

Perth Airport – Preferred Runway Change Post Implementation Review

October 2016



Change Summary

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1. Objectives of the change to preferred runways

Preferred runways are selected by air traffic control in accordance with the Noise Abatement Procedures at Perth Airport. The nomination of runways is also influenced by wind direction and operational requirements.

At Perth operational requirements often preclude the use of preferred runways. This is due to the military restricted airspace around Perth, particularly to the north, and the location of the terminals on the airport and difficult access to some runways.

Runway 21, for example, provides better access from terminals to the runway threshold and provides more airspace to manage the slow and fast aircraft mix in the air than Runway 03. This becomes critical when demand is high.

Prior to 28 May 2015, Runway 21 arrivals (over Guildford) and Runway 24 arrivals (over Greenmount) were equally preferred and Runway 21 was the highest preference runway for departures (over Queens Park). This system of preferred runways had been in place since the Noise Abatement Procedures were formalised in 1998.

Following a review of the airport's Noise Abatement Procedures in 2014, Airservices changed the preferred runway configuration as an intended means of reflecting current operational requirements and practices and to continue to provide the best overall noise outcomes for the Perth community as part of the broader Perth Noise Improvement Plan.

The Noise Abatement Procedures change to preferred runways which took effect on 28 May 2015 provides equal preference for air traffic control to nominate Runway 21 for arrivals (over Guildford), Runway 24 for arrivals (over Greenmount) and Runway 03 for arrivals (over Queens Park). This change provides equal preference to nominate Runway 21 for departures (over Queens Park), Runway 03 for departures (over Guildford) and Runway 06 for departures (over Greenmount).

Arrivals to Runway 06 and departures from Runway 24 continue to be considered as the lowest preference due to the close proximity of the residential area to the south western end of that runway.

The change in runway preference was made to address two issues as follows:

1.1 Reflecting operational requirement

The preference prior to the preferred runway change on 28 May 2015 was for departing aircraft to use Runway 21 (over Queens Park) and reflected the history and proximity of housing development surrounding the airport many years ago. It also recognised the reality of the prevailing wind direction (southerly component) as favouring Runway 21. However, as traffic increased, particularly since 2007, the reason Runway 21 has become increasingly preferred for departures is to meet operational requirements.

The airport's taxiway system, location of hangars and domestic and international terminals disrupt the flow of traffic on the ground and this can lead to significant delays to passengers and increased risk for air traffic control if the most effective runways are not utilised. Airspace to the south of Perth airport also provides more flexibility to manage the mix of speeds of departing aircraft, particularly when the military airspace is active to the north.

The 2014 Noise Abatement Procedures Review identified the preferred runway system as a potential area for improvement and that the selection of runways is related to the operational requirements of air traffic control. The actual nomination of runways was no longer reflective of the original wording of the preferred runway system in the Noise Abatement Procedures.

The Noise Abatement Procedures were amended as a result of the review to reflect existing operational requirements and provide the best overall noise outcomes. The south western end of Runway 06/24 continued to be the least preferred option due to the proximity of residential area to the Runway.

1.2 Potential noise improvement

The 2014 Noise Abatement Procedures review noted that Airservices should always consider air traffic management at Perth holistically with a view to implementing the best overall noise outcomes for the community, whilst balancing the operational need to meet industry requirements with noise improvements already made and those potentially available.

As a consequence, analysis using data for the 2012 calendar year was undertaken to determine whether a change to the Noise Abatement Procedures could potentially deliver a noise improvement for those communities located nearest to the airport.

The analysis showed the Queens Park and Greenmount runway ends received no benefit from the (then) preferred runway system but would benefit from a change which achieved more arrivals over Queens Park and more departures over Greenmount. For Greenmount, this was because measured noise levels for arrivals are louder than for departures for six out of eight jets, and equal to departures for the other two aircraft types. Therefore a reduction in arrivals would equate to a noise reduction.

For Queens Park, measured noise levels for departures and arrivals are equal for eight out of 11 jets. Departures are louder for the other three jets. Therefore an increase in arrivals compared to departures equates to a noise reduction.

The analysis further showed that Guildford, which received more arrivals than departures, did benefit from the (then) preferred runway system, noting that departing aircraft were louder than arrivals.

Noting that two areas adjacent to the airport could benefit from a change to the runway preference system, in 2014 Airservices determined that further consideration of a proposed change was warranted.

Areas further away from the runway were also considered in the analysis to determine potential for reduced noise impact.

While all flight paths to and from Perth Airport have become much busier in recent years predominantly due to the 'fly-in fly-out' servicing of the resources sector, the departure corridor to the southwest of the airport along the Swan River has been particularly impacted since 2007 with a tripling of departure flights to mid-2014 (this area does not receive arrival flights). Airservices noted this changing noise impact and that this residential corridor would also benefit from a change to the preferred runway system that achieved fewer departures to the south.

In light of the above, on balance, there appeared to be a reasonable likelihood that residential areas close to the north eastern end of the cross runway (near Greenmount), the southern end of the main runway (near Queens Park) and to the southwest of the airport (along the Swan River) could benefit from the change to the preferred runway system that was implemented in May 2015. While it was anticipated there would be a discernible increase in noise for Guildford due to being overflown by a higher proportion of departures than previously, Airservices noted the net increase of flights over the area was likely to be in the order of one additional flight per day.

2. Summary of environmental assessment

2.1 Runway use and noise impact findings

(Note that numbers are average estimates only)

Airservices conducted an environmental assessment analysis of the proposed changes to preferred runways with findings summarised as follows:

- No change was expected to runway use on weekdays from 5am to 9pm due to operational requirements.
- There may be an average of 40 fewer nights per year that aircraft would depart Runway 21.
- The change is expected to reduce the number of nights Runway 21 is used for departures (over Queens Park and to the southwest of the airport) by an average of 25 per cent. If this level of reduction in the number of nights was achieved, this would result in a total of 124 nights a year with no Runway 21 departures.

1. Runway 03 arrivals and Runway 21 departures (Queens Park runway end)

- During the day at the weekend – there may be 12 more arrivals and 15 fewer departures each day
- At night – there may be 3 more arrivals and 3 fewer departures when this runway end is used at night
- Queens Park is expected to experience no perceptible difference in noise level between arrivals and departures, however there is likely to be a noticeable reduction in noise levels at Cannington
- The combined use of the proposed Smart Tracking arrival flight path to be implemented in September 15 (reducing overflight of the Canning Vale area) and the Preferred Runway change is expected to provide noise respite to those residents living directly to the south of the airport. The number of departures and arrivals in areas including Canning Vale will reduce as a result.

2. Runway 03 departures and Runway 21 arrivals (Guildford runway end)

- During the day at the weekend – there may be 11 more departures and 9 fewer arrivals per day
- At night – there may be 2 more departures and 3 fewer arrivals when this runway end is used at night
- There would be a net increase of one additional aircraft per day over Guildford
- Departures recorded over the Guildford noise monitor are louder than arrivals by on average between 4.4 and 5.4 dBA.

3. Runway 06 departures and Runway 24 arrivals (Greenmount runway end)

- During the day at the weekend – there may be 5 more departures and 3 fewer arrivals per day
- At night – there may be 1 more departure and 1 fewer arrival when this runway end is used at night
- No perceptible difference in noise level between arrivals and departures is expected over Greenmount

The changes to runway preference would be highly influenced by air traffic control's operational requirements. Runway 21 is expected to be used at times when there is tailwind particularly during peak departure periods. When already using a particular runway, often Air traffic control must wait until the traffic reduces before they are able to change runways and interrupt the traffic flow.

2.2 Aircraft emissions

No changes to aircraft emission levels were expected.

2.3 Natural environment

The proposed changes have no impact on the natural environment.

3. Summary of industry and community consultation undertaken

The change to preferred runways was part of the 2015 Noise Improvement Plan which looked at all opportunities for noise improvement for the Perth community by reviewing what had previously been considered and implemented including the Review of Perth Airport Noise Abatement Procedures.

A Stakeholder Engagement Strategy was delivered for the proposed 2015 Noise Improvement Plan changes including preferred runways, Smart Tracking and a proposal to trial a night time southern departure flight path. This was to ensure that stakeholders understood that these changes were made as part of a broader noise improvement strategy for the Perth community.

3.1 Industry engagement

Consultation with the airlines and Perth airport commenced in May 2014 through the Perth Aircraft Technical Noise and Environment Working Group (PANTWG) and engagement with senior representatives of the airlines and airport.

The preferred runway procedures were developed by Airservices with industry input, and reviewed by the PANTWG to ensure they provided what industry agreed would be the best noise outcomes.

Consultation with industry continued at each PANTWG until the changes were implemented in May 2015, and after implementation to discuss complaints and community feedback.

Industry supported the change as it reflected operational restrictions, took into consideration the findings of the Review of Perth Airport Noise Abatement Procedures, and intended to provide the best noise outcomes for the entire Perth community based on continual review and monitoring of Perth noise improvement initiatives by the PANTWG.

3.2 Community engagement

Community engagement commenced on 5 March 2015 through the Perth Airport Municipalities Group (PAMG) which comprises of local councils representing areas where community are directly or indirectly impacted by Perth Airport operations, and through the Perth Airport Community Forum (PACF) which is an open public forum held immediately after the PAMG every three months.

Airservices presented at the 5 March 2015 PAMG and PACF on the review of noise improvements and proposed changes including preferred runways. There were approximately 180 community members at this meeting.

A fact sheet “Perth Noise Improvements 2015” was published on the Airservices and PAMG websites and distributed at the PAMG and PACF. Information from the fact sheet was distributed through local newspapers and to council representatives to ensure awareness of the community outside the PACF.

A council to the south of the airport represented at the PAMG contacted Airservices after the community sessions to advise that they were not aware of the changes and were provided with the fact sheet and other information as requested.

Community sessions were conducted to provide information and collect feedback on the changes in South Perth twice on 6 March, at Guildford 11 May, Maddington 12 May, and Gosnells 13 May 2015.

Feedback from the Guildford sessions, the Aircraft Noise Ombudsman and complainants to the Noise Complaints and Information Service were taken into consideration before and after the preferred runway change was implemented. Meetings were also arranged with Government representatives to respond to any community concerns.

4. Community feedback

A survey of Noise Complaints Management System data was conducted for the period 28 May 2015 to 31 May 2016.

4.1 Preferred runway feedback

NCMS data identified complainants who referred to the preferred runway change. For some this was the primary issue raised, for others it was referred to but was not the primary issue. Some complainants were asking for information about the change only without expressing an opinion. Table 1 shows the findings.

Table 1: Number of complainants raising the preferred runway change, by suburb

Suburb	Type of feedback	Number of complainants
Canning Vale	Negative	15
	Information request	1
Harrisdale	Negative	1
South Perth	Information request	1
Guildford	Negative	4
South Guildford	Negative	1
Helena Valley	Negative	1
Inglewood	Negative	2
Glen Forrest	Negative	1
Manning	Negative	1
Langford	Negative	1
Riverton	Positive	1
Salter Point	Positive	1
	Information request	1
Total number of complainants		32

In total, 27 complainants provided negative feedback about the change. Concerns raised included that this had led to increased traffic volumes and that there had been a lack of consultation. The majority of negative feedback came from Canning Vale to the south of Perth Airport, and Guildford to the north. Two complainants provided positive feedback. Both were from the Swan River area. A third complainant from this area believed that there had been no change for the better.

4.1.1 All Perth Airport activity feedback

The total number of complainants contacting NCIS about Perth Airport activities in the time period was 2354. Recognising that some of these complainants may have contacted NCIS about a noise issue that was associated with the preferred runway change without specifically referring to it, four suburbs were selected for further examination.

For the suburbs of Canning Vale, Guildford, South Guildford, and Greenmount, the total number of complainants about any Perth Airport activity was collated each quarter in 2014 to 2016. The results are shown in Table 2.

All quarters in 2014 and the January to March quarter of 2015 show pre-change complainant figures. The change began at the end of May 2015, two-thirds of the way through the second quarter. All quarters from July 2015 onwards show post-change complainant figures. The same

complainants may have complained in more than one quarter, meaning that the total number of complainants each year is less than the sum of each quarter.

Table 2: Number of complainants by quarter by suburb

	Jan-Mar			Apr – June			July – Sept			Oct – Dec		
	2014	2015	2016	2014	2015	2016	2014	2015	2016	2014	2015	2016
Canning Vale	2	26	277	9	637	102	7	298	23	1	38	-
Guildford	21	28	5	28	31	4	18	24	6	8	15	-
South Guildford	10	9	5	9	13	3	18	11	1	4	5	-
Greenmount	2	2	2	2	3	3	1	1	2	1	4	-

The comparison of the number of complainants in four suburbs over each quarter in 2014, 2015 and 2016 to date shows:

- there was little change in the number of complainants from Greenmount
- there were fewer complainants from Guildford and South Guildford in 2016 than there were in the same quarter of 2014

Looking specifically at Canning Vale complainants:

- the number of complainants was significantly higher in quarters one and two of 2016 than in the same quarters in 2014
- the number of complainants peaked in quarter two of 2015 and has declined since then. In quarter two of 2016 only 16 per cent of the number of 2015 complainants in the same quarter contacted NCIS. In quarters two and three of 2016 there was a significant decline compared to the same quarters in 2015
- comparing Canning Vale complainants in 2016 (post-change) with 2014 figures (pre-change), in quarter one of 2016 there were 138 times as many complainants as in 2014 (277 compared to two). In quarter two there were approximately eleven times as many as in 2014 (102 compared to nine). In quarter three there were approximately three times as many as in 2014 (23 compared to seven).

The number of complainants who contacted NCIS and specifically referred to the change of runway preference was low compared to the overall number of complainants who contacted NCIS about Perth Airport activities (32 out of 2354 or 1.4 per cent). However the latter group is likely to contain complainants who were concerned about noise events that may have been associated with the preferred runway change without making specific reference to it.

5. Operational data

5.1 Methodology

Data was collected for 12 months prior to and after the change. Two time periods were covered:

- 1 June 2014 – 31 May 2015: before the change
- 1 June 2015 – 31 May 2016: after the change

Two types of data were collected using the Airport Noise and Operations Management System (ANOMS):

- Aerodrome Terminal Information Service (ATIS) data using meteorological equipment at the airport for wind direction and speed
- Movement data (from the air traffic control system including radar data)

ATIS data

The ATIS provides information to pilots. It includes the runway in use, the wind direction and speed, other weather information such as cloud ceiling, thunderstorm activity etc, runway and taxiway closures and other information relevant to pilots such as cranes operating in the area.

In the first instance the data was analysed to identify those times when air traffic control had no choice of runway, for example because the wind speed and direction meant only one runway was suitable under the runway selection rules set down by the Civil Aviation Safety Authority, or because the other runway was closed for maintenance.

This analysis initially determined the total number of hours where there was no choice of runway.

For times where air traffic control had a choice of runway, analysis then determined the number of hours for which Runway 03 and Runway 21 were each chosen.

Air traffic control was consulted to determine whether crane and taxiway works noted on the ATIS affected the choice of runway. As it was confirmed that these factors had no effect on runway choice they were eliminated from the assessment.

Movement data

Using ANOMS, movement data was collected for each runway. This was broken down into arrivals and departures during weekdays, weekends and all time for both the 6:00 am to 10:00 pm and 10:00 pm to 6:00 am periods.

5.2 Data

5.2.1 Hours when a runway selection choice was available

The following pie charts show the number of hours where there was a choice of runway, and whether Runway 03 or Runway 21 was chosen both pre-change and post-change:

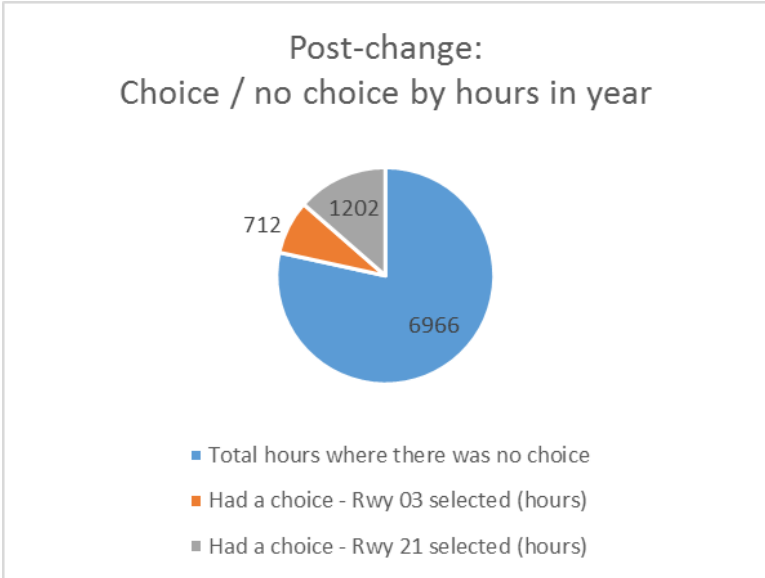
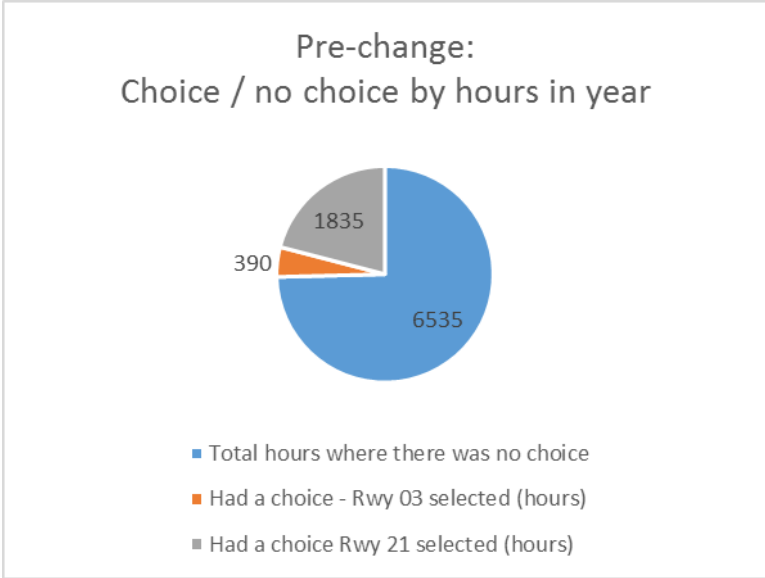
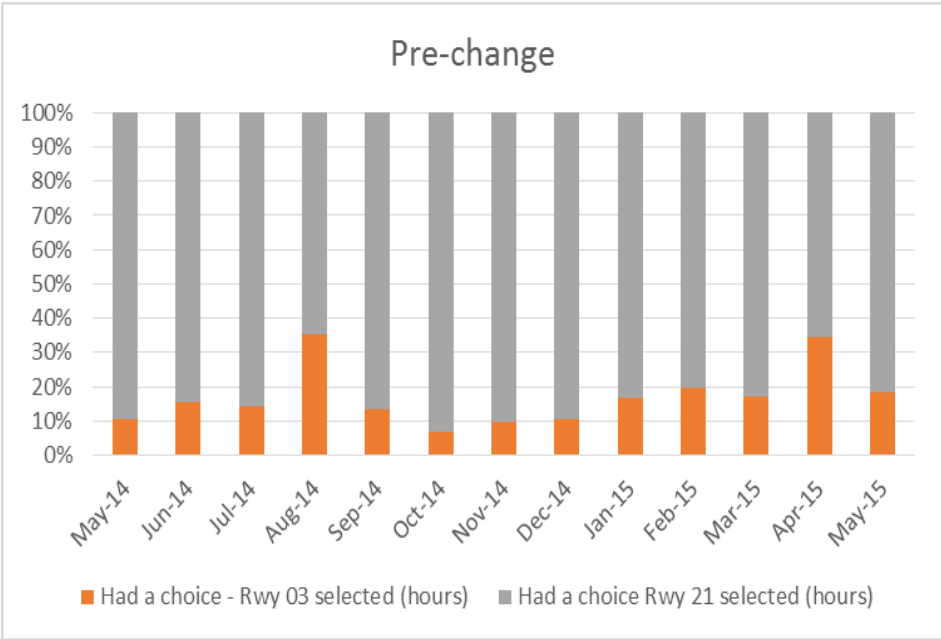


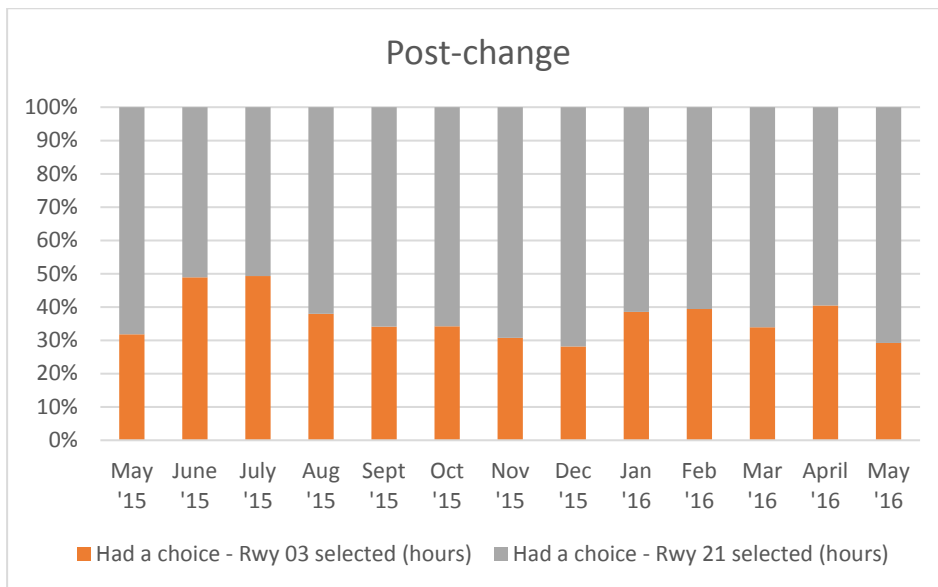
Table 3 below shows runway selection decisions broken down into months before and after the change. It shows the percentage of hours Runway 21 and Runway 03 were each selected in those hours where there was a choice of runway.

Table 3: Runway selection before and after change - percent

Prior to change	Hours where ATC had no choice (%)	Hours where ATC had choice and selected Rwy 03 (%)	Hours where ATC had choice and selected Rwy 21 (%)	After change	Hours where ATC had no choice (%)	Hours where ATC had choice and selected Rwy 03 (%)	Hours where ATC had choice and selected Rwy 21 (%)
May 14	70.83	3.13	26.04	May 15	77.08	7.29	15.63
June 14	75.97	3.75	20.28	June 15	75.28	12.08	12.64
July 14	77.42	3.23	19.35	July 15	81.45	9.14	9.41
Aug 14	75.00	8.87	16.13	Aug 15	74.87	9.54	15.59
Sep 14	69.86	4.03	26.11	Sep 15	76.81	7.92	15.28
Oct 14	74.73	1.75	23.52	Oct 15	74.87	8.60	16.53
Nov 14	77.08	2.22	20.69	Nov 15	81.94	5.56	12.50
Dec 14	81.99	1.88	16.13	Dec 15	82.80	4.84	12.37
Jan 15	75.67	4.03	20.30	Jan 16	73.52	10.22	16.26
Feb 15	72.77	5.36	21.88	Feb 16	81.75	7.18	11.06
Mar 15	67.61	5.51	26.88	Mar 16	77.82	7.53	14.65
Apr 15	78.61	7.36	14.03	Apr 16	80.42	7.92	11.67
May 15	68.06	5.86	26.08	May 16	80.24	5.78	13.98
Total	74.60	4.45	20.95	Total	78.45	8.02	13.54

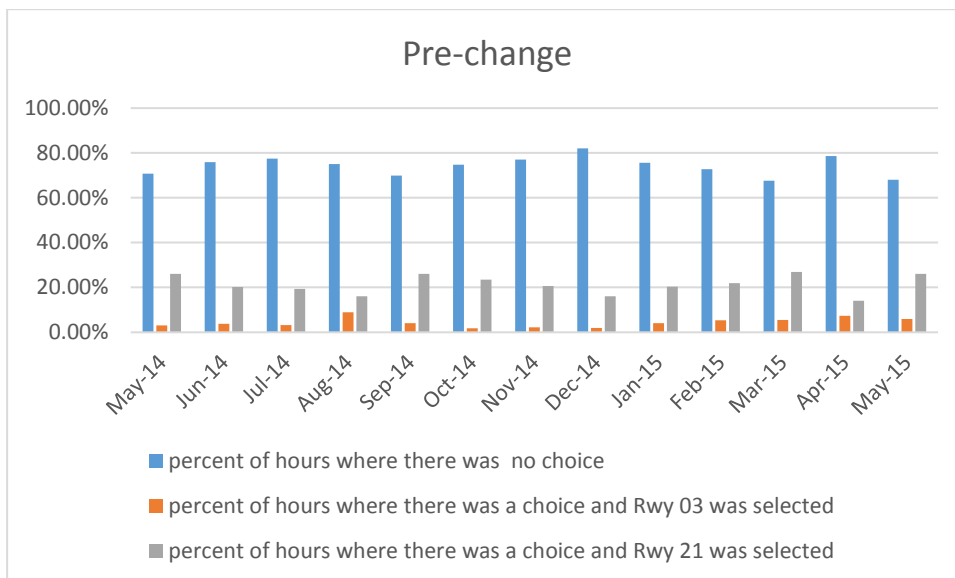
These percentages are also illustrated on the charts below:

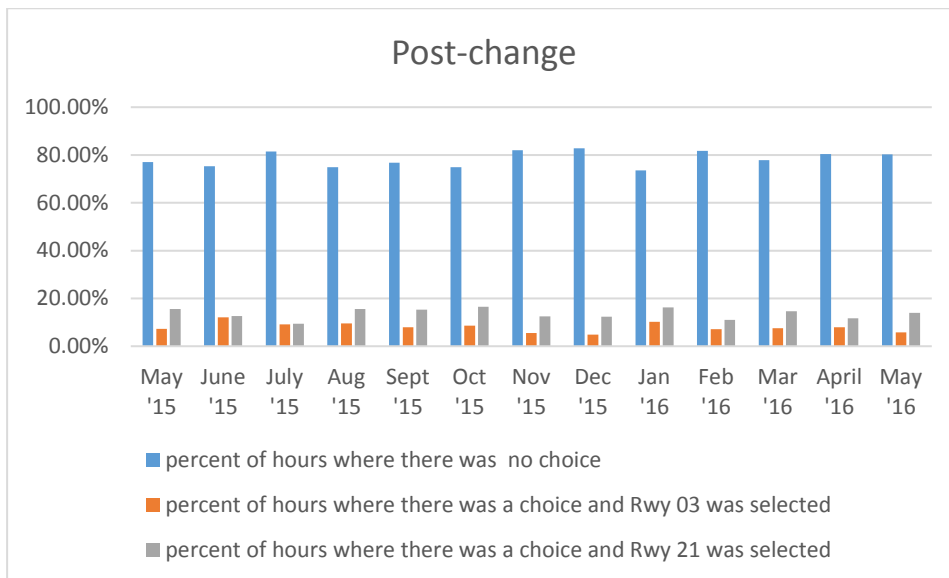




In the post-change period there was a slightly greater percentage of hours where there was no choice available: 78 per cent compared to 75 per cent pre-change.

The following charts illustrate by month the percentage of hours where there was no choice available to air traffic control, compared to the percentage of hours where there was a choice, for both pre and post change periods.





When reviewing the data in the sections 5.2.3 to 5.2.5 it is important to take into account the findings above that no choice of runway was available 78 per cent of the time during the post-change period.

5.2.2 Other factors affecting runway usage

Runway closures

Perth Airport was conducting runway maintenance and upgrades in the time periods surveyed. This resulted in an increased use of the crossing runway at times when the main runway was closed, and vice versa. Runway 06/24 use in particular increased as a result during the weekend and daytime with data showing higher use than would have otherwise occurred. The schedule was as follows:

	Runway 03/21	Runway 06/24
From 9 May 2015 (ongoing)	Closed every second Saturday between 7:00 am and 12:00 pm	
9 October – 29 November 2015	Closed between 7.30 am and 5.30 pm on Fridays, Saturdays and Sundays	
4 – 9 April 2016	Closed between 7.30 am and 5.00 pm	
11 – 19 April 2016		Closed between 11.30 pm and 5.00 am
20 April – 4 June 2016	Closed between 7.30 am and 5.00 pm	
1 – 6 August 2016	Closed between 7.30 am and 5.00 pm	
8 – 13 August 2016		Closed between 11.30 pm and 5.00 am
15 August – 3 September	Closed between 7.30 am and 5.00 pm	

Seasonal variations

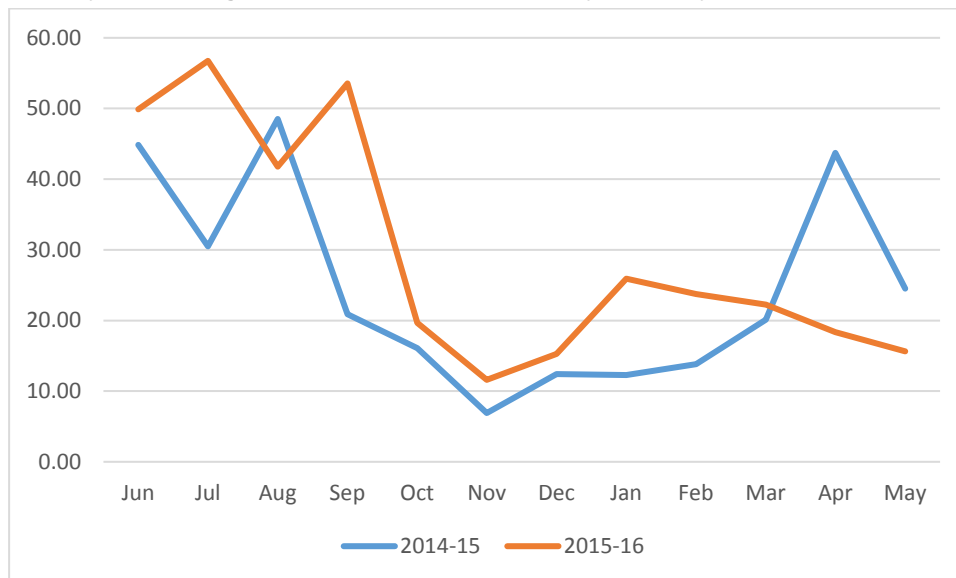
Because aircraft must generally take off and land into the wind, Perth's seasonal wind patterns affect runway use. The charts in sections 5.2.3 to 5.2.5 illustrate the peaks and troughs in runway usage.

5.2.3 Guildford end movement data

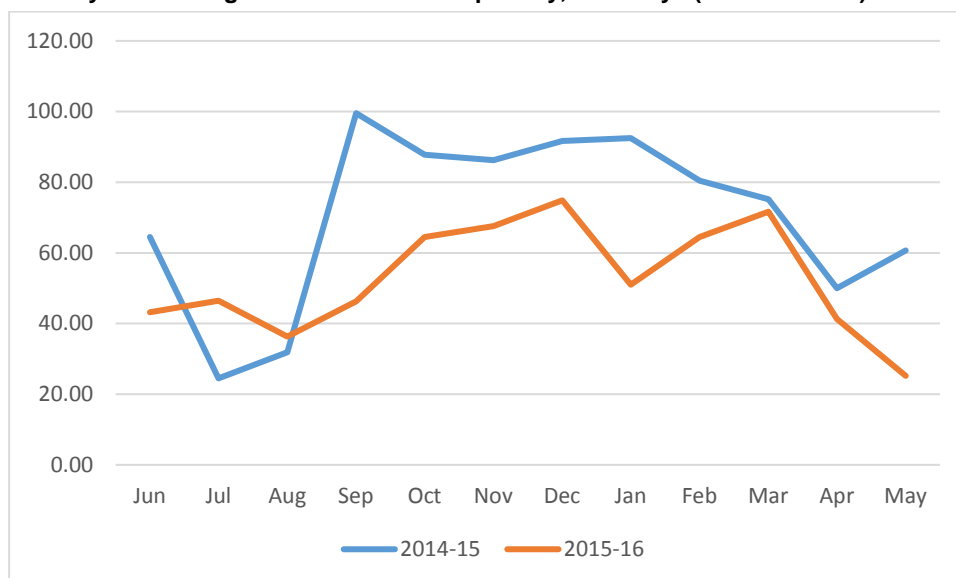
The Guildford runway end is affected by arrivals to Runway 21 and departures from Runway 03.

6 am to 10 pm weekdays

Runway 03 – average number of departures per day, weekdays (Guildford end)

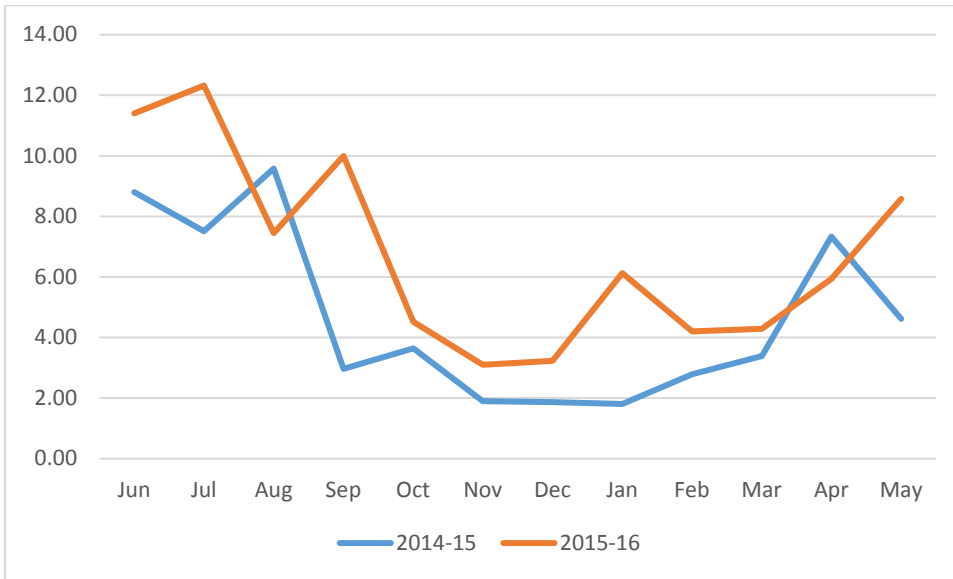


Runway 21 – average number of arrivals per day, weekdays (Guildford end)

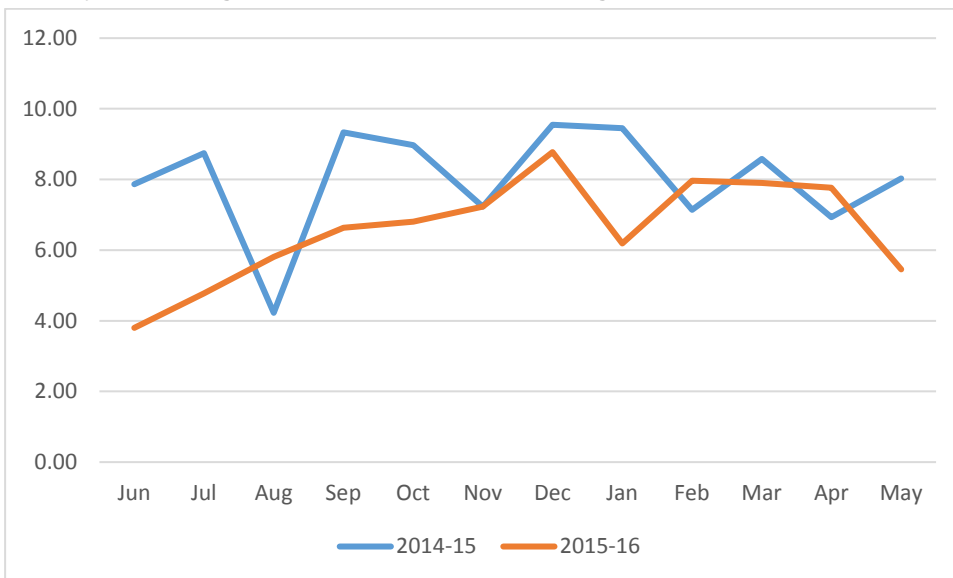


10 pm to 6 am weeknights

Runway 03 – average number of departures per weeknight (Guildford end)

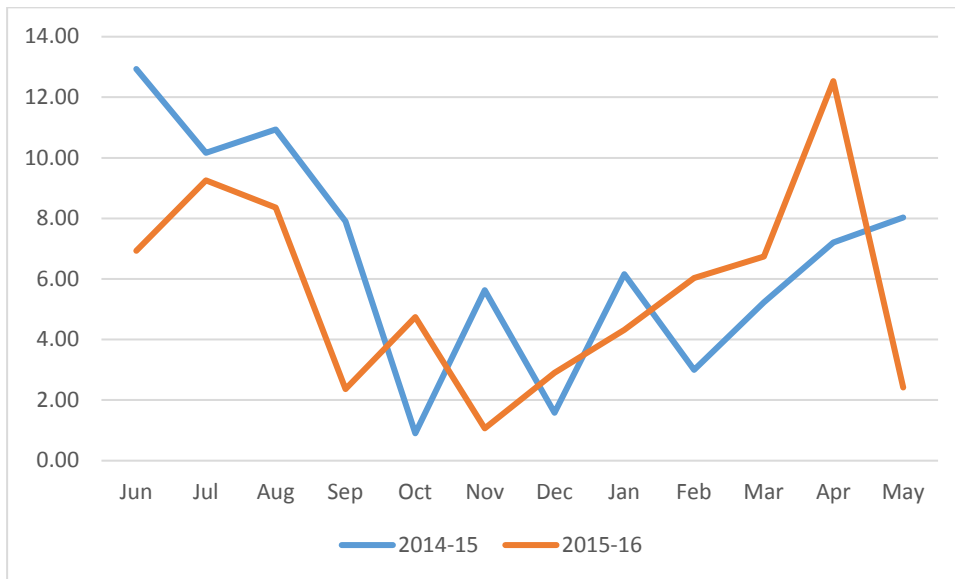


Runway 21 – average number of arrivals per weeknight (Guildford end)

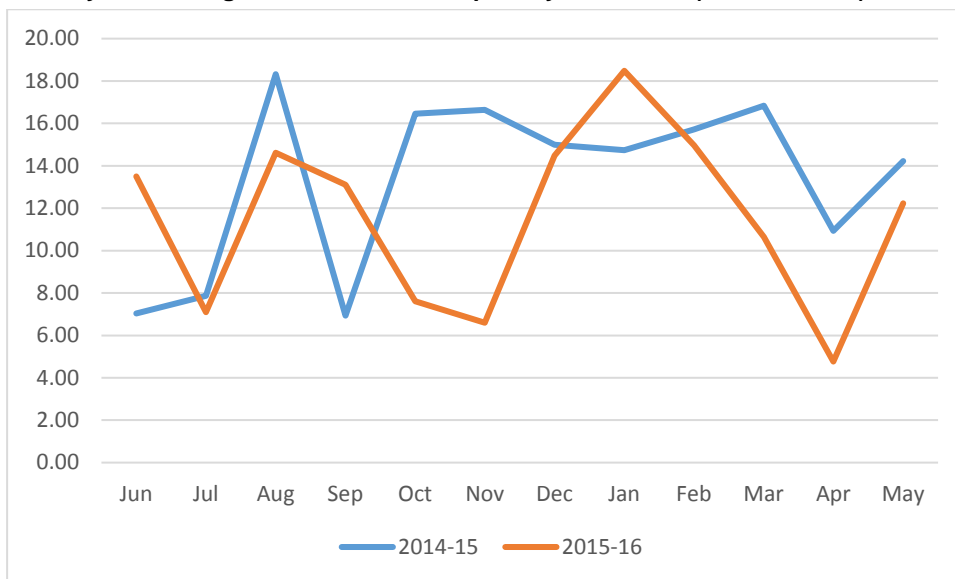


6 am to 10 pm weekends

Runway 03 – average number of departures per day, weekends (Guildford end)

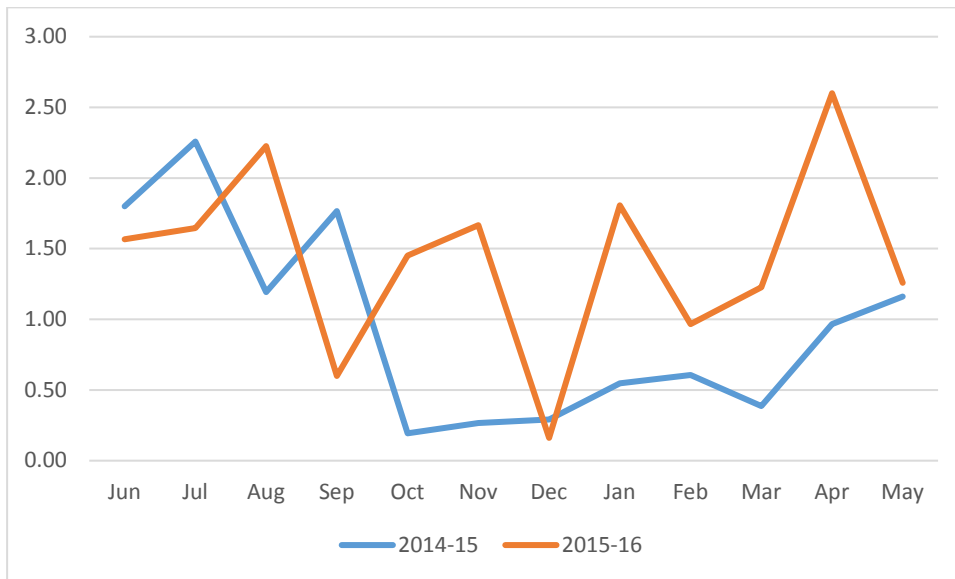


Runway 21 – average number of arrivals per day, weekends (Guildford end)

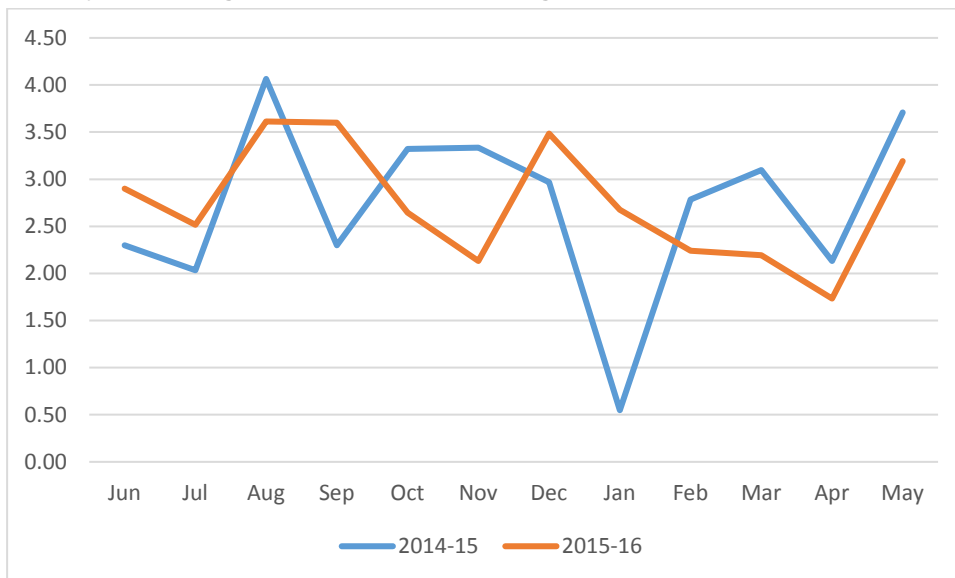


Weekends 10 pm to 6 am

Runway 03 – average number of departures per night, weekends (Guildford end)

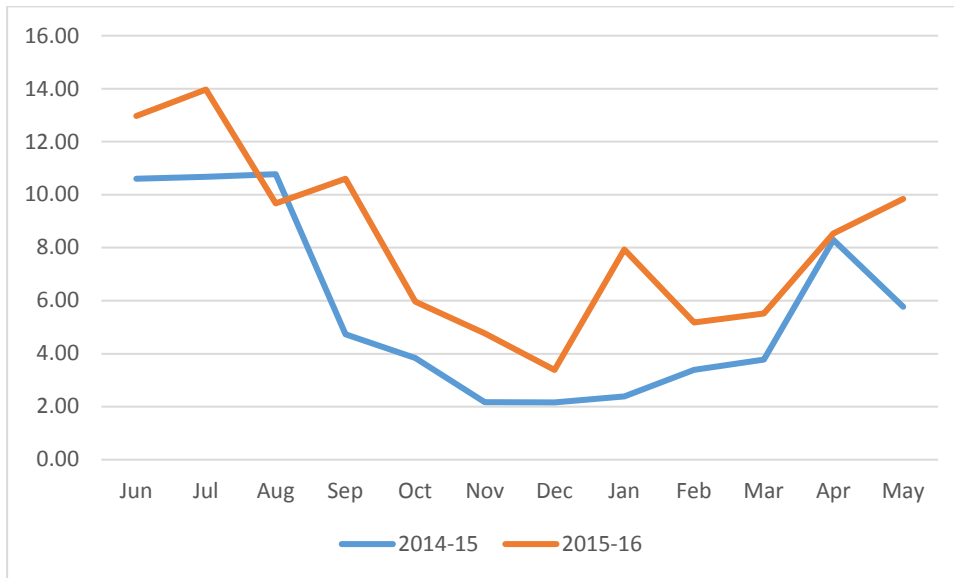


Runway 21 – average number of arrivals per night, weekends (Guildford end)

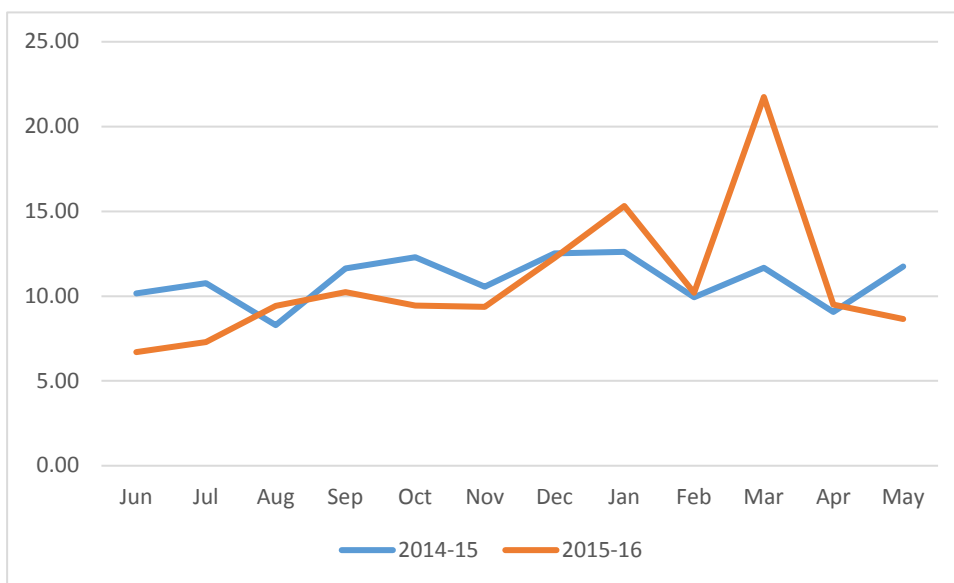


All nights

Runway 03 – average number of departures at night



Runway 21 – average number of arrivals at night

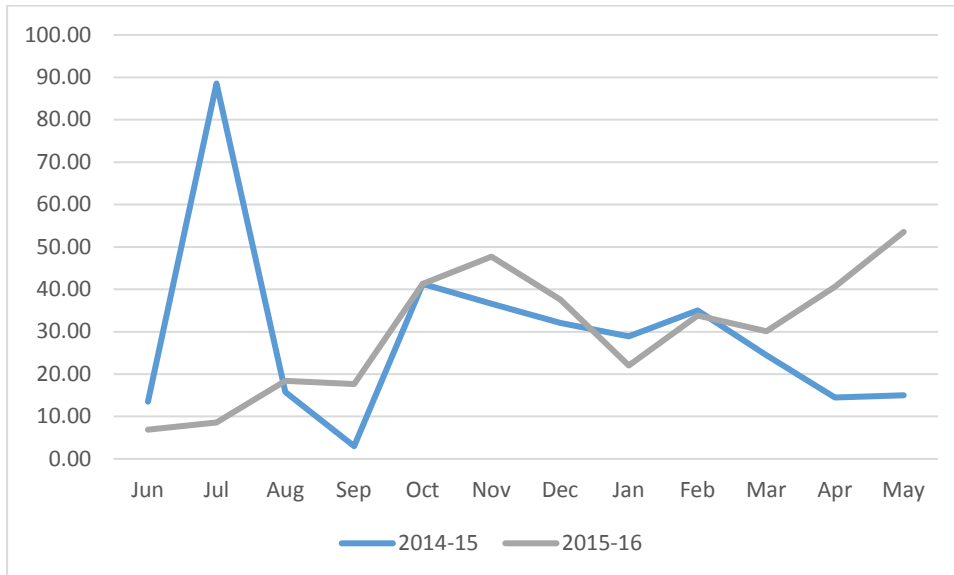


5.2.4 Greenmount end movement data

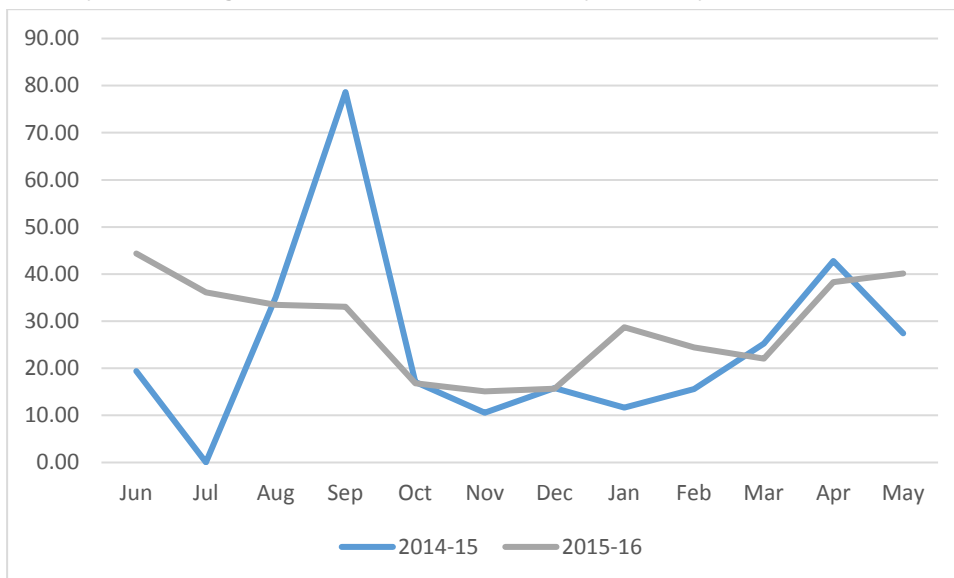
The Greenmount runway end is affected by arrivals to Runway 24 and departures from Runway 06.

Weekdays 6 am to 10 pm

Runway 24: average number of arrivals per day, weekdays (Greenmount end)

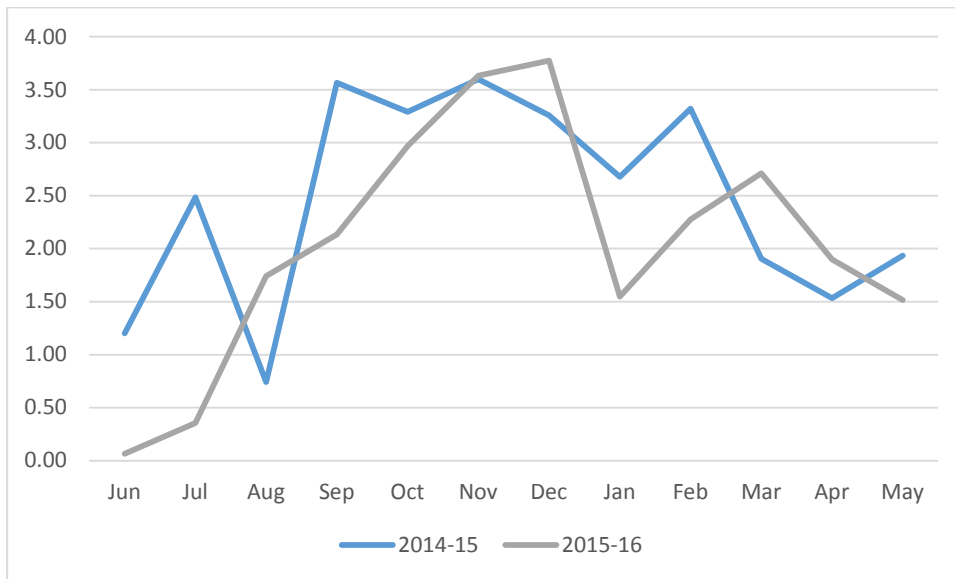


Runway 06 – average number of departures per day, weekdays (Greenmount end)

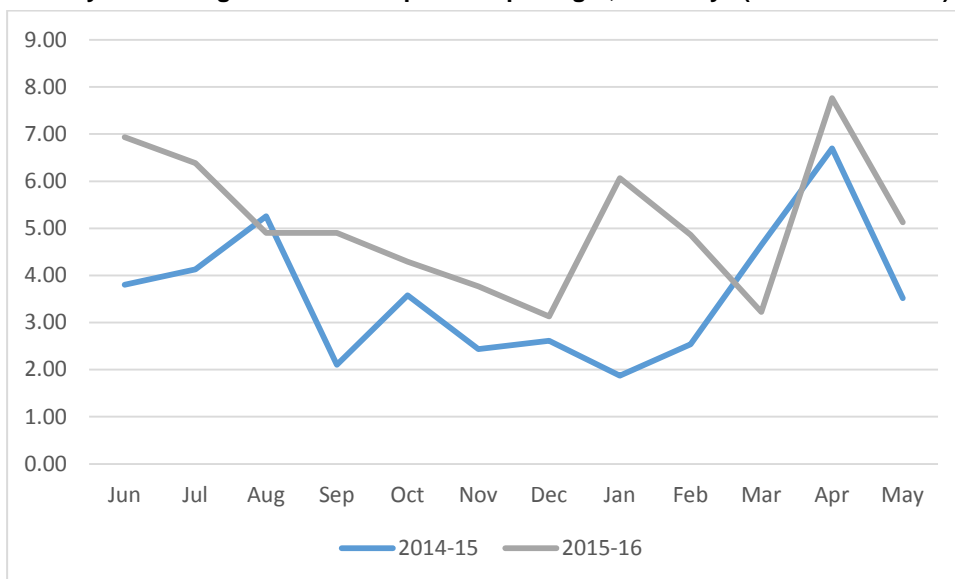


Weeknights 10 pm to 6 am

Runway 24: average number of arrivals per night, weekdays (Greenmount end)

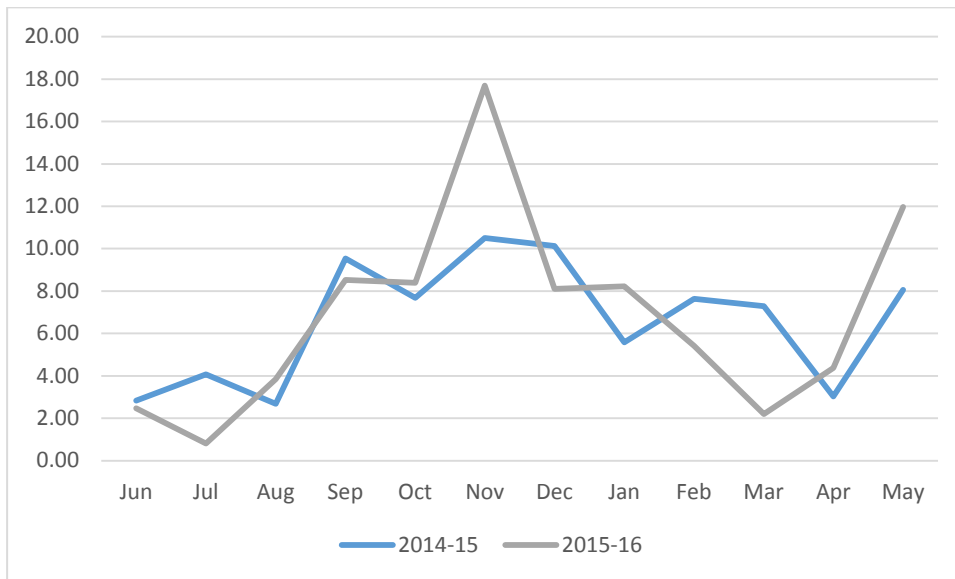


Runway 06 - average number of departures per night, weekdays (Greenmount end)

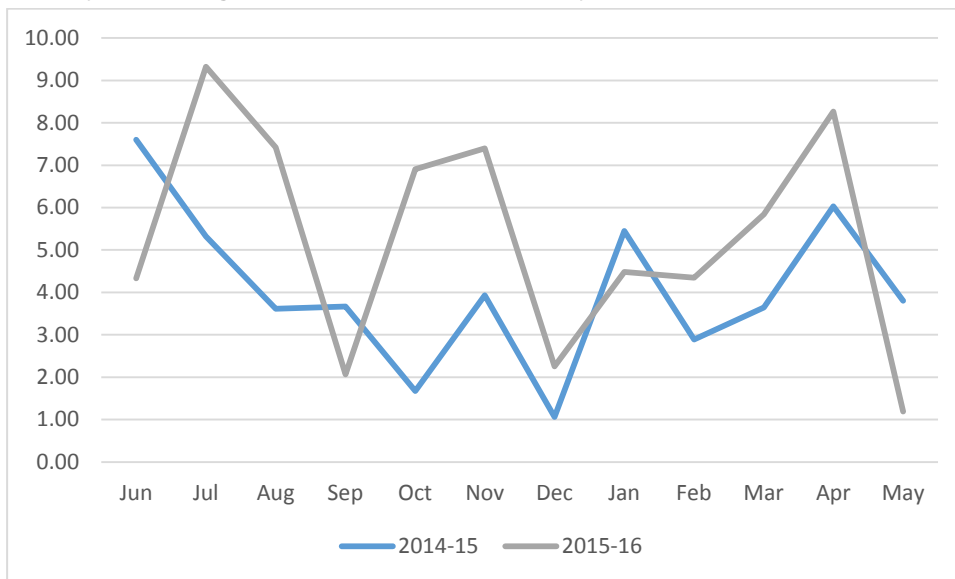


Weekends 6 am to 10 pm

Runway 24 – average number of arrivals per day, weekends (Greenmount end)

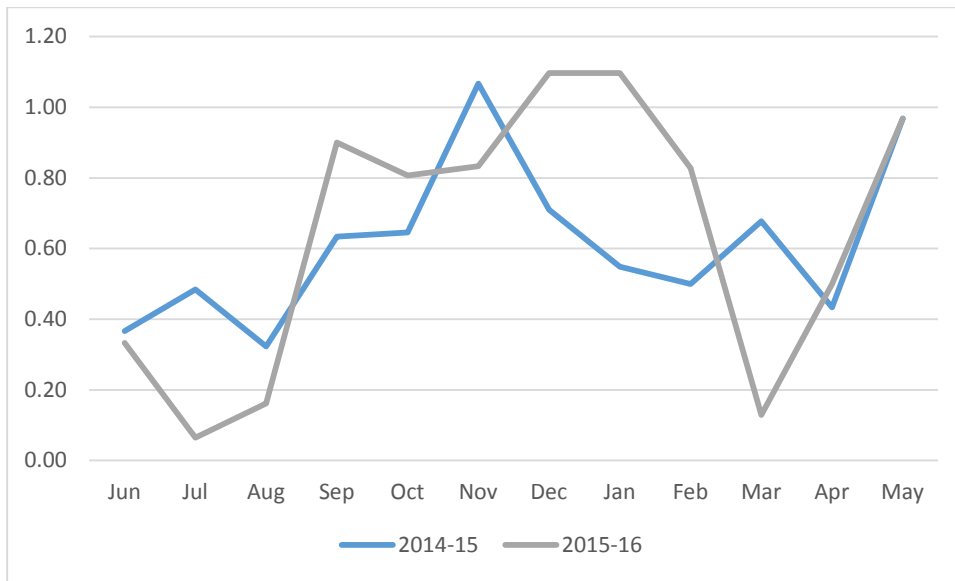


Runway 06 - average number of departures per day, weekends (Greenmount end)

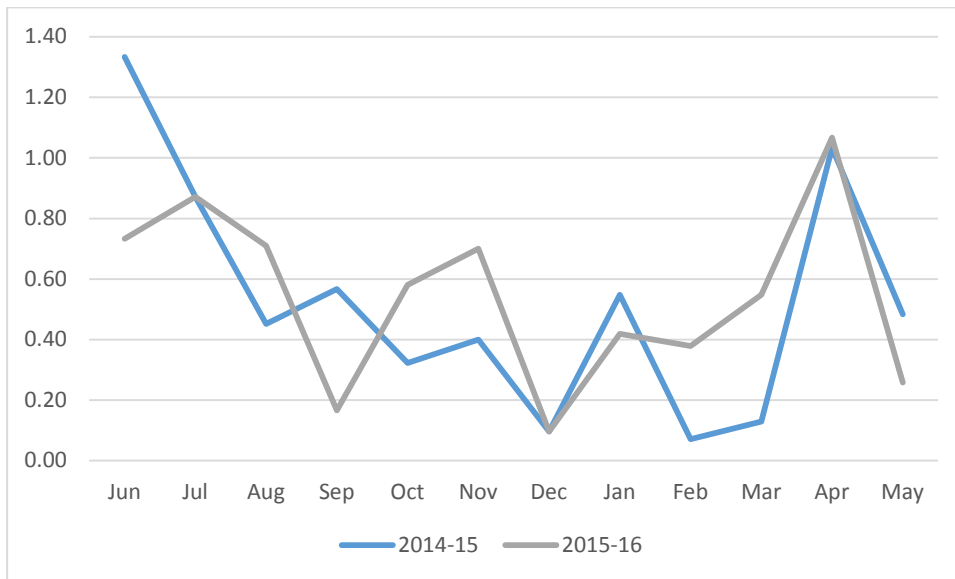


Weekends 10 pm to 6 am

Runway 24 – average number of arrivals per night, weekends (Greenmount end)

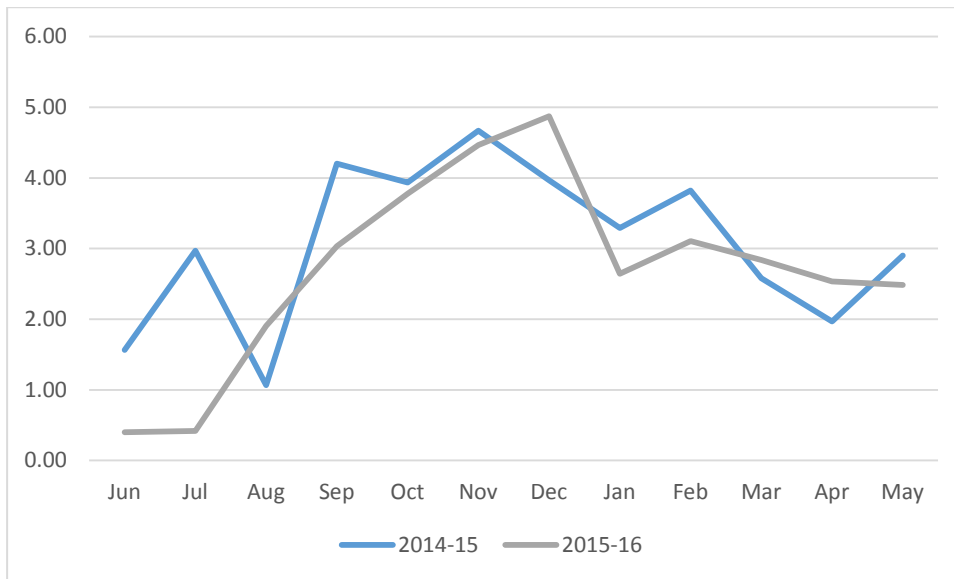


Runway 06 – average number of departures per night, weekends (Greenmount end)

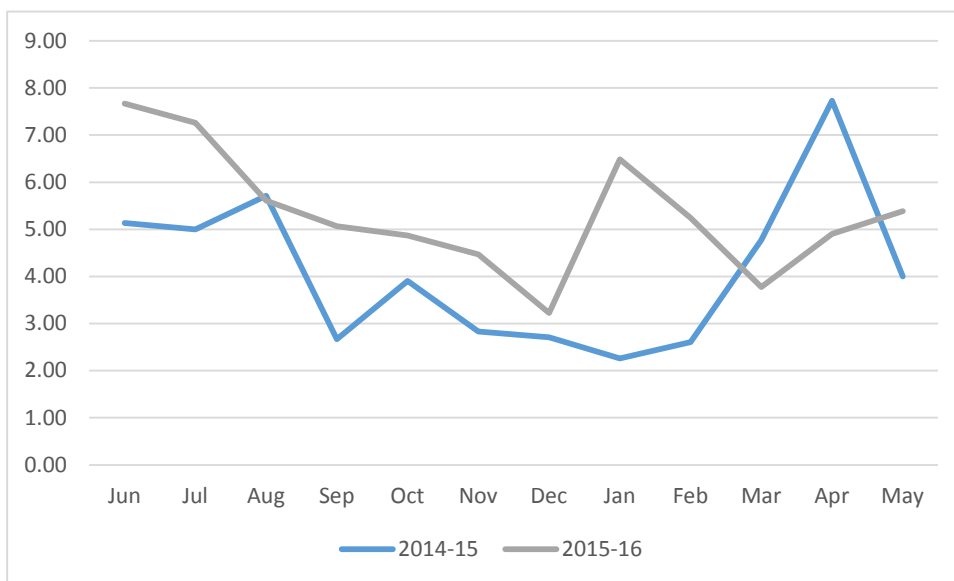


All nights

Runway 24 – average number of arrivals at night



Runway 06 – average number of departures at night

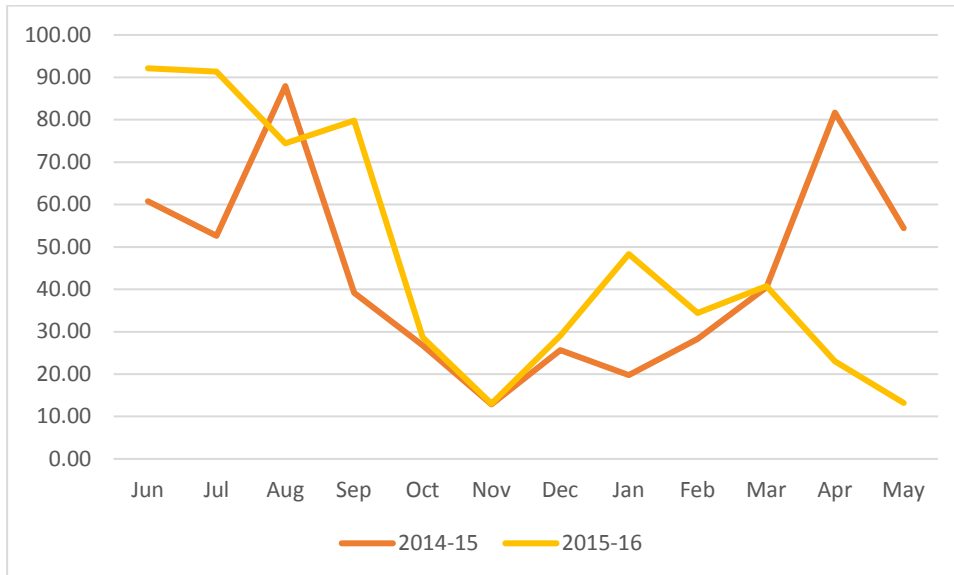


5.2.5 Queens Park end movement data

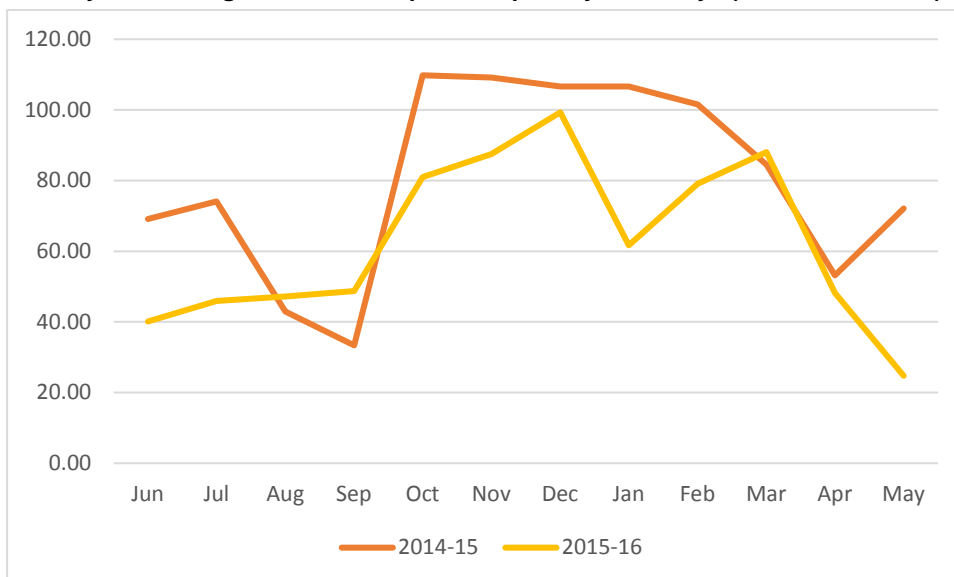
The Queens Park runway end is affected by departures from Runway 21 and arrivals to Runway 03.

Weekdays 6 am to 10 pm

Runway 03 – average number of arrivals per day, weekdays (Queens Park end)

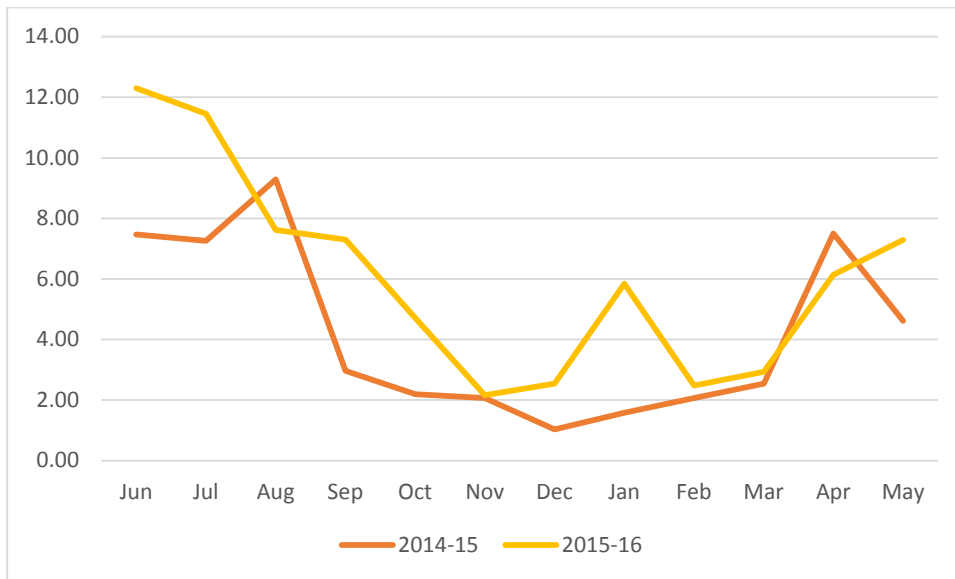


Runway 21 – average number of departures per day, weekdays (Queens Park end)

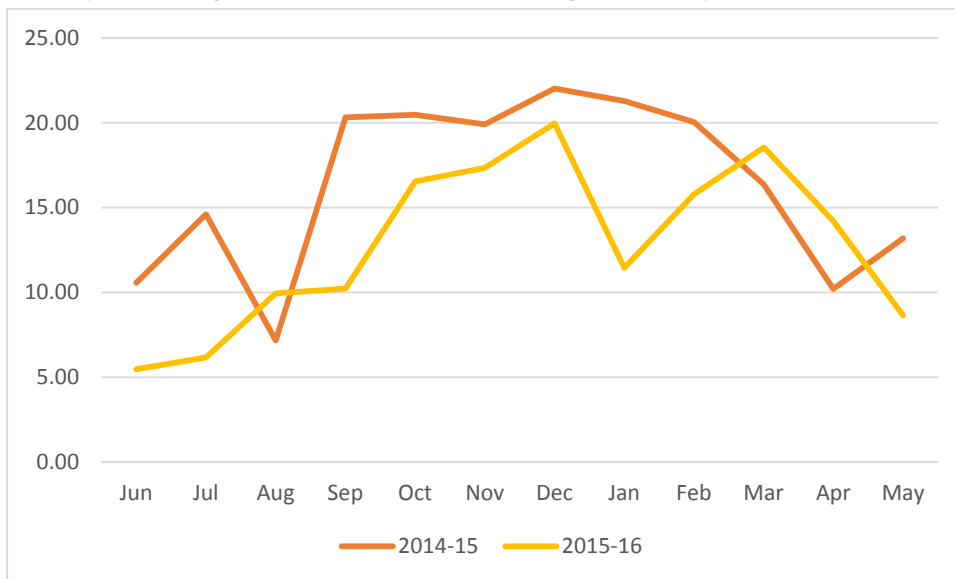


Weeknights 10 pm to 6 am

Runway 03: average number of arrivals per night, weekdays (Queens Park end)

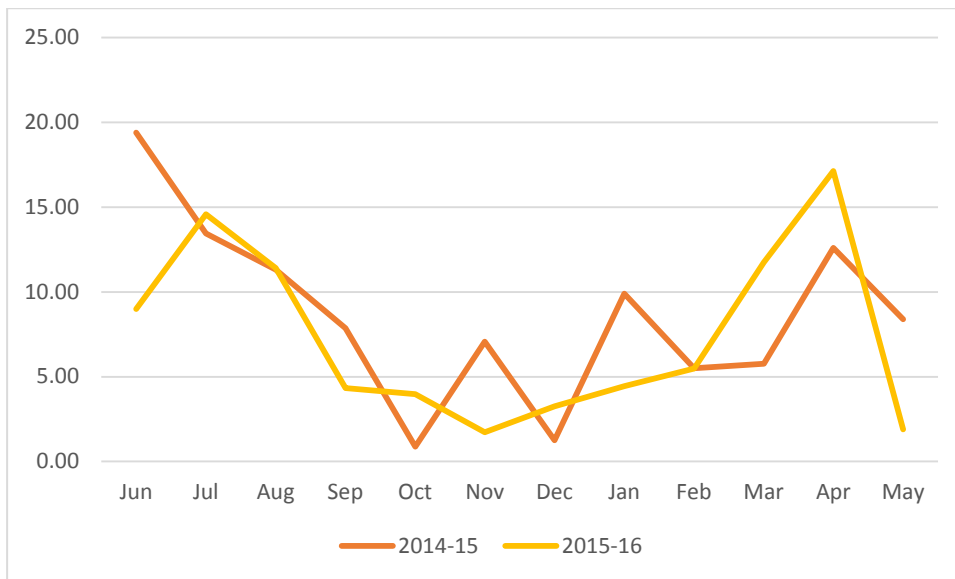


Runway 21: average number of departures per night, weekdays (Queens Park end)

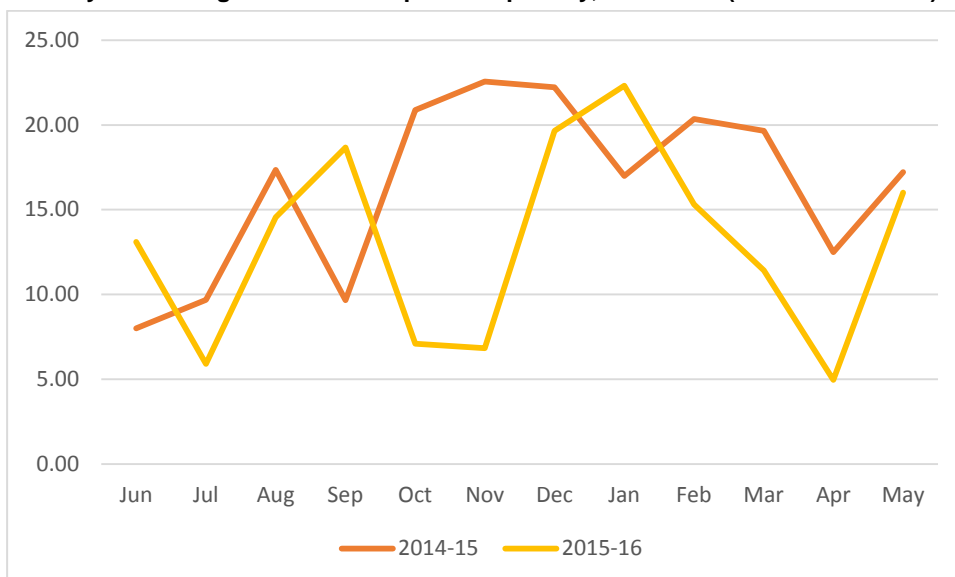


Weekends 6 am to 10 pm

Runway 03 – average number of arrivals per day, weekends (Queens Park end)

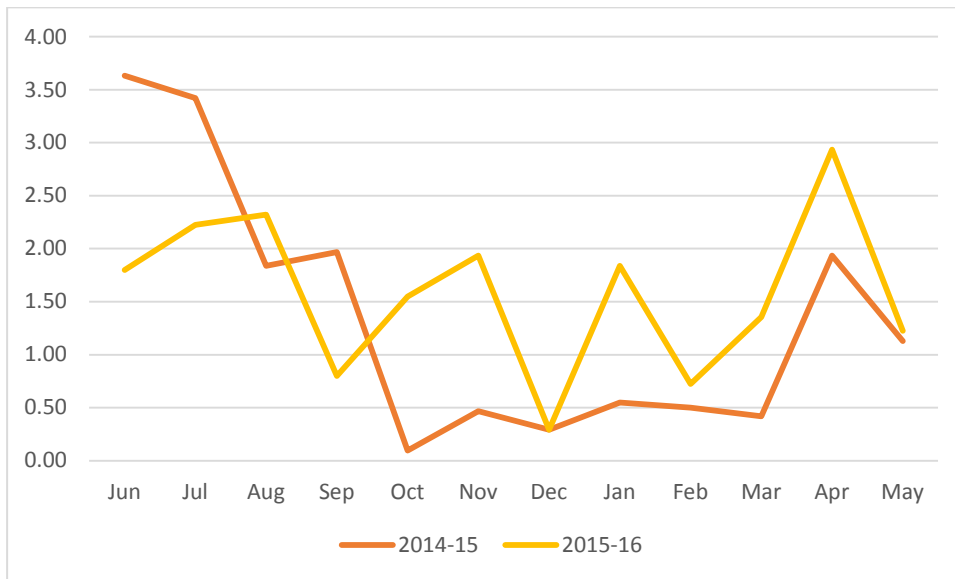


Runway 21 - average number of departures per day, weekends (Queens Park end)

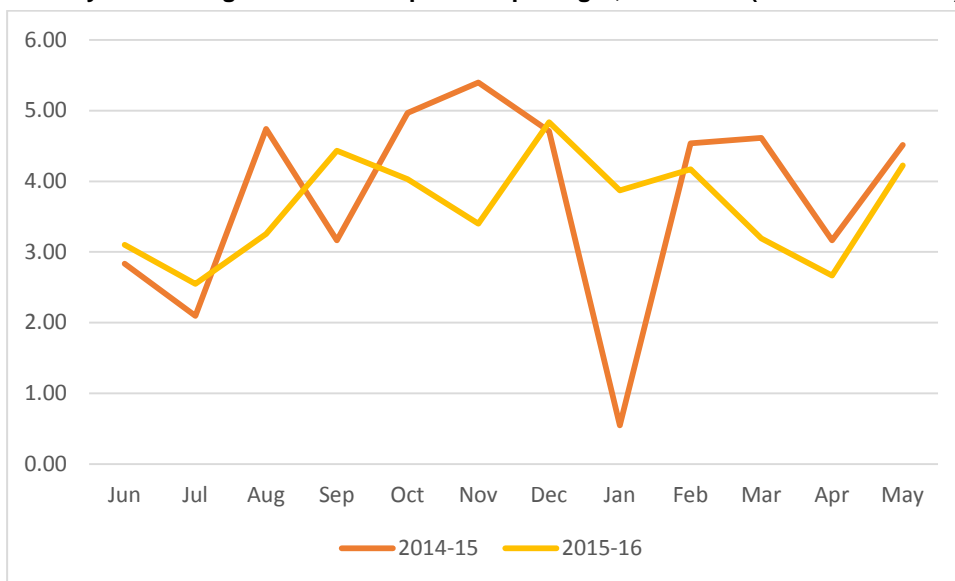


Weekends 10 pm to 6 pm

Runway 03 – average number of arrivals per night, weekends (Queens Park end)

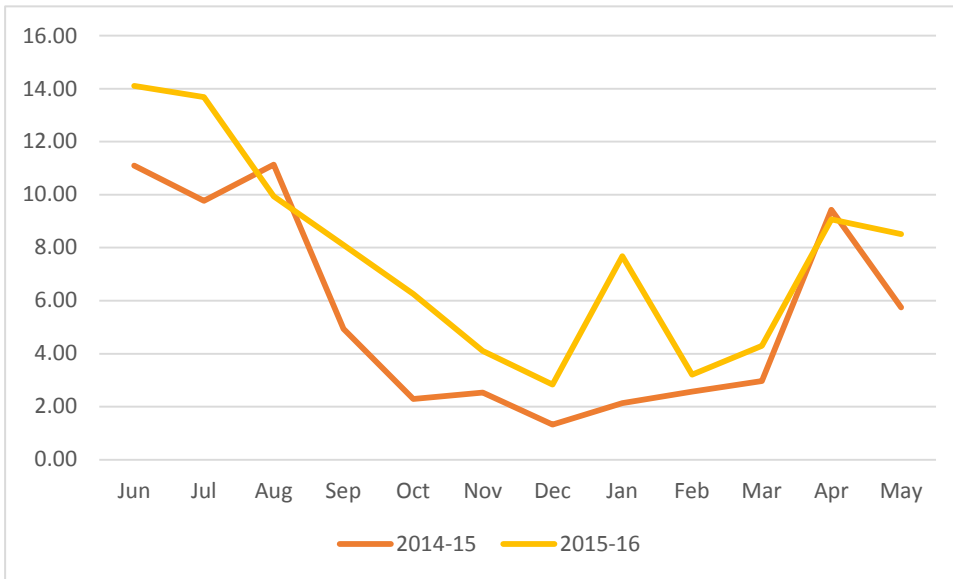


Runway 21 – average number of departures per night, weekends (Queens Park end)

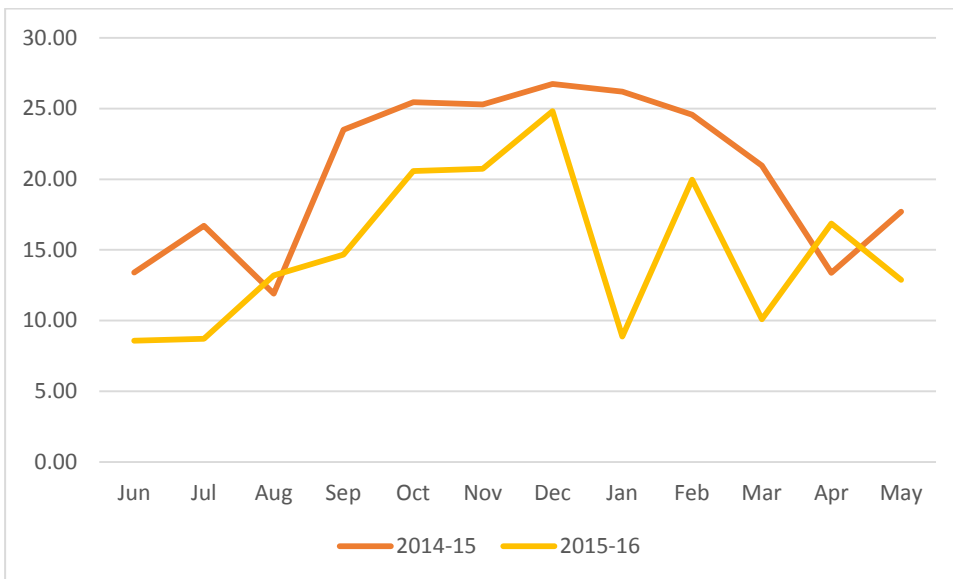


All nights

Runway 03 – average number of arrivals at night



Runway 21 – average number of departures at night



5.2.6 Respite

To determine periods of respite at night, actual movement figures for each night were examined. The number of occasions where no movements were recorded between 10 pm and 6 am for each runway were tallied.

The concept of night respite is relevant to areas that are affected by one type of operation only. For example, areas to the south-west of Perth Airport are affected by Runway 21 departures but are not affected when the opposite runway direction is used for Runway 03 arrivals. Conversely, the area of Canning Vale is affected by arrivals to Runway 03 but not by the majority of departures from Runway 21 which turn east or west before reaching Canning Vale. Areas affected by both arriving and departing aircraft, such as Queens Park and Guildford, do not receive respite nights as they are overflowed regardless of runway selection. Therefore, while the data in this section refers to Runway 03 and Runway 21, it is only relevant to the subset of suburbs affected by just one of these runway directions.

Table 4: Total number of nights of respite between 10 pm and 6 am, per runway

Runway	Pre-change	Post-change	Difference
Runway 03	170	137	-33
Runway 21	59	83	24

Table 4 above shows that suburbs such as Canning Vale received 33 fewer nights of respite while suburbs such as Shelley received an additional 24 nights of respite. While this appears to show a considerable change, given that wind conditions and other factors provided that an active choice by air traffic control occurred only 22 per cent of the time on average, the change is likely to be considerably less than shown. Table 5 takes this into account.

Table 5: Actual difference in number of nights of respite between 10 pm and 6 am, compared to difference when ATC had a choice

Runway	Difference (actual)	Difference when ATC had a choice
Runway 03	-33	-7
Runway 21	24	5

6. Findings

6.1 Operational data

6.1.1 Weekday movements

6 am to 10 pm

Movements to and from Runway 21 decreased by an average of 17 flights a day on weekdays between 6 am and 10 pm. On Runway 03, arrivals increased by an average of three flights a day and departures by an average of five flights a day. Departures from Runway 06 increased by an average of four flights a day. Arrivals to Runway 24 increased by less than one flight per day. It should be noted that the increased average numbers of arrivals to Runway 06 and departures from Runway 24 result from the increased use of the south-western end of Runway 06/24 throughout 2015 and 2016 due to the closure of the main runway for maintenance (see 5.2.2).

Table 6: Difference in average number of movements per day, weekdays

Runway:	03	06	21	24
Arrivals	3.2	5.0	-17.7	0.8
Departures	5.0	4.1	-17.6	6.6

10 pm to 6 am

For weekday nights, on average the number of departures from Runway 21 decreased by under four flights per night while departures from Runways 03 and 06 increased by approximately two flights per night each. For arrivals there was an increase of less than two flights per night on Runway 03. Arrivals to Runways 21 decreased by an average of one flight per night and there was little change overall to use of Runway 24.

Table 7: Difference in average number of movements per night, weekdays

Runway:	03	06	21	24
Arrivals	1.9	0.3	-1.4	-0.4
Departures	2.1	1.9	-3.5	0

6.1.2 Weekend movements

6 am to 10 pm

The only increases in average movements during weekend days were for Runway 06 with an increase of one flight a day for both arrivals and departures and Runway 24 with an increase of one flight per day. Runway 21 experienced reductions of an average of two arrivals per day and three departures. Runway 03 had an average of one fewer arrival and departure each day. As discussed above, the increase in arrivals to Runway 06 is largely due to increased use of the south-western end of Runway 06/24 while the main runway was closed for maintenance (see 5.2.2).

Table 8: Difference in average number of movements per day, weekends

Runway:	03	06	21	24
Arrivals	-1.2	1.5	-1.9	0.3
Departures	-1.0	1.3	-3.4	1.2

10 pm to 6 am

Overall there was very little difference in the average number of movements at night during the weekend.

Table 9: Difference in average number of movements per night, weekends

Runway:	03	06	21	24
Arrivals	0.2	0	0	0
Departures	0.5	0	-0.1	-0.1

6.1.3 All nights

For all nights (weekdays and weekends), there was a reduction of night time departures from Runway 21 of an average of 5.5 flights per night. The resulting increase of traffic on other runways was shared between Runways 03 and 06 with an increase of departure flights by an average of 2.5 and one flight a night respectively. There was an increase of two arriving flights a night on Runway 03.

Table 10: Difference in average number of movements per night

Runway:	03	06	21	24
Arrivals	2.2	0	-0.1	-0.4
Departures	2.5	1.2	-5.5	0

6.1.4 Comparison with Environmental Assessment forecasts

Runway	Operation type	Environmental Assessment Forecast	Outcome
Runway 03	Arrivals	12 more arrivals during day on weekend	Average arrivals per day decreased by 1.2
		3 more arrivals at night	Average arrivals per night increased by 2.2
	Departures	11 more departures per day at weekends	Average departures per day decreased by 1
		2 more departures at night	Average departures per night increased by 2.5
Runway 06	Departures	5 more departures per day at weekends	Average departures increased by 1.3 at weekends
		1 more departure at night	Average departures increased by 1.2 at night
Runway 21	Arrivals	9 fewer arrivals per day at weekends	Average arrivals per day decreased by 1.9 at weekends
		3 fewer arrivals at night	Average arrivals per night decreased by 0.1
	Departures	15 fewer departures during day on weekend	Average departures per day decreased by 3.4 at weekends
		3 fewer departures at night	Average number of departures per night decreased by 5.5
Runway 24	Arrivals	3 fewer per day at weekend	Average arrivals increased by 0.3 at weekends
		1 fewer at night	Average arrivals decreased by 0.4 at night

7. Conclusions

The objective of the preferred runway change was to reflect actual runway use due to operational requirements, and to provide noise improvement benefits for residential areas close to the north eastern end of the cross runway (near Greenmount), the southern end of the main runway (near Queens Park) and to the southwest of the airport (along the Swan River).

7.1 Runway use and noise impacts

During the post-change period reviewed, this assessment found that air traffic control had no choice of runway 78 per cent of the time on average due to wind conditions or runway availability. Throughout the year this percentage varied, from a low of 74 per cent (January 2016) up to a high of 83 (December 2015). For six months of the year no choice was available in over 80 per cent of hours. For the other six months of the year no choice was available for 74 per cent to 78 per cent of hours.

This means that an active choice of runway by air traffic control contributed on average only 22 per cent of the changes set out in the findings of this assessment. This must be taken into account in assessing the impacts of the preferred runway scheme change.

This 22 per cent figure highlights the extent to which factors such as weather and wind, runway closures and operational requirements as set out in 1.1 have on runway selection by essentially taking away the opportunity for choice of runway, and how relatively little room this leaves for implementation of the preferred runway system by air traffic control.

7.1.1 Guildford runway end

For Guildford, the net change in average movements on weekdays was a decrease of 12, comprising seven more departures and 19 fewer arrivals.

On weekends the net change was an average of three fewer movements, comprising a reduction of half of one departure and two fewer arrivals.

Guildford experienced slightly more departures at night on weekends than forecast (2.5 compared to two). The forecast increase of daytime departures at weekends did not occur. Similarly the forecast reduction in arrivals on weekends during the day was much lower in actuality (two flights compared to forecast nine). There was little change in arrivals at night despite the forecast reduction of three arrivals.

Over seven days, there was a net reduction of 16.5 flights a day on average, comprising an average of 6.5 more departures and 23 fewer arrivals. An active choice by air traffic control is likely to have contributed to a net reduction of only three flights, or two departures and five arrivals.

7.1.2 Greenmount runway end

For Greenmount there was a net increase of an average of six flights on weekdays comprising less than one arrival and six departures. On weekends there was a net increase of two flights most of which were departures.

The increase in daytime departures on weekends was lower than forecast (1.3 compared to five) and the night-time increase in departures was zero, less than the forecast one. There was insignificant change in arrivals.

Over seven days there was a net increase of an average of 13 flights a day comprising four arrivals and ten departures. Taking into account that air traffic control had an active choice of runway only 22 per cent of the time on average, this equates to three flights a day (one arrival and two departures).

This increase is likely to have been caused by the increased use of Runway 06/24 during periods of main runway closure and does not provide assurance as to whether the change resulted in a noise improvement for the Greenmount runway end.

7.1.3 Queens Park runway end

For Queens Park there was a net decrease of 16 flights on weekdays, comprising five additional arrivals and 21 fewer departures. On weekends there was a net reduction of five flights comprising one fewer arrival and four fewer departures.

While there were reductions in departures these were lower than forecast on weekends and slightly higher than forecast at night (5.5 compared to the forecast three).

Over seven days there was a net reduction of an average of 30 flights, made up of four additional arrivals and 34 fewer departures. Of these, an active choice by air traffic control is likely to have accounted for only nine flights, comprising one extra arrival and 7.5 fewer departures. As an increase in arrivals compared to departures represents a noise reduction, a small noise improvement has resulted.

For suburbs to the south of the airport that are affected by arrivals and largely unaffected by departures, such as Canning Vale, there was a net increase of an average of four flights comprising two during the day and two at night. Only one of these flights can be attributed to active runway choice by air traffic control.

The peak in the number of complainants from Canning Vale in quarter two of 2015 occurred during the period immediately before and after the implementation of the preferred runway change. It may reflect the level of anxiety that was present in the community about both the preferred runway change and the proposed change to the night-time southern departure flight path announced in March 2015. Also relevant is the fact that use of Runway 03 tends to peak between May and August each year due to seasonal wind patterns; residents may have interpreted this increased activity as being a result of the preferred runway change rather than a typical seasonal peak. The fact that the number of complainants dropped significantly in quarter three of 2016 compared to 2015 may suggest that community concern about the changes referred to above is decreasing, given that this quarter also spans the seasonal peak period. This would accord with the finding of this study that there has been little actual change overall for Canning Vale.

For those areas to the south that are impacted by departures and not arrivals, the largest noise improvement was realised due to the reduction in number of departures off Runway 21.

7.1.4 Night-time respite

While the raw data on night-time respite appears to show considerable change in complete nights of respite, when it is factored in that air traffic control had an actual choice of runway only 22 per cent of the time, far less change is apparent. The following analysis takes this into account.

Suburbs affected by departures from Runway 21 and not also affected by arrivals to Runway 03 have benefitted most from an increase in respite nights.

Suburbs impacted by Runway 03 arrivals that are unaffected by Runway 21 departures experienced a reduction of seven nights of respite. Whilst this was the largest reduction in respite nights, the net result to the south of the airport is a more even sharing of respite nights.

The primary consideration for noise impact changes for this review are changes to the number of flights and evaluation of the difference of noise levels between departures and arrivals at Greenmount, Queens Park and Guildford runway ends as modelled in the environmental assessment. Night respite is an additional consideration but does not in itself determine the changes in noise impact.

7.2 Reflecting existing operational requirements

For the 12 month period after the preferred runway change, when the wind conditions or runway availability allowed a choice of runway during all time periods, air traffic control nominated Runway 03 for 8.02 per cent of the time and Runway 21 for 13.54 per cent of time. Prior to the change Runway 03 was nominated 4.45 per cent of the time and Runway 21 was nominated 20.95 per cent of the time. This degree of change to runway nomination when there was a choice is less than predicted in the environmental assessment and demonstrates that runway selection is heavily influenced by operational requirements.

7.3 Objectives assessment summary

Airservices considers that the Perth Preferred Runway Change has met the objectives of reflecting runway selection based on operational requirements, and providing incremental noise improvement. The degree of noise improvement was less than anticipated and may have been affected by the runway closures after the change was implemented.

The degree of change to runway nomination by air traffic control when there was a choice was smaller than expected and demonstrated how influential operational requirements are for runway nomination in Perth.

The most significant change in noise was the reduction in noise impact to areas south of Perth that are impacted by departures and not arrivals due to the reduction in Runway 21 departures.

Areas near Queens Park may have received a very small benefit or neutral outcome due to the noise level difference between arrivals and departures in these areas.

The impact on the Greenmount runway end was considered inconclusive due to the closure of the main runway for works during the assessment period. The impact on this area was expected to be a noise improvement due to an increase in departures relative to arrivals.

Despite the slight reduction in the net number of flights over Guildford, there does not appear to be any noise benefits for this area considering the relative noise levels between departures and arrivals.

Areas to the south of Perth that are affected by arrivals and not departures received a small increase in the number of arriving flights. The degree of change in noise impacts for these areas is slightly less than the improvement in other areas to the south that are affected by departures and not arrivals.