Appendix M: Cost of capital

In this appendix we set out our proposed estimate of the company's efficient cost of capital for NR23. The evidence and assumptions associated with these proposals are in five sections:

- Cost of equity
- Cost of debt
- Gearing
- Overall cost of capital for NR23
- Tax

CAA business plan guidance

The CAA provided guidance on the development of our NR23 business plan in its June 2021 update[1], including guidance on the cost of capital.

This update advised that: *"NERL should consider relevant precedent (such as from recent* [Competition and Market Authority] *CMA reviews of NERL, water and energy)"*. In addition: *"NERL should provide evidence to show that the cost of capital is set at the efficient level. This includes showing that:*

- *the equity beta is set based on the risk-sharing arrangements that NERL will have in place which mitigate the impacts of risks such as traffic shocks*
- *the notional gearing is set at an appropriate level, taking account of the impact of Covid-19 and the need for NERL to be financially resilient*
- *the estimation of new debt and embedded debt costs are consistent with the notional capital structure employed*
- *any references to actual debt costs incurred (for example, from the costs of NERL's recent financing) are shown to be appropriate for the notional company and demonstrated to be efficient*
- *the allowance for corporation tax is reasonable. NERL should also propose an appropriate approach to recovering tax costs, noting that for Heathrow the CAA is planning to move away from a pre-tax cost of capital"*

We have considered and provided supporting evidence for these factors below.

[1] Economic regulation of NATS (En Route) plc: further update on approach to the next price control review ("NR23"), CAP2160, June 2021

Regulatory precedents

In formulating our proposal for customer consultation in autumn 2021, we considered the relevance of regulatory decisions by the CMA in its 2020 NERL price control appeal[2], its determination on the water industry price control appeal[3], and its provisional determinations in the energy licence modifications appeal[4]. We reference the relevant evidence and decisions in our assessment of each of the parameters, and in the overall cost of capital judgment.

We have also considered the CAA's initial proposals for Heathrow Airport in the H7 price control review[5]. We comment on, and reference, those aspects of the CAA's proposals that we consider relevant to our own assessment.

Updating the cost of capital estimate

We based the estimate of the cost of capital included in our emerging plan (issued to support customer consultation in early October 2021) on market data and regulatory precedents up to 30 September 2021.

As part of customer consultation, we presented a summary of our cost of capital estimate and its impact on charges, followed by a more detailed consultation workshop for customers. In October 2021, we also provided customers with the report we commissioned from *Oxera* which contains most of the evidence and argument for our proposed approach and the specific parameters[6]. The feedback of note from our customer engagement was largely around two areas:

- choice of comparator companies for estimating asset beta: some airlines questioned how far European airports were valid comparators for NERL, given airports' greater revenue risk exposure which had been highlighted during the pandemic
- gearing: some airlines questioned the basis on which NERL was proposing to increase the notional gearing level, for the purposes of calculating the weighted average cost of capital (WACC), from 30% set by the CMA in its 2020 decision, to 50% for NR23

We address these points in the relevant sections below.

In its June 2021 guidance, the CAA invited NERL to provide updates on its building block estimates in the period June-July 2022, once the CAA has reviewed our NR23 business plan and issued its initial proposals. We intend to provide a substantive update on the estimated cost of capital at that time, taking into account latest market data, which will be particularly relevant to the assessment of investors' risk perception and the cost of equity, as well as the overall risk implications of the initial proposals We will also use that opportunity to update our own cost of capital estimate in light of our assessment of the CAA's decision on the Heathrow H7 price control review, any updates to our cost of debt assumptions, and any further precedents arising from CMA decisions.

The cost of capital estimate presented here is therefore our best assessment to date, given currently available data, subject to the cut-off date of 30 September 2021 outlined above.

[2] CMA, NERL price determination, August 2020
[3] CMA, Ofwat price determination, April 2021
[4] CMA, Energy licence modifications appeal, provisional determination, August 2021. The CMA's final determination in the energy appeals was not issued until end October 2021, after the completion of the Oxera report.
[5] CAA, Economic regulation of Heathrow Airport Limited: H7 Initial Proposals – Summary, CAP2265A, October 2021
[6] Oxera, Cost of capital for NR23, prepared for NERL, October 2021

Cost of capital framework

We follow the CAA and other regulatory precedent in estimating the cost of capital for a notional efficiently financed company, rather than following exactly the financing structure of NERL itself. We use the Capital Asset Pricing Model as the framework for estimating the cost of equity, combining this with the cost of debt into an overall allowed WACC. As NERL's regulatory framework provides for a real return measured by reference to the Retail Price Index (RPI), all analysis referred to uses the RPI measure of inflation to switch between nominal and real terms.

Cost of equity

Asset beta

The asset beta[7] of a company is the fundamental measure of investors' exposure to systematic risk. This risk is then borne by debt and equity investors, weighted by the gearing and their respective betas. This is expressed algebraically as:

$\beta_a = g \times \beta_d + (1-g) \times \beta_e$, where β_a = asset beta, β_d = debt beta, β_e = equity beta, g = gearing

We focus our analysis on the asset beta, which provides comparability across time and with other companies, as it is not affected by differences in gearing.

Asset betas cannot be observed directly but are inferred from empirical measures of equity beta. For NERL, with no traded equity, our equity beta cannot be measured directly but must be inferred from direct measurements of the equity betas of a comparable set of publicly-listed companies. The two key judgements to be made in estimating NERL's asset beta are thus the set of comparator companies, whose equity betas can be measured via share price movements, and the statistical method used to combine market data over time.

Following clear regulatory precedent from the CMA, we use as comparators ENAV, the only publicly traded European air navigation service provider (ANSP) and thus the closest available comparator to NERL, along with a small group of European airports (Aena, Aéroports de Paris, Fraport, Zurich[8]). We consider but reject other airports in Europe and elsewhere[9], and other regulated non-aviation companies (eg water companies). The relative weight to give to each of the comparators individually is a matter of judgement, influenced by an assessment of how close to NERL each company lies in its systematic equity risk for investors. This in turn is based on reaching a view on the risk mitigation provided for each company to its investors by its respective economic regulatory framework, and the relative exposure to market demand risk given each company's cost structure and its combination of regulated aeronautical traffic revenue and other unregulated commercial revenue.

Having assessed these business and regulatory risk factors, particularly in light of the impact of the pandemic on airport and ANSP revenues and costs, we conclude that more weight should be given to

[7] Beta is a measure of market risk, calculated by comparing the volatility of a company's sharβe price to the volatility of returns in the market as a whole. Unlevered beta (or asset beta) measures the market risk of the company without the impact of debt. 'Unlevering' a beta removes the financial effects of leverage thus isolating the risk due solely to company assets.
[8] Zürich Airport, which was not included by the CMA as a comparator, appears to be more similar to the sample of large European airport groups based on its stock liquidity. As such, we also consider it to be a suitable comparator.
[9] Other European airports (Vienna and Copenhagen) rejected as comparators on grounds that their respective shares are significantly less liquid than those in the comparator group, and hence it is not possible to derive comparable equity betas from their share price data. Other airports (in Australia, New Zealand, East Asia) rejected on grounds that the commercial and/or regulatory contexts in which they operate is so different from that in Europe as to invalidate them as potential comparators.

ENAV than the four airport comparators. This is reflected in both the range of asset beta estimates and the point within that we select for our central cost of capital estimate.

The asset beta estimation methodology we use follows regulatory precedent carefully. Notably, we follow the CMA in estimating over two year and five year horizons, using daily and weekly share price. Noting the CAA's guidance in its April 2021 consultation on the Heathrow price control review, that beta estimation using data primarily from the pandemic period could over-estimate the longer run equity, we place greater weight on estimation over a five year horizon as this includes a balance of data from before and during the pandemic. We note that the CAA, in its Heathrow H7 initial proposals, uses a formal model to combine pre- and post-pandemic data on observed betas along with a range of estimates of the future likelihood of another Covid-19 like event. Our approach has a similar objective, to balance the use of data pre- and post-pandemic, and uses the same time horizon of data. Our results estimate the asset beta to lie in a range 0.60-0.70, which is 3-13 basis points above the CMA's point estimate for RP3, based on pre-pandemic data. This range is very close to the CAA's estimate for Heathrow that the impact of the pandemic has been to increase its asset beta by 0.04-0.14[10].[The CAA then adjusts down the estimate of Heathrow's asset beta to account for the introduction of new risk mitigation mechanisms via the regulatory framework for the H7 period. Since NERL's regulatory framework is proposed to continue broadly unchanged for NR23, such a downward adjustment is not relevant in NERL's case.

To translate observed equity betas into calculated asset betas, we use each comparator company's gearing[11] and an estimate of the debt beta, which we retain at 0.05 following CMA precedent.

Based on our empirical analysis, we consider that Covid-19 should be viewed as systematic risk to the economy because it affects many, if not all, sectors of the economy and will be factored into assessments of required returns and risk premiums on the market. As such, one would expect to see the differential impact of the pandemic on the systematic risk of particular sectors and companies, as measured by equity betas. The economic effects of Covid-19 vary across sectors and have revised investor expectations about how different sectors will perform when future systematic shocks occur. There is likely to have been an enduring reappraisal of the risk of aviation relative to the economy as a result of Covid-19 and the high levels of future uncertainty. Risks that were not previously priced into betas are likely to be reflected now.

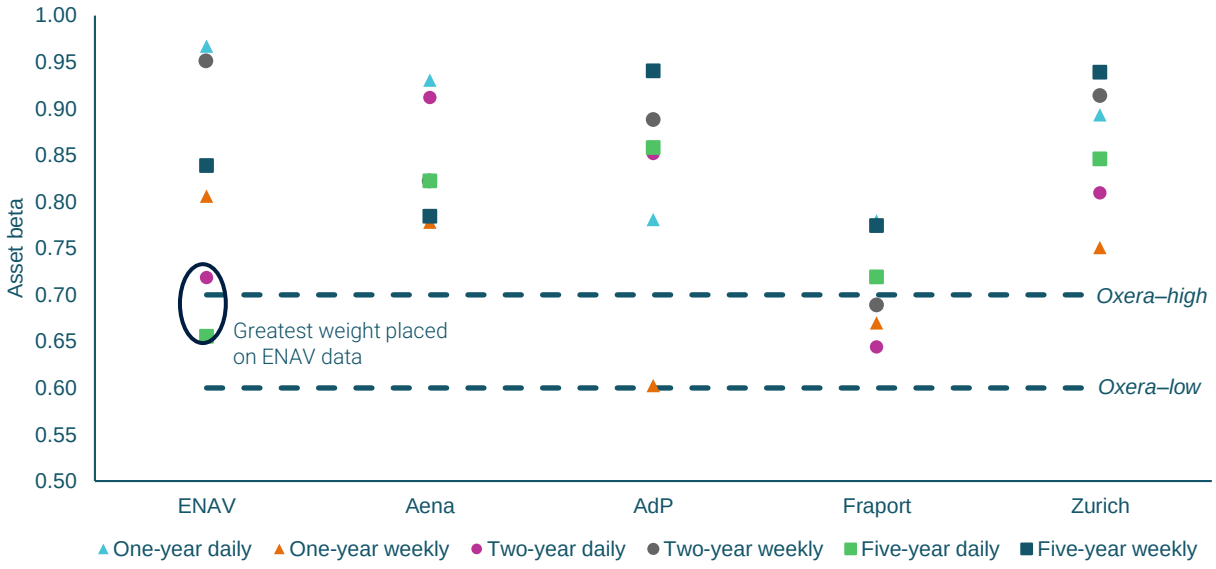
As a result, we estimate that the asset beta for NERL over medium term, including NR23, has risen from that estimated by the CMA in 2020, using pre-pandemic data.

We adopt a conservative approach and estimate an asset beta range with bounds that are slightly lower than ENAV's two-year daily (0.72) and five-year daily (0.64) asset betas as of 31 September 2021. Our approach therefore allows for a possible reduction in ENAV betas ahead of NR23. However, we note that should the current beta levels remain unchanged between now and the NR23 decision, this range may need to be revised upwards. Based on this approach, we adopt an asset beta range of 0.60–0.70.

We note that the majority of the beta data points in our sample sit above this range (as illustrated in the chart below), reflecting the different risk exposures of airports and the conservative nature of our approach. A higher beta range may be warranted for NR23 if the current beta levels persist over the remaining 12months preceding the CAA's final determination. The balance of currently available evidence also points towards a likely upward skewed distribution within the range - this suggests

[10] CAA, Economic regulation of Heathrow Airport Limited: H7 Initial Proposals Section 2: Financial issues, CAP2265C, paragraph 9.67
[11] Per standard regulatory practice, we use the market value of equity (measured by market capitalization) and net book value of debt (ie short-term and long-term debt minus cash).

considering the upper half of the range as the more plausible location of the asset beta point estimate. We consider this further below when assessing the WACC point estimate.



Summary of asset beta estimates and Oxera's proposed range (note, cut-off date is 30 September 2021)
Source: Oxera analysis based on Bloomberg data

Total Market Return

The Total Market Return (TMR) is linked arithmetically to other parameters used in the CAPM: risk free rate and equity risk premium, as follows: TMR = RfR (risk free rate) + ERP (equity risk premium). We use the 'stable TMR' approach, which means that the total returns that investors can expect remain relatively constant over time, with movements in the RfR being largely offset by opposing changes in the ERP. We thus focus our empirical analysis on the TMR and RfR, from which we derive the ERP arithmetically.

- Building on analysis that has been tested in recent UK regulatory reviews, we base our empirical TMR estimate on long run historical average data on nominal market returns. We follow the CMA in using an arithmetic (rather than geometric) mean to summarise these historical data. To convert nominal estimates to real, we use an adjusted RPI series that applies the current methodology used for RPI throughout the whole time series

- We consider other potential approaches to estimating the TMR: historical *ex ante* approaches, dividend discount models (DDMs) and survey evidence

- Historical *ex ante* approach: We note that neither we nor the CAA used this approach at the RP3 review, whereas it was one of the sources of evidence which the CMA considered, and was therefore reflected in the CMA's range for TMR. Similarly, the CMA included this approach in its estimate of TMR for the PR19 review, which we take as latest regulatory precedent. Estimating the TMR using the *ex ante* approach would require an historical dividend yield series from the Barclays Equity Gilt Study, to which neither we nor our advisers have access. We have therefore not been able to replicate or critically assess the CMA's TMR estimate from this source, and so have placed less weight on this approach

- DDM approach: here the TMR is calculated from dividend yield and share buybacks observed in the market, combined with forecast growth in these factors. The TMR result is highly sensitive to the long term growth rate assumptions, so this approach (with a range of growth rates) is used as a cross-check on other empirical results, rather than a primary source itself

- Survey evidence is subject to various potential framing and recency biases affecting how market participants estimate future TMR. Consistent with our assessment at the RP3 review, we consider that forward-looking measures of TMR are prone to subjectivity in assumptions necessary to derive estimates, so we give no weight directly to these data in our own estimates. However, given that we recognise that CMA placed some weight on historical *ex ante* measures, we capture this in our analysis by including the CMA's PR19 point estimate within our range

The conclusion of our empirical analysis is a range for TMR of 6.0-6.5% (on an RPI-real basis), which we consider to be the primary and best source of evidence. We then consider the relevant regulatory precedent, notably the most recent detailed analysis by the CMA in the water company appeals. This concluded on a range for TMR of 5.2–6.5%, midpoint 5.85%. Combining these two sources, we reach a range for TMR of 5.85-6.5%.

Risk Free Rate

The primary source of evidence for the risk free rate per annum are observed yields on UK Government index linked gilts. Following the CMA in the PR19 water companies' appeals, we adjust the resulting RfR estimate upward to reflect the 'convenience premium' difference between gilt yields and those for other effectively risk free borrowers, which arises from investors' preference for holding government bonds to a greater extent than implied by their riskiness relative to other AAA-rated corporate issuers. We use a time horizon of ten years to match the average remaining life of NERL's assets, and estimate the RfR using spot yields for ten-year Index Linked Guilt (ILG) bonds (plus the convenience yield). To reflect current expectation of future movements in gilt yields, we adjust spot estimates for the forward yields on 10 year ILGs at the start end of NR23. We arrive at a range for our estimate of RfR of -2.08% to -1.53%. We will update this estimate in 2022, in light of latest bond market data.

Equity Risk Premium

Based on our proposed TMR and RfR ranges, the estimated ERP range is 7.93–8.03%.

Cost of debt

NERL refinanced its entire debt structure, both bonds and banking facilities, during 2021, and is currently planning to complete this restructuring in 2022 or early in 2023. Given the demand and regulatory uncertainty faced by NERL, exact future financing requirements over 2022 and NR23 remain unclear. However, for the purposes of arriving at a cost of debt for this business plan we assume that once the next phase of the restructuring is complete, no incremental debt is issued during NR23. As such, our cost of debt estimate is based entirely on the actual costs for the bonds issued in 2021 and an estimated cost of terming out the existing £450m bridge facility, along with associated transaction costs and ongoing liquidity costs.

The supporting report by Oxera provides evidence and analysis that demonstrates that these debt costs are efficient by reference to relevant market benchmarks (such as the iBoxx fixed-income indices) at the time of the transaction in spring 2021. The costs of the further debt transaction, that is assumed in the Oxera report to occur in 2022, are estimated using the spread in yield relative to gilt benchmarks that NERL achieved in its spring 2021 bond issuance, along with forward gilt yields. As referenced above, the assumptions around future debt transactions are undertaken for the sole purpose of arriving at an appropriate estimate of the cost of debt for NR23 within our business plan.

Given the relative simplicity of NATS' debt instruments and the transparency of their interest costs relative to relevant benchmarks, we consider that this primary evidence is sufficient for the CAA to form a view as to the efficiency of our embedded debt costs. As such, we do not consider it necessary to complement or substitute this evidence with other ways of setting the costs of debt, such as by indexing it, with reference to a range of corporate bond indices.

The issuance costs are based on the costs actually incurred, and are in line with allowances previously provided by the CAA and other economic regulators. These costs do not include any redemption costs payable to holders of the refinanced bonds. Instead, our estimates of the efficient costs incurred in refinancing during 2021 and 2022, which has enabled customers to benefit from lower costs of debt than otherwise in NR23, are incorporated in our estimates of the cost reconciliation for 2020-22.

As a result, for this estimate of the WACC we use an actual cost of embedded debt, representing 100% of debt in the NR23 period, of -1.24%. To this, we add issuance costs of 0.08%, derived from the actual, apportioned costs for issuing each of the two 2021 bonds and the prospective 2022 bond, with costs distributed over the duration of the bonds. We also add liquidity costs of 0.05%, derived from the projected requirements for a revolving credit facility, in line with the costs allowed by the CMA for the RP3 period. This results in the estimate for the total cost of debt of -1.11%.

This compares with the allowed cost of debt set by the CMA for the RP3 period +1.12% (on the same real RPI basis). The reduction in cost of debt between the two regulatory periods is 2.23%, which, under our central business plan, equates to some 3% of determined costs over NR23[12].

Gearing

We maintain the well established regulatory precedent of basing the gearing used for the cost of capital on the concept of a notional efficiently financed company. The challenge with implementing this approach during a period of substantial economic shock is that it is harder to interpret how such a notional company might have set an efficient financing structure in response to the initial shock, given the different regulatory and financial contexts of comparator companies. It is also challenging to assess how the gearing of the notional company might evolve over the NR23 period as traffic is forecast to return and the financial consequences of the pandemic start to unwind.

In assessing the gearing allowance for NR23, two main factors should be taken into account. Firstly, NERL's gearing and that of its comparators has increased substantially in response to the liquidity challenges caused by Covid-19. Secondly, the level of uncertainty affecting the main drivers of gearing - regulatory changes concerning recovery of determined revenues, and operational challenges caused by low traffic and uncertain recovery - makes estimating a notional gearing allowance for NR23 unusually challenging.

In particular, it is difficult to make an assumption about how much the notional company would have to increase gearing before January 2023 in response to persistently low traffic; at what point the gearing level would stop increasing and would start to plateau; and how quickly the notional company would be able to reduce its leverage once traffic returns to pre-pandemic levels.

Although we have limited visibility on the gearing path ahead for the notional company, we can see that Aéroports de Paris, Fraport and NERL itself have reacted to the crisis by increasing gearing by around 20 percentage points. Therefore, we believe that a gearing allowance of 50%, which results from uplifting the CMA's gearing allowance of 30% by 20 percentage points, is a reasonable estimate of the current capital structure of a notional ANSP given the unprecedented traffic shock and the uncertainty about recovery. In practice, NERL's actual gearing is likely to be higher than 50% at the start of NR23 (it was 58.1% at end September 2021 and estimated then to be 59.4% in March 2023[13]), and may trend down to below that level by the end.

[12] Estimate based on (Cost of debt difference 1.12%-(-1.11%)) * average NR23 RAB (£1.56bn, outturn prices) * 50% gearing, vs en route determined costs in 2023 of £670m.
[13] NERL Gearing report for 30 September 2021

Considering the limited impact that gearing has on the WACC following the reduction in NERL's cost of debt, we also see a limited risk of an increase in charges to consumers due to a higher notional gearing assumption, a concern raised by the CMA in RP3. This issue is explained empirically in the Oxera report (Table 5.1): at current estimates of debt costs, the impact of increasing the gearing assumption from 30% to 50% would increase the mid-point of Oxera's WACC range by 6 basis points. This compares to an increase of 49 basis points from the same step-up in gearing using the cost of equity parameters adopted by the CMA.

Summary

The parameters described above, and the supporting evidence in the paper produced for NERL by Oxera, define a plausible range for the allowed cost of capital. We consider here any factors which might support selecting point estimates for any parameter, or the overall WACC, which differ from the midpoints.

In some regulatory settlements, the allowed cost of capital has been adjusted upwards (so called 'aiming up') to address concerns that the cost of capital derived from the neutral midpoints of parameters may, in the round, risk being too low to attract investment into the relevant companies. 'Aiming up' can also be used to offset any asymmetry in risk in the overall price control framework, and/or to address financeability concerns. We follow the CMA in its RP3 determination in concluding that there are no strong grounds for applying an uplift to the cost of capital in order to promote investment. A final view on the merits of aiming up may need to be undertaken once the proposed price control package has been defined in greater detail.

Some regulators have adjusted downwards the cost of capital estimated using the CAPM framework in order to address concerns that regulated companies have, in the past, consistently outperformed the previous periodic price control, thereby earning consistently greater returns on equity than provided for. We follow the CMA, in its decision on the energy network company appeals, in concluding that such an adjustment is not well focused on addressing any concerns about systematic outperformance, and is therefore not relevant to the allowed cost of capital for NERL in NR23.

We have considered whether there are any factors which could lead to greater weight being placed on a particular end of a parameter range, rather than simply adopting the midpoint in calculating the WACC point estimate. We consider that there are two such.

First, in light of the CAA's initial proposals for the Heathrow H7 price control, we recognise that there is now a stronger body of regulatory precedence in support of a TMR estimate of 5.85%, notwithstanding the empirical evidence which, in our view, continues to support an estimate in the range 6.0-6.5%. We therefore use 5.85% as the point estimate of the TMR in calculating the WACC point estimate. This also acknowledges the wider range of empirical methods used by the CMA, notably forward-looking ex ante measures of TMR, which form the lower part of the CMA's range for this parameter.

Second, we consider that the evidence on asset betas for NERL's closest comparator, ENAV, and the other relevant airport comparators is weighted towards the higher end of the range, and is not equally distributed around the midpoint. To that end, we select the point estimate of 0.678, just above the upper quartile, within the range 0.60-0.70, for the asset beta when calculating the WACC point estimate.

Combining these factors, along with the estimates for each parameter, we derive a point estimate of NERL's allowed cost of capital for NR23 of 3.54% (pre tax RPI-real). This is summarised in the table below.

Parameter		NERL proposals for NR23				CMA decision for RP3
		Low	High	Selected point in range		
Asset beta	A	0.6	0.7	upper quartile	0.678	0.57
Debt beta	B	0.05	0.05	mid	0.05	0.05
Gearing	C	50%	50%	mid	50%	30%
Equity beta	D=(A-B*C)/(1-C)	1.15	1.35	calculation	1.31	0.79
Risk free rate	E	-2.08%	-1.53%	mid	-1.80%	-2.25%
TMR	F	5.85%	6.50%	lower	5.85%	5.50%
ERP	G=F-E	7.93%	8.03%	calculation	7.66%	7.75%
CoE post tax	H=E+D*G	7.04%	9.31%	calculation	8.19%	3.89%
cost of embedded debt	I	-1.24%	-1.24%	mid	-1.24%	
issuance costs & liquidity costs	J	0.13%	0.13%	mid	0.13%	
cost of new debt	K	n/a	n/a			
share of new debt	L	0%	0%			
CoD pre tax	M=I+J	-1.11%	-1.11%	calculation	-1.11%	1.12%
WACC	**N=H*(1-C)+M*B**	**2.97%**	**4.10%**		**3.54%**	**3.05%**

NR23 WACC parameters

Tax

In order to calculate the regulatory return element of NERL's determined costs, it is necessary to convert the vanilla WACC to a pre-tax WACC. This is done in our financial model through a number of steps which calculate the pre-tax WACC required to be included in calculating determined costs, such that the profit after tax is consistent with the vanilla WACC. We have conducted this calculation based on the current UK tax corporate tax regime, including previously announced changes to future tax rates. We consider that this approach to recovering tax costs, which is consistent with the one used for RP3, remains appropriate for NR23.

The result of this modelling, based on a vanilla WACC of 3.54%, is a pre-tax real (RPI) WACC of 5.32%.