MOTT MACDONALD

Expansion of Hong Kong International Airport into a Three-Runway System

Aircraft Noise Monitoring and Audit Plan

February 2025

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This Submission of Aircraft Noise Monitoring and Audit Plan

has been reviewed and certified by

the Environmental Team Leader (ETL) in accordance with

Condition 1.9 of Environmental Permit No. EP-489/2014.

Certified by: 

Terence Kong
Environmental Team Leader (ETL)
Mott MacDonald Hong Kong Limited

Date 5 February 2025

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By Email

Airport Authority Hong Kong
HKIA Tower, 1 Sky Plaza Road
Hong Kong International Airport
Lantau, Hong Kong

Attn: Mr. Lawrence M L Tsui, Principal Manager. Environmental Compliance

5 February 2025

Dear Sir,

Contract No. 3102
3RS Independent Environmental Checker Consultancy Services

Verification of Aircraft Noise Monitoring and Audit Plan

Reference is made to the ET's submission of Aircraft Noise Monitoring and Audit Plan certified by the ET Leader on 5 February 2025.

We would like to inform you that we have no comment on the captioned submission. Therefore we write to verify the captioned submission in accordance with the requirement stipulated in Condition 1.9 of EP-489/2014.

Should you have any query, please feel free to contact the undersigned at 3729 0380.

Yours faithfully,
AECOM Asia Co. Ltd.

Roy Man
Independent Environmental Checker

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Glossary

2RS	Two-Runway System
3RS	Three-Runway System
AAHK	Airport Authority Hong Kong
AEDT	Aviation Environmental Design Tool
AIC	Aeronautical Information Circular
AIP	Aeronautical Information Publication
ANFTMS	Aircraft Noise and Flight Track Monitoring System
ANM&A	Aircraft Noise Monitoring and Audit
ANMP	Aircraft Noise Monitoring Plan
ANP	Aircraft Noise and Performance
AODB	Airport Operation Database
ATM	Air Traffic Movement
CAD	Civil Aviation Department
CDA	Continuous Descent Approach
CLG	Community Liaison Group
DNL	Day-Night Average Sound Level
EIA	Environmental Impact Assessment
EIAO	Environmental Impact Assessment Ordinance
EIAO-TM	Technical Memorandum on Environmental Impact Assessment Process
EM&A	Environmental Monitoring and Audit
EP	Environmental Permit
EPD	Environmental Protection Department
EPNL	Effective Perceived Noise Level
ETL	Environmental Team Leader
FAA	Federal Aviation Administration
HKIA	Hong Kong International Airport
HKO	Hong Kong Observatory
I-2RS	Interim Two-Runway System
ICAO	International Civil Aviation Organization
IEC	Independent Environmental Checker
INM	Integrated Noise Model
MM	Mott MacDonald
NADP	Noise Abatement Departure Procedures
NDP	Noise-Power-Distance
NEF	Noise Exposure Forecast
NMT	Noise Monitoring Terminal
NSR	Noise Sensitive Receiver
RNP	Required Navigation Performance
RNP-AR	Required Navigation Performance – Authorization Required
SEL	Sound Exposure Level
T2 building	Terminal 2 building

In Appendix G:

ARP	Office of Airports in the U.S.
DOT	Department of Transport in the U.S.
EA	Environmental Assessment
EIS	Environmental Impact Statement
FICON	Federal Interagency Committee on Noise in the U.S.
FONSI	Finding of No Significant Impact
NEPA	National Environmental Policy Act in the U.S.
ROD	Record of Decision
USC	United States Code

1 Introduction

1.1 Background

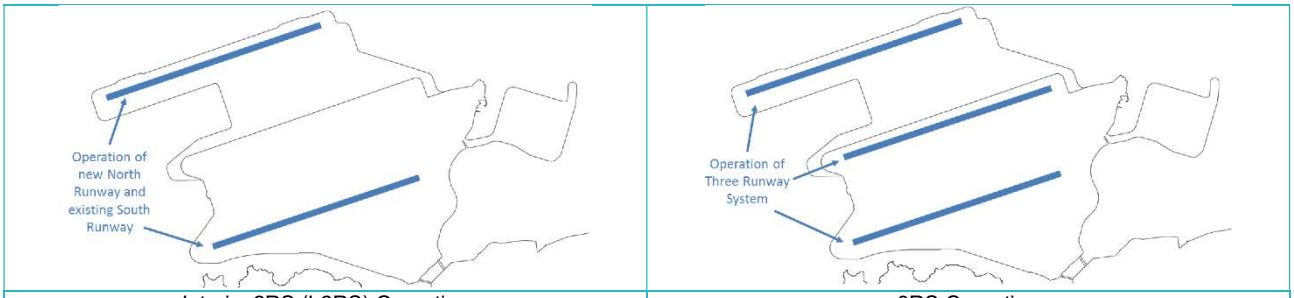
Under the Environmental Impact Assessment Ordinance (EIAO), the Environmental Impact Assessment (EIA) Report and the Environmental Monitoring and Audit (EM&A) Manual (Register No.: AEIAR-185/2014) prepared for the "Expansion of Hong Kong International Airport into a Three-Runway System" (hereafter referred to as the Project or the "3RS Project") have been approved by the Environmental Protection Department (EPD), and an Environmental Permit (EP) (Permit No.: EP-489/2014) has been issued for the Project.

The Project is located on a new land formation area immediately north of the original Hong Kong International Airport (HKIA) in North Lantau, covering a permanent footprint of approximately 650 ha. As stated in the approved 3RS EIA Report, the Project primarily comprises:

- New third runway with associated taxiways, aprons and aircraft stands;
- New passenger concourse building;
- Expansion of the existing Terminal 2 (T2) building; and
- Related airside and landside works, and associated ancillary and supporting facilities.

As presented in the approved 3RS EIA Report, the runway operational configuration will be implemented in phases as shown in **Figure 1.1** below. Upon completion of the new third runway and associated taxiways and with operation familiarisation of the runway started on 8 July 2022 and formal commencement of operation started since 25 November 2022, the previous north runway is temporarily closed for modification works. During this interim period as described in the approved 3RS EIA Report, the existing South Runway and the new third runway (which is designated as the new North Runway) are currently in operation, and this is hereafter referred to as the interim two-runway (I-2RS) operation. Upon completion of all essential infrastructure and facilities, the airport will be operated under the 3RS, which is hereafter referred to as the 3RS operation.

Figure 1.1: Runway Operation Configuration



Interim 2RS (I-2RS) Operation | 3RS Operation

The aircraft noise impact assessment completed as part of the approved 3RS EIA Report had assessed the aircraft noise impact associated with the above-mentioned I-2RS and 3RS operation. These covered both the Worst Operation Scenario and Design Capacity Scenario as two assessment scenarios for the 3RS operation in addition to the Interim Phase Scenario for the I-2RS operation. Relevant aircraft noise mitigation measures had been recommended and adopted as operational assumptions in the detailed aircraft noise modelling undertaken for the above-mentioned assessment scenarios.

In accordance with Section 4.1.7.2 of the Updated Environmental Monitoring and Audit (EM&A) Manual[1], the Airport Authority Hong Kong (AAHK) should submit a detailed Aircraft Noise Monitoring and Audit (ANM&A) Plan to EPD for agreement prior to commencement of Project operation, i.e., prior to commencement of the 3RS operation. Mott MacDonald (MM) has been appointed by AAHK as the Consultant to provide consultancy services for the 3RS Project, which include, among others, the preparation of this ANM&A Plan.

1.2 Purpose of the Plan

This ANM&A Plan has been prepared to set out the details of aircraft noise monitoring and audit according to the relevant requirements of the Updated EM&A Manual.

1.3 Structure of this Plan

Following this introductory section, this ANM&A Plan is structured as follows:

- Section 2 Overview of Aircraft Noise Monitoring and Audit Requirements
- Section 3 Prediction Verification
- Section 4 Review Report
- Section 5 Noise Contour Report
- Section 6 Community Liaison Plan

Pursuant to EP Condition 2.23 of the 3RS EP, AAHK has submitted the *Aircraft Noise Monitoring Plan* (ANMP) for the 3RS operation which has been approved by the Director of Environmental Protection (DEP, or hereafter referred to as the Director) for the 3RS operation. This approved EP submission includes the action plans that have been presented as part of the Event and Action Plans as approved by the Director-General of Civil Aviation in accordance with EP Condition 2.23, which have been reproduced in **Section 4** of this current Plan.

Separately, there is a *Submission of Procedures for Mitigation of Aircraft Noise* that has been made to and approved by the Director for the 3RS operation under EP Condition 2.21, and this approved EP submission shall be referred to for details of the implementation of the planned aircraft noise mitigation measures.

[1] See the web link below for locating the latest version (dated December 2020) of the Updated EM&A Manual available on the 3RS Project's dedicated website:
https://env.threerunwaysystem.com/ep%20submissions/202101%20EM&A%20Manual/EM&A%20Manual.pdf

2 Overview of Aircraft Noise Monitoring and Audit Requirements

2.1 ANM&A Programme Elements

As described in Section 4.1.2 of the Updated EM&A Manual, the ANM&A Plan should consist of the following key elements:

- **Prediction Verification:** *an exercise by AAHK to verify predictions on the effectiveness of measures to mitigate aircraft noise impact and the preparation of a Prediction Verification Report;*
- **Review Report:** *prepared on an annual basis by AAHK, for detailing the compliance with noise abatement procedures and unanticipated events, as well as any further necessary investigation and/or remedial action(s);*
- **Noise Contour Report:** *prepared in at least every five years by AAHK, to compare actual airport operation to forecast airport operation with respect to aircraft noise, taking into account data collected on actual aircraft operational levels, fleet mix, runway and flight track utilisations; and produce an updated noise contour using the most currently available and internationally accepted noise modelling methodology;*
- **Community Liaison:** *in addition to the above reporting requirements, AAHK shall continue to engage with the neighbouring communities in the vicinity of HKIA, other stakeholders and interested parties on aircraft noise issues associated with the operation of the Project.*

In accordance with Section 4.1.7.5 of the Updated EM&A Manual, references have been made to relevant international guidelines such as SAE ARP4721 Part 1 – *Monitoring Aircraft Noise and Operations in the Vicinity of Airports: System Description, Acquisition, and Operation*, which are relevant to the planned review of aircraft noise monitoring data, in developing details of the ANM&A Programme details. Additionally, existing monitoring and audit practices at similar international airports have been reviewed and referenced during the course of preparation of this ANM&A Plan.

According to Section 4.1.7.2 of the Updated EM&A Manual, the ANM&A Plan shall propose the following prior to commencement of the 3RS operation:

- Work programme;
- Actual data collection;
- Methodologies / procedures, including computation model, to process data into indicators or measures / assumptions adopted;
- Quality control and assurance procedure;
- Action / investigation plan if any non-compliance, including associated Action and Limit Levels;
- Community liaison plan;
- Relevant proforma forming part of the reports; and
- Any unforeseeable uncertainties, etc.

Details of this ANM&A Plan covering the above aspects are presented in **Sections 3** to **6** below.

3 Prediction Verification

3.1 Updated EM&A Manual Requirements

The Updated EM&A Manual has set out the key requirements for undertaking the prediction verification exercise, as reproduced in italics below:

4.1.3.1 The purpose of this task is for verification of predictions on the effectiveness of measures to mitigate aircraft noise impact of the project. This verification exercise shall be undertaken upon availability of relevant airport operation data for the first full year operation of the third runway of the project. A Prediction Verification Report, certified by the ETL and verified by the IEC, shall be submitted to EPD for approval.

4.1.3.2 As part of the prediction verification exercise, AAHK should collect radar data showing airport and flight operations for the first full year operation of the proposed third runway from Civil Aviation Department (CAD). Based on the radar data collected, the AAHK should carry out aircraft noise contour simulation. Similar approach adopted to process radar data for the prevailing scenario contour as presented in Chapter 7 of the EIA Report might be applied (individual radar data be pre-processed and annual daily average noise contours be produced by Integrated Noise Model (INM) for daily results) and the detailed methodology shall be agreed with EPD. The computational model to be used shall also be agreed with EPD prior to the analysis.

4.1.3.3 The Noise Exposure Forecast (NEF) 25 contour prepared based on radar data should be compared against the noise contours presented in Chapter 7 of the EIA Report for verifying the effectiveness of measures to mitigate the aircraft noise impact of the project. If the comparison of contours shows a reasonable converge, this would imply the aircraft noise prediction by computer simulation with forecast, assumptions and proposal of mitigation measures would reliably reflect that by actual airport and flight operations. In case discrepancies are observed, explanation shall be given and analysed as part of the Prediction Verification Report.

4.1.3.4 It shall be noted that the noise contours presented in Chapter 7 of the EIA Report are based on reasonable assumptions and input data including air traffic forecast, runway mode of operation, flight tracks and flight track utilisation, and proposed mitigation measures. Therefore, whilst it is being compared with the one generated by actual airport and flight operations, variances within reasonable ranges are envisaged and considered acceptable. Having said that, it is essential to ensure that with the mitigation measures recommended in the EIA Report, no additional noise sensitive receivers should be subject to adverse environmental impact under the requirements of the EIAO-TM. Detailed examination should be followed especially for those areas with major variances and the underneath rationale(s) will be elaborated.

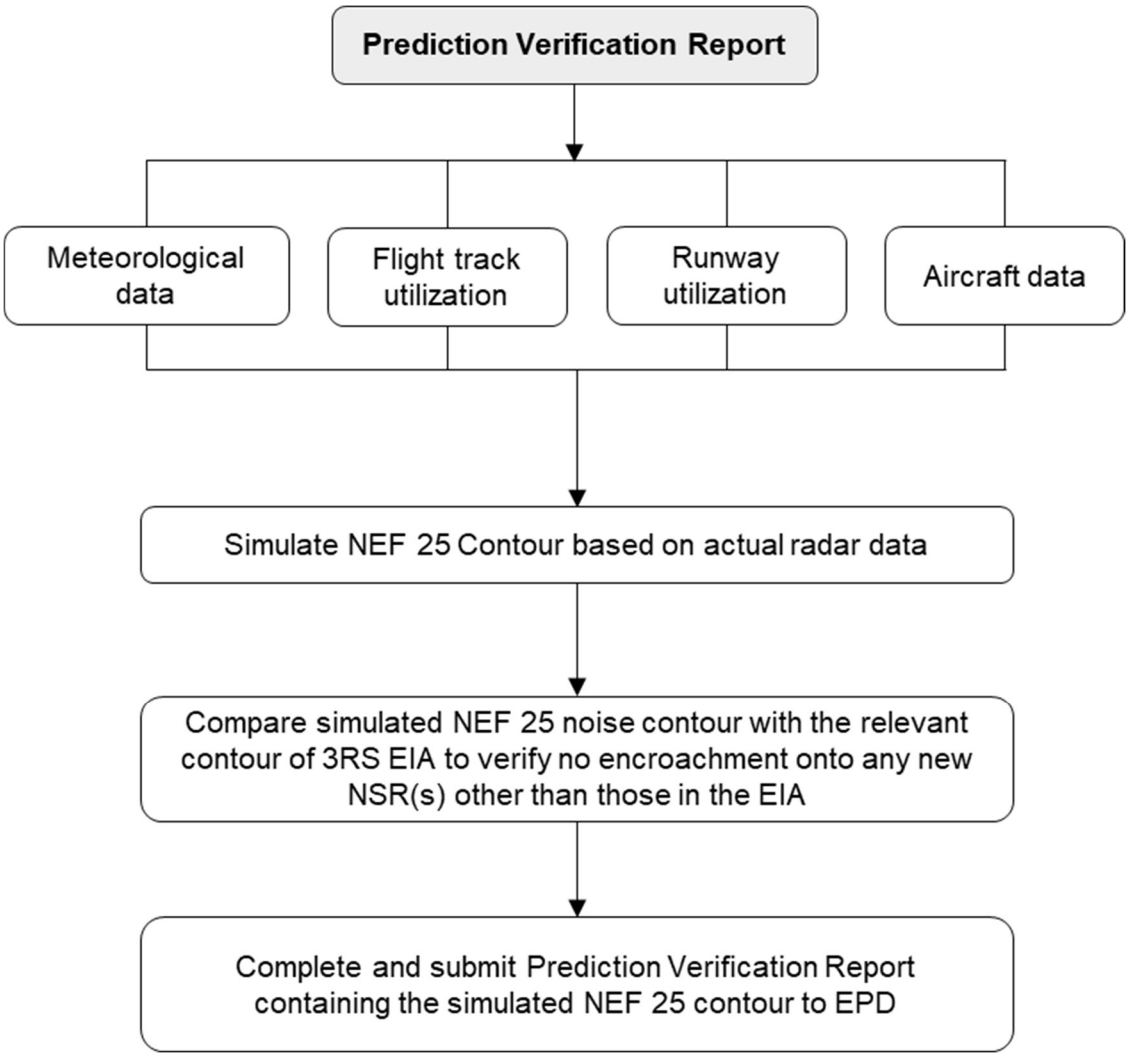
As per Section 4.1.3.1 of the Updated EM&A Manual, a prediction verification exercise has already been undertaken based on available airport operation data for the first full year operation of the third runway, i.e., 8 July 2022 to 7 July 2023 for the current I-2RS operation which involves the use of the third runway. The following sections provide an overview of the process and procedures involved and also the verification methodology adopted. Findings of the prediction verification exercise has been reported in the Prediction Verification Report submitted to EPD.

3.2 Overview of the Process and Procedures

With consideration of the available airport operational data for the first full year of I-2RS operation which involves the use of the third runway and also the findings of the relevant aircraft noise modelling presented in the first Noise Contour Report for the I-2RS operation, the Prediction Verification Report shall provide information for verifying the effectiveness of the measures implemented to mitigate aircraft noise on the Project. The Report shall give a comparison between the updated NEF 25 contour and the NEF 25 contour predicted for the Interim Phase Scenario as presented in Drawing No. MCL/P132/EIA/7-3-008 of the approved 3RS EIA Report for verifying no encroachment onto any new noise sensitive receivers (NSRs) other than those already presented in the approved 3RS EIA Report.

In preparing the Prediction Verification Report the process as illustrated in **Chart 3.1** should be followed.

Chart 3.1: Prediction Verification Process



3.3 Verification Methodology

As per the requirements set out in Section 4.1.3 of the Updated EM&A Manual, which have been reproduced in **Section 3.1** above, actual airport operational data including radar data for the first full year operation of the third runway of the Project shall be collected from CAD. Upon collection of the operational data for the first full year, AAHK shall conduct aircraft noise contour simulation. The NEF 25 contour simulated for the I-2RS operation using actual operational data shall be overlaid onto the NEF 25 contour as presented in Drawing No. MCL/P132/EIA/7-3-008 of the approved 3RS EIA Report.

The coverage of the updated NEF 25 contour and the predicted one presented in the above-mentioned Drawing No. MCL/P132/EIA/7-3-008 of the approved 3RS EIA Report for the I-2RS operation shall be compared, focusing on those NSRs that are situated within the NEF 25 contour for verifying that the updated NEF 25 contour would not encroach onto any new NSRs. The comparison results shall be used as the basis to verify effectiveness of the measures which have been planned and implemented to mitigate aircraft noise impact based on airport operational data from the first full year operation of the third runway of the Project.

In undertaking the above-mentioned comparison, it shall be noted that as already described in Section 7.8.1 of approved 3RS EIA Report and also Section 4.1.3.4 of the Updated EM&A Manual, variances in noise contours within reasonable ranges are envisaged and considered acceptable when the updated NEF 25 contour is compared with the predicted one presented in the approved 3RS EIA Report, as the latter could only be produced based on forecast data and reasonable assumptions at the 3RS EIA stage. Yet, the key focus of the exercise is to ensure that with the mitigation measures planned and implemented for the I-2RS operation which involves the use of the third runway, no additional NSRs would be subjected to adverse environmental impact under the requirements of the Technical Memorandum on Environmental Impact Assessment Process (EIAO-TM).

3.4 Data Quality Assurance (QA) and Quality Control (QC)

QA/QC is built into the input data processing and review process. The process was designed to meet the following key modelling performance criteria:

- **Auditability**: the input and output data of the noise modelling process must be auditable. To satisfy these criteria, a standard folder structure was developed to systematically store the input data, assumptions, and output data. Assumptions made during the modelling process are documented and saved in an appropriate folder.
- **Reliability**: the modelling process should deliver the same results when it is repeated with the same inputs and assumptions. Because noise modelling is performed using a standard computational methodology and computer software, processing of the input data must be systematic and consistent to produce reliable results. To achieve reliability, standard data processing tools and procedures have been developed to allow for consistent development of the input data.
- **Consistency**: the documented process provides a series of pre-determined activities that must be completed to develop the required input data.
- **Accuracy**: the accuracy of the noise contours is determined by the accuracy of the computational methodology, the aircraft noise performance data, and the computer software used. Using consistent and reliable input data processing procedures, tools, and assumptions increases the accuracy of the resulting noise contours.

3.5 Verification Programme

As already described in **Section 3.1** above, a prediction verification exercise has already been undertaken based on available airport operational data for the first full year operation of the third runway of the Project i.e., data from 8 July 2022 to 7 July 2023 for the first full year of I-2RS operation that involves the use of the third

runway. Findings of the prediction verification exercise have been reported in the Prediction Verification Report submitted to EPD.

For the planned 3RS operation, while the Updated EM&A Manual has not specified the need to submit a separate Prediction Verification Report, the findings of a similar prediction verification exercise that may be obtained by comparing the updated NEF contour simulated for the first full year of 3RS operation overlaid onto the NEF 25 contours obtained for both the Worst Operation Scenario and Design Capacity Scenario of the 3RS operation shall be presented as part of the Noise Contour Report mentioned in **Section 5** for the 3RS operation. This exercise will help confirm the effectiveness of the planned mitigation measures and that the updated NEF contour would not encroach onto any new NSRs.

4 Review Report

4.1 Updated EM&A Manual Requirements

The Updated EM&A Manual has specified requirements of the Review Report, as extracted and shown in italics below:

4.1.4.1 The Review Report, prepared on an annual basis by AAHK shall include an analysis of how well aircraft flight follow each of the aircraft noise mitigation measures recommended in Chapter 7 of the EIA Report. Information to be collected shall include available radar data showing airport and flight operations from CAD, and this is to be analysed in terms of flight tracks and runway utilisation for checking the effective implementation of the noise reduction measures. AAHK may make references to available operational noise data collated by the relevant authorities. Wind record in the year should also be collected from HKO. The Review Report should review the data collected including measured noise levels at representative locations, statistics of flight tracks, flight tracks dispersion and aircraft using proposed mitigation measures and existing noise mitigation measures, etc.

4.1.4.2 The annual review and reporting process will allow AAHK to measure exactly how it stands compared to predicted operations used in the preparation of the EIA Report. If there are any major variances / discrepancies / abnormalities that are observed during the ongoing process of data collection and analysis for preparation of the annual review when compared with the assumptions / measures adopted in the assessment, early investigation shall be carried out for identification of the possible causes of the variances / discrepancies / abnormalities and whether these would significantly affect the aircraft noise environment.

4.2 Relevant EP Conditions

The requirements set out in the Updated EM&A Manual as reproduced above are in line with the requirements stipulated as part of EP Conditions 2.22 and 2.23, which are reproduced in italics below:

2.22 The Permit Holder shall, no later than 3 months after a full year of operation of the Project, submit 3 hard copies and 1 electronic copy of an updated Noise Exposure Forecast (NEF) 25 contour with actual operational data to the Director for approval. Thereafter the Permit Holder shall review the operational data annually and update the NEF25 contour if there are major deviations from the assumptions adopted in the approved EIA report (Register No. AEIAR-185/2014).

2.23 The Permit Holder shall, no later than 3 months before the operation of the Project, submit an Aircraft Noise Monitoring Plan (The Plan) to the Director for approval. The Plan shall include monitoring aircraft noise at representative locations in Tung Chung, Ma Wan, Tsing Yi, Tsuen Wan, Ting Kau, Siu Lam and Tuen Mun. The Plan shall make use of the available aircraft noise and flight track monitoring data including measured noise levels in terms of dB(A) and their distribution, flight tracks, aircraft fleet mix data and other relevant information at these locations. The Plan shall also include an action plan, as approved by Director-General of Civil Aviation, to review the noise data to assess the effectiveness of the mitigation measures and to take appropriate action with reference to the prevailing internationally recognized standards in aircraft noise mitigation.

In preparing The Plan, the Permit Holder shall confirm with the Director-General of Civil Aviation on the implementation of restrictions on specific aircraft types to follow the guidelines laid down by the International Civil Aviation Organization to tackle the problem of aircraft noise problems at source.

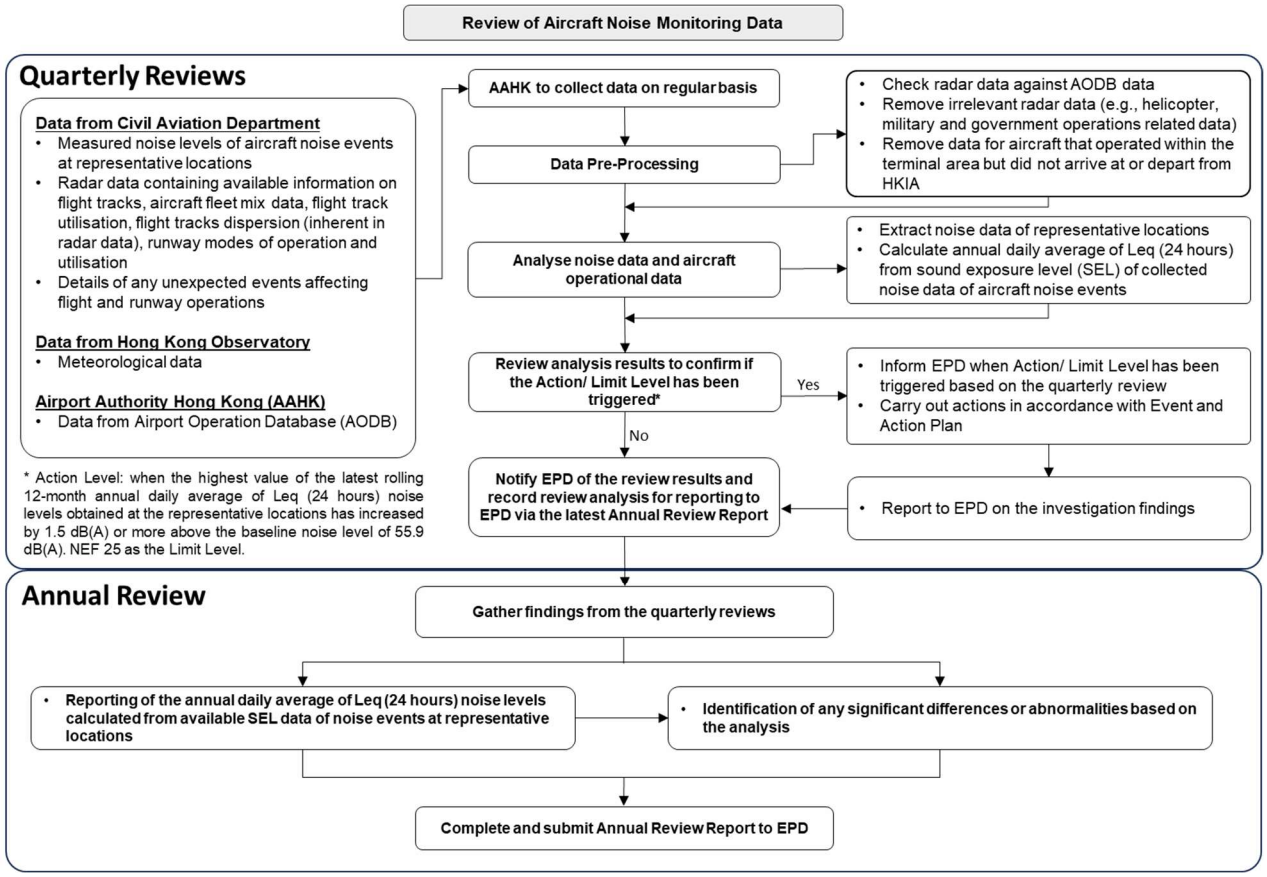
First, in accordance with EP Condition 2.22, AAHK is required to review the operational data annually subsequent to producing the first updated NEF 25 contour for the 3RS operation. The relevant EP Condition 2.23 for which an ANMP has been submitted to and approved by the Director also requires AAHK to make use of the available aircraft noise and flight track monitoring data including measured noise levels in terms of dB(A) and their distribution amongst other relevant information, and to assess the effectiveness of the aircraft noise mitigation measures and take appropriate actions.

4.3 Overview of Process and Procedures

The process and procedures with respect to the review of aircraft noise monitoring data and review of implementation status of aircraft noise mitigation measures as described in the following sections are based on the approved ANMP. The plan and relevant arrangements are reproduced below.

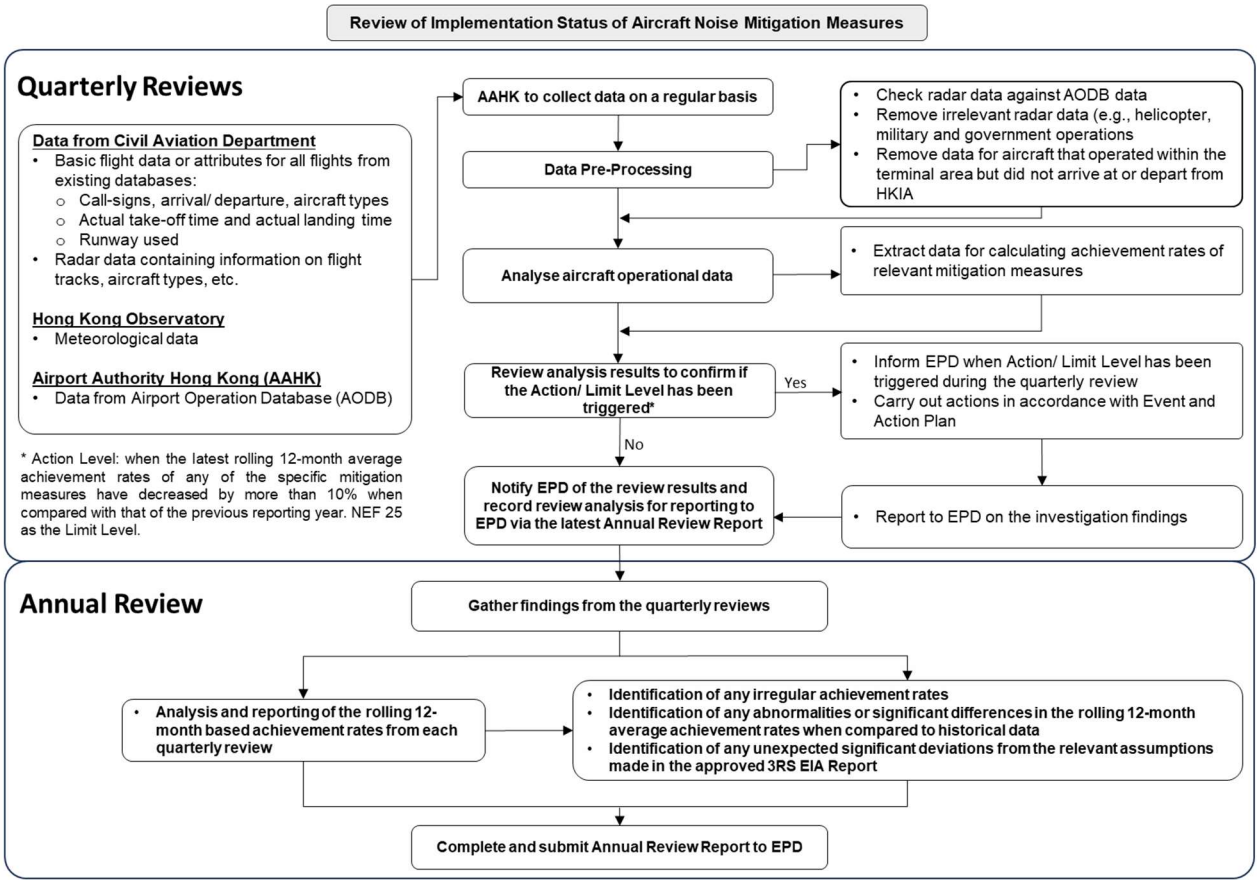
The processes for review of aircraft noise monitoring data and review of implementation status of aircraft noise mitigation measures are summarised in **Chart 4.1** and **Chart 4.2** respectively, with details described respectively in **Sections 4.4** and **4.5** below.

Chart 4.1: Quarterly Reviews and Annual Reporting Process for Review of Aircraft Noise Monitoring Data



Note: The action level shall be reviewed and refined as appropriate after the first year of 3RS operation, when the first updated NEF25 contour for 3RS operation is produced based on actual airport operational data.

Chart 4.2: Quarterly Reviews and Annual Reporting Process for Review of Implementation Status of Aircraft Noise Mitigation Measures



Notes:

1. For details of the implementation of aircraft noise mitigation measures, please refer to the Submission under EP Condition 2.21 – Procedures for Mitigation of Aircraft Noise.

2. The action level shall be reviewed and refined as appropriate after the first year of 3RS operation, when the first updated NEF25 contour for 3RS operation is produced based on actual airport operational data.

4.4 Review of Aircraft Noise Monitoring Data

4.4.1 Aircraft Noise Monitoring

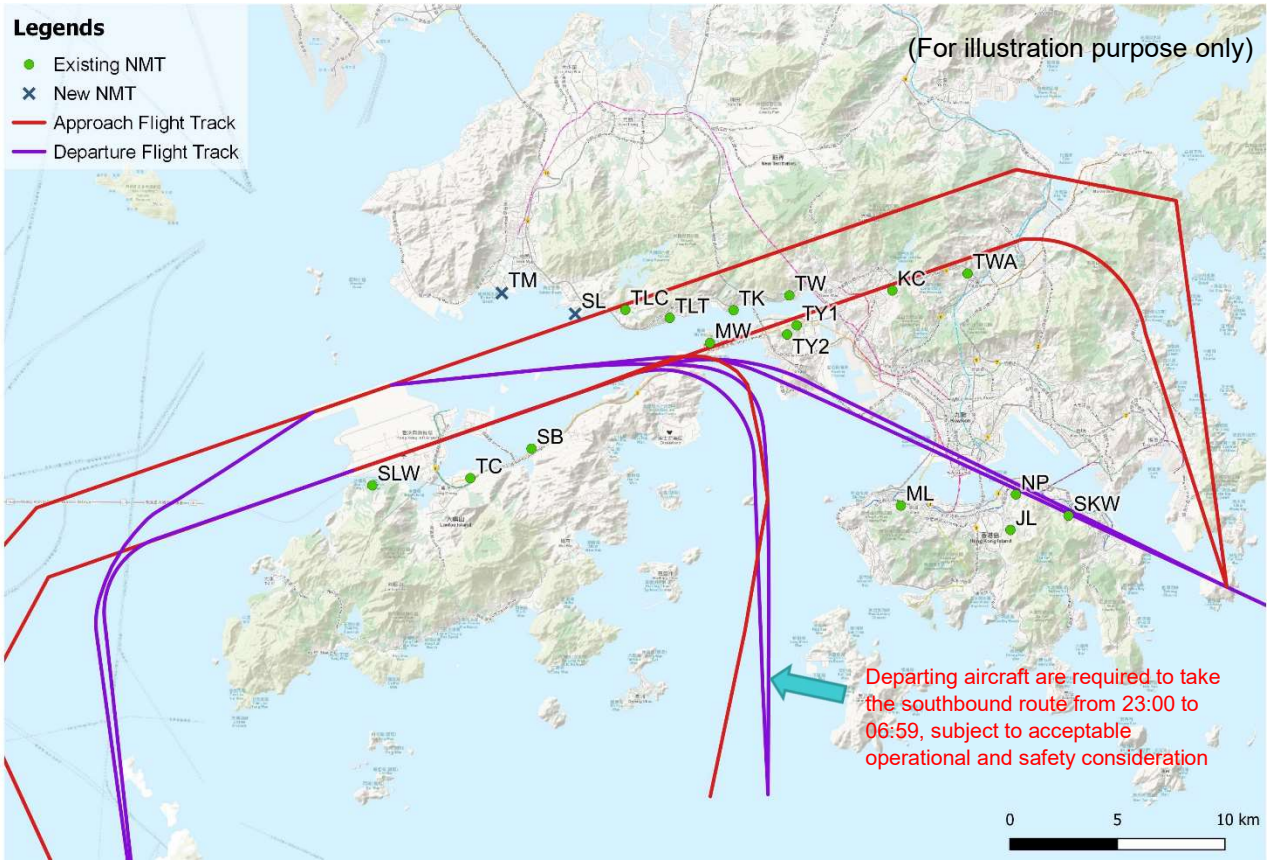
The noise caused by aircraft operations is currently monitored through a computerised Aircraft Noise and Flight Track Monitoring System (ANFTMS) established by the CAD. The ANFTMS is comprised of multiple outdoor noise monitoring terminals (NMTs) which are located along or close to the flight paths operating into and out of the HKIA to collect noise data, and a computer system which correlates noise data collected with actual aircraft flight tracks detected by CAD's radar system.

4.4.1.1 Noise Monitoring in current I-2RS Operation

The flight tracks adopted in the current I-2RS operation are similar to those used in the previous 2RS operation. Yet, with the new North Runway in operation together with the South Runway while the previous north runway is closed for modification works, the flight path associated with the arrivals to the new North Runway has been shifted north, as illustrated in **Figure 4.1**. In view of the commencement of operation familiarisation of the North Runway from 8 July 2022 and formal commencement of operation started since 25 November 2022, the

ANFTMS has been expanded through the installation of additional NMTs at locations close to the flight paths of the North Runway i.e., two new NMTs in Siu Lam (SL) and Tuen Mun (TM) as illustrated in **Figure 4.1**.

Figure 4.1: Locations of existing and new NMTs established for I-2RS operation



4.4.1.2 Noise Monitoring in planned 3RS Operation

The planned 3RS operation will involve the use of existing flight tracks that are already in use in the previous 2RS operation or the current I-2RS operation, as well as updated flight tracks. To ensure the effective monitoring of the aircraft noise situation under the 3RS operation, additional NMTs will be installed at locations close to the updated flight tracks and operated as part of the ANFTMS. **Figure 4.2** shows the locations of the existing and planned NMTs.

It can be noted that among the existing and planned NMTs shown in **Figure 4.2**, seven of the existing NMTs are situated close to the NEF 25 contour obtained under the Worst Operation Scenario or the Design Capacity Scenario of the aircraft noise impact assessment undertaken for the 3RS operation in the approved 3RS EIA Report. These seven NMTs, namely N1 to N7, are further illustrated in **Figure 4.3** and summarised in **Table 4.1.** There are 5 other NMTs, namely F1 to F5 as also illustrated in **Figure 4.3** and listed as part of **Table 4.1** and these involve NMTs that are situated further away from the NEF 25 contour, but have been specifically named in EP Condition 2.23. The remaining NMTs, namely O1 to O6 and P1 to P4 as shown in **Figure 4.3** and listed in **Table 4.1**, are located far away from the NEF 25 contour.

Figure 4.2: Locations of existing and planned NMTs for 3RS operation

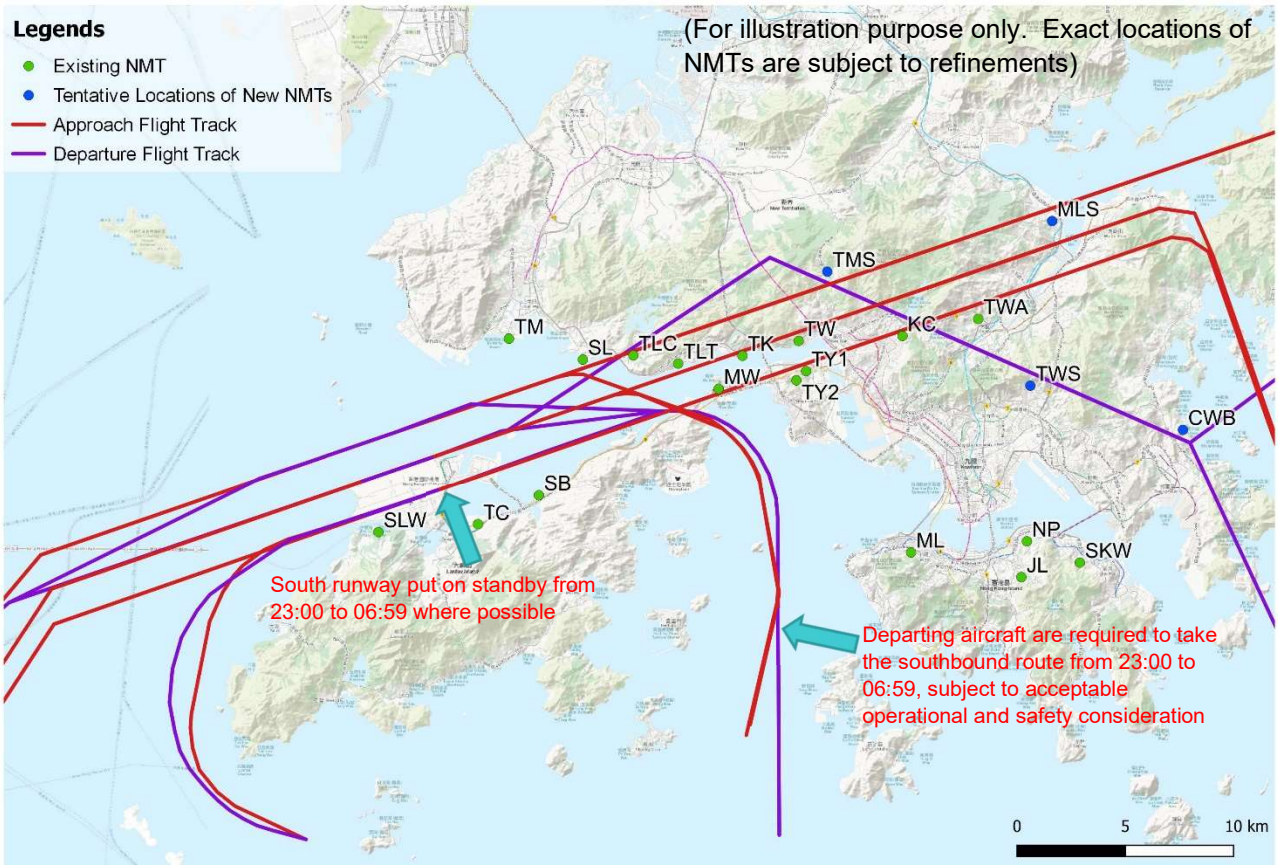


Figure 4.3: Locations of Representative NMTs

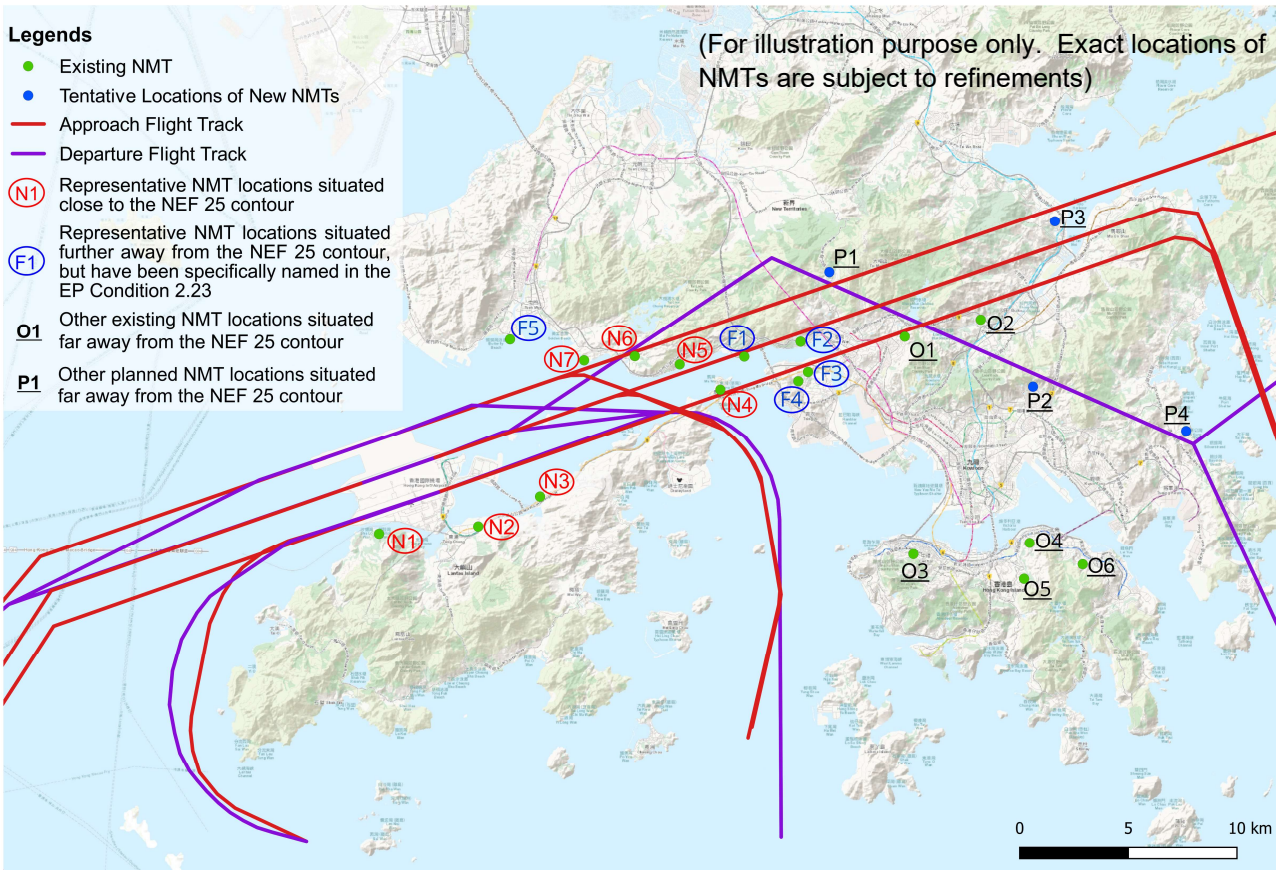


Table 4.1: Noise Monitoring Locations

NMT ID.	Location of existing NMTs
Representative NMT locations situated close to the NEF 25 contour	
N1	Sha Lo Wan (SLW)
N2	Tung Chung (TC)
N3	Sunny Bay (SB)
N4	Ma Wan (MW)
N5	Tsing Lung Tau (TLT)
N6	Tai Lam Chung (TLC)
N7	Siu Lam (SL)
Representative NMT locations situated further away from the NEF 25 contour, but have been specifically named in EP Condition 2.23	
F1	Ting Kau (TK)
F2	Tsuen Wan (TW)
F3	Tsing Yi #1 (TY1)
F4	Tsing Yi #2 (TY2)
F5	Tuen Mun (TM)
Other NMT locations situated far away from the NEF 25 contour	
O1	Kwai Chung (KC)
O2	Tai Wai (TWA)
O3	Mid-Levels (ML)

NMT ID.	Location of existing NMTs
O4	North Point (NP)
O5	Jardine's Lookout (JL)
O6	Shau Kei Wan (SKW)
NMT ID.	**Planned locations of new NMTs**
P1	Tai Mo Shan (TMS)
P2	Tsz Wan Shan (TWS)
P3	Ma Liu Shui (MLS)
P4	Clear Water Bay (CWB)

4.4.2 Monitoring Equipment and Method

The NMTs are generally equipped with a wind shielded microphone mounted on a mast erected at a distance from nearest hard surface together with a bird spike and lightening rod. The microphone is connected via weatherproof cabling to a sound meter housed in a weatherproof cabinet with peripheral equipment for power supply and telecommunication, including a backup battery. The noise meters are in compliance with the International Electrotechnical Commission Publications 651:1979 (Type 1) and 804:1985 (Type 1) or of comparable professional quality. The NMTs are designed to operate 24-hours a day.

Real-time noise data are streamed to the ANFTMS, either via wireless or fixed-line network connection. A computer system operated and maintained as part of the ANFTMS allows correlation of the available noise data monitored with actual aircraft flight tracks detected by the radar system for identification of aircraft noise events. A regular maintenance programme (e.g. preventive maintenance, calibration tests, etc.) for the ANFTMS is in place to ensure the serviceability and proper functionality of the system.

4.4.3 Quarterly Reviews of Aircraft Noise Monitoring Data

AAHK shall obtain the following data from the relevant parties including the Hong Kong Observatory (HKO) and CAD for conducting the quarterly reviews:

- Measured noise levels of aircraft noise events at representative locations including Tung Chung, Ma Wan, Tsing Yi, Tsuen Wan, Ting Kau, Siu Lam and Tuen Mun obtained via the ANFTMS;
- Radar data including available information on but not limited to the following:
  - Flight tracks;
  - Aircraft fleet mix data;
  - Flight track utilisation;
  - Flight tracks dispersion (inherent in radar data); and
  - Runway modes of operation and utilisation, etc.
- Meteorological data measured and reported by HKO;
- Details of any unexpected events affecting flight and runway operations.

All aforementioned data shall be requested from the relevant parties on a regular basis for conducting an initial checking and analysis upon receipt of the data. This shall include but not limited to the checking and analysis of the radar data against available data from the Airport Operational Database (AODB) of AAHK for consistency of the available data and identification of any missing data, information gap and/or abnormalities in the available data. Any information gap, abnormalities or unforeseen circumstances should be addressed via engaging in further discussions and coordination with the relevant parties providing the data.

In addition, pre-processing of the data shall take place to facilitate the undertaking of the quarterly reviews, which includes:

- Removal of irrelevant radar data, such as those related to helicopter, military and government operations; and
- Removal of aircraft operated within the terminal area but did not arrive at or depart from HKIA.

The measured noise levels of aircraft noise events obtained at representative locations, including the distribution of the measured noise levels, shall be analysed for examining and identifying any potential trends and patterns in the aircraft noise monitoring results. Specifically, taking into account that the NEF is the only aircraft noise criterion stipulated in the EIAO-TM, the quarterly reviews of noise levels measured at the NMTs shall focus on representative locations which are close to the NEF 25 contour (i.e., NMT ID. N1 to N7), while the noise levels measured at other representative locations situated at areas further away from the NEF 25 contour but have been specifically named in EP Condition 2.23 shall also be reviewed (i.e., NMT ID. F1 to F5). At the remaining locations that are situated far from the NEF 25 contour (i.e., NMT ID. O1 to O6 and P1 to P4), the available noise data may also be referenced as needed when analysing the potential trends and patterns of the aircraft noise monitoring results obtained at the representative locations.

The available noise data of aircraft noise events collected at the representative locations shall be analysed on a rolling 12-month basis in each quarterly review. As the NEF aircraft noise criterion adopted under the EIAO-TM is based on the Effective Perceived Noise Level (EPNL) as the single event sound level descriptor, and while it is not practicable to carry out routine noise monitoring in EPNL, the annual daily average of Leq (24 hours) may be calculated from available sound exposure level (SEL) data obtained at the NMTs. SEL is a measure of the total sound energy of each aircraft noise event, which is normalised to a reference duration of one second and can be used to derive the Leq (24 hours) metric (see **Appendix A** for the relevant calculation method). The review of the annual daily average of Leq (24 hours) on a quarterly basis will facilitate a good understanding of the trends and patterns of the aircraft noise monitoring results.

4.4.4 Preparation of Annual Review Report

With consideration of the findings from the quarterly reviews using the noise metric proposed above, a Review Report shall be prepared on an annual basis and this shall present the following information to facilitate readers' understanding of the trends and patterns of the aircraft noise monitoring results obtained at the representative locations for the 3RS operation:

- Reporting of the annual daily average of Leq (24 hours) noise levels calculated from available SEL data of noise events at representative locations (i.e., at NMT ID. N1 to N7 and also NMT ID. F1 to F5 as mentioned above); and
- Identification of any significant differences or abnormalities in the above-mentioned analysis.

The quarterly reviews of aircraft noise monitoring data and the annual reporting process may continue throughout the 3RS operation. A proforma illustrating how the noise monitoring results, presented in form of the annual daily average of Leq (24 hours) noise levels obtained at representative locations, may be presented is set out in **Appendix B**. Relevant figures may be presented to visualise the changes over time, based on the results obtained from the quarterly reviews.

4.4.5 Event and Action Plan for Review of Aircraft Noise Monitoring Data

4.4.5.1 Planned Actions related to the Action Level by AAHK

As set out in Section 4.1.5 of the Updated EM&A Manual, AAHK has made a commitment to have the NEF 25 contour updated at least every 5 years using actual flight data obtained from the local Air Traffic Control radar systems.

The quarterly reviews and annual reporting of aircraft noise monitoring data, when analyzed and presented in terms of the annual daily average of Leq (24 hours) noise levels monitored at the representative locations, will help track the trends and patterns of aircraft noise experienced at the Noise Sensitive Receivers (NSRs) situated close to the NEF 25 contour in years before the next updated NEF 25 contour will be presented under the 5-year reporting cycle.

Accordingly, as detailed as part of the Event and Action Plan presented in **Table 4.2,** where major variances, discrepancies or abnormalities are identified in the annual daily average of Leq (24 hours) noise levels monitored at the representative locations (i.e., when the highest value of the latest rolling 12-month annual daily average of Leq (24 hours) noise levels obtained at the representation locations has increased by 1.5 dB(A) or more above the baseline noise level (see **Appendix C** for details of the baseline noise level and the basis of the proposed action level), the action level is considered to be triggered and an early investigation should be launched by AAHK with a view to identifying the possible causes of the variances, discrepancies or abnormalities, including the need to assess for any significant effect on the NEF 25 contour by undertaking relevant noise contour analysis. Based on the analysis results, AAHK should then evaluate the need for any improvement actions and liaise with the relevant parties for actions.

4.4.5.2 Planned Actions related to the Limit Level by AAHK

As NEF is the only aircraft noise criterion stipulated in the EIAO-TM, the limit level is considered to be triggered at such time it is determined that the NEF 25 contour may start to encroach onto any additional NSRs, or when it is considered that there are major deviations from the assumptions adopted in the approved 3RS EIA Report. Under these circumstances, additional analysis will also be necessary to update the NEF 25 contour for confirming if there are any encroachment onto any new NSRs. If required, the need and feasibility of introducing additional mitigation measures as remedial actions shall be assessed and AAHK shall discuss with the relevant parties for implementation of the additional measures.

Table 4.2: Event and Action Plan for Review of Aircraft Noise Monitoring Data

Event	Actions by AAHK
Action Level	
Major variances / discrepancies / abnormalities identified in the trends of the aircraft noise monitoring results obtained at representative locations from the quarterly reviews i.e., when the highest value of the latest rolling 12-month annual daily average of Leq (24 hours) noise levels obtained at the representative locations has increased by 1.5 dB(A) or more above the baseline noise level as mentioned in **Appendix C***	(a) Launch an early investigation to examine the major variances / discrepancies / abnormalities identified at the representative locations, with a view to identifying the possible causes and these may include but not limited to: • Identification of any unexpected events affecting airport and flight operation; • Review and identification of any potential seasonal variations; • Review of wind records from nearest relevant meteorological station operated by HKO; • Identification of any aircraft noise mitigation measure(s) that would be potentially affecting the aircraft noise monitoring results obtained at the representative locations, followed by a review of any variances / discrepancies / abnormalities in the trends or patterns of achievement rates of the concerned mitigation measure(s); • Review and identification of any potential correlation between specific overflights and contribution to noise events, with the use of the aircraft data (e.g., fleet mix); • Review and analysis of measured noise levels obtained at all relevant representative locations; • Carry out early analysis to update the NEF 25 contour to confirm that there is no encroachment onto any new NSRs other than those predicted in the approved 3RS EIA Report. (b) Based on the investigation results, evaluate the need for any improvement actions and liaise with relevant parties for actions.
Limit Level	
NEF 25 (as specified in Annex 5 of the EIAO-TM)	Based on the available airport operational data and with consideration of the findings of the action level related investigation presented above, if it is determined that the NEF 25 contour may start to encroach onto any additional NSRs, or when it is considered that there are major deviations from the assumptions adopted in the approved 3RS EIA Report, the limit level is considered to be triggered and the following actions shall be taken: • Update the NEF 25 contour to confirm if there are any encroachments onto new NSRs other than those predicted in the approved 3RS EIA Report; • Assess the need and feasibility of introducing any additional mitigation measures that may need to be in place as remedial actions; and • Discuss with the relevant parties for implementation of the additional mitigation measures.

* See **Appendix C** for the basis of the proposed action level. Both the action and limit level events are proposed by AAHK in accordance with the criteria set out in Annex 21 of the EIAO-TM. The action level shall be reviewed and refined as appropriate after the first year of 3RS operation, when the first updated NEF25 contour for 3RS operation is produced based on actual airport operational data.

4.5 Review of Implementation Status of Aircraft Noise Mitigation Measures

4.5.1 Overview of Aircraft Noise Mitigation Measures[2]

Sections 7.3.3.11 and 7.3.5.3 of the approved 3RS EIA Report have recommended a number of direct noise mitigation measures for the future 3RS operation, including the following which have been included and listed under EP Condition 2.21, as reproduced in italics below:

(i) putting the existing south runway on standby where possible at night between 2300 hours and 0659 hours;
(ii) requiring departures to take the southbound route via West Lamma Channel during east flow at night between 2300 hours and 0659 hours, subject to acceptable operational and safety consideration;
(iii) assigning a new arrival Required Navigation Performance Track 6 for preferential use in the runway 25 direction between 2300 hours and 0659 hours;
(iv) implementing a preferential runway use programme when wind conditions allow such that west flow is used when departures dominate while east flow is used when arrivals dominate during night-time.

In addition to the direct noise mitigation measures listed above, Section 7.3.5.4 of the approved 3RS EIA Report has also recommended that the existing noise abatement good practices, including the use of noise abatement take-off procedures (also known as Noise Abatement Departure Procedures (NADPs)) and Continuous Descent Approach (CDA), which have been implemented at HKIA since the previous 2RS operation and in the current I-2RS operation, to continue to be applied in the 3RS operation. These measures have accordingly been included and also listed under EP Condition 2.21, as reproduced in italics below:

(v) adopting the noise abatement take-off procedures stipulated by International Civil Aviation Organization (ICAO) for aircraft departing to the northeast so long as safe flight operations permit;
(vi) adopting the Continuous Descent Approach (CDA) for all aircrafts on approach to the Hong Kong International Airport (HKIA) from the northeast between 2300 hours and 0700 hours.

As summarised in **Table 4.3** below, three of the above-listed measures, including items (ii), (v) and (vi), have already been implemented in the current I-2RS operation and all of the six measures are planned for the 3RS operation.

Regarding item (iii) of the measures i.e., the arrival Required Navigation Performance (RNP) Track 6, an Aeronautical Information Circular (AIC) 20/23 of 21 August 2023 titled "*Preferential Use of RNP Y (AR) APCH Procedures to Runway 25 at Hong Kong International Airport (HKIA) during noise mitigation period*" (reproduced in **Appendix D**) was issued on 21 August 2023 to promote the increased use of the arrival RNP Track 6 effective from 3 September 2023. AAHK is also considering introducing a relevant incentive scheme at HKIA to promote the increased use of the RNP Track 6. It is expected that the use of the RNP Track 6 may increase progressively as assumed in the approved 3RS EIA Report with airlines increasingly equipping themselves with the necessary capabilities to meet the more stringent requirements[3].

Besides, regarding item (iv) of the measures i.e., the Preferential Runway Use Programme, it can be noted that the existing noise mitigation measure implemented in the current I-2RS operation and the previous 2RS operation mainly relies on preferential use of the 07 runways as specified under Clause 2.3.1 in AD2.21 of the Hong Kong Aeronautical Information Publication (AIP Hong Kong) published by CAD and also described in Section 7.3.3.25 of the approved 3RS EIA Report. For the 3RS operation, relevant aircraft noise modelling undertaken for both the Worst Operation Scenario and Design Capacity Scenario at the 3RS EIA stage were based on a forecast where the air traffic movements (ATMs) at HKIA would grow beyond the maximum

[2] For details of the implementation of aircraft noise mitigation measures for the 3RS operation, please refer to the Submission under EP Condition 2.21 – *Procedures for Mitigation of Aircraft Noise*.

[3] RNP-Authorization Required ("RNP-AR") capabilities are required for the use of Track 6. In order to perform RNP-AR for using Track 6, the aircraft must have a high level of navigation performance as they need to navigate precisely along the predetermined path over complex terrain; and the flight crew must also meet specific training requirements. In addition, authorization from relevant civil aviation authorities is required.

practicable capacity of 420,000 ATMs per year applicable to the I-2RS and previous 2RS operation towards the 607,480 ATMs per year under the Worst Operation Scenario and 620,000 ATMs per year under the Design Capacity Scenario. A number of aircraft noise mitigation measures as mentioned in the 3RS EP would need to be implemented to mitigate the predicted aircraft noise impact.

Specifically, the introduction of the planned Preferential Runway Use Programme (such that west flow is used when departures dominate while east flow is used when arrivals dominate during night-time when wind conditions allow), when identified to be necessary for the 3RS operation, will enable the majority of traffic to arrive from or depart towards the western side of HKIA over water during night-time. As already pointed out under the sub-section on *Control of night flight movement over residential area* in Section 7.3.4.9 of the approved 3RS EIA Report, for arrivals to HKIA in the runway 25 direction, together with increased use of the arrival RNP Track 6 designed for preferential use that will allow suitably equipped aircraft to reduce the portion of their approach path over populated areas, the implementation of the Preferential Runway Use Programme will also reduce the number of arriving aircraft overflying populated residential areas.

The introduction of the Preferential Runway Use Programme will be dependent on a number of factors, inter alia, air traffic growth, night-time schedule demand and patterns, on-time performance of night flights, air traffic control procedures, usage and impact of different flight tracks, etc. The quarterly reviews of aircraft noise monitoring data, with details presented in **Section 4.4**, will provide data on trends and patterns of aircraft noise. All relevant factors will need to be carefully considered, taking into account the findings of the quarterly reviews, in order to decide when the Preferential Runway Use Programme will be required and can be implemented in the most appropriate manner, with a view to ensuring that the NEF 25 contour would not be encroaching onto any new NSRs. AAHK will closely monitor the situation and provide updates as appropriate.

Table 4.3: Implementation Status of Aircraft Noise Mitigation Measures for I-2RS and 3RS

Item	Measure	Description	Implementation Status	
			I-2RS	3RS
i.	South Runway on Standby	Putting existing south runway on standby where possible at night between 2300 and 0659 hours.	Not applicable*	Planned for implementation
ii.	West Lamma Channel Departures	Departures to take southbound West Lamma Channel during east flow at night between 2300 and 0659 hours, subject to acceptable operational and safety considerations.	Under implementation	Planned for implementation
iii.	RNP Track 6	Assigning a new arrival Required Navigation Performance (RNP) Track 6 for preferential use in the runway 25 direction (i.e., west flow) between 2300 and 0659 hours.	Not applicable**	Planned for implementation**
iv.	Preferential Runway Use	Preferential runway use programme when wind conditions allow such that west flow is used when departures dominate while east flow is used when arrivals dominate during night-time.	Not applicable	Planned for implementation ***
v.	NADP to the Northeast	Adopting noise abatement departure procedures for aircraft departing to the northeast as long as safe flight operations permit.	Under implementation	Planned for implementation
vi.	CDA from the Northeast	Adopting CDA for all aircraft on approach from the northeast between 2300 and 0700 hours.	Under implementation	Planned for implementation

* South Runway on Standby not operationally feasible with 2 runways in I-2RS.

** Taking into account the level of aircraft / aircrew capability and air traffic considerations, the existing RNP Track 6 had been assigned for use in the west flow direction for suitably equipped aircraft only when circumstances permit during the I-2RS operation. To effect the increased use of the RNP Track 6 progressively in the 3RS operation as assumed in the approved 3RS EIA Report, an Aeronautical Information Circular (AIC) 20/23 of 21 August 2023 (reproduced in **Appendix D**) had been issued to promote the increased use of the RNP Track 6 from 3 September 2023. AAHK is also considering introducing a relevant incentive scheme at HKIA to promote the increased use of the RNP Track 6. It is expected that the use of the RNP Track 6 may increase progressively as assumed in the approved 3RS EIA Report with airlines increasingly equipping themselves with the necessary capabilities to meet the more stringent requirements.

Item Measure	Description	Implementation Status	
		I-2RS	3RS
	*** The introduction of the Preferential Runway Use Programme will be dependent on a number of factors, inter alia, air traffic growth, night-time schedule demand and patterns, on-time performance of night flights, air traffic control procedures, usage and impact of different flight tracks, etc. The quarterly reviews of aircraft noise monitoring data will provide data on trends and patterns of aircraft noise. All relevant factors will need to be carefully considered in order to decide when the Preferential Runway Use Programme will be required and can be implemented in the most appropriate manner, with a view to ensuring that the NEF 25 contour would not be encroaching onto any new NSRs. AAHK will closely monitor the situation and provide updates as appropriate.		

4.5.2 Monitoring of Implementation Status of Aircraft Noise Mitigation Measures

Taking into account the nature and implementation status of the aircraft noise mitigation measures as described above, it is considered that the quarterly reviews of implementation status, including the reporting of the rolling 12-month average achievement rates of the mitigation measures on a quarterly basis, should first focus on the following measures in the 3RS operation and the monitoring plans are set out in the sections that follow.

- Putting the existing south runway on standby where possible at night between 2300 hours and 0659 hours;
- Requiring departures to take the southbound route via West Lamma Channel during east flow at night between 2300 hours and 0659 hours, subject to acceptable operational and safety consideration.

As part of the annual reporting process, AAHK shall provide an update of the latest status in the planning of the incentive scheme to promote the use of the RNP Track 6, including details of the incentive scheme once it is developed and the latest update on the implementation status of the scheme, as appropriate. Also, as mentioned in **Section 4.5.1**, all relevant factors will need to be carefully considered, taking into account the findings of the quarterly reviews, in order to decide when the Preferential Runway Use Programme will be required and can be implemented in the most appropriate manner, with a view to ensuring that the NEF 25 contour would not be encroaching onto any new NSRs. AAHK will need to closely monitor the situation and will provide further updates on the implementation status of the following mitigation measures, as appropriate.

- Assigning a new arrival RNP Track 6 for preferential use in the runway 25 direction between 2300hours and 0659 hours;
- Implementing a preferential runway use programme when wind conditions allow such that west flow is used when departures dominate while east flow is used when arrivals dominate during night-time.

Concerning the adoption of NADPs for aircraft departing to the northeast, and also CDA for all aircraft on approach from the northeast during night-time, there are a number of factors such as weather conditions, aircraft weight, engine settings, etc. that can lead to variations in flight profiles of NADPs and CDA. Therefore, the exact procedures applied can differ among aircraft operators, aircraft types and individual pilot performance. As such, it is considered that while the proactive monitoring on a quarterly basis for adoption of these good practices may not be the most effective means to obtain the latest update on the implementation status, AAHK may liaise with the airlines to understand the implementation status, where necessary.

4.5.3 Data Collection Process

To examine the performance of the applicable aircraft noise mitigation measures that are implemented during night-time as described in **Section 4.5.2** above, the following airport operation related data shall be collected from the relevant parties on a regular basis (with relevant data already described in **Section 4.4.3**) for conducting the quarterly reviews:

- Basic flight data / attributes for all flights from existing databases:
  - Call-signs, arrival / departure, aircraft types;
  - Actual take-off time and actual landing time;

  - Runway used;
- Meteorological data;
- Radar data containing information on flight tracks, aircraft types, etc.

Besides, as already described in **Section 4.4.3**, there shall be an initial checking and analysis of the data once these are received, including the need to check and analyse the radar data against available data from the AODB of AAHK for confirming the consistency of the data and identification of any missing data, information gap and/or abnormalities in the available data.

Other data and calculations required for monitoring of the implementation of the above listed mitigation measures are further detailed in the sections below.

4.5.4 South Runway on Standby

Putting the south runway on standby where possible at night between 2300 and 0659 hours will minimise the aircraft noise impact on Sha Lo Wan and other village houses along the Lantau shorelines that would be located within the NEF 25 contour given their proximity to the runway, as predicted and presented in Section 7.3.4.9 of the approved 3RS EIA Report. This measure can only be implemented when the 3RS operation commences with an extra runway to allow the South Runway to be put on standby, while the remaining two runways rotate between operational and maintenance modes. Besides, taking into account operational requirements such as recovering from an incident or other major operational disruption (e.g., typhoon), it was assumed in the 3RS EIA stage that the south runway would only be used for 1% of total yearly night period in the aircraft noise modelling undertaken for both the Worst Operation Scenario and Design Capacity Scenario.

4.5.4.1 Key Metrics and Calculations

The key metric to be considered for this mitigation measure in the quarterly reviews is the rolling 12-month average percentage of flight movements operating on the other two runways, namely the North and Centre Runways between 2300 and 0659 hours. To calculate the percentage, the following numbers shall be derived from the raw data collected (see **Section 4.5.3**) between 2300 hours and 0659:

- Total number of flights;
- Number of flights operated on the North and Centre Runways; and
- Number of flights operated on the South Runway.

Hence, the percentage achievement (monthly, and also the rolling 12-month average) = Number of flights operated on the North and Centre Runways / Total number of flights. A proforma for calculating and recording the percentage achievement is given in **Table E.1** in **Appendix E**.

4.5.4.2 Presentation of Monitoring Results

The achievement rate can be presented by plotting the percentages of all flights operated on the North and Centre Runways, in comparison with the performance from previous years for the 3RS operation.

4.5.5 West Lamma Channel Departures during East Flow Operation

This measure aims at reducing the number of aircraft overflying populated areas during east flow operation between 2300 and 0659 hours, by requiring all departing flights to, instead of flying over the city via their normal daytime tracks, route away from the main populated residential areas by initially taking the southbound track via West Lamma Channel, subject to acceptable operational and safety consideration, before turning east or north over open waters.

For the monitoring of the implementation of this mitigation measure in the planned 3RS operation, relevant airport operational data including available radar data will be obtained from the relevant parties for analysis. The use of the procedure would be determined on the basis of each departing aircraft's ground track as recorded by the radar data.

4.5.5.1 Key Metrics and Calculations

The key metric to be considered for this mitigation measure is the rolling 12-month average percentage of departures following the West Lamma Channel out of all departures during east flow operation between 2300 and 0659 hours. To calculate the percentage, the following numbers shall be derived from the raw data collected (see **Section 4.5.3**) between 2300 hours and 0659:

- Total number of departures in East Flow; and
- Number of departures following West Lamma Channel in East Flow.

Hence, the percentage achievement (monthly, and also the rolling 12-month average) = number of departures following West Lamma Channel in East Flow / total number of departures in East Flow. A proforma for calculating and recording the percentage achievement is given in **Table E.2** in **Appendix E**.

4.5.5.2 Presentation of Monitoring Results

The percentage achievement can be compared to previous years' results. Additionally, plotting the monthly metrics of West Lamma Channel departures as a percentage of all east flow night departures (as illustrated in **Figure F.1** of **Appendix F**) can allow greater understanding of particular periods and events which may have led to discrepancies in performance when compared to previous Annual Review Reports.

4.5.6 Quarterly Reviews and Annual Reporting Process

Similar to the review of monitored noise levels at representative locations, AAHK has planned to review the implementation status of the aircraft noise mitigation measures described in **Section 4.5.4** and **Section 4.5.5** above on a quarterly basis, using the collected data as listed in **Section 4.5.3**. Relevant analysis may be undertaken on a rolling 12-month basis in each quarterly review for identification of the following:

- Any irregular achievement rates;
- Any abnormalities or significant differences in the rolling 12-month average achievement rates when compared to historical data; and
- Any unexpected significant deviations from the relevant assumptions made in the approved 3RS EIA Report.

The findings from the quarterly reviews shall be presented as part of the Review Report to be prepared on an annual basis. The comparison of achievement rates of mitigation measures against previous achievement rates may continue throughout the 3RS operation.

4.5.7 Event and Action Plan for Review of Implementation Status of Aircraft Noise Mitigation Measures

4.5.7.1 Planned Actions related to the Action Level by AAHK

As part of the quarterly reviews of the aircraft noise mitigation measures, where major variances, discrepancies or abnormalities are identified in the trends of achievement rates of aircraft noise mitigation measures (i.e., when the latest rolling 12-month average achievement rate of any of the specific mitigation measures has decreased by more than 10% when compared with that recorded in the previous reporting year), the action level is considered to be triggered and an early investigation should be launched, including the need to assess for any significant effect on the NEF 25 contour by undertaking relevant noise contour analysis (see **Table 4.4** for details of the relevant Event and Action Plan). Based on the analysis results, AAHK should then evaluate the need for any improvement actions and liaise with the relevant parties for actions.

4.5.7.2 Planned Actions related to the Limit Level by AAHK

Details of the actions that should be taken are the same as that described in **Section 4.4.5.2**.

Table 4.4: Event and Action Plan for Review of Implementation Status of Aircraft Noise Mitigation Measures

Event	Actions by AAHK
Action Level	
Major variances / discrepancies / abnormalities identified in the trends of achievement rates of aircraft noise mitigation measures from the quarterly reviews, i.e., when the latest rolling 12-month average achievement rates of any of the specific mitigation measures have decreased by more than 10% when compared with that of the previous reporting year *.	(a) Launch an early investigation to examine the major variances / discrepancies / abnormalities identified of the concerned mitigation measure(s), with a view to identifying the possible causes and these may include but not limited to: • Identification of any unexpected events affecting airport and flight operation; • Review and identification of any potential seasonal variations; • Identification of representative location(s) that is/ are susceptible to the concerned mitigation measure(s), with consideration of available noise data obtained at all relevant representative locations for cross-checking of any potential impacts on the monitored noise levels during the time of identified variances / discrepancies / abnormalities in the collected data; and • Carry out early analysis to update the NEF 25 contour to confirm that there is no encroachment onto any new NSRs other than those predicted in the approved 3RS EIA Report. (b) Based on the investigation results, evaluate the need for any improvement actions, and initiate early discussion with relevant parties for actions.
Limit Level	
NEF 25 (as specified in Annex 5 of the EIAO-TM)	Please refer to **Section 4.4.5.2** for details on the actions that should be taken.

*Both the action and limit level events are proposed by AAHK in accordance with the criteria set out in Annex 21 of the EIAO-TM. The action level shall be reviewed and refined as appropriate after the first year of 3RS operation, when the first updated NEF25 contour for 3RS operation is produced based on actual airport operational data.

4.6 Work Programme

In accordance with EP Condition 2.22 reproduced in **Section 4.2** above, after producing the first updated NEF 25 contour for the 3RS operation, AAHK shall review the operational data annually. Section 4.1.4 of the Updated EM&A Manual also requires AAHK to produce a Review Report on an annual basis for the 3RS operation.

With consideration of the requirements specified in EP Condition 2.22 and Section 4.1.4 of the Updated EM&A Manual as highlighted above, as well as the requirement specified in the approved ANMP in accordance with EP Condition 2.23, AAHK has planned to initiate the quarterly reviews and annual reporting process following the commencement of the 3RS operation.

5 Noise Contour Report

5.1 EP and Updated EM&A Manual Requirements

Under EP Condition 2.22, AAHK is required to produce an updated NEF 25 contour based on airport operational data and report the findings of the aircraft noise analysis if there are major deviations from the assumptions adopted in the approved 3RS EIA Report for the 3RS operation. On the other hand, AAHK has made a commitment in Section 4.1.5.1 of the Updated EM&A Manual to have the NEF 25 contour updated at least every 5 years during the first 20 operational years of the Project, and the first Noise Contour Report shall be prepared upon availability of the airport operational data for the first full year of operation of the third runway of the Project i.e., the I-2RS operation.

The relevant requirements as set out in EP Condition 2.22 and Section 4.1.5 of the Updated EM&A Manual are reproduced in italics below:

EP condition 2.22:

2.22 The Permit Holder shall, no later than 3 months after a full year of operation of the Project, submit 3 hard copies and 1 electronic copy of an updated Noise Exposure Forecast (NEF) 25 contour with actual operational data to the Director for approval. Thereafter the Permit Holder shall review the operational data annually and update the NEF25 contour if there are major deviations from the assumptions adopted in the approved EIA report (Register No. AEIAR-185/2014).

Section 4.1.5 of Updated EM&A Manual:

4.1.5.1 As the aircraft noise impact assessment was undertaken on the basis of projected air traffic movements and estimated fleet mix, it is recommended that at regular intervals of at least every five years during the first 20 operational years of the project, actual flight data obtained from local Air Traffic Control radar systems should be acquired and analysed with a similar aircraft noise modelling methodology to confirm the representativeness of the earlier noise analyses. The first Noise Contour Report shall be prepared upon availability of the airport operation data for the first full year operation of the third runway of the project. In accordance with the requirements set out in Condition 2.22 of the EP, an updated NEF 25 contour shall also be submitted no later than 3 months after a full year of operation of the 3RS project. Similar approach adopted to process radar data for prevailing scenario contour might be applied and the detailed methodology shall be agreed with EPD.

4.1.5.2 At such time that it is determined that the noise contours obtained using actual airport data may start to encroach onto any additional noise sensitive receivers, or when it is considered that there are major deviations from the assumptions adopted in the EIA Report, additional analysis would be necessary to update the NEF 25 contour. The need and feasibility of introducing additional mitigation measures should also be assessed to ensure that no adverse environmental impact would be resulted from the implementation of the project with respect to aircraft noise.

With consideration of the above-mentioned requirements, the Noise Contour Report shall be used to demonstrate that no additional NSRs other than those predicted in the approved 3RS EIA Report would be subject to unacceptable aircraft noise impacts.

The Noise Contour Report for the first year of I-2RS operation, which covers available airport operational data from the first full year of I-2RS operation from 8 July 2022 to 7 July 2023 was already submitted to EPD. **Sections 5.2** to **5.4** below provide an overview of the process and procedures involved and also the NEF 25 contour stimulation methodology adopted.

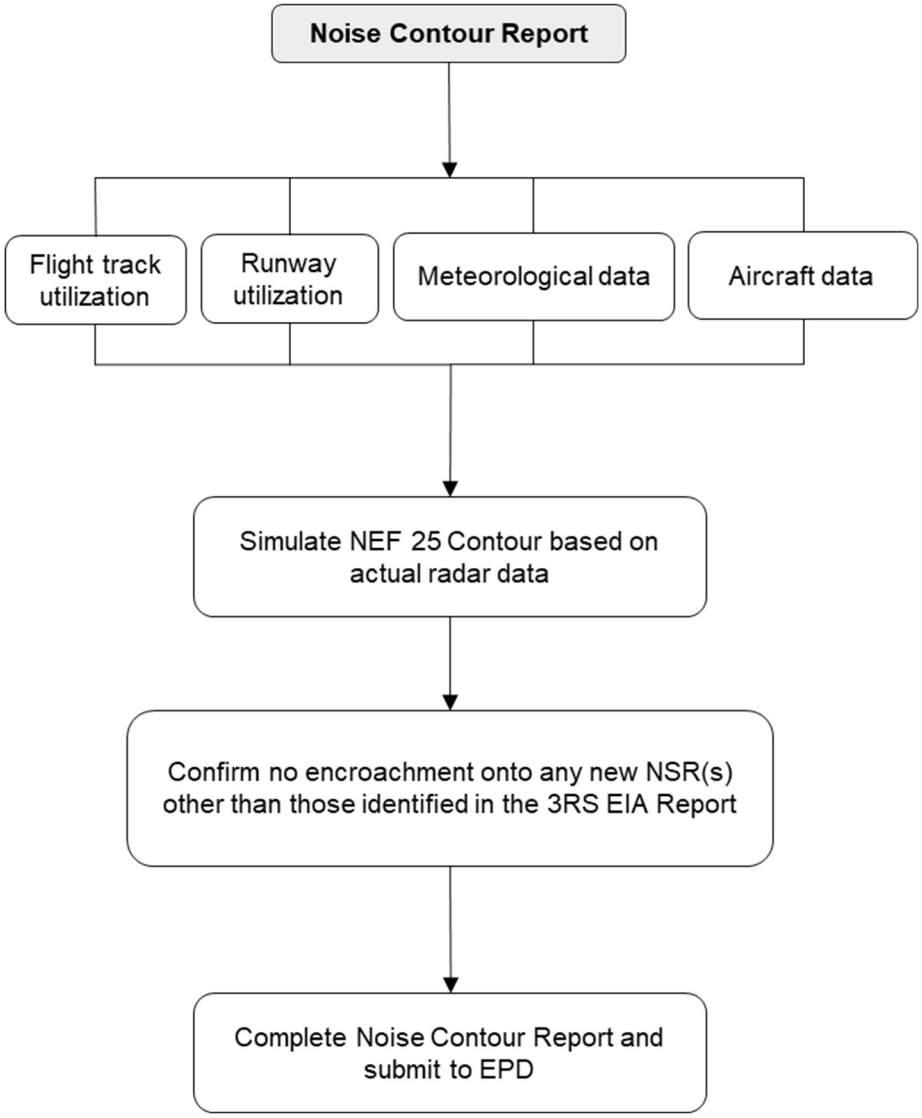
The next Noise Contour Report will be produced no later than 3 months after a full year of 3RS operation to meet the requirements set out in EP Condition 2.22.

5.2 Overview of the Process and Procedures

The Noise Contour Report shall present the updated NEF 25 contour produced based on actual airport operational data for the purpose of determining changes when compared to the previous analysis conducted based on forecasted data as presented in the approved 3RS EIA Report, and assess the need for any remedial measures. The Report will confirm if there is any encroachment of the NEF 25 contour onto new NSRs that was not predicted in the approved 3RS EIA Report. The first Noise Contour Report shall be prepared after the first full year (or 12 months) of airport operational data is available for the I-2RS operation, whereas the next Noise Contour Report shall be prepared after the first full year (or 12 months) of operational data is available for the 3RS operation and submitted to EPD for approval no later than 3 months after a full year of operation of the Project i.e., the 3RS operation.

In preparing the Noise Contour Report, the process as shown in **Chart 5.1** which is similar to what has been presented in **Chart 3.1** from the prediction verification's perspective, should be followed.

Chart 5.1: Noise Contour Report Process



5.3 Computational Model for NEF 25 Contour Simulation

As per Section 4.1.2.1 of the Updated EM&A Manual, the updated noise contour shall be produced using the most currently available and internationally accepted noise modelling methodology. In relation to this, it shall be noted that while the Integrated Noise Model (INM) was used in producing the aircraft noise contours presented in the approved 3RS EIA Report, the U.S. Federal Aviation Administration (FAA) has replaced the INM with the Aviation Environmental Design Tool (AEDT) since May 2015.

Before the introduction of AEDT, noise and emissions from aircraft operations were assessed separately using the INM and the Emissions Dispersion Modelling System (EDMS) tools, respectively. In May 2015, the FAA introduced AEDT to replace INM and EDMS. AEDT combines noise and emissions modelling capabilities in a single tool for regulatory compliance actions. AEDT provides a more comprehensive assessment of aircraft operations by combining noise and emissions modelling into one tool, streamlining the regulatory compliance process.

Both the old INM and the new AEDT are in compliance with the algorithm and framework of the ICAO Doc 9911 *Recommended Method for Computing Noise Contours around Airports*, as accepted in the approved 3RS EIA Report. By adopting the same modelling approach and assumptions used in the approved 3RS EIA Report, a relevant sensitivity analysis undertaken before by AAHK's consultants suggests that the differences in NEF levels attributable to the noise modelling software change from INM to AEDT are considered to be negligible. This is because the input parameters of the noise model used are similar. Therefore, the resulting noise predictions are expected to be very similar.

The AEDT is now widely used worldwide by the civilian aviation community for evaluating aircraft noise impacts in the vicinity of airports. For example, all airports in the US currently adopt AEDT for developing noise contours, including the San Francisco International Airport, the Oakland International Airport and Memphis International Airport, etc. which are comparable to the HKIA in terms of airport operation and capacity.

AEDT contains the most comprehensive aircraft noise database. AEDT's calculation methodologies and metrics are not restricted to standards or conditions unique to particular countries or regions. Therefore, AEDT is an invaluable tool for undertaking aircraft noise impact assessments and analysis worldwide. The core computation modules in AEDT are based on and compliant with internationally accepted methodologies for computing noise levels around airports. The latest available version of AEDT shall be used at the time of developing the updated NEF 25 contour.

In view of the above, the AEDT shall be used for simulating the updated NEF 25 contour required under the EP Condition 2.22 and Section 4.1.3.3 of the Updated EM&A Manual as agreed with EPD. The approach and methodology adopted shall be in line with that presented in the approved 3RS EIA Report, making use of the AEDT's comprehensive International Aircraft Noise and Performance (ANP) database which contains noise footprints for individual aircraft types which relate aircraft performance and noise levels in relation to their distance between the aircraft and sensitive receivers. The ANP database shall be used in combination with the actual airport operational data to simulate the updated NEF 25 contour.

While the ANP database consists of noise-power-distance (NDP) curves of different aircraft, it is possible that new generation aircraft may not be in the database. Although the database continues to rely on the use of other relevant conventional aircraft type as substitutes to represent these new generation aircraft for modelling purpose, it may not fully reflect the improved noise performance of these new aircraft, which are the foreseeable uncertainties associated with the modelling works. Yet, these would lead to a conservative approach to the required aircraft noise modelling.

5.4 Overview of the Modelling Process

The noise modelling process required to produce the updated NEF 25 contour for the I-2RS and 3RS operation shall be similar to that undertaken at the 3RS EIA stage when the 2011 NEF contour was prepared based on daily radar data provided by the CAD to illustrate the prevailing aircraft noise environment. The process begins with a review of the radar data for generation of relevant input data for use in the AEDT modelling, including the following information:

- Aircraft data: the number of aircraft movements, aircraft types, aircraft subtypes, arrival or departure, and time of day (for applying noise penalty in the NEF 25 noise contour to night-time aircraft movements);
- Flight tracks and flight track utilization;
- Runway utilization:
  - Runway modes of operation consisting of arrivals only, departures only, mixed use, maintenance, standby and closed;
  - Runway direction of operation

Any missing data such as aircraft types, destination airports, runways used shall be corrected by using available data from similar records or other data sources such as the Airport Operation Database (AODB) of AAHK. Other relevant data shall also be collected and taken into consideration in the aircraft noise modelling, including runway information from AAHK and latest available meteorological data from HKO, consisting of prevailing wind direction and speed, air temperature, relative humidity and atmospheric pressure.

The above process has been adopted in preparing the updated noise contour for the first full year of I-2RS operation, and this shall continue to be adopted for noise contour simulation to be conducted when one full year of operational data is available for the 3RS operation, and subsequently in at least every five years during the first 20 operational years of the Project. Should there be any updates or evolvement in computational model throughout the first 20 operational years of the Project, any changes to the adopted aircraft noise model and assumptions shall be agreed with EPD prior to the analysis.

5.5 Data Quality Assurance (QA) and Quality Control (QC)

As already described in **Section 3.4** from the prediction verification's perspective, QA/QC are important considerations that shall be taken into in preparing the updated NEF 25 contour. The same key modelling performance criteria, including auditability, reliability, consistency and accuracy shall be met in the Noise Contour Report preparation process.

5.6 Work Programme

As mentioned in **Section 5.1** above, the first Noise Contour Report covering the first full year operation of the third runway from 8 July 2022 to 7 July 2023 of the I-2RS operation was already prepared and submitted to EPD.

In accordance with the requirements set out in EP Condition 2.22, the first Noise Contour Report for the 3RS operation shall be prepared when the first full year (or 12 months) of airport operation data is available for the 3RS operation. The Noise Contour Report shall be certified by the ET Leader and verified by the IEC and submitted to EPD no later than 3 months after the first full year of 3RS operation when 12 month operational data are available to meet the EP requirements. Thereafter AAHK shall review the operational data annually and update the NEF 25 contour if there are major deviations from the assumptions adopted in the approved 3RS EIA Report.

After the submission of the first Noise Contour Report for the 3RS operation, the subsequent Noise Contour Report shall be prepared at intervals not exceeding every five years for the first 20 years of the Project based on the requirements set out in Section 4.1.5.1 of the Updated EM&A Manual.

At such time it is considered that the updated NEF 25 contour may start to encroach onto any additional NSRs, or when it is considered that there are major deviations from the assumptions adopted in the approved 3RS EIA Report, the need for further mitigation and update of the NEF 25 contour more frequently than every five years shall be evaluated.

6 Community Liaison Plan

6.1 Updated EM&A Manual Requirements

The Updated EM&A Manual has set out that a community liaison plan shall be presented as part of the ANM&A Plan, as reproduced in italics below:

4.1.6.1 AAHK has been actively engaging with neighbouring communities in the vicinity of the airport, other stakeholders' groups and interested parties to communicate issues and gauge views on aircraft noise and other environmental aspects. Briefings and airport visits are organised to explain subjects including but not limited to flight paths under the planned 3RS and the proposed aircraft noise mitigation measures. These engagement activities will continue after commencement of the project and a community liaison plan that presents details of the planned programme, including proposed communication channels, tools, procedures and supplementary information, including noise descriptor and flight tracks in accordance with Section 7.3, Appendix C of the Study Brief and activities that would facilitate communications with stakeholders on aircraft noise issues, will be developed by AAHK as part of the detailed Aircraft Noise Monitoring and Audit Plan presented in Section 4.1.7 below.

The following sections present the planned programme that covers the above-mentioned elements.

6.2 Methodology

6.2.1 Community Liaison Groups

AAHK has established five community liaison groups (CLG) since 2012. The five CLGs currently cover a total of approximately 150 members from neighbouring districts, namely Islands, Kwai Tsing, Sha Tin, Tsuen Wan and Tuen Mun. Each CLG consists of approximately 25 to 40 members, comprising of District Council members; Chairmen and Vice Chairmen of area committees; resident committees' representatives; and community leaders.

The aforementioned districts are considered to have covered the key areas associated with potential aircraft noise matters. The composition of members is also considered to be representatives for communicating issues and gauging views on aircraft noise. Therefore, the existing setup of CLGs will be maintained for the purpose of fulfilling the plan described in Section 4.1.6.1 of the Updated EM&A Manual.

6.2.1.1 Early Engagement

Similar to the I-2RS operation, there will be new flight tracks that will be in use in the 3RS operation. Early engagement will be required for the CLG members to gain a better understanding of the planned 3RS operation. This has been achieved by AAHK via arranging relevant meetings with members of the five CLGs in June 2024 at HKIA, with information on flight tracks for the 3RS operation presented as one of the meeting agenda items.

6.2.1.2 Regular Meetings

Regular meetings shall take place with CLG members to provide latest information related to the 3RS operation. During the regular meetings, the following aircraft noise related information can be communicated to the CLG members:

- Key findings of the Prediction Verification Report, Review Reports and/or Noise Contour Reports;
- Summary of aircraft noise monitoring results;
- Summary of implementation status of applicable aircraft noise mitigation measures / initiatives;

- Any major variances/ discrepancies/ abnormalities identified in the trends or patterns during the regular reviews of aircraft noise monitoring data and aircraft noise mitigation measures, and the corresponding actions initiated including early investigation to identify the possible causes, etc.

For any questions, queries and/or comments raised by the CLG members at the regular meetings, these shall be responded directly during the meetings or in subsequent meetings. If necessary, additional meetings can be arranged with specific CLG members or related groups to enhance their understanding of aircraft noise issues. This may include presenting details of the methods used to assess aircraft noise impact, as well as providing further details on the mitigation measures and initiatives planned or implemented to reduce noise from aircraft departing from or arriving at HKIA.

6.2.2 Communication with General Public

AAHK has been hosting a website (https://www.threerunwaysystem.com) dedicated to the 3RS Project. Taking into account of the aircraft noise related reporting requirements and the nature of required community liaison, it is expected that the dedicated 3RS Project website shall continue to be used as the key communication channel with the general public. The Project's dedicated website shall be the platform for disseminating aircraft noise related submissions, including the aircraft noise related EP submissions, this ANM&A Plan and other relevant aircraft noise related reports, including the Noise Contour Report, Prediction Verification Report and Annual Review Report.

Enquiries / complaints on aircraft noise related matters may be received via the dedicated hotline or email channel available on the 3RS Project website. In handling the enquiries and/or complaints received, AAHK will review the cases and take appropriate follow-up actions, which include seeking input from the relevant parties / forwarding the cases to the relevant parties for follow up, where necessary. Replies to the enquirers / complainants will be properly recorded. These cases may provide useful information to facilitate the understanding of the views from the public and aircraft noise situation of the 3RS operation.

6.3 Work Programme

As described in **Section 6.2.1.1** above, AAHK has already arranged introductory briefing on the 3RS operation for members of all five CLGs, including information on the flight tracks for the 3RS operation presented as one of the key meeting agenda items.

After commencement of the 3RS operation, the first batch of CLG meetings that cover the aircraft noise aspect shall be initiated within the first six months of the 3RS operation by having regular meetings that shall be arranged at least twice a year in the first two years of 3RS operation. Subsequently, the frequency of meetings with CLG members shall be reviewed as the 3RS enters routine operation.

Appendices

A. Methodology for Aircraft Noise Calculation

A.1 Calculation of annual daily average of Leq (24 hours) from sound exposure levels (SEL) data of aircraft noise events

The SEL of an aircraft noise event is the sound level, in dB(A), that would be obtained if the entire event energy were uniformly compressed into a reference time of one second. The available SEL data obtained from NMTs erected at representative locations may be used to calculate the corresponding annual daily average of Leq (24 hours) of the noise events using the following equations[4]:

$$L_{eq} = \overline{SEL} + 10\log_{10} N - 10\log_{10} T$$

$$\overline{SEL} = 10\log_{10}\left[\frac{1}{N}\sum 10^{SEL_i/10}\right]$$

where

$\overline{SEL}$ is the logarithmic average sound exposure level (SEL);

N is the number of aircraft events that occurred during the measurement period T; and

T is the measurement period in second.

Where necessary, background noise at specific NMTs during the aircraft noise events shall be quantified such that a relevant level correction may be introduced in calculating the logarithmic average SEL. The need for such background noise correction shall be reviewed as appropriate after the first year of 3RS operation.

[4] Environmental Research and Consultancy Department, Civil Aviation Authority, ERCD Report 0904, *Metrics for Aircraft Noise*, K Jones and R Cadoux, January 2009 (accessible at: https://www.caa.co.uk/publication/download/13689)

B. Proforma for reporting Aircraft Noise Monitoring Results

Table B.1: Annual Daily Average of Leq (24 hours) calculated from SEL data obtained at NMTs of Representative Locations

NMT ID.	Location of NMT	Annual Daily Average of Leq (24 hours) dB(A)
Representative NMT locations situated close to the NEF 25 contour		
N1	Sha Lo Wan	
N2	Tung Chung	
N3	Sunny Bay	
N4	Ma Wan	
N5	Tsing Lung Tau	
N6	Tai Lam Chung	
N7	Siu Lam	
Representative NMT locations situated further away from the NEF 25 contour, but have been specifically named in EP Condition 2.23		
F1	Ting Kau	
F2	Tsuen Wan	
F3	Tsing Yi #1	
F4	Ting Yi #2	
F5	Tuen Mun	

C. Establishment of Action Level

As the actual airport operational data for 3RS operation is not available when this ANMP is being prepared, the action level for aircraft noise monitoring is established with consideration of historical monitoring data collected during the previous 2RS operation, i.e., before commencement of operation of the third runway on 8 July 2022.

Based on a review of the annual total air traffic movement (ATM) from 2015 to 2021 for the 2RS operation as summarized in **Table C.1**, 2018 is the year with the highest annual total ATM before the start of operation of the third runway in July 2022.

Table C.1: Annual Total ATM under Previous 2RS Operation from 2015 to 2021

Year	Annual Total ATM*
2015	406 048
2016	411 566
2017	420 659
2018	**427 766**
2019	419 795
2020	160 666
2021	144 810

* Note that the decrease in ATMs from 2019 to 2021 in the previous 2RS operation was due to the social unrest that happened in the second quarter of 2019 and the COVID-19 pandemic that started in the first quarter of 2020. Between 2022 and 2024, air traffic at HKIA has continued to recover after the pandemic but the latest 12-month ATMs involved in the I-2RS operation are still lower than the ATMs reported in year 2018 for the previous 2RS operation.

It is considered that the highest value of the annual daily average of Leq (24 hours) that may be calculated from available SEL data obtained at the NMTs erected at the representative locations situated close to the NEF 25 contour (i.e., N1 to N6 and F1 to F4)[5] during the previous 2RS operation in 2018 when the ATM at HKIA was highest may serve as a good baseline for establishing the Action Level. This is calculated to be annual daily average of Leq (24 hours) 55.9 dB(A) which happened at the representative NMT at Tsing Lung Tau (i.e., NMT ID. N5) amongst the NMTs situated at representative locations outside the NEF 25 contour.

Accordingly, it is considered that the action level may be set at a level when the highest value of the latest rolling 12-month annual daily average of Leq (24 hours) noise levels obtained at the representative locations has increased by 1.5dB(A) or more above the above-mentioned baseline noise level.

The “1.5 dB(A) increase” is based on a similar significance threshold for aircraft noise adopted by FAA for consideration in relevant aircraft noise analysis i.e., when there is a 1.5 dB(A) or more increase in noise over noise sensitive areas within the Day-Night Average Sound Level (DNL) of 65 dB(A) noise contour, further analysis will need to be carried out.[6]

[5] Note that the NMTs at Siu Lam and Tuen Mun (i.e., NMT ID. N7 and F5) are not relevant as these two new NMTs were only erected in 2022 before the commencement of the I-2RS operation.

[6] See pages 13 and 14 in Sections 7 and 8 of Chapter 17 of the FAA’s *Environmental Desk Reference for Airport Actions* as extracted and presented in **Appendix G** (also accessible at: https://www.faa.gov/sites/faa.gov/files/airports/environmental/environmental_desk_ref/desk-ref-chap17.pdf)

D. Aeronautical Information Circular (AIC) 20/23 dated 21 August 2023

HONG KONG SPECIAL ADMINISTRATIVE REGION
PEOPLE'S REPUBLIC OF CHINA
AERONAUTICAL INFORMATION SERVICE

PHONE +852 2910 6174 FAX +852 2910 1180 AFS VHHHYOYX EMAIL aic@cad.gov.hk	**(ISO 9001 CERTIFIED)** AIR TRAFFIC MANAGEMENT DIVISION CIVIL AVIATION DEPARTMENT HONG KONG INTERNATIONAL AIRPORT	AIC 20 / 23 21 August 2023

PREFERENTIAL USE OF RNP Y (AR) APCH PROCEDURES TO RUNWAY 25 AT HONG KONG INTERNATIONAL AIRPORT (HKIA) DURING NOISE MITIGATION PERIOD

1. Introduction

1.1 In line with the ICAO initiative for the implementation of Performance Based Navigation, Hong Kong Civil Aviation Department (CAD) first published RNP AR APCH procedures in 2010. A number of additional RNP AR APCH procedures have been published since that time, enabling the benefits of RNP AR specification to be realized in terms of shorter arrival paths, avoidance of terrain-rich/built-up areas and enhanced flight management. To date, usage is limited to an on-request basis when traffic permits.

1.2 AIC 04/20 dated 17 January 2020 outlined application procedures by foreign aircraft operators for authorization to conduct RNP AR APCH procedures at HKIA. To date, a number of operators have already been issued with authorization from CAD. The goal is to encourage aircraft operators to achieve a higher percentage of RNP AR capability to realize the early benefits in terms of operational efficiency, track miles, and environmental sustainability.

2. Preferential Approach Sequencing

2.1 To further promote and encourage the usage of RNP AR APCH procedures, with effect from **1500 UTC 3 September 2023**, Hong Kong ATC will endeavor to preferentially sequence those arrival flights having authorization to conduct **RNP Y (AR) APCH** to HKIA, under the following conditions:

i. Between the hours of 1500-2300 UTC daily; and
ii. Runway 25 direction is in use (Note: This does not supersede the preferential use of Runway 07 direction when wind conditions are suitable as per AIP HK VHHH AD 2.21); and
iii. Meteorological conditions are suitable for RNP AR APCH.

2.2 Under such conditions, Hong Kong ATC will ascertain the RNP AR authorization status from the flight crew. Those flights with authorization will be facilitated and assigned the appropriate STAR or radar vectors to GUAVA for the RNP Y RWY 25 (AR) procedure to the runway in use.

2.3 Those flights without RNP AR authorization will be processed via the ILS/LOC or RNP Z (LNAV/VNAV) approach and may be accorded lower priority in sequencing with flights conducting RNP AR APCH, subject to prevailing traffic situation and/or weather conditions.

3. Future Operational Usage of RNP AR APCH

3.1 Aircraft operators, with the appropriate capabilities stated in AIC 04/20, who have not yet sought authorization, are strongly encouraged to submit their applications as soon as possible with a view to achieving the tangible benefits afforded by such procedures together with CAD's commitment to promote and facilitate more extended usage of RNP AR APCH procedures throughout the whole day at HKIA in the coming years.

3.2 Aircraft operators, without the appropriate capabilities stated in AIC 04/20, are strongly encouraged to take into account this AIC in their business plan and expedite their readiness with a view to realizing the said tangible benefits by taking RNP AR APCH procedures.

3.3 Enquiries on this circular may be directed to Senior Operations Officer (Operations)1 atmdsooo1@cad.gov.hk.

This Circular is issued for information, guidance and necessary action
by direction of the Director-General of Civil Aviation
Victor LIU

E. Proformas for reporting Achievement Rates of Aircraft Noise Mitigation Measures

Table E.1: Record and Calculation of Achievement Rates for South Runway on Standby during night-time (between 2300 and 0659 hours)

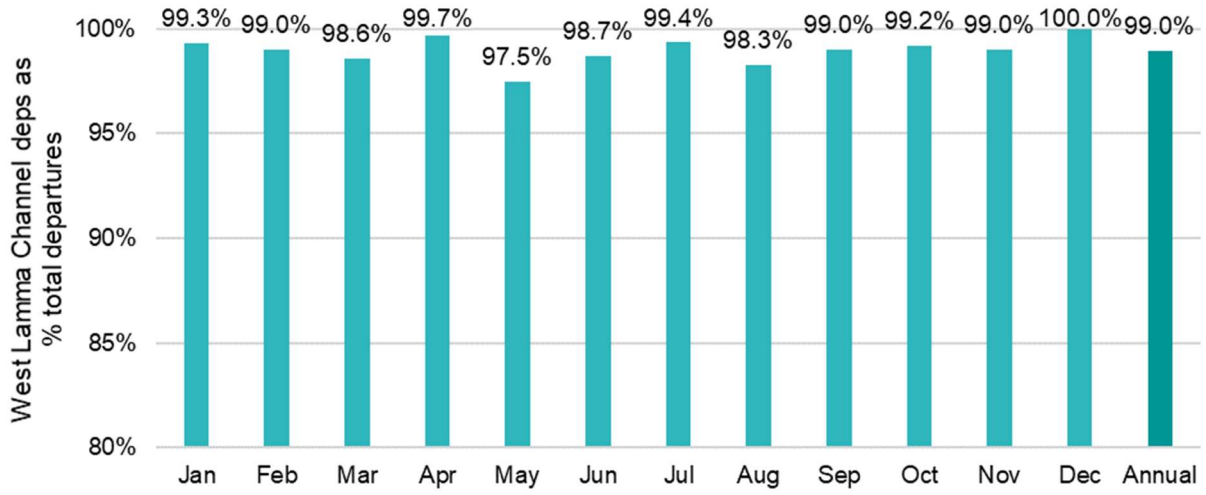
Month Year	Total number of flights	Number of flight operated on the North and Centre Runways	Number of flight operated on the South Runway	Achievement Rate (%) (B/A x 100)
	(A)	(B)	(C)	
Rolling 12-month average				

Table E.2: Record and Calculation of Achievement Rates for West Lamma Channel Departures in East Flow during night-time (between 2300 and 0659 hours)

Month Year	Total number of departures in east flow	Number of departures following West Lamma Channel in east flow	Achievement Rate (%) (B/A x 100)
	(A)	(B)	
Rolling 12-month average			

F. Example of Achievement Rates Presentation

Figure F.1: Indicative West Lamma Channel Departure Route - Achievement Rates evaluated on monthly basis (Example for Illustration Only)



Source: Example data for illustration only, not actual data.

G. An Excerpt from Sections 7 and 8 of Chapter 17 of FAA's *Environmental Desk Reference for Airport Actions*

7. DETERMINING IMPACT SIGNIFICANCE.

a. Significant impact. Use the information obtained during the analysis completed to meet other sections of this chapter and the thresholds in the following table to determine if an action would cause a significant effect. Local land use compatibility standards do not alter this threshold for NEPA purposes.

ORDER 1050.1E THRESHOLD	FACTORS TO CONSIDER
- **For most areas:** When an action, compared to the no action alternative for the same timeframe, would cause noise sensitive areas located at or above DNL 65 dB to experience a noise increase of at least DNL 1.5 dB. An increase from DNL 63.5 dB to DNL 65 dB over a noise sensitive area is a significant impact.	ARP reminds the responsible FAA official that for NEPA purposes, DNL 3 dB impacts over residential areas between the DNL 60 and 65 dB contours do not cause significant adverse noise impacts. However, the potential for mitigating noise in those areas should be weighed, including consideration of the same range of mitigation options available at DNL 65 dB and higher and eligibility for Federal funding.
- For national parks, national wildlife refuges and historic sites, including traditional cultural properties where a quiet setting is a generally recognized feature: The DNL 65 dB level at which residential land uses are compatible does not adequately address noise impacts on visitors to these areas. As a result, relevant and/or supplemental noise analysis is appropriate in certain circumstances. Responsible FAA officials must be cognizant that Part 150 guidelines do not adequately address the effects of noise on visitors to areas within a historic site or national park or wildlife refuge protected under Section 4(f) of the DOT Act (see Chapter 7 of this Desk Reference for information on Section 4(f), recodified as 49 USC Section 303) and where non-aircraft noise is very low and a quiet setting is a generally recognized feature or attribute of the site's significance.	

From: Table 7-1, FAA Order 5050.4B

b. Mitigated Finding of No Significant Impact (FONSI). If sufficient mitigation that would reduce all potentially significant noise impacts below threshold levels measures is included as part of a project and the sponsor has made binding commitments to carry out those measures within its authority, then an EIS is not necessary (absent significant impacts in other categories). In such cases, FAA may conclude the action by issuing a FONSI. The FONSI or FONSI/Record of Decision (ROD) must list the measures FAA has made a condition

of project approval, including those the sponsor will be required to carry out through grant assurances or other means.

8. ENVIRONMENTAL IMPACT STATEMENT CONTENT.

a. General. A potentially significant noise impact often has corresponding impacts on land uses. FAA must prepare an EIS, if mitigation will not reduce impacts below the noise thresholds in section 7 of this chapter. Preparers should avoid repeating information presented in the EIS's Compatible Land Use chapter. As appropriate, preparers should refer the reader to either the EIS's Noise chapter or the Compatible Land Use chapter, depending on how the preparers have addressed noise and compatible land use issues.

b. Information needed when FAA determines a significant noise impact. The EIS should include information discussed in earlier sections of this chapter in the EIS. It should also include the following information as needed.

(1) Refined information. If the sponsor prepared an EA, revise the text and graphics as needed to meet EIS requirements. The EIS must thoroughly explain significant noise impacts. Sometimes, a more complete description of the noise events contributing to the DNL contours with added tables charts, aerial photographs, maps, or metrics is sufficient. In other cases, supplemental analyses may include using metrics other than DNL (see section 8.d of this chapter for supplemental analysis information).

(2) The DNL 60 dB contour. Where an airport development project has a potentially significant impact on noise sensitive areas (i.e., a DNL 1.5 dB or more noise increase within the DNL 65 dB noise contour), the EIS noise analysis must depict the DNL 60 dB contour as well. Further analysis is required in this circumstance to evaluate potential increases of DNL 3 dB and greater between DNL 65 and 60 dB and potential mitigation measures.

This information helps to further disclose potential project-related noise changes in the airport area.[7] Additional contours are optional, as discussed in paragraph 1f, above. Provide figures showing noise sensitive land uses within the DNL 60 dB contour and the DNL exposure level for each of the following scenarios.

[7] FAA has adopted the recommendation of FICON to examine DNL 3 dB or greater noise increases within the DNL 60-65 dB contour where a project has significant impacts. A DNL 3 dB increase in this contour causes a 3 percent increase in the percentage of people highly annoyed (FICON, 1992, Technical Report, Section 3, pg. 3-17.

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