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Winter 2025: Draft assessment of the likely impact of declaring the Wishlist runway capacity

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Contents

01.

Context

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Context

The Irish Aviation Authority (IAA) is responsible for determining the parameters for slot allocation at Dublin Airport.

To ensure that optimal parameters are set, the IAA has instructed Egis to undertake airfield fast time simulations in preparation for the Winter 2025 (W25) season at Dublin airport.

This document provides results from two simulated scenarios:

- W25 flight schedule coordinated to the proposed W25 limits and
- W25 flight schedule coordinated to the existing W24 limits.

02.

Model validation

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Model description

- Based on the model developed to support the coordination committee decisions in 2017 and used since.
- Historically validated against a number of design days from previous seasonal assessments.
- Calibrated against a single day of W24 operations (01 December 2024).
- Run from actual block times to take into account all delays.
- A comparison set of airside performance metrics is provided on following slides.

Busy day simulated for the purpose of model calibration

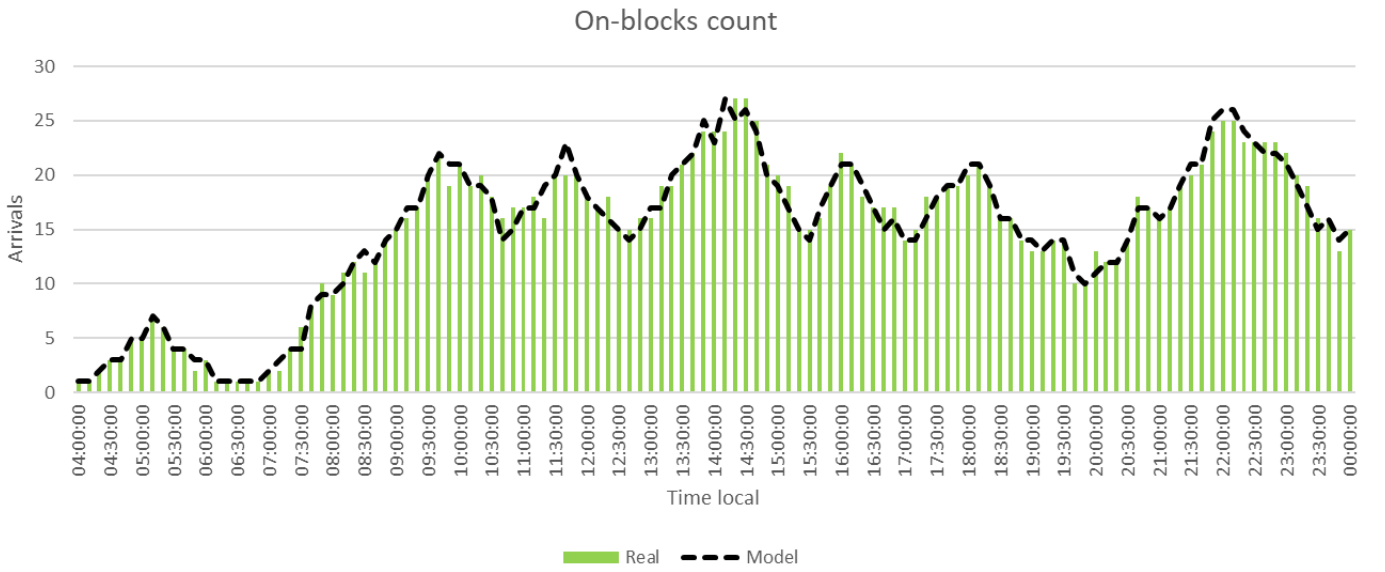
- **01 December 2024**
  - Westerly operations for 100% of the time;
  - Arrivals on 28L only;
  - Departures 28L 2200-0559 UTC (2300-0659 local);
  - Departures 28R 0600-2159 UTC (0700-2259 local);
- **647 flights in total, incl. GA and cargo**
  - 325 arrivals and 322 departures.

Calibration of arrival performance

Metric definition:

Time duration between touch-down and aircraft parking on-blocks.

*This graph is presented as a rolling 10-minute average (value for each time period has been calculated as average of values of all events occurring within the T-60 minutes window from the start of the measurement).

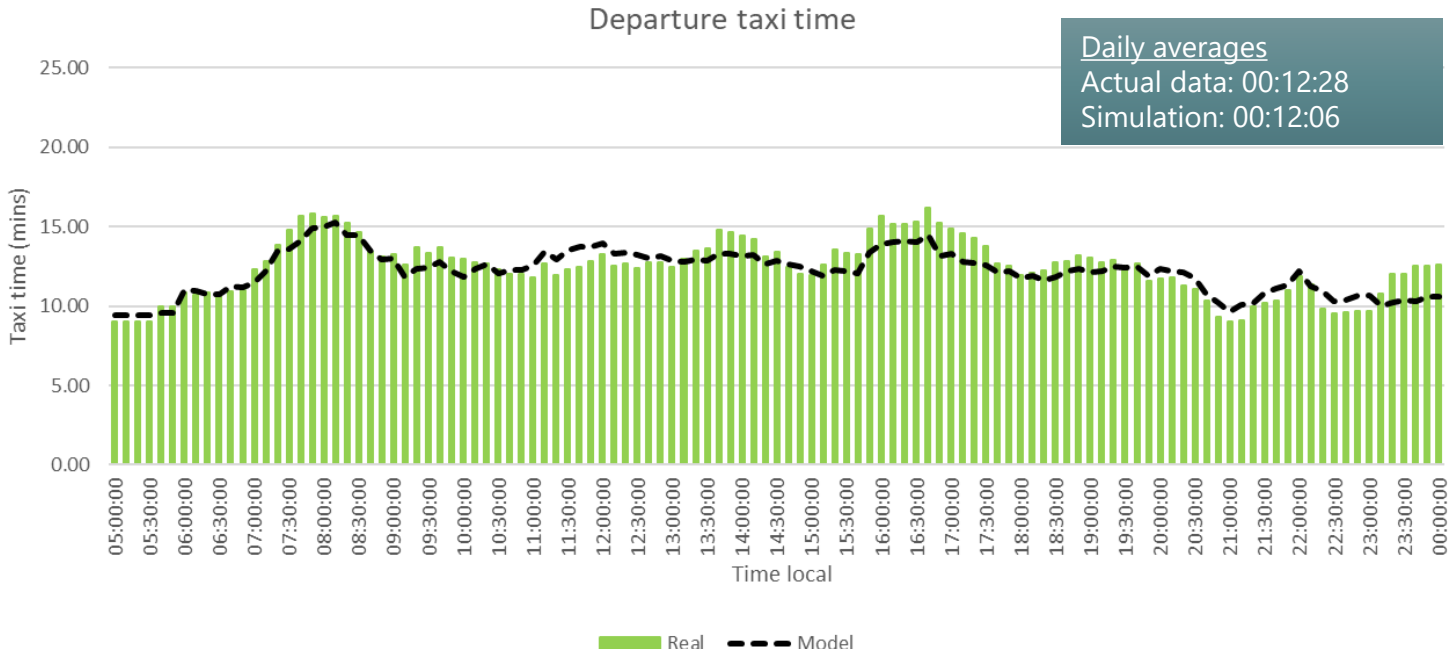


Metric definition:

The number of aircraft that have reached their arrival parking position in the last 10-minute rolling period. The count is incremented when the aircraft reaches its in-blocks position.

* This graph is presented as a rolling 10-minute average (value for each time period has been calculated as average of values of all events occurring within the T-60 minutes window from the start of the measurement).

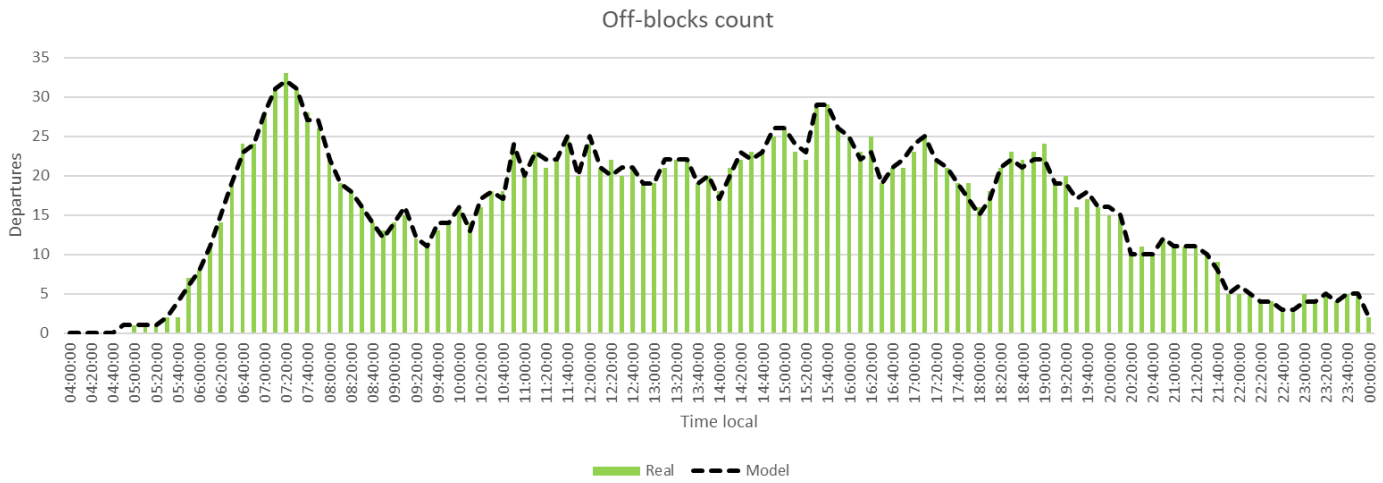
Calibration of departure performance



Metric definition:

Time duration between the off-block time and aircraft lifting off.

*This graph is presented as a rolling 10-minute average (value for each time period has been calculated as average of values of all events occurring within the T-60 minutes window from the start of the measurement).



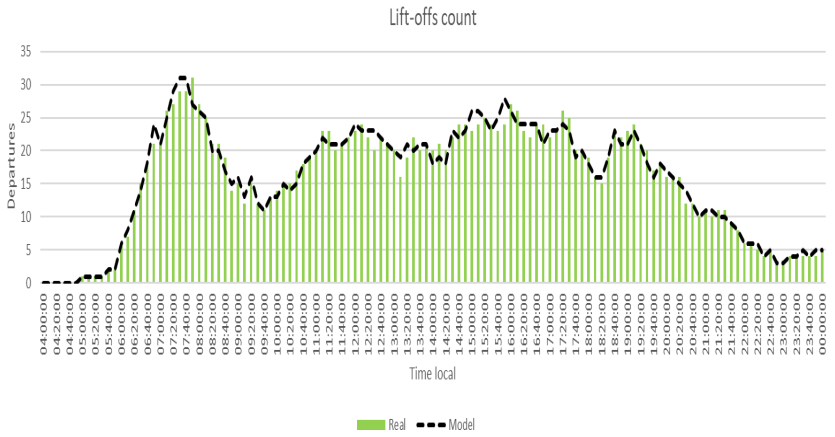
Metric definition:

The number of aircraft that have been pushed back in the last rolling period. The count is incremented when the aircraft leaves its departure parking position (either being pushed back at gate or taxiing / pulled away from a parking position).

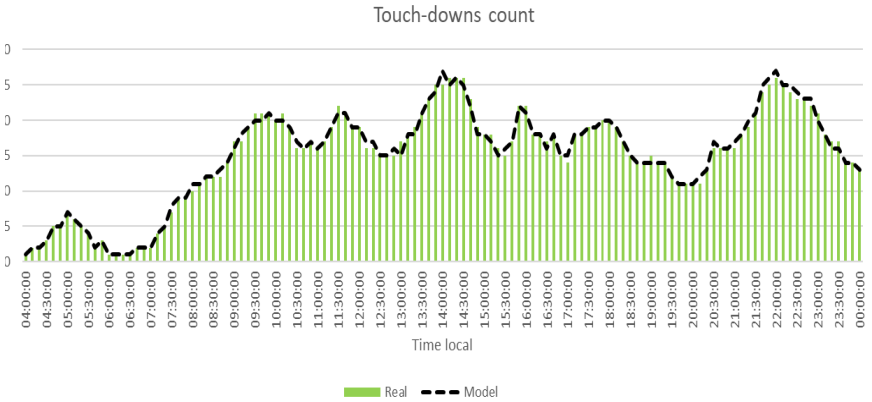
* This graph is presented as a rolling 10-minute average (value for each time period has been calculated as average of values of all events occurring within the T-60 minutes window from the start of the measurement).

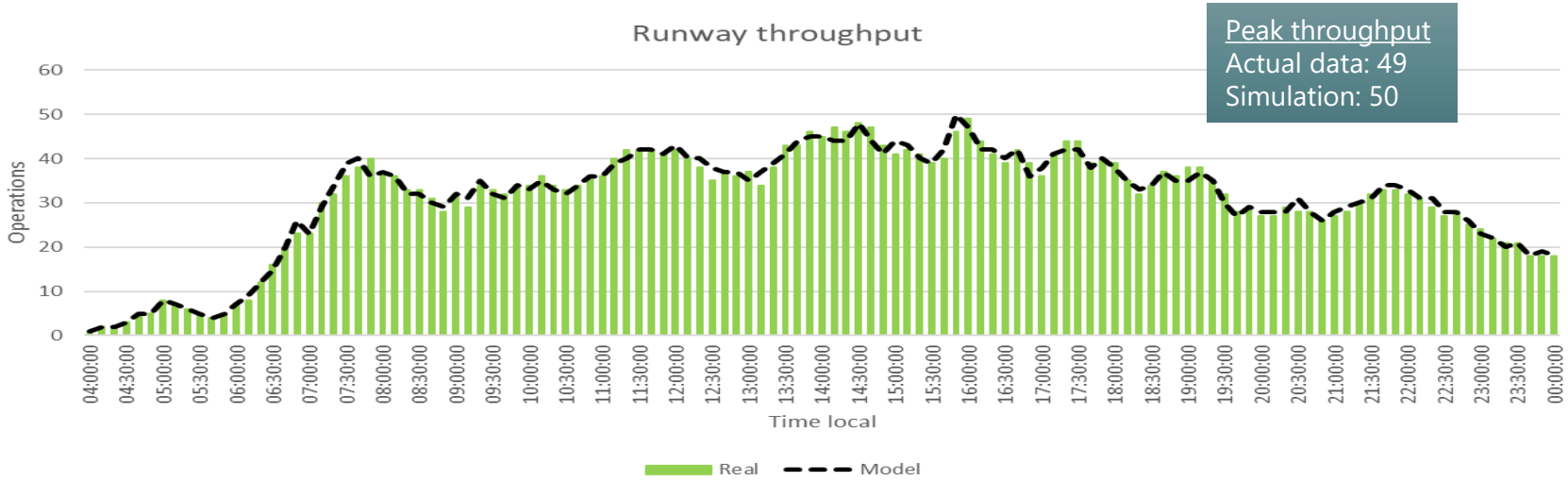
Calibration of runway performance

Peak throughput
Actual data: 31
Simulation: 31



Peak throughput
Actual data: 26
Simulation: 27





Peak throughput
Actual data: 49
Simulation: 50

Metric definition:

Lift-off count: The number of aircraft that have lifted off in the 60-minute rolling period. The count is incremented when the aircraft passes over the opposite end of the runway.

Touch-down count: The number of aircraft that have touched down in the 60-minute rolling period.

Runway throughput: Sum of all aircraft touching down and lifting-off in the 60-minute rolling period.

* All graphs are presented as a rolling 60-minute average (value for each time period has been calculated as average of values of all events occurring within the T-60 minutes window from the start of the measurement).

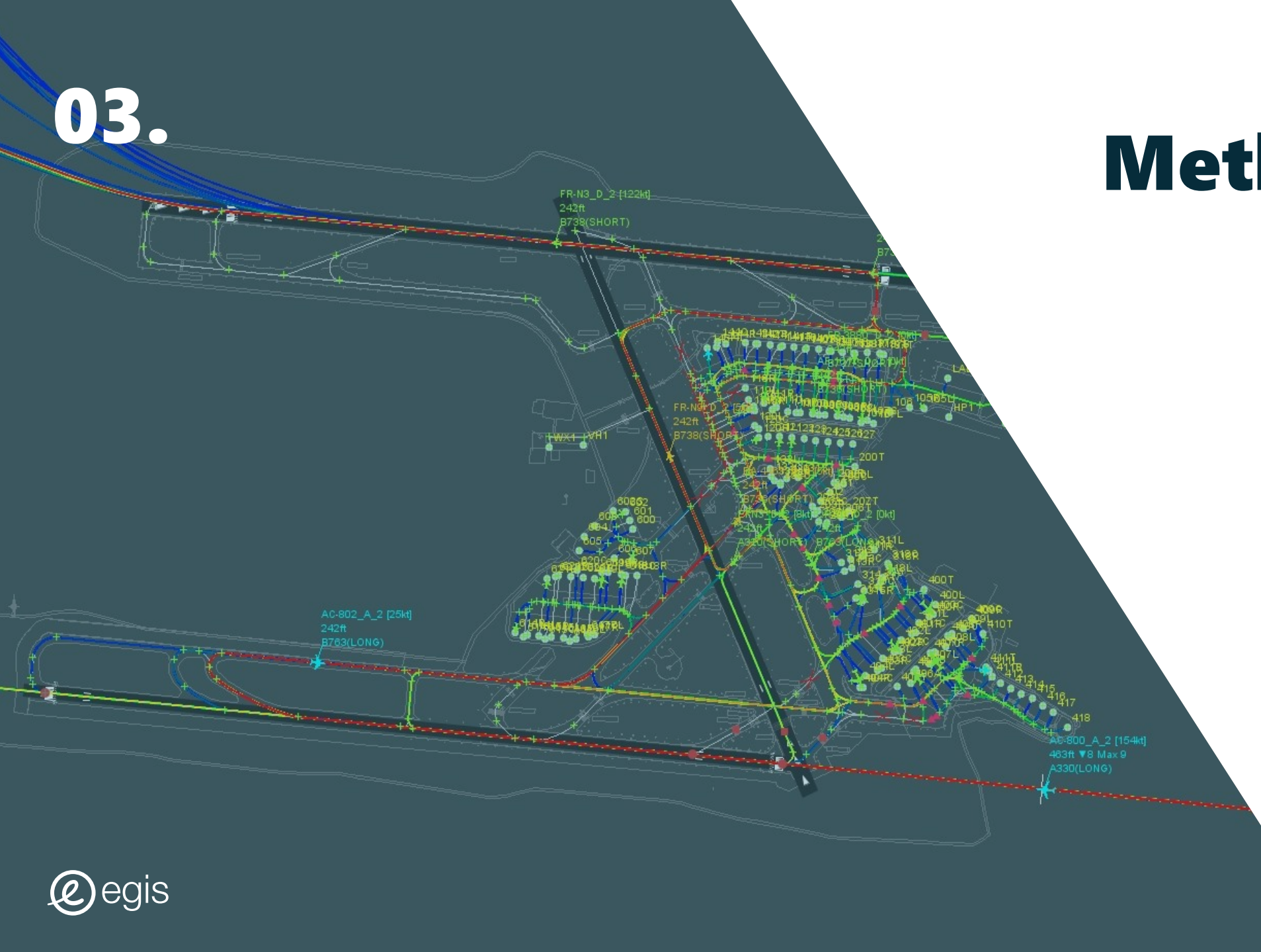
Result of model validation exercise

As the metrics calculated through the FTS model closely match the real-world data, both in terms of magnitude and profile shape, the model can be considered a satisfactory representation for the purpose of evaluating the impact of the proposed changes on flight schedules.

The model is considered to be valid if it is a sufficiently accurate representation of the corresponding real-world problem from the perspective of the intended uses of the model. "Valid" for a simulation does not mean the same as “indistinguishable from the real-world system”, even though in this case there is a close match.

03.

Methodology



Task description

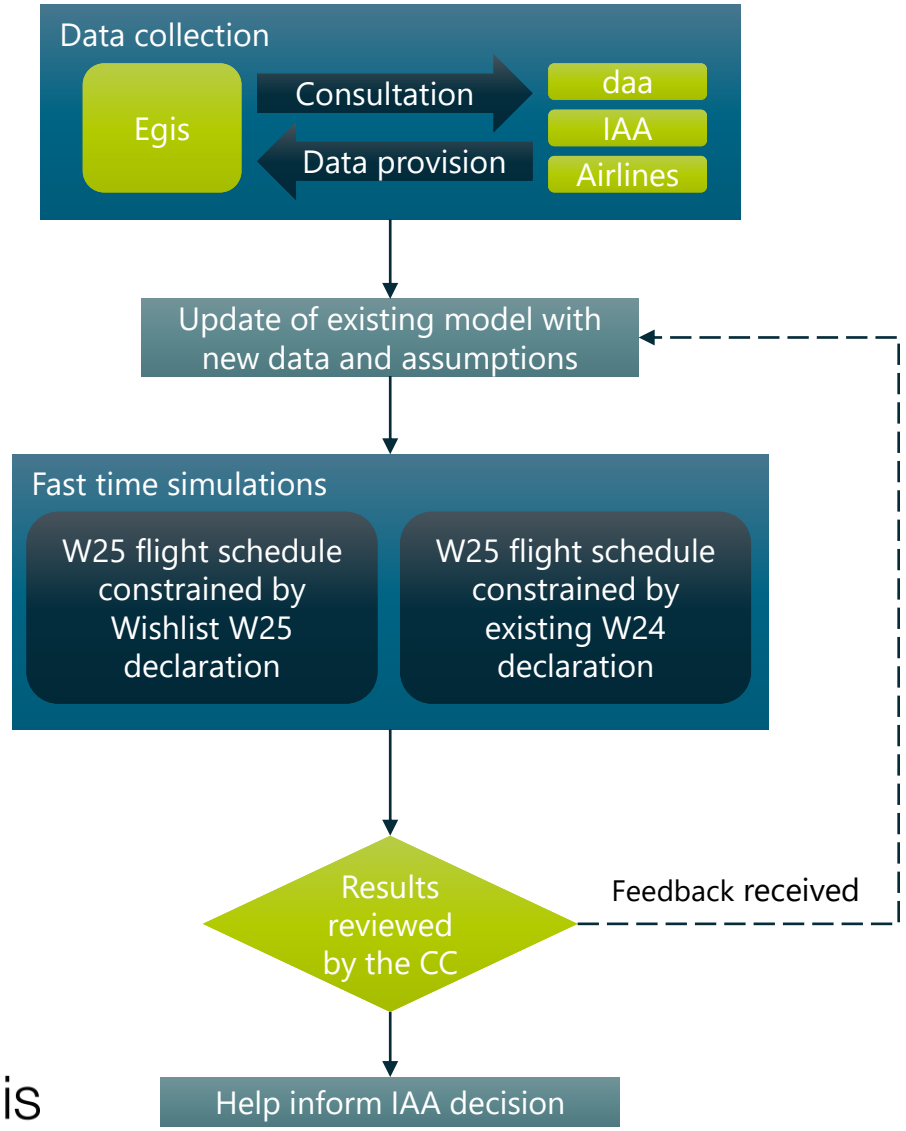
The purpose of this comparison is to assess the likely effect of either:

- **declaring an increased runway capacity, as per the Dublin Airport Wishlist proposal, or**
- **maintaining the Winter 2024 capacity declaration limits.**

The Winter 2025 schedule was designed based on expected W25 demand.

The same number of movements are modelled in all cases, the difference being the limits to which they are coordinated. This difference is therefore a best current information estimate of the effect of a decision to increase the runway limits on a busy Winter 2025 day.

Approach and key changes in the model



Changes to airfield model:

- Following segments closed:
  - B2, E1, B1
- Dual runway operations:
  - Semi-mixed mode (arrive 28L, depart 28L & 28R) during the day (06:00 – 21:59 UTC) and
  - Single runway operations for both arrivals and departures from 28L for the night period (22:00 – 05:59 UTC).

- No changes to operating procedures
  - Departure-departure separation kept at minimum of 84 seconds;
  - Arrival-arrival separation kept at minimum of 3.5 NM;
  - A-D-A separation kept at minimum of 5.5 NM.

Winter 2025 (W25) flight schedule

The flight schedule used for modelling of both scenarios:

- Contains a total of 800 flights (407 arrivals and 393 departures);
- Contains 66 new arrivals and 63 new departures;
- Does not contain helicopter, military, state or medical flights.

W25 Wishlist proposed by Dublin Airport

Hour UTC	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Total
Arrivals																									
Existing W24 arrivals capacity	23	23	23	23	23	23	23	21	25	24	25	28	28	25	25	23	24	26	26	24	24	25	32	23	**589**
Proposed W25 arrivals capacity	23	23	23	23	23	23	23	21	28	26	27	28	28	28	28	23	24	26	26	24	25	29	32	23	**607**
Difference (against W24 declaration)	0	0	0	0	0	0	0	0	3	2	2	0	0	3	3	0	0	0	0	0	1	4	0	0	18
Departures																									
Existing W24 departures capacity	23	23	23	23	23	25	35	35	24	25	25	28	28	28	25	27	26	28	27	25	24	23	23	23	**619**
Proposed W25 departures capacity	23	23	23	23	23	25	35	35	24	25	25	28	28	28	25	31	26	28	29	25	24	23	23	23	**625**
Difference (against W24 declaration)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	2	0	0	0	0	0	6
Totals																									
Existing W24 totals	32	32	32	32	32	32	40	46	45	42	43	50	49	45	42	43	46	49	46	40	39	39	42	32	**970**
Proposed W25 totals	32	32	32	32	32	32	40	48	48	46	47	52	49	49	50	47	46	49	48	40	43	43	42	32	**1011**
Difference (against W24 declaration)	0	0	0	0	0	0	0	2	3	4	4	2	0	4	8	4	0	0	2	0	4	4	0	0	41

10-minute limits:

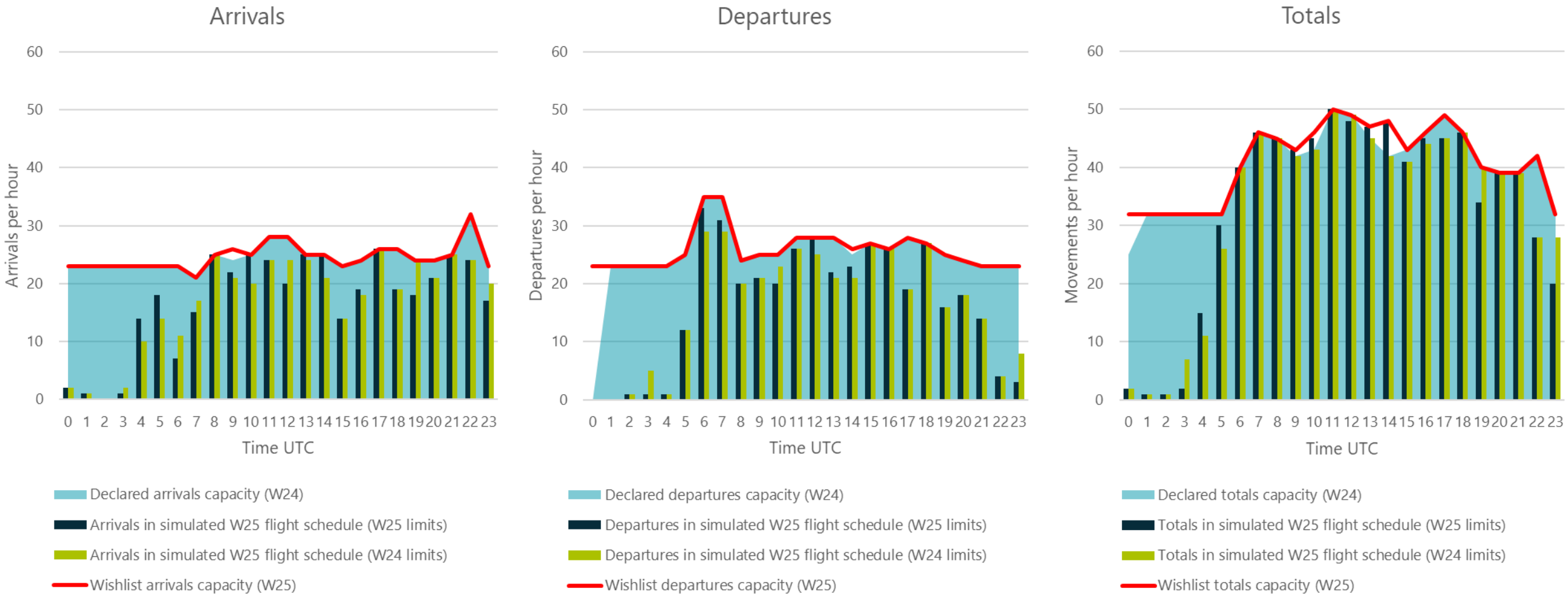
Dual RWY operations:
- 6 arrivals
- 7 departures
- 13 total

Single RWY operations:
- 6 arrivals
- 9 departures
- 9 total

W25 constrained by proposed W25 limits

Hour UTC	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Total
Arrivals																									
Proposed W25 arrivals capacity	23	23	23	23	23	23	23	21	25	26	25	28	28	25	25	23	24	26	26	24	24	25	32	23	**591**
Arrivals in simulated W25 schedule	2	1	0	1	14	18	7	15	25	22	25	24	20	25	25	14	19	26	19	18	21	25	24	17	**407**
Historic	*2*	*1*	*0*	*1*	*12*	*8*	*6*	*10*	*18*	*19*	*23*	*20*	*16*	*25*	*17*	*14*	*16*	*26*	*15*	*11*	*18*	*22*	*24*	*17*	***341***
Additional arrivals proposed for W25	*0*	*0*	*0*	*0*	*2*	*10*	*1*	*5*	*7*	*3*	*2*	*4*	*4*	*0*	*8*	*0*	*3*	*0*	*4*	*7*	*3*	*3*	*0*	*0*	***66***
Spare capacity (against W25 wishlist)	21	22	23	22	9	5	16	6	0	4	0	4	8	0	0	9	5	0	7	6	3	0	8	6	**184**
Departures																									
Proposed W25 departures capacity	23	23	23	23	23	25	35	35	24	25	25	28	28	28	26	27	26	28	27	25	24	23	23	23	**620**
Departures in simulated W25 schedule	0	0	1	1	1	12	33	31	20	21	20	26	28	22	23	27	26	19	27	16	18	14	4	3	**393**
Historic	*0*	*0*	*1*	*1*	*1*	*12*	*33*	*30*	*13*	*13*	*17*	*21*	*24*	*20*	*14*	*26*	*25*	*15*	*27*	*11*	*14*	*7*	*2*	*3*	***330***
Additional departures proposed for W25	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*1*	*7*	*8*	*3*	*5*	*4*	*2*	*9*	*1*	*1*	*4*	*0*	*5*	*4*	*7*	*2*	*0*	***63***
Spare capacity (against W25 wishlist)	23	23	22	22	22	13	2	4	4	4	5	2	0	6	3	0	0	9	0	9	6	9	19	20	**227**
Totals																									
Wishlist W25 Totals capacity	32	32	32	32	32	32	40	46	45	43	46	50	49	47	48	43	46	49	46	40	39	39	42	32	**982**
Totals in simulated W25 schedule	2	1	1	2	15	30	40	46	45	43	45	50	48	47	48	41	45	45	46	34	39	39	28	20	**800**
Historic	*2*	*1*	*1*	*2*	*13*	*20*	*39*	*40*	*31*	*32*	*40*	*41*	*40*	*45*	*31*	*40*	*41*	*41*	*42*	*22*	*32*	*29*	*26*	*20*	***671***
Additional movements proposed for W25	*0*	*0*	*0*	*0*	*2*	*10*	*1*	*6*	*14*	*11*	*5*	*9*	*8*	*2*	*17*	*1*	*4*	*4*	*4*	*12*	*7*	*10*	*2*	*0*	***129***
Spare capacity (against W25 wishlist)	30	31	31	30	17	2	0	0	0	0	1	0	1	0	0	2	1	4	0	6	0	0	14	12	**182**

Constraining the W25 schedule by the W24 limits results in spreading the flights into shoulder hours



Some of the additional services envisaged in W25 schedule had to be re-timed to make the flight schedule compatible with the existing W24 declaration. This simulates a case where existing W24 declaration will be rolled forward to Winter 25 season, but all of the new services would still operate – although not necessarily at the originally scheduled times.

W25 constrained by existing W24 limits

Hour UTC	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Total
Arrivals																									
Existing W24 arrivals capacity	23	23	23	23	23	23	23	21	25	24	25	28	28	25	25	23	24	26	26	24	24	25	32	23	**589**
Arrivals in simulated W25 schedule	2	1	0	2	10	14	11	17	25	21	20	24	24	24	21	14	18	26	19	24	21	25	24	20	**407**
Historic	*2*	*1*	*0*	*1*	*10*	*7*	*6*	*10*	*20*	*19*	*20*	*20*	*20*	*24*	*17*	*14*	*16*	*26*	*15*	*12*	*18*	*22*	*24*	*17*	***341***
Additional arrivals proposed for W25	*0*	*0*	*0*	*1*	*0*	*7*	*5*	*7*	*5*	*2*	*0*	*4*	*4*	*0*	*4*	*0*	*2*	*0*	*4*	*12*	*3*	*3*	*0*	*3*	***66***
Spare capacity (against W24 limits)	21	22	23	21	13	9	12	4	0	3	5	4	4	1	4	9	6	0	7	0	3	0	8	3	**182**
Departures																									
Existing W24 departures capacity	23	23	23	23	23	25	35	35	24	25	25	28	28	28	25	27	26	28	27	25	24	23	23	23	**619**
Departures in simulated W25 schedule	0	0	1	5	1	12	29	29	20	21	23	26	25	21	21	27	26	19	27	16	18	14	4	8	**393**
Historic	*0*	*0*	*1*	*5*	*1*	*12*	*29*	*29*	*13*	*13*	*18*	*22*	*24*	*20*	*13*	*26*	*25*	*15*	*27*	*11*	*14*	*7*	*2*	*3*	***330***
Additional departures proposed for W25	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*7*	*8*	*5*	*4*	*1*	*1*	*8*	*1*	*1*	*4*	*0*	*5*	*4*	*7*	*2*	*5*	***63***
Spare capacity (against W24 limits)	23	23	22	18	22	13	6	6	4	4	2	2	3	7	4	0	0	9	0	9	6	9	19	15	**226**
Totals																									
Existing W24 totals	32	32	32	32	32	32	40	46	45	42	43	50	49	45	42	43	46	49	46	40	39	39	42	32	**970**
Totals in simulated W25 schedule	2	1	1	7	11	26	40	46	45	42	43	50	49	45	42	41	44	45	46	40	39	39	28	28	**800**
Historic	*2*	*1*	*1*	*6*	*11*	*19*	*35*	*39*	*33*	*32*	*38*	*42*	*44*	*44*	*30*	*40*	*41*	*41*	*42*	*23*	*32*	*29*	*26*	*20*	***671***
Additional movements proposed for W25	*0*	*0*	*0*	*1*	*0*	*7*	*5*	*7*	*12*	*10*	*5*	*8*	*5*	*1*	*12*	*1*	*3*	*4*	*4*	*17*	*7*	*10*	*2*	*8*	***129***
Spare capacity (against W24 limits)	30	31	31	25	21	6	0	0	0	0	0	0	0	0	0	2	2	4	0	0	0	0	14	4	**170**

04.

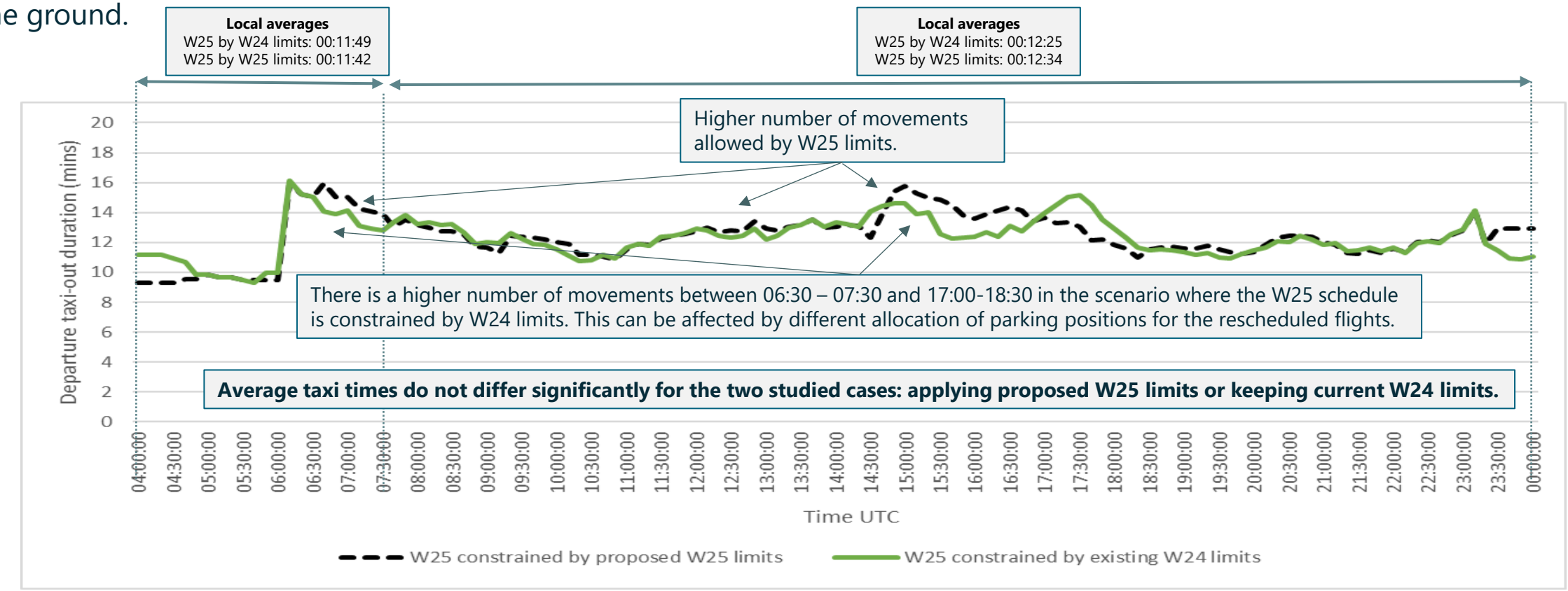
Results

(westerly operations)

Departure taxi out time

	W24 limits	W25 limits	Difference
Daily average	00:12:10	00:12:17	00:00:07
Peak	00:16:08	00:15:57	00:00:11

Definition: This metric is defined to be the time period between off-block and the time the aircraft lifts-off. This value is updated every second during the simulation when the aircraft is taxiing for departure even if the aircraft is stopped on the ground.



*This graph is presented as a rolling 10-minute average (value for each time period has been calculated as average of values of all events occurring within the T-60 minutes window from the start of the measurement).

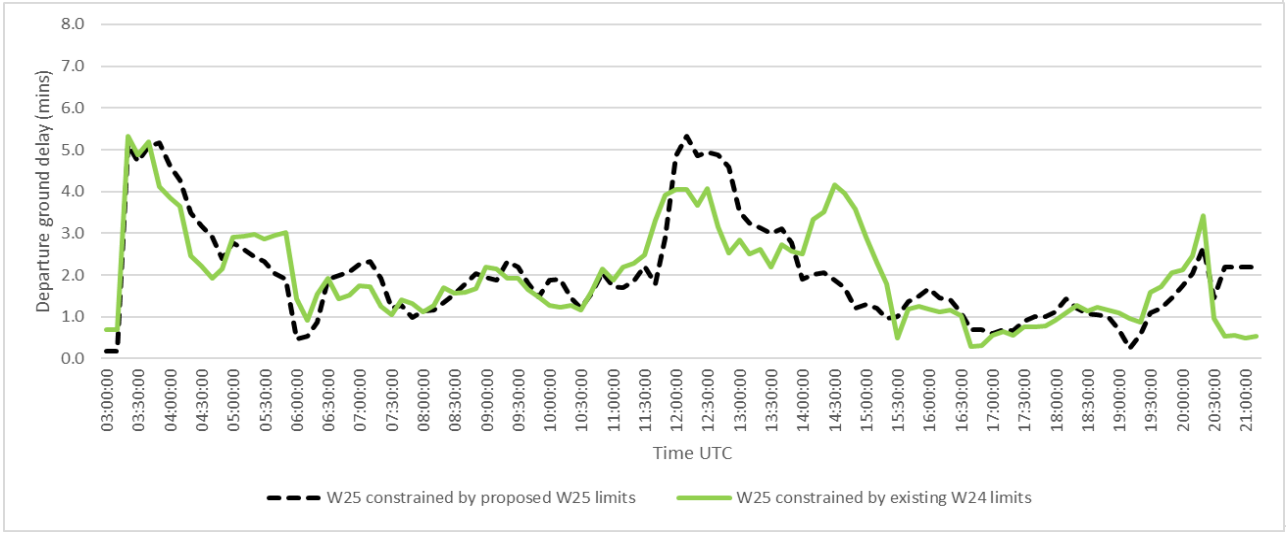
Departure ground delay and runway holding delay

Departure ground delay: Total delay of departing aircraft accumulated between off-block and entering the runway. It is effectively the sum of runway holding delay and other delays.

Average departure ground delays do not differ significantly for the two studied cases.

Daily average (W24 limits): 00:01:42

Daily average (W25 limits): 00:01:43

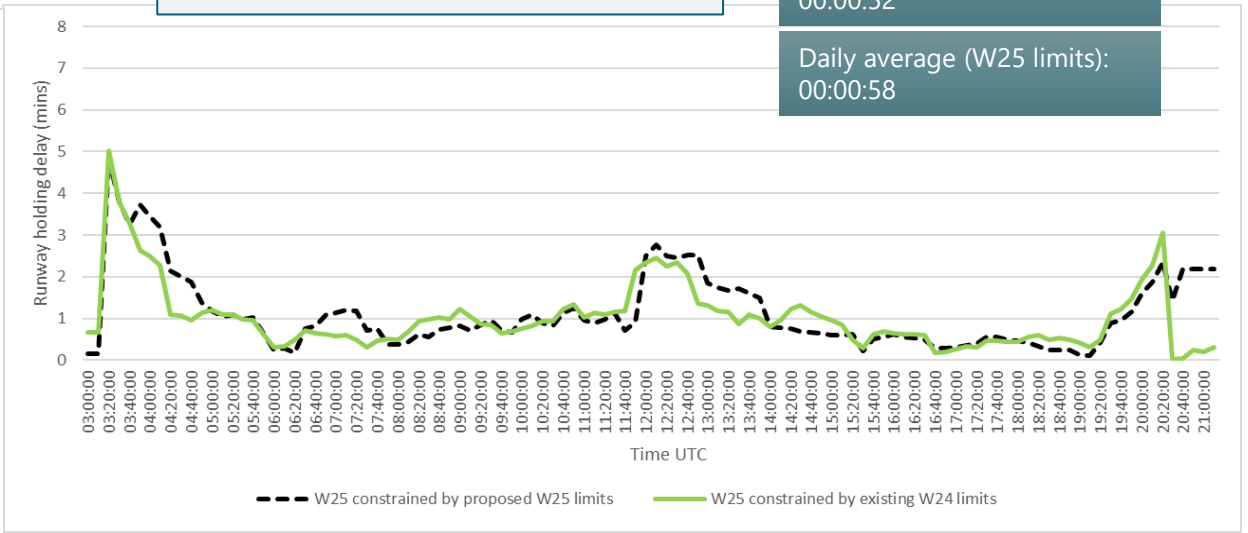


Runway holding delay: The delay experienced while the aircraft is queueing for runway entry. The delay can be caused by other aircraft (being slowed down or stopped) or when waiting at runway stop-bar (because the runway is not free for lining up). This metric is defined to be the time period between joining the back end of the queue and the time the aircraft reaches its stop bar for runway entry.

Average runway holding delays do not differ significantly for the two studied cases.

Daily average (W24 limits): 00:00:52

Daily average (W25 limits): 00:00:58

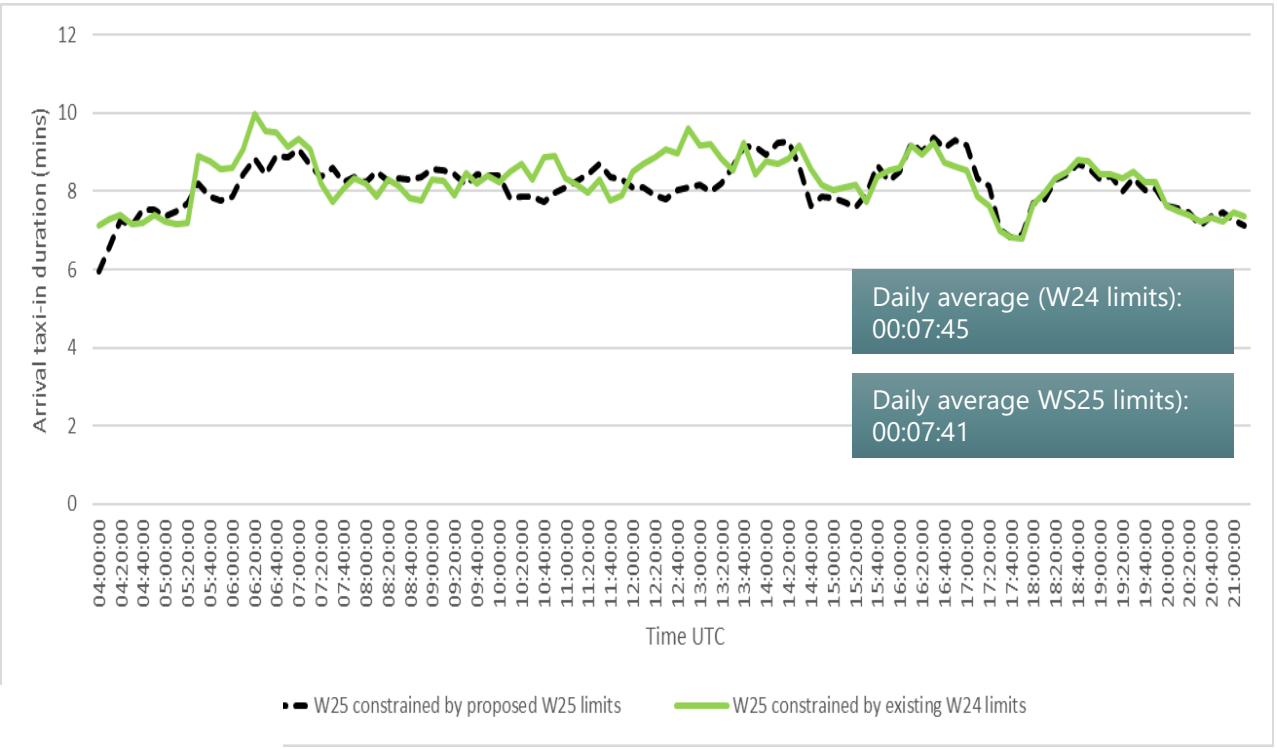


*These graphs are presented as a rolling 10-minute average (value for each time period has been calculated as average of values of all events occurring within the T-60 minutes window from the start of the measurement).

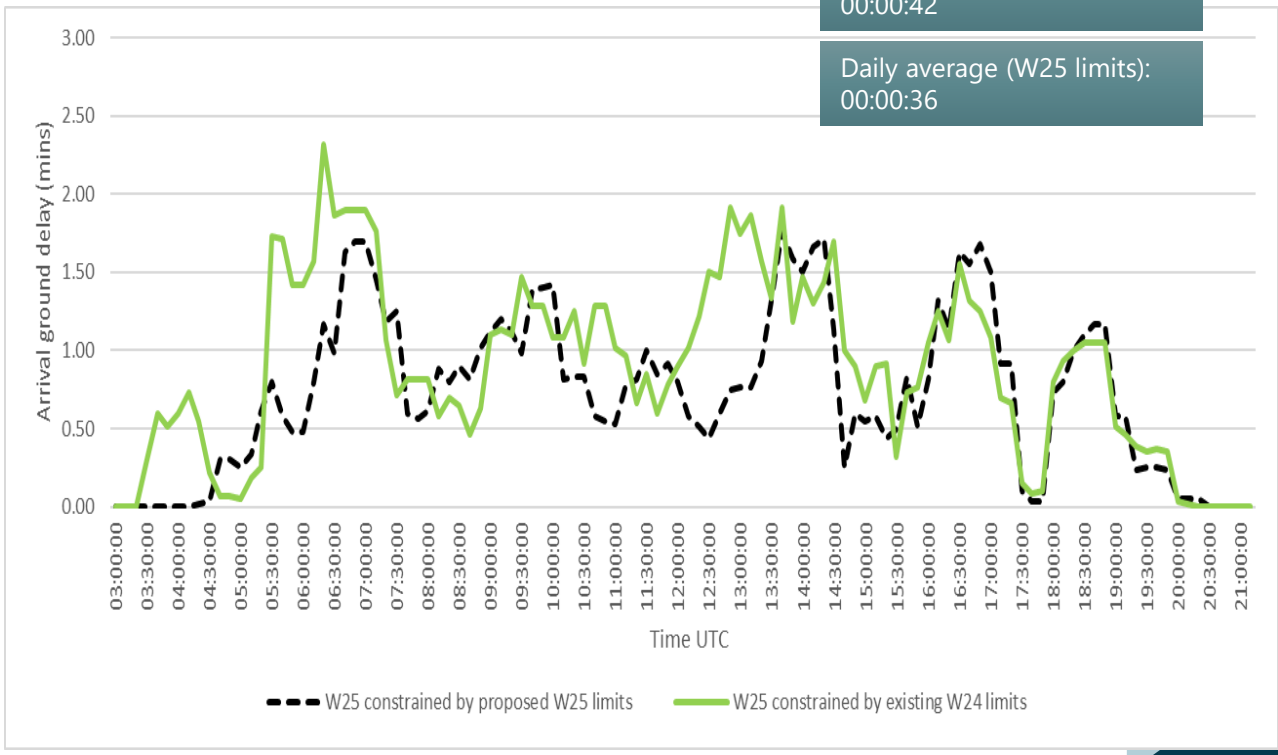
Arrival taxi in time and arrival ground delay

Arrival taxi-in time: The time duration the arriving aircraft has been taxiing on the ground of its arrival airport. This value is updated every second of simulation time when the arriving aircraft is taxiing even if the aircraft is stopped on ground.

Arrival taxi-in time is not significantly impacted by re-scheduling some services to comply with W24 limits.



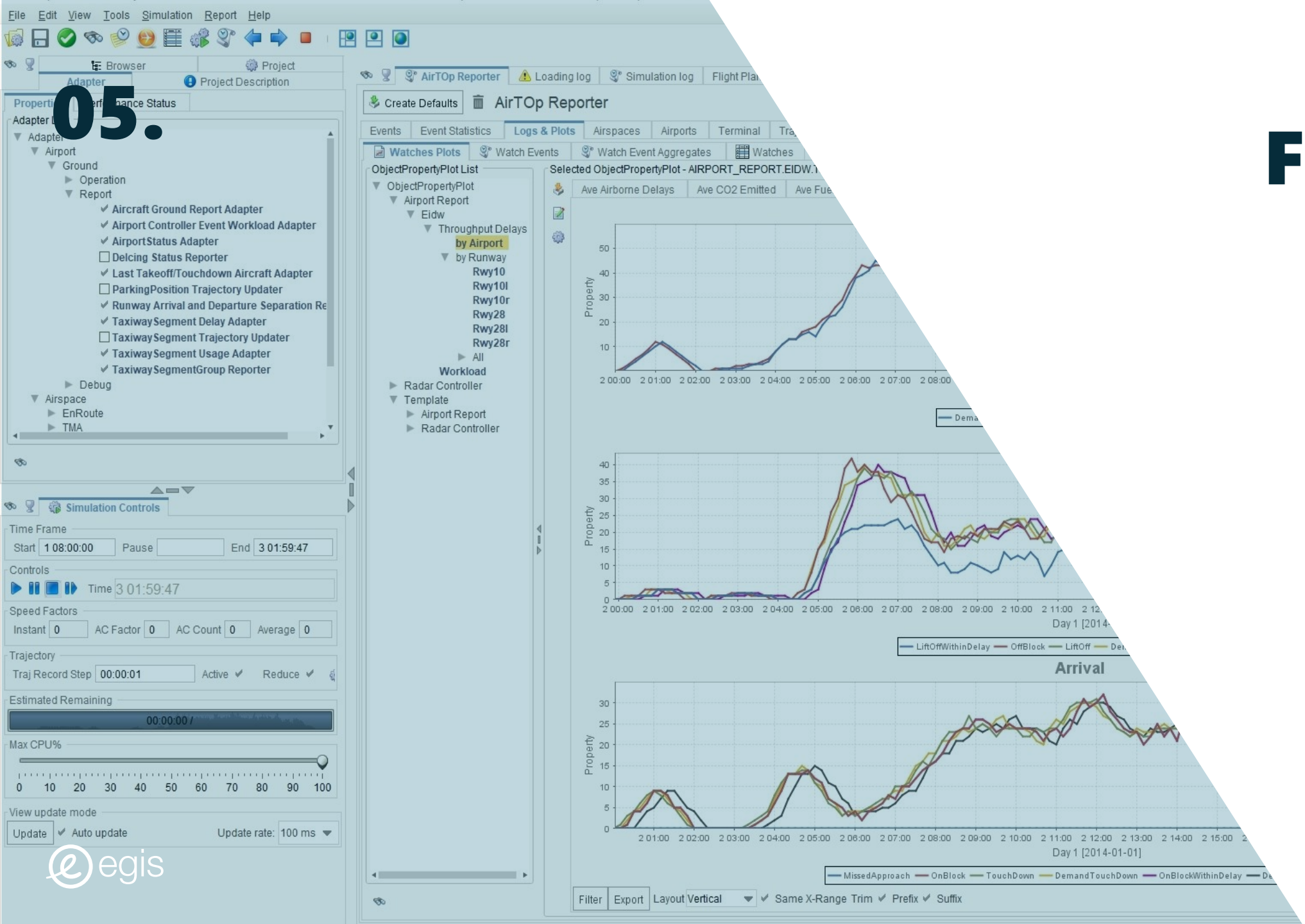
Arrival ground delay: The delay caused by traffic (slowing down or being stopped) while the aircraft is taxiing to its arrival stand. Every second of simulation time the aircraft is stopped on ground due to other traffic, the delay is increased accordingly. Additionally, if the aircraft is forced to slow-down due to other traffic, a proportional delay is calculated.



*These graphs are presented as a rolling 10-minute average (value for each time period has been calculated as average of values of all events occurring within the T-60 minutes window from the start of the measurement).

05.

Findings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Adapter
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Airport
Ground
Operation
Report
Aircraft Ground Report Adapter
Airport Controller Event Workload Adapter
AirportStatus Adapter
Delcing Status Reporter
Last Takeoff/Touchdown Aircraft Adapter
ParkingPosition Trajectory Updater
Runway Arrival and Departure Separation Re
TaxiwaySegment Delay Adapter
TaxiwaySegment Trajectory Updater
TaxiwaySegment Usage Adapter
TaxiwaySegmentGroup Reporter
Debug
Airspace
EnRoute
TMA
Simulation Controls
Time Frame
Start 1 08:00:00
Pause
End 3 01:59:47
Controls
Time 3 01:59:47
Speed Factors
Instant 0
AC Factor 0
AC Count 0
Average 0
Trajectory
Traj Record Step 00:00:01
Active
Reduce
Estimated Remaining
00:00:00 /
Max CPU%
0 10 20 30 40 50 60 70 80 90 100
View update mode
Update
Auto update
Update rate: 100 ms
AirTOp Reporter
Loading log
Simulation log
Create Defaults
AirTOp Reporter
Events
Event Statistics
Logs & Plots
Airspaces
Airports
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by Runway
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OffBlock
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Arrival
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Increasing the RWY limits in line with the W25 Wishlist

Assuming the W25 schedule materialises as expected, increasing the runway limits in line with the W25 Wishlist:

- Is likely to lead to scheduled capacity limits being reached during day between 0600-17:59 and during evening between 20:00-21:59.
- The daily average and peak taxi out times are on average not materially impacted by declaring the additional capacity.
- Is likely to cause minor localised deterioration of ground delays in and around those hours where capacity increases are proposed.
- The average departure taxi time in the first morning wave peaks between 06:00-08:00 with peak departure taxi time of around 15 minutes 57 seconds per flight. There is another peak around 15:00, with taxi time of around 15 minutes 45 seconds.
- For the remaining part of the day, departure taxi times are typically between 9 -15 minutes.

Maintaining the RWY limits in line with the W24 declaration

Assuming the W25 schedule materialises as expected, maintaining the runway limits in line with the W24 capacity declaration:

- Is likely to lead to scheduled capacity limits being reached between 06:00-21:59.
- Is likely to cause re-distribution of newly planned services to hours with any remaining available capacity.
- The overall impact of keeping W24 limits is marginal.
- Re-planning the new services to comply with W24 limits will:
  - Cause local reduction in taxi time performance (compared to the W25 wishlist schedule) in those hours where the additional services were initially proposed and then rescheduled to comply with W24 limits.
  - Local increase in taxi time performance (compared to the W25 wishlist schedule) is not expected as flights were typically rescheduled into hours with enough spare capacity.

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