An aerial photograph of an airport tarmac. A large white commercial airplane is the central focus, parked at a gate. Several other smaller aircraft are visible in the background. The tarmac is dark asphalt with white markings. A blue ground support vehicle is visible on the right side. The background shows a large, curved terminal building with a grey roof.

Summer 2024: Final assessment of the likely impact of declaring the Wishlist runway capacity

Alexandra Dudášová
24 August 2023



Contents

- 01.** Context
- 02.** Model validation
- 03.** Methodology
- 04.** Results:
 - Departure taxi out time
 - Departure runway holding delay
 - Arrival ground delay
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- 05.** Findings
- 06.** Additional simulations

01.

Context



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 Summer 2024 (S24) season at Dublin airport.

This document provides results from two simulated scenarios:

- S24 flight schedule coordinated to the proposed S24 limits and
- S24 flight schedule coordinated to the existing S23 limits.

02.

Model validation



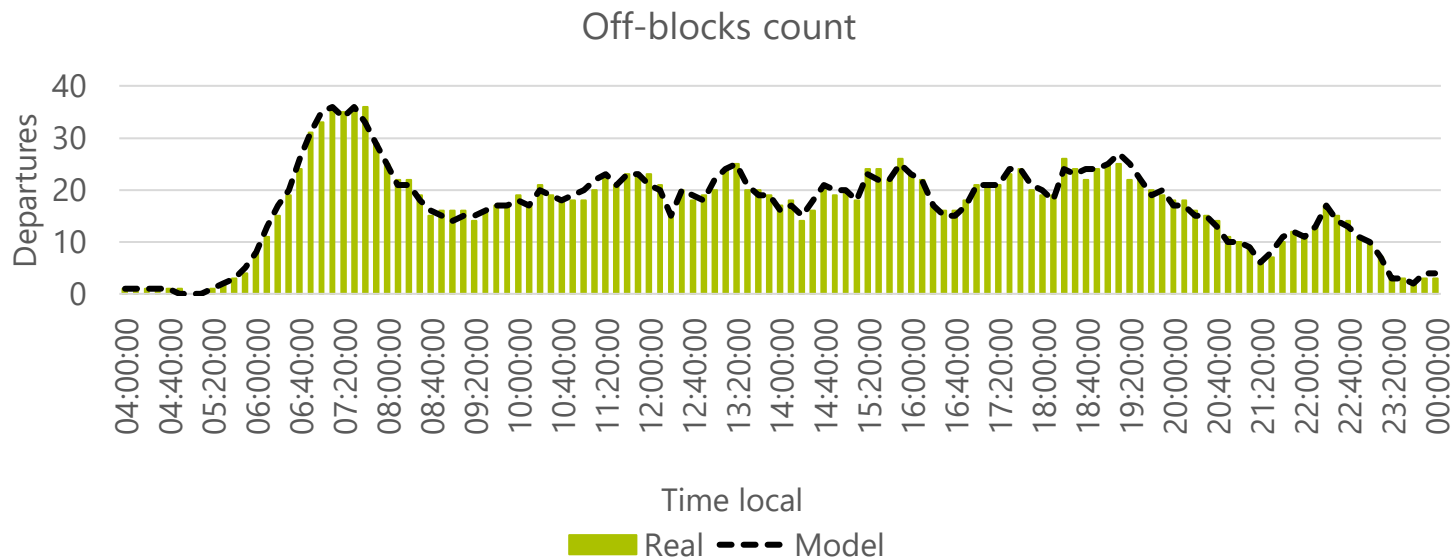
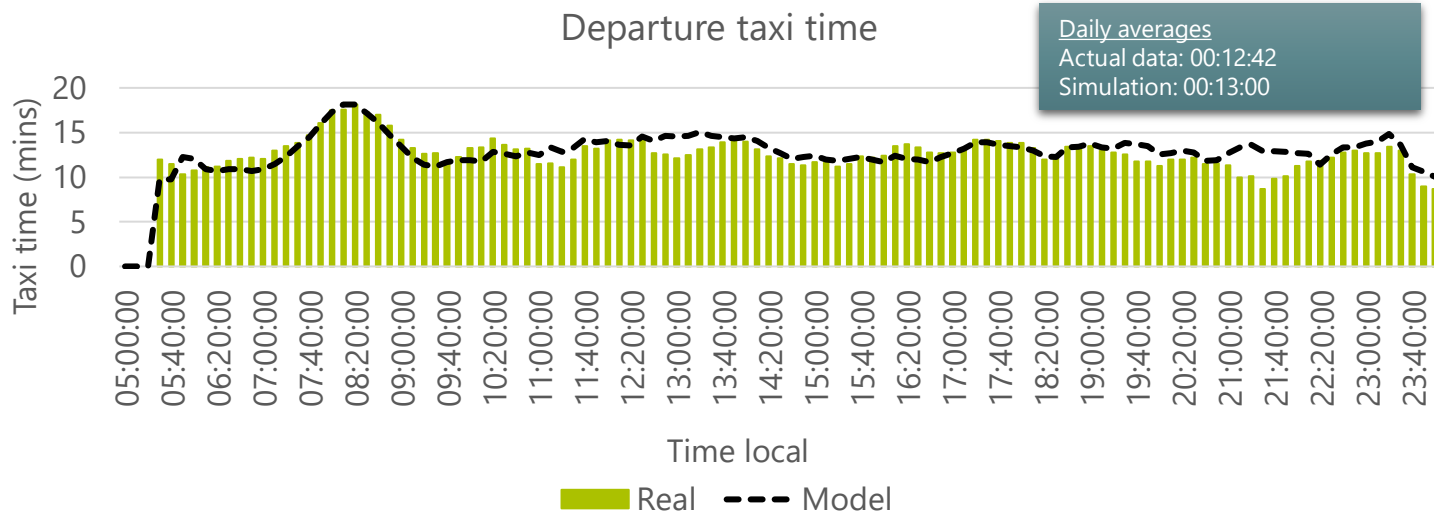
Model description

- **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 S23 operations (05 April 2023).**
- **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

- **05 April 2023**
 - Westerly operations for 100% of the time;
 - Arrivals on 28L only;
 - Departures 28L 1700-0759 UTC (1800-0859 local);
 - Departures 28R 0800-1659 UTC (0900-1759 local);
- **684 flights in total, incl. GA and cargo**
 - 342 arrivals and 342 departures;
 - Helicopter operations not simulated.

Calibration of departure performance



Metric definition:

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

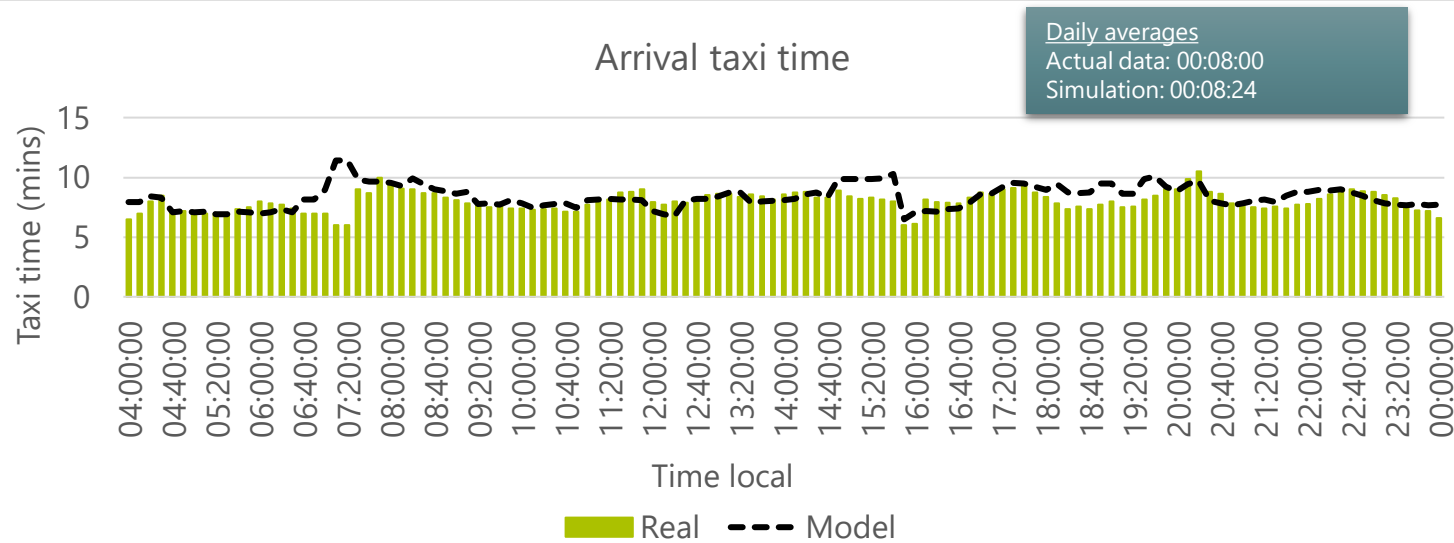
*This graph is presented as a rolling 10-minute average (value for each time period has been calculated as average of values of all events occurring within the T-60 minutes window from the start of the measurement).

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).

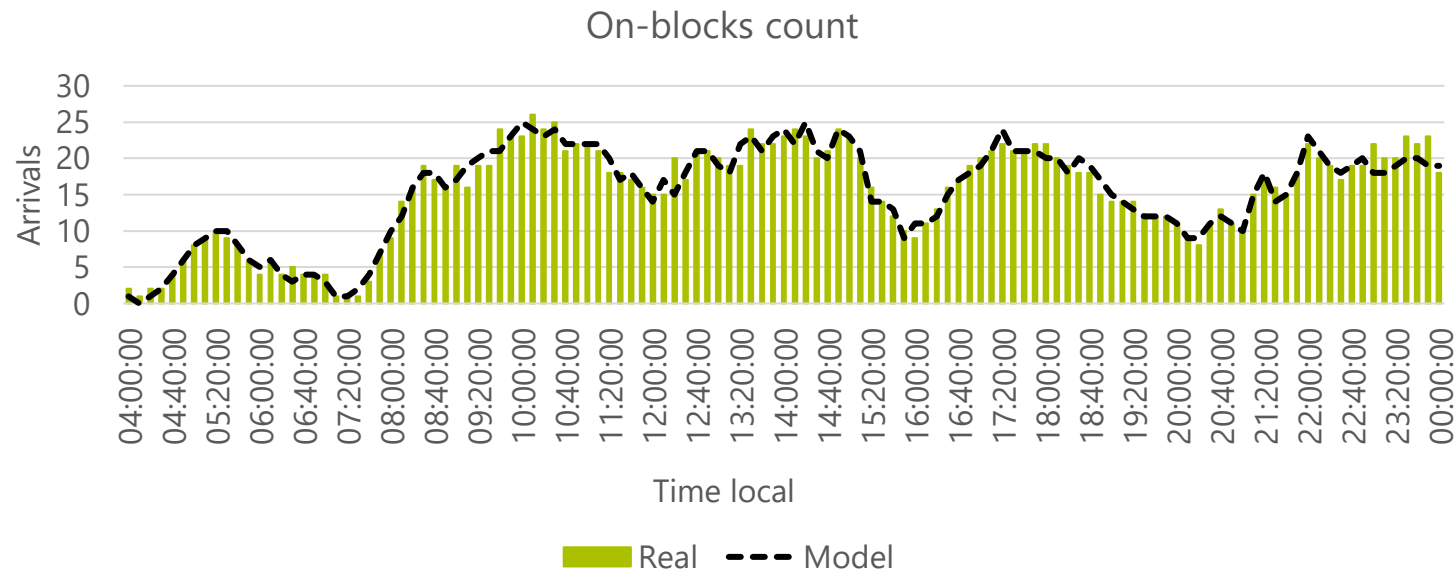
Calibration of arrival performance



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).



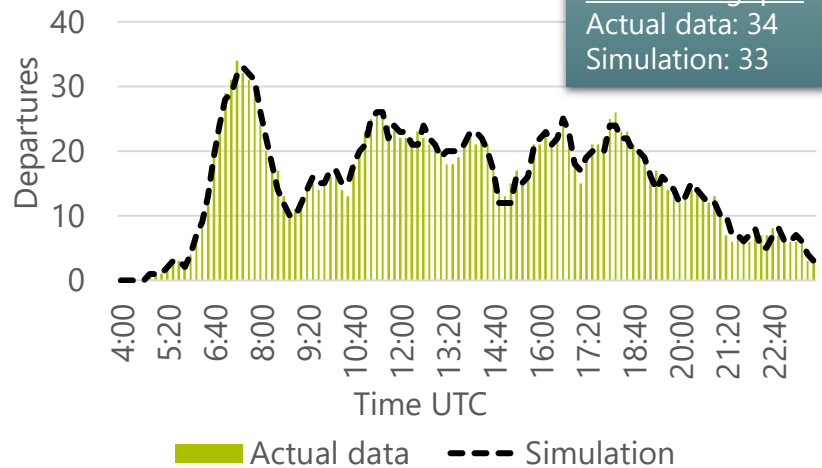
Metric definition:

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.

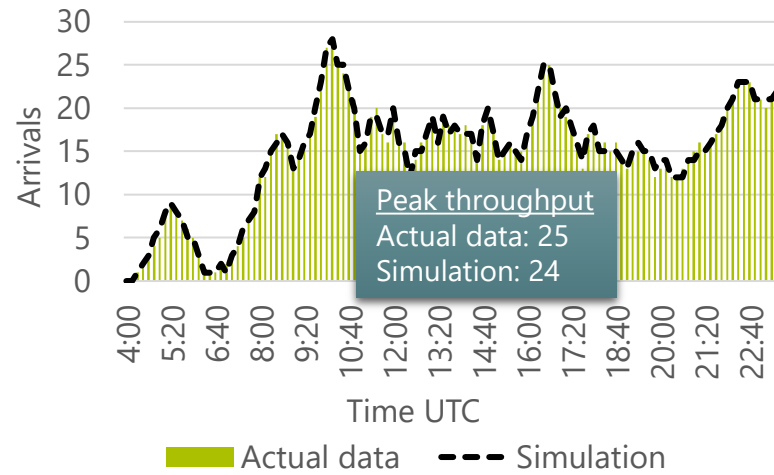
* This graph is presented as a rolling 10-minute average (value for each time period has been calculated as average of values of all events occurring within the T-60 minutes window from the start of the measurement).

Calibration of runway performance

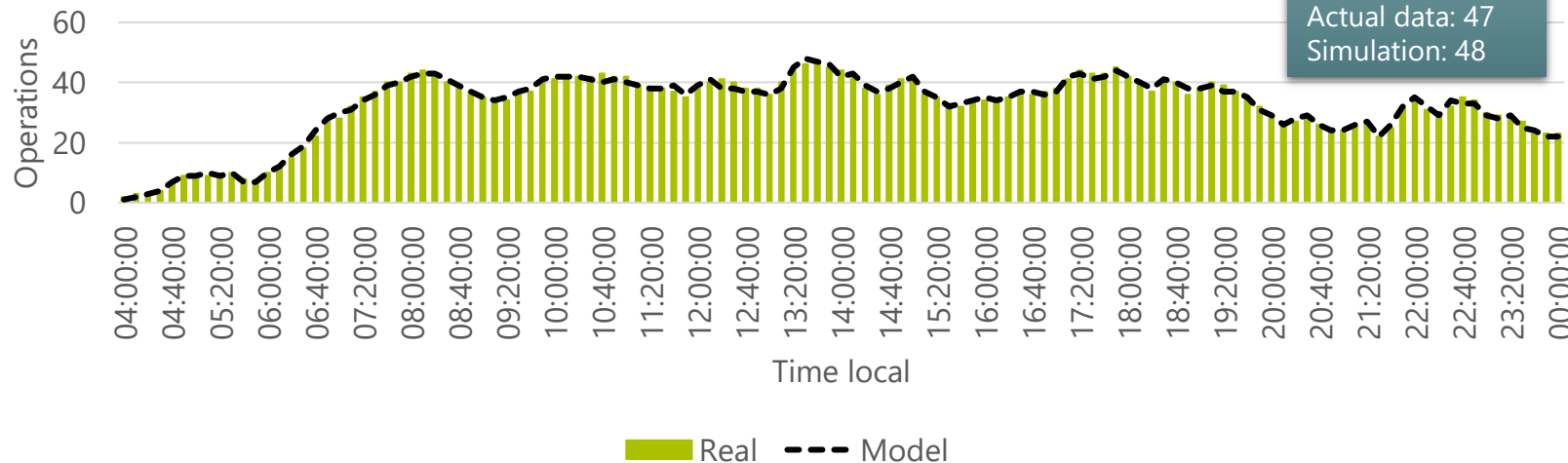
Lift-off count



Touch-down count



Runway throughput



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).

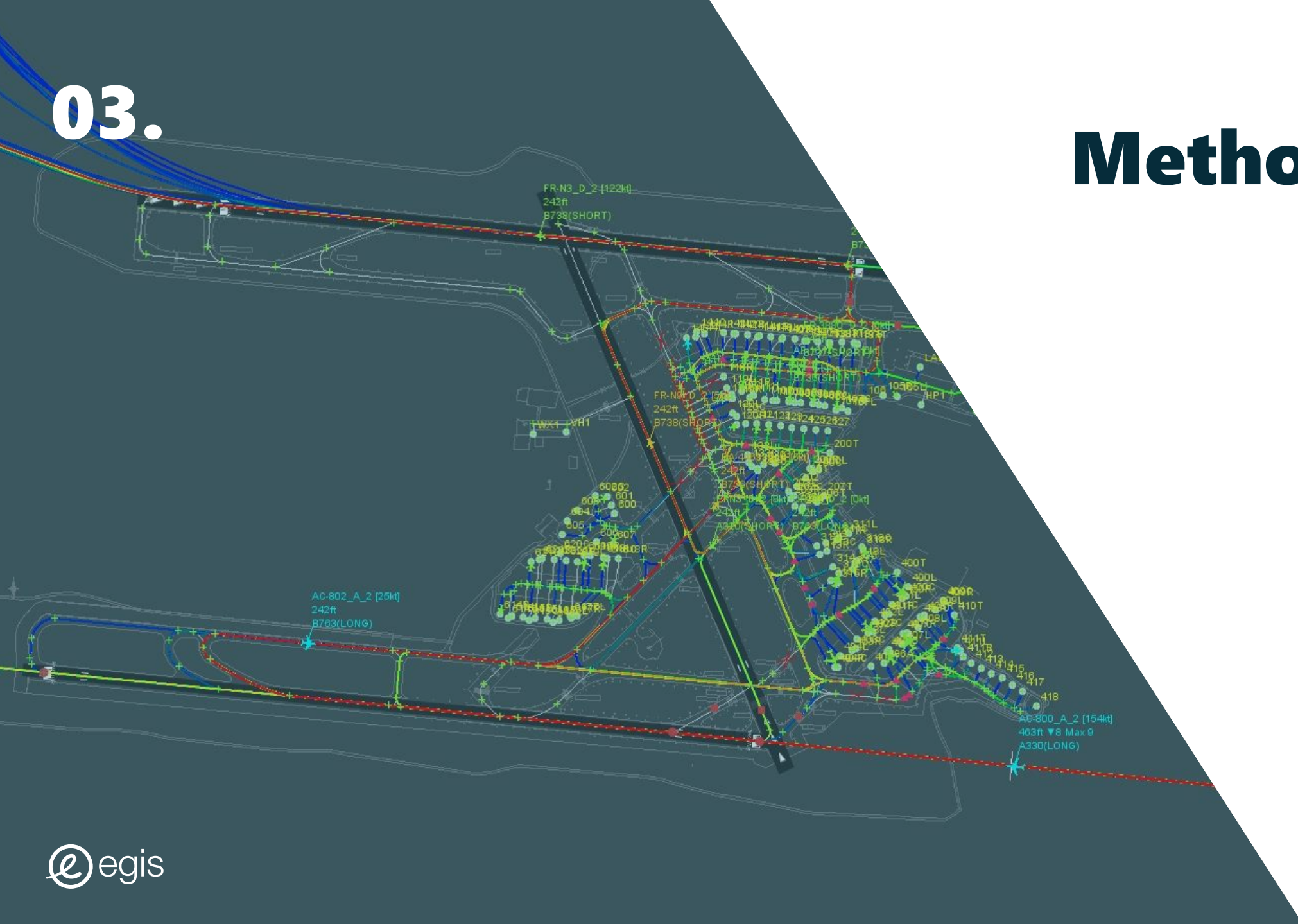
Result of model validation exercise

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:

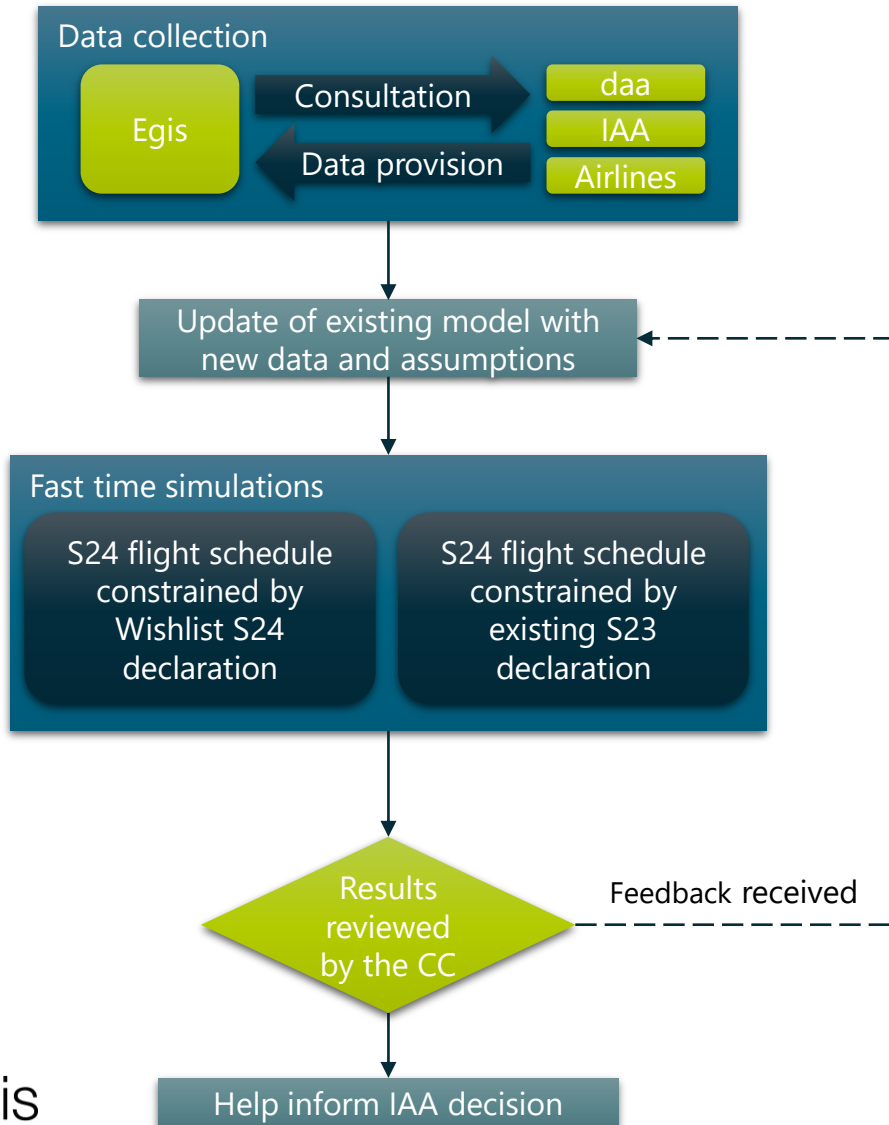
- **declaring an increased runway capacity, as per the Dublin Airport Wishlist proposal, or**
- **maintaining the Summer 2023 capacity declaration limits.**

The Summer 2024 schedule was designed based on expected S24 demand but also to test the proposed R60 capacity increases.

In both cases it is presumed that the Summer 2024 schedule of increased demand materialises as expected.

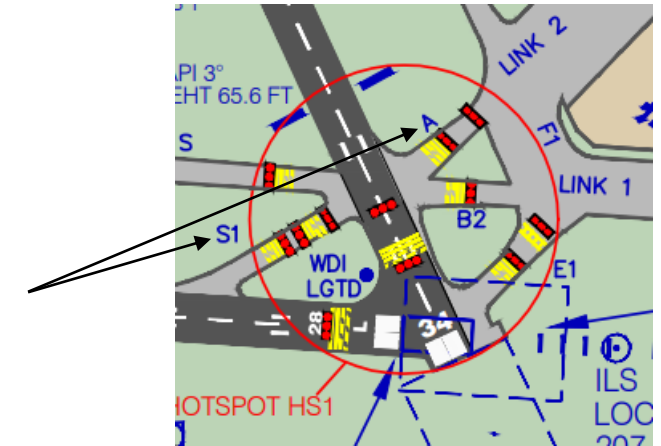
The same number of movements are modelled in all cases, the difference being the limits to which they are coordinated. This difference is therefore a best current information estimate of the effect of a decision to increase the runway limits on a busy Summer 2024 day.

Approach and key changes in the model



Changes to airfield model:

- F-OUTER: open
- Link 5: open
- S1 and A: not in use
- TWY Z: closed
- 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.



Summer 2024 (S24) flight schedule

The flight schedule used for modelling of both scenarios:

- Contains a total of 857 flights (431 arrivals and 426 departures);
- Contains 47 new arrivals and 44 new departures;
- Does not contain helicopter, military, state or medical flights.

S24 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 S23 arrivals capacity	23	23	23	23	23	23	20	25	25	25	27	29	24	27	23	26	27	23	23	23	25	30	28	23	591	
Proposed S24 arrivals capacity	23	23	23	23	23	23	20	25	27	27	29	30	24	28	23	26	27	26	23	23	25	31	28	23	603	
Difference (against S23 declaration)	0	0	0	0	0	0	0	0	2	2	2	1	0	1	0	0	0	3	0	0	0	1	0	0	12	
Departures																										
Existing S23 departures capacity	25	25	25	25	25	36	37	25	25	24	27	28	27	26	27	25	29	27	26	22	22	25	25	25	633	
Proposed S24 departures capacity	25	25	25	25	25	36	39	25	25	26	27	30	29	26	29	27	29	28	26	22	22	25	25	25	646	
Difference (against S23 declaration)	0	0	0	0	0	0	2	0	0	2	0	2	2	0	2	2	0	1	0	0	0	0	0	0	13	
Totals																										
Existing S23 totals	32	32	32	32	32	40	46	41	45	48	48	51	49	50	47	47	52	47	43	39	38	42	32	32	997	
Proposed S24 totals	32	32	32	32	32	40	50	41	48	52	52	52	50	52	49	47	52	51	43	39	38	42	32	32	1022	
Difference (against S23 declaration)	0	0	0	0	0	0	4	0	3	4	4	1	1	2	2	0	0	4	0	0	0	0	0	0	25	

Besides adhering to hourly runway limits, flights in all modelled scenarios adhere also to 10-minute limits on number of movements – these have been assumed in line with daa proposal as follows:

Dual RWY operations:

- 6 arrivals
- 7 departures
- 13 total

Single RWY operations:

- 6 arrivals
- 9 departures
- 9 total

S24 constrained by proposed S24 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 S24 arrivals capacity	23	23	23	23	23	23	20	25	27	27	29	30	24	28	23	26	27	26	23	23	25	31	28	23	603
Arrivals in simulated S24 schedule	7	1	0	9	8	3	12	21	27	27	28	27	24	26	20	17	27	24	20	18	17	31	15	23	432
<i>Historic</i>	7	1	0	6	4	3	10	20	22	24	23	24	20	24	19	15	23	23	20	18	17	27	14	21	385
<i>Additional arrivals proposed for S24</i>	0	0	0	3	4	0	2	1	5	3	5	3	4	2	1	2	4	1	0	0	0	4	1	2	47
Spare capacity (against S24 wishlist)	16	22	23	14	15	20	8	4	0	0	1	3	0	2	3	9	0	2	3	5	8	0	13	0	171

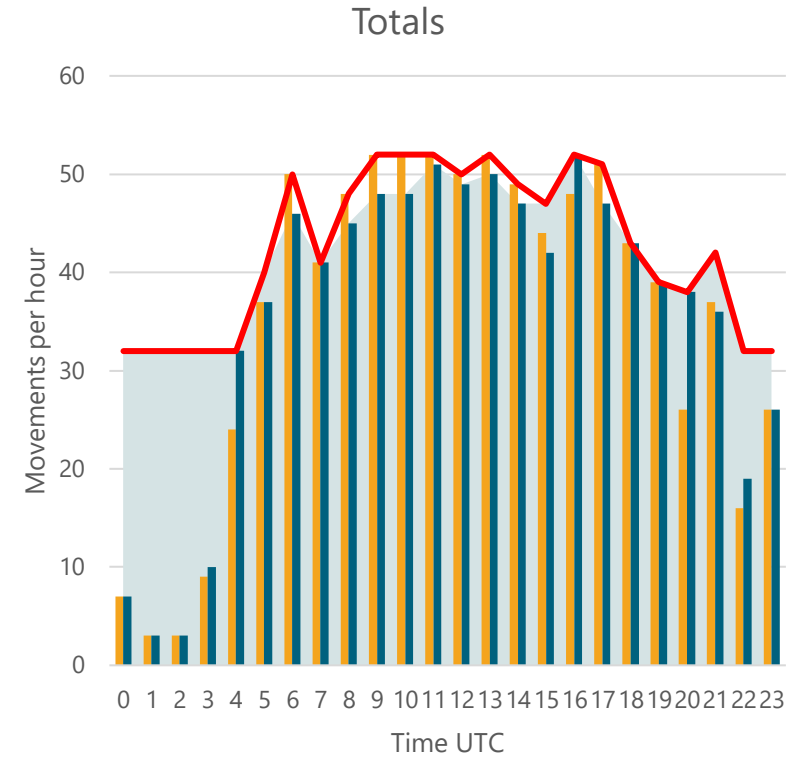
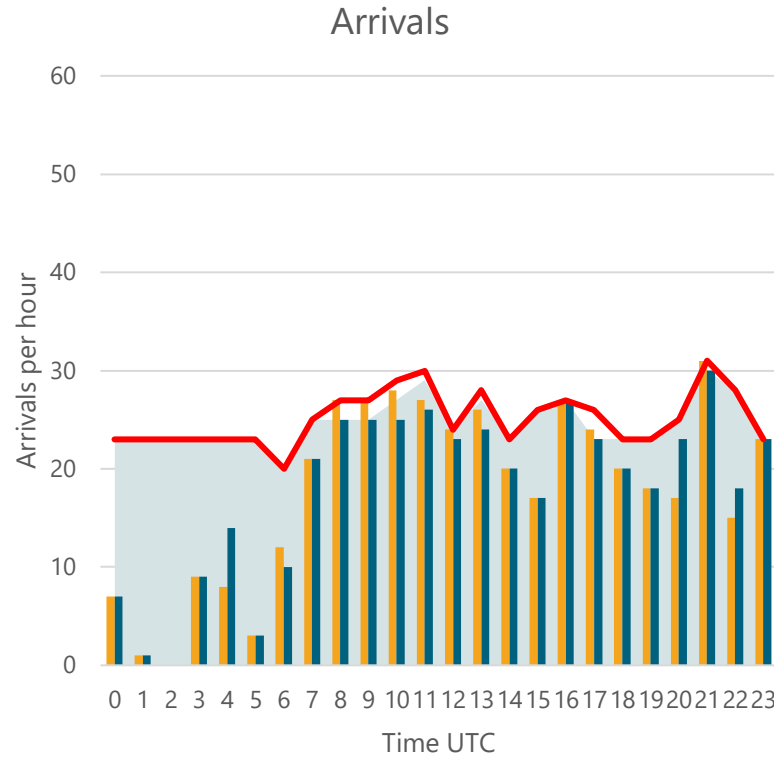
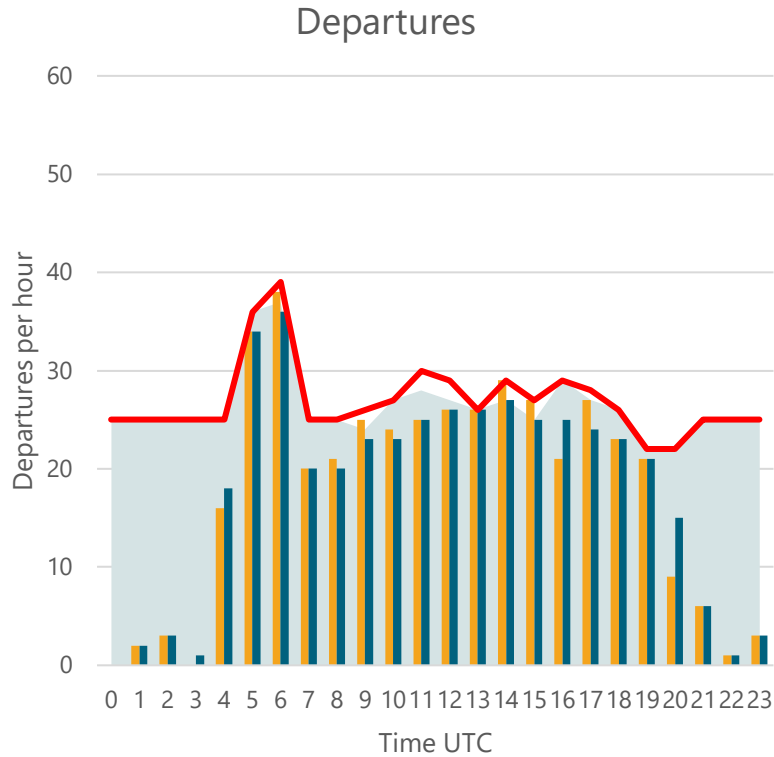
Departures

Proposed S24 departures capacity	25	25	25	25	25	36	39	25	25	26	27	30	29	26	29	27	29	28	26	22	22	25	25	25	646
Departures in simulated S24 schedule	0	2	3	0	16	34	38	20	21	25	24	25	26	26	29	27	21	27	23	21	9	6	1	3	427
<i>Historic</i>	0	2	2	0	16	33	30	19	17	21	22	20	24	22	27	26	19	23	22	20	9	6	1	2	383
<i>Additional departures proposed for S24</i>	0	0	1	0	0	1	8	1	4	4	2	5	2	4	2	1	2	4	1	1	0	0	0	1	44
Spare capacity (against S24 wishlist)	25	23	22	25	9	2	1	5	4	1	3	5	3	0	0	0	8	1	3	1	13	19	24	22	219

Totals

Wishlist S24 Totals capacity	32	32	32	32	32	40	50	41	48	52	52	52	50	52	49	47	52	51	43	39	38	42	32	32	1022
Totals in simulated S24 schedule	7	3	3	9	24	37	50	41	48	52	52	52	50	52	49	44	48	51	43	39	26	37	16	26	859
<i>Historic</i>	7	3	2	6	20	36	40	39	39	45	45	44	44	46	46	41	42	46	42	38	26	33	15	23	768
<i>Additional movements proposed for S24</i>	0	0	1	3	4	1	10	2	9	7	7	8	6	6	3	3	6	5	1	1	0	4	1	3	91
Spare capacity (against S24 wishlist)	25	29	29	23	8	3	0	0	0	0	0	0	0	0	0	3	4	0	0	0	12	5	16	6	163

Constraining the S24 schedule by the S23 limits results in spreading the flights into shoulder hours



- Declared departures capacity (S23)
- Departures in simulated S24 flight schedule (S24 limits)
- Departures in simulated S24 flight schedule (S23 limits)
- Wishlist departures capacity (S24)

- Declared arrivals capacity (S23)
- Arrivals in simulated S24 flight schedule (S24 limits)
- Arrivals in simulated S24 flight schedule (S23 limits)
- Wishlist arrivals capacity (S24)

- Declared totals capacity (S23)
- Totals in simulated S24 flight schedule (S24 limits)
- Totals in simulated S24 flight schedule (S23 limits)
- Wishlist totals capacity (S24)

Some of the additional services envisaged in S24 schedule had to be re-timed to make the flight schedule compatible with the existing S23 declaration. This simulates a case where existing S23 declaration will be rolled forward to Summer 24 season but all of the new services would still operate – although not necessarily at the originally scheduled times.

S24 constrained by existing S23 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 S23 arrivals capacity	23	23	23	23	23	23	20	25	25	25	27	29	24	27	23	26	27	23	23	23	25	30	28	23	591	
Arrivals in simulated S24 schedule	7	1	0	9	14	3	10	21	25	25	25	26	23	24	20	17	27	23	20	18	23	30	18	23	432	
<i>Historic</i>	7	1	0	6	4	3	10	20	22	24	23	24	20	24	19	15	23	23	20	18	17	27	14	21	385	
<i>Additional arrivals proposed for S24</i>	0	0	0	3	10	0	0	1	3	1	2	2	3	0	1	2	4	0	0	0	6	3	4	2	47	
Spare capacity (against S24 wishlist)	16	22	23	14	9	20	10	4	0	0	2	3	1	3	3	9	0	0	3	5	2	0	10	0	159	
Departures																										
Existing S23 departures capacity	25	25	25	25	25	36	37	25	25	24	27	28	27	26	27	25	29	27	26	22	22	25	25	25	633	
Departures in simulated S24 schedule	0	2	3	1	18	34	36	20	20	23	23	25	26	26	27	25	25	24	23	21	15	6	1	3	427	
<i>Historic</i>	0	2	2	0	16	33	30	19	17	21	22	20	24	22	27	25	20	23	22	20	9	6	1	2	383	
<i>Additional departures proposed for S24</i>	0	0	1	1	2	1	6	1	3	2	1	5	2	4	0	0	5	1	1	1	6	0	0	1	44	
Spare capacity (against S24 wishlist)	25	23	22	24	7	2	1	5	5	1	4	3	1	0	0	0	4	3	3	1	7	19	24	22	206	
Totals																										
Existing S23 totals	32	32	32	32	32	40	46	41	45	48	48	51	49	50	47	47	52	47	43	39	38	42	32	32	997	
Totals in simulated S24 schedule	7	3	3	10	32	37	46	41	45	48	48	51	49	50	47	42	52	47	43	39	38	36	19	26	859	
<i>Historic</i>	7	3	2	6	20	36	40	39	39	45	45	44	44	46	46	40	43	46	42	38	26	33	15	23	768	
<i>Additional movements proposed for S24</i>	0	0	1	4	12	1	6	2	6	3	3	7	5	4	1	2	9	1	1	1	12	3	4	3	91	
Spare capacity (against S24 wishlist)	25	29	29	22	0	3	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	6	13	6	138	

04.

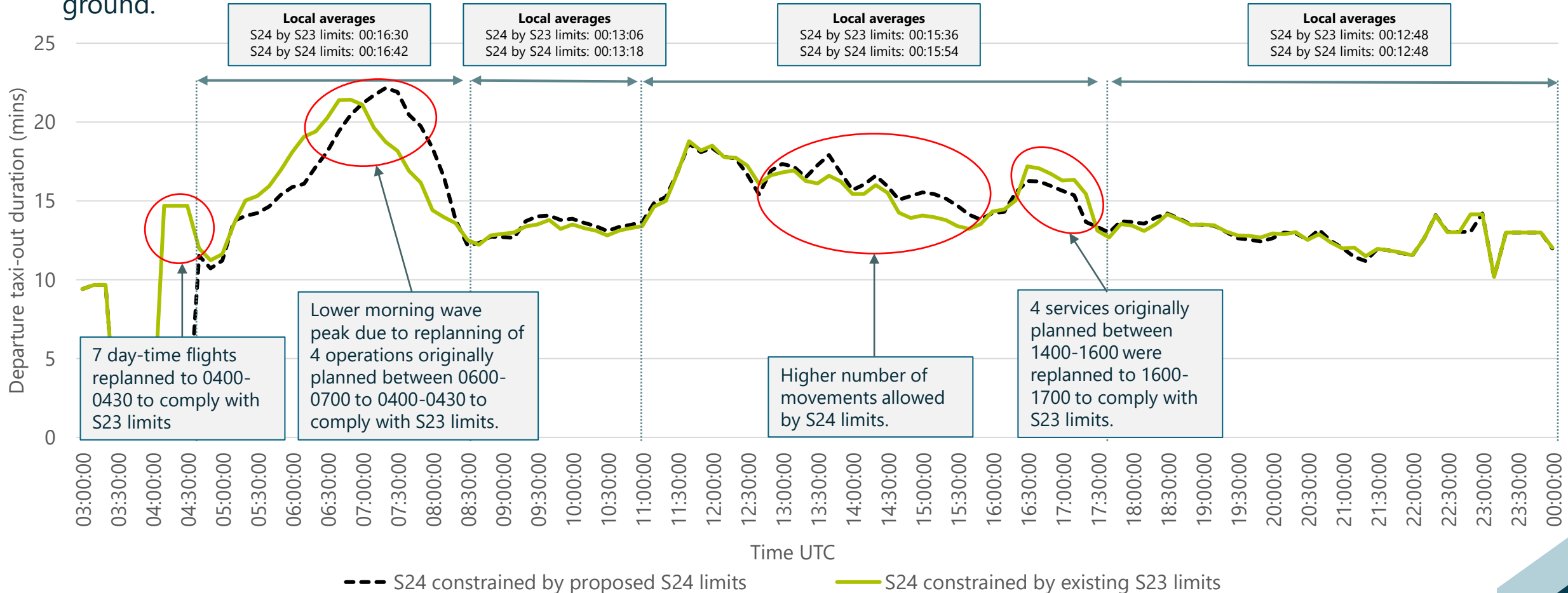
↓
Results

**(westerly
operations)**

Departure taxi out time

	S23 limits	S24 limits	Difference
Daily average	00:13:00	00:12:45	00:00:15
Peak	00:21:24	00:22:12	00:00:48

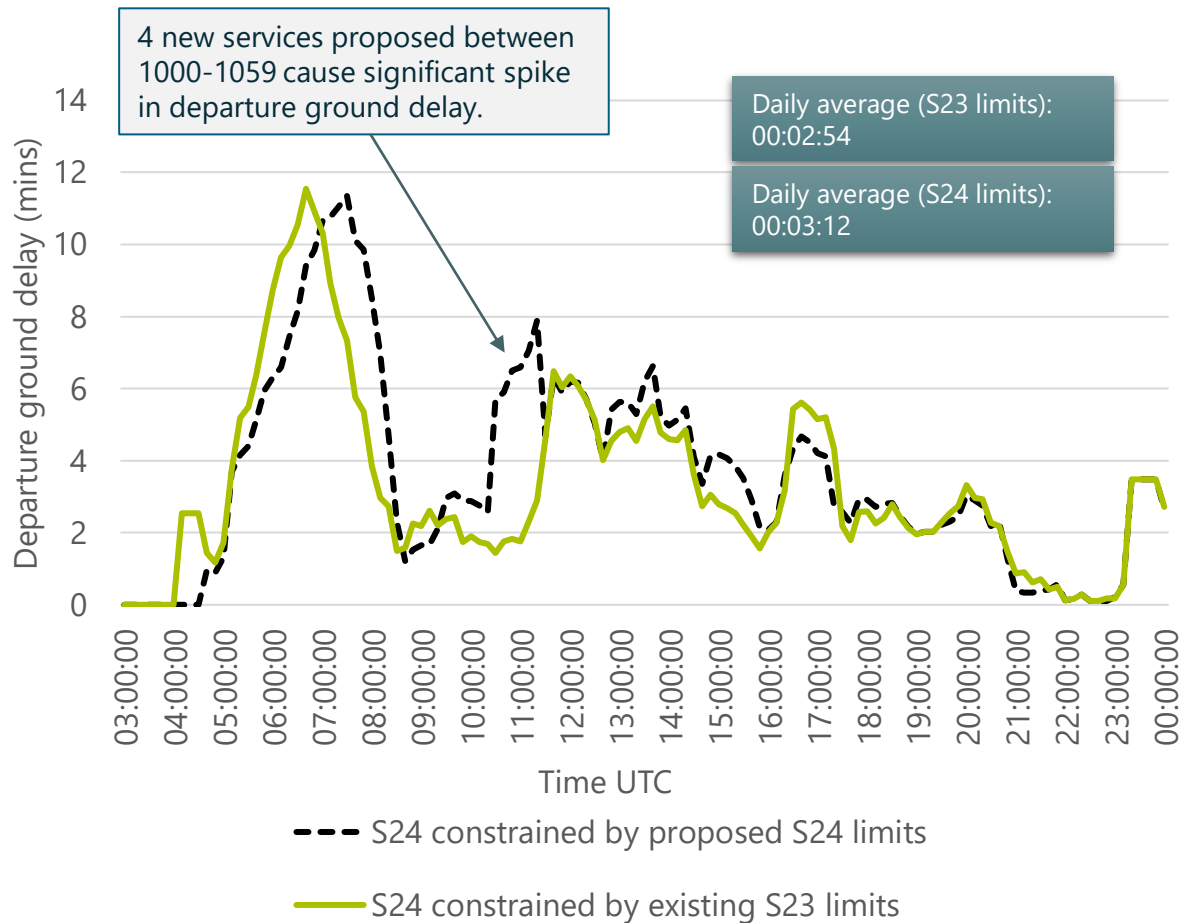
Definition: This metric is defined to be the time period between off-block and the time the aircraft lifts-off. This value is updated every second during the simulation when the aircraft is taxiing for departure even if the aircraft is stopped on ground.



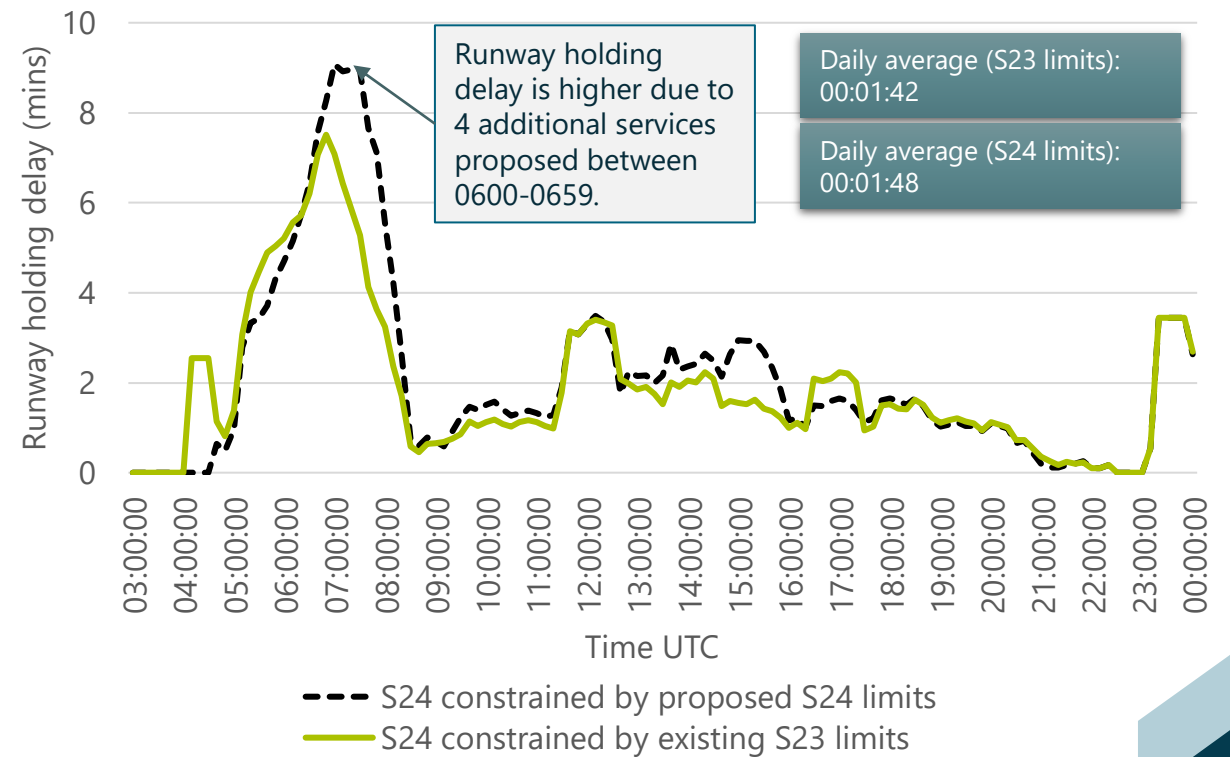
*This graph is presented as a rolling 10-minute average (value for each time period has been calculated as average of values of all events occurring within the T-60 minutes window from the start of the measurement).

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.



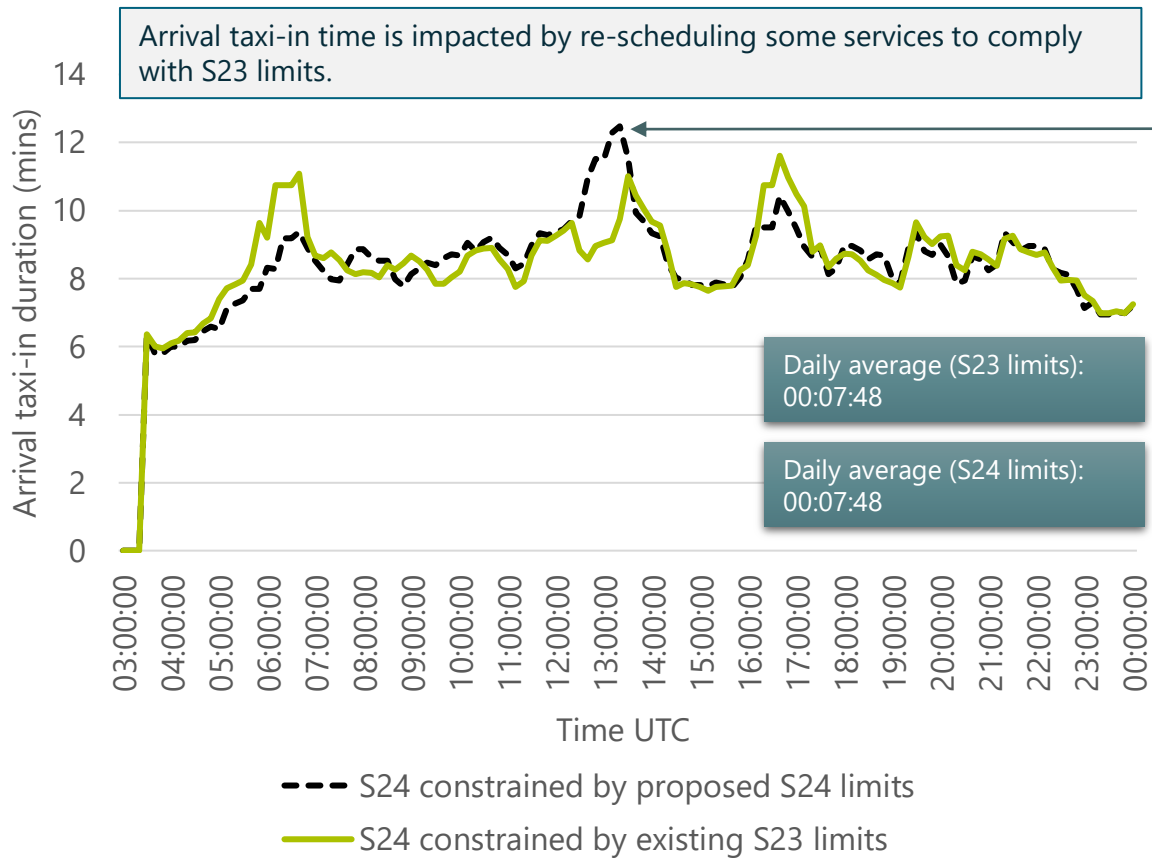
Runway holding delay: The delay experienced while the aircraft is queueing for runway entry. The delay can be caused by other aircraft (being slowed down or stopped) or when waiting at runway stop-bar (because the runway is not free for lining up). This metric is defined to be the time period between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



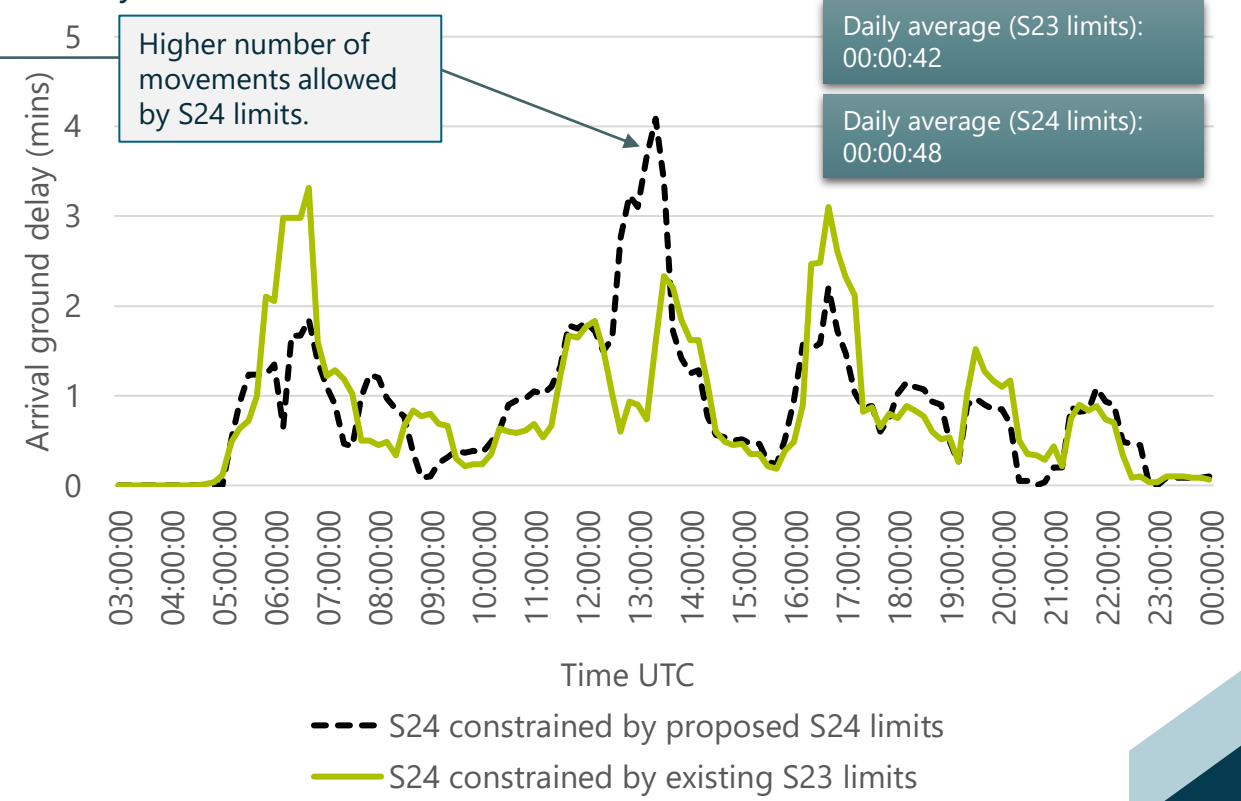
*These graphs are presented as a rolling 10-minute average (value for each time period has been calculated as average of values of all events occurring within the T-60 minutes window from the start of the measurement).

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 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

File Edit View Tools Simulation Report Help

Browser Project

Adapter Project Description

Property Performance Status

Adapter

- ▼ 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 Flight Plan

Create Defaults AirTOp Reporter

Events Event Statistics Logs & Plots Airspaces Airports Terminal Tra

Watches Plots Watch Events Watch Event Aggregates Watches

ObjectPropertyPlot List

- ▼ ObjectPropertyPlot
 - ▼ Airport Report
 - ▼ Eidw
 - Throughput Delays
 - by Airport
 - by Runway
 - Rwy10
 - Rwy10l
 - Rwy10r
 - Rwy28
 - Rwy28l
 - Rwy28r
 - All
 - Workload
 - Radar Controller
 - Template
 - Airport Report
 - Radar Controller

Selected ObjectPropertyPlot - AIRPORT_REPORT.EIDW.1

Ave Airborne Delays Ave CO2 Emitted Ave Fuel

Property

2 00:00 2 01:00 2 02:00 2 03:00 2 04:00 2 05:00 2 06:00 2 07:00 2 08:00

Day 1 [2014-01-01]

Property

2 00:00 2 01:00 2 02:00 2 03:00 2 04:00 2 05:00 2 06:00 2 07:00 2 08:00 2 09:00 2 10:00 2 11:00 2 12:00 2 13:00 2 14:00

Day 1 [2014-01-01]

Property

2 01:00 2 02:00 2 03:00 2 04:00 2 05:00 2 06:00 2 07:00 2 08:00 2 09:00 2 10:00 2 11:00 2 12:00 2 13:00 2 14:00

Day 1 [2014-01-01]

Filter Export Layout Vertical Same X-Range Trim Prefix Suffix



Increasing the RWY limits in line with the S24 Wishlist

Assuming the S24 schedule materializes as expected, increasing the runway limits in line with the S24 Wishlist:

- The daily average and peak taxi out times are on average not materially impacted by declaring the additional capacity.
- Is likely to cause localized deterioration of ground delays in and around those hours where capacity increases are proposed, which is offset by less use of available capacity in adjoining hours.
 - The average departure taxi time in the first morning wave peaks between 0600-0820 with average departure taxi time of around 18 minutes and 54 seconds per flight.
 - Additional services proposed between 0800-1659 show negligible impact on average taxi time performance with a local deterioration of up to 1 minute and 30 seconds per flight between 1330-1530.
 - Average arrival taxi-in time is negatively impacted between 12:30-13:30 by additional services proposed between 1100-1300. Local deterioration is likely to be up to 3 minutes on average.
- Is likely to lead to scheduled capacity limits being reached during day between 0600-1959 and during evening between 2100-2159 and 2300-2359. However, when both runways are operational, taxi time is not materially impacted by additional services.

Maintaining the RWY limits in line with the S23 declaration

Assuming the S24 schedule materializes as expected, maintaining the runway limits in line with the S23 capacity declaration:

- Is likely to cause re-distribution of newly planned services to hours with any remaining available capacity.
 - Negative impact is likely to be in the morning period before 0500 when only RWY28L is operational. On the other hand, due to re-distribution of some services, the morning peak is likely to be smaller by 48 seconds per flight.
 - Re-planning the new services to comply with S23 limits will:
 - Cause local reduction in taxi time performance (compared against S24 wishlist schedule) in those hours where the additional services were initially proposed.
 - Cause local increase in taxi time performance (compared against S24 wishlist schedule) in those hours where the proposed new services for S24 have been accommodated in line with S23 capacity limits.
- Is likely to lead to scheduled capacity limits being reached between 0400-0459, 0600-2159 and between 2300-2359.

06.

**Additional[↓]
simulations**

**Increased
number of
movements
in specific
hours**

Scenario B

Additional movements against original S24 schedule →

Hour	Arrivals	Departures	Totals
0600		+2	+2
0700	+2	+2	+4
2100	+1		+1

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 S24 arrivals capacity	23	23	23	23	23	23	20	25	27	27	29	30	24	28	23	26	27	26	23	23	25	32	28	23	604	
Arrivals in simulated S24 schedule	7	1	0	9	8	3	12	23	27	27	28	27	24	26	20	17	27	24	20	18	17	32	15	23	435	
<i>Historic</i>	7	1	0	6	4	3	10	22	22	24	23	24	20	24	19	15	23	23	20	18	17	28	14	21	388	
<i>Additional arrivals proposed for S24</i>	0	0	0	3	4	0	2	1	5	3	5	3	4	2	1	2	4	1	0	0	0	4	1	2	47	
Spare capacity (against S24 wishlist)	16	22	23	14	15	20	8	2	0	0	1	3	0	2	3	9	0	2	3	5	8	0	13	0	169	
Departures																										
Proposed S24 departures capacity	25	25	25	25	25	36	40	25	25	26	27	30	29	26	29	27	29	28	26	22	22	25	25	25	647	
Departures in simulated S24 schedule	0	2	3	0	16	34	40	22	21	25	24	25	26	26	29	27	21	27	23	21	9	6	1	3	431	
<i>Historic</i>	0	2	2	0	16	33	32	21	17	21	22	20	24	22	27	26	19	23	22	20	9	6	1	2	387	
<i>Additional departures proposed for S24</i>	0	0	1	0	0	1	8	1	4	4	2	5	2	4	2	1	2	4	1	1	0	0	0	1	44	
Spare capacity (against S24 wishlist)	25	23	22	25	9	2	0	3	4	1	3	5	3	0	0	0	8	1	3	1	13	19	24	22	216	
Totals																										
Wishlist S24 Totals capacity	32	32	32	32	32	40	52	45	48	52	52	52	50	52	49	47	52	51	43	39	38	42	32	32	1028	
Totals in simulated S24 schedule	7	3	3	9	24	37	52	45	48	52	52	52	50	52	49	44	48	51	43	39	26	38	16	26	866	
<i>Historic</i>	7	3	2	6	20	36	42	43	39	45	44	44	44	46	46	41	42	46	42	38	26	34	15	23	775	
<i>Additional movements proposed for S24</i>	0	0	1	3	4	1	10	2	9	7	7	8	6	6	3	3	6	5	1	1	0	4	1	3	91	
Spare capacity (against S24 wishlist)	25	29	29	23	8	3	0	0	0	0	0	0	0	0	0	3	4	0	0	0	12	4	16	6	162	

Scenario C

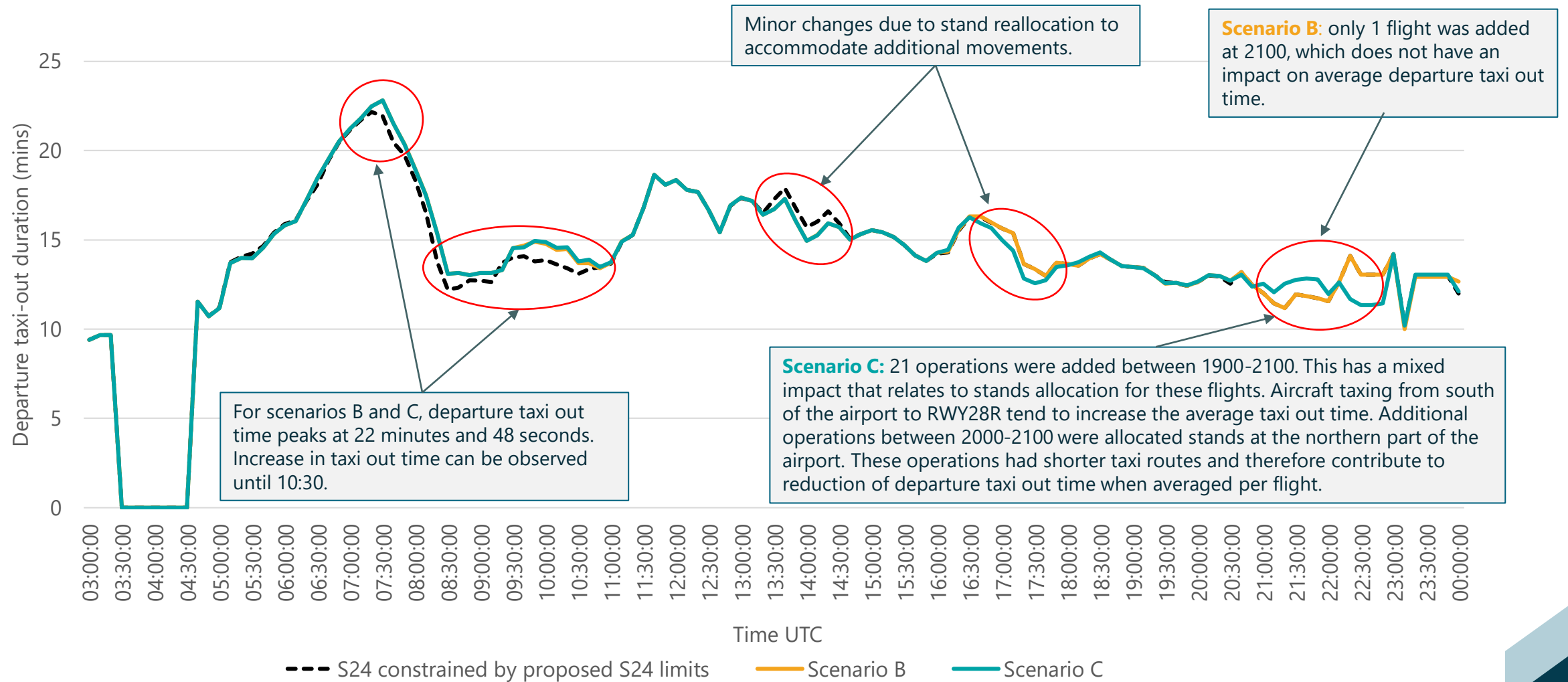
Additional movements against original S24 schedule →

Hour	Arrivals	Departures	Totals
0600		+2	+2
0700	+1	+1	+2
1900	+2		+2
2000	+7	+7	+14
2100	+2	+3	+5

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 S24 arrivals capacity	23	23	23	23	23	23	20	25	27	27	29	30	24	28	23	26	27	26	23	25	27	33	28	23	609	
Arrivals in simulated S24 schedule	7	1	0	9	8	3	12	22	27	27	28	27	24	26	20	17	27	24	20	20	24	33	15	23	444	
<i>Historic</i>	7	1	0	6	4	3	10	21	22	24	23	24	20	24	19	15	23	23	20	20	24	29	14	21	397	
<i>Additional arrivals proposed for S24</i>	0	0	0	3	4	0	2	1	5	3	5	3	4	2	1	2	4	1	0	0	0	4	1	2	47	
Spare capacity (against S24 wishlist)	16	22	23	14	15	20	8	3	0	0	1	3	0	2	3	9	0	2	3	5	3	0	13	0	165	
Departures																										
Proposed S24 departures capacity	25	25	25	25	25	36	40	27	25	26	27	30	29	26	29	27	29	28	26	22	22	25	25	25	649	
Departures in simulated S24 schedule	0	2	3	0	16	34	40	21	21	25	24	25	26	26	29	27	21	27	23	21	16	9	1	3	440	
<i>Historic</i>	0	2	2	0	16	33	32	20	17	21	22	20	24	22	27	26	19	23	22	20	16	9	1	2	396	
<i>Additional departures proposed for S24</i>	0	0	1	0	0	1	8	1	4	4	2	5	2	4	2	1	2	4	1	1	0	0	0	1	44	
Spare capacity (against S24 wishlist)	25	23	22	25	9	2	0	6	4	1	3	5	3	0	0	0	8	1	3	1	6	16	24	22	209	
Totals																										
Wishlist S24 Totals capacity	32	32	32	32	32	40	52	43	48	52	52	52	50	52	49	47	52	51	43	41	40	44	32	32	1032	
Totals in simulated S24 schedule	7	3	3	9	24	37	52	43	48	52	52	52	50	52	49	44	48	51	43	41	40	42	16	26	884	
<i>Historic</i>	7	3	2	6	20	36	42	41	39	45	45	44	44	46	46	41	42	46	42	40	40	38	15	23	793	
<i>Additional movements proposed for S24</i>	0	0	1	3	4	1	10	2	9	7	7	8	6	6	3	3	6	5	1	1	0	4	1	3	91	
Spare capacity (against S24 wishlist)	25	29	29	23	8	3	0	0	0	0	0	0	0	0	0	3	4	0	0	0	0	2	16	6	148	

Departure taxi out time

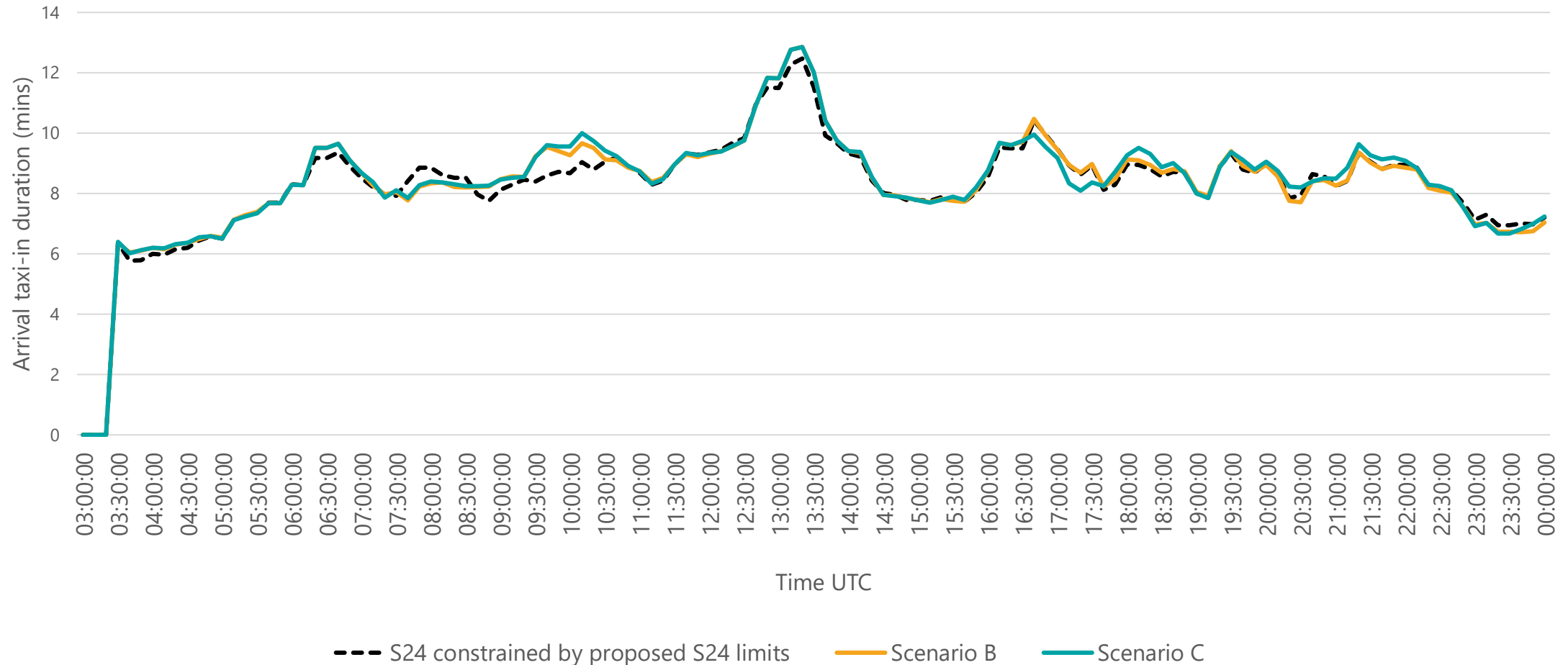
	Original scenario	Scenario B	Scenario C
Daily average	00:12:45	00:12:50	00:12:47
Peak	00:22:12	00:22:48	00:22:48



Arrival taxi in time

	Original scenario	Scenario B	Scenario C
Daily average	00:07:48	00:07:52	00:07:53
Peak	00:12:30	00:12:54	00:12:54

Additional proposed movements have overall minor impact on arrival taxi in time performance. Differences throughout the day, where no operations were added, come from different stand allocation to accommodate additional traffic.





Alexandra Dudášová

Egis

15 avenue du Centre
CS 20538 Guyancourt
Saint Quentin-en-Yvelines
France

www.egis-group.com

