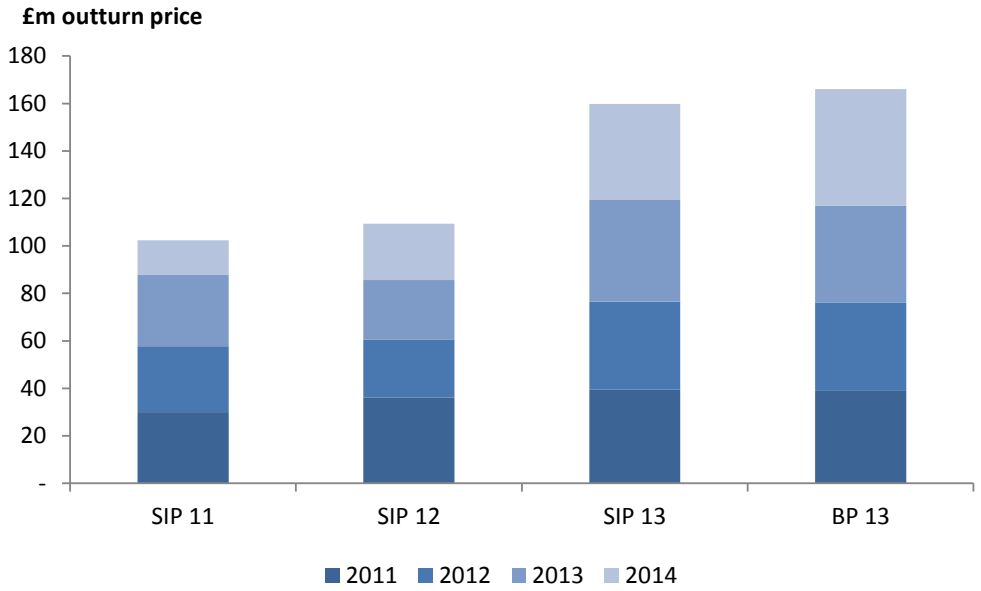


Figure 4: Centre Systems Software – changes to spend profile[15]

As can be seen above, CP3 planned expenditure has gone up with each successive business plan, with the increased spend focused predominantly within the final two years of the control period.

As explained within the SIP documentation, the original increase in spend between SIP2011 and SIP 2012 was attributed mainly to increased costs of Electronic Flight Data (EFD) implemented at Prestwick. Additional spending was approved to deal with unexpected technical and usability issues arising in the initial operation of the system in winter 2010/11. Total projected CP3 spend was adjusted from the original £24.9 million to the current £36.7 million, an increase of c.£11.8 million.[16]

A material increase in the centre systems spend profile can be seen between the SIP 2012 and SIP 2013. NERL attributes its revised delivery strategy for the iTEC programme as the principal reason for this spend increase with the delay in New

[15] Source: "Source: "Action 80-CP3 Evolution-annual spend-BP10-SIP13.xlsx"
[16] NERL has stated that it has "absorbed the cost over-run within the cost envelope by re-prioritising other projects and driving cost savings elsewhere in the portfolio. This underlines our commitment to the overall output measures rather than individual project performance."

Common Workstation deployment meaning that core underlying systems are to be maintained for longer than originally planned. NERL indicates greater investment is required to ensure the sustainment and improvement of various legacy systems in the absence of full iTEC development including FDP Sustainment, TOMS, NAS, NSIS, FPRSA Replacement and Business Intelligence. NERL has also indicated that Time Based Separation (TBS) is being delivered as part of the centre systems programme, in response to customer requests.

NERL has provided a project-level breakdown of centre systems software expenditure.[17] This contains figures for around 120 individual projects, with a short narrative explaining the change in CP3 expenditure for each. Although the centre systems category encompasses major programme elements such as iFACTs, EFD and Datalink, individual projects are not grouped or sub-categorised.

NERL has provided a quantified analysis of key drivers affecting centre systems spend. NERL has identified the degree of expenditure variation resulting from the following six categories, together with the number of individual projects affected::

- New requirement: new projects not included within the baseline, or projects incurring additional spend, which NERL attributes to "new requirements";
- Unplanned sustainment: new projects required to develop rapid solutions to meet emerging asset sustainment issues to maintain service resilience;
- Change to iTEC Strategy: projects that are no longer required in CP3 due to the revised strategy for the implementation of ITEC;
- Scope saving/cost efficiency: projects that have experienced reductions in cost compared to the baseline;
- Cost increase/overrun: projects that have experienced increases in cost compared to the baseline;
- EFD: This separates the impact of the specifically consulted changes to the EFD implementation (whilst the overall approval increased by £11.8m, the actual overrun was limited to £8.6m of which £6.1m was capital spend); and
- Builds: The build projects are subject to scoping to meet the requirements of the business. Once the ITEC strategy was revised, further investment to maintain the legacy systems was required.

The relative impact each of the above on overall centre systems cost levels between the SIP 11 baseline and the latest plan is depicted in the chart below.

[17] Source: "Capex 55 – Project level data for CP3 with comments.pdf"

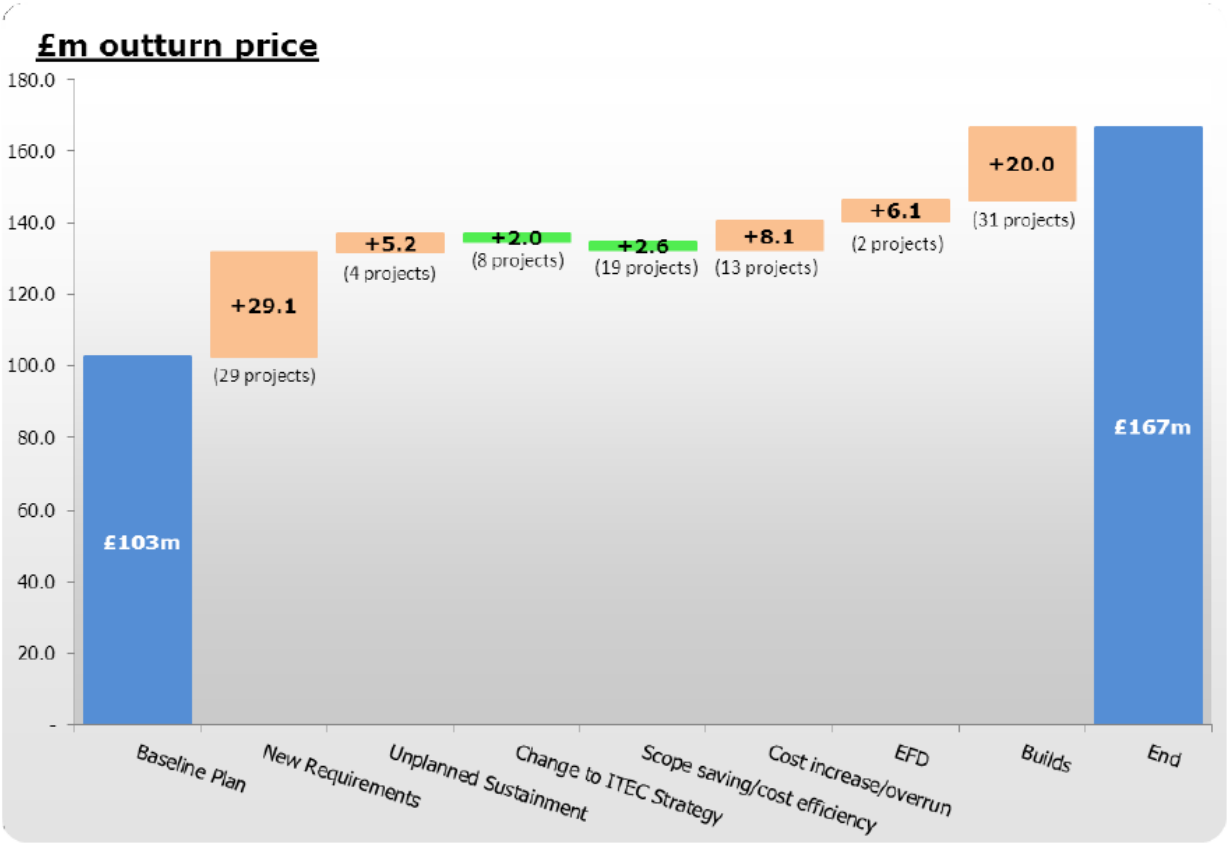


Figure 5: Centre Systems Software – breakdown of actual spend variances vs. baseline[18]

As indicated in the chart above, 29 projects have contributed around £29m of additional spend as the result of new external requirements. Unplanned sustainment adds a further £5m of additional spend. A total of eight projects associated with implementation of the iTEC programme have now experienced reduced spend in line with the slowdown in iTEC development during CP3, although this amounts to only £2m. Nineteen projects have experienced cost reductions totalling £3m. The remainder, about a third of projects, have driven further cost increases, which comprise:

- £8m (from 13 projects) relating to cost increases or overruns vs. baseline;
- £6m (from 2 projects) relating specifically to the EFD project; and
- £20m (from 31 projects) relating to additional spend under the NERC, NAS and NODE build programmes.

For the £20m of spend relating to builds, NERL has also provided further details of factors driving this additional expenditure. We reproduce this analysis in Appendix G.

[18] Source: NERL document "Action 79 update - CP3 Capex Review - CSSD analysis.pdf"

3.5.3 Our opinion

The project-level breakdown of expenditure in this programme area gives a granular overview of the 120 project cost elements. NERL's explanations of the variances broken down on the basis of the six categories described above provides a reasonable level of insight into the main causes for the increased spend. NERL has also provided widespread commentary on key drivers and causes for centre systems cost increases within the SIP and other documentation. NERL goes into detail on selected key projects or elements of the centre systems programme such as EFD and Datalink and makes reference to both sustainment issues on a range of legacy programmes, (highlighting the delay in iTEC as a principal driver for this), and developments to facilitate improvements.

Apart from the analysis of cost variances described above, commentary provided in other documentation remains for the most part high-level with limited quantified detail around the impact on capex costs. We consider that the integration of centre systems software spend within a standard capital expenditure reporting model or template, as described in our previous recommendation (section 3.4.6) would further improve transparency of this cost area and give greater confidence in proposed changes to the capital expenditure plan.

Notwithstanding this, we consider the level of detail provided to explain the levels of capital expenditure in this programme area to be reasonable.

3.5.4 iTEC FDP and New Common Workstation

The most significant change in planned expenditure during CP3 relates to the £98m reduction in expenditure associated with the iTEC FDP and New Common Workstation (which we also refer to collectively as the iTEC programme).

The chart below shows the reduction in planned CP3 spending on the overall iTEC FDP programme since SIP 2011.

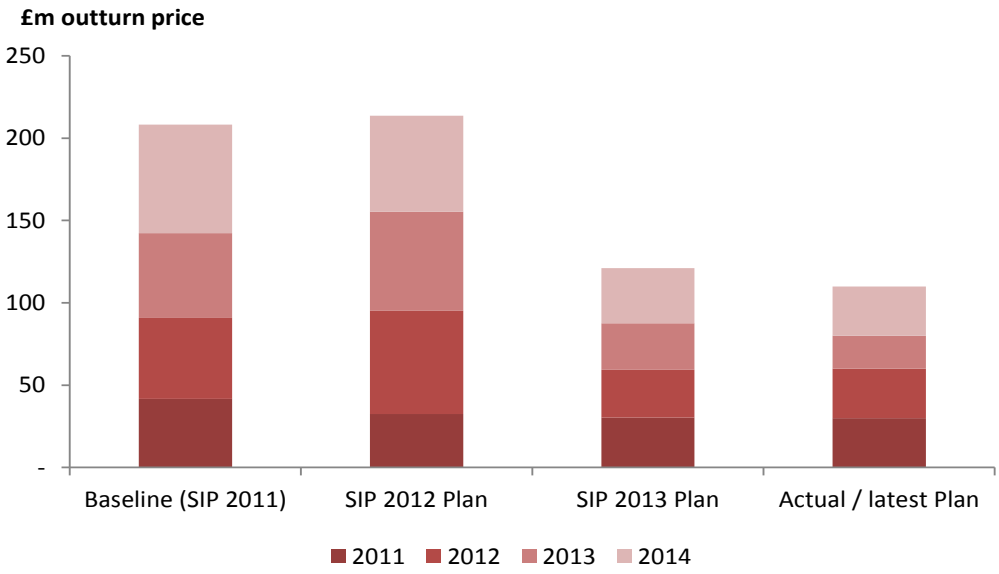


Figure 6: iTEC programme – changes to spend profile[19]

[19] Source: "Action 80-CP3 Evolution-annual spend-BP10-SIP13.xlsx"

The original baseline CP3 spend of £208m consisted of:

- iTEC Flight Data Processor expenditure of £137m, with year-on-year spend level increasing towards the end of the control period; and
- New Common Workstation expenditure of £71m, spread fairly evenly for the duration of CP3.

Comparing projected expenditure between SIP2011 and SIP 2012, NERL had at that stage maintained a largely unchanged expenditure projection. However, NERL then nearly halved planned spending between SIP 2012 and SIP 2013, to £121m, and NERL has made a further slight downward reduction in its latest plan, reducing iTEC programme spend to £110m.

According to SIP 2013, the reduced spend on the iTEC programme is mainly driven by lower traffic forecast for the control period, resulting in overall lengthening of programme timescales and deferral of NCW development spend outside of CP3.

NERL has indicated that capacity constraints will not be reached as soon as expected, enabling a change to the delivery timescales of the programme. Originally NERL had planned for the first version of the New Common Workstation to be deployed in London Terminal Control by 2014 followed by an 'evolved' version being deployed in Prestwick in 2014/15. The revised plan involves an extended timescale, with the final stage of deployment at Swanwick area control by 2023, although NERL still planning to introduce iTEC FDP during 2015/16 within Prestwick Upper Airspace (PUAS) to provide 'network' benefits with more efficient trajectories".

NERL has provided various documents containing information about the iTEC programme, which include:

- iTEC "mini case" giving an overview of the programme characteristics, benefits and timescales on behalf of airline customers;
- An overview of the iTEC development programme, and progress achieved to date in iTEC software build testing;
- Details of how the risk in PUAS implantation is being managed, including interfaces with legacy systems.

According to the "mini case" documentation, NERL has incurred £124m of development spend to date on iTEC FDP, with the total programme cost up to completion (now 2023) of £248m. Apart from iTEC FDP and NCW development being presented as separate items within its original cost projections, there is limited breakdown of cost elements within the iTEC programme. [20] [21]

[20] . We note that all spend under the iTEC programme is now captured in the SIP / CP3 business plan documentation under a single expenditure category (without a breakdown between the FDP and NCW elements). Although NERL has not quantified what proportion of the revised iTEC programme spend relates to costs already incurred in NCW development, the SIP 2012 refers to the PD (Project Definition) phase being concluded at that time. We understand from other worked examples shown to us that spend up to PD is likely to represent a small proportion <10% of the total spend for a project.

[21] A breakdown of spend by project was not provided within the "Capex 55" document for the iTEC programme.

Details of the cost implications associated with the change in the iTEC delivery strategy are also limited.[22] Apart from deferral of the NCW element of the programme, there is limited analysis in this area. It is therefore difficult to see how elements of the programme are affected in terms of cost, delivery or phasing during CP3.

3.5.5 Our opinion

NERL clearly states the overall rationale and benefits that the programme will ultimately deliver, highlighting iTEC as a complex, high criticality and high priority programme. There are significant interdependencies through the collaborative development of iTEC with other European ANSPs (Spain, Germany and the Netherlands) and industry partners. Documentation provided to date gives limited insight into the elements of cost underneath the total spend. Given the size of investment in this programme, further visibility of the component costs, what they represent, when they are being incurred and how they are being would be required in order to gain a full understanding of the programme spend.[23]

Detail underpinning the reprofiling of timescales and reductions in spend coming out of the SIP 2013 is limited. For example, it is not immediately evident as to what the cost implications are of the revised plan, or how the re-phasing of FDP development and delivery, changes in the timing and sequence of NCW deployment, and any abortive spend may each affect CP3 and future costs. Explanation of the cost variances vs. the original plan is limited to spend being reprofiled in response to traffic downturn. It is not clear what variances vs. baseline plan have arisen as a result of cost overruns or efficiency, scope changes, new requirements, acceleration or deferrals. Analysis linking the reduced iTEC programme spend with the increased spend in legacy centre systems described in the previous section has not been provided.

Overall, we consider that a greater level of insight into the cost elements and movements encompassed within the iTEC programme spend would provide a greater level of confidence in the robustness and transparency of this capital expenditure programme area.[24]

3.5.6 CNS infrastructure

CNS is the largest of the remaining expenditure areas, with projected CP3 expenditure of £88m, 17% of the total CP3 capex spend.

CNS infrastructure spend is focused mainly around sustainment and maintaining or improving existing infrastructure capability. NERL has provided details of programme elements within the SIP, specifically associated with new digital data network, capacity improvements and Datalink capability provided which are significant programme components. Total projected CP3 spend remains close to

[22] NERL continues to cite the total projected spend of £248m over the lifetime of the iTEC programme, with this figure in SIP 13 unchanged from SIP 11.
[23] NERL has reiterated that it believes it has provided a representative sample of material in sufficient detail for the purposes of the project terms of reference.
[24] NERL has stated the following: "Further detail exists but was not requested by the samples. We did not consider "all data on all projects" to be an appropriate request given the "representative sample" nature of the review. ITEC was covered at the Swanwick presentation and we provided internal board papers and the mini-case."

the baseline. Various references to cost increases associated with specific elements of the programme are made, including both the En-Route Datalink Services key project (SIP 2013) and smaller individual projects requiring additional funding or risk drawdown within the monthly LMM dashboard documents. Otherwise detail on costs is limited, and no breakdown by individual project has been provided for this programme area.

3.5.7 Our opinion

Although CNS infrastructure represents a significant proportion of total CP3 spend, a breakdown by sub-programme or project of the total spend amount is not evident in the documentation provided for review. The profile of total spend remains almost constant between successive plans. References to cost variances / overruns in relation to a small number of individual programme elements suggest some variability.

3.5.8 Other programme areas

We summarise in the table below the level of cost breakdown and detail provided in relation to the remaining capex programme areas.

SIP programme area	Actual plan (BP13)	Variance actual vs. baseline (%)	Cost breakdown and detail
Airspace Development	£29m	**+7%**	Programme spend broken down into individual projects, providing visibility of key programmes including LAMP, NTCA, Transition Altitude and smaller programmes. Progress of programme elements, changes to timescales and spend are widely documented.
SNets and Airspace Efficiency	£29m	**0%**	Descriptions within SIP and other documentation of programme characteristics and benefits. Later phasing and delivery in line with longer timescales of iTEC programme referred to in SIP 13, but no detail on cost impact. Overall cost remains unchanged from baseline, with no breakdown provided by individual project. Limited overall transparency.
Radar Site Services	£29m	**0%**	Breakdown of programme area by individual project, relating to specific radar infrastructure sites, and cost movements visible at each. Delivery largely complete in line with plan, with actual spend profile vs. baseline stable.
Facilities Management	£20m	**-20%**	Declining spend profile, attributed by NERL to efficiency measures, although monthly dashboard documentation makes reference to minor increases in profile spend. Overall limited cost details provided with no project-level breakdown.
Military	£14m	--	Limited reference. (Not part of the regulated asset base, therefore of limited relevance to this review).
Development of SAATS	£9m	**0%**	Some commentary provided within SIP and other documentation of benefits delivered in Oceanic airspace, although no further breakdown, e.g. by

SIP programme area	Actual plan (BP13)	Variance actual vs. baseline (%)	Cost breakdown and detail
			project, provided.
CO2 and Fuel Saving	£5m	**-50%**	N/a (contingency amount).
Risk and Contingency	£0m	**-100%**	N/a – we comment further on risk approach later in this report.

Table 4: Cost breakdown and detail for other CP3 programme areas

3.5.9 Our opinion

We consider the overall degree of transparency in relation to other programme areas to be reasonable, although the level of detail and depth of analysis underpinning the cost levels and movements varies. Analysis of the delivery and associated costs of many key aspects of the capex plan under these programme areas, such as airspace programmes and RSS legacy investment, is provided in some detail. Transparency in other areas, most notably SNets and airspace efficiency, remains limited.

Cost levels associated with the above categories are for the most part stable or declining compared to the baseline. We consider the detail of costs relating the other programme areas, in overall terms, to be reasonable.

4 Delivery of benefits and outputs in CP3

4.1 Introduction

In this chapter, we review the benefits and outputs of NERL's capex plan in CP3. The review considers the benefit and output metrics, the results achieved and the impact of European regulations.

4.2 Benefits and output measures

4.2.1 Target metrics

For CP3, NERL committed to an overall cost envelope and a set of targets in key performance areas (KPAs). KPA targets are applied top down and NERL analyses the gap between planned benefits of the capex plan and the targets. The CP3 targets are presented in the KPAs of safety, delay, environment and value, and are shown with their corresponding metrics below. Although not agreed at the beginning of the CP3 period, an environment metric was introduced during CP3.

Safety: The target safety metric is the percentage reduction in the safety significant event (SSE) risk index.

Capacity: In the area of capacity, the CP3 settlement presents three delay metrics:

T1 – Average delay: expressed as the "*Average delay per flight'*;

T2 – Impact of individual delays: expressed as an "*Impact Score*" (placing greater weight on long delays and operationally critical departures in the morning and, to a lesser extent, the evening peak); and

T3 – Variability of daily average delays: expressed as a "*Daily Excess Delay Score*" based on weighted delays exceeding pre-determined thresholds on a daily basis.

Environment: For the environment target, the CP3 settlement uses a 3D flight inefficiency (3Di) score. The 3Di score has been well received by NERL's customers because it reflects vertical as well as horizontal flight inefficiency.

Cost efficiency[25]: The cost efficiency target is expressed in terms of cumulative savings in real terms across CP3 compared to the 2010/11 budget.

The table below presents the current metrics for targets over CP3 and for the SES performance scheme targets over reference period 1 (RP1), which covers the three-year period from 2012 to 2014. The SES targets are the UK contribution to the EU targets defined in the UK RP1 Performance Plan. The NERL T1 delay metric, average delay per flight is consistent with the RP1 target metric, and for 2012, the first year of RP1, the NERL T1 target for CP3 (7.72 seconds per flight) was set lower than the RP1 target (0.218 minutes per flight). Although no target was set for the environment area in RP1, the SES metric for environment is the en-route horizontal flight efficiency, whilst NERL's use of a 3Di metric encompasses both horizontal and vertical flight efficiency.

[25] NERL uses "value" to represent cost reduction. Throughout the document we have used "cost-efficiency" to reflect SES terminology.

	CP3 targets/metrics[26]	SES RP1 targets[27]
Safety	10% reduction per annum in SSE risk index	N/A
Capacity	T1 average delay : 11.5 s in 2011, 7.72s in 2012, 12.5 s in 2013 and 2014 (range +/- 2.5 s)	En-route ATFM delay min per flight: 0.218/0.638* in 2012, 0.263 in 2013, 0.263 in 2014
	T2 delay impact score: 32.5 in 2011, 21.74 in 2012, 35.0 in 2013 and 2014	
	T3 delay variability score: 1500 across all years 2012 – specified allowance for London Olympics	
Environment	3D Inefficiency Score: 24	N/A
Cost-efficiency	£57m cumulative savings in real underlying costs across CP3, compared to the cost base in 2010/11 (budget)	Real en-route determined unit rate (DUR) at 2009 prices: €61.83 in 2011, €61.44 in 2012, €61.64 in 2013, €59.22 in 2014
* During Olympic period		

Table 5: CP3 targets/metrics (final settlement) and SES RP1 targets

4.2.2 Benefits metrics

NERL has invested in a number of projects that are expected to deliver benefits over CP3. Benefits are expected to contribute to the achievement of the targets in the final CP3 settlement. As well as capital investment into projects that deliver benefits, benefits are also delivered through projects funded through operating costs.

The Service and Investment Plans (SIP) present benefit streams, as part of the business case summary, for NERL's key projects over CP3. The benefit streams cover sustainment, safety, capacity, environment and cost efficiency and these are more or less aligned with the key performance areas of SES (safety, capacity, cost efficiency and environment). The metrics used to measure project benefits (as presented below) differ from the indicators used for the CP3 targets and those used in the SES performance scheme. The only exception is the safety metric which is expressed as a percentage improvement or reduction in the SSE risk index.

[26] NATS En-Route Plc (NERL) Service and Investment Plan (SIP) 2011, Issue 2
[27] UK Performance Plan, RP1 (2011-2014). The targets shown here are the UK contribution to the EU targets.

	NERL project benefits metrics
Safety	Improvement in NERL SSE risk index (%)
Capacity	Increase in airspace capacity (%)
Cost efficiency	Annual operating cost savings (£m)
Environment/flight efficiency	Reduction in annual CO_2 emissions (tonnes) – this is evaluated for aviation CO_2 and estates CO_2

Table 6: Project benefit metrics

4.2.3 Benefit methodologies

Project benefits are assessed by the operational analysis team at NERL. The estimates of benefits are then used directly in business cases. Benefits are assessed throughout the project lifecycle, from concept stage, through feasibility and options, project definition and post implementation. Benefits are assessed at various levels of granularity depending on the particular phase of the project lifecycle: as projects move closer to definition, benefit assessment is further refined and formalised and uncertainty is reduced. On average, projects take around two years, whilst a major programme such as LAMP can take around five to six years. Over long programme timeframes, traffic assumptions may be considered for review. Assumptions are refined as the project stages progress.

Safety modelling: NERL uses a safety risk index as its safety metric. Benefits are expressed as either a percentage improvement in the risk index or a reduction of *x* points in the safety risk index. Safety significant events (SSE) are monitored and scores (from 1 to 4) are applied to these according to the level of severity of the event. A weighting is applied to the different events to get an absolute value (the risk index). The weightings reflect the estimated relative probability of collision associated with the various grades of SSE.

The impact of programmes or projects on safety is derived by assessing the effect of the project on the number and severity of safety significant events. Weightings are applied to these and an absolute value is derived. Post-implementation reviews of the risk index are carried out on an annual basis. Actual SSEs are monitored to assess the impact of airspace changes that have been implemented. The risk index methodology has been agreed with the CAA's Safety and Airspace Regulation Group (SARG). Although NERL has in the past considered the monetisation of safety benefits, it has decided not to take this approach to safety benefits but instead to use the SSE risk index.

Capacity modelling: Service[28] performance is measured in terms of seconds of delay. This is a proxy measure for capacity, since delay results when demand exceeds capacity. Delay calibrated capacity "staircases" are established for each centre, which show the level of capacity provided for each centre for a given level of average delay. A limitation of the capacity/delay model is that it works less well when delay is at low levels or very high levels, because of the non-linear relationship between capacity and delay. A capacity baseline is defined and a "do-nothing" case is established. The NEVAC tool (now named NEST) is used to assess network capacity and delay modelling. Capacity benefits are underwritten

[28] NERL uses "service" interchangeably with "capacity".

by the centres impacted. Expert opinion on capacity gains is sought from the centre, supported by simulation results, network modelling and previous changes.

Capacity is measured using an absolute value of flights per hour through the sector. Capacity is also measured through the monitor value, which gives tactical flexibility and can lead to increased capacity in the sector. Both these metrics are used over CP3. For RP2, the capacity metric is "additional flights per busy hour"[29] (afpbh), which is the same metric as used in CP3, except that it is measured at the network level. NERL will continue to use monitor values for tactical management of sector capacity, and use the afpbh metric to assess the additional capacity of an airspace change at network level.

Environmental modelling: Environmental modelling is undertaken through a combination of airspace design outputs (through fast-time simulations or Excel models) and fuel burn models. New airspace designs are proposed with more flight efficient routes and fast-time simulations are carried out to assess these. Outputs are used directly in the business cases. Sensitivity analysis is carried out on benefits and costs. Benefits can change through the process, but the baseline is fixed. Traffic growth is applied at a regional level and small sets of data are used.

The AirTOp model is usually used for fast-time simulations to assess major programmes and is being used in the ongoing refinement of LAMP benefits. Traffic data is extracted from flight plans, for typical busy days, with NERL's growth forecast (STATFOR forecasts are also used). Actual data are not used because there may be temporary tactical measures in place that would not give a representative picture of traffic. Outputs from the fast-time simulations include sector counts, workload, and trajectories. These are used as inputs into the aircraft emissions model, KERMIT (Kerosene Emissions Modelling in the TMA) to estimate fuel burn.

NERL previously used the advanced emissions model (AEM) tool from Eurocontrol but found that the tool was not fit for the complexity of the London TMA. NERL used the AEM tool to develop its own bespoke model, KERMIT. The model uses BADA aircraft performance data as well as the ICAO emissions database. The model is compliant with CAP 725[30]. KERMIT is a total energy model that assesses flight profiles to estimate fuel burn. A representative sample of simulated trajectories is used.

The model compares the fuel burn of the baseline against the concept being assessed. Similar formulae to the Eurocontrol AEM model are used, but values have been adjusted for thrust, specifically speed controls, holding operations and continuous descent approaches. Limitations to the model include atmospheric conditions, BADA, aircraft weight, emissions. Outputs include fuel burnt, CO_2, 3Di score and components, total flight time and distance and GCD.

KERMIT is applied to all projects in the UK, except oceanic. Oceanic benefits are estimated using the Jeppeson tool used by airlines to optimise flight plans. Fuel burn is quantified by applying a £650 cost per tonne of fuel. The outputs are validated internally through peer review, analysed for distribution and outliers and

[29] "Busy hour" demand is a measure used to represent a sustainable level of throughput for the airspace regions. NATS calculates busy hour demand by taking the rolling three-hour averages of demand across the day, and selecting the maximum. NATS carries out the analysis at a UK level so that the compound effect of several different airspaces can be determined.
[30] CAA Guidance on the Application of the Airspace Change Process.

validation by the airspace design team. Post-implementation of projects, actual performance is assessed through analysis of radar data.

Estates CO_2 modelling: is conducted using the Defra-defined conversion factors for energy to CO_2.

Cost efficiency[31] modelling: These benefits are either staff savings (headcount reductions or efficiency) or non-staff operating cost savings (utilities, maintenance) and are agreed with budget owners in the business areas. Budgets are adjusted to reflect the necessary changes.

NERL carries out post-implementation reviews, usually within 6-18 months of the projects going live, and a "lessons learnt" process is undertaken. For example, post implementation of a project, enabled savings (maximum theoretical savings) are compared to actual savings to review whether benefits were delivered. NERL informed us that, to address interdependencies, there are formal dependency agreements between projects where appropriate. Double-counting of benefits is minimised through post-implementation analysis of actual benefits.

4.3 Results achieved during CP3

Targets (actual versus planned)

NERL met its CP3 targets in safety, capacity, CO_2[32] and value in 2011 and 2012, according to the SIP 2012 and 2013.

	2011[33]	2012[34]
Safety		
Target	10% reduction risk index <196.7	163
Actual	181.4	116
Capacity		
T1 Target	11.5	20.58*/7.72
T1 Actual	7.87	1.52*/1.51
T2 Target	32.5	58.6*/21.74
T2 Actual	17.9	3.10*/3.23
T3 Target	1500	299.24*/1137.11
T3 Actual	402	0*/1.0 * refers to targets over Olympic period
Environment		
Target	-	3D Inefficiency Score: 24
Actual	23.8	23.9
Cost efficiency		
Target	£57m cumulative savings in real underlying costs across CP3, compared to the cost base in 2010/11 (budget)	£57m cumulative savings in real underlying costs across CP3, compared to the cost base in 2010/11 (budget)
Actual	£15m in FY11/12	On target with forecast of £63m

Table 7: NERL targets and actual performance in 2011 and 2012

[31] NERL uses "value" to represent cost reductions, we have used the term "cost efficiency".
[32] There was no target set for CO_2 in 2011, this was introduced in 2012.
[33] SIP 2012
[34] SIP 2013

4.3.1 Project benefits (actual versus planned)

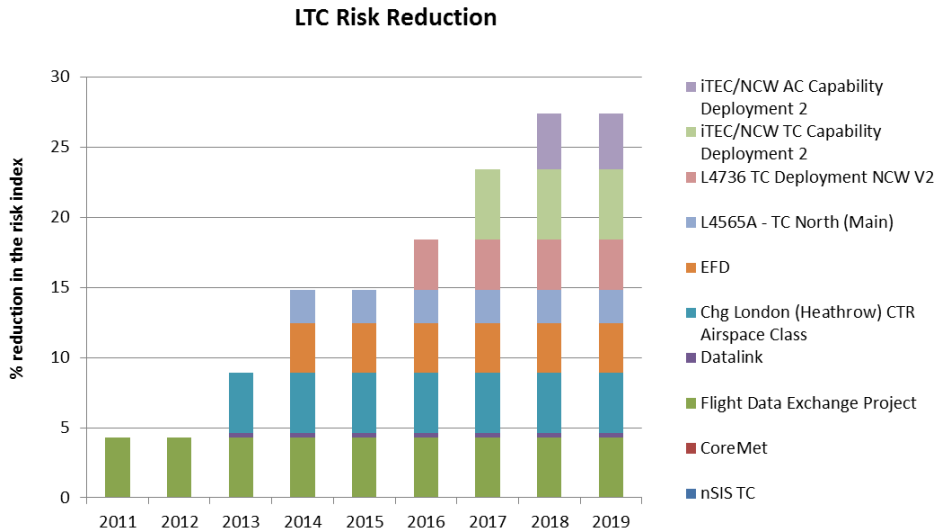
NERL achieved good performance in meeting its CP3 targets for 2011 and 2012. With respect to NERL's performance in terms of delivery of expected benefits by projects over CP3, NERL indicated that it commits to a volume of benefits at an aggregate level. It does not commit to the contribution of individual projects to high level targets. This gives NERL the flexibility to manage its projects delivery. Where projects over- or under-deliver against estimates, or different priorities are set, NERL will adjust the portfolio of projects to deliver the optimum set of benefits within the constraints placed upon it. This flexibility inevitably makes it difficult to establish a stable baseline by which to compare actual benefits against planned benefits.

NERL provided a breakdown of projects over CP3 and their planned and achieved benefits in the areas of environment and safety.

NERL was not able to provide data on the planned and actual benefits for the other KPAs outlined above (capacity and cost efficiency). NERL explained that a historical review of capacity and cost efficiency benefits over CP3 is not possible, since it is difficult to establish the original baseline. This is partly explained by the change of focus away from capacity benefits delivery over CP3. NERL pointed out that only a small part of the cost efficiency benefits are delivered by capital investment projects.

The breakdown of planned benefits per project for safety and CO_2 is discussed below.

4.3.2 Planned safety benefits delivered



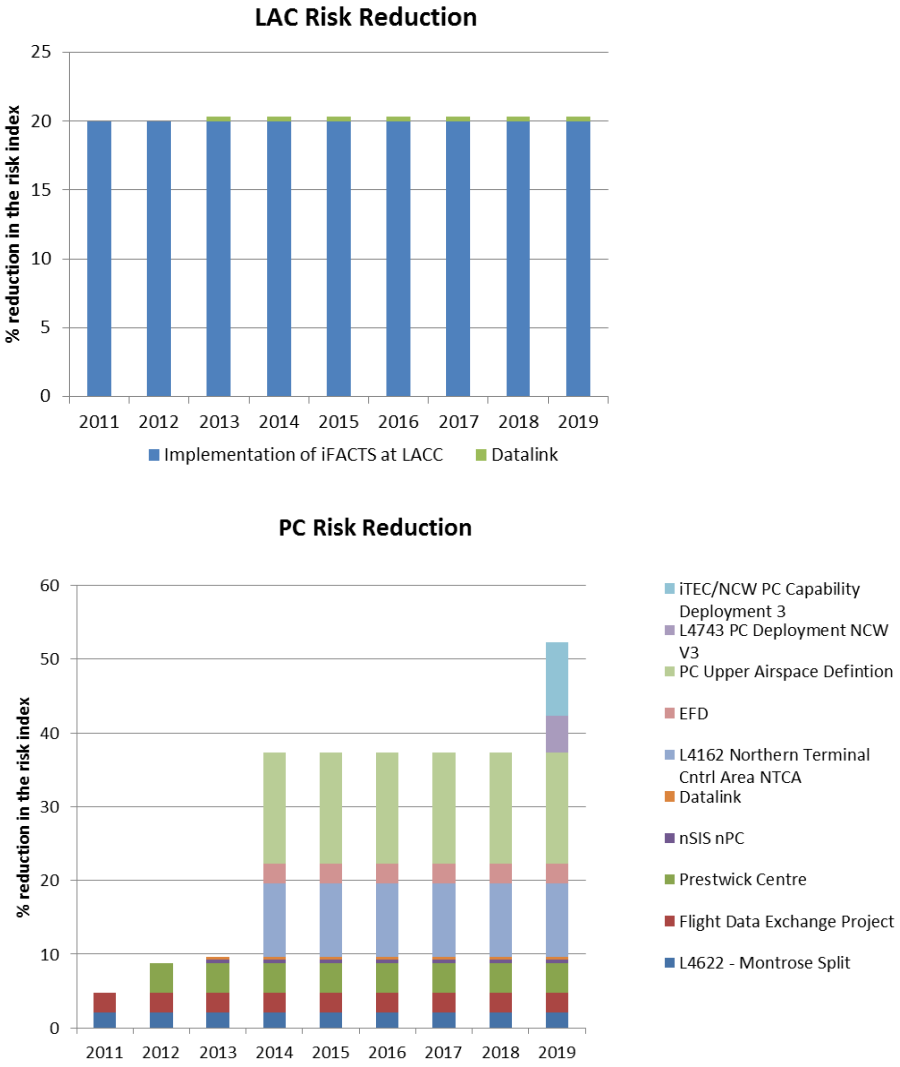


Figure 7: Safety benefits expected from CP3 capex projects

Safety benefits of projects are expressed in terms of three different risk indices for NERL's air traffic control units: London Terminal Control (LTC), London Area Control (LAC), and Prestwick Centre (PC). NERL has explained that these separate indices can be added to obtain the overall risk index presented in the SIP; NERL has provided the actual safety risk indices for FY 2012/13 at each of the centres. The table overleaf shows the planned contribution of each unit to the overall safety risk index. NERL exceeds the 10% reduction per year target up to the end of 2015 based on the capex invested in CP3[35].

[35] A target of 163 in the safety risk index was set for 2012/13.

Risk index	Actual 2012	2013P	2014P	2015P	2016P	2017P	2018P	2019P
AC	17	16.9	16.9	16.9	16.9	16.9	16.3	16.3
TC	104	99.5	93.5	93.5	89.8	85.3	85.3	85.3
PC	11	10.9	7.8	7.8	7.8	7.8	7.8	6.6
Total		**127.3**	**118.3**	**118.3**	**114.5**	**110.1**	**109.4**	**108.2**
Target	**163**	**147**	**132**	**119**	**107**	**96**	**87**	**78**

Table 8: Safety risk index reduction vs. target 2012-2019

4.3.3 Planned CO_2 savings

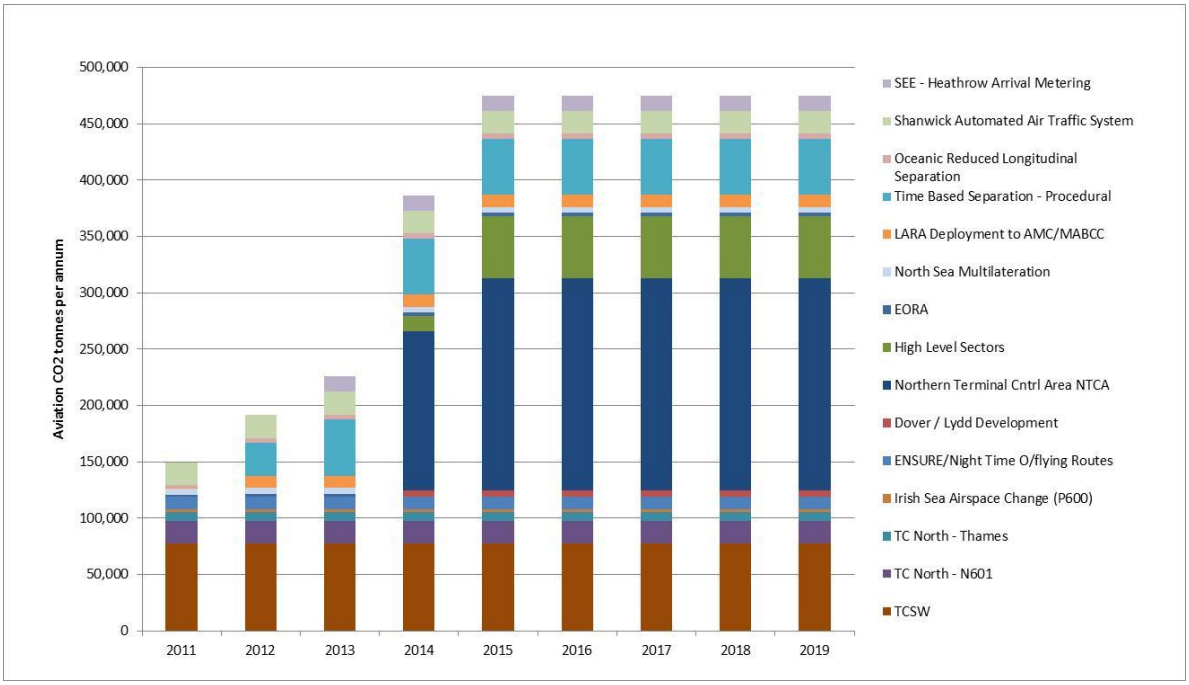


Figure 8: CO2 (aviation) savings expected from CP3 capex projects

In 2011, projects are expected to deliver 150 kilotonnes [kt] of CO_2 savings. By the end of CP3, this is expected to increase to 386 kt per annum through the delivery of an additional two projects: NTCA and High level sectors. By the end of RP2, around 475 kt of CO_2 savings are expected per annum.

NERL has also provided another view of actual benefits against targets in the form of the monthly benefits dashboard which is presented to the LTIP management meeting[36]. The information is presented as snapshots of actual performance against target planned performance in each of the KPAs. NERL has pointed out that the year on year targets presented in these dashboards are an internal view and therefore should not be used to monitor NERL's performance in delivery of benefits, since NERL only commits to the overall CP3 targets.

According to the August 2013 dashboard, NERL is on track to meet its CP3 commitments in safety, corporate environment, and capacity and resilience, and is

[36] Action 27 Benefits Review March-August 2013.

on track to exceed CP3 commitments in cost efficiency by the end of CP3. On environment, the dashboard reported that actual performance was not on track and a recovery plan had been put in place. NERL has committed to achieving a 10% reduction in CO_2 by 2020 compared to a 2006 baseline, and a 4% reduction by March 2015. NERL pointed out that these are internal targets, not regulatory targets. At the beginning of CP3, NERL achieved a 2% reduction through the programmes it had implemented. In 2012/13, these were supplemented with additional programmes, in order to help NERL meet the 4% interim target by 2015. The dashboard reflects this picture.

It is clear that NERL's internal targets for CO_2 savings are not explicitly related to the target for environment, in terms of 3Di, which measures horizontal and vertical efficiency, although one might expect some link between the two. NERL has provided a paper on the relationship between 3Di and CO_2/fuel savings. The paper explains that the 3Di metric cannot be used as a proxy for CO_2/fuel savings since there are other sources of CO_2/fuel savings.

4.4 Regulatory compliance and deployment initiatives

In common with all European ANSPs, NERL is subject to European regulations for the harmonisation and performance improvement of European Air Traffic Management. This includes legislation emanating directly from the European Commission, and regulations developed for the European Commission by the European Aviation Safety Agency (EASA), primarily Implementing Rules. European regulations are binding on the UK and take precedence over UK National Legislation, with these becoming binding regulations for NERL.

The key legislation and Implementing Rules impacting capex spend in CP3 are shown below, including the deadlines promulgated by the UK for their implementation.

Implementing rule	Original deadline for implementation for UK	Notes
COTR Regulation (EC) 1032/2006, amended by (EC) 30/2009	Published 2009. Estimated to be compliant Q4/2013.	CP3 capital expenditure against this Regulation anticipated to be ~£3m
IFPL Regulation (EC) 1033/2006, amended by (EU) 929/2010	01/02/2009 (amended to 2012)	Flight Plan 2012 has been implemented by NERL. Approximately £0.9m was spent on updating FPRSA.
FMTP Regulation (EC) 633/2007, amended by (EC) 283/2011	Postponed to 31/12/2014	Centre Systems (e.g. NAS) will be compliant. CP3 capital expenditure against this Regulation anticipated to be ~£3m.
DLS Implementing Rule (EC) 29/2009	07/02/2013	SIP13 identified £11M capex. However, CP3 capex anticipated to be ~£15m due to delays caused by a number of factors[37]. SIP2013 stated that NERL was in line for core area ACC's to provide DLS by February 2013.

[37] Delays were caused by a need to transition to ADEXP, errors in the Eurocae specification ED-110B and errors in the ETSI DL CS EN-303-214.

Implementing rule	Original deadline for implementation for UK	Notes
Mode S Interrogator Regulation (EC) 262/2009	Assumed 2013	CP3 capital expenditure against this Regulation has been ~£0.5m for the cost of changes to the centre systems. Costs for the RSS programme are also relevant but NERL is unable to apportion part of the costs to Mode S.
ADQ Regulation (EU) 73/2010,	01/07/2013 (but will be repealed)	To be repealed by ADQ-2 Regulation. It is anticipated that NERL will require the replacement of the Nucleus System to meet the requirements of ADQ-2. The anticipated capex is circa £5m. It is unclear whether this falls in CP3 or RP2 at present.
ACID Implementing Rule (EU) 1206/2011	Assumed 2013	Capital expenditure against this Regulation has been ~£0.8m.
SPI Implementing Rule (EU) 1207/2011	13/12/2013 for data exchange format and arrangements	No significant capex was anticipated by NERL in CP3 against this Regulation.
VCS-2[38] Regulation (EU) 1079/2012, repealing VCS Regulation (EC) 1265/2007	Starting 17/11/2013	Capital expenditure against this Regulation is anticipated to be ~£1.2m. This falls within CP3 and RP2.

Table 9: European implementing rules relevant to NERL capital expenditure

From the above table, it appears that these Implementing Rules added approximately £26m to NERL's CAPEX in CP3, although this estimate is necessarily high level.

In addition to regulatory compliance drivers, there are also a series of deployment initiatives underway impacting upon NERL. These do not hold any binding targets on NERL, and will depend upon other stakeholders (e.g. neighbouring ANSPs, airline equipage). However, deployment commitments expressed by NERL must be taken into account when assessing the suitability of an investment programme since they represent a planning aid to all stakeholders to enable synchronised deployment and fast ramp-up of benefits – in line with the ATM Master Plan level 2.

In the UK, the Future Airspace Strategy is the industry-agreed programme of implementation steps to ensure coordinated deployment and early benefits in ATM. The majority of the FAS deployment plan refers to the RP2 period, but several activities require definition and development in CP3.

Within Europe, the SESAR R&D programme (Step 1) will only move to deployment in the RP2 timeframe, and is considered in the subsequent section on RP2. Within CP3, the EC's Interim Deployment Programme is intended to ensure an agreed set of initiatives is deployed across Europe, setting the baseline for early SESAR deployment.

[38] VCS: Voice Channel Spacing

4.5 Our opinion

We consider that NERL has appropriate tools for assessing benefits. NERL has a comprehensive approach to assessing safety and also suitable tools (such as KERMIT and AirTOp) for assessing environmental changes.

NERL has met its CP3 targets for 2011 and 2012. From the information it has provided to us, it is on track to meet or exceed all the CP3 targets, except for the internal environment target on CO_2 for which a recovery plan is in place.

For CP3, planned project-level information has been provided by NERL for two metrics, CO_2 and safety:

- CO_2: The information is in the form of a CO_2 saving and it cannot be related to the 3Di score (in which the target is set).
- Safety: Benefits are given in terms of percentage reduction of risk indices at three ATC units (but not the overall weighted safety target).

NERL has provided us with planned and achieved project benefits for aviation CO_2 and safety. From this data we infer that individual projects have largely met or exceeded their planned CO_2 savings. However, we also note that according to NERL's monthly dashboard, a recovery plan had to be put in place for NERL to achieve its desired CO_2 savings over CP3. NERL has explained that the focus for CP3 was initially on capacity, and once traffic had fallen, the focus changed to cost savings. NERL therefore revisited its commitment to achieving a 4% reduction in CO_2 saved by 2015 and ensured that a recovery plan was put in place to close the gap between the target and the 2% achieved by the beginning of CP3.

For safety, NERL provided information on planned benefits but no information on the achieved benefits. NERL provided limited planned or achieved project benefit information for cost efficiency or capacity.

Some of the changes in performance during CP3 are not linked to any capex projects and instead are due to operational changes or external factors (e.g. traffic reductions). It is not possible for us to determine the impact of these changes on the CP3 targets.

For all of the above reasons, it is not always possible to determine the contribution of individual projects to NERL's targets for CP3. We note that this is not NERL's intention anyway and NERL states that such a change would have been of limited value given the re-focussing of projects away from capacity and towards cost-efficiency during CP3.[39]

4.6 Recommendations

NERL manages a complex series of projects that are inter-linked and co-dependent. The benefit analysis of such projects will always be difficult, as will the "benefit assurance" (i.e. the assessment of whether the planned benefit was achieved). It was made more complex in CP3 by the re-focussing away from

[39] NERL has stated the following in regard to individual project targets: "Once a project exits F&O its contribution is baselined. Once delivered, the benefit is secured. The output performance is showing that we are meeting all of the targets and the capex plan is under the regulatory settlement for CP3."

capacity to cost-reductions mid-way through the period. Recognising these factors, we recommend that, in future, more details are provided on project benefits to help explain the contribution of individual capex projects to the overall targets.

The abstract units of the 3Di score do not make transparent the actual impact on airline fuel usage. We suggest it would be useful to also give the fuel savings of initiatives.[40] Where project level savings are presented as CO_2 benefits, these should be given as fuel savings and, if appropriate, should be linked to the associated benefits in flight efficiency improvement.

We understand that NERL measures the 3Di metric at a network level and attributing benefits to individual projects is difficult. Furthermore, the projects are quite often enablers for procedural changes that deliver the flight efficiency benefits, rather than directly contributing to flight efficiency improvements. We recommend that NERL identifies those projects that are *enablers* for procedural changes that then contribute to the 3Di metric, and those that directly contribute to it (e.g. LAMP).

[40] NERL has stated that this is reported at the SIP and OPA meetings.

5 CP3 programme governance and delivery

5.1 Introduction

We review in this chapter the processes and systems by which NERL is managing the governance and delivery of its CP3 capital investment plan. This combines information received through meetings with NERL – including demonstration of their internal management systems – together with a wide range of relevant documentation. On this basis, we give an opinion NERL's processes and capabilities in the governance and delivery of its investment plan.

5.2 Programme structuring and governance

5.2.1 Overview

NERL has explained and demonstrated the various stages of its capital investment planning, approval and delivery processes, and provided a range of supporting documentation setting out the relevant procedures and requirements.

The diagram overleaf provides an overview of the investment processes.

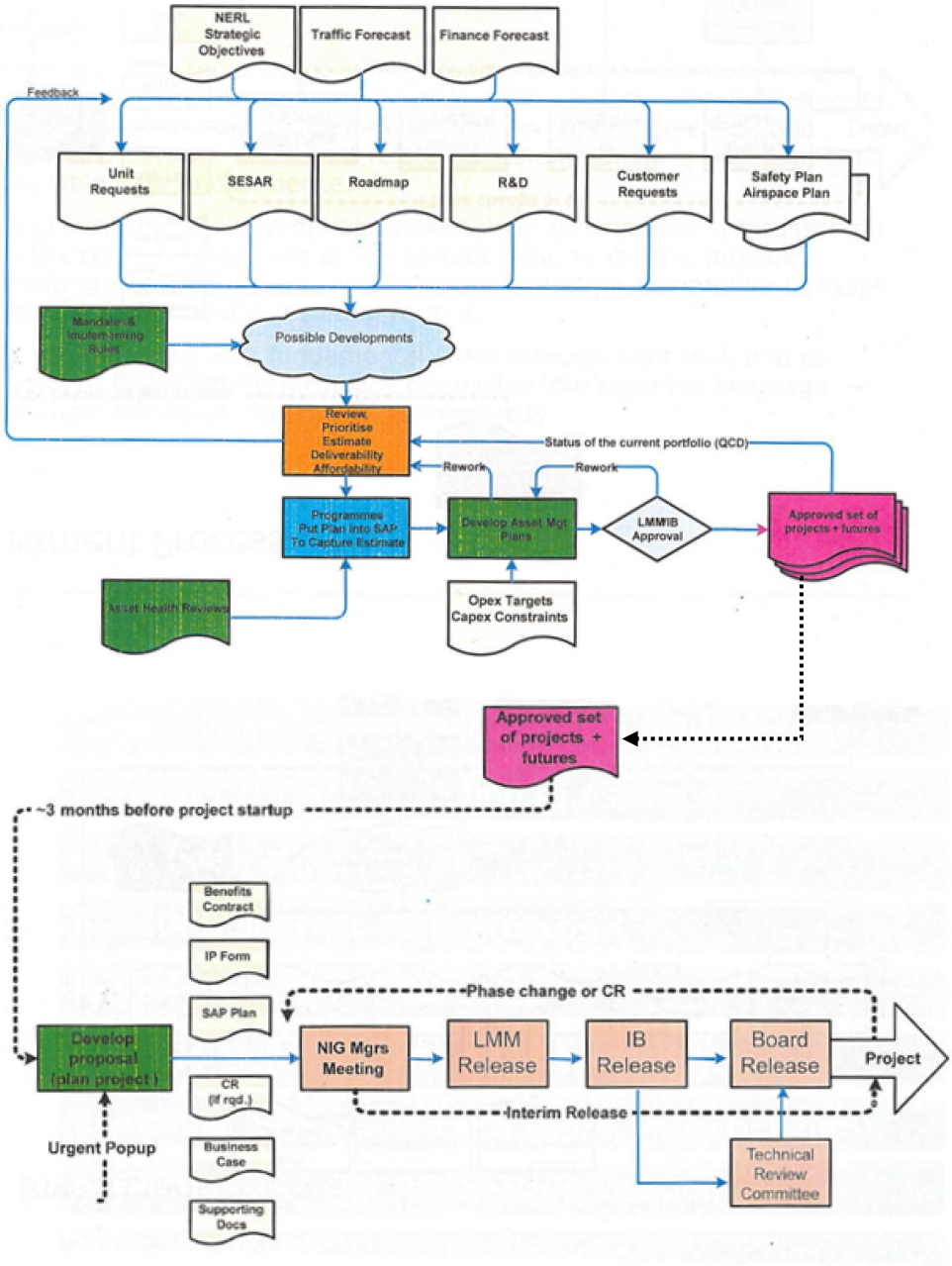


Figure 9: NERL capital investment process overview[41]

NERL's investment process entails a number of important stages, which are discussed further in the sections that follows.

5.2.2 Project structure and approvals

NERL has a defined system for managing projects through the development and approval processes. The core project document is the Investment Proposal, which is developed through a number of stages. NERL utilises the following numbering system for version control through the respective stages of approval and development:

[41] Source: NERL presentation slides, "Capital Investment", presented 14.08.2013

1.x – Study stage

2.x – F&O (Feasibility & Options)

3.x – PD (Project Development)

4.x – Implementation

5.x – Close

Each IP can be accessed and managed via the SAP system. The IP records how plan has evolved and the key decisions, with records attached of key meetings.

Projects for which interdependency is identified with another project require a dependency agreement. This sets out in full the nature of the dependencies and their impact on each project, and is signed by the project manager of both projects involved.

5.2.3 Investment Programme Review

Investment programme review meetings are carried out every six months. Changes and additions to the investment project portfolio are reviewed and prioritised at these meetings based on inputs from asset managers and key stakeholders. NERL does not keep minutes of investment programme review meetings, however the results of discussion and inputs to these discussions are recorded. This is an iterative process for which an initial portfolio is subject to multiple reviews by various internal functions, including the Managing Director Operations, before a finalised version of the portfolio is agreed and imported back into SAP.

5.2.4 Asset Health Review

Asset Health Review provides data and evidence on NERL's current systems and informs asset managers and other stakeholders of various risks that may arise from asset management decisions. Some of the issues considered in Asset Health Review include:

- Criticality of asset
- Safety
- Regulatory or contractual penalty
- Operational capacity
- Loss of Income
- Reputation and brand

The Asset Health Review is an important tool to aid asset managers' decision making on the prioritisation of proposed developments in the investment portfolio. NERL has attained the PAS 55[42] industry standard for asset management processes and practice. This is subject to annual review and validation by Lloyds Register to assure continuing compliance and improvement.

[42] PAS 55 is the British Standards Institution's (BSI) Publicly Available Specification for the optimized management of physical assets. -

5.2.5 LMM / Investment Board Approval Process

Depending on the expected spending, proposed projects are subject to approval by the NERL Investment Group (NIG), Operations Leadership Team, Investment Board or the NATS Board. Information presented for the approval process includes the Benefits Contract, Business Case, Investment Proposal and SAP Plan. NERL has provided us with samples of a number of these documents for specific projects.

Board Papers provided for review outlining business cases for specific projects cover the following aspects for the given project:

- Approval for the expenditure sought
- Strategic context of the project
- Progress and forward plan for the wider plan
- Analysis of expected benefits delivered by the project
- Financial analysis

5.2.6 Monthly LTIP management meeting

NERL manages its CP3 capital investment as an evolving plan subject to on-going optimisation and revision. Project progress and revisions to the plan are monitored continuously. For LTIP management meetings that take place every month, NERL produces a dashboard report and details of variances by individual project (as described previously), to give a 'snapshot' report of latest planned spending on each programme area using data from the SAP management system. As described earlier in the report, the monthly dashboard reports contain a significant level of detail and granularity, with project-level detail on costs, timescales and risks.

Performance is tracked each month at project level, with the project accountant responsible for monitoring actual spending on each individual project versus the financial plan.

5.2.7 Our opinion

We consider the internal review processes to be indicative of a rigorous and controlled approach to capital programme delivery. Notwithstanding our earlier observations regarding the limitations in the detail and granularity of cost variances provided for external review, the internal documentation and quantified analysis is detailed and clearly structured with a full overview of cost variances, as well as the reasons for them. Reviews are delivered on a regular basis, and the sample review undertaken suggests project documentation is comprehensively managed and kept up-to-date within NERL's management system. Both processes and accountabilities appear to be clearly defined to the level of individual projects, with clear procedures in place for controlling and managing costs and the delivery of benefits and outputs.

5.2.8 Recommendation

We recommend that NERL discusses with the CAA and the airline user group potential options for the independent review of the capital investment plan on a cyclical basis for the purposes of providing assurance to the CAA and airline users.[43] Drawing on the detailed project-level analysis and system data that underpins the LMM process, we consider that NERL may provide a similar dashboard to support an independent review process, with a format that consolidates detailed information at a higher level with coherent overview of the material factors driving cost variances across the different programme areas. The parties could consider the merits of a role similar in terms of objectives and approach to the Independent Fund Surveyor (IFS), recently appointed to assess Heathrow Airport Limited's capital project delivery processes.

[43] NERL has stated the following in reviewing to this recommendation: "NERL would want to ensure that any review was at an appropriate level of granularity such as the SIP programmes or equivalent and based on firm output from a feasibility and options stage of a project. The proposed portfolio contains a range of estimates from live, committed projects through to business planning assumptions. NERL can commit at a portfolio level but there may be variances at individual project level as the scope and solution are refined. This is normal portfolio management practice."

5.3 Airline user consultations

5.3.1 Consultation process

NERL has had in place since the start of CP3 an established process of annual consultation with the airline user group. This is a collection of representatives from the main UK and international airlines who represent NERL's customer base. NERL produces the annual "Strategic Investment Plan" (SIP), as the main document summarising the status of its CP3 investment plan. To date, three SIPs have been produced since 2011. The information provided in them has also been one of the main sources of input into the review of CP3 capital investment delivery within this study.

The SIP is produced to a format and structure that was agreed with the airlines and approved by the CAA prior to production of the SIP 2011. The focus is on key developments during the given year, both in terms of traffic and industry developments, and delivery progress across its key programmes. Commentary is made on the delivery of benefits and outputs. The SIP sets out any changes to the capex plan going forward, with revisions to timing and scope explained and a high-level overview given of costs at the programme level.

For each SIP, NERL provides a draft version which is subject to review and comments by members of the airline user group. This is then finalised, with references made to where modifications or adjustments have been made in response to airline feedback. The most recent, SIP 2013, was finalised in March 2013.

All consultation meetings with airline user representatives are fully minuted.

5.3.2 Changes to investment plan resulting from airline user consultations

A number of changes have been made to the CP3 capital expenditure plan as a result of consultations through the SIP process. We understand the most significant amendments to the plan that have resulted from consultation are the following, which were identified through the SIP 2013 process:

- Acceleration of the development of Transition Altitude and LAMP; ca. £6m additional investment in remainder of CP3 as a result
- Developments to support Time Based Spacing in airport approaches, with particular priority at Heathrow and Gatwick: ca. £3m additional investment.

Alongside specific areas highlighted above, the airlines have emphasised through the consultations the need for NERL to clearly demonstrate the benefits of its investment proposals, and to ensure it drives improvements through its existing projects and initiatives, such as the UK-Ireland FAB.

5.3.3 Transparency and evidence

A consistent message emerging from the airline users through the consultation process during CP3 has been the desire for further improvements in the

availability of analysis and evidence that underpins the capital investment narrative presented in the SIP. Particular areas of focus for the airlines in the context have been:

- Better clarity on programme re-scheduling, changes to budget or scope.
- Understanding implications of delays and cost overruns, including implications for longer-term objectives such as delivery of SESAR objectives.
- Improved visibility investment business cases, understanding how projected benefits / outputs are quantified, visibility of underlying assumptions.
- Better understanding of how proposed outputs / benefits of the plan translate directly to airlines operations. Benefits relating to CO2 / fuel savings are a particularly prominent area of focus in this context.

Overall, airlines users appear keen to improve the way in which the capital plan can directly demonstrate the results it has delivered, and to ensure a controlled process is in place to manage cost overruns. Discussions between the airlines and NERL to discuss how to progress the above aspects are ongoing.

5.3.4 Arup questions to airline users

Arup has contacted the airline user group separately, requesting responses to a set of high level questions on their views around NERL's CP3 and RP2 capital investment planning and delivery. Questions are based on costs and efficiency, delivery of benefits and outputs, and the overall consultation process. We summarise the results in the Appendix B.

5.3.5 Our opinion

We consider the overall format and structure of the SIP consultations to be a reasonable process for engaging with airline users. Airline users have been able not only to provide their views on the evolving plan, but also to directly shape and influence the consultation process itself.

We consider the SIP review process and holding of consultation workshops to be a good format for engaging with and gaining input from the relevant stakeholders. The process is fully documented which supports robustness of the material obtained.

There is evidence that NERL has responded to the priorities and feedback of the airline users, particularly in the prioritisation of the airspace programmes and TBS following from the SIP 2013 process.

However, transparency of process and provision of detailed analysis remains a challenge that we consider requires further improvement. We consider that NERL should focus on improving both the transparency and granularity of cost information to explain key elements and movements in its plan, and providing business case justification and details of benefits calculations, to further improve the robustness of the user consultation and challenge process and inspire greater confidence in the plan.

5.4 Supply chain management

5.4.1 Approach

Our approach to understanding how NERL achieves value for money has focused on the policies, systems and processes used in the procurement of projects and programmes. This approach is useful in understanding the strategies that have been adopted during CP3 and how these will be used or developed further during RP2 to deliver value for money.

Arup met with NERL Supply Chain Management (SCM) representatives on the 29th August 2013 and submitted a number of questions through the agreed process. The following findings are based on the information received and the discussions with NERL representatives of the 29th August 2013.

A further meeting took place on the 30th of September 2013 where NERL helpfully provided an in depth review of four projects and provided further Supply Chain documentation and data as requested.

5.4.2 Overview

SCM is a strategic business function within NERL and falls under MD Operations which has Executive level representation. Annually it is responsible for the procurement of approximately £250m of capital and operating expenditure. Approximately 80% of this expenditure is with 40 key suppliers.

Over the last 5 years NERL has achieved a number of industry accreditations including:

- Chartered Institute of Purchasing and Supply – Excellence in Policy and Process 2007 (Subsequently CIPS Gold standard);
- CIPS Gold Standard – Strategic Procurement Capability, certified to 2014; and
- BS11000 Certification for Collaborative Business Relationship Management, 2011.

In 2012 the NERL SCM function delivered to plan on a £4m CAPEX savings target plus £3.5m on £3m OPEX savings targets.

NERL capital and operating expenditure is focused in three areas:

Engineering: Comprises both the external procurement of goods and services and the internal design, operation, management and assurance of NERL engineering systems. Engineering accounts for approximately 80% of spend across capital and operating expenditure. Some limited data have been provided on individual projects to understand the proportion of spend between external and internal resources.

Information Systems (IS): Comprises the internal and external resources required to deliver IS maintenance, upgrades and enhancements. Again, only limited information has been provided to date to allow us to analyse the proportion of spend between external and internal resources. However NERL referenced an approach known as “IS Lite”, an approach to IS procurement

whereby suppliers are managed proactively and outsourcing and the use of low cost country sourcing is encouraged.

Facilities Management: EMCOR is NERL's sole provider of FM and is mainly opex related and covered under a separate study by Capita Symonds. EMCOR is employed on a multi-year framework. Under the framework EMCOR is responsible for the delivery of site specific services ranging from catering to mechanical and electrical maintenance.

In our review meeting, NERL stated that it uses Category Management to group individual streams or types of work, goods or services with the aim of driving greater cost efficiency. This is achieved in practice with a range of tools including:

- Competition;
- Collaboration;
- Industry benchmarking;
- Promoting "Commercial Off The Shelf" (COTS) products over in-house development;
- Standardisation;
- Low cost country sourcing; and
- E-sourcing (using ARIBA) and E-auctions.

Only the SCM function within NERL has the authority to award contracts to external parties. SCM is represented or active in the NERL Investment Board, LTIP Management Meeting, NERL Investment Group and within individual project review and investment boards.

Projects over £250k in value must develop a supply chain strategy detailing strategic objectives, costs, risks & risk management, market analysis and options, recommendations and a plan for market engagement. Evaluation of the strategy was stated as being undertaken on a case by case basis rather than having a fixed strategy for a particular category type or project.

NERL states that procurement is undertaken with a careful balancing of core competencies, value, capacity, timing, market maturity, safety cases and the uniqueness of the business need. Investment groups and project boards review the proposals whilst the SCM and Asset Management role is to set out the recommendations for endorsement.

5.4.3 Supplier Relationship Management (SRM)

A key component of an effective SCM function is the degree to which it actively manages its relationship with suppliers. NERL has provided an overview of its approach to SRM as follows:

- NERL utilises a segmentation model to identify relationship types and the management approach;

- Three types of relationship have been identified: supplier, key supplier and supplier partner. This has been increased in RP2 to include Strategic Partners;
- 17 key/partners suppliers exist which have structured relationship and performance management programmes consisting of formal evaluation, structured improvement plans and evaluation against Key Performance Indicators;
- NATS-wide supplier management policy (PP09SUPMAN) is in place and communicated; and
- All have a supplier relationship manager who develops the supplier management plan/strategy jointly with the business obtaining the sign off of the SCM director.

It was clear that a structure for SRM exists and that the approach was aligned with previous statements regarding policy and category management.

5.4.4 Supplier Performance Management

NERL has provided further information detailing its overarching approach to performance management.

Based on the review meeting it is clear that NERL manages its external suppliers using a formal process. This process measures, analyses and drives improved performance against pre-defined targets. The overall aims of the process are to reduce cost, mitigate risk and drive continuous improvement.

Performance management of external suppliers is undertaken at least once a year. Four main assessment categories are used - commercial/value, delivery/quality, management processes and interactions, technology and capability. Both NERL and the respective supplier score each other with “360 degree” feedback provided on NERL as a client.

Outputs are recorded on NERL’s intranet with suppliers receiving an award and recognition for scores in excess of 85%.

A strategy for performance management is clearly in place and the principles and some of the tools used compare favourably with those used in other organisations, particularly in the regulated utilities sector.

5.4.5 Our opinion

We consider that NERL’s SCM function is represented appropriately in the business and at a number of strategic levels. From our review it is clear that SCM has clear strategy, direction and leadership and its approach to supplier relationship and performance management compares favourably with examples of best practice in the regulated utilities.

Given the degree of change occurring within SCM during CP3 it is not entirely clear how effective NERL procurement processes have been in delivering value for money during CP3. The SCM function is changing to adapt to the requirements of RP2 and it is reasonable to assume that some initiatives such as Category Management could have been implemented sooner.

Evidence provided in the form of procurement strategy documents indicates that internal projects are treated differently to those requiring externally procured resources. Whilst a procurement strategy document may not be the appropriate vehicle (using the example of the Dover Lydd project) to identify the rationale for using internal (as opposed to external) resources, it is reasonable to expect that some form of documentation is in place demonstrate appropriate management decision making in this regard.

Whilst estimation of project costs is part of the project estimating and business case processes discussed earlier in this section, NERL's defined SCM policy (PP09PROC) only applies to activity involving external suppliers. Property contracts and deeds are also not covered under this policy.

There have been four revisions of policy since 2009 and changes have been relatively minor with the current version of August 2013 updated to reflect organisational changes.[44]

This indicates that internal resources are considered and evaluated using alternative processes or policies and we believe this is an area that requires further review, clarification and possible improvement.

5.5 Procurement strategy

Examples of procurement strategy documents were requested for five projects as follows:

- FPRSA Replacement Project;
- EFD;
- Datalink;
- NERC; and
- Dover/Lydd.

Documents were provided by NERL for all but the Dover/Lydd project. NERL stated that this was due to the project being an internal project and that a procurement strategy document was not required.

The following points with regard to the content and quality of the documents were identified:

- Scope information and project background was considered adequate;
- Strategic objectives are clearly stated;
- Risks appear to have been summarised in the FPRSA paper (Greater definition of the risk causation with a clearer link to mitigation would improve the quality of the content);
- The consequences or impact of the risks occurring are not detailed;
- Benefits relate only to cost reduction. We would anticipate that operational benefits are more clearly stated;
- The positioning of the procurement, relative to risks and the value to NERL was clearly illustrated and categorised;
- The link between procurement categorisation and the proposed turnkey solution for FPRSA was less clear;

[44] NERL has indicated that "[t]he latest revision is a placeholder as a more wholesale review of the SCM strategy has taken place and SCM are in the process of implementing this which will result in a fully revised set of policies and procedures."

- Stakeholders are clearly identified although their feedback or involvement in the procurement strategy document was not detailed;
- Alternative approaches (e.g. new software bases or "do nothing") options are explored at summary level;
- A range of options (including single sourcing and competitive tendering) are identified and linked to SCM policy;
- A programme detailing next steps in the procurement action was clearly set out;
- Foreign currency hedging on the FPRSA project opportunity is identified;
- Overall project costs are not very well defined or detailed in the strategy document. Costs are limited to high level estimates;
- As the anticipated spend was presented at a high level only, it was not possible to identify what level of risk was assumed in the procurement approval;
- Third party costs are not clearly identified. It is not possible to see how the approval requested is linked to overall project costs; and
- No authorisation signatures or sign offs appear to be incorporated into the document although we understand that there may be an electronic approval process but this is not referred to in the documents.

Compared to best practice the procurement strategy documents provided by NERL were considered to be below the standard anticipated. This is due to:

- Inadequate description of risks, causal risk factors and impacts;
- Inadequate description of operational benefits;
- Lack of financial detail including clarity on the level of risk included within the estimated cost of the procurement;
- Inadequate context provided in terms of total project cost;
- No apparent senior management sign off.

From our review of NERL procurement policy documents we have found that the policies apply only to external procurement activity. It is not clear how procurement strategy is developed for internally sourced projects such as Dover/Lydd. In the interest of transparency it is recommended that the same procurement rules or principles apply to both internal and external procurement.[45]

5.5.1 Authorisations and approvals

NERL's SCM policy PP09PROC details the delegated levels of authorities for procurement. NERL policy on procurement authorisation is clearly stated as follows:

"No contractual commitments, including amendments to existing contractual commitments, either oral or in writing, with external suppliers of goods and services shall be made other than by Authorised Buyers or the NATS managers listed in Governance Arrangements, PP02GA."

The Director of Supply Chain is responsible for delegating purchasing commitment authority to named "Authorised Buyers". These buyers are provided

[45] NERL has stated that "[t]his is currently covered in NATS business case processes."

in document NPO020308 "Delegated Purchasing and Sales Commitment Authority".

Additionally, all procurement transactions are actioned using the NATS Integrated Business System (NIBS). From our review we considered that delegated authorities were clearly defined and managed by NERL.

5.5.2 Other information

Further information relevant to NERL procurement was provided as follows:

- All tendering e-sourcing is undertaken through the Ariba platform (NATS e-tender tool);
- Processes, tools and templates are documented in the form of "DIMS" (Departmental instructions). DIMS are fully reviewed on a periodic basis as part of the policy and procedure review. . However, it is not clear how material these documents are in terms of delivering value for money;
- Model contract templates are in place to ensure a common approach across procurement activities. We note that specific terms and conditions, warranties and liabilities will be required for many specialist aspects of NERL procurement; and
- For £1m+ projects a sourcing strategy is drafted and approved at the start of a project. Variations are updated and communicated/approved through the procurement process.

5.5.3 Future developments

SCM is implementing a new organisational structure with the following key themes:

- Category Management;
- A major projects focus to ensure adequate supply chain capability to support significant business projects;
- Developing partnerships to drive commonality, share market insights and share development costs with key suppliers and other ANSPs;
- Managing routine purchases through a new service centre to ensure value and efficiency from transitional and tactical spend; and
- Continuing to seek accreditation to guide and validate strategy.

It is also notable that from September 2013 Asset Management will be embedded within the SCM function.

5.5.4 Application in CP3 and RP2

A number of policies are undergoing change and update in CP3 to reflect the changing market and NERL's increased capacity.Based on best practice in other sectors such as the regulated utilities, approaches such as Category Management are commonplace. The benefits that have been delivered through the changes identified are focused on process and management systems. Consistent implementation of these processes and systems by NERL should improve procurement practice.

5.5.5 Our opinion

NERL's SCM strategy was discussed during our review providing a clear understanding of how NERL approaches the market for different categories of procurement. Whilst only a high level review we found that many NERL initiatives aligned with good practice in terms of how overarching policy is developed into strategies and specific procurement activity. NERL also seeks independent verification and certification with positive results.

In terms of implementation of strategy we were provided with four strategy documents. Our review identified a number of issues that are significant in terms of understanding whether the procurement approach represented value for money including the clarity of risks, their causes and potential benefits. A larger sample would be required to understand the materiality of these findings. We consider that improvements can be made in the drafting of individual procurement strategy documents.

Risks, their causes and potential benefits were not clearly articulated in the procurement strategy documents. It is unclear to what extent this may affect delivery of value for money. However, improvements can perhaps be made in this area by addressing the issues identified in our review. These processes are currently under review and are being updated along with the process.

There is an initiative within SCM to standardise MOTS (Modified Off The Shelf) products which is being implemented through key collaborations with FABS and SESAR. Buying groups have been attempted in the past but were not successful due to varying requirements between products and services. Although this may be the case for more specialist equipment there is certainly an argument for buying groups for low value, low risk items that are now being procured under the service centre.

The scope of EMCOR the facilities management supplier has recently been expanded to include minor works such as the supply and installation of air conditioning equipment. It is not known whether this is the most cost effective method of delivery and how this has been benchmarked. Access to the procurement strategy for this decision would provide greater confidence.

The key themes from the new SCM structure and improvements will have a greater impact in RP2 and it is recommended that NERL monitors and records the benefits of these strategies to provide greater confidence in future reviews.

5.6 Programme delivery management

We have also reviewed NERL's capability in project and programme management focusing on policies in place to improve staff capability and the processes and systems that are used in practice.

5.6.1 Project management competencies and accreditation

NERL has two initiatives relating to the project management competency of their staff as follows:

- Association of Project Management (APM) accreditation; and
- The Projects Academy.

With regard to APM accreditation (in place since 2011) NERL endorses the following approaches aligned to the APM "Body of Knowledge":

- Management of a project management body is favoured;
- Continuous Professional Development (CPD) opportunities are available and encouraged;
- All professional development opportunities are demonstrably linked to the APM Body of Knowledge;
- All professional development activities are formally linked to the APM "Competence Framework"; and
- All Project Management staff are mandated to complete relevant APM project management qualifications.

The above initiatives result in a score of five (the maximum APM score) for alignment with the APM assessment standards of Body of Knowledge, Competency Frameworks and Qualifications. NERL scores three and two for CPD and APM Membership respectively.

The Projects Academy is an initiative that has been in place for three years and is a key component of NERL's APM accreditation. The academy's activities include:

- Setting of staff development targets;
- Alignment of project management capability with programmes business plan and new processes;
- Implementation of innovative learning methods such as webinars and blended on-line learning; and
- Providing on-going internal and external CPD opportunities.

It is notable that NERL has been awarded a number of APM and industry awards in recent years for both individual projects and staff achievements.

5.6.2 Process documentation

With regard to management processes NERL supplied the following documents:

- Project Management Overview for LTIP projects
- Cost estimation of LTIP projects

- Project start up
- Project Management Plan
- Full Project Manager(s) report
- Earned Value Management form
- Light PMR template
- Detailed risk management guidance
- Communication stakeholder management for projects
- Impact of change IOC assessment
- Management of NATS configuration control boards

In addition to the above a review of the use of project management processes was undertaken (using NIBS) for the following four projects:

- EFD;
- Datalink;
- NERC; and
- Dover/Lydd.

Additional documentation was provided to demonstrate that processes were either in place (e.g. NERL020106) or followed in terms of project reporting and control (e.g. the use of management dashboard reports):

- Evolution of CP3 Forecast
- NERL Investment Management Process NERL020106
- Lifecycle through Governance Process (broken down by internal and external)
- LMM Agenda Matrix (March through to August 2013)
- LMM Dashboard Report for March and April 2013

To understand the process of obtaining funding for projects, NERL has provided schedules detailing funding requests and budget estimates for a number of projects over time. Following our request this information was also split into internal versus external resources. The document presents information at a high level and does not provide any further breakdown of project estimates, resources or risk and contingency, however it does demonstrate the periodic review of costs and the corresponding levels of budget authorised.
Funding requests for LMM were provided for the period between March and August 2013. The document provides a framework for discussion and records decisions of the LMM meeting with formal approvals being granted using NIBS. It is worth noting that NERL does not have a block on SAP at the authority level that has been approved. Technically it may be possible for an individual to commit to expenditure above their authority level and funds would have to be released retrospectively. Given that the Project Accountant tracks actual, committed (released) and forecast expenditure there is no evidence this is

occurring in practice. Nevertheless, it may be worth considering restricting approvals with delegated authority levels on the SAP system. This is commonplace in other organisations.

The LMM dashboard report for March to August 2013 also provides cost information using a RAG (Red, Amber, Green) status and associated commentary. The report includes:

- Key Quality, Cost and Delivery statements for the period
- Key achievements in the period
- Quality/Benefits
- Cost
- Delivery
- A benefits briefing
- Cost briefing - Portfolio review
- Cost briefing – Project review
- Cost briefing – Risk and COP review
- SIP briefing
- Key project briefing
- Delivery briefing

The LMM dashboard is a very clear and concise document providing a comprehensive health check of projects highlighting any issues or areas of concern. It provides a commentary on under or overspend and how risk and contingency is being managed. A link to the LMM decisions on actual vs. release and forecast vs. approval budget information is also included. Of the 86 projects reported in the dashboard 20 were currently at a red status in terms of the current forecast vs. approval. Of the remaining projects 29 were at Amber status and 37 at Green. Whilst only a periodic snapshot it illustrates that NERL understands where projects are at risk of exceeding their forecasts and that management action is required.
In RP2 NERL anticipates undertaking approximately 140 projects under ten SIP programmes and 45 sub-programmes. To ensure a common approach and robust control the processes provided by NERL need to align with best practice and be subject to independent verification. Our review provided sufficient assurance that NERL's project management policies and processes are being adhered to and are integral to NERL delivery.

Our review identified several areas of improvement in the processes mainly in terms of clarifying the approaches to be taken with respect to internal versus external resources. The cost estimation and subsequent management processes for these resources was not clear and would provide greater confidence in the efficiency of internal delivery if included.

5.6.3 Our opinion

NERL has sought to improve project management capability through the Projects Academy and accreditation with the APM. This appears to have been successful based on NATS' accreditation score and a number of industry awards. A suite of project management processes exist that are of a good quality but they could perhaps be further improved with clarification of specific control measures (e.g. time, cost and quality) for internally resourced projects. From a review of four very different high value projects it is clear that these processes are implemented on a consistent basis.

5.7 Risk management

5.7.1 Approach

Our approach to understanding NERL's risk and contingency management processes has focused on the policies, systems and processes used for identifying, managing and monitoring risk. This approach is useful in understanding the strategies adopted during CP3 and how these will be used or developed further during RP2 to:

- Identify and track project and programme risks;
- Periodically appraise and review risk; and
- Develop mitigation strategies.

5.7.2 Review of risk management procedures

Arup has been provided with the following procedures relating to risk and contingency management:

- NERL020127G1: Detailed Risk Management Guidance
- NERL020127: Project Threat and Opportunity Management
- NERL020128: Project risk and contingency fund management
- NERL020129: Project Risk Management

The Detailed Risk Management Guidance (NERL020127G1 - issue 1, July 2013) document outlines how to implement risk management using a step by step process guide for NERL projects. The guidance provides useful, high level guidance detailing how risk management should be implemented throughout the risk management lifecycle including:

- Risk identification;
- Assessment;
- Entering information in RAMP;
- Assessing mitigations;
- Generating action plans; and
- Periodic review and closeout.

This Project Threat and Opportunity Management (NERL020127) document outlines specific requirements for project risk management. The guidance details the identification and management of risk through the key phases of:

- Initiation;
- Identification;
- Evaluation;
- Treatment planning;
- Treatment implementation

A detailed flow chart is provided and provides guidance on initiating change and risk drawn down. At a meeting with NERL on the 30th of September 2013 evidence was provided of the process of risk drawdown through LMM meetings.

The Project Risk and Contingency Fund Management document describes the processes to ensure financial contingency and risk fund allocations are appropriate, accurate and held for no longer than required.

5.7.3 Review of the RAMP system

In addition to our review of processes a review of the RAMP system was undertaken for three projects:

- LAMP;
- PCUA; and
- Datalink.

Three risk items were reviewed for each project. Each risk item recorded on the system held the following information:

- ID number
- Risk owner
- Location
- Status
- Brief description
- Dates for various stages
- Cause
- Effect
- Evaluation rationale
- Probability
- Threat value including splits between external and labour

Mitigation actions and periodic reviews were also recorded and reviewed within RAMP, demonstrating that risks were current and monitored appropriately. It was not apparent from our review how risk values were released as their value and likelihood of occurrence diminished through the life of a project.

Risk values in RAMPS are calculated for baseline (pre mitigation), current (only completed mitigations) and post (if all mitigations are undertaken) scenarios. Risk values are calculated using the following calculation:

Value x Probability % = Risk item value

The RAMP system does not appear to consider the possibility of a range of values (best case, likely or worst cast), or how a value might be distributed across the range (uniform, triangular or bell shaped distribution). The system also doesn't provide additional analysis tools such as quantitative risk analysis that would enable statistical analysis of risk and the probability of occurrence which in our experience we would usually expect to see.

For the LAMP project NERL also provided a board paper outlining ten project risks (six external risks, two NERL controlled risks and two project definition risks) and a current risk forecast of £13.6m. The board paper also states that:

"although specific risks have been identified there remains a considerable degree of uncertainty (particularly with regard the TA) therefore a contingency provision of 20% is being requested"

Our analysis identified RAMP data for three of the ten risks stated in the board paper. The range of values for these risks in ramp was between £13m (baseline risk) to £5.8m (post mitigation). It is best practice to see the sum of post mitigation values for risk being combined to derive a contingency provision. Based on our analysis, whilst specific risks and values were identified we were unable to fully reconcile the contingency request for the LAMP project with the data held in RAMP. It is unclear how RAMP data were used to determine the 20% contingency provision requested.

Within RAMP, each risk item has a schedule of "treatments", each with an effect on either the baseline threat value or baseline probability percentage. This information is then used to calculate the current and post risk values. There is limited information on how the effects of these actions are derived.

For the LAMP project each risk item was found to include a treatment action for "Inflation adjustment to match business case" as per the following table.

LAMP Risk item	Baseline threat value (£)	Inflation adjustment to match business case value (£)	Percentage of overall item over baseline value
1	6,000,000	-1,000,000	-17%
2	12,000,000	-2,562,500	-21%
3	5,800,000	-2,460,000	-42%

Table 10: Analysis of top three risks within the RAMP for the LAMP project

These adjustments in effect understate the impact of the treatment actions and increase the current and post threat values.

At our meeting on the 30th of September 2013 we requested information about this adjustment and were informed that it was not an adjustment for inflation. No

detail is given as to why it was necessary to adjust the risk values to match the business case. It is reasonable to expect that information from the RAMP system would correlate directly to contingency allowances without further adjustment.

In summary RAMP is a robust system to record, monitor and track project risk. However our analysis of individual projects identified uncertainty in how data from the system was used to determine contingency provisions on individual projects. Items such as inflationary adjustments for risk were not fully explained and we believe indicate that there is some degree of subjective assessment in determining project level contingency. The impact of this approach is to understate the true level of risk, held at programme or project level, across the scope of the investment plan.

5.7.4 Our opinion

We consider that the processes and procedures reviewed provide a robust set of risk management guidance documents. These are cross-referenced with other policies from our discussions with NERL. Additional evidence was provided during project reviews demonstrating at a high level that risk was managed appropriately but without access to detailed project risk information it is difficult to make comment on the appropriateness of this risk allowance.

Programme level risk allowances are comparatively low in value considering the complexity and size of the programme and individual projects. However, risk allowances at project level were less well defined meaning that the overall risk allowance is likely to be greater than that stated at programme level.

NERL has policies, procedures and systems in place to identify, assess, mitigate and monitor risk items that may occur on its projects. These systems are able to generate project budgets for risk although a clear link between process and budget setting was not always evidenced.

Our review found that some risk allowances have been amended to match business case values. We have identified an example where this was achieved with the use of an inflationary adjustment, we recommend that an internal review of this approach is carried out.

Based on the sample of RAMP risk items provided, we consider that RAMP is a robust, mostly complete risk management process that appears to be used on a consistent and professional basis. We have had limited visibility of how values from RAMP flow through to project risk values or the RP2 submission. It is important to understand if this is derived from the current threat values and post treatment threat values or a combination of the two.

STAGE B – RP2 CAPITAL INVESTMENT

6 Capital Investment Costs – RP2

6.1 Introduction

We review in this section of the report the costs associated with NERL's RP2 capital investment plan. We focus on the scope and costs of the different programme areas presented in the variant plans (Plans 1 & 2) presented by NERL, focusing on the key cost elements and drivers. We discuss the transparency of cost and related assumptions within the RP2 plan, and the robustness of proposals and supporting analysis.

6.2 RP2 capital investment plan overview

In its initial RP2 business plan proposals NERL has presented two variants of its capital investment programme. Plan 1 entails a total RP2 capital investment sum over the five years of **£653m** (in outturn prices)**.** Plan 2 presents a slightly lower RP2 total investment of **£603m**.

The charts below show the breakdown by programme of the total capex amounts in the RP2 Plans 1 and 2, and the relative weighting in percentage terms across the different programme areas.

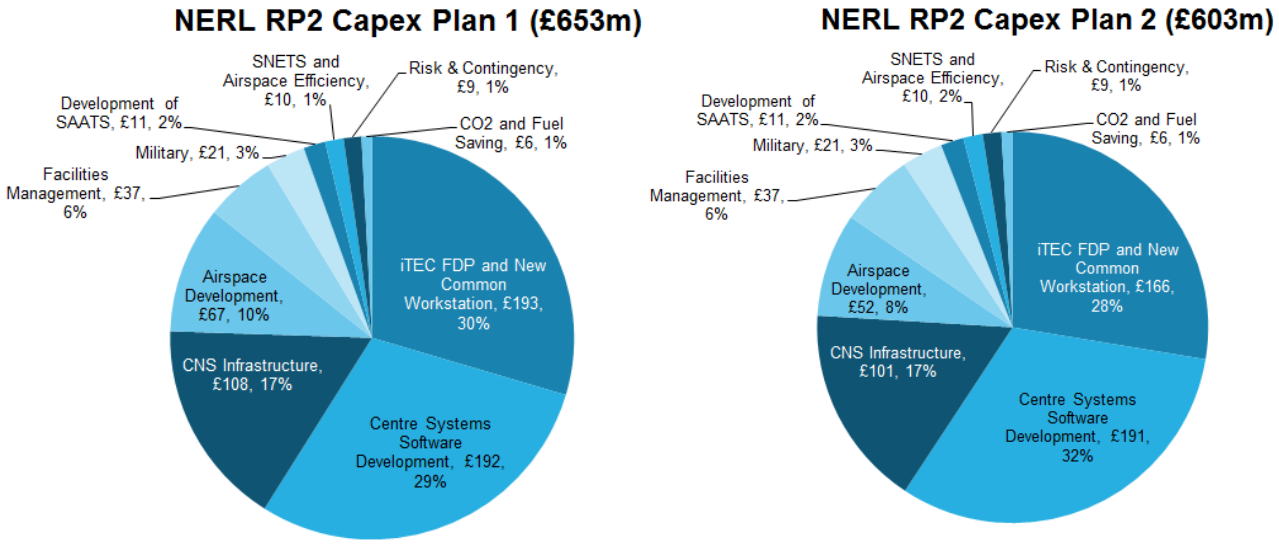


Figure 10: NERL RP2 capital expenditure Plans 1 & 2 overview

The principal drivers for £51m (7.7%) lower spend in Plan 2 compared to Plan 1 are:

- £27m (14%) reduction in iTEC FDP spend; and
- £15m (23%) reduction in £15 million in Airspace Development.

Plan 2 also entails a reduction in CNS Infrastructure spend of £8 million, and a minor £1m reduction in Centre Systems Software Development. For the remaining spend categories there are no differences between the plans.

We set out below the year-on-year projected expenditure for RP2 contained within Plans 1 & 2 (comparing this to CP3 spend levels).

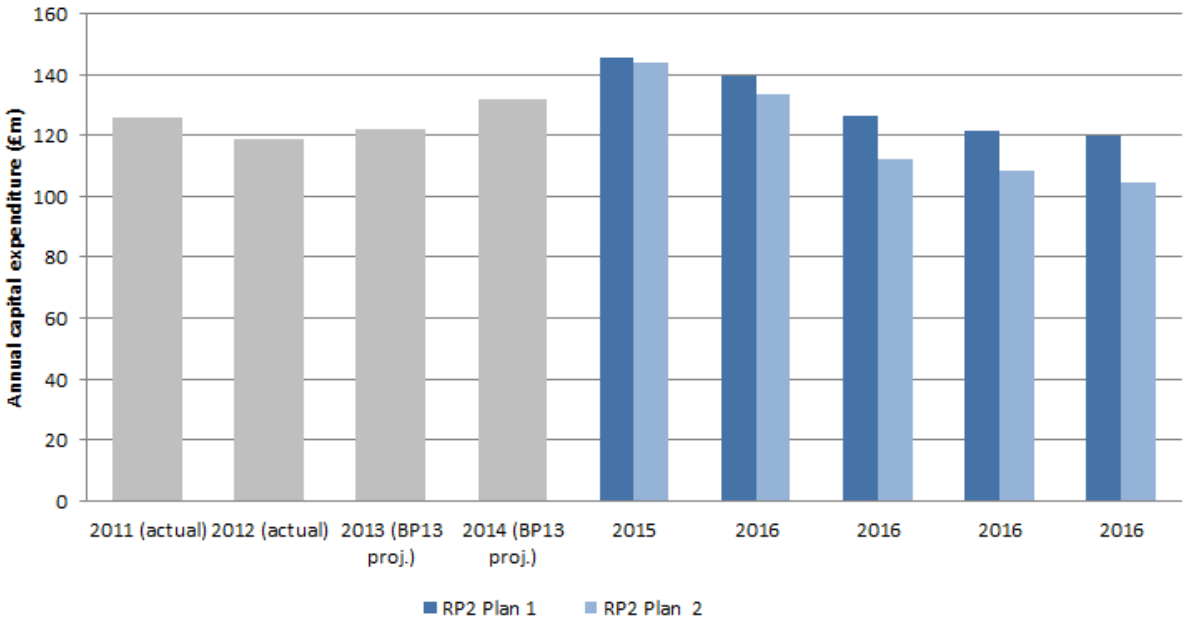


Figure 11: year-on-year capital expenditure comparison – CP3 to RP2

In terms of year-on-year expenditure profile, it can be observed that RP2 plan sets out a slightly reducing level of year-on-year annual investment as the control period progresses. Plan 2 involves a steeper reduction in spend compared to RP2.

When comparing the RP2 plan to CP3, it can be observed that all ten[46] of the defined programme areas comprising the RP2 plan are continuations of defined CP3 programmes,[47] with the relative weightings fairly similar in most areas. The main differences are:

- Reduction in the levels of planned investment in Centre System and Software Development (c.14% lower than in CP3)
- Higher investment in iTEC FDP and NCW (c.40% higher than in CP3 in Plan 1, and c. 20% higher than CP3 in Plan 2)
- Higher investment in Airspace Development (c. 80% higher than in CP3 in Plan 1, and c. 40% higher than CP3 in Plan 2)

[46] We note that NERL in some of its RP2 documentation, e.g. the project-level breakdown, NERL has again split down iTEC programme spend into the iTEC FDP and NCW development. Therefore in some cases 11 programme areas are referred to.

[47] We note that the CP3 Radar Site Services programme does not continue into RP2. This programme of renewals activity on existing radar assets is due to reach completion before the end of CP3

- Ca. 70% reduction in spend on the SNETS and airspace efficiency programme, and discontinuation of radar site services following completion of the investment programme in mid-CP3.

6.3 Programme breakdown and key variances

6.3.1 Expenditure profile by programme area

We compare in the chart below, year-on-year expenditure by programme area between CP3 and RP2 Plan 1.

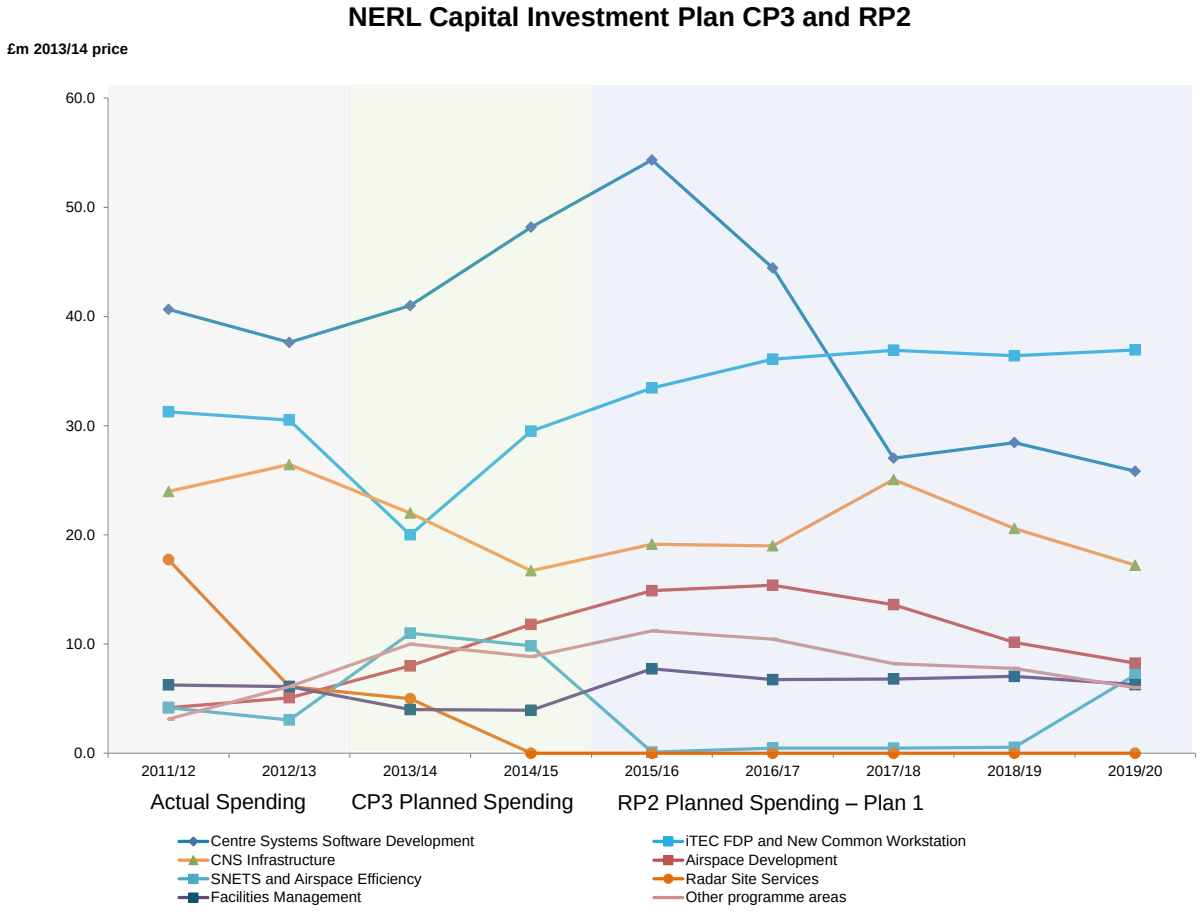


Figure 12: Capital expenditure year-on-year profile by programme from CP3 to RP2

As indicated in the chart above, the main driver for the overall shape of the spend profile (initially higher overall spend profile that then declines during the control period) is Centre Systems Software Development, the largest expenditure area. The initially high level of initial spend during 2015 is projected to fall to just over half this level in the final three years of RP2.

The two next highest spend areas, iTEC programme and CNS infrastructure, both show a slightly increase profile of spend during CP3.

Remaining programme areas show a generally flat or slightly declining pattern of spend, with the exception of SNETS and Airspace Efficiency where almost all of the spend is due to fall in the final year of RP2.

6.3.2 Programme and project-level detail

For each of the ten programme areas, NERL has provided a breakdown by sub-programme within the RP2 Capital Investment Plan.[48] This includes:

- An overview of the overall timescale for the given sub-programme in terms of start and end-point (showing the year of commencement / completion within RP2 and / or the start point before or after the control period).
- Total (Plan 1) spend for the lifetime of the given sub-programme.
- Plan 1 and Plan 2 spend falling within RP2.
- Arrows depicting where the main dependencies are between programme / sub-programme area.

NERL has indicated that it considers the breakdown of the RP2 plan on a programme & sub-programme basis to be the appropriate level of detail in line with the "80-20" rule, whereby a reasonable level of visibility of underlying elements of spend is provided to customers and stakeholders without excessive detail.

There are 40 sub-programmes in total, which we set out in the table below, together with the associated spend amounts and a commentary on the nature and profile of projected spend for each.

Programme and sub-programme	RP2 Plan 1 capex (£m)	RP2 Plan 2 capex (£m)	RP2 expenditure breakdown and detail provided – Arup comments
iTEC FDP/CWP			
CWP and iTEC Rollout`	193.1	166.4	iTEC a very large programme. Detailed explanations given of development and implementation processes, key milestones and planned timescales but no breakdown of component cost elements in RP2 total spend provided.[49] No details given of longer term cost impact in other areas of the reduced iTEC spend in Plan 2.
Total	**193.1**	**166.4**	
Centre systems software development			
SDP System	8.2	8.2	Reasonable degree of granularity, With an overview of each sub-programme and what it delivers provided in the capital investment
FDP System	35.4	35.4	
NERC System	79.4	79.4	

[48] NERL has also provided a spreadsheet containing a list of the 120 individual projects in total that fall within the respective programme areas. We note that, for reasons of commercial confidentiality NERL was not able to provide a breakdown of costs at individual project level.
[49] NERL has stated that this data exists but that this was not requested as a sample.

Programme and sub-programme	RP2 Plan 1 capex (£m)	RP2 Plan 2 capex (£m)	RP2 expenditure breakdown and detail provided – Arup comments
Information Display Systems	4.5	4.5	plan. Given the size and complexity of the NERC system sub-programme as an expenditure area, further breakdown of what the component costs represent would be beneficial.
Centres Voice Comms	22.7	22.7	
Cyber Resilience	3.7	3.7	
Business Intelligence	1.0	1.0	
Queue Management	32.9	31.8	
Training and Simulation	4.1	4.1	
Total	**191.9**	**190.8**	
CNS infrastructure			
Surveillance Resilience	20.4	18.7	Reasonable degree of granularity, as per the previous comment.
CNS Infrastructure Resilience	6.6	6.6	
Comms Infrastructure	20.0	20.0	
IS Core Resilience	14.9	14.9	
Nav Aids	25.3	19.2	
IS tools Enhancement	13.8	13.8	
Met Data and Messaging	7.7	7.7	
Total	**108.3**	**100.5**	
Airspace development			
Airspace Annual Redesign/Change	16.2	9.6	Reasonable degree of granularity, as per the previous comment.
TC Improvement Programme	0.1	0.1	
Transition Altitude Change	6.2	6.2	
LAMP	24.7	18.7	
NTCA	5.8	5.8	
ScTMA	3.2	3.2	
North Sea Improvements	4.3	4.3	
LAMP Alignment	6.0	3.6	
OPA Hotspot Funding	- *	- *	[* - Note: sub-programme funded via opex]
Total	**66.5**	**51.5**	
Facilities management			
CNS Sites	9.1	9.1	Reasonable degree of granularity, as per the previous comment.
CTC	0.5	0.5	
Prestwick Centre Buildings	6.9	6.9	
Prestwick Centre Plant	0.5	0.5	
FM Physical Security Sustainment	0.5	0.5	
Swanwick Buildings	9.1	9.1	
Swanwick Plant	10.3	10.3	
Total	**36.9**	**36.9**	
Military			
Total	**20.5**	**20.5**	Limited information provided. This expenditure is funded separately via the FMARS contract and is not captured within the RAB.

Programme and sub-programme	RP2 Plan 1 capex (£m)	RP2 Plan 2 capex (£m)	RP2 expenditure breakdown and detail provided – Arup comments
Development of SAATS			
Oceanic Build Programme	2.6	2.6	Reasonable degree of granularity, as per the earlier comment.
New Oceanic System	8.7	8.7	
Total	**11.4**	**11.4**	
Safety Nets and Airspace efficiency			
Operational Efficiency	0.5	0.5	Reasonable degree of granularity, as per the earlier comment.
New SDP Systems	8.8	8.8	
Total	**9.7**	**9.7**	
Risk and contingency			
Total	**9.3**	**9.3**	We comment on NERL's RP2 risk provision later in the report.
CO2 and fuel saving			
Total	**5.5**	**5.5**	We understand this to be a contingency amount specifically for projects (as yet undefined) that will be implemented to achieve CO2 / fuel savings.
Plan total	**653.2**	**602.5**	

Table 11: Breakdown of RP2 spend by programme area

6.3.3 Our opinion

Generally, the level of breakdown and detail in terms of sub-programme descriptions, timescales and costs appears reasonable. The main exception to this is the iTEC programme, for which very limited cost detail has been provided. For a small number of the complex and high-spend Centre Systems sub-programmes cost detail is limited.

The capital expenditure documentation presents each sub-programme in a clear and usable format, which includes an overview of spend falling before and after RP2 as well as during it. This helps provide linkage with the CP3 plan. As noted in the Stage A part of this report, capital investment spend during CP3 is not broken down on the same coherent, sub-programme basis as it has been presented for RP2. This means that comparisons of spend at a sub-programme level, and assessing the impact of rescheduling or deferral of programmed spend between control periods, can be challenging.

Providing a cost breakdown and structure that harmonises both "live" programme and sub-programme spend during CP3 and its linkage with continued or associated spend during RP2 could form an effective basis to allow such comparisons to be made.

6.4 Programme area cost developments

We review in this section the explanations given by NERL for capex cost levels in the key programme areas.

6.4.1 iTEC programme

The most significant area of expenditure is the iTEC programme. This is set to increase from CP3 levels as a result of the project entering the full implementation phase, following conclusion of the Project Definition phase, which takes place in CP3. An important element of the iTEC programme will be the development of the New Common Workstation. NCW is now expected to be delivered the Prestwick Centre in latter part of RP2, whilst the NCW is planned for introduction at Swanwick in early RP3. This follows a change to the original iTEC programme strategy during CP3, in which NCW development was anticipated to commence during the latter part of the control period, but which is now deferred until RP2 and beyond. As noted previously, it is not clear what analysis NERL has undertaken of the overall cost and programme implications of the change to NCW development timescales.

The £27 million cost reduction in Plan 2 relative to Plan 1 is mainly driven by constraining spending on the rolling-out of iTEC-FDP and New Controller Workstation (NCW) to £35 million pa from £40 million in Plan 1.

We understand that the reduced spend in Plan 2 will add at least two years to the programme. NERL explain that the size of allowable reduction is limited by the need to replace NERC and NAS systems, which are expected to approach end of life by 2023. Extension of this programme for two years also means that NERL will have the dual running costs of iTEC and NAS for at least a further two years. The target full implementation of iTEC and retirement of NAS by RP3 may also be put at risk. NERL explain that the analysis on the impact of this extension was undertaken at a high level only. It is not yet clear how the extra dual running costs may impact the overall business case for the iTEC programme and whether or not this will have material impact on costs and prices in RP3.

6.4.2 Centre System and Software Development

Centre System and Software Development spend is the next largest category. The overall levels of spend in this programme area are lower during RP2 than CP3, although very high levels of spend are projected for the first two years of the control period. We understand there will be a reducing need for investment to sustain existing system as progress is made in developing the New Common Workstation (part of the iTEC programme), which will replace some of NERL's key legacy systems.

6.4.3 CNS infrastructure

CNS infrastructure, as the next largest capex category, also shows a declining expenditure profile compared to CP3. A clear explanation and details of each sub-programme area has been given, explaining the need for the sustainment and upgrade of existing remote infrastructure and networks to align with advancement in centre systems and capability. There is no variance between Plan 1 and Plan 2

6.4.4 Airspace development

Airspace development, the next largest expenditure category, shows increasing expenditure in comparison to CP3. This programme area includes the LAMP and NTCA projects which were identified as areas of high priority by NERL's airline

customers. We understand that the increase in planned investment to mainly be driven by both projects entering implementation phase after Project Definition concludes in final years of CP3.There is a significant difference in Plan 2 spend compared to Plan 1 for this programme area. The £15 million cost reduction is mainly driven by:

- £6.6 million reduction in Airspace Annual Redesign / Change
- £6.0 million reduction in LAMP
- £2.4 million reduction in LAMP alignment

All investment reductions in Plan 2 for Airspace Development appear to be achieved by delaying investment to beyond RP2 (as opposed to any reduction in project scope). NERL explain that the slowdown of the LAMP project in Plan 2 is mainly due to the expected difficulties in releasing controllers for training as a result of lower staffing levels compared to Plan 1 in attempt to achieve greater saving in operating expenditure. As LAMP is expected to deliver significant safety improvements, this delay will require NERL to closely monitor leading indicators for safety and take action if issues are identified. The mitigation actions required may potentially lead to the diverting of other LTIP funding to fund safety projects during RP2.

We have not yet seen a quantitative analysis of the higher risk caused by the delay in implementation of LAMP. It is also not yet clear what safety issue may potentially arise and how much extra funding (either in terms of capital expenditure or for opex-related measures) may have to be re-allocated to safety projects should the possible safety issue materialise. Risks associated with adopting Plan 2 strategy do not appear to be one of the three highest risk items included in the Risk Assessment and Management Plan (RAMP) for LAMP.

6.4.5 Other programme areas

For the remaining areas of the plan, spend levels are for the most part fairly similar to CP3. We consider the justification provided for these lower spend aspects of the plan appear reasonable.

6.4.6 Our opinion

We consider that the justification provided by NERL for the levels of investment proposed across the different areas of spend within the RP2 plan to be reasonable. Specific, qualitative descriptions are provided for each investment area, setting out what they deliver and why, the key reasons for delivering the given programme, and what the benefits and outputs are. The most notable reflection of the linkage between costs and outputs is in the two variant Plans (1 and 2), where direct differences in outcomes are assessed relative to differing levels of investment. We do however note that for the iTEC programme and, to a lesser extent, CNS infrastructure, there is a limited degree of quantified analysis explaining how the differences between Plan 1 and Plan 2 spend have been calculated.

6.5 RP2 programme efficiency

6.5.1 Efficiency focus within plans

The RP2 business plan provided for consultation makes only limited reference to efficiency in relation to the delivery costs of its capital expenditure plan.

Capital investment is seen as a key facilitator for operational efficiencies across different areas of the business. This includes facilitating ATCO rationalisation, improvement performance and headcount reduction, FM investments to improve energy efficiency, and overhaul or replacement of legacy assets to reduce lifecycle costs.

However, the efficiency of costs involved in delivering the investment plan itself is not focused upon within the plans presented. Whilst NERL has provided a reasonably clear linkage between investment costs and the benefits and outputs that result from them, the focus is on how the given investment will serve the required purposes, deliver the relevant output or benefit etc. The investment amount appears in itself to be a "given" factor in the plans, without any appraisal of how, in its own right, the given investment may be delivered more efficiently. We understand that forward-looking investment cost estimations, developed through the SAP system bottom-up at individual project level, do not have within them any embedded assumptions about efficiency improvement as a specific concept, i.e. we are not aware of any specific efficiency target such as percentage year-on-year unit cost reduction, has been applied within the estimation process for capital spend

We do acknowledge that NERL has in place processes that aim to ensure its capital investment is procured in an efficient and cost-effective way, including through supply chain and procurement strategy, cost review, control and approval processes and assessment of investment need to avoid "nugatory spend" (also documented elsewhere within this report).

Whilst such processes may help achieve efficient delivery and drive cost savings bottom-up, we consider that developing a "top-down" concept for analysing, monitoring and driving efficiency from a high-level target basis downward could be beneficial to help achieve embed efficiency improvement and cost effectiveness into the capital expenditure plan.

6.5.2 Benchmarking analysis

NERL has included as one of the appendices to the capital investment plan, a summary of the results of an ANSP benchmarking study carried out by the Eurcontrol Performance Review Commission based on 2011 data. The results of the study indicated that in terms of overall "gate to gate" unit costs per composite flight hour, NATS compared favourably to comparator ANSPs. The study benchmarked capital costs on the basis of depreciation plus the cost of capital. However, the result indicated that NATS' capital related costs are 14% higher than the average amongst the ANSP comparator group. NERL has stated that, "[t]his is not unexpected, given our need to obtain financing from commercial markets on a fully risk adjusted basis. Other ANSPs in Europe do not necessarily operate on this basis."

NERL concludes that the benchmarking study evidences the comparatively efficient nature of the NATS business in relation to other ANSPs. Nowhere else within the RP2 business plan documentation is there any analysis or explicit reference made that links this (or any other) benchmarking to the capital investment proposals.

6.5.3 Our opinion

We consider that both the internal processes within NERL for project procurement and delivery, and the requirement for clear linkage between capital spend and delivery of outputs are likely to promote cost effective delivery and management of the capital plan.

However, we have not identified through our review measures to define top-down targets for the cost efficiency of NERL's RP2 capital expenditure at a consolidated capex plan level.

NERL has provided details of the way in which cost optimisation measures are defined at individual project level and tracked through the LMM review process. NERL has also highlighted that it is committed to achieving top-down efficiency savings during RP2 that are embedded within the target KPAs (see Section 7.3.3), which require it to continually improve its efficiency in all areas including capex delivery.

Notwithstanding this, we consider that developing a concept for defining and progressively targeting efficiency improvements at a consolidated capex plan level, based (initially) on top-down high level targets, would be beneficial in supporting the efficient and cost effective delivery of the RP2 capital investment plan.

6.5.4 Recommendation

We recommend that NERL explores options for carrying out its own programme of benchmarking activities, in order to gain comparative understanding and insights from other organisations into the cost and efficiency of different aspects of capital programme delivery. Collaboration with other ANSPs may be one way this could be achieved, particularly when benchmarking activities and processes at a more granular level, given similarities across ANSP businesses.[50] Benchmarking with other types of external organisations may also be an option for more general or higher level benchmarking perspectives, e.g. for more "generic" business functions such as facilities management.

[50] NERL has raised a concern in this regard that benchmarking with other ANSP's in this area may be unlikely to lead to efficiency insights.

7 Delivery of benefits and outputs in RP2

7.1 Introduction

In this chapter, we examine the expected benefits and outputs of NERL's capex plan in RP2. The review considers the benefit and output metrics, the RP2 targets, the results expected and the impact of European regulations.

7.2 Benefits and output measures

NERL presents an additional four areas of benefits for its programmes and sub-programmes over RP2 compared to CP3. The nine types of benefits for the main programmes are shown in the table below. Benefits are only quantified across the core measures of safety, service, cost reduction and environment (fuel and CO_2 savings) and sustainment. In all other areas benefits are described qualitatively in the business cases.

Benefit	Description	NERL Metric
Safety	Reducing the likelihood of an incident or accident in UK controlled airspace	Safety risk index measured in Safety Significant Events (SSE)
Service	Additional capacity, additional service resilience or reduced delay	Additional flights per busy hour
Cost reduction	Enable the NERL cost reductions outlined in the RP2 business plan	£pa outturn by the end of RP2
Fuel savings	Reduce customer fuel burn	Tonnes pa of aviation CO_2 avoided
Estate CO_2 savings	Reduce NERL Estate Carbon	Tonnes pa of aviation CO_2 avoided
Sustainment	Reduce the risk of service failure	(£Net Weighted Value reduction shown as % change in the NERL Risk NWV)
Obligations	Investments that allow NERL to meet its licence and legal obligations	
SES/SESAR alignment	Investments that implement changes required to support or increase NERL alignment with SES/SESAR	
Enabler	Investments that provide technology or capabilities that enable other investments to deliver the benefits above	

Table 12: NERL's benefits metrics for RP2

For RP2, there is an additional quantitative metric for sustainment, the percentage reduction in net weighted business risk.

7.2.1 Targets over RP2

NERL presents its targets in the four performance areas of safety, capacity (service), environment (fuel and CO_2 savings) and cost efficiency (cost reduction) in the RP2 business plan. The targets are presented for two variants of the

business plan, which differ in capital expenditure and service quality: Plan 1 and Plan 2[51]. The metrics presented for these areas differ from the metrics presented at programme and sub-programme level and also differ from the target metrics for the SES performance scheme over RP2.

The environment metric at target level, 3D inefficiency score (3Di), is a combination of horizontal and vertical flight inefficiency. It looks at flight inefficiency in the cruise, climb and descent phases of flight. Unlike the horizontal flight efficiency metric for RP2, it does not exclude a 40km area around airports and therefore includes the flight efficiency in the stack. The relationship between project-based fuel savings and the 3Di metric is complex, according to NERL[52]. We also note that oceanic ANS is not part of the SES performance scheme whereas this is included in the NERL metrics.

[51] Plan 1 has a capex of £653m (outturn prices), headcount reduction of 275 FTE, higher cost efficiency; Plan 2 has a capex of £603m (outturn prices)m, headcount reduction of 375 FTE, but lower service quality due to projects being delayed (LAMP, NTCA).
[52] Executive Summary, RP2 Business Plan (2015-2019).

Benefit type	Programme level metrics	NERL target level[53] metrics	SES RP2 performance scheme metrics
Safety	Safety risk index measured in Safety Significant Events (SSE)	Accident risk per flight	Effectiveness of safety management (EoSM) Application of RAT methodology
Capacity	Additional flights per busy hour	Total en-route ATFM delay all causes (avg in RP2) NERL en-route ATFM delay Daily delay>10,000 min Airport ATFM arrival delay	En-route ATFM delay per flight Arrival ATFM delay (airport)
Cost efficiency	£pa outturn by the end of RP2	Real reduction in cost base[54] Real price reduction[54] % DUC reduction pa (EC cost efficiency target)[55] Efficiency saving (real v 2011) ATCO manpower costs Non-ATCO manpower costs Total reduction in FTE costs	Determined unit cost for en route ANS Determined unit cost for terminal ANS
Environment	Tonnes pa of aviation CO_2 avoided	CO2 emissions target - 10%/flight by 2020 (v 2006 baseline, total ER, oceanic and terminal) 3Di Flight efficiency[56]	En-route horizontal flight efficiency of actual trajectory En route horizontal flight efficiency of last filed flight plan trajectory
Sustainment	Reduction in net weighted business risk value		

Table 13: Benefits metrics at programme and target (NERL, SES) level

NERL's view is that both Plan 1 and Plan 2 will achieve SES performance targets over RP2, although at the time of writing these targets have not been finalised. NERL does not provide information to determine the contribution of individual programmes and sub-programmes to the SES targets. [57]

[53] Source: NATS (En Route) plc, RP2 Business Plan (2015-2019) for Customer Consultation, 10 May 2013.
[54] End RP2 v end RP1
[55] From EU average RP2 start point
[56] -1pt=£20m pa fuel saving
[57] NERL has made the following comment: "We provide links from project to NERL targets. We believe the NERL targets are linked to the SES targets. We are content with the linkage."

7.3 Benefits expected for RP2

Planned benefits for the major programmes and sub-programmes have been provided in the RP2 Capital Investment Plan (2015-2019)[58]. NERL has provided information on the planned benefits broken down to project level in the areas of safety, service (capacity), cost reduction, and CO_2 saved. These benefits are shown for Plan 1 and Plan 2 below.

NERL has pointed out that the benefits shown here do not include any of the post 2014 benefits from investments made in the CP3 period. Benefits presented in this section are delivered only from investments made in RP2. Some of these investments may be for projects continuing on from the CP3 period. In any case, all benefits are additional to CP3 benefits documented in Chapter 4.

7.3.1 Safety

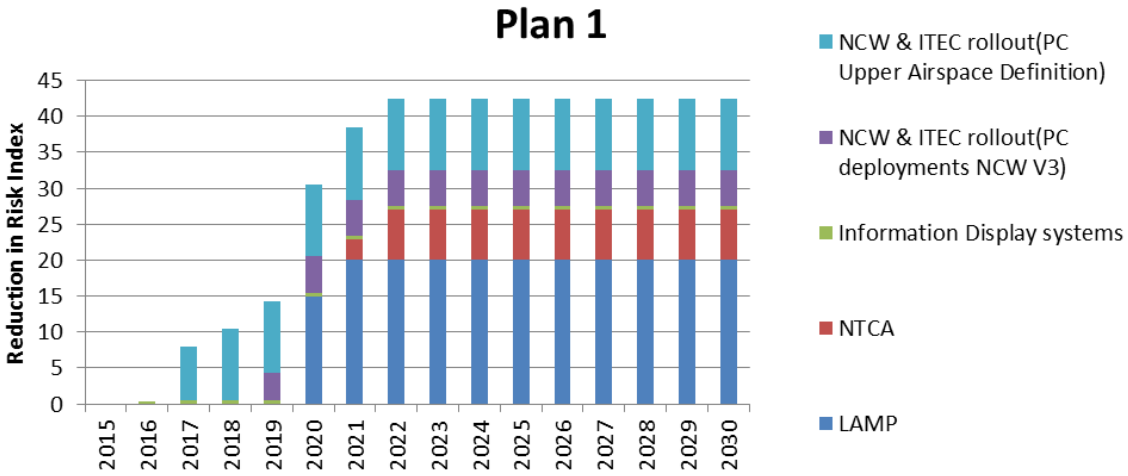


Figure 13: Safety benefits expected for Plan 1

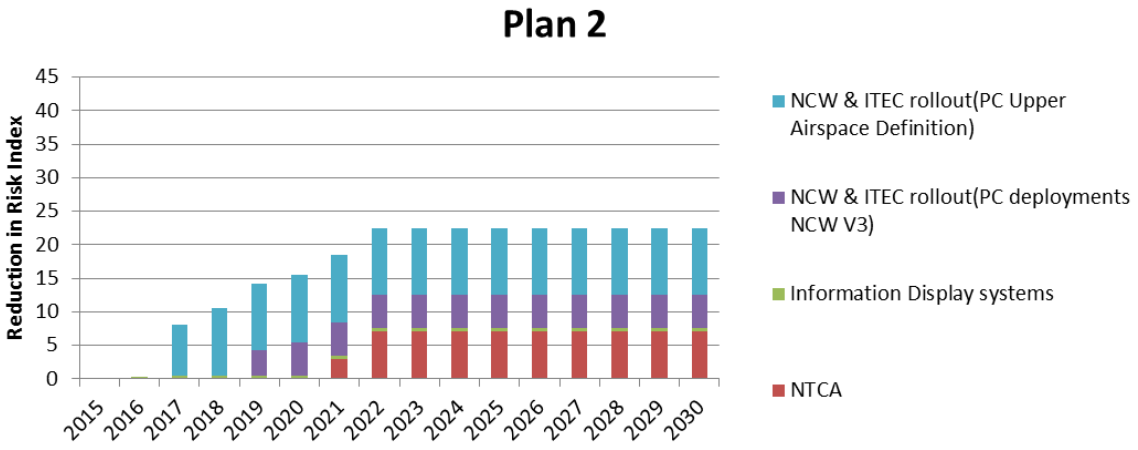


Figure 14: Safety benefits expected for Plan 2

[58] NATS (En-Route) plc, RP2 Capital Investment Plan (2015-2019) for Customer Consultation, Version: Release 1.11, 3 July 2013

Safety benefits are expected to be delivered from 2016, reaching a plateau from 2022 onwards. The greatest benefits are expected from the airspace development programme (NTCA, LAMP), NCW and iTEC-FDP programmes. Limited safety benefits from the RP2 capex programme are expected to be delivered before 2020.

Plan 2 is expected to deliver 20 fewer points off the safety risk index compared to Plan 1. This is because of a delay to the LAMP sub-programme within the airspace development programme.

NERL has presented Plan 1 and Plan 2 as achieving a 13% reduction in accident risk per flight in its headline figures[59], in spite of the variance in safety risk index points between Plan1 and Plan 2. NERL stated that this was achievable in spite of a reduction in capex spend on projects with safety benefits, as the safety level will be prioritised above all other performance aspects. Therefore, as traffic increases, the accident risk per flight will be reduced in accordance with the strategy.

As traffic continues to rise (assuming other factors remain constant) then, to maintain safety, and if no alternate mitigation is available, service quality may be reduced due to the application of operational mitigations such as sector capacity caps.

Thus, although Plan 2 contains less "structural" safety improvement, it will maintain the same target as Plan 1, but with a higher risk of degradation of service quality. Plan 2 may also require more ad-hoc expenditure to deal with responses to safety issues arising through proactive monitoring. This risk of service quality reduction or possible increase of ad-hoc spending on risk mitigation is not captured quantitatively within Plan 2.

7.3.2 Capacity

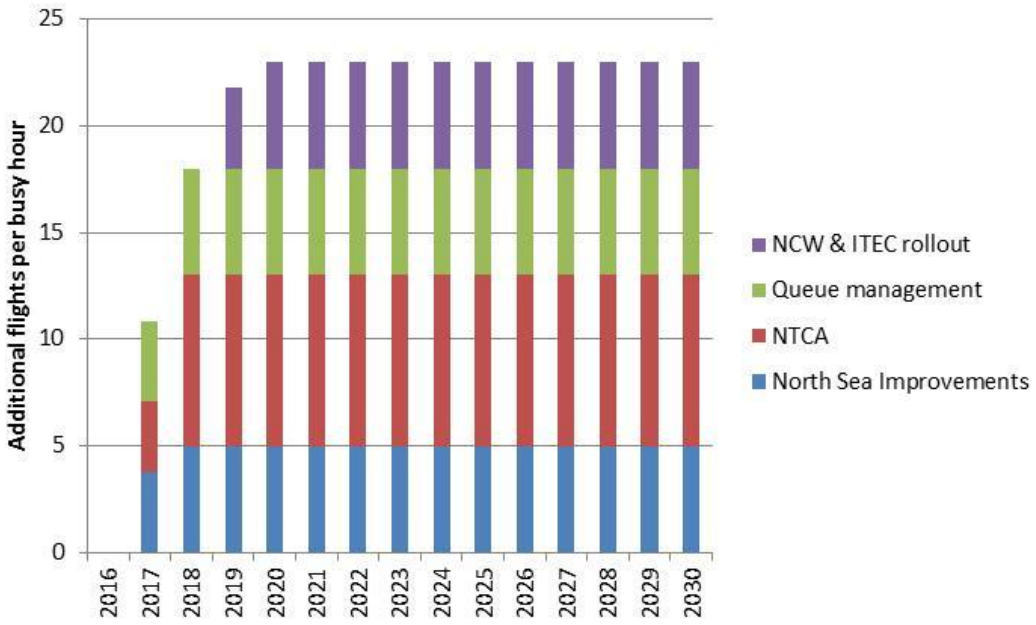


Figure 15: Capacity benefits expected for Plan 1 and 2

[59] RP2 Business Plan for Customer Consultation.

Early benefits are expected to be delivered from North Sea improvements, NTCA and queue management from 2017, reaching a plateau of 23 additional flights per busy hour from 2020 onwards, beyond the RP2 period. Plan 1 and 2 are expected to deliver the same capacity benefits.

7.3.3 Cost efficiency

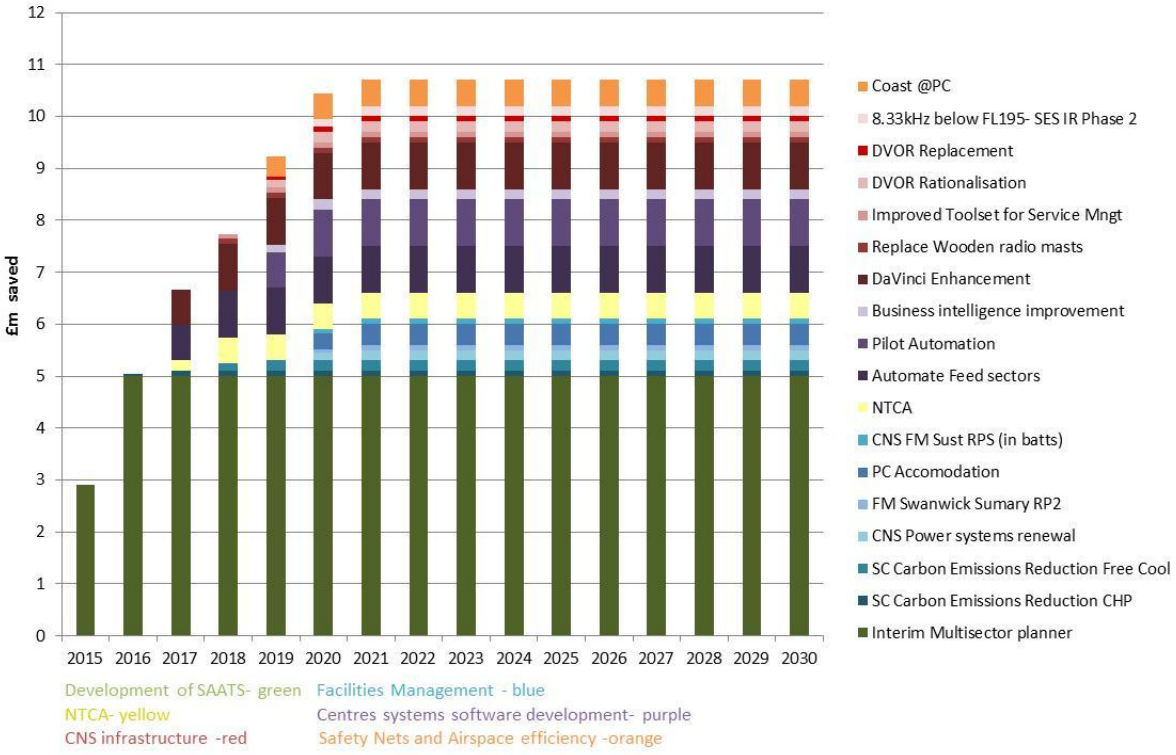


Figure 16: Cost efficiency benefits expected for Plans 1 and 2

The largest cost efficiency benefits in RP2 are expected to be delivered through the interim multi-sector planner project (around £5m saved a year), with another £4m of savings delivered by the end of RP2 through projects in facilities management, NTCA, centre systems software development s and CNS infrastructure programmes. Savings are expected to reach a plateau of £10.7m p.a. from 2021 onwards (beyond the RP2 period). Plan 1 and 2 are expected to deliver the same cost efficiency benefits.

7.3.4 CO_2 savings

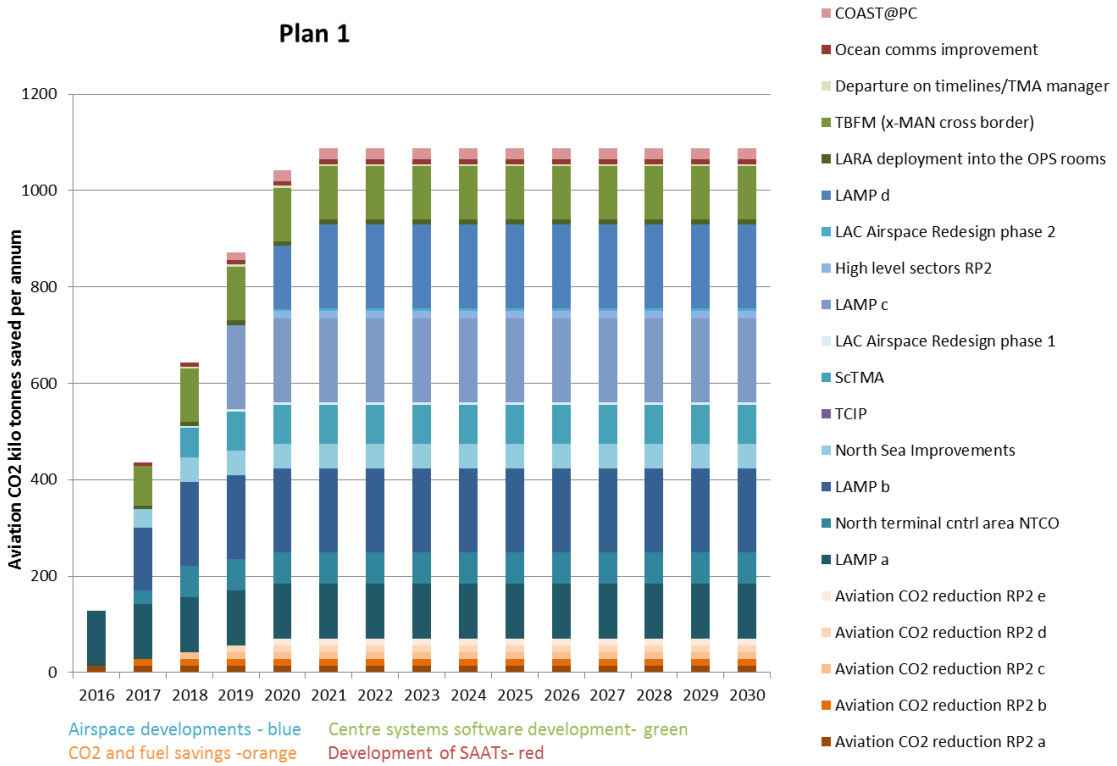


Figure 17: CO_2 savings expected for Plan 1

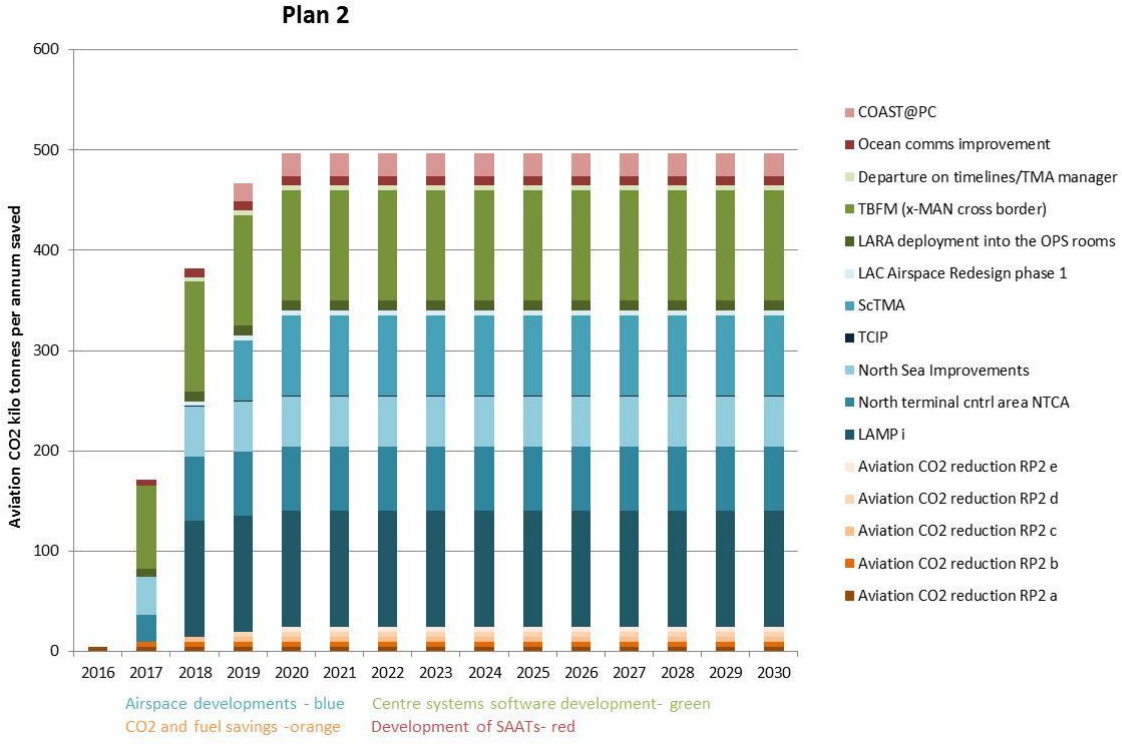


Figure 18: CO_2 savings expected for Plan 2

Benefits from Plan 1 are expected to be delivered from 2016 (129 kilotonnes [kt] per annum) through CO_2 saving projects and early benefits from LAMP. Benefits by the end of RP2 are expected to reach 1085 kt of CO_2 saved per annum through additional airspace development projects.

Plan 2 is expected to deliver around 5 kt of CO_2 savings in 2016, rising to just under 499 kt per annum by the end of RP2.

Plan 2 is expected to deliver 586 kt of CO_2 emissions savings less than Plan 1 over RP2, because of the delay to the Airspace Developments programme (airspace annual redesign, TC improvement change and LAMP), and because of changes in the CO_2 and fuel savings programme.

We asked NERL to comment on the percentage reduction in CO_2 savings achieved by Plan 1 and 2 (9% reduction and 6% reduction, respectively), as presented in its headline figures, given that Plan 2 is expected by NERL to deliver 50% of the CO_2 savings compared to Plan 1. NERL pointed out that these percentage reductions relate to a baseline of 2006 and that it expects to achieve 4% of the reduction by the end of CP3 (around 996 kt). Therefore the incremental reduction over RP2 is 5% and 2% respectively for Plan 1 and 2.

This highlights the importance of identifying which benefits are due to investments in previous regulatory periods, for example by producing a "do nothing"[60] scenario to show what would happen during RP2 if there was no capex. Such a scenario would clearly show the cost of maintaining the CP3 investments through into RP2 and the resulting benefits, and separately the benefits and investment for any additional projects.

7.3.5 Sustainment

NERL presented sustainment metrics at a sub-programme level and also in the overall benefits for Plan 1 and Plan 2. Different metrics are used in these two presentations: either as a percentage reduction in net weighted business risk or as a reduction in net weighted business risk in £m.

Plan 2 delivers £18m less of net weighted business risk reduction compared to Plan 1. We understand there is more asset risk in Plan 2 as some investments in CNS infrastructure and Centre systems software development have been deferred.

7.4 Regulatory compliance and deployment initiatives

As in CP3, there are a number of regulatory compliance issues likely to require capital expenditure by NERL in the RP2 timeframe.

The only programme highlighted by NERL as being required primarily for compliance[61] is the navaid (DVOR) replacement programme. Nevertheless, a number of the other programmes in RP2 have ensuring compliance named as a benefit in the business plan, including:

[60] By "do nothing" we mean the case in which projects from the CP3 period, for which further capex is required in RP2, are continued, but no further projects or investments are implemented in RP2"
[61] RP2 Business Plan for Customer Consultation

- Centre System Software Development, specifically Centres Voice Comms, Cyber Resilience, and Training & Simulation;
- CNS Infrastructure, including Comms Infrastructure, IS Core Resilience, Nav Aids, IS Tools Enhancement, and Met Data & Messaging;
- Facilities Management, primarily CNS sites.

According to NERL, the following programmes and sub-programmes either enable or deliver SESAR.

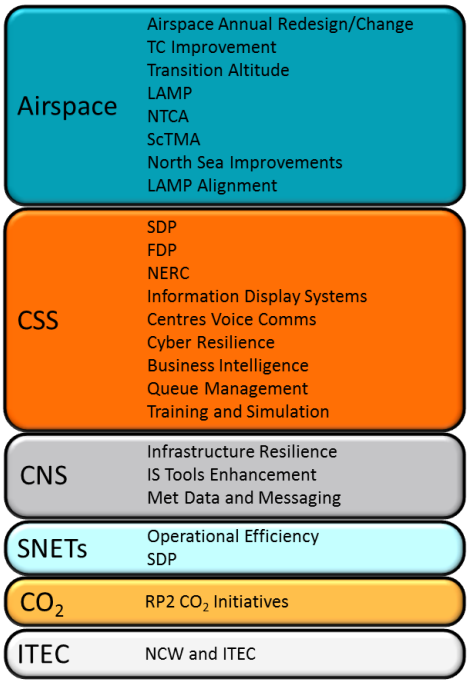


Figure 19: SESAR enablers and deliverers

The Implementing Rules and regulations which may impact upon NERL in the RP2 timeframe are shown in the following table. Where information exists, we have noted how NERL intends to ensure compliance through capex programme elements. We stress that a rulemaking element will usually entail compliance 6-7 years after publication, but that capex may need to begin before publication and may therefore be at risk.

For the forward looking regulations, the reference is the EASA 4 year rulemaking programme published in August 2013. Note that some regulatory compliance capex will continue from CP3, for example VCS-2.

Regulation	Timescale	Relevant NERL capex in RP2 (programme/sub-programme and spend)	Compliance with this regulation considered in the capex programme?
Datalink operations (includes DCL, PM CPDLC, D-ATIS, and CPDLC	Publication expected? 2019	NERL has raised project L4139 (in 2007) but it is currently planned to start and deliver in RP3. NERL plans to monitor the progress of the Implementing Rule and adjust the deployment as appropriate. This is in the CNS Infrastructure SIP programme area. An initial estimate is -------[redacted] is included in RP3 to integrate to a 3rd party infrastructure.	Yes, Not required in RP2.
Harmonised Transition Altitude	Publication due 2017	This is in the RP2 plan. It is delivered by the Airspace and Centre Systems Development Programme areas. A total of -------[redacted].	Yes, In the RP2 plans.
Introduction of i4D	Publication due 2019	Initial trajectory management is planned in RP2 in the ITEC/NCW SIP programme area. Exchange of trajectories between the air and ground require the advanced Datalink infrastructure in place, so are expected to be required in RP3. See also the comment on Pilot Common Projects below. ITEC/NCW is planning -------[redacted] under Plan 1 for RP2. No apportionment has been made as to how much of this spend is in support of i4D as the scope is not yet known.	Yes. Initial roll out planned in RP2.
Use of ground-based safety nets	Publication due 2019	NERL is already investing in ground based safety nets to reduce the London TC risk index. CAIT, pCAIT and Abnormal Airspeed Indicator have been deployed. It is assumed that this rule will just add Restricted Airspace Penetration Warning. This will be delivered by the Safety Net server annual build programme in the "Safety Nets and Airspace Efficiency" and "Centre Systems Software" SIP programmes. -------[redacted] is planned in RP2 to roll out ARTAS and the Safety net server to replace the end of life NODE system. No apportionment has been made as to how much of this spend is in support of this Implementing Rule as the scope is not yet known.	Yes, NERL will deploy the safety net server in RP2 ready to host additional tools when required.

Regulation	Timescale	Relevant NERL capex in RP2 (programme/sub-programme and spend)	Compliance with this regulation considered in the capex programme?
SWIM organisational requirements	Publication due 2017	NERL is leading on the architecture work package in SESAR so understands the SWIM requirements. NERL conducted SWIM system tests during CP3 to improve its understanding of the available technology. No specific SWIM investments are planned for RP2 but there is a Centre Systems network upgrade planned which could become SWIM focussed when the implementing rule is more fully understood. Where appropriate, NERL may deploy SWIM concepts (publisher/subscriber, Service Oriented Architecture) in our RP2 legacy system upgrades.	Yes, Not specifically planned for RP2. Network updates are planned in RP2 which could fulfil the SWIM requirements if required in RP2.
Technical requirement and operation procedures for Airspace design including procedure design	Publication due 2016	Changing these procedures is assumed to be an Opex activity.	Yes, no capex planned.
IP communications		L4258 (DaVinci Enhancement) (live CP3 project) is deploying an IP based wide area network. (CNS Infrastructure, ------- [redacted]) L4552 (Swanwick AC Voice System Replacement) in the Centres Voice Comms sub-programme area will replace the end of life London AC voice switch with an IP compliant version. (------- [redacted]) L4793 Voice System Sustainment (------- [redacted]) in RP2 will fund the upgrade of the Prestwick and London TC VCCS systems to become IP compliant.	Yes, capex planned in RP2.

Table 14: NERL compliance with Implementing Rules

We understand NAS, NERC and the existing controller displays are not able to deal with trajectory-based information. This presents the risk that the SESAR Pilot Common Project goal of introducing limited trajectory-based operations ("initial 4D") through the provision of intent information may be compromised should the implementation of iTEC be further delayed.

The phased timeline of iTEC deployment suggests that full benefits will only be realised post-2023 (Swanwick Area Control). The EASA Rulemaking Programme currently foresees the Implementing Rule development for initial 4D to be between 2016 and 2019, suggesting on average a compliance date of around 2025. This is judged to be in line with the likely EC Pilot Common Project timelines – see below. The NERL Business Plan 2 suggestion of approximately two years' slippage (due to the reduction in maximum spend per annum from £40m to £35m) may then put compliance at risk.

As in CP3, there are a series of deployment programmes which do not have binding power but still represent agreed timelines for NERL to deploy various operational and technical changes.

At the European level, the ATM Master Plan sets out a series of planned operational capability dates for technical and operational enablers. These are then turned into agreed deployment programmes via the Interim Deployment Programme and the SESAR Pilot Common Projects (PCPs). The first SESAR PCP has been defined, but is still in its infancy and has not yet been approved for funding. It includes the following elements, aiming at Initial Operational Capability (early benefits) between 2014 and 2020 – i.e. during RP2:

- Extended AMAN and PBN in high density TMAs
- Flexible airspace management and free routes
- Surface management (out of scope for NERL)
- Network collaborative management
- Initial SWIM functionality, particularly ground-ground aspects
- Initial trajectory information sharing (towards i4D), particularly enabling ground systems to deal with "Extended Projected Profile" information

The Pilot Common Project implementation will be subject to European Commission consultation in Q4 2013, focusing on investor commitment, in particular from airspace users.

More specific activities have been defined in the UK's Future Airspace Strategy, which aims to be the UK deployment programme for SESAR. It encompasses elements of the European Commission Interim Deployment Plan and Pilot Common Project.

The ten key UK FAS deployment initiatives are shown below. For those relevant to the NERL RP2 capex programme, notes of possible impact are shown.

FAS Deployment Initiative		Scope	Time-scales	Notes on NERL capex plans
1	Airport integration (Airports)	Connecting 20+ UK Airports into the data network to deliver accurate departure information. NERL's systems will require the information for trajectory management.	2013-2020	Impact on iTEC-FDP requirements. New requirements may delay implementation phases.

FAS Deployment Initiative		Scope	Time-scales	Notes on NERL capex plans
2	Airport CDM (Airports)	Implementing systems and processes at airports to enhance aircraft ground movement. NATS Queue Management delivers through the DMAN project.	2013-2020	Queue Management may receive new interface requirements (DMAN).
3	UK wide PBN implementation (Terminal)	Aligning investment in PBN routes across the UK. NERL LAMP, NTCA, and Airspace alignment programmes deliver essential Airspace Infrastructure changes.	2013-2020	Airspace developments heavily impacted by early agreement on scope of changes (incl airborne equipage).
4	PBN departure enhancement (Terminal)	Re-designing SID at key airports to inform enhanced route spacing standards. NATS Departure Manager Programme is key to the UK delivery of this technology.	2013-2015	Airspace developments and Centre Systems Software Development (Queue Management) impacted by agreed approach.
5	Terminal airspace re-design (Terminal)	Implementing a more efficient route structure in the TMA to systemise arrival and departure procedures, reduce track miles, and remove stack holding in normal operations.	2013-2020	LAMP and NTCA are the delivery mechanism. Note the timescales expressed within FAS. These are also dependent on other stakeholders besides NERL.
6	Harmonising the transition altitude (En-route/Network wide)	Raising the Transition Altitude across the UK/Ireland FAB and influencing neighbouring States to harmonise at the same level.	2017	Key risk, as many other airspace developments rely on early agreement of TA at State level.
7	Arrival management (En-route/Network wide)	Using ATC support tools to absorb arrival delays through speed controls in the en-route phase of flight.	2013-2015	Centre Systems Software Development includes Queue Management (time-based flow management)
8	Queue management (En-route/Network wide)	Expanding the AMAN capability across FAB boundaries [XMAN] and integrating Departure Management [DMAN] capabilities to de-conflict outbound traffic flows.	2015-2020	Centre Systems Software Development, includes Queue Management.
9	Enhanced flexible use airspace (En-route/Network wide)	Strengthening the toolsets and processes used for MoD Airspace which increases opportunities for civil use. NATS' system upgrades will deliver advanced tool	2013-2015	

FAS Deployment Initiative		Scope	Time-scales	Notes on NERL capex plans
		support.		
10	Network management (En-route/Network wide)	Supporting development of the European Network Manager's capability to optimise network operations [including scheduling, flight planning, and punctuality].	2015-2020	Possible link to time-based flow management.

Table 15: UK Future Airspace Strategy deployment initiatives

7.5 Our opinion

NERL has provided planned project benefits for each quantified metric in RP2 from its individual project-level estimates. Our main observations on these benefits are:

- We note the importance of the Interim Multisector Planner project in the service (capacity) metric. It delivers more than half of the planned benefits in RP2. This project may require a particular focus to ensure that it does not slip in timescales. LAMP has a similar importance to the safety metric for Plan 1.
- Where benefits are shown for RP2 investments, it is not clear how much of the benefit is delivered from the continuation of (and investment in) projects that have already started in CP3.

From the information we have been given, NERL is correctly anticipating future European requirements in their capex. However, there is a risk that the Implementing Rules could change before publication, and this could impact on NERL's benefits. NERL's plans appear to align well with SESAR requirements, e.g. through the Pilot Common Projects.

Some of the largest capex projects are significantly dependent on external parties to deliver benefits. For example, LAMP is dependent on airline and airport activities and, potentially, European regulations, and iTEC is dependent on European partners. These dependencies form some of the largest risks to benefit delivery in RP2. Project delays (e.g. to iTEC) could also compromise NERL's ability to comply with European requirements. Although NERL appears to articulate the risks in dependency agreements, it does not appear to assess the impact on benefits delivery.

7.6 Recommendations

In line with the recommendations from Stage A, we recommend that RP2 projects are presented in a way that shows their contribution to the top-level performance targets.

We recommend that a "do nothing" case for benefits is presented for new price control periods. The "do nothing" case would show only the benefits of projects that have been continued from the previous price control period and for which additional investment has been made in the new control period. The "do nothing" case would not include any new projects starting in RP2. This would then enable the incremental impact of any new projects to be shown and compared to the results of previous initiatives.[62]

The names and definitions of metrics change in different presentations. For example, the environmental metric is sometimes referred to as a CO_2 saving, a 3Di score or a fuel saving. It would be clearer to standardise on the same terms and definitions across all presentations.

[62] NERL has stated that "[t[his is done in all business cases."

8 RP2 programme planning and delivery

8.1 Introduction

We review in this chapter NERL's planning and proposed delivery of its RP2 investment plan. We review the process by which the RP2 capital investment proposals set out in the initial business plan were developed, and comment on the planned delivery process. Finally we provide our view on the risk provision encompassed within the RP2 plan.

8.2 Development of the RP2 plan

8.2.1 RP2 development process

NERL has described how the development of the RP2 capital investment proposals presented in its initial business plan was carried out during the latter part of 2012.

The plan was initially developed on a bottom-up basis, with a full portfolio of activities built up from the SAP system. This was then developed, reviewed and prioritised, resulting in a fully defined initial programme comprising £675m of spend.

These initial proposals were subject to review of their deliverability by programme managers, taking into account the need to mitigate risks around availability of specialist resource and peaks in the profile of the plan.

NERL provided an overview of the subsequent refinement and reprofiling applied to the respective elements of the plan, resulting in the eventual finalisation of Plan 1 (£653m). Further reductions, based on analysis described in the capital investment document, were applied to the Plan 1 proposals in order to present Plan 2 (£603m investment).

8.2.2 Structuring and timescales

NERL's presentation of its RP2 capital expenditure plan is structured around the ten main programme areas documented earlier in this report, with a further breakdown of spend into 40 sub-programmes also provided.

All ten of the RP2 programme areas are continuation of programmes being delivered under the current CP3 plan. As described in Section 6.3 of this report, the levels of spend in RP2 do not show huge variations compared to CP3 for any programme area. Many of the programmes encompass complex, long-term and interrelated activities, the different stages and elements of which span beyond single control periods.

The capital investment plan provides details of the start- and end-points of each sub-programme, including how certain sub-programmes span across control periods and where the main interdependencies are.

NERL has also provided a chart illustrating the year-on-year timings for every individual project in the live business plan from CP3 through RP2 and beyond. Bars are used to show the start and end date of the almost 200 individual projects

involved. For reasons of commercial confidentiality, NERL has not provided any cost details for the projects, apart from a high-level colour coding system to band projects into broad cost ranges.[63] Individual projects within the chart are not grouped according to programme or sub-programme, and the chart does not contain arrows or similar indicating linkages or dependencies, or key milestones. Overall the chart, whilst containing granular detail, provides limited insight into the design and phasing of the RP2 capital expenditure plan.

Alongside the above documents, NERL makes more general reference within its documentation to its "portfolio approach", which emphasises the holistic view NERL takes of its overall plan, and the need for continual challenge and prioritisation of the plan to match requirements as it evolves. We have documented NERL's internal management and governance processes in the delivery of its capital plan at length elsewhere in this document.

8.2.3 Our opinion

We consider the description provided by NERL of the development of the RP2 capital investment plan suggests a reasonably robust and transparent process. The way in which the investment plan was initially defined on a bottom-up basis, and then subject to further development, review and prioritisation appears logical. The subsequent review and refinement suggesting a robust challenge process.

The overall structuring of the RP2 plan is based on the same programme areas already being delivered in CP3. NERL provides within the capital expenditure plan a clear overview of areas of continuation under each programme area.

Whilst the overall scope and structure of the RP2 plan has been clearly presented, there is limited visibility of the detailed structure and interrelationship between the elements of each programme at project level from the information provided. A comprehensive and detailed project plan, in a Gannt chart format or similar, which shows the detailed timescales, delivery milestone and interdependencies between the elements of the plan at individual project level would provide further confidence in the robustness and feasibility of the plan.

[63] For total spend per project, ranges < £2m, £2m - £5m, £5m-£10m and >£10m. For annual spend, bars in the grid shows ranges were 0 - £0.5m, £0.5m - £1m and >£1m.

8.3 RP2 programme delivery

We make reference in this section to our review of NERL's Supply Chain Management processes within the context of CP3 capital expenditure programme delivery (set out in Sections 5.4 and 5.5 of the report). Our review indicated that NERL SCM procedures are designed effectively to enable compliance of procurement activity. These processes were found to be comprehensive and in some areas to compare favourably with best practice procurement.

It is worth noting that these processes in the main have been implemented midway through CP3 and may be somewhat immature. However we understand that SCM will continue to be further developed and reviewed during RP2, taking into account the recommendations of this review.

8.4 Risk management

8.4.1 RP2 risk allowances

The RP2 capital investment plan document sets out the following allowances (in outturn prices) for risk and contingency:

- Plan 1 = £9.3m risk on £653.2m expenditure (1.4%)
- Plan 2 = £9.3m risk on £602.5m expenditure (1.5%)

In addition the capital cost for each project includes an element of risk and contingency. The total allowance for risk within projects is less clear.

Please reference section 5.7 for our comments on NERL's risk management processes and procedures.

8.4.2 Our opinion

We consider that the risk identified at programme level may be understated. This is arguably evidenced by the following statement regarding risk and contingency funding:

"Our project management quality processes ensure that we have an appropriate proportion of risk and contingency funding available within a project, and we seek to mitigate these risks to release the funds for other projects."

NERL's primary method of risk management is the use of the application 'Risk Assessment and Management Plan' (RAMP). This is defined as an application that records operational & business risks setting out their impact on the business with a description of mitigation plans to both reduce the likelihood of risks occurring and the impact if they do.

Risk and contingency is stored within each project budget as well as in the overarching risk and contingency value in RP2 of £9.3m. The overall allowance for programme and project risk combined has not been evidenced and we consider that it is important that NERL gives a clearer statement on the overall value of risk and contingency in the plan.

9 Revised Business Plan (RBP) – updated capital expenditure proposals

9.1 Introduction

We review in this chapter the updates made to NERL's RP2 capital expenditure proposals in its Revised Business Plan (RBP), which was provided for review on 18th October 2013.

9.2 RP2 revised plan – capital investment costs

NERL's RP2 capital expenditure proposals set out in the RBP comprise a total spend of £618m (in outturn prices).[64] The revised plan is exactly the same in terms of spend by programme area as the "Plan 2" capex presented in the initial business plan (see Section 6.2), apart from airspace development, which at £66.5m is £15m higher than the spend allocated to this programme in Plan 2.

The allocation of capex spend by programme area in the RBP is depicted in the chart below.

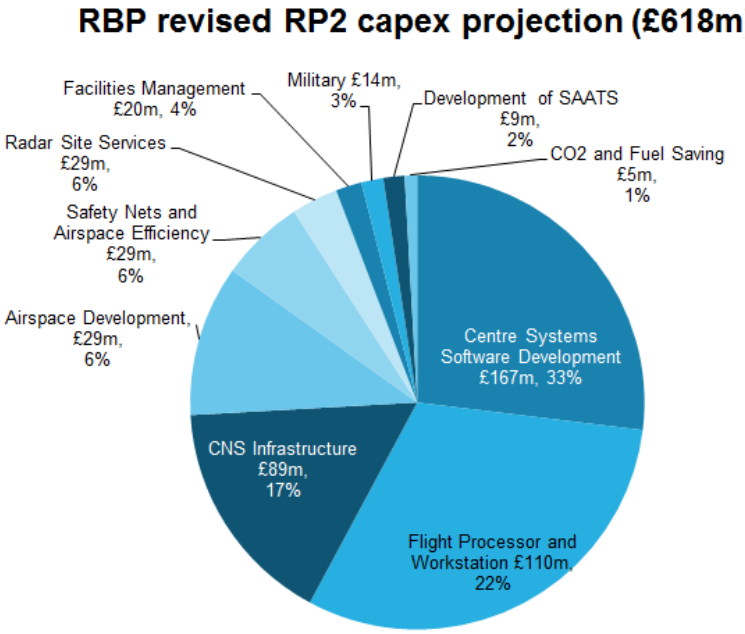


Figure 20: RBP RP2 capital expenditure breakdown

Airspace development encompasses the major airspace redesign programmes, LAMP and NTCS, which are expected to deliver both service (capacity) and fuel saving benefits for airspace users (see Section 7.3). NERL has indicated that through the consultation process airline users highlighted the importance of capital investments that help deliver tangible fuel saving benefits, with the long-running LAMP and NTCA programmes recognised as key enablers for such

[64] We note that in the RBP document, NERL has presented its capital expenditure costs in "current prices", with revised RP2 capital expenditure equating to £575m on this basis. For the sake of consistency, we have adjusted the RBP capital expenditure totals into outturn prices to ensure a consistent basis for comparison with the RP2 capex proposals in the initial business plan.

savings. With the increased spend in this area compared to the "Plan 2" proposals, NERL has indicated that the RBP plan should ensure more of the benefits relating to these programmes can be realized during RP2.

For the remaining programme areas, expenditure remains unchanged from the "Plan 2" proposals for the majority of the plan have been adopted in response to airline customer consultations, although no further detail of the rationale for this is provided.

9.3 RP2 revised plan –benefits and outputs

As indicated above, the RBP focuses on maximising fuel savings and service quality at the lowest price to address feedback from the airlines. The RBP has taken elements of Plan 1 and Plan 2 in order to address airline priorities.

The RBP entails the following variants relative to Plan 1 and Plan 2 in terms of headline outputs:

- Real cost reduction of £102m, which lies between Plan 1 (£88m) and Plan 2 (£106m);
- Determined cost savings of £80m which lies between Plan 1 (£70m) and Plan 2 (£85m);
- CO2 emissions target 9% reduction vs. 2006 baseline by 2019 [65] and 3Di score of c.15-17 by 2019, up to c.9 point reduction, both of which are the same as Plan 1;
- Capacity (service delivery / delay) targets of Plan 1, whereby:
    - Total En Route ATFM delay all causes (avg. in RP2): 6-12secs;
    - NERL En Route ATFM delay: less than 6 secs;
    - Daily delay >10,000 min: <5 days per year;
    - Airport ATFM Arrival delays (mainly weather related): c.20% reduction;
    - Service resilience risk: Low Risk
- Safety: 43 point reduction in the safety risk index (slightly above Plan 1). The headline reduction in flight risk remains at 13%.

In terms of cost savings opportunities by 2019, it is expected to achieve:

- £80m savings in direct ATC cost;
- £180m savings in fuel savings (through flight efficiency);
- £10m through a reduction in airport ATFM delays.

The PRB has advised the EC to set an EU-wide cost efficiency target of 2.1% pa for determined costs and 4.6% pa for determined unit costs for en route ANS. NERL's plan goes further than the PRB target and assumes a 6.1% pa reduction in

[65] CO2 emissions target -10%/flight by 2020 v 2006 baseline, total of En Route, Oceanic and Terminal savings

determined unit costs from the 2014 start point of £62.57 (the National Performance Plan for 2014, adjusted for expected revenue losses and in 2012 prices). This is based on the assumption that NERL is expected to be a major contributor to the EU-wide cost efficiency target.

9.4 RP2 revised plan – user interaction

9.4.1 Prioritisation of RBP capital expenditure proposals

NERL's programme of airline user consultation for the RP2 plan was based on a series of meetings and workshops held between May and August 2013, following release of the Initial Business Plan. All sessions were fully minuted (with records provided to us for review). Airline users were provided with the opportunity to discuss and challenge NERL's proposals, request further evidence and put forward suggestions for amendment / improvement.

It is evident that airlines have expressed their general desire for capital expenditure to be better justified, with a clearer definition of the benefits being delivered as a result of specific capital projects. The airlines have requested greater visibility, at the business case level, of the benefits accrued in quantified, monetary terms. These themes are generally a continuation of those discussed in relation to the SIP-based review of NERL capital expenditure during CP3 (see Section 5.3 of this report for more details).

Consultation records also indicate that users wish to see investments that facilitate prioritised. Airlines with operations focused in the London area, such as British Airways, identified LAMP as a programme they wished to see prioritised. Airlines operating in other regions of the UK such as Jet2 also identified the benefits of NTCA as being of high priority for similar reasons.

From the perspective of capacity / service, airlines have highlighted the particular importance, from a service perspective, of resilience in the airspace, i.e. avoiding instances of significant delay, rather than simply minimising the average seconds of delay overall.

In response to this (as described above), NERL has increased the proposed expenditure for airspace development by £15m, thereby enabling the development of LAMP and NTCA to be prioritised.

There are also proposals for further improvements to the airline consultation processes in relation to the planning and delivery of NERL's capex plan. Aspects being considered include increasing the frequency of SIP consultations from an annual to a six-monthly basis, providing greater detail in and around capital expenditure proposals and business cases, and assessing the potential for capex planning and delivery mechanisms that more closely align delivery with airline / user requirements, such as defined capex triggers[66] or project gateway reviews.

[66] Capex triggers are defined points at which there is a reduction to the level of the permitted revenues that NERL would be allowed to recover in user charges if certain milestones were not reached in respect of relevant capital projects by defined dates.

9.5 Our opinion

NERL's revised RBP capex is projected to achieve the same benefit targets for both environment / CO2 and capacity metrics as the original Plan 1.

In terms of cost savings, for both real cost reduction and determined cost savings these are at levels that lie between Plan 1 and Plan 2. Relative to the EU-wide cost efficiency target set by the EC, NERL's plan still goes further in terms of both efficiencies in determined costs and efficiencies in determined unit costs.

We consider that NERL's process of user consultation around its RP2 capital expenditure proposals leading up to the release of the RBP to have been reasonable, with an appropriate level of engagement with airline users and a clear and open discussions and exchange of views.

We consider NERL's adoption of higher spend "Plan 1" proposals for airspace development capex in its RBP to be reflective of responsiveness to airline feedback in relation to this aspect of the programme.

NERL has based RBP capital expenditure proposals for the remaining programmes on the "Plan 2" version of the capital expenditure plan, which entails significantly lower investment in the iTEC programme and reduced CNS infrastructure spend. We understand from conversations with NERL that this has been in response to the general desire on the part of airlines for costs to be reduced as far as is practicable. With regard to capacity and delay, consultation records suggest that airlines have more significant concerns around how to measure and mitigate delays from all causes (e.g. weather, minimum departure interval regulations), not just those directly controlled by NERL. Airlines have indicated they are less concerned about projects intended to control / minimise the (currently very low) average delay seconds for en route delays. We consider, on this basis, it is logical that NERL places less priority in its RBP on investments such as iTEC that are focused mainly on long term capacity enhancement.

10 Key conclusions and Recommendations

10.1 Introduction

This chapter concludes our report, firstly by summarising our key findings, and secondly by setting out our recommendations.

We note that this chapter is a repeat of Section 1.10 of our Executive Summary.

10.2 Key findings

We consider the following to be strengths of the NERL capital investment programme:

- NERL's capital investment plan is a complex, multi-faceted programme with multiple internal and external dependencies. NERL has shown it has the capability to effectively manage the delivery of the plan. NERL's internal management processes and systems were found to be consistent with good practice.
- NERL has prioritised its capital investment programme effectively, to ensure the benefits and outputs are delivered in way that will ensure both CAA and EC targets for the control period are met.
- The change in focus of NERL's capital investment plan during CP3 and reduced capital spend volumes appeared a logical and appropriate response to lower than expected traffic volumes during the period.
- We consider the airline user consultations were a useful and transparent process. NERL demonstrated a reasonable level of responsiveness to airline user feedback.
- NERL's RP2 capital investment plan was appropriately structured with a clear orientation toward delivery of benefits that will enable CAA and PRB targets to be fulfilled. We consider the benefits presented by NERL to be realistic, with robust underlying modelling and analysis.
- We consider NERL has demonstrated a reasonable degree of responsiveness to airline user feedback in its RP2 investment plans.

We consider the following aspects require development and / or further improvement:

- Transparency of costs underpinning the programme, including the reasons for variances and clear traceability from programmes to individual projects.
- Improved visibility and granularity of benefits and outputs, enabling the incremental impact of programme / sub-programme / project elements to be better understood.
- Stronger evidence around investment cost efficiency, particularly in relation internally procured projects.
- Harmonisation and clearer linkage of programme activities, costs and benefits between regulatory periods, with a consolidated overview of

programme elements, their delivery timescales, costs, cross-linkages and benefits.

- Consistency in the metrics utilised for benefits and outputs measurement – to allow for a common form of measurement across regulatory periods.

10.3 Recommendations

In this section we summarise the recommendations made from our Stage A and Stage B reviews.

- We recommend NERL discusses with the CAA and the airline user group potential options for developing a capital expenditure model for the purposes of regulatory review and analysis, which captures year-on-year capex spend during the control period.
- In the future, we recommend that NERL provides more details on project benefits to help explain the contribution of individual capex projects to the overall targets.
- We recommend NERL presents the fuel savings of initiatives. Where project level savings are presented as CO_2 benefits, these should be given as fuel savings and, if appropriate, should be linked to the associated benefits in flight efficiency improvement.
- We recommend that NERL identifies those projects that are enablers for procedural changes that then contribute to the 3Di metric, and those that directly contribute to it (e.g. LAMP).
- We recommend that NERL discusses with the CAA and the airline user group potential options for the independent review of the capital investment plan on a cyclical basis for the purposes of providing assurance to the CAA and airline users.
- We recommend that NERL explores options for carrying out its own programme of benchmarking activities, in order to gain comparative understanding and insights from other organisations into the cost and efficiency of different aspects of capital programme delivery.
- We recommend that RP2 projects are presented in a way that shows their contribution to the top-level performance targets.
- We recommend that a "do nothing" case for benefits is presented for new price control periods, showing only the benefits of projects that have been continued from the previous price control period and for which additional investment has been made in the new control period. This would then enable the incremental impact of any new projects to be shown and compared to the results of previous initiatives.
- We recommend that names and definitions of metrics, e.g. for environmental benefits, are standardised, using the same terms and definitions across all presentations.

Appendix A – Key requirements of the CAA brief

We set out in the table below, the key requirements of the CAA's terms of reference for this review, together with an indication of the key section or sections of the report in which these are explicitly addressed.

CAA ToR Requirement	Key report section(s)
STAGE A	
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 from 2011 to date.	Chapter 5
How do the total costs compare to the planned cost of delivery at the time of the CP3 settlement?	Section 3.3
Have the planned benefits (a) been delivered (b) to the timetable assumed at the time of the CP3 settlement?	Section 4.2
To what extent was there a demonstration of value for money e.g. through tender processes?	Sections 5.4 , 5.5
How did the costs and outputs of work done by external suppliers compare to what was assumed at the time of the CP3 settlement?	Section 5.4
Was there a rigorous test of costs where work was done internally (or by affiliates);	Section 5.4
What was the actual cost incurred for internal work (or by affiliates) compared to the estimate before work commenced.	Section 5.4
Where there were differences in cost (both external or internal or in the balance between external and internal costs) is the extent to which this was due to changes in scope versus cost over-runs clear?	Section 5.4
Were the levels of risk and contingency that NERL allowed appropriate?	Section 5.7
Is there evidence of good consultation with users relating to changes to the programme?	Section 5.3

CAA ToR Requirement	Key report section(s)
STAGE B	
Assess and report upon the appropriateness of the overall investment strategy and the two alternative plans set out in the initial business plan including with reference to:	Chapters 6, 7 and 8
whether the quoted benefits of the strategy are realistic;	Chapter 7
consistency with the future implementation of SESAR;	Section 7.4
timely and efficient progress towards the implementation of FAS, including reference to the major airspace redesign programs (LAMP, NTCA and Transition Altitude) and the queue management program (including a reduction in stack-holding at Heathrow);	Section 7.4
the responsiveness of NERL to its customers concerns;	Section 9.4
the feasibility of the plan in terms of the scope, design and sequencing. This would include an assessment of the risk profile of the plan including any measures NERL may have put in place to manage these risks;	Chapter 8
whether, on a sample basis, the plan includes efficient and economic projections of capital expenditure with deliverables defined and measureable.	Sections 6.5, 7.3 and 8.2

Table 16: Key report sections addressing ToR requirements

Appendix B – CP3 spend profile by programme

We set out in the table below, the year-on-year profile of CP3 capital spend by programme, together with a brief commentary on the profile of spend in each area.

Latest CP3 business plan projection	2011 actual (£m)	2012 actual (£m)	2013 (BP13 proj.) (£m)	2014 (BP13 proj.) (£m)	Total CP3	Comment
Centre Systems Software Development	39	38	41	49	**167**	Increased spend on legacy systems sustainment and improvement in light of revised iTEC programme
iTEC FDP and New Common Workstation	31	30	20	30	**110**	Revised strategy and timescales, deferment of NCW development to RP2.
CNS Infrastructure	23	26	22	17	**89**	Profile largely in line with baseline plan.
Airspace Development	4	5	8	12	**29**	Late CP3 ramp up in spend for development of airline priority programmes.
Safety Nets and Airspace Efficiency	4	3	11	10	**29**	Delivered later in CP3 than originally projected due to revised iTEC strategy
Radar Site Services	17	6	5	0	**29**	Programme substantially complete in line with plan.
Facilities Management	6	6	4	4	**20**	Reduced spend throughout CP3 to target savings.
Military	1	5	5	3	**14**	Spend under FMARS contract not part of the RAB.
Development of SAATS	2	1	4	2	**9**	Increased spend 2013 to focus SAATS replacement.
CO2 and Fuel Saving	-	-	1	4	**5**	2011 / 2012 contingencies drawn for projects delivering savings, remaining £5m for further 4% CO2 reduction.
Risk & Contingency	-	-	-	-	-	NERL has removed spend under the risk & contingency provision in the latest plan.
Total	**126**	**119**	**122**	**132**	**499**	

Table 17: CP3 year-on-year spend profile by programme

Appendix C – Arup questionnaire to airline users – results obtained

Arup circulated a questionnaire to the airline user group, asking for views in relation to NERL's capital expenditure plan. Questions applied to capital expenditure both in the current control period CP3 and proposals for RP2, and were structured around the three areas of costs & efficiency, delivery of benefits and outputs and consultation process.

For the majority of the questions, respondents were asked to provide an assessment of how satisfactory they consider the relevant aspect of the NERL capital invesment plan, using the following scoring system (1-5):

1	yes absolutely / fully satisfactory
2	yes reasonably / fairly satisfactory
3	only partially / neither satisfactory nor unsatisfactory / neutral
4	no, not as expected or required / fairly unsatisfactory
5	no, definitely not / absolutely unsatisfactory
X	not applicable or relevant

Table 18: Scoring system definitions used for Arup airline user questionnaires

Arup received four questionnaires in total from airline user respondents. We set out in the table below the questions posed, and the responses received.

Question		Responses	Comments
A	**Costs & efficiency**		
A1	Has NERL's RP1 (CP3) capital investment programme delivered value for money?	X 4 3 2	The deployment of iFACTS was one of the biggest CAPEX programmes during RP1, and whilst it was deployed with minimal operational impact, the project cost spiralled and was delivered late. Other CAPEX projects have delivered benefits but these are difficult to quantify.
A2	Are NERL's RP2 capital expenditure plans likely to deliver value for money?	X 3 2 2	On the basis of the RP2 consultation, value for money is expected. LAMP / NTCA are hoped to deliver benefits and flight efficiency and iTEC is an enabler for deployment of SESAR initiatives. There is however a lack of transparency, therefore a lot of trust is put into NATS word that the cost in VFM is truly delivering the promised benefits.
A3	Are there any specific areas of spend or elements within the NERL capex programme that you consider unnecessary?	no no	All programmes are inter-connected. It is very difficult/impossible to pull one project out in isolation.

Question		Responses	Comments
B	**Delivery of benefits and outputs**		
B1	Has NERL's capital investment programme during RP1 (CP3) satisfied your needs with regard to:		
B1.1	Airspace capacity and reliability?	3 2 2 2	Given the lower than forecast levels of traffic during RP2 this is difficult to assess.
B1.2	En-route efficiency and fuel savings?	3 3 2 2	Whilst there has been significant progress in efficiency and fuel savings, this is seen as 'enabled' savings against the FPL and targets fuel uplift rather than actual. Tactical savings are always welcomed, but in real terms the savings identified are actually a fraction of those claimed as a result of regular tactical intervention. There has been little or no direct evidence of actual real bottom line savings to airlines, and once again there is a lack of transparency of the savings being made.
B1.3	Safety requirements?	1 1 1 1	There are no concerns over safety, in this respect one user group called them a market leader.
B2	Do NERL's RP2 capital investment proposals satisfy your needs with regard to:		
B2.1	Airspace capacity and reliability?	3 2 2 2	Capex proposals should be sufficient, but this depends on actually delivering LAMP. There are concerns that too much is out of the scope of NATS and success depends on the consultations and input of others. If these parties do not deliver their areas, this offers NATS an easy out. Furthermore currently Heathrow's requirements will only be met too late in RP2.
B2.2	En-route efficiency and fuel savings?	3 3 2	See B1.2. Similar methods are being deployed, and airlines are eager to engage with NERL to identify the real savings. Similarly to above user groups are concerned on the dependence on other parties, and that this will only occur too late in the RP2 period.
B2.3	Safety requirements?	1 1 1 1	Safety is a strength, there are no issues with it.
B3	Are any areas of investment missing from NERL's capex programme that you wish to see included?	N	No, but Heathrow's delivery is too late, and RP2 has a heavy programme which is at the limit of what should be possible.
C	**Consultation process**		
C1	Has NERL robustly and convincingly demonstrated:		
C1.1	How it has delivered benefits to you through its RP1 (CP3) investment programme?	4 3 3 2	Delays are at their lowest level, but overall it is difficult to distinguish which benefits are directly impacting operators. Once again the issue is a lack of transparency, and a dependence on the validity of the claims NATS makes. Users recognize that benefits are challenging to verify, as without the comeback traffic necessary to test the RP1 delivery, it is hard to prove that the promised capacity is now available.
C1.2	How it is going to deliver benefits to you through its RP2 investment plans?	3 3 3 3	See C1.1, similar issue of not being able to identify direct benefits.

Question		Responses	Comments
C2	Has NERL provided sufficiently robust and detailed capex expenditure programme / activities?	4 3 2 1	NATS have shared a large amount of information on the programme and projects that they have chosen with the airlines and have been superficially very willing to engage and discuss but on their terms. The airlines have requested on a large number of occasions, access to the more detailed business case evaluations which would demonstrate payback periods, NPV, risk analysis etc, but NATS have been unwilling to share this at a sufficient level of details to make any useful analysis at a financial/ economic level.
C3	Has the level of detail provided by NERL on its cost saving / efficiency measures been reasonable?	X 3 3 2	The information provided is of limited value to the airlines as it is difficult to quantify. It is also not sufficiently detailed. Information on forecast savings needs to be substantiated with solid evidence.
C4	Has NERL been responsive to your feedback in its capital investment planning process?	X 3 1 1	There has been good communication with NERL, and they have been willing to listen to views regarding engagement/consultation during the planning process. It is not clear if they will actually be making meaningful changes. There have been requests from the community to have year round engagement and specific Capex governance. As before in the past NERL has been resistant to providing a more detailed NPV type business case assessment.
C5	Do you consider that the consultation process around NERL's capital investment programme has been effective overall?	4 4 2 1	The consultation process has been run well in terms of 'informing' the airlines, however the process has not enabled airlines to get NERL to share a sufficient level of detail to be comfortable and assured of VFM rigour, benefits and delivery. One user group stated it was overall the level expected from other sectors like airports. Another said it was difficult to make sound judgements on the benefits of each project as a result of the lack of detail. Another said that within the limited time available in RP2 discussions, the consultation had been very good.
C6	Do you have any specific views or comments on how the consultation process could be improved?	3 1	A longer timescale would allow greater depth to discuss capex programmes. Far more detail is required in each business plan, particularly on capex to ascertain what the benefits might be.

Table 19: Arup airline user questionnaire: summary of responses received

Appendix D – Issues & queries log

Ref No	Category	Query/ Information Request	Date
1	Investment plan delivery CP3	What level of analysis is available explaining differences between planned and actual CP3 investment spend? Can a variance analysis or similar be provided, e.g. taking the "top six" expenditure categories presented in the previous CP3 business plan?	05/08/13
2	Investment plan delivery CP3	Can further details be provided of NERL's investment track record during CP3? E.g. - What programme elements have come in over budget, which under? - Which elements are on-schedule or deferred? - Which projects increased in scope, which were de-scoped, which deferred?	05/08/13
3	Investment plan delivery CP3	What analysis is available to substantiate NERL's track record in delivering benefits as a result of investment during CP3? These includes: - Safety benefits? - Reliability and delay benefits? - Asset resilience (e.g. reliability rates, need for redundancy, impact on maintenance cost)? - Environmental / CO2 benefits? - Longer-term benefits (e.g. SESAR trajectories)	05/08/13
4	Investment plan delivery CP3	How successful has NERL been in its collaborative developments with other European ANSPs during CP3, most notably the UK-Ireland FAB,? What lessons have been learned, and what is the proposed approach during RP2?	05/08/13
5	Investment plan delivery CP3	How has the strategic renewal programme for legacy / life-expired assets been delivered during CP3? What have been the main elements of spend? How are condition, reliability and resilience evaluated? What has been the basis for renewal prioritization, scheduling or deferral?	05/08/13
6	Investment plan delivery CP3	How has NERL progressed in implementing major new system enhancements / technologies, in particular iTEC, NCW and advanced tools?	05/08/13
7	RP2 Business plan proposals	What are the main differences in investment proposals between CP3 and RP2? What comparative analysis is available? To what extent have underlying assumptions changed?	05/08/13
8	RP2 Business plan proposals	What has been the general process for modeling the different types of benefits? How have these been allocated between resilient / compliance / near- and longer-term customer benefits?	05/08/13
9	RP2 Business plan proposals	Can further details be given of the methodology by which NERL has analysed the trade-off between service level and price underpinning the Plan 1 and Plan 2 variants? How have delay-related benefits for airlines been calculated? How has the up to 8% variation in capex levels been modeled in this process?	05/08/13
10	RP2 Business plan proposals	What evidence is available to substantiate proposed safety benefits? What analysis / modeling takes place to support this?	05/08/13
11	RP2 Business plan proposals	What evidence is available to substantiate capacity and delay benefits of investment proposals? How are future benefits analysed / modeled?	05/08/13
12	RP2 Business plan proposals	What evidence is available to substantiate environmental / CO2 benefits of investment proposals? How are future benefits analysed / modeled?	05/08/13
13	RP2 Business plan proposals	What its NERL's approach to capex contingency planning for the RP2 programme? How far does this differ from the previous control period, and what are the drivers for any differences?	05/08/13
14	Airline consultations	Is NERL able to provide us with minutes / records from the consultation meetings with the customer user group in the SIP 2011 / 2012 / 2013 process, and during the RP2 process as referenced in CAT 10-19?	16/08/13
15	Procurement, SCM	Can NERL please provide details of its procurement and supply chain processes and strategy.	16/08/13
16	Investment plan delivery CP3	Can a numercial overview and explanation be provided explaining the differences / adjustments applied between the original CP3 5-year capex programme presented in the CP3 investment plan (£670m) and the revised 4-year plan presented in the 2011 SIP?	16/08/13
17	RP2 Business plan proposals	Can a breakdown of the CP3 and RP2 capex programmes in Excel format be provided, down to the level of sub-programmes and individual projects? For CP3, can a version (or versions) be provided showing year-on-year changes to the programme between the start of CP3 (SIP 11) and current?	16/08/13
18	RP2 Business plan proposals	Can NERL please confirm details of the inflation assumptions underpinning its presentation of costs on an outturn basis.	16/08/13
19	Investment planning and approval process	Can examples of the following investment process documents be provided for a sample of "approved set of projects and futures": - Benefits contract - IP form - SAP plan - CR - Business case	16/08/13
20	Investment planning and approval process	Can examples of the following investment process documents be provided for a sample of "pop-up" projects: - Benefits contract - IP form - SAP plan - CR - Business case	16/08/13

21	Investment planning and approval process	Are there minutes / records available for a recent 6-monthly investment programme review meetings?	16/08/13
22	Asset management & delivery processes	Can some examples be provided of asset health review reports for significant assets in the portfolio?	16/08/13
23	Benefits and outputs	Can an up to date version of the Requirements Management Database be provided for review?	16/08/13
24	Benefits and outputs	Can details of the methodology for safety index measurement be provided? What assumptions were applied for the RP2 safety index projection?	16/08/13
25	Benefits and outputs	Can further details be provided of the modelling of fuel savings benefits associated with the capex proposals (incl. the "KERMIT" model)? How is this simulated / applied to UK en-route airspace context? What are the traffic assumptions? What sensitivities are applied?	16/08/13
26	Benefits and outputs	Can NERL provide details of how it demonstrates improvements in flight path efficiency (and associated estimations of fuel savings) resulting from airspace investments during CP3 using "radar tracks" or other relevant evidence?	16/08/13
27	Benefits and outputs	Can a recent example be provided of the monthly benefits dashboard showing progress against target on relevant benefits measures?	16/08/13
28	RP2 Business plan proposals	Can a comparison be provided between the STATFOR traffic forecasts for RP2 and the airline forecasts (including any applicable up- and down-side cases).	16/08/13
29	Investment plan delivery CP3	Can further detail / breakdown be provided of the CP3 actual and projected spend on Centre Systems Software Development be provided, showing areas in which costs have increased vs. the original CP3 business plan projections.	16/08/13
30	Investment plan delivery CP3	Can examples of RAMP risk plans be given for a selection of key projects (including iTEC, iFACTS, LAMP, Datalink)?	16/08/13
31	Investment plan delivery CP3	Can further details be provided of the ca. £85m slowdown in CP3 capex for the iTEC programme? Which specific elements were delayed / deferred? What risks have arisen as a result?	16/08/13
32	Risk management	What level of risk is assessed in relation to initial iTEC PUAS implementation? What contingency / fallback measures are in place? How will testing regime ensure all operational interfaces including with legacy systems (NAS) and overseas ANSPs are covered?	16/08/13
33	Risk management	Can further information be given on the interdependency of iTEC and LAMP? What issues have arisen, or are anticipated to arise, in relation to the bringing-forward of LAMP in response to airline pressures? How is this likely to affect compatability of LAMP with existing legacy systems prior to iTEC introduction?	16/08/13
34	RP2 Business plan proposals	Can further brief details of the (now discarded) Plan 3 be provided? What were the results modelled for key outputs measures? On what basis were these considered to be "unacceptably low" in service terms?	16/08/13
35	Investment plan delivery CP3	For 2011/12, actual capital investment spending was c.£13 million below baseline; for 2012/13, actual spending was c.£25 million and c.£29 million below the amounts planned in SIP 2012 and the SIP 2011 baseline respectively. Can NERL please provide 2011/12 and 2012/13 versions of the end-of-year project tracking files, showing the status of the projects and the causes for underspend versus the Baseline and previous SIPs?	23/08/13
36	Investment plan delivery CP3	For CP3 Flight processor and Workstation, planned spending was nearely halved between SIP2012 and SIP 2013. This is attributed to revised deployment strategy around London Terminal Control new workstation due to lower traffic forecast. Can NERL share details of the analyses performed to support the conculsion that early deployment of workstation at London Terminal Control no longer justify the cost?	23/08/13
37	Investment plan delivery CP3	For CP3 ITEC FDP project, orginal end date as seen on SIP 2011 was 2013-14. Estimated end date has now been deferred to 2016-17 and the Project Definition Phase appears to have been extended several times since SIP 2011. Can you please share details of the approval process, board documents / meetings notes relating to the extension / deferral of this programme?	23/08/13
38	Procurement, SCM	Please provide details of your programme/project gateway approval process and the supporting Project Management processes that are used in delivery. For the purposes of the mandate these processes may be limited to the following items or their nearest equivalent: • Stakeholder Management • Work Packaging • Project Management • Cost Management • Change Management • Risk and Value Management • Earned Value Management • Reporting. Processes relating to Supply Chain Management will be addressed separately through item 15.	28/08/13

39	Benefits and outputs	Provide slides from OA workshop	29/08/13
40	Benefits and outputs	Provide definition of "busy hour"	29/08/13
41	Benefits and outputs	Provide 3DI paper	29/08/13
42	Procurement, SCM	NERL to provide EMCOR facilites management contract info	29/08/13
43	Procurement, SCM	NERL to provide confirmation of approval process	29/08/13
44	Procurement, SCM	Provision of business-wide supply chain documents	29/08/13
45	Procurement, SCM	NERL to provide example of sourcing strategy that is material in value	29/08/13
46	Benefits and outputs	We have been asked by the CAA to compare planned benefits over the CP3 period with actual benefits delivered. With regard to planned benefits: - Can the planned benefits, at the time of the CP3 settlement, in the following performance areas of safety, capacity, environment and cost reduction, be provided? -- Safety Improvement in NERL risk index (%) -- Capacity Increase in airspace capacity (%) -- Cost efficiency Annual operating cost savings (£m) -- Environment/flight efficiency Reduction in annual CO2 emissions (Tonnes) - Can the planned benefits (over 2011-2014) be broken down on an annual basis (i.e. showing profile year-on-year)? - Can a breakdown of this annual planned benefit be provided to programme level (12 programmes are shown for CP3)? With regard to actual benefits: - Can actual benefits for the same performance areas outlined above for 2011 and 2012 be provided? Can the actuals be disaggregated to individual programmes? - Can a justification for the differences between planned and actual benefits be provided (project timelines adjusted, benefits overestimate, benefits underestimate, descoping of project, other reasons)? Where relevant, can explanations be broken down to project level to explain differences?	06/09/13
47	Benefits and outputs	According to the NERL SIP 2012 and 2013, NERL met the CP3 targets for the years 2011 and 2012 for safety, capacity (delay), flight efficiency (CO2) and cost reduction. - Can an explanation be provided of how the annual benefits planned for CP3 (and presented in 1) achieve the targets set out in the CP3 settlement? - If actual programme benefits differ from planned, why has this not had an effect on the CP3 targets?	06/09/13
48	Benefits and outputs	- Can an explanation be provided, on a per sub-programme level, how much of the cost reduction allocated to RP2 programmes is from ATCO reductions through improved ATCO productivity as a result of capital investments. - If there are other sources of cost reduction please explain how the programmes deliver these. - Please also provide the cost applied to monetise ATCO cost savings.	06/09/13
49	Benefits and outputs	- Please confirm that the headline figures (in the RP2 business plan) presented for CO2 emissions for Plan 1 and Plan 2, assume that 4% of the 9% and 6% reduction, respectively, is already delivered by the end of CP3 and therefore, that RP2 investments contribute 5% and 2% of the CO2 emissions reduction by 2020?	06/09/13
50	Benefits and outputs	Can an explanation be provided of how RP2 Plan 1 and Plan 2 both achieve a 13% accident risk per flight (RP2 business plan), given that Plan 1 achieves a 43 point reduction in safety risk index and Plan 2 achieves a 23 point reduction.	06/09/13
51	Benefits and outputs	Can information be provided on the benefits per year over RP2 (2015-2019), if possible showing how these benefits are broken down to programme level and sub-programme level. Can any dependencies on other projects and other stakeholders (airports, airlines) be highlighted.	06/09/13
52	Benefits and outputs	In order to show the link between RP2 targets/metrics and project benefits, can a view be provided of how the 10 main programmes over RP2, broken down into sub-programmes contribute to the following RP2 performance indicators: - Average en-route ATFM delay (all causes) per flight; - Arrival (ATFM) delay per flight; - Determined unit cost for enroute ANS; - Determined unit cost for terminal ANS; - En-route horizontal flight efficiency of actual trajectory - En route horizontal flight efficiency of last filed flight plan trajectory For each programme/sub-programme, can the impact of going ahead with the programme and not going ahead with the programme on these metrics be demonstrated?	06/09/13
53	Benefits and outputs	Over RP2 (and CP3, if relevant), can a list be provided of elements of the SIP programmes, and specifically iTEC/FDP, iTEC/NCW and NAS, that address regulatory compliance? Please provide the spend related to these elements on an annual basis. How much further cost is required to meet full compliance?	06/09/13
54	Benefits and outputs	In “Action 27 Benefits Review – Mar 13 to Aug 13”, there is a presentation of cancelled projects on a monthly basis. Can a list of projects cancelled over the CP3 period be provided? Does NERL have an internal assumption on the level of cancelled projects over RP2? What is the impact on benefits from cancelled projects?	06/09/13

55	Investment plan delivery CP3	Can project tracking files used for end of 2011/12, end of 2012/13 and the most recent monthly management meeting, showing information at for each project be provided? This would include: • Original planned spend to date • Actual spend to date • Original target delivery date • Latest target delivery date • Narrative and explanations on any delays, overspend and underspend	06/09/13
56	Investment plan delivery CP3	Can internal documentation / record / communication of corrective and management actions taken as result of the delayed / overspending projects identified in the monthly management meeting be provided? For example, the following identified in the "Benefits Briefing" documents used for monthly management meeting: • L4695 RICE Power Supply Upgrade - "Project remains in implementation" in May 2013 (please also identify value if this delayed project) • L4653 RADNET Decommissing - "Acceptance failed…O date has been delayed" in April 2013 (please also identify value if this delayed project) • Overspending projects identified in these meetings	06/09/13
57	RP2 Business plan proposals	We understand that the c.£27m iTEC and CWP savings in Plan 2 relative to Plan 1 is due to constraining programme spend to £35m pa versus £40m in Plan 1, adding at least two years to the programme with dual running costs of ITEC and NAS simultaneously (page 5 RP2 Capital Investment Plan). Please can you provide: • analysis showing the quantified effect of constraining spend even further than £35m pa may have on the dual running costs and how this may affect the overall business case of this programme? • details (planned time frame, decommissing costs etc.) regarding the retirement of NAS, in relation to iTEC / CWP implementation?	06/09/13
58	RP2 Business plan proposals	We understand that in RP2 Plan2, LAMP will need to be slowed down due to difficulties in releasing controllers for training and actions will be taken of monitoring of leading indicators reveal emerging issues. Can details of the analysis (additional cost required, effects on other programmes etc.) on the type of mitigation actions required in these possible scenarios be provided?	06/09/13
59	RP2 Business plan proposals	RP2 spending for Airspace Annual Redesign/Change is £6.6 million lower in Plan 2 than in Plan 1. We were unable to locate within the RP2 Capital Investment document specific explanation on how lower spending will be achieved and what the associated risks may be. Can an analysis of this £6.6 million reduction (specific quantified effect on RP2 outputs and an analysis of whether or not >£6.6 million savings can be achieved) and the quantified risks associated with this spending reduction be provided?	06/09/13
60	RP2 Business plan proposals	Can complete Gantt charts (showing sub programme costs adding up to programme total, and planned start and delivery dates) be provided, similar to those in the RP2 Capital Investment Plan document, but cover the period over CP3, RP2 (including Plan 1 and Plan 2) and RP3? These would covering sub programmes for: • Airspace development • Centre System Software Development • CNS Infrastructure • iTEC-FDP / CWP / NCW	06/09/13
61	RP2 Business plan proposals	Can further details on RP2 Plan 3 be provided? This would include: • specific programmes / projects to be taken out / delayed further into RP3 • Modelled outputs including Cost efficiency, price reduction, opex reduction, service (delays), safety and fuel saving consistent with metrics shown on Slide 7 of the RP2 Capex Study Kick-off Meeting slide pack • Any tentative minimum standards / benchmarks used internally and/or agreed with airline customers / CAA / EC for each of the metrics listed in the point above, used for determining the viability of 'Plan 3' • Modelling outputs underpinning assessments on Slide 16 of the RP2 Capex Study Kick-off Meeting slide pack	06/09/13
62	RP2 Business plan proposals	Can the 'mini-cases' for LAMP, iTEC/NCW and NTCA shared with airline customers (page 3, Draft minutes of Meeting 2 of Customer Consultation 7 August 2013 11:45-15:15) be provided?	06/09/13
63	Investment plan delivery CP3	Can any material / analysis produced for the 'project review' on EFD organised for airline customers (point 6, 2012 SIP NATS / Customer multi-lateral review minutes) be provided, demonstrating the stringent governance processes that ensure projects are delivered on time and on budget?	06/09/13
64	Investment plan delivery CP3	Can the material / documentation used for sharing 'lessons learned' of EFD and iFACTS with DFS, LVNL and AENA as part of iTEC development process be provided? (point 15, 2012 SIP NATS / Customer multi-lateral review minutes)	06/09/13
65	Procurement, SCM	For a sample (say 3) of both internal and external projects, would it be possible to provide examples of the following key documents (or relevant equivalents): - Cost Plan & whole-life-cost report - Cost budget reports - forecast and actual, spend to date, anticipated final cost & variances - Procurement Strategy (including options analysis, tender process / criteria, commercial risk, choice of contract/ form, etc.) - KPI Report, Value Management Report, Value Engineering Options report - Cost / procurement audit Reports - Project Close Out Report: - Change Register	06/09/13
66	Procurement, SCM	For a sample (say 3) of both internal and external projects, would it be possible to provide examples of the following key documents (or relevant equivalents): - Cost Plan & whole-life-cost report - Cost budget reports - forecast and actual, spend to date, anticipated final cost & variances - Procurement Strategy (including options analysis, tender process / criteria, commercial risk, choice of contract/ form, etc.) - KPI Report, Value Management Report, Value Engineering Options report - Cost / procurement audit Reports - Project Close Out Report: - Change Register	25/09/13

67	Benefits and outputs	Please provide further clarification on information provided under “Action 23 CP3 benefits baseline”: - Is “CP3basedate” the first year of benefits? - Can we assume that per project, benefits are constant in future years and are ongoing until 2019? - Are the benefits delivered by different projects in a year additive (for safety, CO2)? How are the three risk indices at the ATC units related to the overall risk index? - For dates beyond CP3, should we assume that benefits are delivered in the RP2 period? - Can you provide an indication of which projects fall under which of the following programmes: • Airspace development • Centre systems software development • CNS infrastructure • CO2 and fuel saving • Development of SAATS • Facilities management • INCW at TC and PC • iTEC FDP • NCW at all NERL centres • Risk and contingency • SNets and Airspace Efficiency	25/09/13
68	Benefits and outputs	The responses to Queries 46 and 51 refer to RP2 benefits starting on the last day of project execution. Can NERL provide this information for each of the programmes and sub-programmes? The only information on timing of benefits appears to be the Gantt charts provided at programme and sub-programme level in the RP2 Capital Investment Plan (2015-2019) for Customer Consultation. This level of detail does not provide timing of benefits that are delivered during a programme or sub-programme.	25/09/13
69	Benefits and outputs	Further to query 47, we would like to reconcile three different views of benefits/performance in environment/CO2 provided by NERL. We would like to understand why the information provided as a response to query 27 (monthly benefit reviews) show that NERL is not on track to meet its CO2 savings targets, yet it has met the CP3 targets in 2011 and 2012 in environment. In addition, is the information presented in the benefit reviews consistent with the information provided on CO2 benefits in response to query 23 (CP3 benefits baseline)? We understand that the detail behind the dashboard review is available at project level. Please provide this.	25/09/13
70	Benefits and outputs	Further to query 48, we would like to ascertain whether the cost reduction benefits presented per SIP programme are solely as a result of staff reductions or whether costs are saved in other ways. Could NERL clarify how much of the cost reduction per SIP programme and sub-programme is through staff reductions and how much from other savings?	25/09/13
71	Benefits and outputs	We understand that NERL has committed to a volume of savings over CP3 – please provide the information on what the volume of savings is for safety, capacity, environment and cost. We understand that the volume of savings can be disaggregated to project level. Please provide this data, and if available, at an annual level.	25/09/13
72	Investment planning and approval process	For a sample of 4 projects, provide further information as to the evolution of costs and approvals over the life of the project	30/09/13
73	Risk management	Risk Management guidance document referenced a number of Risk Processes - could NERL provide these	30/09/13
74	Investment planning and approval process	NERL Investment Management Process refered to by NERL - can a copy be provided	30/09/13
75	Investment planning and approval process	During on-site meeting at NATS, examples of the LMM Matrix were displayed. Copies of these would aid writing Arup report	30/09/13
76	Investment planning and approval process	During on-site meeting at NATS, examples of the LMM Dashboard were displayed. Copies of these would aid writing Arup report	30/09/13
77	Risk management	During on-site meeting at NATS Project Dependency Agreements were discussed with reference to how projects managed incoming and outgoing dependencies with other projects. Some examples of these agreements would aid writing Arup report	30/09/13
78	RP2 Business plan proposals	Please provide the data previously provided under actions 17 and 29 in spreadsheet format	30/09/13
79	Investment plan delivery CP3	Please provide the data previously provided under action 55 in spreadsheet format	30/09/13
80	Investment planning and approval process	Could NERL please provide the breakdown in spend by programme on a year-by-year basis, in the same format as was provided in the 14th August Swanwick presentation pack for the original CP3 2010 LTIP and the latest business plan (Slides 7 and 8 respectively), that was projected in the following three documents: - SIP 2011 - SIP 2012 - SIP 2013	30/09/13
81	Procurement, SCM	We would like to request the procurement strategies for 4 further projects alongside the one already provided for "L4790 – FPRSA Replacement" (Action 44 - FPRSA - SCM Strategy.pdf, 6th September). Would it be possible to provide them for the four projects we reviewed in the NIBS system at the start of this week (EFD, Datalink, NERC and Dover / Lydd)? If these are not appropriate/available (due to archiving etc) please provide further examples	07/10/13
82	Investment plan delivery CP3	Impairment - could you provide details of the impairment amounts - could not locate in accounts	07/10/13

Appendix E – Meetings held

Date & venue	Purpose of meeting	Attendance
30 July 2013 CAA Kingsway offices	Kick-off meeting	CAA Arup-Helios team
7 August 2013 NERL Heathrow House offices	Initial meeting with NERL	NERL representatives Arup-Helios team
14 August 2013 NATS Swanwick centre	Detailed capital expenditure meeting	NERL representatives Arup-Helios team
29 August 2013 NATS CTC offices	Meeting with NERL SCM team	NERL representatives Arup-Helios team
29 August 2013 NATS CTC offices	Meeting with NERL Operational Analysis team	NERL representatives Arup-Helios team
25 September 2013 NATS Brettenham House offices	Meeting with NERL to discuss emerging issues and further clarifications	NERL representatives Arup-Helios team
30 September 2013 NATS CTC offices	Meeting with NERL to review live project delivery & management system	NERL representatives Arup-Helios team
7 October 2013 NATS Brettenham House offices	Meeting with NERL to discuss final clarification requirements	NERL representatives Arup-Helios team
25 October 2013 CAA Kingsway offices	Workshop presentation of initial findings to CAA and airline user representatives	CAA Airline representatives NERL representatives Arup-Helios team

Appendix F – Documents received

Filename	Document Title	Description	Received
RP2 Business Plan - 10th May 2013.pdf	RP2 Business Plan (2015-2019) for Customer Consultation	Sets out NERL's consultation proposals for their customers on the service provided, and prices to be applied, during the Single European Sky (SES) Reference Period 2015-2019 (RP2).	Email 30 July 2013 09:16
2109_RP2 Capital Investment Plan - Release.pdf	RP2 Capital Investment Plan (2015-2019) for Customer Consultation	Sets out NERL's Capital Investment consultation proposals for the Single European Sky (SES) Reference Period 2 (RP2), which covers 2015-20191. It provides the next level of detail below the RP2 Business Plan.	Email 30 July 2013 09:16
NATS RP2 Business Plan Appendices - 10th May 2013.pdf	RP2 Business Plan (2015-2019) for Customer Consultation Appendices	Appendices for the RP2 Business Plan. Includes: • Traffic forecast • ANSP benchmarking • ATM impact on airline costs • Economic Regulatory Model for RP2 • Pensions • SES Performance Plan Template • Determined Cost Efficiency & Price • Plan 1 Financials • Plan 2 Financials • Financial Assumptions • Reconciliation to National Performance Plan for RP1	Email 30 July 2013 09:16
SIP11-Final-Issue-2-Including-Appendices1.pdf	Service & Investment Plan 2011	Service & Investment Plan 2011 1. Plan Context 2. Delivery Performance Report 3. Investment Plan Update	Email 30 July 2013 17:16
SIP-2012-Final-Report.pdf	Service & Investment Plan 2012	Service & Investment Plan 2012	Email 30 July 2013 17:16
SIP-13-Final-Full-Document.pdf	Service & Investment Plan 2013	Service & Investment Plan 2013	Email 30 July 2013 17:16
[Hard copy]	RP2 Capex Study - Kick-off Meeting	Slide pack handed out in kick-off meeting. Contents: • Overview of NERL • Overview of plan 1 / plan 2 • CP2 / CP3 Delivery performance • Benefits by SIP programmes	Slide pack handed out in kick-off meeting with NATS, 7 Aug 2013
[Hard copy]	Capital Expenditure	Slide pack handed at capex workshop session at Swanwick on 14th August. Contents: • CP3 Investment Performance • FAB Benefits • Asset management processes and portfolio view • General assumptions underpinning the portfolio • Programmes improvement and capabilities • Risk and contingency • ITEC and NCW	Slide pack handed out 14 Aug 2013
[Hard copy]	Benefits	Slide pack handed out at capex workshop session at Swanwick on 14th August, in relation to benefits.	Slide pack handed out 14 Aug 2013
[Hard copy]	NMS: NERL Asset Management Policy (NERLP15AM)	NERL Asset management Policy	Hard copy handed out on 14 Aug 2013
[Hard copy]	Asset Management Verification Certificate	Lloyd's Register Asset Management Verification Certificate for the asset management system of NERL.	Hard copy handed out on 14 Aug 2013
CAA NERL capex-Arup queries log v 1 - GG response after kick-off.xlsx	NATS' response to queries log v1	Gary Gibson's initial responses to how questions on the log will be answered at the session at Swanwick on 14 August	Email 8 August 2013 18:25
RP2 Capex - Q1 response.docx	RP2 Capex Audit Q1 - CP3 Financial performance.	Sent as an answer to the query "What level of analysis is available explaining differences between planned and actual CP3 investment spend? Can a variance analysis or similar be provided, e.g. taking the "top six" expenditure categories	Email 8 August 2013 18:25
Comparison Analysis DFSvNERL 130712.pdf	DFS Deutsche Flugsicherung GmbH and NATS (En Route) Limited – Peer Comparison	In this report, Moody's compares the regulatory environment, financial policies and ownership structures of DFS and NERL. Page 14 is of particular interest, comparing the financial robustness of NERL with DFS	Email 19 August 2013 08:11
• Action 14 CC Meeting 1 29 May 13.pdf	Draft minutes of Meeting 1 of the Customer Consultation process for RP2	Response to Issue 14. Minutes cover meetings for RP2 capex plan consultation	Email 22 August 2013 17:46
• Action 14 CC Workshop 1 05 June 13.pdf	Draft minutes of Workshop 1 - key relationships, trade-offs, customer requirements	Response to Issue 14. Minutes cover meetings for RP2 capex plan consultation	Email 22 August 2013 17:46
• Action 14 CC Workshop 2 19 June 2013.pdf	Draft minutes of Workshop 2 - operating costs and efficiency	Response to Issue 14. Minutes cover meetings for RP2 capex plan consultation	Email 22 August 2013 17:46
• Action 14 CC Workshop 3 03 July 2013.pdf	Draft minutes of Workshop 3 - NERL traffic forecasts and assumptinos	Response to Issue 14. Minutes cover meetings for RP2 capex plan consultation	Email 22 August 2013 17:46
• Action 14 CC Workshop 3b 03 July 2013.pdf	Draft minutes of Workshop 3b - Oceanic business plan proposals	Response to Issue 14. Minutes cover meetings for RP2 capex plan consultation	Email 22 August 2013 17:46
• Action 14 CC Workshop 4 10JULY13.pdf	Draft minutes of Workshop 4 - capex proposals for RP2	Response to Issue 14. Minutes cover meetings for RP2 capex plan consultation	Email 22 August 2013 17:46
• Action 14 CC Meeting 2 23JULY13.pdf	Draft minutes of Meeting 2 of the Customer Consultation process for RP2	Response to Issue 14. Minutes cover meetings for RP2 capex plan consultation	Email 22 August 2013 17:46
• Action 14 CC extra sub group 05 August 13.pdf	Draft minutes of sub-group session discussing governance process for capital expenditure	Response to Issue 14. Minutes cover meetings for RP2 capex plan consultation	Email 22 August 2013 17:46
• Action 14 CC Workshop5 07Aug13.pdf	Draft minutes of Workshop on contingencies [note the document is incorrectly titled]	Response to Issue 14. Minutes cover meetings for RP2 capex plan consultation	Email 22 August 2013 17:46
• Action 14 record of SIP Multi-Lateral Reviews 2011-2013.pdf	Service & Investment Plan: Record of Multi-Lateral reviews	Response to Issue 14. Minutes cover meetings for SIP multilateral reviews 2011 to 2013	Email 22 August 2013 17:46
Action 16 - CP3 versus 2011 SIP.pdf	Response to Action 16: Evolution of CP3 Plan	Response to Issue 16. Contains explanation on BP10 plan, bridge between BP10 and SIP11, bridging 5 year plan to 4 year plan, explanation on the revised target for CP3 in SIP11, Revised inflation assumption used in SIP12, and further reductions	Email 22 August 2013 17:46
Action 18 - Inflation.pdf	Response to Action 18: Inflation Assumptions	Response to Issue 18. Contains CPI and RPI figures used for LTIP and RP2 consultation documents	Email 22 August 2013 17:46
Action 28 - explanation.pdf	NERL's explanation in response to Issue 28	*"We can share what we did with customers about the impacts of a variation in traffic on the RP2 plans. We can also share the comparisons we gave customers about forecast accuracy between ours and STATFOR's. However, airlines have not shared with us their forecasts so we cannot offer any comparison there.* *Arup could carry out this analysis themselves if airlines were willing to share these data with them (in practice, they often don't share because it is viewed as commercially sensitive i.e. a better forecast might allow them to beat their*	Email 22 August 2013 17:46

Action 28 - forecast comparison.pdf	NERL RP2 Customer Consultation	presentation on RP2 traffic forecast used in consultation workshop 3	Email 22 August 2013 17:46
Action 28 - impacts of variations on forecasts.pdf	Impact of High or Low Case traffic on NERL's RP2 Initial Business Plan	This document describes the way in which higher or lower than forecast traffic growth during the RP2 period could affect airline customers.	Email 22 August 2013 17:46
Action 34 - explanation.pdf	NERL's explanation in response to Issue 34	*"In 2012, in preparation for the RP2 consultation, NERL was requested by the CAA to assess the impact of a compound per annum reduction in DUR of -2%, -3.5% and -5% based on traffic at the start of RP1 and including restructuring costs.* *The pdfed slides relating to Action 34 were a presentation to the NERL board on why there is no plan 3, relating to the "-5%" scenario'."*	Email 22 August 2013 17:46
Action 34 - plan 3.pdf	Board Workshop Introduction	Presentation to NERL board on why there is no Plan 3, relating to the -5% DUR scenario	Email 22 August 2013 17:46
3Di and CO2.pdf	Relationship between CO2, 3Di and Fuel savings	This paper explains the basis upon which the annual cost saving estimates have been produced and, in particular, describes the relationship between these fuel saving estimates and the benefits from capital investments for RP2 which will be described at the capex workshop on 10th July and are provided in the RP2 Capital Investment Plan.	Uploaded to NATS sharefile 30 August 2013
17 and 29 - CP3 performance.pdf	SUMMARY OF PROGRAMMES AT EACH DATA POINT	Response to Issues 17 and 29. Spreadsheet printout. Contains evolution of CP3 planned spending at programme area level and project level from BP10 to SIP11, 12, 13 and BP13. Comment to	Uploaded to NATS sharefile 30 August 2013
Action 21 - Constructing and Reviewing the RP2 Capex Plan.pdf	Constructing and Reviewing the RP2 Capex Plan.	Response to Issue 21 List the Actions of the RP2 LTIP review meeting on the 18th October 2012; plus Gary Gibson's notes of the meeting circulated internally	Uploaded to NATS sharefile 30 August 2013
Action 21 Part 2 LTIP Review 23rd October v1.pdf	LTIP RP2 Portfolio - Proposed RP2 portfolio	Response to Issue 21 Slides used in the RP2 Project portfolio review meeting on 23 Oct, first review on RP2 LTIP focussing on creating the portfolio for RP2.	Uploaded to NATS sharefile 30 August 2013
Action 22 AHR - IDS Assets - NATS PRIVATE.xlsx; Action 22 AHR - NAS Assets - NATS PRIVATE.xlsx; Action 22 AHR - NERC Assets - NATS PRIVATE.xlsx	Asset Health Review registers for IDS, NAS and NERC assets	Response to Issue 22 Three examples of Asset Health Reviews	Uploaded to NATS sharefile 30 August 2013
Action 22 IDS Assets - Executive Summary Signed - NATS PRIVATE.pdf; Action 22 NAS Assets - Executive Summary Signed - NATS PRIVATE.pdf; Action 22 NERC Assets - Executive Summary Signed - NATS PRIVATE.pdf	Executive summaries for IDS, NAS and NERC asset groups	Response to Issue 22 Minutes of the asset health review meetings carried by May 2012. To be read in conjunction with the Asset Health Review excel files. Identify overall asset group RAG status and actions arising	Uploaded to NATS sharefile 30 August 2013
Action 23 CP3 Beneftis baseline.pdf	CP3 Benefit Baseline	Response to Issue 23 Printout of spreadsheet showing Fuel/CO2 and Safety baseline and actual benefits for a number of completed, ongoing and planned projects	Uploaded to NATS sharefile 30 August 2013
Action 23 RP2 SPR BEN and TIM.pdf	Strategic Programme Requirement	Response to Issue 23 Extract of Strategic programme requirements containing requirements, rationale, baseline, target and validations	Uploaded to NATS sharefile 30 August 2013
Safety Audit Action 24.pdf	RP2 Safety Audit Action	Response to Issue 24 Methodology of Safety index measurements, number of events and weighted SSE index (historical), assumptions for index projection,	Uploaded to NATS sharefile 30 August 2013
Action 27 Benefits Review - Mar13 to Aug13.pdf	Benefits Briefing - March to August 2013	Response to Issue 27 Contains the last six months of the monthly benefits dashboard which is presented to the LTIP management meeting. The slides measure how NERL are doing against CP3 commitments on the left and on the right, the timeliness of NERL's post implementation benefits reviews. Also included are lists of projects being delayed each month.	Uploaded to NATS sharefile 30 August 2013
Action 32 ITEC.pdf	#32 ITEC/PCUAS Risk	Response to Issue 32 Written explanation to the query "*What level of risk is assessed in relation to initial iTEC PUAS implementation? What contingency / fallback measures are in place? How will testing regime ensure all operational interfaces including with legacy*	Uploaded to NATS sharefile 30 August 2013
CP3 Capex Review - Actions 19 and 20 - completed.pdf	NERL RP2 Customer Consultation Capex Study Response to Actions 19 & 20	Response to Issues 19 and 20 Examples of the process documents underpinning the investment process. • SAP data extract • Board Paper setting out business case for projects, risk, benefits, cost forecast • Investment proposal incl. SPR	Uploaded to NATS sharefile 30 August 2013
Actions 17 and 29 - RP2 detail.pdf	RP2 Details	Response to Issues 17 and 29 Spreadsheet printout, showing RP2 Spend each year at programme area level and benefits at individual project level	Uploaded to NATS sharefile 30 August 2013
Action 39 - OA slides 29th.pdf	NERL RP2 Customer Consultation Capex Study benefits	Slide pack for Modelling / benefits meeting on 29 August	Uploaded to NATS sharefile 2 September 2013
Action 43 - NMS LTIP Approval Levels.pdf	LTIP Approval Levels	Document setting out NERL's various levels of approvals required for the LTIP	Uploaded to NATS sharefile 2 September 2013
[Hard copy]	Supply Chain Management (SCM) in NATS	Slide pack handed out in SCM meeting. Sets out SCM key capabilities, accreditations, processes, relationship management, governance and supplier performance management within NERL	Slide pack handed out in meeting with NATS, 29 Aug 2013
Action 31.pdf	Extracts from Technical Review Committee paper 10/12	Extracts from Technical Review Committee paper 10/12 explaining deployment strategies for iTEC and New Common Workstation	Uploaded to NATS sharefile 3 September 2013
CP3 Arup Capex Audit Q30 RAMP Risk.pdf	Question 30 - Can examples of RAMP risk plans be given for a selection of key projects (including iTEC, iFACTS, LAMP, Datalink)?	This report contains details of the top 3 risks for: 1. LAMP – in project definition stage 2. PCUA (Prestwick Upper Airspace including iTEC) – in project definition stage 3. Datalink – nearing completion of implementation, so most key risks have either	Uploaded to NATS sharefile 3 September 2013
Prog Process Docs	• NERL020120 Project Management Overview for LTIP projects • NERL020122 Cost Estimation of LTIP Projects • NERL020123 Project Start-up • NERL020124 Project Management Plan • NERL020124F5 Full Project Manager_s Report • NERL020124F10 Earned Value Management form • NERL020124F12 Light PMR Template • NERL020127G1 Detailed Risk Management Guidance • NERL020139 Communication Stakeholder Management for Projects • NERL020155 Impact of Change IOC Assessment • NERLS11CCB Management of NATS Configuration Control Boards	NERLS's internal process guidance docuements detailing various processes used for capex programme control management.	Uploaded to NATS sharefile 3 September 2013

Action 44 - NATS _Full_strategy_articulation_v16_PRINT.pdf	NATS. Together we create value through one end to end supply chain	High level description of NERL' supply chain strategy	Uploaded to NATS sharefile 6 September 2013
Action 44 - Supply Chain Processes.pdf	How we buy? (Buying Strategy); Supplier Relationship Management Model	Diagrams showing NERL' buying strategy and relationship management model	Uploaded to NATS sharefile 6 September 2013
Action 44 - FPRSA - SCM Strategy.pdf	Supply Chain Management L4790 – FPRSA Replacement	Supply chain strategy paper for the "L4790 – FPRSA Replacement" project	Uploaded to NATS sharefile 6 September 2013
Action 45 -Supply Chain Management Policy.pdf	Supply Chain Management Policy	Supply chain management policy paper	Uploaded to NATS sharefile 6 September 2013
Capex 50 - Safety Resilience Issue.pdf	RP2 Customer Consultation Workshop 1, Action 28: Provide further information about level of safety resilience in Plans 1 and Plans 2, which might include more values/indicators, depending on feasibility	Explanation of safety benefits projected for RP2 Plan 1 and Plan 2	Uploaded to NATS sharefile 17 September 2013
Capex 53 - Cost of SES Legislation.pdf	Capex Action 53	NERL's estimate of implementation costs for SES legislations	Uploaded to NATS sharefile 17 September 2013
Capex 56 - READ ME FIRST.pdf	NERL's explanation of information provided for Issue 56	*"For Capex action 56 we have provided NERL Critical Project Review (CPR) Process, CPR certificates and project rating information. I have provided information for NTCA as it is a key project for us and demonstrates part of our project governance in action.* *The projects that Arup mention in the action do not meet the criteria for CPR and did not have material variances in their date or costs. CPRs are applied to Projects with a value in excess of £5 million OR that have a "Contract with the Board" milestone*	Uploaded to NATS sharefile 17 September 2013
Capex 56 Critical Project Review Process.pdf	NMS: NATS Operations Critical Project Reviews	NERL's internal guidance note explaining the Critical Project Review (CPR) process	Uploaded to NATS sharefile 17 September 2013
Capex 56 - L4162 NTCA Project Rating overview Sheet 2012.pdf	Project Rating Trend for: L4162	Project rating history for NTCA project from Jan to Dec 2012	Uploaded to NATS sharefile 17 September 2013
Capex 56 - L4162 NTCA Sept 2012 CPR report.pdf	NATS Management System: NERL Project Status Report Form	Project status report form for NTCA programme (review date 1 Oct 2012) showing CPR rating re- and post-reivew	Uploaded to NATS sharefile 17 September 2013
Capex 56 - L4162 NTCA CPR report 130108.pdf	NATS Management System: NERL Project Status Report Form	Project status report form for NTCA programme (review date 30 Nov 2012) showing CPR rating re- and post-reivew	Uploaded to NATS sharefile 17 September 2013
Capex 56 L4162 NTCA Project Rating Sheet Jul 2012.pdf	PROJECT RATING PROCESS	Details of project rating for NTCA, for review period July 2012	Uploaded to NATS sharefile 17 September 2013
Capex 62 - NERL RP2 Customer Consultation_Mini Case_ITEC FDP ITEC NCW_Issue 1.pdf	NERL RP2 Customer Consultation - Interoperability Through European Collaboration (ITEC) Flight Data Processing system (FDP) and New Common Workstation (NCW).	Mini-case' for iTEC-FDP and NCW NERL shared with airline customers. Covers: • Context • Project objectives & description • Project timetable • Options analysis • Implementation & risks • Costs • Benefits	Uploaded to NATS sharefile 17 September 2013
Capex 62 - NERL RP2 Customer Consultation_Mini Case_LAMP_Issue 1.pdf	NERL RP2 Customer Consultation - London Airspace Management Programme (LAMP)	Mini-case' for LAMP shared with airline customers. Covers: • Context • Project objectives & description • Project timetable • Options analysis • Implementation & risks • Costs • Benefits	Uploaded to NATS sharefile 17 September 2013
Capex 62 - NERL RP2 Customer Consultation_Mini Case_NTCA_Issue 1.pdf	NERL RP2 Customer Consultation - Northern Terminal Control Area (NTCA) Airspace Development.	Mini-case' for NTCA shared with airline customers. Covers: • Context • Project objectives & description • Project timetable • Options analysis • Implementation & risks • Costs • Benefits	Uploaded to NATS sharefile 17 September 2013
Capex 64 - Sharing Lessons Learned.pdf	CAPEX 64 – Sharing Lessons from iFACTS and EFD with ITEC partners.	Examples of 'lessons learned' iFACTS and EFD and descriptions of how lessons learned have been applied	Uploaded to NATS sharefile 17 September 2013
Capex 65 - READ ME FIRST.pdf	Capex 65 – LCC	*We have reviewed the action 65 and believe we have provided examples of all the documents except a Through Life Cost Plan.* *We have provided two Life Cycle Cost documents (Our nearest equivalent). One for The new Oceanic system and one for the Rationalisation of DVORs. The selection of projects is one from CNS and once from Oceanic/SAATS SIP programmes.*	Uploaded to NATS sharefile 17 September 2013
Capex 65 - 4876 Coast OPEX forecast.pdf	Coast: implement the Nav Canada GAATS+ FDPReduce TADS from 3 to 1Share future enhancement costs with Nav Canada (same software / hardware baseline)	Analysis of lifecycle costs for "Coast: implement the Nav Canada GAATS+ FDP"	Uploaded to NATS sharefile 17 September 2013
Capex 65 OPEX Forecast LCC DVOR Rationalisation.pdf	Rationalisation of DVOR sites	Analysis of lifecycle costs for "Rationalisation of DVOR sites"	Uploaded to NATS sharefile 17 September 2013
Capex 55 - Project level data for CP3 with comments.pdf	SUMMARY OF PROGRAMMES AT EACH DATA POINT	Evolution of CP3 Capex plan - total CP3 planned spendning at project level with comments explaning changes at project level	Uploaded to NATS sharefile 17 September 2013
Capex 60 - READ ME Explanation of colour coding for storyboards.pdf	Capex 60 — Explanation of colour coding	Explanation of the colour coding used in the Gantt charts provided in "Capex 60 - full Storyboards for end CP3 and RP2.pdf"	Uploaded to NATS sharefile 17 September 2013
Capex 60 - full Storyboards for end CP3 and RP2.pdf	Gantt charts	Gantt chart of projects. 'Pre-2013' to 2019 and RP3	Uploaded to NATS sharefile 17 September 2013
Copy of CAA NERL capex-Arup queries log v.8_TH&GG.xlsx	NERL response to queries log v8	NERL further responses to items raised on Arup issues and queries log	Email Wed 18 Sept. 2013 12:38
IDS data request 23813.xlsx	IDS data request 23813.xlsx	NERL staff organisational data requested by IDS Thomson Reuters as part of their study in relation to staff opex costs within NERL business plan	Email Fri 20 Sept 2013 09:55
IDS pay and grading data request sheet 23813.xlsx	IDS pay and grading data request sheet 23813.xlsx	NERL staff pay and grading data requested by IDS Thomson Reuters.	Email from Adam Elston Fri 20 Sept 2013 09:55
[Hard copy]	Capital Expenditure - follow up to emerging findings report	Slide pack handed out at meeting with NERL in London on 25th September	Hard copy handed out on 25 Sept 2013
[Hard copy]	Service Quality - T1 Delay projection for RP2	Chart comparing projected traffic growth and associated T1 delay for RP2 with historical T1 delays associated with traffic levels comparable to those projected.	Hard copy handed out on 25 Sept 2013

Actions 46, 51, 68 and 70 - Summary benefits from SPoT - CO2 and Cost Efficiency.xlsx	Cost Efficiency (Plan 1&2), Fuel Savings Enabled (Plan 1), Fuel Savings Enabled (Plan 2)	Excel spreadsheet showing RP2 cost efficiency saving amounts from 19 x individual projects, and fuel savings amounts (KtCO2) resulting from 21 x individual projects in RP2 Plan 1, and 17 x individual projects in RP2 Plan 1	Uploaded to NATS sharefile 2 October 2013
Action 52 - Linking capacity and delay.pdf	Capital Expenditure Capacity & Delay	Presentation slides explaining capacity and delay modelling, with a worked example.	Uploaded to NATS sharefile 2 October 2013
Action 67 - SSE Indices.pdf	Capital Expenditure Measuring Safety	Presentation slides explaining the SSE safety measurement system.	Uploaded to NATS sharefile 2 October 2013
Action 72 - Project approvals through life.xlsx	Action 72 - Project approvals through life.xlsx	Spreadsheet setting out capex spend approval and release amounts through approval stages for four example projects (EFD, Datalink, NERC (N31), Dover Lydd airspace) including breakdown internal vs. external spend.	Uploaded to NATS sharefile 2 October 2013
Action 74 - NERL Investment Management Process - NERL020106.pdf	NERL Investment Management Process	Process document setting out NERL's investment management process including the assessment of business benefit and requirements for investment decisions.	Uploaded to NATS sharefile 2 October 2013
Action 75 - LMM Matrix Information Request.pdf	LMM Agenda Matrix	Matrix of projects subject to review for funding, change request or closure at the LMM meetings (examples provided from 12 March 2013, 8 April 2013, 10 May 2013, 7 June 2013, 5 July 2013, 12 Aug 2013)	Uploaded to NATS sharefile 2 October 2013
Action 76 - LMM Dashboard Information Request.pdf	LMM Dashboard Reports (March 2013 - August 2013)	Project dashboard reports presented at 6 x LMM meetings between March 2013 and August 2013, containing project-level updates on cost, schedule / milestones, risks and benefits delivery.	Uploaded to NATS sharefile 2 October 2013
Action 78 - Actions 17 and 29 in Excel Format.xlsx	RP2 Details (Excel format)	Response to Issues 17 and 29 Spreadsheet printout, showing RP2 Spend each year at programme area level and benefits at individual project level	Uploaded to NATS sharefile 2 October 2013
Action 79 - Action 55 in Excel Format.xlsx	SUMMARY OF PROGRAMMES AT EACH DATA POINT (Excel format)	Evolution of CP3 Capex plan - total CP3 planned spendning at project level with comments explaning changes at project level (in Excel format)	Uploaded to NATS sharefile 2 October 2013
Action 77 - Dependency Agreement Examples.pdf	Dependency Agreements (3 examples)	Three examples of dependency agreements between individual projects within the capex programme.	Uploaded to NATS sharefile 2 October 2013
Action 73.1 - NERL020127 - Project Threat and Opportunity Management (incorporates former NERL020129)[1].pdf	Project Threat and Opportunity Management (NERL020127)	Process guidance on the identification and management of opportunities and threats within projects, to maximise the benefit to cost ratio and minimise the impact of uncertainty.	Uploaded to NATS sharefile 7 October 2013
Action 73.1b - NERL020127G3 - Opportunity Management Tool Guidance[1].pdf	Opportunity Management Tool Guidance (NERL020127G3)	Process guidance on identification, recording and progressing opportunities through the RAMP tool.	Uploaded to NATS sharefile 7 October 2013
Action 73.2 - NERL020128 - Project Risk and Contingency Fund management[1].pdf	Project Risk and Contingency Funds Management (NERL020128)	Guidance on the procedure for management of project risk funds and contingency funds, to maintain sufficient fund levels to cover project risk exposure.	Uploaded to NATS sharefile 7 October 2013
Action 80-CP3 Evolution-annual spend-BP10-SIP13.xlsx	Action 80-CP3 Evolution-annual spend-BP10-SIP13.xlsx	Breakdown of CP3 capital expenditure programme by year and programme spend category underpinning projections within BP10, SIP 11, SIP 12 and SIP 13	Uploaded to NATS sharefile 7 October 2013
ACtion 81 4193_TPL_01_EFD_SCM_Strategy.pdf	Supply Chain Management Strategy: EFD	Supply Chain Management Strategy for the EFD programme.	Uploaded to NATS sharefile 7 October 2013
Action 81 Datalink SCM101_Supply_Chain_Management_Strategy[.pdf	Supply Chain Management Strategy: L4300 Datalink	Supply Chain Management Strategy for the project L4300 Datalink	Uploaded to NATS sharefile 7 October 2013
Action 82 - Impairment note from 2013 Statutory Accounts.pdf	Annual Report and Accounts 2013, NATS Holdings Limited	Note on capital impairment costs, derived from NATS Holdings Limited Annual Report and Accounts, p.126	Uploaded to NATS sharefile 7 October 2013
Actions 46, 51, 68 and 70 - Summary benefits from SPoT - All Benefits - with subprogrammes.xlsx	Actions 46, 51, 68 and 70 - Summary benefits from SPoT - All Benefits - with subprogrammes.xlsx	Excel spreadsheet showing RP2 benefits associated with individual projects including: - safety benefits from 5 x individual projects in Plan 1 / 4 x individual projects in Plan 2 - capacity benefits from 4 x individual projects (Plans 1 and 2) - cost efficiency saving amounts from 19 x individual projects (Plans 1 and 2) - fuel savings amounts (KtCO2) resulting from 21 x individual projects in RP2 Plan	Uploaded to NATS sharefile 7 October 2013
Action 53-regulatory compliance.docx	Capex Study Query 53 on regulatory compliance	NERL commentary on its compliance with series of regulations under SES legislation.	Uploaded to NATS sharefile 10 October 2013
Action 81 - datalink procurement strategy.pdf	Supply Chain Management Strategy for L4300 Datalink	Supply Chain Management Strategy for L4300 Datalink	Uploaded to NATS sharefile 10 October 2013
Action 81 - EFD procurement strategy.pdf	Supply Chain Management Strategy for EFD	Supply Chain Management Strategy for EFD	Uploaded to NATS sharefile 10 October 2013
Action 81 - EFD procurement strategy.pdf	Supply Chain Management Strategy for EFD	Supply Chain Management Strategy for EFD	Uploaded to NATS sharefile 10 October 2013
20131018 RP2 Revised Business Plan - updated for PRB targets 18 Oct - se....pdf	RP2 Revised Business Plan (2015-2019)	NERL RP2 Revised Business Plan (2015-2019) - released 18th October 2013 following customer consultation and PRB advice	Email Tue 22/10/2013 08:37
20131018 NATS RP2 Business Plan Appendices - updated for PRB targets 18 .pdf	RP2 Revised Business Plan Appendices	RP2 Revised Business Plan Appendices	Email Tue 22/10/2013 08:37
Action 79 update - CP3 Capex Review - CSSD analysis.pdf	Response to CSSD analysis in Draft Arup Report	Details of CP3 cost variances vs. baseline in Centre Systems Software Development programme area.	Email , Tue 29/10/2013 12:04

Appendix G – CP3 Centre Systems Software: – additional builds expenditure

NERL has provided details of the additional centre systems software development expenditure contained within its latest CP3 business plan compared to the baseline plan, which results from additional software builds. We reproduce the analysis provided below.

Builds

Being a large component of the delta, it is worth examining in more detail the reasons for the changes to the build programme.

The chart overleaf provides additional information with regard to the underlying reasons for increased expenditure within the NERC, NAS and NODE build programmes:

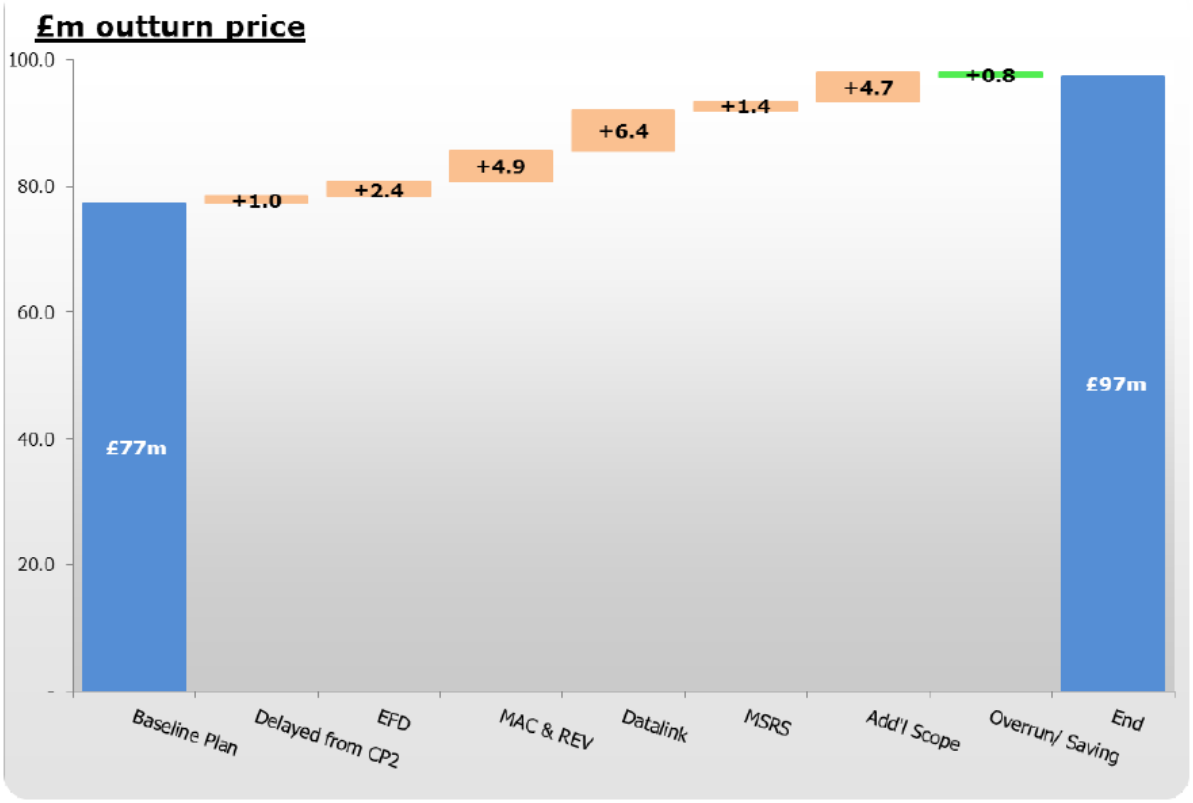


Figure 21: Centre Systems Software Development: drivers of additional spend for builds

This shows that the increase is driven by:

- £1m of delivery delayed from CP2 due to the extended build to deliver iFACTS this led to an almost identical amount of spend (£0.8m) being deferred across the build programmes
- £2.4m of additional spend to deliver the full EFD solution into service

- £4.9m of additional costs to develop and implement the OLDI message standard for MAC & REV
- £6.4m of additional costs to deliver Datalink into service relating to the re-work required due to incorrect specification of the message set in the European standard and the related costs for message set 2
- £1.4m to enable the transition away from MSRS as the primary archive for data recording
- There was also a further £4.7m of additional scope that primarily relates to items that were not expected to be required originally but subsequently had to be undertaken following the decision to extend the life of the legacy systems following the change of ITEC strategy