Heathrow Aircraft De-icing Plan (HADIP)

Winter Season 2020/21

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This version authored by:

Name: Andy Knight

Role: Aircraft Operations Manager

Reviewed by:

Name: Dale Reeson

Role: Head of Airport Operations

Authorised for issue by:

Name: Kathryn Leahy

Role: Director of Operations

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List of Abbreviations & Glossary

Acronym	Definition
A-CDM	Airport Collaborative Decision Making
ACL	Airline Coordination Limited
ACZT	Actual Commencement of De-icing Time
ADIT	Actual De-icing Duration Time
AEZT	Actual End of De-icing Time
AfCR	Airfield Control Room
AfDM	Airfield Duty Manager
AFR	Arrivals Flow Rate
AGLCS	Aerodrome Ground Lighting Control System
AIRT	Airside Incident Response Team

ANAT	Airspace, Noise and ATM Team
AO	Aircraft Operator
AOC	Airline Operators' Committee
AOM	Airfield Operations Manager
AOM	Airport Operations Manager
AODM	Aircraft Operations Duty Manager
AOP	Airport Operations Plan
AOU	Aircraft Operations Unit
APOC	Airport Operations Centre
ARZT	Actual Request for De-icing Time
ASD	Airside Safety Department
ATC	Air Traffic Control
ATCO	Air Traffic Control Officer
ATFCM	Air Traffic Flow Control Management
ATM	Air Traffic Management
ATT	Airside Tactical Team
BA	British Airways
BAU	Business as Usual
CPSRA	Critical Part of the Security Restricted Area
CRS	Customer Relations & Service
CTOT	Calculated Take Off Time
DCB	Demand & Capacity Balancing Tool
DCM	De-icing Coordination Manager
DfT	United Kingdom Department for Transport
DMO	Dynamic Modelling of Operations
DPI	Departure Planning Information (Message)
DSP	De-icing Service Provider
ECMT	Executive Crisis Management Team
ECZT	Estimated Commencement of De-icing Time
EDIT	Estimated De-icing Duration Time
EEZT	Estimated End of De-icing Time
EMB	Electronic Message Board
ERZT	Estimated Request for De-icing Time
ETFMS	Enhanced Tactical Flow Management System
FCO	United Kingdom Foreign and Commonwealth Office
GH	Ground Handler
GRV	Glycol Recovery Vehicle
H24	24 hours per day
HADACAB	Heathrow Airport Demand and Capacity Balancing Group
HADIP	Heathrow Aircraft De-icing Plan
HAL	Heathrow Airport Limited
HOCC	Heathrow Operational Conference Call
HOEC	NATS Heathrow Operational Efficiency Cell
HOT	De-icing Hold Over Time

HSPA	Heathrow Snow Plan Airside
HSRF	Heathrow Snow Response Forecast
HTC	NATS Heathrow Traffic Coordinator
IATA	International Air Transport Association
IRT	HAL Incident Response Team
IT	Information Technology
ITOC	Information Technology Operations Control
MET	Weather data (meteorology)
NATS	NATS Holdings
NMOC	EUROCONTROL Network Manager Operations Centre (Brussels)
NOP	Network Operations Plan
OC	AOU Operations Controller
OCC	(British Airways) Operations Control Centre
OLT	HAL Operational Leadership Team
PDR	APOC Plan, Do, Review Conference Call
PSC	Performance Status Check
RAG	Red, Amber, Green
SMS	Short Message Service (text message)
SOM	Senior Operational Meteorologist
TC	NATS London Terminal Control Centre, Swanwick
TC	(Snow Clearance) Terminal Coordinator
TOBT	Target Off Block Time
Tower HMI	Tower Human Machine Interface
TRM	Turn-round Manager (Flight Dispatcher)
TSAT	Target Start Up Approval Time
VCR Supervisor	Visual Control Room (Tower) Supervisor

1. Introduction, Scope & Objectives of the Plan

The Heathrow Aircraft De-icing Plan (HADIP) is intended to provide all interested parties with an overview of the airport's approach to aircraft de-icing operations, endorsed by the Director of Operations for Heathrow Airport Limited (HAL).

The plan is intended to minimise and mitigate the disruptive effects of frost, ice, snow or any adverse winter weather event on the normal operation of aircraft by facilitating a consistent and coordinated response, assisting the continual safe operation of the airfield even when conditions result in reduced capacity.

In this document any reference to de-icing includes both the anti-icing and de-icing of aircraft. Airfield de-icing, i.e. the treatment of airfield surfaces such as runways, taxiways and aprons, is not within the scope of the HADIP. If wintry precipitation leads to the requirement for airfield infrastructure to be anti-iced, de-iced or cleared of snow, the Heathrow Snow Plan Airside (HSPA) is activated and dedicated resources are deployed to perform these functions. The HSPA should be read in conjunction with the HADIP.

An important part of the plan for low temperature events leading to icing conditions is how airlines, De-icing Service Providers (DSPs), NATS and Heathrow maintain satisfactory aircraft flow rates when conditions require aircraft to be de-iced. When demand for de-icing services becomes high across the airfield, it can quickly become challenging to achieve the scheduled runway throughput. The dynamic nature of de-icing service provision means aircraft are at risk of repeatedly missing scheduled runway slots. Departure runway demand can therefore reduce in a short period of time following the onset of snow or low temperatures, even when runway capacity exists.

The HADIP aims to optimise the deployment of resources taking into consideration the operational impact and expected level of response by HAL to aircraft icing conditions including equipment, people, materials and infrastructure. This document also provides a description of the activities undertaken by DSPs at Heathrow to effectively deliver de-icing services to their airline customers and the communication required to support this activity.

The deployment of de-icing operations resulting in the smooth delivery of aircraft in the correct sequence to the departure runway can only be achieved through close communication with the key relevant stakeholders who need to operate using accurate and timely information, allowing Heathrow to maintain a clear assessment of its ability to complete the published flying schedule.

Heathrow provides remote de-icing pad facilities on the airfield for selected, licenced DSPs to operate in the delivery of off-stand aircraft de-icing. The operation of these pads and the procedure for their activation and use is explained in this document.

The HADIP is reviewed annually and this version is effective for the period 26 October 2020 to 27 March 2021 (IATA Northern Winter Season 2020). It is issued in consultation with NATS, Aircraft Operators, Ground Handlers and De-icing Service Providers.

Any enquiries concerning the Winter 2020/21 HADIP should be addressed to Andy Knight, Aircraft Operations Manager on 020 8757 5229 or at andy.knight@heathrow.com

2. Aircraft De-icing at Heathrow – The Basics

Airport Collaborative Decision Making (A-CDM) is a pan-European concept which aims to improve the efficiency and resilience of airport operations by optimising the use of resources and improving the predictability of air traffic. Airport stakeholder partners (airport operators, aircraft operators, ground handlers and ATC) and the EUROCONTROL Network Manager work transparently and collaboratively, exchanging relevant accurate and timely data. There is a focus on aircraft turn-round and pre-departure processes at airports.

It allows the exchange of more accurate departure information, particularly target take-off times, with the European ATFCM network, leading to better en-route and sectoral planning.

A-CDM is fully implemented at 29 airports across Europe, including Heathrow. The concept measures flight trajectory performance, including the ground phase of the flight, through 16 primary data milestones that are shown in Figure 1 below.

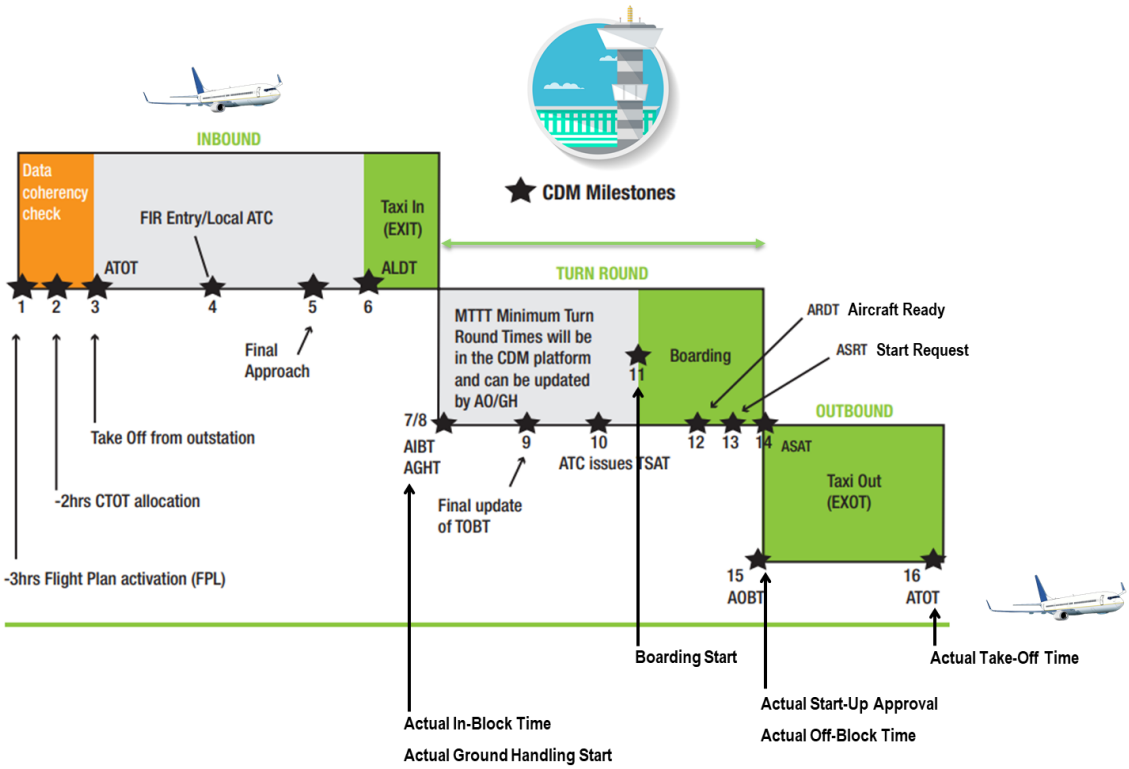


Figure 1: A-CDM Milestones

Within the context of activities at airports and aircraft de-icing, the primary concern is with the turn-round phase which starts when the aircraft arrives in blocks at its parking stand (Actual In-Block Time) and ends with the flight pushing back for departure (AOBT, Actual Off-Block Time). After this the aircraft is still on the ground at the airport but is now taxiing for departure until it becomes airborne (ATOT, Actual Take-off Time).

Timestamps are recorded when these milestones 'actually' happen (AIBT, AOBT, ATOT), but before they happen all airport stakeholders work to a plan that indicates when they are expecting things to happen. Other stakeholders who are involved in the turn-round process can use this information to plan their own

(and sometimes separate) activities. There are three primary target milestones readers of this document should familiarise themselves with, as shown in Figure 2 below.

Figure 2: Turn-round Target Milestones

De-icing activities must be accommodated during the turn-round phase and sequenced according to these milestones, to ensure a smooth departure sequence to optimise runway throughput and therefore best use of capacity.

- **TOBT** is the time at which the aircraft operator or ground handler is expecting the aircraft doors to be closed, tug attached and ready to push back. When de-icing is in progress, this is the time at which de-icing activity may commence;
- **TSAT** is the time at which ATC is expecting to give a start clearance to flight crew, to release aircraft from the stand and taxi to the departure runway. When de-icing is in progress, TSAT reflects the time at which de-icing is expected to finish; and
- **TTOT** is the time at which ATC expects the flight to become airborne. If there is any en route delay then this is passed on to the flight as a restriction on the time at which the flight is permitted to take off, known as a CTOT (Calculated Take-Off Time).

2.1. On-Stand De-icing

At Heathrow, most de-icing activity takes place while the aircraft is still parked on the stand, before pushing back for departure. Other milestones are timestamped around de-icing and are aligned with these planning targets. For example, the estimated commencement of de-icing time should align with TOBT (ECZT).

The most important is the time at which the de-icing service provider (DSP) expects to finish de-icing (EEZT). It is important because TSAT is adjusted to accommodate this activity and build the pre-departure sequence

accordingly. Therefore, DSPs should provide accurate data on their activities through AOP and update dynamically when changes occur. This is shown in Figure 3 below.

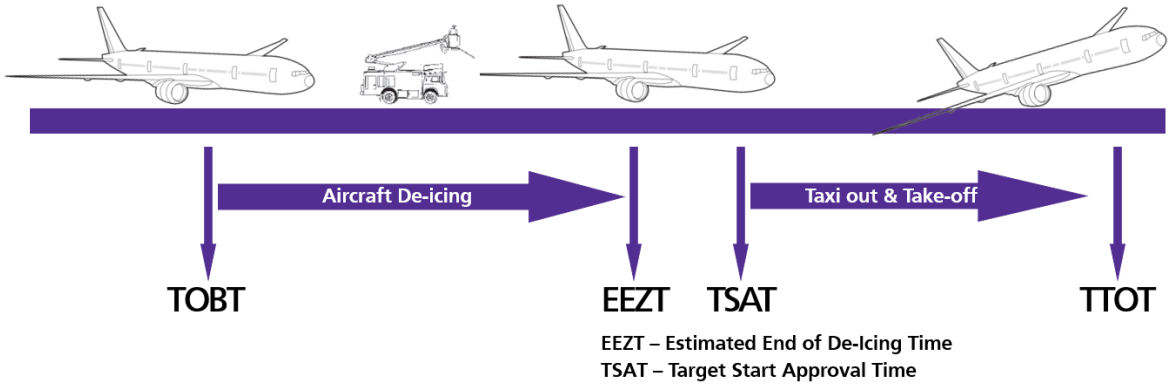


Figure 3: On-Stand De-icing Activity & Pre-Departure Sequence

Flight crews should call Heathrow Delivery at TOBT as per the normal AOP process to confirm ready to de-ice. Note that de-icing may not start immediately. TSAT will be driven by the required de-icing time, as advised by the De-icing Service Provider (DSP). Call Heathrow Delivery on completion of de-icing to request start and push approval. If de-icing cannot be completed by TSAT, call ATC to advise.

Departing flights are normally planned to align with the Target Start-Up Approval Time (TSAT) to generate a smooth and stable departure sequence. During aircraft de-icing operations TSAT is aligned with and driven by the Estimated End of De-icing Time (EEZT), which is promulgated and updated in AOP by the DSP. This allows airspace, airfield and weather conditions to be considered when planning timings, sequence and numbers of aircraft to be de-iced.

Therefore, it is critical that the EEZT value is always kept as accurate and as up to date as possible to avoid poor pre-departure sequencing, which in turn leads to increased start up delay and subsequent Hold Over Time (HOT) risks.

Figure 3 shows de-icing in optimal conditions when there is no ground delay. However, delays to the expected start approval time (i.e. TSAT delay) can be present for several reasons that may or may not be due to de-icing itself, depending on the demand for the service and the DSP's ability to cater for it. Provided the DSP can satisfy its customers in a timely manner, TSAT delay can still be driven by other unrelated causes such as airfield congestion, inefficient use of stand capacity and high demand on certain departure routes.

In these cases, the TSAT generator uses EEZT to generate the sequence, but it will also take more penalising constraints into account such as those mentioned above which can subsequently create further delay – TSAT will 'move to the right' accordingly. Compare Figure 3 with Figure 4 below – it shows that when further ground delay exists, TSAT can be expected at a time later than when de-icing was originally due to finish.

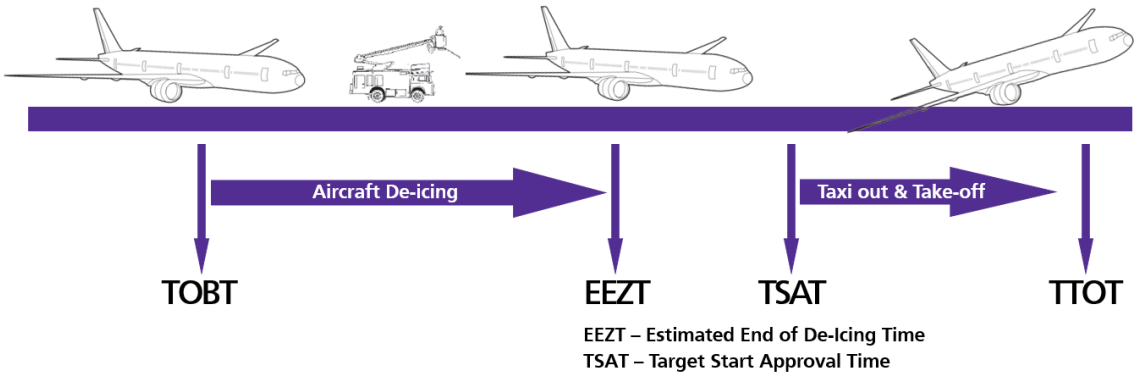


Figure 4: On-Stand De-icing Activity with TSAT Delay

Figure 5 below shows the correct response. No updates are required to TOBT (ready to de-ice) or especially EEZT (estimated completed de-icing) as this will drive further TSAT delay. The TSAT generator sees EEZT moving right and it will itself move further right in response (due to the TSAT algorithm). This creates a feedback loop where no aircraft ever departs the stand. Instead, the DSP should plan to delay the actual commencement of de-icing (ACZT) so that the actual end of de-icing (AEZT) will coincide with the new TSAT.

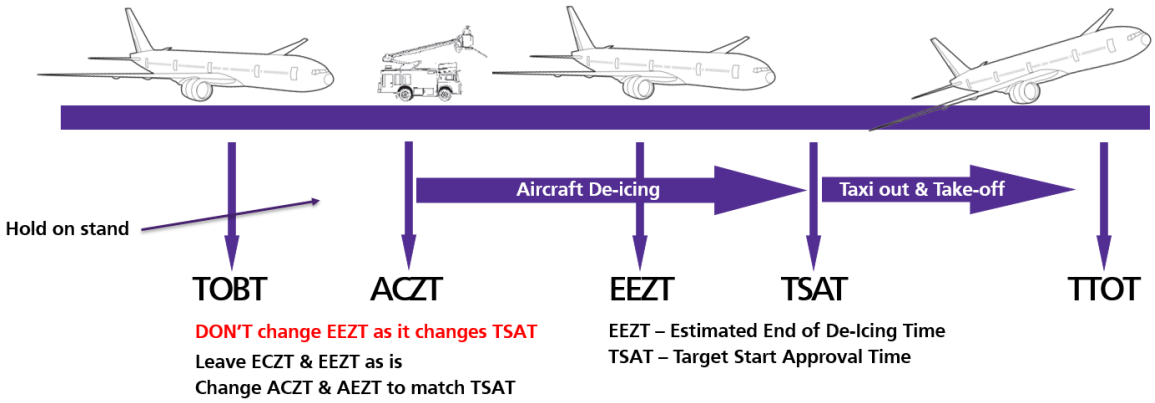


Figure 5: On-Stand De-icing Response to Ground Delay

There is more than one source of delay. TSAT delay refers to those delays suffered on the ground at Heathrow or in the immediate airspace for departing aircraft. Another type of delay affecting Heathrow is inherited from the wider European air traffic management network, which results in an en route airspace restriction or congestion at the destination airport. In this case the air navigation service providers (ATC) who are involved in the flight's trajectory will coordinate these restrictions to balance capacity and pass a departure time back to Heathrow that must be observed.

This is known as a Calculated Take-Off Time (CTOT). When a CTOT is calculated to resolve an airspace capacity restriction, it means the affected flight must become airborne within 15 minutes (minus 5, plus 10) of the calculated time. When CTOTs are applied to departing flights at Heathrow, the TSAT generator will now take this into account and generate a start-up sequence that aims to deliver an airborne time within that window, see Figure 6 below.

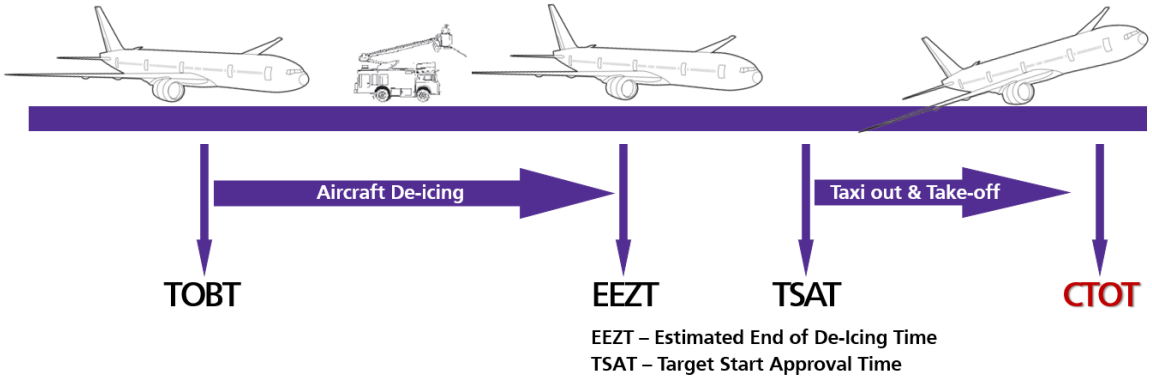


Figure 6: On-Stand De-icing Activity with Network Delay

In this case it is acceptable to adjust estimated start and finish times for de-icing, as the TSAT generator will respect the CTOT as the most penalising constraint and aim to release the flight from the stand at the correct time for the CTOT window. It is worth noting that during winter weather with mass de-icing in effect across the airfield, if CTOTs are numerous then this suggests widespread disruption across Europe – which may or may not be related to degraded weather conditions. Either way, it is possible for airlines to see lengthy CTOT ('slot') delays exceeding one or two hours.

To manage the airfield situation and achieve as orderly a flow as possible under these conditions, NATS prefers a good buffer of approximately 60 minutes between the end of de-icing and the CTOT to manage congestion more effectively. DSPs should therefore be aware of the possible knock-on impact to Hold Over Times (HOT) and look to complete de-icing activities as close to TSAT as possible.

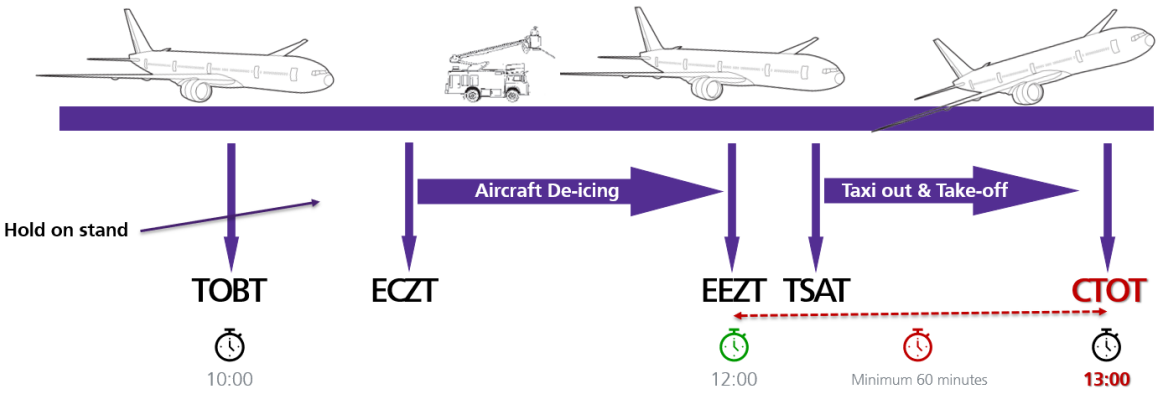


Figure 7: On-Stand De-icing Response to Network Delay

In the example given above in Figure 7, the flight originally had a TOBT (ready to de-ice) at 10:00 but is now faced with a three-hour slot delay (i.e. the CTOT is set at 13:00 by air traffic control). TSAT is now locked to the CTOT to ensure the flight leaves the stand at the correct time to taxi to the runway and depart.

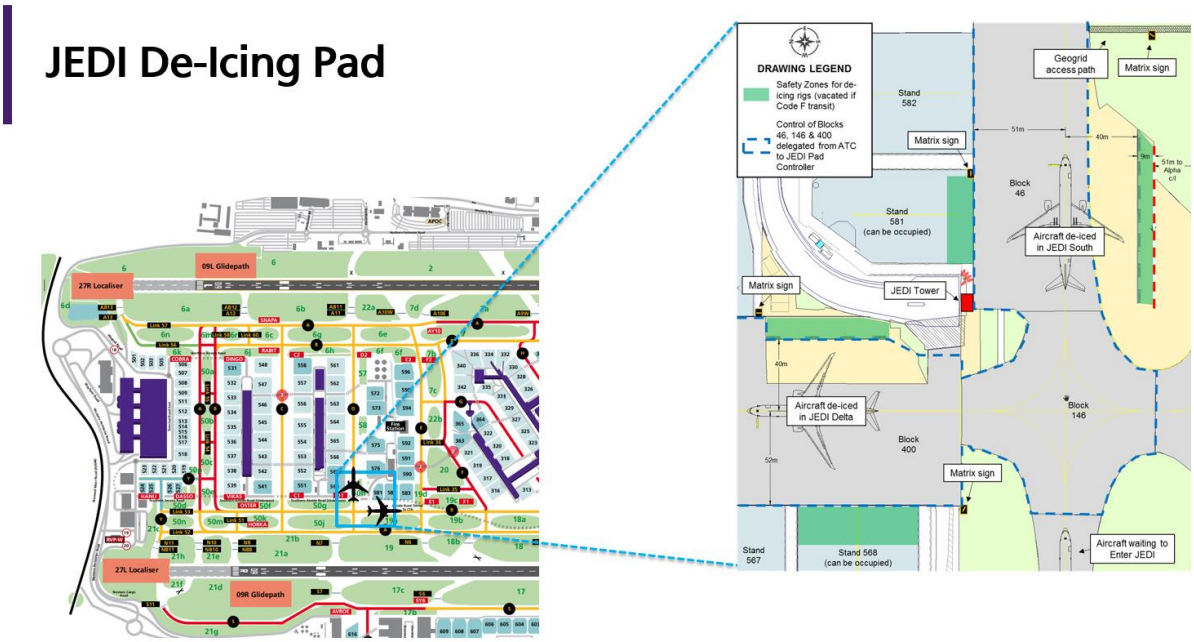
Therefore, EEZT could go forward by two hours and not affect the CTOT as TSAT is locked, avoiding the earlier example for ground (TSAT) delay described in Figure 5. However, de-icing should still be completed

within 60 minutes of the CTOT to ensure the slot window of –5 to +10 minutes can be respected and the aircraft becomes airborne at the correct time to avoid the en route restrictions.

2.2. Off-Stand De-icing

While most de-icing activity stakes place on the parking stand, Heathrow has two sets of remote de-icing pads on the airfield that allow aircraft to instead undertake de-icing while taxiing to the runway. The main benefit to remote de-icing is to free up stand capacity for arriving flights, rather than keeping aircraft on-stand for longer while they de-ice. It also alleviates Hold Over Time issues to reduce the chance that the aircraft will need to return to stand to de-ice a second time, when extensive delays exist.

The de-icing pads to the west of the airfield are named 'JEDI', with a second set to the east named 'VADER'. More detailed information on the pads is provided in Section 3.8, however the locations of the pads are shown in Figure 8 below.



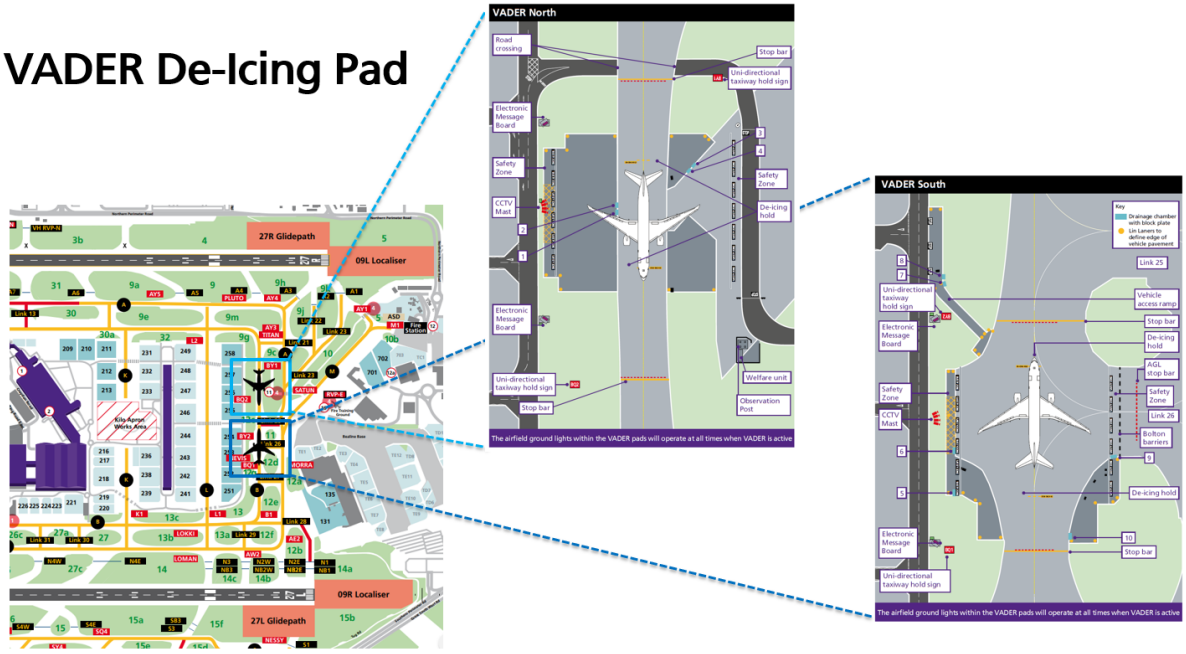


Figure 8: Remote De-icing Pad Locations

In terms of their operation, de-icing activity on the remote pads must also be coordinated within the A-CDM pre-departure sequence, although the procedure is different compared to on-stand de-icing.

TSAT is normally issued automatically at 30 minutes prior to TOBT. Once the de-icing location is set to 'PAD' in AOP by the De-icing Service Provider, no TSAT is displayed. That is, it disappears from AOP once the flight is allocated to the pad. The flight crew calls for start at TOBT and ATC releases the flight from the stand to taxi to the pad. The order in which aircraft are released from stand and sent to the pad is coordinated directly between the Pad Operator (known as the 'ICEMAN') who is physically located in the 'Ice Tower' and the VCR Supervisor in the control tower. The DSP sets the ECZT and EEZT values at the respective times it expects the aircraft to enter and exit the pad (with engines running). Upon completion of de-icing the aircraft proceeds to the runway for departure, see Figure 9 below.

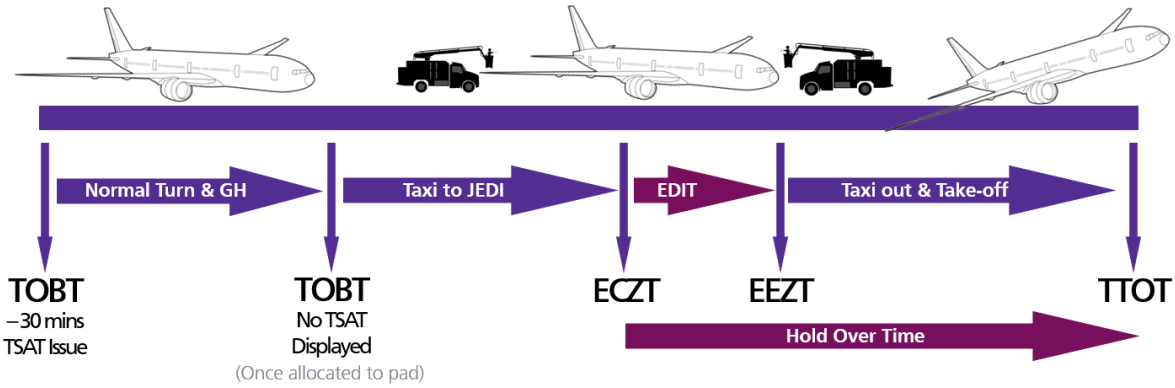


Figure 9: Off-Stand De-icing Activity & Pre-Departure Sequence

Figure 9 considers operation of the remote pad in optimal conditions when no delay is experienced. However, when delay exists, the situation becomes more complicated and coordination of affected flights through the pad can be difficult. In the case of TSAT delay there is no difficulty, because once the flight is allocated to the pad the TSAT is deleted anyway and coordination takes place directly between ICEMAN and ATC. Figure 10 below considers what happens when a flight is instead impacted by a CTOT.

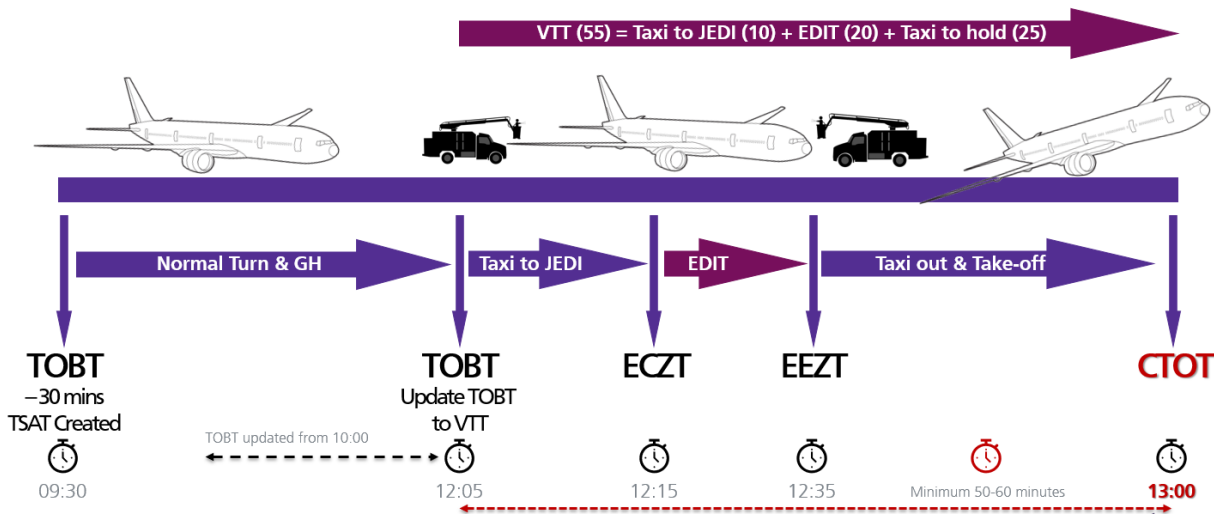


Figure 10: On-Stand De-icing Response to Network Delay

This is the same example as given above in Figure 7. The flight originally had a TOBT of 10:00 but now faces a three-hour slot delay due to network restrictions (CTOT is set at 13:00). Before being assigned to the pad, the TSAT will be generated at 30 minutes prior to TOBT (i.e. at 09:30), but this will disappear once the pad is selected in AOP.

All relevant milestones must now be worked out backwards from the CTOT. As with on-stand de-icing when CTOTs apply, NATS prefers a buffer of approximately 50-60 minutes between pushing back from stand and the required take-off time, but an absolute minimum of 40 minutes for off-stand de-icing. This is to manage airfield congestion.

The DSP must consider how long it will take to taxi from the stand to the pad, de-ice on the pad (EDIT), then continue taxiing to the runway. This complete timespan is the Variable Taxi Time (VTT). Figure 10 shows this as 10 minutes to taxi to JEDI, 20 minutes to de-ice on stand (EDIT), then 25 minutes to taxi to the runway holding point; so VTT = 55 minutes.

Therefore, the airline or Ground Handler (in coordination with the DSP) must change the TOBT from 10:00 to a new time of 12:05. This is because the Calculated Take-Off Time (CTOT) is 13:00 and the aircraft must take off within the tolerance window (minus 5, plus 10). If the complete taxi phase plus de-icing activity on the pad is 55 minutes, then it needs to leave the stand at 12:05. The TOBT now signals the time at which the aircraft has its doors closed, tug attached and is ready to push back.

2.3. AOP SNOW Module ON/OFF

During periods of light or sporadic de-icing across the airfield and the remote pads are not being used, it is not always necessary to switch on the AOP Snow Module to allow de-icing to continue. The provision of de-

icing services can be coordinated directly between the airline, Ground Handler and DSP as and when preferred between themselves. In this case, the Target Off-Block Time (TOBT) simply indicates de-icing activity has been completed and the aircraft is ready to push. However, when the SNOW Module is switched on, it means the aircraft is ready to be de-iced in accordance with the description given in the sections above.

AOP users can see when the SNOW Module is switched on by referring to the Airfield Status icon at the top of the Home screen, see Figure 11 below.

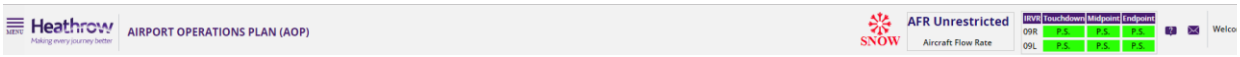


Figure 11: SNOW Module Icon in AOP

As some DSPs solely use AOP for managing their entire de-icing operation, including the allocation of requests and tracking of de-icing rigs, the SNOW Module may be switched on by arrangement directly with the Aircraft Operations Unit at any time of the day. The Aircraft Operations Duty Manager (AODM) will switch it on shortly after midnight in any case where the overnight air temperature is expected to fall to 3°C or below.

For TSAT to take EEZT into consideration, the 'Adverse Weather Module' in the control tower must be switched on at the same time as the SNOW Module in AOP. This can be requested by the AODM, but the DSP can also request it directly with the VCR Supervisor if the AODM is not available for any reason.

For more detailed information on the AOP SNOW Module and how de-icing activities are conducted with the module switched on or off, please refer to Section 3.7.

It is important to note that during de-icing and snow operations ON STAND, TOBT represents AIRCRAFT FULLY READY TO BE DE-ICED, as opposed to aircraft ready to push.

3. AIRCRAFT DE-ICING PLAN

3.1. Winter Weather Forecasts

Meteorological forecasts for the prediction of ice, snow and associated phenomena are provided by the UK Met Office, from a working position located in the APOC at the Heathrow Compass Centre. The Met Office desk is staffed H24 by a Senior Operational Meteorologist (SOM).

The SOM issues a variety of forecast products during the winter season which are described below. Some of these are issued throughout the year regardless of conditions. Each product has a bespoke distribution depending on its operational application. Some of these products are available to internal HAL stakeholders only.

- **HSRF** – the Heathrow Snow Response Forecast is issued whenever there is a 10% or greater risk of snow or sleet. It is issued 48 hours ahead, at 36, 24, 12 hours and then every 4 hours to onset. It may sometimes be reissued outside of these timeframes if there is a significant change in the forecast that may drive a change to HAL's operational response.
- **HSRF Closedown** – the closedown is issued when the risk of snow no longer exists and the actual amount of snowfall is recorded in this report alongside the original forecast for comparison. The distribution is the same as for the HSRF.
- **Temperature Curve** – this is issued daily during the winter season to aid de-icing decision making, i.e. when to de-ice or anti-ice and what level of response is likely to be needed. This is also used by airlines and DSPs to pre-order the correct levels of de-icing fluids, and by landside teams to make decisions on whether to grit road surfaces, pavements and footways.
- **HOCC Brief** – the SOM attends the 0900 HOCC and provides participating stakeholders with an up-to-date status of current conditions and those to be expected in the coming hours. The forecast pack used in the HOCC is issued once per day shortly prior to the HOCC itself. The pack includes a weather risk assessment matrix for the next 24 hours indicating any phenomena that may impact the operation, using a simple RAG status. These briefings take place every day of the year.
- **OpenRunway® 5-Day Forecast** – this forecast is generated daily and is usually produced by the night shift SOM, issued at or around 0400L. It is sent by email to a defined distribution list but it is also available via the Met Office's online OpenRunway® portal at any time. Access requires a username and login but HAL freely provides access to all airport stakeholders who require it; contact Andy Knight, Aircraft Operations Manager on 020 8757 5229 for details.
- **15-Day Forecast** – this is produced and sent to stakeholders at around 1100L when a risk exists in the five to fifteen-day timeframe for snow and low temperature. It consists of a simple risk matrix with a RAG status provided for both types of meteorological phenomena. It allows snow or ice events to be detected up to 15 days ahead to facilitate planning and decision making. The likelihood of the event occurring gains greater granularity and confidence as it moves into the OpenRunway® 5-Day forecast period.
- **Frost Warning** – a standard aerodrome warning is issued when there is the risk of frost on ground, surfaces or in the air.

3.2. Activation & Mobilisation

There are two levels of activation in response to predicted wintry conditions, in accordance with the scenarios described below in Section 7.1:

1. **Business as Usual** – ad hoc de-icing, first wave de-icing and further heavy frost requiring second wave de-icing; and
2. **Full snow team response** – as per the HSPA in the event of significant snowfall impacting airport operations.

There have been instances in the past where prolonged periods of BAU de-icing activity over several days were immediately followed by a snow event, resulting in severe resource pressures for DSPs including manpower levels and fatigue. There won't always be a stark choice between the two scenarios above and it is important that all parties maintain a good level of situational awareness and collaborative information sharing to deal with such occurrences.

The advanced 15-day weather forecast and the more focused forecast at 5 days out (D-5) identify the need to respond to icing conditions or to a snow event. Figure 12 below illustrates the timeline for the preparation of required activities leading up to an event.

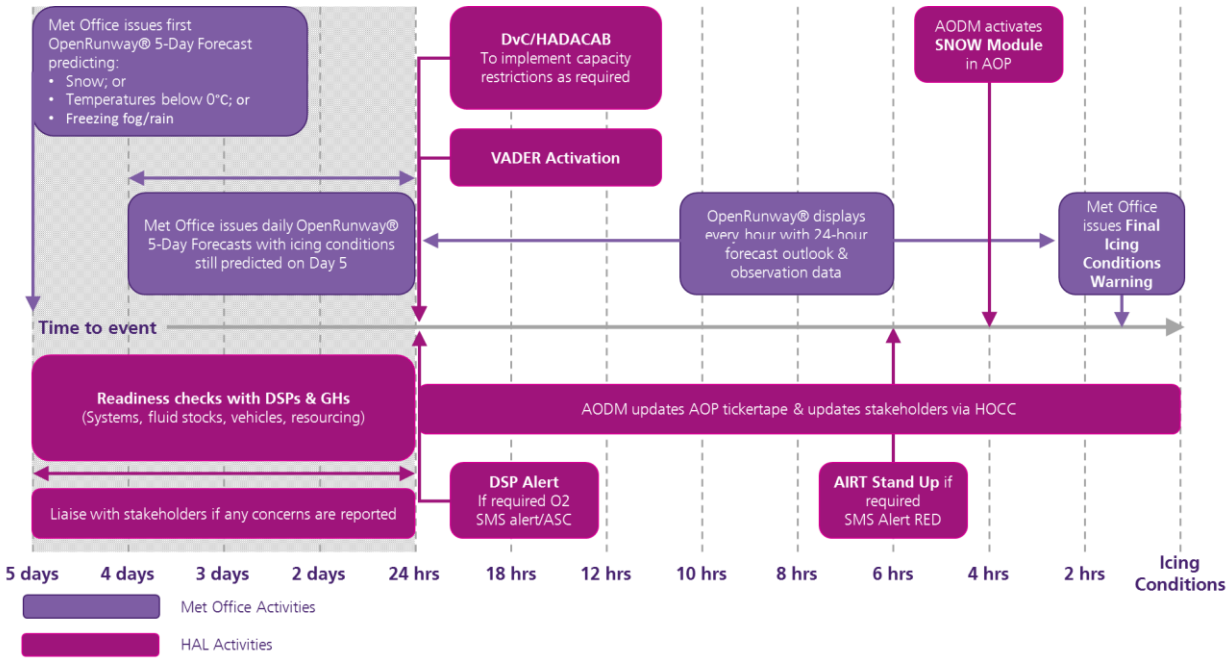


Figure 12: Forecast & Activation Timeline

An initial decision on whether to trigger mass aircraft de-icing activities will be taken four days prior to an anticipated de-icing or snow event, based on the 5-Day weather forecast provided by the Met Office, whose online OpenRunway® portal is available to DSPs and all Heathrow stakeholders at any time. The Met Office undertakes a variety of tasks to support the operation when wintry precipitation is expected as per Table 1 below.

Phase	Actions
D-5 prior to anticipated icing or snow	Winter weather forecast updated four times a day, three times daily through the HOCC, chaired by the AODM
D-4 to D-2 prior to anticipated icing or snow	Confirm snowfall or frost prediction & provide updates four times per day (three times at HOCC)
24, 12 and 4 hours prior to anticipated icing or snow	Weather updates provided via HOCC & the Heathrow Snow Response Forecast (HSRF)
8 hours prior to anticipated icing or snow	Confirm forecast, make yes or no-go decision based on predicted conditions and anticipated time of onset with AIRT Lead via HSRF
4 hours prior to anticipated icing or snow	Send AIRT an update if/when significant changes occur to forecast
During icing or snow	Send AIRT an update *only* if significant changes occur

Table 1: Met Office Winter Event Preparation

3.2.1. Activation Decision – Daily HOCCs

When the forecast predicts a snow event, the Airfield Operations Manager (with responsibility for the snow plan) will join the normal daily 0900L HOCC conference call. HOCC participants will review the latest Heathrow Snow Response Forecast and discuss HAL's intended response to the event. Although HOCC calls usually attract a small number of airlines during BAU conditions, participation tends to increase during expected winter operations and any operational stakeholders are welcome to join the call – even in an unannounced, listen-only capacity – at any time using the details provided below in Section 4.3.1.

3.2.2. DvC Activation

In the event of any short-term event (including weather) that may impact Heathrow's ability to provide its usual capacity levels, the Aircraft Operations Duty Manager (AODM) may instigate the Capacity Constraints Policy Level 2 'Demand versus Capacity' (DvC) process and request that the relevant stakeholders attend the DvC conference call, as per the UK Aeronautical Information Publication (AIP, see Appendix 4 – Capacity Constraints Interventions).

As discussed later in Section 4.3.4, this call has two primary triggers:

- An Arrivals Flow Regulation (AFR) of 36 or less for a period of four hours or more (in the winter season, 34 in summer); or
- An anticipated schedule slippage that indicates 10 scheduled flights or more operating into the Night Quota Period (i.e. these flights are deemed to be Night Jet Movement risks).

Both triggers are calculated using the Heathrow Service Plan (HSP) which is generated daily at D-1 by the HOEC and displayed in AOP. The AODM uses it to assess the expected performance for the following day.

The aim of a DvC intervention is to allow airlines to pre-tactically cancel flights, to provide a stable schedule for the following day when disruption is expected and to minimise the risk of Night Jet Movements. DvC member airlines are usually the top 20+ airlines in terms of traffic volume. They are invited to a conference call on the day prior to the anticipated event where they receive a weather brief and a breakdown of the anticipated impact of the event in terms of airport capacity. The AODM then puts forward a numerical proposal aimed at providing a stable operation. A consensus agreement is sought and the fact that the call is held does not automatically mean that there will be a requirement for a schedule intervention. Airlines collaboratively agree to make schedule reductions, but it is not mandatory.

Should a schedule intervention be required then a NOTAM is issued to support the requirement. Ad hoc slots will be suspended and the diversion status of the airfield will be switched to 'unavailable' (although emergencies and home-based carriers are exempt). During the event the AODM is responsible for keeping the Airport Operations Manager (AOM) and the wider APOC team up to date with how the airfield and airlines are performing against the schedule. This is actioned via the standard APOC 'Plan, Do, Review' (PDR) meetings and specific AOM reporting mechanisms. A full wash-up is actioned by the AODM after every DvC event to determine any areas for improvement and opportunities for enhancement.

3.2.3. HADACAB Activation

When forecast weather is of a type and nature that is likely to lead to deep and prolonged disruption, the HADACAB process is typically triggered in place of DvC in response to such events requiring a capacity reduction of greater than 10% and lasting more than 24 hours. This might also include the loss of

infrastructure such as a runway or terminal. The detailed process is documented in Local Rule 4 which is governed by the Heathrow Coordination Committee and the process is currently owned by the HAL Director of Operations[1]. HADACAB is used sparingly and has only been used once in the last six years at the time of writing.

The AOM, AODM or relevant Heathrow stakeholders can recommend the activation of HADACAB at any time according to the set criteria. This must be escalated through the AOM, who will inform the HAL Director of Operations.

It should be noted that both DvC and HADACAB are only used when the potential for substantial disruption exists. During the winter season it is likely that if these measures are being implemented, then the HSPA will have also been activated in response to a snow event causing these interventions.

In most cases it is expected that de-icing operations take place in Business as Usual conditions and the decision to switch AOP to the SNOW Module will be discussed on the regular HOCC involving BAU participants. If the need for BAU de-icing operations are detected in the pre-tactical phase, the process now follows as set out in the sections below.

3.3. Pre-Tactical Process

All actions in the pre-tactical phase from D-4 to D-1 are the same for both de-icing scenarios, i.e. whether in Business as Usual conditions or during a snow event. At D-1 the Airside Incident Response Team (AIRT) may be called out when a snow event is declared and/or it is ascertained by the AODM that DSPs will be unable to provide sufficient capacity to service the schedule leading to disruption. In both cases, the AIRT is stood up by the AOM based on the AODM's advice.

A process overview can be seen in a single A3 diagram in Figure 28 in Appendix 1 – AOU De-icing Operations Preparation Process, however its components are now examined in the following sections.

3.3.1. Day–4

At D-4 the Met Office Senior Operational Meteorologist (SOM) based in the APOC will issue a weather forecast that identifies a risk of icing conditions likely to trigger the need for de-icing operations. The forecast may also indicate a risk of snow, which implies that de-icing operations will still take place and the snow plan (HSPA) might additionally be activated to stand up snow clearance and incident response teams. If no risk exists, the AODM will continue to monitor MET reports and re-assess the risk the next day at D-3.

If the risk is present, then the AODM will contact De-icing Service Providers and request that they provide an update on their operational readiness. From this the AODM can assess whether any DSP is at risk of not being able to deliver de-icing services to its customers for the envisaged conditions. If no risk exists, the process continues into D-3. If there is a risk, at this stage the Airside Incident Response Team (AIRT) is simply updated with this information (see Figure 13).

[1] See: https://www.acl-uk.org/wp-content/uploads/2016/09/Airportinfolink_LHR_localrule4.pdf

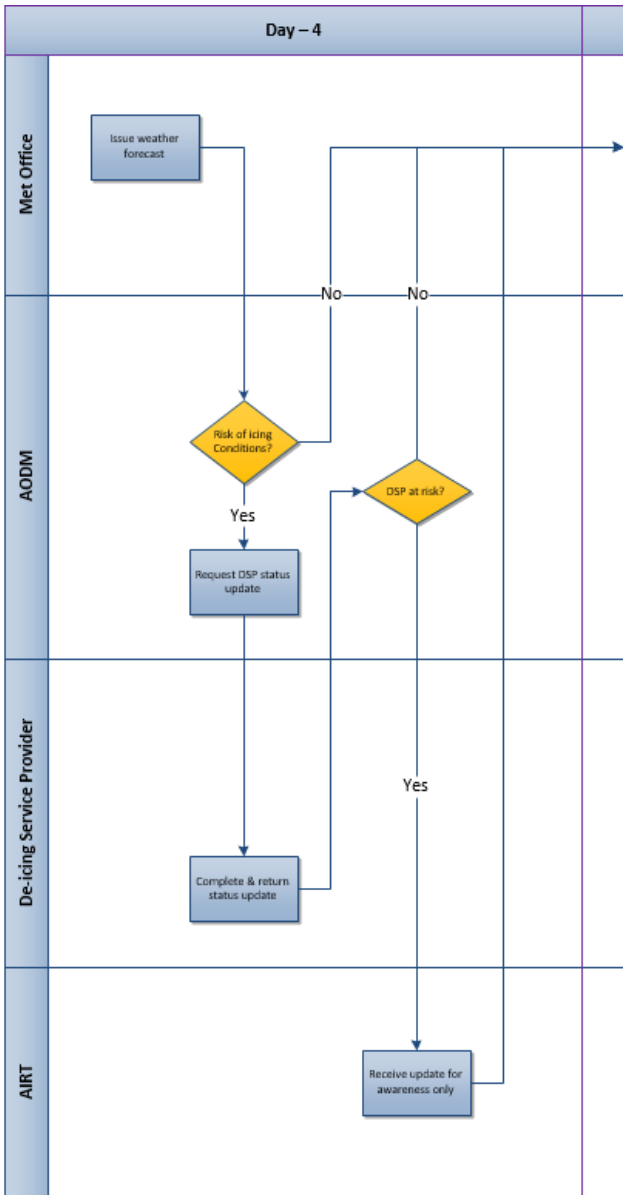


Figure 13: Pre-Tactical Process Overview for D-4

3.3.2. Day–3

At D-3 the process repeats. The Met Office SOM will issue an updated forecast to identify the developing risk of icing conditions and/or snow. If no risks exist the AODM will continue to monitor MET reports and re-assess the risk at D-2.

If the risk is present then the AODM may re-establish contact with De-icing Service Providers and request an update on operational readiness, if needed. From new responses the AODM will re-assess whether any DSP is at risk of being able to deliver de-icing services as planned. If no risk exists the process continues into D-2. If there is a risk, AIRT is informed accordingly (see Figure 14).

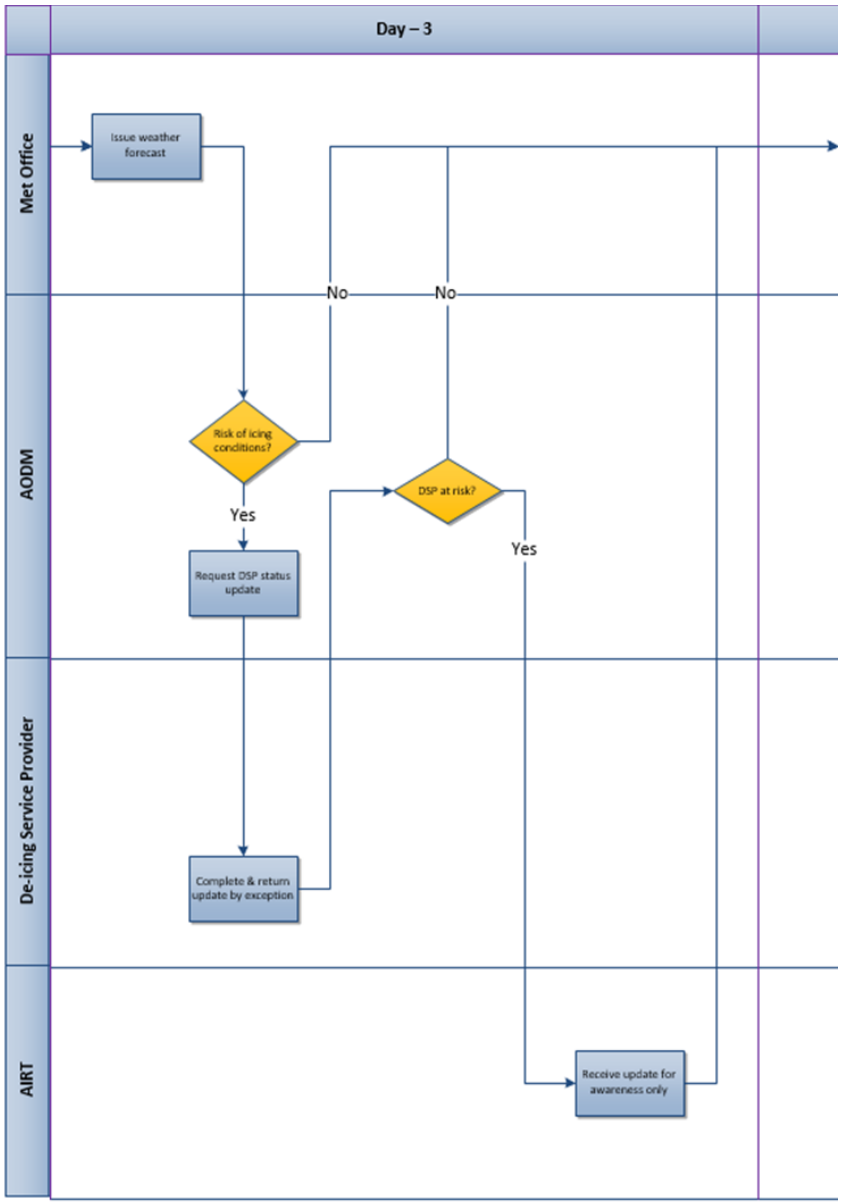


Figure 14: Pre-Tactical Process Overview for D-3

3.3.3. Day–2

At D-2 the SOM updates the forecast to confirm the ongoing risk of icing conditions or snow. If no risks exist the AODM will continue to monitor MET reports and re-assess the de-icing risk at D-1. The AODM will also provide the AIRT with an update on the risk.

If the risk is present then the AODM will contact the De-icing Service Providers for an update once again, if required; additionally in this case the AODM will contact the AOC to advise that de-icing operations can be expected on D0. The AOC should in turn inform its members to prepare for this accordingly.

The AODM will re-assess whether any DSP is at risk of being able to deliver as planned. If no risk exists the process continues into D-1. If there is a risk, both the AOC and the AIRT are informed (Figure 15).

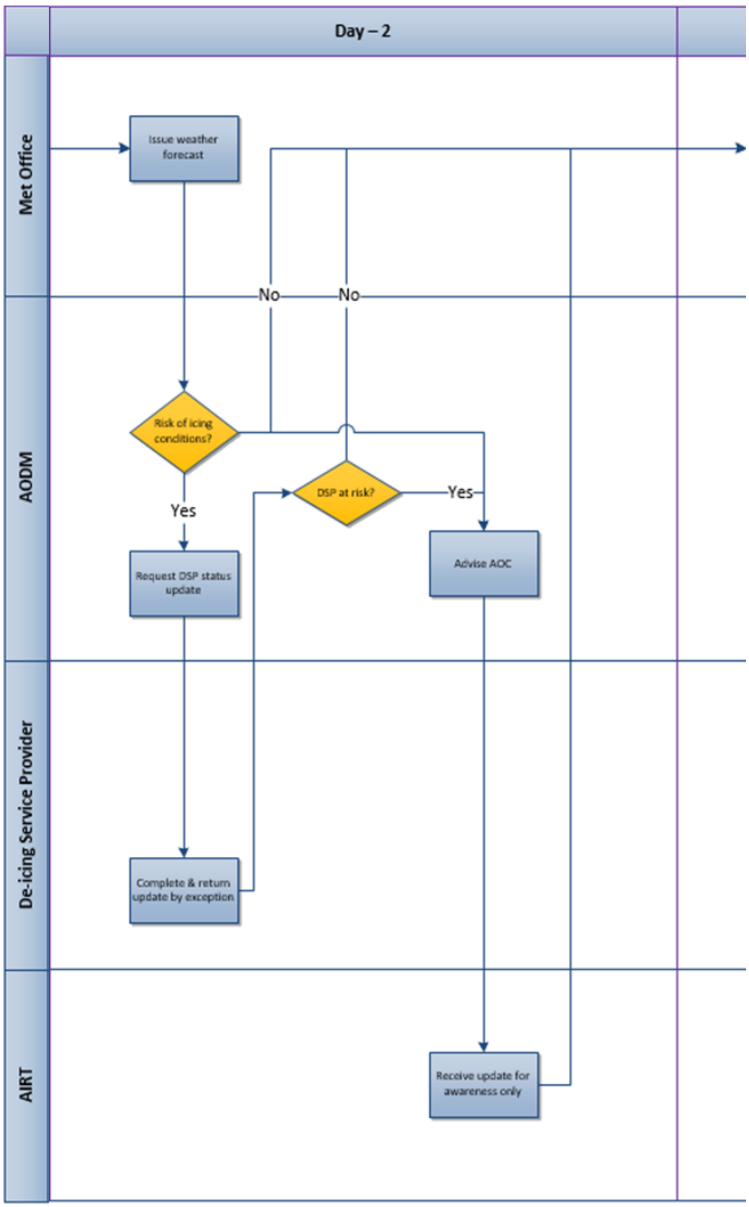


Figure 15: Pre-Tactical Process Overview for D-2

3.3.4. Day–1

On the day before expected icing conditions, the SOM will update the daily forecast as usual. The AODM will calculate the level of required tactical interventions, if any, using the Capacity Constraints procedures for Level 1 and 2. This is a precautionary measure to prepare for D0 and to determine if a DvC intervention is needed. The AODM will review the likelihood of icing conditions and if the risk subsequently sufficiently diminishes, the process ends until the next regular forecast identifies a new risk.

If the risk remains present then the AODM will contact De-icing Service Providers as on previous days and request a further update, if needed. The DSP should then provide any new information and consider the impact of the DvC intervention if it has indeed been promulgated by the AODM. If responses indicate a risk to the de-icing operation, the AODM will determine the existing DSP capability and create a proposal for mitigation to the AIRT. This is based on comparing rig availability and DCB predictions against the pre-season plan and highlighting any bottlenecks or excess demand. If no risk is present the AIRT is informed nonetheless. In either case the AIRT now actively takes information from AODMs and uses it to determine an action plan for D0.

DSPs should also inform the AODM if they wish to open a remote pad to provide off-stand de-icing services. In response, the AODM will instruct the DSP on the preferred mode of pad operation (location and aircraft flow direction) and advise the Airside Safety Department (ASD) of the pad's intended activation. At this point the process ends and further, separate dedicated procedures are now followed to arrange the pad's activation, operation and deactivation (see Appendix 2 – JEDI Operation and Appendix 3 – VADER Operation).

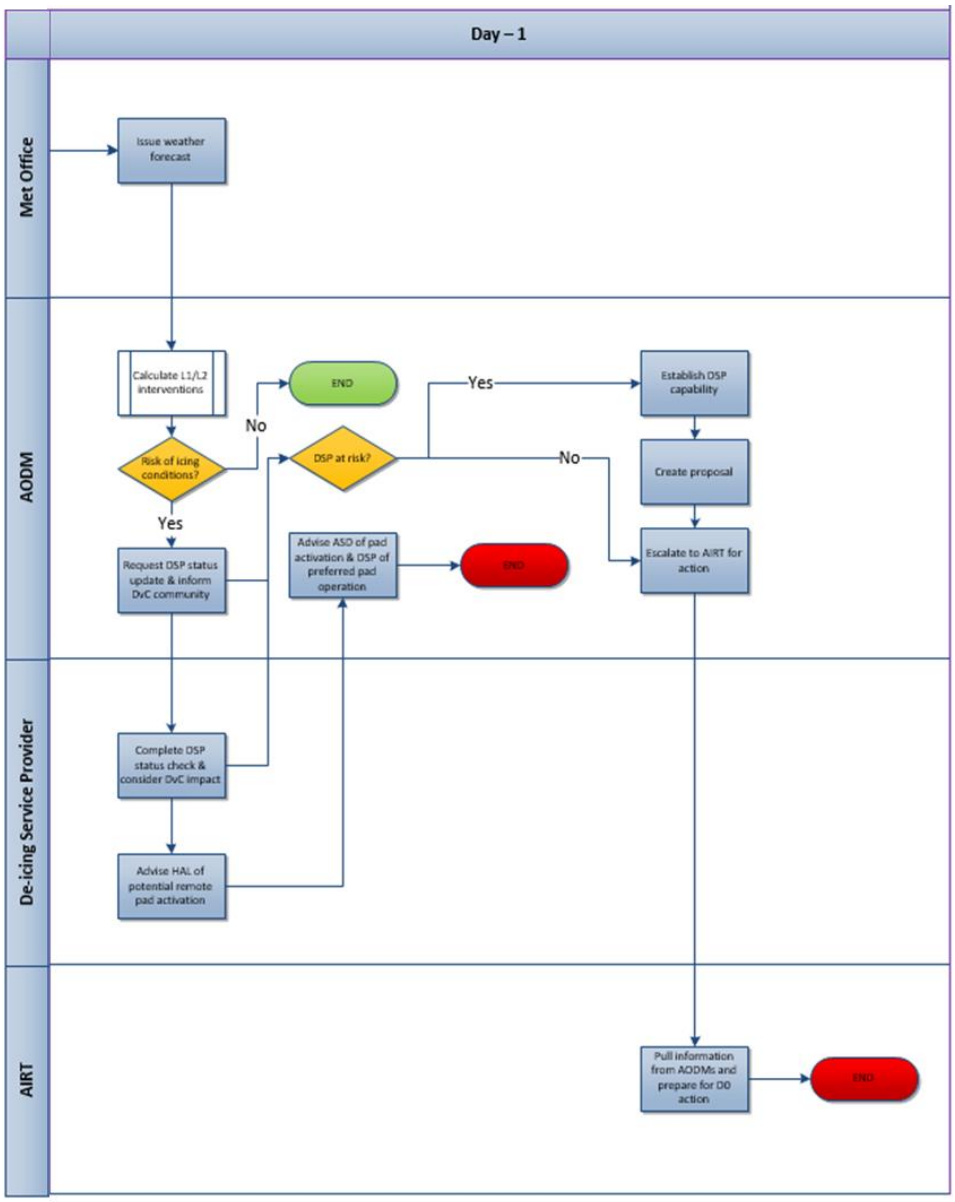


Figure 16: Pre-Tactical Process Overview for D-1

The pre-tactical process remains the same regardless of the scenario. The only exception to this occurs when a snow event is declared and the HSPA is activated – in effect the process is the same from D-4 to D-1 as in Figure 16 above, the only difference is that on D-1 the AIRT is called out and is physically on site.

3.4. Tactical Process

3.4.1. Process Overview: Scenario 1 – BAU De-icing from D-1 to End of Event

'Business as Usual' de-icing operations means that weather and other prevailing conditions are such that no operational constraint affecting airport capacity exists other than the overall capability to de-ice aircraft and sequence them to the departure runway. The weather is essentially benign other than the low ambient temperatures being experienced leading to icing conditions.

Other than the requirement to monitor and manage overall aircraft throughput and traffic flow with integrated de-icing activities, this represents a 'normal' operational day for the AODM who oversees this process. Nonetheless the AODM undertakes the tactical actions as shown in Table 2 below, alongside APOC partners and the Met Office.

Stakeholder	-24 hours	-12 hours	-4 hours
Met Office	Issue daily forecast		Advise MET conditions against appendix
AODM	Request updates from DSPs	Review AODM coverage	Switch AOP to Winter Operations (SNOW Module)
	Assess DSP status	Consider remote pad requirements	Finalise remote pad requirements
	Advise AOM & AOU		Request NATS switch Tower HMI to Adverse Weather mode
	Complete Performance Status Check with DCB information, review AOU staffing levels	Review potential full house (stands)	

Table 2: Process Overview for Scenario 1 – BAU De-icing from D-1 to End of Event

When aircraft are ready to commence de-icing operations, the Ground Handler and De-icing Service Provider are jointly responsible for updating AOP with the following inputs:

- Aircraft requests for de-icing;
- Allocation to stand or pad;
- Estimated Commencement of De-icing Time (ECZT);
- Estimated De-icing Duration Time (EDIT);
- Estimated Ready for De-icing Time (ERZT) via TOBT update;
- Estimated End of De-icing Time (EEZT);
- Actual Commencement of De-icing Time (ACZT); and
- Actual End of De-Icing Time (AEZT).

During periods of high demand, remote de-icing pads may be used for off-stand service provision and to aid airfield flow. British Airways will operate JEDI and all others use VADER, provided that in the latter case the airline has a contractual relationship with the pad operator. For the winter 2020/21 season this is Aéro Mag 2000. Switching the allocation from 'stand' to 'pad' in AOP may only be performed by BA for JEDI. For VADER, the AODM acts as the De-icing Coordinator in conjunction with Aéro Mag and selects aircraft in AOP to be de-iced on the pad based on a set of operational acceptance criteria.

3.4.2. Process Overview: Scenario 2 – Snow Event from D-1 to End of Event

When a snow event is forecast and the HSPA is activated, aircraft will still typically require de-icing but now with the added complexity of snow clearance activity. Depending on the amount of snowfall, this can quickly become the most constraining factor. The AODM will continue working to deliver the optimum level of aircraft de-icing throughput under the conditions being experienced.

The AODM will ensure that all DSPs are aware of any planned or known runway closures to accommodate anti-icing, de-icing and snow clearance activities. For example, when Runway 27L/09R is being swept no crossings to or from Terminal 4 are permitted. This will drive delays to the commencement of de-icing until the runway is operational (usually 30 mins) to prevent returns to stand, media re-application, or Hold Over Times from being affected.

Stakeholder	-24 hours	-18 hours	-12 hours	-4 hours§[2]	-2 hours§
Met Office	Issue HSRF		Issue HSRF	Issue HSRF	
AODM	Request operational update from DSPs	Move to 24/7 roster coverage	Consider remote de-icing pad requirements	-4 hour operational snow call	-2 hour snow call
	Assess DSP status				Switch AOP into SNOW Module
	Advise AOM & AOU				Finalise remote de-icing pad requirements
	Complete Performance Status Check with DCB information, review AOU staffing levels		Review potential full house (stands)		Request NATS switch Tower HMI into Adverse Weather mode
AIRT	Confirm roster & availability				

Table 3: Process Overview for Scenario 2 – Snow Event from D-1 to End of Event

Just as in BAU conditions, when aircraft are ready to commence de-icing, the GH and DSP are responsible for updating AOP with:

- Aircraft requests for de-icing;
- Allocation to stand or pad;
- Estimated Commencement of De-icing Time (ECZT);
- Estimated De-icing Duration Time (EDIT);
- Estimated Ready for De-icing Time (ERZT) via TOBT update;
- Estimated End of De-icing Time (EEZT);
- Actual Commencement of De-Icing Time (ACZT); and
- Actual End of De-Icing Time (AEZT).

[2] § Actions at -2 hours and -4 hours are coordinated with required actions in the HSPA for winter 2020/21

The use of remote de-icing pads will continue provided they can be kept clear of snow. British Airways will operate JEDI and other airlines with an Aéro Mag contract will use VADER (for the winter 2019/20 season). Only BA can select 'pad' in AOP for their aircraft using JEDI. Selections for the VADER pad for designated flights will be made in AOP by Aéro Mag in conjunction with the AODM acting as the De-icing Coordinator.

The AODM will continue to monitor de-icing performance throughout the day while de-icing operations are in progress. If there is sub-optimal performance or the risk of disruption, AODM will then consult the AOM to assess the overall impact to the airport operation and agree mitigating actions.

3.5. Closure of Event

Any period of de-icing operations occurring during Business as Usual conditions can be stood down by the AODM once the ambient meteorological conditions are such that the demand for de-icing services no longer exists. This is usually in consultation with DSPs to confirm that their operations have ended.

The AODM will return AOP to its regular operational mode by switching off the SNOW Module. At the same time the AODM will contact the VCR Supervisor to switch off the Adverse Weather module in the Tower HMI.

If remote de-icing pads have been in use, the AODM will advise the VCR Supervisor, DSPs, the AfDM and Airport Control that the remote pads are no longer in operation. This will also be reflected in the Winter Airfield Status map.

If a snow event and activation of the HSPA has also taken place, the AOM and the Airside Tactical Team will discuss and promulgate the end of the snow event and snow clearance activity will cease. This may be a phased stand down.

All stakeholders will be advised during regular operational updates such as the HOCC, SMS messages and Airport Community app alerts. The AODM will also advise EUROCONTROL's NMOC by updating any Airport Corner[3] entries related to capacity reduction once the situation has returned to normal.

3.6. Demand & Capacity Balancing (DCB) during Aircraft De-icing Events

The DCB tool is a proprietary application bespoke to Heathrow and developed in partnership with NATS. It is used by the HOEC and AODM to drive the predictability of airspace, runway and airfield flow performance based on, amongst other inputs:

- Continually refreshed schedule information to reflect known delays and cancellations;
- Up-gauged aircraft on scheduled services;
- Historical global weather data including jet stream;
- Local and global weather forecasts including wind strength and direction; and
- Any agreed operational modes, runway configurations and schedule interventions including additional pre-0602(L) arrivals and Night Jet Movements.

The DCB tool is used to determine numerous predictions of performance including KPI measures for:

[3] https://ext.eurocontrol.int/airport_corner_public/EGLL

- Arrival and departure punctuality;
- Airborne delay (arrival holding);
- Start-up delay;
- Runway holding area delay;
- Expected cancellations;
- Arrivals per terminal per hour (utilisation); and
- The risk of flights operating into the Night Quota Period (NQP), i.e. predicted Night Jet Movements.

Based on predictions made by DCB, the AODM may elect to initiate Level 1 or 2 interventions from Heathrow's Capacity Constraints Policy as per the UK Aeronautical Information Publication (see Appendix 4 – Capacity Constraints Interventions). The Level 2 process is known colloquially as 'Demand versus Capacity' (DvC) which relies on the airport stakeholder community voluntarily making schedule reductions, coordinated by the AODM.

In extreme cases where there is a high probability that the flying programme cannot be completed as planned, the AODM may escalate the issue to the AIRT for intervention via the AOM. It may be further escalated internally through HAL and externally via the AOC. This may lead to a mandated requirement for Aircraft Operators serviced by DSPs who cannot provide a full de-icing service to amend their schedule to match the service that is available, through the HADACAB (Level 3 or 4 intervention) process. This procedure is intended to provide a stable schedule and avoid tactical cancellations and terminal/airfield congestion.

These interventions and their application were discussed earlier in Section 3.2. DCB brings a new and enhanced capability to have a greater level of confidence in decisions to use these processes, because the operational impact and likely outcomes of adverse weather can be predicted with more certainty. It also allows for a more precise intervention to be used (i.e. the number and timing of cancellations) compared with what was historically a manual calculation, so flights will now only be cancelled where necessary to safeguard performance, using greater granularity and precision.

3.7. Airport Operations Plan (AOP)

The Airport Operations Plan (AOP) is a next generation concept building on the foundation of Airport Collaborative Decision Making (A-CDM). It was introduced to operations at Heathrow in 2018 and is freely available to all airport stakeholders who have an operational requirement to access it. Heathrow is the first airport in the world to implement this pan-European concept.

Like A-CDM, it is intended to provide stakeholders with a common set of performance targets, common situational awareness access through a single data source; and the ability to collaborate on managing overall airport performance when deviations from the agreed plan occur. Stakeholders can use AOP to identify and agree solutions more quickly to restore the airport's performance to the desired targets. AOP builds on A-CDM's milestones and timestamps concerning the visit of an aircraft to an airport, including its arrival, turn-round and departure phases.

AOP contains a richer scope of data extending the operational footprint beyond the airside environment to landside processes such as passenger flow and baggage. Importantly, it moves away from indicating to stakeholders what is happening in the present moment towards what is going to happen in the future. This

allows potential problems to be detected ahead of time and resolved before there is any impact to the operation. Prediction in AOP is primarily driven by the DCB application discussed in Section 3.6 above, so the two concepts are closely related, both acting in service of the smooth and predictable flow of aircraft.

Departing flights are planned to align with the Target Start-Up Approval Time (TSAT) to generate a smooth and stable departure sequence. During aircraft de-icing operations TSAT is aligned with and driven by the Estimated End of De-icing Time (EEZT), which is promulgated and updated in AOP by the DSP. This allows airspace, airfield and weather conditions to be considered when planning timings, sequence and numbers of aircraft to be de-iced. Therefore, it is critical that the EEZT value is always kept as accurate and as up to date as possible to avoid poor pre-departure sequencing, which in turn leads to increased start up delay and subsequent Hold Over Time (HOT) risks. The HOT of de-icing fluid is a limiting factor; aircraft should only be actively de-iced when TSAT confirmation is received to prevent repeated de-icing and unnecessary returns to stand.

For off-stand de-icing service provision on remote pads, the JEDI de-icing process is outlined in Appendix 2 – JEDI Operation and the VADER de-icing process is in Appendix 3 – VADER Operation. Use of these pads is further detailed in Section 3.8 below.

3.7.1. AOP SNOW Module

The AOP SNOW Module is designed to deal with the relevant conditions by adding system functionality for the planning, scheduling and tracking of de-icing operations and resources for departing flights. The SNOW Module is activated by the AODM when airfield conditions require aircraft de-icing. De-icing Service Providers need the module to be turned on to allow them to receive de-icing requests and to allocate rigs to aircraft.

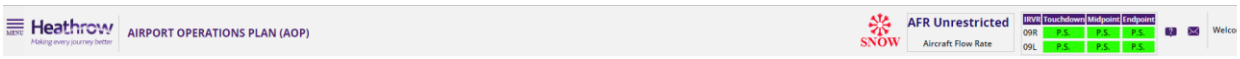


Figure 17: SNOW Module set to ON in AOP

The AOP airfield status is set to 'SNOW' by the AODM, who is an administrative user, via the 'Airfield Status' screen. AOP responds to this change in system state by displaying new columns related to de-icing timestamps in the flight departures screen, and customised information screens to handle requests and for rig allocation and tracking. When conditions improve and de-icing is no longer required, the airfield status is set to 'Regular Operations' and the system reverts to its previous state.

Aircraft Operators and/or their Ground Handlers request de-icing through this portal. The DSP allocates rigs through AOP and provides the times for estimated commencement (ECZT) and estimated end (EEZT) of de-icing. The EEZT is used to generate the TSAT, which in SNOW mode is displayed at 30 minutes prior to TOBT.

The Turn-round Manager (TRM) or Flight Dispatcher must inform the TOBT Updater (which may be the same person depending on the stakeholder) if there are any changes to the time the aircraft will be available for de-icing. Failure to do so may mean that the assigned TSAT is lost and the flight will drop out of the pre-departure sequence. The TRM must remain on stand until the rig arrives and the crew confirms that de-icing activities can be completed in the allotted time.

It is important to note that during de-icing and snow operations, TOBT represents AIRCRAFT FULLY READY TO BE DE-ICED, as opposed to aircraft ready to push.

The flight crew calls ready for de-icing at TOBT +/- 5 minutes. ATC will confirm the TSAT, which is aligned to the EEZT supplied by the DSP. If there is any anticipated ground delay, this information is used to decide whether to delay de-icing in order to meet the delayed TSAT and prevent any HOT issues.

The success of de-icing operations in line with departure milestones relies heavily on good communication at all times between the Aircraft Operator and its Ground Handler, the flight crew and the DSP. In the APOC, the AODM and Terminal Co-ordinators (acting as stand snow clearance coordinators, if stood up for a snow event) will monitor the allocation and completion of tasks to ensure that any intervention or escalation is undertaken in a timely manner to prevent any major impacts to airfield performance.

When the SNOW Module is activated in AOP, an additional set of performance alerts are made available. These are detailed in Appendix 6 – AOP SNOW Module System Alerts.

The AODM acts as the operational administrator for AOP and is responsible for determining the optimum time to switch on the SNOW Module and for determining when de-icing operations should commence. Currently this is when the ambient air temperature is 3°C or less. This prompts the AODM to switch on the SNOW Module in AOP, then contact the VCR Supervisor who in turn activates the Adverse Weather mode in the Tower HMI.

The AODM will review the type and depth of any wintry precipitation together with frost and ice warnings, then use AOP to promulgate the most appropriate de-icing conditions. The AODM can indicate the expected severity of de-icing conditions to airport stakeholders through AOP by using the criteria set out in Table 4 below.

Weather	Light De-icing	Medium De-icing	Severe De-icing
Temperature	Above -3°C	Between -3°C and -6°C	Between -6°C and -10°C
Hoar Frost	Ice saturated air at temperatures below 0°C form ice crystals on ground & exposed objects		
Active Frost	Frost forming when aircraft surface temperatures below 0°C or below dew point (cold soak effect, radiation cooling)		
Freezing Fog/Sleet		Suspension of numerous minute water droplets which freeze	
Rain	Non-freezing precipitation		
Freezing Drizzle, Light Freezing Rain			Precipitation that freezes on impact, max of 0.25mm in 6 minutes
Moderate or Heavy Freezing Rain			Precipitation that freezes on impact, more than 0.25mm in 6 minutes
Snow	None	More than 2cm for 2 hours, but doesn't settle	More than 2cm or more than 2 hours and settles

Table 4: Assessing Meteorological Conditions for AOP SNOW Module

A full table detailing total estimated de-icing times by aircraft type is shown in Appendix 5 – De-icing Conditions based on Meteorological Conditions. Figure 18 below provides an example.

De-icing Condition	A	B	C	D	E	F	G	H	I	J
MET Condition	Light			Medium				Severe		
A388	15	17	19	21	23	25	30	35	45	50
B741										
B742										
B743										
B744										
B748										
B74F										
B74N										
B74R										
B74S										
B74Y										

Figure 18: Assessing De-icing Conditions for AOP

Criteria is provided for categories A to J and once the AODM has selected the correct MET condition, setting the de-icing condition in AOP will determine the Estimated De-icing Duration Time (EDIT) for the relevant aircraft types. To date Category C has been used as a default but from this winter season the correct category for the prevailing conditions will be used.

The categories are consistent with winter operations at European airports. For guidance, Code A reflects minimal de-icing requirements (wings and tail) on an A388. This should take 15 minutes. Code J reflects a two-stage approach to de-icing which may require the physical removal of ice already formed on an airframe.

During an anti-icing event the DSP and/or Ground Handler are responsible for updating AOP to reflect de-icing requests, Estimated Commencement of De-icing (ECZT), Estimated De-icing Duration Time (EDIT), Estimated Ready for De-icing Time (ERZT), Estimated End of De-icing Time (EEZT), Actual Commencement of De-Icing Time (ACZT) and Actual End of De-Icing Time (AEZT).

ALL REQUESTS FOR DE-ICING MUST BE MADE THROUGH AOP

3.7.2. Aircraft De-icing with AOP

There are differences in system processes depending on whether the SNOW Module is activated in AOP. Full details are provided in associated training packs; this section is intended as a high-level overview only.

SNOW Module = ON

The Target Off-Block Time (TOBT) is updated by the Aircraft Operator or Ground Handler to indicate the time the aircraft will be ready for de-icing (ERZT). The EEZT is then provided by the DSP and this is used to generate the TSAT.

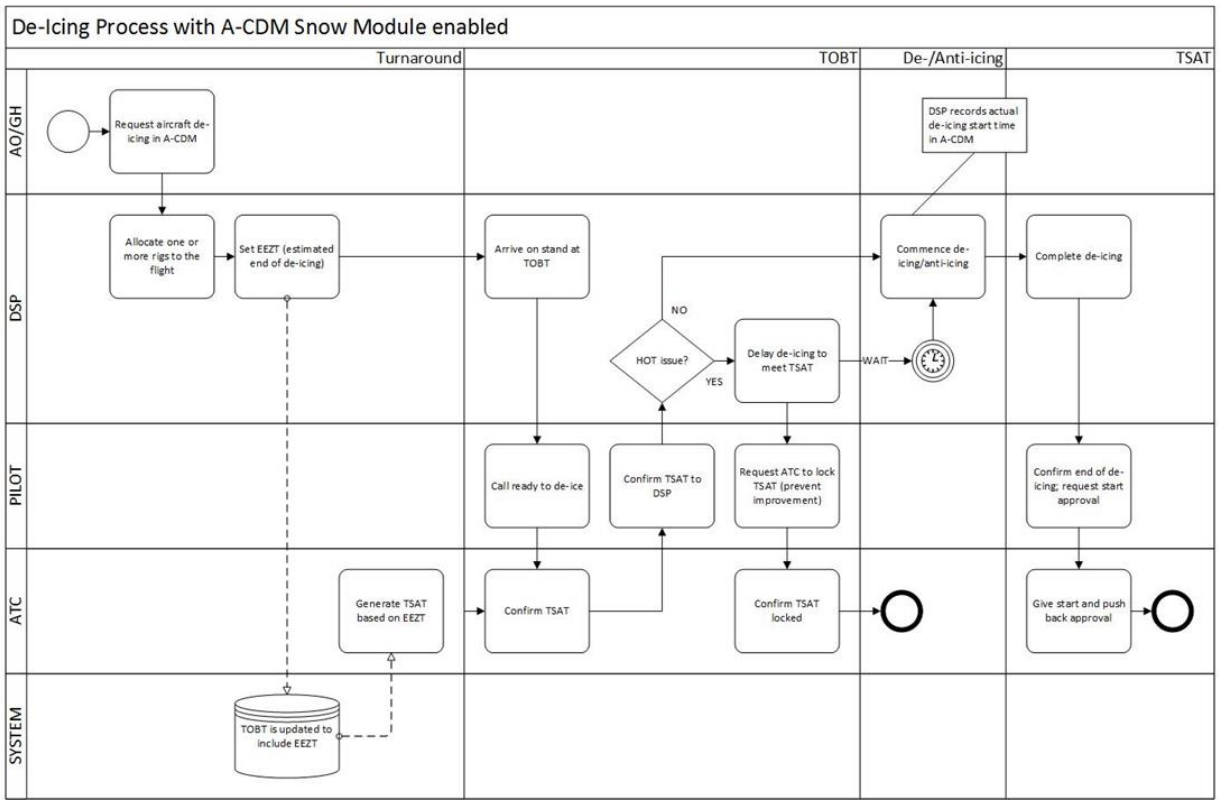


Figure 19: On Stand De-icing Process with AOP SNOW Module Enabled

The process for on stand de-icing in Figure 19 above is shown in a simplified form in Figure 20 below.

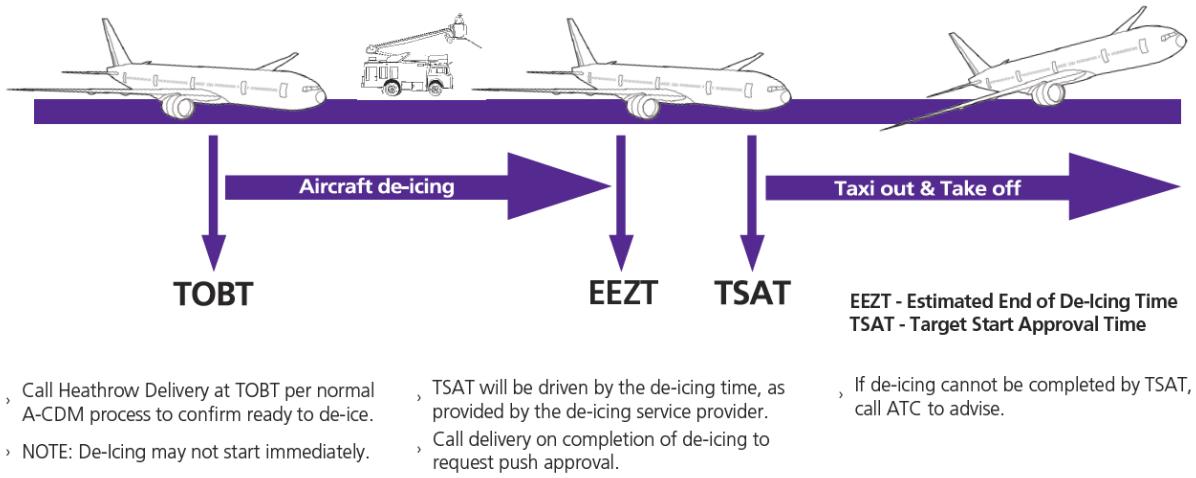


Figure 20: On Stand De-icing Milestone Sequence

SNOW Module = OFF

This method is simply presented as a workaround for rare occasions when de-icing operations have commenced but the SNOW Module has not yet been switched on, for whatever reason. To avoid confusion and standardise processes as much as possible, this is an exception rather than a feasible option for operations. The AODM will aim to ensure that the SNOW Module is switched on at the earliest moment that the de-icing risk presents itself.

In this case, TOBT is updated to include Estimated De-icing Time (EDIT) by the Aircraft Operator or Ground Handler and this is instead used to generate a TSAT. The DSP arrives on stand at ERZT (or the original TOBT) as agreed with the AO/GH. The flight crew will call ATC to confirm it is ready to de-ice, at which point the TSAT will be confirmed. At the end of de-icing, the crew calls for start approval.

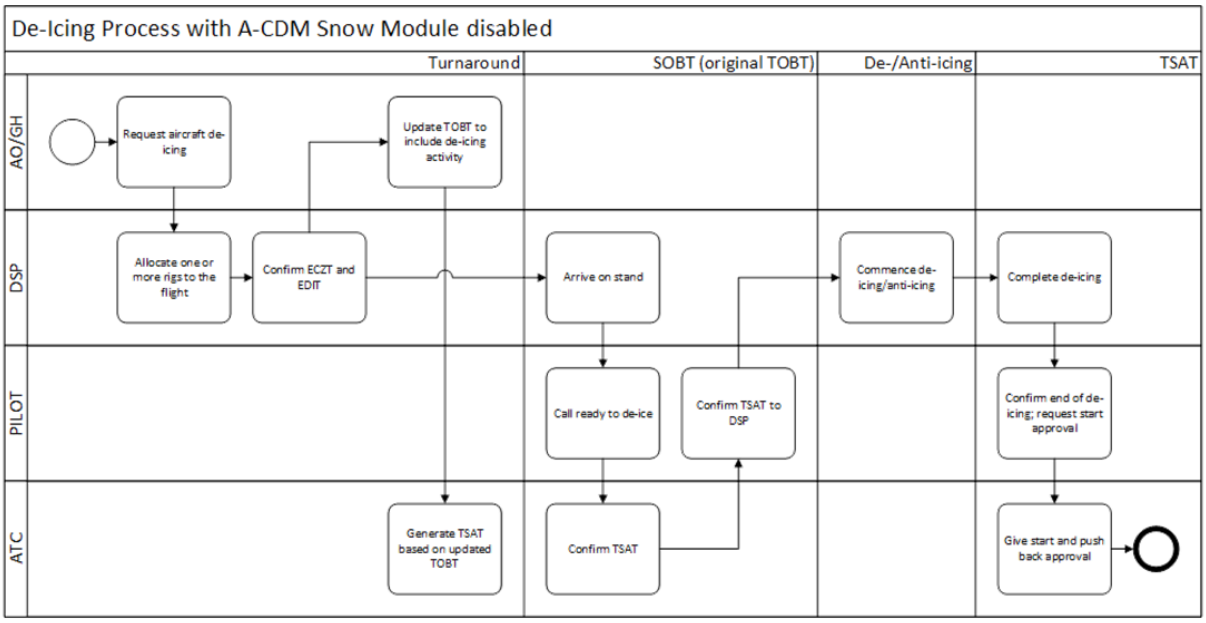


Figure 21: De-icing Process with AOP SNOW Module Disabled

3.7.3. AOP Reversion

'AOP Reversion' means that the AOP is no longer functional, for example due to a technical failure or IT service outage, so it cannot be used for the usual milestone sequencing that aids air traffic control planning. It is therefore no longer possible to transmit Departure Planning Information (DPI) messages to ANSP actors in the ATM value chain and in particular to the NMOC in Brussels which balances traffic demand and capacity in the overall European network.

In this case the airfield must 'revert' to a contingency method that was once the norm prior to the introduction of the A-CDM concept in Europe. Essentially the control tower is now required to sequence aircraft according to flight plan data received in ETFMS, which is a system providing tactical data to all operational stakeholders regardless of national boundaries, language, or equipment.

Should operational circumstances result in AOP reversion and a cessation of DPI messaging with NMOC, the contingency described below will be initiated. There are two envisaged scenarios where AOP operations could be reverted and DPI messaging stopped:

1. **Scenario 1: IT Technical Fault**
    - A technical fault results in one or more of the AOP data feeds being interrupted and it cannot be resolved within 30 to 40 minutes; or
2. **Scenario 2: Data Quality**
    - The data inputs made in AOP by Aircraft Operators, Ground Handlers and DSPs are such that the information being sent to NMOC is of insufficient quality to enable safe and reliable airspace management.

Reversion Decision & Communication – the AODM will review, in conjunction with NATS, the case for AOP reversion and will decide whether the service should be halted to allow time for a resolution to be implemented. If reversion is required, the AOP tickertape will be updated and SMS messages and/or Airport Community app alerts will be issued to airport stakeholders to advise the planned end of DPI messaging. Updates will be given by the AODM on subsequent HOCCs, if appropriate.

De-icing during AOP Reversion – whilst in reversion the process for de-icing remains the same as the 'SNOW Module = OFF' process described above: TOBT should be accurately maintained to reflect the estimated end of de-icing, flight crews should call ready for de-icing and call ready to start at the end of de-icing (at TOBT, as there is no TSAT when AOP is not functioning). Maintaining an accurate TOBT during any period of reversion will ensure a swifter recovery, at both Heathrow and across the European network, when normal service resumes.

AOP Reconnection – when the issue causing reversion has been resolved the AODM, NATS and other key parties will decide when to resume DPI messaging with NMOC. The date and time of reconnection will be communicated via the AOP tickertape and SMS messages and/or Airport Community app alerts. It may also be discussed by the AODM during subsequent HOCCs, if appropriate. After any reversion event, a full investigation will be conducted.

3.7.4. Regulated (CTOT) Flights

Where an airspace regulation is applied, a CTOT may be given to a flight in order to manage capacity imbalances in the wider European network. The normal CTOT tolerance is -5/+10 minutes, i.e. the flight must become airborne in that window. ATC will endeavour to ensure that regulated flights are able to meet their allocated CTOTs through the application of appropriate TSATs. It is important that all parties work towards meeting these TSATs with minimal delay.

The AODM will collaborate with the HOEC to find improvements for particularly penalising regulations on a case-by-case basis.

If extensions to all CTOTs are needed due to widespread disruption, the HOEC requests this by talking to the EUROCONTROL Network Manager Operations Centre (NMOC) in Brussels. In severe disruption this extension may allow for a +30-minute tolerance. Due to the impact this inevitably has on European airspace, this will be constantly monitored by the HOEC and other operational units in NATS and adjusted as necessary.

3.8. Remote De-icing Pads

As part of the D-5 to D-2 activities prior to an anticipated de-icing event, the AODM will review the requirement for the remote pads to be activated and discuss this with the Airfield Operations Manager. Part

of this review should involve a discussion with the relevant DSPs who operate the pads to assess their intentions and confirm their plans.

There are two sets of remote de-icing pads provided at Heathrow, known as JEDI and VADER respectively. JEDI features two pads designated JEDI South and JEDI Delta; both are adjacent to Stand 581 as shown in Figure 22 below.

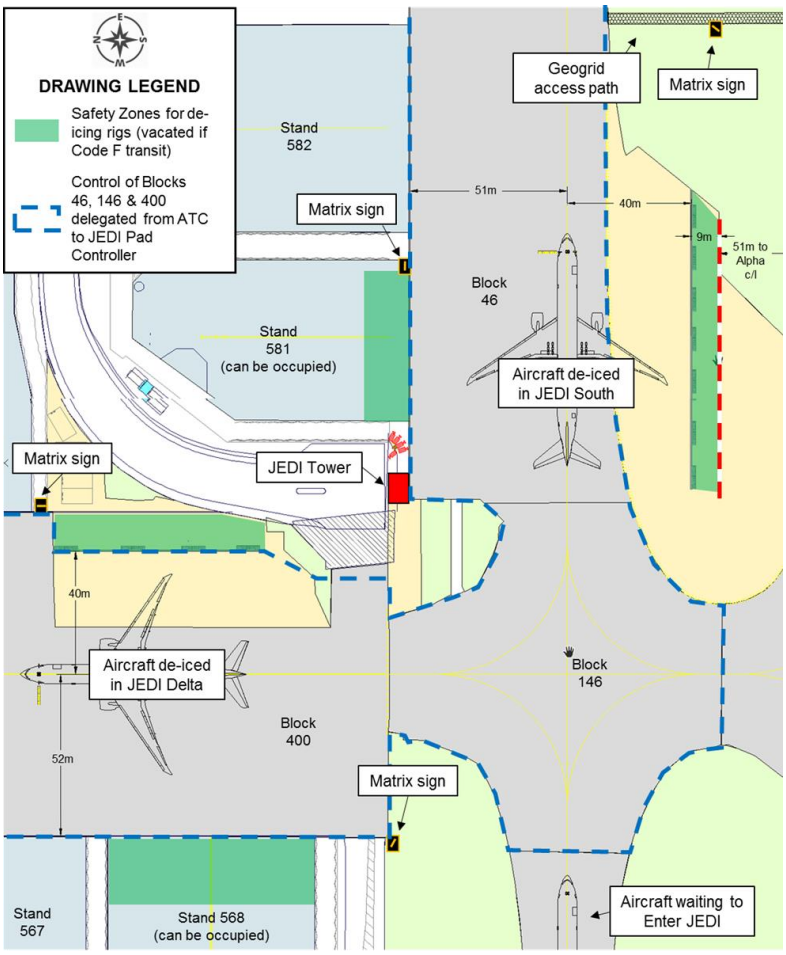


Figure 22: Location & Layout of JEDI Remote De-icing Pads

The two VADER pads are designated North and South and are located on the Bravo East taxiway. The purpose of this facility is to reduce delays to aircraft due to de-icing and subsequent stand congestion primarily for aircraft departing from Terminal 2 and the Central Terminal Area.

VADER North is located on the Bravo (East) Taxiway between Link 21 and Link 25 (Block 707); VADER South is on the Bravo (East) Taxiway between Link 25 and Link 27 (Block 709), as shown in Figure 23 below.

The primary pad for VADER activations will be VADER South due to the ease of road management, airfield flow and reduction of impact to the Runway 27R holding area, however both pads may be used simultaneously at the discretion of the Pad Operator.

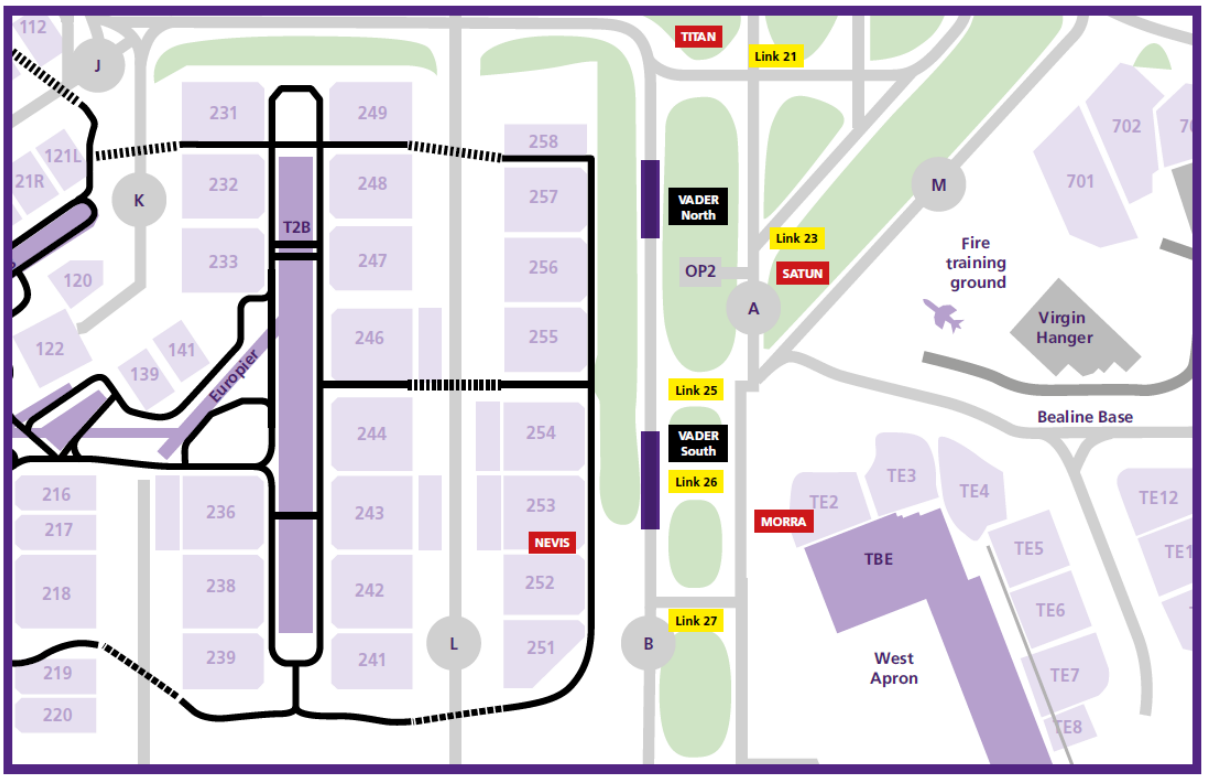


Figure 23: Location & Layout of VADER Remote De-icing Pads

In the case of either JEDI or VADER, the respective Pad Operators may elect to operate one or both pads at each location depending on demand and available resources.

As the sole operator of the JEDI remote pads, British Airways usually takes the decision whether or not to open it and communicates with the parties concerned – principally the AODM and tower to activate the relevant systems in AOP and the Tower HMI respectively, and the AfDM to ensure the ground infrastructure is safeguarded.

Determining the operational requirement to open of VADER is at the discretion of the AODM and at D-1, if agreed as an operational requirement, the AODM will inform all parties including Aircraft Operators, Ground Handlers, Campus Security and the Pad Operator (De-icing Service Provider). This will be actioned during the HOCC and promulgated through the AOP front screen by using the tickertape. Only airlines with a service contract with the Pad Operator will be permitted to use it (i.e. Aéro Mag for the winter 2020/21 season).

When VADER is in use for off-stand de-icing operations and the DSP is unable to identify a priority (sequence) for the de-icing of aircraft, the following criteria for prioritisation should be used:

1. Aircraft Operators that have an aircraft on stand awaiting de-icing with an incoming aircraft allocated to that stand; and
2. Aircraft with a CTOT at risk of missing the required departure time unless de-icing commences soon.

Should any remote pads be activated, the Airside Safety Department (ASD) will ensure that the pad status is updated on the Airfield Winter Status Map. The AODM must advise Airport Control when the pad is made operational.

4. Command Structure

4.1. Command & Control in Disruptive Events & Emergencies

It is anticipated that de-icing operations will predominantly take place in 'Business as Usual' conditions, i.e. there is otherwise no adverse impact to the airport's overall performance arising from the provision of de-icing services nor any other disruptive event that might require corrective intervention.

In the event of a significant safety event (such as media spillage), or any circumstance that requires support from emergency services or a near miss safety event; operators at the airport should call **020 8759 1212** or **222** on a Heathrow landline phone or Heathrow corporate mobile device.

Operationally disruptive events of any nature may require the activation of Heathrow's crisis response which utilises a standard Bronze, Silver and Gold structure for command and control as set out below.

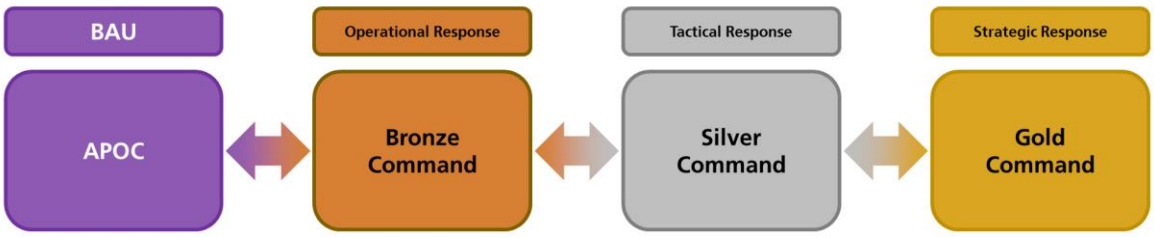


Figure 24: Heathrow Emergency Command & Control Structure

- **Gold Command** provides strategic direction and support. The main objective of Gold Command is to maintain a strategic overview of the incident and, where necessary, engage with airport stakeholders at a senior level. This team is based in the Executive boardroom at the Heathrow Compass Centre;
- **Silver Command** provides tactical coordination, reporting to the high-level strategic team when the latter is activated. This team is based in the Silver Command room at the Compass Centre; and
- **Bronze Command** provides operational direction, reporting to Silver Command and providing the link to APOC. This team is based in the Bronze Command room at the Compass Centre and is led by the Airport Operations Manager (AOM). It is made up of several functional groups including Passenger, Airside and Baggage cells, as well as Bronze cells present on the scene when a focal point for incident response is needed on the ground.

During winter events, the command and control structure has a defined remit to ensure that its responsibilities do not overlap with those of the winter resilience teams. The command teams will be activated – based on the decision of the AOM – to manage any broader, non-airfield operational disruption that may come as a result of a winter event. The Airside cell, known as the Airside Incident Response Team (AIRT), is usually the command and control group most involved in winter resilience. It may be activated in response to operationally disruptive events (for example, when snow is forecast) and it coordinates the Airside response in liaison with operational frontline colleagues and resources.

4.2. Airside Command & Control during De-icing Operations

An important factor in both maintaining and restoring runway flow rates during conditions requiring de-icing operations, and during and after any snow event, is the availability of the appropriate capacity for aircraft de-icing and the associated procedures for scheduling the departure of aircraft once they have been de-iced. Heathrow's response to aircraft icing conditions involves the integrated cooperation of internal HAL resource and external de-icing stakeholders such as Air Traffic Control (NATS), Aircraft Operators (AOs), Ground Handlers (GHs) and De-icing Service Providers (DSPs) as identified in Figure 25 below.

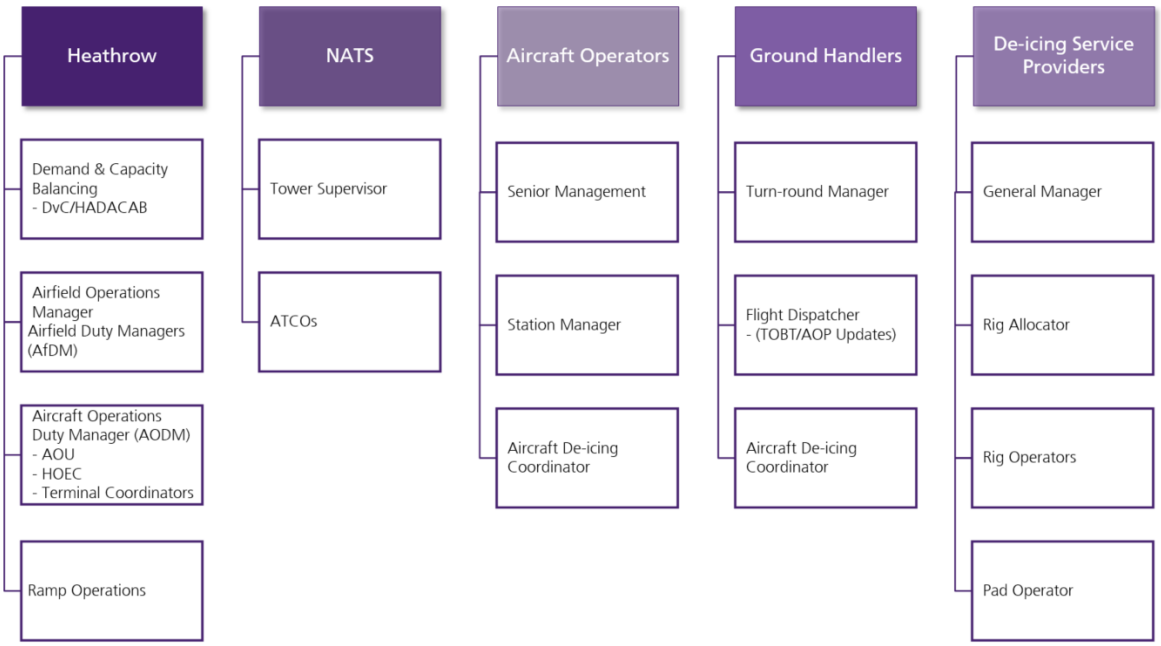


Figure 25: Aircraft De-Icing Stakeholders – Typical Organisational Structure

When snow is predicted the HAL Airside Safety Department (ASD) will respond according to the Heathrow Snow Plan Airside (HSPA). If only aircraft de-icing is required, the Aircraft Operations Duty Manager (AODM) will facilitate the support needed on the day. All stakeholders interact at the appropriate level in the general command structure shown in Figure 25. Note that the diagram simply identifies the stakeholders and is not intended to describe their interactions.

4.3. Communications

4.3.1. HOCC Calls

The Heathrow Operational Conference Call (HOCC) is a regular conference call that updates all ATM stakeholders with the current airfield situation and outlook for the next several hours. This call takes place throughout the year regardless of whether the operation is experiencing wintry conditions. When icing or snow is expected, additional information shared on the call includes but is not limited to:

- An operational status update;
- AOP SNOW Module switch on/off times and settings (de-icing conditions & MET conditions);
- Anticipated runway opening/closure times;
- Updated weather forecasts; and
- Remote de-icing pad activation status.

The HOCC continues according to its normal schedule throughout de-icing operations.

- Telephone number: **0800 376 8452** (UK freephone)
- Log in code (participants): **201434**#
- Call times (local): **0900**, **1330** and **2030** daily (an additional call may be scheduled at **0400** at the AODM's discretion to cover start up anti-icing and first wave de-icing, this will be promulgated on the 2030 HOCC)

4.3.2. Snow HOCC – External Stakeholder

While aircraft de-icing is considered under this plan to be a Business as Usual (BAU) activity, a slightly different process is followed when de-icing takes place at the same time as snow clearance activities when the HSPA is activated.

Under the snow plan, an additional conference call known as the 'Snow HOCC' takes place in collaboration with NATS Terminal Control in Swanwick (TC) and includes the VCR Supervisor, Airfield Duty Manager (AfDM) and Airfield Operations Manager. With a focus on air traffic management, the call takes place at D-1 to agree snow event triggers and a plan for the next day including traffic flow rates and regulations. The Snow HOCC uses the normal HOCC conference call details and discusses the likely impact of snow based on the information available. Participants should also raise any known issues with team preparations for the forthcoming event, for example known staff shortages, media shortages or equipment/plant unserviceability.

The AODM must ensure that the VCR Supervisor is aware of any risk of non-standard operating hours (early landers, runway closures, late dual runway operations, operating into Night Quota Period) and has plans to manage this with adequate resources.

4.3.3. Snow Calls – Internal Stakeholders

When the HSPA is activated for a snow event, this is a further operational call chaired by the AODM and includes the AfDM, AIRT, Terminal Supervisors (as defined by the HSPA) and the Met Office. With a focus on wider airfield infrastructure and involving primarily local stakeholders, participants discuss a runway clearance plan against latest MET forecasts, check that the plan works with TC (e.g. the timing of runway closures),

hold resource discussions on staff and equipment, vehicle availability, serviceability, the wider European situation including diversion capabilities at other airfields, and confirm the runway exit clearance strategy. This call does not usually involve Aircraft Operators, Ground Handlers or De-icing Service Providers.

These calls take place once the operation is placed into 'RED' status as determined by the HSPA.

4.3.4. Heathrow Airport Community Conference Calls

During a significant winter event (either icing conditions or snow), Heathrow's command and control structure may hold an airport community conference call. Participants from the wider airport community will be invited to join the call through existing communication channels (email, SMS, Airport Community app). The call examines the operation of the airport as a whole and the agenda covers (but is not limited to):

- The latest weather forecast from the Met Office;
- A high-level assessment of any impact on aircraft movements as a result, including planned runway de-icing and snow clearance;
- An invitation for airlines to provide an update on their de-icing capabilities and other schedule or passenger flow risks; and
- What preparations are in place for the airport including the airfield, landside infrastructure, terminals, security, check-in zones, passenger welfare and baggage.

The call is normally chaired by either the Airport Operations Manager (the Bronze Commander) or Silver Commander when appropriate.

4.3.5. Demand vs Capacity (DvC) Intervention Call

The Heathrow Capacity Constraints Policy contains four possible levels of tactical intervention that may be implemented to address poor schedule performance caused by disruptive events[4]. The Level 2 process is known locally as 'DvC' and regardless of the time of year the procedures will be enacted if the following conditions are met or exceeded:

- An arrivals flow regulation of 34 (in winter) or less, for 4 hours or more (but less than 24 hours) is forecast; and
- Forecast demand predicts that the declared capacity will be in excess of 10 flights occurring during the Night Quota Period (2300-0600L).

SMS[5] text message alerts will be issued to the airlines included in the DvC intervention policy providing the date, time and dial in details of the required intervention call. During the call the AODM will recommend the proposed level of cancellations as a percentage of the flight schedule and the period of applicability to the Aircraft Operators who participate in the DvC process. Airlines will then decide which flights the intervention will affect and voluntarily cancel them.

4.3.6. HADACAB Intervention Call

The HADACAB process was established in October 2011 in response to a recommendation made by the governmental Begg enquiry after the snow event observed at Heathrow in December 2010. It provides for a

[4] The full set of interventions is described by the Heathrow Capacity Constraints Policy dated 16 November 2017.

[5] SMS alerts will continue to be sent to airport stakeholders for DvC, however notifications may also be managed via the Airport Community app.

higher level of intervention where an event is expected to last longer than 24 hours, possibly over several days, and/or leading to the loss of significant infrastructure such as airspace, runways or terminals.

In terms of its practical application it is the same as the DvC process except that the conference call can be instigated at any time, it is chaired by the Heathrow Director of Operations (or nominated deputy) and the level of pre-tactical cancellations that have been calculated and promulgated on the call are mandatory – airlines must comply with the requirement.

4.3.7. Information Management & Coordination

The Heathrow Operational Efficiency Cell (HOEC), located in the APOC, is provided and resourced by NATS. Heathrow Traffic Coordinators (HTCs) work in the HOEC and liaise closely with the AODM. The HTC issues hourly alerts to airport stakeholders which include operational status information such as runway throughput, flow rates and air traffic regulations. The HOEC will continue to issue these alerts during snow and mass de-icing events.

Prior to and when de-icing operations are in progress, contact numbers for the relevant HAL roles are shown in Table 5 below. Prior to and during an event the AODM may regularly communicate with DSPs and gather information on resource levels.

	Role	Telephone Number	Enquiry Type
Prior to Event	Ground Handling Team (D-5 to D-1)	020 8745 5326	Resource levels (staff, rigs, fluid)
	AODM (APOC, D-1)	07525 825585	AOP process/troubleshooting
During Event	AIRT (APOC, when activated)	07730 147885	Supports decision-making, provides information
	AODM (APOC)	07525 825585	AOP process/troubleshooting
	De-icing Coordinator (DelCO)	07525 825585	VADER Operations Note that DelCO = AODM

Table 5: HAL Aircraft De-Icing Management Team Contact Numbers

5. Roles & Responsibilities

The key Heathrow Aircraft De-icing Plan stakeholders are identified in Table 6 below.

Internal	External
Airfield Operations Manager	Aircraft Operators (AOs)
Airport Operations Manager (AOM)	Ground Handlers (GHs)
Aircraft Operations Manager	De-icing Service Providers (DSPs)
Aircraft Operations Duty Manager (AODM)	NATS
Operations Controller (OC)	Airline Operators' Committee (AOC)
Heathrow Operations Efficiency Cell (HOEC)	
Airfield Duty Manager (AfDM)	
Airside Incident Response Team (AIRT)	
Airspace, Noise and ATM Team (ANAT)	
Airside Safety Department (ASD)	

Engineering	
Security, Baggage, CRS and Command & Control	

Table 6: Key HADIP Stakeholders

5.1. Heathrow – the Airport Operator

5.1.1. Demand & Capacity Balancing

Heathrow operates a Demand and Capacity Balancing protocol that allows for schedule interventions to be made when capacity is predicted to reduce to a level insufficient to cater for demand, which in turn are expected to lead to substantial delays. As referred to above in Sections 4.3.5 and 4.3.6, there are generally two levels of intervention used: Demand versus Capacity (DvC) and HADACAB. In practice they are the same process except that DvC is a voluntary, collaborative agreement between Heathrow and the applicable Aircraft Operators, whereas HADACAB is a mandated intervention that airlines must comply with.

The DvC process is overseen by the Aircraft Operations Duty Manager, whereas HADACAB is a stakeholder group attended by HAL, the Airline Operators' Committee, the Chair of the Heathrow Scheduling Committee, NATS, ACL and representative airlines. The HADACAB group is responsible for implementing capacity restrictions at Heathrow, with a remit to control air traffic demand during periods of reduced capacity.

5.1.2. Aircraft Operations Duty Manager

The Aircraft Operations Duty Manager (AODM) leads the Aircraft Operations Unit (AOU), based in the APOC. The AODM's primary role is to manage the performance of aircraft flow and punctuality, safeguard Heathrow's Night Quota Period against Night Jet Movements, maximise use of slots and manage demand against capacity, 'fly the plan' to achieve daily schedule completion whilst mitigating against any restrictions, and enhance the operational performance of the runways and airfield.

Four days prior to any forecasted aircraft icing conditions (D-4), the AODM will begin compiling information related to the impact of predicted weather on the operation and aircraft de-icing capabilities, enabling effective tactical decisions to be made prior to and on the day of de-icing operations.

On the day when de-icing operations commence, the AODM is the main point of contact with EUROCONTROL's Network Manager Operations Centre (NMOC) in Brussels (via the HOEC) for reviewing regulated (CTOT) flights and negotiating improvements. The AODM maintains an overview of the impact of aircraft de-icing and snow clearance on airfield performance and will activate or deactivate the AOP SNOW Module in response to operational conditions, in agreement with the NATS VCR Supervisor who is based in the control tower. The AODM liaises with the Airfield Duty Manager (AfDM) who coordinates resources on the airfield and facilitates site inspections to open or close remote de-icing pads and aircraft stands.

The AODM also acts as a De-icing Coordinator when overseeing DSP operations through AOP and providing inputs into any decision to activate the VADER remote de-icing pad. The AODM receives VADER de-icing requests, makes approval decisions and selects aircraft to be de-iced on the pad. This role also acts as the main point of contact with the VADER Pad Operator and the Airfield Duty Manager (AfDM). The activation and operation of both de-icing pads is outlined in Appendix 2 – JEDI Operation, and Appendix 3 – VADER Operation.

Based in the APOC, the AODM is supported by:

- The **Aircraft Operations Unit**: the AOU's role is to manage parking and stand allocation for each arriving and departing aircraft. It ensures stand availability and suitability for aircraft type, maximum pier service and airbridges where possible, it deals with cancellations, delays, aircraft returning to stand, diversions, unserviceable aircraft etc. The AOU is comprised of a team of Operations Controllers (OCs) working shifts under the supervision of the AODM. During de-icing operations OCs monitor TOBTs versus the Stand Plan, checking alignment with DSP allocation and activity. During snow events they balance aircraft de-icing with the coordination of snow clearance teams and alert the AODM if stand availability is at risk. The AOU also provides technical support on the use of AOP including the SNOW Module.
- The **Airside Incident Response Team**: the AIRT acts as a cell to support operations and collects relevant data on aircraft de-icing performance for subsequent upwards reporting. If requested by the AODM it can assist the operational teams by monitoring CTOTs and flight plan suspensions, remote pad (JEDI and VADER) de-icing allocations and it co-ordinates with the T5 Terminal Coordinator as appropriate. Note that the AIRT is usually activated in forecast and actual snow conditions and it coordinates the airside response in liaison with the Airside Tactical Team (ATT) as described by the HSPA. The ATT is comprised of the AODM, the AODM Support, the Airfield Duty Manager (AfDM), the AfDM Support and the Logistics Manager.
- The **Heathrow Operational Efficiency Cell**: the HOEC provides updates on air traffic management performance.

Table 7 below provides a further indication of the specific tasks and responsibilities for HAL stakeholders.

Role	Responsibilities for Aircraft De-icing	Key Tasks
Aircraft Operations Duty Manager	Airport Operations Plan management	Airfield status updates
		Establishing AOP snow parameters
		Promulgating Arrival Flow Rates
		Reviewing tactical performance
		HMI status (AOP SNOW Module)
		Updating AOP tickertape
	Demand & Capacity Balancing Tool	Promulgation of weather impact
		Assessment of schedule viability
		Determination of schedule intervention
	DSP declaration	Reviewing DSP readiness
		Escalating issues to AOM (in de-icing)
		Escalating issues to IRT (in snow events)
	Capacity Constraints interventions	Proposing intervention to the community
		Hosting Level 2 (DvC) intervention calls
		Promulgating DvC decisions
		Publishing NOTAMs
		Diversion capability & status
		Ad hoc slot availability
		NOP updates
		Airport Corner updates (NMOC)
	Remote pad activation/de-activation	Liaison with AfDM & ASD
		Liaison with ATC

Role	Responsibilities for Aircraft De-icing	Key Tasks
		Authorising VADER movements
	IRT interaction	Stand Up (F24) with AOM & AfDM
		Updating IRT
		Completing IRT requests
	Performance Status Checks	Completing PSC
		Escalating concerns to AOM (in de-icing)
		Escalating concerns to IRT (in snow events)
	AODM availability	24/7 during snow events
		Flexible during BAU de-icing
Operations Controller	Responding to stand requests	Excess glycol/stand cleaning requests
	HSPA Terminal Coordinators	Coordinating snow clearance on stands
	Stand availability awareness	Updating AOP tickertape
		'Full House' updates
		ACL slot status
Incident Response Team	Tactical & strategic support	Supporting the operation
		Assessing deliverable level of operation
		Assessing PSCs
		Handling escalation as appropriate
		Assisting return to BAU
		Airport community engagement
		Communications via AOM
		Communications with OLT
		Handling escalation as appropriate
Airfield Operations Manager	Overview of HSPA	Issuing HSPA & coordination with HADIP
		Subject Matter Expert
	Pre-tactical planning	AODM engagement through HSPA
	Tactical response for HADIP	Awareness of plan
		DSP throughput measurement
		Escalation process
		HSPA & Winter Operations training
Airport Operations Manager	APOC & operational response	Activating IRTs
		Leading Bronze level response & escalations
		Coordination of the impacts of activities & response across the operational functions
	Communications through HSPA	Plan, Do, Review (PDR) meetings
	Communications through HADIP	Community updates
		Decision gyms
		Communication & team engagement
Airspace, Noise & ATM Team	Compliance with Night Noise legislation	Providing dispensation guidelines
		Providing up-to-date AO pool status
		Providing up-to-date HAL pool status
		Responding to local community complaints
	FCO/DfT exempt or 'special' flights	Communicating with AODM

Role	Responsibilities for Aircraft De-icing	Key Tasks
		Updating FCO/DfT of any issues that may affect flights
Engineering	Overview of balancing ponds, assessing risk of environmental impacts	Awareness glycol levels in HAL drainage system & local watercourses
	Asset availability	Responding to faults
		Escalating as appropriate
Airside Safety Department	Airfield Safety	Marshalling requests
		Escort requests
		Updating airfield winter status map
		Responding to incidents & accidents
	De-icing operations	Glycol recovery
		Remote pad activation/deactivation
		Ad hoc cleaning requests
		Advising AOU of stand issues related to de-icing operations
HAL Security & CRS	Terminal status	Terminal congestion
		Border Force liaison & communications
		Variance to integrated DMO plan
		Health & Safety
		Resource levels
Aircraft Operations Manager	Overview of aircraft de-icing delivery	AOU team welfare
		Resource levels
		Escalation point
		De-icing operations training
Airfield Duty Manager	Coordinate airfield safety & associated activities	Manage additional resource for road closures, glycol recovery & pad drainage
		Coordinate with Airfield Control Room & Campus Security for pad activation/closure
		Check airfield status is safe and allows pads to open and operate
		Confirm activation/closure with VCR Supervisor

Table 7: Key Stakeholder Roles & Responsibilities – Heathrow Airport

The Airside Safety Department (ASD) coordinates all aspects of Heathrow Airside Operations' planning and response to airside winter resilience, focusing on snow clearance and airfield de-icing operations respectively. If wintry precipitation such as snow, freezing fog and sleet are forecast ASD will activate the team below. These functions are not within the scope of the HADIP, but it is important that all aircraft de-icing stakeholders maintain an awareness of the additional tasks being performed in this context to support aircraft flow.

- The Airfield Duty Manager (AfDM) is responsible for the tactical intervention of the HSPA for the airfield to maintain a safe operation and makes decisions for runway and taxiway anti-icing and snow clearance. The AfDM and the NATS Air Traffic Control Officer supervising the relevant part of the airfield will ensure coordination between aircraft de-icing activities and snow clearance teams on the Manoeuvring Area. When a snow event is in progress, the AfDM is responsible for the tactical intervention of the HSPA for the airfield in order to maintain a safe operation.

- The AODM facilitates tactical decisions for stand clearance, snow dumps and support teams, providing information to Terminal Coordinators in the AOU regarding the clearance of taxiways adjacent to stands. The AODM is supported in decision-making by the AOU regarding snow dump stands and contingency parking, by providing the relevant de-icing and stand information.
- The T5 Terminal Co-ordinator (TC) is located at the British Airways Operations Control Centre (BA-OCC) in Technical Block C (TBC) at the BA Engineering Base and acts as a liaison. The TC monitors aircraft de-icing and acts as the point of contact for any queries and issues regarding this process.

5.2. Aircraft Operator

The Aircraft Operator (AO) is responsible for filing and maintaining timely flight plans, TOBT updates and requesting aircraft de-icing services. This responsibility may be deferred to the Ground Handler depending on the operating model and commercial contractual arrangements in place between the parties.

Depending on the size, complexity and operating procedures of each airline, their command and communication structures vary. For example, an AO may have no direct input in updating aircraft AOP turn-round milestones, or conversely it may be responsible for updating both the TOBT and making aircraft de-icing requests.

Role	Responsibilities for Aircraft De-icing	Key Tasks
Aircraft Operator	Pre-event planning	Weather updates
		Discussions with GH
		Discussions with DSP
		Resource levels
		Assessing impacts of outstation & en route issues/trajectory updates
	Remedial actions	Schedule self-intervention
		DvC compliance (if DvC member)
	De-icing operations	Flight plan maintenance
		AOP maintenance: TOBT updates & de-icing requests
British Airways • Heathrow Delivery Manager (Heathrow Ops) • Flight Dispatch Duty Manager (Global Ops) • Accountable Manager Operations (Global Ops)	Pre-event planning & operational coordination with British Airways	Share agreed operational data from the BA Operational Dashboard
		Act as a liaison between key APOC stakeholders & BA to help resolve questions & concerns

Table 8: Key Stakeholder Roles & Responsibilities – Aircraft Operator

5.3. Ground Handler

Grounds Handlers (GHs) employ flight supervisors who are responsible for turning around a visiting aircraft according to an agreed servicing schedule, generally known as either a Turn-round Manager (TRM) or a Flight Dispatcher. He or she is responsible for ensuring that information relating to the progress of the flight being

turned around results in timely and accurate TOBT updates in AOP. Some airlines retain the ground handling function in-house but most at Heathrow outsource it to a third-party service provider, of which there are several. Some airlines update TOBT from a remote location (e.g. airline control centre) based on information being passed to them by the Flight Dispatcher.

The GH acting as the Aircraft Operator's agent is responsible for identifying aircraft that need to be de-iced and making de-icing requests in AOP. Depending on the GH's internal business arrangements this might be a discrete post-holder (i.e. a dedicated De-Icing Coordinator is provided during winter) or it may be combined with the Flight Dispatcher's other duties. GHs manage requests for de-icing through AOP but the De-icing Service Provider manages the allocation of rigs, resources and materials. Some Ground Handling Service Providers at Heathrow also provide de-icing services in which case these processes may be integrated.

Role	Responsibilities for Aircraft De-icing	Key Tasks
Ground Handlers	Pre-event planning	Weather updates
		Coordination with Aircraft Operators
		Resource levels
	De-icing operations	TOBT maintenance
		De-icing request updates via AOP

Table 9: Key Stakeholder Roles & Responsibilities – Ground Handler

5.4. De-icing Service Provider

In the general command structure shown previously in Figure 25, reference was made to the role of 'General Manager' which is simply intended to identify the senior responsible person employed by each DSP and placed in charge of de-icing service provision, forming the main point of contact. The General Manager is responsible for ensuring appropriate manpower resource levels, training and competency, ensuring vehicle serviceability and maintaining correct fluid stock levels both before and during periods of de-icing operations.

Heathrow Airport provides the first level of assurance from D-5 to D-1, ensuring that De-icing Service Providers are correctly resourced and have sufficient equipment and aircraft anti/de-icing fluid supplies prepared for the forecasted event. DSP readiness for de-icing operations is monitored by the duty AODM and the Heathrow Ground Operations Team.

The **Rig Allocator** is responsible for acknowledging de-icing requests from Aircraft Operators and/or Ground Handlers through AOP and allocating de-icing rigs to aircraft in a timely manner. He or she is also responsible for estimating the rig arrival time at the aircraft's side, providing an update at the start of de-icing activity; and responsible for planning mitigations due to any unavailability of rigs during periods when they are being replenished with de-icing fluid.

The **Rig Operator** is responsible for physically attending and de-icing the aircraft, while informing the Rig Allocator of actual de-icing start and finish times, the quantity of fluid used, vehicle status and remaining fluid supplies. Two or more rigs are usually assigned to an aircraft.

The **Pad Operator** is the DSP responsible for the operation of the JEDI and VADER remote de-icing pad facilities to provide an off-stand de-icing service. For the winter 2020/21 season British Airways will operate JEDI and Aéro Mag will operate VADER. **Only British Airways and its affiliates (Iberia, Iberia Express) may use JEDI. Aircraft Operators wishing to use VADER must have a contractual agreement with Aéro Mag.**

Role	Responsibilities for Aircraft De-icing	Key Tasks
De-icing Service Provider	Pre–event planning	Weather updates
		Coordination with Aircraft Operators
		Coordination with the Heathrow Ground Operations Team
		Providing pre-season information on service contracts
		Providing DSP readiness updates to AODM
		Media purchasing
		Media replenishment
		Media availability
		Rig availability and allocation
		Resource planning
	De-icing operations	Providing DSP readiness updates to AODM
		Contingency communications
		AOP updates (providing rig allocation & de-icing timestamps)
		Glycol recovery requests
		Stand status feedback
	Remote De-icing pads	Requesting activation/deactivation
		Maintaining safe pad operations in line with SOPs
		Measuring throughput
		VADER requests via AODM

Table 10: Key Stakeholder Roles & Responsibilities – De-icing Service Provider

5.5. NATS

NATS is the designated Air Navigation Service Provider at Heathrow. It works closely with the airport to maintain optimum runway throughput and to minimise airborne holding in the arrival stacks. NATS manages the pre-departure sequence by arranging departing aircraft according to each flight's Target Start Up Approval Time (TSAT). During periods of winter operations when the AOP SNOW Module is switched on, de-icing timestamps in AOP must be managed accordingly to safeguard TSAT integrity and to continue the optimised delivery of aircraft to the runway holding point.

Role	Responsibilities for Aircraft De-icing	Key Tasks
NATS	Systems management	Tower HMI interface (Adverse Weather Mode)
	Remote de-icing pads	Liaison with AODM
		Liaison with DSP
		Liaison with AfDM

	ATC	AOP TSAT provision
		TSAT updates
		TSAT to pilot during BAU de-icing
	Snow events	TSAT to pilot during snow event
		Push-back coordinated with snow clearing activities

Table 11: Key Stakeholder Roles & Responsibilities – NATS

5.6. Airline Operators' Committee

The Airline Operators' Committee (AOC) is a body representing the airline community at Heathrow[6]. Its principal objective is to provide an effective interface between the airline community and HAL, Government departments and agencies and other authorities and to represent the interests of the travelling public.

Each of the airport's terminals has an elected AOC chairperson and meetings take place every month. The terminal chairpersons attend the AOC Executive, which is the final decision-making body for all operational matters in which it is involved. The Executive has a chairperson (elected) and a general secretary (appointed).

Role	Responsibilities for Aircraft De-icing	Key Tasks
Airline Operators' Committee	Pre-event	Communicate with members
	De-icing operations	Liaise with AOs to manage demand when required
		Escalating issues to HAL

Table 12: Key Stakeholder Roles & Responsibilities – Airline Operators' Committee

6. Training

All organisations involved in the delivery or management of this plan must ensure their employees, third party contractors and teams are trained and competent in their roles to undertake their described responsibilities. Relevant training records must be held by the respective companies and are subject to review by the Heathrow Airside Safety & Compliance team.

7. Event Preparation

7.1. Scenarios & Resourcing

There are two typical scenarios for aircraft de-icing operations at Heathrow.

1. **Business as Usual (BAU) de-icing operations** – this scenario applies to ad hoc requests for de-icing and first wave departures anti-icing. It is referred to throughout this document simply as 'de-icing operations'. BAU de-icing is activated when ambient atmospheric conditions require airframes to be treated (e.g. sub-zero temperatures) but meteorological conditions remain otherwise benign. Notwithstanding the usual operating restrictions such as air traffic regulation, the capacity to de-ice aircraft and maintain an optimised runway throughput becomes the constraining factor. This

[6] See: https://www.heathrow-aoc.com/

scenario may include the activation of one or more remote de-icing pads. In this case there is no requirement to increase resource levels, however AODMs may tactically adjust their roster coverage to provide resilience. This scenario is the focus of this HADIP document.

2. **De-icing operations during a snow event** – when snowfall is forecast by the Met Office, the Airside Safety Department will review the criteria and triggers for the relevant meteorological phenomena and if required, declare RED for Winter Operations to the relevant stakeholders in accordance with the Heathrow Snow Plan Airside (HSPA). This will result in the stand up of teams and equipment responsible for snow clearance and anti-icing of airfield surfaces such as runways and taxiways. Note that there may have already been a period of BAU de-icing prior to this declaration. In this scenario de-icing operations will continue under the guidance of the HADIP and its associated procedures, in tandem with the complementary activities governed by the HSPA to facilitate the prevention or removal of wintry precipitation and snow.

Under the second scenario when a snow event is declared, the AODM team will amend its existing BAU roster pattern to provide additional resilience for the duration of the snow event activation. Additional Operations Controllers will be called in to act as Terminal Coordinators and the Airside Incident Response Team (AIRT) will be established, also in accordance with the HSPA. The AIRT consists of three members:

- **Airfield** – a member of HAL staff with airfield experience or knowledge who assists in the identification and resolution of airfield-related issues (e.g. asset and infrastructure issues, runway friction and braking coefficients);
- **Flow** – a member of HAL staff with aircraft flow/ATC experience or ATM knowledge who can assist in the identification and resolution of traffic flow-related issues (e.g. runway utilisation, AOP management); and
- **Airline** – a member of HAL staff who may base themselves with an airline to assist with communications and information sharing, and to highlight opportunities for instant intervention and optimised de-icing throughput.

Depending on the experience of the AIRT member, some may provide support in more than one role. The AIRT acts at Bronze level in the command and control structure shown previously in Figure 24.

7.2. DSP Media & Equipment

Table 13 shows a sample table listing dummy De-icing Service Provider media storage and rig capability data.

	Type I	Type II	Type IV	Rigs
DSP 1	(50,000) 20,000	(50,000) 15,000	(140,000) 50,000	3
DSP 2	(275,000) 135,000	(150,000) 65,000	(220,000) 80,000	9
DSP 3	(270,000) 155,000	(130,000) 105,000	(200,000) 150,000	8
DSP 4	(300,000) 175,000	(150,000) 85,000	(220,000) 100,000	10
DSP 5	(100,000) 75,000	(75,000) 35,000	(140,000) 100,000	5

Table 13: Sample (Maximum) & Season Start DSP Capabilities

Heathrow has tools to monitor critical information regarding stock levels and rig availability, however should there be a material change to declared figures the DSP should inform the AODM. This is critical in the lead up to and during a de-icing event, as the timely awareness of any operational de-icing issues will assist Heathrow and the wider airport community when considering the need for any schedule intervention.

To assist this process further, when the 5-day OpenRunway® weather forecast issued by the UK Met Office (see Figure 26 below) indicates that de-icing operations are likely, the AODM will request an update on current capabilities and readiness for all DSPs. For consistency and ease of use this information will be requested by phone or email. As the lead up to the event progresses, stakeholders can expect repeated requests for updates as necessary, however DSPs only need respond if there is a change to their previous declarations.

At D-5 the HAL Ground Operations team will determine the fluid levels held by each DSP and report this to the AODM. The Ramp Assurance Manager will decide at D-2 whether it is necessary to activate the process for providing access to the Forward Holding Tanks (see Appendix 7 – Forward Holding Tank Process).

If mass deliveries are required, this will be coordinated by the DSP through the Colnbrook Logistics Centre in line with the process described in Appendix 8 – Fluid Delivery Process. This can be managed by Campus Security out of hours and by exception, through the AfDM on request.

The Ground Operations team will also check the number of serviceable rigs each DSP possesses and that they have sufficient qualified personnel to operate them for the expected duration of any de-icing event over the forthcoming season.

In any case if the forecast still indicates the likelihood of aircraft de-icing at D-2, then DSPs will be asked to re-declare their capability and this will continue each day until the forecast indicates that the risk has ceased.

Met Office

Forecast Summary - Heathrow Airport Valid from 05:00 UTC 14 December 2017

Forecast Issued on 14 December 2017 at 03:30 UTC Meteorologist: Rob Parish Talk to a forecaster 08700 767890

Key: *LVP (<600 Metres), ** Change in wind direction preference between Easterlies and Westerlies.

Thursday's Summary (Valid from 05:00 UTC)			2 - 5 Day Forecast (00:00-23:59 UTC)			
Hazard	Present	Periods of Risk	Friday 15/12/17	Saturday 16/12/17	Sunday 17/12/17	Monday 18/12/17
ICE	N	0%	30%	20%	30%	0%
HOAR FROST	N	60%	70%	90%	60%	0%
SNOW	Y	1900-2400 (10% 0 cm)	10% (0cm)	0%	0%	0%
MIN. GROUND TEMP. (RST)	PS 01 C		MS 02 C (PM)	MS 03 C	MS 01 C	PS 02 C
MIN. AIR TEMP.	PS 03 C		PS 01 C (PM)	MS 01 C	PS 01 C	PS 04 C
SFC WIND > 25KT	Y	0500-1500	10%	10%	10%	0%
SFC WIND > 42KT	N		0%	0%	0%	0%
3000FT WIND > 20KT	Y	0500-2400	100%	100%	60%	60%
3000FT WIND > 32KT	Y	0500-1900	90%	30%	0%	0%
RAIN/DRIZZLE	Y	0500-1500 & 1900-2400 (3-8mm)	30% (0-1mm)	20% (0-2mm)	90% (1-4mm)	60% (0-2mm)
LVP*	N		N	N	ML	L
QNH < 996 hPa	Y	0500-2400	70%	0%	0%	0%
LTMA CB RISK	H	0500-2400	N	N	N	N
SIG WIND CHANGE**	N		N	N	N	N
AMPLIFYING COMMENTS	A cold breezy start, however ground and air temperatures are expected to be just above zero precluding the risk of ice. However, ice is possible on airframes and vehicles. Sunny spells through the day with the odd shower, however these will mainly be in the west and south of the LTMA where there is a high risk of CB's through the day. During the evening rain is expected with a low 10% risk of wet sleet/snow at times overnight. No accumulations are expected – see *Snow Response Event Echo* for more detail. Sub-zero temperatures & ice is not expected overnight due to large cloud amounts. Strong W'ly surface winds gusting 25-28 KT easing through the afternoon to become light SW'ly. 3000 FT winds initially W'ly 45 KT easing through the morning to 30 KT then 25 KT for afternoon & evening.		**Friday:** Mist, light rain and drizzle at first with a low (10%) risk of some sleet – see *Snow Response Event Echo* for more detail. Low cloud is also expected at first 4-800 FT with a low risk of VIS 2 (< 300 FT) until around 08Z. Rain clearing through the morning and cloud lifting becoming clear skies in to the evening for a cold night. Moderate NW'ly surface winds with strong N'ly 3000 FT winds 20-30 KT at first becoming 30-40 KT in the afternoon. **Saturday:** A mainly dry and bright day but cold once again in the fresh NW'ly wind. There is a low risk of an isolated shower during the afternoon. Remaining dry overnight with the wind easing as a ridge builds across the area giving cold night. Ice possible on surface should we catch any showers. Winds remaining moderate NW'ly but easing into the evening with 3000 FT winds N'ly 25-30 KT. **Sunday:** Light winds at first with a medium-low risk of fog and LVPs through the morning. This will be slow to clear, however will be aided by a front approaching from the West. This will bring thickening cloud a strengthening wind and rain for the afternoon and evening. Light NW'ly becoming a moderate SW'ly during the evening. **Monday:** Frontal rain from Sunday clears in the early hours with possibly clear skies to follow. This may allow for mist to form in the light NW'ly winds with a low risk of fog and LVPs. Dry with sunny spells in the afternoon with the wind backing SW'ly.			

Figure 26: Example of Met Office OpenRunway® Forecast

8. Reporting

Reports of various types are generated by different parties for various purposes throughout the HADIP timeline. This section gives a high-level summary of the typical information collected and produced, when and by whom.

8.1. Before the Winter Season

Prior to the commencement of the winter season, the AODM will request a report from ITOC of all active internal and external AOP account holders and review them for recent activity. Contact is made with all external users to ensure that they still need the accounts and to confirm any winter process training requirements.

Contact should made with all internal account holders who have not accessed AOP for at least three months to confirm their requirements and training needs. Depending on current IT policy, inactive users who have not accessed AOP for several months may have their accounts automatically deactivated.

8.2. D-1 to 2nd Wave De-icing

From the day prior to de-icing and throughout any secondary, prolonged de-icing operations, following regular contact with all DSPs, the AODM maintains an on-going situational awareness of items such as the number of rigs, the volume of fluid and staffing levels.

8.3. During 2nd Wave De-icing

AOP users with appropriate access permissions can see live reports of de-icing activities and rig utilisation for each DSP via the 'My Reports' section of the navigation pane and then clicking on the 'Snow Data' tab.

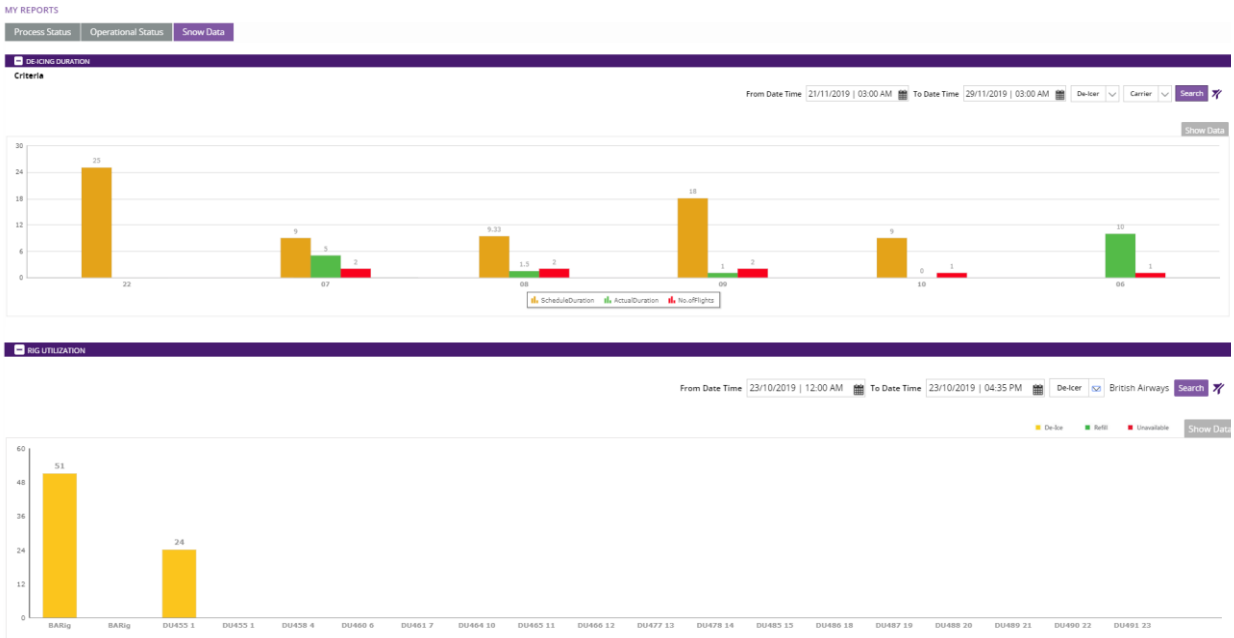


Figure 27: Snow Data Tab in AOP

Further information is available for historic data under the 'Flight Search' section of the navigation pane by selecting 'Historic Search' for De-icing and Rig Data. Users can select the data type from the drop-down menu marked 'Search Category'.

8.4. After De-icing

It is possible to export data from AOP which enables a detailed analysis of relevant metrics included on the Ground Handler's performance scorecard. The key measures for this season are:

- The percentage of rigs allocated prior to TOBT; and
- The average variance of Expected vs. Actual Commencement of De-icing Times (ECZT vs. ACZT)

Other metrics are available to help airport stakeholder partners review their overall performance and to implement subsequent improvements, such as:

- Rig utilisation
- Expected vs. Actual De-icing Duration Times (EDIT vs. ADIT)
- Expected vs. Actual Ready for De-icing times (ERZT vs. ARZT)
- Expected End of De-icing Time vs. Target Start-up Approval Time (EEZT vs. TSAT)
- De-icing requests prior to TOBT

9. Regulatory References & Further Reading

9.1. Overall

Heathrow Snow Plan Airside Winter 2020-2021, available from:
https://www.heathrow.com/company/team-heathrow/airside/useful-publications/winter-operations

A-CDM (AOP) Quick Reference Guide for Requesting De-icing, available from:
https://www.heathrow.com/company/team-heathrow/airside/useful-publications/winter-operations

AOP Quick Reference Guide for DSPs, available from:
https://www.heathrow.com/company/team-heathrow/airside/useful-publications/winter-operations

9.2. Remote pads

Airport_AOU_ALOP_003_Requests for VADER De-icing Facilities – internal reference only

Airport_AOU_ALOP_004_Requests for JEDI De-icing Facilities – internal reference only

Airside_ASD-O_ALOP_021_Operation of VADER De-Icing Facilities – internal reference only

Airside_ASD-O_ALOP_022_Operation of JEDI De-Icing Facilities – internal reference only

9.3. Capacity Constraints

United Kingdom Aeronautical Information Publication (UK AIP), see AD 2-EGLL-1 London Heathrow Aerodrome – Textual Data, dated 8 October 2020, Section EGLL AD 2.20 LOCAL TRAFFIC REGULATIONS

Heathrow Capacity Constraint Policy - Nov 2017 post consultation amendments, dated 16 November 2017, available upon request

Airport_AOU_ALOP_005 Capacity Constraints – internal reference only

10. Appendix 1 – AOU De-icing Operations Preparation Process

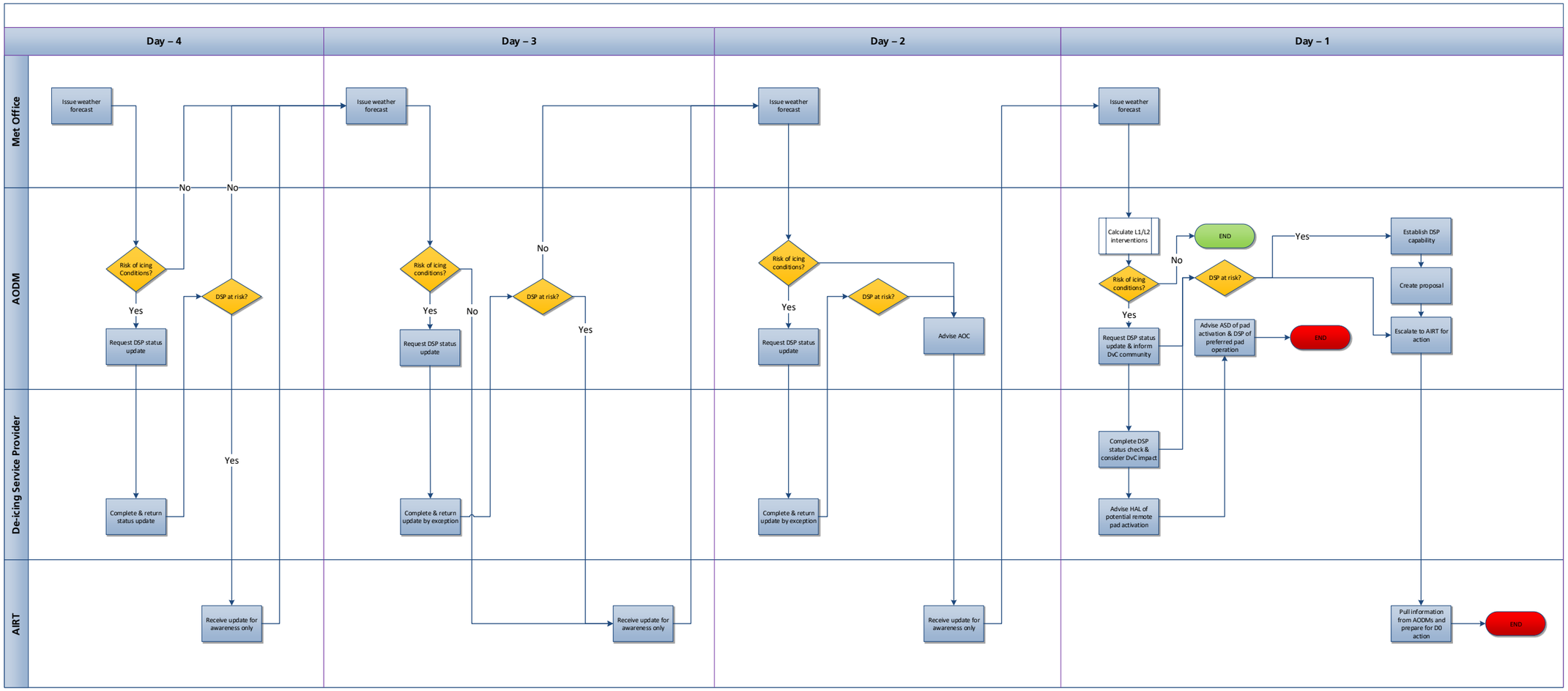


Figure 28: AOU De-icing Operations Preparation Process

11. Appendix 2 – JEDI Operation

When the JEDI de-icing pad is selected in AOP, the TOBT is not adjusted and a TSAT is not issued. Instead, the TTOT is amended to reflect the extended taxi time that now includes a diversion via JEDI and the time needed to de-ice the aircraft (EDIT).

11.1. Activation Request

British Airways should confirm the potential requirement for JEDI at the 2030L HOCC conference call at D-1. It should reconfirm the need at the 0400L HOCC for first wave departures giving an expected time for activation (first aircraft). If a snow event is being experienced and the AODM has elected to call in additional winter resilience, these details will also be discussed. Further information can be discussed at subsequent HOCCs at 0900L, 1330L and 2030L as required. At any time as the need arises, British Airways operational contacts in its Winter Operations team or the OCC (BA Heathrow Delivery Managers) can call the HAL Aircraft Operations Duty Manager (AODM) or vice versa to ensure good levels of information sharing.

The AODM will notify the Airfield Duty Manager (AfDM) that JEDI has been requested, although the AfDM will obviously be aware if he or she is present on the HOCC call. The AfDM will then confirm that JEDI can be activated once an on-site inspection has been made. The AODM will also assess the operational impacts or restrictions around Stands 582, 583 and the movements of aircraft on these stands.

BA will be responsible for managing stand allocation in Taxiway Delta. The AODM will liaise with an OC to close Stand 581 which is used by BA to stage all resources and equipment to operate JEDI South. However, BA may elect to keep an aircraft up to A320 in size parked on Stand 581, provided that the aircraft is not planning to depart during the time JEDI is expected to operate – in which case the stand is kept open. Any aircraft larger than an A320 must be moved and the stand closed. Stand 576 should also be closed, however this may not be necessary provided any aircraft parked on this stand has no planned departure, e.g. it may be night-stopping. If JEDI Delta is in use, Stand 568 is likely to be used for contingency parking.

11.2. Area Set Up

The BA Pad Controller will notify the AfDM that JEDI is being set up, including the positioning of signs prior to the area being handed over to BA's control. BA may request assistance from the AfDM for a leader vehicle to position the variable message signs, if they require support, such as in low visibility conditions:

- Hold sign – positioned in the Delta South Taxiway abeam the stop sign for Taxiway Bravo holding short of Delta;
- JEDI South sign – positioned in the clearway between Stand 581/582; and
- JEDI Delta sign – positioned in the southern clearway of Stand 576.

The signs will be operated by BA from the pad control facility known as 'ICE TOWER'.

11.3. Opening

The BA De-icing Coordination Manager (DCM) will liaise with the BA Pad Controller to agree when JEDI is correctly set up and confirm when JEDI needs to be open.

After completing the set up and confirming requirements with the DCM, the BA Pad Controller (located in the ICE TOWER) will call the AfDM to advise JEDI is ready for operation. The AfDM will speak to ATC to

confirm activation, and if approved the AfDM will advise the Pad Controller. The Pad Controller will then notify the BA DCM in the BA Operations Control Centre (OCC) located in Technical Block C (East Engineering Base) that they are ready to accept the first aircraft. The DCM will communicate this to the relevant stakeholders within the OCC – the Heathrow Delivery Manager, de-icing support coordinator, de-icing allocation and aircraft movements colleagues.

The AfDM will notify the AODM that JEDI is now active and will additionally ensure that the Airfield Control Room (AfCR) is informed.

ATC will use the given TOBT order for sequencing departing aircraft, unless the BA de-icing coordinator notifies the VCR Supervisor as to the schedule and order of aircraft that will use JEDI.

The BA Pad Controller will activate the glycol recovery process for the pads by making a request directly to the AfCR, which will dispatch a Glycol Recovery Vehicle (GRV). JEDI's de-icing operation will be suspended whilst the GRV is in operation.

11.4. Operation

The delegation of taxiways varies depending on whether only JEDI South, or both JEDI South and Delta are in use. Note that JEDI Delta cannot operate in isolation, for it to be open both pads must be used:

- During the operation of JEDI South only, aircraft movements on Taxiway Bravo (South) between Taxiway Delta and Taxiway Echo, and Taxiway Delta at the junction with Taxiway Bravo (South) are delegated to the JEDI Pad Controller; and
- During the operation of JEDI South and Delta, in addition to the restrictions above, Taxiway Delta between D1 and D2 is also delegated to the Pad controller.

If both JEDI South and JEDI Delta have been requested, both pads will operate in the same status, i.e. it is not permissible to have one pad open for use while the other is in standby.

BA will be responsible for the de-icing operating procedures of either JEDI pads. BA will establish a pad control facility (ICE TOWER) which manages all aspects of the operation. This is positioned in the airfield just to the west of Stand 581 and remains in position throughout the winter season.

Operation of the pads is permitted during Low Visibility Procedures (LVPs) and Low Visibility Safeguarding, subject to there being adequate visibility of aircraft both on the pad and approaching the pad at all times. The Pad Controller must be able to see aircraft in the staging areas of any pad in use, as well as the position of all de-icing rigs when in the safety zones. Any twin-engine aircraft can be de-iced with engines running, all other aircraft are to be shut down.

Any size of aircraft can be accommodated in JEDI South and JEDI Delta, however when vehicles are positioned within the Safety Zone only aircraft up to Code E can be accommodated, so for A380 operations de-icing rigs must use the Safety Zone on Stand 581. BA does not plan to assign A380s to JEDI for the Winter 2020/21 season as they are likely to remain in storage.

When an aircraft is moving to or from Stand 582, 583 or any stands located on Taxiway Delta, ATC will call ICE TOWER to request suspension of JEDI. Access for aircraft to/from Stands 582 and 583 must be from the east. Aircraft bound for JEDI will be held short of Delta. ATC will direct non-JEDI aircraft movements

through the area and once the movement is complete, ATC will confirm that JEDI can return to operations with ICE TOWER.

11.5. Operating Restrictions

The decision to deactivate or suspend operations can be made by British Airways, the AfDM, AODM or ATC in consultation with each party. The AfDM will inform the AODM (and the Airside Tactical Team if the HSPA has been activated) of any suspension. The ICE TOWER must always be manned when the JEDI is activated.

Aircraft allocation to JEDI should be suspended when snow clearance or de-icing/anti-icing of the relevant taxiway blocks is taking place. Enough notice should be provided to ensure the associated areas are clear of aircraft and equipment when the vehicles arrive, ensuring BA can re-plan its de-icing strategy effectively.

At the commencement of any snow clearance activity the AODM should contact the BA DCM and BA Heathrow Delivery Manager to advise the estimated period during which aircraft cannot be allocated to JEDI.

11.6. De-Activation

The BA DCM will advise ICE TOWER that there are no more aircraft planned for JEDI. The BA Heathrow Delivery Manager will also be notified. The ICE TOWER will call the AfDM to confirm that the area is ready to be handed back. The AfDM will notify the ASD's Airfield Control Room (AfCR) to enable resource to be allocated to re-open the area. ASD will follow a standard hand-back procedure which includes opening Stands 576 and 581 with AOU and will ensure the mobile lights and LED signs have been returned to their appropriate storage area before making the areas available to ATC. The VCR supervisor will ensure that JEDI mode and maps are de-selected in Tower HMI systems. ASD will positively confirm with ICE TOWER that the area has been handed back to ATC. The ICE TOWER will in turn advise the BA DCM.

12. Appendix 3 – VADER Operation

When the VADER de-icing pad is selected in AOP, TOBT is not adjusted. Instead, TTOT is amended to reflect the extended taxi time that now includes a diversion via VADER and the time needed to de-ice the aircraft.

12.1. Background

The VADER de-icing pad is situated on the east side of the airfield within the BRAVO taxiway. VADER consists of two aircraft de-icing positions, VADER North and VADER South. Each position can be operated independently or together. Both are designed to facilitate a flow of traffic in a north-to-south or south-to-north direction. It is worth noting that VADER is unlikely to be used on easterly operations given the Hold Over Times and taxiing times involved.

The pads are capable of de-icing twin-engine aircraft up to Code E, excluding Boeing 777-300 series aircraft. VADER's operation assumes and supports de-icing with aircraft engines running.

12.2. Activation Request

The responsibilities in promulgating pad activation will continue to lie jointly between ASD and AOU.

As part of the D-5 to D-2 activities prior to a predicted de-icing event, the AODM will review the requirement for VADER to be activated and discuss this with the Airfield Operations Manager among others. This is usually based on an operational requirement for mass de-icing and to mitigate the impact on the operation which may be exacerbated by snow clearance due to loss of taxiways.

If VADER is confirmed at D-1 as an operational requirement, the AODM will inform all parties, including airlines, handlers, campus security and the Pad Operator (usually a De-icing Service Provider). This will be actioned on the HOCC, Airport Community app notifications and the AOP screen via the tickertape stating that 'VADER will be open'. The AODM will advise Airport Control in APOC that VADER is active.

The AfDM will contact Campus Security and confirm the request to utilise the ICE TOWER.

The AODM must advise that VADER will be set up at the 0400L HOCC giving an expected time for activation (i.e. first aircraft) and at the other conference calls (0900L, 1330L, 2030L) or at any other point as the need requires.

The AODM will assess all operational impact/restrictions including on Taxiway Bravo East, Taxiway Alpha East, access to and from Bealine Base and AFRS required areas with the AfDM.

The AODM in consultation with NATS will advise which direction of flow (north-to-south or south-to-north) VADER will operate. This will determine the site set up.

The Pad Operator (ICEMAN) will phone to notify the AfDM when ready to set up. The AfDM will request the transfer of control of block(s) from the VCR Supervisor to ICEMAN. ATC will activate VADER mode on the AGLCS (Aeronautical Ground Lighting Control System). At this point ATC will consider the block suspended to traffic and red AGL stops bars will be lit around the blocks. Once confirmed, the AfDM will contact ICEMAN to confirm that VADER can be set up.

From this point the VADER ICE TOWER must always be manned by an ICEMAN until deactivation is confirmed by the AfDM in consultation with ATC and the De-Icing Coordinator.

The AfDM will ensure that the ASD Airfield Control Room (AfCR) is informed. A notification will be added on the AOP tickertape by the AODM to confirm that 'VADER is open' and in which configuration. The AfDM will deploy a Leader vehicle to support the set up and close the airside road.

When VADER North is operational the taxiway crossing and airside road from the head of Stand 258 to CP16 will be closed. Awareness of VADER and associated impacts to the airfield and airside road network is promulgated to airfield users backed up via road signage. Requests for access to the airside road will be assessed by ASD and any urgent operational need may be accommodated under Leader escort if the AfDM deems it safe, necessary and appropriate.

When VADER South is in operation, Bolton barriers will be placed on the stop bar between Alpha and Bravo in L26 by the Leader.

Drain guards shall be inserted in the catch pits in locations VN DG1-4. This may be completed in advance of the event. Hydraulic pit cover lifters will be used to remove pit covers. This can be used insert/remove drain guards and for glycol recovery purposes.

The Pad Operator will confirm configuration & functionality of the Bay Manager application, Electronic Message Boards (EMBs) and associated equipment (these are activated through interlocks between Bay

Manager and AGLCS). The Pad Operator is responsible for setting the EMBs in the appropriate position for operating in a Northerly or Southerly flow. These positions are marked on the EMBs.

The Pad Operator must advise AfDM on any degradation of asset services and associated impact on aircraft flow. VADER shall not be operated below any Minimum Services Levels or Allowable Contingencies. Any faults should be logged with the Engineering Help Desk on 0208 745 6507.

The AfDM will request ASD staff to conduct a check to ensure all equipment is in the correct position and will not affect other aircraft taxiing or impact ATC.

The EMBs will be operated by ICEMAN from the VADER control facility 'VADER ICE TOWER'.

12.3. Opening

ICEMAN will liaise with the De-icing Coordinator to confirm that VADER is ready to accept the first aircraft. The De-icing Coordinator will confirm to NATS, Airlines, Ground Handlers and service providers that requests can be made to use VADER. The AOP tickertape notification will change its display from 'VADER requested from time XX:XX' to 'VADER is active'.

The De-icing Coordinator will notify the VCR Supervisor of the aircraft that will need use VADER, via a phone call to the Heathrow Traffic Coordinator (HTC) in APOC. The HTC will notify the VCR Supervisor on 0208 750 2610 who will detail the VADER request on EFPS. ATC will route the aircraft to the operational VADER pad via the most efficient route in keeping with natural airfield flow.

The AfDM shall activate the glycol recovery process for the VADER pad as part of the airport's standard glycol recovery procedure and as employed for JEDI operations. This process involves direct communication between the ICEMAN and the Airfield Control Room in ASD, which will dispatch the Glycol Recovery Vehicle (GRV) to intermittently recover glycol from the surface as part of the wider glycol recovery process during winter operations.

12.4. Operation

During the operation of VADER, Taxiway BRAVO in Blocks 707 and 709 is delegated to the control of the VADER ICEMAN. VADER communications will be provided through the following radio frequencies:

- VADER North Channel 121.955
- VADER South Channel 121.555

The Pad Operator will be responsible for de-icing operating procedures of both VADER pads. The Pad Operator will have use of the VADER pad control facility 'VADER ICE TOWER' managing all aspects of the operation. This is positioned to the south of GRASS AREA 11C and will be in position throughout the winter season. This facility, and the associated operational building, is shared with Campus Security who will decant to the operational building during de-icing operations.

The operation of the VADER pads is permitted during Low Visibility Procedures (LVPs) and Low Visibility Safeguarding, subject to adequate visibility of aircraft both on the pad and approaching the pad at all times. The Pad Controller must be able to see aircraft in the staging areas of any pad in use as well as the position of all de-icing rigs when in the safety zones. The use of thermal image cameras supports the safe use of VADER when visibility is reduced.

If required for operational reasons ATC (VCR Supervisor) may call VADER ICEMAN to suspend VADER. ATC will control any non-VADER aircraft movement through the area using the AGL routing control system. Once the non-VADER aircraft movement is complete, the VCR Supervisor will confirm to the ICEMAN that VADER is approved to return to operation.

If a Code F aircraft is required to taxi through VADER South, all de-icing rigs must move to the western access zone to ensure appropriate clearances. This will be confirmed by the VCR Supervisor, who will call ICEMAN and follow the procedure to suspend VADER.

The process for making requests for de-icing and individual aircraft selection is shown in Figure 29 below.

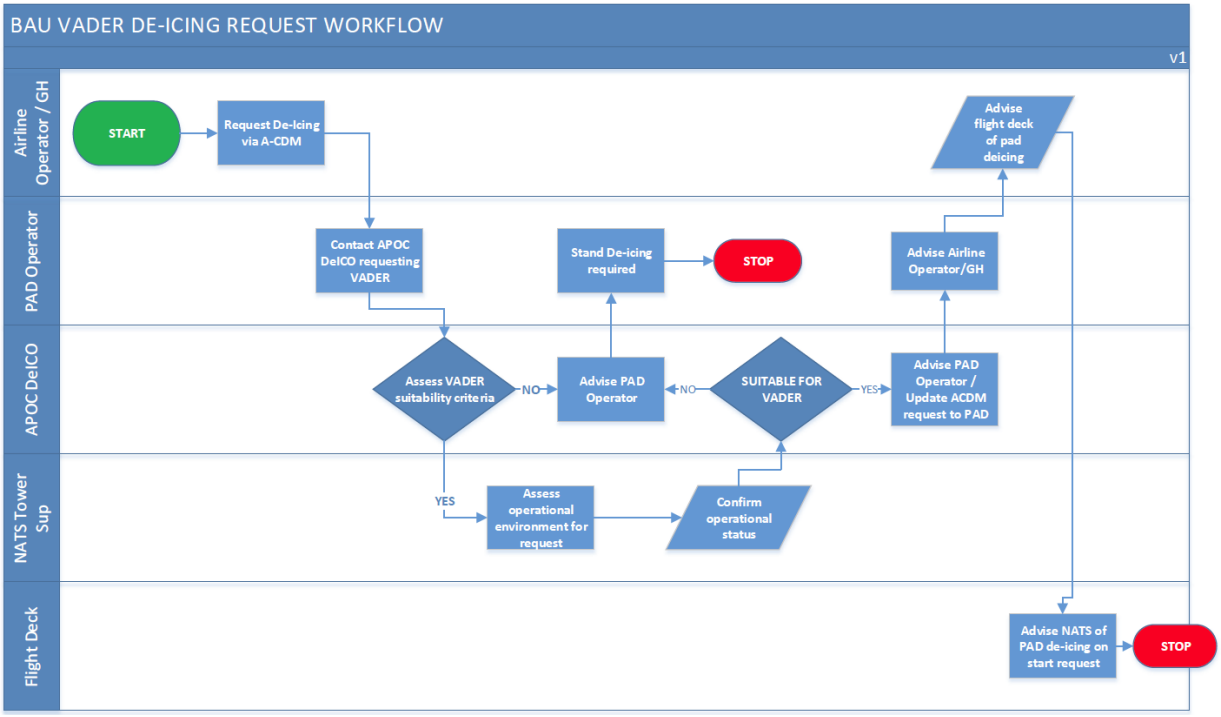


Figure 29: VADER De-icing Request Workflow

12.5. Operating Restrictions

The decision to deactivate or suspend operations will be made by the AfDM but can be requested by De-icing Co-ordinator, the Pad Operator, AfDM, AODM or ATC in consultation with each party. The AfDM shall inform the De-icing Co-ordinator of any required suspension.

Aircraft allocation to VADER should be suspended when snow clearance or de-icing/anti-icing of the relevant taxiway blocks is taking place. Enough notice should be given to ensure associated areas are clear of aircraft and equipment when the vehicles arrive.

At the commencement of snow clearance activity, SNOCO should request ATC to contact the VADER ICEMAN to confirm suspension of operation and ensure all equipment is clear to allow snow clearance to take place. Once the area has been swept, SNOCO should advise ATC who will then contact the VADER ICEMAN to confirm that VADER can be returned to operation.

This process will also be used in the event of a change of operational direction through VADER (i.e. from northerly to southerly, or southerly to northerly).

12.6. Emergency Procedures

In the event of any emergency within the VADER pads, the ICEMAN will trigger the E stop on the Bay Manager system which will instigate an Engine Shut down message and Emergency message for the aircraft being de-iced. All vehicles, where possible, will be retracted to the safe zone. Airport emergency procedures will be applied to command and control any incident. The ICEMAN should contact APOC on 222.

12.7. De-Activation

The responsibilities in promulgating pad deactivation will continue to lie jointly between ASD and AOU.

The De-icing Co-ordinator will advise the VADER ICEMAN that there are no more aircraft planned to go through VADER. The ICEMAN will call the AfDM to confirm that the area is ready to commence the de-activation and hand-back processes. The AfDM will notify the ASD Airfield Control Room to enable resource to be allocated to re-open the area for natural airfield flow.

The AODM will advise Campus Security of the plan to hand back the facility. The DSP will request a formal hand-back of the area to the AfDM.

The DSP will be responsible for ensuring all equipment is returned to the approved storage areas. The DSP will shut down all VADER equipment including EMBs, the Bay Manager system and CCTV and advise the AfDM. Note: the VADER ICEMAN must remain in the VADER ICE TOWER until the AfDM confirms that the formal hand-back to ATC has been completed.

ASD will then follow the standard hand-back procedure for opening a block and ensure all areas are safe for the movement of aircraft before making the areas available to ATC (VCR Supervisor).

The VCR Supervisor will deactivate the VADER control/mode in AGLCS. ASD will follow the removal of the safeguarding procedure by completing an 'all stations' radio call on the 'AIRSIDE ALL' radio channel and update the airfield status screen in the Winter Situational Awareness Map. The AODM will remove the notification from the AOP tickertape, promulgate to Airport Control and any other parties that require updating from the Low Visibility Safeguarding distribution list.

The AfDM will pass a positive confirmation to the ICEMAN that the area has been formally handed back to ATC and only then may the ICEMAN vacate the VADER ICE TOWER. ASD will also reopen the taxiway crossing and airside road.

In the event of an airfield incident and subsequent request by the AfDM, VADER operation will be suspended immediately. Any equipment required will be transferred to the AfDM for immediate use.

13. Appendix 4 – Capacity Constraints Interventions

The procedure for implementing the Capacity Constraints process at Heathrow is promulgated to stakeholders in the United Kingdom Aeronautical Information Publication (UK AIP), see AD 2-EGLL-1 London Heathrow Aerodrome – Textual Data, dated 8 October 2020, Section EGLL AD 2.20 LOCAL TRAFFIC REGULATIONS. The relevant excerpt is provided here:

(k) In order to provide a stable and deliverable schedule during times of disruption Heathrow Airport Ltd, in agreement with the AOC and Airline Operators (AOs), has developed the following mechanisms to assist with both short term and longer-term disruption. These interventions aim to minimise the impact of disruption to passengers and the local community, whilst providing participating airlines with the ability to pre-tactically cancel flights in advance of expected disruption and thus minimise the risk of tactical cancellations. Interventions are managed on behalf of Heathrow Airport by the Aircraft Operations Duty Manager (AODM), tel +44 (0) 208 757 3501, 0530-0000 (local).

(i) Level One intervention – tactical tools and methodologies used to minimise the impact of short term capacity issues. These are applied under BAU conditions.

(ii) Level Two intervention – When inclement weather is forecast the AODM, in conjunction with ATC, will assess the risk to the normal operations of the airfield. If disruption is expected the AODM will convene a conference call with the top 23 airlines (in terms of ATMs) where it may be agreed that airlines are required to make a pre-tactical reduction in their schedules. Heathrow may also decide not to accept diversions during a period of disruption, and ad hoc slots may be suspended. All outcomes will be communicated via NOTAM. Airport Coordination Limited (ACL) is responsible for monitoring the utilisation of slots and applying the "use it or lose it" (80:20) rule as required under the European Union Regulation 95/93 amended by 794/2004. ACL will review each activation of the Demand v Capacity process on a case by case basis. ACL will look favourably on those air carriers that comply with the request by the airport to cancel in advance of predicted disruption following the issuing of a NOTAM and will provide alleviation for 80:20. ACL will review cancellations that occur in the same way it would for any other disruption, which may lead to further alleviations.

(iii) Level Three intervention – if inclement weather is forecast for a more prolonged period (generally in excess of 24 hours) or if the airport has experienced a loss of critical resource, systems or infrastructure and disruption is expected to last for greater than 24 hours the Head of Operations would instigate Heathrow Airport Demand and Capacity Balancing (HADACAB). A conference call is held with the top 50 airlines (in terms of ATMs) and under the Terms and Conditions of use of Heathrow a schedule reduction is mandated. Such reductions are also considered for 80:20 alleviation. Generally, a Level Three Intervention is preceded by a Level Two intervention;

(iv) Level Four intervention – in the event of the loss of a significant asset or processing agent (including staff) resulting in disruption that is expected to last for a prolonged period (such as loss of terminal, loss of runway) then the Head of Operations would instigate Heathrow Airport Demand and Capacity Balancing (HADACAB). A conference call is held with all airlines and under the Terms and Conditions of use of Heathrow a schedule reduction is mandated. Such reductions are also considered for 80:20 alleviation. A Level Four intervention may not necessarily be preceded by a Level Two or Three intervention.

14. Appendix 5 – De-icing Conditions based on Meteorological Conditions

De-icing Condition	A	B	C	D	E	F	G	H	I	J
MET Condition	Light			Medium				Severe		
A388	15	17	19	21	23	25	30	35	45	50
B741										
B742										
B743										
B744										
B748										
B74F										
B74N										
B74R										
B74S										
B74Y										
AB6	12	14	16	18	20	22	25	28	30	35
ABY										
A306										
A30B										
A310										
A330										
A332										
A333										
A340										
A342										
A343										
A345										
A346										
B762										
B763										
B764										
B767										
B76W										
B772										
B773										
B777										
B77F										
B77L										
B77W										
B77X										
B783										
B788										
B789										
DC10										
MD11										

De-icing Condition	A	B	C	D	E	F	G	H	I	J
MET Condition	Light			Medium				Severe		
B75F	11	13	15	16	17	19	21	22	23	25
B75W										
B752										
B753										
B721	10	11	12	14	15	16	17	18	19	20
B722										
B461	10	11	12	13	14	15	16	17	18	19
B462										
B463										
B712										
CRJ7										
CRJ9										
DC91										
DC92										
DC93										
DC94										
DC95										
F100										
F70										
MD81										
MD82										
MD83										
MD87										
MD88										
MD90										
RJ1H										
RJ70										
RJ85										
RX1H										
RX85										
A318	6	7	8	9	10	11	12	13	15	17
A319										
A31Y										
A320										
A321										
A32B										
A32S										
AT43										
AT45										
AT72										
AT73										

De-icing Condition	A	B	C	D	E	F	G	H	I	J
MET Condition	Light			Medium				Severe		
AT75										
AT76										
B731										
B732										
B733										
B734										
B735										
B736										
B737										
B738										
B739										
B73G										
B73H										
B73J										
B73W										
DH8A										
DH8B										
DH8C										
DH8D										
DHC7										
E90										
E95										
E170										
E190										
F50										
CRJ1	6	7	7	8	9	10	11	13	14	16
CRJ2										
E135										
E145										

Table 14: De-icing Conditions based on MET Conditions

15. Appendix 6 – AOP SNOW Module System Alerts

When the SNOW module is activated by the AODM, the additional performance alerts shown in Table 15 may be triggered:

Alert	Description	Resolution

CDM40 **Aircraft not ready for de-icing**	This alert highlights any flight that has not recorded ARZT by the ERZT, with a 5-minute tolerance	Flight crew need to call ready for de-icing within the period ERZT +5 minutes or request a TOBT update if there is a delay.
CDM41 **De-icing not confirmed**	This alert highlights any flight that has requested de-icing but, by X minutes before TOBT, has not been allocated a de-icing rig	The DSP should allocate one or more de-icing rigs as soon as possible to prevent departure delay.
CDM42 **Hold Over Time will be exceeded**	This alert highlights any flight where HOT may not be sufficient to meet TSAT	De-icing activity will need to be re-planned to meet TSAT within the HOT. NOTE: this alert is for guidance only
CDM43 **De-icing scheduled before aircraft is ready**	This alert highlights any flights where the ECZT is prior to TOBT	The DSP should check whether the TOBT has been changed (e.g. due to a turn-round issue) and re-plan de-icing accordingly.
CDM44 **De-icing not compliant with TSAT**	This alert highlights any flight where a TSAT improvement results in the TSAT being prior to EEZT	This may occur where de-icing was planned to TSAT due to ground delay that subsequently reduced or cleared. The DSP should re-plan or request the AO/GH to submit a TOBT in line with the original TSAT.

Table 15: AOP SNOW Module Performance Alerts

16. Appendix 7 – Forward Holding Tank Process

The Forward Holding Tank process is required if one or more DSPs have insufficient fluid stocks and delivery cannot be received in time.

The Ramp Assurance Manager will decide when this process needs to be activated.

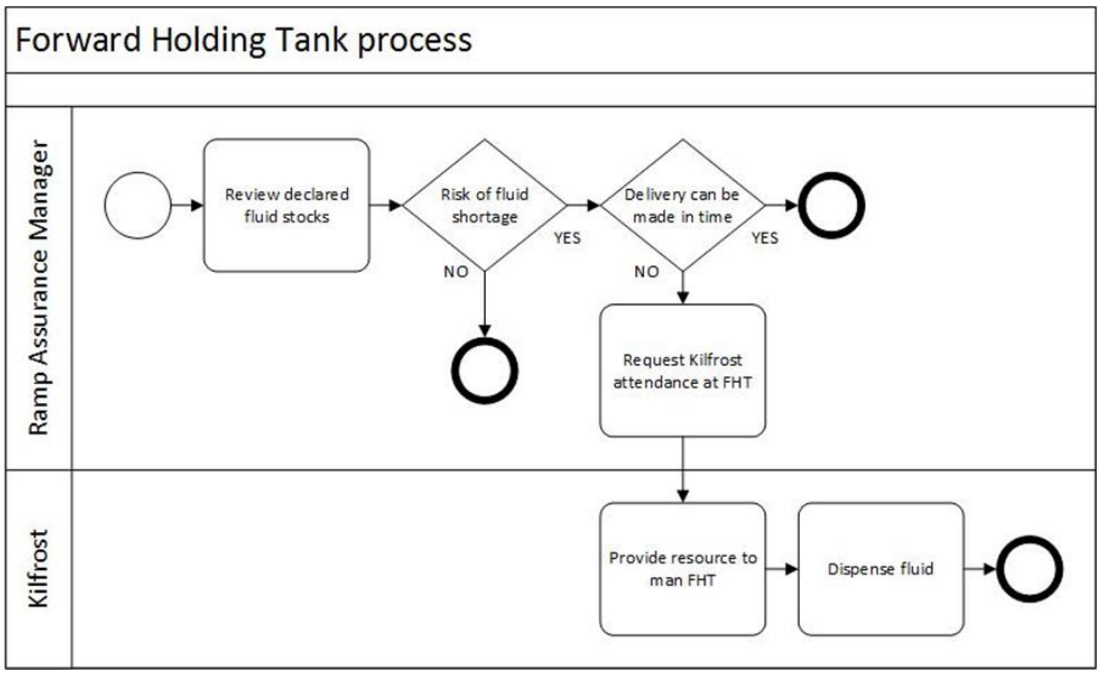


Figure 30: Simplified Forward Tank Holding Process

17. Appendix 8 – Fluid Delivery Process

Heathrow is required to meet DfT standards for screening all personnel and goods entering airside areas and the CPSRA. In line with these requirements, please note the following:

- All goods must be screened through the Colnbrook Logistics Centre (CLC);
- A Fulcrum reference number is needed for access to the CLC;
- The details required for a Fulcrum reference number are:
    - Driver's name;
    - Vehicle registration, make, model, colour and livery (if applicable); and
    - Delivery location and contact number on site.

These details should be entered on Fulcrum when making the booking (www.wj-fulcrum.co.uk) as soon as the requirement is known. Any issues encountered when making a booking should be directed to 020 8757 4110 or email fulcrum@wilsonjames.co.uk.

On arrival at the CLC vehicles will be provided with a required ID, given the facility to store prohibited items within kit lockers, screened and then will await a Wilson James escort through the Control Post to their destination.

Wilson James will then hand over to a responsible party who will take over escorting duties and escort back to landside. If deliveries are scheduled to arrive at the weekend or outside of CLC working hours (0800–1700) please contact the HAL Licence Managers 2-5 working days in advance to be issued with Vehicle Apron Passes. If this is not possible, contact Campus Security to arrange clearance as per the out-of-hours procedure.

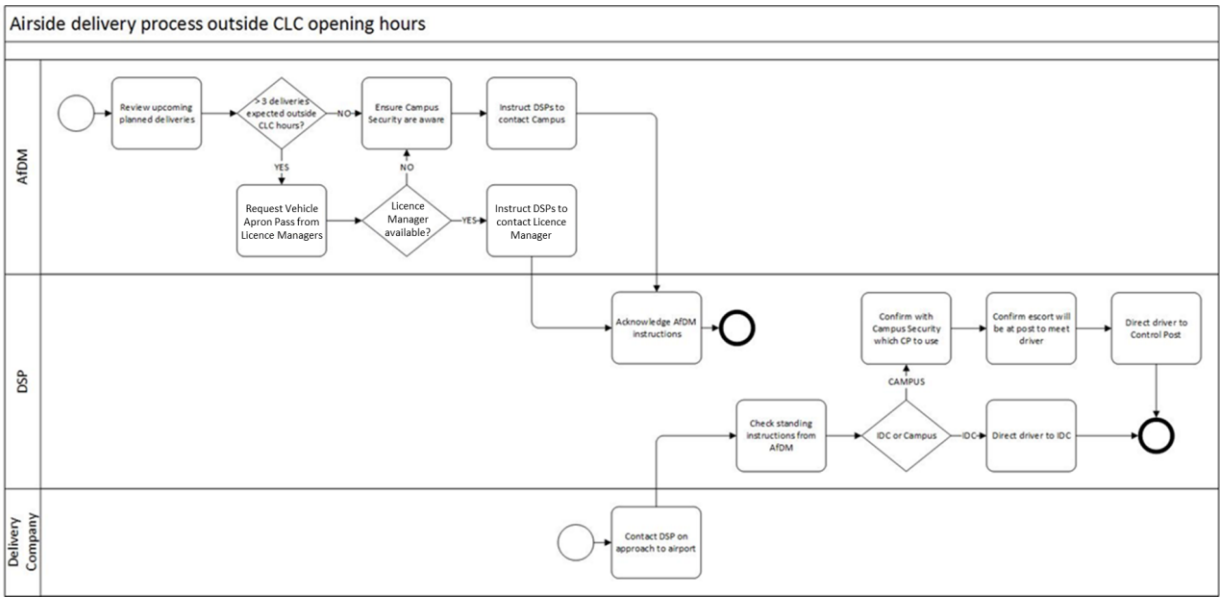


Figure 31: Fluid Delivery Process

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