HELIOS

The aviation consultancy of Egis

WINTER 2018: ASSESSMENT OF THE LIKELY IMPACT OF DECLARING THE WISHLIST RUNWAY CAPACITY

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an egis company

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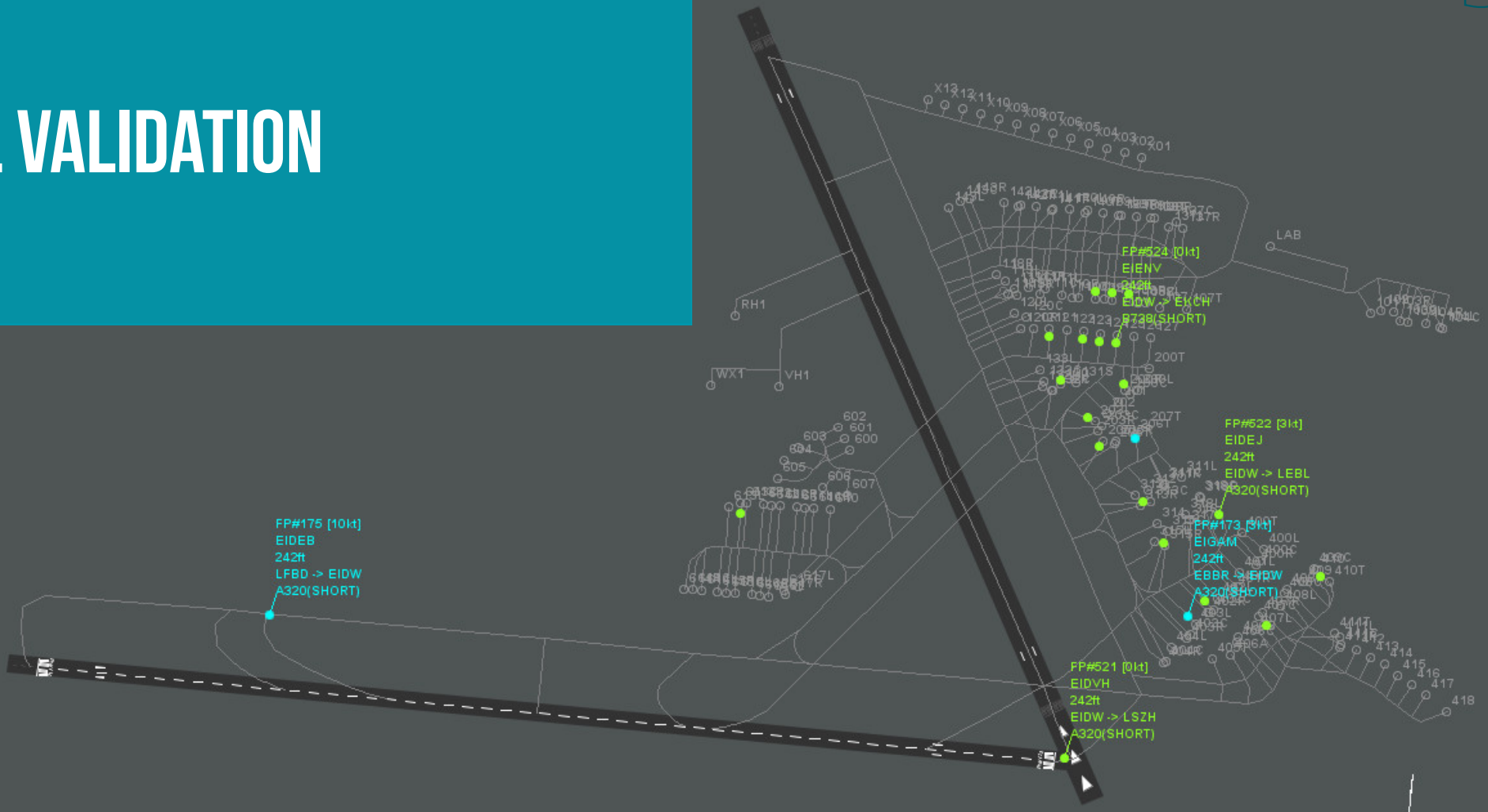
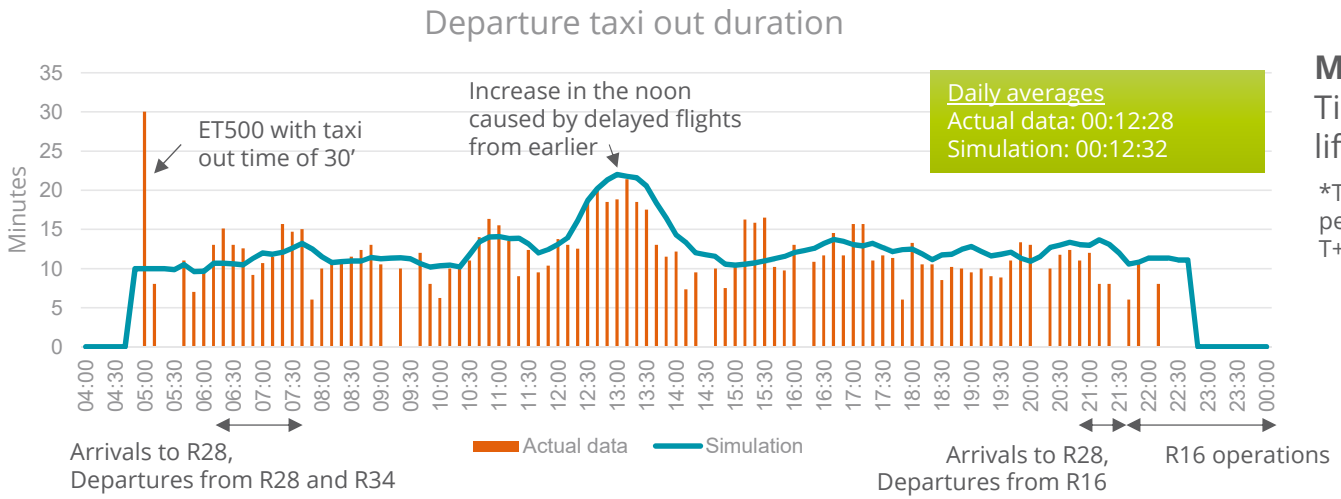
MODEL VALIDATION



MODEL DESCRIPTION

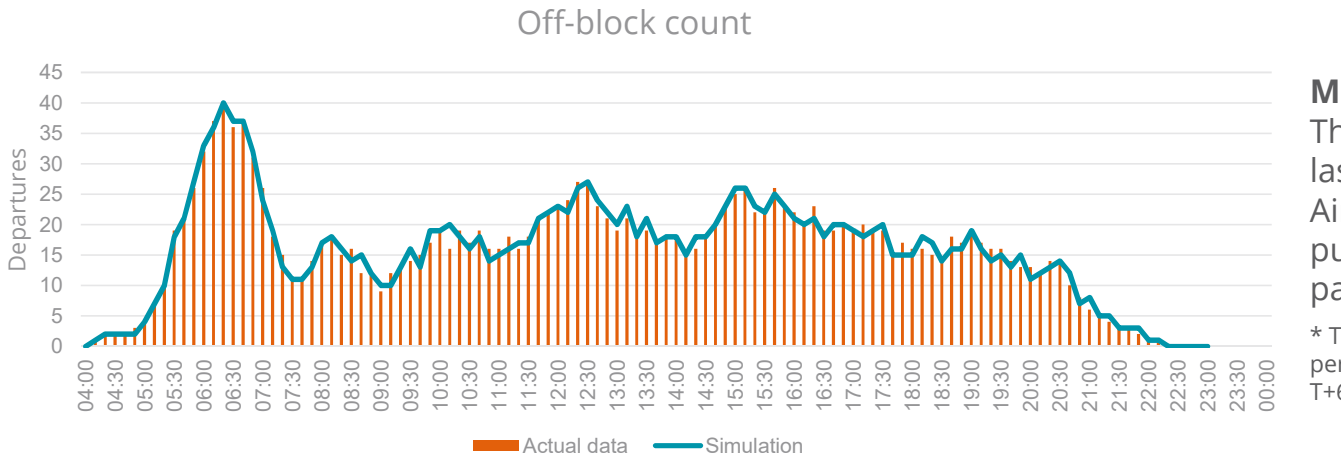
- Based on the model developed in support of the S18 coordination
- Updated to reflect winter operating conditions
- Calibrated against a single day of operations (17 Nov 2017)
  - Dual ops not simulated – assumed all traffic operates from RWY 28
- Run from actual block times to take into account all types of delays
- Comparison against a set of airside metrics provided

CALIBRATION OF DEPARTURE PERFORMANCE



Metric definition:
Time duration between the off-block time and aircraft lifting off

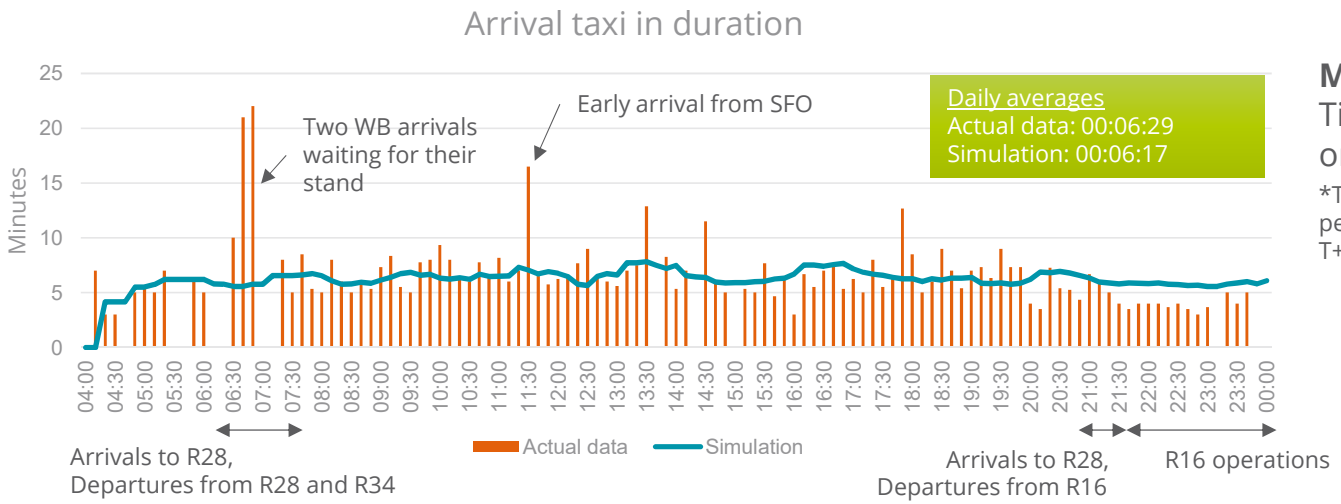
*This graph is presented as a rolling 10-minute average (value for each time period has been calculated as average of values of all events occurring within the T+10 minutes window from the start of the measurement).



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)

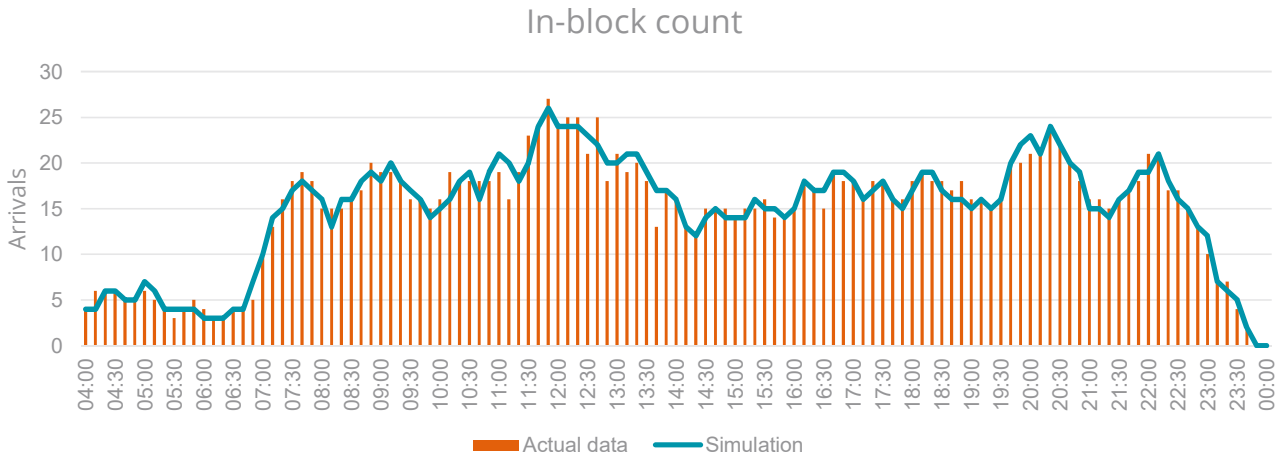
* This graph is presented as a rolling 60-minute average (value for each time period has been calculated as average of values of all events occurring within the T+60 minutes window from the start of the measurement).

CALIBRATION OF ARRIVAL PERFORMANCE



Metric definition:
Time duration between touch-down and aircraft parking on-blocks

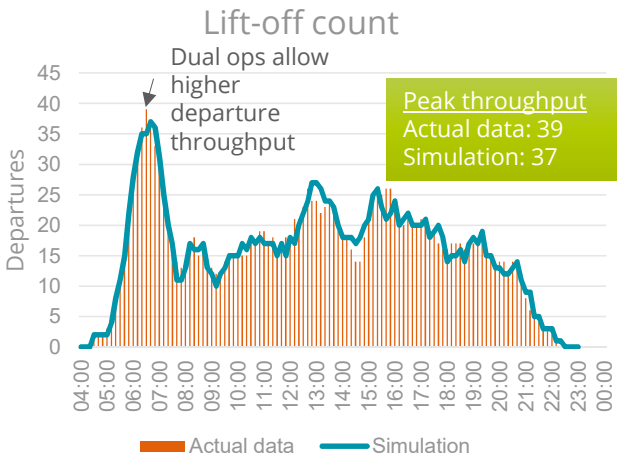
*This graph is presented as a rolling 10-minute average (value for each time period has been calculated as average of values of all events occurring within the T+10 minutes window from the start of the measurement).

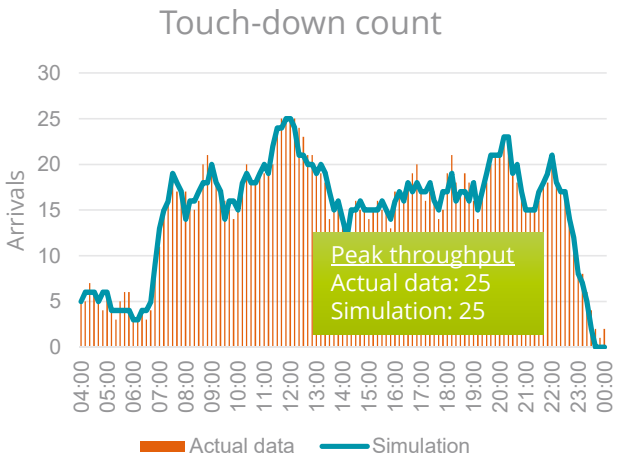


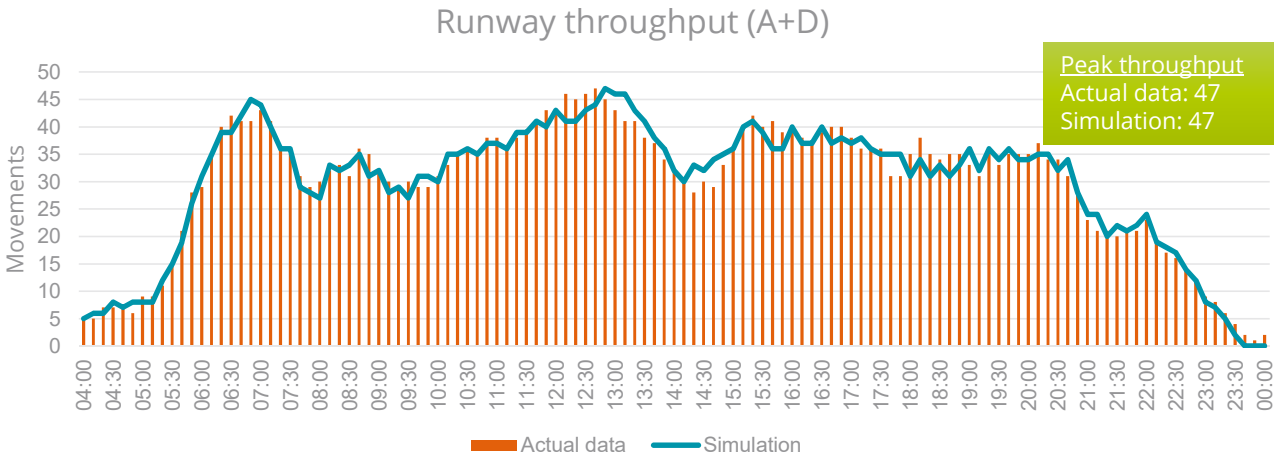
Metric definition:
The number of aircraft that have reached their arrival parking position in the last rolling period. The count is incremented when aircraft reaches its in-blocks position.

* 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 last rolling period. The count is incremented when the aircraft passes over the opposite end of runway.

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

Runway throughput: Sum of all aircraft touching down and lifting-off in the last 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 the magnitude and the shape of profile throughout the day, the model can be considered as a satisfactorily representation of reality for the purpose of evaluating the impact of proposed changes in 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.

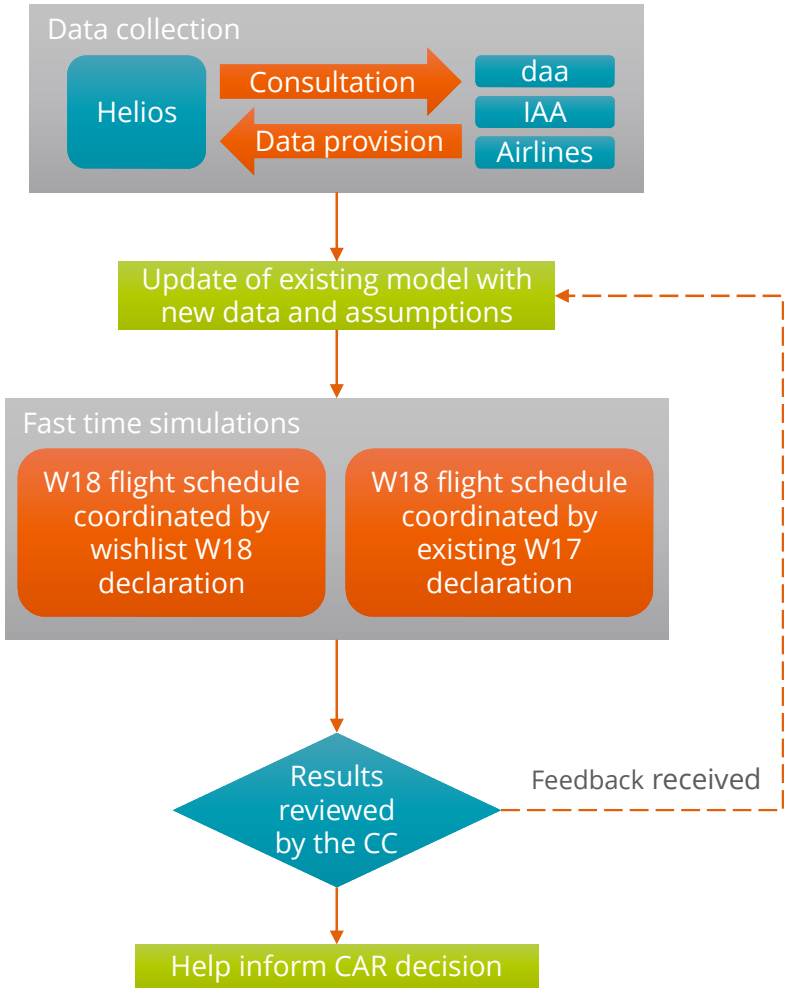
W18 - METHODOLOGY

Photo source: http://www.daa.ie/media-centre/image-library/

TASK DESCRIPTION

- The purpose of this comparison is to assess the likely effect of either:
  - declaring an increased runway capacity, as per the wishlist, or
  - maintaining the Winter 2017 capacity limits
- In both cases it is presumed that the Winter 2018 schedule of increased demand materialises as expected.
- The same number of movements are modelled in both 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 2018 day.

APPROACH AND KEY CHANGES AGAINST S18 MODEL



- Runway occupancy times have been updated taking into account slightly longer ROT in winter months
- Rule-based stand allocation driven by historic data
  - Towing implemented to manage demand for Code E stands
- No changes to the airfield layout (taxiways, stands)
- 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 5.5 NM
- No A-CDM assumptions have been included

WINTER 2018 FLIGHT SCHEDULE

- The flight schedule used for modelling of both scenarios:
  - Is based on 17th of November 2017 flight schedule (which was already 95th percentile busy day before the new services were added)
  - Contains total of 617 flights (307 arrivals and 310 departures)
  - Contains 31 new services (18 new departures and 13 new arrivals)
  - Contains flights that arrived the day before the design day and departed on the design day
  - Contains flights that arrived on the design day and departed after the design day

PROPOSED W18 WISHLIST

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 W17 arrivals capacity	23	23	23	23	23	23	23	21	25	22	23	29	26	24	24	23	24	24	24	23	24	25	29	23	**574**
Proposed W18 arrivals capacity	23	23	23	23	23	23	23	21	25	24	23	28	26	24	24	23	24	24	24	23	24	25	29	23	**575**
Difference (against W17 declaration)	0	0	0	0	0	0	0	0	0	+2	0	-1	0	0	0	0	0	0	0	0	0	0	0	0	**+1**
Departures																									
Existing W17 departures capacity	23	23	23	23	23	25	34	29	23	27	24	25	28	27	24	27	25	27	26	24	24	23	23	23	**603**
Proposed W18 departures capacity	23	23	23	23	23	25	35	30	23	25	24	26	28	27	24	27	25	27	26	24	24	23	23	23	**604**
Difference (against W17 declaration)	0	0	0	0	0	0	+1	+1	0	-2	0	+1	0	0	0	0	0	0	0	0	0	0	0	0	**+1**
Totals																									
Existing W17 totals capacity	32	32	32	32	32	32	40	37	44	42	38	48	46	43	40	43	44	46	43	37	39	39	39	32	**932**
Proposed W18 totals capacity	32	32	32	32	32	32	40	39	44	42	40	48	46	43	40	43	46	46	43	38	39	39	39	32	**939**
Difference (against W17 declaration)	0	0	0	0	0	0	0	+2	0	0	+2	0	0	0	0	0	+2	0	0	+1	0	0	0	0	**+7**

W18 COORDINATED TO PROPOSED W18 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																									
Wishlist W18 arrivals capacity	23	23	23	23	23	23	23	21	25	24	23	28	26	24	24	23	24	24	24	23	24	25	29	23	**575**
Arrivals in simulated W18 schedule	1	1	0	0	5	6	4	11	15	20	20	20	19	18	16	16	19	13	15	16	21	19	18	14	**306**
Spare capacity (against W18 wishlist)	22	22	23	23	18	17	19	10	10	4	3	8	7	6	8	7	5	11	9	7	3	6	11	9	**269**
Departures																									
Wishlist W18 Departures capacity	23	23	23	23	23	25	**35**	30	23	25	24	26	28	27	24	27	25	27	26	24	24	23	23	23	**604**
Departures in simulated W18 schedule	0	2	0	0	0	6	**35**	28	18	9	19	22	23	16	15	22	22	21	15	19	11	6	1	0	**310**
Spare capacity (against W18 wishlist)	23	21	23	23	23	19	0	2	5	16	5	4	5	11	9	5	3	6	11	5	13	17	22	23	**294**
Totals																									
Wishlist W18 Totals capacity	32	32	32	32	32	32	40	**39**	44	42	40	48	46	43	40	43	46	46	43	38	39	39	39	32	**939**
Totals in simulated W18 schedule	1	3	0	0	5	12	39	**39**	33	29	39	42	42	34	31	38	41	34	30	35	32	25	19	14	**616**
Spare capacity (against W18 wishlist)	31	29	32	32	27	20	1	0	11	13	1	6	4	9	9	5	5	12	13	3	7	14	20	18	**323**

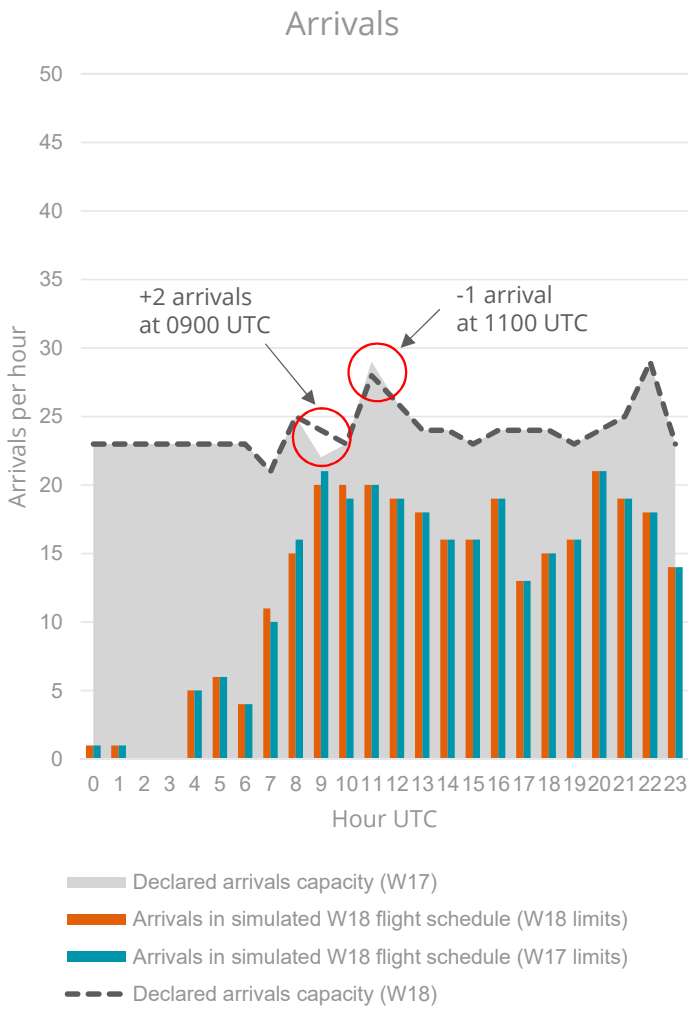
- Departures at 0600 UTC scheduled up to the capacity limit
- Totals at 0700 UTC scheduled up to the capacity limit

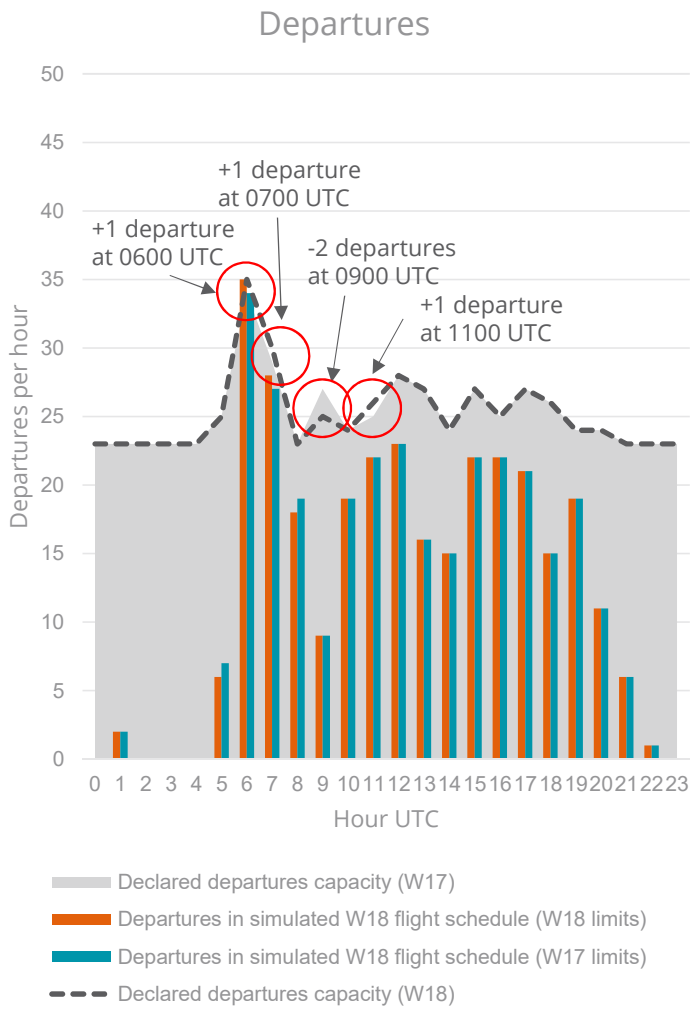
W18 COORDINATED TO W17 LIMITS

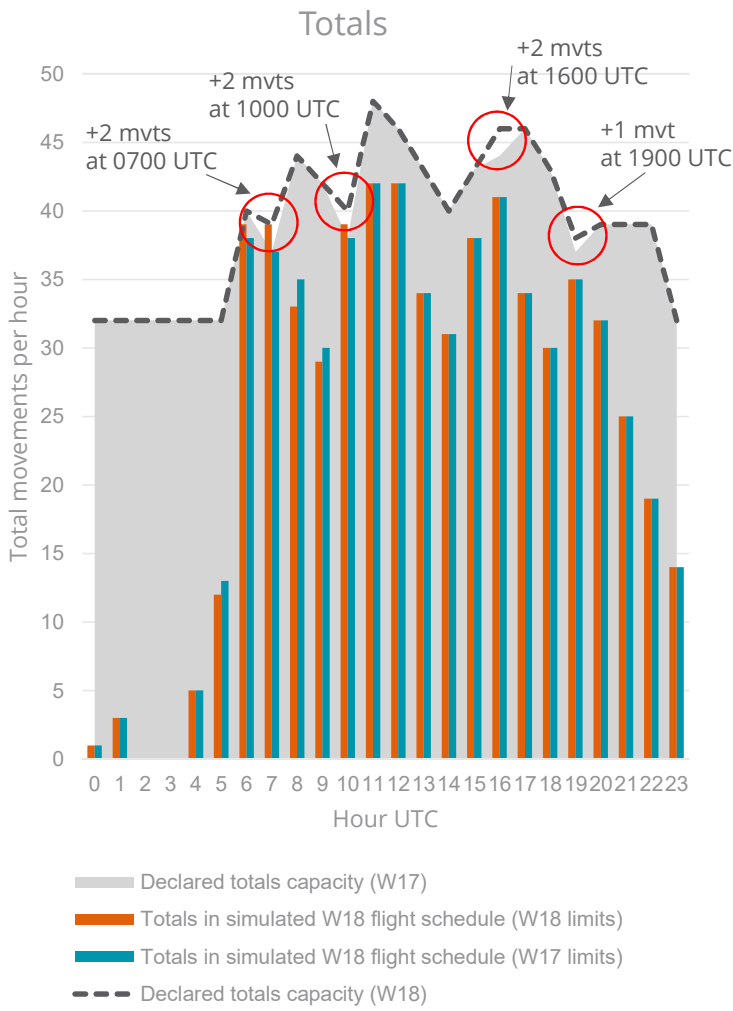
Hour UTC	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Total
Arrivals																									
Existing W17 arrivals capacity	23	23	23	23	23	23	23	21	25	22	23	29	26	24	24	23	24	24	24	23	24	25	29	23	**574**
Arrivals in simulated W18 schedule	1	1	0	0	5	6	4	10	16	21	19	20	19	18	16	16	19	13	15	16	21	19	18	14	**306**
Spare capacity (against W17 declaration)	22	22	23	23	18	17	19	11	9	1	4	9	7	6	8	7	5	11	9	7	3	6	11	9	**268**
Departures																									
Existing W17 departures capacity	23	23	23	23	23	25	34	29	23	27	24	25	28	27	24	27	25	27	26	24	24	23	23	23	**603**
Departures in simulated W18 schedule	0	2	0	0	0	7	34	27	19	9	19	22	23	16	15	22	22	21	15	19	11	6	1	0	**310**
Spare capacity (against W17 declaration)	23	21	23	23	23	18	0	2	4	18	5	3	5	11	9	5	3	6	11	5	13	17	22	23	**293**
Totals																									
Existing W17 totals capacity	32	32	32	32	32	32	40	37	44	42	38	48	46	43	40	43	44	46	43	37	39	39	39	32	**932**
Totals in simulated W18 schedule	1	3	0	0	5	13	38	37	35	30	38	42	42	34	31	38	41	34	30	35	32	25	19	14	**616**
Spare capacity (against W17 declaration)	31	29	32	32	27	19	2	0	9	12	0	6	4	9	9	5	3	12	13	2	7	14	20	18	**316**

- Departures at 0600 UTC scheduled up to the capacity limit
- Totals at 0700 UTC scheduled up to the capacity limit
- Totals at 1000 UTC scheduled up to the capacity limit

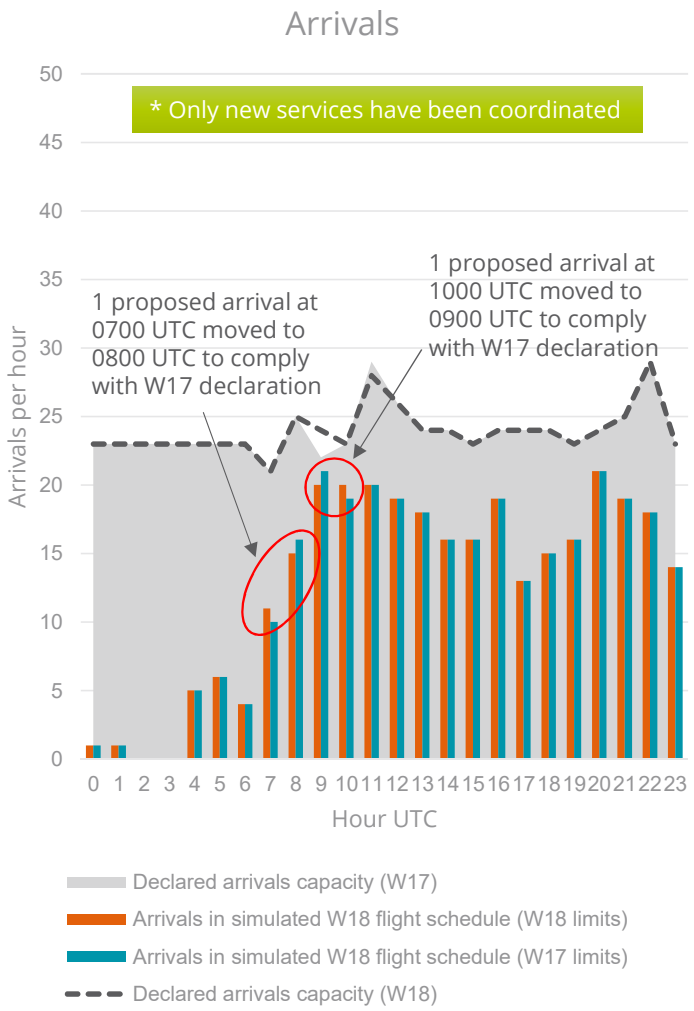
DIFFERENCE BETWEEN EXISTING W17 AND PROPOSED W18 CAPACITY DECLARATION

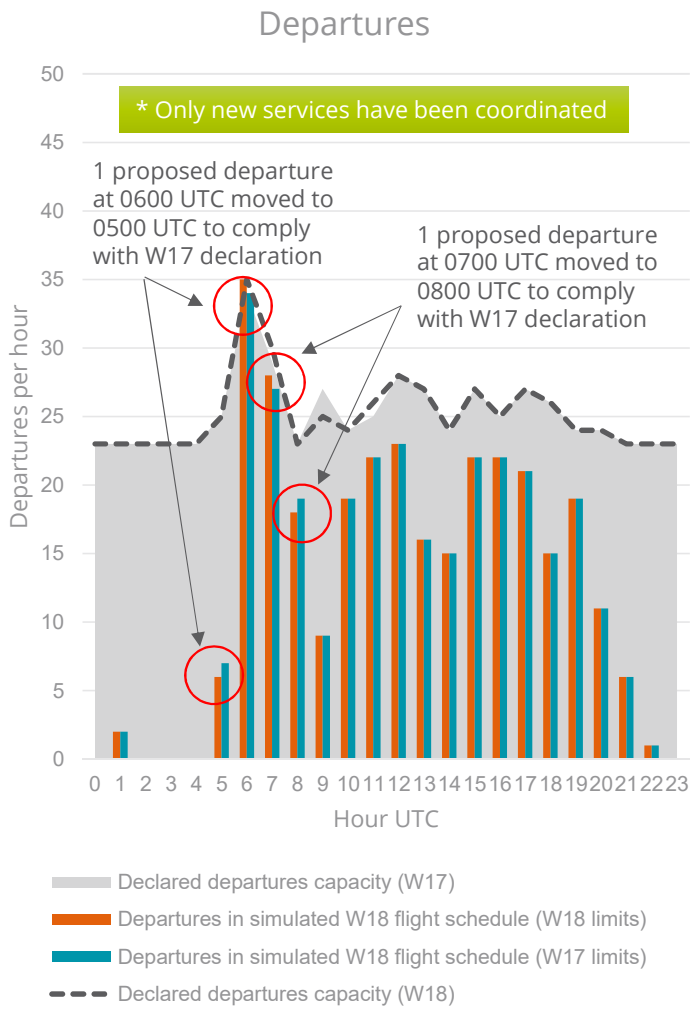


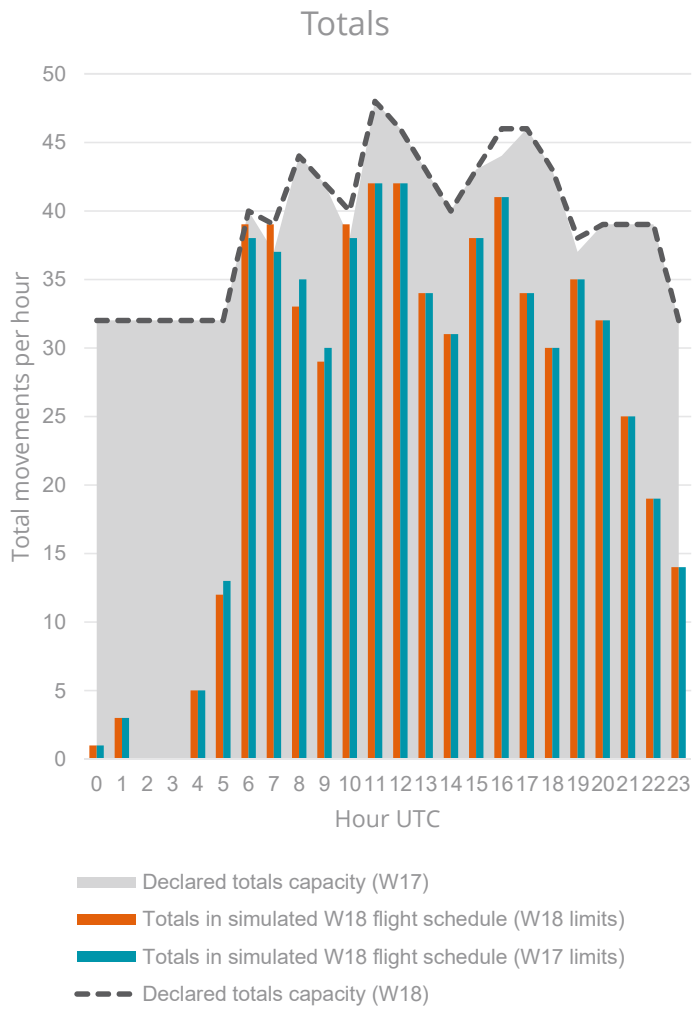




COORDINATING THE SCHEDULE TO THE W17 LIMITS RESULTS IN FLIGHT TIME CHANGES



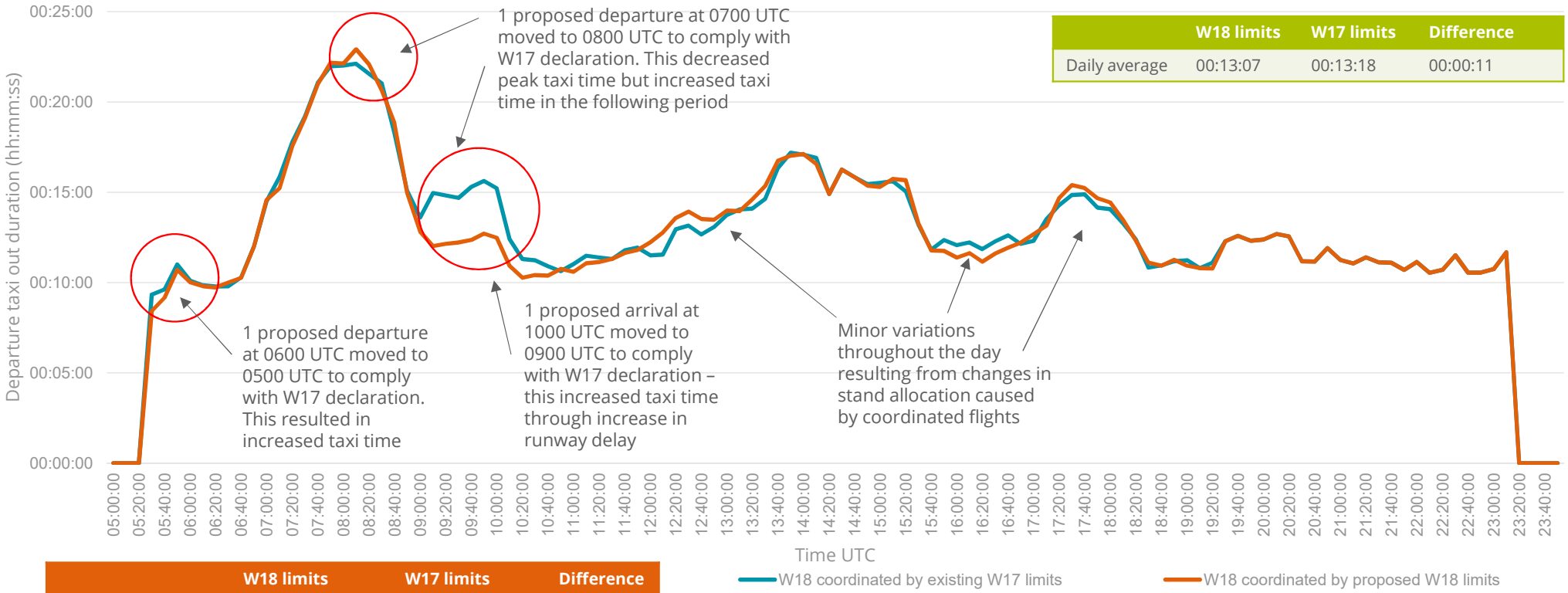




RESULTS (RUNWAY 28)

DEPARTURE TAXI OUT TIME

Definition: The time duration the aircraft has been taxiing for departure on the ground of its departure airport. This value is updated every second of simulation time when the aircraft is taxiing for departure even if the aircraft is stopped on ground. This metric is defined to be the time period between off-block and the time the aircraft reaches its stop bar for runway entry.



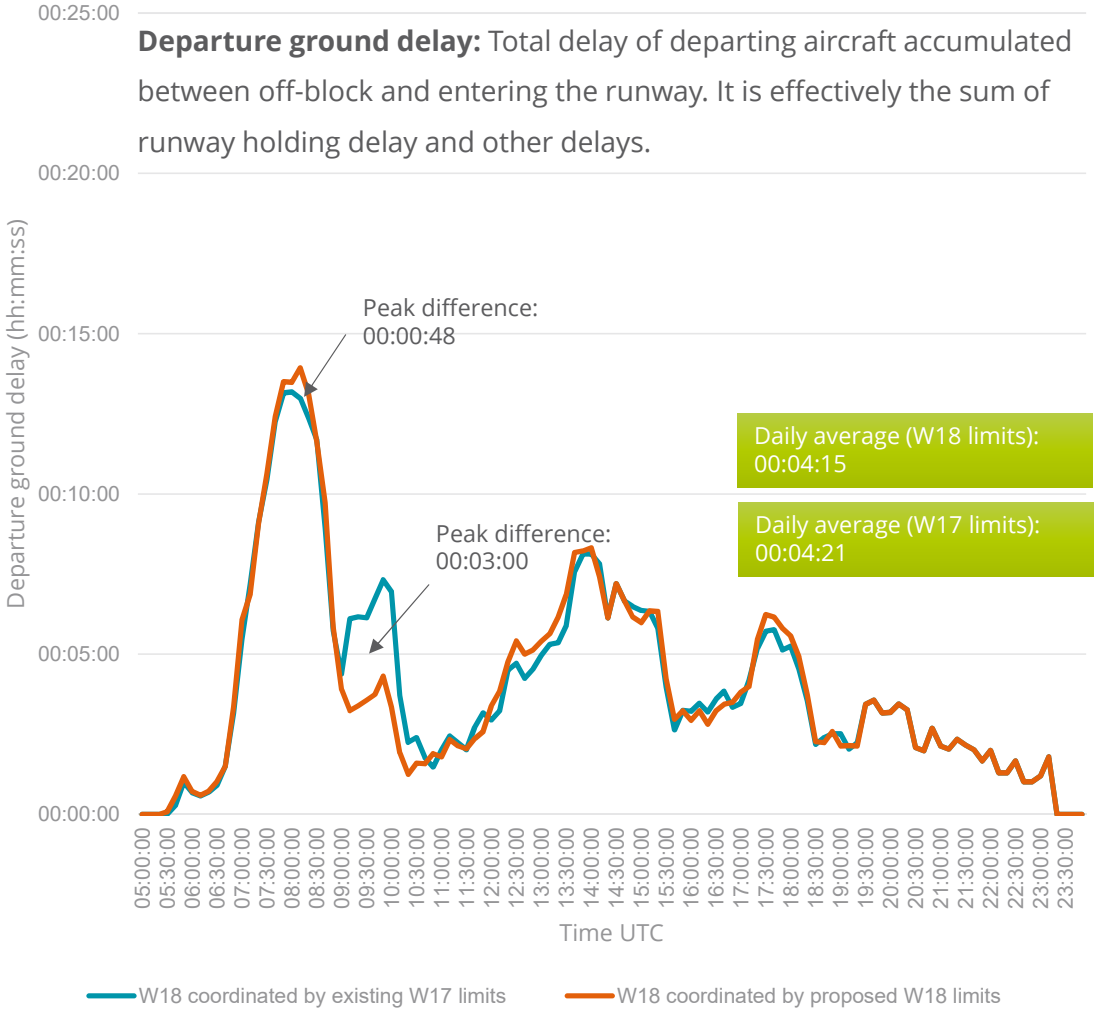
	W18 limits	W17 limits	Difference
Daily average	00:13:07	00:13:18	00:00:11

	W18 limits	W17 limits	Difference
Morning Peak	00:22:55	00:22:07	00:00:48

RUNWAY HOLDING DELAY AND DEPARTURE GROUND DELAY

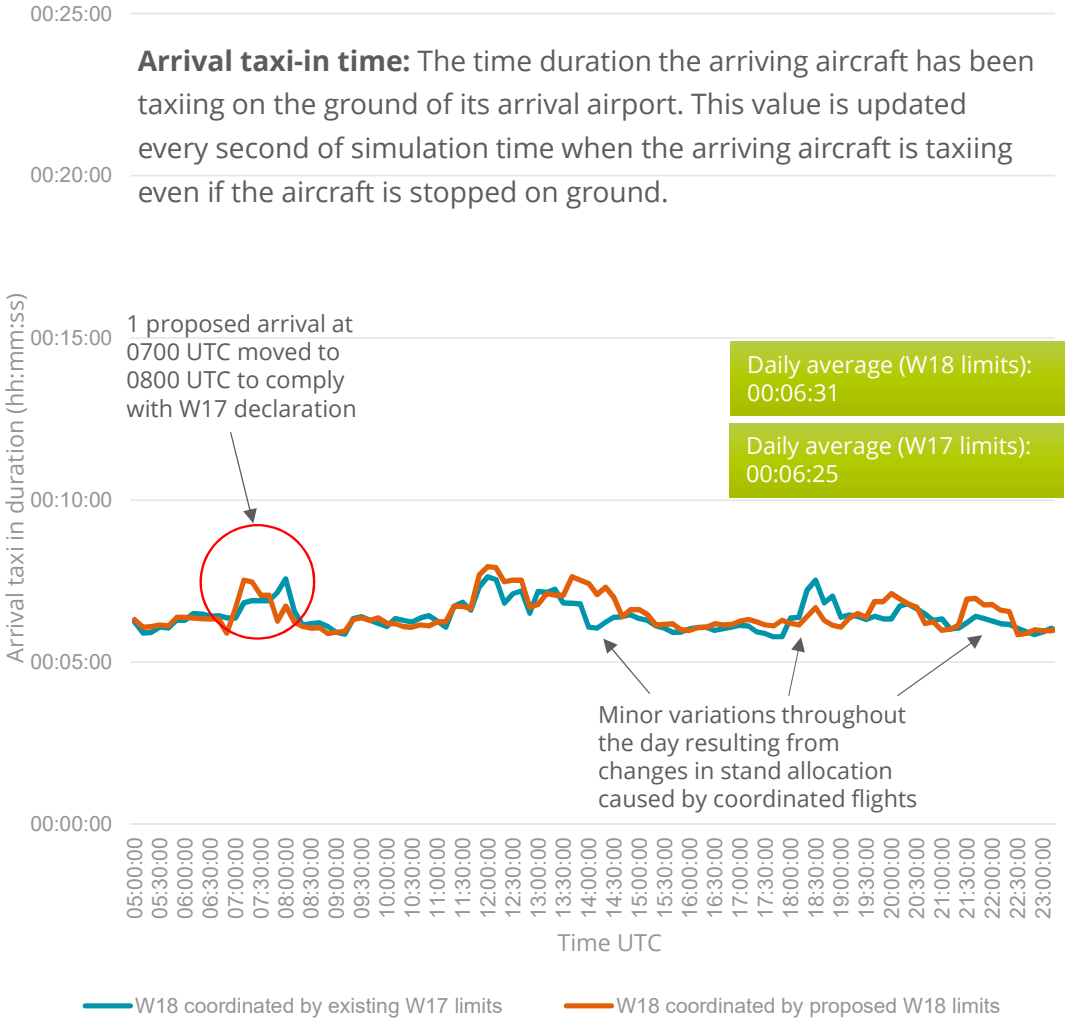
Runway holding delay: The delay experienced while the aircraft is queueing for runway entry. The delay can be caused by other aircraft (being slowed down or stopped) or when waiting at runway stop-bar (because the runway is not free for lining up). This metric is defined to be the time period between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

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.

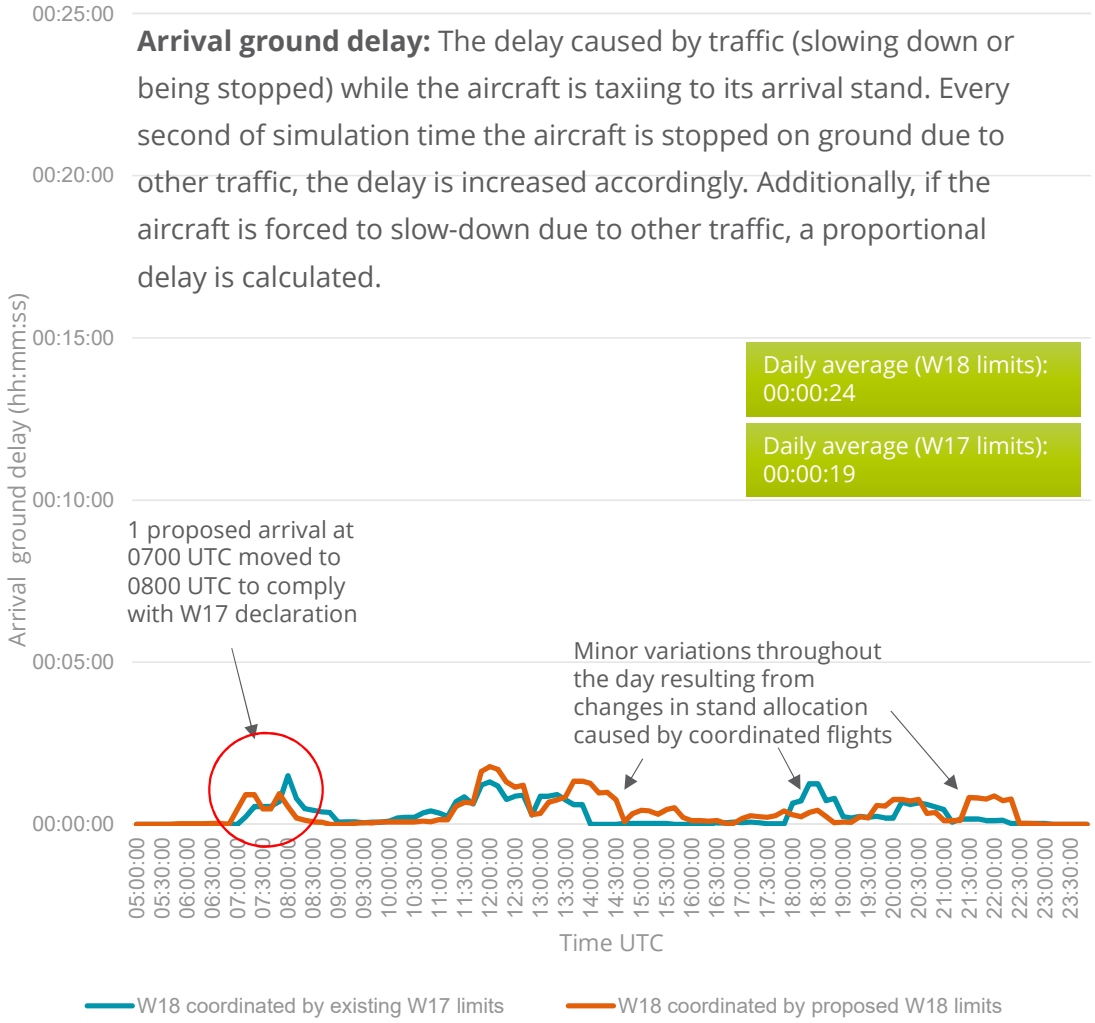


ARRIVAL TAXI IN TIME AND ARRIVAL GROUND DELAY

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.



FINDINGS

Photo source: http://www.daa.ie/media-centre/image-library/

INCREASING THE RUNWAY LIMITS IN LINE WITH THE W18 WISHLIST

Increasing the Runway Limits in line with the W18 Wishlist:

- Is likely to increase the peak departure taxi out time by 48 seconds per flight.
  - 32 seconds of this delay can be attributed to time spent in departure runway queue
  - 16 seconds can be attributed to other factors, such as taxi delay due to taxiing traffic.
- No significant change in Departure Taxi Out Time across the day as a whole.
- Is unlikely to introduce any major changes to either arrival taxi in duration or arrival ground delay.

MAINTAINING THE RUNWAY LIMITS IN LINE WITH THE W17 DECLARATION

Maintaining the Runway Limits in line with the W17 declaration:

- Is likely to lead to redistribution of delays from the peak morning wave to previous and following hours.
- Is likely to keep the existing peak departure taxi out time (and associated runway /ground delays) at the existing levels (peak just above 22 minutes).
- However, due to the need to move 1 proposed departure from 0700 UTC hour to 0800 UTC hour and due to the need to move 1 proposed arrival from 1000 UTC hour to 0900 UTC hour it is likely that the period between 0800 UTC and 1000 UTC will experience an increase in departure taxi out time.
- Is unlikely to introduce any major changes to either arrival taxi in duration or arrival ground delay.

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