EXPERIENCE SHARING ON

IMPLEMENTATION OF E-WTS FOR ARRIVALS

HONG KONG CHINA

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BACKGROUND

Hong Kong International Airport has implemented ICAO e-WTS for Arrivals on 5 November 2020 (effective date of Amendment 9 to Doc 4444 PANS-ATM)

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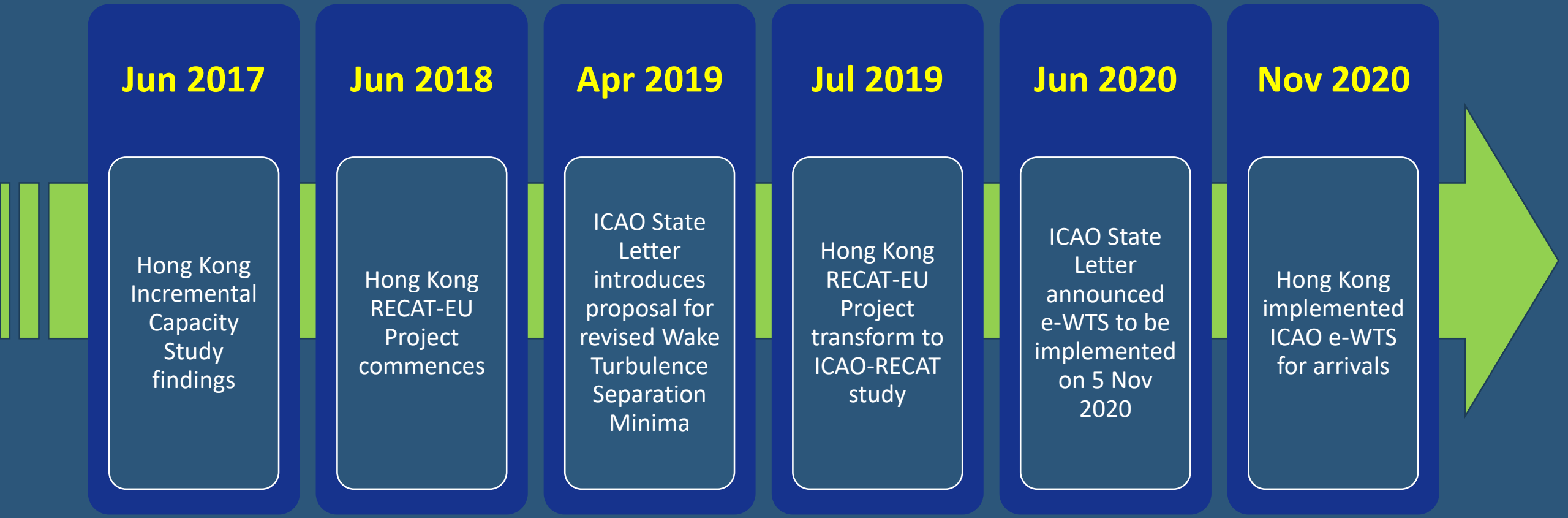
PROJECT TIMELINE

For Hong Kong e-WTS (Arrival)



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HONG KONG E-WTS PROJECT

1. Planning

- Safety Analysis Plan using Eurocontrol template *
- Collection of LIDAR, Flight Data and ATC records
- Project Safety Plan & Safety Assessment Process *

2. Implementation

- Local Safety Case Report *
- Controller Training
- ATM System Adaptation
- Stakeholder Engagement

3. Operational Experience Sharing

*** by Independent Third Party**

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PLANNING

Data Collection, Project Safety Plan & Safety Assessment Process

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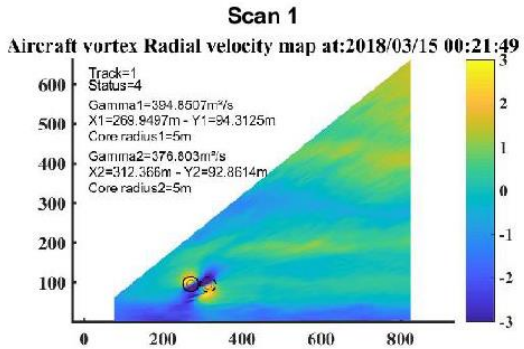
DATA COLLECTION AND ANALYSIS

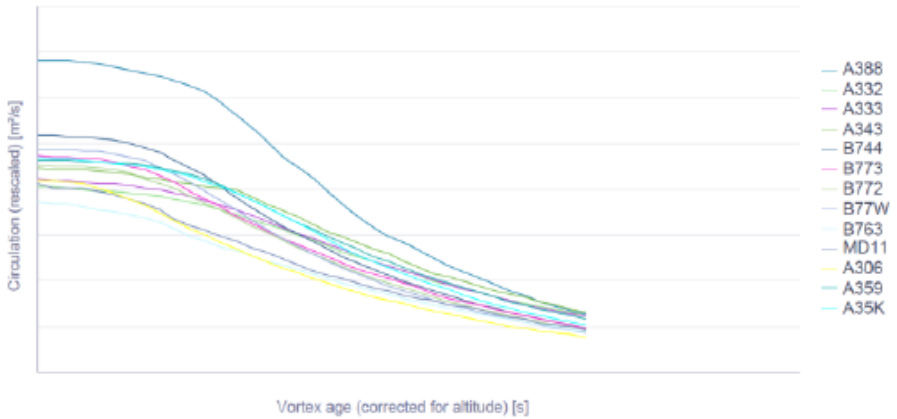
DATA COLLECTION

Collaboration between Hong Kong CAD, Airport Authority Hong Kong, Hong Kong Observatory and Airline Operators to conduct a 12-month study

- LIDAR information on vortex generation and dissipation
- ATM Surveillance records
- Pilot reports
- Aircraft flight recorder data



Records of vortex formation and dissipation



Vortex dissipation rates comparison

DATA ANALYSIS

Analysis to produce detailed vortex generation and dissipation rates for different groups of aircraft

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DATA COLLECTION AND ANALYSIS

- Pilot reports of wake turbulence encounters were analysed with information from ATM surveillance data and aircraft flight recorder data

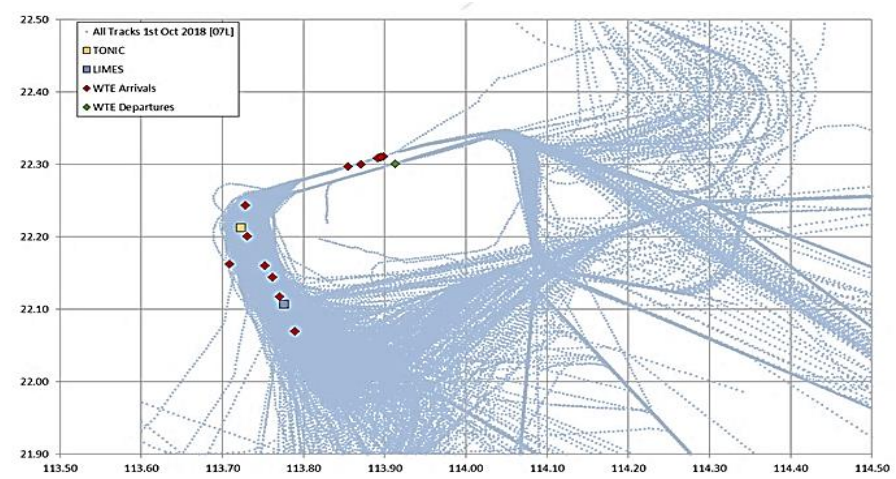
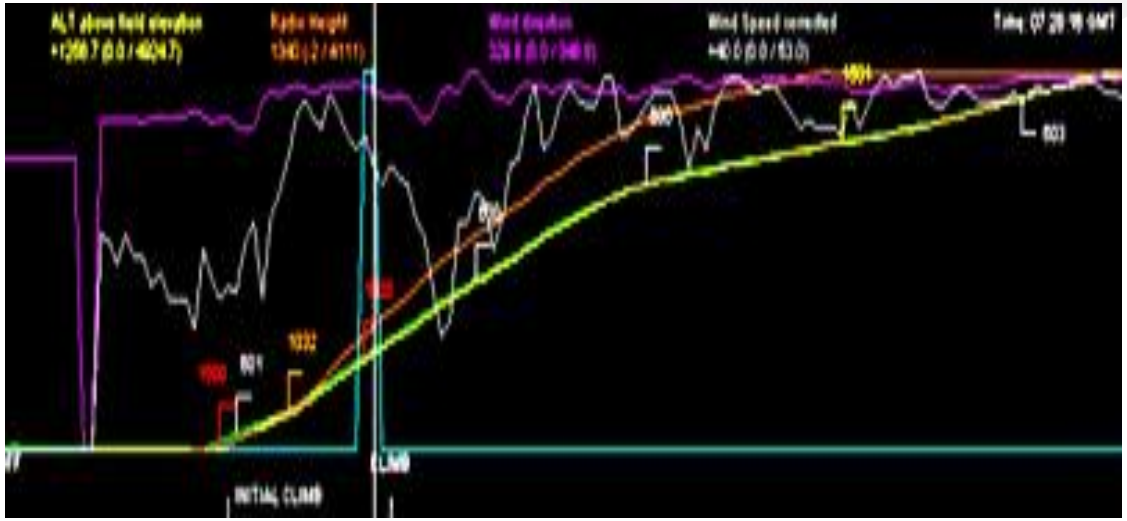


Figure 13: Location of reported WTE Encounters during 07L operations, overlaid on typical 07L daily flight tracks.

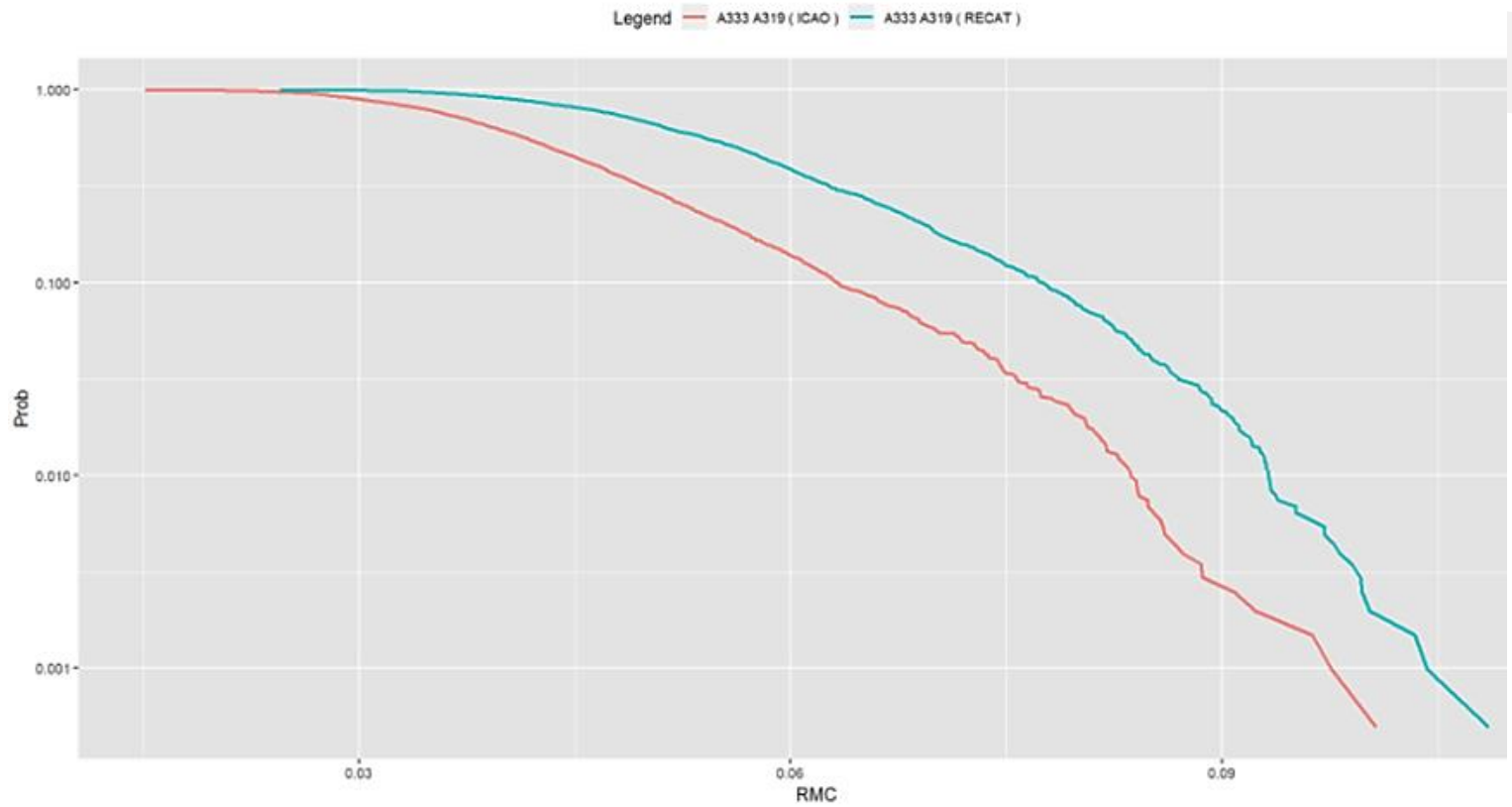
ATM surveillance data



Flight recorder data

DATA COLLECTION AND ANALYSIS

- Comparison of calculated risk values of wake encounter risk for each aircraft pair (e.g. A333 and A319) using ICAO and ICAO-RECAT minima



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PROJECT SAFETY PLAN

GOAL STRUCTURING NOTATION (GSN)

Identify dependencies / risks that needed to be addressed for the major safety activities involved in the implementation

HAZARD IDENTIFICATION WORKSHOPS

A series of workshops were held for all stakeholders to mitigate potential operational hazards and associated risks

IMPLEMENTATION

Local Safety Case Study, Controller Training,
ATM System Adaptation & Stakeholder Engagement

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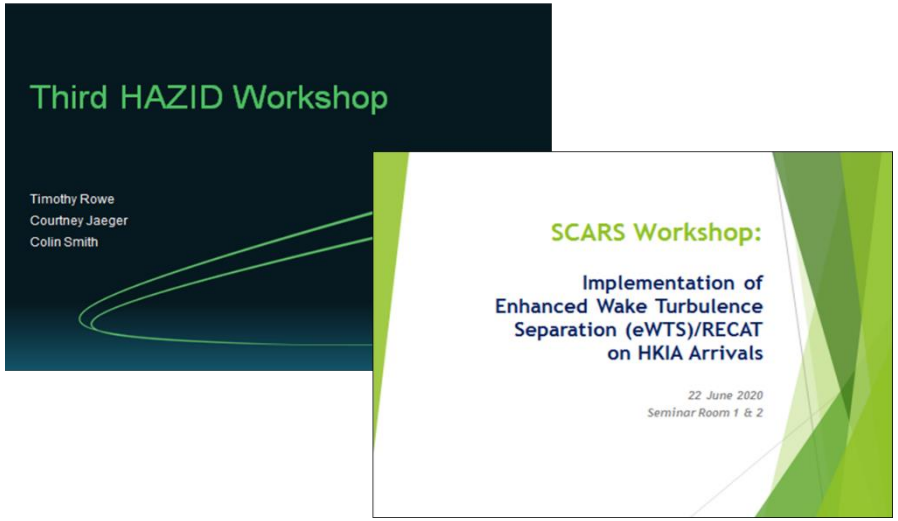
LOCAL SAFETY CASE STUDY

- Comparison of Hong Kong data analysis with Eurocontrol RECAT-EU safety case data
- Risk Assessment and Mitigation Forums
- SMS process to mitigate potential hazards and associated risks
- Conclusion: *"the predicted impact to wake turbulence encounter reporting and severity is in line with the expectations of the RECAT-EU Safety Case and the detailed analysis of local Hong Kong wake data supports the reduction in wake turbulence separation"*



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CONTROLLER TRAINING

- Need for stricter speed control
- Awareness of rate of closure
- Timely issuance of landing clearance
- Recovery actions

ICAO 7 Wake Turbulence Groups

Distance-based Enhanced Wake Turbulence Separation (eWTS) Minima

Follower / Leader	Group A	Group B	Group C	Group D	Group E	Group F	Group G
Group A		4 NM	5 NM	5 NM	6 NM	6 NM	8 NM
Group B		3 NM	4 NM	4 NM	5 NM	5 NM	7 NM
Group C				3 NM	3.5 NM	3.5 NM	6 NM
Group D							4 NM
Group E							4 NM

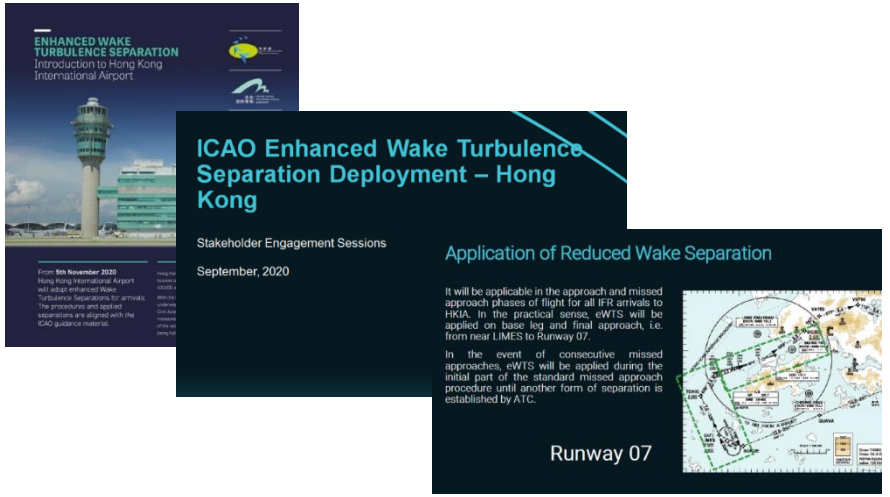
Hong Kong has adopted a conservative e-WTS separation for arrivals

Simulator training for Approach controllers

STAKEHOLDER ENGAGEMENT

WORKSHOPS

Attended by 100+ aircraft operators, pilots, airlines OPS staff and organizations



70+ aircrew and airline personnel participated in the briefing sessions on the implementation of e-WTS at HKIA

BRIEFING SESSIONS

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OPERATIONAL EXPERIENCE SHARING

Post Operational Analysis, Runway Occupancy Times of Arrivals & Environmental Impact

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POST OPERATIONAL ANALYSIS

ICAO Wake Turbulence Minima and Benefits of ICAO e-WTS Minima

A35K (Heavy)

A35K (Group B)

ICAO WTC 4 NM

ICAO e-WTS 3 NM

B773 (Heavy)

B773 (Group B)

A332 (Heavy)

A332 (Group B)

ICAO WTC 5 NM

ICAO e-WTS 4 NM

A320 (Medium)

A320 (Group D)

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POST OPERATIONAL ANALYSIS

- Comparison of average final approach spacing
- Monitor and analyse pilot reports
- Missed approach statistic analysis

RUNWAY OCCUPANCY TIME – ARRIVAL (ROTA)

- Aircrew Active Participation is needed
- Benefits of e-WTS can easily be negated if pilots
  - Do not comply with ATC speed restrictions on final approach
  - Do not adhere to minimum runway occupancy time for arrivals (ROTA)
  - Do not vacate at the first available Rapid Exit Taxiway (RET)

Leader \ Follower		SUPER	HEAVY	UPPER	MEDIUM	SMALL	LIGHT
		J	H	U	M	S	L
SUPER	J	4 NM*	4 NM	5 NM	5 NM	6 NM	8 NM
HEAVY	H	3.5 NM*	3.5 NM*	4 NM	4 NM	5 NM	7 NM
UPPER	U	3.5 NM*	3.5 NM*	3.5 NM*	3.5 NM*	4 NM	6 NM
MEDIUM	M						5 NM
SMALL	S						4 NM
LIGHT	L						3NM

* Spacing requirement with overriding ROTA considerations

ENVIRONMENTAL IMPACT

- Since adopting the e-WTS for arrival at HKIA, the Airport Arrive Rate (AAR) has been progressively increased from 34 to 36 during peak hour
  - Reduced average airborne delay per flight
  - Reduced fuel burn and CO_2 emission

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WHAT'S NEXT?

Implementation of e-WTS for Departures at Hong Kong International Airport

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ANY QUESTIONS?

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THANK YOU!

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