香港國際機場 HONG KONG INTERNATIONAL AIRPORT

Expanding Hong Kong International Airport into a

Three-runway System

More Business • More Jobs • More Convenient Service

To accommodate future air traffic growth, Airport Authority Hong Kong (AA) has been planning to expand Hong Kong International Airport (HKIA) into a three-runway system (3RS). On 17 March 2015, the Executive Council affirmed the need for the 3RS.

Expanding HKIA will not only strengthen Hong Kong's status as an international aviation hub, but also spur economic development, generating economic benefits in hundreds of billions of dollars and creating hundreds of thousands of job opportunities for Hong Kong. The AA will collaborate with the Government, the aviation industry, stakeholders and the city's residents to make this crucial project happen. Over the coming months, necessary preparatory works of the project will continue as planned, with the aim of starting construction as soon as possible.

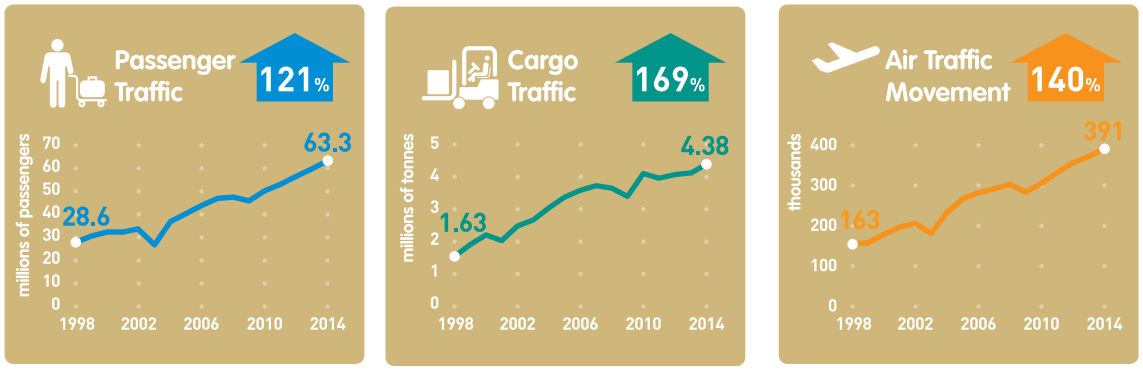
This infokit provides basic information about expanding HKIA into a 3RS.

Hong Kong International Airport is for the people of Hong Kong, and is important for maintaining the city's economic development and overall competitiveness. We hope the public will continue supporting the development of HKIA in order to meet Hong Kong's long-term air traffic demand.

Why we need to expand the airport into a three-runway system

Since its opening at Chek Lap Kok in 1998, Hong Kong International Airport (HKIA) has grown to become one of the busiest airports in the world. In 2014, the airport served 63.3 million passengers, handled 4.38 million tonnes of cargo and accommodated 391,000 air traffic movements (ATMs). With more than 100 airlines connecting to approximately 180 destinations worldwide – including 47 in the Mainland – HKIA is a leading international and regional aviation hub that helps maintain Hong Kong's status as "Asia's World City".

Solid & Robust Traffic Growth



HKIA: An Engine of Economic Growth for Hong Kong

Hong Kong enjoys an enviable geographic location. From HKIA, one can reach half of the world's population in five hours' flying time. Coupled with the airport's extensive air network, Hong Kong has firmly established itself as an international business centre.

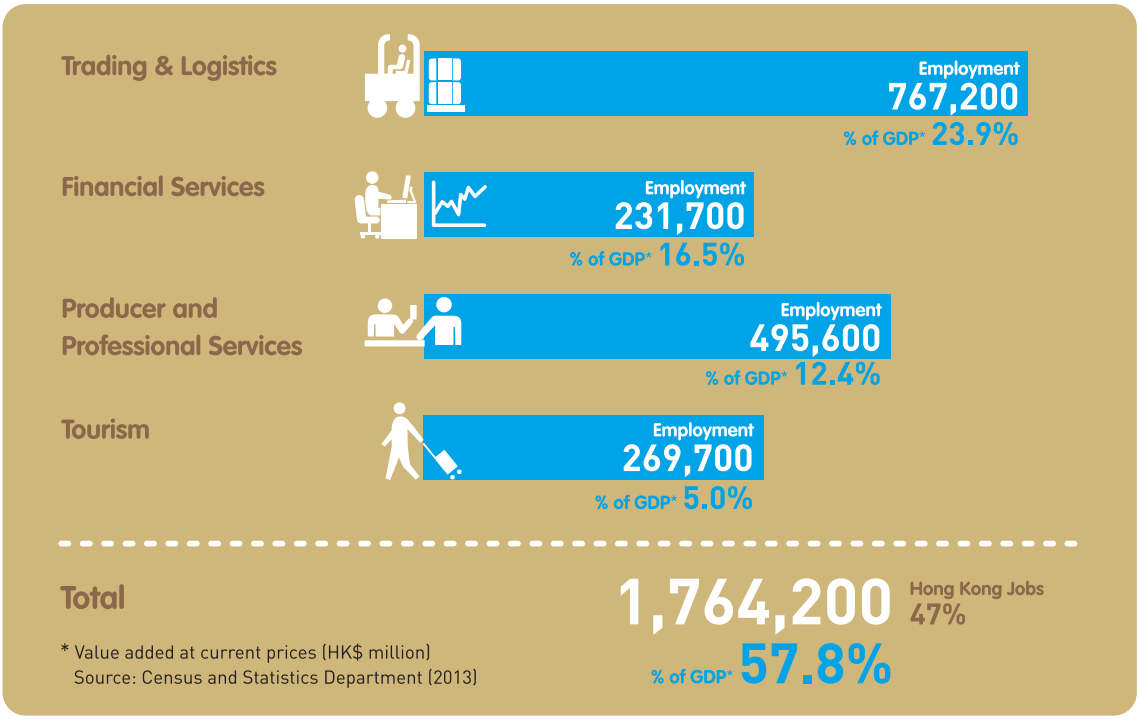
Reaching Half of the World's Population Within Five Hours of Flying Time

* Source: United Nations 2013 data
No.3 - The United States (0.32 billion)

HKIA generates enormous economic value for Hong Kong. In 2012, the airport's direct, indirect and induced contributions to the local economy amounted to HK$94 billion, representing 4.6% of the city's gross domestic product (GDP). The airport also supports Hong Kong's four economic pillars – financial services, trading and logistics, tourism, and producer and professional services – which together accounted for around 58% of the GDP in 2013 according to government statistics. The latest figures also showed that HKIA has helped attract over 7,500 multinational corporations to set up regional headquarters and offices in Hong Kong.

Currently, the airport directly provides more than 65,000 jobs. This number increases to 148,000 when one takes into account indirect and induced employment, such as jobs created by fuel suppliers, construction and cleaning companies, and food and retail goods suppliers. The direct, indirect and induced employment made possible by HKIA represent over 4% of the city's total workforce.

Supporting Four Pillar Industries

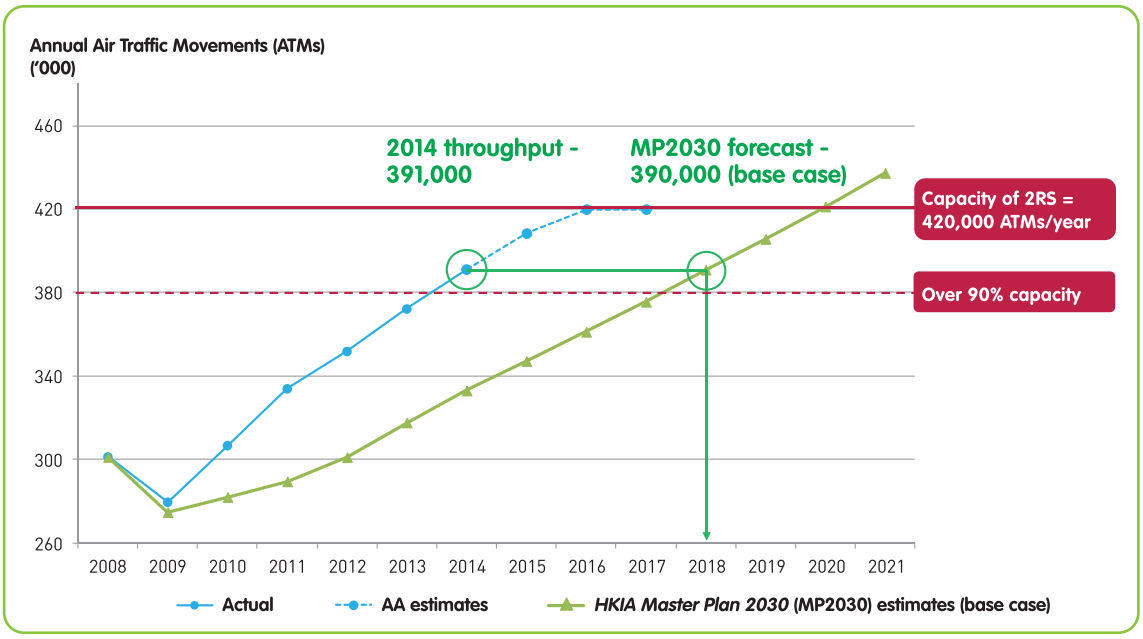


The Time to Act is Now

Two-runway System Nearing Its Capacity With Rising Traffic Demand

There is a pressing need for HKIA to develop into a three-runway system (3RS). The ATMs in 2014 reveal that the actual growth is four years ahead of forecast. According to the latest projections, the existing two-runway system (2RS) will likely reach its maximum practical capacity of 68 ATMs per hour, or 420,000 ATMs per year, in 2016 or 2017.

2014 Air Traffic Movements Showed that 3RS is Urgently Required



Source: IATA Consulting estimates; the AA for actual statistics and estimates

It takes time to complete large-scale infrastructure projects like the 3RS. If works can commence in 2016 as targeted, it is anticipated the 3RS can be completed in eight years. The 3RS project will take a longer time than other airport expansion projects because it involves approximately four years of land formation. Moreover, the construction will take place next to an operating airport, which inevitably poses certain restrictions. Implementing the 3RS as soon as possible will help strengthen Hong Kong's status as an aviation hub, and enhance the city's overall competitiveness.

Hong Kong Must Maintain Its Competitive Advantage as an Aviation Hub

International air traffic expert IATA Consulting expects that by 2030, HKIA, operating with the 3RS, will handle over 100 million passengers, nearly 9 million tonnes of cargo and 607,000 ATMs.

If a third runway is not built, supply of aviation services will fall short of demand. As a result, ticket prices will increase, airlines will focus on more lucrative routes, fewer destinations will be served, and travellers - Hong Kongers as well as tourists and businessmen from all over the world – will all suffer. Such a situation will have negative impact on Hong Kong's overall competitiveness.

Intense Competition

Hong Kong is facing increasingly fierce competition as nearby airports (including Singapore Changi, Seoul Incheon, Shanghai Pudong, Guangzhou Baiyun and Shenzhen Bao'an) are expanding their facilities.

Airport	Expansion Plan (year of completion)	Passenger Traffic Capacity (year)	Cargo Traffic Capacity (year)	Remarks
Seoul Incheon	Will construct a fourth (2020) and fifth runway, and a second terminal (2017)	62 million (2020)	5.8 million tonnes (2020)	
Singapore Changi	Will convert a military runway into a third runway (2020); and will construct a fourth (2017) and fifth terminal (2025)	135 million (2025)		
Guangzhou Baiyun	Will construct a fourth (2020) and fifth runway, and a second terminal (2018)	80 million (2020)	2.5 million tonnes (2020)	Third runway commissioned in February 2015
Shanghai Pudong	Will construct a fifth runway (2017)	80 million (2020)	4.7 million tonnes (2020)	Fourth runway commissioned in March 2015
Shenzhen Bao'an	Will construct a third runway (2018) and a fourth terminal (2025)	45 million (2020)	2.4 million tonnes (2020)	

Updated as of October 2015

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The main facilities and cost estimates of the three-runway system

Medium-term Measures to Meet Traffic Growth

To meet medium-term air traffic growth, Airport Authority Hong Kong (AA) has invested more than HK$12 billion in new facilities. These include the following projects:

Midfield Development

With an investment of more than HK$10 billion, the **Midfield development project** includes a 105,000-square-metre, five-level concourse, 20 parking stands, extension of the automated people mover (APM) system connecting the Midfield with Terminal 1 and other passenger facilities, and a cross-field taxiway. Upon completion of the Midfield development by the end of 2015, Hong Kong International Airport (HKIA) will be able to handle an additional 10 million passengers each year.

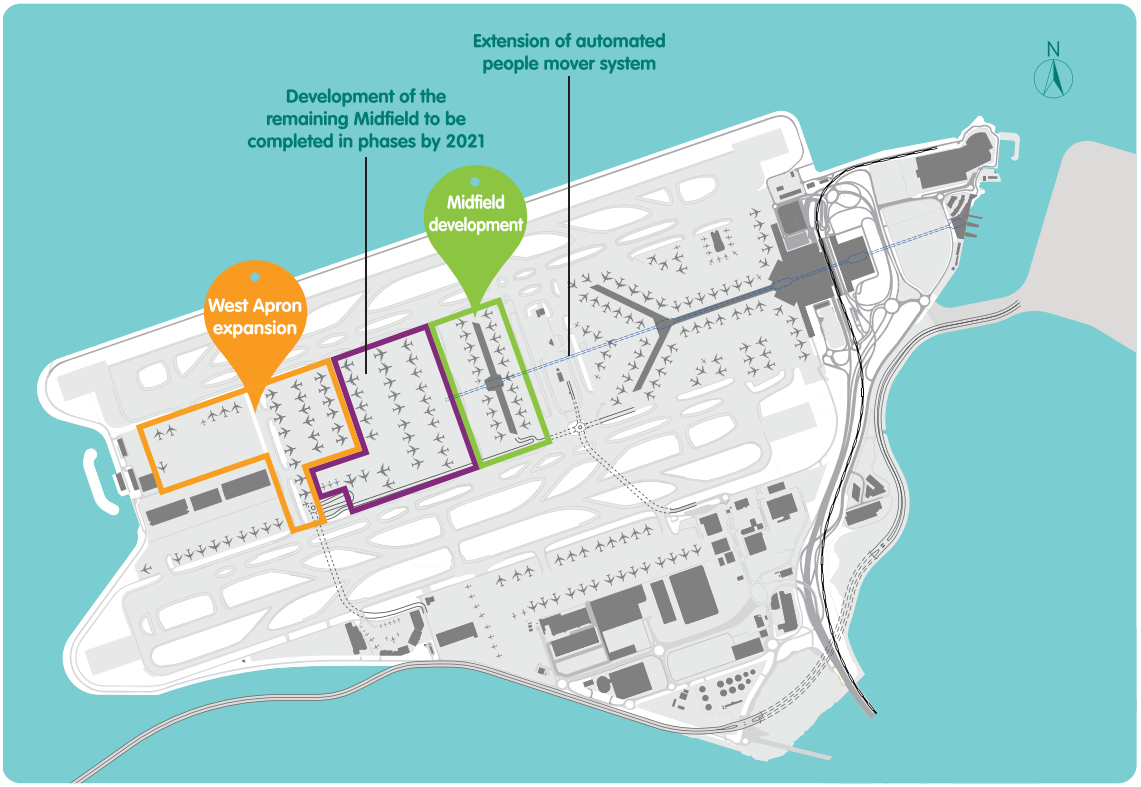
West Apron Expansion

The more than HK$2.5 billion **West Apron expansion** consists of 28 parking stands, a cross-runway vehicular tunnel linking to the cargo area in the south, and other related supporting facilities. The project was completed in February 2015.

Terminal 1 Capacity Enhancement Project

The AA is planning to enhance the capacity of Terminal 1. This project aims to increase the terminal's handling capacity of passengers and baggage to cope with the growing traffic during the period before the three-runway system (3RS) commences operations.

These measures can only help deal with medium-term air traffic demand. To meet the fast-growing passenger and cargo traffic in the long run, it is necessary to expand HKIA into a 3RS.



More Than Just a New Runway

Expanding HKIA into a 3RS is a lot more than building an additional runway. The project includes seven core projects and facilities as shown in the below map.

New Passenger Concourse and 57 parking positions

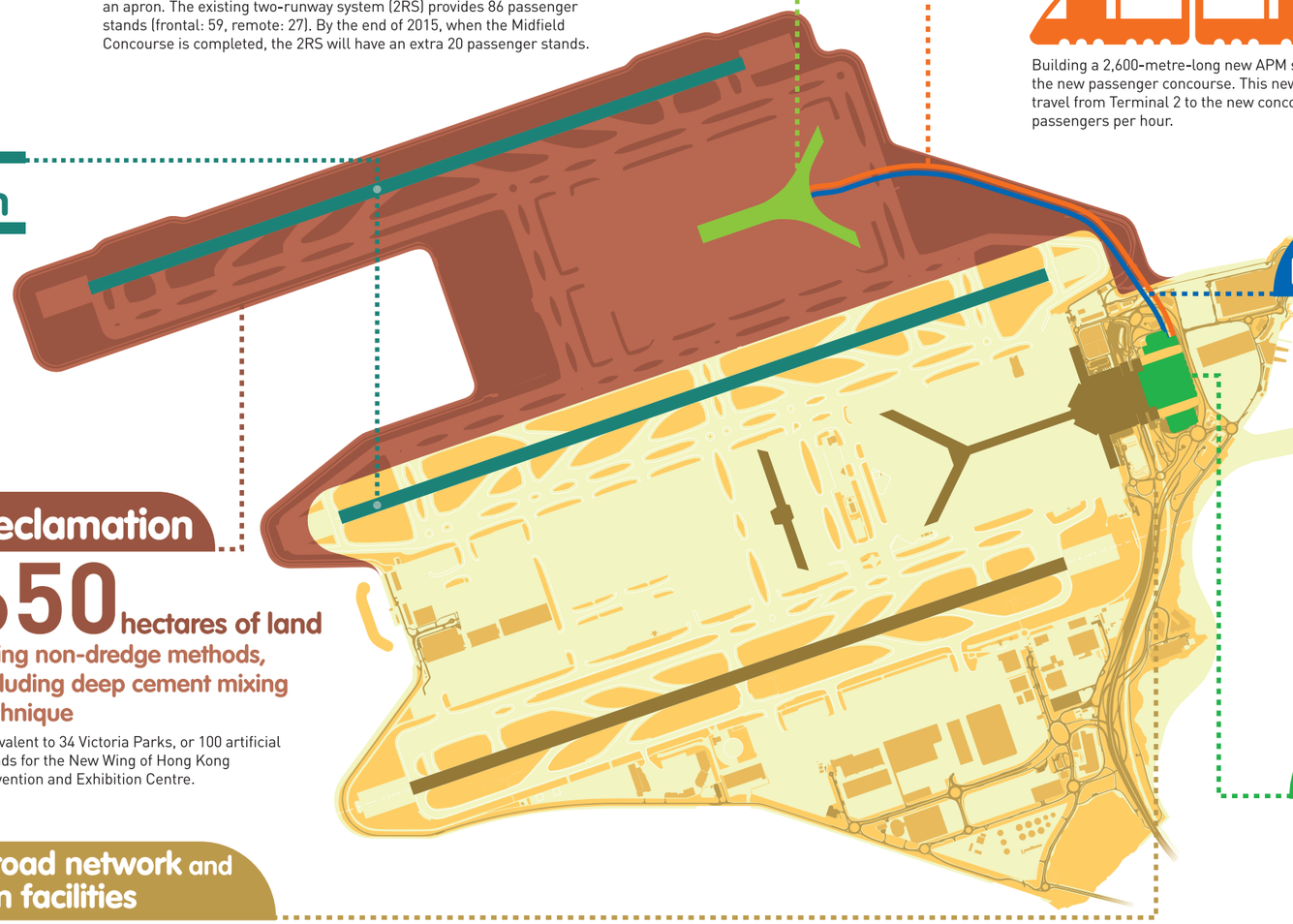
Floor area: 283,000 sq m

Building a new passenger concourse with more than 280,000 square metres of floor area, a total of 57 new parking positions (frontal: 34, remote: 23) and an apron. The existing two-runway system (2RS) provides 86 passenger stands (frontal: 59, remote: 27). By the end of 2015, when the Midfield Concourse is completed, the 2RS will have an extra 20 passenger stands.

New runway

3,800m

Building a 3,800-metre-long new runway and its supporting taxiway systems. The existing north runway will also be reconfigured.



Reclamation

650 hectares of land

Using non-dredge methods, including deep cement mixing technique

Equivalent to 34 Victoria Parks, or 100 artificial islands for the New Wing of Hong Kong Convention and Exhibition Centre.

Comprehensive road network and transportation facilities

New Automated People Mover system

Top speed: 80 km/h

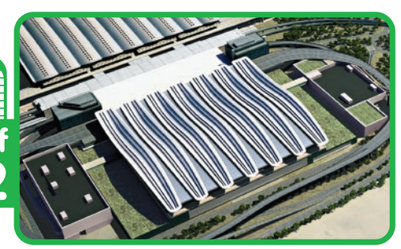
Building a 2,600-metre-long new APM system connecting Terminal 2 with the new passenger concourse. This new APM system takes 2.5 minutes to travel from Terminal 2 to the new concourse. It can transport up to 10,800 passengers per hour.

New Baggage Handling System

Baggage transport speed: 25 – 36 km/h

Building a new baggage handling system (BHS) linking Terminal 2 with the new passenger concourse. The new system will be able to transport the first baggage to the luggage belt upon 20 minutes of passengers' arrival and the last baggage within 40 minutes – about the same amount of time currently required.

Expansion of Terminal 2



Providing arrivals, departures and full-fledged passenger services

The expanded Terminal 2 and new concourse will be able to serve 30 million additional passengers annually as stated in the *HKIA Master Plan 2030*.

Estimated Cost for Building the 3RS

The scale of the 3RS project is almost as big as building a new airport next to the existing one. The total estimated construction cost is HK$141.5 billion at money-of-the-day prices. Approximately 40% of the cost will be used for land formation, while the remainder will be spent on building the passenger concourse, apron, APM and BHS.

The 3RS expansion represents the largest, highest-budgeted construction project in the city since the establishment of Hong Kong Special Administrative Region. Factors leading to its high cost include:

- High local construction cost
- Construction taking place while the existing airport is in operation
- Investment of up to HK$22 billion in environmental protection measures, including advanced reclamation methods (e.g. deep cement mixing) and horizontal directional drilling

Construction Cost of the 3RS

3RS	3RS Scheme Design (in billions of Hong Kong dollars)
Reclamation	36.8
Runway and taxiway systems	6.5
New passenger concourse and apron	16.8
Expansion of and modifications to Terminal 2	9.5
Automated people mover system	6.1
Baggage handling system	4.5
Road network and transportation facilities	4.3
In 2010 dollars	**84.5 billion**
Money-of-the-day prices	**141.5 billion**

Coping with the Growth Beyond 2030

Upon the 3RS' completion, HKIA will be able to serve 30 million additional passengers annually as forecast in *HKIA Master Plan 2030*. The concourse facilities of the 3RS could be further expanded if necessary, which will help accommodate an additional 20 million in passenger traffic.

The AA is mindful of the recent judicial review proceedings regarding the 3RS project, and hopes that it will not cause too big an impact on the related construction work. It is estimated that by delaying the construction of the 3RS by one year, an addition of over HK$7 billion (at money-of-the-day prices) in project fees will be incurred.

Updated as of October 2015

Contributions of the three-runway system to Hong Kong's economy and employment

Economic net present value increment: HK$455 billion

Direct employment: increase to 123,000 jobs

International experience shows that investing in airports generates higher economic returns than other types of infrastructure. In order to accurately understand the economic implications of expanding Hong Kong International Airport (HKIA), Airport Authority Hong Kong (AA) commissioned Enright, Scott & Associates (ESA) to conduct an Economic Impact Analysis in 2011 to assess the potential impact of airport expansion on Hong Kong's economy as part of the *HKIA Master Plan 2030*. In early 2015, ESA updated the Economic Impact Analysis of the 3RS in accordance with the latest economic data, traffic demands and costs.

Estimated Economic Impact of HKIA in 2012

According to the analysis conducted by ESA, the direct, indirect and induced contributions of HKIA to Hong Kong's economy in 2012 amounted to HK$94 billion, which represented 4.6% of Hong Kong's gross domestic product (GDP).

Estimated Economic Impact of the 2RS

Based on the updated study conducted in 2015, ESA estimated that the combined direct, indirect and induced contributions of HKIA, under a two-runway system (2RS), to Hong Kong's GDP in 2030 would be HK$133 billion (in 2012 dollars), equivalent to around 3.6% of Hong Kong's GDP forecast for 2030 (compared to 4.6% in 2012). Direct jobs brought by the 2RS would increase from 63,000 in 2012 to 89,000 in 2030, while indirect and induced jobs would increase from 85,000 in 2012 to 119,000 in 2030.

Factoring in the given construction costs of the 2RS, and the corresponding stream of additional traffic up to 2061 (a 50-year lifespan is assumed for infrastructure[1]), the economic net present value (ENPV) of the 2RS is estimated to be HK$591 billion (in 2012 dollars).

Estimated Economic Impact of the 3RS

Based on the 2015 study, ESA estimated that the three-runway system (3RS) would generate combined direct, indirect and induced contributions of HK$184 billion (in 2012 dollars) to Hong Kong's GDP in 2030, equivalent to around 5% of Hong Kong's GDP forecast for 2030 (compared to 4.6% in 2012). Direct jobs associated with HKIA would reach 123,000 by 2030, and indirect and induced jobs would increase to about 165,000. Under the 3RS, the airport's ENPV up to 2061 is estimated to be HK$1,046 billion (in 2012 dollars), an increase of HK$455 billion compared to the ENPV of HK$591 billion generated by the 2RS.

During the construction phase of the 3RS, it is estimated that the employment created would amount to around 139,000 (in man-years), including 60,600 direct jobs, and 78,500 indirect and induced jobs. (A "man-year" is defined as one person employed full-time for one year.)

	2012 (Actual)	2030	
		2RS	3RS
Economic contribution (Direct + Indirect + Induced)	HK$94 billion	HK$133 billion	HK$184 billion
% of GDP	4.6%	3.6%	4.9%
Direct employment	63,000	89,000	123,000
Indirect + induced employment	85,000	119,000	165,000
		2012 - 2061	
ENPV	–	**HK$591 billion**	**HK$1,046 billion**

Note: Economic contribution in 2012 dollars
Source: Enright, Scott & Associates Ltd (2015)

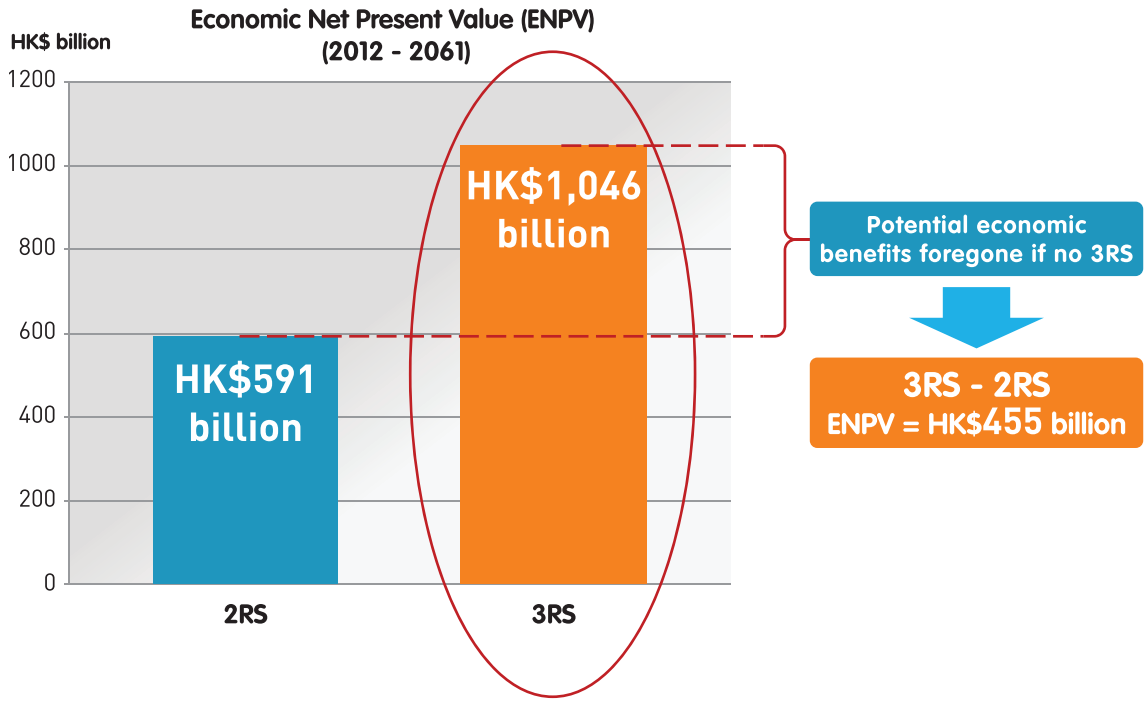
[1] In general, a 50-year lifespan is used for assessing infrastructure investment projects. Hence, it is assumed that HKIA can be used for a period of 50 years.

Economic contributions of the 3RS

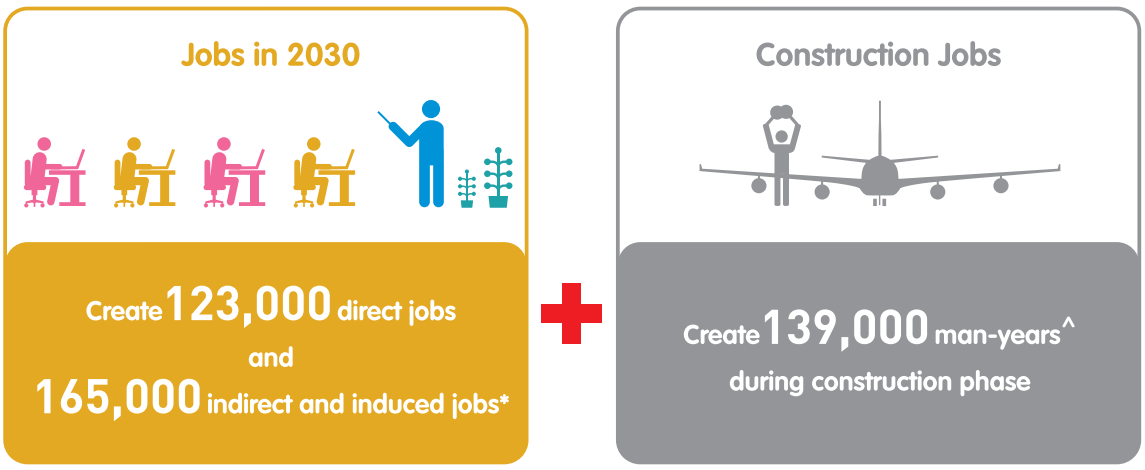
Although the 2RS is less expensive in terms of capital investment and would provide ENPV of HK$591 billion, the 3RS has a projected ENPV of HK$1,046 billion and is a "front-loaded" investment, meaning it is projected to generate much higher value in the long term.

Compared with the 2RS, the 3RS will not only make a substantially higher economic contribution in the long run (a difference of HK$455 billion[2] in ENPV), but also provide a significantly greater boost to local employment as it will create many more direct jobs than the 2RS (123,000 vs 89,000).[3]

3RS will Bring Enormous Economic Benefits



Job Opportunities under 3RS



* Direct, indirect and induced value added

^ A "man-year" is defined as one person employed full-time for one year

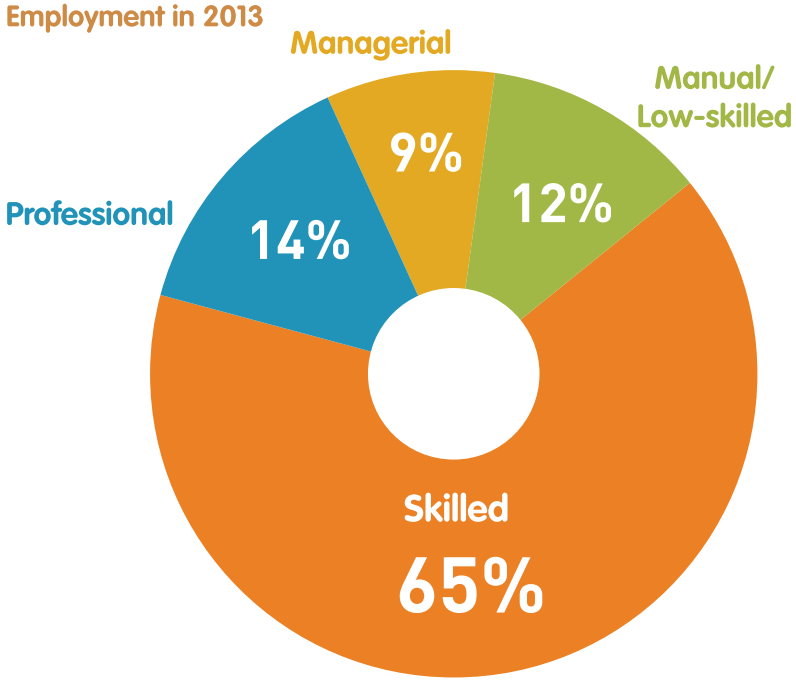
Source: Enright, Scott & Associates Ltd (2015)

[2] The 2012 GDP of Hong Kong is HK$2,037 billion. The incremental value (in 2012 dollars) the 3RS brings on top of the 2RS over 50 years is roughly equivalent to 22% of Hong Kong's total GDP in 2012.

[3] The comparison of the projected economic impacts of the 2RS and 3RS was made against independently forecast GDP figures. Such figures have not been adjusted to take into account potentially slower economic growth brought by the 2RS when compared to the 3RS.

Further to ESA's analysis, the AA also surveyed more than 400 different companies and organisations operating on the airport island in 2013. Of the airport's 65,000 staff, around 12% performs manual/low-skilled jobs and 65% is engaged in skilled jobs. Expanding the airport into a 3RS will continue to provide enormous job opportunities.

Airport Island Employment in 2013



Definitions:

Manual/Low-skilled: Jobs involving simple and routine tasks carried out often with some physical effort and help of hand-held tools.

Skilled: Jobs requiring special knowledge and skills acquired through training.

Professional: Jobs requiring qualifications and knowledge of a specialised field.

Managerial: Jobs which are responsible for the management of a section, department, division or a company in the achievement of organisation objectives.

Source: HKIA Workforce Survey 2013 (as of 30 April 2013)

Updated as of October 2015

The environmental impact of the three-runway system and mitigation measures

On 7 November 2014, the Director of Environmental Protection approved the Environmental Impact Assessment (EIA) report of the three-runway system (3RS) project and issued an Environmental Permit. Airport Authority Hong Kong (AA) is committed to carrying out all the mitigation measures proposed in the EIA report, and fully complying with all the conditions listed by the Environmental Protection Department in a highly prudent, transparent and professional manner, with the aim of achieving a balance between economic development and environmental conservation.

The EIA is a major part of the 3RS project. It includes a series of studies assessing the potential environmental impact of the project across 12 key aspects. The studies were undertaken by a strong EIA Study Team, comprising an experienced EIA lead consultant, a review consultant and a number of reputable experts, both local and overseas.

The AA is committed to tackling the potential environmental impacts arising from the 3RS project and proposed more than 250 measures to avoid, minimise, mitigate and/or compensate for them in the EIA report. With the extensive mitigation measures, the report concluded that all potential impacts could be reduced to an acceptable level.

In terms of environmental protection, the AA will incorporate a number of green elements during the design, construction and operation of the 3RS, and fully comply with the more than 50 conditions listed on the Environmental Permit.

On-going Commitment to Reduce Emissions

Now: Banned all idling vehicle engines on the airside since 2008, except for certain vehicles that are exempted

Now: Banned the use of Auxiliary Power Units for all aircraft at frontal stands

By end 2017: All airside saloon vehicles are electric vehicles

By end 2018: Increase the number of charging stations for Electric Vehicles (EVs) and electric ground support equipment to 290

Non-dredge Reclamation

For the formation of 650 hectares of land, traditional dredging methods would have great impact on the ocean. In view of this, the AA will use non-dredge methods, such as deep cement mixing (DCM) in area comprising contaminated mud pits, which accounts for 40% of the total reclamation area. DCM has long been widely used in Japan, South Korea, the United States and Europe. Although it has not previously been implemented in Hong Kong for reclamation, this new technique has been tested and found suitable for local use. It can also help prevent the release of pollutants into water.

Barges for deep cement mixing

More than 250 measures were proposed in the EIA report to avoid, minimise, mitigate and/or compensate for the potential environmental impacts arising from the 3RS project. Below are highlights of some of the key measures.

1. Advanced Design and Construction Methods to Minimise Environmental Impacts	• Minimise land formation area with optimised 3RS layout design • Use non-dredge methods during land formation to minimise risk/disturbance to the environment e.g. use of deep cement mixing for area of contaminated mud pits • Use horizontal directional drilling for submarine aviation fuel pipeline diversion to avoid disturbance to seabed • Connect the diverted submarine cable outside the existing marine park area to avoid disturbance to marine park • Others include complete avoidance of marine percussive piling, prohibition of marine bored piling during Chinese White Dolphins' (CWDs) peak calving season and acoustic decoupling of marine construction equipment, etc.
2. On-going Commitment to Reduce Air Emissions	• All idling vehicle engines on the airside have been banned since 2008 • All aircraft at frontal stands have been banned from using Auxiliary Power Unit since end 2014 • All airside saloon vehicles will be EVs by end 2017 • Increase the number of charging stations for EVs and electric ground support equipment to 290 by end 2018 • Hong Kong International Airport (HKIA) community has pledged to reduce airport-wide carbon emission by 25% per workload unit by 2015 compared to 2008 levels. An accumulative reduction of 18% has already been achieved in end 2013
3. Measures to Reduce Aircraft Noise under 3RS Operation	• Whenever practical, the south runway will remain on standby at night to alleviate aircraft noise impact on North Lantau • Flight paths will be adjusted to avoid populated areas at night • Night-time runway directions will be managed to minimise noise
4. Marine Ecology and Chinese White Dolphins Conservation	• Designate a marine park of about 2,400 hectares to tie in with the full operation of the 3RS for long term conservation of CWDs in North Lantau waters; the marine park strategically links existing and planned marine parks and HKIA Approach Area, in which the speed controls in the marine park would minimise disturbance to CWDs and regulation of fisheries activities in the marine park would enhance recovery of fisheries resources • Manage the SkyPier high-speed ferries by 1) limiting the traffic at the current annual average daily level of 99 prior to designation of the proposed marine park; 2) diverting the high-speed ferries travelling to/from Zhuhai and Macao away from the proposed marine park area; and 3) restricting the speed of those diverted high-speed ferries to 15 knots or below in high CWD abundance areas • Skipper training for safe operation of construction vessels around CWDs • Establish an independent and sustainable Marine Ecology Enhancement Fund for the conservation of marine life, particularly the CWDs within the Hong Kong and the Pearl River Estuary waters • Support research studies on CWD conservation strategy in the Pearl River Estuary • Establish Fisheries Enhancement Fund to support the fishing industry and enhance fisheries resources in the western Hong Kong waters, especially the Lantau waters

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For FAQs on the 3RS, please visit:
www.thb.gov.hk/eng/whatsnew/transport/2015/three_runway

For other information of the 3RS, please visit:
www.threerunwaysystem.com

Updated as of October 2015

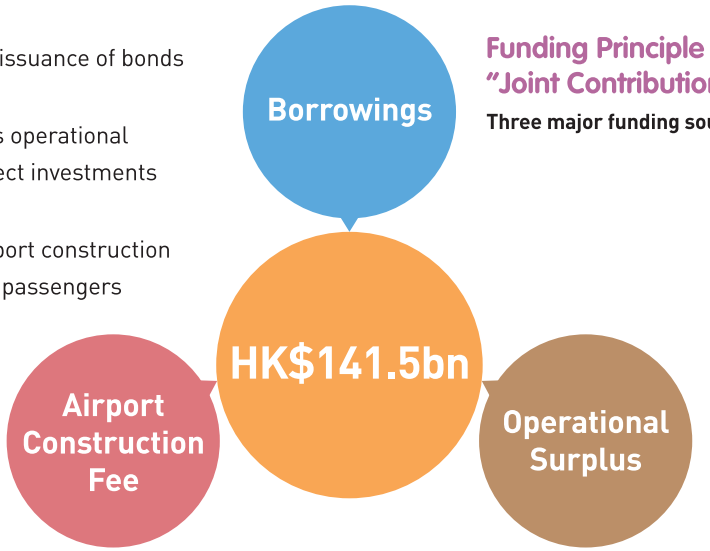
Revised financial arrangements for the three-runway system

Joint Contribution and User-pay Principle

In March 2015, the Executive Council affirmed the need to expand HKIA into a three-runway system (3RS) and requested the Airport Authority Hong Kong (AA) to adjust the project's financial arrangements. After consulting various stakeholders including airlines, the travel industry and conducting passenger surveys, the AA announced the revised financial arrangements in September 2015 which lowered the airport construction fee. Under the revised plan, 70% of passengers departing from HKIA will pay HK$90 or less for the airport construction fee.

Based on the "joint contribution and user-pay" principle, the funding for the project will include the following three channels:

1. Bank loans and issuance of bonds
2. Retaining HKIA's operational surplus for project investments
3. Charging an airport construction fee to departing passengers



Funding Principle of 3RS - "Joint Contribution and User-pay"

Three major funding sources

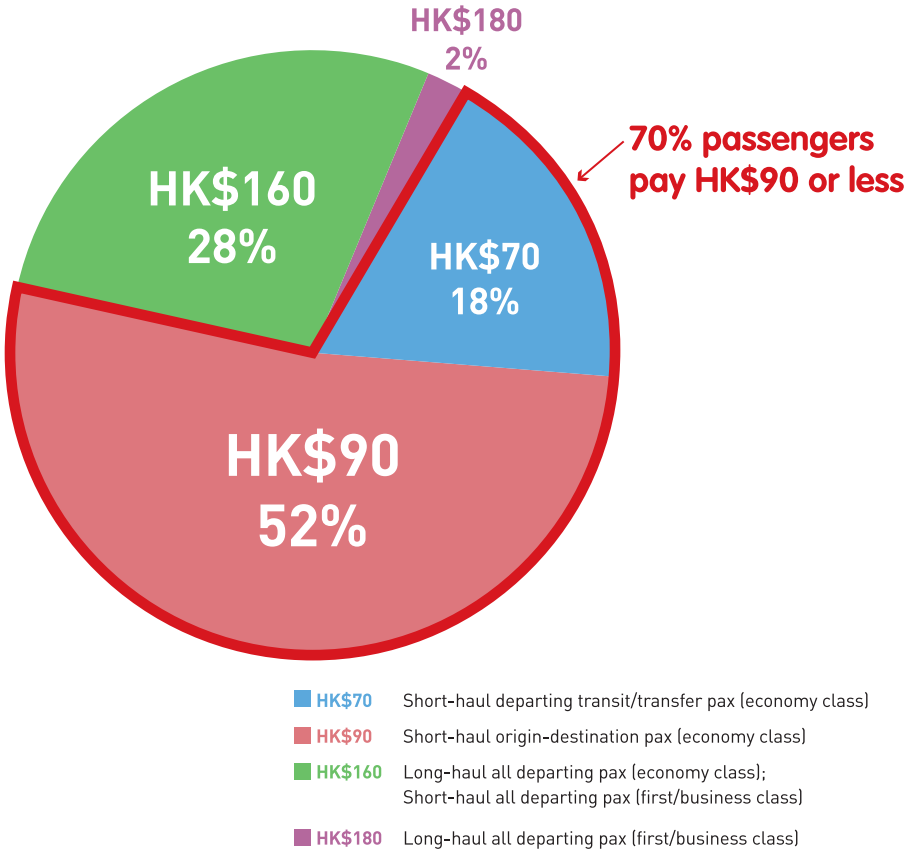
Airport Construction Fee

For short-haul passengers in economy class, the airport construction fee will be HK$90, while the charge for short-haul passengers in first/ business class will be HK$160. For long-haul passengers flying in economy and first/business classes, the fees will be HK$160 and HK$180 respectively.

All Departing Passengers (Origin-Destination and Transit/ Transfer)		
Per departing passenger	**First / Business class**	**Economy class**
Long-haul	HK$180	HK$160
Short-haul	HK$160	HK$90*

* To maintain the competitiveness of HKIA's hub status, the airport construction fee for short-haul economy Transit/Transfer passengers will be set at HK$70

Most Passengers Pay HK$90 or Less for Airport Construction Fee



Charging Regime:

1. According to flying distance (as defined by the Civil Aviation Department when determine the fuel surcharges)
   - Long-haul : To North & South America, Europe, Middle East, Africa, Southwest Pacific, Indian Subcontinent
   - Short-haul: Any destinations in Asia
2. According to ticket class
   - First/ Business class
   - Economy – ticket class other than first/ business class

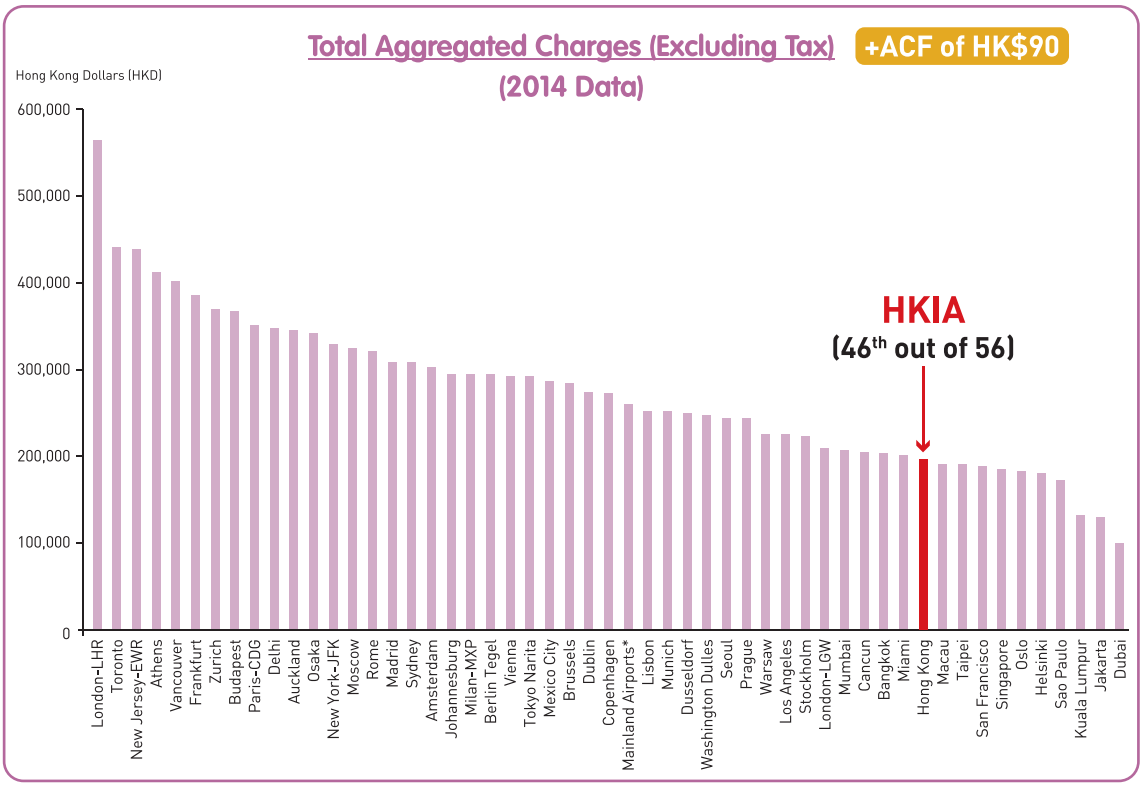
Levies or charges on passengers are common in worldwide airports when there is a need for development, the AA's proposed airport construction fee is at a low level comparing with many airports in the world. Even including the proposed airport construction fee, HKIA's total aggregated charges is still on the lower end.

Examples of Airport Construction Fee at Airports Worldwide

Airports/Country	Name of Charge	HK$ Equivalent
Toronto	Airport Improvement Fee	172
Vancouver	Airport Improvement Fee	138
Calgary	Airport Improvement Fee	206
Athens	Airport Development Tax	218
Mumbai	Airport Development Fee	76
United States	International Transportation Tax	137
China Mainland	Airport Construction Fee	114

Source: IATA Airport, ATC and Fuel Charges Monitor (January 2015)

Despite adding a HK$90 ACF (short-haul economy origin-destination passengers), HKIA's ranking among 56 airports is still on the lower end



* Mainland Airports refer to Beijing, Guangzhou Baiyun, Shanghai Pudong, and Shenzhen Bao'an; All of which have the same charges for international flights

Source: Aeronautical Charges Benchmarking Study, LeighFisher (2015)

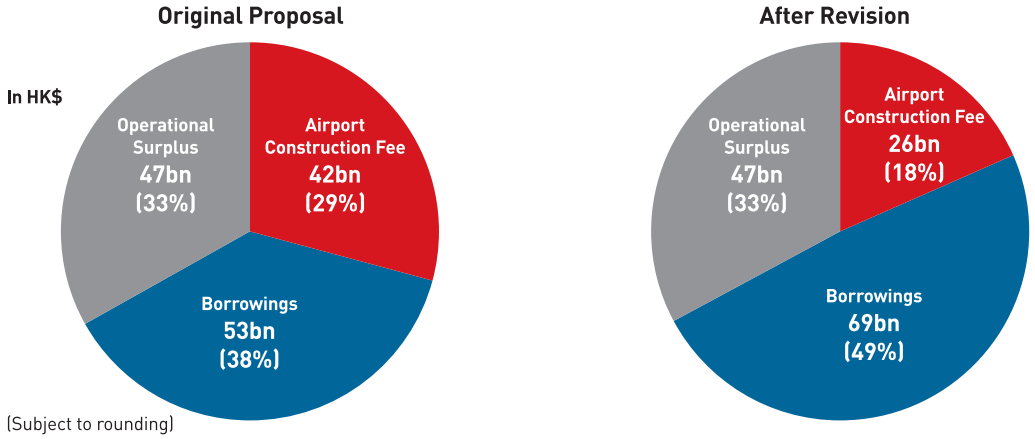
Once all the statutory processes of the 3RS project are completed, the new proposed airport construction fee will be implemented and will remain in place until all the related borrowings of the 3RS are returned.

Other Aspects of the Financial Arrangements

With a lower airport construction fee level, the AA has to increase borrowings from HK$53 billion to HK$69 billion, which accounts for about half of the construction cost. This financial arrangement is still able to maintain AA's good credit rating. The AA will also consider adopting various financial tools to meet the construction expenses, such as retail bonds and Islamic bonds.

The revised financial arrangements have been examined by the Government and independent experts. All cost overruns, if any, will be borne by the AA.

Comparison with Revised Financial Arrangement



(Subject to rounding)

As the 3RS project is very critical to Hong Kong's development, the AA accepts supervision from the Legislative Council (LegCo) which set up a subcommittee in May 2015 to follow up on 3RS-related issues. In August 2015, the Government also formed the Aviation Development and Three-runway System Advisory Committee to give advice on policy matters concerning Hong Kong's civil aviation and developments at HKIA, as well as issues concerning the implementation of the 3RS. The AA will continue to cooperate fully with the Government to gauge the public's opinions on the 3RS project.

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For FAQs on the 3RS, please visit:
www.thb.gov.hk/eng/whatsnew/transport/2015/three_runway

For other information of the 3RS, please visit:
www.threerunwaysystem.com

Updated as of October 2015

香港 國際機場 HONG KONG INTERNATIONAL AIRPORT

The concern about airspace

Some people have questioned whether the airspace negotiations between the Hong Kong and Mainland aviation authorities can ensure that an expanded Hong Kong International Airport (HKIA) will be able to fulfil its potential. In fact, Mr Li Jiaxiang, the Administator of Civil Aviation Administration of China (CAAC) has previously expressed his full support for the three-runway system (3RS) project, and for Hong Kong to continue to strengthen and enhance its status as an international aviation hub. Regarding the airspace issue, the Director-General of Civil Aviation, Mr Norman Lo, also published an article in April 2015 as below (a translation from the original Chinese version):

Constraints on HKIA's Dual-runway Operation and Airspace Issue

Recently some members of the public have challenged the planning of the 3RS at HKIA on two issues: (1) whether the current capacity of the two-runway system (2RS) can be expanded (and hence, the third runway would be unnecessary); and (2) whether the airspace issue can be resolved.

The maximum capacity of the existing two runways

Various studies had been conducted in the past to assess the capacity of the 2RS. The latest study was the Airspace and Runway Capacity Study commissioned by the Airport Authority of Hong Kong (AA) and carried out by National Air Traffic Services (NATS) in 2008, which was based on the latest air traffic control technology and international standards. According to this study, in full compliance with the safety standards/requirements of the International Civil Aviation Organisation (ICAO), the maximum practical capacity that can be achieved with the existing 2RS would be 68 movements per hour.

Can the maximum capacity of the existing 2RS be further increased?

The capacity of the existing 2RS is constrained by two factors in which the ICAO has strict requirements and standards: (1) the need for spacing between aircraft due to the spiral air turbulence generated by operating aircraft (known as wake turbulence); and (2) the surrounding terrain near the runway.

Wake turbulence

Strong wake turbulence can cause the following aircraft to lose balance, thus affect flight safety. Therefore, the ICAO requires that a minimum spacing be maintained between aircraft during takeoff and landing. The heavier the aircraft, the stronger the wake turbulence and the larger the spacing would be required. Consequently, the capacity of a runway is limited.

Terrain constraints

The report of *New Airport Master Plan* (NAMP) in 1992 from the former Provisional Airport Authority pointed out that, a pair of parallel runways under different modes of operation could in theory achieve different capacity ranging from 52 to 86 movements per hour (See table below). However, the NAMP report made clear that due to the mountains on the nearby Lantau Island, in order to achieve higher runway capacity, it would not be possible to operate in compliance to relevant ICAO standards on flight procedure, hence such operation was neither safe nor practicable.

Mode of Operation	Practical Hourly Capacity Estimate
(a) Single-runway system	43 movements
(b) Dual-runway system with Segregated Operation (i.e. one runway used exclusively for approaches and the other exclusively for departures)	52 movements
(c) Dual-runway system in Mixed Operation	
(i) **Dependent Mixed Modes:** departures and approaches on one runway must take into consideration an aircraft landing or departing on the parallel runway. The possible modes are as follow:	
(a) Dependent Approaches and Departures	69 movements
(b) Independent Approaches and Dependent Departures; and	71 movements
(c) Dependent Approaches and Independent Departures	79 movements
(ii) Independent Mixed Mode: Operation on one runway can take place completely separately and without interference from the parallel runway, as if the two runways were two different airports.	86 movements

The consultant commissioned by the Civil Aviation Department (CAD) in 1994 also pointed out that, due to the constraints from surrounding terrain, the maximum capacity of the 2RS could only be about 63 movements per hour. As previously mentioned, in 2008 NATS had conducted a thorough review of runway capacity of HKIA and confirmed that after implementing some 40 improvement recommendations, in full compliance to ICAO safety standards/requirements, the maximum runway capacity of the 2RS could be increased to 68 movements per hour.

Some comments suggested that if the peak of Tai Yam Teng (610 feet) and Fa Peng Teng (810 feet) which are located at the North East of Lantau were removed, the runway capacity of the 2RS could be further increased. These comments claimed that removal of Tai Yam Teng and Fa Peng Teng were suggested in the 1992 NAMP report. In fact, the suggestion in the NAMP report was made in connection with possible options to enhance the climb gradient of contingency departure procedures for departing aircraft on engine out during initial climb (i.e. to reduce restriction on the aircraft engine out climb performance). In order to attain the theoretical maximum runway capacity outlined in the NAMP report, i.e. 86 movements per hour, and conforming to the safety standards/requirements of the ICAO, most of the high peaks on Lantau Island, including Lantau Peak, Sunset Peak and other high mountains, would have to be levelled. Major infrastructure and landmarks like Ngong Ping Cable Car, Big Buddha and Po Lin Monastery would also be affected, not to mention that most of these areas fall within the boundaries of the Lantau Country Parks. Therefore, the proposed removal of high peaks is neither practical nor feasible.

The "Air wall" issue

There have also been concerns on the constraints imposed by the so-called "air wall". In fact this is not an appropriate term as in reality there is no "wall"-type segregation between different airspaces. To ensure that aircraft in adjacent airspaces can operate concurrently in a safe and efficient manner, every aircraft must reach a certain altitude and geographic location before an air traffic control (ATC) unit may hand over control of that aircraft to another ATC unit. This is to ensure that aircraft in adjacent airspaces flying in opposite directions can fly at various altitudes and prevent collisions. This air traffic management arrangement of "Transfer of control point" aims to safeguard flight safety, and is commonly applied at busy airports all over the world, including those in London and New York.

Airspace issue

The Tripartite Working Group (TWG), set up by the CAAC, CAD of Hong Kong and the Civil Aviation Authority of Macao (CAAM), drew up the "Pearl River Delta Region Air Traffic Management Planning and Implementation Plan (2007 Plan)" after three years of work and more than 10 rounds of meetings at various working levels. The maximum capacity of 102 movements per hour under the 3RS operation at HKIA as proposed by the AA is based on this 2007 Plan.

2007 Plan

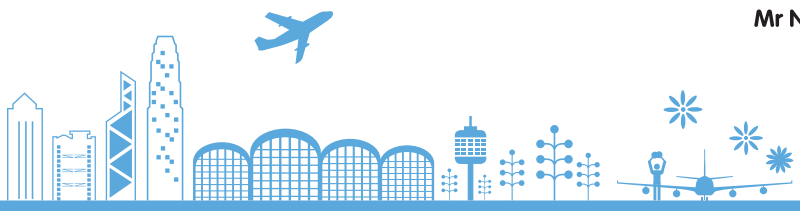
The 2007 Plan has clear objectives and contents. As per the press release issued by the CAAC on 15 February 2007, the Plan "aiming at strengthening the synergy of collaborative operations between all three parties, taken into consideration of terminal airspace structure, ATC operation standards and ATC operation procedures, defined three phases of the planning and development of Pearl River Delta (PRD) air traffic management. With the use of state-of-the-art computer-simulation and evaluation techniques, technical experts from the three parties conducted analysis and concluded that the Plan could generally satisfy the development needs of aviation industry in the PRD region in 2020".

At the TWG meeting held on 18 June 2012, all parties expressed their support for HKIA adopting the 3RS as the future development option, and to the CAD using such a proposal for air traffic management and planning purposes.

The Central Government has always supported Hong Kong in cementing its position as an international aviation hub and developing the 3RS. We strongly believe that the Mainland, Hong Kong and Macao will be able to implement, in accordance with the 2007 Plan, all enhancement and collaborative measures conducive to the development of the five major airports in the PRD region.

Mr Norman Lo, Director-General of Civil Aviation

2 April 2015



Updated as of October 2015

Frequently asked questions about the three-runway system

1. Is it true that the existing two-runway system (2RS) has not met its original design capacity?

The 1992 *New Airport Master Plan* by the Provisional Airport Authority pointed out that Hong Kong International Airport's (HKIA) capacity could only in theory reach between 52 and 86 movements per hour depending on the operation model. However, the conclusion of the report also clearly stated that due to the terrain of Lantau Island, HKIA would have difficulty achieving higher capacity while complying with the standards of International Civil Aviation Organisation. The article published by Mr Norman Lo, Director-General of Civil Aviation, in April 2015 elaborated on this point (please refer to the article "The concern about airspace").

2. Heathrow Airport in London has managed to increase the capacity of its 2RS after adopting time-based separation (TBS). Can HKIA adopt a similar approach instead of developing the three-runway system (3RS)?

TBS is a strategic air traffic control measure that was recently introduced at Heathrow Airport with a view to reducing the implications of flight delays or cancellations caused by strong headwinds. However, this measure does not increase the capacity of runways or time allocated to aircraft. The National Air Traffic Services (NATS) of the United Kingdom and EUROCONTROL also indicated that the use of TBS will not increase the capacity of the runways.

3. Can HKIA reduce non-major destinations in the Mainland and overseas to raise the airport's operation efficiency, thereby avoiding construction of the 3RS?

Airlines may deploy flights to whichever cities they deem appropriate, based on market demand and economic return. In fact, the "non-major destinations" in the Mainland only account for less than 2% of the total flight movements at HKIA.

The main reason that Hong Kong has become a strategic aviation hub, an international metropolis and a global business centre is that it has a comprehensive aviation network. It is convenient for both passengers and cargo to come to Hong Kong, and to reach other cities via Hong Kong.

4. Can airlines shift to wide-bodied aircraft to raise the airport's efficiency instead of constructing the 3RS?

HKIA is one of the most efficient airports in the world in terms of the average number of passengers and volume of cargo carried per aircraft (workload unit[1]). In addition, among the world's top 100 airports by passenger throughput, HKIA has the second highest proportion of wide-bodied aircraft after Tokyo Narita Airport at over 62%. In fact, airlines deploy aircraft based on the market situation and airport operators have no right to influence this.

HKIA is an highly efficient airport in the world

Rank	Airport	WLU/ATM(1)
1	Taipei (TPE)	271.4(2)
2	**Hong Kong (HKG)**	**267.0**
3	Dubai (DXB)	263.5
4	Tokyo (NRT)	246.1
5	Incheon (ICN)	243.0
6	Memphis TN (MEM)	211.5
7	Singapore (SIN)	209.9
8	Shanghai (PVG)	207.7
9	Krasnodar (KRR)	203.8
10	Bangkok (BKK)	200.2
11	Tokyo (HND)	196.9
12	Osaka (KIX)	189.4
13	London (LHR)	188.9

Note (1): 1 WLU (workload unit) = 1 passenger or 100kg of cargo

Note (2): In 2014, Taipei Taoyuan's ATM (210k) was approximately half of HKIA's (391k).

Source: ACI annual report 2014, covering ~ 1,000 airports in the world with annual aircraft movements >15,000 ATMs in 2014

HKIA has high usage of wide-bodied aircraft

Rank	Airport	% wide-bodied	% narrow-bodied
1	Tokyo (NRT)	63.8%	36.2%
2	**Hong Kong (HKG)**	**62.1%**	**37.9%**
3	Taipei (TPE)	58.7%	41.3%
4	Dubai (DXB)	58.3%	41.7%
5	Incheon (ICN)	52.2%	47.8%
:	:	:	:
9	Singapore (SIN)	43.3%	56.7%
12	London (LHR)	37.8%	62.2%
:	:	:	:
21	Paris (CDG)	25.6%	74.4%
23	Frankfurt (FRA)	23.1%	76.9%
29	Amsterdam (AMS)	18.7%	81.3%
33	San Francisco CA (SFO)	17.7%	82.3%
:	:	:	:
67	Chicago IL (ORD)	7.5%	92.5%

Source: ACI annual report 2014 - Top 100 passenger throughput airports in 2014; OAG 2015 (as of Sep 2015)

5. Can expanding passenger terminal facilities replace the construction of the 3RS?

The bottleneck of airport capacity has to do with flight movements on the runways, not ground facilities such as passenger terminals. Currently HKIA handles around 1,100 daily flight movements, which is very close to the 2RS' maximum runway capacity of 1,200. Expanding the passenger terminal facilities alone cannot ease the airport's long-term capacity constraints.

[1] workload unit = 1 passenger or 100kg of cargo

6. Why can't we cooperate with neighbouring airports as an alternative to the 3RS?

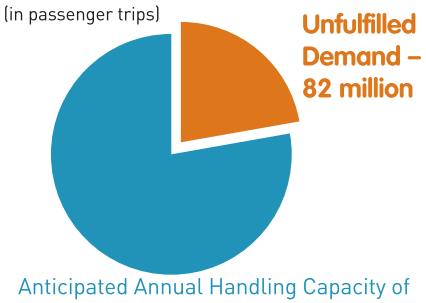
Cooperation with neighbouring airports cannot solve the capacity crunch problem of HKIA. Around the globe, demand for aviation services is outstripping supply, and the situation is particularly serious in the Mainland. According to IATA Consulting, the combined supply of the five Pearl River Delta airports in 2030 will fall short of forecast demand by 82 million passenger trips – even after factoring in all the anticipated increases in the handling capacity of each of them.

In addition, the passenger profiles of HKIA and Mainland airports are different. Also, air services are regulated by individual jurisdiction and governed internationally through a network of bilateral air service agreements. Flights cannot be funnelled to others at the wish of individual airports.

Airports	Planned Number of Runways	Passenger Capacity in 2030 (million trips)
Hong Kong	3	102*
Guangzhou	5	100
Shenzhen	3	63
Zhuhai	2	13
Macao	1	11
Total	**14**	**289**

* Based on IATA Consulting EIA Constrained Forecast
Source: IATA Consulting PRD Airport Forecasts (Jan 2015)

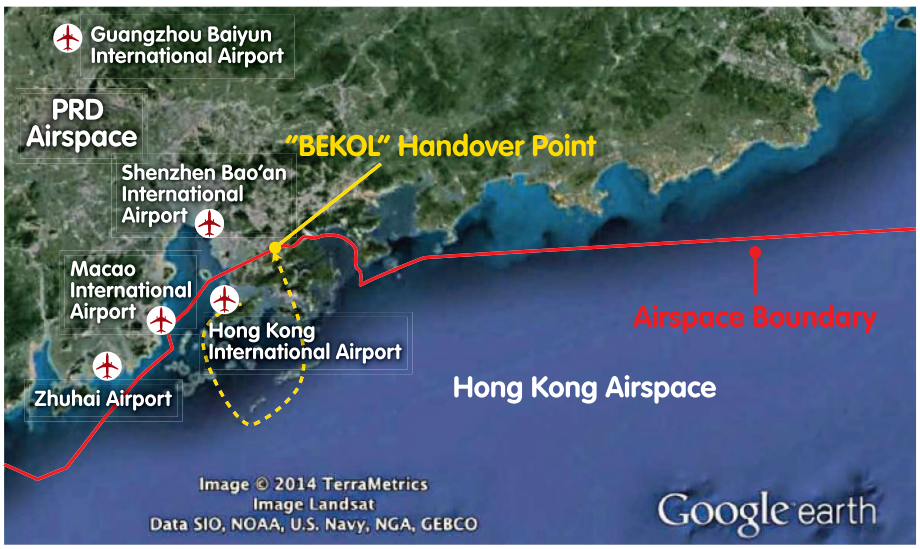
IATA Consulting's Latest Annual Passenger Demand Forecast by 2030 – 371 million*



7. Does the "air wall" restrict the runway capacity? What determines the runway capacity?

"Air wall" is not a precise term, it refers to the boundary between airspaces (or "point of control transfer"), which an aircraft needs to reach a certain altitude before an air traffic control (ATC) unit may hand over control to another ATC unit. The arrangement ensures that aircraft in adjacent airspaces can operate in a safe, efficient manner. It is commonly applied by busy airports all over the world and is not relevant to runway capacity.

The constraints of runway capacity are determined by the time interval and space separation between successive flight movements. In addition, as there is a 10-minute flying distance between the HKIA runway and the "point of control transfer", the runway operation will therefore not be affected by the requirement of a minimal altitude. (Please refer to the article "The concern about airspace".)



8. Why is the design of the new concourse changed to a single Y-shape from a double Y-shape?

The AA initially developed the 3RS project in 2011. Over the past three years, the AA considered a wide variety of aspects, including airport operations, and finally submitted a single Y-shaped concourse as the final design of the 3RS' new passenger terminal. It is estimated that the new design would be capable to handle an extra of 30 million passenger trips as forecast in the *HKIA Master Plan 2030*. The new concourse could be further developed to help the airport accommodate a total of 50 million additional passenger trips in the future.

9. Why do the people of Hong Kong have to pay for an expansion that only increases the number of destinations to the Mainland?

The suggestion that the 3RS will primarily cater to Mainland Chinese is not based in fact. Only three out of the 33 new routes that were established from 2011 to 2014 are to Mainland destinations. The 3RS is built for Hong Kong, and it will ultimately benefit the people of Hong Kong.

10. Will the third runway only be for landing?

The third runway is designed for both landing and taking off purposes. However, for reasons of efficiency and environmental protection, the three runways under the 3RS will basically function as follows: landings on the northern runway, takeoffs on the central runway, and both landings and takeoffs on the southern runway. This is the most efficient mode of operation, as suggested by an independent consultancy study. In fact, currently the southern runway of the 2RS is mainly used for takeoffs and northern runway for landings.

11. Why do you select the current location for the 3RS?

During the preparation of the *HKIA Master Plan 2030*, NATS evaluated 15 possible runway alignment options, and recommended only runway options to the north of the existing dual runways as the preferred airport layout plan for the 3RS. The recommendation was made based on the operational safety, obstacle clearance, Pearl River Delta airspace constraints, air traffic control procedures, and optimum mode of operations including runway usability and capacity. It was concluded that any non-parallel new runway options would be restricted by terrain constraints on Lantau Island, air traffic conflicts with Macao and Shenzhen Airports, and incur landing difficulty.

Based on NATS' runway alignment recommendation, the consultant for airport facilities planning developed a high-level evaluation of 18 airport layout options and eventually recommended the northward expansion option as the basis for developing the 3RS.

12. Can we build another airport instead of constructing the 3RS?

Building a second airport in Hong Kong is not viable as it will incur high capital costs, and it is difficult to transfer passengers between the two airports.

During the initial planning of HKIA, it was concluded that Chek Lap Kok was the preferred airport site. Even if there are other suitable sites within Hong Kong, it would similarly require substantial land reclamation which is cost prohibitive and would create environmental concerns to more districts in Hong Kong. In addition, very long lead time is needed to plan and construct a second airport. HKIA will reach its capacity as soon as in 2016 or 2017, and if we do not act fast to expand the existing airport, Hong Kong's position as the international aviation centre will be jeopardised and its overall competitiveness will be undermined.

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