

Appendix H: Capital investment programme

This appendix details our capital investment proposals for NR23 and seeks to address the CAA's requests for information. It reflects consultation with customers and the CAA's independent reviewer, and builds on the detail already shared through the Service and Investment Plan (SIP) as well as Technical Customer Advisory Board (TCAB) consultations.

This description of the portfolio is structured in five main sections:

- › The rationale for the portfolio, including the key drivers and benefits, and a description of the impact of Covid-19 on our original investment plans
- › An overview of the portfolio, including the high level milestones, overall costs and key portfolio risks and dependencies
- › Our approach to benefits management with more detail on the key benefits
- › Information about each programme, complete with financial estimates, risks, dependencies and a summary of key benefits
- › A high-level financial summary of the portfolio including the impact on opex

Rationale for the portfolio

Our capital investment is defined by regulatory requirements, customer and service priorities, our long-term modernisation plans, agreed in previous reference periods, and feedback from the SIP consultations and the CAA's independent reviewer.

The investment is necessary to address various drivers and deliver benefits including to:

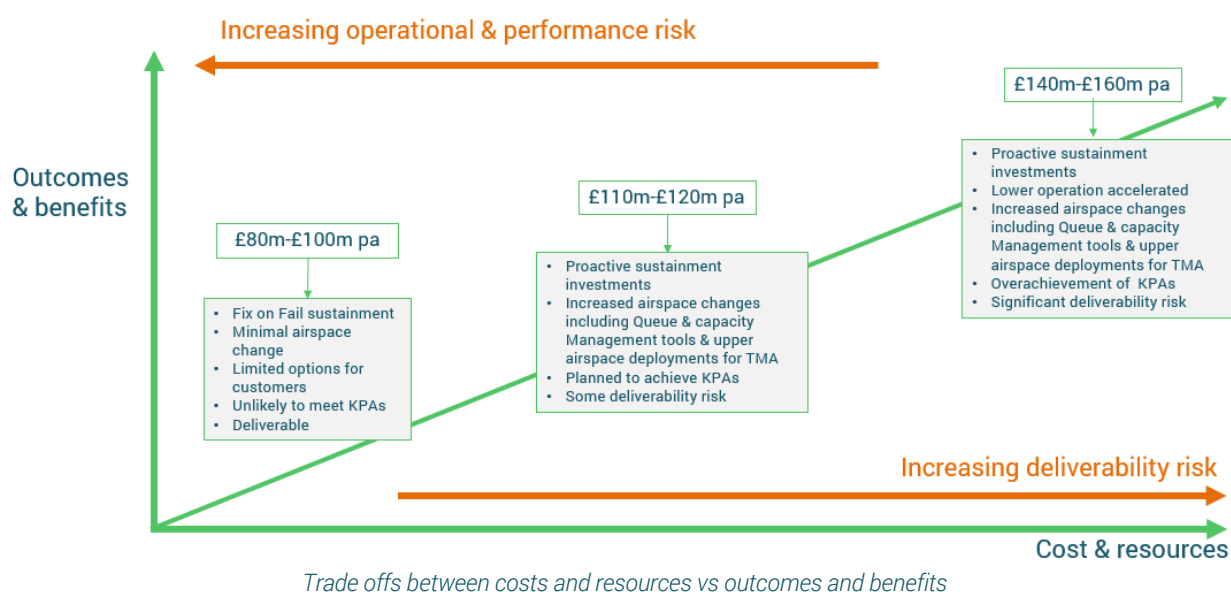
- › Maintain a safe, resilient, secure service and efficient operation
- › Deliver customers' priorities and be responsive to changes in them and/or the operating environment
- › Facilitate the recovery and subsequent growth of traffic
- › Deliver future efficiency in our operating costs
- › Contribute to aviation's net zero emissions targets
- › Deliver our licence and regulatory obligations
- › Continue to maintain close interoperability with other air navigation service providers (ANSPs) and contribute to overall network performance

In managing our investment, using industry recognised P30¹ principles, we have established, developed and maintained appropriate business controls that allow us to:

- Make effective decisions to align regulatory, customer and service requirements, prioritise benefits, manage risk and optimise resources to successfully deliver our objectives
- Identify and realise benefits, via programmes, to meet agreed business outcomes
- Successfully deliver project outputs that enable benefits within time, cost and quality

This investment plan consists of a number of underpinning programmes. There is a complex set of interdependencies between them including benefits, schedule, technology, costs and risks. We will report and monitor performance against the individual programmes but this investment portfolio, and its outcomes for customers, should be considered as a whole, balancing sustainment, replacement and airspace change. This overall plan supports the performance objectives set out in our NR23 plan and will be an enabler to continue improvements into NR28.

As a result of the necessary actions we took in response to Covid-19, we have scaled the investment portfolio for NR23 in line with our current overall capacity to deliver change. Our plan for NR23 includes a total investment of £574m (2020 CPI prices), which is around 20% lower than the original RP3 settlement. This results in a portfolio of £110-£120m per year (2020 prices), represented in the diagram below.



Around half of our planned investment in NR23 is directed to accelerate airspace modernisation, in collaboration with the Airspace Change Organising Group (ACOG) and airports, and to sustaining our current systems to provide the day to day performance customers expect in the short term as we recover from the pandemic and meet future traffic growth.

The remaining investment will complete the replacement of large parts of our ageing critical infrastructure with a modern, highly resilient and secure platform, providing the opportunity to evolve

¹ Portfolio, programme and project offices – the decision-enabling and support model for business change within an organisation.

new capabilities to manage the airspace more efficiently. Systems scheduled for replacement include Area Control's voice communication system, our flight data processor in lower airspace (NAS), radar display system (NODE) and our flight data processor in area control (NERC) which are essential for our operational service. This approach was approved during RP2 and will be continued through NR23.

The first phase of that transformation, our core DP En Route programme, is now 80% complete². The design, build and install stages are largely complete. The remaining transition activities include validation and testing, safety assurance, training controllers and engineers and final cutover. These are key to its successful deployment as in any safety critical 24/7 operation.

DP En Route will deliver new tools and, in conjunction with investment in airspace design, will be a key enabler for new airspace concepts that align with modern aircraft fleets to provide capacity, safety and service performance improvements. It also supports delivery of the European SESAR concepts that customers want to see. As our current technology reaches end of life, the risk of service disruption or cyber vulnerability increases. This programme, in conjunction with a further phase of investment in technology to deliver a Common Platform³ for our entire operation, enables us to maintain a highly resilient and reliable Air Traffic Control (ATC) service. Once complete and the existing systems decommissioned, we expect the new infrastructure to reduce our operating costs by £10m pa from mid NR28.

The high-level benefits and outcomes we intend to deliver to customers broadly align with passengers' views⁴. Passengers rank safety as the number one priority for ATC by a considerable margin. Investment in technology to sustain our current operational systems and to replace these systems is essential to this. The second and third-ranked priorities for passengers are the need to minimise environmental impact, and resilience and punctuality. Our contribution towards aviation net zero targets will be through new, efficient airspace designs, including Free Route Airspace, while investment to provide a resilient service will support airline schedules, improving the punctuality of departures and arrivals.

RP3 and NR23 compared to original RP3 plan

The original investment plan for NERL's RP3 portfolio was £769m (2020 prices excluding Military), broadly £150m-£160m pa over five years. This covered airspace re-design, legacy system sustainment and replacement, new support tools and system enhancement. It included the continuation of our Deploying SESAR strategy that began early in RP2 to replace almost all of our critical technical architecture.

We took decisive action during 2020-21 to mitigate the impact of Covid-19 and undertook regular engagement with our customers. We changed our original investment plans and reduced our costs in RP3 to ensure we remained financeable, not only to reduce cost pressure on our customers but also to ensure we could meet our licence requirements to deliver a day to day service. The actions taken (pause investment, release of 149 contractors and voluntary redundancy of 200 technical employees,

² By percentage of expected expenditure to date.

³ The Common Platform means the deployment of our target collaboration common version of the current iTEC across our upper and lower airspace on one architecture. This incorporates activity previously planned as 'DP Lower' in the RP3 rBP and has continued in RP3 under the iTEC collaboration programme. This programme will leverage the modernised architecture and technologies already delivered, and planned for, by the DP En Route programme.

⁴ Passenger research for price control reset. Final Report – Blue Marble Research – dated December 2021.

move to 'fix on fail' for sustainment) has resulted in an overall reduction in capex by comparison with the original plan of around £230m (2020 prices) by the end of 2022 (£519m - £290m).

CY, 2020 prices, £m	2020	2021	2022	2023	2024	2025	2026	2027	20-22	20-24	20-27
									Total	Total	Total
NR23 plan	78	92	120	122	116	116	110	110	290	528	864
RP3 plan	209	185	125	109	142				519	769	

Comparison of NR23 projections vs RP3 plan projections

As a result of the actions to scale our business we now have a proposed plan in the region of £120m pa of capex for NR23 compared to £150m-£160m pa originally expected for RP3. The total cost for RP3 (2020-24) was planned at £769m; the anticipated total cost for RP3 and NR23 (2020-27) is expected to be in the region of £864m.

DP En Route & Voice

DP En Route is now projected to be completed in 2024-25 while transition to the Common Platform (upper and lower airspace) will be completed in mid-NR28. This resulted in a capex reduction of £49m between 2020-22 and an overall increase of £23m between 2020-27 compared to the original plan. However, we are still assessing the final Common Platform solution to identify any alternative approaches that might be more efficient and these will be consulted on through the TCAB and SIP.

CY, 2020 prices, £m	2020	2021	2022	2023	2024	2025	2026	2027	20-22	20-24	20-27
									Total	Total	Total
DP En Route & Voice	54	56	58	26	10	1			168	204	205
Common platform	2	6	4	18	17	29	23	34	12	47	133
NR23 plan	56	62	62	44	27	30	23	34	180	251	338
RP3 plan	124	89	16	19	67				229	315	

Comparison of NR23 projections vs RP3 plan projections for DP En Route & Voice

Sustainment & surveillance

The change in sustainment investment reflects the need to reinforce our current systems for longer. This is a result of the investment pause and a smaller investment plan that increased the transition period onto the Common Platform. We originally planned to invest £91m in sustaining our technical service systems in 2020-22 and as a result of the short-term 'fix on fail' methodology introduced in response to Covid, we will now invest £57m in the same period of RP3 to maintain a safe, resilient service. This results in an increase in sustainment costs for the first two years of NR23. However, sustainment investment in NR23 is still less than originally planned for the same period of RP3.

CY, 2020 prices, £m	2020	2021	2022	2023	2024	2025	2026	2027	20-22	20-24	20-27
									Total	Total	Total
NR23 plan	10	15	32	36	45	43	43	40	58	138	264
RP3 plan	27	28	36	33	27				91	151	

Comparison of NR23 projections vs RP3 plan projections for sustainment & surveillance

We take a risk-based approach to sustainment; the replanning of our transformation changed our risk profile which had to be reflected in our investment plans for current systems. This resulted in a requirement for £206m during NR23 (2020 prices) and £264m from 2020-27 (noting that this figure also includes 'hard' FM activity that was to be delivered separately in the RP3 rBP of £28m). During the

SIP and TCAB we will continue to set out the details of long and short term sustainment activities for consultation. It should be noted that approximately £35m of this expenditure includes the commencement of a complete renewal of our surveillance service as our current assets reach their end of life.

Airspace & operational service enhancements

We planned to invest £161m in airspace change in RP3 across two separate programmes. Airspace aimed to deliver the major structural changes to airspace infrastructure; Domestic En Route aimed to provide mitigation for identified 'hotspots' in the network. As a result of Covid, we consulted on the highest priority airspace changes for customers from both programmes and agreed to invest £33m in the three years 2020-22 (we will invest £32m). This is a reduction of £80m compared to the original plan for the same period. We have continued to take close account of customer priorities and total expenditure over 2020-27 will be £115m (2020 prices) which will be £46m less than the original RP3 plan. Our latest plan reflects the pace of delivery that can be achieved with a smaller overall change capacity and ensures alignment with ACOG, airports and other major stakeholders who have similar change constraints.

CY, 2020 prices, £m	2020	2021	2022	2023	2024	2025	2026	2027	20-22	20-24	20-27
									Total	Total	Total
NR23 plan	6	11	15	21	22	18	14	8	32	75	115
RP3 plan	28	43	41	30	19				112	161	

Comparison of NR23 projections vs RP3 plan projections for airspace & operational service enhancements

Our planning approach

Prior to RP3, we created detailed plans for each five-year regulatory period, based on bottom-up estimates for technology replacement and airspace change. This constrained our flexibility to respond to changing market, technology and delivery dynamics and did not provide the level of flexibility required to deliver effective transformation.

We subsequently adopted a portfolio planning process in line with industry best practice⁵ that enables us to generate options on which we consult with customers. Portfolio management aims to ensure:

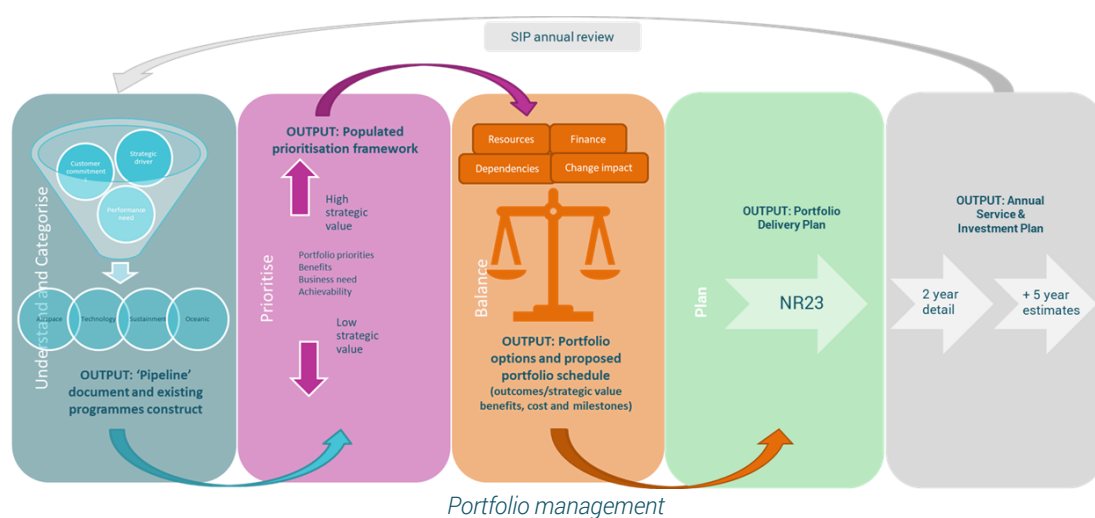
- › Optimum allocation of resources
- › Desired contribution to strategic objectives
- › Effective and cost-efficient delivery
- › Delivery of benefits

Our plan is based on customer engagement. It sets out the overall technology strategy for the next regulatory period (or a longer timescale where necessary). It is more detailed for the first two years, during which time programmes and projects deliver specific outputs or outcomes, either ending on

⁵ Infrastructure and Projects Authority; Management of Portfolios.

completion or rolling forward. We use best practice methodologies (such as 'managing successful programmes') which contain broadly sequential activities to help their successful delivery.

Thereafter, portfolio management allows for greater flexibility in scale and pace. There is no defined start, middle or end. It uses an iterative cycle of activities (see below) which enables us to consider the full range of strategic drivers, customer priorities and our current portfolio structure in order to conduct analysis and categorisation. Prioritisation is considered against benefits, resource availability and affordability, the extent of dependency on other areas of industry, our suppliers capacity, and our capacity to manage the rate and scale of change into the operation. We have used this approach to create our proposed plan and the process will be used on an annual basis to enable an effective review with customers throughout NR23 and into NR28.



We have continued to develop our engagement with customers in the last regulatory period and they have expressed support for greater agility and responsiveness in our approach. While we acknowledge this is still maturing, we will continue to consult with customers annually, using our portfolio management process, through the SIP (which incorporates the Technical Customer Advisory Board⁶) to enable us to roll the plan forward every year for two years in detail with a view of a further five years as 'building blocks' for investment.

This would bring customers closer to the decision-making process throughout the regulatory period; help to prepare future consultation for each regulatory period, ie SIP26 (at the end of 2025) should set out 2026-27 in detail and 2028-32 (NR28) in overview; and reduce the burden of consultation at NR28 for customers, CAA and NERL. It will enable us to:

- › Ensure flexibility in our delivery, to enable us to scale up and down according to air traffic, affordability, financeability and stakeholder priorities
- › Ensure we use portfolio management principles to continually review plans and offer options to customers

⁶ The Technical Customer Advisory Board is designed to support 'early in the lifecycle' options development jointly with our customers, allowing greater time for consultation between subject matter experts from within NERL and our customers.

- › Maintain our intent for the SESAR deployment (common platform, legacy escape, new operating capabilities and airspace change) which remains valid, noting we anticipate the benefits, pace, scale, scope and risk may need to adjust to reflect the evolving market and economic recovery

An illustration of the approach is shown below:



This is in line with our benefits-led approach as it enables us to engage regularly with our customers, review the priorities within the portfolio and make adjustments where needed. We can proactively trade investment, benefits and resources between projects and programmes to ensure the right outcomes for our customers.

As well as providing a more flexible, dynamic governance to respond to new or evolving customer priorities, our recommended portfolio approach will also enable us to model impact on the interdependencies between our various programmes within the portfolio and overall outcomes. This will enhance effective decision-making as an industry.

Portfolio overview

Benefits

We aim to measure the impact of our investment through six benefits areas:

- › **Safety:** Maintain or improve historical levels of safety performance by reducing percentage workload, thereby ensuring that the number of serious or risk bearing incidents per flight does not increase and where possible decreases (quantified as a percentage reduction in risk analysis tool (RAT) points per 100,000 air traffic movements)
- › **Service:** Delivery through enabled capacity improvements aligned to percentage monitor value (MV) improvements leading to improved service performance, quantified by the number of seconds saved per flight that will be enabled by the investment. This is linked to the C2 service measure
- › **Environment:** This is linked to target reductions in the 3Di service measure, and to airspace modernisation and NATS' commitment to climate change targets. The benefit measurement is kilo-tonnes of CO₂ reductions enabled

- Technical resilience:** We use this proxy measure to ensure we can maintain service performance. We are evolving this to align to a more industry-standard measure based around tolerance levels. The detail of this measure is set out within the Sustainment & Surveillance programme overview and is currently measured through net weighted value of risk
- Cost efficiency:** The impact of our investment plan on overall Technical Services operating costs is set out in later in this document and in detail at Annex A. Quantified as our ability to minimise medium term costs and drive long-term efficiency in our operation
- Legislative compliance:** We are required to demonstrate we are meeting our licence obligations, statutory requirements or UK legislation arising from the EU SES (but recently transposed into UK law). Following the UK's departure from the EU, there remains considerable uncertainty as to which further aspects of EU Law will continue to be applicable in the UK. We continue to track developing regulations and their potential impact on the portfolio . The contribution of deliverables towards meeting compliance is set out in the table of deliverables at Annex B

The anticipated overall portfolio base value of benefit delivered to customers for the key safety, service and environment measures is set out in the table below⁷. In line with portfolio management principles this provides our current initial assessment of the contributions that our investment will make towards our performance in NR23 and will be refined as programmes and projects are defined during the period.

We will consult with customers annually at each SIP to confirm the value of each significant investment in the plan. While the benefits noted in the table below will be realised largely through the Airspace programme, they also depend on other investment commitments, primarily sustainment and DP En Route & Voice. We expect to leverage the additional enabled capabilities through our modernised infrastructure which will be delivered in NR23 and further developed in NR28 with the transition of our operation onto a Common Platform.

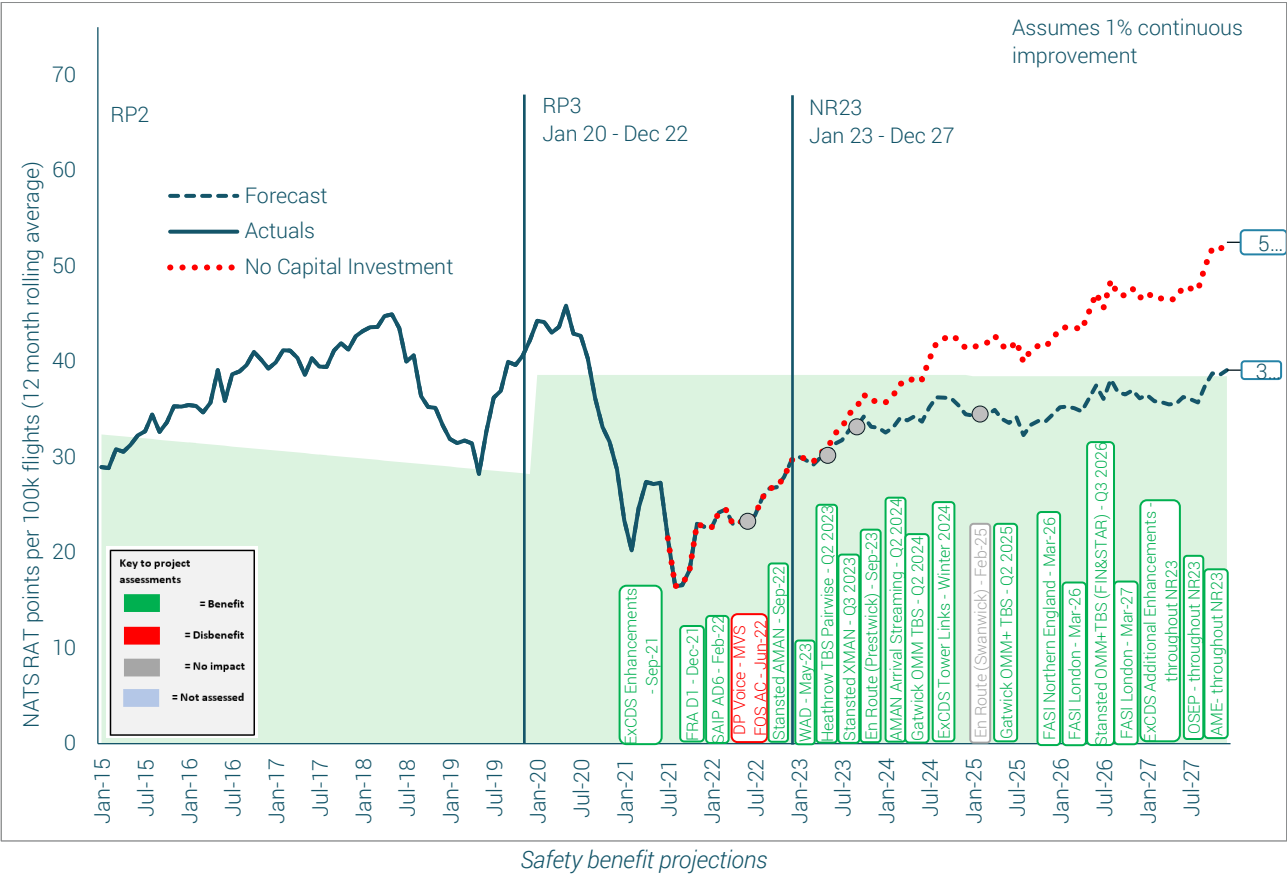
	2023	2024	2025 - 27	Overall contribution
Safety (RAT) % reduction / 100k movements	3 - 6%	10 - 12%	6-12%	18-27%
Service impact C2 (seconds per flight)	0	0	0.7-1.2	0.7-1.2
3Di (score)	0-0.3	0.9-1.5	1.1-1.5	2-3.3

Service performance benefits

To help illustrate the table above, the example below provides an assessment of the impact of changes to the investment plan on our forecast safety performance. This is compared to a hypothetical 'no investment' line which shows the impact to our safety performance if we did not invest in change (the 'no investment' line assumes our current resilient service is always available). It also includes the benefit from continuous improvement within the operation to meet our performance objective⁸.

⁷ All benefit information has been developed from the STATFOR October 2021 'Base' case.

⁸ Our internal safety performance has yet to be finally agreed upon by our Safety Review Committee.



The interrelated nature of investment across the portfolio is clear. While the changes above appear have discrete deliverables, they depend on associated investment in our technical infrastructure. Further detail is provided in the relevant programme overviews described later in this document.

Portfolio structure

Our proposed baseline investment plan of £574m (2020 prices) will deliver the optimum mix of benefits for our customers. The figures presented align with our consultation with some minor adjustments to reflect current planning.

An illustration of the proposed investment areas and costs for NR23 is shown below. The following table breaks this down further by showing indicative investment across each of the five years⁹.

⁹ All costs are shown to zero place (ie whole integers).

CY, 2020 CPI prices, £m	2023	2024	2025	2026	2027	NR23
	<i>Plan</i>	<i>Plan</i>	<i>Plan</i>	<i>Plan</i>	<i>Plan</i>	<i>Total</i>
Airspace and operational enhancements	21	22	18	14	8	83
DP En Route and Voice	26	10	1	0	0	38
Sustainment and surveillance	36	45	43	43	40	206
Common platform	18	17	29	23	34	120
Business resilience (information solutions)	9	8	7	5	7	36
Business resilience (property and facilities)	7	3	2	2	2	18
Oceanic	6	7	6	3	1	23
ATC training	0	2	2	2	0	7
Risk & contingency	0	0	9	18	18	44
Total	122	116	116	110	110	574

NR23 capital investment projections

We have used a combination of mid-point estimates incorporating ranges (particularly from 2024 onwards) as our best projections of benefits and costs until the 'identify' and 'define' phases of a programme are completed.¹⁰ As these costs are matured they will be presented for further scrutiny through the SIP process. The cost excludes risk allowance and incorporates our best estimate of variation in direct/ indirect costs. We have also included a risk and contingency allowance of £44m (2020 prices). At less than 8% this level of contingency is low compared to standard practice in industry but takes into account the mix of investment we are undertaking in sustainment (known technologies) and in modern technology where there is less certainty¹¹.

In addition to continuing to maintain our current services in line with the KPAs, we expect our investment to deliver the following major enhancements:

- › Free Route Airspace including cross-border Free Route Airspace: 2023 and 2025 onwards
- › Significant Queue & Capacity Management enhancements: 2023 through 2025
- › FASI Network changes: 2023 and 2025 onwards
- › DP En Route: Prestwick Upper Airspace 2023
- › DP En Route: Area Control Upper Airspace 2024 – early 2025

Dependencies

The interdependencies within the portfolio help to achieve the right balance of resilience and benefits. For example, investment in airspace change must first prioritise the need to ensure safety and resilience, and also depends on enabling technologies delivered through the sustainment and surveillance programme. This means that the hierarchy of priorities for investment is:

¹⁰ The programme brief within the 'Identify' phase provides the formal basis for assessing whether the proposed programme is viable and achievable. It aims to avoid overly detailed cost analysis, investment appraisals at this stage. If approved, the programme moves into its 'define' phase which confirms the suitability of the programme and is where detailed planning for the programme is undertaken (MSP (Axelos Global Best Practice)). Similar phases are conducted within each of our projects to confirm viability of estimated costs and benefits.

¹¹ While there is no standardised percentage to set a level of contingency there is standardised guidance issued by HM Treasury and other studies that we have drawn upon in considering the requirement for contingency within our cost estimation.

- › Investment in sustaining our current systems required for a safe and resilient service
- › Investment in new technology to enable retirement of aged assets with modern systems
- › Investment in airspace change

These significant dependencies are illustrated on the following page.

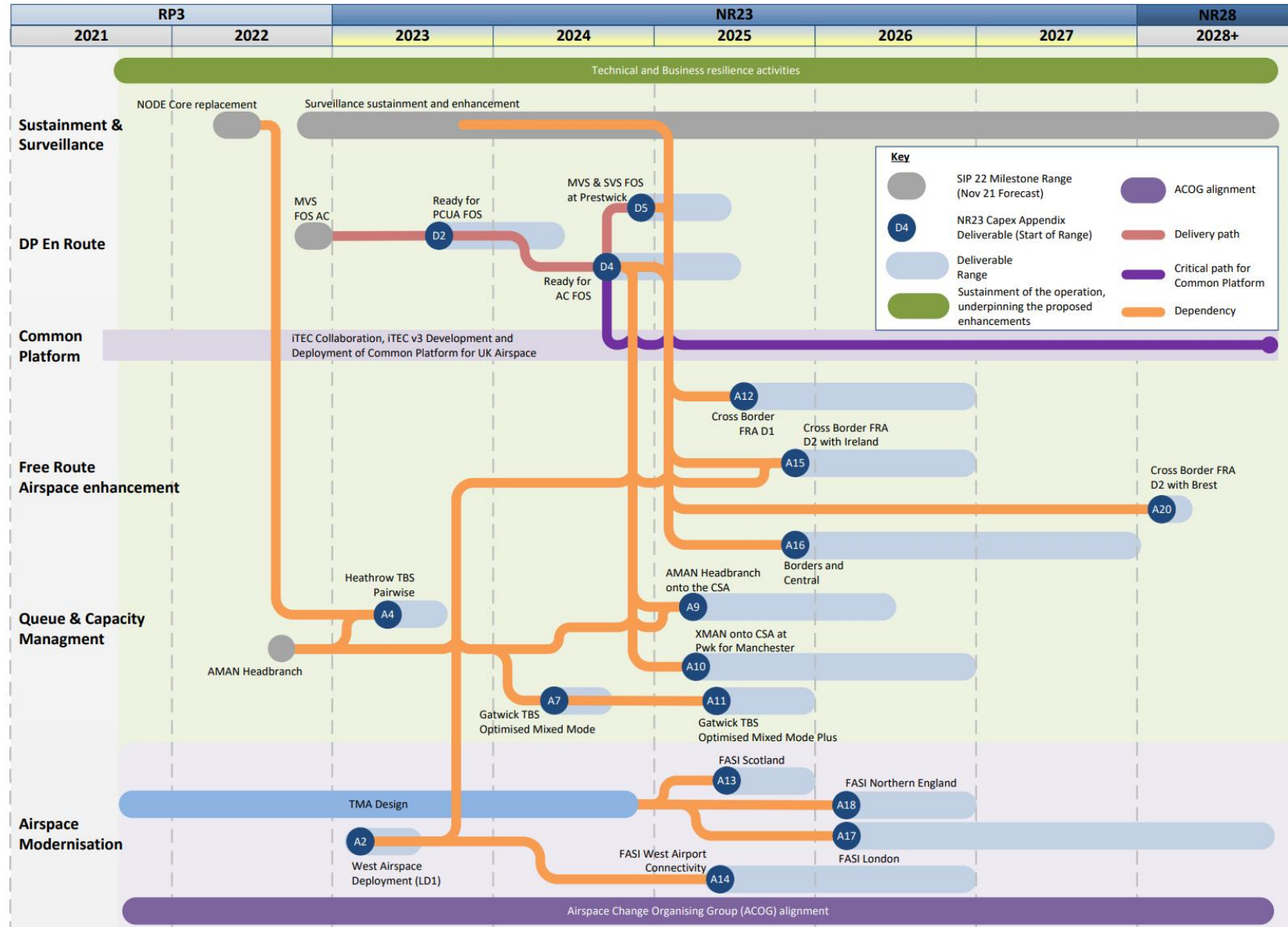
The importance of sustainment

The 20% reduction in the overall cost of the portfolio in comparison to the original RP3 plan and the need to invest in sustainment means the relative investment in sustainment is higher in NR23 (£206m, 2020 CPI prices) than RP2 (£99m, 2020 CPI prices) and subsequently in RP3 (£58m, 2020 CPI prices).

We use a risk-based approach to ensure our sustainment spend is appropriate to provide a safe, resilient service, meet our licence obligations and enable airspace change ¹². Expenditure on sustainment and surveillance in RP2 was below trend as, based on the information and understanding we had at the time, we anticipated deploying DP En Route & Voice early in RP3. As a result, we took the decision to maximise the economic life of our assets in RP2 to reduce overall costs to customers.

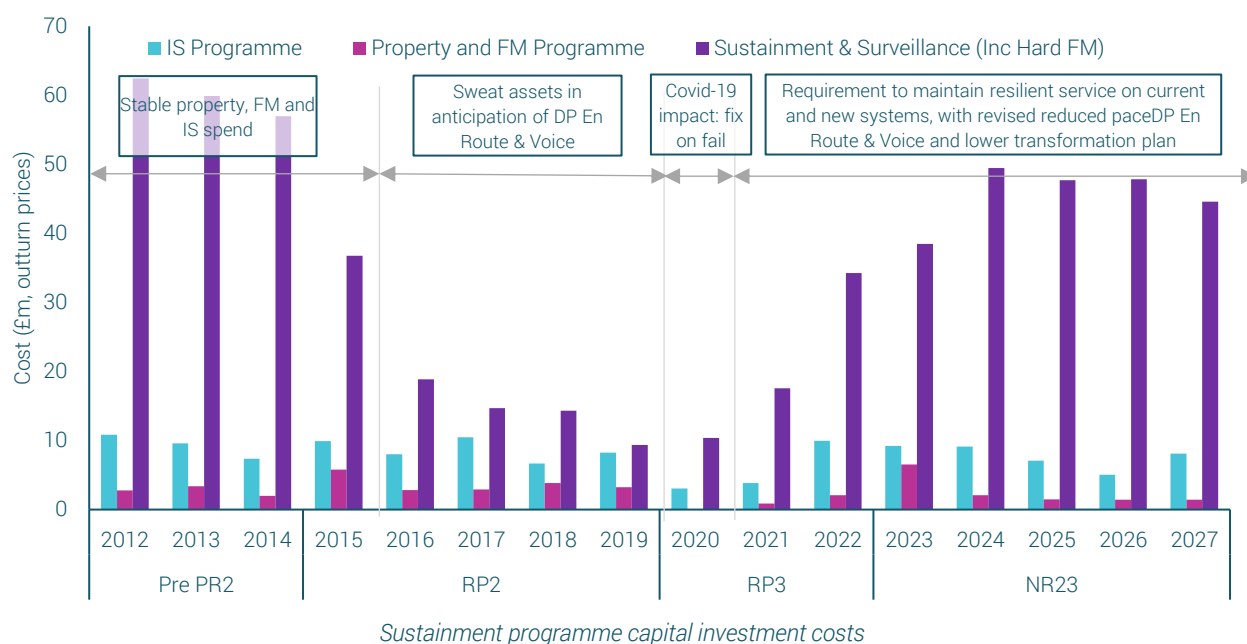
The impact of Covid-19, and actions we took to protect staff and limit expenditure to 'fix on fail' on our current systems resulted in a continued low-spend profile during 2020- 2021. Lowering our costs reduced our ongoing change capacity across the portfolio; as a result, our 155 current operational systems' anticipated 'retirement' plans will be extended with a corresponding change to the investment profile to maintain safety and performance. Many of our current operational assets are reaching the end of their expected life with little scope to extend any further. An asset lifecycle analysis conducted as we entered RP3 in 2020 identified 89 systems predicted to reach the end of their useful life by the end of 2023 without continued investment. Investment in sustainment and in our future technology platform (DP En Route) will address this and also ensures that supporting operating costs are managed and we do not develop a backlog of technical investment into NR28 and beyond.

¹² We manage our infrastructure and services utilising service performance and risk management based on ITIL best practice and in line with ISO55001.



NR23 capital investment critical path and dependencies

The chart below shows the necessary level of investment in sustainment in 2022 and thereafter from 2023. Maintaining expenditure at low levels similar to 2020/ 2021 is not practical or recommended if we are to maintain expected service levels. For a period in NR23 we will be maintaining both the new and existing systems as the new DP En Route & Voice platform enters service. However, the deployment of DP En Route & Voice will eventually enable reduced investment on 33 of our current assets after 2024. We will seek to leverage the investment to date and transition aspects of our current systems onto our new core strategic architecture. However, the reduction of ongoing investment in the remaining systems will only be realised with the implementation of the common platform in NR28. Expenditure on sustainment also includes significant investment towards the replacement of our surveillance service. The last major investment in surveillance took eight years and was completed in 2012¹³. We have engaged customers closely on the options available for a replacement surveillance service through the TCAB. This investment in surveillance is also reflected in the chart below.



We have conducted benchmarking to assess the validity of our investment plan. We plan to invest in our asset base (calculated as an investment level against the total replacement value of technical assets) at the rate of 4.7% pa. A comparative figure from an equivalent ANSP shows they plan to invest at an equivalent rate of 6.5% pa. Comparative figures in this industry are limited albeit the latest ATM Cost Effectiveness (ACE) report¹⁴ illustrates the continuing relative cost-effectiveness of our services against the 'big five' ANSPs.

The chart also includes a view of comparative expenditure on Information Services (IS) and Property & Facilities Management services. Continued investment in these services is essential to provide the secure basis for our services to operate effectively and the extent of investment (except for the investment pause in 2020) remains broadly consistent with previous periods. Benchmarking has been conducted in each area to confirm the relative cost-effectiveness of investment in IS and FM services and these are discussed in more detail in their respective programme overviews. However, in broad

¹³ The impact of the Covid-19 pandemic required us to cancel planned mid-life upgrades and switched to a fix-on-fail methodology. This increases the imperative for replacement of our surveillance service.

¹⁴ ATM Cost-Effectiveness (ACE) 2019 Benchmarking Report with Special Focus on COVID-19 Impacts in 2020 (May 2021).

terms, in RP2 we invested £46m and £21m on IS and FM; in NR23 we expect to invest £36m and £18m respectively (all 2020 prices).

Programme Areas

Sustainment & surveillance

As NERL is part of the UK's critical national infrastructure, it is essential that we have an appropriate and robust maintenance strategy in specialist technologies. To that end, we adopt a risk-based approach rather than a schedule-based approach, as the consequences of a failure would far outweigh the cost of the equipment. We use this knowledge to ensure the right balance for cost and complexity of maintenance in the plan. The table below shows the structure of our planned investment.

Deliverables	Outcomes
NODE core	NODE is going to be deployed into Swanwick TC in RP3, and there is an option to deploy this enhanced functionality into Prestwick & Western Radar as part of the sustainment programme in NR23. The need for this additional option will be confirmed when work concludes to determine the right deployment approach for the next stages of delivering a common platform
Core Infrastructure	Delivers updates and ensures the connectivity between sites and users is maintained through investment when networks elements are unsupported or ceased.
EFD	Frequentis flight strip product used in Prestwick lower airspace and the Manchester TMA. EFD, went live in 2011-12 and uses dated hardware which will be retired when the lower operation is modernised through our common platform. The system will require some sustainment and component refresh to ensure it continues to be fit for purpose.
NAS	The main FDP system for Scottish lower and all of the London FIR. It also drives the large UK airports' electronic flight progress systems. It runs on a mainframe computer and is mature software. It is subject to a significant investment as noted within the Common Platform programme in order to maintain a resilient lower operation in advance of transition to the Common Platform in NR28.
Cyber security	The risk in this area is significant and rising, and operating system upgrades, firewall enhancements/replacements and improvements to the security architecture of the current and future platforms are required.
Minor sustainment	To avoid safety and/or delay impacts, minor sustainment activities are required across the current operational estate of approximately 155 systems to manage them to end of life; typically this is to support reactive 'fix on fail' sustainment. This will maintain resilience in respective systems. Within NR23 there will also be some requirement for hardware refresh to the DP En Route & Voice platform that is currently being delivered (based on an average life of seven years for IT equipment).
AIRAC changes	This investment covers change that we are obliged to make to match changes by adjacent ANSPs, the MOD or required by regulation, and minor changes to airspace that we choose to make to drive efficiency and safety in our operation
Information systems	Ensures the services are maintained in accordance with licence obligations (for ATM and specified AIS services and that updates and supportability are delivered to maintain service levels). Failure to invest risks a failure to deliver these specified services to customers and wider aviation.
Communications Radio sustainment	The UHF and VHF radios used to support civil and military operations are reaching end of life in 2024, therefore investment is required to refresh these facilities to sustain safe operations throughout NR23.
Navigation:	We continue to work closely with the CAA to remove NERL dependencies on DVORs as we move to performance based navigation. Removal of the DVORs (which will save opex and further capex for sustainment) requires airspace change consultation and the programme will complete within NR23.

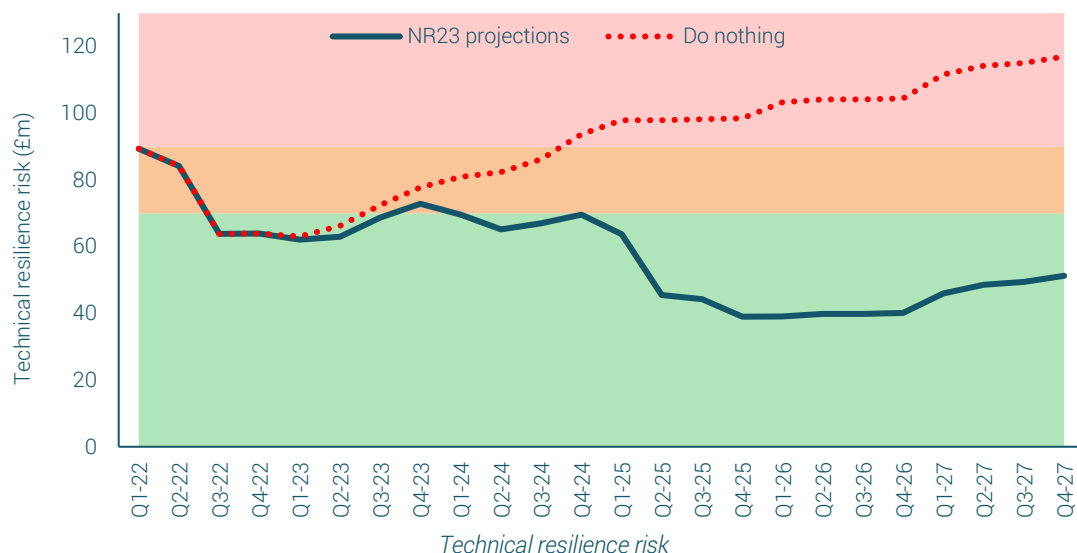
Surveillance development	The 23 primary and secondary radars (PSR and SSR) in the field were fitted between 2007 and 2013 with a 15-year design life. This life was extended to 2027 for all sites in RP2 through a mid-life upgrade programme, and funding is required to sustain the current fleet and begin to replace it. We are assessing the scale of our future requirement and the technologies available, but we expect this programme will be a significant component of the plan in NR28. The most significant future surveillance technology to date is ADS-B. We expect the requirement for PSR to remain into NR23 and beyond, as there is no realistic alternative for the provision of non-cooperative surveillance. We will work to support the requirements to enable UTM flight safely into airspace and improve resilience and capability for our surveillance infrastructure. We will continue to consult and engage with our customers on the most appropriate options as technology matures.
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Sustainment and surveillance investment

Benefits

The principal benefit is the reduction in technical resilience risk to the operation to deliver a highly resilient operation and enable airspace change in advance of the deployment of our modernised technology. Our current infrastructure is heading towards end of life with limited access to the necessary skills to support it. We currently use technical resilience risk (measured as net weighted value of risk) as a proxy measure to ensure we are targeting investment in line with our risk-based approach to sustainment. We always seek to manage a tolerable level of risk to sustain a safe and resilient service which is capable of meeting customer priorities and KPAs. The bands used are:

- › Red > £90m NWV
- › Amber > = £70m NWV
- › Green < £70m NWV



Our plan shows the impact of the delivery of replacement voice services at the end of RP3 and our intent to remain at a tolerable level of risk throughout the investment period as we deploy new technologies.

Other benefits delivered through the sustainment & surveillance programme include ensuring compliance with our legal obligations, contributing to the management of safety performance, contributing to the net zero initiative and cost efficiency.

The following provides a current example, in contributing to safety performance, during 2021 there were 23 Mandatory Occurrence Report (MORs) of danger area infringements. This instigated a technical review into the options to reduce the risk. The current programme has responded rapidly and subsequently approved changes to be incorporated into the February 2022 AIRAC change. This will enhance the visualisation of danger areas to Swanwick En-route ATC which will reduce the overall risk.

As an additional example in contributing to the net zero initiative and cost efficiency, in 2021 a six month energy review post-implementation of an updated replacement of the switchgear and Air Handling Unit (AHU) at the Great Dun Fell (GDF) Radar site was conducted. The GDF site is now consuming approximately 60% less of the electricity in comparison to the same period in 2020; this equates to 206 tonnes of CO2 reduction. We anticipate OPEX savings of around £100k per year, resulting in a payback period of under 2.5 years

Costs

CY, 2020 CPI prices, £m	2023	2024	2025	2026	2027	NR23
	<i>Plan</i>	<i>Plan</i>	<i>Plan</i>	<i>Plan</i>	<i>Plan</i>	<i>Total</i>
Platform (cyber, AIRACs, annual sustainment)	8	9	8	8	8	42
FM (centres infrastructure) and sims sustainment	5	7	7	9	8	37
FM (remote sites infrastructure)	6	4	7	5	5	27
Communications	0	6	5	6	7	23
Surveillance	2	7	7	8	6	30
Cross functional (eg networks) and info management	10	6	3	6	4	29
Flight (controller applications)	3	7	5	2	2	19
Total	36	45	43	43	40	206

Sustainment and surveillance investment

Risks

- › Third party delays (including delays at borders following UK exit from the EU) may impact the delivery of equipment and key programme milestones – we have enhanced supplier relationships, performance measurement and management of our most important suppliers in line with ISO 44001
- › Covid -19 impacts (eg site access and social distancing measures) may result in additional cost and schedule delays – we have essential measures in place to protect the safety of our operations, using these measures to minimise access restrictions and mitigating impact
- › The evolving and unknown nature of future cyber threats – we mitigate this risk through investment in systems, training and evaluation of our staff and maintaining close links with the National Cyber Security Centre
- › Unforeseen critical asset failure requiring an immediate fix which is outside current programme planned activities – we seek to mitigate this wherever possible through careful asset management programmes, routine monitoring and maintenance of systems and networks

DP En Route & Voice

The DP En Route & Voice programme began in RP2 in response to the need to replace infrastructure, and for new technology to meet the needs of customers and wider industry stakeholders. This will improve resilience by replacing ageing systems, improve safety by introducing new capabilities that reduce controller workload and, ultimately, enable us to leverage cost efficiencies.

The programme is 80% complete¹⁵, and has already delivered two new data centres to host our systems and services (2019); a highly resilient, high speed, dual fibre optic network connecting the data centres to our operational centres (2019); and voice and surveillance infrastructure (2019). The programme will replace 33 systems (including our critical main voice service for upper airspace). We are in the final stages of integration, test and validation activities for the support services, including the iTEC trajectory-based flight data processing and visualisation service, conflict detection tool, dual-redundant surveillance and safety net service.

In NR23, we will complete the transition into operational service which will place a demand on controller resource late in 2023 and through 2024. We will apply the lessons from earlier significant deployments (such as ExCDS) to ensure we maintain close engagement with our customers prior to and during deployment.

The new technology will replace disparate systems and continue to work towards our vision of one operation, bringing greater consistency, flexibility and resilience to meet future capacity and enable efficiencies across the operation. It will also host the key iTEC software changes to enable transformation of our lower airspace systems and the delivery of major future airspace change which will drive a range of benefits for our customers. These benefits will be realised progressively as we move to the new systems.

Benefits

- › **Resilience:** Without replacement our core infrastructure will become less resilient with a corresponding impact on our overall service delivery. DP En Route & Voice will deliver modern platform-based, off-premises systems providing greater cyber-security, resilience, flexibility and enable interoperability with partner ANSPs
- › **Safety:** The introduction of DSESAR solutions allows the introduction of operational concepts that can reduce controller workload by up to 1.5% which will enable us to maintain safety levels and operational service performance (it can be used to improve controller productivity) as air traffic recovers and grows. It will have far greater resilience to meet the growing cyber threat worldwide and has been assessed by the national cyber security centre
- › **Environment:** We expect the deployment of DP En Route and Voice will provide environmental benefits delivering a minimum of 15-32 kT CO₂ savings per year
- › **Costs:** Deployment of new technology, and automation of manually intensive processes, will enable us to leverage cost efficiencies over the longer term as we transition to a common platform. For example, a relatively simple airspace change can require changes to 38 of our current systems due

¹⁵ By cost and schedule.

to their point to point infrastructure. We expect automation on the platform to improve flexibility and speed of change. We have generated cost savings in procurement: we have taken advantage of the iTEC collaboration to reduce development costs (avoiding approximately £50m of costs to date) and we continue to benefit from the collaboration contributing to only around 25% of these costs for ongoing development

Costs

CY, 2020 CPI prices, £m	2023	2024	2025	2026	2027	NR23
	<i>Plan</i>	<i>Plan</i>	<i>Plan</i>	<i>Plan</i>	<i>Plan</i>	<i>Total</i>
DP En Route & Voice	26	10	1	0	0	38

DP En Route & Voice investment

Risks

- › Ongoing Covid-19 impacts (eg overseas suppliers, site access and social distancing measures) may result in additional cost and schedule delays – we have essential measures in place to protect the safety of our operations
- › There is a risk that Limited Operational Service (LOS) and Full Operational Service (FOS) environments are not delivered when required as a result of technical issues identified during integration and testing – we have continued to maximise the use of a temporary infrastructure (called Springboard) to mitigate this risk

There is a risk that material issues will be raised during validation, as a result of proving that the fully integrated product for DP En Route and DP Voice meets the full operational requirement – we have continued to build on our earlier Lessons Learnt work to provide early-warning through informal validation.

Common Platform

The Common Platform is the deployment of our target collaboration common version of the current iTEC across our upper and lower airspace on one architecture. We remain confident that the SESAR concepts, utilising the iTEC Flight Data Processor (FDP), are the right solution for the overall change to our operation including the lower operation. The current FDP, NAS, is responsible for processing and disseminating all flight data to our controllers and other systems, such as our flow management and time-based separation tools. It is an essential component of our operation which is becoming ever more difficult to sustain through our supplier base, and requires replacement.

Our RP3 plan expected to start the work modernising our lower operation during RP3 with delivery early in RP4 (around 2027). We noted at the time of publication of our RP3 plan in 2018 that customers might wish to exercise choice and it would be possible to slow development in RP3 if traffic stalled, albeit it was not recommended. The disruption to the aviation industry over the past 18 months has been far more significant.

The disruption to our investment plans, a longer and thinner investment profile in NR23 and the extension of the DP En Route programme have resulted in a requirement to consider a range of options.

Our NR23 programme combines the development of the iTEC product through collaboration with other ANSPs and sufficient funding to provide a resilient and reliable FDP for the lower operation. It

will enable capabilities, such as trajectory based operations, that have been developed through SESAR to date. It will also enable a high degree of interoperability with our European partners for future enhancements.

Introducing our lower operation requirements into the iTEC v3 product will mean we can retire NAS, as well as some supporting systems and networks. Our intent is to transition the lower operation onto the iTEC v3 product ensuring it does not impede operational service delivery mid-way through NR28. We would then expect to transition the upper airspace operation from its earlier (DP En Route) version of iTEC onto the iTEC v3 product to provide a unified service on a common platform and meet our strategic goal.

We have considered a range of options and maintained engagement with customers who recognise the need for investment. The additional flexibility we are building into our planning approach within the portfolio will enable us to assess and develop these options further with our customers through the SIP process.

Benefits

- › Open, modular applications across our operation, enabling agility to respond to emerging requirements and cost efficiency by avoiding the need to manage a wide range of proprietary systems at each centre
- › Trajectory-based operations across the entire UK airspace enabling greater service resilience and environmental benefits
- › Common controller tools supporting free route and systemised airspace roles, reducing workload per flight and providing continued safety and service improvements

Costs

CY, 2020 CPI prices, £m	2023	2024	2025	2026	2027	NR23
	<i>Plan</i>	<i>Plan</i>	<i>Plan</i>	<i>Plan</i>	<i>Plan</i>	<i>Total</i>
iTEC collaboration	4	4	4	3	3	18
Lower platform (incl FMARS)	14	14	16	10	22	76
Upper airspace builds	0	0	9	9	9	27
Total	18	17	29	23	34	120

Common platform investment

Risks

- › Skilled resources may not be available when required for key points of the programme.
- › The iTEC v3 product may require additional performance requirements for effective use in the highly complex airspace of the London TMA – we will mitigate this through recommended options in consultation with customers.

Airspace & operational enhancements

Our airspace plan is a major component of the UK's overall Airspace Modernisation Strategy and is essential to maintain capability while traffic grows, and to support the industry's net zero targets.

It is an ambitious programme with the design and implementation of significant airspace change that will systemise UK terminal airspace, enhance the way we manage flows of traffic and deliver Free Route Airspace across the high-level UK sectors delivering significant environmental benefits. It assumes the availability of a safe and resilient service for successful delivery.

Core elements in this programme are the Future Airspace Strategy Implementation (FASI) changes, Free Route Airspace, small scale, operational capability improvements and queue and capacity management. The key elements are described below.

There is a significant dependency on airports to agree and deliver their respective changes to complement the systemisation of lower airspace. The Airspace Change Organising Group (ACOG) leads the coordination of this programme but synchronised airspace change of this scale requires the continued commitment of the Department for Transport and the CAA.

En Route airspace change

Deliverables	Outcomes
Free Route Airspace	Enabling optimised customer-led cross-border flight planning options across Europe to deliver fuel, CO ₂ and 3Di benefits.
Interface improvement	Developing and deploying airspace improvements in conjunction with our partner ANSPs at our boundaries to enable routes which provide fuel benefits and alleviate workload.
Airspace management enhancements	Improvements to the design of segregated airspace and flexible airspace structures, offering improved airspace access and fuel savings. This includes enhancements to airspace management tools, as required by our licence and as part of our commitment to Advanced Flexible Use of Airspace, as laid down in the Airspace Modernisation Strategy.
Ops service enhancements	A series of changes targeted at observed bottlenecks/ congestion points to deliver fuel and CO ₂ emission benefits, and the opportunity for controller workload reduction to support safety enhancements or capacity.
Airspace capacity management enhancement	More efficient deployment of ATCOs to match the more variable aircraft demand expected in free route airspace, increasing en route capacity.

En route airspace change projects

Systemised (climb and descent phase) airspace change projects

Deliverables	Outcomes
FASI Network Changes	Deployment of PBN routes between the London, Manchester and Scottish Terminal Manoeuvring Areas (TMAs) and Free Route Airspace to increase airspace capacity and enable fuel and CO ₂ savings.
Extended Arrivals Management (AMAN/XMAN)	Improvements to Heathrow and Gatwick XMAN procedure by transferring more holding into the en route and descent phases and enabling more aircraft to fly an uninterrupted continuous descent saving fuel and CO ₂ , improving the passenger experience, and meeting our compliance obligations.
Time-Based Separation (TBS)	XMAN will also be extended to Stansted, Manchester airports (subject to Manchester choosing to deploy an AMAN) and other airports if the Multi-Airport Arrival Streaming Service (MASS) option is requested.
ExCDS enhancements	Provides increased landing capacity at Heathrow, Gatwick and Stansted airports to either increase airport capacity, or reduce stack holding and save fuel if the movement rate is unchanged, or a combination of outcomes;

Systemised airspace change projects

Benefits

	Safety (workload)	Service (capacity)	Environment (fuel kT CO ₂)	Environment (3Di)
Airspace Management Enhancement/ OSEP/ iACM	Marginal workload impact	The improved C2 performance is as a result of an anticipated 8% (NERL Level) capacity increase, supported by the NR23 capital investment #Please see below table for estimated capacity increases with specified sectors	30 – 60 kT CO ₂	0.2 – 0.6
Airspace modernisation	Workload impact to Manchester TMA and TC Sectors		100 – 160 kT CO ₂	0.8 – 1.3
ExCDS enhancements	Workload impact to TC Sectors		0 – 15 kT CO ₂	0
FreerRoute	0		30 – 60 kT CO ₂	0.4 – 0.6
Q&CM	Workload impact to Heathrow, Gatwick and Stansted		40 – 50kT CO ₂	0.6 – 0.8

Airspace and operational enhancements benefits

The anticipated benefits in the table above are at varying levels of maturity which we expect to refine through NR23. We expect to deliver significant increased network capacity of between 4 - 8% at the NERL level during NR23 based on our early estimates across the following sectors:

	Pre-feasibility & options - estimated capacity increases by sector
Airspace modernisation	7.5% Capacity increase in TLA & GWY
	2% Capacity increase across TC
	5% Capacity increase in the MTMA
Free Route	10% Capacity increase in NOR, LAK, DCS S, TYN & HUM
	5% Capacity increase in Central, Channel, DTY & CLN

Airspace and operational enhancements estimated capacity increases

Costs

CY, 2020 CPI prices, £m	2023	2024	2025	2026	2027	NR23
	Plan	Plan	Plan	Plan	Plan	Total
Airspace management enhancement / OSEP / iACM	4	4	3	3	2	15
Airspace modernisation	6	7	7	7	5	32
ExCDS enhancements	3	3	3	0	0	9
Free route	2	5	2	0	1	9
Queue and capacity management	6	4	4	3	0	18
Total	21	22	18	14	8	83

Airspace and operational enhancements benefits

Risks

- › Collaboration will be essential to conduct effective consultation across multiple FASI sponsors. The complexity of the proposals will be high and public consultation generates a risk that the change is not understood by those consulted. We have sought to mitigate this risk through the development of the ACOG and close engagement with our wider stakeholders to ensure the commitment to system-wide change is supported

- › Sponsors do not receive approval of their submitted ACPs or ACP delivery is delayed due to application of the Secretary of State “Call In” process as part of CAP1616 (Airspace Change process)
- › Training and transition phases of large change projects can impact service delivery performance for a defined period of time. We will work with our customers to understand and minimise potential service impact throughout the deployment of technology and airspace change. We will seek the most efficient way to transition the projects into service, building on our experience of other major transitions to service

Information solutions

Our business IT is an essential component of business resilience and the IS programme delivers value by providing effective, reliable and secure IT services. The strategy is to provide flexible and responsive IT services which leverage a blend of cloud based and on-premise platforms, with the emphasis on a cloud first approach.

The key areas of work in this programme will be:

- › Core infrastructure sustainment in order to maintain the performance, reliability, and capacity of the existing IT infrastructure (hardware and software for networks, computers, storage and telephony) and to add infrastructure components to support new applications
- › End user device sustainment and replacement
- › Applications (including ERP, collaboration and business intelligence platforms), covering their sustainment, modernisation and rationalisation, that maintain the performance and regulatory compliance of business IT systems
- › Enhancement of security and cyber resilience to reduce the likelihood of unauthorised access to our data from internal and external attack

Benefits

- › Continued service continuity/business resilience
- › Enabling the operation
- › Addressing obsolescence
- › Managing the increase in the cyber threat to the business
- › Ensuring compliance with legal and regulatory obligations
- › Improving the overall useability and efficiency of business applications and our digital workspace platform

Costs

CY, 2020 CPI prices, £m	2023	2024	2025	2026	2027	NR23
	<i>Plan</i>	<i>Plan</i>	<i>Plan</i>	<i>Plan</i>	<i>Plan</i>	<i>Total</i>
Information systems	9	8	7	5	7	36

Information solutions investment

Risks

- › Increased service failures (business resilience/ business productivity impacts) through lack of obsolescence management (eg staying up to date for supportability and security patching) or a successful cyber attack
- › Decreased business productivity through lack of investment in digital workplace optimisations and/or One Operation
- › Potential fines due to non-compliance around commercial (eg software licensing), legal and regulatory obligations (eg ERP legal control pack updates)

Property & facilities management

We have 177 freehold and leasehold sites across the UK with an insured value of approximately £410m for the buildings alone. While all FM assets are monitored by the FM team within NERL, the majority of the estate (technical centres and remote sites which are essential to the service) is managed and funded through the Sustainment & Surveillance programme.

This programme focuses on delivering the core corporate accommodation. We have taken a limited approach in RP3 to satisfy the minimum requirement to meet landlord obligations, and health and safety legislation. Benchmarking indicates that we have been consistently better than benchmark for the efficiency of our accommodation costs per person¹⁶.

Specific areas of focus for NR23 will include 'right-sizing' our estate following our re-organisation and adoption of agile working practices, allowing employees to vary their work pattern and location and ensuring a resilient ongoing service at Swanwick and Prestwick through upgrade/ replacement of accommodation, security, logistics and catering systems. In conjunction with the cost savings we expect from rationalisation through the sub-letting of space and physical reduction of space where possible, we expect this to improve our performance relative to benchmark to around 50% below benchmark efficiency costs; and to reduce the risk of an unplanned loss of FM services.

This programme provides benefit by supporting the NATS business through the sustainment and implementation of infrastructure and services focusing on employee accommodation, security and wellbeing. The programme provides a reduction in technical service risk and cost, as well as meeting legal and licence obligations and contribution towards net zero targets.

Costs

CY, 2020 CPI prices, £m	2023	2024	2025	2026	2027	NR23
	<i>Plan</i>	<i>Plan</i>	<i>Plan</i>	<i>Plan</i>	<i>Plan</i>	<i>Total</i>
Property and facilities management	7	3	2	2	2	18

Property and facilities management investment

Risks

¹⁶ JLL Global Benchmarking Services – December 2021.

- › As a result of Covid-19, Brexit and other global political challenges, there are worldwide supply chain issues for procuring materials and equipment, which would lead to increase costs and elongated timescales for delivery
- › As a result of wider market resource constraints and priorities / commercial commitments of NATS and their suppliers, there may not be sufficient resource available to staff the Programme and Projects, which would lead to delays to the projects and delivery to benefits, and potential cost increases if supplier dependencies are not met
- › As a result of NATS being early adopter of net zero technologies, the solutions and working environments may cost more to incorporate net zero technologies, which would lead to increased costs
- › As a result of post Covid-19 requirements and expectations, attendance in the workplace has changed. NERL is required to support a new working environment to meet these changes. There is a risk the changes made to deliver agile working areas may not maximise productivity and may need further changes. This may lead to increased costs and delays to adjust the solution.

Oceanic

Our essential investment in the oceanic operation is focused on transforming the information infrastructure for the North Atlantic service, with our strategic partner NavCanada, the Canadian provider of air traffic services across the western side of the NAT, and Aireon, our satellite data service provider for space based ADS-B, to continue to deliver the [NAT Vision 2030](#)¹⁷.

Our plan for NR23 is to modernise the oceanic system architecture, with initial focus on:

- › The core GAATS+¹⁸ system elements. This is to address technology debt and obsolescence to provide a more flexible and scalable solution. There is a requirement to align our system with our strategic partner in order to ensure the capacity to refresh and upgrade systems on a 'once only' basis
- › Reducing the footprint of the Organised Track Structure (OTS) to improve capacity and enable more airlines to fly their optimum route, speed and trajectory
- › Introduction of a profile optimiser tool to provide guidance to air traffic controllers to select an operationally equivalent, or next best profile, should the requested profile not be available
- › Modernising and automating service support tools, including the Message Extraction and Correction System (MECS) capability, to improve service resilience and with the aim of reducing oceanic service delivery costs

In addition, we will deliver removal of oceanic clearances early in NR23, identified as a priority within the NAT Vision 2030 and requested by industry trade organisations, in order to harmonise the NAT Region with global procedures and simplify operations for flight crews.

¹⁷ ICAO NAT Vision 2030

¹⁸ Gander Automated Air Traffic System + (GAATS+) is a flight data processing system for the North Atlantic. This is the same technology used by NAV CANADA to manage their sector of the NAT.

The GAATS+ system sustainment works will also enable greater system and operational alignment with NavCanada, delivering cost efficiencies through shared development. It will deliver enhanced safety, through alignment of operating procedures and reduced risk of controller overload through strengthened safety barriers, while allowing for further operational collaboration and shared mutual contingency in the future. More flexible flight planning will reduce estimated fuel costs and CO₂ emissions.

Detailed planning for the roadmap with NavCanada is still in its infancy. The planning will focus on the definition and delivery of the technology upgrades, which due to size and complexity are likely to be delivered later in the control period and will be confirmed through the annual SIP process.

Benefits

- **Safety:** enhanced barriers that effectively remove risk of controller overload and better support contingency situations
- **Resilience:** ability to maintain and support current service operations, while providing a platform for future service delivery enhancements beyond NR23
- **Service improvements:** As a result of a reduction in the Organised Track System (OTS) footprint, and introduction of a profile optimiser – taken together these allow NATS to better satisfy the requests of our customers and will be the key to delivering our service requirements
- **Compliance:** continued compliance and adherence to NAT 2030 Vision, to which the UK Government has signed up under the NAT ICAO SPG structure
- **Cost efficiency:** reduced operating costs through greater collaboration and systematic alignment will result in future system support and development cost avoidance

Costs

CY, 2020 CPI prices, £m	2023	2024	2025	2026	2027	NR23
	<i>Plan</i>	<i>Plan</i>	<i>Plan</i>	<i>Plan</i>	<i>Plan</i>	<i>Total</i>
Oceanic	6	7	6	3	1	23

Oceanic investment

ATC training transformation

Due to the variation in size, complexity and other operational commitments such as airspace or technical system changes, it can be difficult to compare the unit elements of ATCO training. We consider ATCO training to be a single, end-to-end process which we aim to improve continuously. The imperative to deliver the operational workforce needed to achieve the required service performance has also driven our search for more innovative approaches to training. Given the volume of new controllers required, assuring the resourcing pipeline through effective, efficient and evolutionary training is critical.

We propose to enhance our training capability to provide greater agility for the business, making us better placed to respond to material changes in traffic volumes. It will modernise our simulation platforms, improving facilities in support of training operational staff and airspace development, and improve the cost efficiency of our simulations systems. It will reduce the cost of delivery and create the opportunity to partner with suppliers for best in class simulation services.

Outcomes and benefits

Key deliverables for this programme area are:

- Increasing our responsiveness to variations in ATCO resource demand, enabling enhanced service delivery and support to NERL's investment plans
- Further reducing duration and cost of ATCO training potentially leading to a leaner operational resource requirement
- Enabling cost efficient use of resource (ATCO and support staff) at a single site
- More flexible use of ATCOs between the operation and training once co-located, not only for initial training, but also conversion training required by controllers to operate new equipment, procedures and airspace before these enter into operation
- Supporting delivery of NATS Property Strategy to consolidate accommodation and therefore ultimately reduce cost.
- Increasing the predictability of training through use of enhanced synthetic training capabilities with reduced training time and resource required in the live environment
- Enhancing our ability to understand, de-risk, exploit, monitor in real time and optimise current and future operational processes and technological developments.

The investment benefits are further described in [Appendix G](#).

Costs

CY, 2020 CPI prices, £m	2023	2024	2025	2026	2027	NR23
	<i>Plan</i>	<i>Plan</i>	<i>Plan</i>	<i>Plan</i>	<i>Plan</i>	<i>Total</i>
ATC training transformation	0	2	2	2	0	7

ATC training transformation investment

Additional options consulted

Customers were consulted on additional options which were not supported in consultation:

- No investment in Unified Traffic Management, on the basis that the CAA establishes suitable charging mechanisms for new classes of airspace users. Further information on our approach to new airspace users can be found in [Appendix P](#)
- Additional investment for accelerated renewal and transformation of our surveillance service. Airlines were not clear how the increased expenditure would materially benefit them at this stage without greater detail. We agreed that we would address these as additional options as part of the 2+5 process within the SIP annual review cycle
- Increased pace of investment for iTEC v3. Airlines were not clear how the increased expenditure would materially benefit them at this stage without greater detail. We agreed that we would address these as additional options as part of the 2+5 process within the SIP annual review cycle

- Reduce investment by around £50m across NR23 to further support customers in the coming years. This was seen as contrary to the strategic goals of our investment plan requiring focus on sustainment and reducing the scale of change available to customers

We also reiterated our intent to complete our DVOR rationalisation. The DfT has supported our stance and we have issued formal correspondence to airports and to the CAA. We continue to plan on removal of airport dependencies and decommissioning the affected DVORs and NDBs in December 2023.

We will continue to use the Technical Customer Advisory Board and wider SIP process to discuss these options and the benefits with customers as they develop.

Financials

We are proposing planned investment of £574m (2020 CPI prices) to provide sufficient resources for a balanced portfolio which will meet our long-term modernisation plans agreed in previous price controls and which can be delivered at the pace appropriate to the scale of our business. It will ensure we can maintain a reliable, safe day to day service, introducing technology and airspace change now and in the future. This results in a portfolio which averages approximately £110m - £120m a year which is around 20% less than RP3. It is our best assessment of the investment which maximises benefits to customers, ensures the availability of a resilient technical operation now and in the future and is affordable and deliverable.

In developing our costs, we have used a combination of point estimates and ranges (particularly in years from 2024 onwards) where there is less certainty about benefits and costs until the 'identify' and 'define' phases of a programme are completed and limited probabilistic forecasting. Given the inherent cost uncertainty that exists at this stage of planning, our point estimate for £574m (2020 CPI prices) sits within an overall range of between £547m - £680m (2020 CPI prices).

CY, 2020 CPI prices, £m	Low	Base	High
Airspace and operational enhancements	70	83	100
DP En Route and Voice	38	38	40
Sustainment and surveillance	195	206	235
Common platform	120	120	170
Total	547	574	680

Capital investment ranges

The plan is phased broadly equally across each year in order to ensure the most efficient use of our resource. Given our approach to use a two-year rolling plan, by which we will consult regularly with customers to agree a firm plan through the SIP process, the balance of investment in the later years (2025 – 2027) will be refined and confirmed; they should be considered within the low and high ranges for the key investment areas in the table above. This reflects a realistic level of uncertainty in planning across a five-year period up to six years ahead, including the extent of external dependencies such as suppliers, those stakeholders beyond our direct control; and, inter-dependencies within our portfolio reflecting the close linkage between the successful modernisation of airspace to our technical transformations. This approach is further reflected in the use of date ranges within the table of expected deliverables at Annex B. The summary cost table for capex for NR23 is shown below.

CY, 2020 CPI prices, £m	2023	2024	2025	2026	2027	NR23
	<i>Plan</i>	<i>Plan</i>	<i>Plan</i>	<i>Plan</i>	<i>Plan</i>	<i>Total</i>

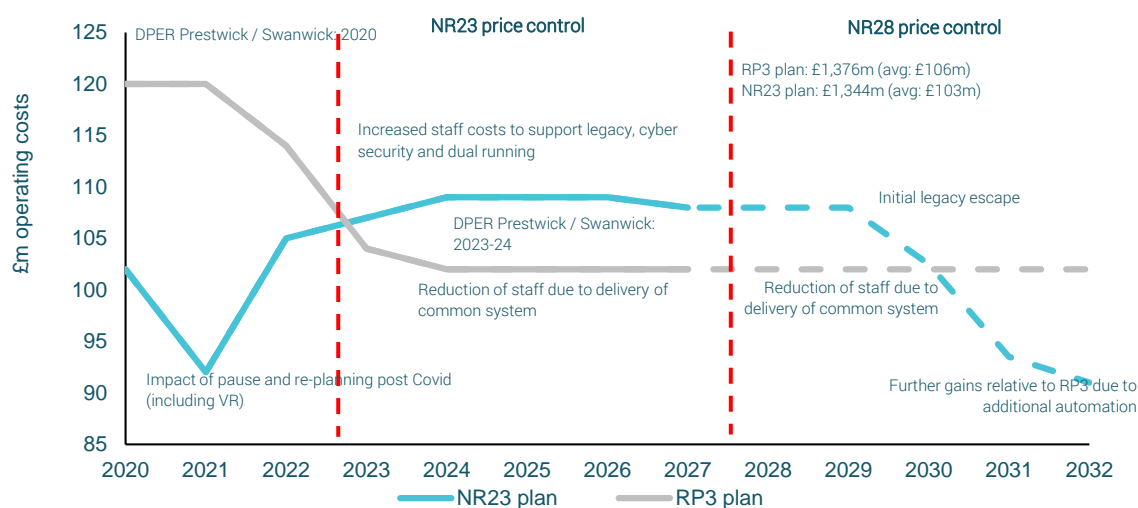
Airspace and operational enhancements	21	22	18	14	8	83
DP En Route and Voice	26	10	1	0	0	38
Sustainment and surveillance	36	45	43	43	40	206
Common platform	18	17	29	23	34	120
Business resilience (information solutions)	9	8	7	5	7	36
Business resilience (property and facilities)	7	3	2	2	2	18
Oceanic	6	7	6	3	1	23
ATC training	0	2	2	2	0	7
Risk & contingency	0	0	9	18	18	44
Total	112	116	116	110	110	574

NR23 capital investment

Impacts on operating costs

The impact of Covid-19 and the subsequent reshaping of our investment plans agreed in previous price controls has altered the timeline for the change and impact to operating costs originally expected during RP3. In the original RP3 period (2020 to 2024), our actual and forecast costs fell substantially compared to projections in the RP3 plan, resulting in lower costs to customers at a critical time. However, the costs that will not be incurred in 2020-2024 will now have to be incurred during NR23 and NR28, leading to higher costs in the upcoming period.

Additionally, the benefits and savings generated by further headcount reductions and ending external service contracts following legacy escape will now be delivered after mid-NR28, while previously these benefits were factored in post-2024. This has been mitigated by the voluntary redundancy programme which has constrained the extent of the change in opex.



Comparison of operating cost impacts in NR23 plan vs RP3 plan

Like most companies in the aviation industry, we had to carefully re-examine our cost structure and, in the context of technical services opex, we now forecast lower costs going forward than our pre Covid-19 plan.

The changes result in aggregate costs that are £25m lower under the current NR23 plan over a period which includes RP3 namely, the 2020–27 period, (£30m higher over the 2023–27 period and £55m lower in 2020–22). This is driven by:

- Reductions in staff costs due to automation and adoption of new ways of working, and facilitated by the implementation of the VR programme
- Delaying execution and implementation costs until later, which means that fewer benefits (ie less avoided costs) will be obtained during NR23 as they will only be attained during NR28
- Other efficiencies (and costs) due to adopting a different planning approach

CY, 2020 CPI prices, £m	2020-27	2020-22	2023-27
NR23 plan	841	300	541
RP3 plan	866	355	511
Difference	(25)	(55)	30

Summary of overall technical services operating costs in NR23 plan vs RP3 plan

In assessing the technical services opex plan, it is also important to consider the following additional points:

- New efficiencies will be achieved after NR23: we will deliver the same service for a lower cost than in the initial RP3 plan, once the systems are in place during NR28. This results in approximately £10m less per year in technical service opex from mid-NR28 onwards
- Resourcing risks associated with postponing investments: inadequate levels of investment in NR23 will ultimately result in higher costs and greater risks, as it becomes increasingly difficult to maintain current ageing systems while coping with higher traffic. Furthermore, as the current systems are managed by engineers nearing retirement, there is a considerable risk of facing a shortage of staff with the necessary skills
- Impact of Covid-19: the changes to the technical service operating costs are the result of our reaction to an unexpected and highly damaging event which seriously threatened our (and the wider aviation industry's) financial health. The decision to postpone our investment programme was done with the financial wellbeing of our business and customers in mind, and the modifications of the plan were also done with the aim of minimising costs and risks while fully supporting the recovery of the aviation industry

Risks

We face a number of ongoing portfolio risks:

- **Transition:** The impact of Covid-19 on the aviation industry has prompted a re-assessment of the risks and benefits associated with the speed of delivering a technical transformation project. The original RP3 plan envisaged multiple programme activities being undertaken simultaneously where an issue in one area could cause significant delay due to the programme interdependence. Sequential implementation, for example with increased periods of LOS, reduces operational risks and allows for a greater familiarity with the new systems being deployed
- **Critical resource availability:** The scale and complexity of transformation, continuing to operate on legacy equipment and requirement for specialist resources means there is a risk that demand from the Change Portfolio may be greater than the resources available. We seek to mitigate this risk with specialist recruitment consultants, balancing portfolio demand and ensuring operational transitions continue to be consulted with our customers

- **Supplier performance:** As a result of a dependency on multiple cross-dependant suppliers there is a risk that one or more suppliers may not deliver to cost, quality, or schedule. We have enhanced supplier relationships, performance measurement and management of our most important suppliers in line with ISO 44001. We continue to work very closely with our suppliers to ensure efficient delivery

Annexes

- A. Impact of plan on technical services operating costs and comparison between NR23 and our RP3 plan
- B. Key deliverables from the investment portfolio in NR23

Annex A to Appendix H: Impact of plan on technical services operating costs and comparison between NR23 and our RP3 plan

This section provides an explanation of the differences between technical services opex in NR23 and RP3 and distinguishes between the impact on staff and non-staff costs in response to a request from customers during the consultation on the NR23 business plan. We also explain the impact on technical services opex of the investment re-planning that was prompted by Covid-19.

Technical services, including our engineering, simulations services (SIMS) and programme delivery functions, are essential for the implementation of NATS transformation, sustainment and airspace programmes. This section focuses on the main ATM Systems transformation programmes taking place during the RP3 and NR23 periods, namely DP En Route, followed by the deployment of new technical applications in the Lower Airspace. We refer to these as ‘technical transformation projects’.

As already noted, part of our response to the liquidity challenges caused by Covid-19 in May 2020 led us to suspend non-essential capital investment for six months and re-assess our existing plans. As a result, transformation programmes will now take longer to implement than originally expected in our RP3 plan, and this has impacted the level of operating costs associated with the technical transformation programmes in NERL’s engineering function.

Impact of Covid-19 on the transformation programmes costs

NERL’s RP3 plan was structured around a specific timeline for the Upper and Lower Airspace transformation programmes, which drove the projected operating costs for the period. The RP3 plan expected DP En Route to be deployed during 2020–21, followed by the lower platform at the end of 2024. This meant that the projected costs for RP3 included a ramp-up period, where staff and external costs increased to implement the programmes and to complete a phase of ‘dual running’ (where both new and legacy systems are operated in parallel), followed by a decrease in costs and headcount as legacy escape (ie transitioning to a single updated technological platform) was finalised in 2024.

As part of our response to the challenges caused by Covid-19 the majority of the ATM transformation investment was paused and the NR23 plan therefore reflects the shift in the implementation timeline, leading to a shift in the operating cost timeline vs the RP3 plan.

DP En Route is now projected to be complete by 2025, while the lower platform will be complete by mid-NR28. This means that the period of dual running of systems (ie the period between the completion of DP En Route in 2025 and the completion of the lower airspace transformation programme in mid-NR28) will be longer than initially projected. More significant reductions in costs will therefore be delivered in NR28.

CY, 2020 CPI prices, £m	2020	2021	2022	2023	2024	2025	2026	2027
DP En Route capex	54	62	52	26	10	1	0	0
Lower airspace capex	2	6	5	9	9	36	38	45
NR23 plan total	56	68	57	35	19	37	38	45
DP En Route capex	23	5	0	0	0	1		
Lower airspace capex	97	82	16	18	65	67	40	4
RP3 plan total	120	87	16	18	65	68	40	4
Difference	(64)	(19)	41	17	(46)	(31)	(2)	41

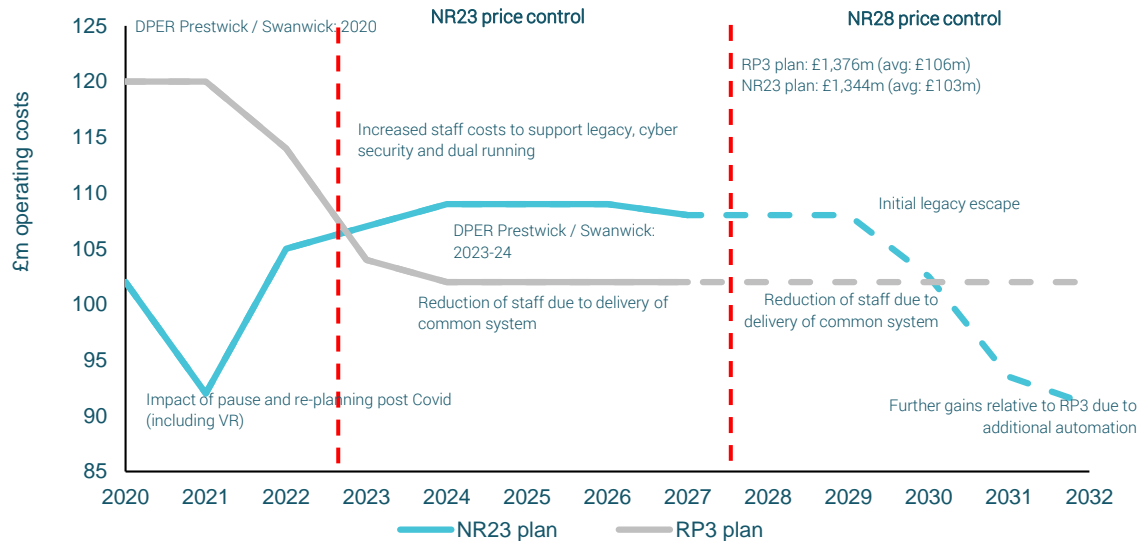
Summary of capital investment in NR23 plan vs RP3 plan

The VR programme we implemented as part of our Covid-19 response, significantly reduced staff costs. In technical services, the reduction was around 200 employees (around 20% of pre-pandemic staff), and the NR23 plan does not project any material increase in headcount to reverse this. Additionally, we released 149 contractors supporting Technical Services engineering functions in the period March–June 2020 to conserve cash. This means that, in order to maintain service resilience and engineering performance, the new plan already requires substantial productivity gains from the remaining employees.

As a response to the pandemic, we have accelerated some of the productivity and efficiency gains that we previously planned to achieve towards the end of RP3, as we have started adopting new and more efficient ways of working. Nevertheless, this significant reduction in headcount and the resourcing and supply chain challenges caused by Covid-19, mean that there are stronger constraints and obstacles requiring changes to the original RP3 plan.

Impact on operating costs

The postponement and re-shaping of the investment plan, along with the VR programme, means that the timeline of operating costs has changed. In the original RP3 period (2020 - 2024), our actual and forecast costs have fallen substantially compared to projections in the RP3 plan, thus resulting in lower costs to customers at a critical time. However, the costs that will not be incurred in 2020-2024 will instead be incurred during NR23 and NR28, leading to higher costs in the upcoming period. Additionally, the benefits and savings generated by further headcount reductions and ending external service contracts following legacy escape will now be delivered after mid-NR28, while previously these benefits were factored in post-2024.



Comparison of operating cost impacts in NR23 plan vs RP3 plan

Like most businesses in the aviation industry, we had to carefully re-examine our cost structure, and in the context of technical services opex, we now forecast lower costs going forward than our pre Covid-19 plan.

Having now implemented some of the building blocks of DP En Route (albeit at a slower pace over the past 20 months), we have a better understanding of the new software, which has allowed us to update our cost estimates factoring in some slight reductions for NR23.

Impact on staff costs

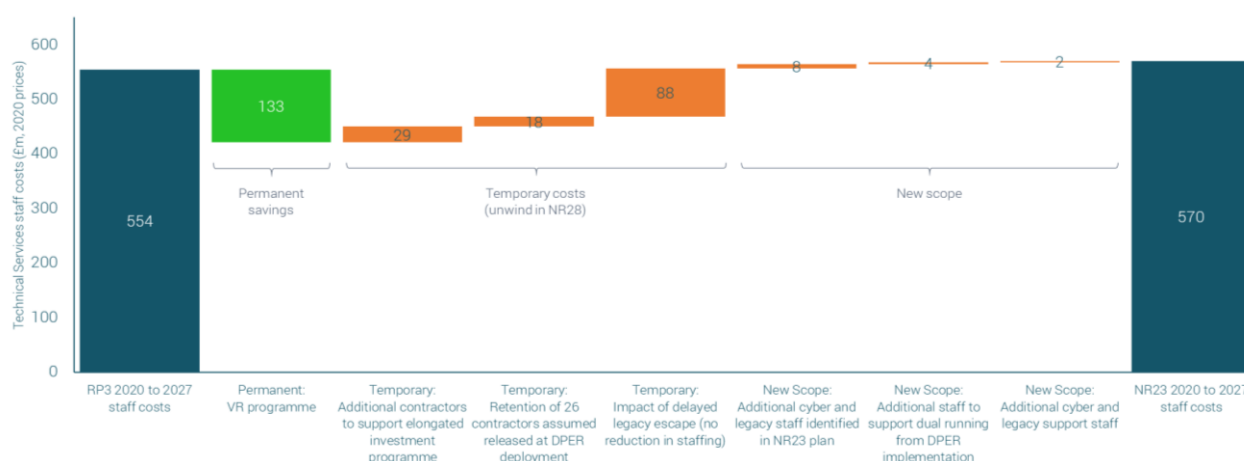
In both the RP3 and the NR23 plans, staff costs account for over 60% of technical services opex. The overall result of the changes to the projections in the NR23 plan is £570m, compared to £554m in the RP3 plan. Comparing only the 2023–27 period covered by NR23, we now project £353m costs, compared to £326m in our RP3 plan.

CY, 2020 CPI prices, £m	2020-27	2020-22	2023-27
NR23 plan	570	217	353
RP3 plan	554	228	326
Difference	16	(11)	27

Summary of overall technical services staff costs in NR23 plan vs RP3 plan

The impact of the VR programme on operating costs over the period 2020–2027 is the single most important item, as it will generate a saving of £133m relative to the RP3 plan over seven years. However, it does not fully compensate for the fact that staff are now needed to support a longer timescale of investments and a longer transition period of dual systems. Additional staff will also be needed relative to the original RP3 plan due to the change in time and shape of the plan. These changes in the plan can be classified into three broad categories:

- Permanent changes:** this refers to changes in total costs of the programme that have been caused by the actions taken during Covid-19, and will not be reversed in future periods. The VR programme represents an additional saving relative to the original RP3 plan, while the need to hire staff for longer to support an elongated programme and dual running are additional costs relative to RP3. The permanent savings are £133m over the seven year period.
- Temporary changes:** this refers to changes in costs caused by timing mismatches of the NR23 plan relative to the pre-Covid-19 RP3 plan. For example, having to maintain staff for longer in the current elongated plan than under the RP3 plan means that cost savings will only be achieved in NR28, which is thus a foregone saving in NR23. This category of foregone savings is estimated to total £135m in the period 2020–2027
- New scope:** this refers to changes in costs caused by the change in the shape and requirements of the new TS plan, for example, additional cyber threats and requirements identified for NR23 but unknown during RP3 planning. This represents £14m additional costs in 2020–2027 overall



RP3 staff costs vs NR23 staff costs, 2020 - 2027

Impact on non-staff costs

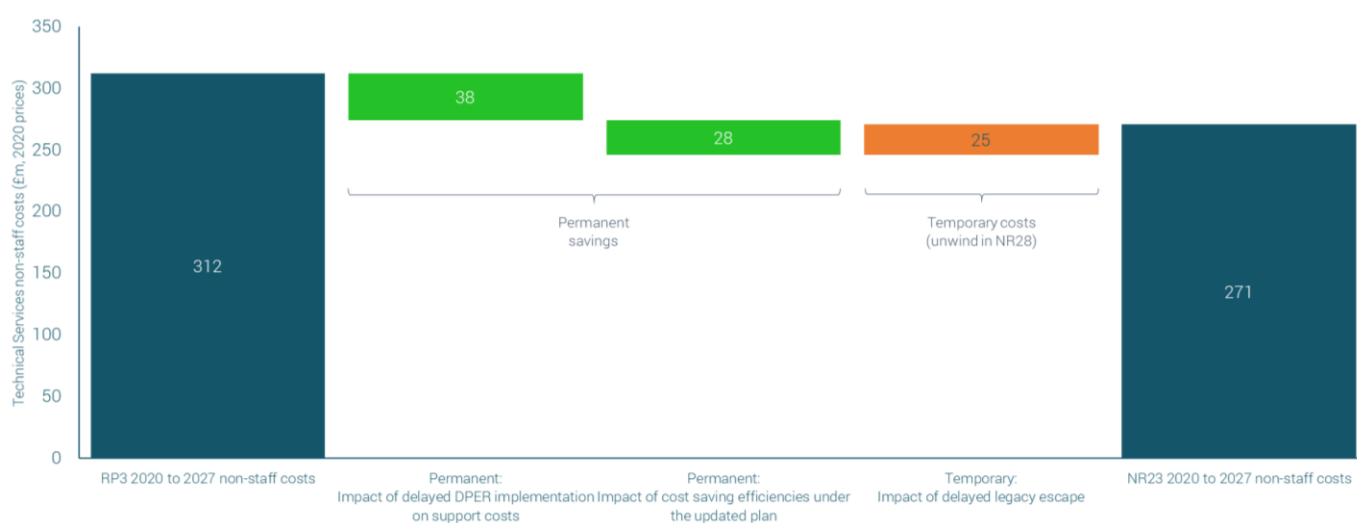
Non-staff costs for 2020–27 have fallen from £312m to £271m in the current plan. For the NR23 period alone, the cost projections have decreased from £189m to £184m. Similarly to staff costs, the main driver is the change in the timeline of the programme.

CY, 2020 CPI prices, £m	2020-27	2020-22	2023-27
NR23 plan	271	87	184
RP3 plan	312	123	189
Difference	(41)	(36)	(5)

Summary of overall technical services non-staff costs in NR23 plan vs RP3 plan

Delaying the implementation of DP En Route later in NR23 has led to a reduction in support costs in the period 2020–27, with some costs being “pushed out” to NR28. Conversely, the decision to delay means that the legacy escape savings, which were projected to take place in NR23 will only happen during NR28, which results in foregone savings. We can classify the cost changes into two categories:

- Permanent changes:** as described in the staff costs section, this refers to permanent changes that have been made to the technical services plan compared to the original RP3 plan. The implementation plan for DP En Route following Covid-19 has reduced parallel activities (which has contributed to a reduction in implementation risk) introducing a phased approach to delivery with multiple periods of LOS separating Prestwick and Swanwick implementations. As we have become more familiarised with the support requirements for DP En Route, we can now project a slight reduction of costs going forward. Overall, this results in savings of £28m
- Temporary changes:** this refers to timing mismatches of the NR23 plan relative to the RP3 plan, noting that these savings will still be achieved in future periods. Unlike for staff costs, the delayed implementation of the plan represents a net saving for NERL and its customers over the 2020–27 period. DP En Route implementation support costs have been reduced over NR23, while the impact of delayed legacy escape creates a foregone saving (ie additional cost) during NR23, as this is postponed to the later price control. This results in an overall saving of £13m



RP3 non-staff costs vs NR23 non-staff costs, 2020 - 2027

Overall allowance

The changes result in aggregate costs that are £25m lower under the current NR23 plan over the 2020–27 period (£30m higher over the 2023–27 period and £55m lower in 2020–22). This is driven by:

- › Reductions in staff costs due to automation and adoption of new ways of working, and facilitated by the implementation of the VR programme
- › Delaying execution and implementation costs until later, which means that fewer benefits (ie less avoided costs) will be obtained during NR23 as they will only be attained during NR28
- › Other efficiencies (and costs) due to adopting a different planning approach

CY, 2020 CPI prices, £m	2020-27	2020-22	2023-27
NR23 plan	841	300	541
RP3 plan	866	355	511
Difference	(25)	(55)	30

Summary of overall technical services operating costs in NR23 plan vs RP3 plan

In assessing the technical services opex plan, it is also important to consider the following additional points:

- › **New efficiencies will be achieved after NR23:** we will deliver the same service for a lower cost than in the initial RP3 plan, once the systems are in place during NR28. This is primarily due to committing to deliver similar levels of service in the future with a significantly lower headcount following further technology-enabled automation savings and the VR programme. This results in approximately £10m less per year in technical service opex from mid-NR28 onwards
- › **Resourcing risks associated with postponing investments:** inadequate levels of investment in NR23 will ultimately result in higher costs and greater risks, as it becomes increasingly difficult to maintain current ageing systems while coping with higher traffic levels. Furthermore, as the current systems are managed by engineers nearing retirement, there is a considerable risk of facing a shortage of staff with the necessary skills. At the start of NR23, we estimate that approximately 40% of technical services engineering staff will be over 50, and one third will be over 55. Although we have the necessary resourcing plans in place to mitigate this, the retirement risk is increasing in each regulatory period. We anticipate that the cost of hiring engineers with the appropriate technical skills will be increasing at a faster pace than the market, which also increases the opportunity costs of delaying investments progressively further
- › **Impact of Covid-19:** the changes to the technical service operating costs are the result of our reaction to an unexpected and highly damaging event which seriously threatened our (and the wider aviation industry's) financial health. The decision to postpone our investment programme was done with the financial wellbeing of our business and customers in mind, and the modifications of the plan were also done with the aim of minimising costs and risks while fully supporting the recovery of the aviation industry

Annex B to Appendix H: Key milestones

Ref	Range start	Range end	Milestone / delivery	Description and outcomes	Compliance
A1	Early 2023, then annually	N/A	Airspace Management Enhancements	Delivery of improvements to the design of segregated airspace and flexible airspace structures, including enhancements to airspace management tools	
A2	Q1 2023	Q2 2023	West Airspace Deployment (LD1)	Delivery of FRA and systemisation in the west of the UK. First delivery of FASI airspace changes	EU 716/2014 (PCP) - AF 3.1.2
A3	2023 then twice annually	N/A	Operational Service Enhancements	This project fast tracks some smaller changes which deliver customer benefit, operational improvements and future enablement	
O1	Q1 2023	Q4 2023	Removal of Oceanic clearance	Clearance Requests removed from Oceanic operations, revised Condition 11 reporting agreed and in place.	
A4	Q2 2023	Q3 2023	Heathrow TBS Pairwise	Current Heathrow TBS (eTBS) enhanced with Pairwise capability	EU 716/2014 (PCP) - AF 2.3.1
D1	Q2 2023	Q4 2023	Ready for PCUA LOS 3	Final functionality testing of the DP Enroute platform within the operation	
T1	Q2 2023	Q4 2023	Prestwick UPS Replacement	Replacement of Prestwick Centre Uninterrupted Power Supply (UPS) system to replace end of life assets	
T2	Q3 2023	Q4 2023	Tiree Radome replacement	Replacement of the Radome at Tiree Radar to enhance service resilience	
A5	Q3 2023	Q4 2023	Stansted XMAN	Publish Stansted AMAN data to neighbouring ANSPs to enable reduced stack holding	EU 716/2014 (PCP) - AF 1.1.1 EU 716/2014 (PCP) - AF 1.1.2
D2	Q3 2023	Q3 2024	Ready for PCUA FOS	Preparatory point and technically ready for deployment	EU 1206/2011 (ACID) EU 716/2014 (PCP) - AF 3.1.1 EU 716/2014 (PCP) - AF 3.1.2 EU 716/2014 (PCP) - AF 3.1.3 EU 716/2014 (PCP) - AF 3.1.4 EU 716/2014 (PCP) - AF 4.1.2 EU 716/2014 (PCP) - AF 4.2.3 EU 716/2014 (PCP) - AF 4.2.4 EU 716/2014 (PCP) - AF 4.3.1 EU 716/2014 (PCP) - AF 4.3.2 EU 716/2014 (PCP) - AF 4.4.2 EU 716/2014 (PCP) - AF 5.1.3 EU 716/2014 (PCP) - AF 5.1.4 EU 716/2014 (PCP) - AF 5.2.1 EU 716/2014 (PCP) - AF 5.2.2 EU 716/2014 (PCP) - AF 5.2.3 EU 716/2014 (PCP) - AF 5.6.1
A6	Q4 2023	Q1 2024	Interim XMAN HMI	Deployment of enhanced HMI for en route ATC to pass XMAN constraints for 8 airports	EU 716/2014 (PCP) - AF 1.1.1 EU 716/2014 (PCP) - AF 1.1.2
T3	Q4 2023	Q1 2024	Dry Air Coolers (DACs) and Chillers Deployment 1	Deployment of upgraded Chillers and 2 DACs at Swanwick Centre to ensure service resilience	

T4	Q4 2023	Q4 2024	Upgrades to sustain core networks reaching EoL	<p>Upgrades of the following to ensure continued service:</p> <ul style="list-style-type: none"> The wide area network (EDWAN) which connects the NATS control centres with remote sites (eg radars) and other international networks, Civil Aviation Packet Switching Integrated Network (CAPSIN) that enables the exchange of operational information (meteorological, flight regularity and control information for airport sensors, voice systems and external agencies) between NATS end systems at Airports and Air Traffic Control Centres throughout the UK. <p>Firewall Hardware replacements</p>	
*	From 2024	N/A	Launch UK	Changes required to accommodate proposed space launches, focusing on management of restricted areas	
O2	2024	2026	New Traffic and workload management tools	Enhanced Service provision through introduction of new traffic and workload management tools	
A7	Q2 2024	Q3 2024	Gatwick TBS Optimised Mixed Mode	All arrivals at Gatwick follow time based separation rather than distance based	EU 716/2014 (PCP) - AF 2.3.1
A8	Q2 2024	Q2 2025	Arrival Streaming	AMAN enhanced with arrival streaming capability (at Heathrow, Gatwick & Stansted)	
T5	Q2 2024	Q4 2024	Surveillance Deployment 1	First deployment of our Surveillance Service Infrastructure project to ensure service resilience.	
D3	Q2 2024	Q4 2024	Ready for AC LOS 4	Final functionality testing of the DP Enroute platform within the operation	
D4	Q3 2024	Q2 2025	Ready for AC FOS	Preparatory point and technically ready for deployment	EU 1206/2011 (ACID) EU 716/2014 (PCP) - AF 3.1.1 EU 716/2014 (PCP) - AF 3.1.2 EU 716/2014 (PCP) - AF 3.1.3 EU 716/2014 (PCP) - AF 3.1.4 EU 716/2014 (PCP) - AF 4.1.2 EU 716/2014 (PCP) - AF 4.2.3 EU 716/2014 (PCP) - AF 4.2.4 EU 716/2014 (PCP) - AF 4.3.1 EU 716/2014 (PCP) - AF 4.3.2 EU 716/2014 (PCP) - AF 4.4.2 EU 716/2014 (PCP) - AF 5.1.3 EU 716/2014 (PCP) - AF 5.1.4 EU 716/2014 (PCP) - AF 5.2.1 EU 716/2014 (PCP) - AF 5.2.2 EU 716/2014 (PCP) - AF 5.2.3 EU 716/2014 (PCP) - AF 5.6.1

T6	Q3 2024	Q2 2025	Commence replacement of Radio Equipment	Commence the replacement of current radio equipment to ensure service resilience.	
D5	Q4 2024	Q2 2025	MVS & SVS FOS at Prestwick	Deployment of the new Main and Secondary Voice platform into our Prestwick Operation	
IS1	Q4 2024	Q4 2025	SAP Core Upgraded	Upgrade of key Enterprise Resource planning (ERP) capabilities ahead of EoL in Dec 2025.	
O3	2025	2026	Modernised User Interface system deployed	Modernised User Interface system deployed into our Oceanic Operation	
O4	2025	2026	Modernisation of MECS	Modernisation of the Message Extraction and Correction System (MECS) capability in the Oceanic operation.	
A9	Q1 2025	Q2 2026	AMAN Headbranch onto the CSA	Transition of AMAN onto the Core Strategic Architecture	
A10	Q1 2025	Q4 2026	XMAN on CSA at PWK for Manchester	XMAN for Manchester deployed on the Core Strategic Architecture (CSA)	EU 716/2014 (PCP) - AF 1.1.1 EU 716/2014 (PCP) - AF 1.1.2
T7	Q1 2025	Q1 2026	Sustainment build 1 for iTEC V2:	Sustainment update for iTEC V2 FDP to ensure continued service resilience	
A11	Q2 2025	Q4 2025	Gatwick TBS Optimised Mixed Mode Plus	Arrivals gaps spaced according to departing aircraft size	EU 716/2014 (PCP) - AF 2.3.1
A12	Q2 2025	Q4 2026	Cross Border FRA D1	Deployment of Cross Border Free Route Airspace (FRA) in the FRA D1 region	EU 716/2014 (PCP) - AF 3.1.2 EU 716/2014 (PCP) - AF 3.2.4
A13	Q2 2025	Q4 2025	FASI Scotland	Delivery of Airspace Modernisation in the Scottish Terminal Manoeuvring Area (TMA)	
A14	Q2 2025	Q4 2026	FASI West Airport Connectivity	Delivery of connectivity for FASI Airport changes in the west of the UK	EU 716/2014 (PCP) - AF 1.2.3
T8	Q2 2025	Q4 2025	ExCDS Mid Life upgrade	ExCDS Mid Life upgrade to ensure continued service resilience	
T9	Q3 2025	Q4 2025	Dry Air Coolers (DACs) Deployment 2	Upgrade of remaining 2 DACs at Swanwick Centre to ensure service resilience	
A15	Q4 2025	Q4 2026	Cross Border FRA D2 with Ireland	Deployment of Cross Border FRA with Ireland in the West Airspace Deployment Region	EU 716/2014 (PCP) - AF 3.1.2 EU 716/2014 (PCP) - AF 3.2.4
A16	Q4 2025	Q4 2027	Borders & Central	Deployment of FRA in high level airspace across Borders & Central Region	EU 716/2014 (PCP) - AF 3.1.2 EU 716/2014 (PCP) - AF 3.2.4
T10	Q4 2025	Q2 2026	Surveillance Deployment 2	Second deployment of our Surveillance Service Infrastructure project to ensure service resilience.	
T11	2026	2027	Sustainment build 2 for iTEC V2	Sustainment update for iTEC V2 to ensure continued service resilience	
A17	Q1 2026	Q2 2029	FASI London	Delivery of Airspace Modernisation in the London TMA	EU 716/2014 (PCP) - AF 1.2.3

A18	Q1 2026	Q4 2026	FASI Northern England	Delivery of Airspace Modernisation in the Manchester TMA dependent on priority vs FASI London changes	EU 716/2014 (PCP) - AF 1.2.3
A19	Q3 2026	Q4 2027	Stansted TBS Optimised Mixed Mode Plus	All arrivals at Stansted follow time based separation rather than distance based	
T12	Q4 2026	Q4 2027	Surveillance Deployment 3	Third deployment of our Surveillance Service Infrastructure project to ensure service resilience.	
O5	2027	2029	FDP Replatforming	Upgrade to the GAATS+ platform as required to maintain the resilience of the Oceanic service in alignment with the NAV Canada build programme.	
O6	2023	To end of NR23 (OTS reduction to 2026)	GAATS+ Enhancement Build Programme (inc OTS Reduction)	Interim upgrades of GAATS+ across NR23 in alignment with the NAV Canada build programme. Includes progress towards Oceanic Track Structure (OTS) reduction.	