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Winter operations evaluation

Independent report for
Royal Schiphol Group and KLM

QUALIFICATIONS, ASSUMPTIONS, AND LIMITING CONDITIONS

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Contents

1. Introduction, airport context and methodology

This report presents an independent evaluation of the operational disruption at Amsterdam Airport Schiphol (AAS) during the period of significant and sustained winter weather (snowfall, ice accumulation), in early January 2026, conducted for Royal Schiphol Group (RSG) and KLM. This report has been prepared for information purposes only, to support decision making by Royal Schiphol Group and KLM; it does not provide a legal perspective or opinion and was not prepared for use in legal proceedings. The objective of the report is to understand the root causes of the disruption, identify lessons learned, and develop forward-looking recommendations to reduce the operational, passenger, and employee impact of future winter weather disruptions, and enhance overall winter resilience.

The severe winter weather occurred over several days, from 2 January to approximately 9 January, and resulted in significant operational impacts, including flight cancellations, delays and disruption to passenger, cargo, employee, and ground operations. A substantial proportion of scheduled departures required de-icing, and peak periods saw pressure on landside passenger flows, as well as reduced airside capacity across multiple parts of the system, including runway throughput, de-icing operations, ground handling and stand availability.

Airports are complex operating environments where the airport, air traffic control (Luchtverkeersleiding Nederland or LVNL at AAS), airlines, ground handlers, and other third-parties collaborate to deliver a safe, and reliable operation. At AAS, de-icing is performed by ground handling companies contracted by airlines, with KLM Ground Services (KLM GS) acting as the only provider at the Central De-icing Facility (CDF), which is in a remote location at the airport. The CDF serves all cargo aircraft and approximately 60 airlines. Due to the large number of contracted airlines and the high volume of KLM flights as the hub carrier and largest operator at Schiphol, KLM Ground Services carries out the majority of de icing operations. As such, KLM GS is responsible for the largest share of de-icing throughput, while other handlers provide de-icing services at the gate for their respective airline customers. RSG, as airport operator, is responsible for overall airside operations of its facilities, including infrastructure (runways, taxiways, stands, de-icing pads), and most system coordination, but does not directly provide de-icing services.

In addition to KLM, multiple passenger airlines operate at AAS, each contracting their own ground handling providers for aircraft handling and de-icing services. These include handlers such as Menzies, Swissport, Aviapartner and Viggo, which deliver gate-based de-icing for their respective airline customers. While these handlers operate independently within their contractual arrangements, their activities collectively contribute to the overall system de-icing capacity. As such, effective winter operations depend not only on the performance of individual providers, but also on the coordination and alignment across airlines, ground handlers, LVNL and the airport operator.

Within this operating model, several structural and regulatory constraints shape how disruption management is executed. Airlines retain full responsibility for their flight schedules, including decisions on cancellations, which are made on a voluntary basis and cannot be mandated by RSG as the airport operator. Similarly, passenger communication is primarily owned by airlines, which are responsible for informing passengers about flight status, rebooking and entitlements, while RSG provides complementary airport-specific and general guidance (e.g. via website and public announcements). In addition, meteorological forecasting is provided by Koninklijk Nederlands Meteorologisch Insituut (KNMI) as the designated national weather authority for the aviation sector. These constraints are inherent to the ecosystem at Schiphol and define the roles and responsibilities of each stakeholder during disruption events. The interaction between these roles is critical, as overall airside capacity (i.e. achievable departures per hour) during winter operations is jointly determined by runway throughput, stand availability and de-icing capacity.

It should be noted that snow and de-icing conditions occur relatively infrequently at AAS and that severe winter weather events inherently create operational disruption at major hub airports, even where infrastructure and preparedness are well developed. Additionally, accurate forecasting of the timing and severity of a winter event is essential for effective operational planning and enabling timely mitigation measures, such as proactive cancellation of affected flights.

The purpose of this report is to establish a factual understanding of the disruption, identify the root causes, and set out recommendations to strengthen winter operations and reduce the impact of similar events in the future. We do not make an assessment on the implementation timeline of the recommendations.

The report is based on a combination of qualitative and quantitative inputs across RSG, KLM and the wider operating ecosystem. The methodology includes:

- Over 80 interviews conducted with operational and senior stakeholders across RSG, KLM, other airlines, ground handlers, LVNL, the Ministry of Infrastructure and Water Management, and other relevant parties including KNMI, cargo representatives and industry associations (the Board of Airline Representatives in the Netherlands (BARIN) and the Human Environment and Transport Inspectorate (ILT)).
- Review of over 100 documents, including operational data, disruption reports, internal communications and decision records.
- Reconstruction of the disruption timeline across key operational processes, including weather forecasting and interpretation, de-icing demand and capacity, operational decision-making, and passenger impact.
- Benchmarking against 10 international airports (Europe 7, North America 3), spanning both high-snow exposure airports (6) and comparable low-snow exposure hubs (4). At its core, the analysis explored each airport’s winter operations infrastructure and operating model (including de-icing) and helped identify best-practice guidance for winter preparedness, winter operations, disruption management, and governance.

In this document, we use “capacity” in several specific ways. De-icing capacity refers to the number of aircraft that can be de-iced at a specific location or by a specific method given the weather and precipitation conditions. System de-icing capacity refers to the combined, theoretical de-icing capacity across both gate and remote de-icing, reflecting the de-icing capacity of all de-icing infrastructure at Schiphol airport. Airside capacity refers to the number of departures achievable over a defined period across the airside system. Runway capacity refers to the maximum runway movement rate over a defined period. Stand capacity refers to the number of available vliegtuigopstelplaatsen (VOPs), hereafter referred to as stands. Glycol storage capacity refers to available tank/storage volume for glycol.

Where relevant, findings reflect both observed data and reported stakeholder perspectives, referred to as “it was reported”, which by their nature may involve an element of subjectivity on the part of the stakeholders. References to stakeholder input presented have been triangulated where possible with available data. This report relies on information that has been furnished by RSG, KLM and other third parties. This information is believed to be reliable but, unless otherwise expressly indicated, it has not been independently verified by Oliver Wyman, and Oliver Wyman accepts no responsibility for its accuracy.

RSG and KLM are existing clients of Oliver Wyman, and they have jointly commissioned Oliver Wyman to prepare the report. RSG and KLM provided information to support preparation of the report, they had the opportunity to review it for factual accuracy, and each of them has confirmed their agreement with the fact base set out in the report. Notwithstanding the input of RSG and KLM, the views and recommendations contained in the report are those of Oliver Wyman and Oliver Wyman retains editorial control.

The analysis focuses on operational, organisational and coordination factors affecting system performance. This report is technical in nature and assumes a degree of familiarity with industry-specific terminology (See Exhibit 11) and operational concepts from the reader.

Safety-related issues, as well as legal and regulatory matters are outside the scope of this report, although it may reference these matters where appropriate. Further, the report does not opine on the culpability of, or seeks to attribute liability to, individual organisations or actors in respect of the operational disruption at AAS.

2. Executive summary of findings

Severe winter weather occurred from 2 to 9 January 2026 and resulted in significant impacts across the airport system, including flight cancellations, delays and disruption to passenger and cargo operations. The report reconstructs the sequence of events based on operational data and stakeholder input and provides an evidence-based assessment of system performance during the disruption.

The analysis identifies a combination of factors contributing to the disruption and its severity. These causes can be distinguished across root causes, contributing causes and other factors, outlined below.

Root causes of the disruption (underlying factors that drove the disruption):

- Weather forecasts underestimated the timing and volume of snowfall on 2 January
- Prolonged significant winter weather conditions, above historical averages, persisted through 7 January
- De-icing demand and processing times for remote[1] and gate[2] de-icing were underestimated in planning assumptions
- Remote de-icing capacity was not fully utilised
- Total system de-icing capacity was not fully utilised due to an uneven distribution of demand across providers
- System de-icing capacity[3] was insufficient to meet peak demand
- Scheduled flight demand on the day of operations (D0) exceeded available airside capacity

Contributing causes (factors that did not trigger the disruption but reduced system resilience and recovery capability):

- Operational governance of Royal Schiphol Group (RSG) did not enable timely flight schedule reduction guidance, based on system constraints
- Gate, stand and runway availability were constrained during peak snowfall, which limited airside capacity (departures over a defined period)
- Operational decision-making was not based on a real-time integrated view of airside capacity

1 Operated by KLM Ground Services (KLM GS), CDF central pads owned by AAS

2 Operated by other de-icing ground handlers, gate positions owned by AAS

3 Reflecting the theoretical de-icing capacity of all de-icing infrastructure at Schiphol airport

Other factors (factors that amplified the scale and duration of the disruption):

- Crisis management frameworks of RSG and KLM lacked effective trigger-based escalation and system-wide coordination
- Cross-ecosystem operational coordination and communication relied primarily on bilateral channels
- Passenger communication at the airport lacked clear guidance, ownership and coordination
- Staff access to the airport was constrained during the disruption

While not a core focus of the disruption summary timeline or root causes featured in this report, it should be noted that the disruption also placed sustained pressure on employees across Schiphol, airlines and ground handling organisations. Staff were required to manage increased workloads over multiple days under challenging winter conditions, including supporting disrupted operations and assisting passengers in a dynamic and at times demanding environment. In some cases, access to the airport was affected by weather conditions and public transport disruption, adding further complexity to staffing availability. The resilience and adaptability of operational staff were important in maintaining continuity of operations throughout the disruption period, and employee impact is therefore considered as an integral part of the overall system response. In addition, passengers were affected over multiple days, particularly when delays and cancellations accumulated rapidly and were often last-minute. Congestion developed in the terminal, with queues at check-in, transfer desks and baggage reclaim areas, and a number of passengers remained at the airport overnight. Communication and passenger care measures were scaled up as the disruption progressed. However, high passenger volumes combined with limited clarity on next steps and rebooking timelines created a difficult passenger experience. This report considers passenger impact as an important dimension of overall system performance during disruption events.

The ”core recommendations” support in addressing at least one of the root causes identified, and focus on four main areas aimed at strengthening system resilience and reducing the impact of future winter disruptions:

- Winter preparedness and governance documentation
- De-icing operating model
- Weather forecast and operational response
- Operational decision-making

There are several ”further considerations” which highlight additional improvement opportunities.

Implementation of recommendations will require coordinated action across RSG, KLM and the wider ecosystem, with a focus on improving consistency, transparency and predictability in future disruption events. Recommendations do not make a judgement on the implementation timeline and require both RSG and KLM to complete their own feasibility and prioritisation assessment.

3. Disruption summary timeline

This section provides a factual reconstruction of the disruption at Schiphol Airport during early January 2026, based on operational data, available reports and stakeholder interviews. It outlines the sequence of events (see Exhibit 1), key operational developments and system constraints observed over the period. Where relevant, the timeline notes whether the disruption was predominantly airside (runways, taxiways, de-icing, gates) (see Exhibit 2) or landside (terminal operations, passenger processing, baggage). The timeline is intended to provide context for the root cause analysis that follows and does not seek to assess individual decisions in isolation.

Exhibit 1: Disruption summary timeline

Date	Forecasted snowfall (D-1)	Actual snowfall	Events
Late December-early January			Interim check of de-icing provider readiness regarding expected weather; no problems were reported across all ground handlers KNMI weather forecasts of 1 January indicated a 40% chance of light snowfall without accumulation, a 10% chance of 1cm snow accumulation and strong winds for 2 January. Winter conditions were anticipated, but the precise timing and intensity of the snowfall were unexpected. (See Exhibit 3) Snow stars (Schiphol snow clearing personnel) were activated timely on D-3 (31 December) and maintained up to date as planned throughout the disruption
Friday, 2 January	40% chance 0 cm	1-2 cm	**Morning:** Snowfall commenced at 7 AM, earlier and with greater intensity than forecasted (1.5 cm snow fell). 100% of aircraft required de-icing, compared to an anticipated 30%, increasing demand of available de-icing capacity. (See Exhibit 3) **Day:** • Demand for de-icing increased rapidly. The throughput rate at the remote de-icing facility did not meet expected levels. Aircraft turnaround times increased, contributing to outbound delays and reduced gate availability • Operational disruption at airside escalated. Queues formed at the remote de-icing facility and congestion increased across gates, causing inbound aircraft to wait for gates Disruption was primarily airside-related
Saturday, 3 January	80% chance 2 cm	1 cm	De-icing throughput increased and airlines implemented more proactive flight cancellations (See Exhibit 8) Operational disruption expanded to include landside. Passenger queues formed within the terminal, at ticket desks and at Baggage Reclaim Door 16 as delays and cancellations further accumulated

Date	Forecasted snowfall (D-1)	Actual snowfall	Events
Sunday, 4 January	85% chance 4 cm	0.5 cm	Communication from airlines to passengers was more directive compared with the initial phase of the disruption Operational pressures remained, with ongoing schedule disruption and continued rebooking activity
Monday, 5 January	95% chance 4 cm	5 cm	In the morning, snowfall intensity (5 cm snow within a short period) was such that, despite continuous snow clearing efforts, runway and taxiways could not be maintained at operational levels. This resulted in a temporary suspension of flight movements (zero departure and arrival rate)
Tuesday, 6 January	80% chance 3 cm	3 cm	KLM GS glycol levels (for one-step de-icing) became critical, causing a shift towards two-step de-icing procedures[4], reducing de-icing throughput. KLM GS also decided to deprioritise cargo flights for de-icing operations and had to secure additional glycol supplies at short notice from outside the airport to avoid depletion Landside disruption persisted with high numbers of stranded passengers requiring support Passenger care arrangements, including the "Bed Plan" were scaled up for stranded passengers
Wednesday, 7 January	100% chance 5 cm	2 cm	Last day with heavy snowfall and mass cancellations Proactive flight cancellations reached their peak, with 97% of cancellations made proactively (D-1) (See Exhibit 8)
Thursday, 8 January	25% chance 0.3 cm	0 cm	System recovery commenced. Rebooking activity increased, and operational performance began to stabilise, although delays and backlogs persisted. (See Exhibit 7) Two-hour power outage
Friday, 9 January	80% chance 2 cm	1 cm	First day of largely normal operations from airside perspective; no de-icing issues reported
Post-event			Passenger processing and baggage handling continued to experience pressure for several days due to accumulated disruption

4 Two-step de-icing uses a different type of glycol than one-step de-icing; glycol availability for two-step de-icing was not critical

Exhibit 2: System capacity constraints throughout disruption[1]

Timeline of bottlenecks across key factors

2 Jan-6 Jan (based on available data range)

	Planned capacity at AMS	02-Jan	03-Jan	04-Jan	05-Jan	06-Jan
De-icing capacity[2]	**Remote de-icing:** 4 stands, operated by KLM GS **1-step de-icing:** max of ~25/hr **2-step de-icing:** max of ~10/hr	**Forecast:** 20-30% de-icing **Actual:** 100% de-icing required Actual de-icing capacity below expected de-icing capacity				KLM Ground Services glycol stock critical, cargo deprioritised
	Gate de-icing: operated by other ground handlers ~6/hr/ground handler	Unused gate de-icing capacity due to limited pooling of ground handler de-icing capacity Ground handlers were effectively de-icing existing customers and had additional capacity • Other airlines proactively engaged them to facilitate additional de-icing • However, long wait times for gate de-iced aircraft persisted because gate de-icing not integrated in operational planning systems (including to CDM inputs)				
Gate/VOP availability	~110 boarding gates[3] Snow clearing capacity of 12 VOPs/hr	Outbound capacity constraints leading to congestion at gates and inbound flights waiting for available gate During heavy snowfall, last-minute gate changes forced snow fleets to be redirected, delaying clearing of gates needed for inbound flights			1.5h zero rate caused by heavy snowfall	
Runway capacity	6 available runways Avg. outbound capacity of 74/hr[4]	Snow clearing of runways and taxiways reduces outbound and inbound capacity, but not more constraining than de-icing capacity			1.5h zero rate caused by heavy snowfall	

Binding | Constraining but not binding | Not limiting

1. See Exhibit 4, 5 and 6 for 04 Jan deep dive; 2. Source: Schiphol Memo on Winter disruptions; 3. Number connected gates, Source: airport overview Schiphol; 4. Source: LVNL

4. Root causes

The root causes of the January 2026 disruption have been assessed based on interview evidence, operational data and supporting documentation. The analysis focuses on system-level drivers of performance across weather forecast interpretation and response, airside capacity, governance and coordination. To provide clarity on causality and impact, the findings are structured across three levels:

- Root causes: Underlying factors that directly constrained airside capacity or decision-making and therefore drove the disruption. The root causes are presented in the sequence in which they unfolded, and the ordering does not reflect their relative impact on the overall disruption.
- Contributing causes: Factors that did not in themselves trigger the disruption but reduced system resilience and recovery capability.
- Other factors: Factors that amplified the scale and duration of the disruption.

In line with industry practice, the transition from operational disruption to crisis is not defined by a single event, but by a combination of factors including duration, predictability of recovery and system-wide impact. While airports and airlines manage operational disruptions on a daily basis, escalation to crisis governance typically occurs when disruption extends beyond a single operational cycle, recovery is uncertain and multiple parts of the system are simultaneously under sustained pressure. In this context, multiday disruption with continued adverse conditions and limited recovery trajectory is generally considered to require full crisis-level coordination. The root cause analysis indicates that while crisis governance structures were activated, there was no shared, predefined set of metrics or thresholds across stakeholders to consistently determine when escalation to crisis-level coordination was required.

Root causes

4.1. Weather forecast underestimated the timing and volume of snowfall on 2 January

KNMI weather forecasts on 1 January indicated a 40% chance of light snowfall (see Exhibit 3) without accumulation and a 10% chance of 1 cm snow accumulation for 2 January. Winter conditions were anticipated, but the precise timing and intensity of the snowfall were underestimated in the forecasts.

Snowfall began earlier and more intensely than expected, at approximately 7:00 AM on 2 January, leading to a divergence between anticipated and actual operating conditions. Operational planning was based on the forecasted moderate snow scenario, resulting in limited early flight cancellation guidance by RSG. While the forecast for 2 January did not reflect actual conditions, forecasts for subsequent days were more aligned with observed weather conditions, although exact timing of snowfall was at times inaccurate

Exhibit 3: Weather forecast during the disruption

Snow forecasts for each day of winter disruption

Forecasts of D-5 until D-1, maximum snow amount in cm, chance of snow in %

	02-Jan	03-Jan	04-Jan	05-Jan	06-Jan	07-Jan	08-Jan	09-Jan
D-5	0 cm	0.3 cm	3 cm	1 cm	0 cm	1 cm	2 cm	2 cm
	15%	50%	60%	45%	40%	40%	45%	20%
D-4	0 cm	2 cm	2 cm	3 cm	1 cm	4 cm	2 cm	7 cm
	10%	60%	70%	80%	40%	70%	65%	40%
D-3	0 cm	2 cm	3 cm	4 cm	2 cm	5 cm	1 cm	0 cm
	10%	70%	60%	80%	60%	75%	40%	15%
D-2	0 cm	3 cm	4 cm	4 cm	2 cm	4 cm	0 cm	2 cm
	5%	75%	80%	90%	70%	80%	15%	50%
D-1	0 cm	2 cm	4 cm	4 cm	3 cm	5 cm	0.3 cm	2 cm
	40%	80%	85%	95%[2]	80%	100%	25%	80%
Actual snowfall	1.5 cm[1]	1 cm	0.5 cm	5 cm	3 cm	2 cm	0 cm	1 cm

Low forecasted amount of snow — High forecasted amount of snow

1. Forecasts underestimated snowfall intensity for 02-Jan, which began at 7h00; snow, with no accumulation, was expected in the night of 02-Jan to 03-Jan; 2. On the 05-Jan very heavy snowfall caused a 1.5h zero flight rate

Source: KNMI 5-day weather reports, received between 1 AM and 5 AM; KNMI historical data

4.2. Prolonged significant winter weather conditions, above historical averages, persisted through 7 January

The disruption was further driven by sustained snowfall over multiple consecutive days, which is an uncommon occurrence in the Netherlands. Historical KNMI data indicates that the average number of days per year with continuous snow cover has decreased from approximately 23 days around 1960 to 3 days in recent years.[5] Multi-day snowfall events are therefore rare. The January 2026 disruption accounted for the highest number of consecutive snowfall days at Schiphol since 2010. The duration and persistence of these conditions increased operational pressure across all parts of the airport system, including de-icing and stand availability. It was reported that the infrequency of such prolonged winter conditions contributed to limited operational familiarity, affecting the assessment of disruption severity and speed at which system-wide adjustments were implemented.

5 KNMI (Royal Netherlands Meteorological Institute) website, historical climate data and long-term weather statistics, 2026

4.3. De-icing demand and processing times for gate and remote de-icing were underestimated in planning assumptions

4.3.1 De-icing demand and processing time were higher than anticipated

Snowfall intensity was greater than forecasted. De-icing demand was higher than anticipated throughout the winter disruption period. On 2 January, planning assumed that around 30% of aircraft would require de icing, based on the limited forecasted snow; in reality, 100% of departures required de icing. In addition, a higher proportion of aircraft required two-step de-icing. Two-step de-icing requires more time than one-step treatment, increasing average processing time per aircraft. As a result, both volume of demand and time required per aircraft were higher than assumed, reducing overall system throughput.

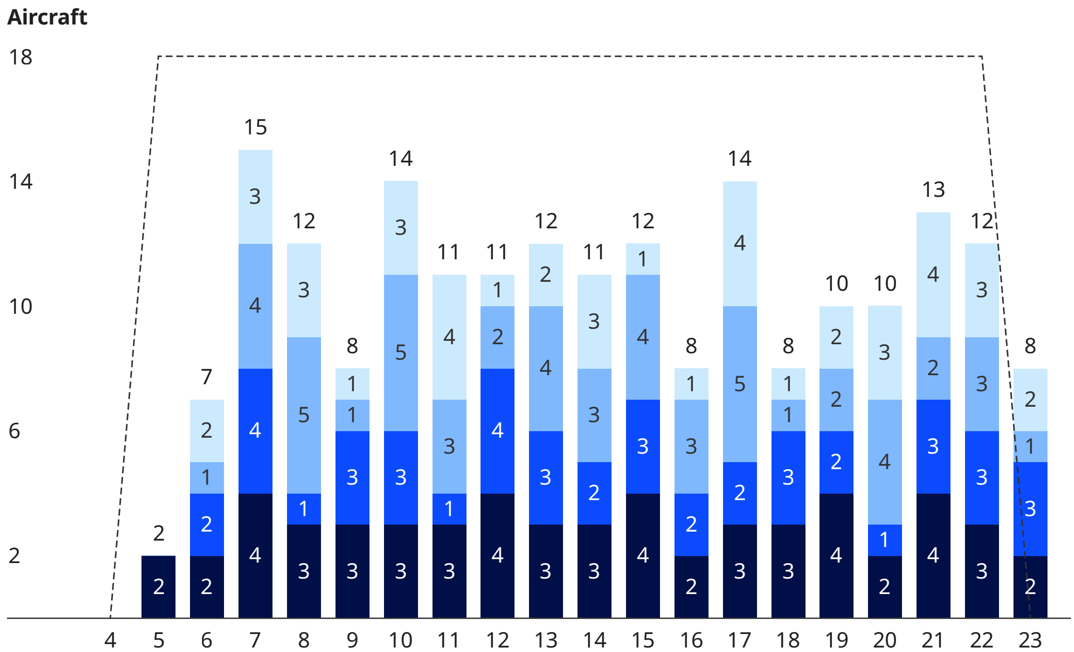
4.3.2 Declared de-icing capacity does not reflect achievable throughput

Declared de-icing capacity (De-icing Flow Expectations, DFE) for gate and remote de-icing did not reflect achievable throughput during the disruption (see Exhibit 4 and Exhibit 5). Current DFE calculations do not systematically account for operational factors such as driving times for de-icing trucks, de-icing crew rotations, refilling of de-icing fluid, stand availability, mix of one-step and two-step de-icing and mix between widebody and narrowbody for specific hourly intervals. These factors reduced the number of aircraft that could be processed per hour in practice. As a result, DFE figures tended to overestimate the de-icing capacity available to the system, reducing their reliability as an input for decision-making and operational planning systems.

Exhibit 4: De-icing capacity throughput for remote de-icing per pad compared to de-icing flow expectations by KLM ground services for 04-Jan[1]

De-icing performance per stand on 04-Jan

De-icing flow expectations (DFE)[2] and actual # of de-iced (per pad[3]), per hour



	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
# waiting[4]		6	4	10	19	16	6												
% 2-step de-icing[5]	100	86	67	8	75	64	18	55	75	45	33	88	86	50	20	10	31	8	0

# of de-iced aircraft per pad: P16 P14 P12 P10

-- KLM-GS DFE

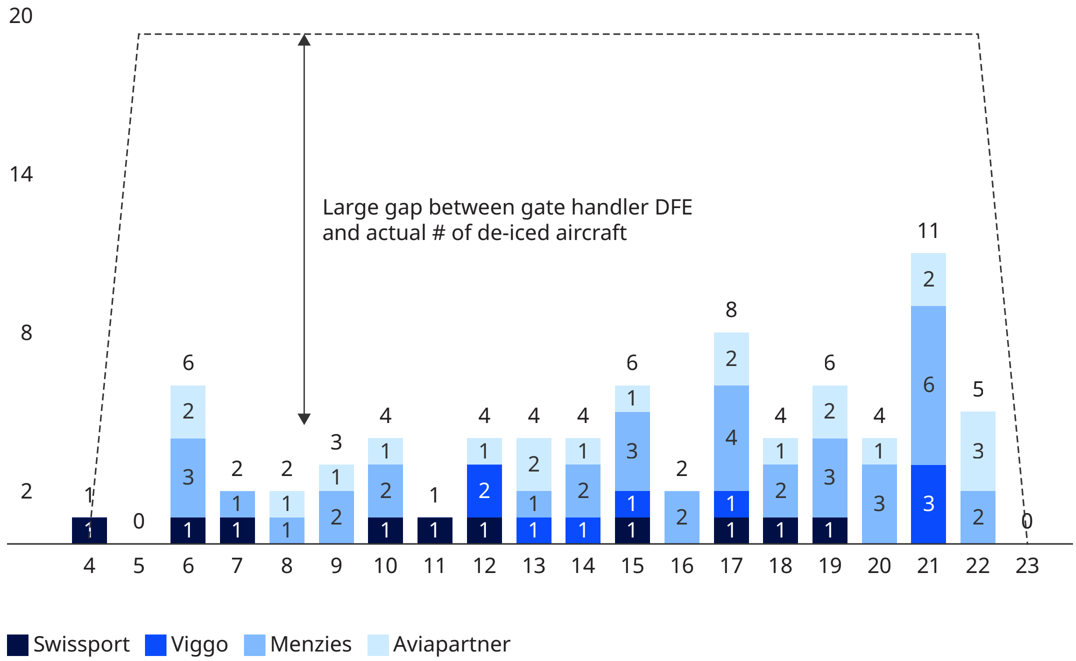
1. Declared de-icing capacity (DFE) reflects theoretical assumptions and overstates achievable throughput, as it does not fully account for operational constraints (e.g. travel times, crew rotations, refilling). Even under full utilisation of declared capacity, which was not achieved in practice, total de-icing capacity would have remained insufficient to meet peak demand. 2. De-icing flow expectations are the # of aircraft that are expected to be de-iced by KLM-GS in an hour. It varies based on the de-icing capacity level (DCL) and weather conditions; 3. The remote de-icing facility has 4 pads, called P10, P12, P14, P16;
4. # of waiting is calculated as the maximum number of aircraft waiting at a given 15' of that hour to avoid double counting. The number of waiting does not reflect how long each aircraft waits; 5. Fraction of total de-icings per hour that are 2-step de-icings (e.g. 100% all 2-step, 0% all 1-step)

Source: AMS flight data, AMS de-icing data, Oliver Wyman analysis

Exhibit 5: De-icing capacity throughput for gate de-icing compared to de-icing flow expectations by other 3rd-party ground handlers for 04-Jan[1]

De-icing performance per stand on 04-Jan

De-icing flow expectations (DFE)[2] and actual[3] # of de-iced per handler, per hour



1. Declared de-icing capacity (DFE) reflects theoretical assumptions and overstates achievable throughput, as it does not fully account for operational constraints (e.g. travel times, crew rotations, refilling). Even under full utilisation of declared capacity, which was not achieved in practice, total de-icing capacity would have remained insufficient to meet peak demand. 2. De-icing flow expectations are the # of that are expected to be de-iced by all gate de-icing ground handlers in an hour. It varies based on the de-icing capacity level (DCL) and weather conditions; 3. Actual de-iced aircraft by all gate handlers (Swissport, Viggo, Menzies, Avia Partner)

Source: AMS flight data, AMS de-icing data, Oliver Wyman analysis

4.4. Remote de-icing capacity was not fully utilised

Remote de-icing facilities, operated by KLM GS, did not achieve planned throughput levels. There was a consistent gap between declared and realised remote de-icing capacity. Fewer aircraft were de-iced than planned, directly contributing to delays, long waiting times and additional cancellations.

On 2 January, operations were not initially scaled to full de-icing capacity, reflecting the initial assessment of weather conditions. After 2 January, throughput remained below planned levels due to higher-than-anticipated processing times per aircraft driven by concerns over glycol availability, as well as limitations in planning, coordination and the adjustment of operations to actual conditions.

4.5. Total system de-icing capacity was not fully utilised due to an uneven distribution of demand across providers

At AAS, the market to offer de-icing activities is open. KLM GS operates the remote de-icing facility and holds contractual agreements with approximately 60 airlines. A significant share of de-icing demand is therefore concentrated at the remote facility. In contrast, de-icing capacity available at gates is distributed across multiple operators (i.e., Aviapartner, Swissport, Viggo and Menzies). This results in uneven allocation of demand across the system. In recent years, there has been a shift towards remote de-icing, including for environmental reasons. This has also contributed to a concentration of demand at the remote de-icing facility.

Since the realised throughput at this remote facility was lower than planned, a significant number of airlines were affected by delays. Available de-icing capacity at other providers could not be used to offset shortages, due to existing distribution of airline contracts. As a result, system de-icing capacity (capacity of both gate and remote de-icing) was not fully utilised.

4.6. System de-icing capacity[6] was insufficient to meet peak demand

De-icing infrastructure[7], consisting of pads for remote de-icing owned by Schiphol, and equipment (trucks, hoses, etc.) used for both gate and remote de-icing owned by ground handlers, is insufficient to meet peak demand during snowfall conditions[8] (see Exhibit 6). During the disruption, demand for de-icing exceeded available de-icing capacity, leading to queue build-up, extended waiting times and reduced departure throughput.

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6 Reflects the theoretical de-icing capacity of all de-icing infrastructure at Schiphol airport

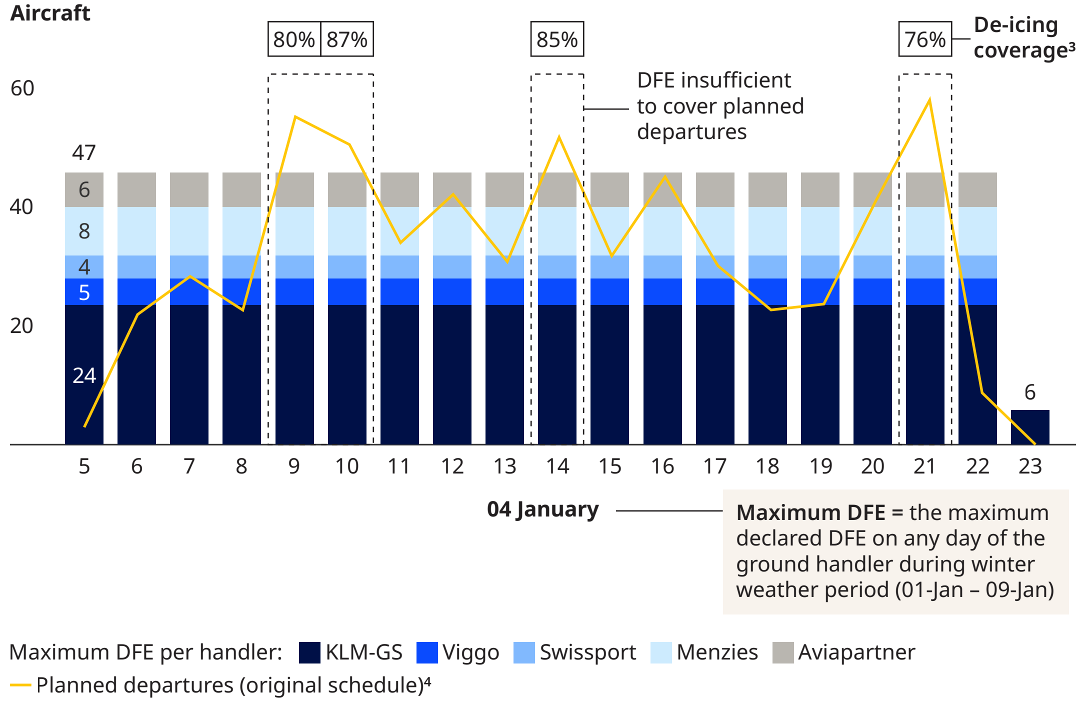
7 Declared de-icing capacity (DFE) reflects theoretical assumptions and overstates achievable throughput, as it does not fully account for operational constraints (e.g. travel times, crew rotations, refilling). Even under full utilisation of declared capacity, which was not achieved in practice, total de-icing capacity would have remained insufficient to meet peak demand.

8 Heavy snowfall, as experienced during the winter weather disruption

Exhibit 6: Maximum de-icing flow expectation across all de-icing ground handlers compared with planned departures for 04 January[1]

Planned departures vs. maximum de-icing flow expectation (DFE)[2] per handler on 04-Jan

# of aircrafts that can be de-iced and are planned to depart, per hour



1. Declared de-icing capacity (DFE) reflects theoretical assumptions and overstates achievable throughput, as it does not fully account for operational constraints (e.g. travel times, crew rotations, refilling). Even under full utilisation of declared capacity, which was not achieved in practice, total de-icing capacity would have remained insufficient to meet peak demand. 2. Maximum stated de-icing flow expectation (DFE) of ground handlers during the snow disruption: Avia Partner declared 6 AC/hr (03-Jan), Menzies 8 AC/hr (02-Jan), Viggo 5 AC/hr, Swissport 4 AC/hr (04-Jan), and KLM-GS 24 AC/hr (02-Jan); 3. De-icing coverage is % of scheduled flights that can be de-iced (show only <100% to highlight unmet demand); 4. Originally scheduled flights before cancellations

Source: AMS flight data, AMS de-icing data, Stakeholder interviews, Oliver Wyman analysis

4.7. Scheduled flight demand on the day of operations (D0) exceeded available airside capacity

Scheduled flight demand on the day of operations (D0)[9] exceeded the system's achievable throughput, which was primarily constrained by de-icing capacity. RSG issued guidance to airlines on flight schedule reductions in response to emerging operational constraints.

Under the current legal framework, RSG cannot mandate flight cancellations and can only provide non-binding guidance. As a result, the implementation of cancellations depended on voluntary action by airlines. The level and timing of cancellations varied across airlines and were, particularly in the initial phase of the disruption, insufficient to fully align demand with available airside capacity. This imbalance contributed to increasing queues, delays and a reliance on short-notice cancellations. At later stages of the disruption, it was reported

9 Following flight cancellations by airlines in response to guidance from RSG

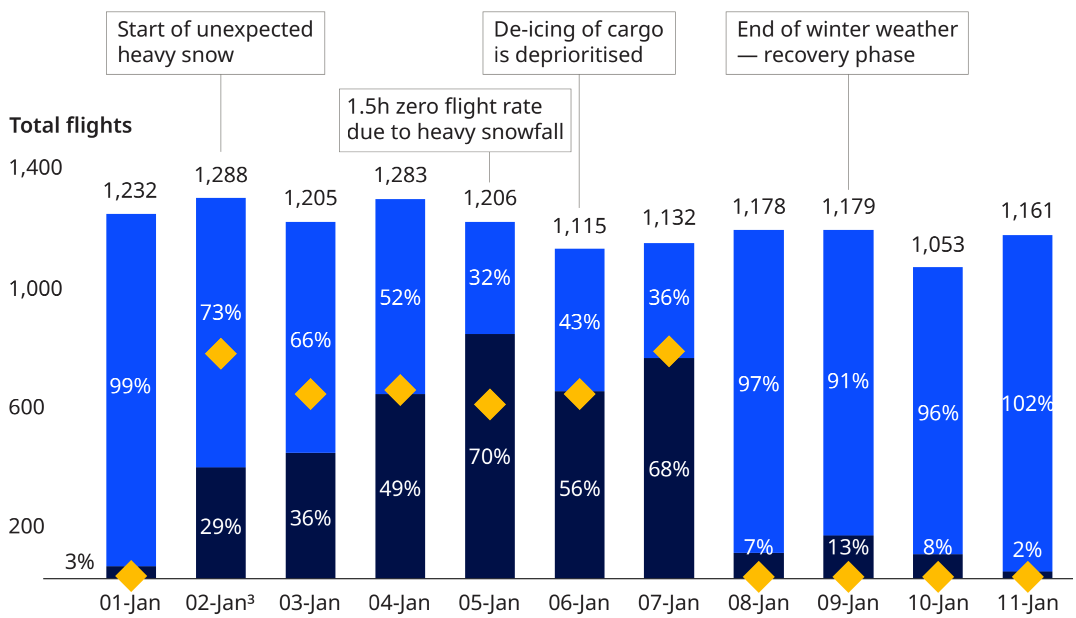
that flight cancellations in some instances exceeded operational constraints, reflecting the uncertainty in operational conditions. It was reported in interviews that operational response by airlines was, in part, influenced by limited experience with disruptions of this nature. This reflects the infrequent occurrence of prolonged winter weather events at AAS, as supported by historical data.

The imbalance between scheduled demand and available airside capacity was further exacerbated by limitations in governance processes, particularly the timing and structure of Sector Briefings (see contributing causes 4.2.1.).

Exhibit 7: Total departures and arrivals during disruption

AMS operational performance

Departures and arrivals of commercial flights[1], per day



	01-Jan	02-Jan	03-Jan	04-Jan	05-Jan	06-Jan	07-Jan	08-Jan	09-Jan	10-Jan	11-Jan
Snowfall (cm)	0 cm	1-2 cm	1 cm	0.5 cm	5 cm	3 cm	2 cm	0 cm	1 cm	0 cm	0 cm
Forecasted snowfall[3] (cm)		0 cm 40%	2 cm 80%	4 cm 85%	4 cm 95%	3 cm 80%	5 cm 100%	0.3 cm 25%	2 cm 80%	0 cm 0%	0 cm 0%

% Cancelled commercial flights % Operated commercial flights Requested cancellations[4]

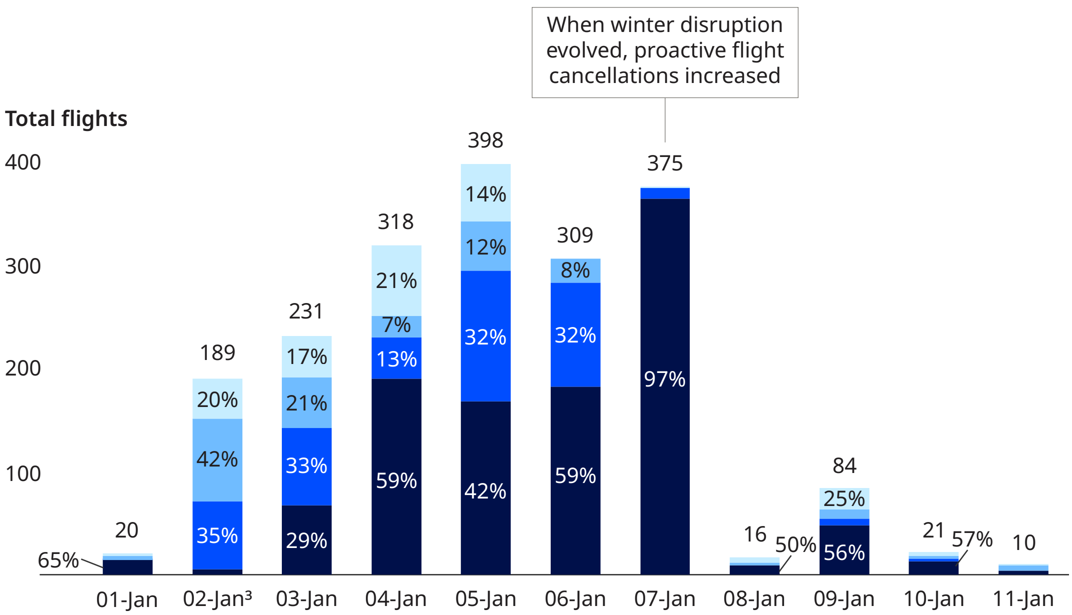
1. Disclaimer: there may be a delay between the decision, passenger notification and system cancellation; 2. Cancellations on 02-Jan only requested on D0, when snowfall already started; 3. Based on KNMI D-1 forecasts; 4. Requested cancellations refer to the number of flights that Schiphol asks airlines to cancel on D−1, e.g. on 6 January, Schiphol requested the cancellation of 70% of flights scheduled for 7 January

Source: AMS flight data, KNMI weather forecasts, Oliver Wyman analysis

Exhibit 8: Total cancelled departures during disruption

Cancelled departures

# of cancelled departures by date, split in "issue date of cancellation"[1], per day



	01-Jan	02-Jan	03-Jan	04-Jan	05-Jan	06-Jan	07-Jan	08-Jan	09-Jan	10-Jan	11-Jan
Snowfall (cm)	0 cm	1-2 cm	1 cm	0.5 cm	5 cm	3 cm	2 cm	0 cm	1 cm	0 cm	0 cm
Forecasted snowfall (cm)		0 cm 40%	2 cm 80%	4 cm 85%	4 cm 95%	3 cm 80%	5 cm 100%	0.3 cm 25%	2 cm 80%	0 cm 0%	0 cm 0%

Cancelled previous day or earlier · Same day >3 hours in advance · Same day <= 3 hours in advance · After it was scheduled

1. Disclaimer: there may be a delay between the decision, passenger notification and system cancellation; 2. Based on KNMI D-1 forecasts

Source: AMS flight data, KNMI weather forecasts, Oliver Wyman analysis

Contributing causes

4.8. Operational governance of RSG did not enable timely flight schedule reduction guidance, based on system constraints

4.8.1 Absence of clear triggers for Sector Briefings limited early airside capacity alignment

Sector Briefings are the planning forum for aligning on target total airside capacity and required schedule adjustments. For 2 January, the Sector Briefing was held on the day of operation, after the snowfall had started, which was consistent with the limited snowfall forecast at that time (see Exhibit 9). However, there are no clearly defined quantitative triggers for activating Sector Briefings in advance of potential disruptions. Activation therefore relies on judgement, based on weather forecast interpretation and perceived operational risk. As a result, the timing of the initial Sector Briefing depended on interpretation of available information, rather than predefined thresholds.

4.8.2 Airside capacity alignment and non-binding guidance on flight schedule reductions were based on a short-term planning horizon

Sector Briefings and Scenario Tables (used to provide guidance to airlines on potential flight schedule reductions) are typically conducted on D-1. Sector Briefings are not held earlier than D-1 as airside capacity discussions require accurate input from multiple stakeholders and depend on operational parameters that are less certain further in advance. During the disruption, forecasts issued from 31 December indicated a period of consecutive snowfall from 3 January onwards (see Exhibit 9). However, airside capacity alignment and guidance on flight schedule reductions remained focused on the next day of operations. The extension of Scenario Tables to a longer planning horizon (up to D-5) was only implemented on 7 January, after the disruption had already developed.

Flight cancellation guidance prior to D-1 is generally uncommon at airports and limited to situations with a high degree of certainty, given the impact on airlines and passengers. As a result, alignment between expected airside capacity and flight schedules was established on a short-term basis, limiting forward visibility in a multiday disruption scenario.

Exhibit 9: Forecasted snowfall compared to governance and crisis meetings and flight cancellations

	Forecasted snowfall[1] for future days and # of cancelled flights[7]													Governance and crisis meetings			
	02-Jan		03-Jan		04-Jan		05-Jan		06-Jan		07-Jan		Actual snowfall	Airport ecosystem	Schiphol-led	KLM	Requested cancellations by Schiphol for D+1
29 Dec	0 cm 10%	1[6]	0.3 cm 50%														
30 Dec	0 cm 10%	1[5]	2 cm 60%	1[6]	3 cm 60%												
31 Dec	0 cm 5%	0[4]	2 cm 70%	0[5]	2 cm 70%	0[6]	1 cm 45%							Scenario tables			
01 Jan	0 cm 40%	5[3]	3 cm 75%	0[4]	3 cm 60%	0[5]	3 cm 80%	0[6]	0 cm 40%					Scenario tables		Venezuela crisis focussed	
02 Jan		185[2]	2 cm 80%	65[3]	4 cm 80%	0[4]	4 cm 80%	0[5]	1 cm 40%	0[6]	1 cm 40%		1.5 cm	Scenario tables; Sector briefings		Operation team	(D0): 60% (11:00-23:00); (D+1): 65% (05:30-14:00); (D+1): 40% (16:00-22:00)
03 Jan				166[2]	4 cm 85%	189[3]	4 cm 90%	1[4]	2 cm 60%	0[5]	4 cm 70%	1[6]	1 cm	Scenario tables; Sector briefings	CVO	Operation team	(D+1): 50% (05:30-22:30)
04 Jan						135[2]	4 cm 95%	168[3]	2 cm 70%	0[4]	5 cm 75%	1[5]	0.5 cm	Scenario tables; Sector briefings			(D+1): 50% (07:00-17:00)
05 Jan								235[2]	3 cm 80%	183[3]	4 cm 80%	71[4]	5 cm	Scenario tables; Sector briefings	CVO	Operation team; COO status call; Scenario team	(D+1): 55% (05:00–22:00)
06 Jan										128[2]	5 cm 100%	302[3]	3 cm	Scenario tables; Sector briefings	CVO; CCT; TTO	Operation team; COO status call; Scenario team	(D+1): 70% (05:00–22:00)

Beyond 5-day weather forecast

First day of winter disruption

In the past

Weather forecast | Cancelled flights | Crisis meetings

1. Weather forecast is issued early in the morning/at night of each day (between 01:00-07:00); 2. Cancellations issued on the same day as scheduled (D-0); 3. Cancellations issued for the next day; 4. Cancellations issued for 2 days ahead; 5. Cancellations issued for 3 days ahead; 6. Cancellations issued for 4 days ahead; 7. Cancellations that were issued for future days

Source: AMS flight data; KNMI weather forecasts; Schiphol Memo on Winter disruptions; KLM meeting report; Oliver Wyman analysis

4.9. Gate, stand and runway availability were constrained during peak snowfall, which limited airside capacity

4.9.1 Snow clearing of gates was delayed due to last-minute gate changes

RSG is responsible for clearing gates prior to aircraft arrival. Gate allocation is a dynamic process, dictated by RSG (gate planning), and gate changes already occur regularly under normal operations. In winter conditions, snow clearing is planned based on the allocated gate. It was reported that, during the disruption, last-minute gate changes for inbound aircraft, driven by outbound delays and de-icing delays, required snow clearing teams to be redirected at short notice. This delayed the clearing of gates for inbound aircraft, contributing to inbound congestion at the airport ("waiters in the field").

4.9.2 Snow pile-up around some gates temporarily limited gate de-icing operations

While snow clearing of gates by RSG was not reported as a structural problem, in some instances, it was reported that snow was temporarily piled on or near gates. This reduced available space and limited the feasibility of gate de-icing, despite the availability of equipment and personnel.

4.9.3 Certain cargo stands were not available due to slower snow clearing

Procedures for snow clearance at cargo stands are defined, with execution performed by dedicated contractors. RSG activated the snow clearing processes in advance, in line with these procedures.

During the disruption, it was reported that snow clearing at certain cargo stands was not consistently performed in line with these procedures. Clearing of certain cargo stands was slower and deprioritised compared to passenger operations. In some cases, snow was pushed in front of cargo stands, restricting access and reducing stand availability for cargo operations.

4.10. Operational decision-making was not based on a real-time integrated view of airside capacity

4.10.1 No real-time, integrated view of total airside capacity

Total airside capacity (i.e., achievable departures per hour) is determined with multiple inputs such as runway, de-icing and stand capacity and is discussed across stakeholders during Sector Briefings. It was reported that during the disruption, changes in these airside capacity inputs occurred outside of Sector Briefings, due to last-minute weather developments. These updates were not consistently reflected in a shared, updated airside capacity view and not all stakeholders were continuously informed of the changes. As a result, different stakeholders operated with varying assumptions on available airside capacity. This led to situations in which expected airside capacity did not align with actual performance, and in which flight schedule adjustments did not reflect emerging operational constraints.

4.10.2 De-icing capacity was not accurately embedded in CDM system

De-icing capacity was not accurately included in the outbound planning logic of the Collaborative Decision Making (CDM) system. As a result, outbound flights were not prioritised based on whether they required de-icing. Flights that did not need de-icing waited unnecessarily, adding to delays and overall congestion at the airport.

Given the inaccuracy of the CDM system, there were days when departure sequencing was coordinated manually, outside the CDM system. In these cases, air traffic control, ground handlers and pilots coordinated departures based on aircraft readiness and runway availability.

Other factors

4.11. Crisis management frameworks of RSG and KLM lacked effective trigger-based escalation and system-wide coordination

4.11.1 Crisis escalation occurred after disruption had intensified

Formal crisis governance structures were activated after the disruption had intensified on 5 January. Key coordination forums of RSG, TTO (Tactical Team Operations) and CCT (Corporate Crisis Team) were convened at a later stage, which limited the ability to introduce early, proactive operational measures (where legally possible) and passenger care arrangements (see Exhibit 9). Passenger care (e.g., overnight Bed Plan) was scaled up on 6 January, after substantial disruption had accumulated.

Key crisis governance forums of KLM such as the Operation Crisis team, Scenario team and COO status calls, were activated on 2 January, with an initial focus on the closure of the Caribbean airspace. The focus shifted towards the winter weather disruptions on 5 January, lagging behind the operational disruption that started on 2 January. (see Exhibit 9).

4.11.2 Absence of clear, quantitative crisis escalation thresholds

Informal quantitative triggers for different snow scenarios are used to activate snow clearing teams, resources and equipment. These triggers relate to winter operations deployment rather than escalation into formal crisis governance.

Escalation from routine operational coordination to crisis governance relied solely on expert judgement, without complementary, predefined quantitative triggers to support the escalation process. While expert judgement is an integral part of decision-making, the absence of such supporting triggers limited consistency and transparency across stakeholders in determining when the disruption had escalated to a system-wide crisis.

4.11.3 Lack of system-wide crisis visibility

The distribution of responsibilities across the airport ecosystem, where airports are responsible for passenger handling and airlines for hotel accommodation, creates fragmented visibility of information. As such, there was no consolidated, real-time overview of key indicators of crisis severity, in particular the number and location of stranded passengers in the terminal and the availability of hotel accommodation.

4.12. Cross-ecosystem operational coordination and communication relied primarily on bilateral channels

Operational coordination mechanisms were in place, with Sector Briefings used to determine airside capacity and Scenario Tables used to provide guidance to airlines on flight cancellations. However, the implementation of cancellations by airlines was not centrally coordinated. Airlines had limited visibility on cancellation decisions taken by other carriers, resulting in an incomplete system-wide view of demand adjustments. In addition, several external stakeholders (including ground handlers and other operational partners) reported in interviews that they relied on bilateral communication channels to exchange information on the disruption and its operational impact.

4.13. Passenger communication at the airport lacked clear guidance, ownership and coordination

4.13.1 Airline passenger communication did not provide clear, actionable guidance on next steps

For some airlines, passenger communication during the disruption focused mainly on rebooking status, cancellation notifications and travel waivers. It was reported that digital channels were not always updated with sufficient frequency and that frontline ticket office staff at times had limited actionable information to provide to passengers. As a result, communication tended to emphasise rebooking options rather than clear guidance on whether passengers should leave the airport. It was also reported that many passengers remained in the terminal, waiting in line at the ticketing desks, after being rebooked to flights the following day, and that some passengers were directed to Door 16, without confirmation that their baggage had been located and sent there (Door 16 is normally for departing passengers with checked-in baggage that ended up not departing). This contributed to crowding, while the status or location of passengers' baggage was still uncertain and with no alternative option to collect the baggage.

4.13.2 Airport and airline messaging were not consistently coordinated, and ownership was not fully operationalised in practice

While passenger communication is primarily owned by airlines, coordination across the ecosystem was limited, resulting in fragmented messaging to passengers. In disruption scenarios of this scale, there is a practical dependency between airlines and the airport in delivering clear behavioural guidance to passengers, particularly where system-wide actions (e.g. advising passengers to leave the airport) are required. RSG did provide airport-specific guidance via its own channels, including website updates from 3 January onwards advising passengers to check flight information, with more directive messaging introduced on 5 January (e.g. advising passengers not to travel to the airport if their flight was cancelled). PA announcements were also in use from 3 January but applied inconsistently in the early phase (including being paused on 4 January), and only from 6 January onwards included explicit instructions for passengers with cancelled flights to leave the airport. However, this guidance was not consistently aligned or reinforced through airline communication, limiting its effectiveness in managing passenger flows in the terminal.

4.14. Staff access to the airport was constrained during the disruption

While RSG completed snow clearing activities at staff car parks in line with existing procedures, it was reported by various stakeholders that access to the airport by car and movement from parking areas to the airport was at times constrained due to snow and ice conditions. This, combined with disruption to public transport, affected staffing availability and punctuality and indicates that current policies may not fully support disruptions of this scale. However, it was not reported that staffing shortages were a primary contributing factor during the disruption.

5. Recommendations

Based on the findings, a set of recommendations has been developed with the objective of strengthening winter operations and reducing the impact of future disruptions. The recommendations are grounded in the analysis of the January 2026 event, supported by operational data, stakeholder interviews and benchmarking against comparable airports. The recommendations have not been tested against safety or legal/regulatory requirements and, in some cases, would require voluntary collaboration from airlines, ground handlers, and other relevant stakeholders. However, we believe the recommendations could be implemented within the existing regulatory and operational framework applicable to Amsterdam Airport Schiphol. In particular, airlines retain full responsibility for flight schedules, including decisions on cancellations, which are implemented on a voluntary basis and cannot be mandated by RSG. Passenger communication is primarily owned by airlines, with RSG providing complementary airport-specific and general guidance. In addition, meteorological forecasting is provided by KNMI as the designated national weather authority for the aviation sector, which is responsible for forecast production and accuracy.

Winter operations impose additional operational constraints that no airport can fully remove, particularly during heavy or prolonged snowfall. Accordingly, the recommendations are designed to strengthen preparedness and the ability to respond, while recognising that some delays, cancellations, and passenger impact remain unavoidable.

The report outlines ”core recommendations” which are categorised across four themes: winter preparedness and governance documentation, de-icing operating model, weather forecast and operational response, and operational decision-making. In addition, some ”further considerations” are identified which would also enhance winter preparedness but are not immediate priorities.

Each recommendation and further consideration includes a suggested indicative owner and is mapped to the root cause(s) it addresses (See Exhibit 10). Ownership reflects the party expected to lead implementation, recognising that several actions will require coordination across multiple organisations.

All decisions in connection with the implementation or use of advice or recommendations contained in this report are the sole responsibility of RSG and KLM. The outcome of such recommendations is dependent upon how they are implemented and the circumstances at the relevant time, and Oliver Wyman cannot confirm such recommendations will achieve a specified result.

Core recommendations

5.1. Winter preparedness and governance documentation

The January 2026 disruption indicated that parts of the winter response framework were in place, but that the existing governance documentation (e.g., Scenario Cards), escalation logic, responsibilities and training arrangements can be improved to provide more clarity under sustained operational pressure.

5.1.1 Strengthen existing governance documentation and operational guidance for multiple disruption scenarios (Owner: RSG (with input from KLM and other airlines and/or ground handlers))

Root cause(s) addressed: 4.1, 4.2, 4.11

This recommendation includes both the formal crisis governance documentation (often referred to in industry as ”playbooks”) and the supporting Scenario Cards used for operational guidance in coordination forums.

For formal crisis governance documents, ensure they support effective management of prolonged and system-wide disruptions. This should include the development of clear escalation pathways for disruptions that intensify or extend over time, the introduction of quantitative triggers to support existing qualitative triggers, to aid timely activation of governance structures, and the inclusion of (prolonged) extreme weather (beyond only snow) as an explicit scenario category within the playbooks.

For operational guidance documentation, improve their usability in crisis situations by leveraging best-in-class airports’ standardised structure across Scenario Cards to provide clear, consistent and actionable guidance during disruptions. This includes incorporating measurable quantitative triggers by supporting and sometimes translating existing qualitative escalation thresholds (e.g., long disruption, crowding, system failures) into quantitative metrics (e.g., anticipated snowfall, number of affected flights, days of disruption, passenger volumes). Moreover, be more detailed on objectives, step-by-step action plans, key disruption drivers and escalation logic.

In parallel, decision rights and stakeholder roles across the ecosystem should be refined by improving responsibility assignment documentation in the playbooks (also known in project management terminology as RACIs), with refined guidance on decision rights and stakeholder involvement across the ecosystem. Areas that could benefit from such RACIs include passenger care (e.g., between airlines, RSG and handlers) and external communications during crises (e.g., between media relations teams from RSG and airlines)

To ensure playbooks remain practical and effective in live disruption scenarios, they should be actively tested and refined through regular system-wide table-top exercises involving key stakeholders across the ecosystem, as deployed by best-in-class peer airports (i.e. structured simulation sessions where stakeholders walk through disruption scenarios and decision-making steps). In addition, a structured post-event feedback loop should be embedded into governance processes (as seen in best-in-class peer airports), capturing lessons learned across all parties and systematically incorporating these into updated playbooks and procedures ahead of subsequent winter seasons.

5.1.2 Improve governance documentation on passenger communication to provide more proactive and directive messaging (Owner: KLM and other airlines (with input from RSG))

Root cause(s) addressed: 4.13

Strengthen RACI for passenger communication during disruption events. Airlines' own passenger communication, but RSG manages airport-specific operational messaging (e.g., PA announcements). Establish clearer expectations for airlines' proactive communication, including advising passengers when to leave the airport where appropriate. In addition, KLM, as the hub carrier, and other airlines should closely coordinate with RSG to align on and amplify airport-specific operational guidance (e.g., terminal conditions, crowd management measures). While airlines retain primary responsibility, clearer escalation triggers should be defined for when RSG may adopt a more directive role to support airlines in a coordinated response.

5.2. De-icing operating model

De-icing was the primary operational bottleneck for several days during the January disruption, with snow clearing becoming an additional bottleneck on 5 January. On most days, total de-icing capacity was insufficient and throughout the disruption there were challenges with how the de-icing capacity was forecasted, coordinated and used across the system, which led to under-utilisation of available de-icing capacity.

5.2.1 Enable coordinated cross-handler de-icing (Owner: RSG (requires voluntary participation from KLM and other airlines/ground handlers))

Root cause(s) addressed: 4.5

During the disruption, gate de-icing providers at times had spare de-icing capacity after meeting the needs of their contracted customers, while remote de-icing did not have available de-icing capacity. However, legal and commercial constraints limit the extent to which de-icing capacity can be directed centrally.

For this reason, the cross-handler de-icing recommendation is focused on increasing transparency and facilitation, rather than central allocation. Benchmarking indicates that airports with comparable de-icing operating models achieve a high degree of control over de-icing performance without directly operating the service, through the design of commercial agreements and contractual clauses.

In particular, RSG should define and maintain a single real-time dashboard of system de-icing capacity covering both remote and gate de-icing, integrated within CDM. RSG should then define clear triggers (e.g., declared demand exceeds available de-icing capacity) to convene a coordination forum with airlines and handlers[10] and provide real-time transparency on system-wide de-icing capacity, including a consolidated view of expected de-icing demand versus available capacity across all handlers.

Airlines retain the ability to contract de-icing services with their preferred providers, and these commercial arrangements cannot be directed or enforced by RSG. Therefore, RSG cannot allocate de-icing capacity across providers, but can act as a facilitator by providing transparency and enabling coordination across airlines and handlers so de-icing capacity can be optimised. It is the responsibility of the airlines and ground handlers to act on the facilitated information.

5.2.2 Improve remote de-icing operational efficiency (Owner: KLM)

Root cause(s) addressed: 4.4, 4.6

The review found that remote de-icing throughput was below expected levels during key periods. There is therefore value in reviewing the central operating model and learning from airports with comparable winter operations.

- Review staffing models and strengthen training to increase throughput reliability
- Learn from handlers at best-practice peer airports through site visits and knowledge exchange (e.g., Toronto, Oslo)

5.2.3 Improve planning assumptions and numerical model to inform a more accurate and conservative declared de-icing capacity (Owner: Ground handlers)

Root cause(s) addressed: 4.3

Declared de-icing capacity should reflect the conditions under which throughput is actually achieved during winter operations, rather than idealised assumptions.

- Include additional factors such as precipitation type, ground conditions and staff break rotations

10 This requires voluntary participation and collaboration of RSG, airlines and de-icing ground handlers

5.2.4a Increase remote de-icing infrastructure capacity through expansion of remote de-icing pads, following a cost-benefit assessment (Owner: RSG)

Root cause(s) addressed: 4.6

Additionally, based on benchmarking insights and a detailed de-icing capacity assessment, RSG should assess the expansion of remote de-icing infrastructure through additional remote de-icing pads. Expanding gate-based de-icing capacity is not recommended, as peer European and North American airports indicate that remote de-icing is more effective operationally, environmentally and from a safety perspective.

During the January disruption, de-icing emerged as the primary operational bottleneck, constraining overall throughput more than runway or stand capacity under the same snow conditions. From a capacity perspective, the recommendation is to increase system de-icing capacity to a level sufficient to match runway capacity across a range of snow conditions. In terms of additional remote de-icing pads, this requirement translates to:

- Two to three additional remote de-icing pads if an effective de-icing capacity pooling model is implemented. This would result in an airport-wide de-icing capacity of approximately 35 aircraft per hour under light snow conditions, bringing it in line with runway capacity and total capacity of peer airports operating under similar conditions, when normalised for departures per hour
- If de-icing capacity pooling cannot be implemented (e.g. due to regulatory or commercial constraints), assess a larger expansion of approximately four to five additional remote de-icing pads to deliver comparable system resilience

RSG should, in consultation with airlines, conduct a detailed cost-benefit assessment to validate the return of such a potential investment. Additionally, RSG should undertake a detailed engineering assessment to evaluate spatial constraints, airside configuration, and operational integration.

5.2.4b Ensure sufficient de-icing equipment and operational resources to utilise expanded infrastructure (Owner: Ground handlers)

Root cause(s) addressed: 4.6

In parallel with any potential infrastructure expansion, any ground handlers responsible for operating it should ensure that sufficient operational resources are in place to fully utilise the remote de-icing facility. This includes the provision of adequate de-icing trucks, staffing and supporting operational resources to match expanded remote de-icing capacity.

5.3. Weather forecast and operational response

The review found that the weather forecast, especially for 2 January, did not accurately reflect the eventual conditions. However, the challenge was not only the forecast itself, but how this information was translated into operational assumptions and mobilisation decisions, where there remained scope for a more robust response to evolving conditions.

5.3.1a Review and refine disruption triggers for operational mobilisation and system-level coordination (Owner: RSG (with input from KLM and other airlines/ground handlers))

Root cause(s) addressed: 4.8, 4.10

RSG should review existing disruption triggers to ensure they support earlier activation of governance forums and system-wide coordination when there is a credible risk of severe winter conditions. Triggers should move beyond descriptive weather thresholds and explicitly define required operational actions, including governance activation, coordination forums and airside-level capacity management measures. Each trigger level should clearly specify expected actions across the ecosystem (e.g., activation of Scenario Tables/Sector Briefings, communication to airlines and coordination with LVNL and ground handlers). Quantitative triggers should be used to support existing qualitative triggers.

Peer airports use a mixture of quantitative and qualitative metrics to inform disruption and crisis escalation. Usual quantitative metrics with formalised activation thresholds include snow forecast severity, snowfall duration and likelihood, number of stranded passengers and mismatch between scheduled flights on D0 and expected capacity.

5.3.1b Review and align airside capacity and mobilisation planning assumptions linked to disruption scenario triggers (Owner: KLM and other airlines/ground handlers (with input from RSG))

Root cause(s) addressed: 4.8, 4.10

KLM and other airlines/ground handlers should review their existing capacity and mobilisation planning assumptions to ensure alignment with severe winter disruption scenarios. Existing plans associate trigger levels with required actions on staffing, equipment readiness and expected de-icing capacity under different weather conditions.

These triggers and resulting actions should be accurately calibrated and aligned with actual performance to ensure that declared de-icing capacity (DFE) and operational readiness are realistic and support timely decision-making during disruption events.

5.4. Operational decision-making

The January disruption showed that disruption governance and crisis management forums were in place, but that real-time operational decision-making, escalation, coordination and airside capacity management could be strengthened. In particular, the review found a need for more explicit communication of expected voluntary flight cancellations and a stronger system-wide view of airside capacity.

5.4.1a Strengthen proactive airside capacity coordination through clearer communication of voluntary flight cancellations (Owner: RSG)

Root cause(s) addressed: 4.7

It was reported in interviews conducted with several airlines that flight cancellation requests were at times communicated in a way that left scope for different interpretation. This reduced the effectiveness of real-time system-wide coordination and decision-making during periods of constrained airside capacity.

Within the current regulatory framework, RSG cannot mandate flight cancellations, which are implemented on a voluntary basis by airlines. However, there is scope to strengthen how these requests are communicated to support more consistent interpretation and response.

- Provide more explicit, quantified guidance on voluntary flight cancellations to airlines based on assessed airside capacity (e.g., D-1 planning)
- Clearly communicate the underlying airside capacity constraints (e.g., de-icing, runway, stand limitations) to support transparency and alignment
- Engage with the Ministry of Infrastructure and Water Management, where relevant, to inform ongoing discussions on airside capacity management during disruption events

It is worth noting that peer airports in other jurisdictions with regulatory frameworks granting the airport power to mandate cancellations have reported it to be an effective mechanism for managing disruptions. There is a provision in Dutch law[11] that could enable mandatory flight cancellations in certain disruption scenarios (e.g. events which have a severe impact on airport processes). However, this provision has not been used by the government to establish legislation which provides a mechanism to manage such disruptions.

5.4.1b Improve visibility and transparency of airline cancellation intentions to support system coordination (Owner: Airlines)

Root cause(s) addressed: 4.4, 4.7, 4.12

Limited visibility on airline cancellation intentions reduced the ability of stakeholders to assess whether aggregate demand would be sufficiently reduced to align with available airside capacity.

While cancellation decisions remain the responsibility of individual airlines and cannot be mandated, improved transparency and timely communication of intentions would support more effective coordination across the ecosystem.

- Provide timely and transparent visibility to RSG and relevant stakeholders on intended cancellations and schedule adjustments, in support of coordinated system-wide decision-making. A comparable peer European airport with such a system in place stated that such transparency allows the flight schedule reductions to be visible and supports operational planning coordination across airlines

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11 Article 8a.52 Dutch Aviation Act

- Align internal decision-making timelines with sector coordination forums (e.g., Scenario Tables, Sector Briefings) to enable earlier system-level assessment
- Where feasible, update flight cancellation intentions as conditions evolve to support continuous alignment between demand and airside capacity

Further considerations

5.5.1 Strengthen forecast accuracy feedback loops and interpretation through structured collaboration with KNMI (Owner: RSG (in collaboration with KNMI and other airlines/ground handlers))

Root cause(s) addressed: 4.1

KNMI is the designated meteorological provider within the current regulatory framework and is responsible for forecast production and accuracy. Beyond the existing real-time Rapid Weather Evaluation alerts, there is an opportunity to introduce a more regular and structured feedback process on forecast performance and on how forecast information is interpreted operationally across the ecosystem.

RSG should lead the establishment of this process, working in collaboration with KNMI, airlines, ground handlers and LVNL to better align forecast outputs with the operational decision-making needs.

- Establish a regular (e.g., annual) structured review of forecast performance, incorporating input from key operational stakeholders
- Following major disruption events, conduct joint evaluations of forecast accuracy and interpretation to identify opportunities to improve forecasting approaches and communication of uncertainty

5.5.2 Increase glycol storage capacity (Owner: KLM)

Root cause(s) addressed: None for this event

Storage constraints increased operational pressure during the disruption period, despite an actual glycol shortage never becoming a root cause. Increasing glycol tank capacity and glycol supply would reduce the risk of this becoming a secondary operational constraint in future events. Increasing glycol tank capacity would not, in isolation, resolve refilling constraints; however, it would provide additional buffer capacity to absorb delivery delays and demand spikes, reducing the risk of shortages during peak disruption periods. Initial assessments indicate this is a relatively cost-efficient way to de-risk glycol shortages in future disruption events. It is recommended that KLM completes a more detailed cost-benefit assessment. An initial consideration is to expand glycol tank capacity in the remote de-icing facility (increase from 9 to 16 tanks as was in place in years preceding 2026).

5.5.3 Ensure a snow clearing prioritisation framework is in place and ensure coordination between snow clearing and gate allocation (Owner: RSG)

Root cause(s) addressed: 4.9, 4.14

It was reported through interviews with ground handlers, airlines and other airside stakeholders that inefficiencies in snow clearing during the disruption were driven by the interaction between gate allocation, de-icing delays and gate snow clearing activities. Gate allocation is dynamic; however, heavy snowfall increases the impact of last-minute gate changes. A clearer approach to prioritisation would improve operational stability under these conditions.

Establish structured coordination between LVNL, RSG and ground handlers for gate allocation, with clear decision rules and triggers (e.g., when to prioritise gate stability versus reallocation) and ensuring de-icing capacity constraints and real-time conditions/delays are considered in gate allocation decision-making.

Additionally, establish minimum clearance standards around gates to ensure sufficient space for aircraft manoeuvring, and better prioritise early snow clearance of key employee access routes to increase efficiency of the treatments already being performed under such disruptions.

5.5.4 Review and revise Terms of Reference (ToR) for regular meetings (Owner: RSG)

Root cause(s) addressed: 4.8, 4.12

The existing governance forums (e.g., Scenario Tables, Sector Briefings and CVO) serve different purposes, but those purposes were not always clear in practice. Clarifying their respective roles would support faster escalation and more consistent decision-making.

6. Outlook

The impact and severity of the January 2026 weather disruption resulted from a combination of root causes, contributing causes and other factors.

The event was initially driven by an underestimation of the timing and intensity of snowfall, followed by several consecutive days of winter weather which are uncommon at Schiphol. This created sustained pressure on the system over multiple operational cycles. At the core of the disruption was the interaction between de-icing demand and available capacity. Demand and processing times were higher than anticipated, while declared capacity overstated achievable throughput and available capacity across the system was not fully utilised due to operational and structural constraints. In addition, total de-icing capacity was insufficient to meet peak demand during critical periods. At the system level, scheduled flight demand exceeded achievable airside capacity, particularly in the early phase of the disruption. This imbalance between demand and capacity resulted in queue build-up, delays and increasing reliance on short-notice cancellations.

While multi-day winter disruptions of this scale are infrequent, they remain a foreseeable risk within a complex operating environment and require the hub to prepare accordingly. Despite this, severe winter weather events inherently create operational disruption at major hubs, even where infrastructure and preparedness are well developed.

The recommendations set out in this report focus on strengthening these areas within the current operating model related to winter preparedness and governance documentation, de-icing operating model, weather forecast and operational response and operational decision making. Implementation will require coordinated action across RSG, KLM, other airlines, ground handlers and other stakeholders. Continued monitoring and structured feedback will be important to ensure that improvements are embedded and that future winter events can be managed with greater resilience.

Exhibit 10: Root causes and recommendations mapping

Sub-category	Root cause	Recommendation(s) addressing root cause
Root cause	4.1 Weather forecast underestimated the timing and volume of snowfall on 2 January	5.1.1 Strengthen existing governance documentation and operational guidance for multiple disruption scenarios 5.5.1 Strengthen forecast accuracy feedback loops and interpretation through structured collaboration with KNMI
	4.2 Prolonged significant winter weather conditions, above historical averages, persisted through 7 January	5.1.1 Strengthen existing governance documentation and operational guidance for multiple disruption scenarios
	4.3 De-icing demand and processing times for gate and remote de-icing were underestimated in planning assumptions	5.2.3 Improve planning assumptions and numerical model to inform a more accurate and conservative declared de-icing capacity
	4.4 Remote de-icing capacity was not fully utilised	5.2.2 Improve remote de-icing operational efficiency 5.4.1b Improve visibility and transparency of airline cancellation intentions to support system coordination
	4.5 Total system de-icing capacity was not fully utilised due to an uneven distribution of demand across providers	5.2.1 Enable coordinated cross-handler de-icing
	4.6 System de-icing capacity was insufficient to meet peak demand	5.2.2 Improve remote de-icing operational efficiency 5.2.4a Increase remote de-icing infrastructure capacity through expansion of remote de-icing pads, following a cost-benefit assessment 5.2.4b Ensure sufficient de-icing equipment and operational resources to utilise expanded infrastructure
	4.7 Scheduled flight demand on the day of operations (D0) exceeded available airside capacity	5.4.1a Strengthen proactive airside capacity coordination through clearer communication of voluntary flight cancellations 5.4.1b Improve visibility and transparency of airline cancellation intentions to support system coordination

Sub-category	Root cause	Recommendation(s) addressing root cause
Contributing cause	4.8 Operational governance of RSG did not enable timely flight schedule reduction guidance, based on system constraints	5.3.1a Review and refine disruption triggers for operational mobilisation and system-level coordination 5.3.1b Review and align airside capacity and mobilisation planning assumptions linked to disruption scenario triggers 5.5.4 Review and revise Terms of Reference (ToR) for regular meetings
	4.9 Gate, stand and runway availability were constrained during peak snowfall, which limited airside capacity	5.5.3 Ensure a snow clearing prioritisation framework is in place and ensure coordination between snow clearing and gate allocation
	4.10 Operational decision-making was not based on a real-time integrated view of airside capacity	5.3.1a Review and refine disruption triggers for operational mobilisation and system-level coordination 5.3.1b Review and align airside capacity and mobilisation planning assumptions linked to disruption scenario triggers
Other factors	4.11 Crisis management framework of RSG and KLM lacked effective trigger-based escalation and system-wide coordination	5.1.1 Strengthen existing governance documentation and operational guidance for multiple disruption scenarios
	4.12 Cross-ecosystem operational coordination and communication relied primarily on bilateral channels	5.4.1b Improve visibility and transparency of airline cancellation intentions to support system coordination 5.5.4 Review and revise Terms of Reference (ToR) for regular meetings
	4.13 Passenger communication at the airport lacked clear guidance, ownership and coordination	5.1.2 Improve governance documentation on passenger communication to provide a more proactive and directive messaging
	4.14 Staff access to the airport was constrained during the disruption	5.5.3 Ensure a snow clearing prioritisation framework is in place and improve coordination between snow clearing and gate allocation

Source: Oliver Wyman

Exhibit 11: Glossary

Topic	Term	Details
Stakeholders	AAS	Amsterdam Airport Schiphol
	ATC	Air traffic control
	BARIN	Board of Airline Representatives in The Netherlands
	ILT	Human Environment and Transport Inspectorate (NL regulator)
	KLM	Koninklijke Luchtvaart Maatschappij (KLM Royal Dutch Airlines)
	KLM Ground Services	KLM's own ground-handling unit that operates the remote de-icing facility and performs remote de-icing at Schiphol
	KNMI	Koninklijk Nederlands Meteorologisch Instituut (Royal Netherlands Meteorological Institute)
	LVNL	Luchtverkeersleiding Nederland (Dutch Air Traffic Control organisation)
	RSG	Royal Schiphol Group
	3rd party ground handlers	Non-KLM ground handling companies (e.g., Swissport, Viggo, Menzies, Avia Partner) providing handling and gate de-icing services
Governance forums and tools	Scenario Tables	Forward-looking planning forum (D+1) to translate weather forecast into capacity scenarios
	Sector Briefings	Schiphol-led forum that determines declared operational capacity and aligns inbound/ outbound balance
	CVO	Commissie Voor Overleg — operational crisis meeting for cross-functional coordination, managing emergency and passenger impacts
	TTO	Tactical Team Operations — escalation crisis meeting above CVO for senior operational decision-making on risk mitigation
	CCT	Corporate Crisis Team — crisis meeting for managing reputational impact and external communications during major disruptions
	Scenario Cards	Structured playbooks describing triggers, responsibilities and actions for specific disruption scenarios
	ToR	Terms of Reference
	RACI/RACIs	Responsible, Accountable, Consulted, Informed (roles & responsibilities framework)
De-icing & capacity	CDF	
	Remote de-icing	Central de-icing facility (CDF) operated by KLM Ground Services with 4 remote pads where aircraft are de-iced away from the gate
	Gate de-icing	De-icing done at the aircraft stand/gate by ground handlers
	DFE	De-icing Flow Expectation — planned number of aircraft that can be de-iced per hour under given conditions, as reported by ground handlers
	DCL	De-icing Capacity Level — planning level that DFE is based on
	Throughput	Actual number of aircraft processed per hour
	Glycol	De-icing fluid used on aircraft
	CDM	Collaborative Decision Making
	PA	Public Address (e.g., PA announcements)
	Zero rate	Period where the airport accepts no arrivals or departures
	Nabo	Narrowbody (aircraft)
	Wibo	Widebody (aircraft)

Topic	Term	Details
Passenger & landside	Door 16	Baggage reclaim area that became a main queue point for disrupted passengers seeking baggage
	Bed Plan	Schiphol's plan to provide camp beds and overnight facilities for stranded passengers
	Pax	Passengers
Ops	VOP	Vliegtuig Opstel Plaats — an aircraft parking stand at the terminal or remote area
	APOC	Airport Operations Centre at Schiphol, leading capacity/co-ordination meetings such as Sector Briefings and Scenario Tables and responsible for a shared understanding of upcoming events or disruptions
	Snowstars	Schiphol employees staffed for snow-clearing during winter operations
Operational time references	D0	Day of operations (the operational day itself)
	D-1	Day before day of operations
	D-N	N days before day of operations

Source: Oliver Wyman

Americas	Europe	Asia Pacific	India, Middle East & Africa
+1 212 541 8100	+44 20 7333 8333	+65 6510 9700	+971 (0) 4 425 7000

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