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Review of feedback on AIAL WACC estimates for PSE4

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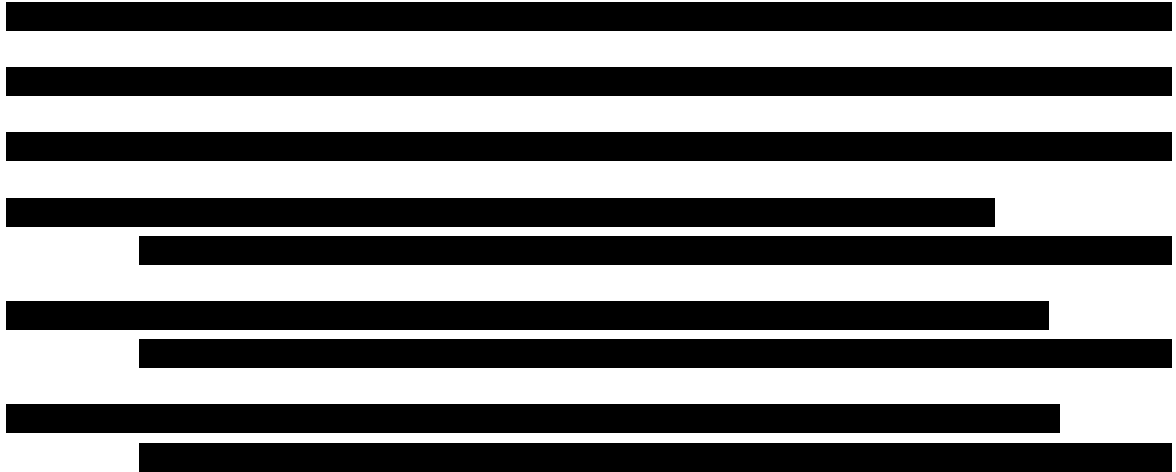
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1 Executive summary and report structure

1. This report provides an independent expert review of feedback on AIAL’s proposed WACC for PSE4. The primary issues raised in feedback fall into the following five categories:
 - i. Concern about AIAL departing from 2016 IM parameter values for the purpose of setting the WACC to govern PSE4 (2022 to 2027).
 - ii. Views on de-weighting the impact of COVID-19 and having regard to UKCAA precedent for doing the same.
 - iii. Concern that AIAL’s asymmetric risk “wash-up” mechanism involved a form of double compensation for risk.
 - iv. Submissions responsive to CEG empirical evidence that aeronautical operations exhibit higher risk than non-aeronautical operations across the sample of asset beta comparators.
 - v. Submissions from [REDACTED] to narrow the sample of asset beta comparators from 25+ companies¹ to only 8 companies (6 of which are located in Europe).
2. Each of these categories of feedback is dealt with in the same order as listed above in sections 3 to 7 of this report. In my view, none of the submissions give reason for AIAL to alter its proposed approach to estimating the WACC for PSE4. My reasons can be summarised as follows.

1.1 Departures from 2016 IM parameters

3. AIAL’s approach is to apply the 2016 IM methodology to arrive at WACC parameters consistent with that methodology and the data available immediately prior to PSE4. I explained in my previous reports for AIAL and New Zealand Airports, that only AIAL’s approach gives a reasonable and consistent approach to historical data for the purpose of estimating WACC parameters and, in particular, asset beta. None of the submissions addressed the reasoning and logic in those reports and, therefore, nothing in those submissions gives me reason to change my advice.

¹ The final number varies based on the period of estimation and how a handful of exclusions applied by CEG or CEPA are treated.

asymmetric risk. AIAL would be justified to, and if it followed UKCAA precedent for Heathrow AIAL would, include in its building block costs an estimate of the expected cost of being exposed to the residual asymmetric risk. AIAL has not done so and, therefore, is under-compensated for exposure to asymmetric risk.

1.4 Risk of aeronautical vs non-aeronautical operations

10. In previous CEG reports, I presented empirical evidence that there was a statistically significant negative relationship between measured asset betas and the share of non-aeronautical revenues. One submission argued that the same results could be driven by non-aeronautical operations happening to be very high risk at the airports with low shares of non-aeronautical operations and vice versa. While this is theoretically possible, I explain in this report that this is not a credible potential explanation for the observed empirical relationship I presented.
11. Moreover, in my previous reports I also:
 - showed that, across all the comparator airports, aeronautical revenues and profits were much more negatively affected by COVID19 than non-aeronautical operations; and
 - explained there was no conceptual *a priori* rationale for believing non-aeronautical operations were higher risk.
12. The submissions did not address this additional evidence in any manner.
13. On this basis, I continue to consider that there is no sound justification for a 0.05 decrement to measured asset betas on the basis that aeronautical operations are lower risk than non-aeronautical operations. Indeed, if anything, an upward adjustment would be more justified (although AIAL has not applied such an upward adjustment).

1.5 [REDACTED] comparator asset beta sample of 8

14. [REDACTED] submitted that the sample of comparators should be radically reduced to 8 comparators. I do not agree with any of [REDACTED] various rationales for excluding comparators and many are simply wrong. By way of example, [REDACTED] proposes that AIAL is removed from the IM sample on the basis:³

...Auckland Airport contributes 6% to the local index, its beta estimate is overrepresented in systematic risk, introducing an upward bias.

³ [REDACTED] 17 February 2023 submission to the NZCC, Re: CEPA Report on Aspects of the Cost of Capital Input Methodologies for the 2023 Review, p.1.

15. This is factually incorrect. The higher an asset's contribution to the local stock market then the resulting equity beta becomes biased towards 1.0. AIAL has a measured equity beta that is well above 1.0.⁴ That means, based on [REDACTED] logic, that AIAL's measured equity beta (and therefore its derived asset beta) is biased downward (i.e., downward towards 1.0). [REDACTED] proposed ground for removal of AIAL is diametrically opposite to the facts.
16. [REDACTED] justification for removing other airport companies are similarly problematic.

⁴ AIAL's asset betas measured by CEPA are 0.935 for 2012-17 and 1.025 for 2017-22 with gearings of 21% and 16% respectively. This implies AIAL has equity beta of 1.18 in 2012-17 and 1.22 in 2017-22.

2 Introduction

17. I, Tom Hird [REDACTED] have been engaged by AIAL to provide an independent expert review of feedback on AIAL's proposed WACC for PSE4 including feedback on my own February 2023 report⁵ relied on by AIAL.
18. I hold the following qualifications:
 - Bachelor of Economics (Honours First Class), Monash University (1989); and
 - PhD in Economics, Monash University.
19. From 1990 to 2000 (both prior to, during and after the completion of my PhD in economics) I was employed by the Commonwealth Treasury. Since 2001 I have worked as a consulting adviser specialising in economics: first with Arthur Andersen, then NERA Australia and, since 2007, for my own firm (Competition Economists Group). I have advised private clients, regulators, and other Government agencies on a large number of cases specialising in finance theory.
20. I have more than 30 years of experience in the economic analysis of markets and in the provision of expert advice in regulatory, litigation and policy contexts. I have provided expert testimony before courts and tribunals and in numerous regulatory forums in Australia but also in the United Kingdom and New Zealand.
21. In completing this report, I have received assistance from my colleague at CEG, Samuel Lam. Notwithstanding this assistance, all of the opinions expressed in this report are my own.
22. In preparing this report I have had regard to the materials specifically identified throughout the report, in the form of footnotes or in the text.

⁵ Tom Hird, AIAL asset beta and WACC estimates for PSE4, February 2023.

3 Departure from IM WACC parameters

23. The submissions appear to be that AIAL should just apply the 2016 IM asset beta estimate (0.60) in PSE4 and then apply whatever IM asset beta estimate the NZCC publishes in its 2023 IM for PSE5 and PSE6 (and then again apply the 2030 IM asset beta estimate to PSE7). However, these submissions fail to grapple with the logic that I set out in my previous reports for both AIAL⁶ and New Zealand Airports⁷. That logic is summarised here:⁸

In my view it would be appropriate in general, and in the specific context of the COVID-19 pandemic, to estimate asset beta using the most recent 10 years of data available at the start of each 5-year PSE (including PSE4 and future PSEs).⁹

At each future PSE, the older 5 years of data in the estimation window would be dropped and replaced with newer data. The effect of this method is that the asset beta estimate in every PSE reflects the balance of systematic shocks that occurred in the previous 10 years but these shocks only influence the asset beta applied in PSEs for a 10 year period (while they remain in the 10 year estimation window).

For example, if one were to (arbitrarily) define the COVID-19 pandemic shock as occurring in 2020 and 2021 then the COVID-19 shock would influence asset betas used in PSE4 and PSE5 but would drop out of the estimation window for PSE6.¹⁰

The major advantage of the proposed approach is that, in the long run:

⁶ Tom Hird, AIAL asset beta and WACC estimates for PSE4, February 2023.

⁷ Tom Hird, NZCC comments on asset beta estimates for airports, February 2023.

⁸ Tom Hird, AIAL asset beta and WACC estimates for PSE4, February 2023, section 3.2.

⁹ This is consistent with the NZCC IM asset beta methodology to date – which has been to retain a stable 10 year estimation window (made up of two five year estimation windows) and to set the asset beta based on whatever systematic shocks occurred during that window. No attempt has been made by the NZCC to adjust the asset beta based on a view that the shocks that occurred in the 10 year estimation window were not representative of the expected frequency of that form of shock. For example, the NZCC did not attempt to adjust for the impact of the global financial crisis in the 2016 IM update – even though this was a large systematic shock of the kind that arguably occurs less than once every 10 years. Nor did the NZCC attempt to adjust Chorus’ estimated asset beta for the impact of COVID-19.

¹⁰ PSE6 is scheduled to begin on 30 June 2032. At which time a 10-year estimation window would only reach back to 1 July 2022.

- *all systematic shocks that actually occur are captured in the asset beta estimates actually applied in PSEs;*
 - *each shock is assigned an impact that matches the actual severity of the shock; and*
 - *each shock receives the exactly correct weight based on its actual frequency through time.*
24. This is the approach that AIAL has applied. As I explained in my previous reports for AIAL and New Zealand Airports, AIAL’s approach is the only approach that gives a reasonable and consistent approach to historical data for the purpose of estimating WACC parameters and, in particular, asset beta.
25. I explained that applying the most recent NZCC IM asset beta estimate to every PSE that falls between published IMs would result in a highly distorted weighting to historical data. This is because:
- The NZCC updates its IM asset beta estimate **once every 7-years** (in each 7-yearly IM update) **using 10 years** of data to March in the relevant year of the decision (e.g., 10 years to: March 2016, March 2023, March 2030 and so on);
 - A seven-year update and 10-year estimation window mean that six out of every 10-years are sampled twice (being 2 times the 3 years immediately before March in the year of the IM). The other four out of every 10-years are sampled only once.
 - PSE’s are reset once **every 5-years** with the exact starting date varying by Airport. AIAL (and CIAL) is every 5-years starting in July 2017, 2022, 2027, etc. For WIAL, PSE’s beginning on 1 April 2024 and every subsequent 5 years. This means that some IMs will apply to two PSE’s and other IMs will apply to only one PSE. For example:
 - For AIAL and CIAL the NZCC’s 2023 IM asset beta estimate would apply only PSE5 but the NZCC’s 2030 IM asset beta would apply to PSE6 and PSE7 (beginning in July 2032 and 2037 respectively).
 - For WIAL the NZCC’s 2023 IM asset beta estimate apply to PSE5 and PSE6 but the 2030 IM apply only to PSE7.

	2016 IM (10 years of data to March 2016)	2023 IM (10 years of data to March 2023)	2030 IM (10 years of data to March 2030)
AIAL and CIAL July 2017/22/27/32	PSE3 and PSE4	PSE5	PSE6 and PSE7
WIAL April 2019/24/29/34	PSE4	PSE5 and PSE6	PSE7

26. In summary, NZCC IM asset beta estimates:

- do not evenly weight historical data through time (because they are updated every 7 years using 10 years of data);
 - are not evenly applied to PSEs for an individual airport (due to PSE’s being updated every 5 years but IM’s updated every 7 years); and
 - The uneven weighting of data in IMs will apply differently to AIAL/CIAL and WIAL due to the different start dates for their PSEs.
27. As I noted in my report for New Zealand Airports,¹¹ this would mean that for AIAL and CIAL **3 times as much weight** would be given to the COVID-19 affected three years of data from April 2020 to March 2023 (used to set asset betas for PSE 5 to 7) than to the 4 years from April 2017 to March 2020 (only used to set asset beta for PSE5).¹²
28. In my previous report for both AIAL and New Zealand Airports I explained that the only way in which to be:
- both consistent with the IM methodology; and
 - give all historical data the same weight in setting PSE asset betas.
- Is to set reset the asset beta at the beginning of each PSE using the IM methodology (i.e., 10 years of data up to that date).
29. It does not appear that any of the submitters have grappled with the logic and mathematical facts set out above. One submitter states:
- [REDACTED]
- [REDACTED]
- [REDACTED]
30. But this statement fails to appreciate that, based on the logic set out above, AIAL is not and should not be attempting to estimate the asset beta that the NZCC will estimate for the 2023 IM. AIAL is, and should be, attempting to estimate the asset beta that the NZCC would have estimated had it applied its 2016 IM estimation methodology to the 10 years of data ending June 2022 (i.e., the data available at the beginning of PSE4).
31. Similarly, another submitter states:

¹¹ Tom Hird, NZCC comments on asset beta estimates for airports, February 2023. Paragraph 53 on page 25.

¹² For WIAL it is also the case that CIAL **3 times as much weight** would be given to the COVID-19 affected three years of data from April 2020 to March 2023, but the relevant comparison period is the 4 years ending 4 years ending 31 March 2027 would only be used to set one PSE asset beta (PSE7).

[REDACTED]

32. This also fails to correctly understand the logical basis of AIAL’s method. AIAL is not attempting to make its own decision about what the NZCC will do in the 2023 IM update. AIAL is attempting to apply the currently published IM framework to estimate an asset beta (and other parameters) consistent with the available data at the beginning of PSE4.

33. Another submitter states:

[REDACTED]

34. While CIAL did apply the 2016 IM asset beta to its PSE4 it is also correct that CIAL has endorsed my finding that this approach will result in distorted weighting to historical data. CIAL has subsequently stated that: ¹³

All information should be applied when estimating the asset beta, and a change to the current approach is required to ensure all years are weighted equally.

35. This is consistent with my advice. CIAL also states: ¹⁴

The issues CEG has raised about the differential weighting of years when estimating asset betas are important.

36. CIAL further states that, given their adoption of the 2016 IM asset beta for PSE4, that the PSE5 asset beta may need to be estimated using a “reasonably simple modification to CEG’s main proposal” to “address the circumstances of CIAL”. The relevant “circumstances of CIAL” seem to be that having used the asset beta estimated over the 10 years to March 2016 in PSE4, there will be a need to be special transitional

¹³ CIAL, 2023 input methodologies review – submission on CEPA report on aspects of the cost of capital, 3 February 2023.

¹⁴ CIAL, 2023 input methodologies review – submission on CAEP report on aspects of the cost of capital, 3 February 2023.



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arrangements to ensure, consistent with my advice, that all subsequent years are given equal weight in setting asset betas for subsequent PSEs.

37. On this basis, I do not consider that it is correct to cite CIAL as having a different position to AIAL on the merits of my advice.

4 De-weighting COVID-19 to reflect forward-looking expectations

4.1 Theoretical justification for de-weighting COVID-19

38. A general theme in submissions from airlines is that the COVID-19 shock was a highly unusual event that materially affected measured asset betas over the IM 10 year estimation window. It is argued that this means that the 10 year IM estimation window does not reflect the mix of economic shocks that investors expect in the future and, therefore, the impact of COVID-19 should be de-weighted to make the estimate more consistent with forward-looking risk perceptions (emphasis added in the following quotes).

[REDACTED]

[REDACTED]

[REDACTED]

39. While the submissions focus on reducing the weighting of the COVID-19 events in the last 10 years of data they do not grapple at all with the logical corollary of applying a permanent uplift to future asset betas to reflect exposure to pandemic risk even after COVID-19 drops out of the estimation window. As I explained in my report for AIAL (emphasis in the original):¹⁵

¹⁵ Tom Hird, AIAL asset beta and WACC estimates for PSE4, February 2023, section 3.2.1.

One might be tempted to argue that major pandemics occur less frequently than once in 10 years and, therefore, the 10 years to June 2022 are not “representative” of the true actuarially expected risk of pandemics for investors in airport companies. However:

- *if a 10 year estimation window that includes a major pandemic overweights (relative to a priori probabilities) pandemic type shocks; then*
- *a 10 year estimation window that **does not** include a major pandemic **underweights** (relative to a priori probabilities) pandemic type shocks.*

Once the second dot point is accepted as the logical corollary of the first, it can be easily seen that attempting to adjust the estimated asset beta to reflect some estimate of a shock’s “a priori probability” creates more problems than it solves. Specifically, adjusting downwards the asset beta estimates affected by COVID-19 on the basis that COVID-19 type shocks are “overrepresented” in that period requires an offsetting upward adjustment to asset beta estimates derived from all other periods where COVID-19 type shocks are “underrepresented”. This would include the historical PSE1 to PSE3 periods.

40. I explain that the net effect of these adjustments, if done perfectly accurately, should be zero. That is, the average asset beta measured and applied in PSEs over-time should be the same whether one simply applies:
- A rolling 10 year average asset beta without adjustments at the beginning of each regulatory period. In the long run, this weights every shock that actually occurs consistent with its true underlying probability of occurring; or
 - De- and re-weighting shocks based on their long-run underlying probability of occurring. Provided the long-run underlying probability of a shock occurring can be accurately determined, this approach will also weight every shock that actually occurs consistent with its true underlying probability of occurring.
41. Of course, as my report for AIAL focusses on, the problem with the second approach is that nobody knows with any accuracy the “true” probability of shocks that affect airlines. Using pandemic risk to illustrate, nobody knows the true underlying probability of such a COVID-19 like shock occurring in any given PSE window.¹⁶ Any attempt to estimate that probability will almost certainly be wildly inaccurate. This in turn will mean that, under the de- and re-weighting regulatory policy, the actual long run compensation for pandemic risk will be materially different to the true long run underlying pandemic risk that airports are exposed to. It will also create what I

¹⁶ Not to mention that we do not really know what the impact of COVID-19 itself was on asset betas for airports compared to other factors occurring simultaneously. The best we can do is make crude estimates based on the assumption that absent COVID-19 the asset beta would have been the same as in prior or subsequent periods.

described as a “regulatory quagmire” of competing claims about ultimately unknowable facts including the probability of a pandemic occurring in any given year.

42. I also explained that if the de- and re-weighting approach was applied consistently then there should have been a pandemic uplift to asset beta in PSE1 to PSE3. The historical data windows used to estimate asset betas for these PSEs did not include a COVID-19 magnitude shock and there was no upward adjustment to the estimated asset beta to “re-weight” for the true underlying risk that such a pandemic event might occur. As it happens, such a pandemic event did occur during PSE3 even though the PSE3 asset beta, like the PSE1 and PSE2 asset betas before it, gave the compensation ‘as if’ there was zero risk of a pandemic of this scale (because no pandemic of that scale occurred in the historical period used to estimate asset betas for PSE1 to 3).
43. A well-considered proposal to “de-weight” the COVID-19 shock in estimating the asset beta for PSE4 would have included a discussion of all of the above issues. This would have included a discussion of uplifts for asset beta estimates for future PSEs but also a discussion of how this policy can be reconciled to the approach in past PSEs where asset betas gave zero weight to pandemic shocks¹⁷ and the fact that AIAL had just borne 100% of the uncompensated impact of the pandemic event risk that the submitters are proposing to de-weight from updated asset beta estimates. It would have included an acknowledgement that de- and re-weighting asset betas should result in the same long run asset beta of PSEs simply applying my method (a rolling average of 10 year asset betas estimated consistent with the IM method).
44. None of the submissions included discussion of such topics. Indeed, the discussion appeared to focus entirely on “de-weighting” COVID-19 in the historical period affected by COVID-19 without acknowledging that this logically implied the need for a “re-weighting” other periods not affected by COVID-19 to include an uplift or pandemic risk. In my view, this was a serious shortcoming in the submissions to AIAL suggesting some form of de-weighting the impact of COVID-19 on measured asset betas.

¹⁷ A well-considered proposal would have acknowledged that the logic for de-weighting COVID-19 for PSE4 (and presumably PSE5) on the basis that such pandemics are less frequent than once in ten years implies that, if asset betas are to be de/re weighted in this way, that the asset betas for PSE1 to PSE3 were all under-estimated. It follows that only “de-weighting” for the presence of a pandemic immediately after a pandemic occurs without ever having ‘re-weighted’ for the absence of a pandemic creates a bias in the NPV of asset betas compensated – even if all future PSE asset betas are correctly re-weighted to include pandemic risk.

4.2 UKCAA precedent

45. Many of the submissions referred explicitly to UK regulatory precedent where the Civil Aviation Authority (the UKCAA) recently set the asset beta for Heathrow airport below the asset beta that would have resulted had the UKCAA applied its standard approach of using the most recent 5 years of historical data to estimate asset betas.
46. In doing so the UKCAA relied on empirical analysis undertaken by Flint Group that applied an approach that de-weighted the impact of COVID-19. The UKCAA ultimately concluded that the COVID-19 pandemic should raise asset beta via two effects:
- First, higher risk comparators should be included in its sample of comparators; and
 - The sample average asset beta should be raised above the pre-COVID-19 measured asset beta for that sample.
47. The total sum impact of these changes was to raise the UKCAA midpoint asset beta by 0.115. Given that the UKCAA adopts the midpoint WACC this can also be regarded as the uplift in the UKCAA final asset beta estimate.

Table 1: Summary of Flint and UKCAA assumptions and findings

	Low impact	High impact	UKCAA mid-point estimate
Frequency of major pandemics	1 in 50 years	1 in 20 years	1 in 28.5 years
Duration of pandemic	17 months	39 months	36 months
COVID impact via change in comparator set	0.000	0.100	0.050
COVID impact via higher asset beta for individual comparators	0.020	0.110	0.065
Sum of COVID uplifts	0.020	0.21	0.115
UKCAA TRS adjustment to asset beta*	(0.08)	(0.09)	(0.085)

Source: UKCAA, Economic regulation of Heathrow Airport Limited: H7 Final Proposals, Section 3: Financial issues and implementation, June 2022. Table 9.2.

48. Having applied a midpoint COVID uplift of 0.115 to HAL's asset beta, the UKCAA then reduces this by 0.085 to reflect a dramatic shifting of passenger volume risk from HAL to airline customers. This is achieved via a new Traffic Risk Sharing (TRS) mechanism. This mechanism shifts 50% of all traffic variations less than 10% from forecast from HAL to users. It also shifts 105% of (i.e., more than fully compensates HAL for) the risk of higher than 10% variation from forecast. As explained in Section 5 AIAL's proposed wash-up mechanism provides trivial insulation from risk by

comparison to the UKCAA TRS and, therefore, the UKCAA asset beta decrement for TRS is of no precedential relevance to AIAL.

49. It is relevant to note that the 0.115 asset beta uplift (i.e., before the TRS decrement) is a very material increase in asset beta which should, if the logic is applied consistently, result in a permanent uplift to asset beta of this magnitude in all future determinations.
50. By way of comparison, I have estimated that the sample average asset beta is only 0.18 higher for the 5-years ending June 2022 (0.89) versus the 5-years ending June 2017 (0.71).¹⁸ This implies a PSE4 uplift to asset beta of only around 0.09 (noting that a 10 year average takes the average of both 5 year estimates and, therefore, halves the magnitude of the COVID-19 impact in the second 5 year period).
51. In summary, the COVID uplift that AIAL is effectively proposing is:
 - Smaller than the UKCAA uplift (around 0.09 vs 0.115); and
 - Is temporary (will fall to zero in PSE6 when COVID-19 falls out of the 10 year estimation window) while the UKCAA uplift is permanent (or, at least, will be permanent if future UKCAA decisions are internally consistent with the H7 decision).
52. Moreover, the above direct uplift to the asset beta is not the only way in which the UKCAA has provided compensation for pandemic risk. The UKCAA also:
 - Added £300m to HAL’s regulatory asset base in 2018 prices from 2021 onwards;¹⁹
 - Provided £25m per annum in all future years to compensate for the expected costs to HAL of a pandemic (based on an assumed frequency and length of a pandemic as set out in the last column of Table 1 above).
 - Adopted a 0.87% lower forecast of passenger numbers than the UKCAA’s “most likely” estimate.
53. AIAL is not proposing any of these forms of compensation. It is relatively simple to express each of these changes in an “asset beta uplift” equivalent manner. That is, to calculate the asset beta uplift that would provide the same compensation to AIAL as the above policies provide to HAL (adjusting for differences in scale between HAL and AIAL and also differences in risk sharing mechanisms in place). When I do this I estimate that the UKCAA policies outlined above would, if applied to AIAL, be

¹⁸ Tom Hird, AIAL asset beta and WACC estimates for PSE4, February 2023, Table 5-1 on page 35.

¹⁹ UKCAA, CAP2524D, Economic regulation of Heathrow Airport Limited: H7 Final Decision Section 3: Financial issues and implementation paragraph 10.74.

equivalent in value terms to a 0.26 permanent uplift in asset beta for AIAL.

54. In summary:
- AIAL's proposed approach includes a temporary uplift in asset beta as a result of COVID-19 of around 0.09 which will apply in PSE4 and PSE5 but not beyond those.
 - The UKCAA has implemented an uplift of 0.115 and the logic for this uplift means that it should be permanent (i.e., apply in all future decisions);
 - The UKCAA has also applied three other policy changes in response to the COVID-19 pandemic above and beyond the 0.115 asset beta uplift. If the logic for these policies were applied to AIAL then this would be the equivalent of a further permanent 0.26 uplift in asset beta;
 - Combining the second and third dot points results in a total UKCAA compensation equivalent to permanent 0.37 uplift in asset beta.
 - It follows that AIAL's proposed asset beta can reasonably be characterised as involving a **temporary** uplift that is less than one quarter of the **permanent** compensation that would be consistent with the logic and calculations of UKCAA decision being applied to AIAL.
55. The calculations that underpin my permanent 0.26 uplift in asset beta in the third dot point above are set out in Table 2 below.

Table 2: UKCAA non-asset beta policy changes expressed in asset beta uplift equivalent terms

	Expressed as a % of HAL RAB (£16bn)	Equivalent WACC uplift at HAL levels of risk exposure	AIAL vs HAL risk exposure	Risk sharing adjusted WACC uplift	Equivalent asset beta uplift (WACC uplift divided by 7.5% TAMRP)
£300m RAB adjustment ²⁰	1.88%	'=0.164% =(1.88%*(AIAL WACC of 8.73%))	N/A (1 times)	0.164%	0.022
£25m pa for asymmetric pandemic risk ²¹	0.16%	0.156%	10 times	1.563%	0.208
0.87% deliberate under-forecasting of median pax ²²	0.11%	0.109%	2 times	0.218%	0.029
Sum	N/A	0.43%		1.94%	0.26

Source: UKCAA, Economic regulation of Heathrow Airport Limited: H7 Final Proposals. CEG analysis.

56. Each row of this table can be explained as follows.

- a. In consideration of the impact of COVID-19, a one-off permanent increase of £300m was applied HAL's regulatory asset base in 2018 prices from 2021 onwards. Any comparison to AIAL should account for difference in scale of the airports. £300m represents around 1.88% of HAL's \$16bn RAB.²³ A one-off 1.88% permanent increase in RAB is the equivalent, in dollar value terms, to a 1.88 percentage (not percentage point) increase in the WACC. Based on AIAL's WACC of 8.73% this is equivalent to a 0.16% permanent uplift to the WACC. This is equivalent **to a 0.022 (=0.16%/7.5%) permanent uplift in asset** (assuming a 7.5% TAMRP).
- b. The UKCAA also modelled the impact that a future repeat of a COVID-19 type shock would have on HAL's profitability. The modelling assumed an annual probability of pandemic of 3.5% and that, if this occurred, revenue reductions in

²⁰ UKCAA, CAP2524D, Economic regulation of Heathrow Airport Limited: H7 Final Decision Section 3: Financial issues and implementation paragraph 10.74.

²¹ UKCAA, CAP2524D, Economic regulation of Heathrow Airport Limited: H7 Final Decision Section 3: Financial issues and implementation, Table 11.2 at paragraph 10.36.

²² UKCAA, CAP2365D, Economic regulation of Heathrow Airport Limited: H7 Final Proposals Section 3: Financial issues and implementation, paragraph 10.31.

²³ UKCAA financial model caa-h7-pcm-v2-11-7mar-fds.xlsm.

the following three years would be -73%, -76% and -32% respectively.²⁴ However, the losses to HAL that result from such a shock would be very largely offset by a traffic risk sharing (TRS) mechanism introduced by the UKCAA. Accounting for that risk mitigation and the low probability of a pandemic the UKCAA estimated that this asymmetric risk exposure required compensation of £25m per annum in all future. £25m per annum on a RAB of £16bn is equivalent to a permanent WACC uplift of 0.16% or a permanent asset beta uplift of 0.021 given a 7.5% TAMRP(=0.16/7.5%). However, the UKCAA TRS insulates HAL from the vast majority of traffic risk modelled by the UKCAA. AIAL would be exposed to at least 10 times the traffic loss for the same event (see Section 5 below). Therefore, the internally consistent compensation for asymmetric risk would be 10 times higher for AIAL – **equivalent to a 0.21 asset beta uplift**.

- c. Finally, the UKCAA adopted a 0.87% lower forecast of passenger numbers than the UKCAA’s “most likely” estimate. This is intended to compensate for asymmetric risks that stem from non-pandemic events.²⁵ (The UKCAA has also permanently reduced its business travel forecast by 10%.)²⁶ Given annual revenues of around £2bn, a 0.87% reduction in passenger forecasts raises prices and expected revenues by around \$17m or 0.11% of HAL’s RAB. However, this is based on a risk sharing arrangement where HAL is exposed to only 50% of forecast error within a central band of 10%. AIAL has no risk sharing within a central band of 15% for forecast errors. This means that AIAL’s compensation should be at least double HAL’s. This implies a permanent revenue uplift of 0.22% (=2*0.11%) of RAB. This is equivalent to **0.029 permanent uplift** in asset beta (=0.22%/7.5%) with 7.5% TAMRP.

4.3 Conclusion

57. The submissions that proposed adopting a lower asset beta by de-weighting the impact of COVID-19 did not adequately deal with the logical implications that an

²⁴ UKCAA, CAP2524D, Economic regulation of Heathrow Airport Limited: H7 Final Decision Section 3: Financial issues and implementation, paragraph 11.7. The Final Proposals set out the modelling in more detail than the Final Decision. The Final Proposal estimated £27m compensation per annum (not £25m pa). However, this difference appears to be due to changes in some of the baseline revenue allowances (not the actual modelling of pandemic events). The Final Proposals sets out that it has modelled a pandemic will “have an impact on passenger numbers over a three-year period” and “have an impact with a similar profile to that seen in and/or anticipated for 2020, 2021 and 2022: that is, precipitating a traffic reduction of -73%, -76% and -32% in each of the three years respectively.” See CAP2365D H7 Proposals Section 3, paragraph 11.35 on page 116.

²⁵ Ibid, see Chapter 11 and, specifically, paragraph 11.31.

²⁶ “We decided to retain some long-term reduction of business travel in all but the most optimistic scenario, but to reduce that long-term impact from 20% to 10% in the most likely scenario for these Final Proposals. We decided not to alter our assumption on the associated impact of business travel demand on fares for these Final Proposals.” (Section 1 paragraph 1.46, p.19)

internally consistent approach to de-weighting would imply. Specifically, a highly contentious exercise in both:

- “de-weighting” data to reduce the realised impact of the COVID-19 pandemic on measured asset betas;
- “re-weighting” all other periods to “insert” an actuarially fair recognition of pandemic risk even if the estimation period does not include such a pandemic.

58. The submissions that referred to the UKCAA precedent for dealing with the pandemic do not provide full account of UKCAA policy. A full account would have noted AIAL’s proposed asset beta can reasonably be characterised as involving a **temporary** uplift that is less than one quarter of the **permanent** compensation that would be consistent with the logic and calculations of UKCAA decision being applied to AIAL.

5 AIAL's asymmetric risk "wash-up" mechanism

5.1 Comparison of AIAL and UKCAA risk sharing mechanisms

59. As noted above, the UKCAA proposes an extreme form of risk sharing. This is summarised in the quote below (emphasis added).²⁷

*The structure of our proposed TRS mechanism is very similar to that included in our Initial Proposals, with moderate risk sharing in a central band and stronger risk sharing in an outer band. As noted above, **the central band still covers differences of up to 10 per cent from CAA's passenger forecast** although, because of the new implementation method, this is assessed on a year by year basis rather than cumulatively over H7 as a whole. ...*

*Mindful of the need to strike a balance preserving HAL's incentives to facilitate traffic growth while also reducing the risk of significant gains or losses, **our Final Proposal is for a risk sharing rate of 50 per cent for the central band.** ...*

Even if we were to set the risk sharing factor in the outer band at 100 per cent, therefore, which would effectively guarantee HAL's revenue from airport charges, it would still face an expected net loss of around £0.12 for every £1 reduction in airport charges that would have occurred in the absence of TRS. For this reason, we are proposing to adopt a risk sharing factor for the outer band of slightly more than 100 per cent. Even though this will more than compensate HAL for the loss of airport charges revenues, after taking account of the expected impacts on commercial revenues and opex we would still expect HAL to have a positive incentive to increase passenger numbers.

*On this basis, **our Final Proposal for the sharing rate for the outer band is 105%.** We estimate that this will protect HAL from between 91 and 94 per cent of the expected impact on its EBITDA of traffic changes in the outer band.*

60. In summary, HAL is insulated from at least 50% of variations in aeronautical revenues and is more than fully compensated for lost aeronautical revenues beyond

²⁷ See CAP2365B H7 Proposals Section 1, paragraphs 2.39 to 2.44 on pages 41 to 42.

10% variation from forecasts. That means, by way of example, if passenger volumes fell to zero for a year, HAL would still receive 99.5% of forecast revenue (5% from the central band and 94.5% (=90%*1.05) from the outer band).

61. By way of comparison:

- AIAL has zero insulation from within the central band;
- AIAL's central band is *at least* a 50% wider (15% vs 10%) than HAL's. This is an "at least" comparison because moving outside the central band for AIAL requires both a 15% shortfall in revenues and a fall in internal rate of return of at least 100 bpa. Consequently, the effective central band can never be less than 15% of revenues but can be greater than 15% of revenues.
- AIAL's central band is cumulative over a 5 year period – which means it is much less likely to be exceeded than HAL's which is assessed annually.
- In the event that the central band is exceeded, AIAL is compensated for *at most* 100% of the revenue loss beyond 15%. This is *at most* for the same reasons set out in the second dot point

62. All of these considerations mean that:

- AIAL has zero insulation from normal fluctuations which result in 5 year revenues varying by less than 15% from forecast. By contrast, HAL is insulated from more than two thirds of a 15% variation (HAL is insulated from half of the first 10% variation and 105% of the next 5% variation).
- AIAL has much less insulation than HAL from shocks to revenues that are larger than 15%. For example, a 60% shock to revenues would result in AIAL suffering an *at least* 15% loss in revenues while HAL would suffer only a 2.5% loss in revenues (=0.5*10% less 0.05*(60%-10%)).

63. This is why I state, in paragraph 56.b that AIAL is at least 10 times more exposed to the pandemic event that the UKCAA modelled when estimating compensation for asymmetric risk. I used this 10 times factor this fact to scale up the "risk adjusted" UKCAA asymmetric compensation for exposure to a major pandemic event. The calculation of this 10 times factor is based on the following:

- Modelling the same magnitude pandemic event as the UKCAA models (a 3 year impact where traffic volumes are depressed by -73%, -76% and -32% respectively).
- HAL's TRS examines each year independently and HAL will suffer losses in each year respectively of annual forecast revenue multiplied by:
 - 1.85% (=0.5*10%-0.05*(73%-10%));
 - 1.70% (=0.5*10%-0.05*(76%-10%));
 - 3.90% (=0.5*10%-0.05*(32%-10%));

- The sum of these losses across 3 years is 7.45% of annual revenue
 - By contrast, the *minimum* loss that AIAL can suffer is 15% of PSE revenue. That is 75% (=5*15%) of annual revenues.
 - 75% is more than 10 times 7.45% which is the derivation of the 10 times factor.
- 64. Of course, this conclusion that AIAL has one tenth the insulation as HAL is only relevant to a large shock of the kind modelled here. For smaller shocks that do not trigger the AIAL threshold, AIAL has zero insulation compared to at least 50% insulation for HAL. Thus, on average, the level of insulation provided to AIAL from its wash-up mechanism is much less than one 10th the level of insulation afforded HAL.

5.2 Commentary on AIAL’s asymmetric risk “wash-up” mechanism

65. One commenter asks if AIAL is proposing double compensation for risk exposure

[REDACTED]

66. My answer to this question is that AIAL is not proposing double compensation. In fact, AIAL’s proposals actually fail to fully compensate for risk.
67. Firstly, AIAL’s proposed wash up mechanism applies symmetrically to revenue gains and losses. This means that the only way in which AIAL’s proposed wash up mechanism can raise AIAL’s expected revenue is if AIAL is exposed to asymmetric revenue shocks (more likely to suffer a large loss than a large gain in revenues).
68. If this is the case then AIAL will be under-compensated so long as it does not include in its cost build up the actuarially expected cost of these asymmetric shocks. AIAL’s proposed wash-up mechanism limits, but far from eliminates, AIAL’s exposure to extreme negative shocks to revenues (such as from future pandemics). AIAL has not proposed such direct compensation for asymmetric risk exposure and this is the basis for my conclusion that AIAL is under-compensated for risk. Consistent with this. I note that the UKCAA included both:
- A much stronger form of insulation for HAL from asymmetric demand shocks in the form of its TRS; and
 - Provided compensation or the expected cost to HAL from the residual exposure to asymmetric demand shocks.
69. The above quote also implies that compensation for asymmetric risk is already provided for in the WACC. This is not correct, as I explained in section 7.1 of my February 2023 report for AIAL. It is correct that AIAL’s wash-up mechanism will

modestly reduce AIAL’s asset beta risk relative to a scenario where AIAL did not have such a wash-up mechanism. However:

- AIAL’s asset beta estimate is already based on airports that typically have less exposure to risk than AIAL and the proposed wash-up mechanism will make AIAL’s risk more consistent with the sample average asset beta not less consistent (see section 7.2 of my February 2023 report for AIAL); and
- as explained in paragraph 64 of Section 5.1 above, AIAL’s wash-up mechanism provides much less than one tenth the insulation from revenue shocks than the UKCAA’s TRS. The UKCAA reduced HAL’s asset beta by 0.085 based on the introduction of the TRS. A consistent order of magnitude for AIAL would be a reduction in its underlying asset beta of much less than one 10th of this. That is, much less than 0.008.

70. Another commenter states:

[REDACTED]

71. I note that businesses in competitive markets are free to set prices as they see fit. If a negative shock raises unit costs I would expect that to be passed on to customers. Far from being “unrealistic” for a business to be able to raise prices in the context of an increase in unit costs the opposite is true. In my view, it is unrealistic to expect a business would enter into a long term contract that prevents them from managing exposure to asymmetric demand risk.

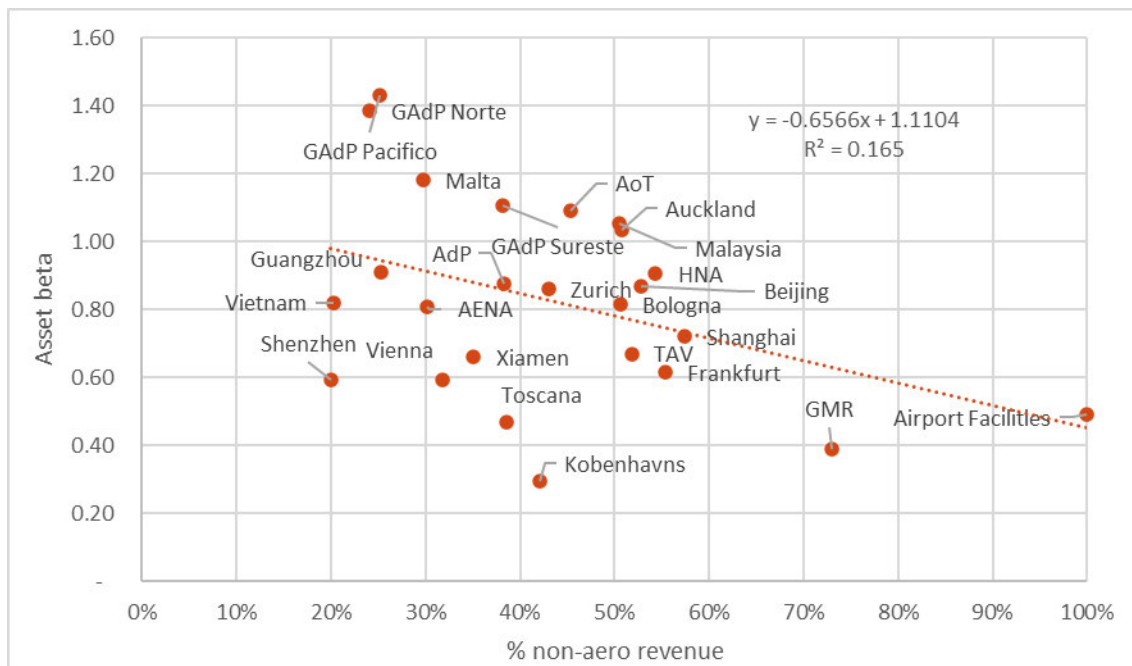
72. There are, of course, many examples of this occurring at airports. The discussion of HAL’s TRS mechanism is just one example of this. I also explained in section 7.2.2 of my February 2023 report that demand risk sharing is common at other airports and that many European airports are in negotiations with government and regulators about recovery of lost profits due to COVID19 (something which AIAL is not attempting to do).

73. I further note that the submission that the wash-up should have a lower upside threshold than downside threshold fails to properly understand the purpose of the wash-up. The wash-up is intended to reduce the level of expected losses that AIAL is exposed to due to the existence of asymmetric demand shocks. The suggestion appears to be that the wash-up thresholds should also be asymmetric in manner that causes the expected value of the wash-value mechanism to be zero. That would defeat the entire purpose of the wash-up mechanism.

6 Risk of non-aeronautical operations

74. I presented empirical finding that asset beta is lower the higher the percentage of non-aeronautical revenues of an airport company as illustrated in Figure 2-2 of my February 2023 report for New Zealand Airports (reproduced below).

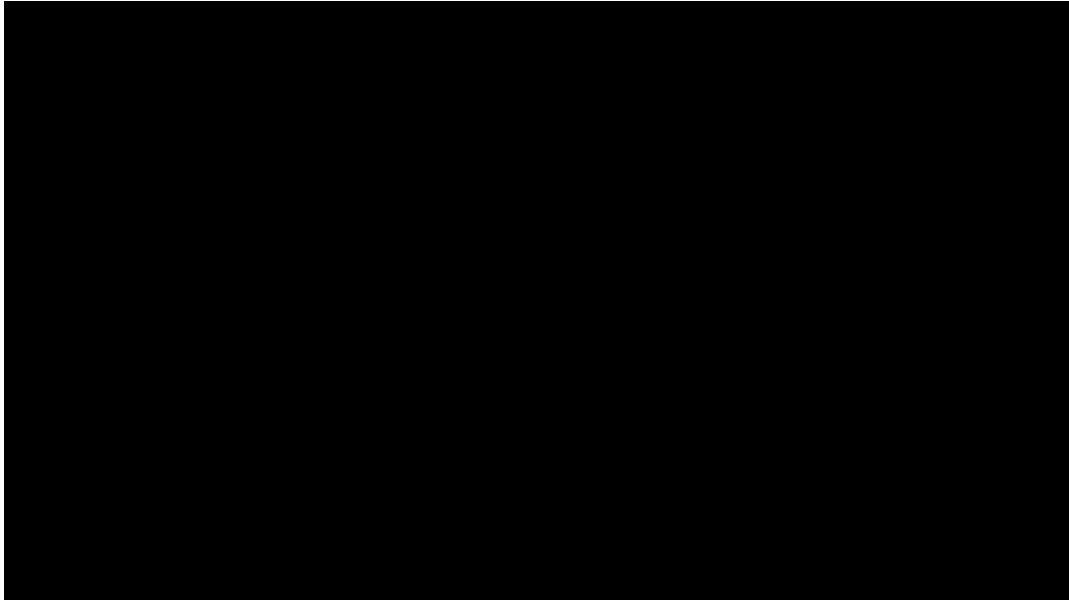
Figure 1: Asset betas* ex JAT vs 2018 non-aeronautical revenue share



Source: annual reports, Bloomberg and CEG analysis. *5-year asset betas to 30 June 2022 estimated using NZCC methodology.

75. One submission offered an explanation of this empirical finding arguing that it might reflect the fact that the smaller an airports non-aeronautical operations the riskier those non-aeronautical operations are. This submission provided an illustration where all airports have the same aeronautical asset beta and non-aeronautical asset betas are always higher but a negative slope exists due to non-aeronautical asset betas falling the higher the percentage of non-aeronautical operations. I extract this illustration below.

Figure 2: Extract of illustration



76. There are several problems with this illustration. I first start by noting that the slope shown in this illustration is that measured asset beta falls by 0.01 for every 25% increase in the proportion of non-aeronautical revenues. This is a slope of -0.04. By contrast, the actually empirically estimated slope that I presented was -0.66 (16 times steeper than in this illustration). In order to generate the actually estimated slope in this illustration the illustration would need much higher non-aero asset betas in the first row and much lower non-aero asset betas in the bottom row.
77. Specifically, the relevant table would need to look like the Table 3 below.

Table 3: Illustration that results in the same slope as the empirically estimated slope of -0.66.

Aero – non-Aero mix	Asset beta –aero	Asset beta–non aero	Asset beta-average
75 – 25 %	0.6	1.45	0.81
50% - 50%	0.6	0.70	0.65
25%-75%	0.6	0.45	0.49

78. It can be seen that the non-aeronautical asset beta needs to be more than double the aeronautical asset beta at 25% non-aeronautical operations and needs to fall by a two thirds (from 1.45 to 0.45) as non-aeronautical operations increase in importance from 25% to 75%. Moreover, at 75% non-aeronautical operations the non-aeronautical asset beta needs to be less than the aeronautical asset beta.
79. In my view this is simply not a credible potential explanation for the observed empirical relationship I presented. Even if there was no other evidence or theory,

Occam's razor would require that the simplest explanation be adopted. Namely, that lower observed asset betas for airports with more non-aeronautical operations suggests that, if anything, non-aeronautical operations are lower risk. Certainly, it suggests that non-aeronautical operations are very unlikely to be higher risk on average.

80. Moreover, I presented other evidence that supports the view that non-aeronautical operations are lower risk than aeronautical operations. This was evidence to the effect that aeronautical revenues and profits fell by materially more than non-aeronautical revenues and profits during the COVID-19 shock. I summarised analysis presented in my February 2023 report for New Zealand Airports in my February 2023 report for AIAL as follows:²⁸

Key results from that analysis are that

- *There is a statistically significant negative relationship between measured asset betas and the non-aeronautical share of total revenue (noting that this analysis must be performed using revenue rather than profits because the sample would be only 5 firms if profits was used.*
- *When performing an event study off the effect of COVID19 we find that aeronautical:*
 - *profit (measured as EBIT or EBITDA) fell by more than non-aeronautical profit for the five airports that report in this way (Japan Airport Terminal,²⁹ AIAL, Frankfurt, AdP and AENA);*
 - *revenue fell by more than non-aeronautical revenue for 24 out of the 26 airports.*
- *Moreover, Japan Airport Terminal was one of the two firms where this did not occur and I have already noted that Japan Airport Terminal's revenues are a special case with non-aeronautical revenues overstating the importance of non-aeronautical profits (and that Japan Airport Terminal's aeronautical EBIT fell by more than its non-aeronautical EBIT (as is the case for all other airports that report profits on a segment basis)). This leaves HNA as the only other airport that where aeronautical revenues were less affected by COVID19 than non-aeronautical operations.*

²⁸ Tom Hird, AIAL asset beta and WACC estimates for PSE4, February 2023, paragraph 141.

²⁹ Although for Japan Airport Terminal the result was mixed with aeronautical EBITDA/EBIT falling by less/more than non-aeronautical EBITDA/EBIT.



81. The submitters did not address the additional evidence in the second and third dot points listed above. Neither did they address my conceptual explanation for why this was not a surprising result - discussed in detail in section 6.1 of my February 2023 report for AIAL. Specifically, that aeronautical revenues are generally driven entirely by passenger traffic. Non-aeronautical revenues are also largely typically driven by passenger traffic but there are often material non-passenger traffic related non-aeronautical operations (such as land and building leasing). It is reasonable to expect the latter to have relatively more stable revenues and profits and, therefore, lower risk. This was discussed in detail in section 6.1 of my February 2023 report for AIAL.

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