



Summer 2027: Assessment of the likely impact of declaring the Wishlist runway capacity

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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 To70 to undertake airfield fast time simulations in preparation for the Summer 2027 (S27) season at Dublin airport.

This document provides results from two simulated scenarios:

- S27 flight schedule coordinated to the proposed S27 limits and
- S27 flight schedule coordinated to the existing S26 limits.

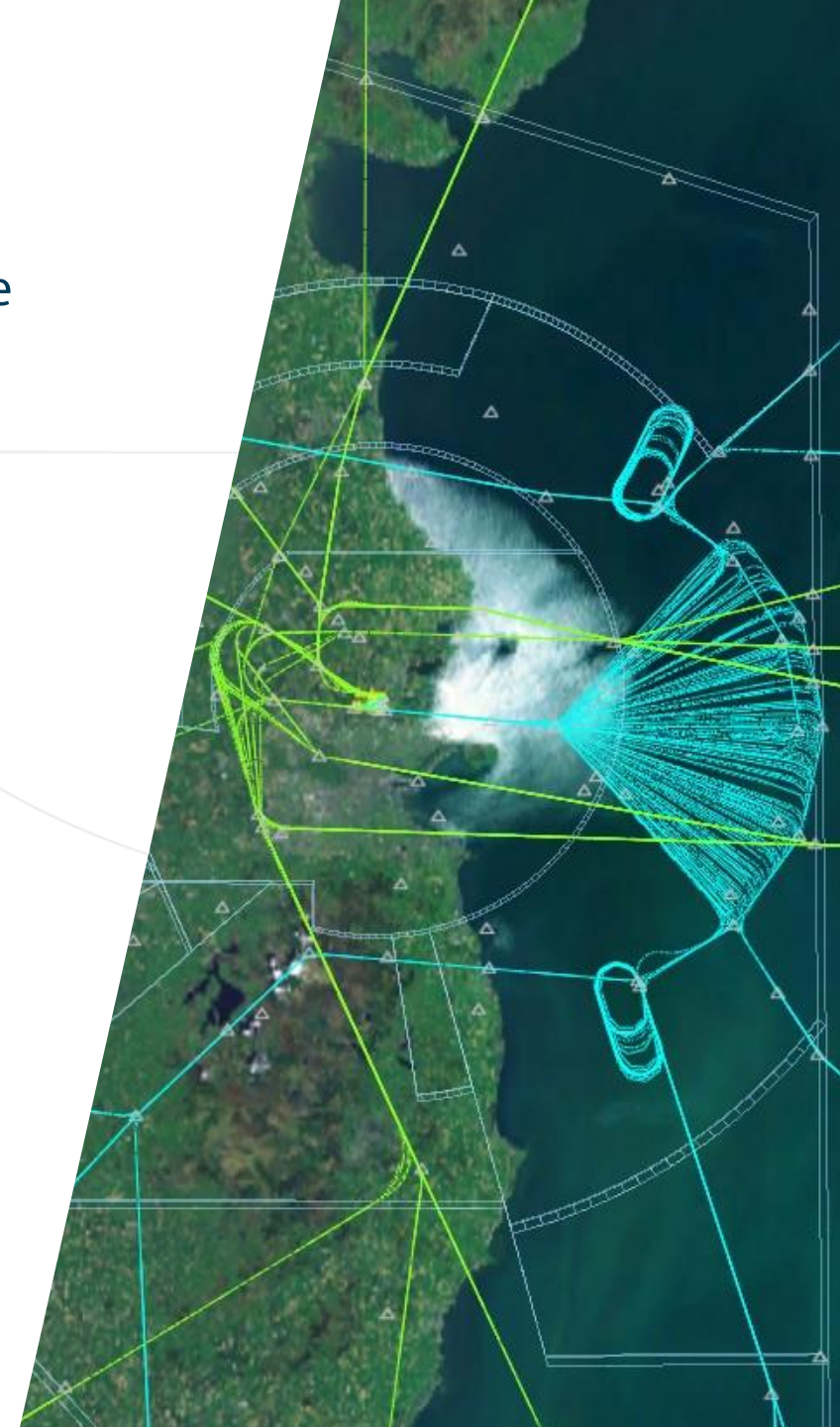


Model validation

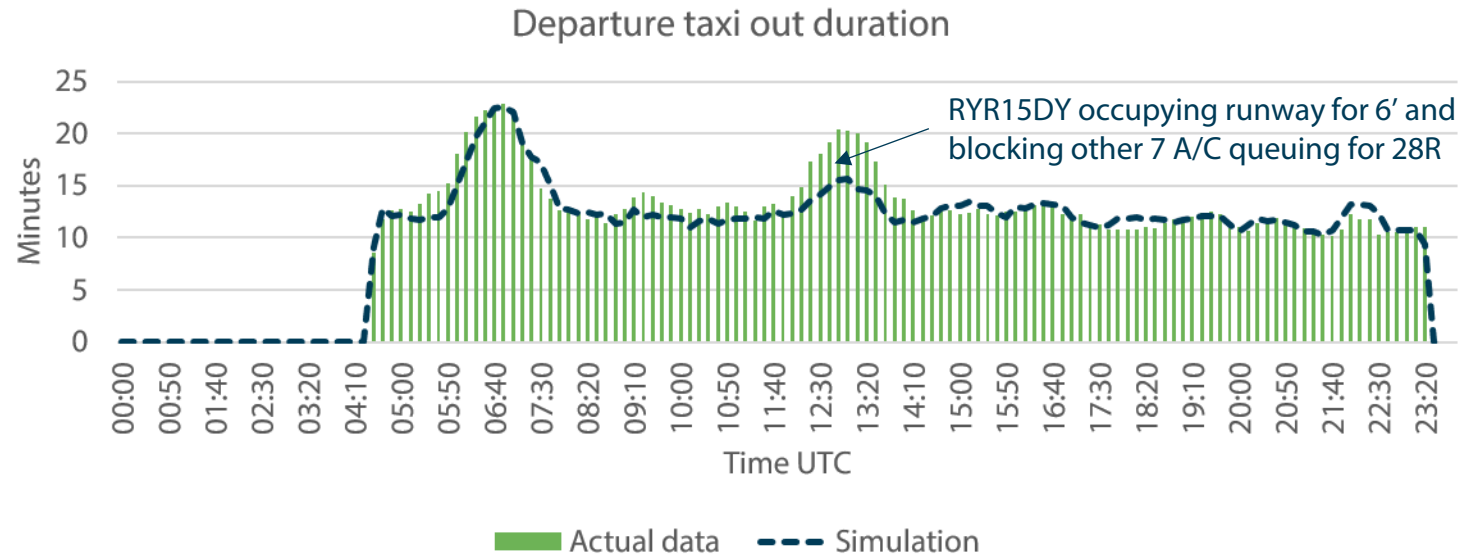


Model validation

- ✈ 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 S26 operations (5th of May):
 - 370 arrivals and 381 departures, incl. GA and cargo,
 - Arrivals on 28L only,
 - Departures from 28L 2200-0559 UTC,
 - Departures from 28R 0600-2159 UTC,
 - Run from actual block times to take into account all delays.
- ✈ A comparison set of airside performance metrics is provided on the following slides.



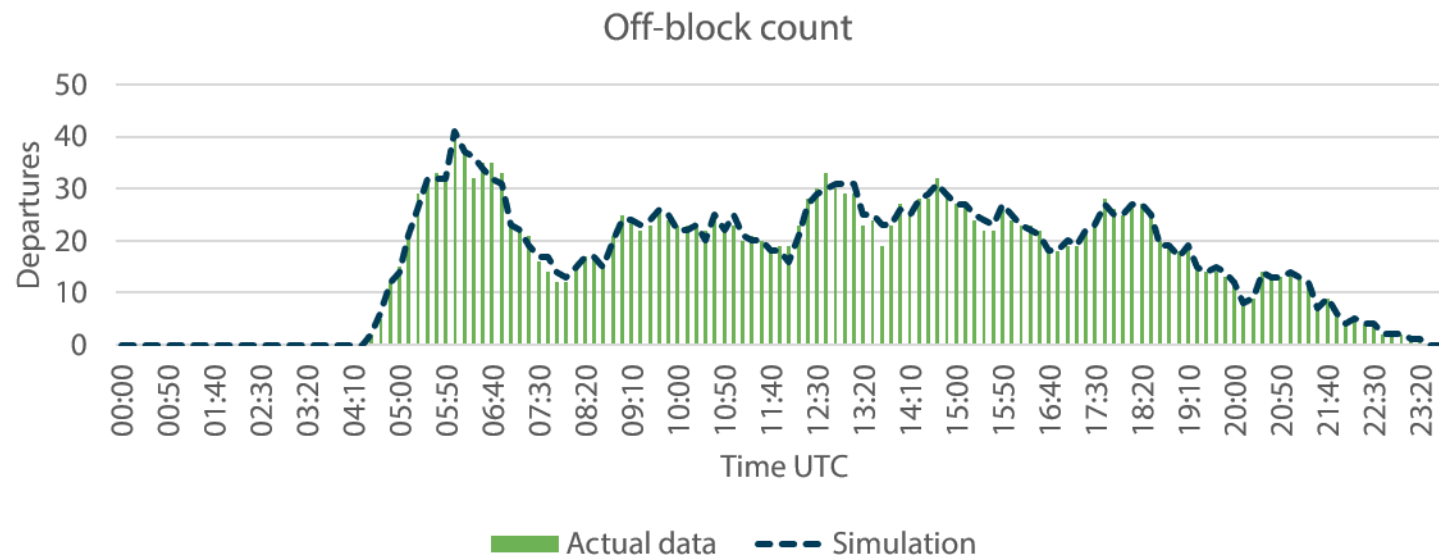
Calibration of departure performance



Metric definition:

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

*This graph is 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).

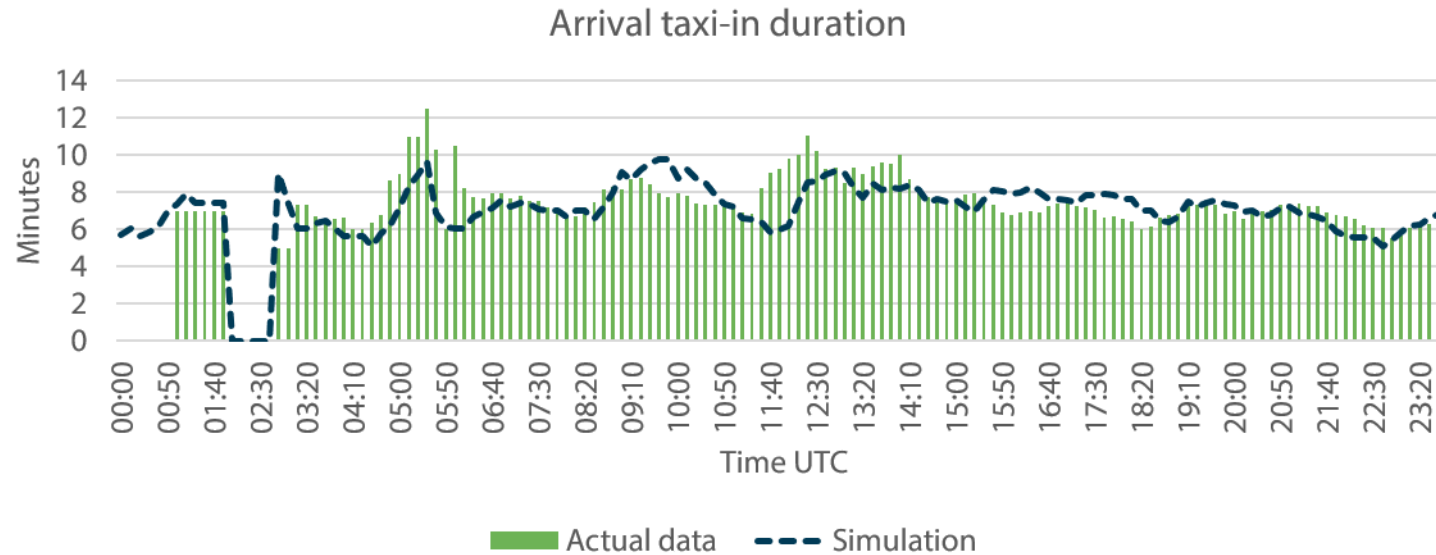


Metric definition:

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).

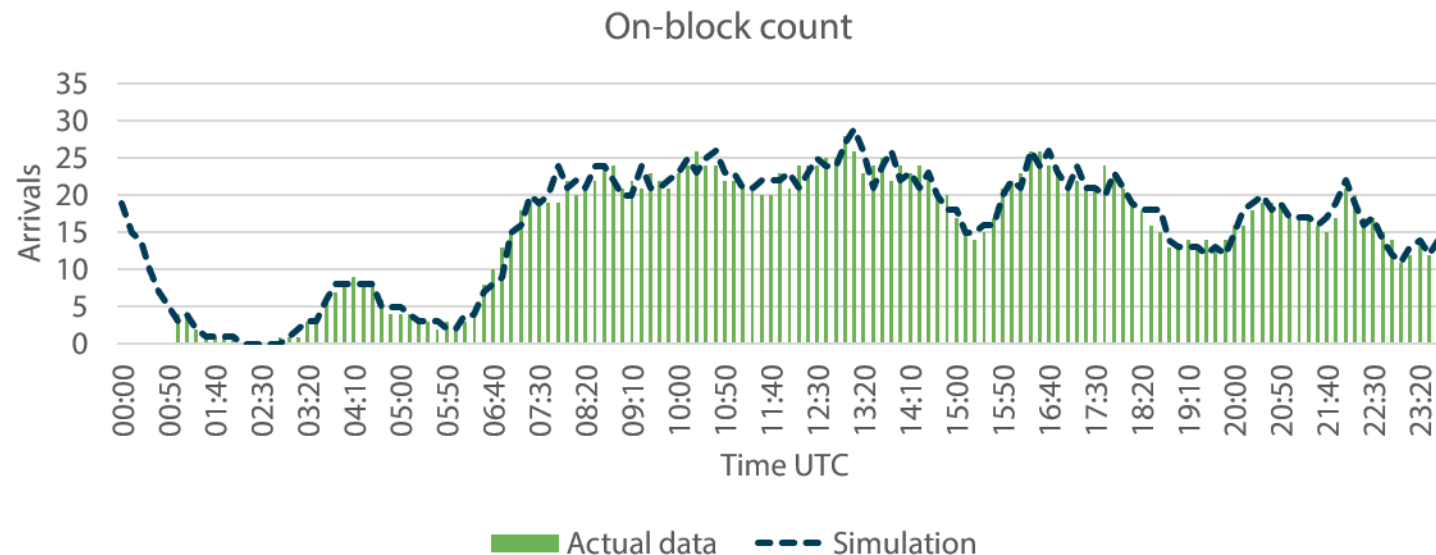
Calibration of arrival performance



Metric definition:

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

*This graph is presented as a rolling 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).

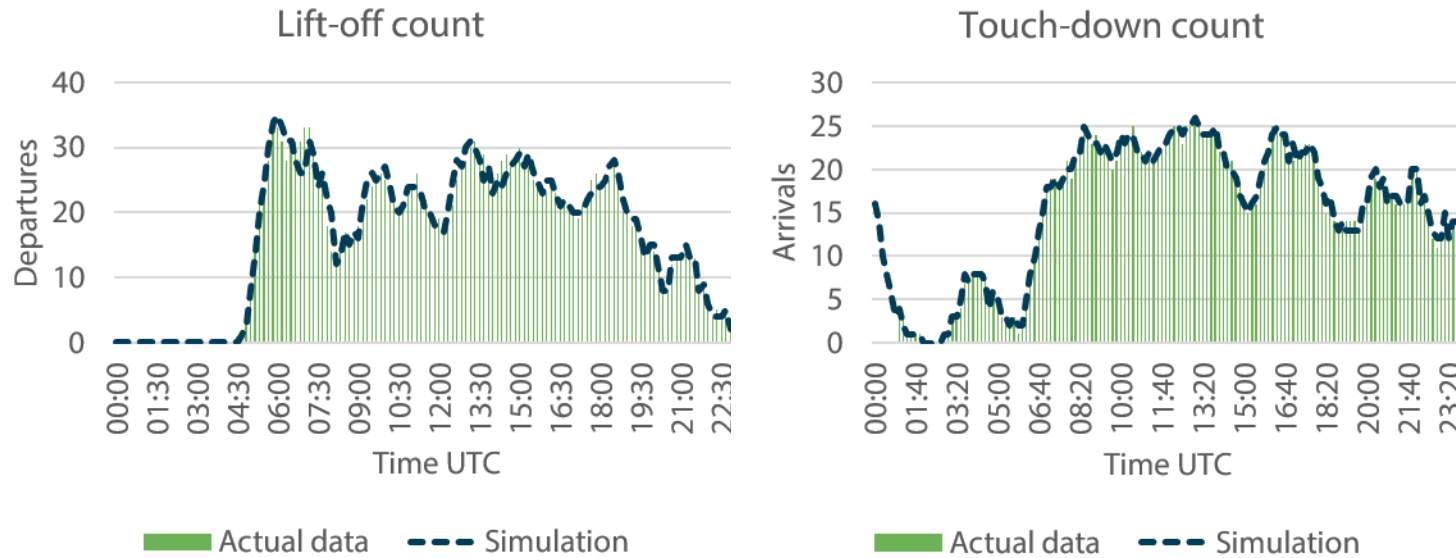


Metric definition:

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

* This graph is 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).

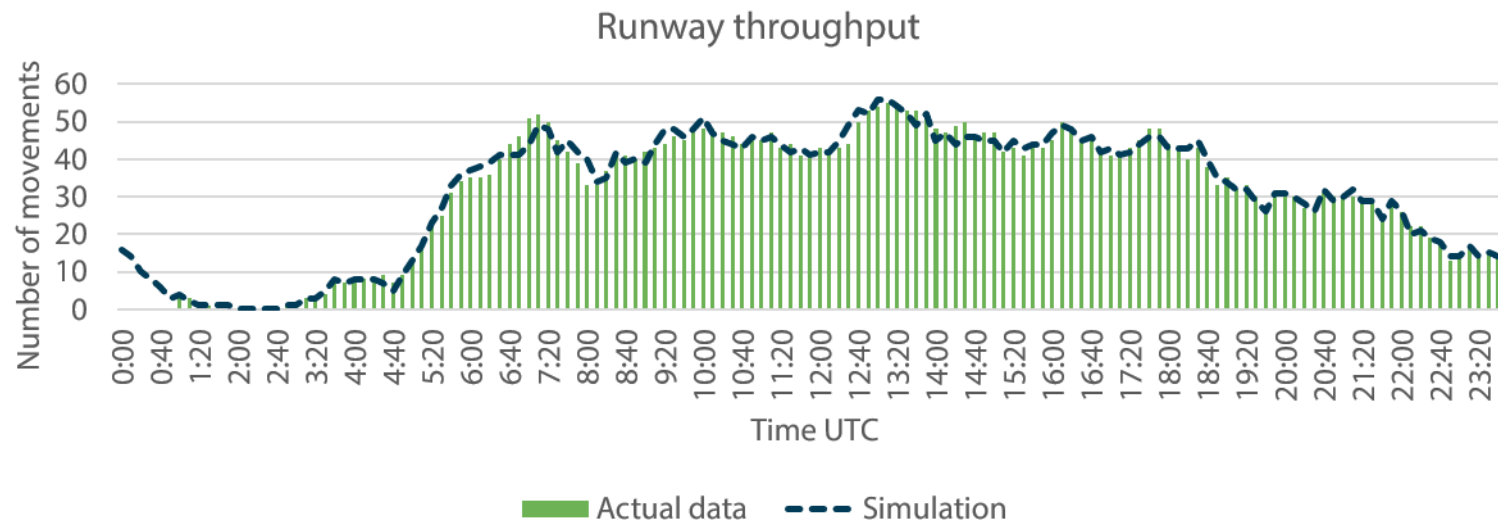
Calibration of runway performance



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.

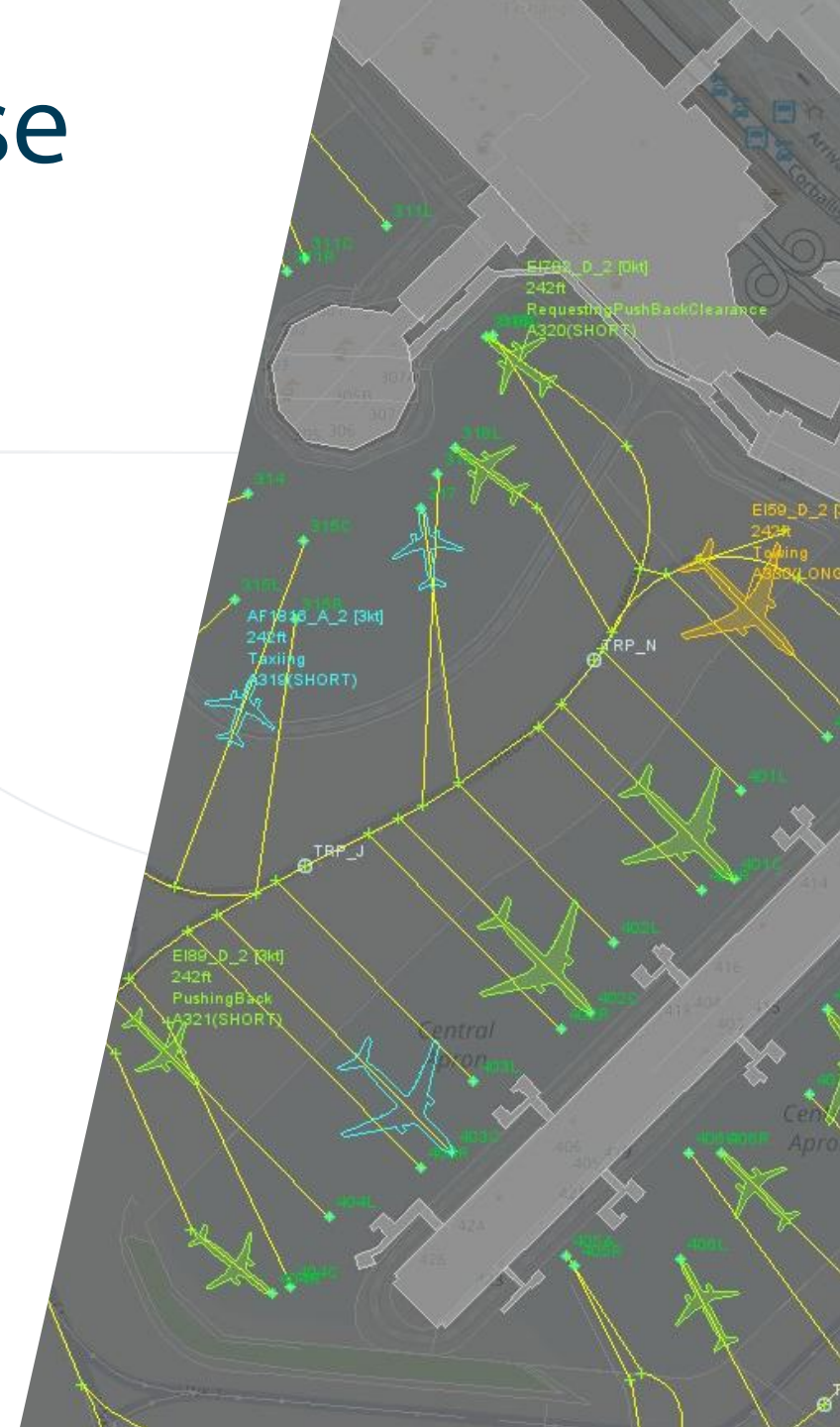


Runway throughput: Sum of all aircraft touching down and lifting-off in the 60-minute rolling period.

* 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.



Summer 2027 assessment



Task description

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

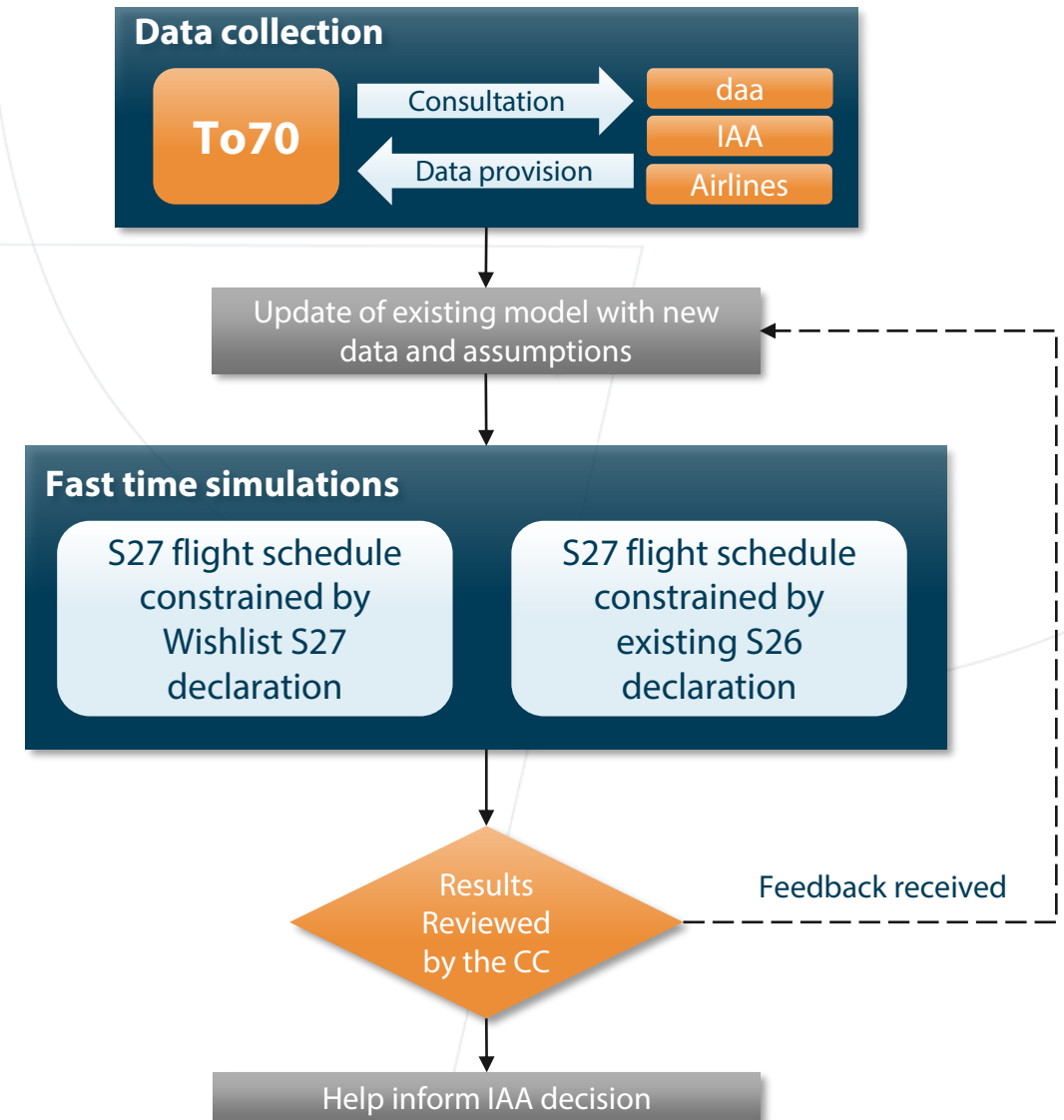
- declaring an increased runway capacity, as per the Summer 2027 Wishlist proposal, or
- maintaining the Summer 2026 capacity declaration limits.

- ✂ In both cases it is presumed that the Summer 2027 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 2027 day.



Approach and key changes in the W26 model Celebrating 25 years

- ✈ Dual code E taxiways B1/Z to/from South Apron,
- ✈ TWY A permanently closed,
- ✈ TWY B2 bi-directional,
- ✈ TWY W1 closed because of Underpass works.



S27 Wishlist proposed by Dublin Airport

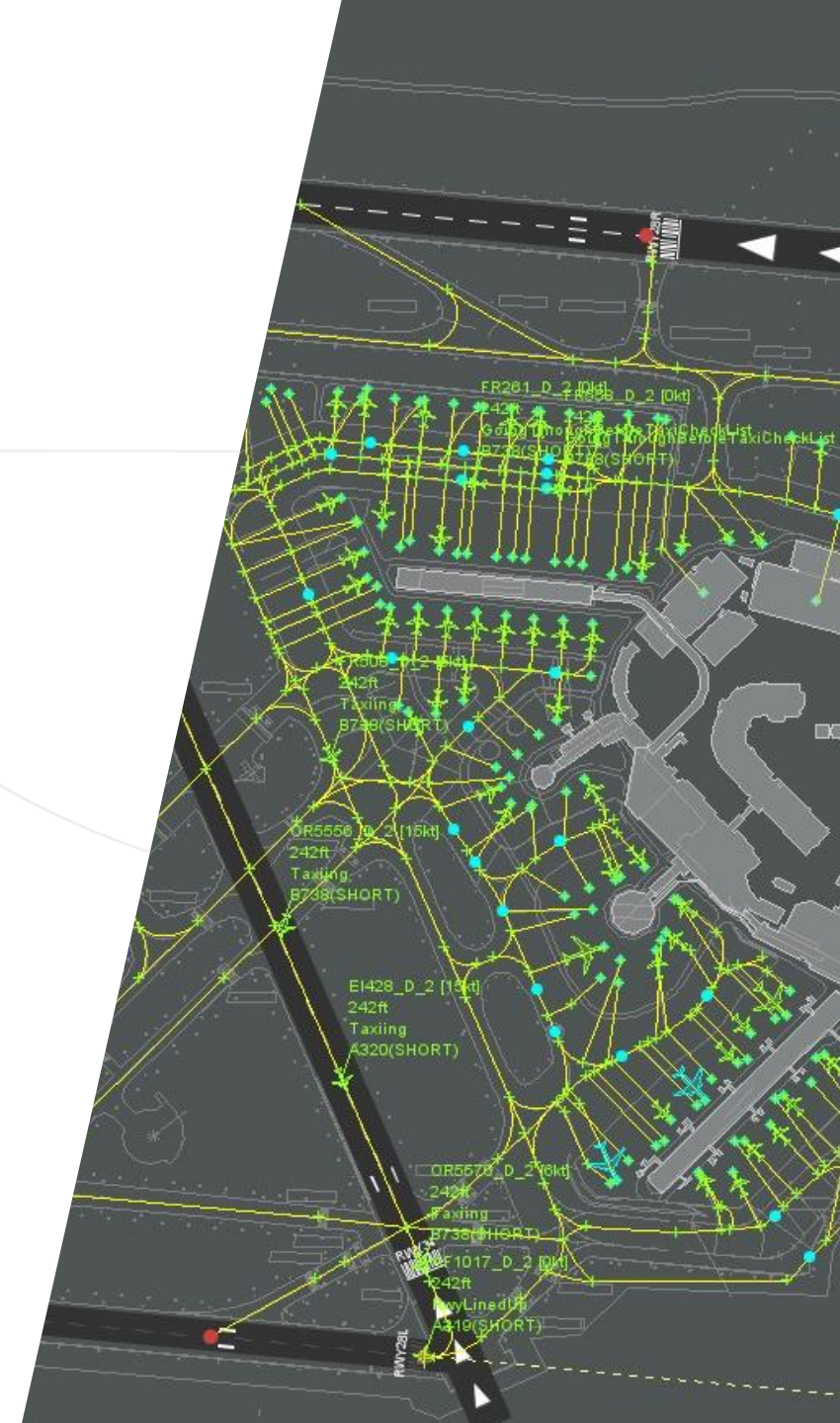


Hour UTC	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Total
Arrivals																									
Existing S26 arrivals capacity	23	23	23	23	23	23	22	28	29	27	30	30	28	28	23	26	28	26	23	26	27	34	28	23	624
Proposed S27 arrivals capacity	23	23	23	23	23	23	22	30	29	29	30	30	30	28	25	26	30	26	25	26	27	34	28	23	636
Difference (against S26 declaration)	0	0	0	0	0	0	0	2	0	2	0	0	2	0	2	0	2	0	2	0	0	0	0	0	12
Departures																									
Existing S26 departures capacity	25	25	25	25	25	36	40	25	26	30	27	30	30	30	32	27	29	30	26	23	22	25	25	25	663
Proposed S27 departures capacity	25	25	25	25	25	36	41	25	28	30	30	30	30	33	32	29	29	32	26	23	22	25	25	25	676
Difference (against S26 declaration)	0	0	0	0	0	0	1	0	2	0	3	0	0	3	0	2	0	2	0	0	0	0	0	0	13
Totals																									
Existing S26 totals capacity	32	32	32	32	32	40	54	48	50	54	54	57	57	56	52	47	54	55	48	46	46	45	32	32	1087
Proposed S27 totals capacity	32	32	32	32	32	40	57	50	53	56	56	57	59	58	54	51	56	57	50	46	46	45	32	32	1115
Difference (against S26 declaration)	0	0	0	0	0	0	3	2	3	2	2	0	2	2	2	4	2	2	2	0	0	0	0	0	28

Summer 2027 flight schedule

✈ The flight schedule used for modelling of both scenarios:

- Contains a total of 907 flights:
 - 450 arrivals and
 - 457 departures;
- Contains 98 new services:
 - 47 new arrivals and
 - 51 new departures;
- Does not contain:
 - helicopter,
 - military,
 - state or
 - medical flights.



S27 constrained by proposed S27 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
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Arrivals

Proposed S27 arrivals capacity	23	23	23	23	23	23	22	30	29	29	30	30	30	28	25	26	30	26	25	26	27	34	28	23	636
Arrivals in simulated S27 schedule	9	2	0	2	5	3	16	30	25	29	26	24	30	25	25	22	30	25	25	20	15	30	16	16	450
<i>Historic</i>	9	2	0	2	5	3	15	23	25	25	22	24	23	25	21	20	22	18	22	20	15	30	16	16	403
<i>Additional arrivals proposed for S27</i>	0	0	0	0	0	0	1	7	0	4	4	0	7	0	4	2	8	7	3	0	0	0	0	0	47
Spare capacity (against S27 wishlist)	14	21	23	21	18	20	6	0	4	0	4	6	0	3	0	4	0	1	0	6	12	4	12	7	186

Departures

Proposed S27 departures capacity	25	25	25	25	25	36	41	25	28	30	30	30	30	33	32	29	29	32	26	23	22	25	25	25	676
Departures in simulated S27 schedule	0	0	0	0	11	36	41	20	28	27	30	24	29	33	29	29	26	32	25	16	11	5	5	0	457
<i>Historic</i>	0	0	0	0	11	36	33	18	24	24	25	24	29	22	28	26	23	24	22	16	11	5	5	0	406
<i>Additional departures proposed for S27</i>	0	0	0	0	0	0	8	2	4	3	5	0	0	11	1	3	3	8	3	0	0	0	0	0	51
Spare capacity (against S27 wishlist)	25	25	25	25	14	0	0	5	0	3	0	6	1	0	3	0	3	0	1	7	11	20	20	25	219

Totals

Wishlist S27 Totals capacity	32	32	32	32	32	40	57	50	53	56	56	57	59	58	54	51	56	57	50	46	46	45	32	32	1115
Totals in simulated S27 schedule	9	2	0	2	16	39	57	50	53	56	56	48	59	58	54	51	56	57	50	36	26	35	21	16	907
<i>Historic</i>	9	2	0	2	16	39	48	41	49	49	47	48	52	47	49	46	45	42	44	36	26	35	21	16	809
<i>Additional movements proposed for S27</i>	0	0	0	0	0	0	9	9	4	7	9	0	7	11	5	5	11	15	6	0	0	0	0	0	98
Spare capacity (against S27 wishlist)	23	30	32	30	16	1	0	0	0	0	0	9	0	0	0	0	0	0	0	10	20	10	11	16	208

S27 constrained by existing S26 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
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Arrivals

Existing S26 arrivals capacity	23	23	23	23	23	23	22	28	29	27	30	30	28	28	23	26	28	26	23	26	27	34	28	23	624
Arrivals in simulated S27 schedule	9	2	0	2	6	4	16	28	25	27	27	27	28	26	23	20	28	25	23	26	16	30	16	16	450
<i>Historic</i>	9	2	0	2	5	3	15	23	25	25	22	24	23	25	21	20	22	18	22	20	15	30	16	16	403
<i>Additional arrivals proposed for S27</i>	0	0	0	0	1	1	1	5	0	2	5	3	5	1	2	0	6	7	1	6	1	0	0	0	47
Spare capacity (against S26 limits)	14	21	23	21	17	19	6	0	4	0	3	3	0	2	0	6	0	1	0	0	11	4	12	7	174

Departures

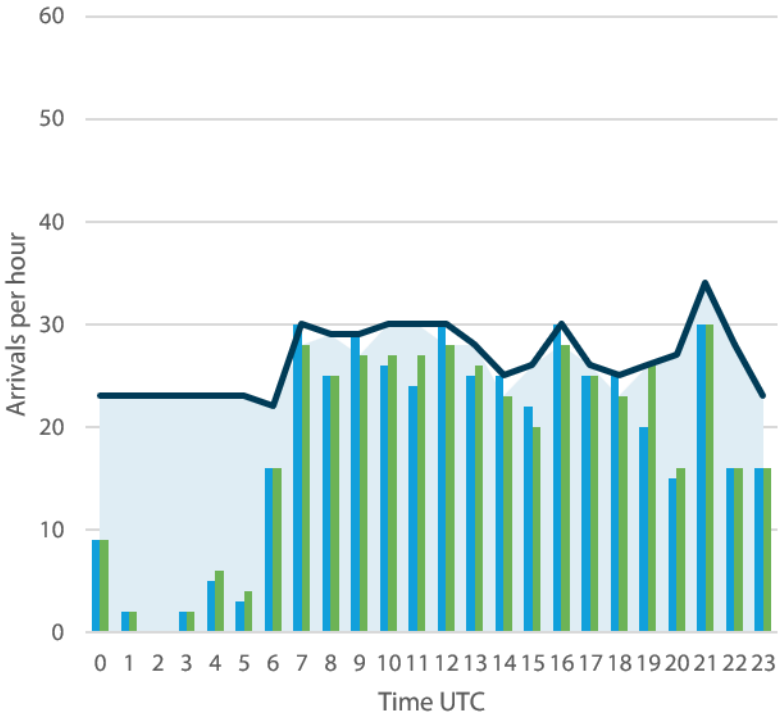
Existing S26 departures capacity	25	25	25	25	25	36	40	25	26	30	27	30	30	30	32	27	29	30	26	23	22	25	25	25	663
Departures in simulated S27 schedule	0	0	0	0	17	36	38	20	25	27	27	30	29	30	29	27	26	30	25	20	11	5	5	0	457
<i>Historic</i>	0	0	0	0	11	36	33	18	24	24	25	24	29	22	28	26	23	24	22	16	11	5	5	0	406
<i>Additional departures proposed for S27</i>	0	0	0	0	6	0	5	2	1	3	2	6	0	8	1	1	3	6	3	4	0	0	0	0	51
Spare capacity (against S26 limits)	25	25	25	25	8	0	2	5	1	3	0	0	1	0	3	0	3	0	1	3	11	20	20	25	206

Totals

Existing S26 totals capacity	32	32	32	32	32	40	54	48	50	54	54	57	57	56	52	47	54	55	48	46	46	45	32	32	1087
Totals in simulated S27 schedule	9	2	0	2	23	40	54	48	50	54	54	57	57	56	52	47	54	55	48	46	27	35	21	16	907
<i>Historic</i>	9	2	0	2	16	39	48	41	49	49	47	48	52	47	49	46	45	42	44	36	26	35	21	16	809
<i>Additional movements proposed for S27</i>	0	0	0	0	7	1	6	7	1	5	7	9	5	9	3	1	9	13	4	10	1	0	0	0	98
Spare capacity (against S26 limits)	23	30	32	30	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	19	10	11	16	180

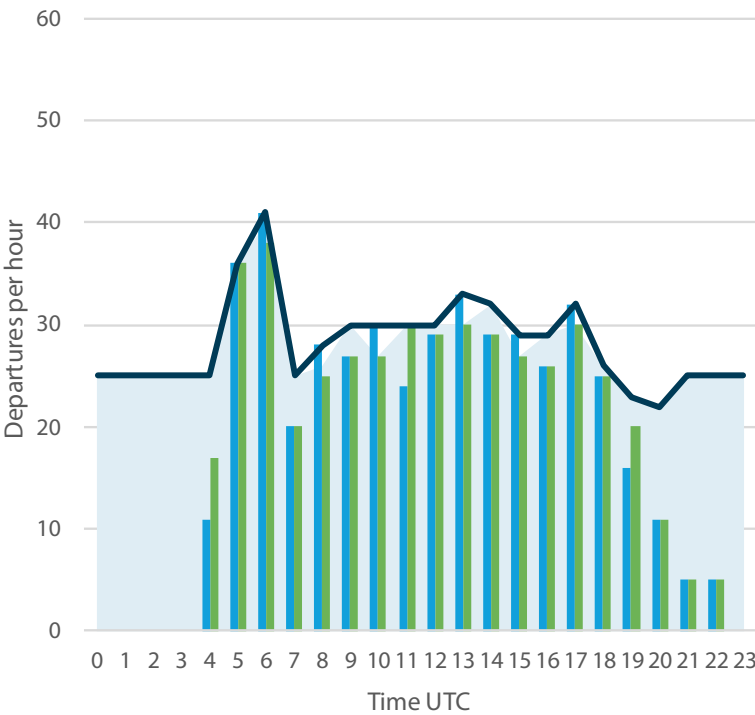
Constraining the S27 schedule by the S26 limits results in spreading the flights into shoulder hours

Arrivals



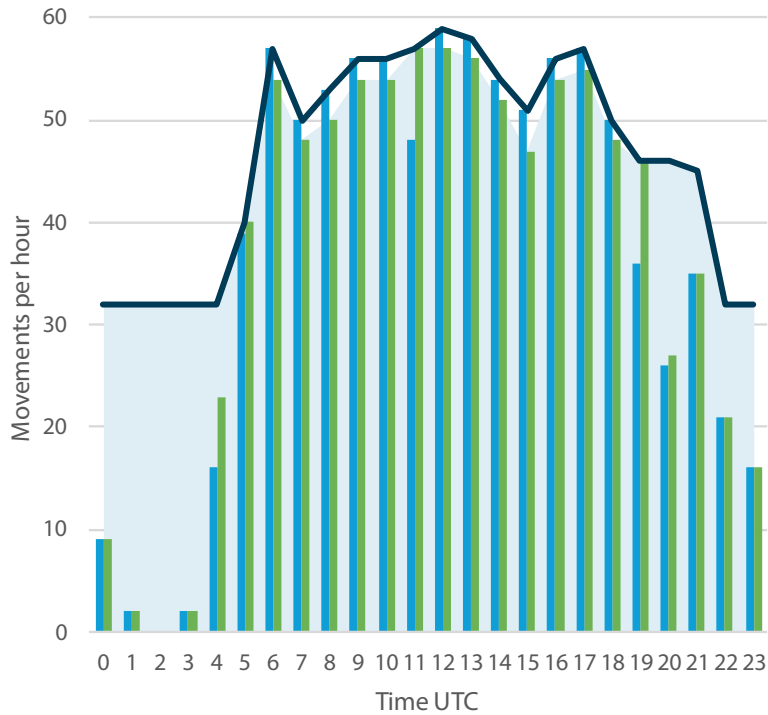
- Declared arrivals capacity (S26)
- Arrivals in simulated S27 flight schedule (S27 limits)
- Arrivals in simulated S27 flight schedule (S26 limits)
- Wishlist arrivals capacity (S27)

Departures



- Declared departures capacity (S26)
- Departures in simulated S27 flight schedule (S27 limits)
- Departures in simulated S27 flight schedule (S26 limits)
- Wishlist departures capacity (S27)

Totals



- Declared totals capacity (S26)
- Totals in simulated S27 flight schedule (S27 limits)
- Totals in simulated S27 flight schedule (S26 limits)
- Wishlist totals capacity (S27)

Some of the additional services envisaged in S27 schedule had to be re-timed to make the flight schedule compatible with the existing S26 declaration. This simulates a case where existing S26 declaration will be rolled forward to S27 season, but all the new services would still operate – although not necessarily at the originally scheduled times.

Results

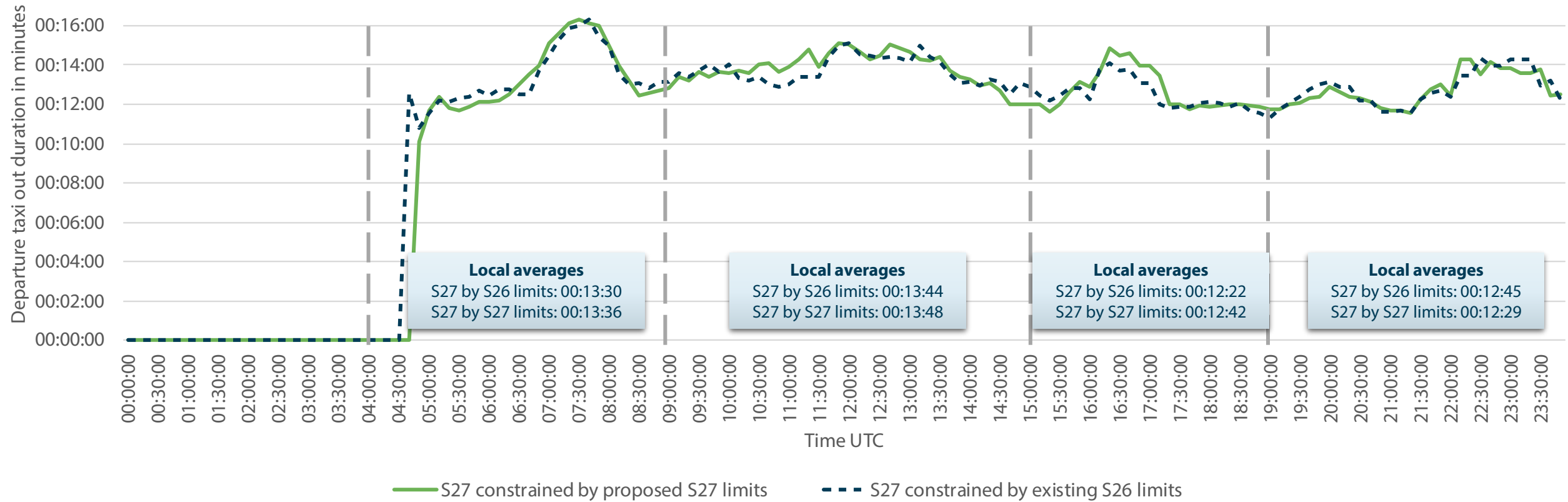


Main set of results with Runway 28R opening for departures at 06:00 UTC

Departure taxi out time

	S26 limits	S27 limits	Difference
Daily average	00:13:15	00:13:20	00:00:05
Peak average	00:16:19	00:16:17	00:00:02

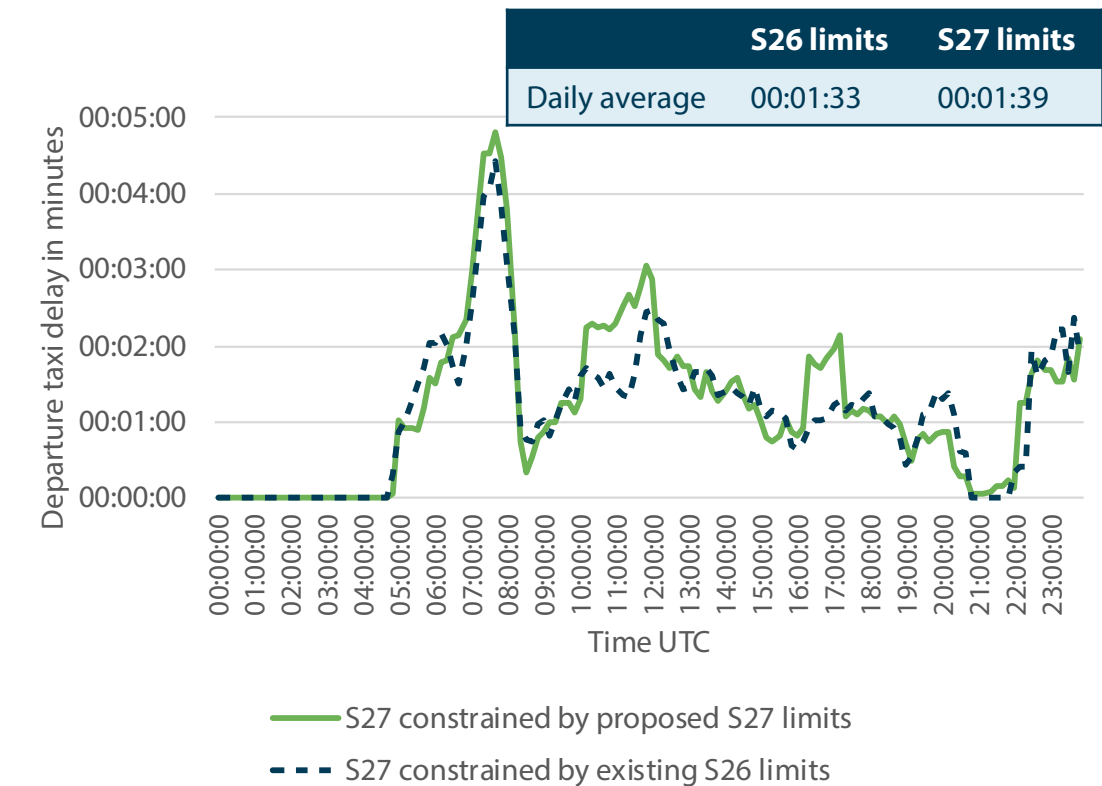
Definition: This metric is defined to be the time period between off-block and the time the aircraft starts its take-off roll. This value is updated every second during the simulation when the aircraft is taxiing for departure even if the aircraft is stopped on the ground.



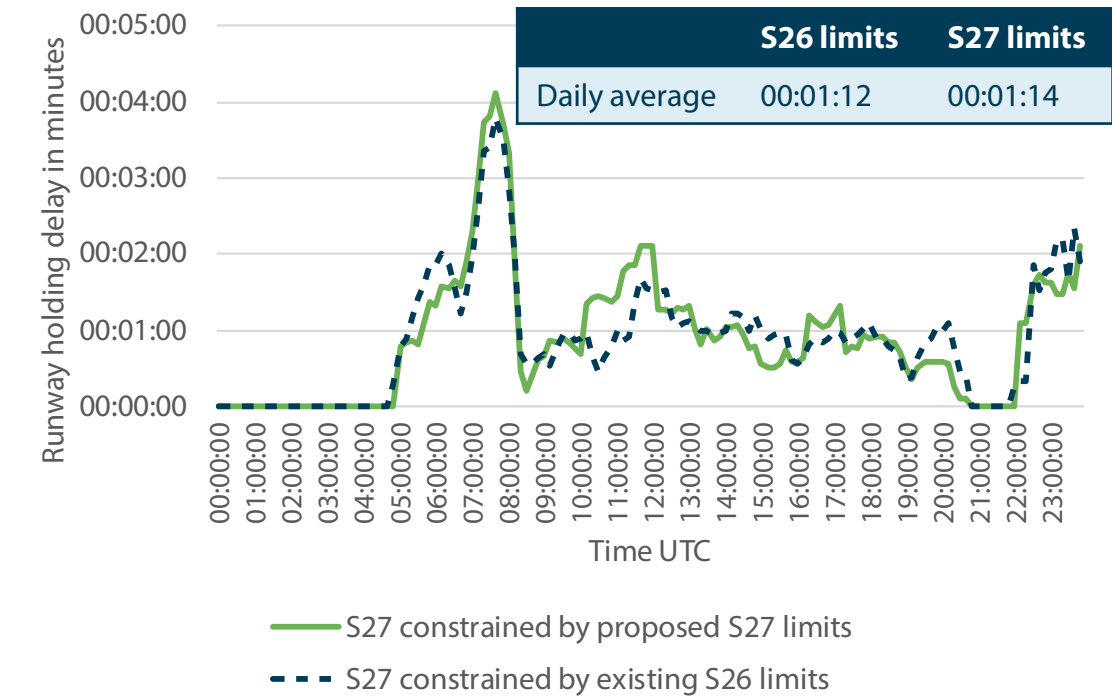
*This graph is presented as a rolling 60-minute average (value for each time period has been calculated as average of values of all events occurring within the T-60 minutes window from the start of the measurement).

Departure taxi delay and runway holding delay

Departure taxi delay: Total delay of departing aircraft accumulated between off-block and entering the runway. It is effectively the sum of runway holding delay and non-runway delays encountered during taxi-out.



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 as the period between joining the back end of the runway queue and the time the aircraft starts lining up.

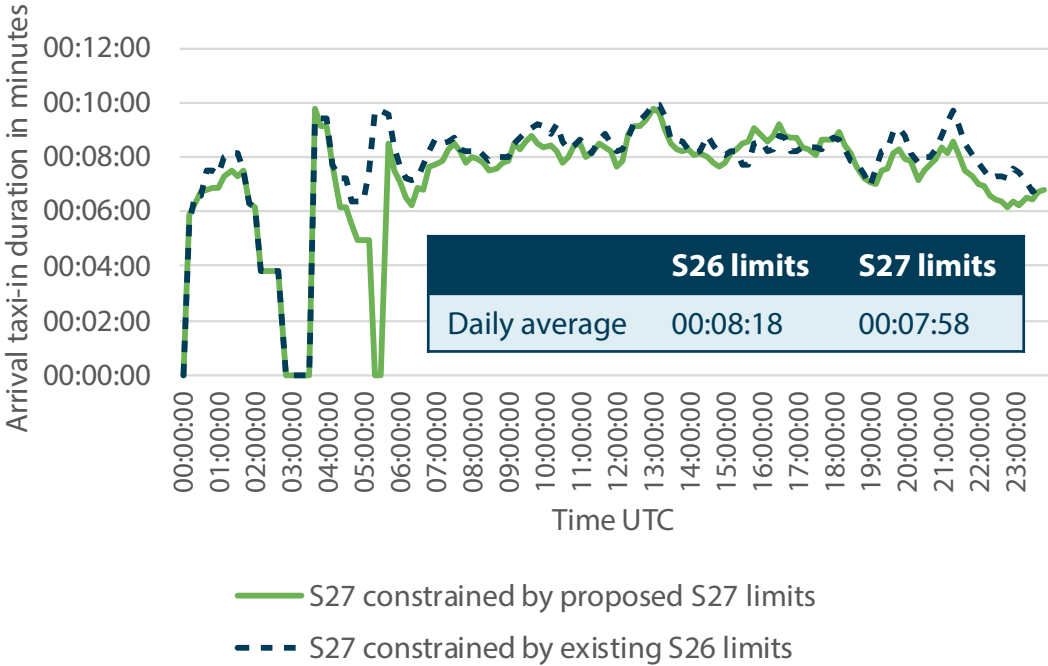


*These graphs are presented as a rolling 60-minute average (value for each time period has been calculated as average of values of all events occurring within the T-60 minutes window from the start of the measurement).

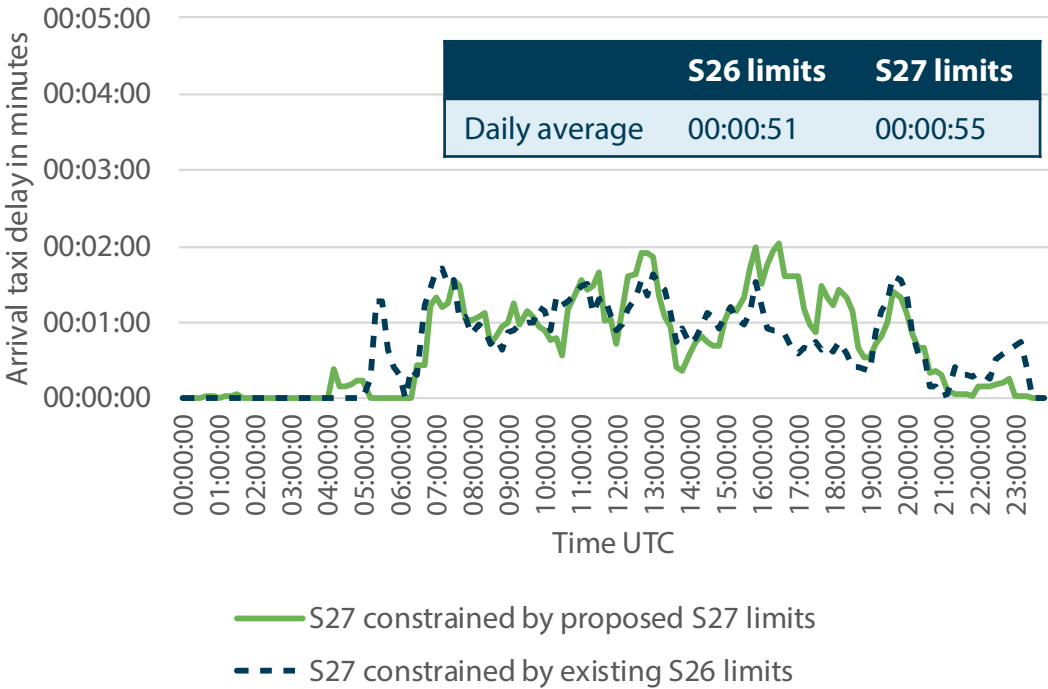
Arrival taxi-in time and arrival taxi delay



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 delay: The delay caused by other 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 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).

Increasing the RWY limits in line with the S27 Wishlist

✂ If the demand materialises as expected and the S27 limits are declared:

- There might be localised increases in av. taxi times in or around the time periods where the new services are added.
- The totals between 05:00 hour and 18:00 hour (inclusive) are likely to be scheduled up to the capacity limits, with the exception of 11:00 hour that is nine slots short of its maximum capacity and could serve as a “firebreak”.
- The morning departure limits at 05:00 and 06:00 hours are likely to be reached.

However, the overall impact of declaring the S27 Wishlist runway capacity limits seems to have only marginal impact on the daily taxi performance (i.e. a couple of seconds per flight on average).

Code	Actual Touch Down Time	Opt Result	Opt Delta ...
_A_1(EI342)	1 22:59:29	Ok	0.1NM
_2_A_1(FR1442)	1 23:34:07	Ok	0.1NM
_3_A_1(FR313)	1 23:49:53	Ok	0.1NM
_328_A_1(FR328)	1 23:55:31	Ok	0.1NM
_044_A_1(FR7044)	2 00:09:35	Ok	0.1NM
R7354_A_1(FR7354)	2 00:15:13	Ok	0.1NM
JR5556_A_1(OR5556)	2 00:23:36	Ok	0.1NM
_7_A_2(EI377)	2 00:35:16	Ok	0.1NM
FR1975_A_2(FR1975)	2 06:15:09	Ok	0.1NM
_18_A_2(WL18)	2 06:24:38	Ok	0.1NM
_3A832_A_2(BA832)	2 06:34:15	Ok	0.1NM
FR5347_A_2(FR5347)	2 06:36:39	Ok	0.1NM
J)<-LX402_A_2(LX402)	2 06:41:31	Ok	0.1NM
WL15_A_2(WL15)	2 06:44:18	Ok	0.1NM
<-I21881_A_2(I21881)	2 07:25:09	Ok	0.1NM
_3401_A_2(EI3401)	2 07:29:37	Ok	0.1NM
<-EI76_A_2(EI76)	2 07:34:06	Ok	0.1NM
_150)<-FR7047_A_2(FR7047)	2 07:47:11	Ok	0.1NM
_30)<-FR1443_A_2(FR1443)	2 08:38:40	Ok	0.1NM
_4)<-FR157_A_2(FR157)	2 08:51:29	Ok	0.1NM
_3)<-FR123_A_2(FR123)	2 09:05:17	Ok	0.1NM
_3553)<-FR1900_A_2(FR1900)	2 09:24:08	Ok	0.1NM
_154)<-EI3351_A_2(EI3351)	2 09:38:43	Ok	0.1NM
_13301)<-FR5307_A_2(FR5307)	2 10:10:15	Ok	0.1NM
_A208)<-EI58_A_2(EI58)	2 10:31:32	Ok	0.1NM
_58)<-LM51_A_2(LM51)	2 10:33:19	Ok	0.1NM
_2(FR4845)<-EI503_A_2(EI503)	2 10:39:11	Ok	0.1NM
_EI503)<-SK537_A_2(SK537)	2 10:40:43	Ok	0.1NM
_2(EW9394)<-EI333_A_2(EI333)	2 10:49:30	Ok	0.1NM
_2(EI593)<-EI429_A_2(EI429)	2 11:03:51	Ok	0.1NM
_2(EK161)<-SI5580_A_2(SI5580)	2 11:12:28	Ok	0.1NM
_A_2(FR7045)<-EI3253_A_2(EI3253)	2 11:50:03	Ok	0.1NM
_A_2(EI3223)<-MS775_A_2(MS775)	2 12:08:28	Ok	0.1NM
_A_2(FR287)<-FR327_A_2(FR327)	2 12:36:36	Ok	0.1NM
_A_2(EI525)<-EI3931_A_2(EI3931)	2 12:56:35	Ok	0.1NM
_A_2(EI581)<-FR4785_A_2(FR4785)	2 13:43:39	Ok	0.1NM
_85_A_2(FR4785)<-EI163_A_2(EI163)	2 13:45:48	Ok	0.1NM
_14_A_2(FR494)<-WL134_A_2(WL134)	2 13:53:17	Ok	0.1NM
_15_A_2(EI165)<-FR4500_A_2(FR4500)	2 14:35:09	Ok	0.1NM
_385_A_2(AY1385)<-EI167_A_2(EI167)	2 16:05:38	Ok	0.1NM
_813_A_2(FR813)<-EI539_A_2(EI539)	2 16:24:40	Ok	0.1NM
_1362_A_2(DY1362)<-EI3275_A_2(EI3275)	2 16:49:10	Ok	0.1NM
PS207_A_2(UPS207)<-TP1324_A_2(TP1324)	2 16:57:07	Ok	0.1NM
_1324_A_2(TP1324)<-EI552_A_2(EI552)	2 16:58:40	Ok	0.1NM

Maintaining the RWY limits in line with the S26 declaration

✂ If the demand materialises as expected and the S26 limits are kept:

- The additional S27 demand may end up re-distributed to hours with any spare capacity. Re-distribution of these services flattens some of the local taxi time peaks.
- The totals between 05:00 hour and 19:00 hour (inclusive) are likely to be scheduled up to the capacity limits.
- There will be no “firebreak” between 05:00 hour and 19:00 hour (inclusive), suggesting possible sensitivity airport performance to operational irregularities.
- The morning departure wave is likely to start earlier, with as many as 17 departures scheduled in 04:00, followed by two additional hours at (or close to) scheduling limits.

The overall impact of keeping the S26 limits on average taxi time performance is negligible compared to declaring the S27 runway limits.

Code	Actual Touch Down Time	Opt Result	Opt Delta ...
_A_1(EI342)	1 22:59:29	Ok	0.1NM
_2_A_1(FR1442)	1 23:34:07	Ok	0.1NM
_3_A_1(FR313)	1 23:49:53	Ok	0.1NM
_328_A_1(FR328)	1 23:55:31	Ok	0.1NM
_044_A_1(FR7044)	2 00:09:35	Ok	0.1NM
R7354_A_1(FR7354)	2 00:15:13	Ok	0.1NM
JR5556_A_1(OR5556)	2 00:23:36	Ok	0.1NM
_7_A_2(EI377)	2 00:35:16	Ok	0.1NM
FR1975_A_2(FR1975)	2 06:15:09	Ok	0.1NM
_18_A_2(WL18)	2 06:24:38	Ok	0.1NM
_3A832_A_2(BA832)	2 06:34:15	Ok	0.1NM
FR5347_A_2(FR5347)	2 06:36:39	Ok	0.1NM
J)<-LX402_A_2(LX402)	2 06:41:31	Ok	0.1NM
WL15_A_2(WL15)	2 06:44:18	Ok	0.1NM
<-I21881_A_2(I21881)	2 07:25:09	Ok	0.1NM
_3401_A_2(EI3401)	2 07:29:37	Ok	0.1NM
<-EI76_A_2(EI76)	2 07:34:06	Ok	0.1NM
_150)<-FR7047_A_2(FR7047)	2 07:47:11	Ok	0.1NM
_30)<-FR1443_A_2(FR1443)	2 08:38:40	Ok	0.1NM
_4)<-FR157_A_2(FR157)	2 08:51:29	Ok	0.1NM
_3)<-FR123_A_2(FR123)	2 09:05:17	Ok	0.1NM
_3553)<-FR1900_A_2(FR1900)	2 09:24:08	Ok	0.1NM
_154)<-EI3351_A_2(EI3351)	2 09:38:43	Ok	0.1NM
_13301)<-FR5307_A_2(FR5307)	2 10:10:15	Ok	0.1NM
_A208)<-EI58_A_2(EI58)	2 10:31:32	Ok	0.1NM
_58)<-LM51_A_2(LM51)	2 10:33:19	Ok	0.1NM
_2(FR4845)<-EI503_A_2(EI503)	2 10:39:11	Ok	0.1NM
_EI503)<-SK537_A_2(SK537)	2 10:40:43	Ok	0.1NM
_2(EW9394)<-EI333_A_2(EI333)	2 10:49:30	Ok	0.1NM
_2(EI593)<-EI429_A_2(EI429)	2 11:03:51	Ok	0.1NM
_2(EK161)<-SI5580_A_2(SI5580)	2 11:12:28	Ok	0.1NM
_A_2(FR7045)<-EI3253_A_2(EI3253)	2 11:50:03	Ok	0.1NM
_A_2(EI3223)<-MS775_A_2(MS775)	2 12:08:28	Ok	0.1NM
_A_2(FR287)<-FR327_A_2(FR327)	2 12:36:36	Ok	0.1NM
_A_2(EI525)<-EI3931_A_2(EI3931)	2 12:56:35	Ok	0.1NM
_A_2(EI581)<-FR4785_A_2(FR4785)	2 13:43:39	Ok	0.1NM
_85_A_2(FR4785)<-EI163_A_2(EI163)	2 13:45:48	Ok	0.1NM
_J4_A_2(FR494)<-WL134_A_2(WL134)	2 13:53:17	Ok	0.1NM
_5_A_2(EI165)<-FR4500_A_2(FR4500)	2 14:35:09	Ok	0.1NM
_385_A_2(AY1385)<-EI167_A_2(EI167)	2 16:05:38	Ok	0.1NM
_813_A_2(FR813)<-EI539_A_2(EI539)	2 16:24:40	Ok	0.1NM
_1362_A_2(DY1362)<-EI3275_A_2(EI3275)	2 16:49:10	Ok	0.1NM
_PS207_A_2(UPS207)<-TP1324_A_2(TP1324)	2 16:57:07	Ok	0.1NM
_D3224_A_2(TP3224)<-EI552_A_2(EI552)	2 16:58:46	Ok	0.1NM

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Results

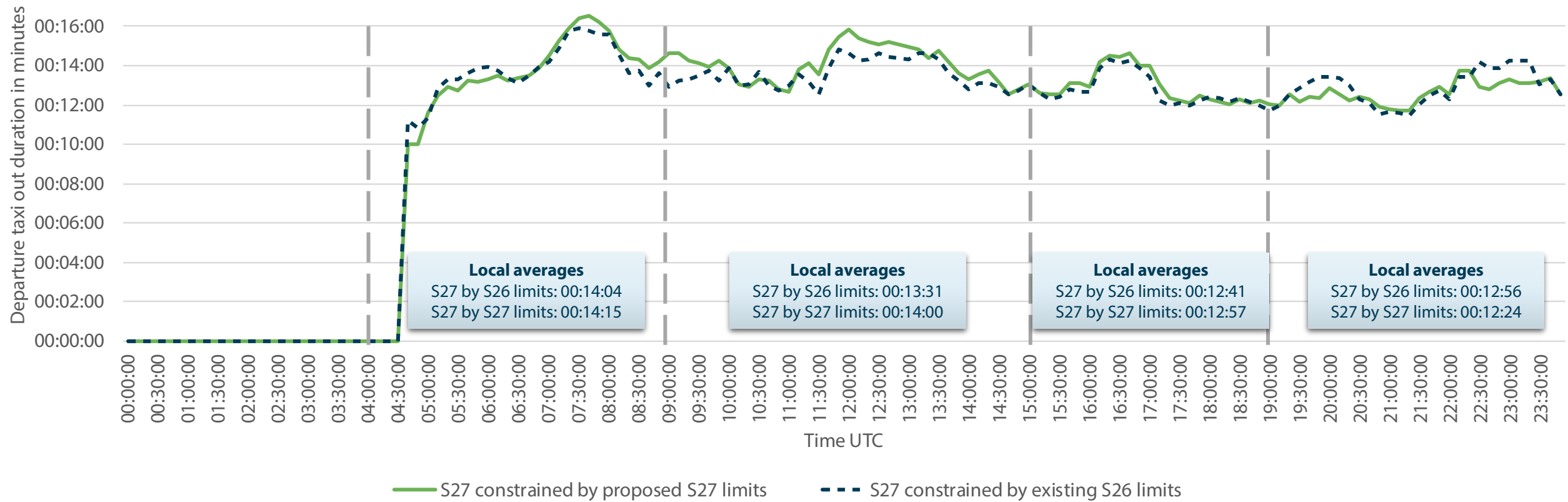


Alternative set of results with Runway 28R opening for departures at 05:15 UTC

Departure taxi out time

	S26 limits	S27 limits	Difference
Daily average	00:13:24	00:13:38	00:00:14
Peak average	00:15:56	00:16:34	00:00:38

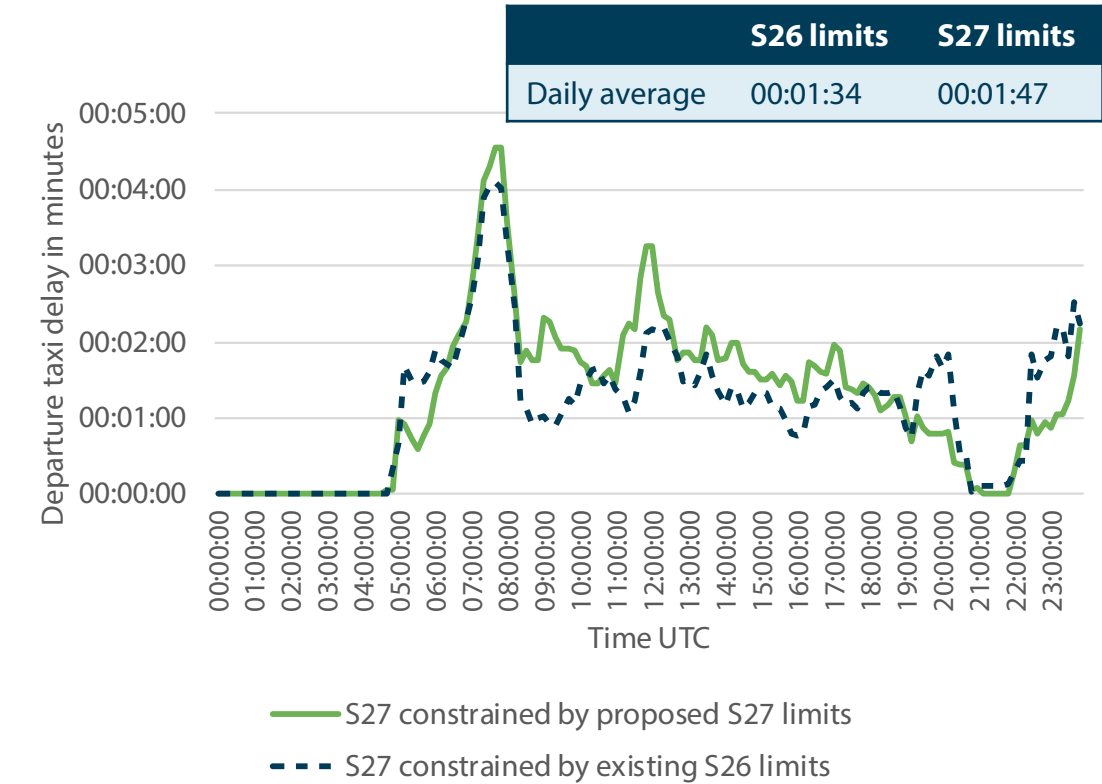
Definition: This metric is defined to be the time period between off-block and the time the aircraft starts its take-off roll. This value is updated every second during the simulation when the aircraft is taxiing for departure even if the aircraft is stopped on the ground.



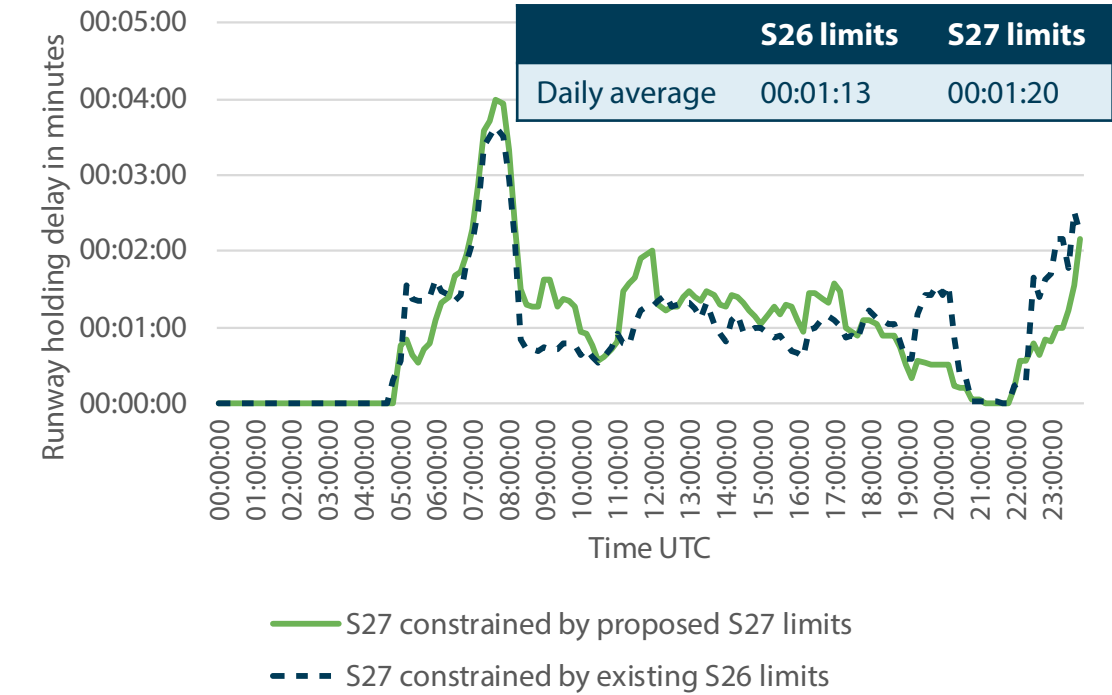
*This graph is presented as a rolling 60-minute average (value for each time period has been calculated as average of values of all events occurring within the T-60 minutes window from the start of the measurement).

Departure taxi delay and runway holding delay

Departure taxi delay: Total delay of departing aircraft accumulated between off-block and entering the runway. It is effectively the sum of runway holding delay and non-runway delays encountered during taxi-out.



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 as the period between joining the back end of the runway queue and the time the aircraft starts lining up.

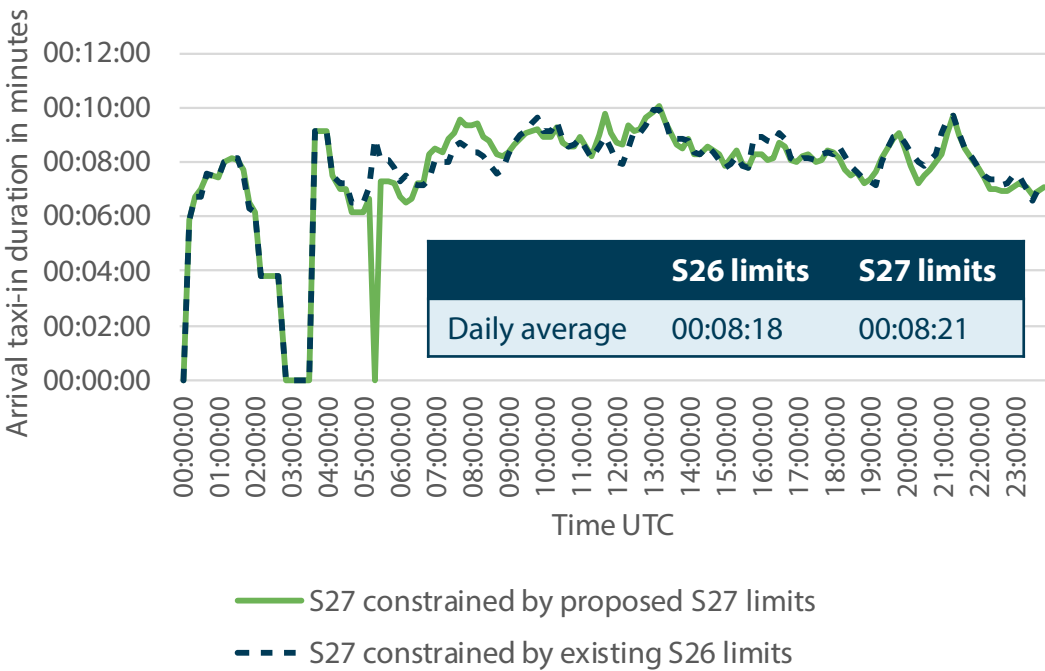


*These graphs are presented as a rolling 60-minute average (value for each time period has been calculated as average of values of all events occurring within the T-60 minutes window from the start of the measurement).

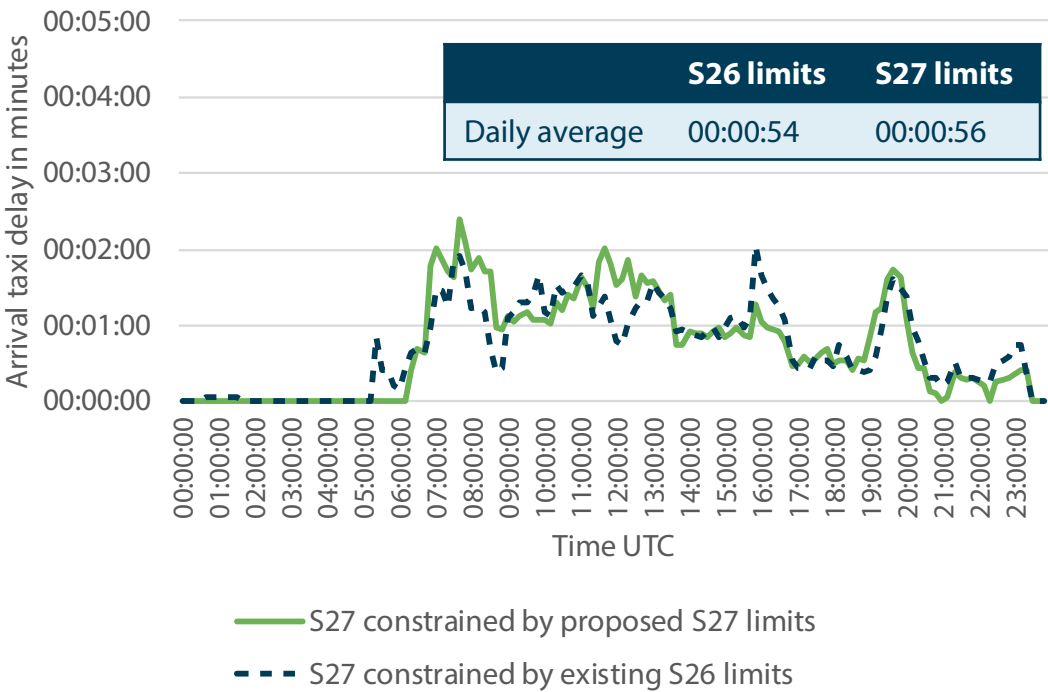
Arrival taxi-in time and arrival taxi delay



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 delay: The delay caused by other 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 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).

Opening of RWY 28R at 05:15 UTC

- ✈ Opening the North Runway at 05:15 UTC instead of 06:00 UTC does not seem to have a material impact on taxi durations.
- ✈ Opening the North runway earlier will likely improve efficiency of early morning departures that would no longer need to “compete” for a single runway with incoming arrivals but could instead use a dedicated departures-only North runway. Although the TXOT does not change much, the simulation suggests a reduction in departure runway holding delay associated with earlier opening of the North runway.
- ✈ Opening the North runway earlier will allow less “injections” of departures into the flow of arrivals to the South runway, with expected improvement in arrival performance (better OTAP and reduction in arrival airborne holding/fuel burned).

Code	Actual Touch Down Time	Opt Result	Opt Delta ...
_A_1(EI342)	1 22:59:29	Ok	0.1NM
_2_A_1(FR1442)	1 23:34:07	Ok	0.1NM
_3_A_1(FR313)	1 23:49:53	Ok	0.1NM
_328_A_1(FR328)	1 23:55:31	Ok	0.1NM
_044_A_1(FR7044)	2 00:09:35	Ok	0.1NM
R7354_A_1(FR7354)	2 00:15:13	Ok	0.1NM
JR5556_A_1(OR5556)	2 00:23:36	Ok	0.1NM
_7_A_2(EI377)	2 00:35:16	Ok	0.1NM
FR1975_A_2(FR1975)	2 06:15:09	Ok	0.1NM
_18_A_2(WL18)	2 06:24:38	Ok	0.1NM
_3A832_A_2(BA832)	2 06:34:15	Ok	0.1NM
FR5347_A_2(FR5347)	2 06:36:39	Ok	0.1NM
_J)<-LX402_A_2(LX402)	2 06:41:31	Ok	0.1NM
WL15_A_2(WL15)	2 06:44:18	Ok	0.1NM
<-I21881_A_2(I21881)	2 07:25:09	Ok	0.1NM
_3401_A_2(EI3401)	2 07:29:37	Ok	0.1NM
<-EI76_A_2(EI76)	2 07:34:06	Ok	0.1NM
_150)<-FR7047_A_2(FR7047)	2 07:47:11	Ok	0.1NM
_30)<-FR1443_A_2(FR1443)	2 08:38:40	Ok	0.1NM
_4)<-FR157_A_2(FR157)	2 08:51:29	Ok	0.1NM
_3)<-FR123_A_2(FR123)	2 09:05:17	Ok	0.1NM
_3553)<-FR1900_A_2(FR1900)	2 09:24:08	Ok	0.1NM
_154)<-EI3351_A_2(EI3351)	2 09:38:43	Ok	0.1NM
_13301)<-FR5307_A_2(FR5307)	2 10:10:15	Ok	0.1NM
_A208)<-EI58_A_2(EI58)	2 10:31:32	Ok	0.1NM
_58)<-LM51_A_2(LM51)	2 10:33:19	Ok	0.1NM
_2(FR4845)<-EI503_A_2(EI503)	2 10:39:11	Ok	0.1NM
_EI503)<-SK537_A_2(SK537)	2 10:40:43	Ok	0.1NM
_2(EW9394)<-EI333_A_2(EI333)	2 10:49:30	Ok	0.1NM
_2(EI593)<-EI429_A_2(EI429)	2 11:03:51	Ok	0.1NM
_2(EK161)<-SI5580_A_2(SI5580)	2 11:12:28	Ok	0.1NM
_A_2(FR7045)<-EI3253_A_2(EI3253)	2 11:50:03	Ok	0.1NM
_A_2(EI3223)<-MS775_A_2(MS775)	2 12:08:28	Ok	0.1NM
_A_2(FR287)<-FR327_A_2(FR327)	2 12:36:36	Ok	0.1NM
_A_2(EI525)<-EI3931_A_2(EI3931)	2 12:56:35	Ok	0.1NM
_A_2(FR7045)<-EI3253_A_2(EI3253)	2 13:43:39	Ok	0.1NM
_85_A_2(FR4785)<-EI163_A_2(EI163)	2 13:45:48	Ok	0.1NM
_J4_A_2(FR494)<-WL134_A_2(WL134)	2 13:53:17	Ok	0.1NM
_5_A_2(EI165)<-FR4500_A_2(FR4500)	2 14:35:09	Ok	0.1NM
_385_A_2(AY1385)<-EI167_A_2(EI167)	2 16:05:38	Ok	0.1NM
_813_A_2(FR813)<-EI539_A_2(EI539)	2 16:24:40	Ok	0.1NM
_1362_A_2(DY1362)<-EI3275_A_2(EI3275)	2 16:49:10	Ok	0.1NM
_PS207_A_2(UPS207)<-TP1324_A_2(TP1324)	2 16:57:07	Ok	0.1NM
_D4224_A_2(TD4224)<-EI552_A_2(EI552)	2 16:58:46	Ok	0.1NM

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Results of additional scenarios

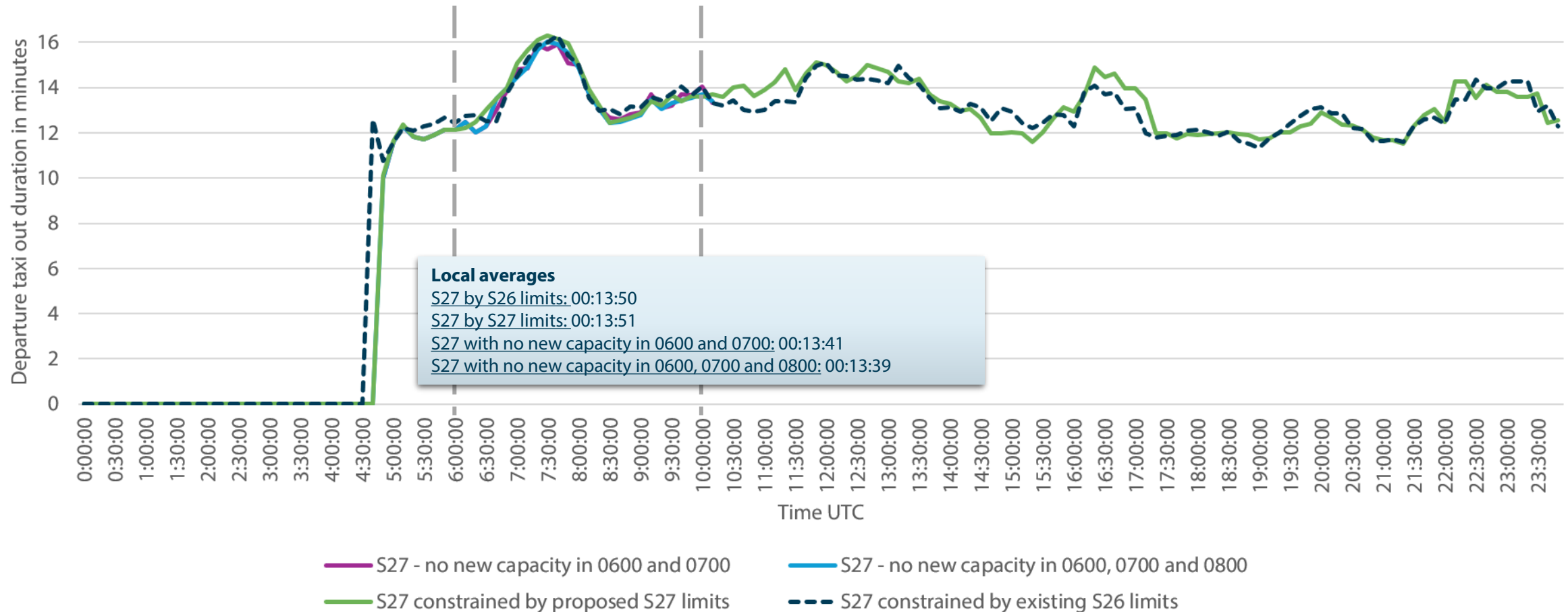
The additional scenarios are variations to the S27 wishlist schedule with the following changes:

1. No new capacity in 0600 and 0700
2. No new capacity in 0600, 0700 and 0800

Both are simulated with Runway 28R opening for departures at 06:00 UTC.

Departure taxi out time

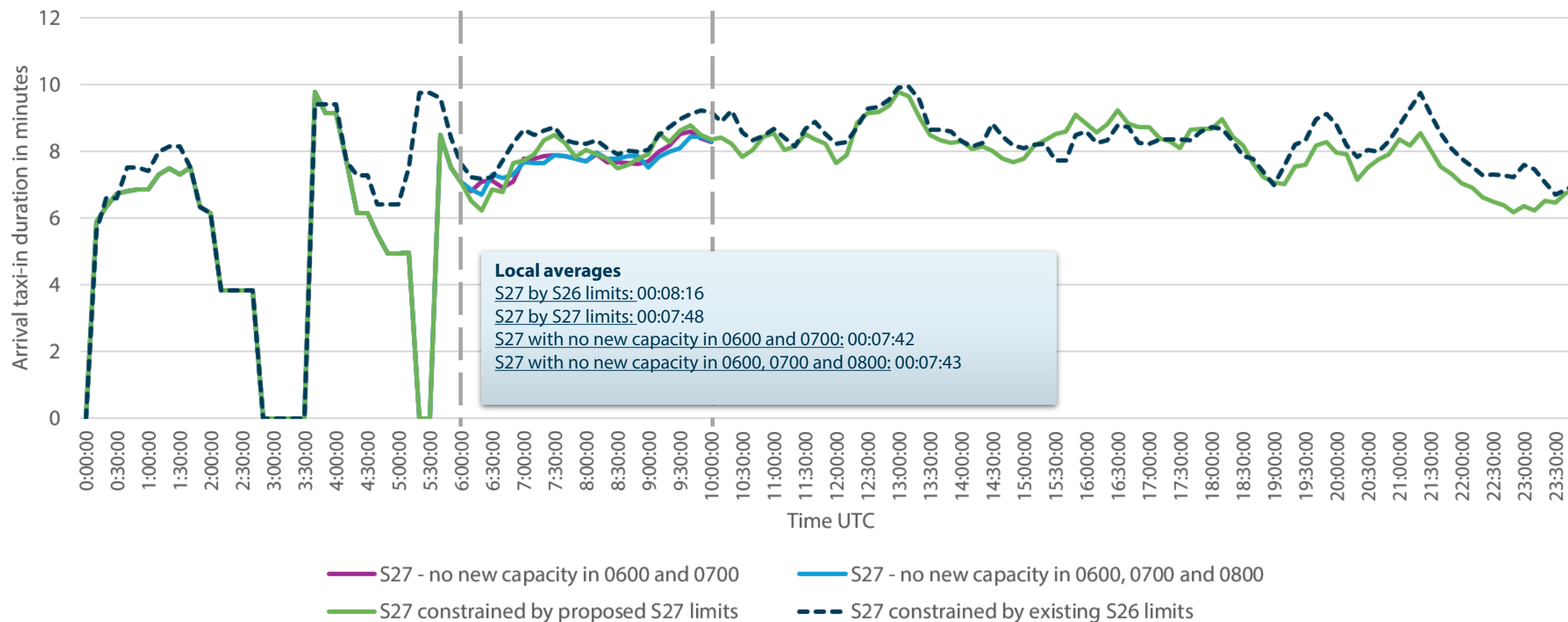
Definition: This metric is defined to be the time period between off-block and the time the aircraft starts its take-off roll. This value is updated every second during the simulation when the aircraft is taxiing for departure even if the aircraft is stopped on the ground.



*This graph is presented as a rolling 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).

Arrival taxi in time

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.



Maintaining the RWY limits in line with the S26 declaration at 0600, 0700 and 0800, and increasing the RWY limits in line with S27 for the remainder of the day

- ✈ Additional scenarios assuming no capacity increases during the morning hours have only a minor impact on taxi-out and taxi-in durations, as the runways already operate in segregated mode during this period.

Code	Actual Touch Down Time	Opt Result	Opt Delta ...
_A_1(EI342)	1 22:59:29	Ok	0.1NM
_2_A_1(FR1442)	1 23:34:07	Ok	0.1NM
_3_A_1(FR313)	1 23:49:53	Ok	0.1NM
_328_A_1(FR328)	1 23:55:31	Ok	0.1NM
_044_A_1(FR7044)	2 00:09:35	Ok	0.1NM
R7354_A_1(FR7354)	2 00:15:13	Ok	0.1NM
JR5556_A_1(OR5556)	2 00:23:36	Ok	0.1NM
_7_A_2(EI377)	2 00:35:16	Ok	0.1NM
FR1975_A_2(FR1975)	2 06:15:09	Ok	0.1NM
_18_A_2(WL18)	2 06:24:38	Ok	0.1NM
3A832_A_2(BA832)	2 06:34:15	Ok	0.1NM
FR5347_A_2(FR5347)	2 06:36:39	Ok	0.1NM
J)<-LX402_A_2(LX402)	2 06:41:31	Ok	0.1NM
WL15_A_2(WL15)	2 06:44:18	Ok	0.1NM
<-I21881_A_2(I21881)	2 07:25:09	Ok	0.1NM
_3401_A_2(EI3401)	2 07:29:37	Ok	0.1NM
<-EI76_A_2(EI76)	2 07:34:06	Ok	0.1NM
_150)<-FR7047_A_2(FR7047)	2 07:47:11	Ok	0.1NM
_30)<-FR1443_A_2(FR1443)	2 08:38:40	Ok	0.1NM
4)<-FR157_A_2(FR157)	2 08:51:29	Ok	0.1NM
_3)<-FR123_A_2(FR123)	2 09:05:17	Ok	0.1NM
_3553)<-FR1900_A_2(FR1900)	2 09:24:08	Ok	0.1NM
_154)<-EI3351_A_2(EI3351)	2 09:38:43	Ok	0.1NM
_13301)<-FR5307_A_2(FR5307)	2 10:10:15	Ok	0.1NM
A208)<-EI58_A_2(EI58)	2 10:31:32	Ok	0.1NM
58)<-LM51_A_2(LM51)	2 10:33:19	Ok	0.1NM
2(FR4845)<-EI503_A_2(EI503)	2 10:39:11	Ok	0.1NM
EI503)<-SK537_A_2(SK537)	2 10:40:43	Ok	0.1NM
_2(EW9394)<-EI333_A_2(EI333)	2 10:49:30	Ok	0.1NM
2(EI593)<-EI429_A_2(EI429)	2 11:03:51	Ok	0.1NM
_2(EK161)<-SI5580_A_2(SI5580)	2 11:12:28	Ok	0.1NM
_A_2(FR7045)<-EI3253_A_2(EI3253)	2 11:50:03	Ok	0.1NM
_A_2(EI3223)<-MS775_A_2(MS775)	2 12:08:28	Ok	0.1NM
_A_2(FR287)<-FR327_A_2(FR327)	2 12:36:36	Ok	0.1NM
_A_2(EI525)<-EI3931_A_2(EI3931)	2 12:56:35	Ok	0.1NM
_A_2(EI581)<-FR4785_A_2(FR4785)	2 13:43:39	Ok	0.1NM
85_A_2(FR4785)<-EI163_A_2(EI163)	2 13:45:48	Ok	0.1NM
_14_A_2(FR494)<-WL134_A_2(WL134)	2 13:53:17	Ok	0.1NM
_15_A_2(EI165)<-FR4500_A_2(FR4500)	2 14:35:09	Ok	0.1NM
_385_A_2(AY1385)<-EI167_A_2(EI167)	2 16:05:38	Ok	0.1NM
813_A_2(FR813)<-EI539_A_2(EI539)	2 16:24:40	Ok	0.1NM
_1362_A_2(DY1362)<-EI3275_A_2(EI3275)	2 16:49:10	Ok	0.1NM
PS207_A_2(UPS207)<-TP1324_A_2(TP1324)	2 16:57:07	Ok	0.1NM
PS207_A_2(UPS207)<-TP1324_A_2(TP1324)	2 16:57:07	Ok	0.1NM

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