

S18 forecast:

coordinated to proposed S18 limits

vs

coordinated to existing S17 limits

## Case description

The purpose of this comparison is to assess the likely effect of declaring increased runway capacity, as per Wishlist 3, or maintaining the Summer 2017 limits, presuming that the Summer 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.

# S18 coordinated to proposed S18 limits

<b>Arrivals</b>																									
Hour of Day (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
2017 Design day arrivals	3	2	0	2	11	3	9	20	22	18	20	24	18	19	17	19	22	19	14	17	14	19	24	12	348
S18 forecast arrivals	0	0	0	0	1	0	1	0	2	2	1	0	1	1	0	2	1	1	0	0	1	0	3	2	19
S17 design day + S18 forecast	3	2	0	2	12	3	10	20	24	20	21	24	19	20	17	21	23	20	14	17	15	19	27	14	367
Missing to reach the S17 declared capacity	20	21	23	21	11	20	10	5	-2	3	6	3	4	7	6	5	2	3	9	6	10	11	-1	9	212
Missing to reach the S18 wishlist capacity	20	21	23	21	11	20	10	5	0	4	6	3	4	7	6	5	2	3	9	6	10	11	0	9	215
<b>Departures</b>																									
Hour of Day (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
2017 Design day departures	1	0	1	0	12	35	27	19	18	19	22	21	22	13	23	23	23	23	21	14	5	3	0	0	345
S18 forecast departures	0	0	0	0	2	1	1	0	1	1	1	2	0	2	2	1	1	1	1	0	0	1	0	0	18
S17 design day + S18 forecast	1	0	1	0	14	36	28	19	19	20	23	23	22	15	25	24	24	24	22	14	5	4	0	0	363
Missing to reach the S17 declared capacity	24	25	24	25	11	-1	2	6	10	4	4	5	4	9	1	0	4	3	2	8	17	21	25	25	258
Missing to reach the S18 wishlist capacity	24	25	24	25	11	0	3	6	6	4	4	5	5	9	1	1	5	3	2	8	17	21	25	25	259
<b>Totals</b>																									
Hour of Day (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
2017 Design day movements	4	2	1	2	23	38	36	39	40	37	42	45	40	32	40	42	45	42	35	31	19	22	24	12	693
S18 forecast movements	0	0	0	0	3	1	2	0	3	3	2	2	1	3	2	3	2	2	1	0	1	1	3	2	37
S17 design day + S18 forecast	4	2	1	2	26	39	38	39	43	40	44	47	41	35	42	45	47	44	36	31	20	23	27	14	730
Missing to reach the S17 declared capacity	28	30	31	30	6	1	4	3	-1	1	1	-1	5	11	2	0	1	-2	1	7	18	13	5	18	212
Missing to reach the S18 wishlist capacity	28	30	31	30	6	2	4	3	0	3	1	0	5	11	2	1	1	0	1	7	18	13	6	18	220

# S18 coordinated to proposed S17 limits

<b>Arrivals</b>																									
Hour of Day (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
2017 Design day arrivals	3	2	0	2	11	3	9	20	22	18	20	24	18	19	17	19	22	19	14	17	14	19	24	12	348
S18 forecast arrivals	0	0	0	0	1	0	1	2	0	2	1	0	1	1	0	2	1	0	1	0	1	1	2	2	19
S17 design day + S18 forecast	3	2	0	2	12	3	10	22	22	20	21	24	19	20	17	21	23	19	15	17	15	20	26	14	367
Missing to reach the S17 declared capacity	20	21	23	21	11	20	10	3	0	3	6	3	4	7	6	5	2	4	8	6	10	10	0	9	212
Missing to reach the S18 wishlist capacity	20	21	23	21	11	20	10	3	2	4	6	3	4	7	6	5	2	4	8	6	10	10	1	9	215

<b>Departures</b>																									
Hour of Day (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
2017 Design day departures	1	0	1	0	12	35	27	19	18	19	22	21	22	13	23	23	23	23	21	14	5	3	0	0	345
S18 forecast departures	0	0	0	0	3	0	1	0	1	1	1	1	1	2	2	1	2	0	1	0	0	1	0	0	18
S17 design day + S18 forecast	1	0	1	0	15	35	28	19	19	20	23	22	23	15	25	24	25	23	22	14	5	4	0	0	363
Missing to reach the S17 declared capacity	24	25	24	25	10	0	2	6	10	4	4	6	3	9	1	0	3	4	2	8	17	21	25	25	258
Missing to reach the S18 wishlist capacity	24	25	24	25	10	1	3	6	6	4	4	6	4	9	1	1	4	4	2	8	17	21	25	25	259

<b>Totals</b>																									
Hour of Day (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
2017 Design day movements	4	2	1	2	23	38	36	39	40	37	42	45	40	32	40	42	45	42	35	31	19	22	24	12	693
S18 forecast movements	0	0	0	0	4	0	2	2	1	3	2	1	2	3	2	3	3	0	2	0	1	2	2	2	37
S17 design day + S18 forecast	4	2	1	2	27	38	38	41	41	40	44	46	42	35	42	45	48	42	37	31	20	24	26	14	730
Missing to reach the S17 declared capacity	28	30	31	30	5	2	4	1	1	1	1	0	4	11	2	0	0	0	0	7	18	12	6	18	212
Missing to reach the S18 wishlist capacity	28	30	31	30	5	3	4	1	2	3	1	1	4	11	2	1	0	2	0	7	18	12	7	18	220

Changes to S18 forecast schedule:

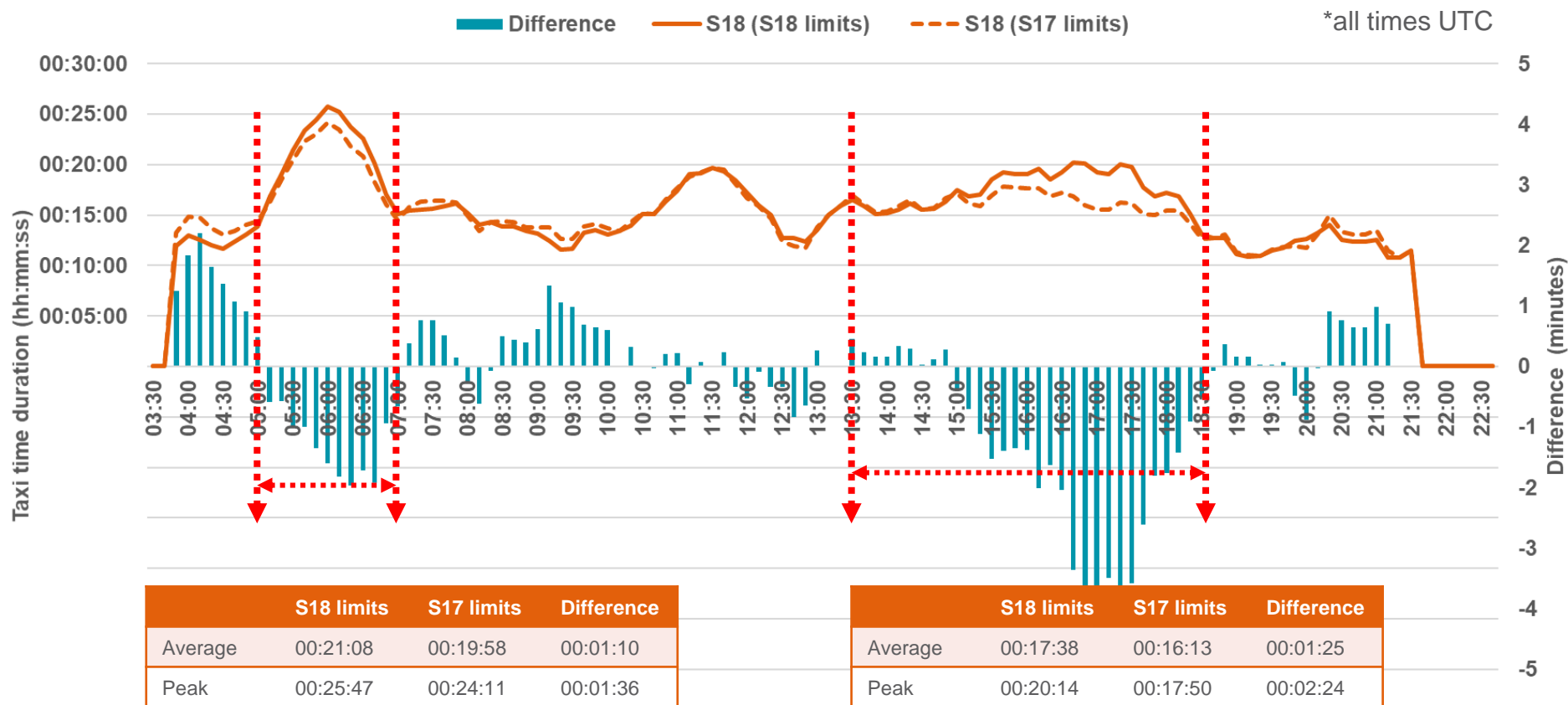
Count	Direction	Moved from	Moved to
1	DEP	0500 UTC	0400 UTC
2	ARR	0800 UTC	0700 UTC
1	DEP	1100 UTC	1200 UTC
1	DEP	1700 UTC	1600 UTC
1	ARR	1700 UTC	1800 UTC
1	ARR	2200 UTC	2100 UTC

# Runway 28

## Departure taxi out time

	S18 limits	S17 limits	Difference
Daily average	00:12:32	00:12:17	00:00:15

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.

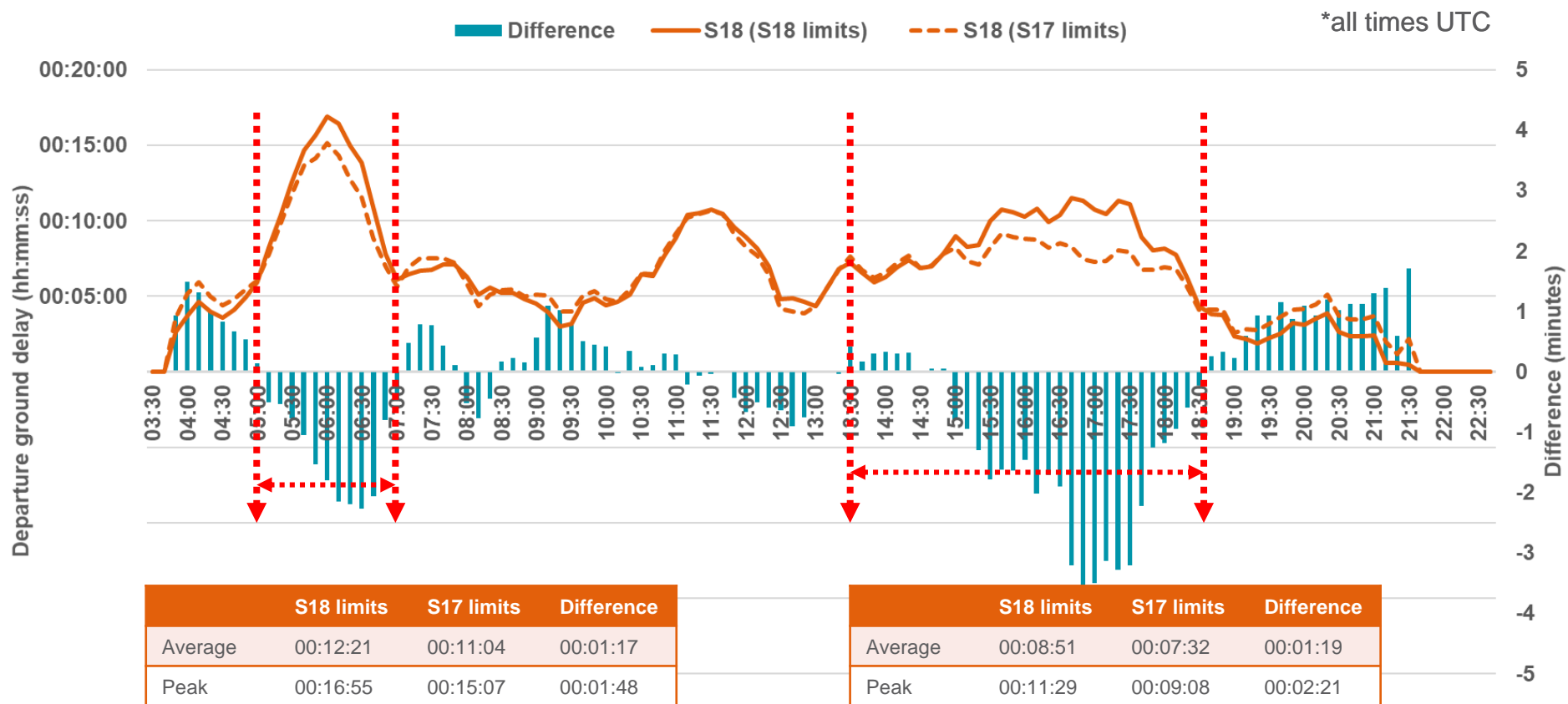


# Runway 28

## Departure ground delay

	S18 limits	S17 limits	Difference
Daily average	00:05:09	00:04:57	00:00:12

Definition: 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.

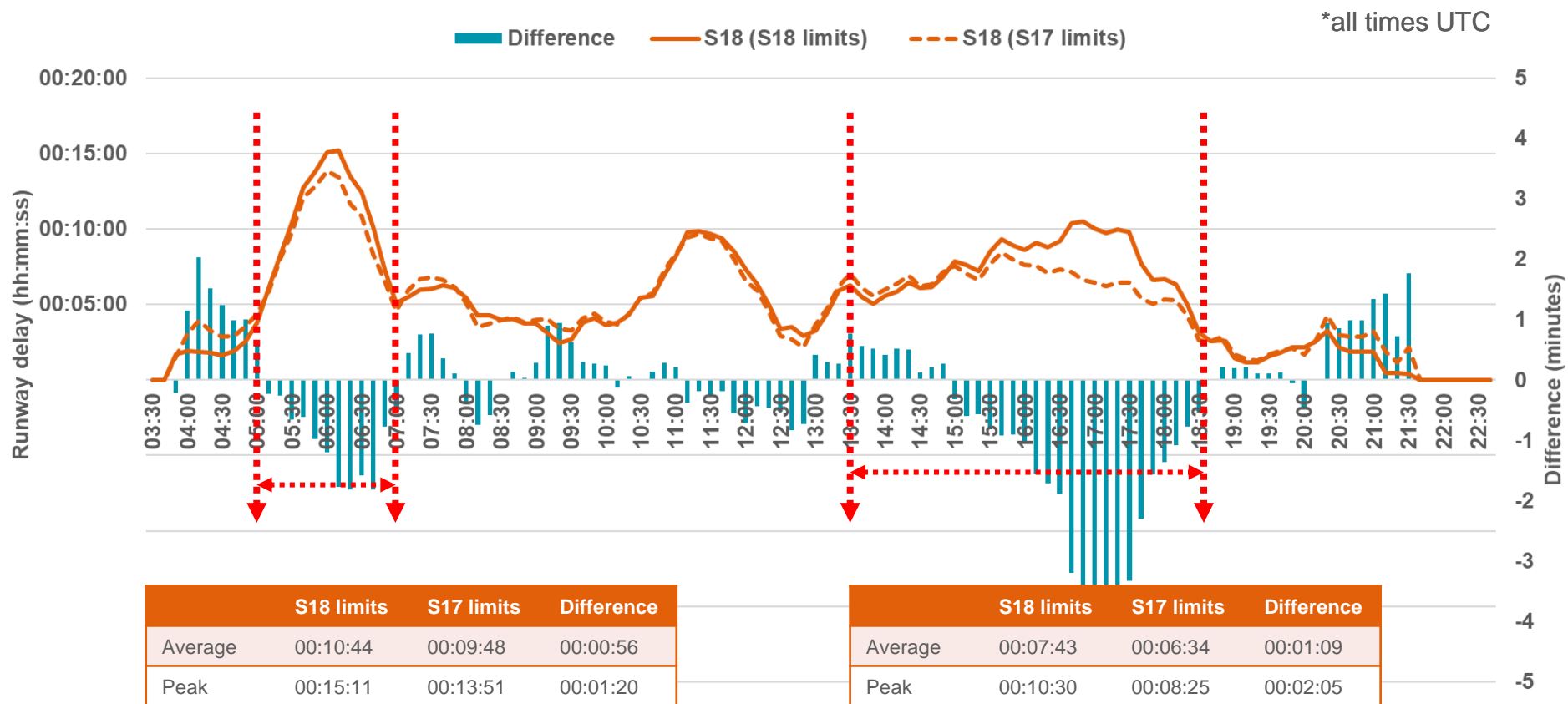


# Runway 28

## Runway holding delay

	S18 limits	S17 limits	Difference
Daily average	00:04:19	00:04:07	00:00:12

Definition: The delay experienced while the aircraft is queuing 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.

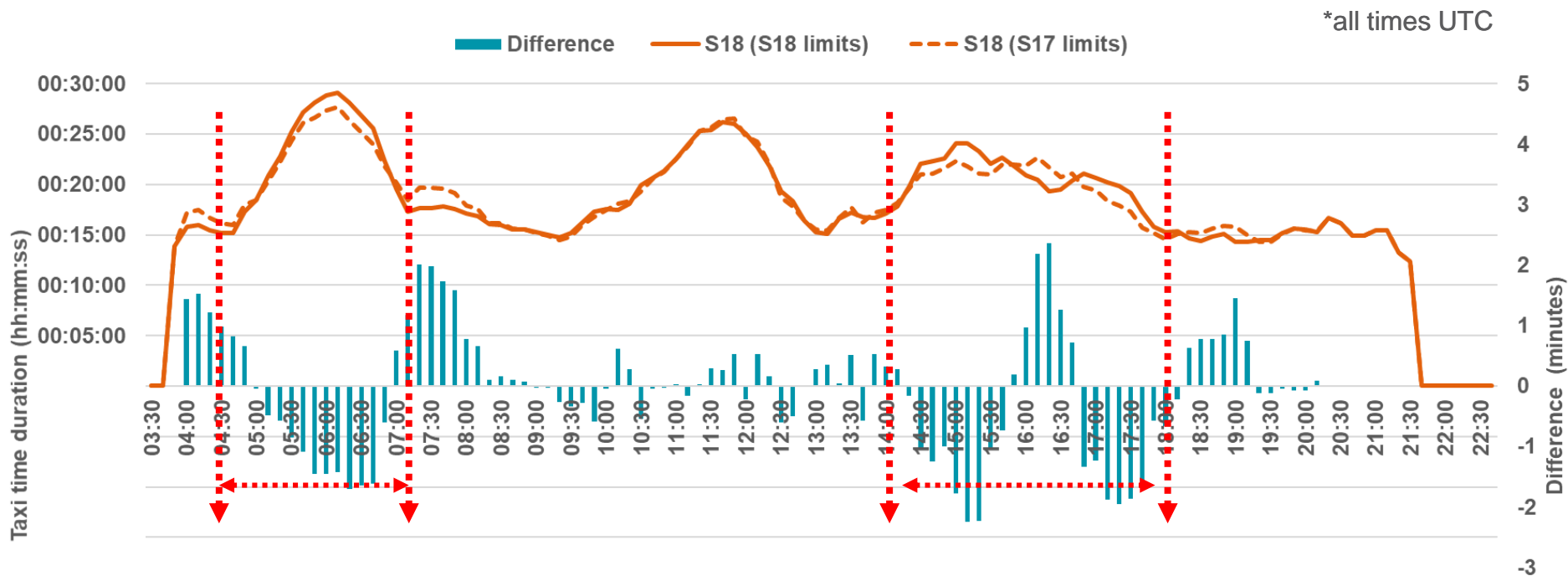


# Runway 10

## Departure taxi out time

	S18 limits	S17 limits	Difference
Daily average	00:15:13	00:14:55	00:00:18

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.



	S18 limits	S17 limits	Difference
Average	00:23:10	00:22:33	00:00:37
Peak	00:29:07	00:27:42	00:01:25

	S18 limits	S17 limits	Difference
Average	00:19:46	00:19:41	00:00:05
Peak	00:24:06	00:22:38	00:01:28

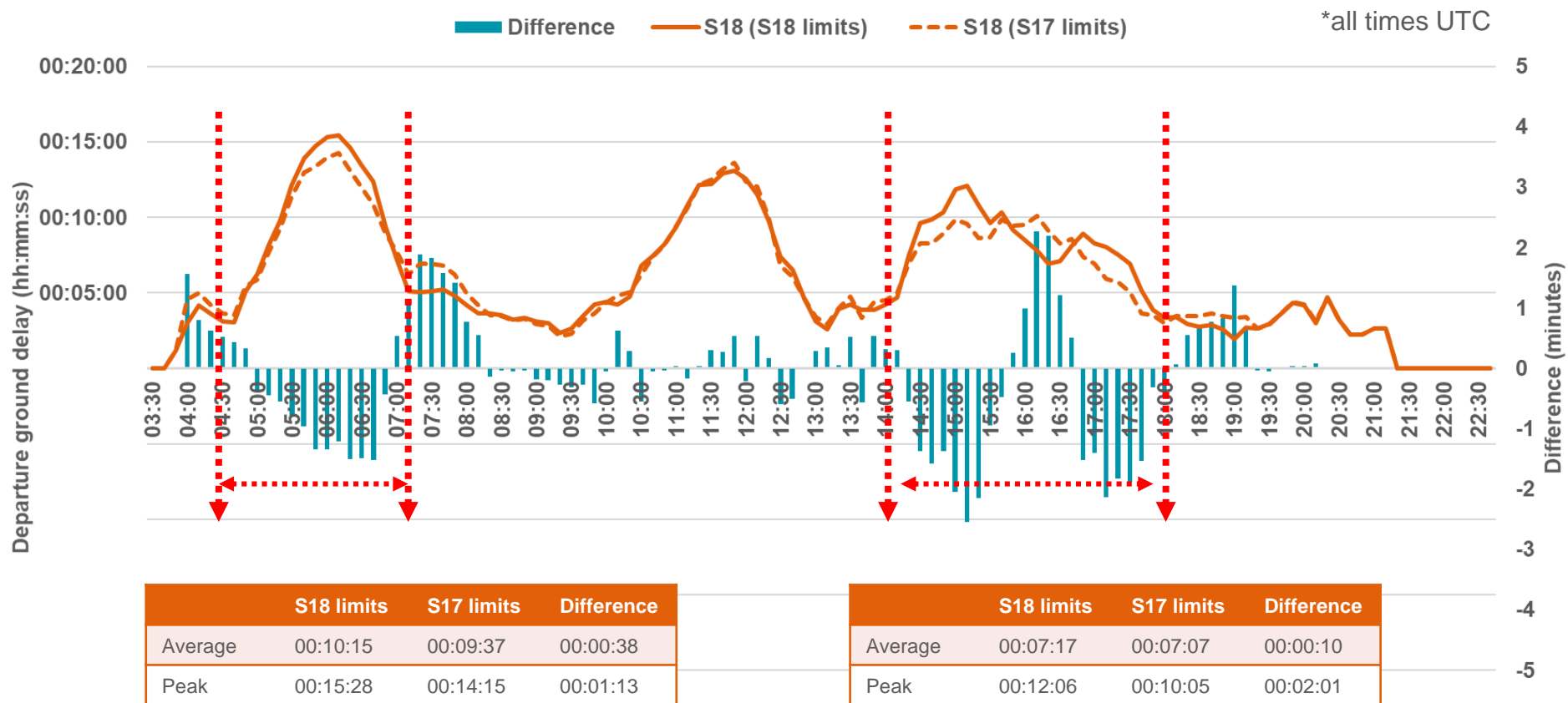


# Runway 10

## Departure ground delay

	S18 limits	S17 limits	Difference
Daily average	00:04:46	00:04:26	00:00:20

Definition: 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.

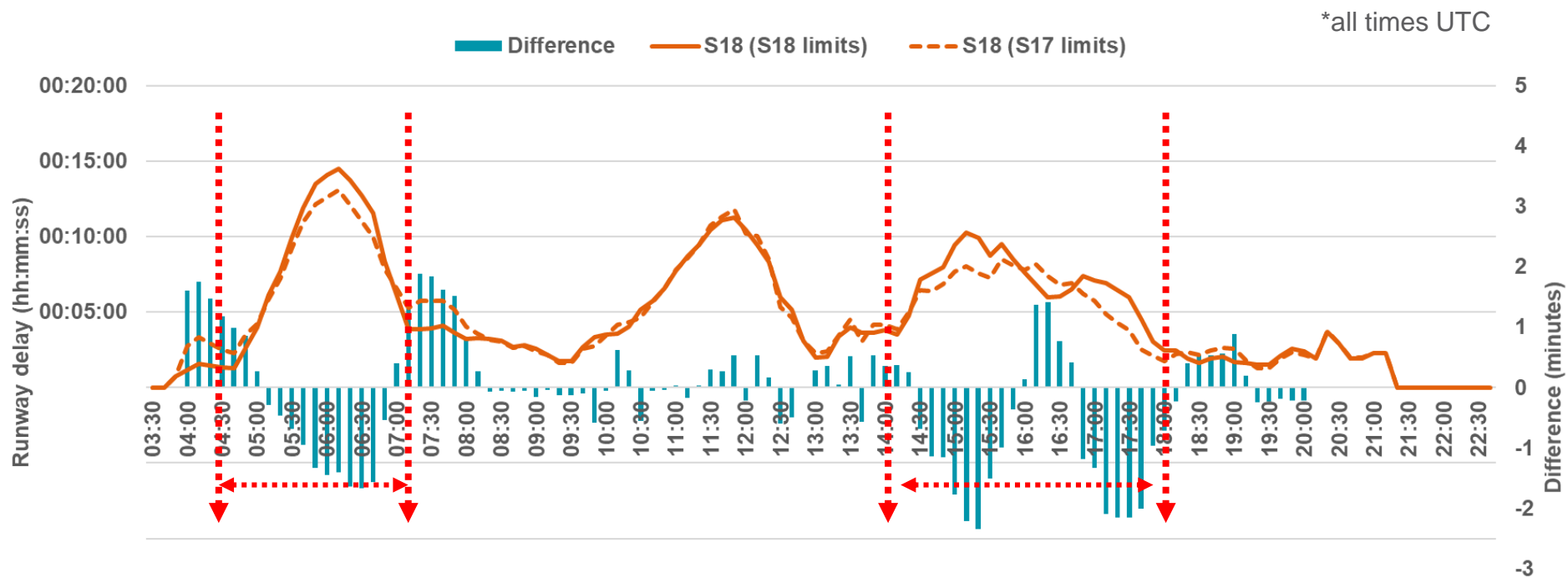


# Runway 10

## Runway holding delay

	S18 limits	S17 limits	Difference
Daily average	00:03:52	00:03:32	00:00:20

Definition: The delay experienced while the aircraft is queuing 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.



	S18 limits	S17 limits	Difference
Average	00:08:43	00:08:12	00:00:31
Peak	00:14:28	00:13:04	00:01:24

	S18 limits	S17 limits	Difference
Average	00:06:04	00:05:49	00:00:15
Peak	00:10:15	00:08:29	00:01:46

S18 forecast:  
Impact of adding 3 extra departures in 6 UTC

## Case description

The purpose of this comparison is to assess the likely effect of declaring increased runway capacity, as per Wishlist 3, or maintaining the Summer 2017 limits under the following assumptions:

- The Summer 2018 schedule of increased demand materialises as expected.
- There are three additional departures in the 0600 hour, such that this hour is now full of departures.

The same number of movements are modelled in both cases, the difference being the limits to which they are coordinated.

# S18 + 3 departures in 0600 UTC coordinated to S18 limits

<b>Arrivals</b>																									
Hour of Day (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
2017 Design day arrivals	3	2	0	2	11	3	9	20	22	18	20	24	18	19	17	19	22	19	14	17	14	19	24	12	348
S18 forecast arrivals	0	0	0	0	1	0	1	0	2	2	1	0	1	1	0	2	1	1	0	0	1	0	3	2	19
S17 design day + S18 forecast	3	2	0	2	12	3	10	20	24	20	21	24	19	20	17	21	23	20	14	17	15	19	27	14	367
Missing to reach the S17 declared capacity	20	21	23	21	11	20	10	5	-2	3	6	3	4	7	6	5	2	3	9	6	10	11	-1	9	212
Missing to reach the S18 wishlist capacity	20	21	23	21	11	20	10	5	0	4	6	3	4	7	6	5	2	3	9	6	10	11	0	9	215
<b>Departures</b>																									
Hour of Day (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
2017 Design day departures	1	0	1	0	12	35	27	19	18	19	22	21	22	13	23	23	23	23	21	14	5	3	0	0	345
S18 forecast departures	0	0	0	0	2	1	4	0	1	1	1	2	0	2	2	1	1	1	1	0	0	1	0	0	21
S17 design day + S18 forecast	1	0	1	0	14	36	31	19	19	20	23	23	22	15	25	24	24	24	22	14	5	4	0	0	366
Missing to reach the S17 declared capacity	24	25	24	25	11	-1	-1	6	10	4	4	5	4	9	1	0	4	3	2	8	17	21	25	25	255
Missing to reach the S18 wishlist capacity	24	25	24	25	11	0	0	6	6	4	4	5	5	9	1	1	5	3	2	8	17	21	25	25	256
<b>Totals</b>																									
Hour of Day (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
2017 Design day movements	4	2	1	2	23	38	36	39	40	37	42	45	40	32	40	42	45	42	35	31	19	22	24	12	693
S18 forecast movements	0	0	0	0	3	1	5	0	3	3	2	2	1	3	2	3	2	2	1	0	1	1	3	2	40
S17 design day + S18 forecast	4	2	1	2	26	39	41	39	43	40	44	47	41	35	42	45	47	44	36	31	20	23	27	14	733
Missing to reach the S17 declared capacity	28	30	31	30	6	1	1	3	-1	1	1	-1	5	11	2	0	1	-2	1	7	18	13	5	18	209
Missing to reach the S18 wishlist capacity	28	30	31	30	6	2	1	3	0	3	1	0	5	11	2	1	1	0	1	7	18	13	6	18	217

Additions to S18 forecast schedule:

Count	Direction	Added to
3	DEP	0600 UTC

# S18 + 3 departures in 0600 UTC coordinated to S17 limits

<b>Arrivals</b>																									
Hour of Day (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
2017 Design day arrivals	3	2	0	2	11	3	9	20	22	18	20	24	18	19	17	19	22	19	14	17	14	19	24	12	348
S18 forecast arrivals	0	0	0	0	1	0	1	2	0	2	1	0	1	1	0	2	1	0	1	0	1	1	2	2	19
S17 design day + S18 forecast	3	2	0	2	12	3	10	22	22	20	21	24	19	20	17	21	23	19	15	17	15	20	26	14	367
Missing to reach the S17 declared capacity	20	21	23	21	11	20	10	3	0	3	6	3	4	7	6	5	2	4	8	6	10	10	0	9	212
Missing to reach the S18 wishlist capacity	20	21	23	21	11	20	10	3	2	4	6	3	4	7	6	5	2	4	8	6	10	10	1	9	215

<b>Departures</b>																									
Hour of Day (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
2017 Design day departures	1	0	1	0	12	35	27	19	18	19	22	21	22	13	23	23	23	23	21	14	5	3	0	0	345
S18 forecast departures	0	0	0	0	3	0	3	1	1	1	1	1	1	2	2	1	2	0	1	0	0	1	0	0	21
S17 design day + S18 forecast	1	0	1	0	15	35	30	20	19	20	23	22	23	15	25	24	25	23	22	14	5	4	0	0	366
Missing to reach the S17 declared capacity	24	25	24	25	10	0	0	5	10	4	4	6	3	9	1	0	3	4	2	8	17	21	25	25	255
Missing to reach the S18 wishlist capacity	24	25	24	25	10	1	1	5	6	4	4	6	4	9	1	1	4	4	2	8	17	21	25	25	256

<b>Totals</b>																									
Hour of Day (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
2017 Design day movements	4	2	1	2	23	38	36	39	40	37	42	45	40	32	40	42	45	42	35	31	19	22	24	12	693
S18 forecast movements	0	0	0	0	4	0	4	3	1	3	2	1	2	3	2	3	3	0	2	0	1	2	2	2	40
S17 design day + S18 forecast	4	2	1	2	27	38	40	42	41	40	44	46	42	35	42	45	48	42	37	31	20	24	26	14	733
Missing to reach the S17 declared capacity	28	30	31	30	5	2	2	0	1	1	1	0	4	11	2	0	0	0	0	7	18	12	6	18	209
Missing to reach the S18 wishlist capacity	28	30	31	30	5	3	2	0	2	3	1	1	4	11	2	1	0	2	0	7	18	12	7	18	217

Additions to S18 forecast schedule:

Count	Direction	Added to
2	DEP	0600 UTC
1	DEP	0700 UTC

Changes to S18 forecast schedule:

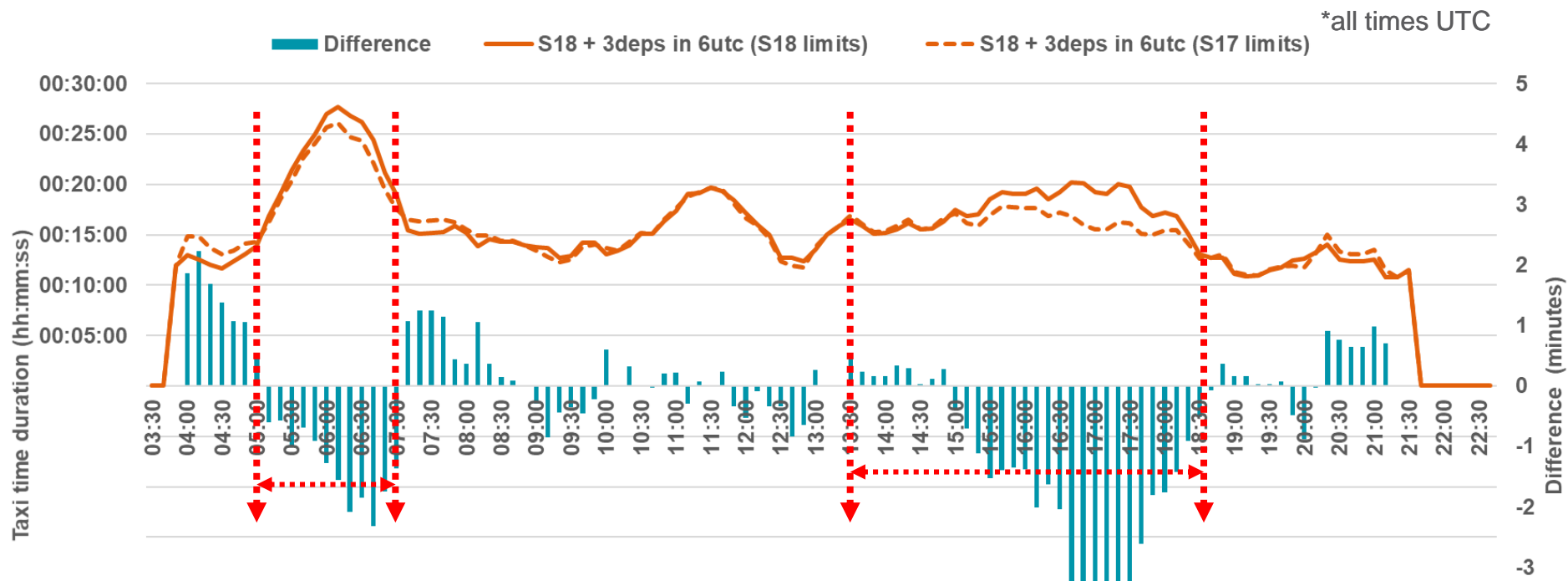
Count	Direction	Moved from	Moved to
1	DEP	0500 UTC	0400 UTC
2	ARR	0800 UTC	0700 UTC
1	DEP	1100 UTC	1200 UTC
1	DEP	1700 UTC	1600 UTC
1	ARR	1700 UTC	1800 UTC
1	ARR	2200 UTC	2100 UTC

# Runway 28

## Departure taxi out time

	S18 limits	S17 limits	Difference
Daily average	00:12:44	00:12:37	00:00:07

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.



	S18 limits	S17 limits	Difference
Average	00:22:44	00:21:34	00:01:10
Peak	00:27:39	00:26:06	00:01:33

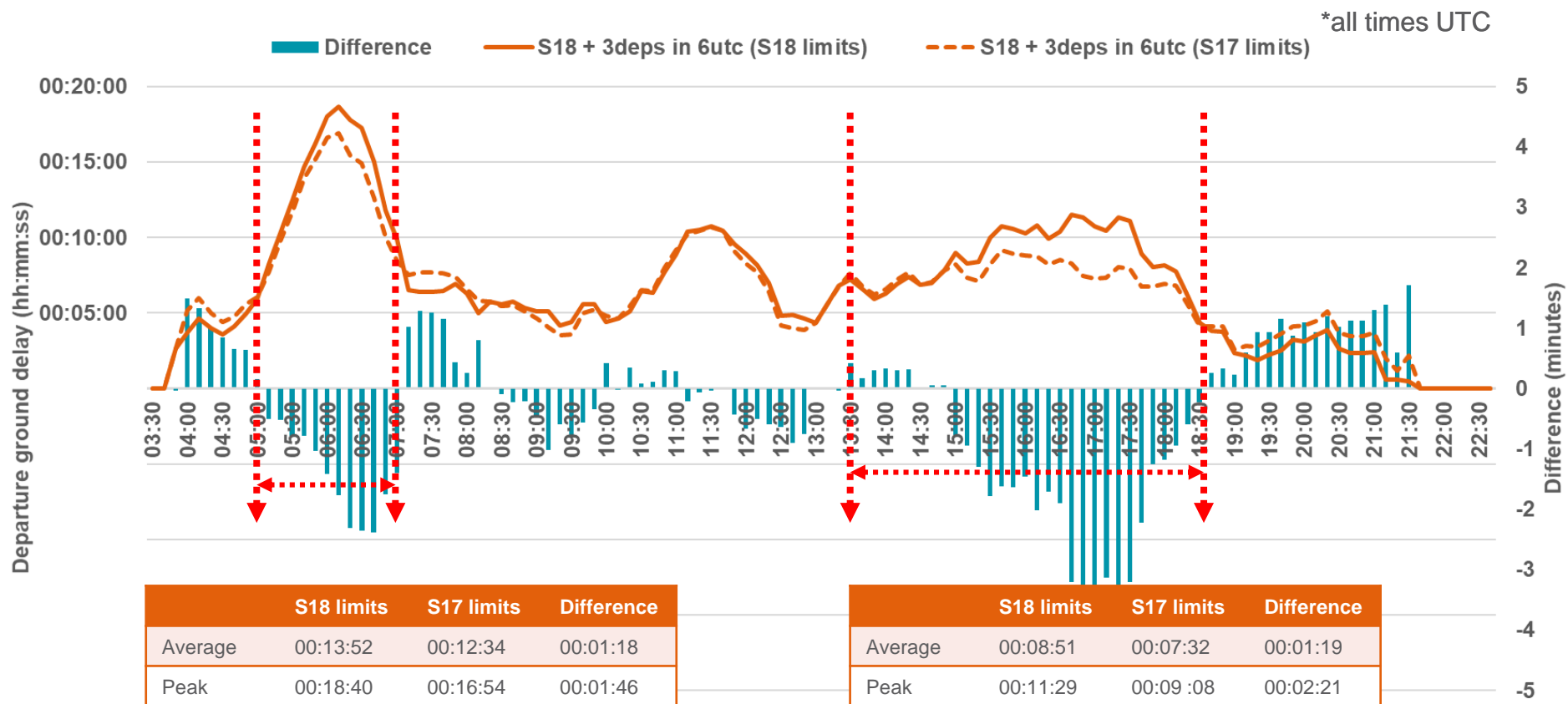
	S18 limits	S17 limits	Difference
Average	00:17:38	00:16:13	00:01:25
Peak	00:20:14	00:17:50	00:02:24

# Runway 28

## Departure ground delay

	S18 limits	S17 limits	Difference
Daily average	00:05:23	00:05:09	00:00:14

Definition: 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.



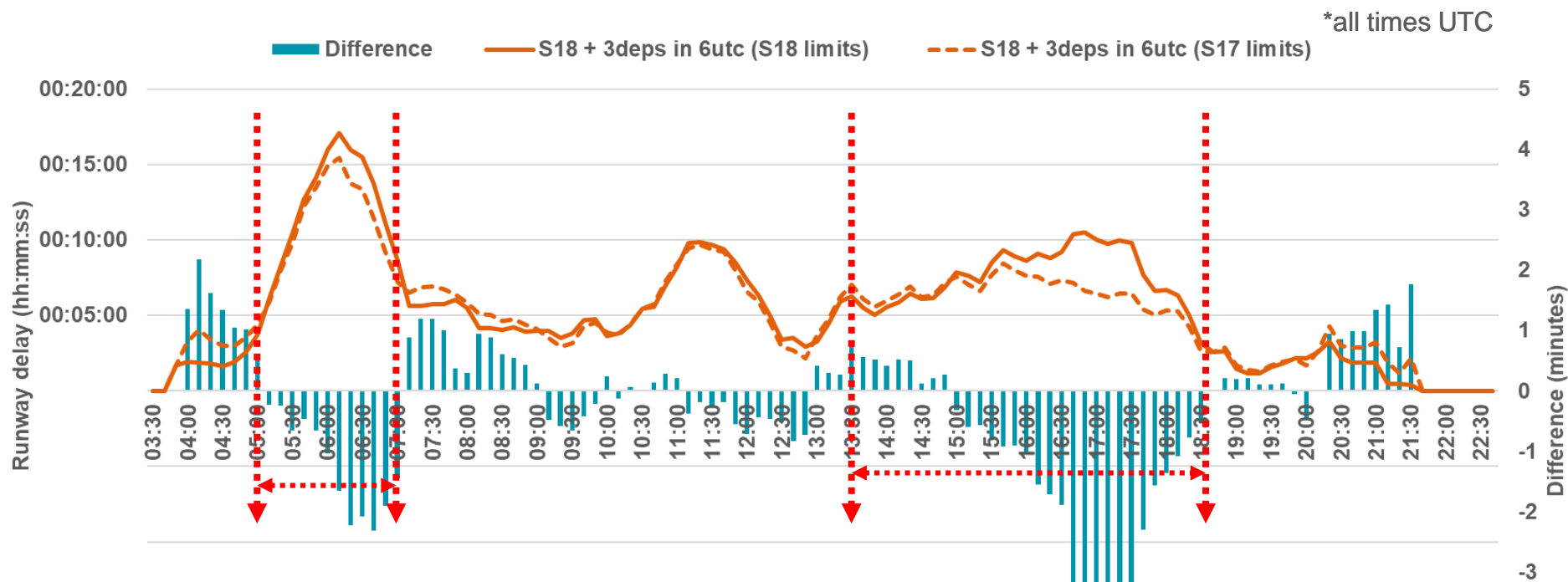


# Runway 28

## Runway holding delay

	S18 limits	S17 limits	Difference
Daily average	00:04:28	00:04:24	00:00:04

Definition: The delay experienced while the aircraft is queuing 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.



	S18 limits	S17 limits	Difference
Average	00:12:03	00:10:58	00:01:05
Peak	00:17:04	00:15:25	00:01:39

	S18 limits	S17 limits	Difference
Average	00:07:43	00:06:34	00:01:09
Peak	00:10:30	00:08:25	00:02:05

# Summary

# Findings

Coordinating S18 forecast flights to S17 capacity declaration is likely to lead to:

- Redistribution of delays from the peak morning wave to previous and following hour.
- Redistribution of flights from the afternoon peak is likely to cause shorter average delays during this peak

It should be noted that besides 11 UTC another four subsequent hours will be scheduled up to the capacity limits (15 to 18 UTC).

**Totals**

Hour of Day (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
2017 Design day movements	4	2	1	2	23	38	36	39	40	37	42	45	40	32	40	42	45	42	35	31	19	22	24	12	693
S18 forecast movements	0	0	0	0	4	0	2	2	1	3	2	1	2	3	2	3	3	0	2	0	1	2	2	2	37
S17 design day + S18 forecast	4	2	1	2	27	38	38	41	41	40	44	46	42	35	42	45	48	42	37	31	20	24	26	14	730
Missing to reach the S17 declared capacity	28	30	31	30	5	2	4	1	1	1	1	0	4	11	2	0	0	0	0	7	18	12	6	18	212
Missing to reach the S18 wishlist capacity	28	30	31	30	5	3	4	1	2	3	1	1	4	11	2	1	0	2	0	7	18	12	7	18	220

# Findings

Using up all departure capacity in 5 and 6 UTC as per S17 capacity declaration:

- Is likely to increase delays during the first morning wave
- Bears additional risk of increased delays if any irregularity occurs during the peak period