

For Discussion
on 16 December 2008

Legislative Council Panel on Economic Development

Proposal to Replace and Upgrade Meteorological Facilities for the Hong Kong International Airport

PURPOSE

This paper invites Members to endorse a funding proposal from the Hong Kong Observatory (HKO) to replace and upgrade meteorological facilities for maintaining and enhancing aviation weather services.

BACKGROUND

2. As the designated meteorological authority in Hong Kong¹, HKO operates meteorological facilities serving international air navigation across Hong Kong's airspace, including flight operations at the Hong Kong International Airport (HKIA). This contributes towards the safe, efficient and reliable operation of air traffic.

3. In the above connection, HKO provides aviation weather information (including forecasts and alerts) direct to users including airlines, pilots, the Civil Aviation Department (CAD), and the Airport Authority (AA). To deliver its services, HKO operates a suite of meteorological facilities for weather observation, forecasting and warning (including windshear alert), as well as related infrastructure including IT facilities for data processing and information transmission. These HKO facilities are linked to the Air Traffic Control (ATC) system of CAD at HKIA.

PROPOSAL

4. The Director of HKO, with the support of the Secretary for Commerce and Economic Development, proposes to -

¹ The Hong Kong Observatory is the designated meteorological authority in Hong Kong by virtue of Annex 3 to the Convention on International Civil Aviation.

- (a) replace the ageing Terminal Doppler Weather Radar (TDWR), a key equipment for issuing windshear alerts; and
- (b) replace and upgrade the other meteorological and related infrastructural facilities of HKO for HKIA, taking into account the need to integrate their facilities with CAD's replacement ATC system and to provide enhanced aviation-specific weather information.

JUSTIFICATION

5. Aviation safety is critical to the further development of Hong Kong as an aviation hub in the region. HKO needs to replace the ageing meteorological equipment to maintain its aviation weather services. It also has to upgrade its meteorological facilities to meet the growth in air traffic and the demand for higher-quality aviation weather services.

Replacement of the Terminal Doppler Weather Radar

6. Windshear is a hazardous weather phenomenon that has brought about aircraft accidents around the world. Issuance of windshear alerts in good time is of paramount importance to ensure aviation safety.

7. The present TDWR, a specialized equipment installed in 1996 for detection of windshear, is approaching the end of its functional life. Its annual unserviceable time has been increasing in recent years². Maintenance work has become increasingly difficult as many components are already out of production.

8. HKO proposes to install a new TDWR to ensure timely and uninterrupted provision of accurate windshear warnings to aircraft. After the new TDWR is in place, the existing one will be turned into a backup for as long as its economical useful life permits.

9. The operation of the existing TDWR must remain intact until the new equipment is fully functional. Hence, the new TDWR has to be installed on a separate site. The related capital works for the formation

² The average annual unserviceable time of the present TDWR has increased from 27 hours for the period 2000-2003 to 47 hours for the period 2004-2007.

of the new site are to be funded under the Capital Works Reserve Fund. We will seek funding approval from LegCo separately when ready.

Replacement of Other Meteorological and Infrastructural Facilities

10. The other existing aviation meteorological and infrastructural facilities of HKO have been in operation since the opening of HKIA in 1998. Many of these facilities are also approaching the end of their serviceable lives³. They need to be replaced in a timely manner.

11. HKO proposes to replace and upgrade these meteorological and infrastructural facilities to enable the department to –

- (a) plan and implement the integration of the facilities with CAD's replacement ATC system (funding approval obtained from the Finance Committee vide FCR(2007-08)9 in May 2007); and
- (b) develop more accurate, reliable and sophisticated aviation-specific weather information and services to meet the evolving demands for higher quality services from pilots, airlines, CAD, and AA in the years ahead.

Annex A

Annex A gives details of the proposed facilities.

Users' Support

12. The proposal has the strong backing of the Windshear and Turbulence Warning System Working Group and the Liaison Group on Aviation Weather Services. The two user groups include representatives from airlines, pilots and air traffic controllers. AA recognizes the need for acquiring the facilities.

Anticipated Benefits

13. The proposal would enable uninterrupted delivery of mission-critical windshear warnings as well as the provision of other timely and reliable aviation weather information to the aviation

³ The normal serviceable life of most meteorological facilities is between 10 to 15 years.

community. This helps ensure safe, efficient and reliable flight operations at HKIA and across Hong Kong's airspace, in the interest of upholding Hong Kong's position as a leading aviation hub in the region.

Implementation Plan

14. HKO plans to put the TDWR in place in 2013. The other facilities will be installed in phases between 2012 and 2015. To allow the necessary lead time for invitation of tenders, parallel site formation work (in the case of the TDWR), system installations and test-runs, preparatory work will start from 2009-10. In the meantime, HKO will continue to sustain its services where possible on the basis of the existing facilities. For the TDWR, HKO will try to upkeep the reliability of the existing system by more frequent maintenance checks and extending the search for potential suppliers of possible replacement components.

IMPLICATIONS

Financial Implications

Non-recurrent Expenditure

15. We estimate that the proposal as a whole would require a non-recurrent provision of \$154 million for the purchase of the equipment. Of this, \$100 million is for the new TDWR and \$40 million for the others. The remaining \$14 million is for contingency purposes. A detailed breakdown is at **Annex B**.

Annex B

16. Besides, three time-limited non-directorate posts, namely one Scientific Officer and two Scientific Assistants, will be created from 2009-10 to 2014-15 to assist in overseeing the planning and installation of the proposed facilities. It will entail a non-recurrent staff cost of \$10.2 million in total.

17. The proposal would also entail another non-recurrent provision for the construction of the TDWR site, estimated at this stage at about \$122 million. Detailed justifications for this will be submitted to LegCo separately when we seek the necessary funding formally.

Recurrent Expenditure

18. We estimate that the entire proposal would necessitate a recurrent provision of \$15 million per annum upon full implementation in 2015-16, comprising :

- (a) about \$2.2 million for staff cost – this involves three non-directorate civil service posts (one Scientific Officer, one Experimental Officer and one Radar Specialist Mechanic) for overseeing the entire planning and implementation process, maintaining and operating the facilities, and developing enhanced aviation weather services, etc.; and
- (b) \$12.8 million for maintaining the facilities – this includes specialist supplies and maintenance, rental costs of communication links, other professional services and electricity costs, etc.

Annex C Details are at Annex C.

Impact on Fees and Charges

19. Under the existing “user pays” principle, the costs for providing aviation weather services will be fully recovered from AA for aircraft landing at HKIA and from airlines for overflying aircraft without landing at HKIA (as part of en-route navigation charges). Since HKO’s service charges only constitute about 2.6% of the overall airport charges of HKIA, the effect of HKO’s proposal on the airport charges should be minimal⁴. Similarly, it is not envisaged that the en-route navigation charges, currently pitched at \$4.8 per nautical mile, will see a significant change as a result of the proposal since aviation weather services only constitute about 6% of the charges.

⁴ As a result of the present proposal and the other ongoing aviation weather services, HKO estimates that the annual weather service charges collected from AA would gradually increase to about \$99 million in 2013, or \$18 million more than would otherwise be the case.

ADVICE SOUGHT

20. Subject to Members' views, we intend to put the funding proposal to the Finance Committee in early 2009 for approval.

Commerce and Economic Development Bureau
Hong Kong Observatory
December 2008

**Proposed Meteorological and Infrastructural Facilities to be
Replaced or Upgraded**

(other than the Terminal Doppler Weather Radar)

- Hardware and software for weather observation, data processing, information and service delivery.
- Additional hardware and software to facilitate integration with the replacement Air Traffic Control system of the Civil Aviation Department.
- Computing hardware and software for development of enhanced aviation-specific weather forecasting services for the aviation community.
- Communication facilities, network equipment and uninterruptible power supply systems.

Annex B

**Equipment Cost for the Proposed Replacement and Upgrading of
Meteorological and Infrastructural Facilities**

		\$ million
(a)	<i>Replacement of Terminal Doppler Weather Radar</i>	
	(i) Hardware	46.5
	(ii) Software	23.0
	(iii) Delivery, installation, testing, commissioning, documentation and training	17.5
	(iv) Initial spare parts, consumables and test equipment	13.0
	<i>Sub-total of (a)</i>	<i>100.0</i>
(b)	<i>Replacement and Upgrading of other meteorological and infrastructural facilities</i>	
	(i) Meteorological and infrastructural facilities to replace ageing equipment and facilitate integration with the replacement Air Traffic Control System of the Civil Aviation Department	28.0
	(ii) Meteorological and infrastructural facilities for development of enhanced aviation-specific weather services for the aviation community	12.0
	<i>Sub-total of (b)</i>	<i>40.0</i>
(c)	<i>Contingency (10 % of ((a)+(b)))</i>	<i>14.0</i>
	Total ((a)+(b)+(c))	154

**Recurrent Expenditure for the Proposed Replacement and
Upgrading of Meteorological and Infrastructural Facilities**
(including the Terminal Doppler Weather Radar)

		2009- 10 \$ '000	2010- 11 \$ '000	2011- 12 \$ '000	2012- 13 \$ '000	2013- 14 \$ '000	2014- 15 \$ '000	2015- 16 & beyond \$'000
(a)	Staff cost (including the non-directorate posts in para. 16 and 18(a) of the paper) – Notes 1 and 2	2,060	4,119	4,119	4,119	4,119	4,119	2,270
(b)	Cost for maintaining the facilities							
	i. Light and power	-	377	753	753	1,003	1,003	1,003
	ii. Rental of communication links	-	123	245	245	1,745	1,745	1,745
	iii. Specialist supplies	-	5	11	11	11	4,011	4,011
	iv. Maintenance and other professional services	-	188	3,501	3,501	3,501	6,001	6,001
	Sub-total of (b)	-	693	4,510	4,510	6,260	12,760	12,760
	Total ((a)+(b))	2,060	4,812	8,629	8,629	10,379	16,879	15,030

Note 1 - The figures listed on staff cost are the full annual average staff costs, including salaries and staff on-cost.

Note 2 - The staff cost for the time-limited non-directorate posts in paragraph 16 of the paper covers the period from 2009-10 to 2014-15.