Dublin Airport Operating Expenditure: Bottom-up Efficiency Assessment

Commission for Aviation Regulation

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PUBLISHABLE DRAFT REPORT

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EXECUTIVE SUMMARY

Scope of work

Dublin Airport is economically regulated by CAR, with the current price control determination ("the 2019 determination") originally due to run from 2020 to 2024. The 2019 determination was based on pre-Covid 19 passenger forecasts, investment plans and operational processes. However, the impacts of the pandemic have meant that many of the assumptions that underpinned the 2019 determination are no longer applicable. As a result, CAR has decided on a complete review of the 2019 determination.

CAR commissioned CEPA and Taylor Airey to advise CAR on its review and assist in drawing up its 2022 draft and final decisions. Our work is focused on forecasting efficient operating expenditure (opex) at Dublin Airport, using a 'bottom-up' methodology, i.e. where operating expenditure is taken at its most granular level and projected forward.

This study builds on the efficiency analysis we conducted in support of the 2019 determination (referred to in this report as the "2019 study").[1] We have reviewed the conclusions of that study in light of new evidence presented by Dublin Airport, testing whether the assumptions underpinning our previous conclusions remain applicable, and considering new issues that have emerged in the intervening period. Given the extensive efficiency analysis we conducted in support of the 2019 study, we have set a relatively high bar for deviating from the forecasts we produced for that study, beyond making volume related adjustments to account for lower passenger volumes.

Our efficient forecasts from the 2019 study were based on what we considered would have been reasonably achievable given Dublin Airport's outturn expenditure at the start of the previous determination period (i.e. 2015) and assuming they had grown efficiently between 2015 and 2019. However, we note that there was a substantial gap between our view of baseline efficiency in 2019 and Dublin Airport's estimates of 2019 expenditure, which resulted in CAR implementing a glidepath in its 2019 determination. We have not explicitly adjusted our view of what is reasonably achievable to account for the size of the efficiency gap in 2019 and CAR's implementation of a glidepath. However, as we show later on, there is no longer a gap between our 2022 baseline efficient forecast and Dublin Airport's 2022 forecast.

Context

We recognise that much has changed in the intervening period. Passenger traffic substantially reduced in both 2020 and 2021, as at all other international airports, as a consequence of the pandemic. Both aeronautical and commercial revenues have consequently been much lower than anticipated, and costs have been reduced in response to the lower traffic volumes. Dublin Airport implemented actions to reduce its cost base, including:

- the introduction of a Voluntary Severance Scheme (VSS) by daa in Dublin and Cork Airport, which resulted in a 30% reduction of its staff compared to 2019;
- the freezing of wage increases and recruitment; and
- the temporary introduction of a 4-day working week.

Amongst other measures, these resulted in 2020 opex for Dublin Airport being 29% lower than the CAR forecast.[2] Dublin Airport's income from regulated charges and commercial revenues in 2020 was however 65% lower than

[1] CEPA and Taylor Airey (2019), Dublin Airport Operating Expenditure: Bottom-up Efficiency Assessment – Publishable Final Report, October 2019. Unpublished.

[2] Daa plc, Financial Review and Extract from Regulated Entity Accounts, Year Ending December 2020, page 3.

the CAR forecast.[3] The revenue figures would have been still lower had CAR not increased the 2020 price cap relative to the 2019 determination. Several questions arise from recent history including which pandemic related changes will reverse and which are more permanent; how to manage the uncertainty of forecasting in volatile conditions; the applicability of our 2019 elasticity assumptions to large step changes and the impact of changes to the capital programme on opex.

Conclusions

Comparing our forecasts of reasonably achievable efficient opex with Dublin Airport's forecasts, we draw three main conclusions:

- Dublin Airport has made good progress at delivering the efficiencies suggested in our 2019 study, through the delivery of the VSS scheme, through the introduction of more flexible rostering of staff, through increased outsourcing where outsourced services are more cost-effective, and through rationalising operations.
- At an aggregate level we broadly agree with Dublin Airport's 2022 forecasts of expenditure, though there are some cost categories where our forecasts are higher than Dublin Airport's and other areas where our forecasts are materially lower, namely Terminal Facilities staffing and to a lesser extent Maintenance staffing and IT non-pay costs. In each of these cases we are open to receiving additional evidence that substantiates the airport's position.
- We have more substantive differences on the reasonable growth in expenditure and staffing from 2022 onwards. The main drivers of difference are:
    - **Wage growth assumptions.** We have used more recent forecasts than Dublin Airport. We have also used a different methodology from Dublin Airport for applying external wage forecasts within our opex estimates, as we believe that Dublin Airport's approach is erroneous.
    - **Elasticity assumptions.** We have assumed that when Dublin Airport returns to 2019 passenger volumes, it requires the same level of resource as we previously estimated was efficient for 2019, before accounting for our other effects (e.g. wage growth, on-going efficiency improvements, new activities, etc.). Once passenger numbers grow beyond 2019 levels, we revert to the elasticities used within our 2019 study in most cost categories, except where there is a good reason for taking a new approach. By contrast, Dublin Airport has largely used the same elasticities as per its previous regulatory submission, which were on the whole higher than the elasticities we used, for the whole forecast period.
    - **Our more measured approach to allowing step changes in expenditure.** We allow step changes where there is clear evidence of need, a sound argument that costs are additional and not captured by our volume drivers, and where the proposed cost appears efficient.

We consider that Dublin Airport has not always provided adequate evidence to demonstrate that its proposals for step-increases in expenditure are necessary, genuinely additional, and appropriately sized for the need (i.e. efficient). We consider that there is a risk the airport overcompensates for short-term operational pressures by building in substantial additional cost. This present draft report provides Dublin Airport with a further opportunity to provide more substantive evidence that its proposed increases in expenditure are efficient, and also for other stakeholders to set out their views and evidence on these specific points.

[3] The Daa Financial Review and Extract 2020, page 2, shows €73.4 million regulated charges and €94.5 million commercial net revenues, totalling €167.9 million for the year. We have compared this with the 2019 determination which shows at Table 3.1 a forecast of €255.2 million regulated charges and €217.0 million commercial revenue, totalling €472.2 million. We then increased the latter by 1.1% for inflation (the same inflation adjustment daa used for that purpose in the Financial Review) to come to €477.4 million for the comparator figure.

As a high-level sense check of our forecasts, we have calculated the elasticity of overall opex with respect to passenger volumes, over the period 2022 to 2026. Excluding opex impacts from capital expenditure, our forecasts imply an elasticity of 0.36, rising to 0.43 when we include the impact of capex, which is within the generally accepted benchmark range of 0.3 to 0.4. By contrast, Dublin Airport's forecasts imply an elasticity of 0.7 over the same period.

Implications of our findings for cost forecasts

The table below shows our forecast of headcount in terms of full time equivalent (FTE) staff, over the period 2022 to 2026. While our estimated 2022 headcount of 2,380 FTEs is a substantial increase on Dublin Airport's 2021 outturn of 1,844 FTEs, we expect this to decline slightly in 2023. ✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂ ✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂ ✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂. From 2024 onwards, we expect there to be a gradual increase in headcount as the airport serves more passengers.

The table also shows that a substantial gap emerges over the determination period between our forecasts of reasonably efficient headcount and Dublin Airport's forecast. This gap increases when we reproduce our forecasts using Dublin Airport's projections of passenger volumes, which are lower than the CAR passenger projections used to produce our main forecasts.

Table E.1: Summary of forecast staffing levels at Dublin Airport, 2022-2026 (FTEs)

	2022	2023	2024	2025	2026
Security	895	847	873	895	908
Maintenance	206	216	221	226	229
Central Functions	312	315	318	320	321
Facilities and Cleaning	396	411	417	422	425
Campus Services	228	233	236	237	238
Retail	296	324	336	364	366
IT	62	66	70	72	75
Airside operations	78	80	80	81	81
Capital Projects	33	33	33	33	33
Total (excluding CIP)	**2,507**	**2,526**	**2,584**	**2,650**	**2,676**
CIP (including new runway and HBS3)	10	33	73	85	86
Total (including CIP)	**2,516**	**2,559**	**2,656**	**2,736**	**2,762**
CEPA/Taylor Airey forecast using Dublin Airport passenger projections	✂	✂	✂	✂	✂
Dublin Airport forecast	✂	✂	✂	✂	✂

Source: CEPA and Taylor Airey analysis

The following table shows our forecast of opex over the period 2022 to 2026. This presents a similar story to the above table showing our forecast of headcount. While our overall 2022 forecast is close to Dublin Airport's, there are a couple of cost categories where our 2022 baseline is materially different:

- **Terminal Facilities** – While our 2022 baseline of terminal facilities staffing has been constructed by rolling forward our 2019 efficient baseline, Dublin Airport suggest they require a step increase in headcount in 2022, despite the airport serving fewer passengers. It is not immediately apparent to us why this is necessary, though we recognise that a change in passenger expectations may warrant greater investment

in service delivery. Nevertheless, Dublin Airport has not yet adequately made the case for the additional expenditure. This is an area where further engagement will be required before we finalise our forecasts.

- **IT** – Dublin Airport has also proposed a step increase in non-pay IT but has not clearly articulated the case for additional expenditure, and so, we have only allowed increases we could validate independently.

Over the determination period, as with our forecast of headcount, a substantial gap emerges between our forecast and Dublin Airport's.

Table E.2: Summary of forecast opex at Dublin Airport, 2022-2026 (€ million, February 2022 prices)

	2022	2023	2024	2025	2026
Payroll					
Security	44.2	43.2	45.6	47.4	48.7
Maintenance	15.4	16.6	17.4	18.0	18.4
Central Functions	30.1	31.5	32.9	33.8	34.4
Facilities and Cleaning	19.6	20.8	21.6	22.1	22.5
Campus Services	19.1	20.1	20.7	21.1	21.4
Retail	16.7	18.9	20.2	22.2	22.6
IT	7.1	7.8	8.5	8.9	9.4
Airside operations	6.3	6.6	6.8	6.9	7.0
Capital Projects	3.3	3.4	3.5	3.6	3.7
Non-pay					
Maintenance	14.0	15.1	15.6	16.0	16.4
Facilities and Cleaning	✂	✂	✂	✂	✂
IT	10.0	10.9	11.1	11.4	11.7
Car Parking	✂	✂	✂	✂	✂
Employee-related overheads	6.4	6.5	6.7	6.9	6.9
Rent and rates	17.5	16.0	15.1	14.5	13.8
Consultancy services	7.1	7.1	7.1	7.1	7.1
Marketing	5.3	5.9	6.3	6.6	7.0
Insurance	4.4	4.9	5.2	5.5	5.8
PRM	✂	✂	✂	✂	✂
Other overheads	22.8	24.1	25.5	26.5	27.0
Utilities	13.0	12.7	12.9	13.0	13.0
Totals					
Pay	161.8	168.8	177.2	183.9	188.1
Non-pay	119.6	124.1	128.0	131.4	133.3
Total opex (excluding CIP)	**281.4**	**292.8**	**305.2**	**315.3**	**321.4**
CIP	0.4	3.5	7.8	8.0	7.5
Total (including CIP)	**281.8**	**296.3**	**313.0**	**323.3**	**329.0**

	2022	2023	2024	2025	2026
CEPA/Taylor Airey forecast using Dublin Airport passenger projections	✂	✂	✂	✂	✂
Dublin Airport forecast	✂	✂	✂	✂	✂

Source: CEPA and Taylor Airey analysis

1. INTRODUCTION

CEPA and Taylor Airey have been commissioned by the Commission for Aviation Regulation (CAR) to assess, on a bottom-up basis, the efficiency of Dublin Airport's operating expenditure (opex). This study provides an independent forecast of the efficient level of opex at Dublin Airport over the price control period, 2023 to 2026. This study will inform CAR in setting the airport's opex allowance, which is one of the regulatory building blocks for the price control.

The previous price control period ("the 2019 determination") was originally scheduled to run from 2020 to 2024, but the price cap within the 2019 determination was based on pre-Covid-19 passenger forecasts, investment plans and operational processes. The impacts of the pandemic mean that many of the assumptions that underpinned the 2019 determination are no longer applicable. As a result, CAR committed to carrying out a full review of the determination during 2022. CAR also made some short-term variations to permitted airport charges during 2020, which would apply in the interim period.

The full review of all the building blocks underpinning the 2019 determination has now started. This report documents CEPA/Taylor Airey's initial review of the opex building block. It has been used to inform CAR's draft decision. We will review responses to CAR's draft decision before issuing a further version of the report, which will document our final view of Dublin Airport's efficient opex over the period 2023 to 2026.

The forecasts in this report have been developed on a 'bottom-up' basis, where Dublin Airport's opex is taken at its most granular level and projected forwards. This means taking individual items of operating cost (e.g. security staffing, energy costs, rents etc.) and determining the efficient level of these costs in 2022, our base year, and then projecting those efficient costs forward to cover the complete control period, i.e. 2023 to 2026. We determine efficient baseline expenditure for 2022 either through benchmarking, expert judgement, or other quantitative methods, while the projections are based on elasticities which provide a means of quantifying how much costs vary as a result of changes in passenger numbers and/or other cost drivers. For our projections, we also consider potential step-changes to the airport's efficient cost base, such as increases in input cost prices beyond inflation (and outside of the airport's control), changes in operational efficiency due to capital investment, and improvements in service quality that require additional opex.

CEPA undertakes a range of efficiency analyses across the regulated sectors, which we have drawn on when producing our analysis. We are supported by Taylor Airey in this study, who bring long standing experience in airport operations and in developing efficient staffing arrangements.

This study builds on the efficiency analysis we conducted in support of the 2019 determination (referred to in this report as the "2019 study").[4] We have reviewed the conclusions of that study in light of new evidence presented by Dublin Airport, testing whether the assumptions underpinning our previous conclusions remain applicable, and considering any new issues that have emerged in the intervening period, for instance in consultation responses to CAR's Issues Paper. Given the extensive efficiency analysis we conducted in support of the 2019 study, we have set a relatively high bar for deviating from the forecasts we produced for that study, beyond making volume related adjustments to account for lower passenger volumes.

The remainder of this report is structured as follows:

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[4] CEPA and Taylor Airey (2019), Dublin Airport Operating Expenditure: Bottom-up Efficiency Assessment – Publishable Final Report, October 2019. Unpublished.

CEPA and Taylor Airey (2019), Dublin Airport Opex Efficiency Assessment: Review of Consultation Responses, October 2019. Available at aviationreg.ie.

Throughout this report, we distinguish between our 2019 study and CAR's 2019 determination. CAR's determination allowed Dublin Airport a glidepath to achieve the efficient levels of opex forecast within our study. As such, the opex implied within CAR's determination was higher in the early years of the determination period than was proposed within our 2019 study.

- In Section 2, we provide the regulatory context and set out our approach, specifying the evidence we have used and the stakeholder engagement we have conducted, and presenting the elasticities and other assumptions used in our forecasts;
- In Section 3, we review the efficiency of Dublin Airport's current salary and other payroll costs and project unit payroll costs by role, over the determination period;
- In Sections 4-21, we provide an overview of Dublin Airport's historic expenditure for each cost category, summarise the results of our efficiency analysis, and provide forecasts for each opex category; and,
- In Section 22, we summarise the results of our forecasts.

2. OUR APPROACH

In this study, we have been tasked with identifying an achievable efficient level of opex for Dublin Airport for the years 2023 to 2026. As with our 2019 efficiency study, we have built up an estimate of an efficient level of costs by separately examining the efficiency of historic salary levels, staff numbers, and non-staff costs, before projecting each element forwards using cost drivers and elasticities.

In developing our forecasts, we have been conscious that the pandemic has resulted in changes to operations that may be inconsistent with previous practice. Some of these changes are temporary whereas others may continue into the next determination period. We are also conscious that the airport is currently experiencing a rapid increase in passenger numbers that is proving challenging to manage at current levels of resourcing.

In this section, we set out our approach to producing efficient opex forecasts, and key considerations we have made in response to the Covid-19 pandemic.

2.1. DATA AND EVIDENCE USED

We use several sources of evidence in this report:

- We use cost and staffing data provided by Dublin Airport for the years 2019 to 2021 to understand the actions taken by the airport during the pandemic, and the current structure of the airport's cost base. We supplement this with historic data taken from our previous efficiency study to understand broader trends in expenditure. This data provides annual staffing levels in terms of full-time equivalent (FTE) staff for each business unit, associated payroll costs, and non-pay costs by detailed cost category.
- We also use Dublin Airport's regulatory submission, to better understand the airport's plans for the next determination period, and to consider the evidence base supporting its proposed expenditure levels.[5] We have requested and received supplementary information from Dublin Airport, such as staffing levels by terminal, staff rostering patterns, airport usage metrics, etc.
- To conduct benchmarking analysis, we have collected data from the annual accounts of other airports and comparator firms, from industry benchmark reports, and from previous regulatory and efficiency studies.
- Finally, we draw on the analysis and conclusions in the 2019 efficiency study. The 2019 study was a detailed piece of analysis that drew several conclusions around Dublin Airport's efficiency potential. We reviewed whether the actions identified by our study have been implemented and whether the assumptions underpinning those conclusions remain relevant in a post-pandemic context.

Where necessary, we have clarified this information provided by Dublin Airport through workshops with the airport, and through a review of the regulatory submission. In particular, we have explored the actions taken by Dublin Airport in response to the Covid-19 pandemic, both as the operational requirements of the airport evolved and in response to the financial pressures introduced by the pandemic.

While we recognise the efforts Dublin Airport has taken to respond to our queries, particularly under challenging circumstances, there have been some instances where the airport has been unable to provide relevant data or has provided incomplete or inconsistent answers to our queries. Due to constrained timescales, it has not always been possible to pursue these issues in time for Dublin Airport to provide a revised or more complete response. In some instances, we have received information too late for it to be properly considered within our forecasts.

We have taken a pragmatic approach in response to this issue, aligning our forecasts with Dublin Airport's where we consider, on balance, that its approach is likely to be justified. However, such positions will be reviewed and reconsidered in our final report, and it is possible that our forecast of efficient opex will therefore adjust in some

[5] Dublin Airport (2022), Regulator Proposition for 2023-2026, Appendix 4: Operating Expenditure Report. Unpublished.

areas. Throughout the remainder of this report, we highlight where we have used placeholder assumptions that need to be reviewed for the final forecasts, where we have received evidence that is yet to be considered, and where further evidence, or better-quality evidence, would allow us to revisit our assessment and forecasts.

2.2. Core assumptions

Inflation – The monetary figures in this report are presented in February 2022 prices unless otherwise stated. We have used the Consumer Price Index (CPI) for Ireland to inflate historic figures to February 2022 prices. For future rates of inflation, where needed, we have taken an average of available CPI forecasts to produce a consensus forecast based on:

- Economic and Social Research Institute, Quarterly Economic Commentary, Spring 2022.
- International Monetary Fund, World Economic Outlook, April 2022.

For forecasts from 2024 onwards, we use the long-term inflation target of 2%.[6]

Passenger forecasts – Our forecasts use CAR's passenger projections (shown in the table below), to ensure the opex building block is consistent with the other regulatory building blocks. ✂.

As it is still unclear whether the recovery in passenger volumes experienced over the past few months will continue at the same pace, or strengthen further, we anticipate that CAR's passenger forecasts may change between the draft and final determinations. This could result in some material changes to the forecasts presented within this report.

Table 2.1: Dublin Airport historic passenger volumes, and comparison of forecasts for the period 2022 to 2026 (million passengers)

	2019	2020	2021	2022	2023	2024	2025	2026
Historic	32.9	7.9	8.5					
Dublin Airport forecast				✂	✂	✂	✂	✂
CAR forecast				25.3	30.1	32.3	34.2	35.2

Source: Dublin Airport (2022) Regulatory Proposition for the Period 2023 to 2026; CAR

Wages and other payroll costs – We have used data on historic wage growth to compare how wages for specific roles compare with similar roles elsewhere in the Irish economy.[7] The data is available up to 2020, for wages in Ireland as a whole, as well as wages in specific economic subsectors.

From 2020 onwards, we firstly explore if there are specific roles which might deviate from standard wage growth in the Irish economy. For remaining roles, we assume that Dublin Airport unit payroll costs will generally grow at the same rate as average wage growth in the Irish economy. We use the average from the following two publications as the source of our Irish wage growth forecasts:

- European Commission, Economic Forecast for Ireland, Spring 2022.
- Central Bank of Ireland, Quarterly Bulletin, April 2022.[8]

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[6] Central Bank of Ireland (undated), https://www.centralbank.ie/monetary-policy/policy-setting

[7] Taken from the Central Statistics Office on Annual Earnings and Labour Costs, including bonuses and overtime.

[8] The Central Bank of Ireland's July quarterly bulletin was published on 7th July. However, the timings for finalising our forecasts and producing this report did not allow it to be incorporated for this iteration of our forecasts.

From 2025 onwards, we assume real wage growth will be 1.5% in line with the historic average growth in real wages in the Irish economy in recent decades, as per our previous study.[9] In Section 3, we present further detail on our approach to forecasting wages for each role.

The table below shows our assumptions of standard wage growth from 2021 onwards. As can be seen from the range of figures presented, there is significant uncertainty around the future trajectory of wage growth. We expect to update this for our final forecasts in line with any updates to the publications referenced.

Table 2.2: Forecasts of wage growth, 2021-2026 (%)

	2021	2022	2023	2024	2025	2026
Real wage growth (inflation adjusted)						
European Commission	1.2	-2.3	4.7	-	-	-
Central Bank of Ireland	-0.7	-4.2	1.9	3.0	-	-
Long-run wage growth	-	-	-	-	1.5	1.5
CEPA assumption (average)	**0.3**	**-3.3**	**3.3**	**3.0**	**1.5**	**1.5**
Nominal wage growth						
European Commission	3.6	3.8	7.8	-	-	-
Central Bank of Ireland	1.7	2.3	4.7	5.1	-	-
Long-run wage growth	-	-	-	-	3.5	3.5
CEPA assumption (average)	**2.7**	**3.1**	**6.3**	**5.1**	**3.5**	**3.5**

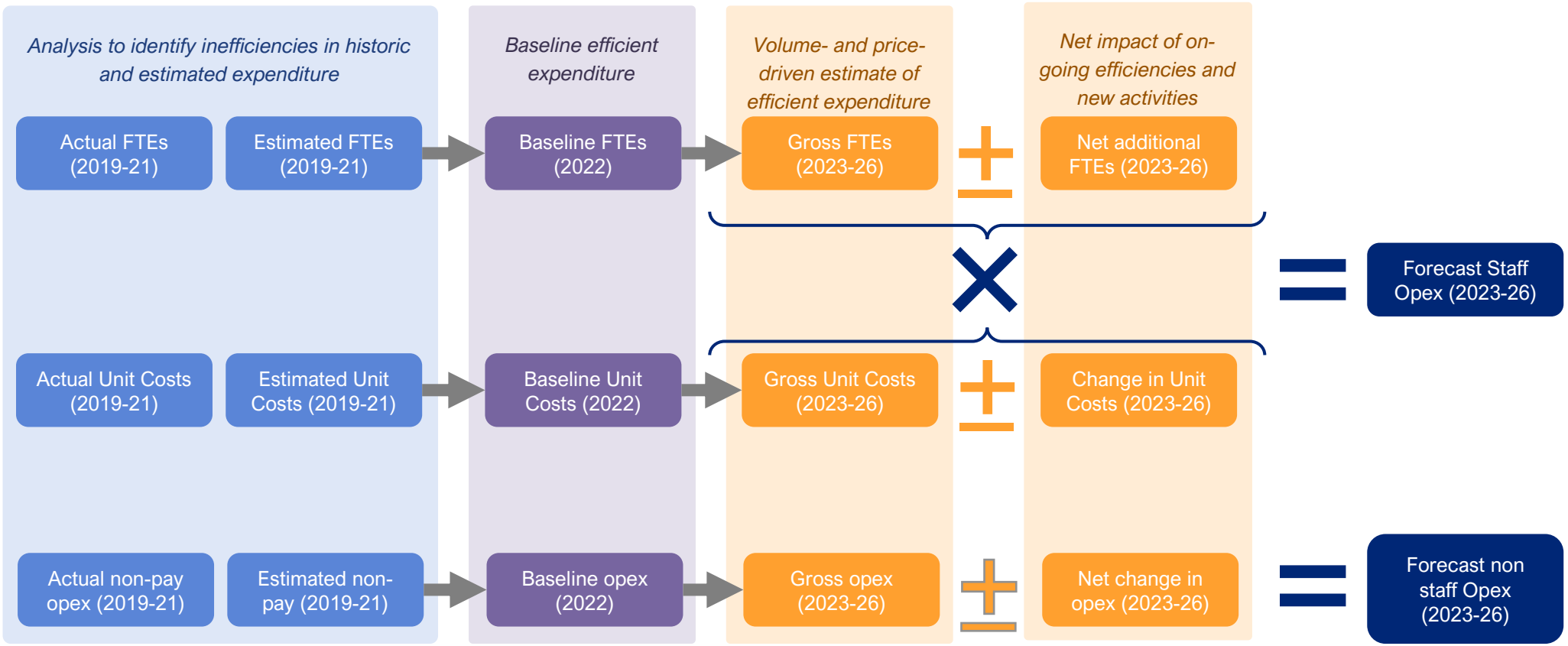
Source: European Commission; Central Bank of Ireland; CEPA analysis

[9] CEPA analysis of IMF data over the period 2000 to 2020.

2.3. OUTLINE ANALYTICAL APPROACH

We illustrate in Figure 2.1, the analytical approach we have taken to producing the opex forecasts.

Figure 2.1: Approach to estimating forecast efficient operating expenditure at Dublin Airport



For each cost category, we have:

- Assessed the efficiency of historic expenditure over the period 2019-2021;
- Used this information to estimate a baseline for efficient expenditure in 2022;
- Projected efficient level of expenditure over the period 2023-2026 using volume/price drivers and elasticities; and
- Added or subtracted any known step changes in expenditure over the period 2023-2026 e.g. as a result of newly emerging cost pressures, efficiency initiatives, or opex impacts from completed capital projects.

2.3.1. Assess efficiency gap over the period 2019 to 2021

To inform the 2022 baseline, we started by assessing the efficiency of Dublin Airport's historic expenditure, to better understand the extent to which there was an efficiency gap. We utilised a range of sources, seeking to identify any themes running across the categories of spend, and their overall implications for our estimate of baseline costs:

- For each category of spend, we examined actual expenditure over the period 2019 to 2021 against our estimate of efficient expenditure taken from the 2019 study. These estimates were lower than the allowance assumed within CAR's 2019 determination, as the determination allowed for a glide-path for Dublin Airport to reach efficient spending levels.[10]
- We also compared actual expenditure to what we refer to in this report as an 'adjusted efficient forecast'. This adjusted allowance is what our 2019 estimate of efficient expenditure would have been if we had perfect foresight around outturn wage growth over the period 2019 to 2021 and passenger volumes. Given the sharp reduction in passengers as a result of the Covid-19 pandemic, this provides a more appropriate comparison with outturn expenditure. In making these comparisons, we also sought to account for government support schemes, such as the Employee Wage Support Scheme (EWSS), that temporarily reduced costs to the business during the pandemic.
- Where appropriate benchmarks are available, we benchmarked externally against other airports or other organisations with similar functions, and by calculating productivity metrics such as expenditure per passenger or per square metre of terminal space.
- We considered qualitative and contextual evidence on the efficiency of expenditure provided by Dublin Airport, with a particular focus on the actions taken by the airport since our last efficiency study. Our engagement with Dublin Airport has been valuable in understanding what elements of Dublin Airport's expenditure in 2020 and 2021 were one-off effects, and what changes will persist.
- Finally, where there was a gap between our view of efficient costs and Dublin Airport's outturn expenditure, we applied a three-part test to determine whether this additional expenditure could be considered efficient:
    - **Need** – We assessed whether there was a need for the additional expenditure, i.e. whether there was an impact outside of Dublin Airport's control that affected its cost base.
    - **Additional** – We considered whether the additional expenditure was likely to be genuinely additional to our benchmarks or volume-related adjustments.

[10] Our 2019 forecasts were based on what we considered would have been reasonably achievable by Dublin Airport had its opex grown efficiently over the previous determination period, running from 2015 to 2019. However, as there was a substantial gap between our estimate of efficient expenditure in 2019 and Dublin Airport's estimates, CAR implemented a glidepath to allow Dublin Airport time to reach efficient spending levels.

- **Efficiency** – We tested if the strength of the evidence supported the scale of additional expenditure.

For staff costs, we first considered the appropriateness of staffing levels (rather than spend) and then separately assessed the efficiency of current unit payroll costs.

2.3.2. Establishing baseline expenditure

Once we identified the size of any efficiency gap for each category, we constructed an estimate of 2022 expenditure, which forms our baseline. We constructed this in one of three ways:

- Taking Dublin Airport's estimate for 2022 expenditure / staffing levels, removing any inefficiency, and adding allowances for any new activity or step changes in cost. We have used Dublin Airport's 2022 estimates where we lack confidence that the 2019 or 2021 figures appropriately reflect efficient expenditure in 2022, even after making appropriate volume and efficiency adjustments, due to the large volume of structural changes. This applies primarily to Utilities expenditure, where there have been substantial changes to consumption over time and to prices in 2022.
- Taking our estimate of efficient expenditure / staffing levels in 2019, rolling forward to 2022 using appropriate volume or cost drivers, and adding allowances for any new activity or step changes in cost. We start from 2019 expenditure where we consider Dublin Airport is likely to return to a business-as-usual arrangement by 2022, subject to volume adjustments. We use this approach for the majority of the cost categories.
- Taking Dublin Airport's outturn 2021 expenditure / staffing levels, rolling forward to 2022 using appropriate volume or cost drivers, and making any adjustments for step-changes. We use 2021 expenditure as our starting point where there have been major structural changes to Dublin Airport's cost base that mean 2019 expenditure is no longer reflective of efficient expenditure. For example, for non-pay cleaning costs, there has been a major change in the scope of the cleaning contract with Momentum, which means that 2019 costs are no longer an appropriate basis for setting the forecasts.

We have not explicitly adjusted our forecast to account for the achievability of such spending levels given Dublin Airport's outturn expenditure in 2021 and its estimated expenditure in 2022. However, as our 2022 forecast implies higher spending than proposed by Dublin Airport in 2022, we do not consider such an adjustment necessary.

2.3.3. Projecting expenditure forwards

From our 2022 baseline, by cost category, we first projected gross expenditure and staffing levels by applying a passenger volume related elasticity to passenger forecasts. For selected cost categories, we used other more appropriate cost drivers, such as energy price forecasts or projections of wage growth.

To select an appropriate elasticity, we relied heavily on the elasticity assumptions used in the 2019 study.[11] These were either derived on a bottom-up basis, or were judgements based on an analysis of the type of activities captured within each cost category and the historic relationship between the cost driver and cost. For some cost categories, we have found it appropriate to use two elasticities:

- **A 'recovery phase' elasticity, used in years when passenger volumes are expected to be lower than they were in 2019.** We set this recovery phase elasticity such that by the time passenger volumes recover to 2019 levels, our estimate of efficient expenditure is broadly in line with our estimate of efficient expenditure established in 2019 (before accounting for any step changes). In other words, our recovery elasticities imply that, all else being equal, Dublin Airport should be able to serve 32.9 million passengers in

[11] CEPA and Taylor Airey (2019), Dublin Airport Opex Efficiency Assessment: Review of Consultation Responses, October 2019. Available at aviationreg.ie.

the next determination period with the same resources we considered was necessary and efficient in 2019; 2019 being the year when Dublin Airport last served 32.9 million passengers.

- **A 'standard' elasticity applied to years where passenger volumes are higher than they were in 2019, drawn from our 2019 study.** We reviewed whether new evidence on the relationship between costs and cost drivers has emerged since our 2019 study that would suggest revisiting our elasticity assumptions. At this stage, we have made only a limited number of small adjustments where evidence from Dublin Airport's outturn expenditure in 2019-2021 suggested using a different elasticity assumption.

In Appendix B we detail the elasticities we use in this study, the cost and volume drivers we use, and our rationale for both.

After projecting each cost and staffing category using volume or price drivers, we produced a forecast of efficient expenditure by adjusting the estimates for any anticipated step changes, such as costs arising from new activities, the implementation of efficiency initiatives and ongoing productivity improvements, and the opex impact of capital expenditure. For this, we drew on a number of sources of evidence:

- For ongoing efficiency initiatives, we reviewed estimates provided to us by Dublin Airport, either within its regulatory submission or through bilateral engagement. We also drew on our own experience from other airports, and from the analysis in our 2019 study.
- For the costs associated with new activities, we similarly applied the three-part test discussed above (i.e. need, additionality, efficiency). To test efficiency, we reviewed estimates provided to us by Dublin Airport within the regulatory submission and sought to validate these, using publicly available benchmarks wherever possible.
- Finally, we separately assessed the opex impact of Dublin Airport's Capital Investment Plan (CIP). Dublin Airport presented its estimates of the opex impact of its CIP2020, in support of the 2019 determination. We used this as the basis of our estimates but we:
    - removed projects that had been cancelled, deferred, or delayed beyond the end of the next determination period.
    - removed projects that had already been implicitly accounted for within our forecasts.
    - adjusted the timing of projects that had been delayed and applied any efficiency adjustments to the estimates as per our 2019 study.
    - considered new projects that were not in the previous CIP and used our understanding of that project to estimate any opex impact, alongside any estimates provided by Dublin Airport.

3. EFFICIENCY OF UNIT PAYROLL COSTS

Summary

As a result of the Covid-19 pandemic, average unit payroll costs fell in 2020 and 2021 from a high point in 2019, mostly as a result of government wage supports. Dublin Airport has employed a range of strategies to mitigate pandemic-related reductions in revenue, ranging from pay-freezes in 2020 and 2021, to the introduction of a voluntary severance scheme (VSS). However, we find that there was a proportionately greater reduction in the number of lower paid staff than higher paid staff.

The movement in average unit payroll costs between 2019 and 2021 represents a positive move towards efficiency, following a period of inefficient wage growth above the Irish economy-wide average in prior years. There still exists a wage differential between staff on older, pre-2010 contracts and those hired on contracts with more modern terms and conditions, as discussed in our 2019 study. However, one effect of the VSS has been to reduce the number and proportion of staff on older contracts, making the impact of this wage differential less pronounced.

To produce our 2022 baseline of efficient unit payroll costs, we started with estimates from the 2019 study and projected forwards using economy-wide wage growth rates, adjustments to account for changes in the proportion of staff on older contracts vs new contracts, and adjustments to account for longstanding pay deals agreed with airport staff and unions.

In the following section, we assess the efficiency of salary and other pay costs, such as pensions, social insurance etc, and produce a forecast of unit payroll costs by role for the next determination period.

3.1. Staff contractual arrangements

There exists a wide range of employment contracts for staff at Dublin Airport which, as documented in our 2019 study, is partly dependent on when staff started their employment at the airport. Dublin Airport introduced contracts with revised terms and conditions following the combination of the global recession and the opening of Terminal 2 in 2010. The post-2010 contracts contain more limited restrictions on working practices, giving the airport the ability to deploy staff cross-functionally depending on demand, increasing staff productivity and, therefore, reducing staffing requirements and payroll costs.[12]

Initially, only staff employed to work in Terminal 2 were appointed on these 'post-2010' contracts, with staff hired in the years prior largely remaining in Terminal 1 on pre-2010 contracts. Staff are no longer attached to a single terminal, with their terms changing in 2020-2021 under New Ways of Working (NWOW) to allow them to work across both terminals as demand requires.

Figure 3.1 details the proportion of staff on pre-2010 terms and conditions, versus those on post-2010 contracts for each staff category. [redacted], with the number of staff on old contracts declining by 34% during the same time period. Historically, this decline in pre-2010 contracts has been attributed to staff progression and natural attrition but has likely been accelerated by the VSS introduced in 2020.[13] As was the case in the 2019 report, we do not have separate estimates for unit payroll costs for staff on pre-2010 contracts versus those on post 2010-contracts. However, we understand from discussions with Dublin Airport that there remains a pay differential between staff on the two contract types.

Dublin Airport has made good progress at reducing the number of staff on pre-2010 terms. However, we also note that faster progress has been made in tackling such issues at other airports and airlines in Ireland and the UK. As such, we consider there should be an ongoing incentive on Dublin Airport to continue efforts to reduce the impact of pre-2010 terms on its cost base, while recognising that this type of change takes time to deliver.

[12] CEPA & Taylor Airey (2019), Dublin Airport Operating Expenditure: Bottom-up Efficiency Assessment, p. 25

[13] Dublin Airport (2022), Regulator Proposition for 2023-2026, Appendix 4: Operating Expenditure Report, p. 9

Figure 3.1: Number and proportion of staff on old contracts versus new contracts, 2017 and 2021 (# and %)

Source: CEPA analysis of Dublin Airport data
Note: For Capital Projects, we note that the number of staff on pre-2010 contracts is higher in 2021 than in 2017. We consider this is likely due to reallocation of staff between categories and differences in capitalisation of staff time from year-to-year.

3.2. Analysis of historic payroll costs

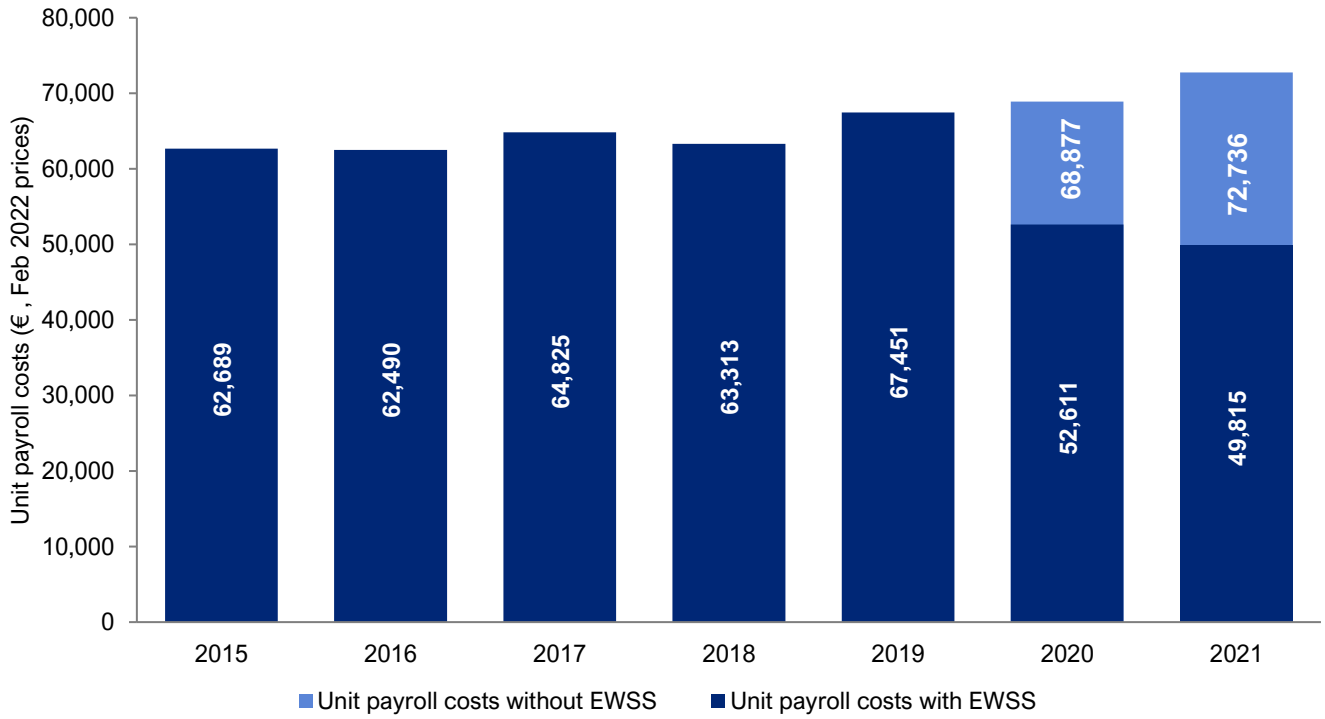
As Figure 3.2 shows, there was a gradual upward trend in Dublin Airport's average unit payroll costs between 2015 and 2019. Unit payroll costs fell in 2020, and again in 2021, though this can largely be attributed to the EWSS, where the Irish government provided a flat-rate subsidy to employee pay for eligible Irish businesses.

Dublin Airport has explained the various strategies deployed to reduce payroll costs in its regulatory submission.[14] This includes reducing the working week to four days,[15] introducing a pay freeze in 2020 and 2021, and cancelling performance related pay. Despite this, average unit payroll costs increased in 2020 and 2021, when the EWSS subsidy is accounted for. This is because proportionately, there has been more of a reduction in lower paid than higher paid staff, increasing the average unit payroll cost. This is not necessarily evidence of inefficient behaviour, as we would expect passenger-facing roles, which are more volume-driven, to be lower paid than the airport average. Nevertheless, this does mean that as staffing levels recover, we would expect average unit payroll costs to rise by less than economy-wide wage growth, even if the wages for individual roles are linked to standard wage growth assumptions.

[14] Dublin Airport (2022), Regulator Proposition for 2023-2026, Appendix 4: Operating Expenditure Report, p. 8-9

[15] The move to a four-day working week ran from 27 April 2020 to 28 May 2021. While this reduced overall payroll costs, it did not affect unit payroll costs – staff worked four days at 80% pay, meaning that FTE staffing fell in proportion to the reduction in total payroll costs.

Figure 3.2: Average unit payroll costs, 2015-2021 (€, February 2022 prices)



Source: CEPA analysis of Dublin Airport data
Note: The EWSS adjusted forecast should only be considered a broad estimate, as it does not explicitly account for differing eligibility rules around the wage support paid by government.

3.3. PROJECTED UNIT PAYROLL COSTS

As with our 2019 study, we distinguish between staff on older contracts and staff on newer contracts, projecting wages for each separately. To smooth any year-on-year fluctuations in unit payroll costs within a single business unit, we group similar roles together when producing our unit payroll cost forecasts. Table 3.1 shows how these staff roles have been categorised:

Table 3.1: Forecast unit payroll costs from 2022 to 2026 (€ per FTE, February 2022 prices)

Salary grouping	Functions / roles (CAR Category)
Maintenance *	All (Maintenance)
Facilities and Cleaning *	All (Facilities and Cleaning) Transfer product (Central Functions) Terminal facilities (Campus Services) Car Park operations (Cark parks)
Retail *	Terminal retail (Retail)
Security *	Terminal security (Security) Campus security (Security) Group security, daa group (Security)
IT	All (IT)
Fire / Police	Fire (Campus Services) Police (Campus Services)
Commercial	Commercial (Central Functions)

Central Finance	Finance except SSC (Central Functions)
Finance (Shared Services Centre)	SSC
Airside Operations	All (Airside operations)
Admin	All remaining (Central Functions) Capital Projects (Capital Projects) Security management (Security) Staff planning and administration (Campus Services) Retail management and logistics (Retail)

Source: CEPA

** Groups where staff on older contracts are considered separately to those on newer contracts.*

3.3.1. Baseline

To estimate unit payroll costs for our 2022 baseline, we take the 2019 efficient baseline from our previous study and apply our standard wage growth assumptions to uplift this efficient baseline to 2022. As stated in Section 2.2, we use data from the Central Statistics Office for 2020 wage growth, and a consensus forecast of earnings constructed from European Commission and Central Bank of Ireland projections for 2021 onwards.

In our baseline estimate, we also account for the increase in pension costs from 2020 onwards due to the unfreezing of pension contributions. This relates to a historic agreement that temporarily froze employer pension contributions.[16]

As a cost-controlling measure in response to the Covid-19 pandemic, Dublin Airport implemented a pay freeze in 2020, extending it to 2021. This pay freeze mirrored the actions of other businesses in the aviation sector, which employed a variety of measures including pay freezes, changes in employment terms and conditions, pay cuts and redundancies.[17]

As we are using standard wage growth assumptions to forecast the growth in unit payroll costs between 2019 and 2022, instead of aviation sector specific wage growth assumptions, [redacted]

- [redacted]
- [redacted]
- [redacted]

We have also not explicitly adjusted our wage forecasts to account for the fact that, as Dublin Airport hires more staff, average unit payroll costs will reduce as newer staff are placed towards the bottom of their respective pay scales. With the large increases in staffing expected between 2021 and 2022, this could have a material effect on efficient unit payroll costs. However, newer staff may also be less productive than their more experienced colleagues initially. At present we assume that these effects cancel each other out, but we may revisit this in our final report.

[16] Dublin Airport (2022), *Regulator Proposition for 2023-2026, Appendix 4: Operating Expenditure Report*, p. 8-9

[17] Lucy Budd, Stephen Ison, Nena Adrienne (2020), *European airline response to the COVID-19 pandemic – Contraction, consolidation and future considerations for airline business and management*, p.6

Table 3.2 details our baseline, alongside Dublin Airport estimates for 2022. For retail staff, we have relied on Dublin Airport's 2022 estimate for unit payroll costs. While these are slightly higher than our alternate estimate, Dublin Airport has provided compelling evidence in its regulatory submission to demonstrate the efficiency of its 2022 wages for retail staff. Specifically, they show that their proposed hourly rate for retail staff is in line with other local retailers, after accounting for the greater level of training required and the higher proportion of unsocial hours.[18]

Where direct comparisons can be made for other staff, the CEPA efficient baselines are broadly similar to Dublin Airport's estimates for 2022, except for Airside Operations which is slightly higher than Dublin Airport's estimates and Maintenance which is slightly lower than Dublin Airport's estimates. This suggests that following Dublin Airport's implementation of the pay freeze and with its proposed pay offer for 2022, the unit payroll costs for 2022 are broadly efficient.

Dublin Airport has recently provided further evidence to support its proposed unit payroll costs for Maintenance staff. We have been unable to review this evidence in time for the finalisation of this draft report. We will consider this evidence alongside any further representations made in response to the CAR's consultation on the draft determination.

Table 3.2: Baseline unit payroll costs, compared with Dublin Airport 2022 estimate (€ per FTE, February 2022 prices)

Staffing group	2019 – CEPA efficient baseline	2019 – Dublin Airport actual	2022 – CEPA efficient baseline	2022 – Dublin Airport estimate
Admin **	✂	✂	✂	✂
Airside Operations	✂	✂	✂	✂
Commercial **	✂	✂	✂	✂
Central Finance **	✂	✂	✂	✂
Finance (SSC) **	✂	✂	✂	✂
Fire / Police **	✂	✂	✂	✂
IT	✂	✂	✂	✂
Maintenance *	✂	✂	✂	✂
Facilities and Cleaning *	✂	✂	✂	✂
Retail *	✂	✂	✂	✂
Security *	✂	✂	✂	✂

Source: CEPA analysis of Dublin Airport data
Notes: (*) ✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂ ✂✂✂✂. (**) For these categories, we are unable to make a like-for-like comparison with Dublin Airport's estimates as payroll costs and FTEs are categorised differently.

3.3.2. Forecast

Our core wage forecast, described in Section 2.2, is used to estimate salary costs from 2022 onwards. We have assumed that wage growth will be universal across staff categories. Unlike our 2019 study, we do not assume higher wage growth for any specific role; we do not identify enough of a differential between wage growth or job vacancy rates across roles in the Irish economy to justify a wage growth premium for specific types of staff.

✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂ This is not an action we expect to be precisely replicated in practice but seeks to maintain an incentive on Dublin Airport to reduce the impact of pre-2010 terms on its cost base.

[18] Dublin Airport regulatory submission to CAR, "Appendix 4: Operating Expenditure Report", p.22 to 24.

Table 3.3 summarises our wage growth forecasts by staff group.

Table 3.3: Forecast unit payroll costs from 2022 to 2026 (€ per FTE, February 2022 prices)

	2022	2023	2024	2025	2026
Admin	✂	✂	✂	✂	✂
Airside Operations	✂	✂	✂	✂	✂
Commercial	✂	✂	✂	✂	✂
Central Finance	✂	✂	✂	✂	✂
Finance (SSC)	✂	✂	✂	✂	✂
Fire / Police	✂	✂	✂	✂	✂
IT	✂	✂	✂	✂	✂
Maintenance *	✂	✂	✂	✂	✂
Facilities and Cleaning *	✂	✂	✂	✂	✂
Retail *	✂	✂	✂	✂	✂
Security *	✂	✂	✂	✂	✂

Source: CEPA analysis of Dublin Airport data

** Weighted average of staff on pre-2010 contracts and those on post-2010 contracts*

4. SECURITY

Summary

Dublin Airport responded swiftly to the pandemic with expenditure in 2020 and 2021 below the forecasts we made in 2019 when adjusted for the downturn in passenger movements and having accounted for government wage support. There was an increase in security cost per passenger in 2020, but this is not unreasonable given the level of uncertainty at the time, and that the cost per passenger returned to near-2019 levels in 2021.

The higher than expected increase in passenger numbers in early 2022, combined with IT issues, [redacted], have all had an impact on resourcing security at Dublin Airport. This means that setting an efficient staffing level and associated cost for security at the airport is especially challenging, and the figures we present in this report are highly uncertain. Further work and discussions with stakeholders will be required to finalise our projections and they could differ substantively from the figures presented here. In this section, and in Appendix C we highlight areas where we consider assumptions to be interim and subject to change. This could have material impact on the results.

In developing our baseline for 2022 and forecasts for subsequent years we have:

- Modelled the link between passenger growth and FTE requirements within the Airport Search Unit, using 2019 traffic data adjusted to CAR's forecast future traffic levels.
- Absent current roster data, used Dublin Airport's actual staffing levels in 2019 as if they were efficient
- [redacted]
- [redacted]

The assumptions made in each of these areas are subject to further refinement and may change.

We have also assessed the impact of planned future developments in the security operation from 2024, in particular the deployment of C3 scanning equipment which removes the requirement for liquids and electronics to be removed from hand baggage when screened. This results in a reduced average number of trays / X-ray images per passenger (IPP). At present we do not accept arguments made by the airport that the benefits of C3 are very limited. Our analysis suggests that staffing levels and costs from 2024 could be materially reduced as a result of the positive impact of C3 equipment on passenger throughput.

Our current forecast of staffing levels, including the impact of the deployment of C3 equipment, is 895 FTEs in 2022, reducing to 847 FTEs in 2023 [redacted], and then increasing to 934 FTEs by 2026. This implies **€44.2 million** in expenditure in 2022, **€43.2 million** in 2023, rising to **€50.1 million** by 2026. Although currently close in 2022, our projections of cost and staffing levels diverge substantially over time from the projections provided by the airport, this may change (in either direction) as we complete our review of recently provided evidence.

The security function remains the single largest component of opex at Dublin Airport. Most expenditure is on directly employed staff carrying out the following security-related activities:

- **Terminal security ("the Airport Search Unit" or ASU)** – Security within the terminal buildings, comprising officers and team leads. This is split between in-lane operations for passenger hand-baggage screening, and static posts to manage passenger flows. Staffing requirements differ between Terminal 1 and Terminal 2 due to the type of screening equipment in use, number of lanes available, and overall configuration of the security operation.
- **Vehicle control points (VCP)** – Security outside the terminal buildings, comprising officers and team leads managing control posts on the airfield perimeter, including screening of staff and vehicles and perimeter security.
- **Management and other security functions** – Support functions necessary for the functioning of the security operation at the airport including management, staff planning, and training.

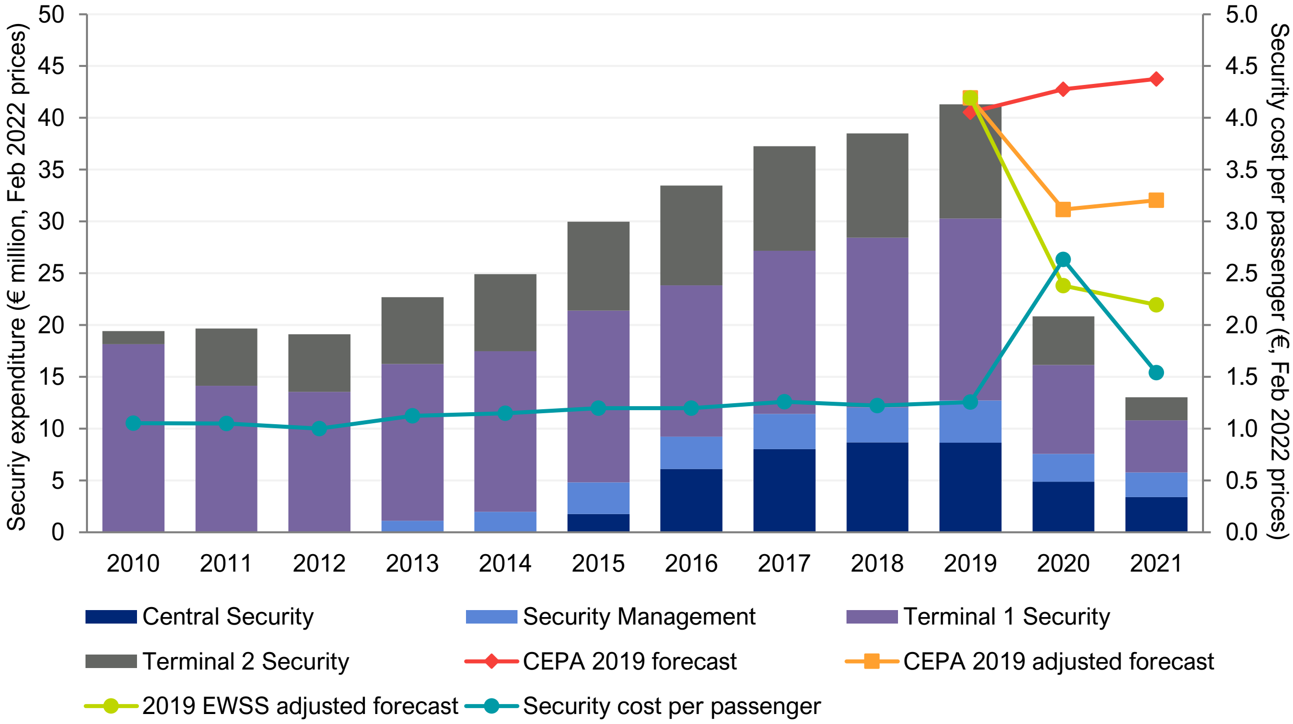
The operating and maintenance costs of security equipment and facilities is included within other cost categories.

4.1. Historic expenditure

Payroll costs

Security staff costs continued to increase in 2019, growing by 7% from 2018 as shown in Figure 4.1. However, security costs per passenger remained relatively constant at €1.26, with the total spend of €41.3 million, marginally below our outturn passenger volume adjusted forecast of €41.9 million.

Figure 4.1: Security staff historic expenditure at Dublin Airport, 2010-2021



Source: Taylor Airey analysis of Dublin Airport data
Note: The EWSS adjusted forecast should only be considered a broad estimate, as it does not explicitly account for differing eligibility rules around the wage support paid by government.

Given the impact of Covid-19, security staff costs halved in 2020, with a further reduction in 2021 where costs were nearly 70% lower than 2019 levels. This was the result of a number of factors, including the VSS, the temporary move to a four-day working week, and the use of government support schemes such as the EWSS.

Staff in security remain employed on a mixture of contractual terms which attract significantly different average pay rates. [redacted].

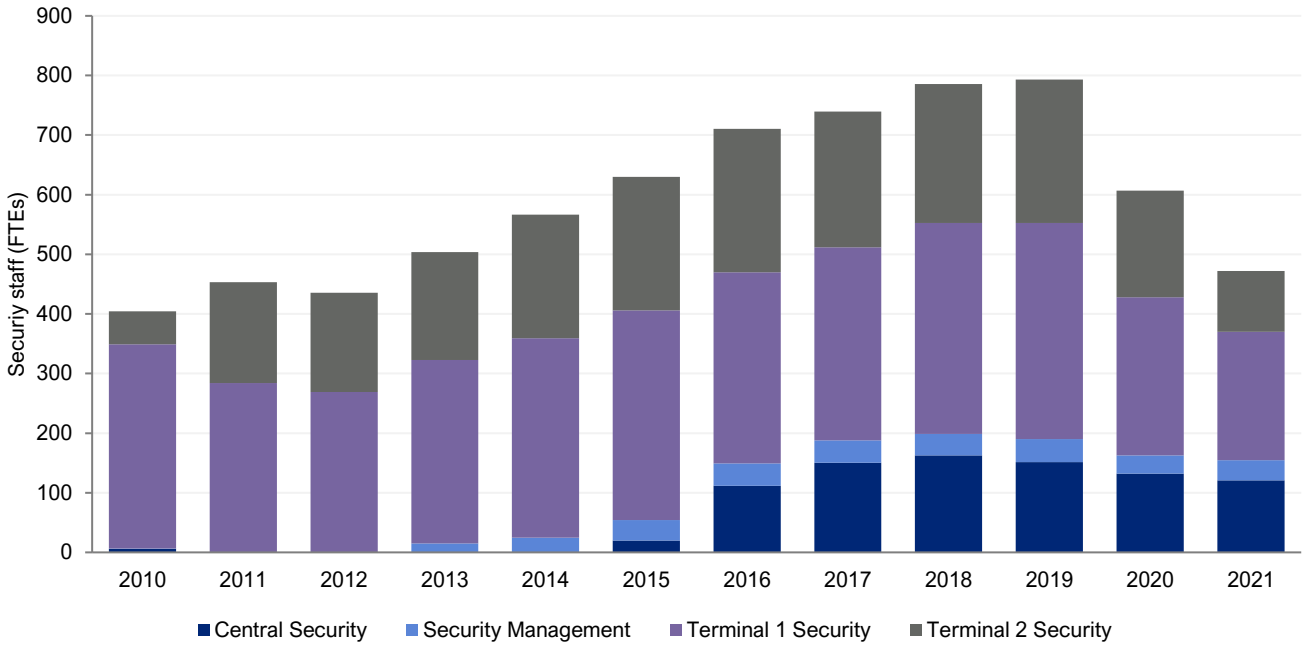
Dublin Airport appear to have responded swiftly to the pandemic with regards to its security operation, with expenditure in 2020 and 2021 below forecasts made in 2019 and adjusted for the downturn in passenger movements. Even when taking into account government wage support subsidies, staff costs remained below forecast levels.

Staff numbers

The number of FTEs employed in security in 2019 increased slightly to 793 compared to 785 in the previous year. This was driven by increases in both T1 and T2 ASU staff along with a small increase in other general security, while VCP staff numbers dropped by 8% from 150 to 138 due partly to more efficient operations in this area.

Following the impact of Covid-19, the number of FTEs in security dropped in both 2020 and 2021 across all areas. The largest reductions were seen in ASU staff as a result of the severance scheme open to security staff in both terminals. VCP numbers and FTEs in other security areas dropped by a smaller proportion.

Figure 4.2: Security staffing at Dublin Airport, 2010-2021 (FTEs)



Source: Taylor Airey analysis of Dublin Airport data

4.2. Analysis

The following section provides a summary of our findings when assessing the efficiency of operating expenditure on terminal security and staff working at vehicle control points. It then assesses the appropriateness of Dublin Airport's forecasts for 2022 and beyond, in the context of the positive response to the pandemic as described above.

Terminal security

When previously assessing the efficiency of terminal security, we considered a number of factors:

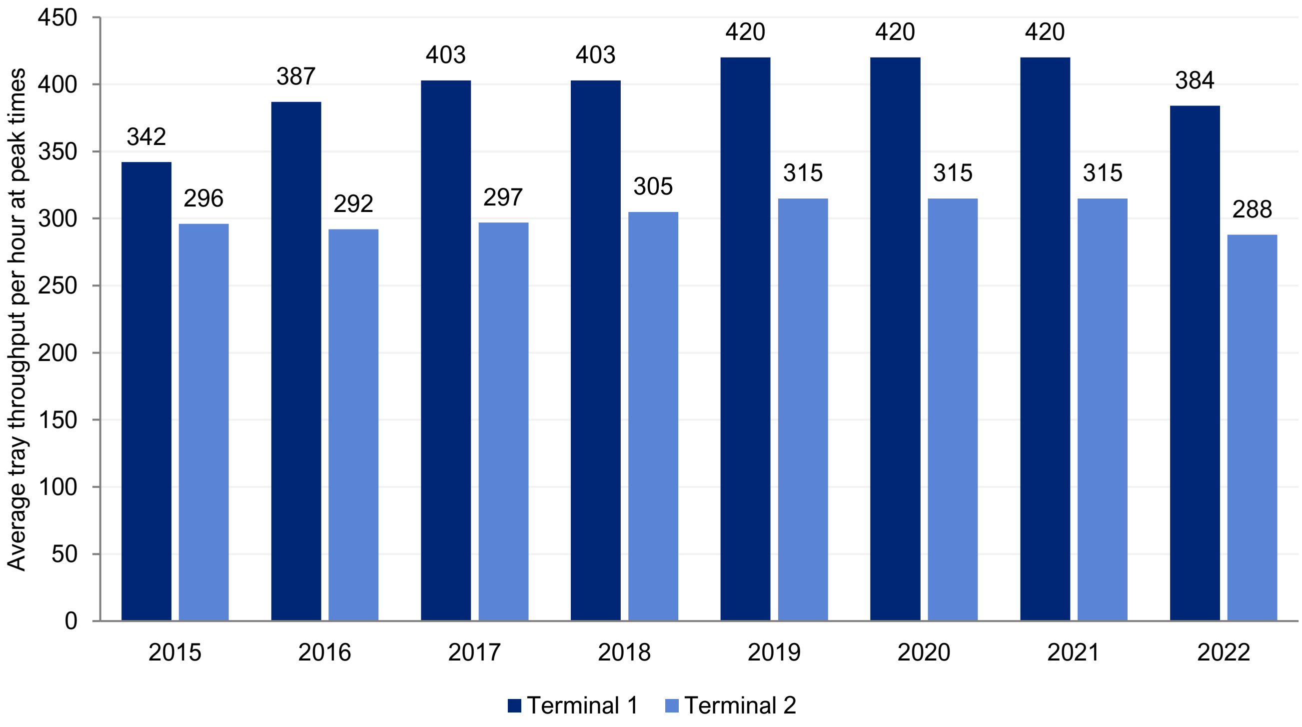
- Whether the capacity at the central search locations for each terminal is efficient from an operations perspective;
- Consideration at a high-level of whether staff numbers appropriately match passenger numbers;
- Whether the workforce planning process has been optimised to maximise efficiency; and
- Detailed consideration of rostering efficiency at both terminals for typical peak and off-peak periods.

Dublin Airport has been unable to provide either roster information or sufficiently granular data on workforce planning to assess the last two factors listed above. This is partly due to issues with the IT systems storing the data, and partly due to a lack of internal resource to service data requests as the security operation has struggled to handle the faster than predicted recovery in traffic. As the airport has not provided current roster data, in most areas we have conducted our analysis based on the assumption that its 2019 security staffing levels were efficient. However our previous study found that this was not the case. The starting headcount forecasts used in this report are therefore subject to change in our final report, to reflect either updated 2022 rosters provided the airport, or to

align with our 2019 study findings in terms of efficient staff levels. Full details of the assumptions used in our initial analysis are shown in Table 4.1: Approach taken to produce forecasts of security staffing levels below.

In previous years, Dublin Airport has improved the throughput of the X-ray machines used for hand baggage screening at Terminals 1 and 2, reaching a peak in 2019 of 420 trays per hour and 315 trays per hour respectively. The throughput of the X-ray machines is the constraining capacity factor at the central search locations where passenger and hand baggage security screening occur. Improvements in tray throughput increase the number of passengers that can be processed by each security lane, thereby reducing the number of lanes needed and leading to a reduction in total staffing requirements.

Figure 4.3: Evolution of X-ray machine tray throughput, 2015-2022 (trays per hour)



Source: Dublin Airport

Dublin Airport considers that the throughput rate achieved at both terminals in 2019 is the maximum that can be supported using existing equipment, taking into account constraints around physical configuration and the space available. This appears to be reasonable given the historical growth rates as shown above and comparing with other airport security operations worldwide.

The airport has since observed an 8.6% decrease in tray throughput rate in 2022, [redacted] placing a greater emphasis on compliance with screeners taking additional time to review images. It is also stated that this decrease is expected to persist in the future. We will investigate this issue further prior to our final report and encourage Dublin Airport to provide evidence that supports the assertion that this change is permanent.

Planned future developments of the security operation at Dublin Airport which will further affect throughput rates, are discussed in Section 4.3 below.

4.3. Projected efficient expenditure

Staff numbers

We use the quantitative analysis described above to determine efficient staffing levels for the Airport Search Unit, which forms the largest component of the security operation and is closely related to passenger numbers. We use a

bottom-up assessment applying the elasticity of 0.89 for Terminal 1 and 0.88 for Terminal 2 to forecast future staffing needs. All forecasts assume a passenger queueing time of 10 minutes, which remains less challenging than CAR's proposed service quality target for security queues. For other categories of staff which are smaller and less closely related to passenger numbers, we make a more qualitative assessment as discussed in the table below.

Table 4.1: Approach taken to produce forecasts of security staffing levels

Staff category	Approach
T1 ASU	*Baseline efficiency* – We establish a baseline by taking the 2019 actual staffing levels provided by Dublin Airport, and using our elasticity estimate to establish efficient staffing levels in 2022. *Elasticity* – We apply an elasticity of 0.89 with respect to passenger numbers for in-lane security officers only (i.e. not to static posts). Our estimate of this elasticity is based on analysis of the variation in X-ray Lane requirements with traffic growth coupled with the T1 lane staffing profile for the passenger traffic distribution. *Other adjustments* – From 2024 we assume the introduction of new C3 baggage scanning equipment, which impacts tray throughput, the number of trays per passenger, and the staffing requirement of each security lane – further details are provided below.
T2 ASU	*Baseline efficiency* – Similar to the T1 analysis, we establish a baseline by taking the 2019 actual staffing levels provided by Dublin Airport, and using our elasticity estimate to establish efficient staffing levels in 2022. *Elasticity* – We apply an elasticity of 0.88 with respect to passenger numbers for in-lane security officers only. Our estimate of this elasticity is similar to our analysis of T1 ASU staff. *Other adjustments* – From 2024 we assume the introduction of an automatic tray return system (ATRS) along with new C3 baggage scanning equipment. Together, these changes impact tray throughput, the number of trays per passenger, and the staffing requirement of each security lane – further details are provided below.
VCP	*Baseline efficiency adjustment* – We estimate a baseline for 2019 by taking actual 2019 staffing levels and then removing 10 FTEs which Dublin Airport states have been removed through efficiency improvements – this also aligns closely to the efficiency reduction of 11 FTEs in VCP staff proposed in our 2019 analysis. *Elasticity* – We do not apply any elasticity to our forecast as we do not expect staff numbers to vary by passenger numbers.
Security management and supervisors	*Baseline efficiency* – We establish a baseline by taking the 2021 actual staffing levels provided by Dublin Airport. *Elasticity* – We do not apply any elasticity to our forecast as we do not expect staff numbers to vary by passenger numbers.
Other	*Baseline efficiency adjustment* – The remaining functions consist of a mix of operational roles (hold baggage screening and a behavioural detection unit), training, planning and compliance roles (including group security). For these areas we take 2022 forecast FTEs as provided by Dublin Airport as our baseline, as these include efficiencies realised over the pandemic and see a reduction to 48 FTEs from 50 FTEs in 2019. *Elasticity* – We do not apply any elasticity to our ongoing forecasts as we do not expect staff numbers to vary by passenger numbers.

Source: Taylor Airey analysis

Staffing requirements currently differ between the terminals, with twelve officers per two lanes in T1 and eight per two lanes in T2.

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- **A revised Security Operating Model** including an increased number of Team Supervisors, a new Security Operations Centre, and implementation of an "Optimum Resource Model" with a new structure, roles, and accountabilities. An enhanced training requirement is also included for security staff. The revised model was proposed by Dublin Airport in an updated Opex submission for security ✂. The updated submission proposes an additional 68 FTEs from 2022 onwards made up of:
  - An increase in supervisory staff (+21 FTEs)
  - A new Security Operations Centre (+19 FTEs)
  - Additional security staff training requirement (+19 FTEs)
  - A new Equipment Testing team (+7 FTEs)
  - Additions to the Management and Training team (+2 FTE)

As the proposed revision to the operating model was provided in late June 2022, there was insufficient time to complete a full review and validation of the additional requirements put forward by Dublin Airport. Our forecasts currently include the additional 68 FTEs in full but may be adjusted once we have had the opportunity to assess whether Dublin Airport's proposed actions ✂. Our additional analysis is also expected to include benchmarking of staffing levels and a comparison of best practice with other airports.

In the table below, we present our forecasts of the security staffing requirement reflecting the above points, before discussing the impact of CIP projects from 2024 onwards.

Table 4.2: Our forecast of security staffing excl. CIP, 2022-2026 (FTEs)

	2022	2023	2024	2025	2026
Terminal 1 ASU	394	363	380	394	402
Terminal 2 ASU	259	242	251	259	263
VCP	128	128	128	128	128
Security management and supervisors	34	34	34	34	34
Other	12	12	12	12	12
Additional Security roles	68	68	68	68	68
Total security staff	**895**	**847**	**873**	**895**	**908**

Source: Taylor Airey analysis

The security operation will be further impacted as a result of two major CIP projects both due to be completed and operational from the start of 2024:

- **Deployment of ATRS equipment in T2,** leading to an increased tray throughput rate. In our forecasts this is assumed to be delivered by project CIP.20.06.042 from 2024 onwards (aligned with C3 equipment as detailed below).
- **Deployment of C3 scanning equipment at both terminals**. In another project, CIP.20.06.001, Dublin Airport plans to introduce new security systems compliant with the EU/ECAC C3 standard for Explosive

Detection Systems (EDS). These machines are capable of automated detection of solid and liquid explosives, and therefore allow liquids and electronic items to remain within cabin baggage during screening. This reduces the time needed for the passenger divest and pick-up process. Dublin Airport has stated that the implementation of C3 at both terminals, along with T2 receiving ATRS, will require staffing requirements to be increased and aligned between the terminals, with 15 officers per two lanes. While Dublin Airport has provided some narrative to explain why staffing per lane needs to increase following the introduction of C3, it is yet unclear whether this will need to be sustained throughout the determination period.

ACI's Smart Security Implementation Guide details multiple benefits of the C3 system for airport operators:

- **Improved detection capabilities** – this results in a lower false alarm rate and therefore less need for manual search of bags rejected by the screener.
- **Reduced time required for the passenger divest and pick-up process** – particularly as passengers are often unprepared when reaching the security lanes.
- **Reduced manual searches required** – the majority of rejected trays are due to passengers forgetting to remove liquids and electronics, therefore a further significant reduction in rejects can be anticipated.
- **Reduction in trays / images per passenger (IPP)** – electronics and liquids can be left within cabin baggage rather than removed and placed in a separate tray (although within the EU there will still be restrictions on liquids in quantities of greater than 100ml). ACI state that IPP typically reduces by 30% when using C3.

ACI find an average decision time of 8-11 seconds screening time with C3,[19] compared to 5-8 seconds with X-Ray. But this is more than offset by the IPP reduction, resulting in an overall increased passenger throughput with C3 compared with X-Ray scanning.

Contrary to ACI's findings, Dublin Airport states that it expects C3 to reduce throughput by 5%,[20] although this will be offset by a 25% throughput increase in T2 due to the introduction of ATRS. It should also be noted that while Dublin Airport has stated that it expects the 8.5% decrease in tray throughput experienced in 2022 ✂ ✂ ✂ ✂ ✂ ✂ ✂ ✂ ✂ ✂ ✂ ✂ ✂ to persist in future years, it does not appear that this has been factored in when forecasting the change in tray throughput rates as a result of ATRS and C3 introduction, as shown in Table 4.2 below.

Table 4.3: Dublin Airport forecast tray throughput rates at T1 and T2 (Trays per hour)

	T1	T2
Trays per hour – 2022	420	315
Trays per hour – ATRS in both terminals	420	394
Trays per hour – C3 and ATRS in both terminals	400	375
Change	-5%	+19%

Source: Dublin Airport

Using the assumptions on tray throughputs from Dublin Airport as outlined above and forecast traffic levels, our modelling suggests that if IPP were to decrease by 30% as suggested by ACI, the overall resourcing requirement for ASUs could reduce by around 26% in both T1 and T2. This is in-line with expectation given that tray throughput is the limiting factor. The number of lanes in operation is a discrete variable meaning that the theoretical maximum 30% reduction in resourcing is not achievable.

[19] ACI references a case study of "Australia" which claims C3 screening times as low as 2 seconds for simple bags, a modal time of 3 seconds, and a mean of 8 seconds.

[20] Appendix 4 – Operating Expenditure Report of its 2022 Regulatory Submission,

While we will consider further trial-based evidence that the airport can provide, we find it unlikely that C3 will deliver the low level of benefit suggested by Dublin Airport. Our forecast of headcount for 2024-2026 is therefore based on a reduction of 30% in IPP from 2019 levels, the impact of this assumption is shown in the following two tables.

Table 4.4: Our forecast of Security staffing including CIP (i.e. C3 equipment and T2 ATRS in use from 2024) and IPP unchanged from 2019 levels, 2022-2026 (FTEs)

	2022	2023	2024	2025	2026
Terminal 1 ASU	394	363	468	487	497
Terminal 2 ASU	259	242	347	360	368
VCP	128	128	128	128	128
Security management and supervisors	34	34	34	34	34
Other	12	12	12	12	12
Additional Security roles	68	68	68	68	68
Total security staff	**895**	**847**	**1,058**	**1,090**	**1,107**

Source: Taylor Airey analysis

Table 4.5: Our forecast of Security staffing including CIP (i.e. C3 equipment and T2 ATRS in use from 2024) and IPP reduced by 30% from 2019 levels, 2022-2026 (FTEs)

	2022	2023	2024	2025	2026
Terminal 1 ASU	394	363	373	386	394
Terminal 2 ASU	259	242	283	292	298
VCP	128	128	128	128	128
Security management and supervisors	34	34	34	34	34
Other	12	12	12	12	12
Additional Security roles	68	68	68	68	68
Total security staff	**895**	**847**	**898**	**921**	**934**

Source: Taylor Airey analysis

We do not find any reference to a change in IPP following the introduction of C3 equipment in Dublin Airport's Regulatory Submission. However, our analysis does align with the CIP, where C3 is covered under project CIP.20.06.001. Here, Dublin Airport state:

> *"IPP is significantly lower with EDS screening units and is forecast to enable Dublin Airport to screen more passengers than [X-Ray] by approx. 100 pph/lane in T1 and 45 PPH/lane in T2 [with] a reduction in the number of lanes required along with the associated capital and operational costs."*

An increase in lane capacity of 100pph is closely aligned to a 30% reduction in IPP; assuming a tray throughput rate of 400 for T1, an IPP of 1.67 equates to 240pph, while reducing the IPP by 30% to 1.17 equates to 342pph, an increase of 102pph.

Payroll costs

Table 4.6 below shows our final payroll forecasts under the three scenarios we have modelled. We have used the final scenario, where we assumed a reduction in IPP, as the basis of our overall opex forecast.

Table 4.6: Our forecast of security payroll costs, 2022-2026 (€ million, February 2022 prices)

	2022	2023	2024	2025	2026
Total security payroll (excl. CIP)	44.2	43.2	45.6	47.4	48.7

	2022	2023	2024	2025	2026
Total security payroll (incl. CIP, unchanged IPP)	44.2	43.2	55.3	57.7	59.4
Total security payroll (incl. CIP, IPP reduction)	**44.2**	**43.2**	**46.9**	**48.8**	**50.1**

Source: Taylor Airey analysis

5. MAINTENANCE

Summary

We find that Dublin Airport reduced maintenance expenditure significantly during the pandemic, following the sharp reduction in passenger volumes. We expect that this reduction in expenditure is unlikely to be sustainable in the longer term and that, the airport may need to conduct additional maintenance activities in the shorter term for assets that that have been under a reduced maintenance schedule.

Drawing on the analysis from our previous efficiency study, we remain of the view that although overall maintenance expenditure at Dublin Airport is relatively efficient, there is scope for further efficiency improvement in payroll expenditure through tackling the historic productivity differential between the two terminals. While there are several reasons for the observed difference in productivity, we consider that Dublin Airport's NWOW initiative will go some way towards reducing that differential. We assume NWOW will deliver 5% of efficiency over and above the efficient baseline from our previous study, which we include in our 2022 baseline. However, we would welcome further evidence from stakeholders on their view of the efficiencies achievable from NWOW.

We estimate efficient maintenance expenditure in 2022 to be €29.4 million, comprising €15.4 million in payroll and €14.0 million in non-pay costs. For payroll expenditure, we assume staffing levels will grow using an elasticity of 0.3 with respect to passenger volumes until passenger numbers recover to 2019 levels, and then 0.4 thereafter. For non-pay expenditure, we assume expenditure will grow using an elasticity of 0.3 with respect to passenger volumes. Finally, we provide additional allowances to reflect new initiatives and to reflect additional maintenance activities for new assets delivered through the CIP. This results in a pay forecast of **€15.6 million** in 2022 rising to **€19.4 million** by 2026, and a non-pay forecast of **€14.1 million** in 2022 rising to **€20.0 million** by 2026.

Maintenance expenditure is split between pay and non-pay spend, with staffing broadly split into terminal maintenance and central maintenance. Terminal maintenance includes staff working on day-to-day repairs and maintenance, specialist staff maintaining baggage handling systems, and a small number of managerial staff. Central maintenance includes all airfield electrical and operative staff, as well as several airport-wide functions (gardening, engineering, utilities management, car park repair and maintenance, etc.). It also includes a larger maintenance management team.

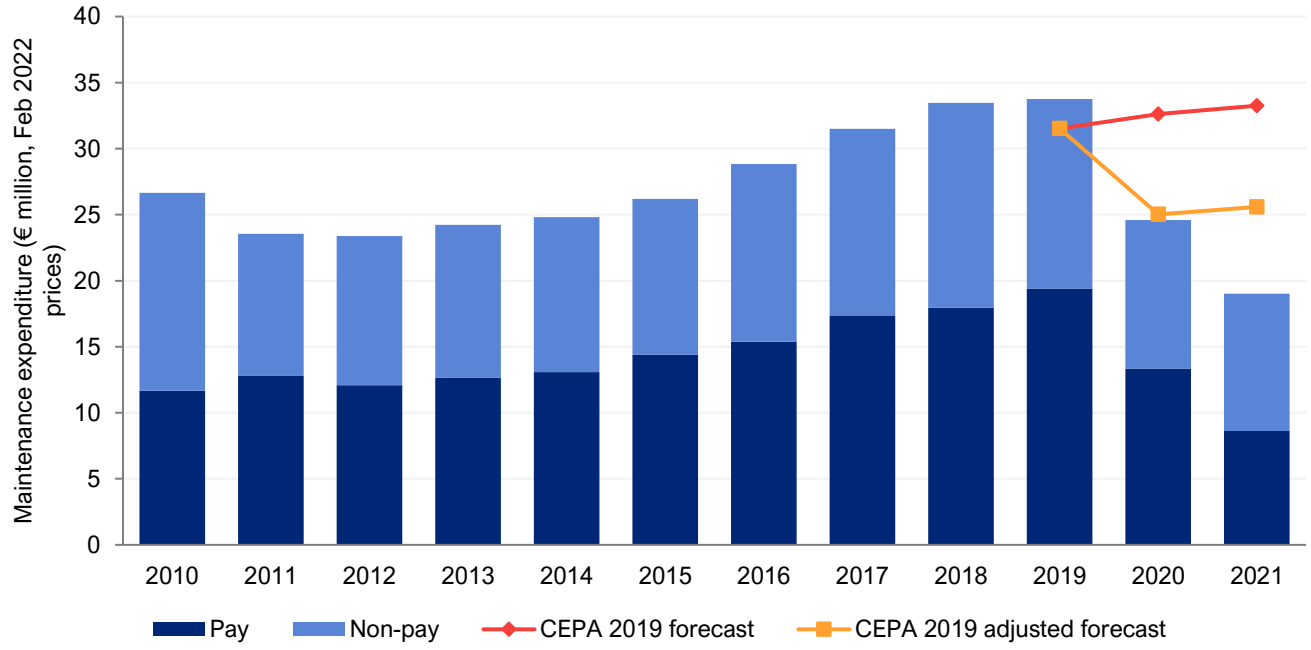
Non-pay expenditure consists of a variety of outsourced repairs and maintenance costs across the airport campus. This includes the replacement of smaller equipment, vehicle repairs, and building and runway repairs.

5.1. HISTORIC EXPENDITURE

Figure 5.1 shows that, as with most other cost categories, expenditure on maintenance has been on a general upward trajectory in real terms since 2010 though there was a small decline in pay costs between 2018 and 2019, followed by a much larger pandemic-induced decline in 2020 and 2021. Pay costs drove a large proportion of the reduction in expenditure, through a combination of reduced working hours and a recruitment freeze.

The chart also shows that expenditure in 2019 was higher than the efficient forecast for that year from our 2019 study, though 2020 and 2021 spending levels are much lower, even after our efficient forecast is adjusted for outturn passenger volumes.

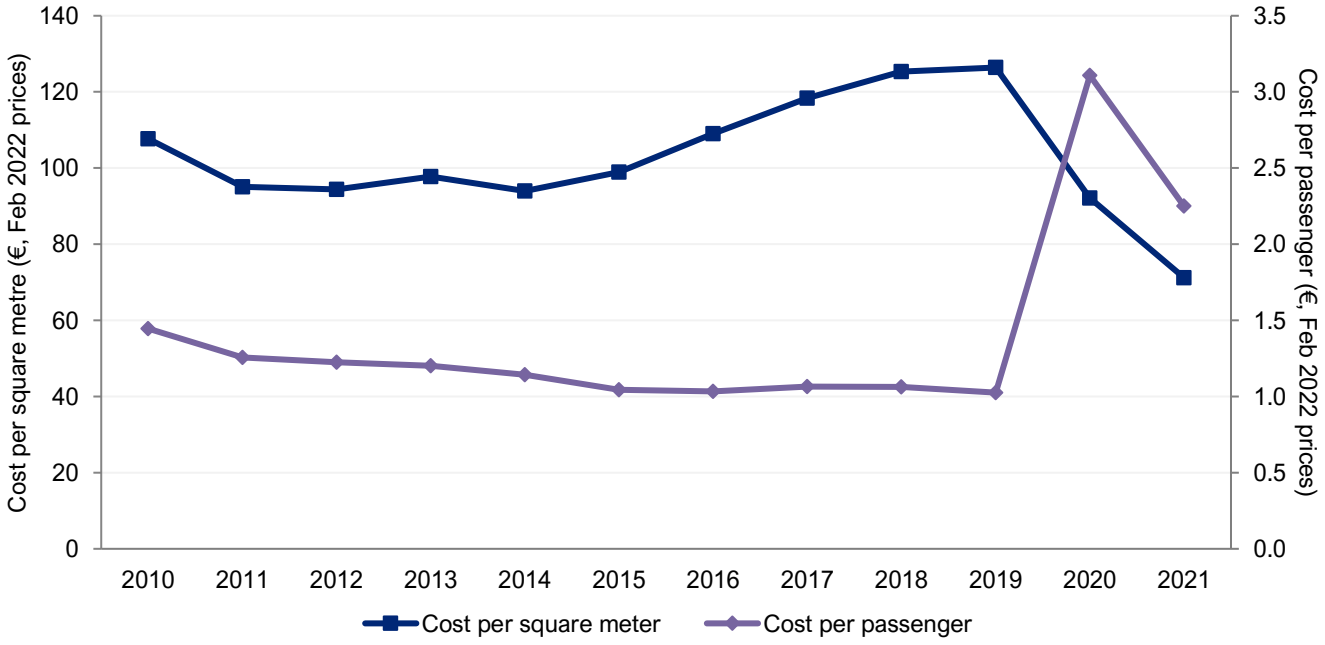
Figure 5.1: Maintenance historic expenditure at Dublin Airport, 2010-2021 (€ million, February 2022 prices)



Source: CEPA analysis of Dublin Airport data

The following chart shows that, as expected, maintenance costs per square metre of terminal space have reduced substantially between 2019 and 2021, while maintenance costs per passenger increased sharply in 2020 before falling back down in 2021.

Figure 5.2: Maintenance unit costs at Dublin Airport, 2010-2021

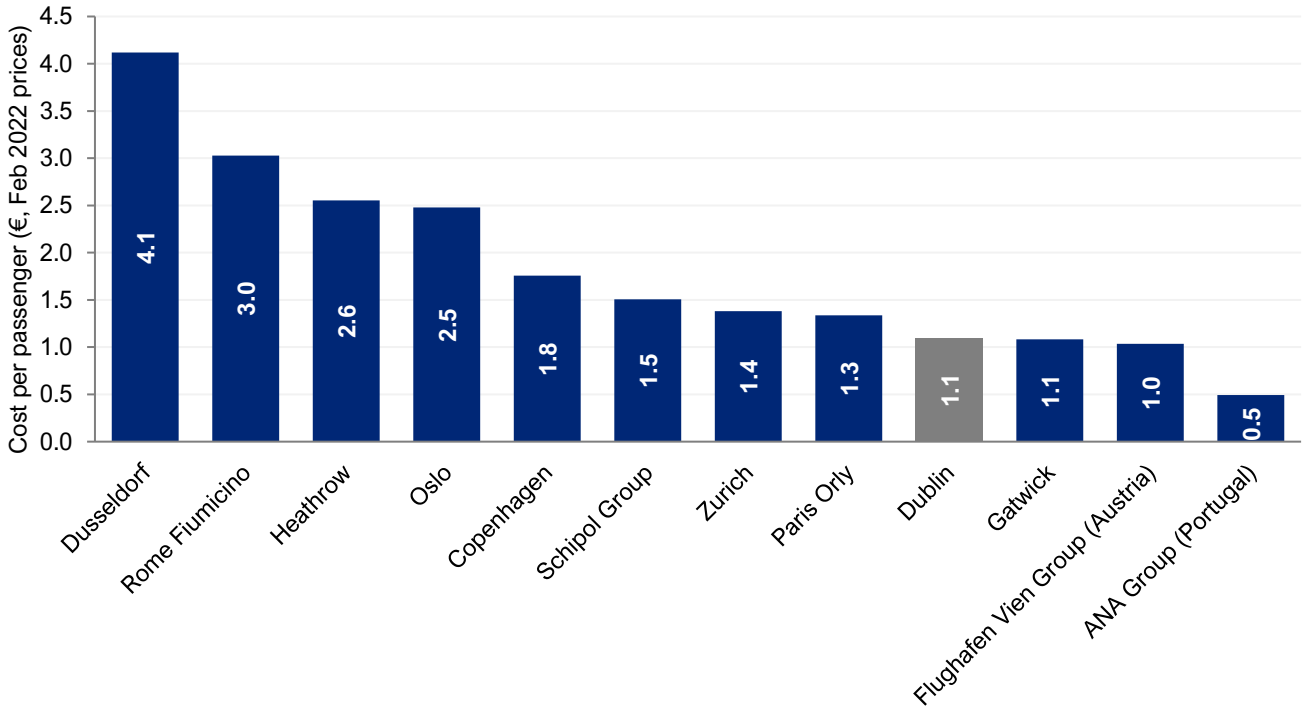


Source: CEPA analysis of Dublin Airport data

5.2. Analysis

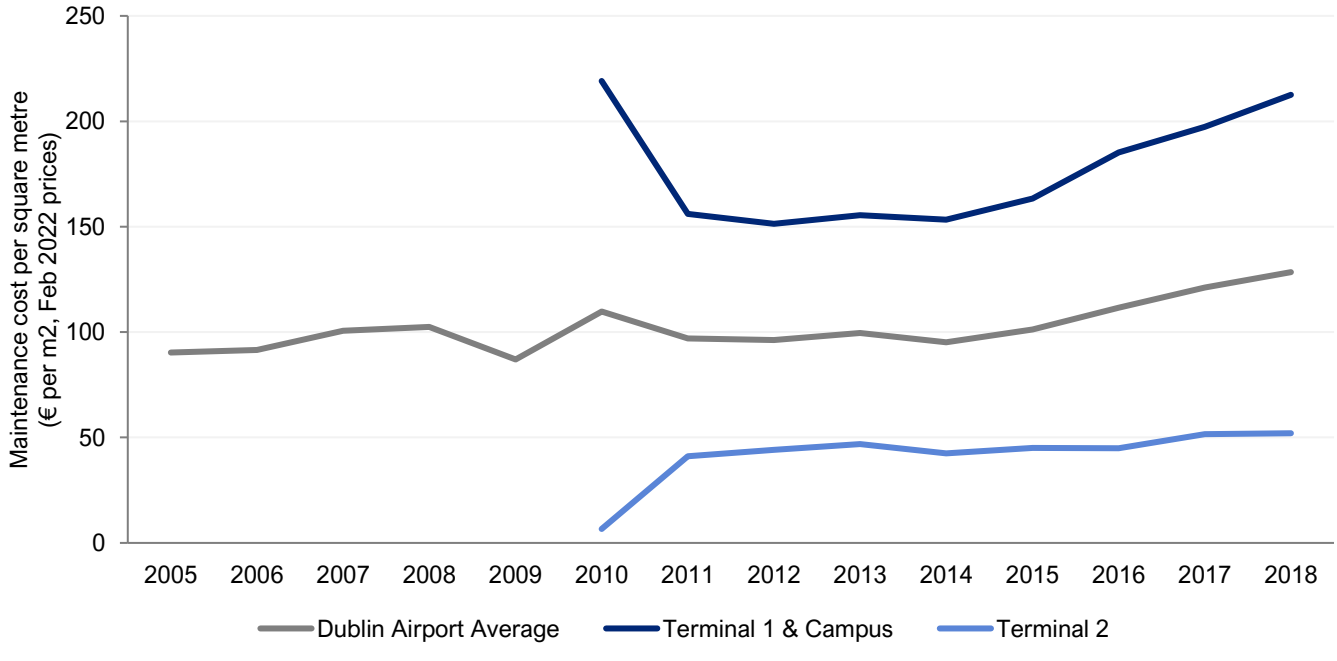
Our benchmark analysis from the 2019 study concluded that while overall maintenance costs were relatively efficient, maintenance costs at Terminal 1 were a lot higher than at Terminal 2. Figure 5.3, shows maintenance costs per passenger at Dublin Airport compared against a range of other European airports, and Figure 5.4 compares maintenance costs per square metre across the two terminals.

Figure 5.3: Benchmarks of maintenance costs per passenger by airport, 2017



Source: CEPA analysis

Figure 5.4: Comparison of maintenance unit costs between Terminal 1 and Terminal 2 at Dublin Airport, 2005-2018



Source: CEPA analysis of Dublin Airport data

The historic unit cost differential between the two terminals is likely to have been down to a combination of three main factors:

- Higher average wage rates for staff working at Terminal 1 (who were predominantly on pre-2010 contracts) compared with Terminal 2.
- The terminals having a different asset base.
- Less flexible terms and conditions for staff working at Terminal 1, which meant that many technicians were limited to operations at Terminal 1.

The first of these factors has partially been tackled through the VSS, which has reduced the absolute number of staff on pre-2010 contracts. We would expect that, as passenger volumes recover, Dublin Airport will benefit from having fewer staff on older contracts, reducing unit payroll costs.

Dublin Airport has less ability to control differences in the asset base, other than through capital investment. However, the implementation of NWOW, which will allow maintenance technicians to work across the two terminals, should tackle issues around limited flexibility. We would expect this to primarily affect the Asset Care team, which makes up approximately 20% of Maintenance FTEs.

In the shorter term, we also expect some reversal of the sharp reduction in activity in 2020-21 assuming Dublin plans to transition back to a strategy of preventative and predictive maintenance.

5.3. PROJECTED EFFICIENT EXPENDITURE

Pay

To produce a 2022 baseline of efficient payroll costs for maintenance, we roll forward our 2019 efficient baseline based on expected passenger volumes and elasticities. As with our previous study, we split maintenance costs into roles where the resource requirement is passenger driven, such as baggage handling, and roles that are not, such as general asset care. We also assume that NWOW will deliver a 5% efficiency saving based on the size of the Asset Care team and the size of the unit cost differential between Terminal 1 and Terminal 2. Finally, we allow for 2 additional FTEs to maintain new Fixed Electrical Ground Power units and Passenger Boarding Bridges, following completion of the associated CIP project at the end of 2021. This results in a 2022 baseline of **208 FTEs** and payroll expenditure of **€15.6 million**.

We then forecast staffing levels using an elasticity with respect to passenger numbers of 0.3 during the 'recovery' phase (for passenger driven roles) and an elasticity 0.4 thereafter. As described in Section 2.3.3, our recovery elasticity is based on ensuring staffing numbers recover to 2019 efficient levels when passenger volumes recover to 2019 levels, all else being equal. Our use of a lower recovery elasticity implies that fewer additional staff are needed from 2022 levels, for staffing to eventually return to 2019 efficient levels.

Finally, we allow several additional FTEs relating to new requirements, or new CIP-related assets. We allow 1 additional FTE in 2023, rising to 4 additional FTEs by 2026 relating to new noise and environmental compliance requirements. From 2023 onwards, we allow 4 additional FTEs for the maintenance of Hold Baggage Screening (HBS) equipment, and 6 additional FTEs for the maintenance of the new North Runway. This is summarised in the table below:

Table 5.1: Our forecast of maintenance staff, 2022-2026 (FTEs)

	2022	2023	2024	2025	2026
Maintenance staff (passenger driven)	162	171	175	179	181
Maintenance staff (non-passenger driven)	45	45	45	45	45
Noise and environmental compliance	0	1	2	3	4
Total maintenance staff (excl. CIP)	**206**	**216**	**221**	**226**	**229**

	2022	2023	2024	2025	2026
Fixed Electrical Ground Power	2	2	2	2	2
Hold Baggage Screening	0	4	4	4	4
North Runway	0	6	6	6	6
Total maintenance staff (incl. CIP)	**208**	**228**	**233**	**238**	**241**

Source: CEPA analysis

Table 5.2: Our forecast of maintenance payroll costs, 2022-2026 (€ million, February 2022 prices)

	2022	2023	2024	2025	2026
Total maintenance payroll (excl. CIP)	15.4	16.6	17.4	18.0	18.4
Total maintenance payroll (incl. CIP)	15.6	17.5	18.3	18.9	19.4

Source: CEPA analysis

Non-pay

To produce a 2022 efficient baseline of non-pay maintenance costs, we roll forward our estimate of 2019 efficient expenditure based on the expected trajectory of staffing levels (before we account for NWOW). We also allow approximately €0.1 million in additional expenditure relating to the maintenance of new CIP-linked assets, such as electric vehicle chargers and new fleet. This results in a 2022 baseline of €14.1 million.

We then roll forward our 2022 efficient costs using elasticity of 0.3 with respect to passenger volumes. Finally, we provide an allowance for a series of additional activities. Some of these activities were included in Dublin Airport's regulatory submission, whereas others relate to CIP projects where Dublin Airport had previously provided an estimate of the CIP impact:

- We allow €0.3 million in 2023, rising to €0.7 million by 2026, for new activity relating to Dublin Airport's sustainability initiatives and environmental management requirements.
- We allow €0.1 million in 2023, rising to €0.2 million by 2026, for activity relating to public sector sustainability targets.
- We allow €0.8 million for specialist maintenance of HBS equipment from 2023 onwards and a further €1.5 million from 2024 onwards for the maintenance of C3 screening equipment.
- We allow €0.7 million for expenditure relating to the new runway from 2023 onwards.
- Finally, we allow €0.2 million in 2025 and €0.3 million in 2026 for CIP-related car park maintenance, and €0.1 million in 2023 rising to €0.3 million by 2026 for other CIP-related maintenance.

Several other step changes are requested by Dublin Airport in its regulatory submission for which we have not made allowance. This includes any step-changes that we consider are already covered by our passenger elasticity, i.e. that are volume driven, or any inflation adjustment. While the provision of further information may lead to a change at final determination stage, Dublin Airport has not yet provided a compelling argument for why its maintenance expenditure is exposed to cost pressures materially above general inflation.

Our resulting forecast is summarised in the table below.

Table 5.3: Our forecast of maintenance non-pay costs, 2022-2026 (€ million, February 2022 prices)

	2022	2023	2024	2025	2026
Total maintenance non-pay (excl. CIP)	**14.0**	**15.1**	**15.6**	**16.0**	**16.4**
HBS ST3 screening	0.0	0.8	0.8	0.8	0.8
C3 Security Screening	0.0	0.0	1.5	1.5	1.5

	2022	2023	2024	2025	2026
CIP-related car parking	0.0	0.0	0.0	0.2	0.3
North Runway	0.0	0.7	0.7	0.7	0.7
Other CIP	0.1	0.1	0.3	0.3	0.3
Total maintenance non-pay (incl. CIP)	**14.1**	**16.8**	**18.9**	**19.5**	**20.0**

Source: CEPA analysis

6. CENTRAL FUNCTIONS

Summary

We find that going into the Covid-19 pandemic, there was significant scope for efficiency with regards to staffing in 2019, due to substantial increases in headcount between 2017 and 2019, particularly in relation to the strategy and policy functions. This is supported by our benchmarking of overall staffing and of the staffing of specific functions.

Since then, Central Functions staffing has reduced substantially in response to the pressures introduced by the Covid-19 pandemic. However, we note that while there has been a broad-based reduction in staffing across the various functions, a significant proportion of the cost reductions relate to temporary savings to roles that are more volume driven. We anticipate that many of these savings will need to be reversed once passenger numbers recover. On the other hand, we conclude that there has been insufficient headcount reduction in the areas we had identified as inefficient in 2019, such as the policy and strategy functions referred to above. To the extent that savings have been made in these areas, we consider they should be made permanent.

We recognise that some of the roles introduced between 2017 and 2019 may capture valuable activity necessary for the running of the airport. However, with the exception of HR, Dublin Airport has not provided sufficient evidence around what these roles cover, why they are necessary, and why there has been such a large increase in the number of such roles since 2017.[21] As such, we do not consider it appropriate to include them within our estimate of efficient expenditure. This drives much of the difference between our 2022 baseline estimate and Dublin Airport's estimate. Nevertheless, we welcome evidence from Dublin Airport in support of its estimate, which we could use to reassess our baseline estimate.

Our overall forecast, therefore, recognises that while some of the cost savings introduced in 2020 and 2021 will necessarily be reversed, but that other cost savings should be made permanent and new cost savings implemented to ensure expenditure remains at efficient levels. Our estimate of efficient spend on Central Functions is **€30.1 million** in 2022 rising to **€34.4 million** by 2026.

Central Functions staff comprise those working for Dublin Airport directly and daa group staff that are allocated to the regulated entity. The staff work mostly in administrative roles such as commercial, finance, human resources, and airport management and include other support staff (e.g. procurement, communications, strategy and regulation).

6.1. HISTORIC EXPENDITURE

Payroll costs

As shown in Figure 6.1, Dublin Airport increased its expenditure on Central Functions by nearly 50% between 2015 and 2019, from €23 million to €35 million. Almost half of this increase occurred in 2019. While part of this increase was related to reallocation of FTEs from other categories into Central Functions,[22] expenditure was still €6.7 million higher in 2019 compared to our forecast for that year.[23]

HR and Other Support staff were two areas that drove most of the increase in expenditure during these years, collectively accounting for over three quarters of the cost increase between 2015 and 2019.

While expenditure decreased to €24 million in 2020, it increased again to €26 million in 2021. Expenditure in both years is affected by a number of one-off factors that are unlikely to be repeated, including:

[21] Some additional evidence was provided by Dublin Airport shortly before the finalisation of our forecasts for the draft determination. As we did not have sufficient time to consider this evidence, we will consider it as part of our analysis in support of the final determination.

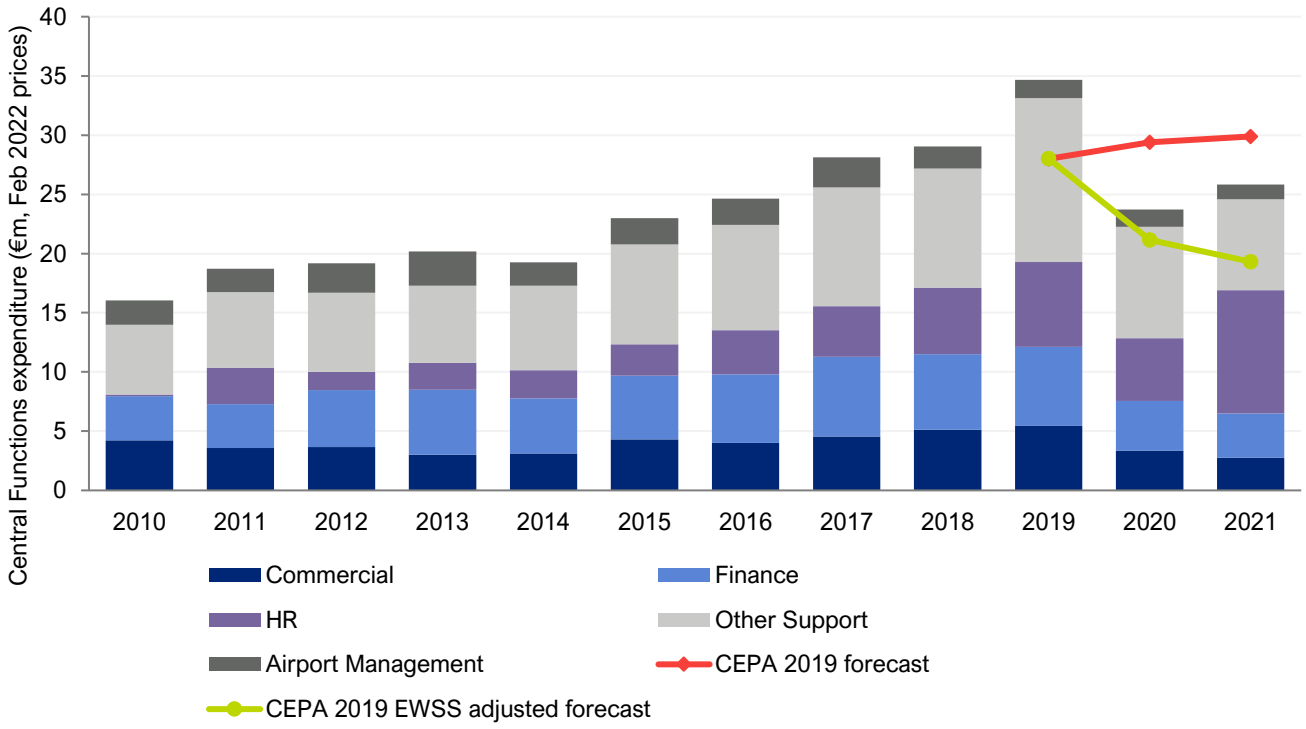
[22] CEPA (2019), Dublin Airport Opex Efficiency Assessment: Review of Consultation Responses, Publishable Report, Section 3.2.

[23] We compared, after adjusting to February 2022 prices, outturn data from Dublin Airport for 2019 received for this exercise with CEPA (2019), Dublin Airport Opex Efficiency Assessment: Bottom-up Efficiency Assessment, Confidential Final Report, Table 1.

- A move to a four-day work week for part of 2020 and part of 2021;
- The introduction of government wage support, through the EWSS; and
- ✂

While expenditure in both years was lower than our efficient forecast from the 2019 study, expenditure would have been higher than our efficient forecast if the effects of the EWSS and HR charge are stripped out. This suggests that there remains an efficiency gap.

Figure 6.1: Central Functions historic expenditure at Dublin Airport, 2010-2021 (€ million, February 2022 prices)



Source: CEPA analysis of Dublin Airport and CAR data.
Note: The EWSS adjusted forecast should only be considered a broad estimate, as it does not explicitly account for differing eligibility rules around the wage support paid by government.

6.2. Analysis

To assess the efficiency of Dublin Airport's historic expenditure on Central Functions, we have:

- Investigated the reasons behind the higher than anticipated expenditure in 2019;
- Compared overall staffing levels, as well as FTEs in key functions at Dublin against other airports and function specific benchmarks; and
- Reviewed the evolution of expenditure levels during the pandemic years.

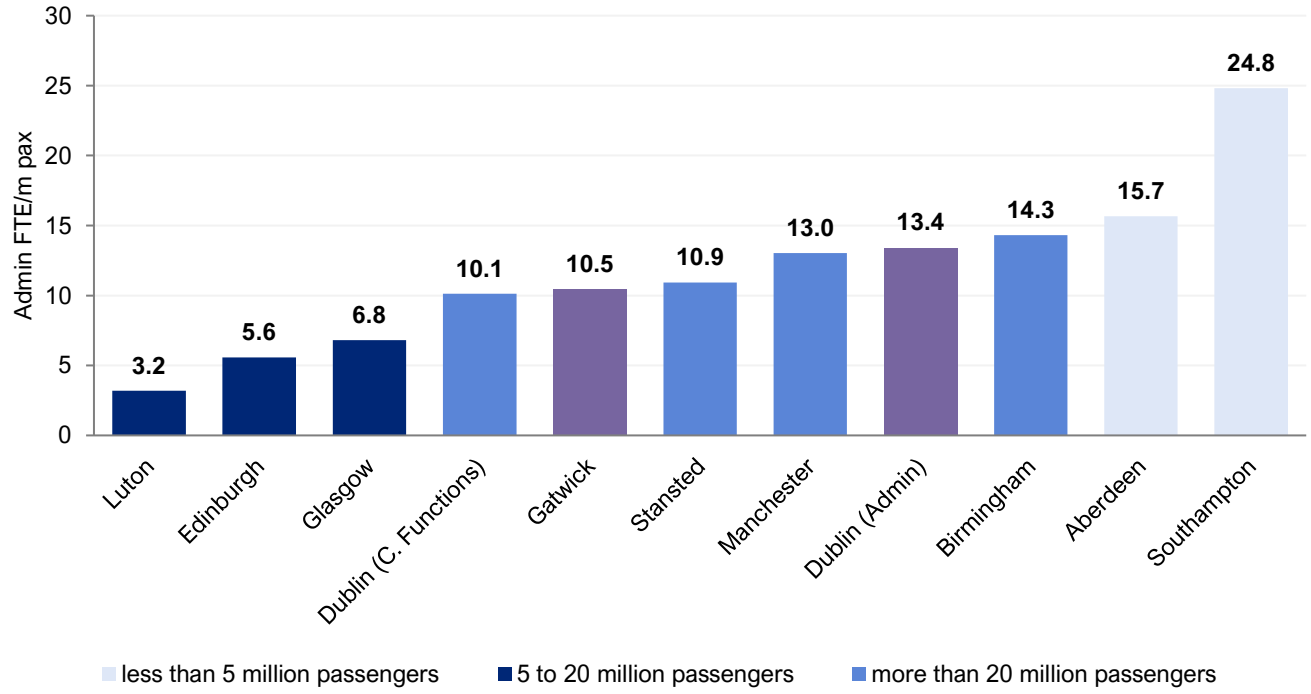
Efficiency of 2019 expenditure

A significant proportion of the increase in expenditure between 2018 and 2019 related to new business units that did not exist prior to 2019. These business units, which mostly relate to strategy and policy roles, accounted for 41 FTEs and €3.7 million in expenditure in 2019. While further information from Dublin Airport has allowed us to reconcile some of these functions to equivalent functions elsewhere in the business, there remain several new roles that cannot be clearly related to new activity. Without evidence that these roles are necessary, relate to genuinely

additional activity, and appropriately sized for the airport, it is challenging for us to consider this increase in staff efficient.

We also benchmarked overall administrative staffing at Dublin Airport against airports in Great Britain for 2019.[24] Figure 6.2 shows that staffing levels per passenger at Dublin Airport when considering Central Functions staff only, were in the same range as similarly sized airports. But when counting all administrative staff regardless of whether they are in Central Functions, and removing non-administrative staff within Central Functions, Dublin Airport's staffing was at the top end of our benchmark range. This further supporting our view that 2019 staffing was likely to have been inefficient.

Figure 6.2: Benchmarks of admin FTEs per million passengers across airports in 2019 (FTEs per million passengers)



Source: CEPA analysis of Dublin Airport data and airports annual accounts data.

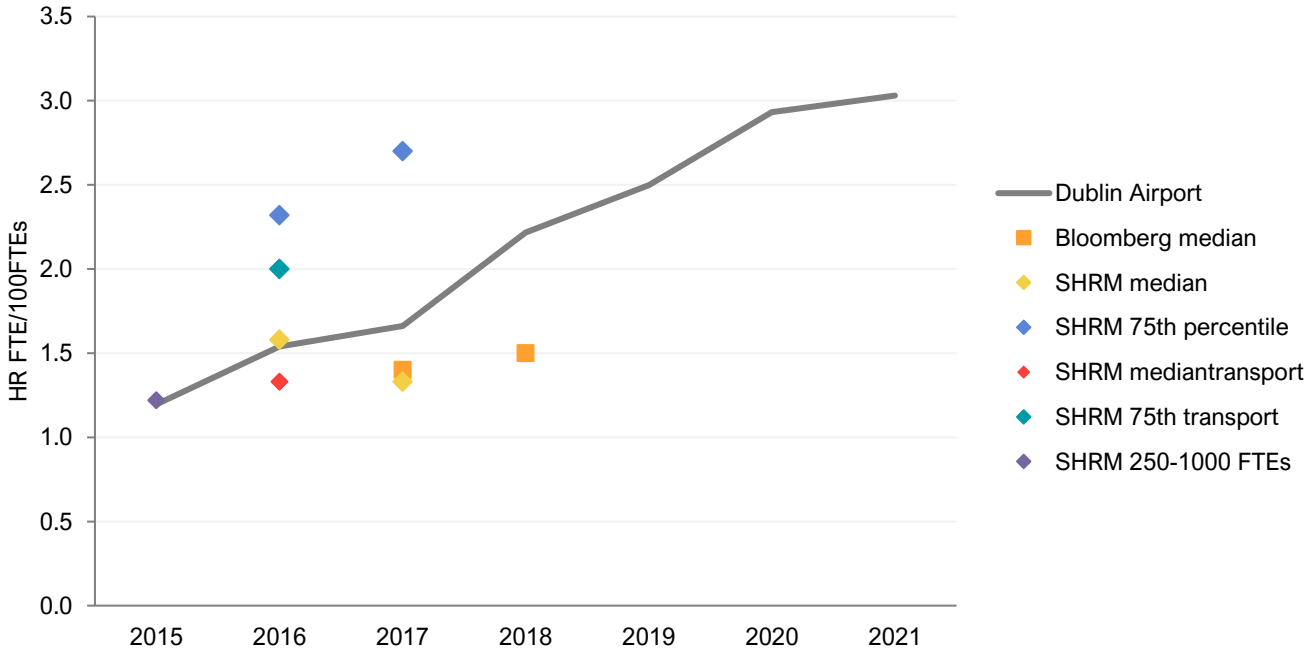
HR

HR staff account for a further €1.0 million of the difference between our forecast of efficient 2019 expenditure and outturn expenditure. To test whether this difference could nevertheless be considered efficient, we compared HR staffing levels at Dublin Airport to a number of publicly available benchmarks.[25] As shown in Figure 6.3, the ratio of HR FTEs to the total number of staff increased substantially over the period from 2015 to 2019, to a level at the top of our benchmark range.

[24] We have included IT staff and security management within "admin" to increase comparability with reporting from other airports in their annual reports. Where an airport is part of a group, we have apportioned group level administrative staff to subsidiary companies, based on revenues generated

[25] These benchmarks are the median, or 75th percentile HR FTEs/100 FTEs from surveys across samples of companies both within and outside of the transport industry. Sources: (1) Bloomberg BNA HR benchmarking analysis (2017, 2018, 2021). (2) Society for Human Resources Management (2016, 2018, 2019), Human Capital Benchmarking Report.

Figure 6.3: Benchmarks of HR staffing levels, 2015-2021 (HR FTEs per 100 FTEs)



Source: CEPA analysis of Dublin Airport, Bloomberg BNA and SHRM data.

However, Dublin Airport has provided evidence to show that much of the increase in staffing between 2017 and 2019 was due to a reallocation of the workforce planning function from Campus Services into Central Functions. They also argue that this function, which relates to designing rosters and providing centralised governance for all time and attendance activities, would not be captured within external benchmarks as the latter would only capture basic HR functions.

We have considered the evidence provided by Dublin Airport and note that the workforce planning function is not captured within our Campus Services functions, and therefore should be considered for inclusion within our Central Functions forecasts. We also consider there to be some merit to the suggestion that HR benchmarks may not fully capture the requirement for a workforce planning function at an organisation like Dublin Airport. However, it is important not to overplay this suggestion – many organisations have complex staff rostering requirements, particularly within the transport sector. While the need for a separate workforce planning function may mean that the median HR benchmarks are less applicable, we do not consider this discounts the applicability of benchmarks entirely. Instead, we consider it more appropriate to use the 75th percentile benchmark, which suggests that Dublin Airport's HR staffing levels were broadly efficient.

Expenditure during pandemic years

In 2020 and 2021, staffing levels and expenditure on Central Functions have been consistently below our efficient forecast from the 2019 study, even when adjusted to reflect outturn passenger volumes and wage growth. This is primarily due to the exceptional measures put in place by the airport as a result of the pandemic.

We find a reduction in staffing levels across all functions except for Airport Management: FTEs in Commercial and Finance (including the Shared Services Centre and Platinum Services) decreased by 25%, in HR by 18% and in other support functions by 32%. These staffing reductions generated average cost savings of 45% per function.[26]

However, we also find that staffing of other support functions remained broadly the same in 2021 as it was in 2018. In 2014, there were 60 FTEs working in various roles that we have grouped under strategy and regulation, and

[26] Cost savings do not apply to HR in 2021, where, as discussed in the previous section a one-off €5 million charge has been allocated.

other support staff. This rose to 72 FTEs by 2018 and to 108 FTEs in 2019. While staffing levels have reduced since, they have reduced to 2018 levels.

We recognise that some of these cuts in expenditure are unlikely to be sustainable in the longer term, particularly where they relate to functions that are more volume driven, such as shared services and Platinum Service.

Overall findings

Based on the above analysis, we draw the following general conclusions:

- The reduction in Central Functions staffing means that Dublin Airport's budget for 2022 is broadly in line with the expectations we set in our previous analysis. This does, however, mask discrepancies between different business units.
- While staffing in some cost categories (e.g. SSC, HR) has reduced, we and Dublin Airport envisage that such staffing cuts will be reversed over the next determination period as passenger volumes, staffing levels, and transaction volumes recover.
- There has been a lot of unexplained growth in strategy, policy and regulation roles, which we are not convinced is efficient. However, we would welcome further evidence from Dublin Airport as to why these roles are needed, genuinely additional to existing roles, and efficiently resourced.

6.3. PROJECTED EFFICIENT EXPENDITURE

For our 2022 baseline, we use our forecast of FTEs from the 2019 study, allowing an additional 14 FTEs to account for the workforce planning function not captured within our 2019 efficient forecast. Our 2019 forecast had implicitly accepted the corresponding reduction in staff within Campus Services but had not allowed the increase within Central Functions.

Dublin Airport has also requested 10 FTEs, rising to 17 FTEs by 2026, within the regulatory submission to support the delivery of its sustainability strategy. Based on the narrative and evidence provided within the submission, we consider that the sustainability initiative passes the need and additionality test, though we will require further evidence on how Dublin Airport has determined that 10 FTEs are required to deliver its objectives.

- **Need:** Dublin Airport notes that the Government's ambition in relation to climate change has increased since the previous determination was set, which is likely to matched by an increased obligation on the airport. We also note that Dublin Airport is about to enter into new commitments in relation to airport noise, as part of a package of measures designed to mitigate the impact of reducing restrictions on night-time usage of the airport.[27] More broadly, we also recognise that there are increased expectations on infrastructure firms like Dublin Airport to better manage the environmental impact of its operations. As such, we consider the needs case for additional resourcing has been met.
- **Additionality:** Dublin Airport states that additional headcount is required for measuring and reporting, governance and compliance, assurance, training, and supply chain improvement. We assume this partly relates to additional headcount within Maintenance, which we have allowed for, with the remainder captured within Dublin Airport's forecast of sustainability FTEs within Central Functions. We accept that there is likely to be an incremental effect on headcount to deliver the additional activities outlined above and as such, the additionality case is likely to be met. However, it is unclear to what extent there already exists staff within Dublin Airport that carry out such functions.
- **Efficiency:** Dublin Airport has not provided any detail of how they have estimated the additional staffing required for the sustainability strategy. This is not a topic we have explored in detail in our existing

[27] See https://www.fingal.ie/news/noise-abatement-objective-and-regulatory-decision

engagement with the airport. For our draft position, therefore, we have applied a 25% efficiency adjustment to Dublin Airport's proposals for the sustainability initiative, subject to further evidence provided by the airport.

As shown in Table 6.1, our headcount forecast implies a 2022 baseline estimate of **€29.6 million** for Central Functions payroll costs.

Table 6.1: Our estimate of Central Functions staffing and payroll costs for 2022 (FTEs)

Category	FTEs
Airport Management	13
Commercial	34
Platinum Services	24
Finance	22
SSC	54
HR	69
Procurement	17
Other admin	81
Sustainability	8
Total FTEs	**320**
Average cost per FTE (€, Feb 2022 prices)	€ 94,058
Total Payroll Cost (Feb 2022 prices)	**€30.1 million**

Source: CEPA analysis of Dublin Airport data

Our 2022 staffing levels are what we consider to be a right-sized administrative function, given the size of the airport and the number of staff. We, therefore, assume staffing levels stay broadly unchanged throughout the determination period, but allow for wage increases. This brings staffing levels in 2026 to 11.8 FTE per million pax, marginally higher than Stansted levels in 2019 but lower than Manchester levels. We report our FTEs and payroll costs forecasts in Table 6.2.

Table 6.2: Our forecast of Central Functions staffing levels and payroll costs at Dublin Airport, 2022-2026

	2022	2023	2024	2025	2026
Central Functions staffing levels (FTEs)	320	324	329	333	333
Central Functions expenditure (€ million)	30.1	31.4	32.9	33.8	34.4

Source: CEPA analysis

7. FACILITIES AND CLEANING

Summary

Facilities and Cleaning is a substantial area of cost and includes both pay and non-pay elements. In 2019 Dublin Airport's Facilities and Cleaning pay expenditure was significantly higher than the efficient level set in our 2019 study. However, payroll spend declined during the Covid-19 pandemic to a level below both our efficient forecast (from the 2019 study), and our efficient forecast adjusted for outturn passenger volumes.

Two notable changes have occurred since. The first is the introduction of NWOW, allowing for more flexible rostering of staff employed on contracts with pre-2010 terms. The second is a shift towards more third-party cleaning. This will reduce overall cleaning costs as in-house cleaning costs are significantly more costly on a square metre basis than third party cleaning costs.

The third-party cleaning contract, with Momentum, is currently in the process of finalisation. Under the new contract Momentum will be responsible for cleaning Terminal 1, representing a substantial increase in the proportion of the airport cleaned by third parties.

We have incorporated these two changes into the development of our 2022 baseline of headcount for in-house cleaning. For non-cleaning FTEs, our start point is derived from the 2019 study, adjusted for passenger volumes. This results in a 2022 baseline pay cost of **€19.6 million** rising to **€24.4 million** in 2026. Our forecasts for non-cleaning FTEs (i.e. terminal facilities) are substantially below the levels proposed within Dublin Airport's regulatory submission. While it is not immediately clear why Dublin Airport requires such a large increase in the number of terminal facilities staff, we are open to representations from the airport justifying the need for additional expenditure.

For non-pay costs, we have taken Dublin Airport's most recent estimate of the cleaning contract value, as well as the 2019 value for other costs within this category to develop the 2022 baseline of ✂ ✂ ✂ ✂. We then uprate both cost lines with wage growth, resulting in a 2022 forecast of ✂ ✂ ✂ ✂.

The Facilities and Cleaning category includes payroll costs for in-house cleaning, as well as for staff performing other duties around the campus such as terminal management and operations control, baggage control, car park and trolley operations. After Security, Facilities and Cleaning employs the highest number of FTEs in the airport. The non-pay element of Facilities and Cleaning includes costs relating to cleaning materials, waste disposal and, most significantly, the third-party cleaning contract. The latter is currently in the process of renegotiation.

In 2018, ✂ ✂ of these staff were employed on contracts with pre-2010 terms which limited rostering flexibility. The majority of these staff worked within Terminal 1. During the pandemic, these staff agreed to adopt 'New Ways of Working' updates to their contracts which allows them to be more efficiently allocated, both in time and location, across the airport.

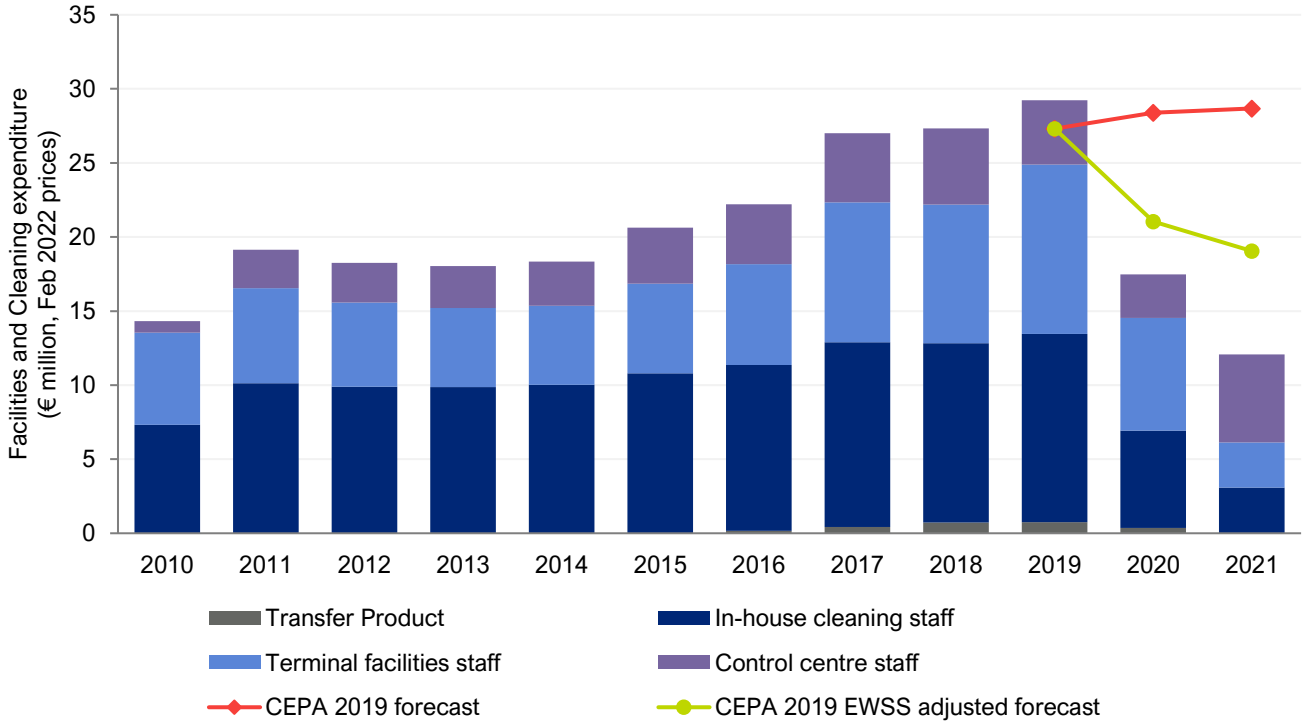
The third-party cleaning contract has constituted an increasing proportion of overall non-pay Facilities and Cleaning cost, moving from c.50% in 2015 to 67% in 2019. However, it continues to make up a relatively small proportion of overall cost related to Facilities and Cleaning (between 10-15%).

7.1. HISTORIC EXPENDITURE

Pay

Facilities and Cleaning staff costs increased between 2013 and 2019 with multiple step-changes throughout that period. In 2019 Dublin Airport's expenditure was significantly greater than we considered efficient in our 2019 study. This spend declined during the pandemic to levels both below our efficient forecast from the 2019 study, even after adjusting for the reduction in passenger volumes and for the EWSS.

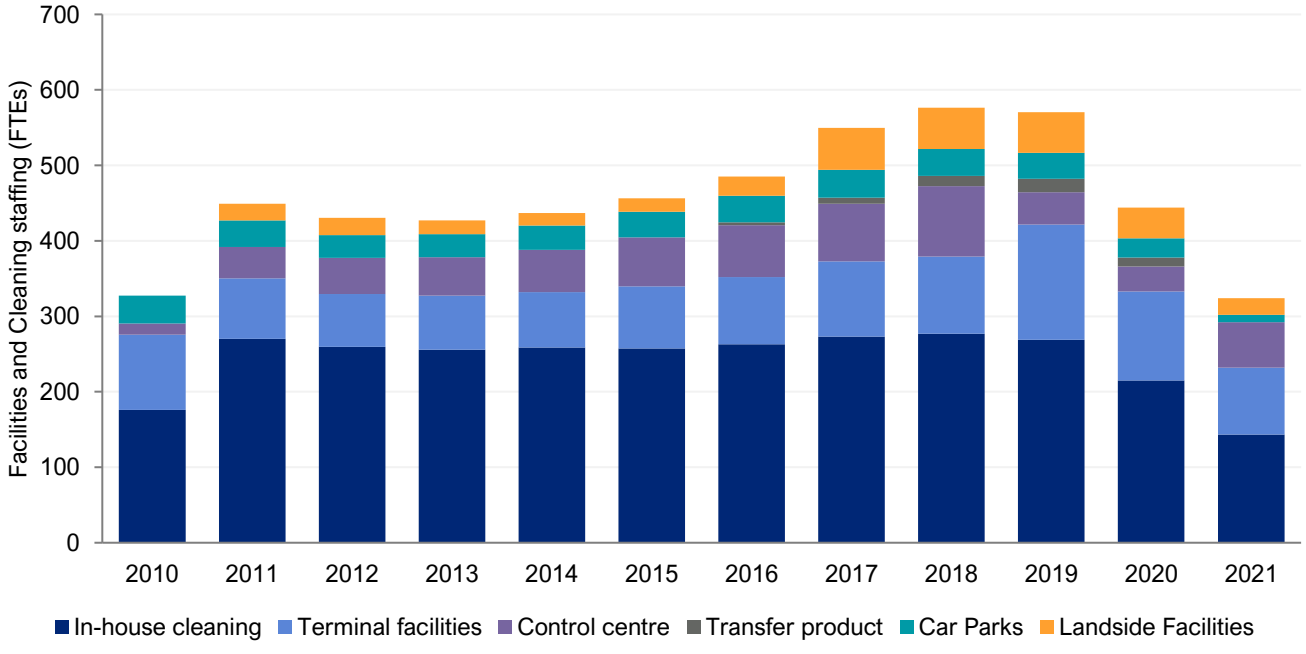
Figure 7.1: Facilities and Cleaning historic expenditure at Dublin Airport, 2010-2021 (€ million, February 2022 prices)



Source: CEPA analysis of Dublin Airport data
Note: The EWSS adjusted forecast should only be considered a broad estimate, as it does not explicitly account for differing eligibility rules around the wage support paid by government.

A similar pattern is seen with FTEs, which were significantly higher than our efficient forecast for 2019 (by 2.5%) but reduced below these levels in 2020 and 2021. The differences in the rate of increase between FTEs and overall costs is due to differences in determined and outturn wage growth.

Figure 7.2: Facilities and Cleaning historic staffing at Dublin Airport, 2010-2021 (FTEs)



Source: CEPA analysis of Dublin Airport data

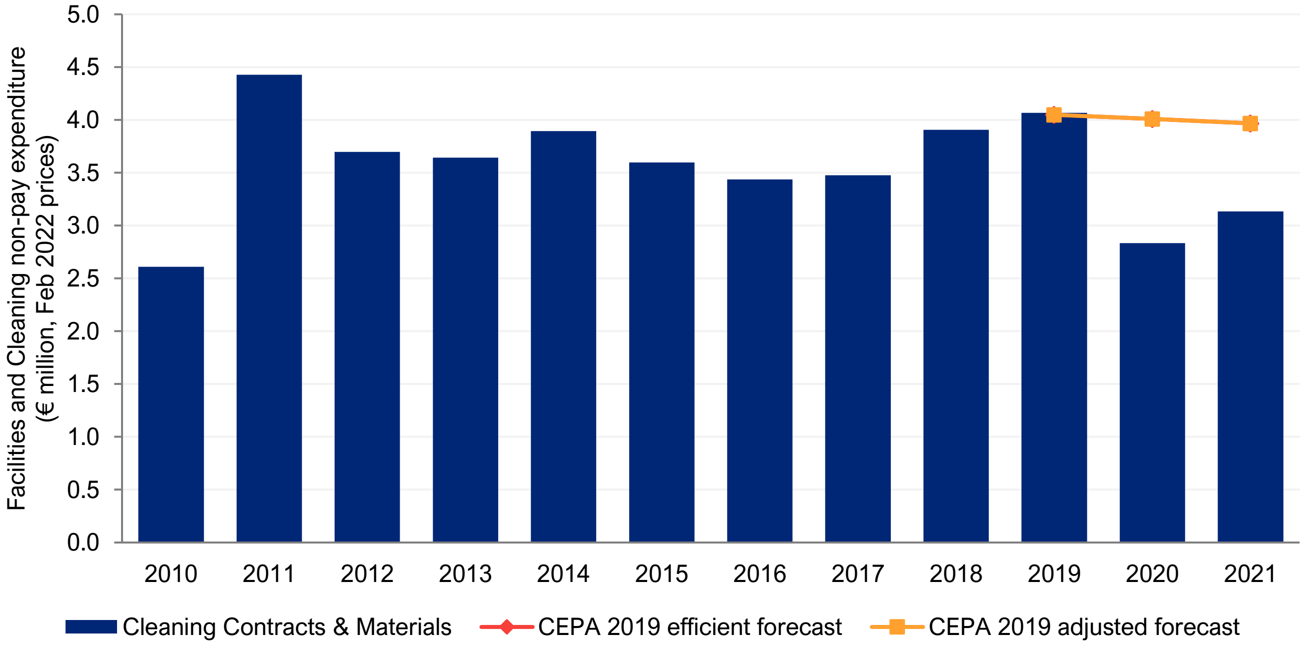
Evidence suggests some efficiency improvements were achieved in 2019 through outsourcing cleaning services and by more efficiently allocating remaining in-house staff. As a greater proportion of cleaning responsibilities shift to Momentum, this should enable a lower level of in-house cleaning FTEs relative to pre-pandemic levels.

Non-pay

Dublin Airport's spend on non-pay cleaning cost was broadly in line with our forecast in the 2019 study. Costs then declined by 30% in 2020 and increased by 10% in 2021, below the allowances of both our 2019 efficient forecast and adjusted efficient forecast.

The scope of third-party cleaning services, provided by Momentum, has also changed over time as Dublin Airport sought to develop a more efficient allocation of its in-house staff. Historically third-party cleaners have both worked across terminals as well back-of-house and front-of-house.

Figure 7.3: Historic Facilities and Cleaning non-pay expenditure at Dublin Airport, 2010-2021 (€ million, February 2022 prices)



Source: CEPA analysis of Dublin Airport data

7.2. Analysis

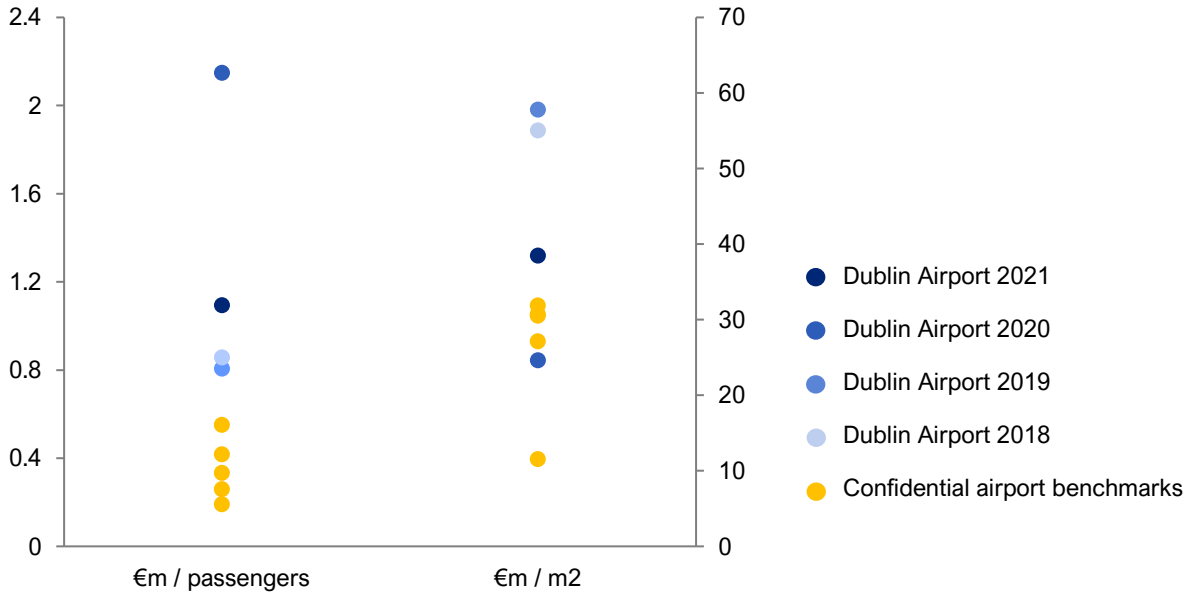
Momentum has been successful in resecuring the third-party cleaning contract after a competitive tender process in which four bidders participated. Under the forthcoming contract, Momentum will be responsible for Terminal 1 in entirety, providing cleaning services for the terminal's front-of-house, back-of-house, offices, and washrooms. Dublin Airport has informed us that no in-house cleaning staff will work within Terminal 1. Based on information provided by the airport we understand the area of the airport that Momentum will be responsible for cleaning will increase from 72,700 m^2 in 2019 to 130,200 m^2 in 2022.

[redacted]. Although there are factors that might account for some of this difference, as described below, they are unlikely to bridge such a material gap:

- **Cleaning intensity**: We expect cleaning intensity to be higher within Terminal 1 than Terminal 2 as it is an older terminal and receives a much higher throughput of passengers. We also expect front-of-house areas to need more frequent cleaning than back-of-house areas.[28]
- **Cleaning quality**: It is plausible that third-party cleaning services are less likely to meet quality requirements,[29] which may impact the relative costs, particularly if these issues must be corrected by existing staff. We are also aware from our work with other airports, that the use of third-party cleaning services can lead to issues around service quality.
- **Contracting and operational overhead associated with the Momentum contract**: Given the spread of Momentum's work across the airport in 2019, we expect that managerial responsibility for at least a proportion of these services would fall to Dublin Airport managerial staff with higher salaries.

This is further exemplified when comparing Dublin Airport's cleaning costs on a per square metre and per passenger basis to other airports, as shown in Figure 7.4.

Figure 7.4: Comparison of unit cleaning costs at Dublin Airport with other airports, 2018-2021



Source: CEPA analysis of Dublin Airport data

NWOW is expected to improve the efficiency of Facilities and Cleaning staff. To determine the possible extent of the improvement for in-house cleaning in particular, we compared in-house cleaning costs in Terminal 1 and Terminal 2 between 2015 and 2018, noting that the majority of cleaning staff on pre-2010 contracts were located in Terminal 1. Our analysis indicates that Terminal 1 FTEs covered 32% less space relative to Terminal 2 FTEs. Though we recognise that this difference will be impacted by other factors such as cleaning intensity, it remains a strong indication that staff on pre-2010 contracts are less efficient due to inflexible rostering. We expect this will be improved through NWOW.

Prior to the Covid-19 pandemic, **Facilities staff** had been separated into groups performing single duties, such as car park operations and directing transfer passengers. At that time, Dublin Airport was relying primarily on opex solutions to handle additional passenger volumes and was therefore anticipating large increases in Facilities staff

[28] We have been unable to identify the extent to which this would impact the relativity of cleaning costs as we have received conflicting data submissions from Dublin Airport.

[29] Elkomy, Cookson, Jones (2019) Cheap and Dirty: The Effect of Contracting Out Cleaning on Efficiency and Effectiveness.

numbers. As highlighted in our 2019 report, we considered these increases in FTEs to be avoidable, as flexible deployment of terminal facilities staff would enable greater operational efficiencies.

Dublin Airport has since adjusted its approach, in line with the recommendations set out in our 2019 report. Terminal facilities staff working across functions have been rationalised into cross-functional units, that will allow more flexible operations that are driven by need i.e.:

- A centralised Airport Operations Centre.
- One service delivery unit covering trollies, customer service agents, transfer hosts, bussing marshalling, cark parks, immigration and Pier 3 processing.
- One cross-functional service delivery management unit.

Staff now perform multiple duties, allowing them to be deployed more flexibly. As such, we expect that NWOW will have enabled efficiencies for facilities staff. Coupled with the reduction in passenger figures, we expect operational efficiencies should result in a notably lower level of FTEs in 2022 relative to 2019.

In its regulatory submission, ✂ They explain that this increase is due to an increased requirement to operate within a constrained environment as passenger numbers recover but provide no additional detail. With the material provided within Dublin Airport's regulatory submission, it is difficult to understand why significantly more terminal facilities staff are required to support the same volume of passengers as 2019. Rather, we would have expected that the operational efficiencies in the management and deployment of facilities staff would translate to a lesser need to increase headcount as passenger numbers recover. As such, we do not currently consider significant changes in FTEs over the regulatory period to be warranted.

Nevertheless, we recognise that changes in passenger behaviour and passenger needs following the pandemic may require additional staff in the short term in order to deliver the service quality passengers expect. We also note that Dublin Airport has provided further evidence in support of its facilities staffing forecasts, which we have not yet reviewed in detail. In this submission and in further submissions we receive from Dublin Airport, we would expect to see:

- To satisfy the need test, clear evidence of a change in expectations from passengers or of new requirements on the airport.
- To satisfy the additionality test, clear linkages between the change in need and a requirement for additional staff.
- To satisfy the efficiency test, evidence that the airport has fully considered ways of mitigating the increased staffing. For example, where Dublin Airport has identified a need for improved wayfinding, have alternatives such as improved signage been considered.

7.2.1. Projected efficient expenditure

Pay

Due to the significant change in third party scope we expect there to be a step-reduction in in-house cleaning FTEs, strengthened by NWOW efficiencies.

- Using data provided by Dublin Airport, we calculate the 2019 in-house cleaning FTE per square metre and apply this to the 2022 square metreage that in-house FTEs will be responsible, taking into account the new Momentum contract.

- We then adjust this for NWOW by assuming the in-house cleaning staff on pre-2010 contracts [redacted] would cover 16% more square metreage in 2022 relative to 2019.[30]

In relation to facilities staff, and for the reasons set out in the preceding section, we use the efficient staffing levels from our 2019 study, adjusted for actual passenger volumes. This results in a forecast for facilities staffing in 2022 of 254 FTEs, compared with 2019 actuals of approximately 284 FTEs and 2021 actuals of approximately 180 FTEs. Taken together, the Facilities and Cleaning headcount figures result in a 2022 baseline of **€19.6 million**.

For the remainder of the determination period, we project in-house cleaning FTEs with an elasticity of 0.4 with respect to terminal area. We consider the space covered by each member of cleaning staff will drive the number of FTEs, relative to passenger numbers, which would impact the extent to which each staff member is utilised during their working day. We project facilities FTEs using an elasticity 0.4 with respect to passenger volumes.

In addition to the above, the revised CIP includes initiatives that are expected to impact the cost and headcount forecasts for Facilities and Cleaning. These consist of:

- Terminal 1 shuttle, bus lounges and injection points: expected to be complete by Q4 2024 and requiring an increase of two FTEs.
- Pier 3 immigration: expected to be complete by Q4 2024 and requiring an increase of eight FTEs.
- Terminal 2 Multi-Storey Car Park: expected to be complete by Q2 2025 and increase in-house cleaning costs by c.€25k.

In line with the above, expenditure increases to **€24.4 million** by 2026.

Table 7.1: Our forecast of Facilities and Cleaning staffing levels and payroll expenditure, 2022-2026

	2022	2023	2024	2025	2026
Staffing levels (FTEs)					
Facilities and Cleaning (excl. CIP)	396	411	417	422	425
Facilities and Cleaning (incl. CIP)	396	423	442	457	460
Payroll expenditure (€ million, February 2022 prices)					
Facilities and Cleaning payroll (excl. CIP)	19.6	20.8	21.6	22.1	22.5
Facilities and Cleaning payroll (incl. CIP)	19.6	21.4	22.9	23.9	24.4

Source: CEPA analysis

Non pay

Given the increased scope of third-party cleaning services, we would expect there to be a large increase in non-pay cleaning costs. We have taken Dublin Airport's estimate of 2022 expenditure on the cleaning contract as we have no evidence to suggest the retender was inefficient. [redacted].

Other cost elements within this category, including waste and materials, have been rolled forward from 2019 cost figures.

[redacted]

[30] 16% is half of the 32% square metreage efficiency identified between T1 and T2 between 2015 and 2018. We chose to half this efficiency figure to reflect cleaning intensity differences between terminals.

Table 7.2: Our forecast of Facilities and Cleaning non-pay expenditure, 2022-2026 (€ million, February 2022 prices)

	2022	2023	2024	2025	2026
Facilities and Cleaning non-pay	✂	✂	✂	✂	✂

Source: CEPA analysis

8. CAMPUS SERVICES

Summary

Campus Services payroll expenditure increase in 2019 from 2018 levels despite a small drop in FTEs. While expenditure reduced significantly in 2020, it remained above our 2019 forecast adjusted for government wage support. Costs dropped further in 2021 and were close to our wage support adjusted forecast. While the response to the pandemic appeared to have been delayed, we find this to be reasonable given the importance of the Police and Fire services, uncertainty around the long-term impact of the pandemic, and the relatively low elasticity of staffing levels with respect to passenger volumes.

Our future payroll forecasts are projected forwards from a 2022 baseline using 2019 staff numbers and applying adjustments to account for structural changes and efficiencies realised by the airport over the last two years. This results in a baseline of **€19.1 million**. We do not see a significant increase in FTEs or costs between 2022 and 2026 in this area, as growth is not strongly linked to passenger volumes. Taking into account wage growth and a small allowance for volume-related effects, we forecast expenditure in 2026 to be **€21.4 million**.

Campus Services is responsible for delivering services across the entire of the airport rather than being specific to one of the two terminals. It includes the airport police force and the airport fire and rescue service which account for nearly three quarters of overall staff costs.

The airport police are responsible for general policing and aviation security duties including the protection of civil aviation from unlawful acts of interference. Duties also include responding to emergency situations, traffic management and dealing with the preservation of good order to ensure users enjoy a safe environment while working or travelling through the airports. The airport police are “Authorised Officers” under the Airports and Aviation Acts 1936 to 2014 and as such have full policing powers within the State airports.

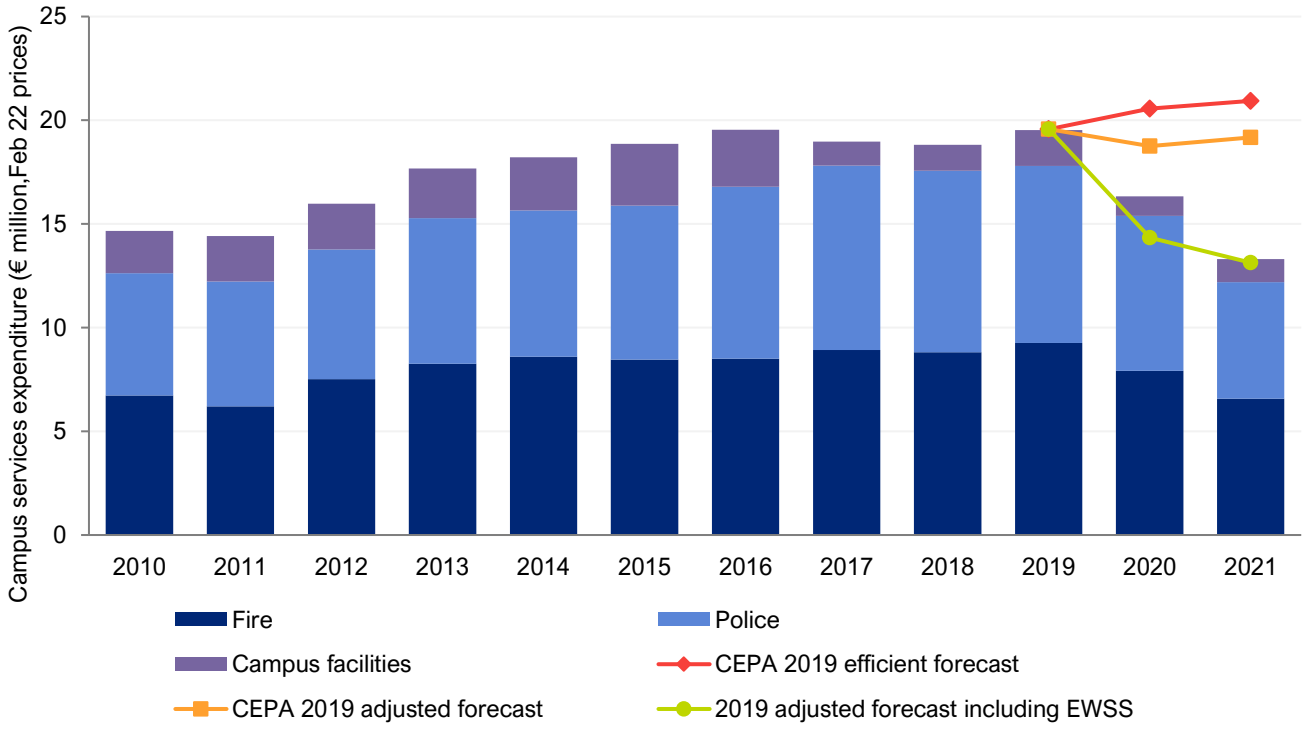
The airport fire and rescue service provide emergency response cover required to maintain the airport categorisation and specialise in fire-fighting skills required for a full-scale aircraft emergency.

Campus facilities, a subset of Campus Services, include operations training, the Airport ID Centre, and operational safety. It previously also included the trollies section, but this has now been reallocated to terminal facilities with Facilities and Cleaning.

8.1. HISTORIC EXPENDITURE

Campus Services staff costs followed a rising trend through recent determinations before flattening off in 2018-2019. Costs for 2020 and 2021 however were well below our forecasts in the 2019 study, primarily due to government support for staff wages.

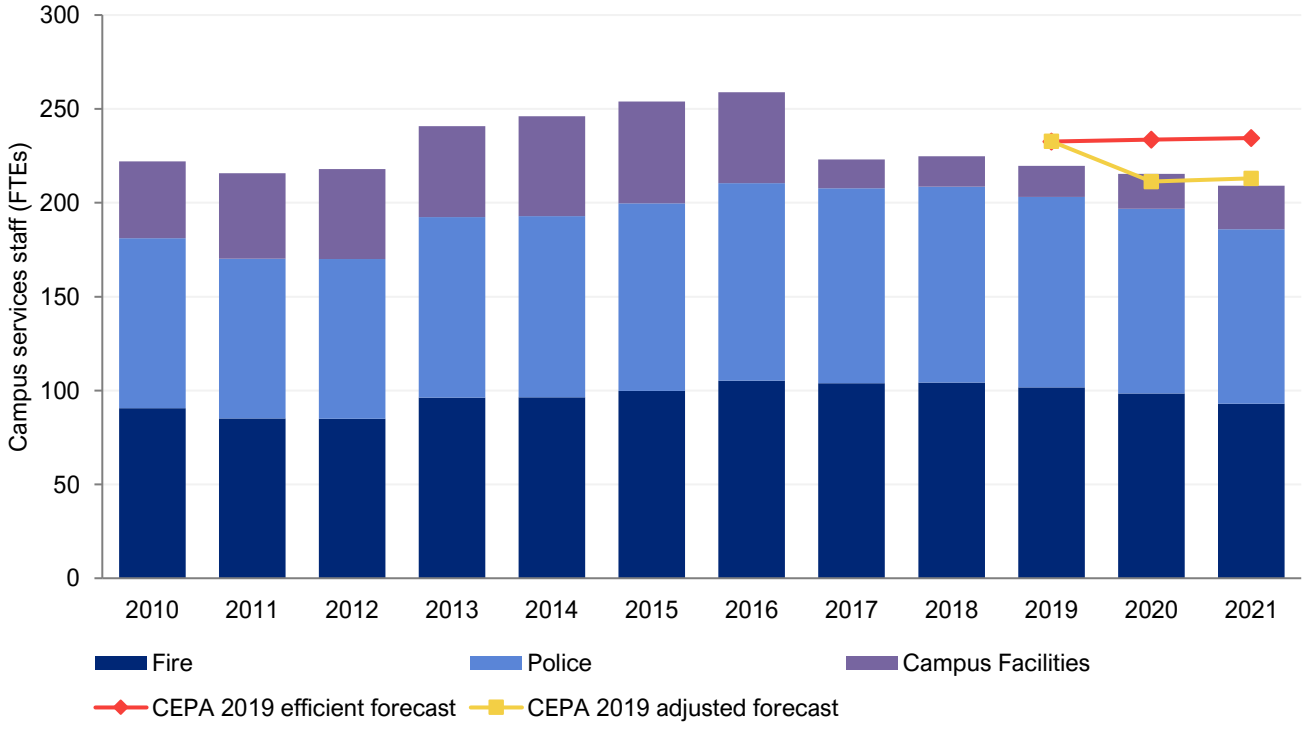
Figure 8.1: Payroll expenditure on Campus Services by type of role, 2010-2021 (€ million, February 2022 prices)



Source: Taylor Airey analysis of Dublin Airport data
Note: The EWSS adjusted forecast should only be considered a broad estimate, as it does not explicitly account for differing eligibility rules around the wage support paid by government.

In 2019, Campus Services staff levels fell below our forecast in the 2019 study. FTEs reduced further in 2020 and 2021, though by less than other cost categories.

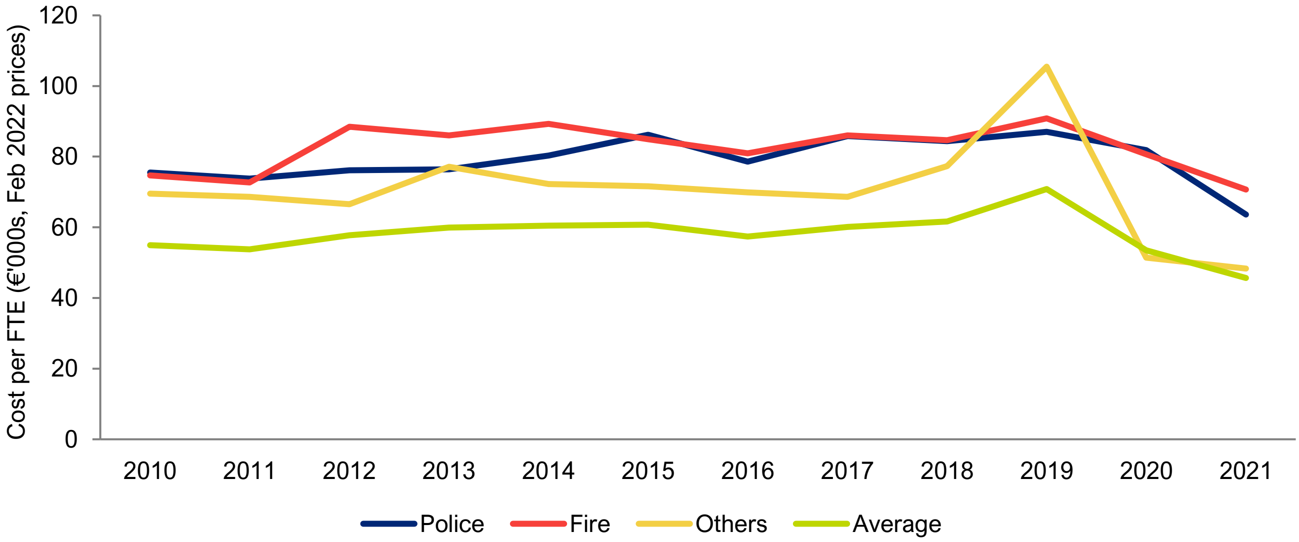
Figure 8.2: Staff numbers working in Campus Services by type of role, 2010-2021 (FTEs)



Source: Taylor Airey analysis of Dublin Airport data

The average cost per FTE in 2019 increased for all roles within Campus Services to varying degrees, with a spike in the “Other” category caused by the introduction of the Airport ID Centre which was not included before this year. Costs reduced in all areas in 2020 and 2021, with Landside Services and Police experiencing the greatest reductions if the spike in the “Other” category is disregarded.

Figure 8.3: Unit payroll costs by role, 2010-2021 (€ thousands, February 2022 prices)



Source: Taylor Airey analysis of Dublin Airport data

8.2. Analysis

Airport Police

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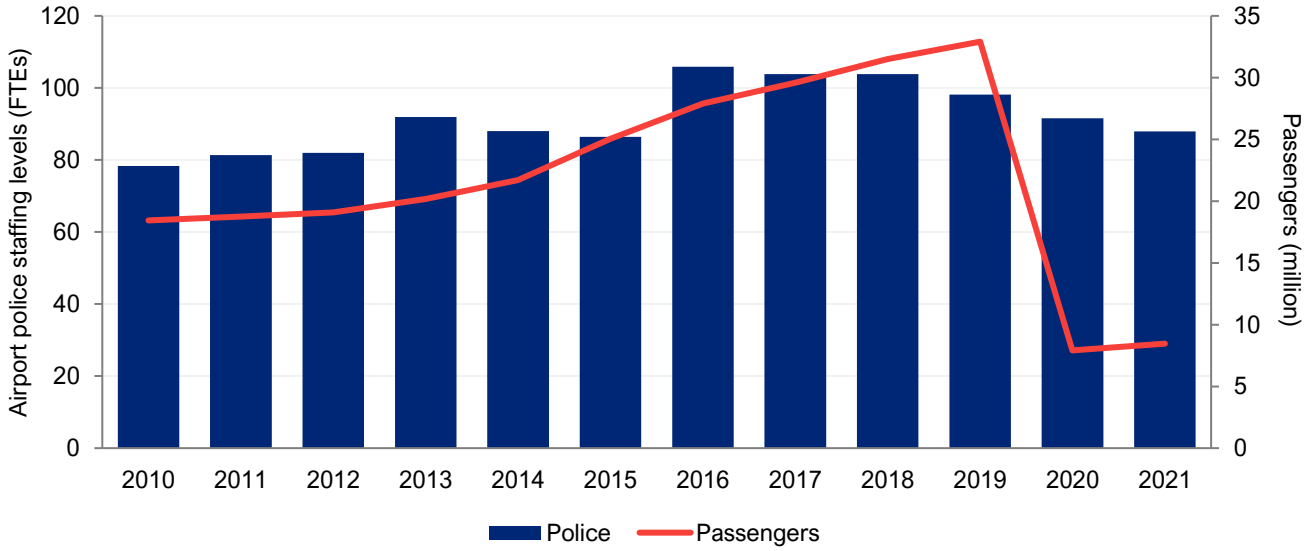
Figure 8.4: Unit payroll costs for Dublin Airport police against benchmark, 2015-2021

Source: Taylor Airey analysis of Dublin Airport data

Airport Police FTEs reduced slightly each year between 2016 and 2019 despite steady growth in passenger numbers. This was reduced by a further 12 FTEs in 2020-2021, partly through workforce attrition but also by a restructure which replaced the 5 Duty Manager roles with 2 Inspector roles.

Figure 8.5: Airport police staffing levels compared with growth in passenger numbers, 2010-2021

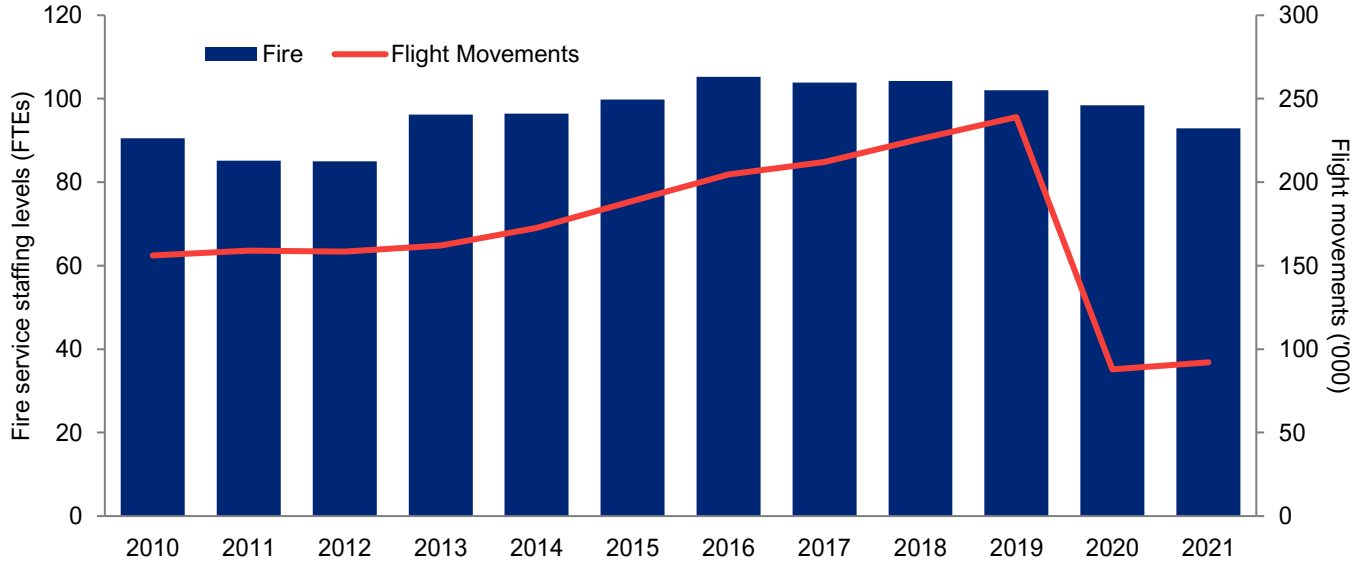


Source: daa; Taylor Airey analysis

Airport Fire Service

Dublin Airport Fire Service numbers are driven by the need to maintain the response capability for a Category 9 Aerodrome classification to comply with the Irish Aviation Authority licensing and the requirements of International Civil Aviation Organisation Annex 14 Airport Manual. Fire Service activities become busier as the number of flight movements handled at the airport increase and a weak elasticity to this driver has been identified in historical analysis.

Figure 8.6: Airport fire service staffing levels compared with growth in flight movements, 2010-2021



Source: daa; Taylor Airey analysis

There is clearly a relationship between the number of passengers at the airport and the number of flight movements handled. However, the number of passengers carried per air transport movement increased by around 9.5% during the last regulatory period (2014 to 2019).

8.3. PROJECTED EFFICIENT EXPENDITURE

Staff numbers

For each part of Campus Services we took the 2019 number of FTEs as the baseline for future projections, with some one-off changes applied to account for efficiencies or new requirements which have arisen in the interim period. Whilst we believe there is a link between passenger volumes and the number of Campus Services staff required, we do not believe it is strong. For example, our econometric analysis found no strong link between police costs and passenger numbers. We therefore propose that the elasticity of Campus Services staff to passenger numbers should be 0.1 for operational areas i.e. Airport Police Service and Airport Fire Service.

Table 8.1: Approach to forecasting by staff category within Campus Services

Staff category	Approach
Airport Fire Service	*Baseline efficiency* – We establish a 2022 baseline by taking the 2019 actual staffing levels provided by Dublin Airport, applying our elasticity estimate with respect to passenger numbers, and adding 14 FTEs to allow for additional staff required to support dual runway operations. *Elasticity* – We apply an elasticity of 0.1 with respect to passenger numbers as described above.
Airport Police Service	*Baseline efficiency* – We establish a 2022 baseline based on the Dublin Airport estimate which is equal to 2019 staffing levels with 12 FTEs removed, this is an efficiency gain as a result of rationalisation of grades. *Elasticity* – We apply an elasticity of 0.1 with respect to passenger numbers as described above.
Operational Safety	*Baseline efficiency adjustment* – We establish a 2022 baseline by taking actual 2019 staffing levels and then adding 4 FTEs to account for staff transferred from the Airside Safety team in Airside Operations. Elasticity – We do not apply any elasticity to our ongoing forecasts.
Airport ID Centre	*Baseline efficiency adjustment* – We establish a 2022 baseline by taking actual 2019 staffing levels and then adding 3 FTEs to allow for understaffing of this team which was new in 2019 and not fully resourced. Elasticity – We do not apply any elasticity to our ongoing forecasts.
Operations Training	*Baseline efficiency adjustment* – We establish a 2022 baseline by taking actual 2019 staffing levels. *Elasticity* – We do not apply any elasticity to our ongoing forecasts.

Source: Taylor Airey analysis

As shown in Table 8.2, this approach forecasts efficient Campus Services expenditure to increase from **€19.1 million** in 2022 to **€21.4 million** in 2026.

Table 8.2: Our forecast of efficient Campus Services expenditure, 2022-2026

Forecast	2022	2023	2024	2025	2026
Campus Services staffing levels (FTEs)	228	233	236	237	238
Campus Services expenditure (€ million)	19.1	20.1	20.7	21.1	21.4

Source: Taylor Airey / CEPA analysis

9. INFORMATION TECHNOLOGY

Summary

IT costs at Dublin Airport include both pay and non-pay elements. Between 2019 and 2021 Dublin Airport's IT staffing, both in terms of headcount and overall expenditure, has been below the projected efficient levels of our 2019 study. This difference was slight in 2019 but increased significantly in 2020 and 2021 as a result of efforts to reduce IT spend during the Covid-19 pandemic.

Comparably, non-pay IT opex rose between 2017 and 2019 before reducing by about 18% in 2020 and remaining at that level in 2021. Dublin Airport's expenditure on non-pay IT in 2019 was higher than our forecast for that year by approximately 9%, but in subsequent years it has been lower than our forecast.

Overall, Dublin Airport's IT opex spend has aligned with SITA benchmarks in recent pre-pandemic years, though its benchmark spend has been higher than comparable benchmarks in the pandemic years. Looking forwards, however, SITA has reported that more than half of airports expect opex spend to increase from 2022 onwards.

While IT opex is expected to recover to pre-pandemic levels, we expect this will not occur immediately. The projected FTEs proposed by Dublin Airport in its regulatory submission fall within our view of efficient performance; these have been adopted in developing our forecasts. We have maintained the 2022 non-pay IT opex forecast developed in our 2019 study as our 2022 baseline. We then separately allow for additional investments in cyber security over the determination period, as well as additional CIP-related expenditure.

Overall this means we forecast IT expenditure to rise from **€17.2 million** in 2022, to **€22.2 million** by 2026.

Staffing within the IT function at Dublin Airport is split into four areas: Technology and Infrastructure, PMO, Data and Analytics and IT Security. The largest of these, Technology and Infrastructure, covers over half of total staffing and is responsible for operation and first line maintenance of the airport's systems, networks, and data management. These systems include those required for the operation of the airport, as well as back-office systems to support airport administration and Dublin Airport's retail proposition. PMO staff are responsible for the delivery of IT capital projects. We understand from information provided by Dublin Airport that this function includes contract and agency staff, allowing Dublin Airport to adjust resources to match project delivery needs. We also understand that the cost of PMO staff is partially capitalised.

The non-pay element of IT consists of third-party support costs relating to maintenance, operation and support of back office and operational systems. Prior to the pandemic, Dublin Airport informed us that around 65% of non-pay costs is attributable to the ten highest value contracts. These include: the airport's service desk support provided by the supplier ESP Global Services, airport IT operational systems support provided by suppliers such as SITA and ARINC, as well as back-office licencing and support from Oracle and HP.

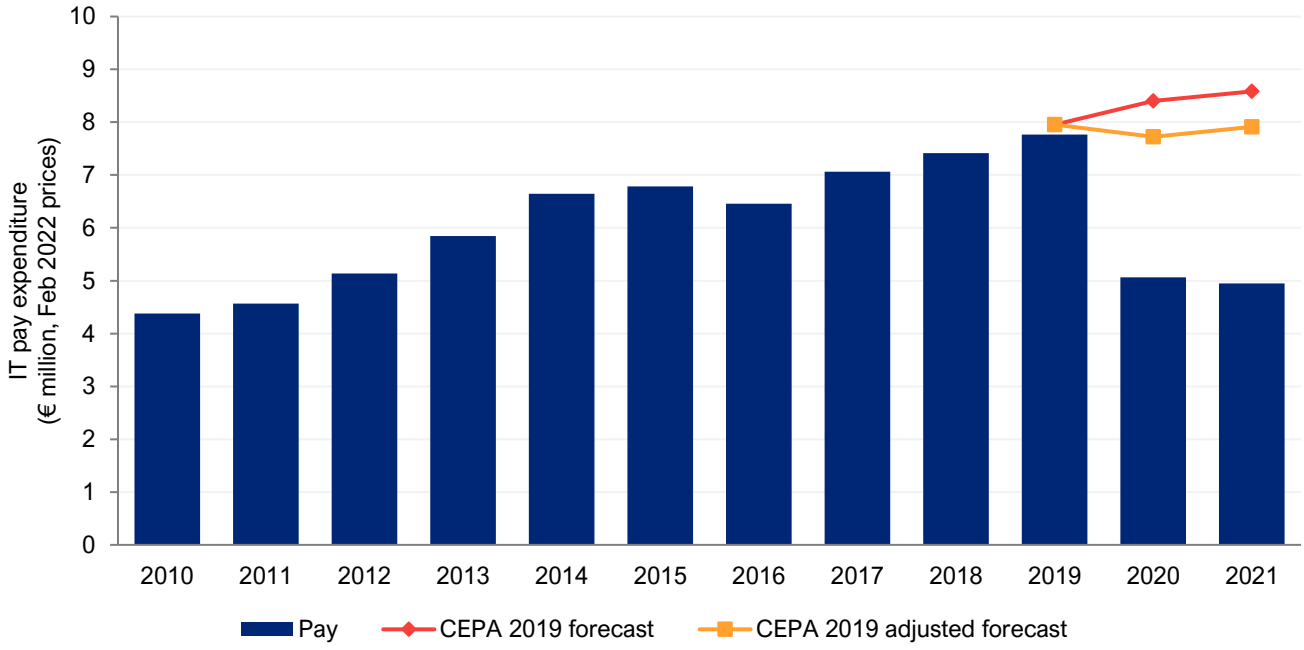
9.1. HISTORIC EXPENDITURE

Pay

Dublin Airport's IT staffing levels increased year-on-year between 2016 and 2019, though 2019 expenditure remained below projected efficient levels in our 2019 study. The underspend between 2019 and 2021 applies both relative to our efficient forecast in the 2019 study, and to the adjusted efficient forecast which accounts for the drop in passenger volumes.

Since 2019, IT staff costs and FTEs have reduced further, remaining substantially below the levels assumed in our forecast. This substantial difference in 2020 and 2021 is largely the result of cost-cutting measures introduced in response to the Covid-19 pandemic. Although the pandemic did not result in structural IT changes, Dublin Airport made efforts to reduce IT spend. In 2019 IT FTEs were at 70; this declined to 56 in 2021.

Figure 9.1: IT pay historic expenditure, 2010-2021 (€ million, February 2022 prices)

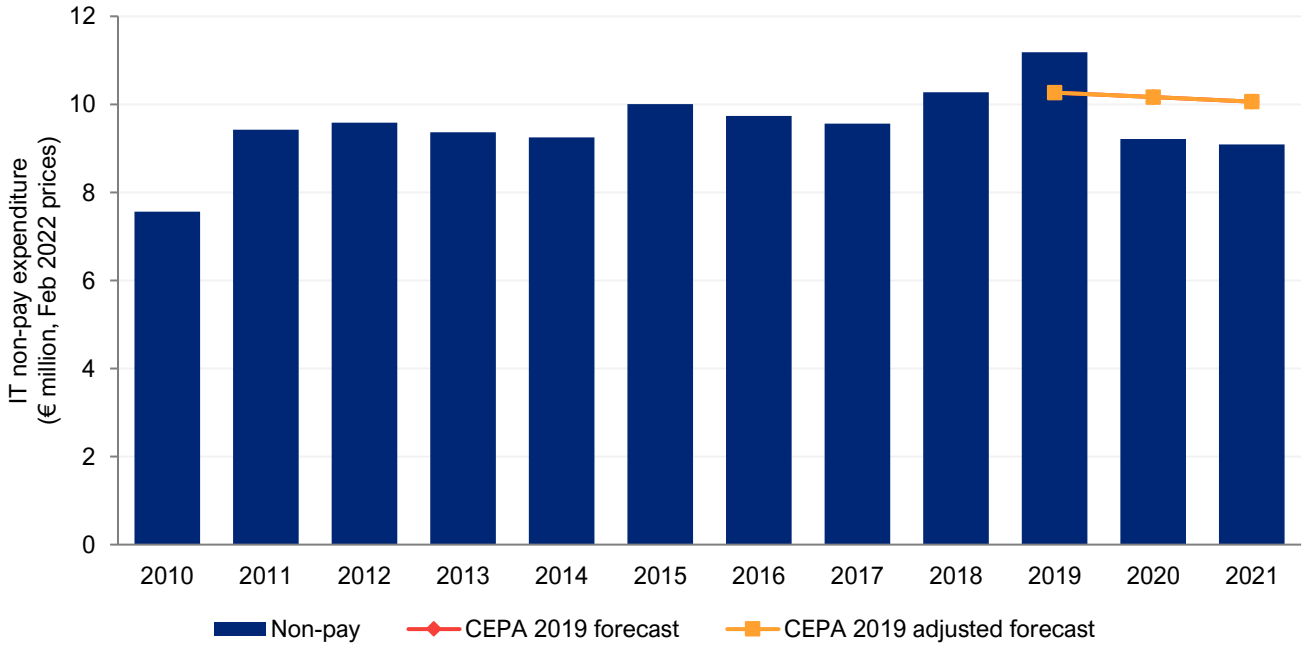


Source: CEPA analysis of Dublin Airport data

Non-pay

Non-pay IT opex rose between 2017 and 2019 before reducing by approximately 18% in 2020 and remaining at that level in 2021. Dublin Airport's expenditure in 2019 was significantly higher than our efficient forecast for that year in our 2019 efficiency study. However, in 2020 and 2021, expenditure reduced significantly.

Figure 9.2 IT non-pay historic expenditure, 2010-2021 (€ million, February 2022 prices)



Source: CEPA analysis of Dublin Airport data

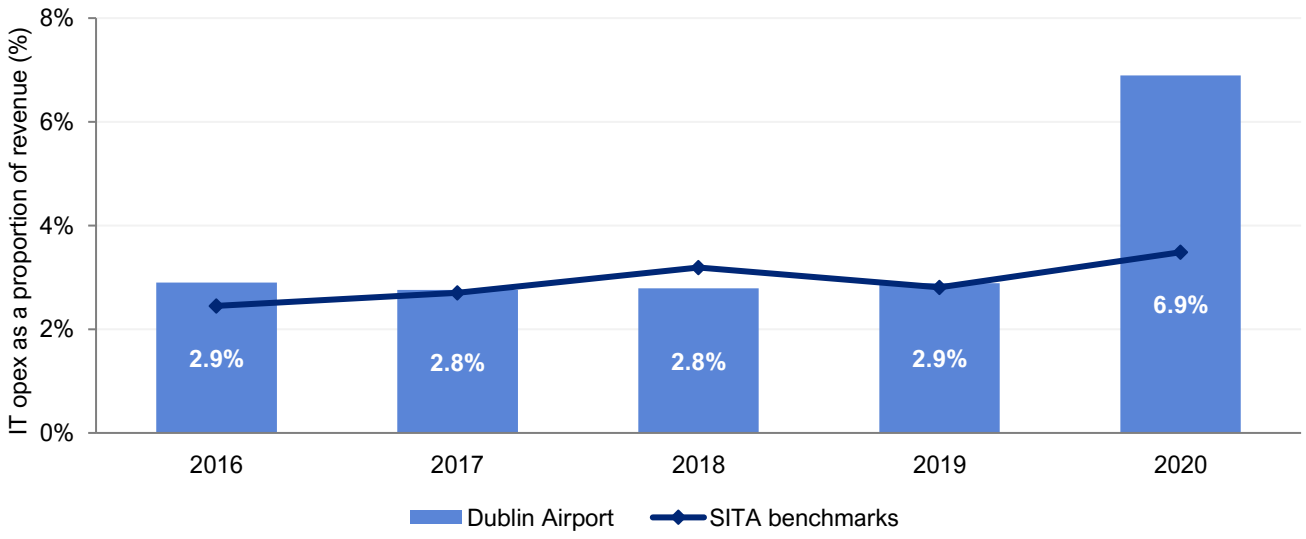
9.1.1. Analysis

Pay

We sought to assess the efficiency of historic IT opex based on benchmarks published annually by SITA.[31] These benchmarks are reported based on a combination of pay and non-pay IT costs; we therefore undertook our IT assessment holistically.

As shown in Figure 9.3, in the period leading up to 2019, Dublin Airport's IT opex spend as a proportion of revenue was aligned with SITA airport benchmarks, suggesting relatively efficient performance. In 2020, however, it appears that Dublin Airport struggled to maintain IT opex relative to benchmarks. We expect that all airports will have experienced similar revenue pressures in 2020 due to the global impact of the Covid-19 pandemic on the travel industry. The precise reason for Dublin Airport's significant difference is not clear; we expect this may be due to a number of factors such as contractual restrictions on third party costs, the proportion of IT opex that is more 'fixed' in nature (e.g. servers and storage) for which maintenance cannot be deferred, staff retention, public salary support, reporting differences, and/or the scale of decline in revenues.

Figure 9.3: IT opex as a percent of annual revenue, Dublin Airport and SITA benchmarks, 2016-2020 (%)



Source: SITA – Air Transport IT Insights: 2019, 2020, 2021; CEPA analysis of Dublin Airport data

As noted above, Dublin Airport's FTEs declined nearly 20% over the pandemic period. The airport expects IT costs to recover to pre-pandemic levels. We expect staffing levels may not recover immediately, nor will it necessarily align with the recovery of passenger figures, as:

- We have not found IT FTEs to have a strong statistical link with passenger volumes; and
- To some extent, Dublin Airport is able to meet its IT requirements through third party services, the costs of which will be captured within non-pay costs.

Non-pay

As set out in section 9, we sought to assess the efficiency of Dublin Airport's historic IT opex based on benchmarks published annually by SITA using a combination of pay and non-pay IT costs.[32] In the period leading up to 2019,

[31] SITA | Air Transport IT Insights 2021

[32] SITA – Air Transport IT Insights: 2019, 2020, 2021

Dublin Airport's IT opex spend as a proportion of revenue suggested relatively efficient performance, though in 2020 Dublin Airport struggled to maintain that position.

For our previous efficiency study, Dublin Airport told us that investment had been made in reviewing and developing the procurement function at the airport. This cost category consists of third-party services, which should benefit from improvements to the procurement function, enabling Dublin Airport to achieve better value for money. This was reflected in our 2019 forecast. However, we also note that, according to SITA, 55% of airports expect opex spend to increase from 2022, with 26% expecting it to remain the same.[33]

9.1.2. Projected efficient expenditure

Pay

In its regulatory submission, Dublin Airport has proposed an increase in staffing from 62 FTEs in 2022 to 75 FTEs in 2026. This compares with 70 FTEs in 2019 and 56 FTEs in 2021. For our forecasts, we have used Dublin Airport's estimates as we consider these to be within the bounds of efficient performance. However, Dublin Airport's supporting narrative could be strengthened through a clearer explanation of whether the staffing increases are due to increases in passenger volumes, due to more general scale effects, or due to CIP-related investments that require associated increases in opex.

In terms of unit payroll costs for 2022, we have rolled forward 2019 efficient costs and adjusted for pension uplift in 2020, resulting in a wage forecast that is marginally higher than wages projected by Dublin Airport. The resulting 2022 baseline is **€7.1 million** rising to **€9.4 million** in 2026.

Table 9.1: Our forecast of IT staffing levels and payroll costs at Dublin Airport, 2022-2026

	2022	2023	2024	2025	2026
IT staffing (FTEs)	62	66	70	72	75
IT payroll (€ million)	7.1	7.8	8.5	8.9	9.4

Source: CEPA analysis

Non-pay

In its regulatory submission, Dublin Airport proposes an increase in non-pay IT opex. Though it describes many IT activities in its regulatory submission, it provides few cost figures to support the proposed increase in IT non-pay, aside from cyber security. Dublin Airport's narrative also does not clearly articulate whether the proposed increases are due to volume effects (i.e. due to more passengers), due to increased operational requirements beyond volume effects, or due to CIP-related effects. Where the proposed increases are due to volume effects, we would expect there to be some consideration of the relationship between passenger volumes and IT opex requirements. And similarly, where there are other step changes in IT opex requirements beyond volume effects, we would expect there to be some explanation of what value such additional expenditure is delivering, e.g. in terms of enhanced capacity or resilience, or improved service quality for customers.

In developing our 2022 baseline, we therefore start from the 2022 forecast in our 2019 efficiency study. No elasticity assumptions are applied to this cost category. We then uplift this over the determination period to capture:

- The cyber security investments highlighted by Dublin Airport in its regulatory submission. We find that the scale of investment proposed is similar to other organisations of the same scale. [34] We therefore consider it appropriate to increase non-pay IT costs accordingly, given increasing cyber security requirements, both from a regulatory perspective and from an operational resilience perspective.

[33] SITA (2021) Air Transport IT Insights

[34] In 2021 CEPA undertook a cost efficiency assessment of IT spend for NI Water, which includes analysis of the efficiency of its cyber resilience proposals. This report is confidential.

- IT projects included and costed within the revised CIP. It is unclear whether these projects were captured in the forecasts within Dublin Airport's regulatory submission, as they were not explicitly costed. However, we have been able to reconcile a number of the qualitatively described projects in the submission with the CIP project costings. These include, for example, Digital Passenger Experience, Servers and Storage, and Reliability, Safety, Security and Compliance.

The resulting 2022 baseline for IT non-pay costs is **€10.1 million** rising to **€12.8 million** in 2026. The forecast ensures Dublin Airport's overall IT opex cost (i.e. the combination of both pay and non-pay IT opex) returns to historic SITA benchmark levels by 2026.

Table 9.2: Our forecast of IT non-pay costs at Dublin Airport, 2022-2026 (€ million, February 2022 prices)

	2022	2023	2024	2025	2026
IT non-pay (excl. CIP)	10.0	10.9	11.1	11.4	11.7
IT non-pay (incl. CIP)	10.1	11.1	11.9	12.5	12.8

Source: CEPA analysis

10. RETAIL

Summary

We have generally found Dublin Airport's historic retail expenditure to be efficient, and its response to the reduction in passenger volumes to be efficient. While Dublin Airport's proposed salary costs for 2022 are higher than we have estimated, we consider the airport has justified its proposed pay levels given labour market constraints.

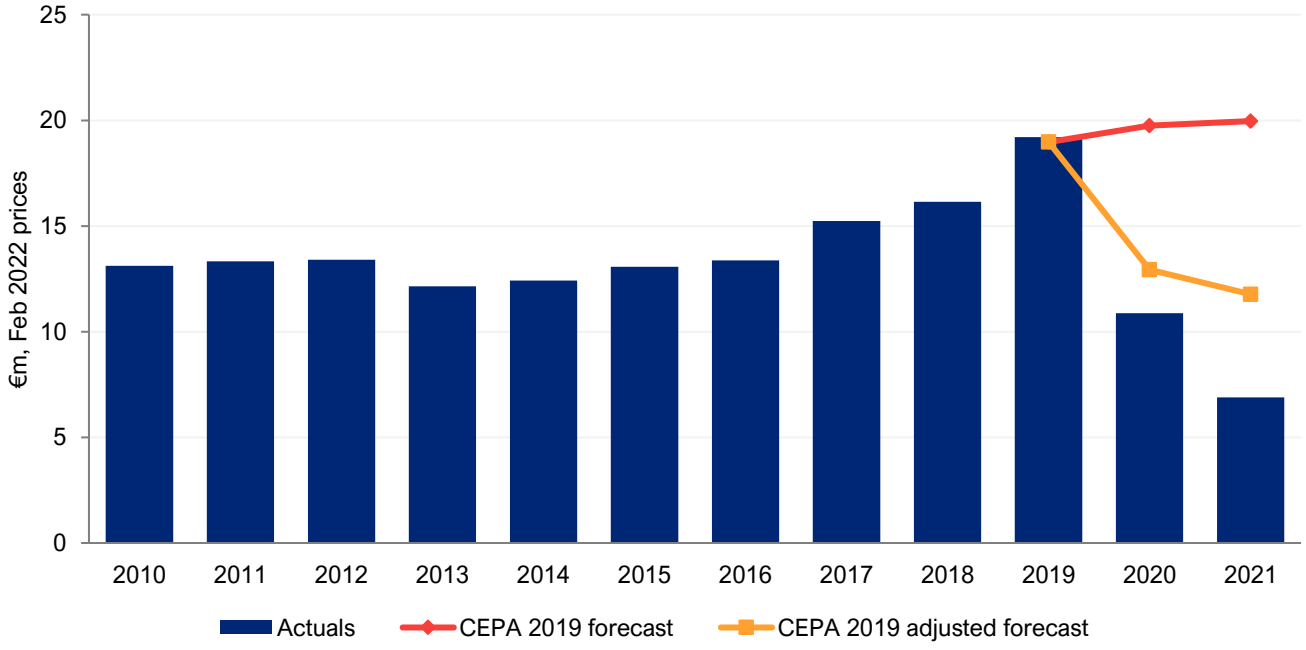
We expect retail staffing levels to grow quickly as passenger volumes recover to pre-pandemic levels, but more slowly after that. We also allow for additional staffing to reflect envisaged store growth. This results in a forecast of efficient retail expenditure growing from a 2022 baseline of **€16.7 million**, rising to **€22.6 million** by 2026.

Retail expenditure consists entirely of payroll costs. Unlike many other airport operators, daa group directly operates many of its own stores at Dublin Airport, through its subsidiary ARI. The remaining stores, mainly specialist shops and food and beverage outlets, are let to concessionaires. As a result, Dublin Airport directly employs many of the shop floor retail staff, in addition to some back-office staff.

10.1. HISTORIC EXPENDITURE

Dublin Airport's retail expenditure has broadly followed the trajectory of passenger numbers. As shown in Figure 10.1, retail expenditure increased from €13.1 million in 2015 to €19.2 million in 2019, while traffic increased from 25 million passengers to 32.9 million passengers over the same period. The Covid-19 pandemic severely impacted Dublin Airport retail activities, with retail expenditure reducing to €10.9 million in 2020 and to €6.9 million in 2021.

Figure 10.1: Retail historic expenditure, 2010-2021 (€ million, February 2022 prices)



Source: CEPA analysis of Dublin Airport and CAR data.

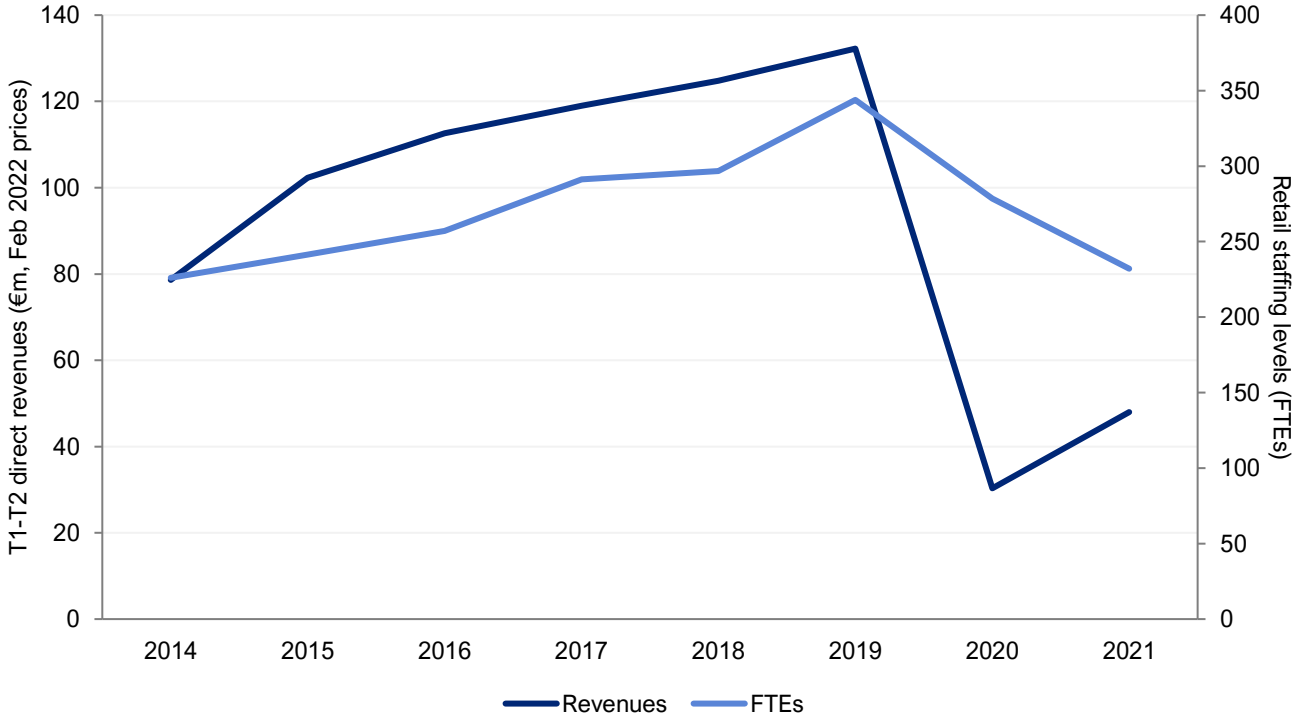
In 2019 Dublin Airport's expenditure was marginally higher than our forecast from the 2019 study, but cost reductions in 2020 and 2021 were substantially larger than we would have expected given the reduction in passenger volumes.

10.2. Analysis

We find that Dublin Airport's actual staffing levels in 2019 were slightly lower than we had assumed in our efficient forecast for 2019 (344 vs 348), though unit payroll costs were 4.6% higher.[35] Given the net effect is for outturn 2019 payroll expenditure to be broadly similar to our forecast, we consider Dublin Airport's retail expenditure in 2019 to be broadly efficient.

We also consider the 64% reduction in Dublin Airport's retail costs between 2019 and 2021 to be efficient, given the exceptional circumstances of the pandemic, with traffic decreasing by 74% over the same period. In general, variation in retail expenditure can be considered efficient to the extent that it goes in the same direction as variation in retail revenues, signalling that profitability considerations guide retail decisions. As shown in Figure 10.2, the reduction in retail FTEs between 2019 and 2021, and thus that of payroll costs, follows a similar trajectory to that of retail revenues, providing further evidence that the cost reduction between 2019 and 2021 was broadly efficient.

Figure 10.2: Comparison of Dublin Airport's direct retail revenues and retail FTEs, 2014-2021



Source: CEPA analysis of Dublin Airport and CAR data.

We have also benchmarked Dublin Airport's headcount reductions during the Covid-19 pandemic against other major aviation retailers such as Dufry to understand the proportionality of Dublin Airport response. At Dufry, the number of FTEs per 100 square metres of retail space decreased by 25% between 2019 and 2021,[36] while at Dublin Airport, the equivalent reduction was 33%. This suggests that Dublin Airport's response to the pandemic was broadly in line with comparators within the travel retail industry.

[35] This is the difference between wage for ARI Retail Staff as reported by Dublin Airport for this exercise and the wage for ARI Retail Staff we forecasted in 2018 to inform CAR's 2019 determination. ARI Retail Staff account for 93% of all FTEs in the retail cost category.

[36] CEPA analysis of data on Dufry's number of employees and metreage of shops in their Europe business area as reported in their annual reports.

10.3. PROJECTED EFFICIENT EXPENDITURE

To forecast retail staffing levels, we use a recovery elasticity of 0.5 with respect to passenger volumes, and a lower business as usual elasticity of 0.2 once passenger numbers are above 2019 levels.[37] As Dublin Airport is expecting to open new stores, we include 24 additional FTEs to accommodate store growth.[38] We report our forecast of headcount in Table 10.1.

As shown in Table 10.1, this approach forecasts efficient retail expenditure to increase from **€16.7 million** in 2022 to **€22.6 million** in 2026.

Table 10.1: Our forecast of efficient Retail expenditure and associated headcount, 2022-2026

	2022	2023	2024	2025	2026
Retail staffing levels (FTEs)	296	324	336	364	366
Retail payroll expenditure (€ million)	16.7	18.9	20.2	22.2	22.6

Source: CEPA analysis

[37] 0.5 reflects the elasticity of FTEs to passenger numbers as implied by the reduction of FTEs and traffic between 2019 and 2021. 0.2 reflects the elasticity assumption used for the 2019 efficiency study.

[38] These 24 FTEs are Dublin Airport's own estimate of the staffing levels required for the new stores. Source: Dublin Airport regulatory submission to CAR, "Appendix 4: Operating Expenditure Report", p.62

11. AIRSIDE OPERATIONS

Summary

In terms of Airside Operations, Dublin Airport appear to have acted swiftly and appropriately to the pandemic. Payroll costs in 2020 were close to the wage support-adjusted determination, and in 2021 they fell significantly below it. While staff costs per passenger spiked in 2020, they fell back in line with the pre-2020 historical trend in 2021.

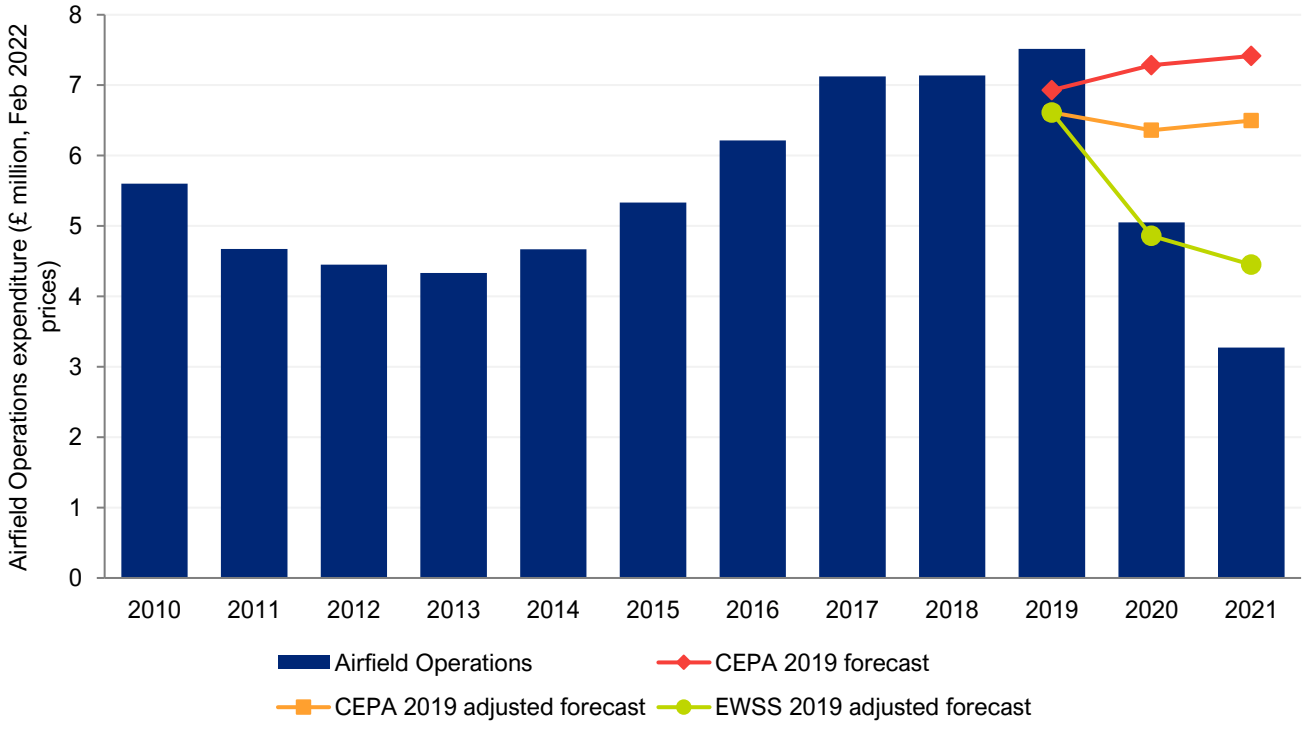
Our future payroll forecasts are projected forward from a 2022 baseline using 2019 staff numbers and applying adjustments to account for structural changes and efficiencies realised by the airport over the last two years. We do not see a significant increase in FTEs or costs between 2022 and 2026 in this area as we do not believe growth is strongly linked to passenger volumes, with economies of scale, improved automation, and other efficiencies able to absorb increased flight movements. As a result, we forecast efficient Airside Operations expenditure to increase from **€6.3 million** in 2022 to **€7.0 million** in 2026.

11.1. INTRODUCTION

Airside Operations is an operational function which is staffed by directly employed Dublin Airport employees, who are responsible for maintaining the safe and efficient operation of the airfield. Duties include operational duty teams, responsible for patrolling and checking for foreign object debris (FOD), safety teams responsible for checking that safe working practices are being applied by the airport users, and operational planning staff managing stand and gate allocation.

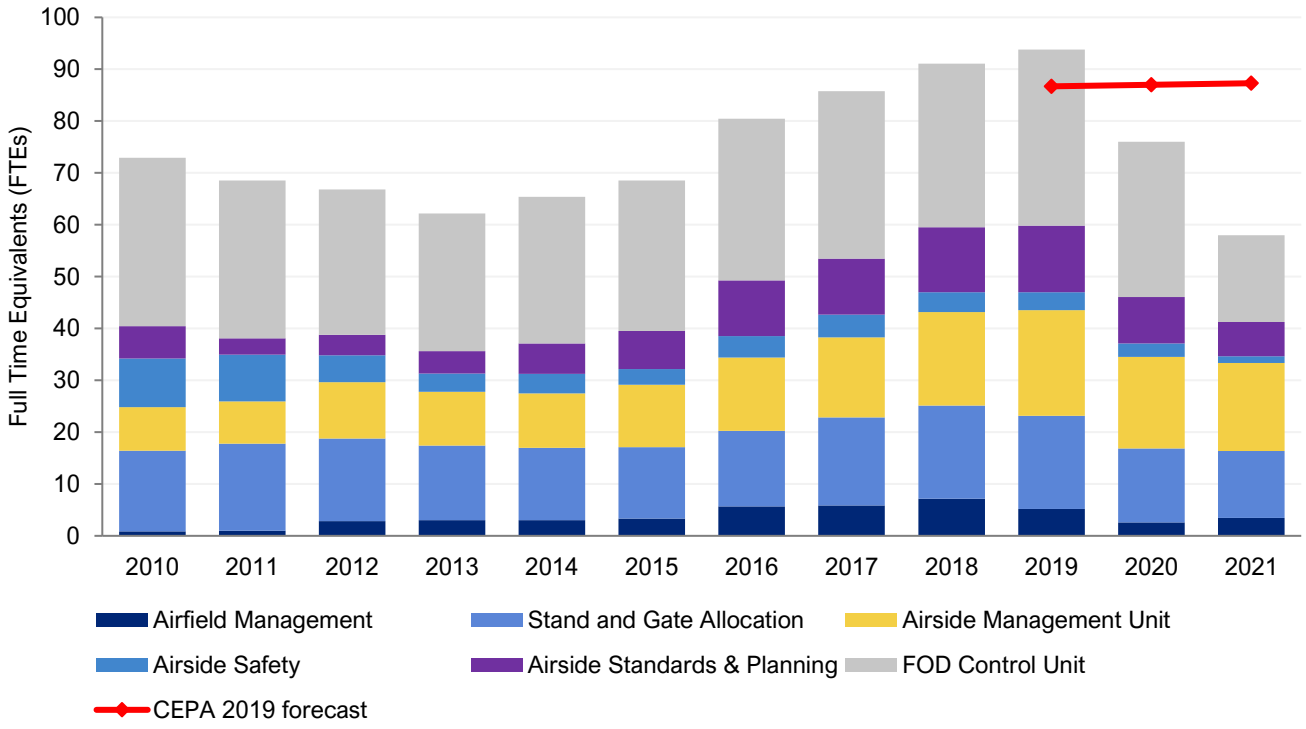
11.2. HISTORIC EXPENDITURE

Figure 11.1: Airside operations payroll expenditure, 2010-2021 (€ million, February 2022 prices)



Source: Taylor Airey analysis of Dublin Airport data
Note: The EWSS adjusted forecast should only be considered a broad estimate, as it does not explicitly account for differing eligibility rules around the wage support paid by government.

Figure 11.2: Airside operations FTEs by role, 2010 – 2021 (FTEs)

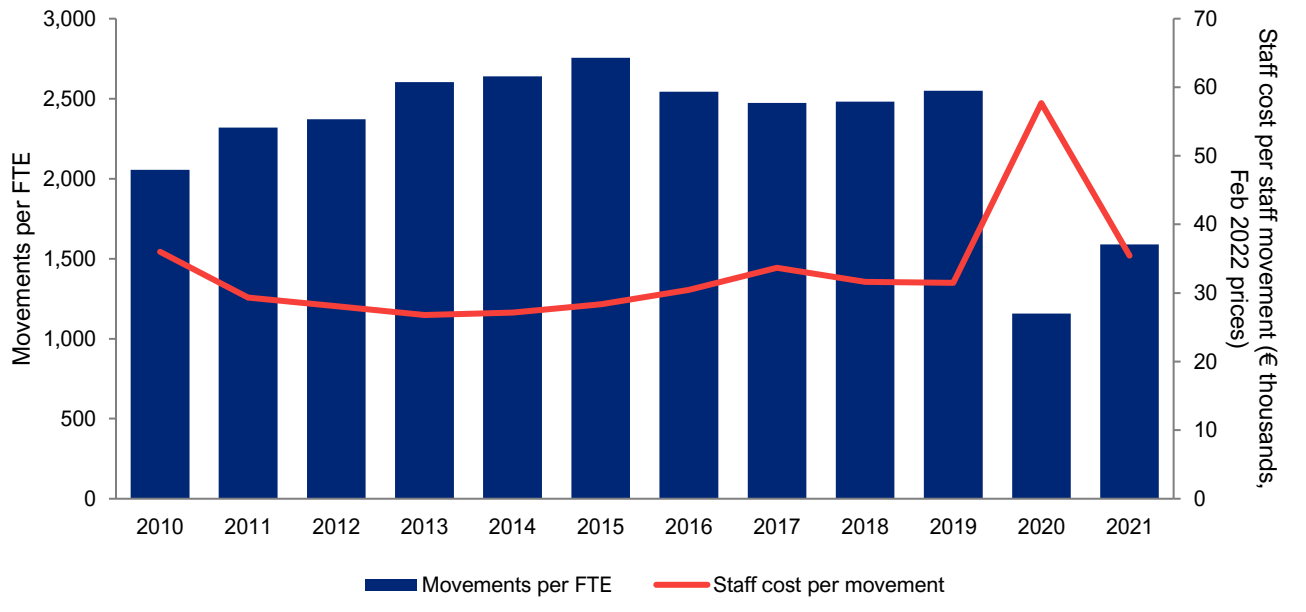


Source: Taylor Airey analysis of Dublin Airport data

Actual payroll expenditure continued to increase in 2019 remaining above our 2019 forecast levels, this was a result of increased FTEs and a higher unit payroll cost. Costs then reduced significantly during the pandemic, primarily due to a reduction in FTEs within the FOD control unit. By 2021 costs were significantly below the revised determination figure, even when taking into account wage support.

11.3. Analysis

Figure 11.3: Airside operations efficiency measures, 2010-2021



Source: Taylor Airey analysis of Dublin Airport data

Staff cost per aircraft movement spiked in 2020 as traffic volumes reduced at a greater rate than payroll expenditure, however further payroll savings in 2021 resulted in the staff cost per movement returning to near-2019 levels. This is primarily the result of wage support, as the number of movements handled per FTE remained significantly lower than pre-pandemic levels.

11.4. PROJECTED EFFICIENT EXPENDITURE

Our 2022 efficient baseline rolls forward the 2019 actual staffing levels provided by Dublin Airport adjusted for traffic growth where relevant, after applying structural efficiencies made over the last two years.

Table 11.1: Approach to forecasting by staff category within Airside Operations

Staff category	Approach
Airside Operations and Safety Officers	*Baseline efficiency* – We establish a 2022 baseline by taking the 2019 actual staffing levels provided by Dublin Airport, removing 5 FTEs relating to structural efficiencies and a further 3.5 FTEs to reflect staff transferred from Airside Safety to Campus Services. *Elasticity* – Headcount growth is linked to flight movements and not passenger numbers. We apply an elasticity of staff to passenger numbers of 0.1 in the absence of forecast movements data.
Airside Services and FOD Control Team	*Baseline efficiency adjustment* – We establish a 2022 baseline by taking the 2019 actual staffing levels provided by Dublin Airport, removing 5 FTEs relating to structural efficiencies claimed by the airport as a result of measures such as a system to assist with automated FOD detection. Elasticity – As above, we believe headcount growth will be linked to flight movements and apply an elasticity of staff to passenger numbers of 0.1.
Stand and Gate Allocation	*Baseline efficiency* – We establish a 2022 baseline by taking the 2019 actual staffing levels provided by Dublin Airport. *Elasticity* – We do not apply any elasticity to our ongoing forecasts, with efficiencies and economies of scale able to absorb any increase in workload.

Source: Taylor Airey analysis

Figure 11.4: Our forecast of Airside Operations staffing, 2022-2026 (FTEs)

	2022	2023	2024	2025	2026
Airside Ops & Safety Officers	32	33	33	33	34
Stand & Gate Allocation	18	18	18	18	18
Airside Facilities & FOD Team	28	29	29	29	29
Total Airside operations staff	**78**	**80**	**80**	**81**	**81**

Source: Taylor Airey analysis of Dublin Airport data

As shown in Table 11.2, we forecast efficient Airside Operations expenditure to increase from **€6.3 million** in 2022 to **€7.0 million** in 2026.

Table 11.2: Our forecast of efficient Airside Operations expenditure, 2022-2026 (€ million)

	2022	2023	2024	2025	2026
Airside Operations expenditure	6.3	6.6	6.8	6.9	7.0

Source: Taylor Airey / CEPA analysis

12. CAPITAL PROJECTS

Summary

Dublin Airport's spending on non-capitalised staff working on Capital Projects has been on an upward trajectory since 2014. Between 2019 and 2021 expenditure has broadly been aligned with the forecasts from our 2019 study, with approximately 30 FTEs working in the team (on a non-capitalised basis) in 2021.

In its regulatory submission, Dublin Airport has argued that it requires a substantial increase in headcount from 2022 onwards to account for the increase in capital expenditure, to 38 FTEs. We are sceptical of this, as we have previously found no statistical link between the number of Capital Projects staff and the level of capex spend.

The 2022 baseline we have developed allows for an increase in headcount, in line with the increase we allowed between 2018 and 2020 in the lead up to the original CIP. Our forecasts assume Capital Projects staffing levels will stay the same over the determination period. Our resultant forecast is **€3.3 million** in 2022, rising to **€3.7 million** by 2026.

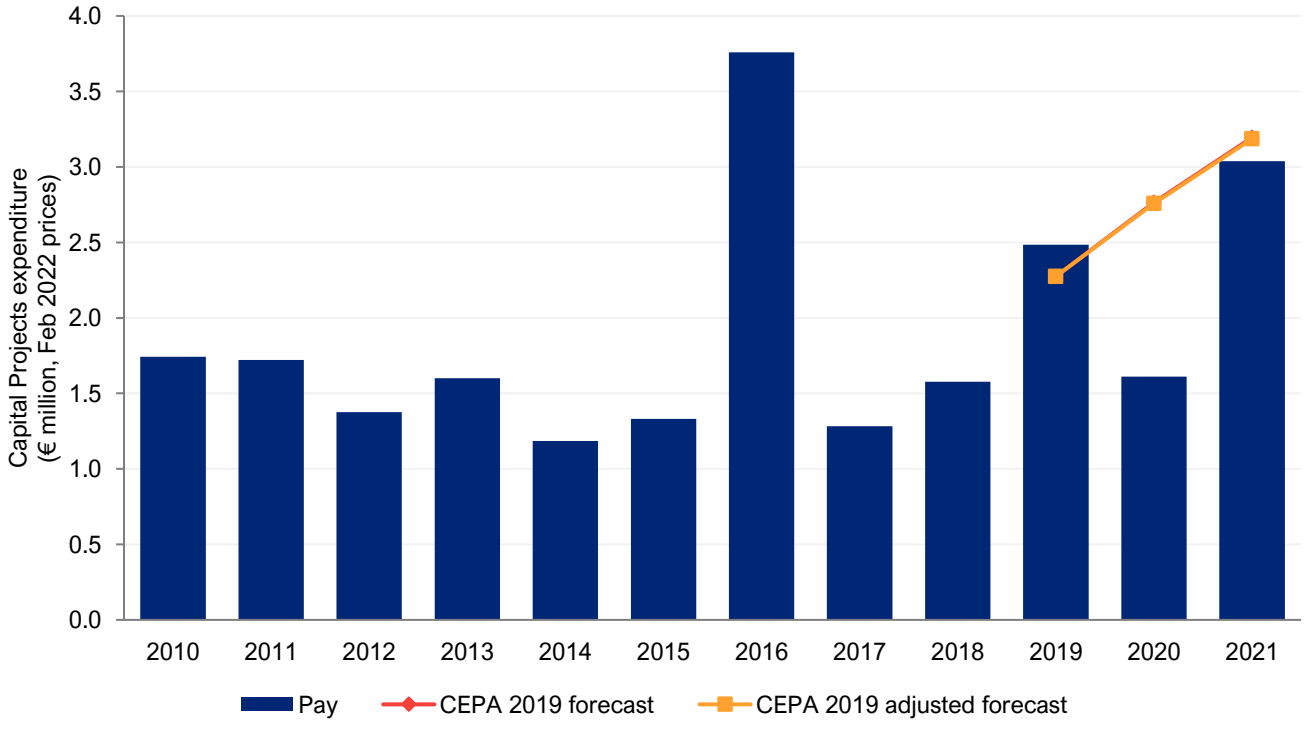
Dublin Airport's operational expenditure on Capital Projects covers payroll spending within its Asset Management Department (AMD) as well as some payroll expenditure on staff involved in the airport's runway projects. While a large proportion of such costs are capitalised and are therefore out of scope of this study, a small proportion is considered opex.

The role of the AMD is to ensure projects are sufficiently well developed to proceed successfully through the development phase. We expect these costs would therefore typically be incurred prior to the commencement of the Capital Projects to which they relate.

12.1. HISTORIC EXPENDITURE

Capital project staffing levels have steadily increased since 2014. Between 2019 and 2022 they have broadly been aligned our forecasts from the 2019 study, though the outturn costs have varied somewhat due to differences in wage growth. Notably, staffing levels are expected to increase in 2022 in preparation to deliver the updated CIP.

Figure 12.1: Capital Projects historic expenditure, 2010-2021 (€ million, February 2022 prices)



Source: CEPA analysis of Dublin Airport data

12.2. Analysis

Dublin Airport's capital plan was impacted by both Covid-19 and regulatory requirements (e.g. Aircraft Noise Regulation, Climate Action and Low Carbon Development Act). In light of this, it developed a revised CIP which represents a c.50% overall increase in the level of investment.[39] However, the revised CIP has reprofiled spend over a longer time horizon.

Dublin Airport indicates that more FTEs are needed in order to deliver the revised CIP, arguing that expenditure is expected to increase from approximately €200 million per annum (in 2019 and 2020) to approximately €400 million per annum. However, we note that staffing levels have already increased from 20 FTEs in 2017 to 25 FTEs in 2019 and to 30 FTEs in 2021. And while the revised CIP includes a number of new projects and increased spend, this is spread over a much longer period rather than a single determination period as previously assumed. Further, in our previous 2019 study we did not find a statistical link between the number of Capital Projects staff and the level of annual capex; though this may have been, in part, due to different planning horizons. We would expect there to be a stronger link with the number of projects being progressed rather than the overall quantum of capex.

Due to the above, we do not expect the revised CIP to materially impact Capital Projects opex relative to the 2019 CIP, though recognise some increase may be required.

12.3. Projected efficient expenditure

The 2022 baseline we have developed allows for an increase in headcount to support the development of the revised CIP. Our assessment of headcount represents the 2021 forecast from our 2019 study, uplifted by the increase seen between 2018 and 2020 in the lead up to the original CIP. Our resulting 2022 baseline estimate of headcount is 33 FTEs, at a cost of **€3.3 million.**

For our forecast from 2023 to 2026, we keep this staffing level constant, assuming that the rate of projects being progressed by the AMD stays relatively constant. The resulting 2026 forecast is **€3.7 million**.

Table 12.1: Our forecast of Capital Projects staffing levels and payroll costs at Dublin Airport, 2022-2026

	2022	2023	2024	2025	2026
Capital Projects staffing levels (FTEs)	33	33	33	33	33
Capital Projects payroll (€ million, Feb 2022 prices)	3.3	3.4	3.5	3.6	3.7

Source: CEPA analysis

[39] Dublin Airport (2022) Capital Investment Programme 2020+ Review – Submission to CAR

13. CAR PARKING

Summary

Car Parking expenditure initially exceeded our 2019 forecast though it subsequently decreased following the Covid-19 pandemic. While this 2019 overspend can be attributed to higher-than-expected unit average payroll costs, our benchmarking evidence suggests this historical expenditure was nevertheless efficient, with actual FTEs in 2019 falling below our allowed number in the 2019 efficiency study. A reduction in the share of Car Park staff on pre-2010 contracts also represents a move towards efficiency.

Over the next determination period, there are a few notable changes taking place in the Car Parking function. Most notably, Car Parking operations has been merged into a broader facilities function (captured within Facilities and Cleaning), meaning that there are no longer any staff costs within the Car Parking category. For non-pay costs, Dublin Airport has tendered a new contract that includes a transition of the bus fleet from diesel to electric vehicles.

Consequently, our payroll forecasts for Car Parking are now included within Facilities and Cleaning. Our non-pay forecasts account for the transition to electric vehicles and allow for an increase in expenditure as passenger volumes recover. Overall, we forecast expenditure to grow from ✂ ✂ ✂ ✂ in 2022 to ✂ ✂ ✂ ✂ by 2026.

Historically, Car Parking spending has encompassed both payroll and non-pay expenditure, with staffing made up of operational staff, and non-pay expenditure comprising of direct overheads related to private security costs and a shuttle bus service contract that transports passengers and staff members from the car parks to the terminals.

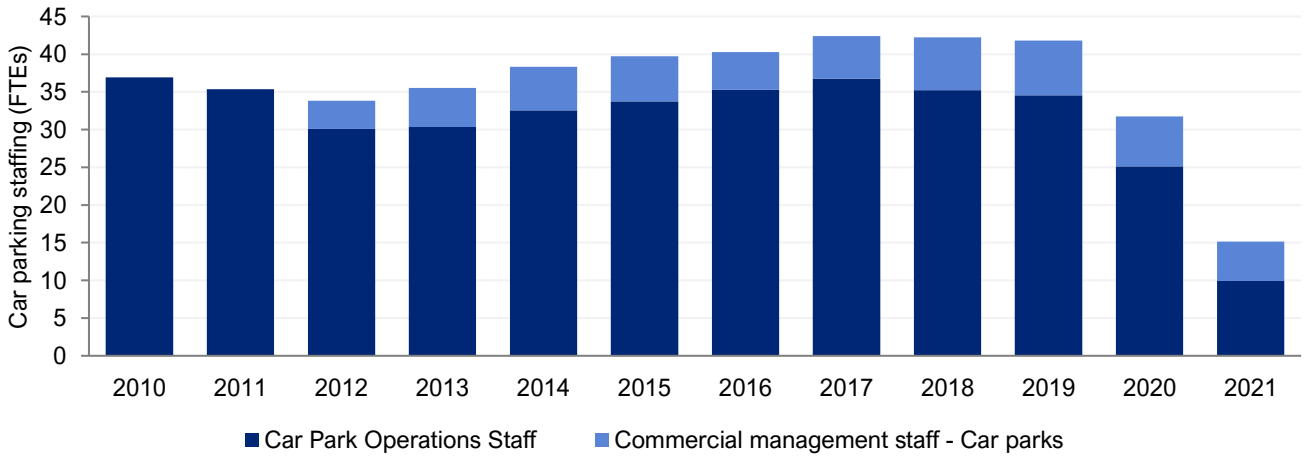
However, from 2022 onwards, Car Parking operational staff have been combined with other terminal and campus facilities staff into a number of cross-functional, cross-campus units. As a result, there no longer exists a dedicated Car Park operations team, with the relevant staff now within Facilities and Cleaning (Section 7). Commercial staff that focus solely revenue generation, as well as staff responsible for the maintenance and repair of Dublin Airport's car parks are allocated to the Central Functions and Maintenance categories respectively. We mirror this approach for our forecasts, including these staff members in their respective categories.

13.1. HISTORIC EXPENDITURE

Staff numbers

Figure 13.1 details staff numbers for Car Parks. Following relatively stable staff numbers in the years prior, staff numbers decreased significantly below our 2019 forecast in 2020 and 2021 as a result of the Covid-19 pandemic. During the pandemic, large sections of car parks were unused and subsequently closed, with Car Parking headcount decreasing as a result.

Figure 13.1: Car Parking *staff, 2010-2021 (FTEs)*

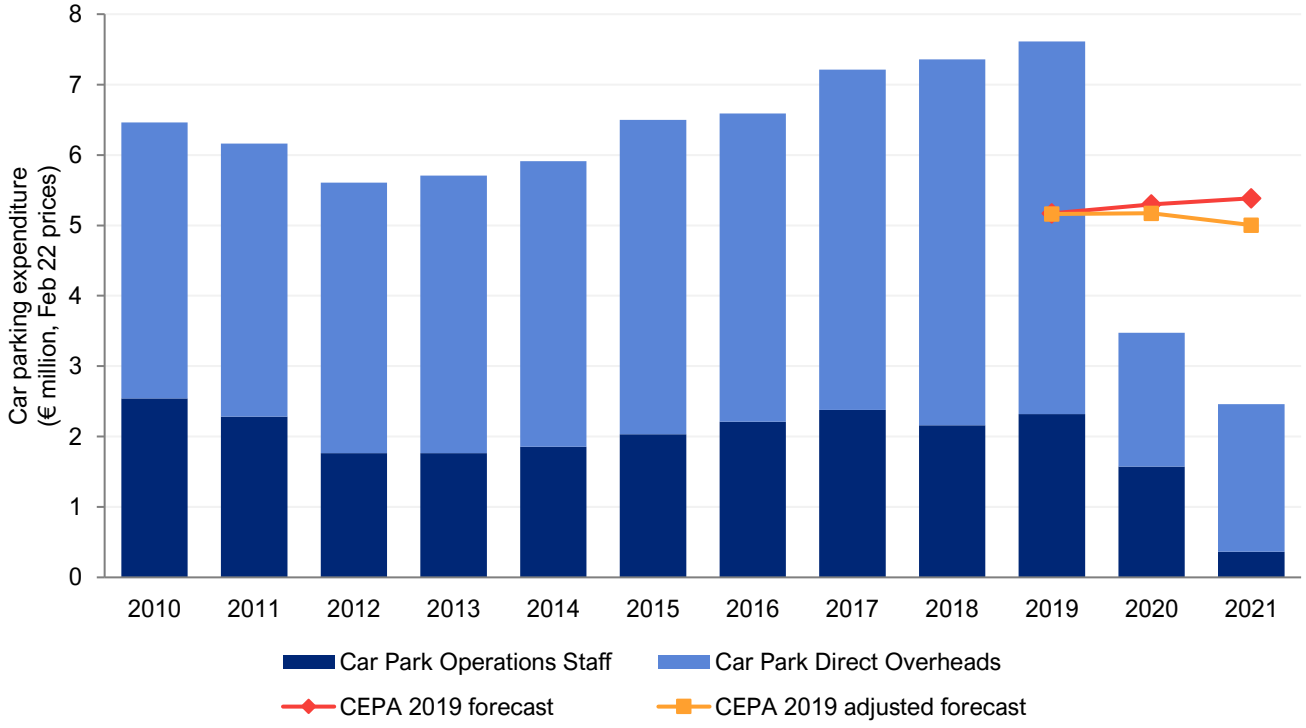


Source: CEPA analysis of Dublin Airport data

Overall expenditure

Figure 13.2 illustrates both payroll and non-pay expenditure on Car Park operations staff. Car Parking expenditure exceeded our forecast from the 2019 study, due to a payroll overspend of approximately €0.5 million. As a result of the pandemic, payroll and non-pay Car Parking expenditure decreased in both 2020 and 2021. Both decreases combine to a level below the forecast in both our 2019 study and the adjusted efficient forecast.

Figure 13.2: Car Parking historic expenditure, 2010-2021 (€ million, February 2022 prices)



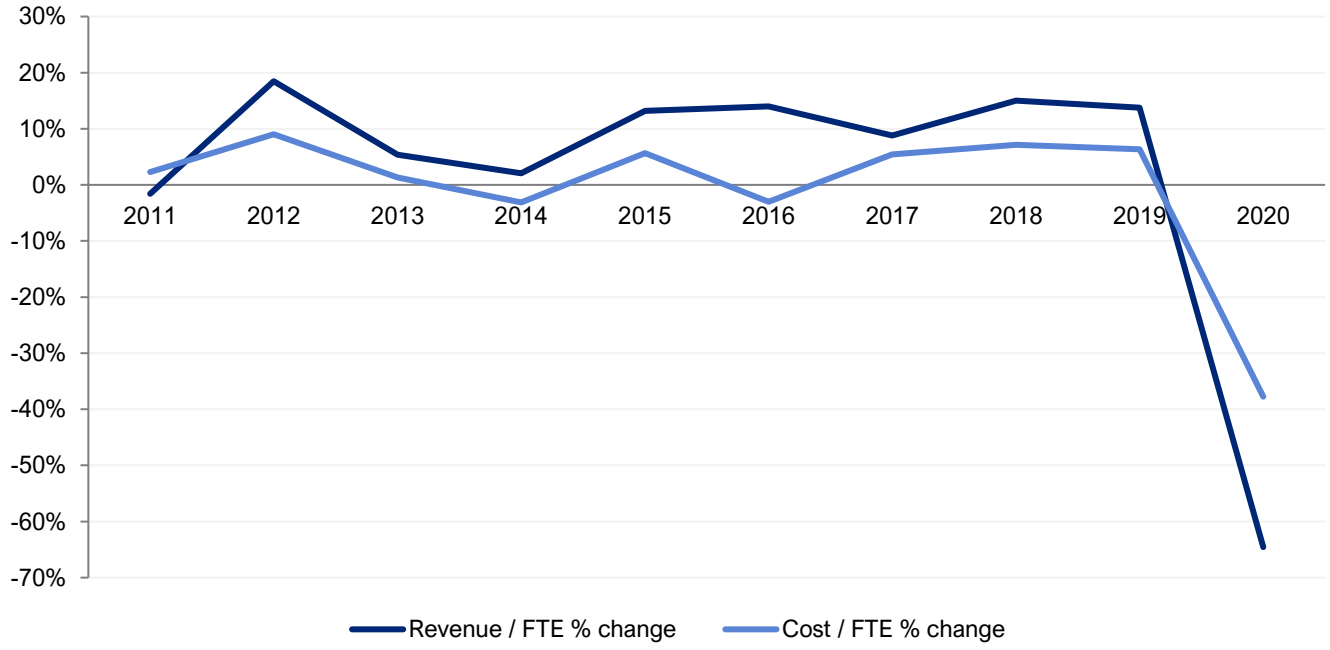
Source: CEPA analysis of Dublin Airport data

13.2. Analysis

As Car Parking staffing remained broadly steady between 2018 and 2019, we infer that the €0.5 million overspend was primarily driven by higher unit payroll costs. As detailed above, payroll costs have fallen since 2019. Likewise, the share of operational staff that were on higher-wage pre-2010 contracts has fallen from ✂ ✂ in 2019 to ✂ ✂ in 2021. This represents a move towards efficiency.

As shown in Figure 13.3, the ratio of costs to staffing levels vary in the same direction as revenues/FTE suggests that Car Parks expenditure is broadly efficient.

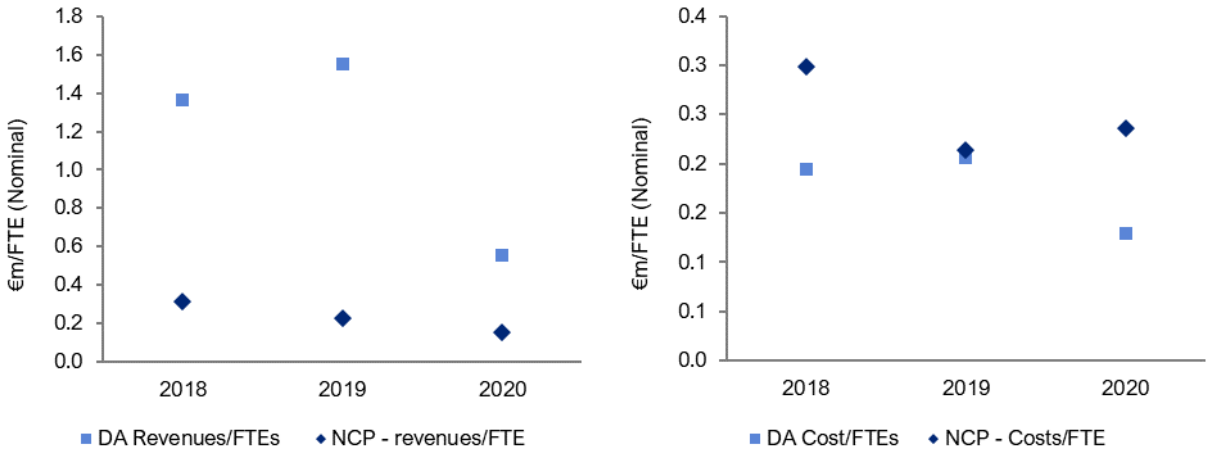
Figure 13.3: Dublin Airport Revenue/FTE and Cost/FTE, 2011-2020 (Year-on-Year % change)



Source: CEPA analysis of Dublin Airport data

We also conducted a benchmarking exercise, comparing Dublin Airport's car park revenues to National Car Parks (NCP). As a way of normalising these figures, we compare the ratio of costs and revenues to FTEs. Figure 13.4 illustrates revenues per FTE (left) and costs per FTE (right) for both Dublin Airport and NCP. As normalised revenues at Dublin Airport are higher than at NCP, and their normalised costs are broadly similar, we conclude that Dublin Airport's recent Car Park expenditure level is broadly efficient.

Figure 13.4: Revenue/FTEs (left) and Cost/FTEs (right), Dublin Airport versus National Car Parks (nominal)



Source: CEPA analysis of Dublin Airport data, National Car Park annual accounts

13.3. PROJECTED EFFICIENT EXPENDITURE

Payroll

The forecasts for payroll costs are now captured within Facilities and Cleaning.

Non-pay costs

Our forecasts assume that the cost of the bussing contract will return to its 2019 level once passenger volumes recover, ✂ ✂ ✂ ✂ ✂ ✂ ✂ ✂ ✂ ✂ ✂ ✂ ✂ ✂ ✂ ✂. Within the current bussing contract, Dublin Airport is currently transitioning the bus fleet from diesel to EVs. Within our forecast we assume a gradual rollout of EVs towards the end of the determination period, so that 100% of buses are electric by 2026. Our forecast also incorporates evidence that there is an approximate 30% premium for the cost of running electric buses over diesel buses.[40] We assume this reflects a 15% premium for non-pay costs, and 15% premium for the wage costs.

Table 13.1 presents our Car Parking cost forecast. We envisage an over 50% increase in expenditure by the end of the determination period from 2022 levels, mostly due to the transition to EVs.

Table 13.1: Our forecast of efficient Car Parking expenditure, 2022-2026 (€ million, February 2022 prices)

	2022	2023	2024	2025	2026
Car Parking non-pay costs	✂	✂	✂	✂	✂

Source: CEPA analysis

[40] Aivars Rubenis, Igors Graus, Aigars Laizans, George Utehin (2016), *Economic Viability of Electric Public Busses: Regional Perspective,* Table 2.

14. RENT AND RATES

Summary

We consider that as Dublin Airport has limited control over its rates expenditure, and as the airport has taken concrete steps to minimise its future rates liability, we consider historical expenditure on rates to be efficient overall. For rental costs, we note a sharp increase in during the pandemic, mostly due to Dublin Airport vacating existing office premises in favour of office space owned by Dublin Airport Central, which is entity outside the regulated business. We do not find this increase in rental expenditure efficient unless it has been offset by an equivalent increase in commercial property rent through leasing the vacated premises or offset through productivity improvements / cost reductions elsewhere. In particular, we note that many other airports have reduced costs in this area during the pandemic.

Looking forwards there remains significant uncertainty around the size of Dublin Airport's future business rates liability, with the outcome of a legal appeal pending with respect to the rateable valuation of Dublin Airport's campus. We forecast rates costs going forward using a range that reflects the uncertainty over the outcome of the appeal, and also reflects the increase in the Annual Rate on Valuation and in the proportion of rates costs recovered from tenants. CAR will continue to use the passthrough mechanism for rates. For rent, we assume expenditure remains at 2019 levels in real terms.

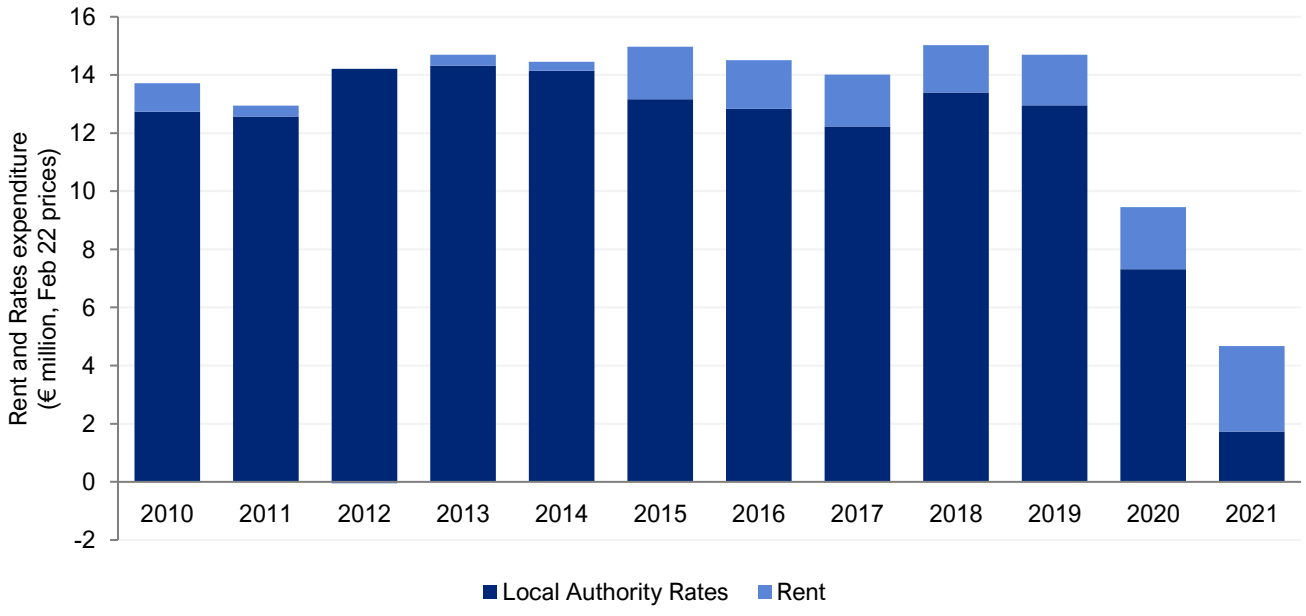
We project efficient rent and rates costs ✂

Most of Dublin Airport's Rent and Rates expenditure can be attributed to local authority rates. Net rental expenditure includes cross-charges between the regulated entity and daa group, where daa group assets are used by Dublin Airport.

14.1. HISTORIC EXPENDITURE

As shown in Figure 14.1, Dublin Airport expenditure on Rent and Rates decreased marginally from €15.0 million in 2015 to €14.7 million in 2019, before falling significantly during the pandemic years to €9.5 million in 2020 and €4.7 million in 2021. The fall in rates expenditure in 2020 and 2021 was primarily due to a rates waiver that lasted until the end of March 2022. However, Dublin Airport's spend on rent increased substantially from 2019, growing by 68% between 2019 and 2021.

Figure 14.1: Rent and rates historic expenditure, 2010-2021 (€ million, February 2022 prices)



Source: CEPA analysis of Dublin Airport data

14.2. Analysis

As Dublin Airport has somewhat limited control over its expenditure on rates, we consider its historic expenditure over the period 2019 to 2021 efficient. We also recognise that the low levels of expenditure in 2020 and 2021 are unlikely to be carried forward, given the exceptional impact of the pandemic and the impact of temporary government support.

Finally, we note that there is significant uncertainty around the future trajectory of Dublin Airport's rates cost. The airport received a revised rateable valuation by the Valuation Office in 2018, which increased the rateable valuation from €122 million in 2019 to €189 million in 2022. Dublin Airport has appealed this revised valuation to the Valuation Tribunal. Depending on the outcome of the appeal, the airport's rates liability could be significantly different from historic levels.

With regards to rent, we are unable to conclude that the increase in rental expenditure seen since 2019 was also efficient. Dublin Airport's spend on rent increased by 68% between 2019 and 2021, reaching €2.9 million in 2021. From our bilateral engagement with Dublin Airport, we understand that this increase in expenditure occurred because regulated entity staff occupied office space belonging to Dublin Airport Central (DAC), a daa owned entity outside the regulated business.[41] We also understand that such staff have vacated office space that is inside the regulated business. Dublin Airport's narrative has not provided an explanation of why such a move was considered efficient and in the airport user interest, nor whether this move is intended to be permanent or temporary.

We would expect an efficient airport to minimise rental costs by making best use of existing office space, particularly as changes in working patterns are tending to mean that fewer staff are in the office at any one time. We have seen similar actions taken by other airports in response to cost pressures introduced by the pandemic.[42] While we recognise that from a daa-wide perspective it may make sense to rationalise staff into DAC-owned buildings, this may not be in the airport user interest if users are expected to pay additional rental costs but not benefit from the associated income.

14.3. Projected efficient expenditure

We have produced separate projections for rent and rates and then aggregated them to forecast efficient expenditure for Rent and Rates between 2022 and 2026.

As mentioned in the previous section, we do not have enough evidence to consider the rent increase seen since 2019 either efficient or necessary. As such, we project rent costs to be constant in real terms at their 2019 levels, consistently with the approach taken for the 2019 CAR determination.

Our forecasts for local authority rates reflect the recent changes introduced by Fingal City Council. Notably:

- In 2019 there was a revaluation of the airport which increased the rateable value of the airport to €189 million.[43] While this increase should have applied starting in 2020, it did not due to the waiver on rates introduced during the pandemic and ended in March 2022.
- We understand Dublin Airport appealed against the new rateable value to the Valuation Tribunal. While a final decision has not been published yet, Dublin Airport is currently paying rates based on the new rateable value

[41] Dublin Airport answer to CAR information request, received by email by CEPA on 25 April 2022.

[42] Heathrow Airport Limited (2021), A5. H7 Efficient Airport Programme Appendix. Available at caa.co.uk.

[43] Dublin Airport regulatory submission to CAR, "Appendix 4: Operating Expenditure Report", p.97.

- A higher Annual Rate on Valuation (ARV) of 0.1796 applies from 2021 onwards.[44]

Given the high uncertainty over the actual rateable value that will ultimately apply at the airport we have produced two different forecasts reflecting both a successful and an unsuccessful appeal. Multiplying the rateable values by the ARV we obtain the total amount that is paid by Dublin Airport on rates, which is then reduced to account for the proportion of rate costs that will be recovered from tenants (✂ ✂ ✂ ✂ ✂ ✂ ✂ ✂ ✂ ✂ ✂ ✂ ✂).[45]

We have also adjusted our forecasts to include any impact that Dublin Airport's CIP could have on rent and rate expenditure. From the projects contained within CIP that are due to complete during the next determination period, we identify the following have potential rent or business rates implications:

- Office consolidation and refurbishment (CIP.20.07.010), which is due to be completed at the end of 2024. Based on information provided to us by Dublin Airport for our previous study, we estimate this could deliver €0.5 million in 2025, and €1.0 million in 2026, in savings from reduced rental payments to Dublin Airport Central and lower business rates.
- ✂

We summarise our forecasts in Table 14.1. For our core forecast, we assume there is not revaluation of rates, using the scenario presented in bold.

Table 14.1: Our forecast of efficient Rent and Rates costs at Dublin Airport, 2022-2026 (€ million, February 2022 prices)

	2022	2023	2024	2025	2026
Rent	**1.8**	**1.8**	**1.8**	**1.8**	**1.8**
Rates – no revaluation	✂	✂	✂	✂	✂
Rates – no revaluation including CIP	✂	✂	✂	✂	✂
Rates – revaluation	✂	✂	✂	✂	✂
Rates – revaluation including CIP	✂	✂	✂	✂	✂
Total	✂	✂	✂	✂	✂

Source: CEPA analysis

[44] Fingal City Council, Annual Budget 2022 p.17.

[45] Dublin Airport regulatory submission to CAR, "Appendix 4: Operating Expenditure Report", p.98.

15. CONSULTANCY SERVICES

Summary

Consultancy spending has historically fluctuated from year to year. Spending in 2019 and 2020 exceeded our 2019 forecast, with the overspend partially explained by ad-hoc noise mitigation work undertaken from 2019 onwards.

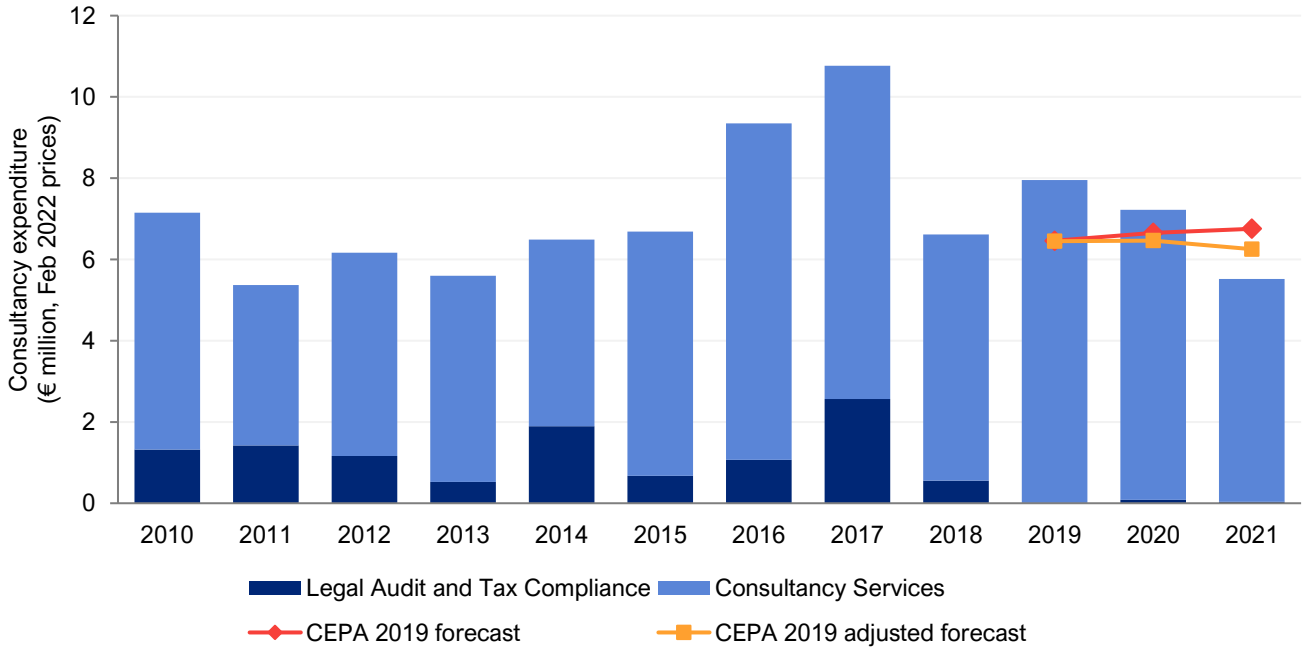
We construct our 2022 baseline using a historical average of Dublin Airport's consultancy spending. Overall, we forecast consultancy services spending at **€7.1 million** in 2022, staying constant until 2026.

Consultancy services expenditure relates to spend on specialist external advice at Dublin Airport. This consists of mandatory regulatory services such as legal, audit and tax compliance advice, but also more ad-hoc consultancy services related to areas such as commercial property, recruitment, and noise monitoring.

15.1. HISTORIC EXPENDITURE

The nature of consultancy services spending implies significant year-to-year fluctuations, depending on the type and volume of external advice Dublin Airport requires to support its operations. We would also expect there to be some cyclicality related to the price control cycle. This is reflected in Figure 15.1, which shows high variability in annual consultancy spending. Whilst actual spending exceeded the forecasts in our 2019 study in both 2019 and 2020, spend was lower than forecast in 2021.

Figure 15.1: Consultancy services historic expenditure, 2010-2021 (€ million, February 2022 prices)



Source: CEPA analysis of Dublin Airport data

15.2. ANALYSIS

As mentioned above, consultancy services spend was higher than our adjusted efficient forecasts in both 2019 and 2020, with spending falling below the forecast in 2021. This type of ad-hoc spending will fluctuate year-on-year depending on how much external advice is needed. We understand that one-off consultancy spending related to noise monitoring was a key contributor to the higher than expected spend in 2019 and 2020.

15.3. PROJECTED EFFICIENT EXPENDITURE

Due to the fluctuations in year-to-year consulting expenditure, our baseline is calculated using a historical average of consultancy services expenditure from 2010 to 2021. This results in a 2022 baseline of **€7.1 million**, higher than Dublin Airport's proposal of €5.4 million.[46] This baseline acknowledges the fact that there is a trade-off between consultancy services expenditure on external experts, and moving some of this work internally, with this expenditure instead being reallocated to Central Functions. Dublin Airport's choice in this regard may lead to consultancy services expenditure that is lower than our efficient projections, with the difference being made up through greater expenditure on in-house staff.

In our 2019 study, the consultancy forecast was uprated each year in line with real wage growth for skilled staff. For this study we adopt a different approach, contending that input cost increases for professional consultancy services over and above inflation is for Dublin Airport to manage. This is because consultancy firms primarily provide knowledge services as opposed to labour services, so increased expenditure on consultancy services is not directly driven by wage pressures.

Table 15.1: Our forecast of efficient expenditure on consulting services, 2022-2026 (€ million, February 2022 prices)

	2022	2023	2024	2025	2026
Consultancy services	7.1	7.1	7.1	7.1	7.1

Source: CEPA analysis

[46] Dublin Airport (2022), Regulator Proposition for 2023-2026, Appendix 4: Operating Expenditure Report, p. 75

16. MARKETING AND RELATED COSTS

Summary

We consider Dublin Airport's historic expenditure on marketing and related activities to be efficient. Dublin Airport underspent by 27% in 2019 compared to our forecast. In 2020 and 2021 expenditure levels appear to be in line with the exceptional circumstances of the pandemic.

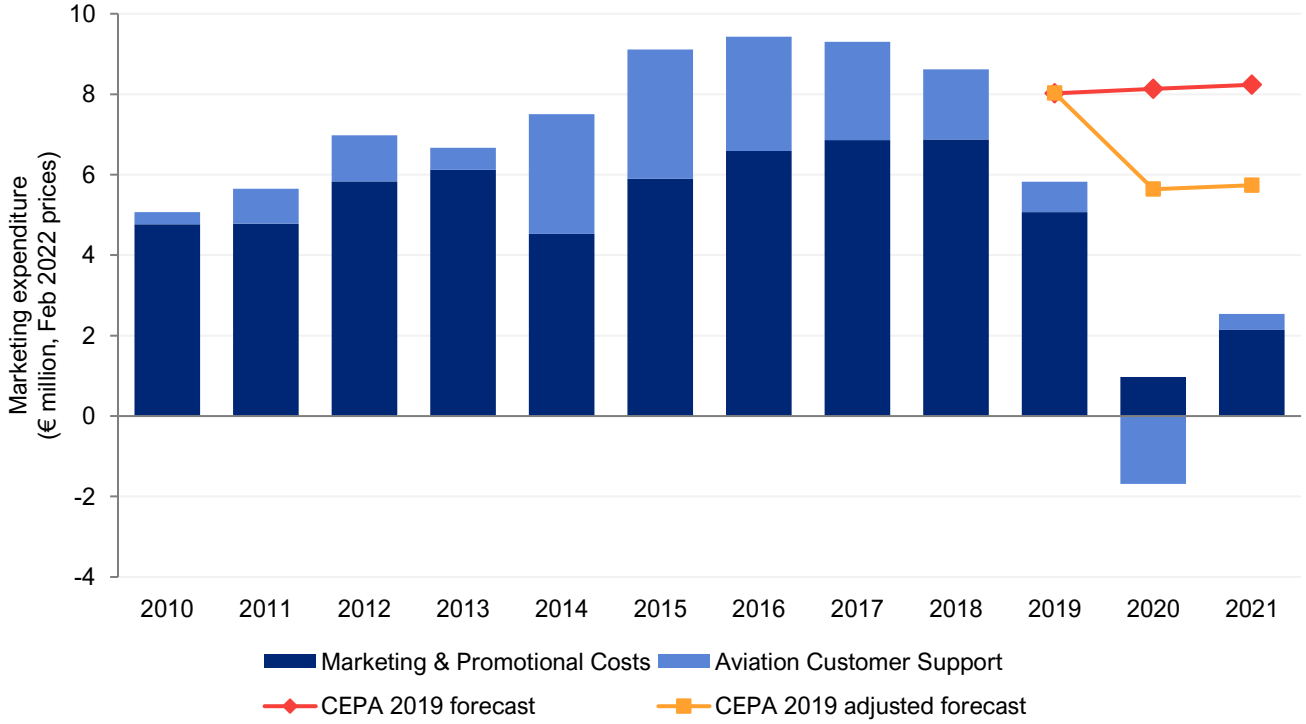
Our forecasts assume persistence of the cost savings delivered in 2019 but an increase in expenditure compared to 2020 and 2021 as passenger numbers recover. We estimate marketing and related costs to increase from **€5.3 million** in 2022 to **€7.0 million** in 2026.

Costs in this category consist of both marketing for services provided directly to passenger by Dublin Airport as well as marketing support on behalf of airlines. It also includes miscellaneous costs such as market research and charitable donations.

16.1. HISTORIC EXPENDITURE

As shown in Figure 16.1, Dublin Airport expenditure on marketing and related costs has reduced since 2016, when it peaked at €9.4 million, decreasing to €8.6 million in 2018 and €5.8 million in 2019. During the pandemic years marketing costs decreased further reaching €2.5 million in 2021 and becoming negative in 2020 as Dublin Airport accrued a credit for aviation customer support of €1.7 million from airlines. We understand this to be the result of airlines not delivering the promised capacity during 2020 because of the impact of Covid-19 on passenger numbers at the airport.[47]

Figure 16.1: Marketing historic expenditure, 2010-2021 (€ million, February 2022 prices)



Source: CEPA analysis of Dublin Airport data

[47] Dublin Airport answer to CAR information request, received by email by CEPA on 16 March 2022.

16.2. Analysis

We consider Dublin Airport's historic expenditure on marketing and related activities to be efficient. In 2019, Dublin Airport underspent relative to our forecast for that year in our 2019 study. This was also the lowest level of expenditure since 2011 and reflects marketing spend not being necessary when the airport was operating at full capacity.

While the further decrease in costs during the pandemic was just a temporary solution reflecting the exceptional circumstances of low traffic and wider cost cutting pressure on the airport, we consider it an appropriate level of expenditure given these circumstances.

16.3. Projected efficient expenditure

We develop our 2022 baseline forecasts using the Dublin Airport 2019 actual expenditure as the starting point. As part of an information request, Dublin Airport clarified that the decrease in marketing costs in 2018 and 2019 is expected to continue going forwards as passenger numbers recover. We then took the 2022 baseline forecast scaling down the 2019 values using a 0.4 elasticity, reflecting lower traffic in 2022 compared to 2019 levels.

In producing our forecasts, we differentiated between "marketing and promotional costs" and "aviation customer support". For the former, we forecast using an elasticity of 0.4 with respect to passenger numbers. For the latter, we assume that spend will return to the long-term average (2010-2019) by 2026 as aviation customer support will be needed for new routes and additional airport capacity.

Table 16.1: Our forecast of efficient marketing expenditure, 2022-2026 (€ million, February 2022 prices)

	2022	2023	2024	2025	2026
Marketing and Promotional Costs	✂	✂	✂	✂	✂
Aviation Customer Support	✂	✂	✂	✂	✂
Total	**5.3**	**5.9**	**6.3**	**6.6**	**7.0**

Source: CEPA analysis

17. PRM SERVICES

Summary

The Passengers with Reduced Mobility (PRM) service is outsourced to OCS from 2019 until 2023, with an option to extend by two years. While total costs decreased over the current determination period, given the reduction in passengers, unit costs have increased. This is a function of the terms, and the increase is in line with that at other airports.

Our 2022 baseline and forecasts use CAR's passenger projections, expected growth in propensity to use PRM services, and wage forecasts. Overall, we forecast PRM costs to be ✂ ✂ ✂ ✂ in 2022, growing to ✂ ✂ ✂ ✂ by 2026.

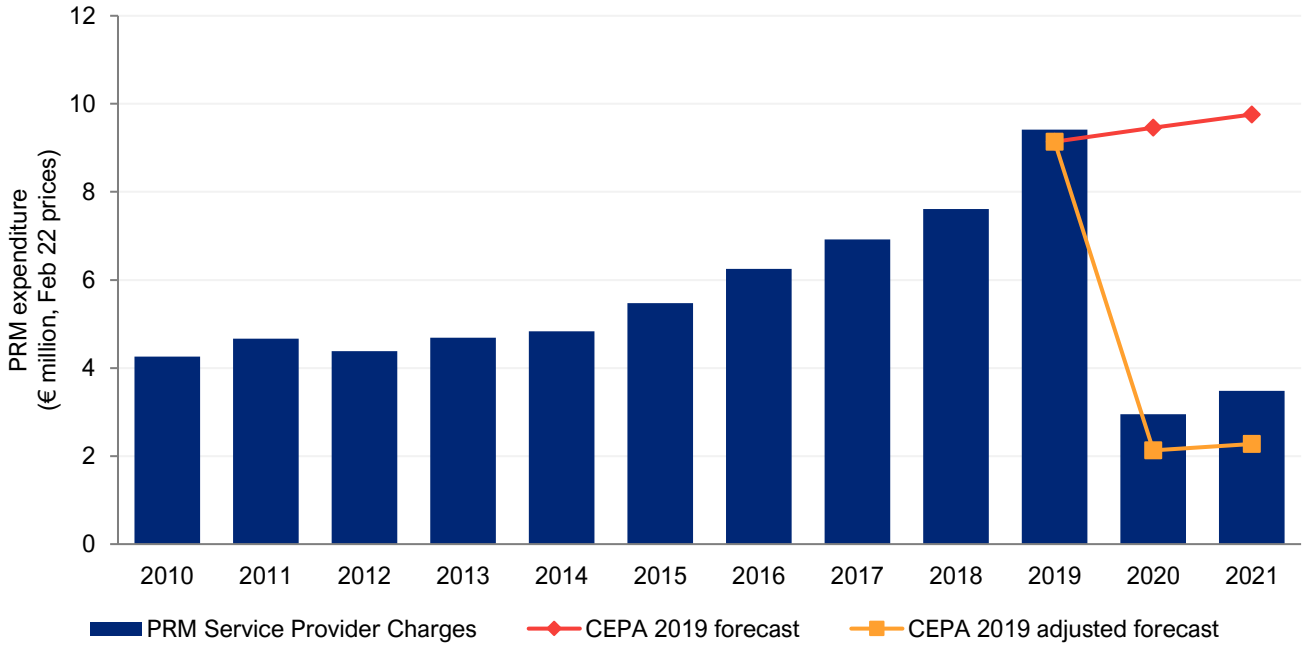
Under European Union regulations (EC) 1107/2006, airports are obliged to provide passengers with assistance services to support and facilitate their journey.[48] Services can range from helping the passenger to board the aircraft to accompanying the passenger from arrival at the airport to the flight.

Provision of these services at Dublin Airport is outsourced to OCS whose three-year tender was awarded in 2013 and then extended by two years in 2016. Following retendering, a new contract was agreed with OCS for the provision of PRM services from 2019 until 2023, with an option to extend the contract by a further two years. Dublin Airport, in its regulatory submission, indicate that it will extend the contract until 2025.

17.1. HISTORIC EXPENDITURE

Dublin Airport's expenditure on PRM rose steadily from 2010 to 2019. Due to the Covid-19 pandemic, costs fell in 2020, and recovered slightly in 2021.

Figure 17.1: PRM historic expenditure at Dublin Airport, 2010-2021 (€ million, February 2022 prices)



Source: CEPA analysis of Dublin Airport data

[48] Regulation EC No (1107/2006) concerning the rights of disabled persons and persons with reduced mobility when travelling by air.

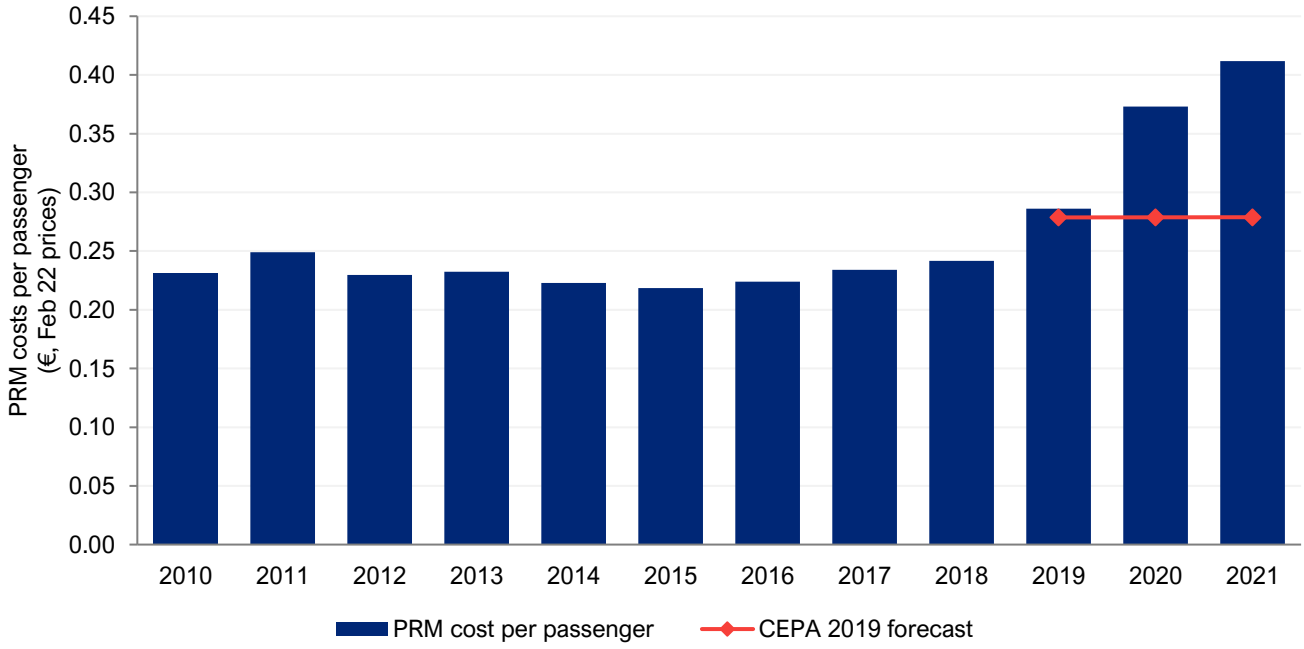
17.2. Analysis

Although PRM spend was lower than the forecast from our 2019 study, expenditure was higher than our forecast adjusted for outturn passenger volumes. This suggests that the cost of the contract is potentially less elastic with respect to passenger volumes than assumed in our 2019 study, in other words, the contract has a higher proportion of fixed costs.

The increase in per passenger costs can be seen in Figure 17.2, which is consequence of the contracting terms, as provided to us by Dublin Airport in its regulatory submission.[49] OCS charges more on a per PRM basis, the lower the PRM numbers are. And as passenger numbers decreased heavily in 2020 and 2021, per passenger costs increased.

Three bidders participated in the competitive tendering process run by Dublin Airport, with the process attended by both CAR and by airlines operating at the airport. Given the number of bidders participating in the tender, we do not have any material concerns about the tendering process.

Figure 17.2: PRM costs per passenger at Dublin Airport, 2010-2021 (€ / passenger, February 2022 prices)



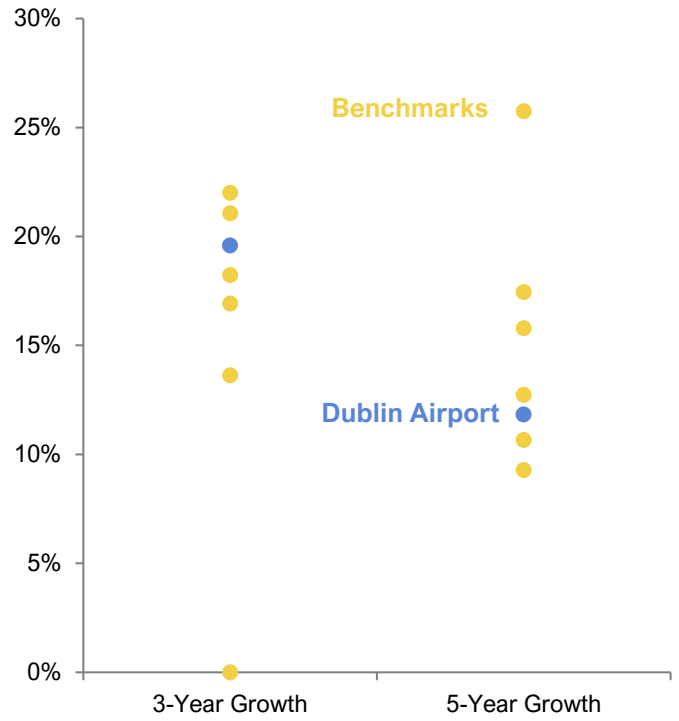
Source: CEPA analysis of Dublin Airport data

We also compare the growth in the cost of PRM services at Dublin Airport to a range of benchmark airports, finding that the growth in PRM costs per passenger is a widespread trend. Comparing Dublin Airport to benchmark airports, in Figure 17.3, we conclude that the increases in PRM costs per passenger are in line with wider industry cost increases.

In our benchmark analysis, we have only compared growth rates of PRM costs rather than absolute levels, as the services on offer and the service quality provided to PRM users vary significantly by airport. Therefore, absolute costs are not particularly comparable between airports. However, assuming the services and their quality is consistent over time for all airports, we would expect the drivers for growth rates to be similar for all airports, i.e., wage growth rates, passenger increases, and demand for PRM services.

[49] Dublin Airport (2022), Regulatory Proposal for 2023-2026, Appendix 4: Operating Expenditure Report, p. 78

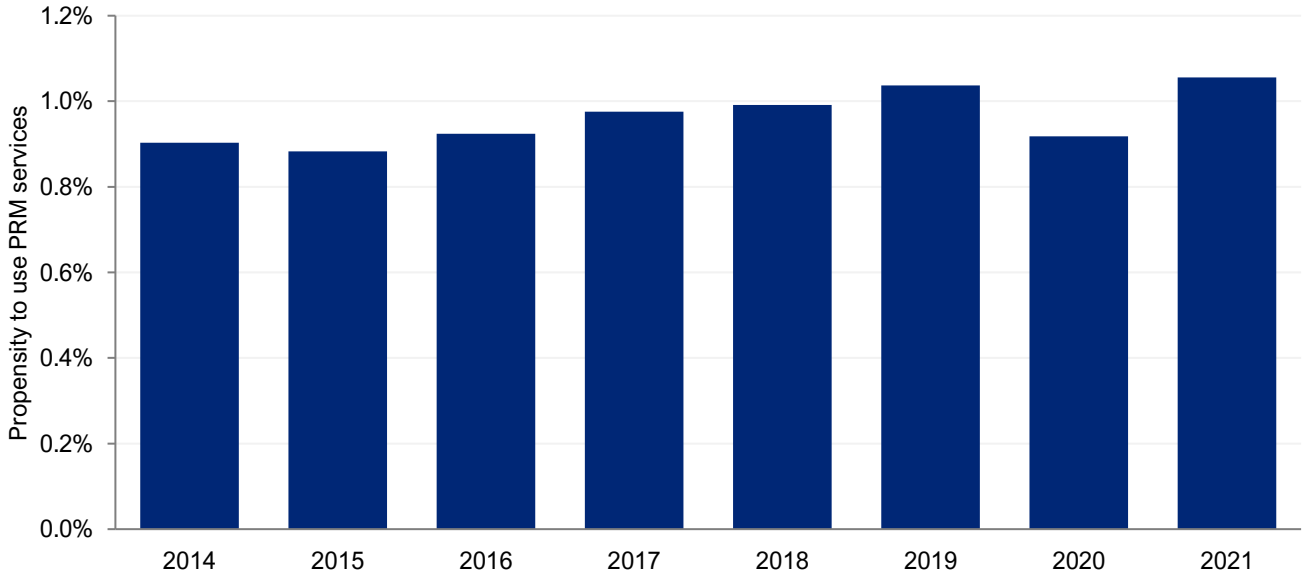
Figure 17.3: Growth in PRM costs / passenger (%)



Source: CEPA analysis of Dublin Airport and benchmark airports data

The number of passengers using PRM services is determined by (i) the total number of passengers, and (ii) the propensity to use PRM services. In our 2019 study, we noted a growth in the propensity to use PRM services, over and above the growth in total passenger numbers. While the propensity to use PRM services dropped in 2020, this can be explained by the fact that PRM users are, on average, more at risk of Covid-19 than other passengers and, therefore, PRM users will have decreased their air travel more severely than other passengers. Nonetheless, in 2021 the propensity to use PRM services increased again, to a level above the 2019 level. Therefore, we conclude Covid-19 has not fundamentally changed the propensity to use PRM services.

Figure 17.4: Propensity to use PRM services, 2014-2021 (%)



Source: CEPA analysis of Dublin Airport data

17.3. PROJECTED EFFICIENT EXPENDITURE

In its regulatory submission, Dublin Airport provide the costs agreed under the PRM contract with OCS, under different passenger bands:

Table 17.1: Contracted pricing bands for PRM services at Dublin Airport (€ per PRM passenger)

PRM passengers – Lower	PRM passengers – Upper	2022	2023	2024	2025
✂	✂	✂	✂	✂	✂
✂	✂	✂	✂	✂	✂
✂	✂	✂	✂	✂	✂
✂	✂	✂	✂	✂	✂
✂	✂	✂	✂	✂	✂
✂	✂	✂	✂	✂	✂
✂	✂	✂	✂	✂	✂

Source: Dublin Airport

We have tested the appropriateness of these pricing bands by comparing them with the 2019 cost per PRM passenger and uprating for wage growth. This suggests that, assuming 2019 costs were efficient, 2022 costs were also likely to be efficient. Consequently, we use these pricing bands in our forecast. For 2026, we assume the price per PRM passenger increases in line with real wage growth (i.e. 1.5%).

We also adopt Dublin Airport's assumptions around the propensity to use PRM services at 1.1% of the total passenger base. While this is higher than recent years, we do note that the proportion of passengers using PRM services has been on an upward trajectory for several years, and we expect that to continue.

This gives a baseline a 2022 baseline forecast of **€8.6 million**, rising to **€11.8 million** by 2026.

Table 17.2: Our forecast of efficient PRM expenditure, 2022-2026

	2022	2023	2024	2025	2026
Passengers (million)	25.3	30.1	32.3	34.2	35.2
Propensity to use PRM services (%)	1.10	1.10	1.10	1.10	1.10
✂	✂	✂	✂	✂	✂
✂	✂	✂	✂	✂	✂

Source: CEPA analysis

18. UTILITIES

Summary

We consider Dublin Airport's historic expenditure on utilities to be efficient, with an underspend in 2019 compared to CAR's allowance and substantial temporary cost reductions during the pandemic years.

We expect 2022 expenditure on utilities costs to be substantially higher than historically, given the recent increase in utilities unit costs. Despite expecting a reduction in electricity and gas unit costs, the envisaged increase in electricity consumption limits future savings on utilities to gas costs.

We project Dublin Airport efficient expenditure on utilities to increase to **€13.0 million** in 2022 and start decreasing by 2023, reaching **€11.3 million** in 2026. This reduction mostly comes about through capital projects, which lead to improvements in energy efficiency and greater levels of in-house electricity generation.

Dublin Airport's expenditure on utilities covers energy and water costs. Dublin Airport's energy expenditure primarily relates to electricity usage, with smaller volumes of expenditure on gas and a very small amount on fuel oil. Water expenditure is made up of water usage as well as charges for surface water drainage.

18.1. HISTORIC EXPENDITURE

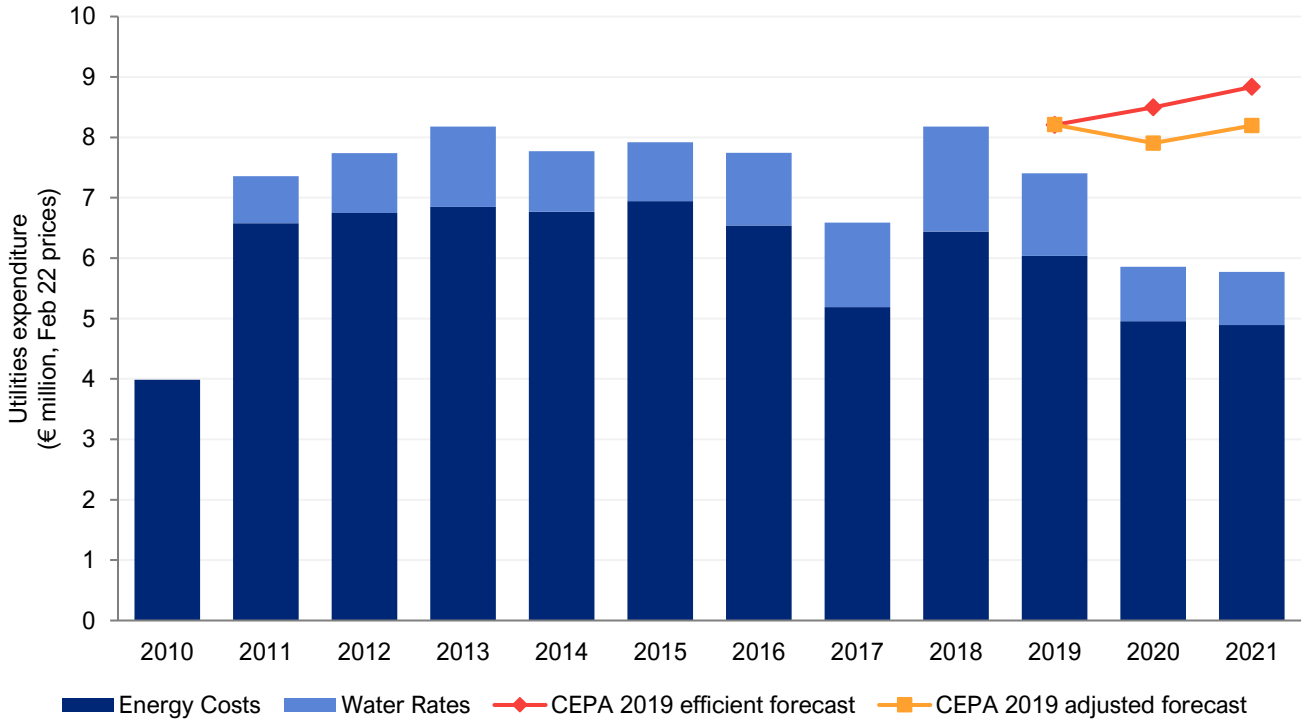
As can be seen in Figure 18.1, Dublin Airport's expenditure on utilities can fluctuate significantly between years. This is due to volatility in energy prices as well as changes in heating requirements from year-to-year depending on weather patterns. Nevertheless, expenditure has stayed relatively constant in real terms for several years despite increases in passenger volumes:

- Following the opening of Terminal 2 in 2010, net electricity consumption has been on a steady decline from 47 GWh in 2011 to 40 GWh in 2021.
- Gas consumption has followed a similar downward trajectory, with net consumption falling from 48 GWh in 2014 to 40 GWh in 2021.
- Water consumption, which is more directly driven by passenger volumes, has been on a gradual upward trajectory between 2015 and 2018 reflecting the increase in passenger volumes. However, consumption reduced in 2019 despite high passenger numbers, and it more than halved in 2020 and 2021 compared with 2019 consumption.

During the pandemic years of 2020 and 2021, exceptionally low levels of traffic and closure of sections of the airport dropped led to electricity consumption being 19% lower, gas consumption 8% lower, and water consumption by 50% lower than pre-pandemic consumption.[50]

[50] Dublin Airport (2022), Regulatory Proposal for 2023-2026, Appendix 4: Operating Expenditure Report, Section 6.18.

Figure 18.1: Dublin Airport historic marketing and related expenditure, 2010-2021 (€ million, February 2022 prices)



Source: CEPA analysis of Dublin Airport data

18.2. Analysis

We consider Dublin Airport's historic expenditure on utilities to be efficient. We note that our 2019 efficiency study found that Dublin Airport's expenditure on utilities was significantly lower than comparable airports, when assessed on a per passenger basis. Since then, consumption at Dublin Airport has fallen further, with expenditure in 2019 lower than our forecast for that year, and expenditure in 2020 and 2021 lower than our forecast even after accounting for the reduction in passenger numbers.

18.3. Projected efficient expenditure

Despite our conclusions in the section above, we must note that expenditure on utilities over the period 2019 to 2021 is likely to bear little reflection on utilities costs over the next determination period. Energy costs, which form a large proportion of Dublin Airport's utilities expenditure, have increased substantially during 2021 and into 2022. In addition, new assets such as the completion of the North Runway and the completion of several larger solar farms, mean that we can expect large step changes in consumption.

In light of this uncertainty, we have reviewed Dublin Airport's forecast of utilities expenditure and made adjustments where necessary.[51] Taking each utilities element in turn:

- **Electricity:** We note that in its regulatory submission, Dublin Airport expects 2022 electricity costs to be ✂✂c/KWh. To test the appropriateness of this assumption, we use data from the Sustainable Energy Authority of Ireland (SEAI), which shows that for commercial firms with annual consumption between 20 GWh and 70 GWh, the average unit price in 2021H2 was 16c/KWh in nominal terms.[52] Prices are expected

[51] Dublin Airport (2022), Regulatory Proposal for 2023-2026, Appendix 4: Operating Expenditure Report, Section 6.18.

[52] SEAI (2022), Commercial Fuel Cost Archives. Available at seai.ie.

to increase by a further 30% in 2022, which results in a unit cost that is broadly in line with Dublin Airport's estimate. As a result, we accept Dublin Airport's forecast for 2022 and adopt it as our baseline.

- **Gas:** Unit costs are higher than would be expected given airport consumption (at ~✂c/KWh compared with 5c/KWh in 2021H2). However, cost is highly dependent on Dublin Airport's hedging strategy. We find that retail gas prices for large users have increased by 218% in real terms between 2019 and 2021.[53] As Dublin Airport's 2019 costs were efficient, and assuming consumption is constant, we estimate a 2022 baseline of €3.5 million.
- **Water:** We have relied on Dublin Airport's own estimate for water costs.
- **Fuel oil:** We estimate total expenditure on fuel oil to be €0.1 million, taking Dublin Airport's fuel oil 2018 cost (the last data point available) and adjusting it to reflect the actual increase in Irish fuel oil between 2018 and 2021.[54]

As shown in Table 2.1, we forecast that utilities cost will remain stable around the **€13.0 million** baseline in 2022.

- **Electricity:** Electricity costs after 2022 are highly uncertain but are generally expected to fall back to the longer-term trend, sometime within the next determination period.[55] We consider Dublin Airport's assumptions, indicating a 20% reduction in electricity prices, a reasonable estimate at this stage. We also use Dublin Airport's assumptions around future consumption due to new assets coming online which ultimately increases electricity costs over time, negating the impact of the price reduction.
- **Gas:** For gas, we assume a decline in unit costs of 20% in line with the electricity price reduction and assume consumption is constant.
- **Water:** We have relied on Dublin Airport's own projections for water costs.
- **Fuel oil:** We assume expenditure on fuel oil stays constant in real terms.

We have also adjusted our forecasts to include any impact that Dublin Airport's CIP could have on future utilities' costs. Dublin Airport's regulatory submission for utilities consumption and expenditure mentions some of the CIP projects. We consider the impact of these to be already included in Dublin Airport's base forecast and include additional savings only for the projects that are not mentioned. These include new CIP projects related to Dublin Airport's sustainability strategy, which were not included within the previous CIP.

Table 2.1 shows that these projects have the potential for €3.1 million additional cumulative savings. As it has not always been clear whether the impact of CIP projects has been included within Dublin Airport's consumption estimates, we will need to review this analysis in more detail ahead of our final forecasts.

[53] (1) SEAI, Commercial Fuel Costs Archive, available at: https://www.seai.ie/publications/Commercial-Fuel-Cost-Archives.pdf (2) Irish Time, available at: https://www.irishtimes.com/business/energy-and-resources/electricity-and-gas-bills-to-go-up-27-and-39-next-month-1.4827534.

[54] SEAI, Commercial Fuel Costs Archive, available at: https://www.seai.ie/publications/Commercial-Fuel-Cost-Archives.pdf

[55] While expectations of future energy prices are changing on a monthly basis, we understand the current consensus to be that high costs will remain until at least the middle of 2023.

Table 18.1: Our forecast of efficient utilities expenditure, 2022-2026 (€ million February 2022 prices)

	2022	2023	2024	2025	2026
Electricity	8.1	8.2	8.3	8.4	8.4
Gas	3.5	2.8	2.8	2.8	2.8
Fuel Oil	0.1	0.1	0.1	0.1	0.1
Water	1.3	1.5	1.6	1.6	1.6
Total Utilities expenditure (excl. CIP)	**13.0**	**12.7**	**12.9**	**13.0**	**13.0**
CIP	-0.1	-0.2	-0.2	-1.0	-1.6
Total Utilities expenditure (incl. CIP)	**13.0**	**12.4**	**12.7**	**12.0**	**11.3**

Source: CEPA analysis

19. INSURANCE

Summary

In 2019 Dublin Airport's expenditure on insurance was significantly higher than was assumed within our 2019 forecasts. Insurance costs increased 30% from the previous year due to a combination of market hardening, greater insurance cover, and an increase in the number claims. While we do not consider the last of these factors to be outside the airport's control, we do find that the market did harden significantly over this period resulting in premium increases across the industry.

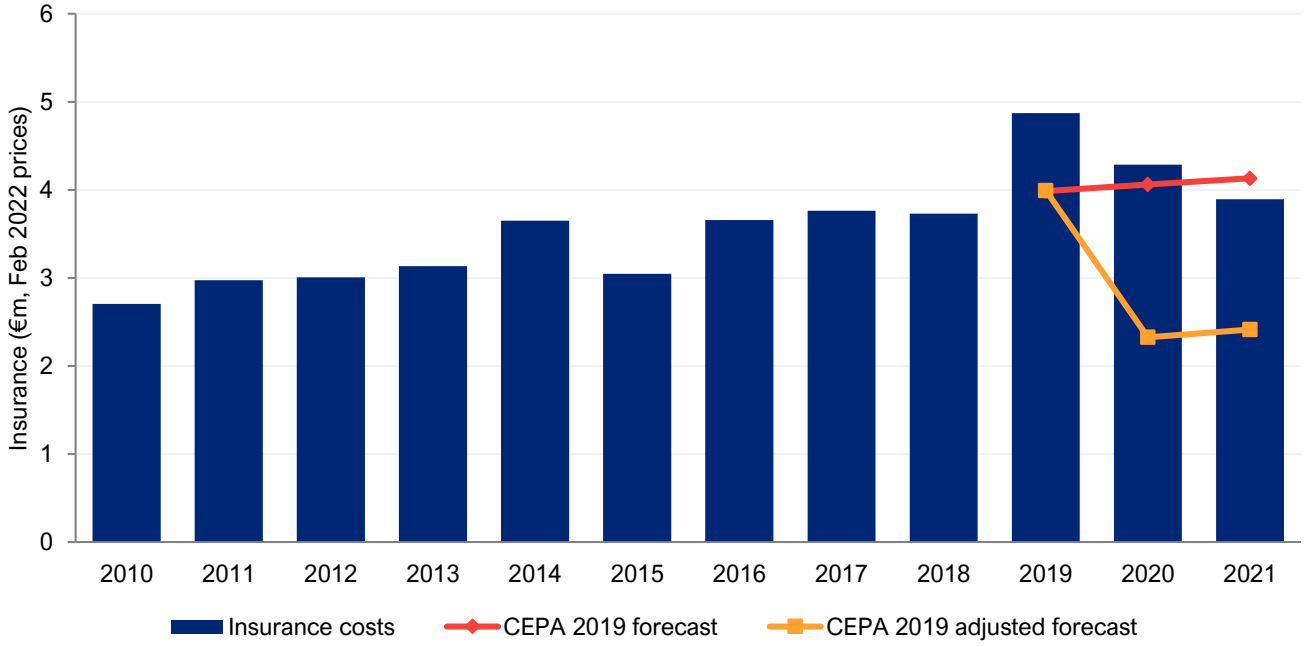
In determining a 2022 baseline and forecasts for the determination period, we have used industry estimates of the growth in insurance premiums over the period 2018 to 2022. We have applied this growth rate to Dublin Airport's 2018 insurance costs and then adjusted for the reduction in passenger volumes, resulting in a 2022 baseline of **€4.4 million**. Using industry projections, our own analysis of longer-term trends in insurance costs, and forecast passenger volumes, we project insurance costs to grow to **€5.8 million** by 2026.

The Insurance covers Dublin Airport's costs related to both external insurance cover and self-insurance arrangements. Currently, Dublin Airport is self-insured for both employers' liability and public liability. External policies include property / business interruption and vehicle insurance.

19.1. HISTORIC EXPENDITURE

Employers' and public liability costs, in the five-year lead up to 2018, constituted approximately 67% of insurance costs. In 2019, Dublin Airport's expenditure on insurance was significantly higher than our forecast for that year, with insurance costs increasing 31% from 2018 levels. The higher than expected spend was explained by Dublin Airport as being the result of a combination of factors, (i) market hardening; (ii) increased cover levels; and (iii) claims experience. However, the relative contribution of those three factors is unknown.

Figure 19.1 Insurance non-pay historic expenditure at Dublin Airport, 2010-2021 (€ million, February 2022 prices)



Source: CEPA analysis of Dublin Airport data

19.2. Analysis

Of the three factors that increased insurance costs in 2019, we do not consider (iii) to necessarily be efficient as Dublin Airport has some degree of control over passengers and employees making claims. Also, given the extent of self-insurance at Dublin Airport, we would expect there to be year-on-year fluctuations in insurance costs. We do not consider it appropriate to select a peak year for insurance claims as the basis of future insurance costs.

Factors (i) and (ii), are less controllable, and between 2018 and 2019 we found (i) to be significant, corroborated through external research and discussion with an insurance expert.

In 2019, insurance provider exits and consolidations caused a significant rise in premiums. Marsh published analysis showing the mean increase in premiums for airport owners and operators was 12% and 23% in 2019 and 2020, respectively.[56] As noted above, Dublin Airport experienced a 30% increase in insurance costs in 2019, though its most significant costs are related to self-insured cover. Swiss RE Sigma has also published analysis on the recent and forecast annual premium increases in the industry.[57]

19.3. Projected efficient expenditure

In determining a 2022 baseline, we developed a view on the extent to which Dublin Airport may have experienced an insurance increase due to market hardening and increased cover, relative to claims-related increases which would not be considered efficient. We developed an annual growth rate based on the data from Marsh and Swiss RE Sigma,[58] averaging them where both sources provided data for a single year (2020 only). The resulting growth rate is shown in the table below. For 2024 onwards, we have used data from our analysis of Heathrow Airport's insurance costs to construct a compound annual growth rate estimate.

Table 19.1: Insurance annual growth rate, 2019-2026 (%)

	2019	2020	2021	2022	2023	2024	2025	2026
Marsh	12.0	23.0						
Swiss Re		1.6	4.0	3.6	2.9			
CEPA						3.7	3.7	3.7
Average	**12.0**	**12.3**	**4.0**	**3.6**	**2.9**	**3.7**	**3.7**	**3.7**

Source: Marsh (n.d.) Aerospace Insurance Market: Air Navigation Service Providers (ANSPs), Swiss Re Institute (2021) Turbulence after lift-off: global economic and insurance market outlook 2022/23, CEPA analysis

Dublin Airport's actual 2018 insurance costs were uplifted as per the growth rates in the table above and adjusted for actual and forecast passenger figures with an elasticity of 0.55 to develop the 2022 baseline and forecast for the regulatory determination. This resulted in a 2022 baseline of **€4.4 million,** rising to **€5.8 million** in 2026.

Table 19.2: Our forecast of efficient insurance expenditure, 2022-2026 (€ million, February 2022 prices)

	2022	2023	2024	2025	2026
Insurance non-pay costs	4.4	4.9	5.2	5.5	5.8

Source: CEPA analysis

[56] Marsh (n.d.) Aerospace Insurance Market: Air Navigation Service Providers (ANSPs)

[57] Swiss Re Institute (2021) Turbulence after lift-off: global economic and insurance market outlook 2022/23

[58] Marsh (n.d.) Aerospace Insurance Market: Air Navigation Service Providers (ANSPs), Swiss Re Institute (2021) Turbulence after lift-off: global economic and insurance market outlook 2022/23

20. OTHER NON-STAFF COSTS

Summary

The other non-staff costs category covers miscellaneous areas of expenditure, such as CAR costs charged back to Dublin Airport, and new cost lines that have not yet been allocated to other categories. Other non-staff costs decreased during the pandemic, remaining below our forecast from the 2019 study, even when the forecast is adjusted for outturn passenger volumes. New cost lines, such as Apron Shuttle Bus Hire, did not materialize having been expected to have high costs.

We use different m. The method used per sub-category depending on (i) whether the costs are constant or not, (ii) whether Dublin Airport has control over the costs, and (iii) whether the costs are affected by passenger numbers. We account separately for one-off costs. Overall, we forecast other non-staff costs to be **€22.9 million** in 2022, growing to **€27.6 million** in 2026.

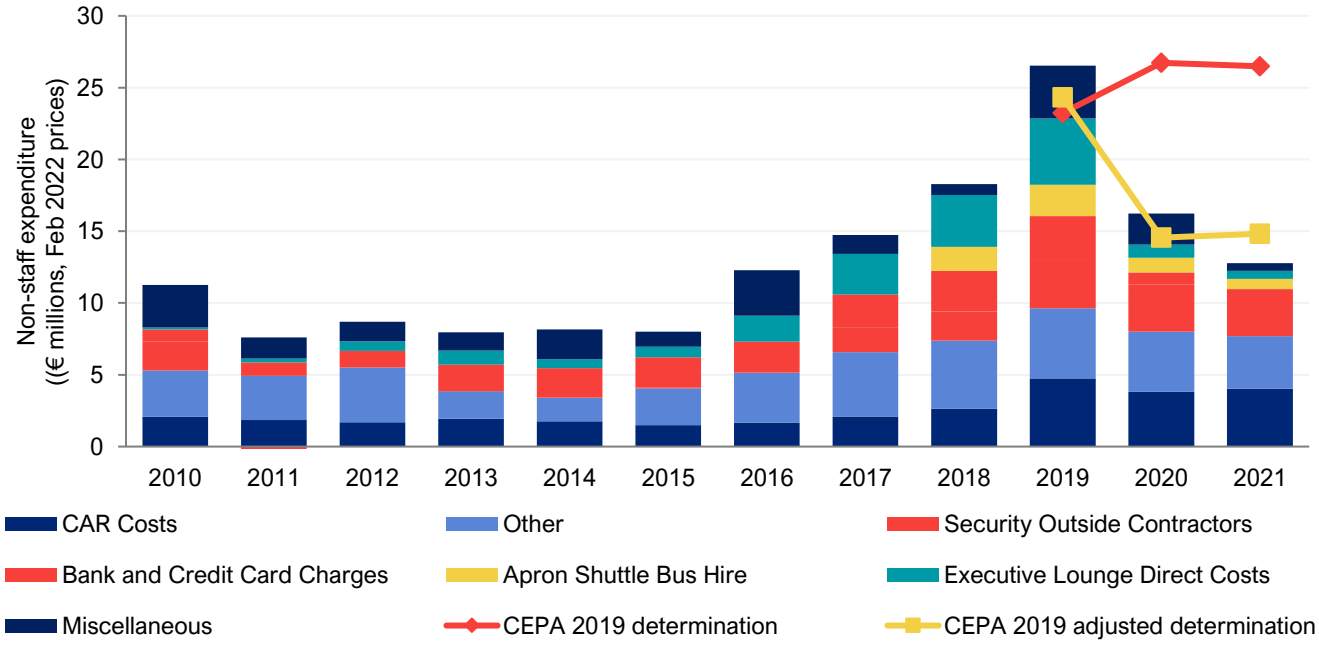
This category of costs covers miscellaneous areas of expenditure, including:

- CAR costs charged back to Dublin Airport;
- A new Security Regulatory Charge, of €0.05 per departing passenger;
- US Preclearance costs, called Security Outside Contractors;
- Telephone, print and stationary costs;
- Bank, credit card and foreign exchange costs; and
- New cost lines that have not yet been allocated to other categories.

20.1. HISTORIC EXPENDITURE

Expenditure in this category increased year-on-year between 2015 and 2019, exceeding our forecast for 2019. In 2020 and 2021, costs decreased substantially to levels below our forecast from the 2019 study, even when that forecast is adjusted for lower outturn passenger numbers.

Figure 20.1: Other non-staff costs, 2010-2021 (€ million, February 2022 prices)



Source: CEPA analysis of Dublin Airport data

In our review we focus on costs that (i) are of material size, (ii) experienced material changes in 2019-2021, or (iii) are new cost lines.

CAR costs, which are costs levied by the regulator on Dublin Airport, account for a large proportion of the other non-staff costs category. These differ year by year, but are unaffected by passenger numbers, and not in Dublin Airport's control. CAR costs are a pass-through cost and are mandatory.

Three new cost lines have been introduced in recent years that were explicitly accounted for in our 2019 forecasts, namely (i) Apron Shuttle Bus Hire, (ii) Security Contracting Costs for Hold Baggage Screening, and (iii) Executive Lounge Direct Costs. Although these were expected to have high costs due to them being passenger driven, the reduction in passenger volumes meant that outturn costs were much lower than anticipated.

The other drivers of the decrease in other non-staff costs are Bank and Credit Card Charges and Miscellaneous Costs in 2019-2020 (accounting for respectively 21% and 15% of the decrease), and Miscellaneous Costs and Contingencies in 2020-2021 (accounting for respectively 40% and 11% of the decrease).

Since 2019, there has been one new cost line, namely the Security Regulatory Charge. This charge was established under S.I. No. 632/2019 – European Communities (Civil Aviation Securities) (Amendment) Regulations 2019. This came into effect on 1 January 2020. This is a mandatory cost, which consists of €0.05 per departing passenger.

20.2. Analysis

In its regulatory submission Dublin Airport has forecast an increase in spending on Credit Card Commissions of 42% between 2022 and 2026 (€0.76 million to €1.08 million). It considers that, due to the Covid-19 pandemic, payment habits have changed, and people are now more likely to use credit card than before the pandemic. We agree with Dublin Airport. We note that this line of reasoning also implies a decrease in the number of cash transactions, and therefore a decrease in cash handling costs. We have incorporated this into our forecasts.

As noted above costs which are passenger driven decreased through the pandemic. With the recovery of passenger numbers now underway, we expect these costs to increase returned to their 2019 level by 2023.

20.3. Projected efficient expenditure

Our approach to determining the baseline by cost subcategory is as follows:

- If sub-category costs are unaffected by passenger numbers and costs fluctuate, we take average of 2019-2021; i.e., for CAR costs.
- If sub-category costs are unaffected by passenger numbers and costs do not fluctuate, we take 2021 as baseline; i.e., for corporate trade subscriptions.
- If sub-category costs are affected by passenger numbers, we take 2019 or 2018 as the baseline, depending on whether 2019 costs were efficient or not. For example, for executive lounge direct costs, we take 2019 as the baseline, since 2019 costs were efficient.
- We account separately for one-off costs. For example, Miscellaneous Costs increased in 2020-2021 due to Covid-related expenditure. We do not expect such expenditure to continue, and therefore take 2019 as baseline.

This generates a baseline of **€22.9 million** for 2022.

Table 20.1: Our baseline of other non-staff costs, 2022 (€ million, February 2022 prices)

Sub-category	Baseline (€ million)
Regulatory Costs	4.9

Sub-category	Baseline (€ million)
Pre-booking Commission	0.0
Credit Card Commission	1.0
Security Regulatory Charge	0.7
US CBP	✂
HBS Screening	✂
Airside Bussing	✂
Lounge Costs	✂
Telephone Print and Stationery	0.8
Foreign Exchange Costs	0.0
Contingency	0.0
Corporate Trade Subscriptions	0.3
Other Overheads	5.1
Total other staff costs (excl. CIP)	**22.8**
CIP	0.1
Total other staff costs (incl. CIP)	**22.9**

Source: CEPA analysis

Our approach to determining the forecast, based on whether costs are affected by passenger numbers, is as follows.

- If costs are unaffected by passenger numbers, we assume the costs to be constant, unless there is a clear reason why this should not be the case. The costs which are not constant are:
    - Credit Card Commissions: Following Dublin Airport's reasoning, we assume Credit Card Commissions will increase as a result of changing payment habits.
    - Cash Handling Costs: As discussed above, we assume Cash Handling Costs will decrease as a consequence.
- If costs are affected by passenger numbers, we forecast using the appropriate cost driver.

Dublin Airport has performed a detailed bottom-up analysis of some sub – category costs. We incorporate its analysis where we determine it to be appropriate. We have incorporated Dublin Airport's analysis of credit card commission costs, HBS contractor costs.

This produces the forecast below with expenditure increasing to **€27.6 million** by 2026.

Table 20.2: Our forecast of efficient other non-staff costs, 2022-2026 (€ million, February 2022 prices)

	2022	2023	2024	2025	2026
Regulatory Costs	4.9	4.9	4.9	4.9	4.9
Pre-booking Commission	0.0	0.0	0.0	0.0	0.0
Credit Card Commission	1.0	1.2	1.3	1.4	1.5
Security Regulatory Charge	0.7	0.7	0.8	0.9	0.9
US CBP	✂	✂	✂	✂	✂
HBS Screening	✂	✂	✂	✂	✂

	2022	2023	2024	2025	2026
Airside Bussing	✂	✂	✂	✂	✂
Lounge Costs	✂	✂	✂	✂	✂
Telephone Print and Stationery	0.8	0.8	0.8	0.8	0.8
Foreign Exchange Costs	0.0	0.0	0.0	0.0	0.0
Contingency	0.0	0.0	0.0	0.0	0.0
Corporate Trade Subscriptions	0.3	0.3	0.3	0.3	0.3
Other Overheads	5.1	5.2	5.2	5.2	5.2
Total other staff costs (excl. CIP)	**22.8**	**24.1**	**25.5**	**26.5**	**27.0**
CIP	0.1	0.2	0.5	0.6	0.6
Total other staff costs (incl. CIP)	**22.9**	**24.3**	**26.0**	**27.1**	**27.6**

Source: CEPA analysis

21. OTHER NON-PAY STAFF COSTS

Summary

The other non-pay staff costs category comprises employee-related overheads, for example travel and subsistence. Total costs decreased in 2020 and 2021, mainly due to a decrease in FTEs but to a lesser extent, due to less spending on travel, etc.

We determine the 2022 baseline using our estimate of headcount in 2022 and the per FTE costs established in our 2019 study. We then project from this baseline using our forecast of headcount. Overall, we forecast other Non-Pay Staff Costs to be **€6.4 million** in 2022, growing to **€6.9 million** in 2026.

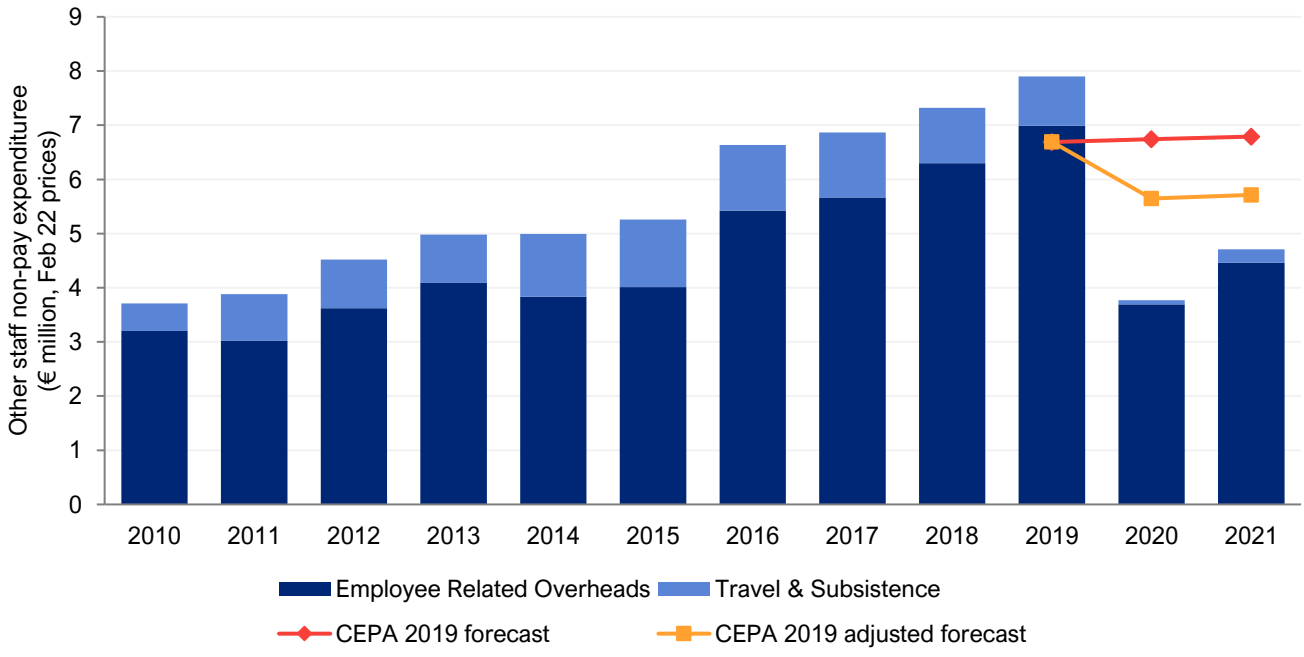
This category consists of all employee-related overheads such as:

- Travel and subsistence;
- Training and development;
- Recruitment costs;
- Uniforms and protective clothing; and
- Staff transport subsidies.

21.1. HISTORIC EXPENDITURE

Other non-pay staff costs increased between 2010 and 2019. This was largely as a result of increased expenditure on training and on the use of external recruitment agencies. In 2020, other non-pay staff costs decreased as a result of the Covid-19 pandemic. Both Employee Related Overheads and Travel & Subsistence decreased since 2019, although the latter decreased by more (36% and 73% respectively).

Figure 21.1: Other non-pay staff costs at Dublin Airport, 2010-2021 (€ million, February 2022 prices)

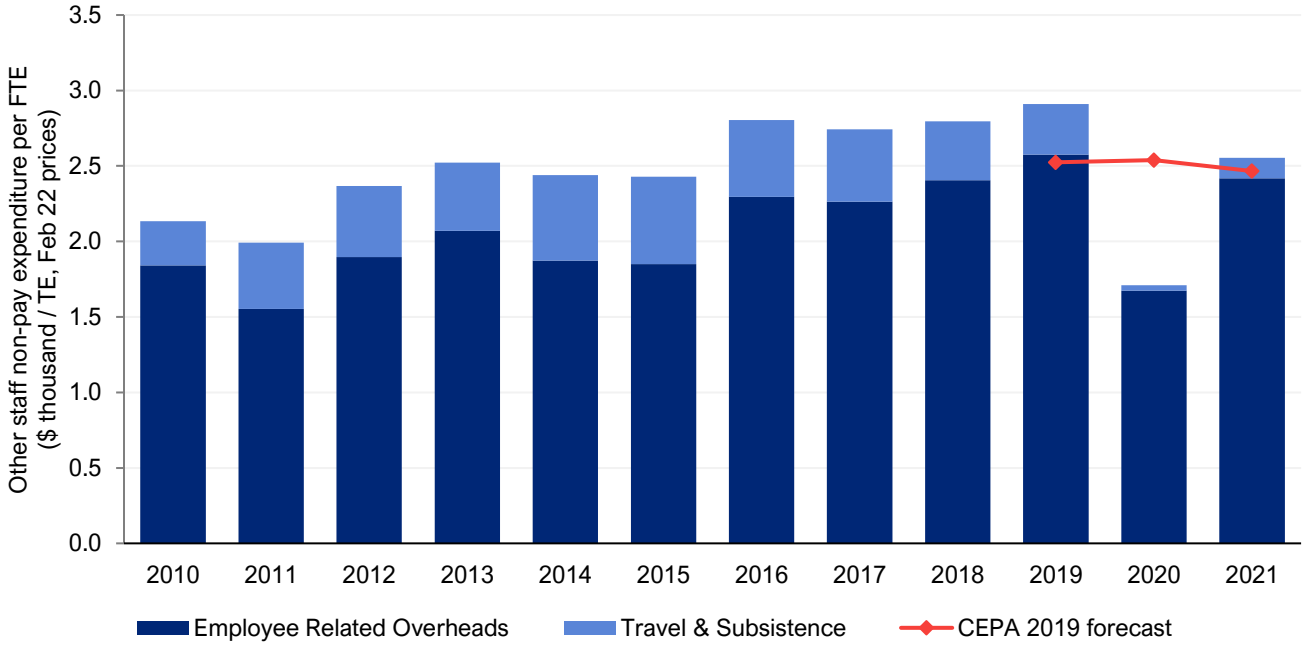


Source: CEPA analysis of Dublin Airport data

Costs per FTE also decreased, but by less. While in 2021 total other non-pay staff costs were lower than both our 2019 forecast and our adjusted forecast, 2021 other non-pay staff costs per FTE were broadly the same as our

2019 forecast. This illustrates how the majority of the decrease in total non-pay staff costs was due to a decrease in FTEs, rather than a decrease in per-FTE costs.

Figure 21.2: Other non-pay staff costs per FTE at Dublin Airport, 2010-2021 (€ thousand per FTE, February 2022 prices)



Source: CEPA analysis of Dublin Airport data

21.2. Analysis

Dublin Airport states in its regulatory submission that it achieved efficiency improvements, decreasing per-FTE costs to €2.35 thousand in 2022 from €2.76k in 2019. Nonetheless, it forecasts per-FTE costs to be €2.76 thousand in 2022. Dublin Airport states that this higher per-FTE cost is due to Covid-staff testing and investment in health and wellbeing for staff.[59]

We do not agree that the Covid-19 related costs will remain as high as they are now. Consequently, our view is that efficient per-FTE are largely the same as they were in 2019 and that our estimate of per-FTE costs from the 2019 study of €2.5k remains appropriate.

21.3. Projected efficient expenditure

For the 2022 baseline, we assume the 2019 per FTE baseline costs, and our 2022 efficient FTEs forecast. This results in a 2022 baseline of **€6.4 million**, growing to **€6.9 million** in 2026.

Figure 21.3: Our forecast of efficient FTEs and other non-pay staff costs, 2022-2026

	2022	2023	2024	2025	2026
Dublin Airport staff (FTEs)	2,516	2,559	2,656	2,736	2,762
Other non-pay staff costs (€ million, Feb 2022 prices)	6.4	6.5	6.7	6.9	6.9

Source: CEPA analysis

[59] Dublin Airport (2022), Regulatory Proposal for 2023-2026, Appendix 4: Operating Expenditure Report, p. 76

22. CONCLUSIONS AND FORECAST SUMMARY

Table 22.1 and Table 22.2 below summarise our projections of staffing levels and opex by cost category. In Appendix A, we present our forecasts using Dublin Airport's passenger projections and compare then with Dublin Airport's forecasts. From this, we draw four main conclusions:

- Dublin Airport has made good progress at delivering the efficiencies we suggested in our 2019 study, through the implementation of NWOW, through increased outsourcing where outsourced services are more cost-effective, and through rationalising operations.
- We broadly agree with Dublin Airport's 2022 forecasts of expenditure, with the exception of Central Functions and Terminal Facilities. Dublin Airport anticipate a substantial increase in 2022 staffing levels for both these functions that we do not consider has been justified in the supporting evidence provided. But should Dublin Airport provide evidence that the additional staff relate to roles that are necessary for the effective functioning of the airport, are genuinely additional to existing roles, and efficiently resourced commensurate to the need, we are open to changing our position.
- Where we have more substantive differences, is on the growth in expenditure and staffing from 2023 to 2026. One major factor relates to differences in our wage growth assumption, where we have used more recent forecasts, and where we have found an apparent error in how Dublin Airport has uses external forecasts of wage growth. However, a lot of the difference also relates to our use of different elasticity estimates, and our more measured approach at allowing step changes in expenditure. Again, we consider that Dublin Airport has not always provided adequate evidence that this expenditure is necessary, genuinely additional, and efficient.

  As a high-level sense check of our forecasts, we consider the elasticity of overall opex with respect to passenger volumes, over the period 2022 to 2026. Excluding the CIP, our forecasts imply an elasticity of 0.36, rising to 0.43 when we include the CIP. This is within the general benchmark range of 0.3 to 0.4.
- Finally, there remains significant uncertainty around what an efficient security operation looks like, both today and in the future. While we have produced a forecast for security expenditure, it relies on several assumptions over which there is currently uncertainty. We welcome further engagement from Dublin Airport and other stakeholders on those assumptions.

Table 22.1: Summary of forecast staffing levels at Dublin Airport, 2022-2026 (FTEs)

	2022	2023	2024	2025	2026
Security	895	847	873	895	908
Maintenance	206	216	221	226	229
Central Functions	312	315	318	320	321
Facilities and Cleaning	396	411	417	422	425
Campus Services	228	233	236	237	238
Retail	296	324	336	364	366
IT	62	66	70	72	75
Airside operations	78	80	80	81	81
Capital Projects	33	33	33	33	33
Total (excluding CIP)	**2,507**	**2,526**	**2,584**	**2,650**	**2,676**
CIP (including new runway and HBS3)	10	33	73	85	86
Total (including CIP)	**2,516**	**2,559**	**2,656**	**2,736**	**2,762**

Source: CEPA and Taylor Airey analysis

Table 22.2: Summary of forecast opex at Dublin Airport, 2022-2026 (€ million, February 2022 prices)

	2022	2023	2024	2025	2026
Payroll					
Security	44.2	43.2	45.6	47.4	48.7
Maintenance	15.4	16.6	17.4	18.0	18.4
Central Functions	30.1	31.5	32.9	33.8	34.4
Facilities and Cleaning	19.6	20.8	21.6	22.1	22.5
Campus Services	19.1	20.1	20.7	21.1	21.4
Retail	16.7	18.9	20.2	22.2	22.6
IT	7.1	7.8	8.5	8.9	9.4
Airside operations	6.3	6.6	6.8	6.9	7.0
Capital Projects	3.3	3.4	3.5	3.6	3.7
Non-pay					
Maintenance	14.0	15.1	15.6	16.0	16.4
Facilities and Cleaning	✂	✂	✂	✂	✂
IT	10.0	10.9	11.1	11.4	11.7
Car Parking	✂	✂	✂	✂	✂
Employee-related overheads	6.4	6.5	6.7	6.9	6.9
Rent and rates	17.5	16.0	15.1	14.5	13.8
Consultancy services	7.1	7.1	7.1	7.1	7.1
Marketing	5.3	5.9	6.3	6.6	7.0
Insurance	4.4	4.9	5.2	5.5	5.8
PRM	✂	✂	✂	✂	✂
Other overheads	22.8	24.1	25.5	26.5	27.0
Utilities	13.0	12.7	12.9	13.0	13.0
Totals					
Pay	161.8	168.8	177.2	183.9	188.1
Non-pay	119.6	124.1	128.0	131.4	133.3
Total opex (excluding CIP)	**281.4**	**292.8**	**305.2**	**315.3**	**321.4**
CIP	0.4	3.5	7.8	8.0	7.5
Total (including CIP)	**281.8**	**296.3**	**313.0**	**323.3**	**329.0**
Opex per passenger, excl. CIP (€)	11.13	9.73	9.46	9.23	9.13
Opex per passenger, incl. CIP (€)	11.15	9.84	9.70	9.46	9.34

Source: CEPA and Taylor Airey analysis

Appendix A COMPARISON OF FORECASTS WITH DUBLIN AIRPORT'S

In this appendix, we compare our forecasts with Dublin Airport's forecasts. To make the comparisons as like-for-like as possible, we present our forecasts using Dublin Airport's passenger projections rather than using CAR's passenger projections as elsewhere in this report.

Table A.1: Summary of forecast staffing levels at Dublin Airport using Dublin Airport's passenger projections, 2022-2026 (FTEs)

	2022	2023	2024	2025	2026
Security	✂	✂	✂	✂	✂
Maintenance	✂	✂	✂	✂	✂
Central Functions	✂	✂	✂	✂	✂
Facilities and Cleaning	✂	✂	✂	✂	✂
Campus Services	✂	✂	✂	✂	✂
Retail	✂	✂	✂	✂	✂
IT	✂	✂	✂	✂	✂
Airside operations	✂	✂	✂	✂	✂
Capital Projects	✂	✂	✂	✂	✂
Total (excluding CIP)	✂	✂	✂	✂	✂
CIP (including new runway and HBS3)	✂	✂	✂	✂	✂
Total (including CIP)	✂	✂	✂	✂	✂

Source: CEPA and Taylor Airey analysis

Table A.1: Summary of Dublin Airport's forecast staffing levels, 2022-2026 (FTEs)

	2022	2023	2024	2025	2026
Security	✂	✂	✂	✂	✂
Maintenance	✂	✂	✂	✂	✂
Central Functions	✂	✂	✂	✂	✂
Facilities and Cleaning	✂	✂	✂	✂	✂
Campus Services	✂	✂	✂	✂	✂
Retail	✂	✂	✂	✂	✂
IT	✂	✂	✂	✂	✂
Airside operations	✂	✂	✂	✂	✂
Capital Projects	✂	✂	✂	✂	✂
Total	✂	✂	✂	✂	✂
Total (as per reg submission)	✂	✂	✂	✂	✂

Source: Dublin Airport analysis
Note: (1) Facilities and Cleaning includes Taskforce FTEs; (2) Numbers in each column do not add up to totals provided in the regulatory submission

Table A.3: Summary of forecast opex at Dublin Airport using Dublin Airport's passenger projections, 2022-2026 (€ million, February 2022 prices)

	2022	2023	2024	2025	2026
Payroll					
Security	✂	✂	✂	✂	✂
Maintenance	✂	✂	✂	✂	✂
Central Functions	✂	✂	✂	✂	✂
Facilities and Cleaning	✂	✂	✂	✂	✂
Campus Services	✂	✂	✂	✂	✂
Retail	✂	✂	✂	✂	✂
IT	✂	✂	✂	✂	✂
Airside operations	✂	✂	✂	✂	✂
Capital Projects	✂	✂	✂	✂	✂
Non-pay					
Maintenance	✂	✂	✂	✂	✂
Facilities and Cleaning	✂	✂	✂	✂	✂
IT	✂	✂	✂	✂	✂
Car Parking	✂	✂	✂	✂	✂
Employee-related overheads	✂	✂	✂	✂	✂
Rent and rates	✂	✂	✂	✂	✂
Consultancy services	✂	✂	✂	✂	✂
Marketing	✂	✂	✂	✂	✂
Insurance	✂	✂	✂	✂	✂
PRM	✂	✂	✂	✂	✂
Other overheads	✂	✂	✂	✂	✂
Utilities	✂	✂	✂	✂	✂
Totals					
Pay	✂	✂	✂	✂	✂
Non-pay	✂	✂	✂	✂	✂
Total opex (excluding CIP)	✂	✂	✂	✂	✂
CIP	✂	✂	✂	✂	✂
Total (including CIP)	✂	✂	✂	✂	✂
Opex per passenger, excl. CIP (€)	✂	✂	✂	✂	✂
Opex per passenger, incl. CIP (€)	✂	✂	✂	✂	✂

Source: CEPA and Taylor Airey analysis

Table A.3: Summary Dublin Airport's forecast opex, 2022-2026 (€ million, February 2022 prices)

	2022	2023	2024	2025	2026
Payroll					
Security	✂	✂	✂	✂	✂
Maintenance	✂	✂	✂	✂	✂
Central Functions	✂	✂	✂	✂	✂
Facilities and Cleaning	✂	✂	✂	✂	✂
Campus Services	✂	✂	✂	✂	✂
Retail	✂	✂	✂	✂	✂
IT	✂	✂	✂	✂	✂
Airside operations	✂	✂	✂	✂	✂
Capital Projects	✂	✂	✂	✂	✂
Non-pay					
Maintenance	✂	✂	✂	✂	✂
Facilities and Cleaning	✂	✂	✂	✂	✂
IT	✂	✂	✂	✂	✂
Car Parking	✂	✂	✂	✂	✂
Employee-related overheads	✂	✂	✂	✂	✂
Rent and rates	✂	✂	✂	✂	✂
Consultancy services	✂	✂	✂	✂	✂
Marketing	✂	✂	✂	✂	✂
Insurance	✂	✂	✂	✂	✂
PRM	✂	✂	✂	✂	✂
Other overheads	✂	✂	✂	✂	✂
Utilities	✂	✂	✂	✂	✂
Totals	✂	✂	✂	✂	✂
Pay	✂	✂	✂	✂	✂
Non-pay	✂	✂	✂	✂	✂
Total opex	✂	✂	✂	✂	✂
Opex per passenger (€)	✂	✂	✂	✂	✂
Total opex (as per reg submission)	✂	✂	✂	✂	✂

Source: Dublin Airport analysis
Note: The totals in each column do not exactly match the totals provided within the regulatory submission

Appendix B ELASTICITY ASSUMPTIONS

Table B.1: Elasticity assumptions related to staffing requirements

Category	Recovery elasticity	Standard elasticity	Driver	Explanation
Security - Terminal 1 ASU - Terminal 2 ASU - Other	 - - -	 0.89 0.88 -		For Terminal 1 and Terminal 2 security, we made a bottom-up assessment of operational processes to estimate cost elasticity
Maintenance - passenger driven - non-passenger driven	 0.30 -	 0.40 -		We maintain the elasticity assumption used in our previous study, which was a judgement based on the activities undertaken by role.
Central Functions - Platinum Services - HR - Other	 - - -	 0.40 0.77 0.00	 Total staff numbers 	We make a judgement based on staff roles. For most roles we would not expect staffing levels to be driven by passenger numbers. For HR staff, we apply an elasticity of 1 for those roles directly affected by staff numbers and apply an elasticity of 0 for the remainder.
Facilities and Cleaning - cleaning - terminal facilities - control centre	 - - -	 0.40 0.40 0.10	 Pax accessible space, m^2 	For cleaning services, we maintain our previous assumption, which we estimated based on the historic relationship between costs and terminal space at Dublin Airport. For terminal facilities, we increase our elasticity to 0.4 as evidence from 2019-2021 suggests staffing has been more elastic to passenger volumes that we had previously assumed.
Campus Services - Police / Fire service - Campus facilities	 - -	 0.10 0.40		We make a judgement based on the roles captured within Campus Services (i.e. police and fire service). We expect these roles to be driven by the size of the campus rather than passenger numbers.
IT	-	-		Now use Dublin Airport's forecast. We expect major increases in staffing requirements will be dealt with through CIP-related step changes.
Retail	0.50	0.20		Judgement based on the activities undertaken by role. We expect major increases in staffing requirements will be dealt with through CIP-related step changes.
Airside operations	-	0.10		We estimate these based on historic patterns at Dublin and the link between flight numbers and passenger numbers.
Capital Projects	-	-		We find no historic link between staffing requirements and passenger numbers. Linked more to scale of CIP

Source: CEPA and Taylor Airey analysis

Table B.2: Elasticity assumptions related to non-pay costs

Cost category	Recovery elasticity	Standard Elasticity	Driver	Explanation
IT	-	0.00		We would not expect there to be a short-run link with passenger numbers. We expect major increases in expenditure will be dealt with through CIP-related step changes.
Facilities and Cleaning	-	1.00	Wage growth	Changed from 2019 study. We understand contract costs are not linked to passenger numbers. Instead assume link to wage growth.
Car Parks	✂	✂		Changed from 2019 study. Now linked directly to passenger volumes as switch to EVs makes link to fuel prices less relevant.
Maintenance	-	0.30		Changed from 2019 study. Now linked directly to passenger volumes.
Rent and rates	-	-		We would not expect there to be a short-run link with passenger numbers.
Consultancy	-	-		Changed from 2019 study. Now use historical average
Marketing - Customer support - Other	 - -	 - 0.40		We estimate these based on historic patterns at Dublin Airport. For aviation customer support, now assume return to historical average.
PRM services	-	-		Changed from 2019 study. We adopt Dublin Airport's assumption that propensity to use PRM services will increase to 1.1% of the passenger base and stay constant at that level
Utilities	-	-		Changed from 2019 study. Now use Dublin Airport's consumption figures.
Insurance	-	0.55		We make a bottom-up assessment based on historic expenditure patterns. We review different elements of Dublin Airport's insurance expenditure and make a judgement on the extent to which the insurance cost is driven by passenger volumes (either directly or indirectly).
Other staff costs - Travel - Other	- 	0.95 	 Staff numbers Staff numbers	We estimate this based on historic patterns at Dublin Airport.
Other - US CBP - Bank charges - Lounges & VIP handling	 0.00 - -	 1.00 1.00 0.50	 US CBP passengers	

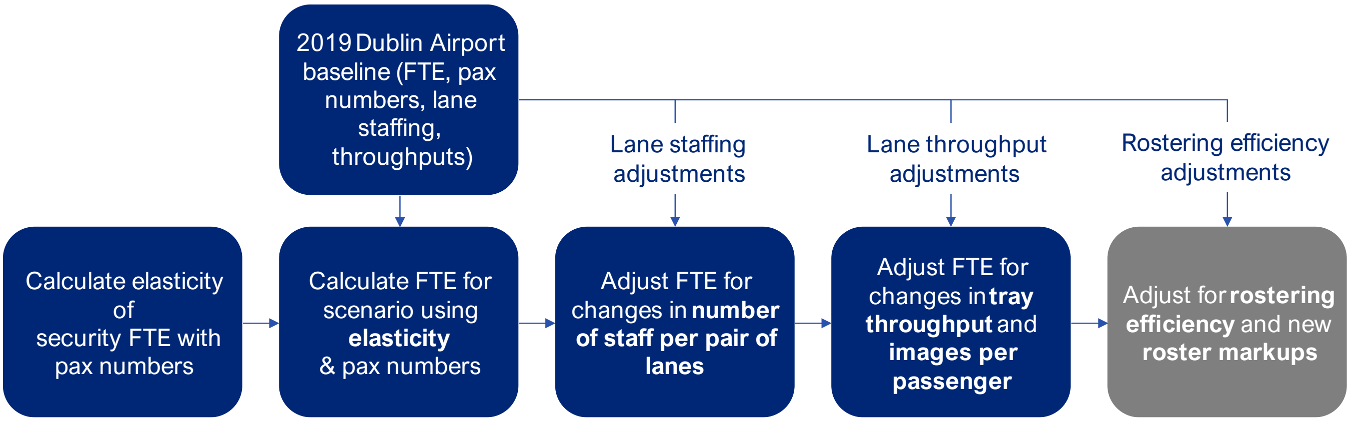
Source: CEPA and Taylor Airey analysis

Appendix C KEY ASSUMPTIONS UNDERPINNING SECURITY FORECAST

As we indicated in Section 4 there remains uncertainty about the security forecasts in this report. In this annex we discuss the assumptions that we have currently made and the issues that mean those assumptions might change in our final report.

To forecast the staffing requirement for in-lane ASU staff, we use the calculation approach as outlined in the following diagram. The diagram shows, in bold, the key data and assumptions that drive the forecast of FTEs.

Figure C.1: Modelling in-lane security staffing



Source: Taylor Airey
Note: We have not yet adjusted for roster efficiency as we have not been given security roster information.

Over our forecast period, there are three key events that influence many of the assumptions in our calculation approach:

- ✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂ ✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂✂ ✂✂✂✂✂✂✂✂✂✂✂
- The commissioning of an automated tray returns system (ATRS) in Terminal 2 in 2024.
- The commissioning of C3 scanning equipment at both Terminals 1 and 2 in 2024.

In the table below, we present our current view of how these assumptions evolve over our forecast period, and our rationale for those assumptions. As we show in the table, we require further information on some of these assumptions to finalise our forecasts.

Table 22C.1: Summary of key assumptions and our rationale underpinning those assumptions

Assumption		Description of assumption
Queue time	Baseline	In line with our analysis in the 2019 efficiency study, all our forecasts are based on a notional 10-minute queue time. While we consider this a reasonable assumption, we note that this is a shorter queue time than required by CAR in the service quality measure.
Roster efficiency	Baseline	Dublin Airport has been unable to provide us with security roster information, so we have been unable to assess roster efficiency. For the purpose of this forecast we currently assume that Dublin Airport's rosters from 2019 were efficient, though our 2019 study found an efficiency gap. Given there have been material changes in staffing levels and in staff terms and conditions since then, we do not consider it appropriate to set our final report forecasts based on 2019 rosters. We require up-to-date roster

Assumption		Description of assumption
		information from Dublin Airport in order to revisit the efficiency analysis we conduction in support of the 2019 study.
Roster markups	Baseline	We assume the same roster markups as per Dublin Airport's 2019 rosters. Once we receive up to date roster information from Dublin Airport, we will need to consider the appropriateness of the roster markups proposed.
	✂ ✂ ✂ ✂ ✂ ✂ ✂ ✂ ✂	✂ ✂ ✂ ✂ Dublin Airport has suggested that its in-lane staff require additional training on a permanent basis. To reflect that, we are advised that they have adjusted their rosters to allow for more training time. While we have not made the adjustment in the same way, we currently allow for the additional 19 FTEs that Dublin Airport states, that this roster adjustment requires. However, we are unsure whether there is indeed a need for additional training on a permanent basis, and whether such training needs to be implemented as a roster marker (or whether training can take place during periods where staff are on shift but not working on active lanes). We require further evidence of need from Dublin Airport.
Elasticity		We use an elasticity with respect to passenger volumes of 0.89 for Terminal 1 and 0.88 for Terminal 2. We have estimated this on a bottom-up basis by firstly modelling the profile of passenger volumes arriving at security, the number of open lanes required to maintain our notional queue time, and the number of in-lane screening staff required, before modelling how this changes as the volume of passengers increases. This contrasts with Dublin Airport, which uses an elasticity of 1.00. We would need to understand the evidential basis of the figure applied by Dublin Airport if we are to revisit our elasticities.
Lane staffing	Baseline	As per Dublin Airport's assumption, we assume a baseline staffing requirement of 12 staff in Terminal 1, and 8 staff in Terminal 2 for each pair of lanes. Given the configuration of security at each terminal, we consider this reasonable. We, therefore, consider this assumption fixed unless we receive further information from stakeholders suggesting this assumption is inappropriate.
	✂ ✂ ✂ ✂ ✂ ✂ ✂ ✂ ✂	✂ Based on this assumption, we estimate the increased requirement to be 106 staff on a full-time equivalent basis. However, it is currently unclear whether the ✂ ✂ increase in staffing is required ✂ ✂ ✂ ✂ ✂ ✂ ✂, or whether this also captures the increased staffing requirement due to passenger volumes in early 2022 being higher than Dublin Airport had originally anticipated. We require further explanation of Dublin Airport's plans to be able to take a view on the short-term additional staffing requirement.
	Introduction of C3	In 2024, when C3 scanning is introduced, Dublin Airport states that the staffing per pair of lanes will increase to 15 staff for both terminals. While there is some evidence that other airports are operating on the basis of the same (or similar) planning assumptions, we will need to review this assumption in further detail.
Tray throughput	Baseline	In our modelling, we implicitly assume that tray throughput is the determining factor of how rapidly passengers travel through security. Tray throughput captures a number of considerations including how long it takes for an image to render on screen, how quickly security staff decide on an image once rendered, and the rate at which bags are selected for a physical

Assumption		Description of assumption
		search. As per Dublin Airport's assumption, we assume a baseline tray throughput of 420 trays per hour in Terminal 1 and 315 trays per hour in Terminal 2. The tray throughput in Terminal 2 is lower partly due to the physical configuration of the lanes and partly due to the lack of an ATRS. Dublin Airport has suggested to us that tray throughput may not always be the determining factor of how rapidly passengers travel through security. The airport considers that the introduction of full body scanners will mean throughput will be determined by how quickly passengers are scanned, rather than how quickly trays are scanned. However, it is not clear to us the extent to which this view is based on Dublin Airport's judgement or whether it is based on evidence from other airports.
	✂ ✂ ✂ ✂ ✂ ✂ ✂ ✂ ✂	Dublin Airport has stated that increased scanning times by security staff ✂ ✂ ✂ ✂ ✂ ✂ ✂ ✂, has reduced tray throughput. On that basis we assume tray throughput has reduced in 2022 to 384 trays per hour in Terminal 1 and 288 in Terminal 2, based on observations provided to us by Dublin Airport. We consider the scanning times implied by this revised throughput assumption to be broadly in line with scanning times elsewhere.
	Introduction of C3	We adopt Dublin Airport's assumption that the introduction of C3 scanning will reduce tray throughput by 5%. However, we note that other evidence suggests tray throughput may increase, with the improved technology reducing the number of false rejections of bags.
	Introduction of ATRS in T2	Based on information provided to us by Dublin Airport, we assume the introduction of ATRS will increase throughput in Terminal 2 by 25%. We consider this assumption to be reasonable.
Images Per Passenger (IPP)	Baseline	We adopt Dublin Airport's baseline of 1.67 images per passenger in Terminal 1 and 1.92 images per passenger in Terminal 2. As this is based on observed data, we consider this assumption to be reasonable.
	Introduction of C3	We assume that the introduction of C3 scanning will reduce the number of images per passenger by 30% as passengers will no longer need to remove liquids and laptops from their bags. It is unclear whether this is accounted for within Dublin Airport's forecasts.
Other staffing	✂ ✂ ✂ ✂ ✂ ✂ ✂ ✂ ✂	Dublin Airport suggests an additional 49 FTEs are required in security roles outside of in-lane security screening, ✂ ✂ ✂ ✂ ✂ ✂ ✂. These include: • An increase in supervisory staff (+21 FTEs) • A new Security Operations Centre (+19 FTEs) • A new Equipment Testing team (+7 FTEs) • Additions to the Management and Training team (+2 FTE) ✂ ✂ ✂ ✂ ✂ ✂ ✂ ✂ ✂ ✂ ✂ ✂ ✂, we currently adopt Dublin Airport's estimates of the additional staffing requirement. We will undertake a review of evidence recently provided as part of preparing our final report

Source: Taylor Airey

The table below summarises the impact of the above assumptions on the key modelling parameters used to forecast in-lane security staffing.

Table C.2: Summary of key parameters used in security modelling

Description	Terminal	ASU in-lane officers	Throughput per hour		
			Trays	IPP	Passengers (Trays ÷ IPP)
2019 baseline	T1	12	420	1.67	251

Description	Terminal	ASU in-lane officers	Throughput per hour		
			Trays	IPP	Passengers (Trays ÷ IPP)
	T2	8	315	1.92	164
Reduced tray throughput ✂ ✂ ✂ ✂ ✂ from 2022	T1	12	384	1.67	230
	T2	8	288	1.92	150
✂ ✂ ✂ ✂ ✂ ✂ ✂ ✂ ✂ ✂ ✂ Summer 2022	T1	18	384	1.67	230
	T2	12	288	1.92	150
Introduction of C3 and ATRS from 2034	T1	15	365	1.17	312
	T2	15	342	1.35	253

Source: Taylor Airey

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