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24 January 2018

Mr Anthony Chu
Clerk to the Public Accounts Committee
Legislative Council
Legislative Council Complex
1 Legislative Council Road
Central
Hong Kong

Dear Mr Chu,

Follow-up to Public Accounts Committee Report No. 63A
Administration of the air traffic control and related services

Thank you for your letter ref CB4/PAC/CS(66,67&67A) dated 5 January 2018. We would like to provide the following response to your enquiries:

(a) Has the Administration implemented all the recommendations in the final report of the ATMS Expert Panel; if not, please provide a timeline for the implementation of outstanding recommendations.

2. In December 2016, the Civil Aviation Department (CAD) set up an Expert Panel comprising local and overseas experts and academia in the fields of air traffic management, engineering and aviation safety management to offer independent advice to CAD on the teething issues identified since the full commissioning of the new Air Traffic Management System (ATMS). The final report of the Expert Panel published in November 2017 (English only) and the executive summary in Chinese are available at:

Full report: http://www.cad.gov.hk/reports/Final%20Report%20by%20the%20Air%20Traffic%20Management%20System%20Expert%20Panel%20dated%20November%202017.pdf

Executive summary: http://gia.info.gov.hk/general/201711/21/P2017112100575_272401_1_1511262331248.pdf

3. Pursuant to a total of seven meetings, the Expert Panel made a number of recommendations to CAD in addressing the teething issues of the ATMS and in the continuous monitoring of system performance. CAD had taken various actions to implement all these recommendations, including optimisation of the ATMS, enhancement of relevant system operating and maintenance procedures, strengthening the communication with and training of the frontline staff, etc.. Details are set out at **Annex**. The Expert Panel reviewed the follow-up actions then already in place by CAD and was satisfied with the implementation of the recommendations. The Expert Panel also noted that the total number of movements handled by the new ATMS between November 2016[1] and October 2017 increased by 6.7% as compared with the same period in the previous year. A record high figure of 2,341 total movements was recorded over a 24-hour period on 24 August 2017 recovering from the impact of Super Typhoon HATO. The ATMS had successfully coped with the peak air traffic flow and overcome the challenges brought by adverse weather.

4. In line with the best international practice, CAD will continue to further enhance the ATMS and refine the related operations and procedures, in order to cope with the growing air traffic as well as to meet the latest and forthcoming international requirements.

(b) Membership of the users group and for how long each member has been using AutoTrac III.

5. The purpose of setting up the AutoTrac III Users Group (AUG) is to establish a platform for the AutoTrac III international users to share operational and technical experiences in their ATMS implementation, and to enhance users' operations and map out the future system development roadmap. The AUG comprises CAD, Airports Authority of India (AAI), Dubai Air Navigation Services (DANS), Federal Aviation Administration of

[1] The ATMS was fully commissioned on 14 November 2016.

the United States (US FAA), and Raytheon Company (RTN).

6. According to information available to the AUG, AutoTrac III has been used by AAI and DANS since 2011 and 2013 respectively. Various airports in the United States have been using the core components of AutoTrac III, namely the Surveillance Data Processing system and Flight Data Processing system, provided by RTN.

(c) Exchanges and communications, if any, between group members on the irregularities found in the deployment of AutoTrac III, whether the irregularities identified were common among the members and measures they have undertaken to tackle the irregularities; and

(d) Details of the meetings that have been held/will be held by the group, including the dates, participants, issues raised at the meetings and papers and minutes of the meetings.

7. The first meeting of the AUG was held at the CAD Headquarters from 19 to 20 September 2017 with attendance by 20 participants from all of the participating organisations. At the meeting, the participating organisations shared their respective experiences in the implementation, operation and maintenance of AutoTrac III and systems supplied by RTN, handling of teething issues, system optimisation and post commissioning enhancements. Regarding the deliberations at and report of the meeting, it was agreed among the participating organisations of the AUG that the views expressed should be taken as those of the AUG as a whole and that the report of the meeting shall be limited to the internal use of the participating organisations. It is under this agreed principle of confidentiality that the discussion of the AUG was taken forward in a frank and open manner. We seek the Public Accounts Committee (PAC)'s understanding of the arrangement. For the reference of PAC, we set out a summary of the key issues and observations shared by the participating organisations at the meeting in the ensuing paragraphs.

8. The participating organisations of the AUG considered that their AutoTrac III systems were in general operating satisfactorily. Some common teething issues, including surveillance related issues and human factor related issues, were also discussed at the meeting with a view to further enhancing system performance.

9. For surveillance related issues, the participating organisations considered that there was general commonality of limitations of conventional radar systems and external factors affecting the conventional radar systems (such as terrain and aircraft avionics), which were extraneous to the ATMS'

robustness but could impact on its operation. To tackle the surveillance related issues caused by the limitations of conventional radar surveillance technology, CAD has implemented Automatic Dependent Surveillance – Broadcast (ADS-B). The participating organisations expressed interest in ADS-B's contribution to reduction in surveillance related issues in Hong Kong, CAD's experience in the progressive deployment of ADS-B and the associated safety management processes, as well as the subsequent continuous monitoring of the performance in accordance with the International Civil Aviation Organisation (ICAO) guidance document. The participating organisations found this experience valuable which could serve as a useful reference in their implementation or continuous monitoring of ADS-B. With the progressive implementation of ADS-B in Hong Kong, the weekly averages of split tracks, false targets and instances of an aircraft's position being temporarily not displayed had decreased from 3.4, 8.6 and 1.9 cases respectively in the period between November 2016 and March 2017 to 0, 1.3 and 0.3 cases respectively in the period between August and mid November 2017.

10. On human factor related issues, the participating organisations shared their respective experiences, such as maintenance activities carried out inadvertently at time of high traffic or inadvertent inputting of command to initiate unregistered configuration, which affected the operation of the ATMS. All the participating organisations agreed that occurrences of such human factor related issues had declined with progressive staff familiarisation with the new system and the related procedures.

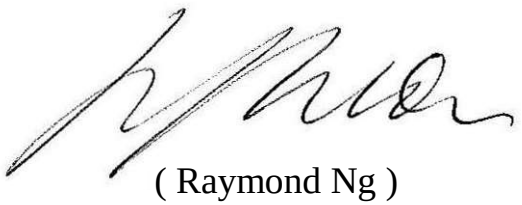
11. Given the highly complicated and sophisticated nature of ATMS, the participating organisations considered the above teething issues not uncommon, and the most important thing was the availability of robust and established procedures to manage them. According to the participating organisations, all teething issues of their respective systems mentioned had been handled by all respective users in accordance with their established procedures in a satisfactory manner.

12. Other than the above teething issues, the participating organisations also shared respective system operation and maintenance experiences and practices for the upkeep of the ATMS. For optimisation and enhancement of the ATMS (including the launch of new system features), the participating organisations shared a common view that a prudent and gradual approach should be adopted by the relevant stakeholders in the optimisation and enhancement process to minimise risks. During the discussion on the ATMS post commissioning enhancements, the participating organisations discussed various new initiatives and noted that with a view to enhancing air traffic

control operation efficiency and capacity, it would be worthwhile to pursue new initiatives, such as implementation of re-categorisation of wake turbulence categories, which might necessitate further enhancement to the ATMS. The participating organisations indicated that since the local operational environment and work culture varied in different places, different users might implement new initiatives according to their own priorities and situations.

13. As detailed in the Expert Panel's final report, the Panel was appreciative of CAD's efforts in championing the AUG, and opined that CAD could further optimise the new ATMS in Hong Kong through experience sharing with international users. Indeed, after the first meeting of the AUG, the participating organisations continued to keep an open dialogue and exchange experiences in operating and optimising the ATMS. The AUG also agreed to continue with holding AUG meetings in future and sharing experience with industry players through various platforms as opportune. CAD will liaise with other AUG members on hosting future AUG meetings.

Yours sincerely,



(Raymond Ng)
for Director-General of Civil Aviation

c.c. Secretary for Transport and Housing
Secretary for Financial Services and the Treasury
Director of Audit

Annex

ATMS Expert Panel's Recommendations and CAD's Follow-up Actions

Para. No. in Final Report	Expert Panel's Recommendation	CAD Follow-up Actions
44	A few reported occurrences shared a common thread of human factor element of the frontline staff at the time of occurrences such as maintenance activities not conducted at time of low traffic, and inputting command to initiate an unregistered system configuration. The Expert Panel advocated continuous vigilance against similar inadvertent activities through the standardisation of and adherence to the relevant procedures, where applicable.	With briefings provided to staff and updates of relevant procedures against such inadvertent activities, during the latter part of the term of the Expert Panel there had been no further reported occurrences attributable to human factor issues in the conduct of maintenance activities. CAD will continue to stay vigilance against similar inadvertent activities through the standardisation of and adherence to the relevant procedures, where applicable.
45	The Expert Panel noted that it was important for the engineering staff to maintain good communication with operational controllers. It recommended that timely advice on the temporary arrangement, including fallback arrangement, and any possible impact from conduct of maintenance activities should be provided to frontline controllers to minimise risk and disruption to operation and improve response and recovery time should issues occur.	With experience gained from these teething issues and increasing familiarity with the system, CAD has implemented various measures, in the form of Operational Instructions, team briefings, handover notes, lessons learnt and maintenance instructions, to promulgate relevant information to frontline operational and maintenance staff in a timely manner.
46	The Expert Panel recommended CAD continuing its efforts to closely monitor the overall ADS-B performance with regular reviews on the operational, technical and system aspects to assess the need for further fine-tuning.	CAD has established a mechanism to closely monitor the performance of ADS-B avionics of aircraft flying within the HKFIR and follow up with relevant airlines/civil aviation authorities for aircraft with suspected degraded ADS-B avionics performance in accordance with the International Civil Aviation Organisation (ICAO) guidance document.

Para. No. in Final Report	Expert Panel's Recommendation	CAD Follow-up Actions
47	The Expert Panel recommended that CAD should continue to optimise the operating procedures and system operations in order to enable the system to continue to perform to the highest standard possible as a safe and reliable tool for uninterrupted air traffic control (ATC) operations.	CAD has optimised relevant operating and maintenance procedures of the new ATMS and would continue to review them on a regular basis to ensure its highest performance standard. From maintenance and operational perspectives, necessary updates to reflect lessons learnt and day-to-day operational experience and knowledge have been incorporated into the respective maintenance procedures and operational instructions/practices, thereby contributing to overall improvement to system performance and stability. For example, maintenance procedures have been enhanced to avoid maintenance activities being carried out during high air traffic periods, and Operational Instruction has been issued to frontline staff to avoid inadvertent manual initiation of system configuration not relevant to the prevailing operating environment.
48	On deployment of software fixes/enhancements, the Expert Panel suggested that CAD should prioritise the items and implement those changes prudently in order to minimise risks when introducing any changes.	CAD has established a mechanism to assess and review the priority of enhancement items among ATC and engineering staff. For instance, uploading of new software builds to rectify the ATMS sub-systems related issues in June and September 2017 was prioritised and implemented under the established Safety Management System (SMS) with risks adequately mitigated. All immediately needed software builds have been successfully deployed to the new ATMS for operational use without any issues.

Para. No. in Final Report	Expert Panel's Recommendation	CAD Follow-up Actions
53	The Expert Panel recommended CAD to uphold its long established and effective SMS and safety culture in safeguarding the smooth and safe provision of ATC services.	CAD has put in place a robust SMS, with controls and mitigation measures, contingency plan and the associated procedures, resilience in system design, along with a team of experienced and professional staff, in managing the risks induced by the teething issues. CAD will continue to uphold its long established and effective SMS and safety culture in safeguarding the smooth and safe provision of ATC services.
55	The Expert Panel recommended that CAD should address the staff's concerns and enhance staff's confidence in the ATMS through a series of measures including further reducing nuisance conflict alert caused by false targets, and in particular, through the on-going efforts with monitoring of ADS-B performance; fine-tuning the predictive conflict alert settings in order to best suit operational needs; and continuing to monitor and address controllers' concerns on workload through measures such as reviewing the break/relief arrangements to keep pace with growing air traffic in the longer term.	CAD has successfully integrated ADS-B technology into the ATMS to reduce false targets, optimised the predictive conflict alert settings; and progressively strengthened the ATC operational manpower to better support the air traffic growth. CAD will continue to monitor and address controllers' concerns on workload through measures such as reviewing the break/relief arrangements to keep pace with growing air traffic in the longer term.
56	On occasional occurrences of keyboards/mice not being responsive to commands for individual workstation, the Expert Panel opined that the issue was not unique to the ATMS at CAD but also other brands of ATMS in other Air Navigation Service Providers (ANSPs), and proactive housekeeping measures in accordance with international best practices were carried out to keep the number of reports relatively low. The Expert Panel recommended CAD strengthening the communication with the frontline staff in this particular aspect. The Expert Panel	CAD has strengthened communication with frontline staff through regular meetings and communication with the frontline ATC and engineering staff, including representatives from the Hong Kong ATC Association and the Electronics Engineer Branch of the Hong Kong Chinese Civil Servants' Association, in order to solicit frontline views in formulating both short term and long term plans in enhancing the ATMS with the Contractor for continuous improvement.

Para. No. in Final Report	Expert Panel's Recommendation	CAD Follow-up Actions
	recommended CAD following up with the Contractor to strive for continuous improvement in this aspect through system enhancement in view of growing air traffic.	
57	The Expert Panel recommended CAD to be proactive in sharing information with staff on management's considerations in the implementation of enhancement and optimisation measures, including practicality, priorities and timelines of implementation. CAD should continue with its good practice of gathering views and facilitating feedbacks from both the operational and engineering teams.	CAD's management has put in continuous efforts to improve the ATMS and the working environment of ATC frontline staff. CAD's management has also arranged regular informal gatherings with the frontline controllers and engineering staff and posted lessons learnt as a result of occurrence investigations on notice boards, conducted briefing sessions on system behaviours and disseminated information via intranet to enhance mutual communications and address staff's concerns.
58	The Expert Panel recommended CAD exploring ways to promote the ATC profession and knowledge to the community at large.	With the establishment of the Hong Kong International Aviation Academy (the Academy) by the Airport Authority Hong Kong (AAHK) and delivery of training programmes since May 2017, introductory courses on ATC had been available to the public as an initial step in promoting the ATC profession and knowledge to the community at large. CAD is also working with the Academy in incorporating ATC engineering training into its curriculum.
63	The Expert Panel encouraged CAD to continue to share its positive ATC transition experience, handling of teething issues, established SMS process along with the challenges it had faced at local and overseas settings.	CAD has spearheaded the forming of the AutoTrac III Users Group (AUG), which serves as an excellent forum for sharing of knowledge and operational experiences, system enhancements, future development plans and roadmaps with other AutoTrac III users. With the AUG members being supportive of

Para. No. in Final Report	Expert Panel's Recommendation	CAD Follow-up Actions
		sharing information and experience on a regular basis among AutoTrac III users, CAD is following up with other AUG members on hosting future AUG meetings.
65	The Expert Panel considers that on-going effort is required to sustain the long term development of the ATMS to meet the challenges of future traffic demand, particularly with the on-going three-runway system (3RS) Project at the Hong Kong International Airport (HKIA).	CAD's Project Team, consisting of professional ATC staff and engineers, has been considering the long term development needs of the ATMS in order to meet all these challenges. A Steering Committee, chaired by a Deputy Director-General of Civil Aviation, with representation of the Transport and Housing Bureau, oversees matters relating to the continued implementation and optimisation of the ATMS.
66	The Expert Panel considers that continuous enhancement and refinement of any ATMS is necessary and should be an on-going process. In addition, CAD should continue to keep the operating and maintenance procedures of the ATMS as living documents that need to be reviewed and updated on a regular basis.	CAD has established regular meetings with the frontline maintenance staff to review and upkeep the maintenance procedures. CAD has also established regular communication with the frontline ATC and engineering staff, including representatives from the Hong Kong ATC Association and the Electronics Engineer Branch of the Hong Kong Chinese Civil Servants' Association, in order to solicit frontline views in formulating both short term and long term plans in enhancing the ATMS for meeting the new ICAO initiatives and addressing on-going operational needs.
68	CAD should continue to upkeep its internal and external communication with relevant parties in a timely manner, collect feedbacks from staff, and thus pool wisdom to improve ATMS operations in future.	CAD has established regular communication with the frontline ATC and engineering staff, including representatives from the Hong Kong ATC Association and the Electronics Engineer Branch of the Hong Kong Chinese Civil

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		Servants' Association. CAD has also spearheaded the establishment of the AUG, which serves as an excellent forum for sharing of knowledge and operational experiences, system enhancements, future development plans and roadmaps with other AutoTrac III users. CAD will continue to maintain its internal and external communication with relevant parties in a timely manner, collect feedbacks from staff, and thus pool wisdom to improve ATMS operations in future.
69	CAD should continue to upkeep its relevant mechanisms, channels and practices to regularly monitor the performance of ATMS and its enhancement needs through: (i) collecting comments from frontline staff via formal and informal channels; (ii) enhancing communication between engineering and operation subject matter experts via formal and informal channels; (iii) reviewing with ATMS supplier and maintenance staff via standing senior management level meetings/teleconferences and system performance review meetings; and (iv) conducting safety performance assessments under the established SMS framework such as the review of safety performance targets, review of the effectiveness of risk mitigating measures, safety audits and inspections, refresher training and fallback drills to ensure competency and continuous improvement in system maintenance and procedures.	Items (i) to (iv) are established mechanism and processes within CAD, which CAD will continuously maintain for regularly monitoring performance of ATMS and its enhancement needs:- (i) CAD's management has established regular gatherings with the frontline controllers and engineering staff, posted lessons learnt as a result of occurrence investigations on notice boards, and conducted briefing sessions on system behaviours with information disseminated via intranet to enhance mutual communications and address staff's concerns. (ii) CAD has implemented various measures, in the form of Operational Instructions, team briefings, handover notes, lessons learnt and maintenance instructions, to promulgate relevant information to frontline operational and maintenance staff in a timely manner. (iii) CAD has regular communication/coordination

Para. No. in Final Report	Expert Panel's Recommendation	CAD Follow-up Actions
		with ATMS supplier and maintenance staff via standing senior management level meetings/teleconferences and system performance review meetings. (iv) CAD has conducted safety performance assessments under its established SMS framework including review of safety performance targets and the effectiveness of risk mitigating measures, conduct of safety audits and inspections, refresher training and fallback drills to ensure competency and continuous improvement in system maintenance and procedures.
70	A long term ATC manpower plan should be formulated to provide adequate level of competent staff to cope with the foreseeable expanded operation of the ATMS.	CAD has formulated a long term ATC manpower plan. Apart from bidding for additional manpower resources through the established procedure, CAD will also liaise with AAHK to engage experienced expatriate air traffic controllers on a time-limited basis to supplement and train local ATC manpower to meet long-term development need of the HKIA.
71	The Expert Panel believed it prudent for CAD to closely monitor developments and fine-tune and/or upgrade the ATMS on an on-going basis in maintaining the capability and resilience of the ATMS on a sustained basis, especially during contingency.	CAD will continue its on-going effort in upgrading the ATMS and refining the related operations and procedures. A Steering Committee, chaired by a Deputy Director-General of Civil Aviation, with representation of the Transport and Housing Bureau, oversees matters relating to the continued implementation and optimisation of the ATMS.