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Target Return and WACC for Auckland Airport – Response to John Small Paper

A Report for Auckland Airport

23 May 2017

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Executive Summary

On 23 March 2017, NERA Economic Consulting (NERA) published a report setting out its peer review of Auckland Airport's approach to determining the WACC and target return for aeronautical pricing in its draft pricing proposal. Auckland Airport estimates a post-tax target return of 7.0% for PSE3 in its draft pricing proposal, and our report reviewed the academic literature, latest empirical evidence and international regulatory precedent to peer review Auckland Airport's estimate. Based on our review, we concluded that Auckland Airport's estimate of the target return is conservative and we estimated a range for the post-tax target return of 7.5% to 8.1%.

Auckland Airport has received feedback from airlines on its draft pricing proposal and NERA's report. In particular, the Board of Airline Representatives New Zealand (BARNZ) has commissioned John Small to provide his opinion on the NERA report. John Small's report argues that the NERA report contains several errors and weaknesses, which we respond to in this report.

On the beta parameter within the cost of equity, Small makes three major arguments against our asset beta range of 0.73 to 0.81:

- Small claims that we have not presented any empirical anchor for the theory of the link between higher fixed costs and asset beta. We show that our beta estimate is centred on empirical evidence of Auckland Airport's asset beta, which increased following Auckland Airport's announcement of its capital expenditure plan. Moreover, even this historical beta estimate does not reflect the full impact of the forecast capital expenditure over PSE3, since the market is not yet aware of the full scale of the 5 and 10 year capex forecast that Auckland Airport is currently consulting on with its customers and which will be disclosed with the final PSE3 pricing decision in June this year. Our use of a short historical window to estimate the beta captures some of the impact of the capex plan on the systematic risk Auckland Airport faces, but remains conservative, since market prices do not currently reflect the full extent of the plan.
- Small argues that the empirical evidence we present shows a negative relation between capital expenditure and beta estimates. However, Small does not sufficiently adjust for differences between comparator airports to support his assertion, including regulatory regime and passenger mix, and his claimed negative relation is statistically insignificant.
- Small argues that our beta estimates are imprecise, but we show that our estimates are statistically robust under statistical tests.

On the cost of debt, Small argues that it is incorrect to use the level of the forward curves as the direct estimate of the AIAL cost of debt. He argues that AIAL's cost of debt estimate is reasonable, based on the assumption that the change in the 10-year NZ sovereign forward curve is the same as the change in AIAL bonds. However, we use the 10-year NZ sovereign forward curve as a proxy for the *base rate* on AIAL's bonds, rather than equate the 10-year NZ sovereign cost of debt with AIAL's cost of debt.

Finally, Small does not find any merit in our arguments on financeability and real options for setting a target return higher than the WACC. On financeability, Small argues that there is no reason why Auckland Airport must maintain an A- rating, and a reduction to BBB+ would still be an investment-grade rating. However, Small fails to note that any reduction in rating

also means the cost of debt should increase to reflect the revised (lower) rating. On real options, Small suggests there is no evidence of Auckland Airport incurring capex due to outside pressure even though Auckland Airport has changed its draft plan for domestic integration to have both domestic carriers moving to the planned new facility at the same time, which has increased its capital envelope.

Based on the arguments above, we maintain our post-tax target return range of 7.5% to 8.1%. This is higher than the Commerce Commission's latest estimate of the post-tax WACC of 6.41%.[1] The Commission updated its WACC estimate from December 2016 to take account of the recent changes in NZ government bond yields, as result of which it increased its WACC estimate from 6.30% in December 2016 to 6.41% in April 2017. The increase highlights the importance of setting the WACC at the top end of any estimated range, because of the possibility that market yields increase above the anticipated level.

Our target return estimates are summarised below, along with the Commission's latest estimate.

Table 1
NERA Estimate of Target Return

	Commission	NERA Target Return	
	Apr 17	**Low**	**High**
Risk-free rate	2.76%	2.80%	2.80%
Debt premium	1.45%		
Leverage	19%	19%	19%
Asset beta	0.6	0.73	0.81
Debt beta	0	0	0
TAMRP	7.00%	7.25%	7.25%
Corporate tax rate	28%	28%	28%
Investor tax rate	28%	28%	28%
Debt issuance costs	0.20%		
Equity beta	0.74	0.90	1.00
Cost of equity	7.17%	8.55%	9.27%
Cost of debt	4.41%	4.52%	4.52%
Vanilla WACC/Return	6.64%	7.8%	8.4%
Post-tax WACC/Return	**6.41%**	**7.5%**	**8.1%**

Source: Commerce Commission (April 2017), Auckland UniServices (December 2016), Auckland Airport Draft Pricing Proposal (December 2016), NERA analysis.

Overall, we see no reason to change our post-tax target return range of 7.5% to 8.1% from our original report.

This report is structured as follows:

[1] Commerce Commission (April 2017): "Cost of capital determination for information disclosure year 2018 for electricity distribution services and specified airport services (March year-end disclosure year)", page 3.

- Section 1 considers John Small's arguments on the beta parameter;
- Section 2 discusses John Small's views on the cost of debt; and
- Section 3 reviews John Small's arguments on whether the target return should be different from the WACC for Auckland Airport.

1. Beta

In our original report, we noted that Auckland Airport is expecting to increase its capital expenditure over PSE3 relative to historical levels, and this increase in expenditure is likely to increase the systematic risk it faces. To capture the increase in systematic risk, we argued Auckland Airport should adopt a relatively short estimation window of 5 years, compared to Auckland Airport's own 20-year estimation window for estimating the beta in its draft pricing plan. We estimated an asset beta range of 0.73 to 0.81 in our original report.[2]

Small makes several arguments against our beta estimates:

- He argues we have not presented any empirical anchor for the theory of the link between higher fixed costs and asset beta. On this point we reject Small's criticism as it is widely recognised that beta is a function of the fixity of costs. In this rebuttal report we provide a short review of the theoretical and empirical literature on this relationship. We also explain that the use of recent market data of 5 years for estimating beta is precisely to better capture the effect of recent risk factors and to give a better proxy for the systematic risk following the projected increase in the scale of the capex.
- Small argues that the empirical evidence we present shows a negative relation between capital expenditure and beta estimates. We argue in this section that Small does not sufficiently adjust for differences between comparator airports to support his assertion.
- Small also highlights the imprecision of our beta estimates. In this section, we show that our estimates are statistically robust.

We address each of Small's arguments on the beta in this section.

1.1. Our Beta Estimate is Centred on Empirical Evidence

Small suggests that "*NERA offer no empirical anchor for the theory on which it relies*".[3]

In our original report, we argued Auckland Airport should adopt a shorter estimation window than the 20-year window it used in its draft pricing plan to capture the effect of its capital expenditure programme. Auckland Airport is expecting to increase capex relative to historical levels over PSE3 and a long estimation window of 20 years is unlikely to capture the market's pricing of any change to systematic risk as a result of the programme.

We argued that an increase in capital expenditure increases beta through greater 'operating leverage', which measures the degree to which costs are fixed. The positive relationship between operating leverage and beta is well-recognised and explained in detail in finance literature.[4] Several academics have noted that greater cost fixity results in greater volatility in profits in response to demand shocks, and therefore implies a higher beta. For example,

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2 NERA (23 March 2017): "A Peer Review of Auckland Airport's Approach to WACC and Target Return for Aeronautical Pricing", Table 1.

3 Small, J (13 April 2017): "Response to NERA on WACC for AIAL", paragraph 16.

4 Brealey, Meyers, Allen (2011) : "Principles of Corporate Finance – 10th edition", page 222

Morin (1994), in his seminal textbook on estimating the cost of capital for regulated natural monopolies, noted that the beta is comprised of three main components:[5]

$$Beta = Demand\ Risk\ x\ Operating\ Leverage\ x\ Financial\ Leverage$$

Similarly, Damodaran (2006) highlights the degree of operating leverage as a key determinant of the beta:[6]

> *"A firm that has high operating leverage (i.e., high fixed costs relative total costs) will also have higher variability in operating income than would a firm producing a similar product with low operating leverage. This* ***higher variance in operating income will lead to a higher beta*** *for the firm with higher operating leverage."*

Ogier, Rugman and Spicer (2004) also support this relation, finding that "*operational leverage increases a company's equity beta, all other things being equal*".[7] Empirical studies also support that companies with high operating leverage tend to have high betas.[8] The positive relation between operational leverage and beta is therefore well established in the literature and provides a firm theoretical underpinning for setting a higher beta to calculate Auckland Airport's target return to take account of its expected increase in capital expenditure.

In addition, regulatory precedent in the UK acknowledges the positive relationship between operating leverage and asset beta. In the recent cost of capital determination for Bristol Water plc, the UK Competition and Markets Authority acknowledged that higher operating leverage should in theory lead to a higher asset beta, and determined an upward adjustment to the asset beta to account for higher operating leverage.[9] The former UK Competition Commission also recognised the positive effect of operating leverage on asset beta.[10]

By advocating a short estimation window, we explicitly took account of the market's view of the effect of the change in capital expenditure on Auckland Airport's beta, reflecting the market's current understanding of the size of the capex plan over PSE3. We note that Auckland Airport is yet to reveal the full extent of its capex plan to the market as it is still

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5 Morin, R (1994): "Regulatory Finance – Utilities' Cost of Capital", p364.

6 Damodaran, A (2006): "Damodaran on Valuation", Wiley, Second Edition, p51

7 Ogier, T, Rugman ,J, Spicer, L (2004): "The Real Cost of Capital", FT Prentice Hall, p48.

8 Lev (1974): "On the Association between Operating Leverage and Risk," Journal of Financial and Quantitative Analysis 9, page 627–642; and Mandelker and Rhee (1984): "The Impact of the Degrees of Operating and Financial Leverage on Systematic Risk of Common Stock," Journal of Financial and Quantitative Analysis 19, page 45–57. Chung (1989): "The impact of the demand volatility and leverages on the systematic risk of common stocks", Journal of Business Finance and Accounting, 343-363. Lord, (1996) "The impact of operating and financial risk on equity risk." Journal of Economics and Finance: 27-38. Beneda (2003): "Estimating cost of capital using bottom-up betas", The CPA Journal, 73.5,66-73.

9 Competition and Market Authority (October 2015): "Bristol Water plc, A reference under section 12(3)(a) of the Water Industry Act 1991 Report", para 10.147 – 10.165.

10 Competition Commission (February 2010): "Bristol Water plc, Notice of Reference: Determination of Adjustment Factor for the Period 2010-2015, Water Services Regulation Authority Water Industry Act 1991, Section 12" Appendix A, para 121-137

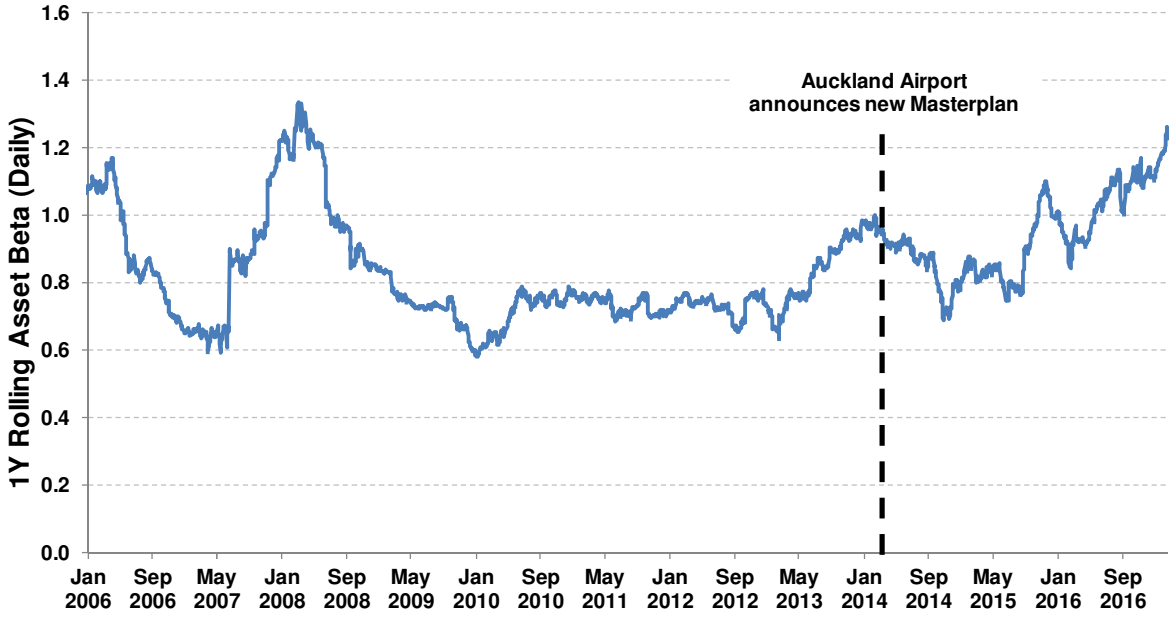
consulting on this plan, and so market prices currently do not reflect the entire impact of the forecast capex plan on systematic risk.

Small's argument that "*NERA has no basis for assessing the scale of materiality of the assumed effect*" suggests that our beta estimate is not based on market-based empirical evidence. In fact, by using market data on Auckland Airport's share returns, we captured what market participants consider will be the effect of the capex programme, based on the market's current understanding of the size of the capex programme over PSE3. Our use of market share price data takes account of all the factors that Small raises about the scale effects related to greater capex, since the share price will reflect the market's view on how changes in scale affect systematic risk. Our beta estimate is therefore rooted in empirical evidence and Small is incorrect to suggest that we have not supported our theory of operating leverage with empirical evidence.

Moreover, as we noted in our original report, the market has not had the opportunity to price in the impact of Auckland Airport's planned increase in capital expenditure, as the airport has been consulting with airlines on the plan and therefore it has not been released to the market yet. [ ]. Therefore, any beta estimate based on current market prices will underestimate the true beta once Auckland Airport concludes its consultation process and releases the resulting forecast of capex over PSE3 to the market. Our beta estimate based on a historical 5-year window may therefore be an underestimate of Auckland's true beta when the capex risks have been fully priced.

Small also argues that the rolling asset beta estimates we presented do not increase in response to Auckland Airport's announcement of its Masterplan, which for the first time set out that Auckland Airport's capital expenditure programme will be on a significant upwards trajectory over the next 30 years. In our original report, we presented rolling beta estimates at yearly intervals. To examine the effect of the announcement of the Masterplan, we present rolling beta estimates at daily intervals in Figure 1.1.

Figure 1.1
1Y Rolling Asset Beta for Auckland Airport



Source: NERA analysis of Bloomberg data with cut-off date of 22 February 2017

Figure 1.1 shows that the 1-year asset beta was around 1.0 when Auckland Airport announced its Masterplan in early 2014, after which it decreased for half a year before increasing consistently to above 1.0 in 2015. Although Small is correct that the asset beta did not react immediately to the announcement of the Masterplan, we would not expect it to for two principal reasons:

- The market gradually prices in the impact: The market may have priced in the effect of higher capex on systematic risk gradually, as the details of the capex plan will become more certain over time.
- A 1-year estimation window will lag the date of the announcement: The announcement will not change the 1-year beta estimate immediately, and will only gradually feed into the estimate as the window rolls forward.

Given these reasons, we conclude the timing of the increase in the beta estimate remains broadly consistent with the announcement of the Masterplan and subsequent increases in actual full year historic capex disclosures through Auckland Airport's annual reporting cycle, plus associated increases in market capex guidance for the upcoming financial years (including two consecutive half year upgrades to the original guidance levels). Even so, the market is not yet aware of the full scale of the 10 year capex forecast to be disclosed with the final PSE3 pricing decision in June / July this year. Hence, the increase observed in the beta estimate is unlikely to be fully consistent with the market pricing in the effect of greater capex on systematic risk, and we therefore maintain the use of a shorter 5-year estimation window (giving greater weight to the period when the Masterplan was announced and when annual historic capex disclosures and future guidance levels began to rise strongly) to estimate the beta.

1.2. Small's international comparisons of the relationship between capex and beta estimates is flawed since Small does not sufficiently adjust for other differences across the airports

Small shows that there is a negative correlation between the capex and asset beta estimates for the international comparators we present in our report. He argues that this negative relation goes against our conclusions that higher capital expenditure should result in an increase in systematic risk.

However, there are three important reasons why this negative relation does not change our conclusions.

Firstly, as Small himself notes, "*the associated t-statistics indicate that these relationships are not statistically significantly different from zero*".[11] By implication, we cannot conclude that there is a negative relation between the capex and asset betas for the international comparators.

Secondly, and again as Small notes, we would also need to adjust for other differences between the airports to establish the correct relation between capex and beta estimates. These may include competition risk, country risk, the regulatory regime, proportion of low cost carrier traffic, proportion of business versus leisure traffic and proportion of international traffic. All of these factors may have a bearing on the asset beta estimate, and Small should adjust for these other factors before making any inference about the relation between capex and betas for the international comparators. Even for Copenhagen Airport, the only airport Small discusses in any detail, Small does not consider the range of possible factors that may explain the difference in its beta estimate with Auckland Airport. For example, Small does not consider relative proportions of low cost carrier traffic and business versus leisure passengers.

Thirdly, the purpose of our comparison of Auckland Airport's capex and beta to international comparators was not to establish a precise correlation between beta estimates and capex, but to note that Auckland Airport's average capex and average beta estimate was above the average of the comparator sample. In our original report, we estimated Auckland Airport's 5-year asset beta as 0.65, compared to the international comparators' average asset beta of 0.57. Similarly, Auckland Airport's capex as a percentage of turnover (30.1%) was higher than the average for international comparators (17.3%). Assuming all other risk factors remain the same, any further increase in the market's expectations of Auckland Airport's future capex and operating leverage will result in a further increase in Auckland Airport's asset beta above the average of the international comparators.

For the above reasons, we do not believe Small is correct in suggesting there is a negative relation between the capex and asset beta estimates of the international comparators. We maintain that high capex increases beta estimates, *all else being equal*, and Auckland Airport's announcement of its capex expenditure programme would have increased its beta

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[11] Small, J (13 April 2017): "Response to NERA on WACC for AIAL", paragraph 13.

estimate, which we consider is appropriate to take account of through a relatively short estimation window of 5 years.

1.3. NERA's Beta Estimates are Statistically Robust

Small argues that the increasing standard errors of NERA's beta estimates means that the recent increase in AIAL's beta may not be a statistically robust conclusion. We have considered the statistical robustness of our beta estimates.

Table 1.1 shows our estimates of beta coefficient and standard error for Auckland Airport using different estimation windows. For all estimation windows, the beta coefficients are found to be statistically significant using the t-test at 5% significance level. The table reports the beta estimate and their associated standard errors (in brackets below each beta estimate). Dividing each beta estimate by its standard error, we see the result exceeds the critical point of the standard t-distribution at the 5% level, implying statistical significance.

The result also holds for the estimates using the 5-year and 20-year estimation windows we used to estimate our asset beta range of 0.73 to 0.81. We conclude that the recent increase in AIAL's beta is a statistically robust conclusion and Small is incorrect in suggesting our beta estimates are not appropriate for setting the target return.

Table 1.1
Auckland Airport Asset Beta Estimates

	6M	1Y	2Y	5Y	10Y	20Y (Auckland Airport Window)
Daily	1.28	1.23	1.06	0.93	0.83	0.81
	(0.15)	(0.11)	(0.07)	(0.05)	(0.03)	(0.02)
Weekly	1.01	1.08	1.06	0.69	0.70	0.70
	(0.34)	(0.24)	(0.16)	(0.08)	(0.07)	(0.07)
4-Weekly	1.19	1.00	0.97	0.82	0.69	0.69
	(0.49)	(0.36)	(0.24)	(0.14)	(0.12)	(0.12)
Average	1.16	1.10	1.03	0.81	0.74	0.73
Avg (Weekly and 4-Weekly)	1.10	1.04	1.01	0.76	0.69	0.69

Source: NERA analysis of Bloomberg data with cut-off date of 22 February 2017. Note: A t-test is a statistical hypothesis test in which the test statistic follows a Student's t-distribution under the null hypothesis. It can be used to determine if two sets of data are significantly different from each other. In this case, we determine whether the beta estimate is statistically significant and different from the null hypothesis that it is zero.

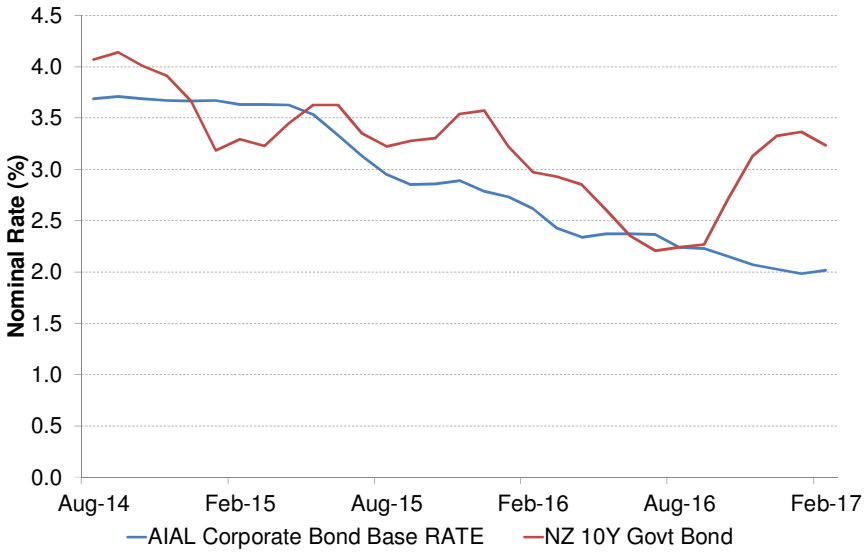
2. Cost of Debt

In our original report, we estimated a cost of debt of 4.52%, 20 basis points higher than Auckland Airport's original cost of debt estimate of 4.32% calculated in December 2016. Our higher estimate was based on the fact that NZ 10-year government bond yields were forecast to be 20 basis points higher by the end of the next pricing period relative to Auckland Airport's original assumption on the base rate for its last round of bond refinancing in PSE3.

Small notes that "*AIAL debt is not the same as 10yr NZ sovereign debt, so we clearly cannot assume that the level of the forward curves is a direct estimate of the AIAL cost of debt*".[12] He argues the change in the 10-year NZ sovereign forward curve is the same as the change that AIAL is assuming for its own bonds, and so AIAL's estimate of the cost of debt is reasonable.

We do not equate the 10-year NZ sovereign debt with AIAL's cost of debt. Instead, we use the 10-year NZ sovereign forward curve as a proxy for the *base rate* on AIAL's bonds.[13] The figure below presents the historical relation between the base rate on AIAL's corporate bonds and the 10-year NZ sovereign bond. It shows there have been periods when the AIAL bond base rate has been higher than the NZ 10-year government bond yield and vice versa, but the historical relation is fairly close. Given this close historical relation, we used the forward curve for the NZ government bond yield as a proxy for the base rate over PSE3, since there is no available data for the forward curve for the base rate.

Figure 2.1
Comparison of AIAL Bond Base Rate vs NZ Government Bond Yield



Source: Bloomberg

[12] Small, J (13 April 2017): "Response to NERA on WACC for AIAL", paragraph 25.

[13] The total cost of debt for AIAL's bonds includes both the base rate and a corporate debt margin.

We note that the difference between our cost of debt estimate of 4.52% and the Commission's latest cost of debt estimate of 4.41% in its recent determination on the WACC for Wellington Airport only makes 0.01% difference in the final post-tax WACC.[14]

[14] Commerce Commission (28 April 2017): "Cost of capital determination for information disclosure year 2018 for electricity distribution services and specified airport services (March year-end disclosure year)", p11.

3. Target Return

In our original report, we argued that Auckland Airport's target return should be different from the WACC based on the Commerce Commission's framework to take account of Auckland Airport-specific risks. These included the impact of its capex plan on the ability to maintain financeability and the loss of the real option to delay investments under pressure from airlines.

On financeability, Small argues that there is no reason why AIAL should be targeting an A- credit rating. Based on our credit metric analysis, Small suggests that AIAL would be able to maintain an *investment-grade* credit rating of BBB- or above and this is the primary credit rating distinction that matters to investors.

Although we agree with Small that the reduction in project credit metrics may allow AIAL to maintain an investment-grade credit rating, we note that any such reduction in rating would require an adjustment to the cost of debt estimate. The cost of debt estimate is based on a projection that AIAL is able to maintain its A- rating. If AIAL's credit rating falls, we would expect its cost of debt to increase for any refinancing over PSE3, and therefore AIAL's current cost of debt estimate (based on maintaining an A- rating) would underestimate the projected cost of debt over the pricing period. Therefore, under Small's reasoning, the cost of debt should be higher than AIAL's assumption in its draft pricing plan. Unless there was an adjustment to the estimated cost of debt, the approach to target return as a whole is internally inconsistent. Small does not make this point in his report. We also note Auckland Airport Management's primary concern that an unexpected downgrade in the company's credit rating would create a "mark-to-market" loss for most of its existing lenders and this could create real difficulties in securing the unprecedented growth in borrowings required to fund forecast aeronautical capex levels over the next 5-10 years.

On real options, Small argues that "*we should assume that AIAL has complete freedom to set its own capital investment programme*" because there are no legal or regulatory obligations for AIAL to invest.[15] Small does not believe there is any merit in adjusting the WACC range based on the Commission's framework to take account of real options.

However, Small acknowledges that Auckland Airport is able to change the timing of its capex when he discusses AIAL's capex programme. He states "*AIAL retains the flexibility to defer these projects*",[16] implicitly accepting that, if AIAL faces any pressure to undertake capex earlier than it would if making the decision on purely commercial terms, the target return should include a real option premium. In our original report, we highlighted Auckland Airport has adjusted its capex programme following feedback from airlines. In particular, Auckland Airport has changed its draft plan for domestic integration to have both domestic carriers moving to the planned new facility at the same time, which has materially increased its capital envelope. This provides clear evidence of Auckland Airport undertaking capex earlier than if it took the decision on purely commercial terms. As a result, we maintain our view that the target return should include a real option premium.

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[15] Small, J (13 April 2017): "Response to NERA on WACC for AIAL", paragraph 37.

[16] Small, J (13 April 2017): "Response to NERA on WACC for AIAL", paragraph 18.

We note that our final post-tax target return range of 7.5% to 8.1% did not include an explicit premium for the two factors above: financeability and real options. We argued that the final post-tax target return point estimate should be at the top end of the range, which we believe is a conservative allowance for the two factors.

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NERA
ECONOMIC CONSULTING

NERA Economic Consulting
Marble Arch House, 66 Seymour Street
London W1H 5BT
United Kingdom
Tel: 44 20 7659 8500 Fax: 44 20 7659 8501
www.nera.com