

For discussion
on 28 November 2011

Legislative Council Panel on Economic Development

Proposal for the Construction of a Station for a New Windshear Detection Radar of the Hong Kong Observatory

PURPOSE

Further to the funding approval of the Finance Committee (FC) for the Hong Kong Observatory (HKO) to procure a weather radar to detect windshear, this paper invites Members to endorse a related funding proposal to construct a station for housing the new radar. The new radar is critical in ensuring continued aviation safety.

BACKGROUND

2. In February 2009, we sought FC's funding approval for HKO to acquire a new windshear detection radar called the Terminal Doppler Weather Radar (TDWR), among other meteorological facilities for the Hong Kong International Airport (HKIA) (ref: FCR(2008-09)69). We explained to FC that aviation safety was critical to the further development of Hong Kong as an aviation hub in the region. HKO needed to replace/upgrade the meteorological equipment, including the existing aging TDWR, to maintain its aviation weather services.

3. In considering the funding request for the TDWR itself, FC noted that windshear was a hazardous weather phenomenon that had brought about aircraft accidents around the world. Issuance of windshear alerts in good time was of paramount importance for ensuring aviation safety. The present TDWR, in operation since 1998, was approaching the end of its functional life¹. It needed to be replaced in a timely fashion.

¹ The annual unserviceable time of the existing TDWR has been increasing in recent years, from 33 hours for the period of 2002 to 2004, to 42 hours for the period of 2005 to 2007, and further to 44 hours for the period of 2008 to 2010.

4. FC subsequently approved the funding application, with an amount of \$100 million for the acquisition of a new TDWR.

PROPOSAL

5. The Director of Hong Kong Observatory, with the support of the Secretary for Commerce and Economic Development, proposes to construct a station in Tuen Mun for housing the new TDWR.

PROJECT SCOPE

6. Through the proposed project, we seek to construct a station on a hilltop near Brothers Point in Tai Lam Chung, Tuen Mun (**Enclosure 1**) for HKO to house the new TDWR and supporting installations. The proposed scope of the project comprises –

- (a) a single-storey main station building with a rooftop for installing the new radar with a radome;
- (b) a single-storey auxiliary building;
- (c) a loading and unloading area; and
- (d) a new access road to the site by extending an existing access road in the vicinity.

JUSTIFICATIONS

7. To ensure uninterrupted, timely and accurate detection of windshears, it is vital that the new radar is ready for use when the functional life of the existing TDWR draws to an end. It is not possible to operate two TDWRs at the existing station². If the existing TDWR (located close to the Marine Police base of Tuen Mun) is dismantled to make way for installation of the new radar, this could mean service disruption for more than one year. The absence of TDWR coverage for such an extended period is not acceptable to aviation stakeholders, taking into account the frequency at which windshears occurs at HKIA. We therefore need a separate site to hold the new radar.

² There is not enough space for installing the new TDWR at the existing station. Moreover, operating two radars at the same station will cause unacceptable mutual interference.

8. Moreover, in anticipation of growing air traffic at HKIA, HKO sees a case for having two TDWRs in the longer term, so that at times when one of the radars is not serviceable or stands down for maintenance, it would help ensure aviation safety if HKO could rely on the other radar to upkeep the service. Under the scenario where a pair of TDWRs operate in tandem, the site for the existing TDWR would be used to house the other radar.

Site Selection

9. To ensure effective operation of the windshear radar, the site for holding the new radar has to fulfill certain technical criteria³. HKO started the site selection process in 2006, with the assistance of international radar experts. Having examined over 20 sites, HKO considered that the present proposed site was the most suitable one in technical terms.

10. The other examined sites were not favored as a result of one or a combination of factors. These included impairment to full-scale functioning of the TDWR due to more extensive obstruction by nearby hills, inadequate site area to hold the station, mutual interference with the existing TDWR because of proximity, unacceptable height above the mean sea level, safety concerns, greater damage to the surrounding environment because of more extensive slope removal works, and longer construction time.

11. In September 2008, under section 16 of the Town Planning Ordinance (Chapter 131 of the Laws of Hong Kong), HKO submitted an application to the Town Planning Board (TPB) for planning permission to construct the station at the proposed site as it is located in a green belt zone. The TPB considered the application in February 2009. Some villagers living in the vicinity raised objections against use of the site for housing the TDWR on grounds of radiation safety concerns and “fung shui”.

12. The TPB noted that both the Office of Telecommunication Authority (OFTA) and the Department of Health (DH) had no adverse comments on the application. HKO was experienced in operating weather radars. The angle of

³ The criteria include, inter alia :

- (a) unobstructed view to the airport;
- (b) alignment with the direction of the runway;
- (c) at a distance of 10 kilometres (km) to 15km from the airport; and
- (d) at a height of 40 metres (m) to 130m above mean sea level.

the radar emission would be programmed in a way that the nearby residents and the passers-by would be protected from microwave radiation exposure. The proposed radar station would comply with the relevant guidelines, code of practice and standards on radiation safety. DH considered the proposed protective measures adequate to protect the residents in the vicinity. The TPB approved the application and invited HKO to liaise with the local villagers to address their concerns including the “fung shui” issue.

13. HKO has continued to engage the villagers since then. In response to a number of alternative sites put forward by villagers, HKO duly considered the sites in consultation with the Architectural Services Department. Each of the sites had its own shortcomings. These included the need for reclamation, extensive obstruction by nearby hills, greater damage to the surrounding environment because of more extensive slope removal works, site not being available until 2014, longer construction time and so on.

14. After taking into account technical, environmental and other relevant factors, HKO remains of the view that the present proposed site meets all the requirements and is the most suitable one.

Local Concerns

15. Some villagers living near the proposed site have raised concerns about radiation safety and the visual impact (or “fung shui”) of the proposed radar station. We have endeavoured to put the villagers’ minds at ease. A summary of our efforts is given below :

- (a) *Radiation safety* : when briefing villagers, we highlighted the fact that HKO had been operating weather radars since 1959 and following strictly the code of practice issued by OFTA. OFTA and DH had confirmed that the radiation level of the existing TDWR fully complied with the international standards issued by the World Health Organization. As such, there should not be adverse health impact on nearby villagers.

Acceding to the villagers’ request, HKO engaged in early 2011 an expert from a local university to carry out independent radiation measurement. The expert re-affirmed that the radiation level of the existing radar was well within the international safety limit.

Since the technical specifications of the new TDWR are similar to those of the existing one, its radiation level is expected to resemble that of the existing TDWR. For added assurance, OFTA will assess the radiation level again when the design of the new radar station is ready. It will also take actual radiation measurements upon installation of the new radar. We will consult both OFTA and DH before the new TDWR is brought into operation; and

- (b) Visual Impact (“Fung Shui”) : to minimize the visual impact of the proposed radar station, we have modified the design of the station as far as it is technically feasible. The key changes made include :
- (i) moving the TDWR by 17 meters away from the nearby villages. We would need to construct a platform over the cliff just adjoining the main site area to support the radar station at some additional cost;
 - (ii) reducing the height of the radar station by 7 meters (by compressing the station building from two storeys to one storey and using a smaller radome); and
 - (iii) planting trees facing the direction of the nearby villages.

As a result, the radar should generally be masked from sight when viewed from nearby villages. Details are at **Enclosure 2**.

We have also assured local villagers that in accordance with the existing established policy on “tun fu” ex-gratia allowance, the Government stands ready to consider paying the allowance when the construction works start on site.

Anticipated Benefits

16. The proposal would ensure uninterrupted delivery of windshear alerts to the aviation community, thereby contributing towards the maintenance of aviation safety. By facilitating safe and efficient operation at HKIA, that in turn would help uphold Hong Kong’s position as a leading aviation hub in the region.

Implementation Plan

17. Given the aging conditions of the existing TDWR, the proposed site construction works are time critical. Subject to the funding approval by FC, we hope to take the project forward as soon as possible, according to the following schedule -

Activity	Target completion date
(a) Tender preparation and invitation for the station construction works	February 2012
(b) Contract award	May 2012
(c) Commencement of construction works	June 2012
(d) Completion of construction works	May 2014
(e) Commissioning of the new TDWR	December 2014

18. HKO plans to commission the new TDWR by late 2014. HKO considers that if the new radar could not be brought into operation by then, there is a real risk of the existing radar being out of service when the new radar is not yet fully functional. This will not be acceptable as aviation safety will be at stake.

PUBLIC CONSULTATION

19. Timely replacement of the aging TDWR has the strong support 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. The Airport Authority also supports the replacement.

20. We consulted the TPB on the proposed radar station site in February 2009. The TPB supported the application and asked HKO to liaise with the villagers on their concerns including “fung shui”. We made modifications to the proposed radar site as far as it is technically feasible to minimize the visual impact of the proposed radar station. We consulted the Tuen Mun District Council (TMDC) on the proposed site in January and May 2010. TMDC recognized the importance of the project from the aviation safety angle and

showed understanding of the choice of the proposed site. Whilst TMDC did not object to the construction of the new radar station, it invited the Government to continue to liaise with the villagers and see if there were any additional measures that might help further ease their minds.

21. We have continued to engage local stakeholders, explaining to them further the safeguards that would be in place to ensure radiation safety. We have taken additional measures to ease their concerns, including the independent radiation measurement exercise referred to in paragraph 15(a) above. We have also confirmed our readiness to consider paying for the “tun fu” ex-gratia allowance when construction works start on site, in accordance with the existing established policy on the ex-gratia allowance.

FINANCIAL IMPLICATIONS

22. We estimate that the cost for constructing the TDWR station to be \$150.7 million (in September 2011 prices). Also, the proposal would necessitate a recurrent provision of about \$0.55 million per annum upon completion of building works. This includes expenditure for maintenance of the station building and access road, and landscaping.

WAY FORWARD

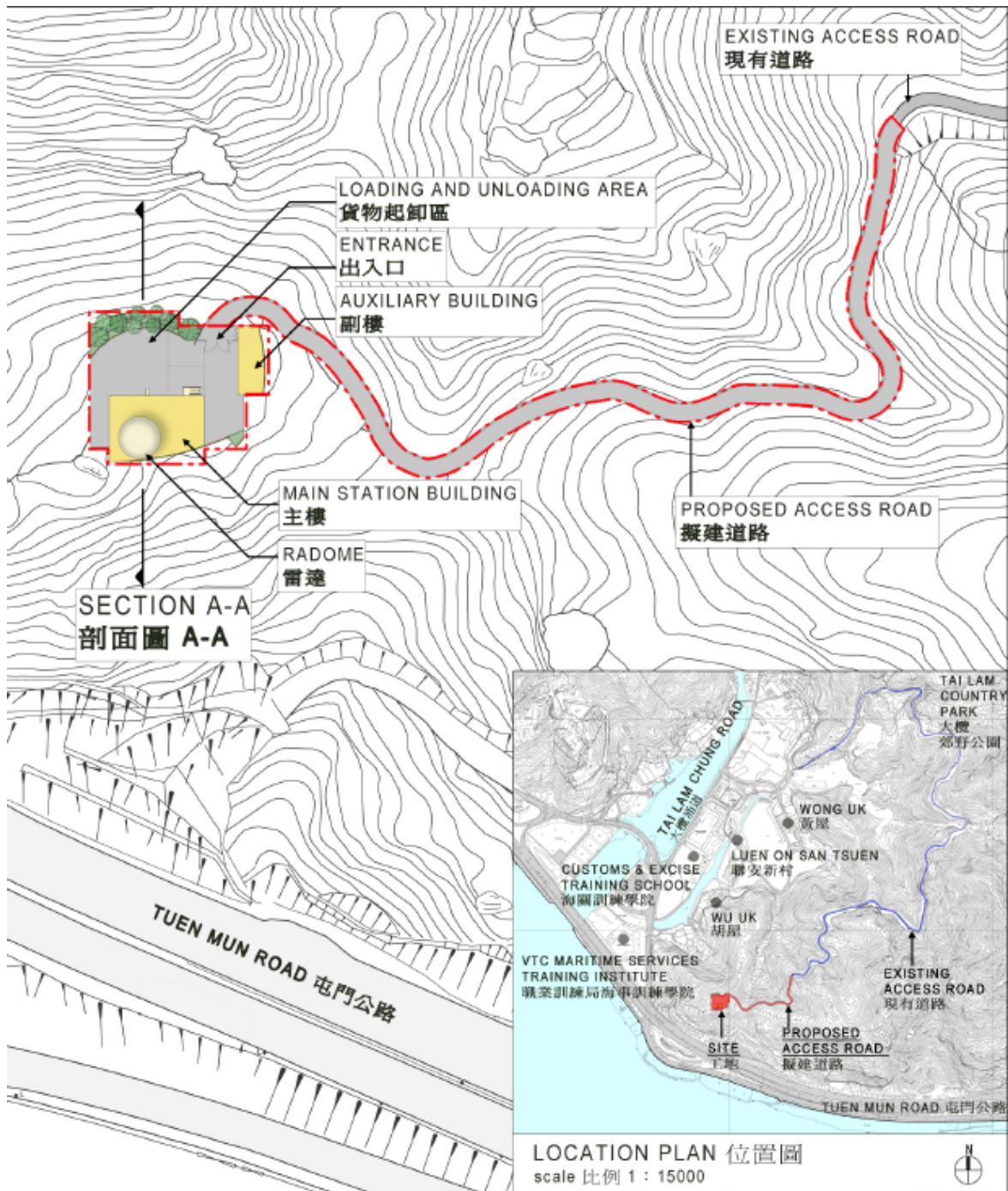
23. Subject to Members’ views, we intend to put the funding proposal to the Public Works Subcommittee in December 2011, with a view to seeking the approval of FC in January 2012.

Commerce and Economic Development Bureau
Hong Kong Observatory
November 2011


Proposed Site for the New Radar



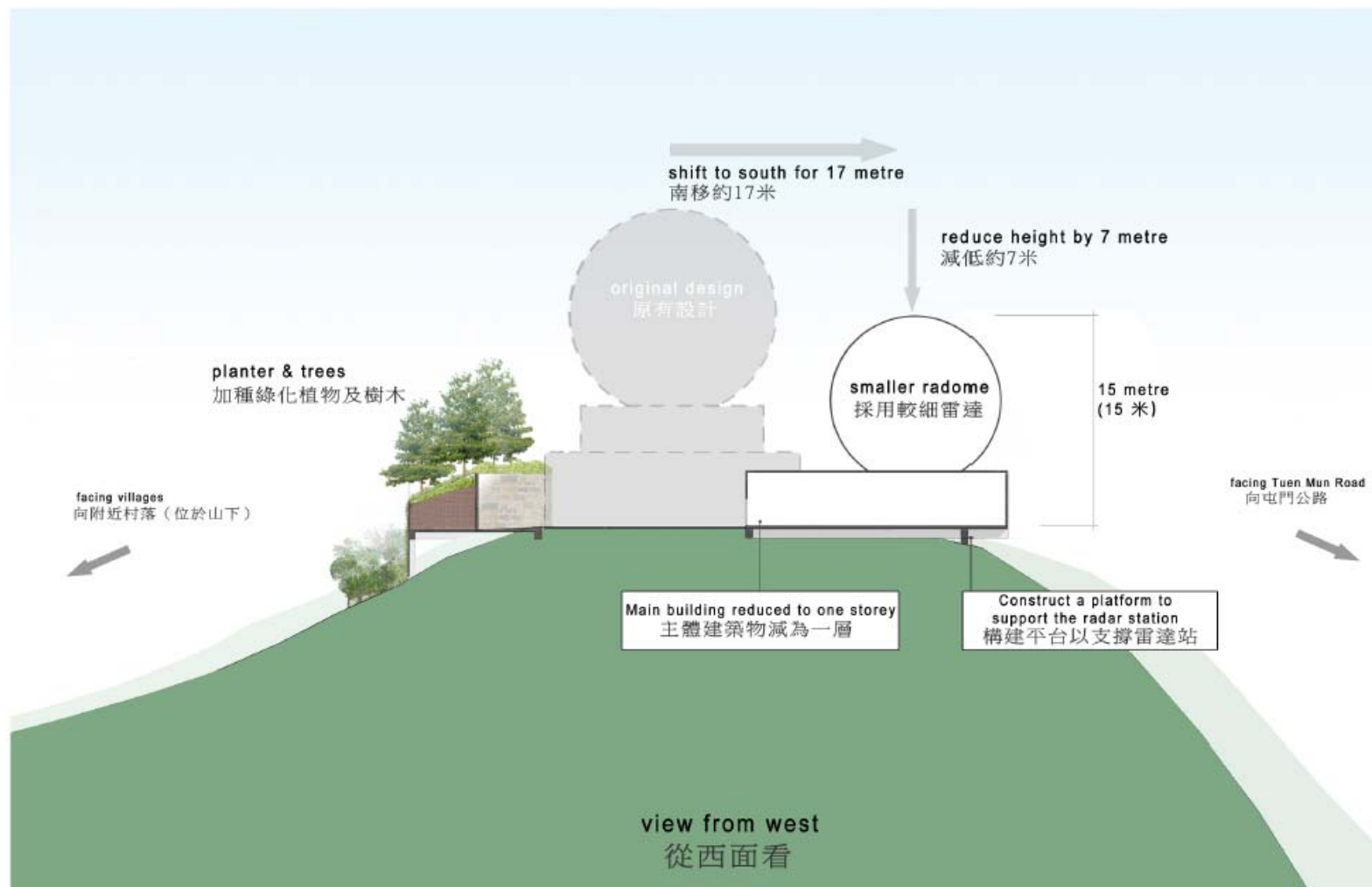
Details of the Proposed Site for the New Radar



SITE PLAN - 工地圖

project code and title 工程計劃編號和名稱	drawn 繪圖 K.C. Leung	date 日期 25/10/2011	drawing no. 編號 PMB1/7218/XA101	scale 比例 1:1500
3181GK – CONSTRUCTION OF A STATION FOR THE NEW TERMINAL DOPPLER WEATHER RADAR 3181GK – 為新的機場多普勒天氣雷達建造雷達站	approved 覆核 S.K. Yeung	date 日期 25/10/2011	 ARCHITECTURAL SERVICES DEPARTMENT 建築署	
	office 辦事處 PROJECT MANAGEMENT BRANCH			

Modifications made to the Proposed Radar Station

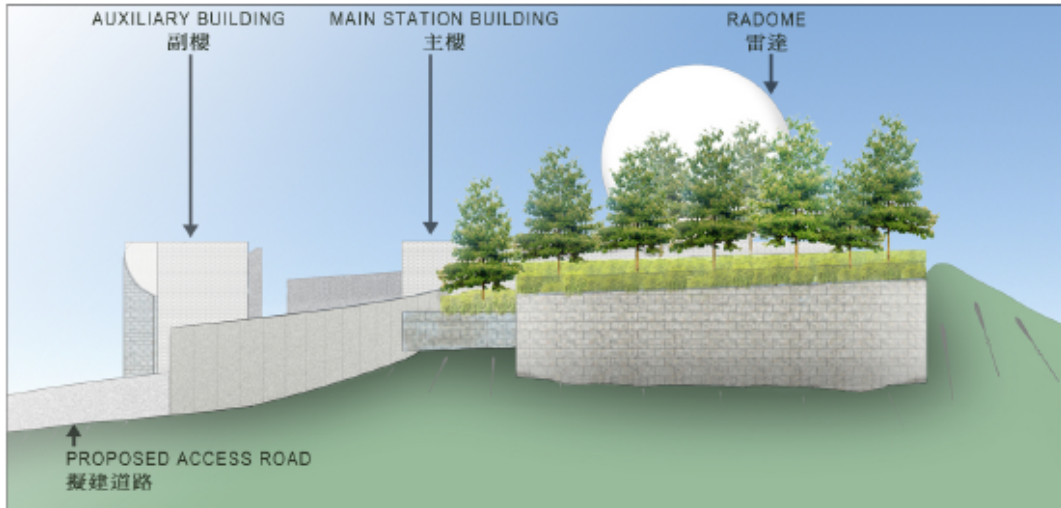


比較示意圖
COMPARISON DIAGRAM

DETAIL DESIGN 詳細設計

CONSTRUCTION OF A STATION FOR
THE NEW TERMINAL DOPPLER WEATHER RADAR
建造新機場多普勒天氣雷達站


Detailed Design for the Proposed Radar Station



ELEVATION OF THE RADAR FROM NORTHERN DIRECTION (ARTIST'S IMPRESSION)
從北面望向雷達站的立面構思圖



SECTION A-A
剖面圖A-A

project code and title 工程計劃編號和名稱	drawn by 繪圖 K.C. Leung	date 日期 25/10/2011	drawing no. 編號 PMB1/7218/XA102	scale 比例 1:400
3181GK – CONSTRUCTION OF A STATION FOR THE NEW TERMINAL DOPPLER WEATHER RADAR 3181GK – 為新的機場多普勒天氣雷達建造雷達站	approved 覆核 S.K. Yeung	date 日期 25/10/2011	 ARCHITECTURAL SERVICES DEPARTMENT 建築署	
	office 辦事處 PROJECT MANAGEMENT BRANCH			