SUSTAINING GROWTH AT A NEW LEVEL
Chapters 5 and 6 discuss two very different approaches in planning the future development of Hong Kong International Airport (HKIA) in the next 20 years. They have their respective pros and cons. A detailed comparison between the two options against key considerations is discussed below.

**CONSIDERATION 1 : AIR CONNECTIVITY**

Air connectivity is essential for Hong Kong to maintain its attractiveness as an international business hub as well as competitiveness on the global economic and financial stage.

Air connectivity is commonly defined by the number of destinations served and the frequency of flights along each of those routes. The better HKIA is connected to the world, the greater the frequency of services it could offer, resulting in more reliable air services and a lower threshold for opening new routes. With every new flight it adds to its network, HKIA’s connectivity will be further enhanced. Passengers, particularly business travellers, who have access to an airport with great connectivity would benefit from a wider range of services and frequency.

It is widely recognised that air connectivity plays a crucial role in attracting foreign business. Moreover, the availability of air freight services further facilitates trade by enabling businesses to operate in the most flexible and time-sensitive manner. Global connectivity is particularly important to those sectors characterised by internationalised, high-value products and services, that are also dependent on mobile workforces and face-to-face relations. Among them are financial and business services, which are the cornerstone of Hong Kong’s economy.

As Hong Kong’s air connectivity increases, it in turn makes Hong Kong more attractive to foreign investment and increases the potential for business efficiency, ultimately generating a virtuous cycle of connectivity and economic growth.

Hence, in comparing the two options, air connectivity is one of the most critical considerations. According to International Air Transport Association (IATA) Consulting’s forecast, Option 1 can only meet the unconstrained demand for air traffic of Hong Kong up to 2020 (base case), at which time the maximum runway capacity would be reached. Should that happen, the following changes in air traffic pattern would likely occur, as experienced by both Kai Tak and overseas airports such as Heathrow –

(a) Once all available slots were taken up, it would be impossible for existing operators to introduce new destinations or additional frequency on existing routes except for substituting existing flights. This will put a halt to the growth of our aviation network and remove the room for introducing competition on existing routes;

(b) With slots at a premium, airlines may deploy bigger aircraft, use available slots for lucrative routes instead of the less profitable ones. This would gradually reduce the frequency of less profitable routes and may eventually eliminate them from our network. The reduction in frequency would result in longer connecting time; and the shrinking network, in less choices and higher prices on most routes. The higher yield origin-and-destination
traffic may gradually replace the relatively lower yield transit/transfer traffic. All these would eventually render Hong Kong a less attractive place for transit/transfer traffic to hub through;

(c) When the runway is operating to its limits, there will be less flexibility to cope with operational delays or disruptions due to weather or other unforeseen incidents. This will invariably lead to longer flight delay and deterioration of the overall airport experience;

(d) Should all of the above happen, travellers who wish to use HKIA would be pushed to consider using other neighbouring airports that provide services they need, resulting in considerable inconvenience for travellers as a whole; and

(e) In the wider context, when HKIA is saturated, the growth of our hub airport would be halted and the economic benefits for Hong Kong associated with that potential growth would be lost. Hong Kong’s overall competitiveness in terms of its position as an international business centre would be adversely affected. Hong Kong’s market share across the whole spectrum of the logistics industry, including freight forwarding and insurance, would shrink as we lose our edge to other airports with increasing connectivity.

In this respect, Option 2 has a clear advantage over Option 1 as the runway capacity of a three-runway system would be able to meet Hong Kong’s unconstrained traffic demand up to and possibly beyond 2030. Option 2 would ensure that our connectivity is maintained and developed in line with demand. Failure to do so would result in our connectivity being eroded over time relative to other neighbouring or regional airports with expansion plans.

Adopting Option 1 now and then reverting to Option 2 at a later stage is not a viable proposition. Firstly, it would be very wasteful as part of the infrastructure built under Option 1 would have to be taken down to make way for a different airport layout under Option 2. Secondly, due to the long lead time required to implement Option 2, any substantial delay in implementing that option will mean that the capacity of HKIA would be exhausted before the third runway is built. During that period, traffic may be lost to other airports with increasing connectivity and,
Express Line (WEL), which is currently under feasibility study by the Government, may provide an efficient mode of transport to allow seamless passenger flight connections between the two airports, and to make it even more convenient for the GPRD’s travelling public to fly via HKIA internationally or Shenzhen airport domestically. The project is subject to further studies, including alignment options, patronage forecasts, the functionality of the railways, technical standards, operational and service requirements, etc. If and when the WEL is constructed, the benefit it brings would equally apply to both Options. This is an example of our cooperation with other GPRD airports. We enhance consumer choice by making smooth travel. A recent example is

Relying on Neighbouring Airports is Not an Option

Some advocates have argued that greater cooperation with Greater Pearl River Delta (GPRD) airports (most notably Shenzhen Bao’an Airport) could possibly remove the need for us to expand HKIA’s capacity. We, however, do not believe that it is a viable proposition, for the following reasons –

(a) Air services to and from an airport are regulated by individual jurisdiction and governed internationally through a network of bilateral air services agreements. Therefore, flight movements that we cannot accommodate due to capacity constraints cannot be funnelled to other airports purely based on demand or at our wishes;

(b) It would not be in the interest of most passengers who would likely find using or transferring through another airport highly inconvenient; and

(c) Most importantly, relying on other airports to meet our demand would inhibit the growth of our hub airport and thus adversely affect Hong Kong’s overall competitiveness as a world city.

It should be noted that the Hong Kong-Shenzhen Western Express Line (WEL), which is currently under feasibility study by the Government, may provide an efficient mode of transport to allow seamless passenger flight connections between the two airports, and to make it even more convenient for the GPRD’s travelling public to fly via HKIA internationally or Shenzhen airport domestically. The project is subject to further studies, including alignment options, patronage forecasts, the functionality of the railways, technical standards, operational and service requirements, etc. If and when the WEL is constructed, the benefit it brings would equally apply to both Options. This is an example of our cooperation with other GPRD airports. We enhance consumer choice by making smooth travel. A recent example is
the Hong Kong-Shenzhen Airports Link, which is a service to make it more convenient to travel via HKIA or Shenzhen Bao’an Airport. Such efforts are however different from directing to other GPRD airports traffic which would have chosen Hong Kong due to market forces if there had been sufficient capacity at HKIA.

CONSIDERATION 2 : ECONOMIC BENEFITS

Experience overseas has shown that investment in airports provides very handsome economic return and that airports produce significantly higher economic impact than other transport infrastructure to the local economy. In order to understand precisely the economic implications of expanding HKIA, Enright, Scott & Associates (ESA) was tasked to conduct an Economic Impact Analysis to assess the potential impact of such an investment on Hong Kong’s economy.

In general, an investment’s economic impact is measured by its direct, indirect, and induced contributions to the economy, usually expressed in terms of "value added" and percentage contribution to gross domestic product (GDP) in a certain year.

In the context of HKIA –

(a) “Direct” contribution refers to employment and income generated by the aviation sector in Hong Kong, including the direct operation of the airport, such as airlines, air cargo terminal operators, catering operators, aircraft maintenance and other services operators, and Airport Authority Hong Kong (AAHK), etc., as well as non-aviation businesses at HKIA, including retail, food and beverage, hotels and convention and exhibitions;

(b) “Indirect” contribution refers to employment and income generated by the suppliers of goods and services to the direct activities of the aviation sector in Hong Kong and non-aviation businesses at HKIA, such as utilities suppliers, fuel suppliers, construction and cleaning companies, food and retail goods suppliers, etc.; and

(c) “Induced” contribution refers to employment and income generated by the spending of income by the direct and indirect employees on local goods and services, such as spending of airline employees, utilities supplier employees, AAHK employees, etc.

In estimating the relevant economic contribution components of airport investment, ESA has quantified the direct value added (VA) impact of airport-related activities, as well as those indirectly generated VA impact arising from a change in airport activities. ESA has also adopted a set of VA “multipliers” for selected sectors related to the airport in its calculations and estimated the VA generated from additional spending due to the income projected from the direct and indirect impacts mentioned above.

To ascertain whether an investment is worthwhile, analyses were conducted based on two widely used investment analysis tools: Economic Net Present Value (ENPV) and Economic Internal Rate of Return (EIRR). However, based on the options presented for analyses, Option 1 involves leveraging mainly on existing assets to serve additional demand, and Option 2 involves heavy investments in building up new assets to serve additional demand. Given the significant difference in investment profiles and the noted shortcoming of EIRR (that it tends to favour projects with short-term paybacks at the expense of projects with longer paybacks regardless of the overall value generated by the project), ESA recommended to use ENPV as the tool to assess the relative merits of the two options.

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13 According to Economic Impacts of Hub Airports, a report commissioned by British Chamber of Commerce in July 2009, the wider economic benefits of hub airports can be two to five times that of rail.

14 “Value added” is defined as the value of gross output less the value of intermediate consumption (the value of goods and services used up in the course of production).

15 The VA multipliers comprise the sectors’ own ability to generate VA and the spillover effect to other sectors. The multipliers relating direct plus indirect VA to gross output or business receipts were provided by the Economic Analysis and Business Facilitation Unit of the Hong Kong SAR Government as broad working assumptions for the current economic impact analysis. These are produced based on the observed linkages between sectors and the resultant pattern of intermediate consumption, import leakages of the various economic activities, gross margin of external trade and the ratios of VA to gross-output and business receipts for the affected sectors in recent years. As these impact estimates are largely judgmental, they should only be taken as working assumptions for the current economic impact analysis, and should not be regarded as “official estimates” of the Government.
Economic Impact of Option 1 (Two Runways)

ESA estimates that the direct, indirect and induced contribution of HKIA to Hong Kong’s GDP in 2030 under this option would be HK$120 billion\(^{16}\), equivalent to around 3.3% of Hong Kong’s GDP forecast for 2030 (compared to 4.6% in 2008). Direct employment would be increased from 62,000 in 2008 to 101,000 in 2030. Indirect and induced employment would be increased from 124,000 in 2008 to 143,000 in 2030.

With the given construction costs under this option\(^{17}\), and the corresponding stream of additional traffic up to 2061 (a 50-year life span is assumed for infrastructure), the ENPV\(^{18}\) is estimated to be HK$432 billion\(^{19}\).

The foregone economic benefits due to constrained passenger and cargo throughput will in turn translate into lower economic contribution of the airport and its associated industries, and the ripple effect would ultimately affect the GDP growth in Hong Kong.

Economic Impact of Option 2 (Three Runways)

ESA estimates that given the higher construction costs under this option\(^{20}\), the direct, indirect and induced contribution to Hong Kong’s GDP in 2030 would be HK$167 billion\(^{21}\), equivalent to

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\(^{16}\) In 2009 dollars.
\(^{17}\) Cost details are in Chapter 5.
\(^{18}\) ENPV refers to the difference between the present value of the future economic benefits from an investment and the present value of the investment amount.
\(^{19}\) In 2009 dollars.
\(^{20}\) Cost details are in Chapter 6.
\(^{21}\) In 2009 dollars.
around 4.6% of the Hong Kong’s GDP forecast for 2030 (compared to 4.6% in 2008). Direct employment associated with HKIA would reach 141,000 and indirect and induced employment would increase to about 199,000 by 2030. The ENPV up to 2061 under Option 2 is estimated to be HK$912 billion.

**Summary**

Figure 7.3 provides a summary of the economic impact analysis.

Option 1 is no doubt a less expensive option in terms of capital investment and would bring about an ENPV of HK$432 billion. Option 2, however, has a projected ENPV of HK$912 billion and is a “front-loaded” investment that is projected to generate a much higher value added in the long term.

Between the two options, Option 2 brings a substantially higher economic contribution in the long term (a difference of HK$480 billion in ENPV) and...
provides a significantly greater boost to local employment. One important aspect of the economic analysis that deserves particular attention is the gradual decrease of HKIA’s economic contribution as a percentage of Hong Kong’s GDP under Option 1 (below the 2008 level). As Hong Kong’s economy continues to grow, it is obvious that Option 1 does not allow HKIA to grow in tandem due to its constrained capacity\(^{23}\). In addition, constrained capacity is likely to affect air connectivity. Experience in Heathrow bears this out clearly: In 1990, Heathrow ranked second among airports in Europe, after Frankfurt, in the number of destinations served, but as its capacity became constrained, it slipped to seventh in 2010 behind Frankfurt, Paris, Amsterdam, Munich, Rome and Madrid\(^{24}\).

Between the two options, Option 2 would provide substantially more direct jobs than Option 1 (141,000 jobs under Option 2 vis-à-vis 101,000 jobs under Option 1). Further to the ESA analysis, we have surveyed nearly 400 different companies and organisations operating on the airport island in 2010. Of the 65,000 people employed, around 20% of the employment belongs to manual/low-skilled jobs. According to returns from the survey, it is anticipated that roughly 50% of the new jobs created under both Options 1 and 2 would be manual/low-skilled jobs. As Hong Kong is currently in need of employment opportunities for manual/low-skilled labour, the expansion of HKIA would contribute towards filling this gap.

\(^{23}\) The comparison of the projected economic impact of the two options was made against independently forecast GDP figures. Such figures have not been adjusted to take into account potential slower economic growth in Option 1 than in Option 2.


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### COMPARISON BETWEEN THE TWO OPTIONS

#### CONSIDERATION 3: CONSTRUCTION COST

The construction cost estimates are supported by the preliminary engineering feasibility assessment conducted, with approximate work quantity measured to the level of design details available and costs per unit of construction floor areas benchmarked with existing similar projects on the airport island.

Option 2 costs considerably more than Option 1 (estimated at HK$86.2 billion vis-à-vis HK$23.4 billion in 2010 dollars or HK$136.2 billion vis-à-vis HK$42.5 billion at money-of-the-day [MOD] prices) as the former entails a sizeable reclamation and extensive airport ancillary facilities required to efficiently integrate the third runway with the rest of the airport.
The high construction cost of Option 2 is attributed to the following factors –

(a) The proposed reclamation falls on a wide stretch of Contaminated Mud Pits (CMPs). In order to contain the CMPs in-situ, a special reclamation method called “Deep Cement Mixing” would be employed and this element alone would cost HK$9.0 billion more than conventional reclamation methods. Moreover, unlike the reclamation of the existing airport island where a considerable amount of fill was obtained from the original island, the fill for the proposed reclamation under Option 2 would have to be imported from the Pearl River Delta or beyond, which would drive up the land formation cost significantly;

(b) A provisional amount of 20% of the construction cost has been included to cover uncertain elements of this project given its massive scale, the innovative reclamation method adopted on a large scale, and that only preliminary engineering assessment has been done hitherto; and

(c) The airport is a unique piece of infrastructure that needs to be designed to meet a whole host of stringent standards for safety, security, efficiency and service quality. It can only operate efficiently with specialist automation systems such as baggage handling and automated people mover systems. All these add up to the capital intensive investment required, particularly so for Option 2, where the operation of the third runway has to be integrated fully with the rest of the airport infrastructure to sustain the same level of airport experience.

The construction cost figures above would have to be updated in due course after the statutory Environmental Impact Assessment process and preliminary design have been completed.

CONSIDERATION 4 : FUNDING

Under the Airport Authority Ordinance, we are required to conduct our business according to prudent commercial principles. We have maintained an efficient capital structure in line with comparable commercial entities. Leveraging our strong revenue base and superior credit rating, we operate with
The results of our operations for each year based on the above-mentioned assumptions show a trend of rising profits. As depreciation is charged before arriving at our profits, the cashflow generated from our operations is the aggregate of our profits and the depreciation charge but less any increase in our working capital. At the same time, expenditure is incurred on the committed capital projects such as Phase 1 of the Midfield Development and routine replacement of fixed assets.

(e) We will continue to invest in our committed capital projects, such as Phase 1 of the Midfield Development, and the routine replacement of fixed assets.

The cashflow projections under both Options 1 and 2 are prepared on the following assumptions –

(a) The final construction cost of the capital projects will be increased from the current estimate based on 2010 dollars to the MOD amounts, in line with the Tender Price Index (TPI) which is estimated to increase at the rate of 5% per annum from 2011 to 2014, 5.5% per annum from 2015 to 2020 and 3% per annum thereafter;

(b) Our operating revenue will increase in line with traffic growth based on IATA Consulting’s base case traffic forecast for this period;

(c) Airport charges will be adjusted in line with Consumer Price Index (CPI) movements (assuming 3% CPI increase per year up to 2030);

(d) The majority of our profits will be distributed by way of dividends to our shareholder each year at a similar rate as in previous years; and

(e) We will continue to invest in our committed capital projects, such as Phase 1 of the Midfield Development, and the routine replacement of fixed assets.

Cashflow Analysis – Option 1

Under Option 1, capital expenditure to be incurred would amount to HK$23.4 billion (in 2010 dollars) or HK$42.5 billion at MOD prices between 2013 and 2030. The annual cash outflow of the capital expenditure is shown in Figure 7.5.

The cashflow projections under both Options 1 and 2 are prepared on the following assumptions –

(a) The final construction cost of the capital projects will be increased from the current estimate based on 2010 dollars to the MOD amounts, in line with the Tender Price Index (TPI) which is estimated to increase at the rate of 5% per annum from 2011 to 2014, 5.5% per annum from 2015 to 2020 and 3% per annum thereafter;

(b) Our operating revenue will increase in line with traffic growth based on IATA Consulting’s base case traffic forecast for this period;

(c) Airport charges will be adjusted in line with Consumer Price Index (CPI) movements (assuming 3% CPI increase per year up to 2030);

(d) The majority of our profits will be distributed by way of dividends to our shareholder each year at a similar rate as in previous years; and

(e) We will continue to invest in our committed capital projects, such as Phase 1 of the Midfield Development, and the routine replacement of fixed assets.

The results of our operations for each year based on the above-mentioned assumptions show a trend of rising profits. As depreciation is charged before arriving at our profits, the cashflow generated from our operations is the aggregate of our profits and the depreciation charge but less any increase in our working capital. At the same time, expenditure is incurred on the committed capital projects such as Phase 1 of the Midfield Development and routine replacement of fixed assets.

25 According to 2010/11 unaudited accounts.
Hence, such expenditure should be deducted from our cashflow from operations to arrive at the net cashflow before dividend payments.

Under the Airport Authority Ordinance, the Financial Secretary has the power to request AAHK to distribute dividend after consultation with the AAHK Board. We have distributed about 80% of our profits in past years by way of dividends. We have assumed the same level of distributions in the projections.

Based on the foregoing, the forecast profits for the period from 2013 to 2030 under Option 1 will amount to HK$101.6 billion after depreciation charges of HK$68.2 billion and a net increase in working capital of HK$6.1 billion. In the same period, capital expenditure on committed capital projects and routine replacement of fixed assets will amount to HK$79.5 billion. On the basis of the previous practice of payment of approximately 80% of the preceding year’s profits by way of dividends, which will amount to HK$79.6 billion, the net cashflow after dividend is forecast to amount to HK$4.6 billion (representing HK$101.6 + HK$68.2 – HK$6.1 – HK$79.5 – HK$79.6 billion).

When comparing the cash outflow required for the capital expenditure with the net cashflow after dividend, it is clear that there would be a funding shortfall for most of the years between 2013 and 2030. The annual funding shortfall is shown in Figure 7.7 and the total funding shortfall between 2013 and 2030 is estimated to be HK$37.9 billion, peaking in 2030 (see Appendix 1 for details).

Based on the assumptions set out on page 46, our financial advisor has assessed our prudent borrowing capacity on the assumption that we would expect to maintain a high investment grade standalone credit rating (at a minimum of A) so as to ensure our continued access to the debt market at a reasonable cost. The advisor considered that the amount that we could borrow on this basis is approximately HK$26.0 billion, representing a net additional borrowing capacity of about HK$17.0 billion over our average level of borrowings of about HK$9.0 billion. As additional interest costs would be incurred on these borrowings, the net incremental cashflow available from borrowings up to 2030 would amount to approximately HK$13.0 billion under Option 1. This amount would not be sufficient to meet the funding shortfall as shown in Figure 7.8.

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26 In determining our prudent borrowing capacity, the financial advisor has applied a range of criteria which take into account the key financial metrics analysed by rating agencies, lenders’ measures of AAHK’s ability to service debt and the robustness of AAHK’s financial profile.
Cashflow Analysis – Option 2

Under Option 2, capital expenditure to be incurred would amount to HK$86.2 billion (in 2010 dollars) or HK$136.2 billion at MOD prices between 2013 and 2030. The annual cash outflow of the capital expenditure is shown in Figure 7.9.

As described on page 46, our net cashflow generated from our operations represents our profits, plus depreciation charges and changes in working capital less capital expenditure on committed capital projects and dividends to our shareholder. On the assumptions...
set out on page 46, the forecast profits for the period from 2013 to 2030 under Option 2 will amount to HK$102.7 billion after depreciation charges of HK$87.2 billion and increase in working capital of HK$4.6 billion. In the same period, capital expenditure on committed capital projects and routine replacement of fixed assets will amount to HK$83.0 billion. On the basis of the previous practice of payment of approximately 80% of the profits of the preceding years by way of dividends, which will amount to HK$78.9 billion, the net cashflow after dividend is forecast to amount to HK$23.4 billion (representing HK$102.7 + HK$87.2 – HK$4.6 – HK$83.0 – HK$78.9 billion).

When comparing the cash outflow required for the capital expenditure with the net cashflow after dividend, it is clear that there would be a funding shortfall for most of the years between 2013 and 2030, with the exception of a few years beyond 2025. The funding shortfall is also much bigger than that of Option 1. The annual funding shortfall is shown in Figure 7.11 and the total funding shortfall would peak at HK$112.8 billion in 2030 (see Appendix 2 for details).

A similar approach to debt sizing has been adopted in Option 2 as for Option 1, resulting in a net additional borrowing capacity of approximately HK$17.0 billion. After allowing for the related interest cost over a slightly longer period, the net incremental cashflow available from borrowings would amount to approximately HK$11.0 billion under Option 2. This amount would not be sufficient to meet the funding shortfall as shown in Figure 7.12.
Funding the Two Options

The above analysis is predicated on the base case financial projections of AAHK and Master Plan 2030 construction costs. It shows that we cannot finance either of the options through our internal cashflows and external prudent borrowing capacity. While we may be able to reduce the shortfall by reviewing our existing revenue framework with a view to increasing our revenue, the magnitude of such additional revenue sources would unlikely be material within this time frame. Subject to views gauged on the way forward for the Master Plan 2030, further discussion on how best to bridge the funding gap between AAHK and the Government would be necessary.

CONSIDERATION 5: ENVIRONMENTAL ISSUES

Care for the environment is at the heart of HKIA’s long-term commitment to sustainable growth. A voluntary Environmental Impact Assessment (EIA) was conducted and included in the 1992 New Airport Master Plan (NAMP) – EIA. This was updated in 1998 to provide a thorough evaluation of the potential environmental impacts associated with the ultimate airport development envisioned by the NAMP for the two-runway operations at design capacity, with a range of commitments made to ensure that environmental impacts would be effectively mitigated over the operational lifespan of the airport. We do not underestimate the challenges involved in both options, particularly in Option 2. In line with HKIA’s long-term commitment to sustainable growth, we will rise to these challenges by addressing the environmental concerns. Should Option 1 be pursued, a review will be undertaken based on guidelines as stipulated in the statutory EIA process to assess whether the proposed developments under Option 1 will constitute material changes to the NAMP to trigger the requirement for an EIA study and environmental permit.

For Option 2, we commissioned Mott MacDonald to conduct a preliminary environmental assessment to assess the potential constraints associated with the various alternative airport expansion layouts of the third runway. While this preliminary assessment does not replace a full-scale statutory EIA and compliance with all legal requirements, we must ensure that the final recommended airport expansion layout under Option 2
should minimise environmental impact as far as possible. In the course of the statutory EIA process, we will be able to address environmental concerns in detail. The following paragraphs briefly summarise the key findings of the preliminary environmental assessment of the recommended airport expansion layout under Option 2.

**Hydrodynamics, Water Quality, Marine Ecology and Fisheries**

With the reclamation involved, Option 2 is undeniably associated with more environmental issues than Option 1. In planning Option 2, every attempt has been made to maximise the use of land on the existing airport island, thus keeping the requirement for new land reclamation to a minimum. The conceptual design of the expanded airport layout plan identifies that about 650 hectares of reclamation would be required.

About 40% of the proposed reclamation falls upon an area of Contaminated Mud Pits (CMPs) – an area subject to substantial disturbance in the past and considered to be of low ecological value. This area was identified by the Government in 1991 as the preferred disposal site for contaminated dredged sediment, based on a Contaminated Spoil Management Study. Reclamation in this area cannot be carried out through the conventional “Undredged with Vertical Drains” reclamation method as it involves potential release of polluted mud and leachate. Our consultants have recommended the “Deep Cement Mixing” reclamation method which has the advantage of minimising disturbance to the contaminated mud. While this method needs to be further considered in subsequent detailed studies, including on-site trials, it has been widely used overseas, particularly in Japan, where it is a well established means of improving the integrity of the soft ground and providing a robust foundation for reclamation.

Hydrodynamic and water quality models from Delft Hydraulics have been used in a preliminary assessment of the potential impacts...
of the proposed reclamation on water sensitive receivers (WSRs) and ecological sensitive receivers (ESRs) in the North Western Water Control Zone (WCZ). According to the assessment, during the construction phase, except for a marginal exceedance predicted at Sha Chau and Lung Kwu Chau Marine Park which can be addressed when mitigation measures are applied, the predicted suspended solids concentrations at all WSRs and ESRs resulting from the proposed reclamation are expected to be in compliance with the Water Quality Objectives. As to the preliminary assessment for the operation phase, the expanded airport footprint has been simulated and is shown to have no significant large-scale impact on the tidal flow regime, although some local impacts are projected, for example small increases in flow speed at the western end of the third runway. No significant change in the flushing capacity of the channel between the airport platform and North Lantau is anticipated, nor in the major channel from Urmston Road to Ma Wan Channel. As a result, no large-scale changes in water quality within the North Western WCZ are anticipated.

A desktop literature review has established a good understanding of both the physical and marine ecological environments in the areas that could be impacted by the proposed reclamation. In terms of marine ecology, most ecologically sensitive areas (such as coral sites, intertidal habitats of horseshoe crabs and coastal sea-grass beds) are located quite a significant distance from the proposed reclamation, along the North Lantau coastline. Preliminary assessment has also indicated that despite a significant loss in soft bottom seabed areas, the significance of impacts will be low insofar as the direct loss of marine lives living on the seabed and intertidal flora and fauna is concerned – in particular given that much of the proposed reclamation footprint has been subject to substantial human disturbance in the past (note: around 40% of the footprint is located above the CMPs) and is not known to be inhabited by species of conservation importance, other than Chinese White Dolphins.

The preliminary fisheries impact assessment has looked into those areas sensitive to the proposed
reclamation works, including the marine fish culture zone at Ma Wan and capture fisheries in the North Western WCZ. Based on preliminary water quality modelling results, construction activities are not expected to result in any significant impact on the culture fisheries at Ma Wan Fish Culture Zone. However, the permanent loss of water body would affect fisheries resources and fishing operations, as the proposed reclamation area currently supports a medium-low fisheries production. The permanent loss in fisheries production is preliminarily estimated to be around 0.08% of Hong Kong’s yearly production (58,700-117,400 kg loss). The mechanism for compensation for capture and culture fisheries impacted by reclamation and/or construction works is well established. Should Option 2 be pursued, further discussions with the Government and the affected parties would be required.

**Indo-Pacific Humpback Dolphin**

Potential impact on the Indo-Pacific humpback dolphin (Sousa chinensis), or Chinese White Dolphin (CWD), is another important issue. The local population of dolphins in Hong Kong waters is estimated to be about 100 – 200 individuals, depending on the time of year. The Agriculture, Fisheries and Conservation Department’s (AFCD) current database (see Figure 7.14) on CWD has been reviewed. The review identified that CWDs are widely distributed throughout northwest Lantau, northeast Lantau, west Lantau and southwest Lantau, while they are rarely observed in the...
Deep Bay, southeast Lantau and Lamma areas. CWD sightings (and the areas of highest abundance) are common in the waters east of Lung Kwu Chau, between Lung Kwu Chau and Black Point, near Pak Chau, around the Brothers Islands and throughout the west Lantau area. Abundance is especially high along the stretch of waters between the Tai O Peninsula and Kai Kung Shan. CWDs are much less frequently observed in waters north of the HKIA platform, and in northeast Lantau waters.

In broad terms, expanding the existing airport island northwards would overlay a marine area of low CWD abundance. Nonetheless, the reclamation could potentially impact on dolphins during both the construction and the operation stages, extending to loss of habitat, disruption of breeding and calving areas, and disturbance of activities such as feeding and socialising. A range of working methodologies, mitigation and compensation measures developed from other EIA studies over the years have been considered effective in minimising such impacts. All options for minimising, mitigating and compensating the potential impacts on CWDs would be fully investigated in the course of the statutory EIA process.

Noise Impact on Noise Sensitive Receivers

Residential communities along the flight paths are subject to a varying degree of aircraft noise. We follow guidelines established by the International Civil Aviation Organization (ICAO) and the United States Federal Aviation Administration (FAA), which indicate areas of aircraft noise exposure by using Noise Exposure Forecast (NEF) contours around an airport and its flight paths. According to the “Hong Kong Planning Standards and Guidelines” (HKPSG), noise sensitive uses such as domestic and educational premises should not be located within the NEF 25 contour. This is in line with the standards adopted by many developed countries.

In 1998, we published NEF contours that represented a projection of the existing two-runway system operating at its design capacity. We have also conducted a preliminary projection of NEF
contours for a three-runway layout at design capacity. With newer aircraft producing less noise and the introduction of new flight paths and flight procedures made possible by the three-runway system, the preliminary NEF contours projected for Option 2 do not differ significantly from the 1998 NEF contours. More detailed NEF contour forecasts will be carried out in subsequent studies under the statutory EIA process.

Air Quality
Our consultants have carried out preliminary studies on the possible air quality impact of the air traffic movements (also known as flight movements) projected for 2030 under Option 2 and the results indicate that it would not exceed the prevailing Air Quality Objectives (AQOs) for all air sensitive receivers around HKIA. They also show that our operations make a relatively small contribution to the overall air quality of Hong Kong. We understand that the Government is currently reviewing Hong Kong’s AQOs and taking into account the outcome of the Government’s review, a detailed air quality impact assessment will be conducted under the statutory EIA process.

Summary of Environmental Considerations
It is worth noting that the preliminary environmental assessment undertaken at this stage for Option 2 has covered potential environmental issues involved and has explored, albeit on a preliminary basis, possible mitigation and compensatory measures.

Option 1 does not involve any reclamation. Hence, comparatively speaking, Option 2 will potentially create more environmental issues than Option 1. We are committed to addressing the environmental concerns associated with both Options. For example, in the course of the statutory EIA process, we will fully investigate the environmental issues in question to ensure that practical and feasible plans are advanced and their residual environmental impacts are minimised.