HELIOS

The aviation consultancy of Egis

SUMMER 2020: ASSESSMENT OF THE LIKELY IMPACT OF DECLARING THE WISHLIST RUNWAY CAPACITY

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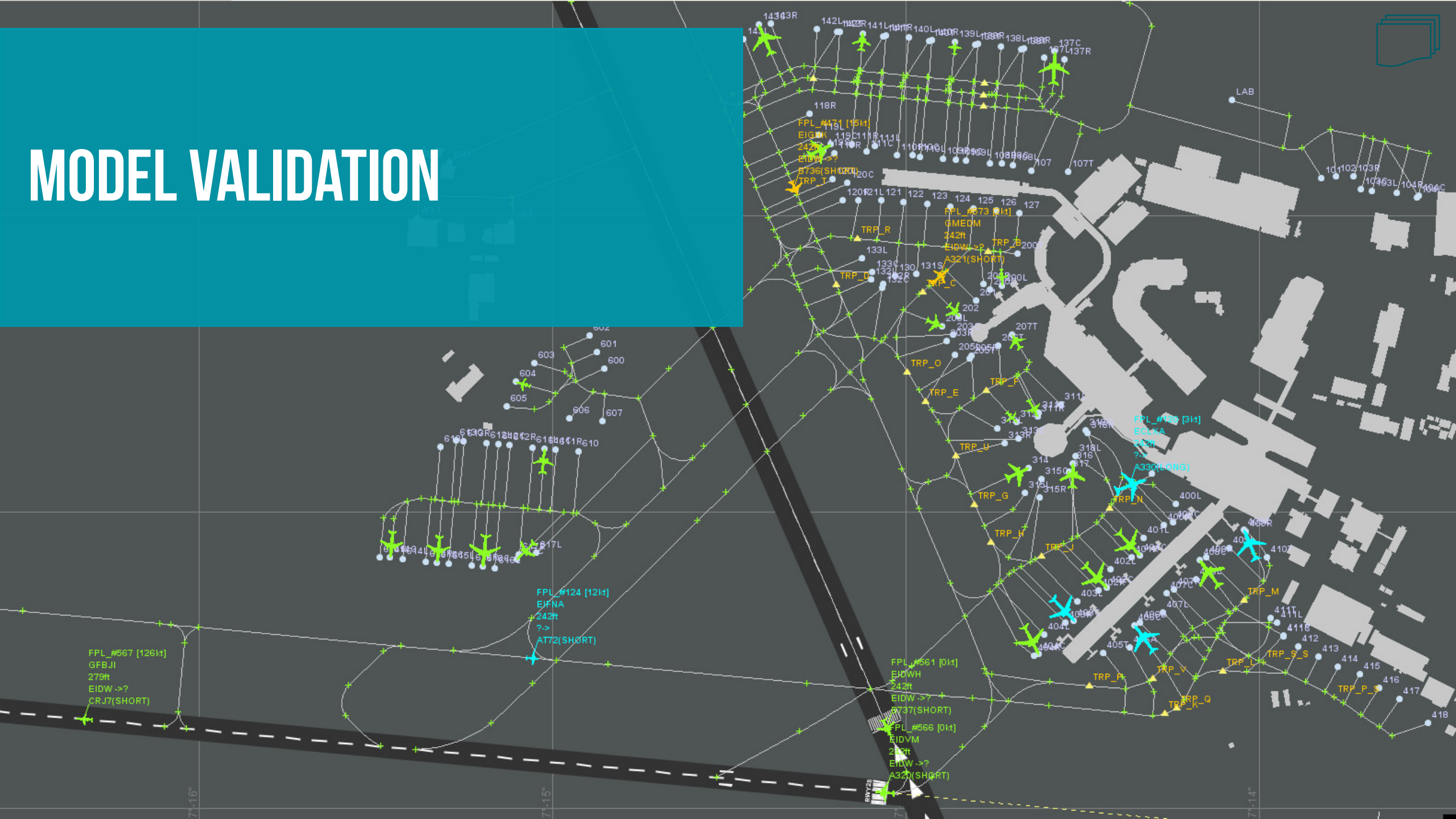
an egis company

CONTENTS

MODEL VALIDATION



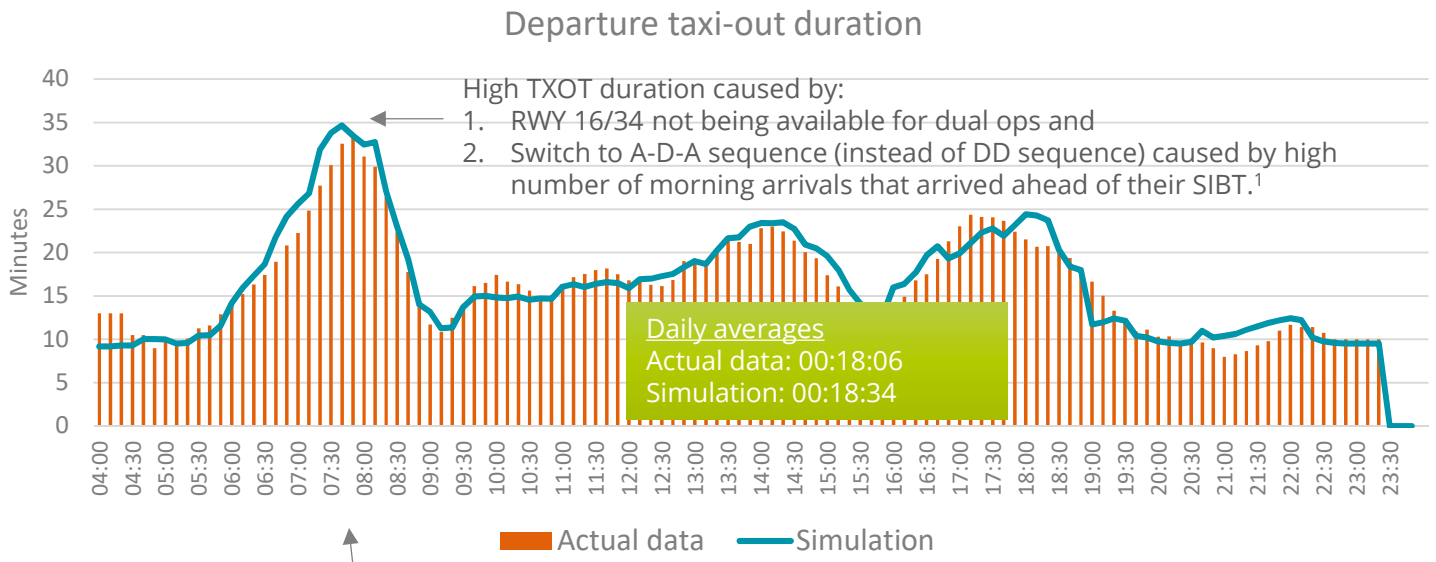
MODEL DESCRIPTION

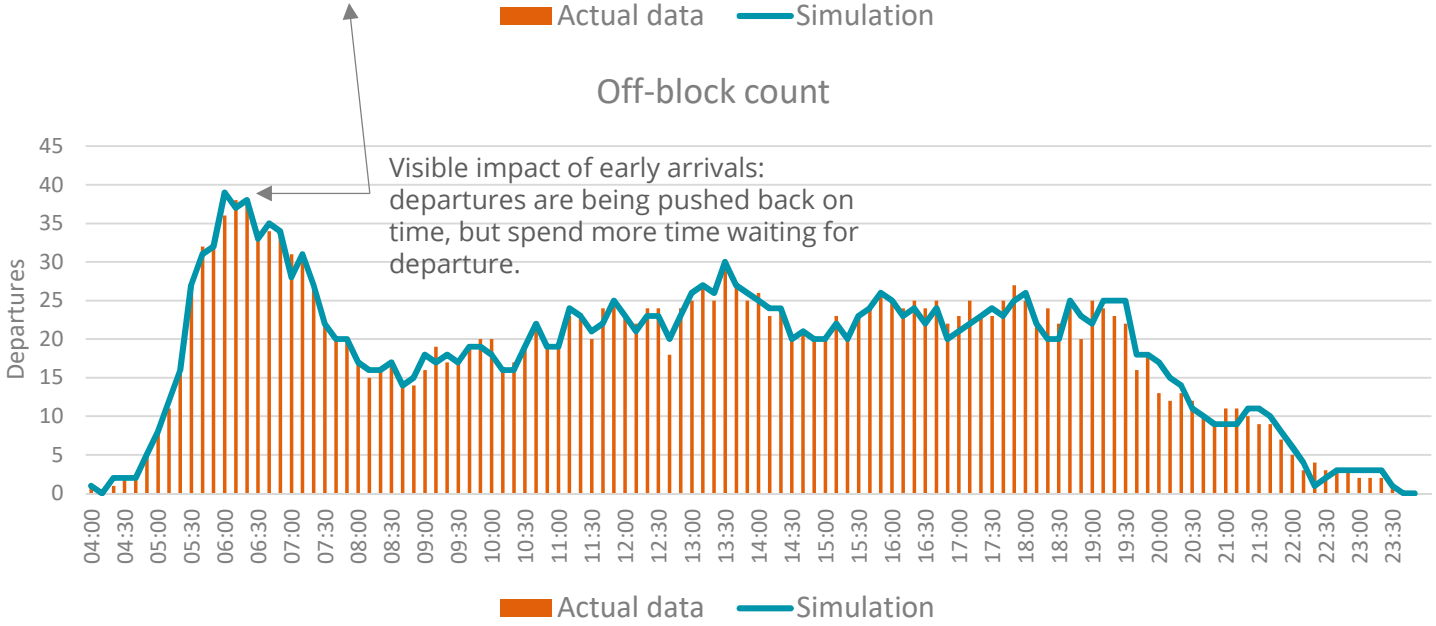
- Based on the model developed in support of coordination of several previous seasons.
- Historically validated against a number of design days from previous seasonal assessments.
- Calibrated again, against a single day of S19 operations (31 May 2019).
- Run from actual block times to take into account all delays.
- A comparison set of airside performance metrics is provided.

DESIGN DAY SIMULATED

- RWY 28 in operations for 100% of the time
  - Dual ops not available on this day.
- 749 flights in total, incl. GA and cargo
  - 377 arrivals and 372 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+10 minutes window from the start of the measurement).

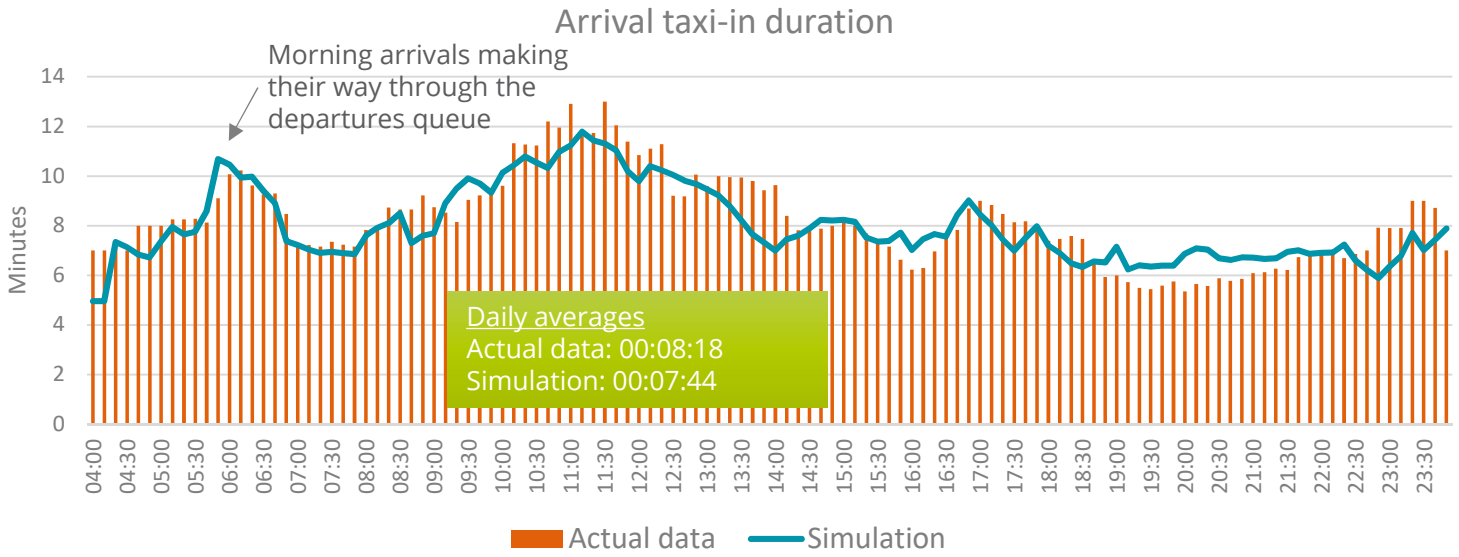
1 In order to simulate the actual operations from the "calibration day" accurately it was necessary to temporarily disable the Departure Sequencer module within the simulation. This Sequencer ensures that the longest possible DD sequence is used when simulating the morning departures wave. However, the real-world data suggest the sequence used in this time period was A-D-A because of the incoming stream of early arrivals.
The Departure Sequencer module will be re-enabled in the model that will be used for the S20 coordination assessment.

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)

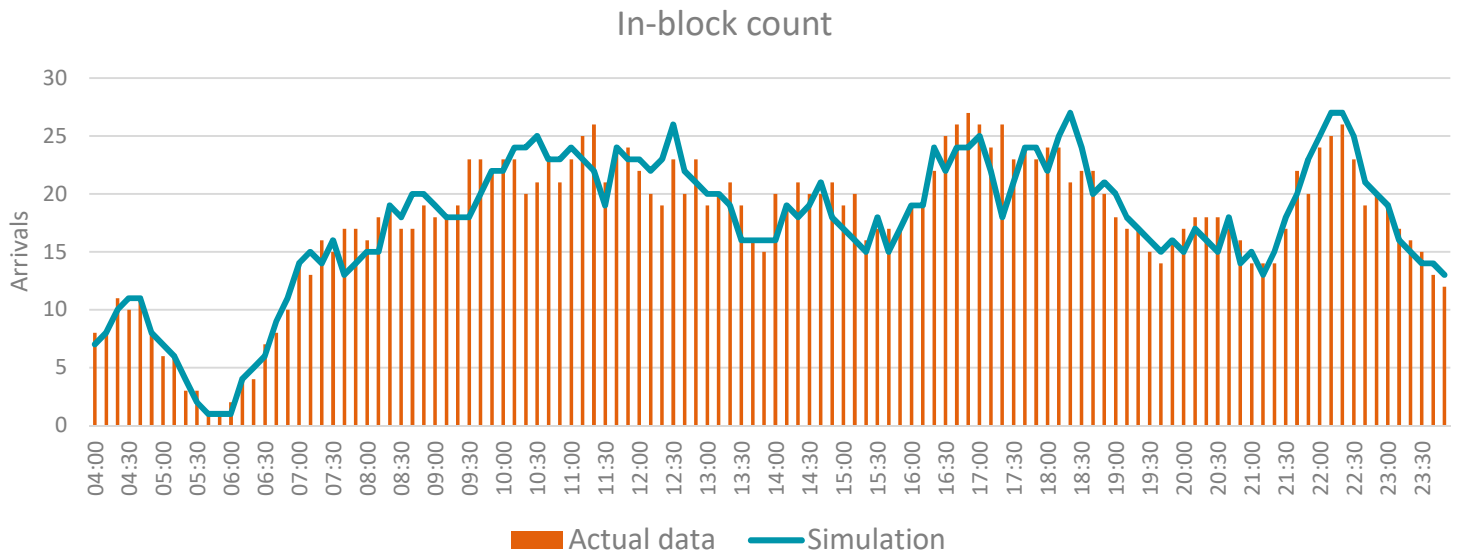
* This graph is presented as a rolling 60-minute average (value for each time period has been calculated as average of values of all events occurring within the T+60 minutes window from the start of the measurement).

CALIBRATION OF ARRIVAL PERFORMANCE



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

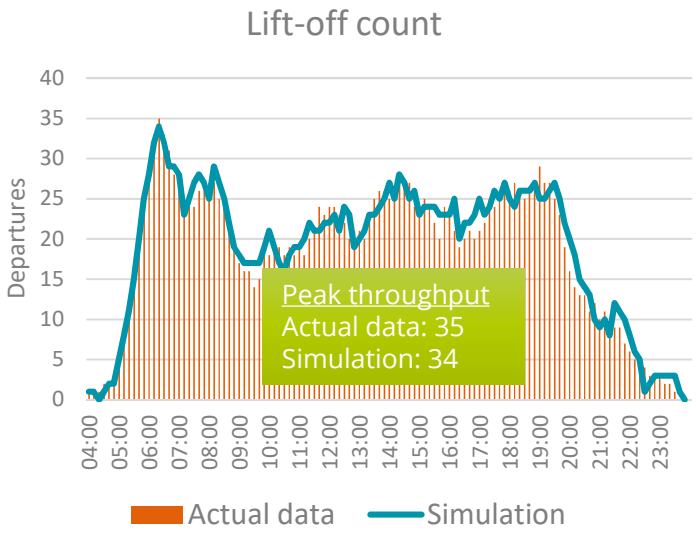
*This graph is presented as a rolling 10-minute average (value for each time period has been calculated as average of values of all events occurring within the T+10 minutes window from the start of the measurement).

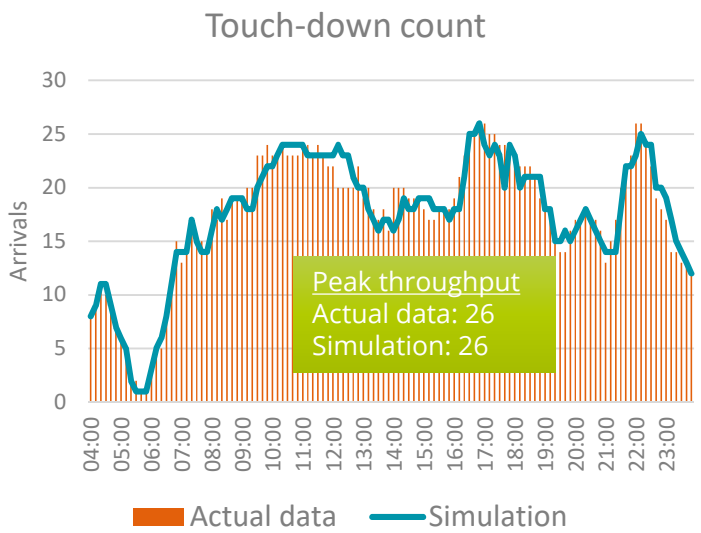


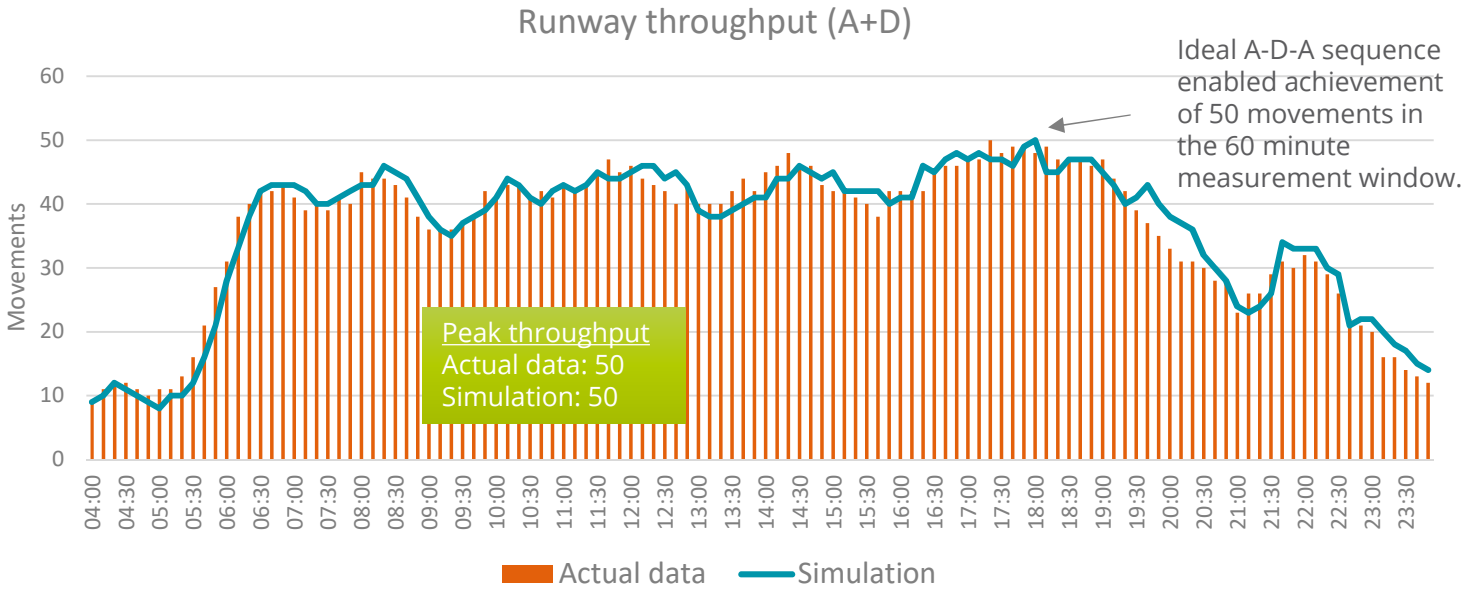
Metric definition:
The number of aircraft that have reached their arrival parking position in the last 60-minute rolling period. The count is incremented when the aircraft reaches its in-blocks position.

* 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 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.
- The Departure Sequencer module (see slide 6) will be re-enabled in the model that will be used for actual S20 coordination assessment.

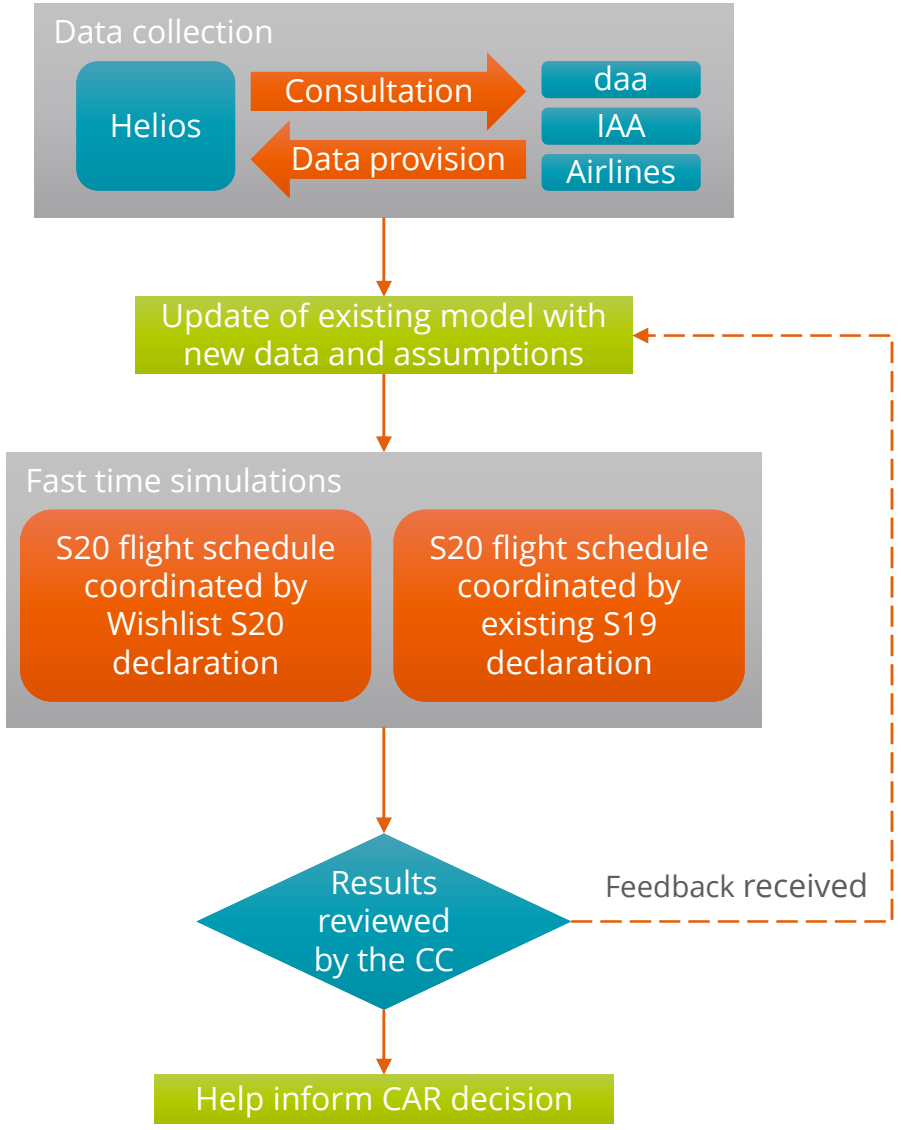
S20 - METHODOLOGY

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 Summer 2019 capacity declaration limits.
- In both cases it is presumed that the Summer 2020 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 Summer 2020 day.

APPROACH AND KEY CHANGES IN THE MODEL



- Runway occupancy times have been updated taking into account Summer 2019 averages to-date.
- Rule-based stand allocation driven by historic data
  - Towing implemented to manage demand for Code E stands
- **Redevelopment of the MRO stands (101-106)**
- **Widening of 137 to have full code C aircraft on 137 L and R**
- **New code C A/C and code B outside the hangar 1/2**
- **Redesign of 107 stands**
- **Re-design of the West Apron**
- **Removal of the long-term parking positions on the old runway**
- 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

SUMMER 2020 FLIGHT SCHEDULE

- The flight schedule used for modelling of both scenarios:
  - Is based on 12th of August 2019 flight schedule (which is already set to be a S19 busy day, before the new S20 services were added)
  - Contains total of 764 flights (381 arrivals and 383 departures)
  - Contains 7 new arrivals and 7 new departures
  - Does not contain general aviation or helicopter flights.

ASSESSMENT OF THE WISHLIST DECLARATION

PROPOSED S20 WISHLIST DECLARATION

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 S19 arrivals capacity	23	23	23	23	23	23	20	25	25	25	27	27	23	27	23	26	25	23	23	23	25	30	28	23	**586**
Proposed S20 arrivals capacity	23	23	23	23	23	23	20	25	25	25	27	27	23	27	23	26	25	23	23	23	25	30	28	23	**586**
Difference (against S19 declaration)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Departures																									
Existing S19 departures capacity	25	25	25	25	25	36	31	25	25	24	27	28	27	24	26	25	29	27	26	22	22	25	25	25	**624**
Proposed S20 departures capacity	25	25	25	25	25	36	31	25	25	24	27	28	27	24	27	25	29	27	26	22	22	25	25	25	**625**
Difference (against S19 declaration)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**+1**	0	0	0	0	0	0	0	0	0	**+1**
Totals																									
Existing S19 totals capacity	32	32	32	32	32	40	42	42	44	44	45	47	46	46	44	46	48	45	39	39	38	36	32	32	**955**
Proposed S20 totals capacity	32	32	32	32	32	40	42	41	45	44	45	48	46	46	45	47	48	45	40	39	38	36	32	32	**959**
Difference (against S19 declaration)	0	0	0	0	0	0	0	**-1**	**+1**	0	0	**+1**	0	0	**+1**	**+1**	0	0	**+1**	0	0	0	0	0	**+4**

Source: S20 Wishlist based on airline submissions

S20 COORDINATED TO PROPOSED S20 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 S20 arrivals capacity	23	23	23	23	23	23	20	25	25	25	27	27	23	27	23	26	25	23	23	23	25	30	28	23	**586**
Arrivals in simulated S20 schedule	7	1	2	6	7	2	11	22	23	23	24	23	19	23	18	25	19	22	16	17	14	25	23	9	**381**
Historic	*7*	*1*	*2*	*5*	*6*	*2*	*11*	*22*	*22*	*23*	*24*	*22*	*19*	*23*	*18*	*23*	*19*	*22*	*15*	*17*	*14*	*25*	*23*	*9*	***374***
Additional arrivals proposed for S20	*0*	*0*	*0*	*1*	*1*	*0*	*0*	*0*	*1*	*0*	*0*	*1*	*0*	*0*	*0*	*2*	*0*	*0*	*1*	*0*	*0*	*0*	*0*	*0*	*7*
Spare capacity (against S20 wishlist)	16	22	21	17	16	21	9	3	2	2	3	4	4	4	5	1	6	1	7	6	11	5	5	14	**205**
Departures																									
Wishlist S20 Departures capacity	25	25	25	25	25	36	31	25	25	24	27	28	27	24	27	25	29	27	26	22	22	25	25	25	**625**
Departures in simulated S20 schedule	1	0	0	1	12	36	31	15	22	20	20	25	27	21	27	22	27	21	24	16	7	6	1	1	**383**
Historic	*1*	*0*	*0*	*1*	*12*	*36*	*30*	*15*	*21*	*20*	*20*	*25*	*27*	*21*	*25*	*21*	*27*	*21*	*23*	*16*	*7*	*5*	*1*	*1*	***376***
Additional departures proposed for S20	*0*	*0*	*0*	*0*	*0*	*0*	*1*	*0*	*1*	*0*	*0*	*0*	*0*	*0*	*2*	*1*	*0*	*0*	*1*	*0*	*0*	*1*	*0*	*0*	*7*
Spare capacity (against S20 wishlist)	24	25	25	24	13	0	0	10	3	4	7	3	0	3	0	3	2	6	2	6	15	19	24	24	**242**
Totals																									
Wishlist S20 Totals capacity	32	32	32	32	32	40	42	41	45	44	45	48	46	46	45	47	48	45	40	39	38	36	32	32	**959**
Totals in simulated S20 schedule	8	1	2	7	19	38	42	37	45	43	44	48	46	44	45	47	46	43	40	33	21	31	24	10	**764**
Historic	*8*	*1*	*2*	*6*	*18*	*38*	*41*	*37*	*43*	*43*	*44*	*47*	*46*	*44*	*43*	*44*	*46*	*43*	*38*	*33*	*21*	*30*	*24*	*10*	***750***
Additional movements proposed for S20	*0*	*0*	*0*	*1*	*1*	*0*	*1*	*0*	*2*	*0*	*0*	*1*	*0*	*0*	*2*	*3*	*0*	*0*	*2*	*0*	*0*	*1*	*0*	*0*	***14***
Spare capacity (against S20 wishlist)	24	31	30	25	13	2	0	4	0	1	1	0	0	2	0	0	2	2	0	6	17	5	8	22	**195**

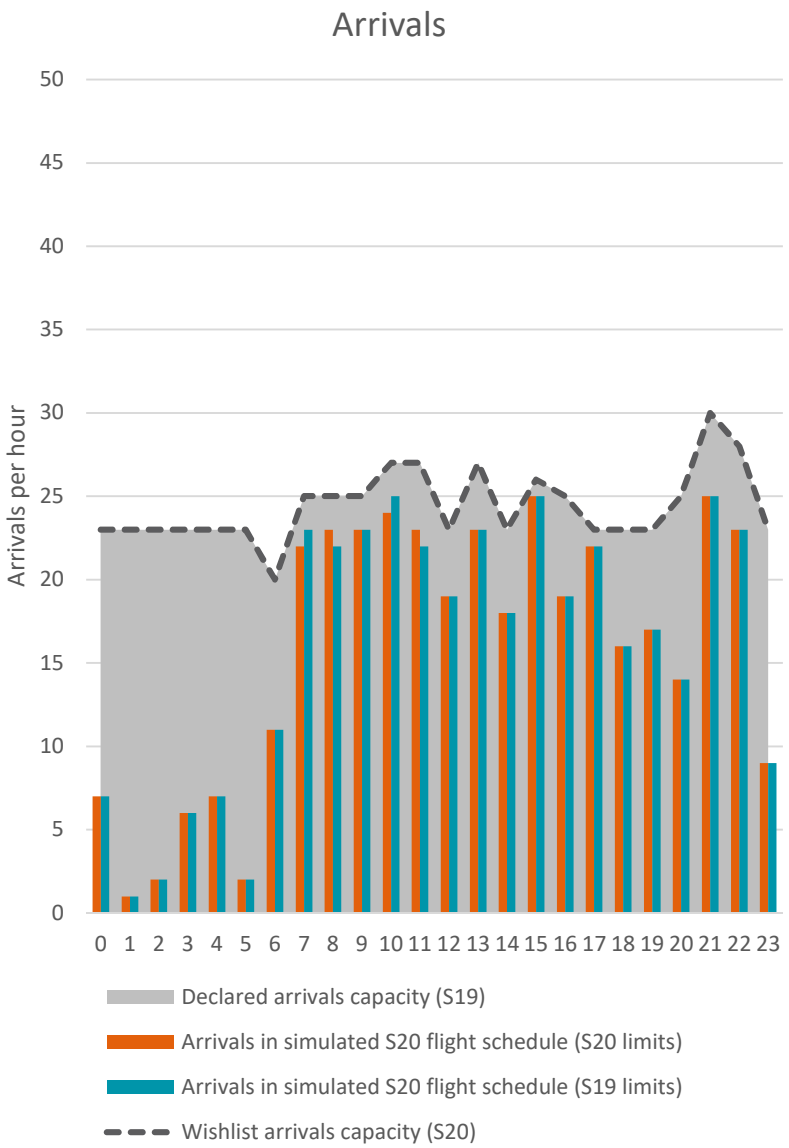
Source: S20 Wishlist based on airline submissions

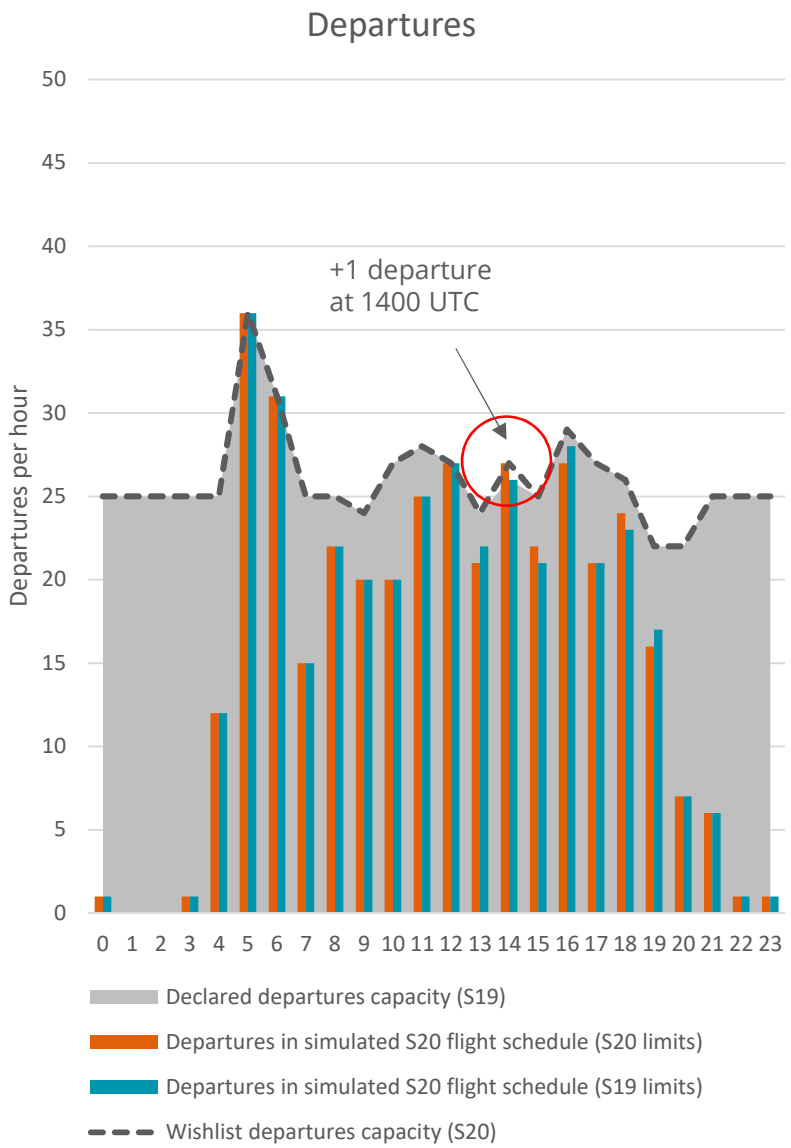
S20 COORDINATED TO EXISTING S19 LIMITS

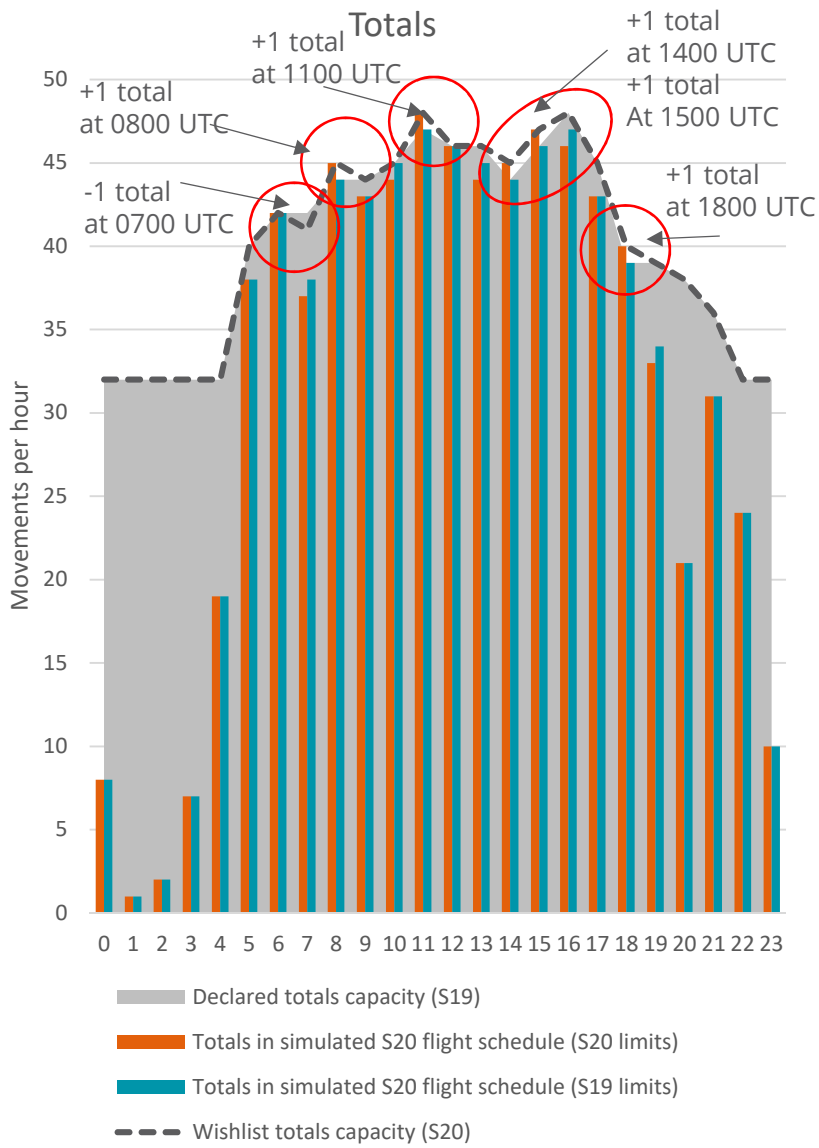
Hour UTC	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Total
Arrivals																									
Existing S19 arrivals capacity	23	23	23	23	23	23	20	25	25	25	27	27	23	27	23	26	25	23	23	23	25	30	28	23	**586**
Arrivals in simulated S20 schedule	7	1	2	6	7	2	11	23	22	23	25	22	19	23	18	25	19	22	16	17	14	25	23	9	**381**
Historic	*7*	*1*	*2*	*5*	*6*	*2*	*11*	*22*	*22*	*23*	*24*	*22*	*19*	*23*	*18*	*23*	*19*	*22*	*15*	*17*	*14*	*25*	*23*	*9*	***374***
Additional arrivals proposed for S20	*0*	*0*	*0*	*1*	*1*	*0*	*0*	*1*	*0*	*0*	*1*	*0*	*0*	*0*	*0*	*2*	*0*	*0*	*1*	*0*	*0*	*0*	*0*	*0*	***7***
Spare capacity (against S19 declaration)	16	22	21	17	16	21	9	2	3	2	2	5	4	4	5	1	6	1	7	6	11	5	5	14	**205**
Departures																									
Existing S19 departures capacity	25	25	25	25	25	36	31	25	25	24	27	28	27	24	26	25	29	27	26	22	22	25	25	25	**624**
Departures in simulated S20 schedule	1	0	0	1	12	36	31	15	22	20	20	25	27	22	26	21	28	21	23	17	7	6	1	1	**383**
Historic	*1*	*0*	*0*	*1*	*12*	*36*	*30*	*15*	*21*	*20*	*20*	*25*	*27*	*21*	*25*	*21*	*27*	*21*	*23*	*16*	*7*	*5*	*1*	*1*	***376***
Additional departures proposed for S20	*0*	*0*	*0*	*0*	*0*	*0*	*1*	*0*	*1*	*0*	*0*	*0*	*0*	*1*	*1*	*0*	*1*	*0*	*0*	*1*	*0*	*1*	*0*	*0*	***7***
Spare capacity (against S19 declaration)	24	25	25	24	13	0	0	10	3	4	7	3	0	2	0	4	1	6	3	5	15	19	24	24	**241**
Totals																									
Existing S19 totals capacity	32	32	32	32	32	40	42	42	44	44	45	47	46	46	44	46	48	45	39	39	38	36	32	32	**955**
Totals in simulated S20 schedule	8	1	2	7	19	38	42	38	44	43	45	47	46	45	44	46	47	43	39	34	21	31	24	10	**764**
Historic	*8*	*1*	*2*	*6*	*18*	*38*	*41*	*37*	*43*	*43*	*44*	*47*	*46*	*44*	*43*	*44*	*46*	*43*	*38*	*33*	*21*	*30*	*24*	*10*	***750***
Additional movements proposed for S20	*0*	*0*	*0*	*1*	*1*	*0*	*1*	*1*	*1*	*0*	*1*	*0*	*0*	*1*	*1*	*2*	*1*	*0*	*1*	*1*	*0*	*1*	*0*	*0*	***14***
Spare capacity (against S19 declaration)	24	31	30	25	13	2	0	4	0	1	0	0	0	1	0	0	1	2	0	5	17	5	8	22	**191**

Source: S20 Wishlist based on airline submissions

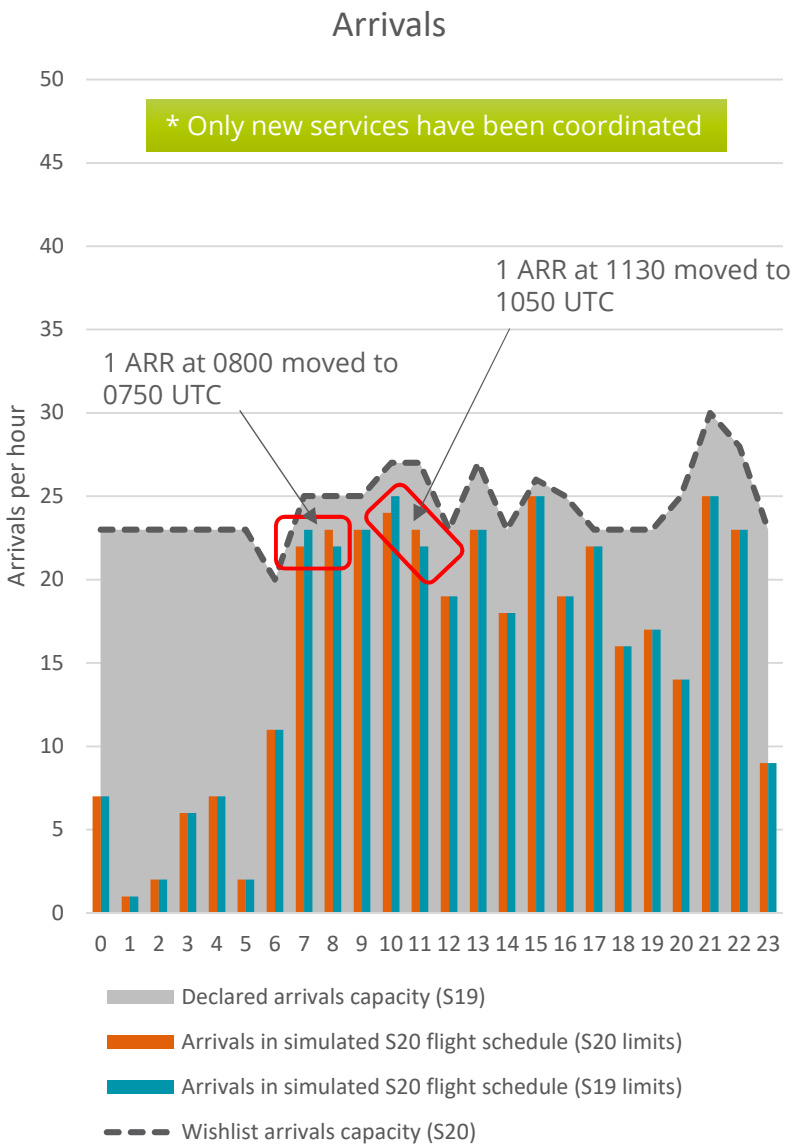
DIFFERENCE BETWEEN EXISTING S19 AND PROPOSED S20 CAPACITY DECLARATION

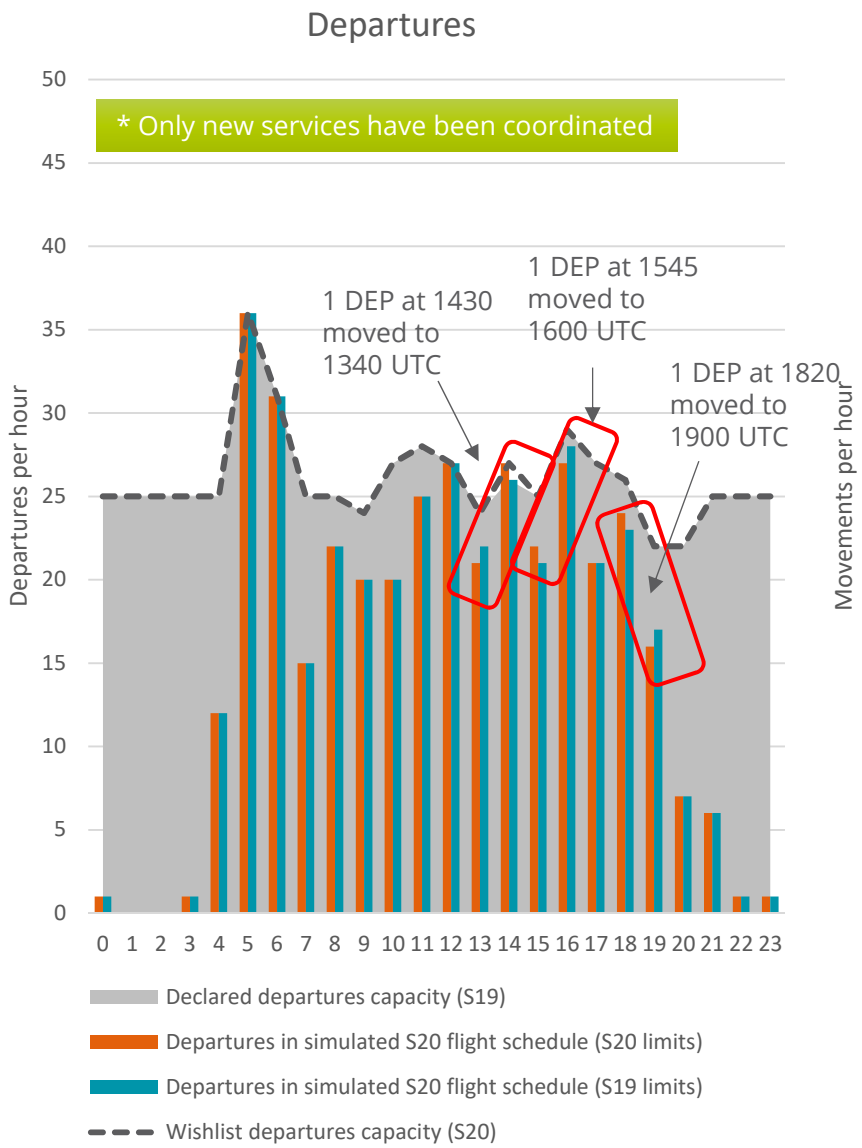


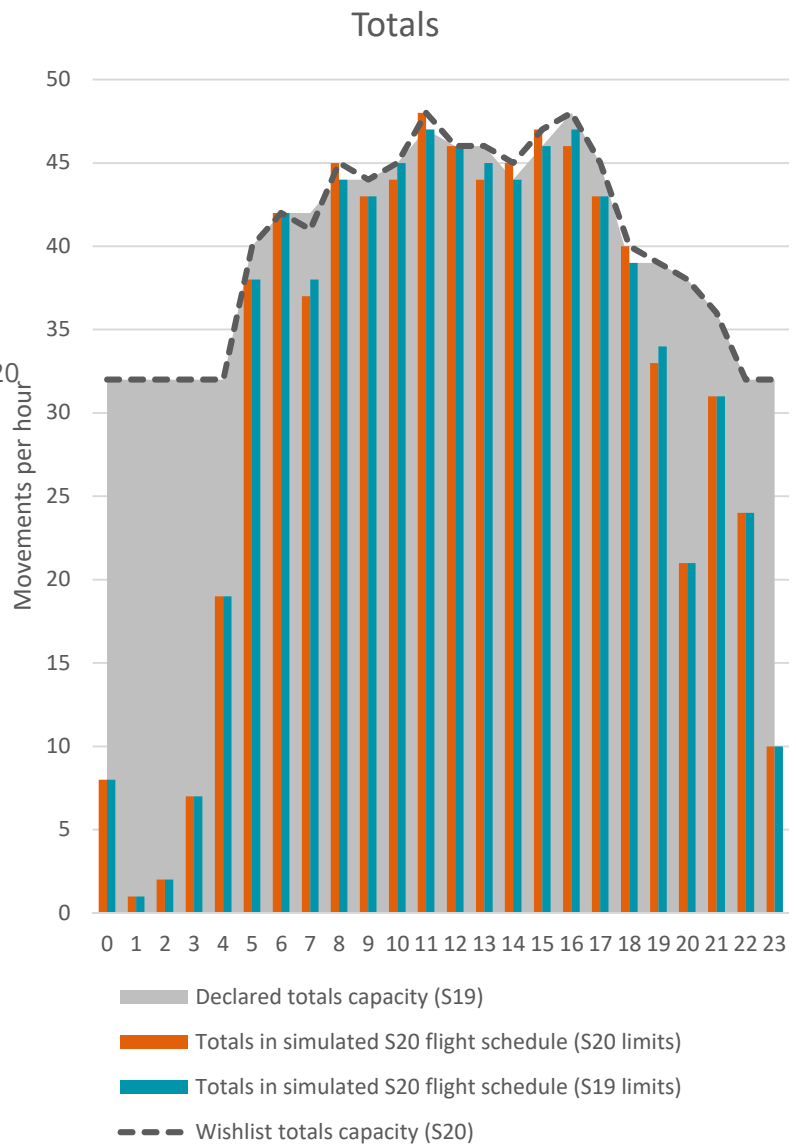




COORDINATING THE SCHEDULE TO THE S19 LIMITS RESULTS IN FLIGHT TIME CHANGES



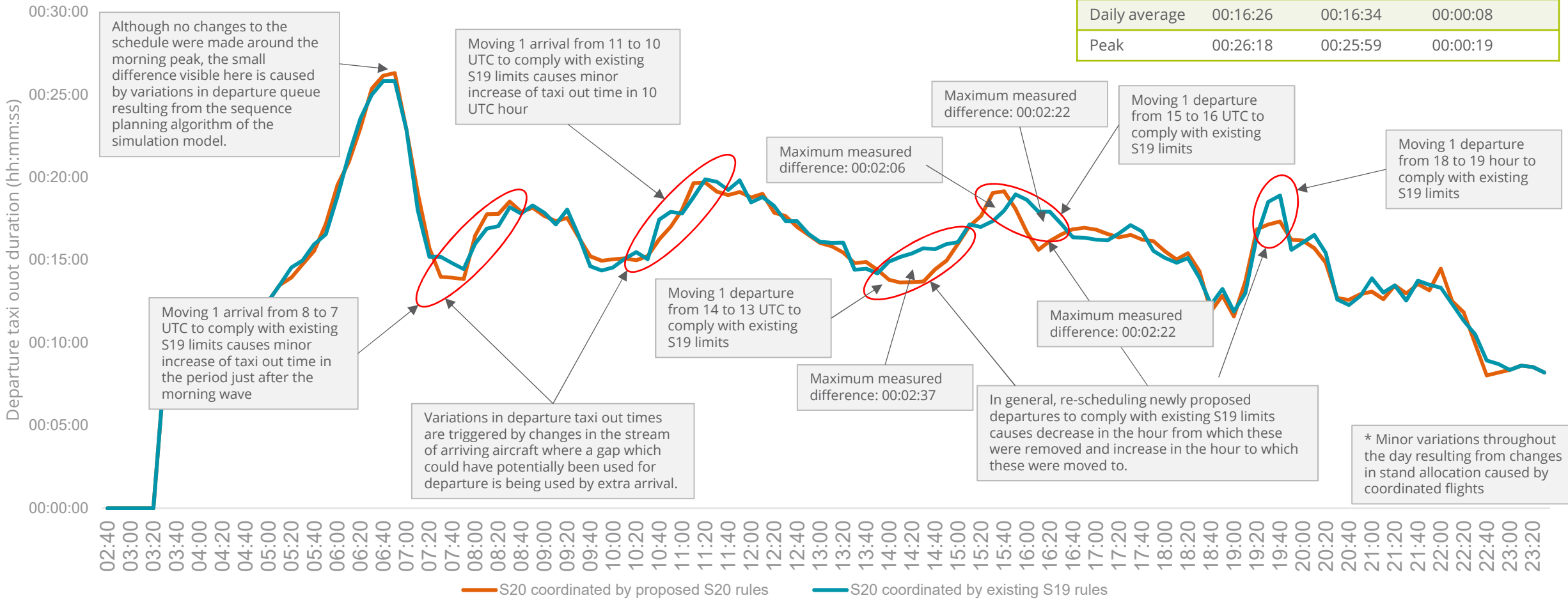




DEPARTURE TAXI OUT TIME

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

	S20 limits	S19 limits	Difference
Daily average	00:16:26	00:16:34	00:00:08
Peak	00:26:18	00:25:59	00:00:19

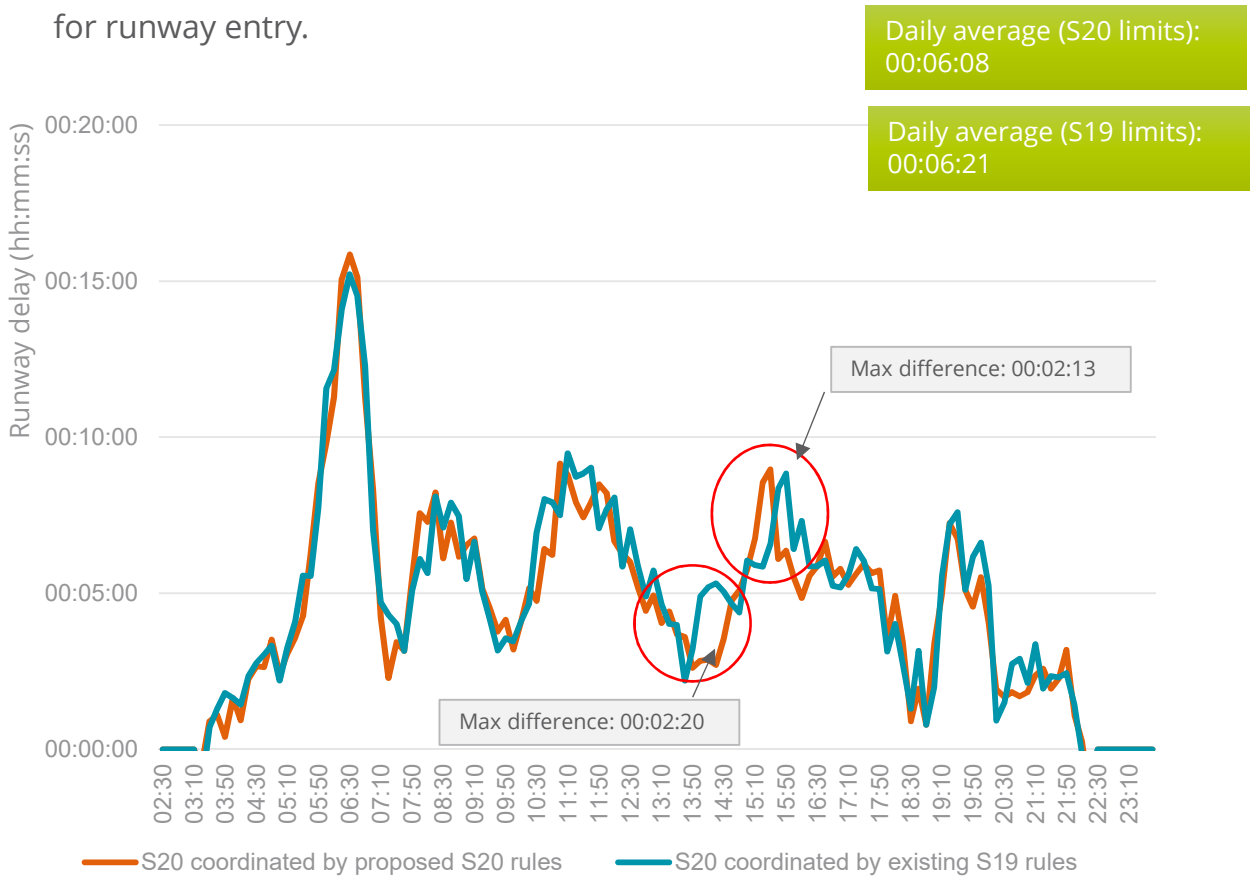


DEPARTURE TAXI OUT TIME

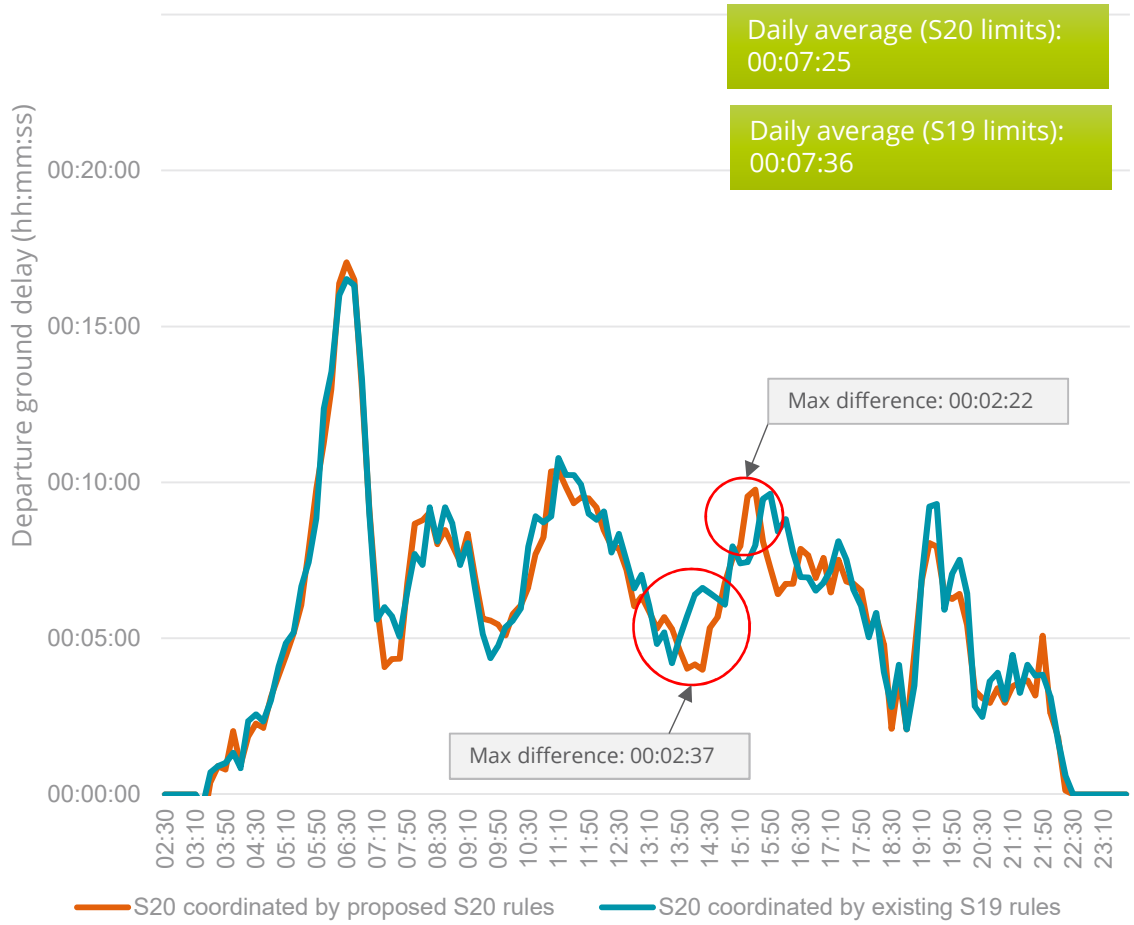
Definition: This metric is defined to be the time period between off-block and the time the aircraft reaches its stop bar for runway entry. This value is updated every second of simulation time when the aircraft is taxiing for departure even if the aircraft is stopped on ground.

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


FPL_#96 [25kt]
ETAOT
242ft
HAAB -> EIDW
B772(SHORT)
FPL_#485 [0kt]
LZCGR
242ft
EIDW -> EDDP
FPL_#106 [136kt]
GFBJD
366ft ▼7.0 Max 11.0
EGFF -> EIDW
CRJ7(SHORT)
FPL_#434 [0kt]
EIDEO
242ft
EIDW -> LEBO
FPL_#438 [0kt]
EIFTT
242ft
EIDW -> LIPH
B738(SHORT)
FPL_#447 [0kt]
EIDVJ
242ft
EIDW -> EDDT
A320(SHORT)
FPL_#405 [20kt]
EISTA
242ft
EIDW -> EGNS
B733(SHORT)
FPL_#492 [0kt]
EILBR
242ft
EIDW -> EINN
FPL_#436 [13kt]
242ft
EIDW -> KEWR
B772(LONG)
AirTOpsoft
bing
100 m

INCREASING THE RUNWAY LIMITS IN LINE WITH THE S20 WISHLIST

Increasing the Runway Limits in line with the S20 Wishlist:

- Is unlikely to have a major impact on average daily departure taxi out time across the day when measured as a whole (compared to maintaining S19 limits), however:
  - Declaring the S20 Wishlist may lead to increase of taxi out times in the afternoon period, specifically between 1500 and 1600 hour. This increase may be up to maximum of two minutes per flight scheduled in this period.
- Due to no changes proposed in the morning peak it is unlikely that declaring the S20 Wishlist will cause any changes to this period.
- Is unlikely to introduce any major changes to either arrival taxi in duration or arrival ground delay.
- Is likely to bring 0500, 0600, 0800, 1100, 1200, 1400, 1500 and 1800 UTC hours up to the scheduling limits, with 0900, 1000 and 1700 hours being just one movement from reaching the limit, assuming the S20 schedule materializes as expected.

MAINTAINING THE RUNWAY LIMITS IN LINE WITH THE S19 DECLARATION

Maintaining the Runway Limits in line with the S19 declaration:

- Is likely to lead to redistribution of delays from periods where increases for S20 season were proposed into periods with any spare capacity left.
- Due to no changes proposed in the morning peak it is unlikely that sticking with S19 declaration will cause any changes to this period.
- However, due to the need to move 1 departure from 1400 hour to 1300 hour and due to the need to move another departure from 1500 hour to 1600 hour to comply with existing S19 declaration, it can be expected that departure ground delays will increase both in 1400 UTC and 1600 UTC hours. These increases are expected to be no more than 00:02:37 in 1400 UTC and no more than 00:02:22 in 1600 UTC.
- Is unlikely to have any major impact on taxi in duration.
- Is likely to bring the 14-hour period between 0500 and 1800 UTC hour to capacity limits or just one slot below the limit, with the only exception being 0700 UTC hour which may be considered as a “firebreak” after the morning peak wave.

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