



**An Assessment of the Planning
for the Second Runway at the
Bandaranaike International Airport (BIA)**

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Executive Summary

Introduction

At the invitation of the Minister of Transport, Highways & Civil Aviation the International Air Transport Association (IATA) was invited to carry out a study on the development of Bandaranaike International Airport (BIA), Colombo, as a regional aviation hub. This study addresses the need for a second runway and its location.

A number of meetings with officials of the Ministry, the Airports & Aviation Services (Sri Lanka) Limited (AASL), SriLankan Airlines and the Sri Lankan Air Force (SLAF) gave valuable information to the IATA team. IATA would like to place on record its appreciation of the wide co-operation that was given by all concerned.

Economic Impact

The development of a strong aviation sector is a vital component of the Social & Economic Development of Sri Lanka. The tourism industry is recognised as one of the major contributors to the national economy in terms of foreign exchange earnings and employment generation. Tourism is the fourth largest foreign exchange earner to the Country and indirectly accounts for nearly 600,000 jobs — representing over 7% of total Employment; and 138.7 billion LKR (US\$1,389.6 million) of GDP — equivalent to 8.6 % of total GDP.

Making BIA an Aviation Hub

Since 2000, consecutive Ministers holding the portfolio of Civil Aviation have repeatedly expressed their intention to make BIA an Aviation hub. Sri Lankan Airlines also wishes BIA to be a major passenger and cargo hub linking not only the east and west, but also serving South Asia.

Competition for hub status is fierce and despite BIA's desire to become an aviation hub, it must be understood that the events of the last twenty years have placed Sri Lanka at a major disadvantage. In the last twenty years, trade and tourism in South East Asia has proliferated. Nearly all the Asian countries have outward looking economies and extensive involvement in manufacturing and trade, not only amongst themselves but also with North America and Europe. As the consequence of substantial and sustained growth, the Asia-Pacific region has put far more investment into airports in the past twenty years, than any other region of the world.

It is unlikely that Colombo can replicate the achievements of those airports in South East Asia such as Hong Kong, Bangkok, Kuala Lumpur and Singapore and achieve major hub status. However, Colombo has the possibility of becoming a niche hub for South Asia. It has a favourable geographic location, origin and destination traffic is growing, its tourism industry is developing and it has a highly regarded and strong base carrier. What it does not have is an efficient airport with adequate capacity for the future.

Current Airport Status

Colombo's BIA is currently undergoing limited development. The principal work is to provide additional aircraft parking, hard standing areas and a finger pier to provide a number of in-contact parking stands. While this long overdue work is welcome, there are major problems with the current runway. BIA has the only runway in the entire country that can support civil aviation operations by international airlines, and also support the fast-jet operations of the Sri Lankan Air force. Any closure of the runway, from an accident or incident, will have major repercussions on Sri Lankan Airlines, the Sri Lankan Air Force and the remaining airline industry.

There are concerns about the safety implications of using a single runway for both Civil and Military operations. Furthermore, its length is inadequate for some current operations by A340 aircraft and its length and width will be inadequate for potential future developments. The runway was constructed in 1986 and is now some seventeen years old. Within the next 4 to 5 years, it will be necessary for it to undergo major refurbishment.

Future Needs and Impact

The appearance of new ultra long-range aircraft such as the Airbus A340-500, the New Large Aircraft Airbus A380 and the Boeing 747-400ER, will enable airlines to develop new and innovative services, but, the restricted runway length will preclude the development of such services to Colombo. Unfortunately, any plan to extend the existing runway to around 4,000 metres – the nominal length required by these aircraft would on its own be inadequate. The Airbus A380's outer engines will be 47 metres apart, just beyond the width of the 45 metre standard runway at Bandaranaike International Airport. The jet blast could cause serious soil erosion and destroy runway signs and lights unless runway shoulders were paved and the signs and lights were moved. ICAO requires the runway to be 60 metres in width. But widening the runway to 60 metres would be a very difficult proposition, cause major disruption, be potentially hazardous and could not be recommended.

The logical solution is the construction of a new runway, which would significantly delay the need for major runway maintenance and facilitate such a work programme when eventually it became necessary.

The Wrong Recommendation

In the past, it has been suggested that a new closely spaced parallel runway could be a cost-effective way of providing two runways at Bandaranaike International Airport. It could provide a second runway for operational use while maintenance was carried out on the first runway, and provide an alternative if an accident or incident blocked the first runway. It could also minimise land acquisition. However, the use of a closely spaced runway would not meet the long-term operational requirements for capacity, and operations on one runway would always be dependent on the operations of the other. Furthermore, the concept of two closely

spaced runways, with a passenger terminal on one side, is operationally difficult, as traffic to and from the farthest runway would have to cross an active runway. Not only does this limit capacity, but also increases the risk of runway incursions.

The construction of a closely spaced second runway at the BIA would be an expensive mistake. In the event this course of action were to be followed, in the distant future a third runway would still have to be added, that too further separated from a second, or a completely new airport developed. The acquisition of land once again will be unavoidable and an unnecessary expenditure for the State.

IATA's Recommendation

In the 1990's, airport master planning began to space runways 2,000 to 2,500 metres apart. Recent new airports, such as Bangkok's NBIA and Kuala Lumpur's Sepang are based upon a minimum of 2,500 metre separation between the runways. IATA recommends 2,500 metres between the two runways.

Military Considerations

Any recommendations to the siting of the runway must consider the existing Sri Lankan Air Force Base adjacent to the BIA.

If the construction of the second runway is delayed until a new military airbase is constructed then Sri Lanka would have lost a golden opportunity of becoming a hub. Furthermore, the cost associated with the construction of a new airbase would be a significant drain on the government funds. It is highly unlikely that any grant aid would be forthcoming for the construction of a new military airbase.

There is no valid reason why the SLAF and the AASL operations should not co-exist. There are a number of successful international airports, which are joint civil/military ventures. The retention of the current base and the maximisation of joint use of facilities are seen as a very cost-effective approach. A second runway at the BIA would meet both civil and military requirements.

Examination of the current land-use shows that it is possible to construct the runway 2,000 metres north of the existing runway. However, this would divide the military site into two, and would require the demolition of the significant amounts of infrastructure within the Base.

A separation of 2500 metres would ensure that the entire base is unaffected and sufficient land is available for Civil Aviation growth. This distance would also ensure the separation of the air traffic on the ground as well as in the air as if though it were from two airports that were close to each other. It is also noteworthy that aircraft of the SLAF would have access to both the runways, when needed, and the huge cost involving the shifting of Sri Lanka's premier and historic Base could be avoided.

The Economic Importance of International Civil Aviation

Air transport is essential to economic progress. In an increasingly global community and marketplace, air transport makes possible the rapid movement of millions of people and billions of dollars worth of goods to markets around the world. The air transport industry includes the suppliers and operators of aircraft, engine manufacturers, fuel suppliers, airports and air traffic control systems and plays a decisive role in the work and leisure of hundreds of millions of people. Its customers come from every sector of the world's economy and from every segment of the world's population.

The air transport industry plays a major role in world economic activity. Air transport drives economic progress, and in turn benefits from it. It acts as an economic catalyst, promoting business and leisure activities, contributing to growth and increasing efficiency. In every region of the world, countries large and small depend on the aviation industry to fuel their economic growth and their financial strength. In a global society, the contribution of the airline industry to the world's economies is growing more important every day.

Above and beyond all of these quantifiable economic benefits, commercial aviation also generates a whole host of less tangible 'spin-off' benefits. These include reducing the cost of trade and movement, attracting new businesses to locations with good air service links to the rest of the world, and support for the development of new technology and distribution processes based on the rapid movement of people and goods. In addition, there are equally significant fringe benefits, including the strengthening of ethnic and cultural links between countries and continents, and the stimulation of innovative research and development, which benefits the whole economy. Airports act as magnets to a wide range of industrial and commercial enterprises. Many industries locate close to airports specifically to gain easy access to air transport.

Airports are key assets for regions wishing to attract new industries. Their presence offers a strong inducement for companies wishing to set up in a particular location. A region cannot be marketed as a centre for establishing major new businesses without an efficient air transport infrastructure, nor will it attract major investment. In addition to the quantitative and qualitative contributions of the air transport industry, aviation also acts as an economic catalyst by:

- Providing a new and faster mechanism for distributing goods and services throughout the world.

- Contributing to growth in existing industries.
- Increasing overall economic efficiency.

Air transport reduces the cost of trade and opens up new market opportunities by moving products and services quickly over long distances. The availability of air transport has created entirely new industries, such as the export of fresh tropical fruit from Latin America and the Caribbean to Europe. Air transport has generated an enormous increase in tourism to remote and developing regions. For example, Asia countries such as Thailand, and more recently Vietnam, have benefited from significant growth in tourist-derived income.

In addition, it facilitates personal contact amongst those with dispersed operations and enhances long distance markets' international business opportunities. The development of electronic communications, including the Internet, as a base for worldwide e-commerce relies heavily on complementary delivery services of high reliability and speed, such as those provided by express airfreight companies.

The full extent of the industry's impact on the global economy includes not only the actual movement of passengers and cargo, but also the stimulation of economic growth that the industry's presence can cause in a local situation. These are defined as direct, indirect, and induced impacts.

- *The direct economic impact* is obtained by measuring the values of the activities of airlines, airports and businesses located at airports, including everything from fuel suppliers to fast-food stands.
- *The indirect economic impact* is derived from the off-airport activities of passengers and shippers, such as expenditures at travel agencies, hotels and restaurants, and tourist attractions.
- *The induced impact* is calculated with the help of a multiplier; which estimates the successive rounds of spending generated by the recipients of the direct and indirect economic benefits. For example, airport employees spend significant parts of their salaries on housing, food and other items in the local area.

Supporting Examples and Lessons Learned

Anchorage International Airport: The Alaskan based Institute of Social and Economic Research has published a series of reports detailing the economic impact of Anchorage International Airport. Activities at the airport generate considerable off-site employment. As a result, the total economic significance

of the airport is substantially more than the US \$316 million of payroll directly generated by on-site activities.

Off-site employment in Anchorage results from the local spending by the households of airport workers, local purchases of goods and services by the businesses and government agencies at the airport, and to a smaller extent, the purchases by layover flight crews. The total off-site employment resulting from this re-circulation of dollars flowing out into the community amounts to 5,300 additional jobs. The majority of these jobs are in the trade, service, and finance sectors of the economy with an associated payroll of US \$130 million.

Brisbane Airport: The Airport is an important part of the Australian Trade Coast area, as well as being a key element of the air transport network in the Australasia region. The value of visitor arrivals and freight exports and imports through the airport to the Southeast Queensland economy is of major economic significance to the region.

This importance is reflected by the impact of Brisbane Airport on the Queensland economy. An economic impact study carried out in 1998 by Ernst & Young for Brisbane Airport shows that in 1996/97, the airport accounted for approximately 6.8% of Gross State Product, and for 5.2% of employment in the State. As a result, 16,400 people earned their living directly from airport operations, and most importantly a further 67,200 jobs were indirectly dependent on airport operations.

Bangkok/Don Muang: Nowhere else is the contribution of the airline industry more vital to a region's economies than in Southeast Asia. Nearly all Southeast Asian economies have outward looking economies and have extensive involvement in manufacturing and trade, not only amongst themselves but also with North America and Europe. For most Asian economies, the travel and tourism industry is also well developed and economically important.

In 2002, Thailand's Travel & Tourism Industry generated 5.2% of GDP and 1,358,280 jobs, while the broader Travel & Tourism Economy totalled 11.8% of GDP and 2,890,670 jobs. Looking ahead, the forecast for Travel & Tourism Demand is expected to total 6.7% real growth in 2003, and continue to provide 6.9% real growth per annum between 2004 and 2013.

In order to meet the expectations of the Government, and most importantly the desires of the people of Thailand for improvements in the social and economic structure of Thailand, the issues of airport development to had to be addressed. Bangkok has a prime geographic location, strong origin-

destination market, is home base for a premier international airline and has the potential to become a regional hub for the Greater Mekong Area.

Bangkok/Don Muang handled 5.68 million passengers in 1983. By 1992, this had reached 16.52 million passengers and in 2002 the number of passengers was 27.17 million. But shortcomings in the capacity of the existing Bangkok/Don Muang airport required action to ensure that airport capacity did not stifle economic growth and social development. It was determined that the runway system at Don Muang with two runways only 400 metres apart was the limiting factor, as the separation between the runways would not permit independent operations, which would limit the ultimate capacity of the airport to some 35 million passengers per annum.

The Thai Government recognised that constrained or costly airport facilities would be less attractive and less competitive. Airlines would be unable to add flights or develop new services at Bangkok. Other hubs would seize the opportunity to become even more competitive. This would adversely affect the social and economic development of Thailand.

The Thai Government gave full support for the project to replace the current Bangkok/Don Muang airport. The New Bangkok International Airport (NBIA) is a unique opportunity to provide new facilities that will enable Thailand to allow for unconstrained growth. The new airport named Suvarnabhumi (The Golden land) will open for operations on the 29th of September 2005. It will have an initial capacity of 45 million passengers per annum with an expansion potential to cater for 100 million passengers.

The NBIA will have two runways with a separation of 2,500 metres. Although initially both the runways were to be limited in length to 3,700 metres, when IATA pointed out that this would be insufficient for the A380 aircraft to take off when the air temperature was ISA +20 or higher, their consultants amended the design of the second runway - which was under construction so that it would be 4000 metres. The other runway, which had already been completed, would remain at 3700 metres. However, provision was made for it to be increased to 4000 metres in the future.

Dubai International Airport: Dubai is a small city of just over 1 million inhabitants in the United Arab Emirates. In a very short span of time, Dubai International Airport has grown from a simple airfield into an aviation hub and is now one of the fastest growing airports in the world. From 9 airlines serving some 20 destinations in 1969, Dubai International Airport grew to accommodate 100 airlines connecting to over 140 destinations in the first half of 2002. It is now recognised as the aviation hub of the Middle East. From handling 5,444,086 passengers in 1992, this had grown to 15,973,391 by 2002.

This has been strongly aided by the development of a world-class airline 'Emirates' based in Dubai and by the 'open skies' policy implemented by the Dubai government and the Department of Civil Aviation.

To accommodate future rapid expansion, Dubai Department of Civil Aviation is pressing ahead with a US\$4.1 billion Dubai International Airport expansion project. The project includes the all-new Terminal 3, as well as a complete overhaul of Terminal 2, Dubai's charter terminal. A new concourse is also being constructed.

The new expansion programme includes construction of Terminal 3, concourse 2 and concourse 3 all dedicated for Emirates airline and a Mega Cargo Terminal. Work will have been completed on the construction of Terminal 3, Concourse 2 and Concourse 3 by 2006. With the completion of this phase, Dubai International Airport will have the capacity to handle close to 60 million passengers a year, its present capacity being 22 million.

The Dubai-based airline Emirates has committed to purchase forty-three Airbus A380 aircraft. As from the end of 2006, Dubai will have the greatest concentration of the world's largest civil aircraft. With the closely spaced runways at Dubai Airport, serious congestion during peak periods are expected daily and have been pointed out by IATA. However, in recognition of the limitations at the present site, adequate land has already been allocated at Jebel Ali enabling the construction of a completely new international airport with adequate and well-spaced runways to be built when the present airport will become congested. Such an approach is a luxury that most developing countries could ill afford.

Aviation and Sri Lanka

Importance of aviation to Sri Lanka's Social & Economic Development

The contribution of the airline industry is vital to the economy of Sri Lanka. Sri Lanka's tourism industry in the past two decades has experienced testing times and fluctuations. The industry has clearly shown resilience in facing numerous challenges. Today, Sri Lanka Tourism has started a strong come back. The most encouraging happening that the industry has been eagerly looking forward to is the new peace scenario. The peace initiatives launched by the government early this year and announcement of the peace agreement has ended many uncertainties that prevailed in the past. This has given a remarkable boost and confidence to the industry in terms of creating new dimensions in developing the industry and attracting more visitors.

Annually the country receives on average 400,000 tourists. The tourism industry is recognised as one of the major contributors to the national economy in terms of foreign exchange earnings and employment generation. Tourism is the fourth largest foreign exchange earner to the Country. Industry, the Sri Lanka Tourist Board and the Ministry of Tourism, are all working together to make Sri Lanka the best tourist destination in Asia. The key focus is to ensure sustainable tourism development, enhancing its yield to support all stakeholders including the communities and to promote building peace and harmony.

In 2003, Sri Lanka's travel & tourism industry was expected to generate 196.9 billion Lankan Rupees (LKR) (US\$ 1,973.1 million) of total economic activity. The industry's direct impact includes 203,753 jobs—representing 2.4% of total employment, LKR 48.5 billion (US\$486.2 million) of the country's Gross Domestic Product (GDP)—equivalent to 3.0% of the total GDP.

However, since travel & tourism touches all sectors of the economy, its real impact is even greater. Sri Lanka's travel & tourism industry directly and indirectly accounts for nearly 600,000 jobs—representing over 7% of total employment; and 138.7 billion LKR (US\$1,389.6 million) of GDP—equivalent to 8.6 % of total GDP¹.

In April 1998, Air Lanka, was privatised following the establishment of a strategic partnership with Dubai based Emirates Airline. As part of its commitment to the SriLankan government, Emirates contracted to undertake the management of SriLankan Airlines for a 10-year period, during which time it would establish programmes to stimulate renewed growth and

¹ THE WORLD TRAVEL & TOURISM COUNCIL (WTTC), 2003 REPORT FOR SRI LANKA

profitability. Primary among these considerations was the development of Bandaranaike International Airport, Colombo, as a major passenger and cargo hub linking east and west.

Because of its geographical location and the nature of the country, Sri Lanka is energetically promoting itself as a destination of many facets, most of which it believes will appeal to people from many walks of life. SriLankan Airlines recognises the importance of tourism to its country and is adamant that once people have experienced the island they will return time-and-time again. Because of this belief, it is deeply committed to persuading its passengers to return time-and-time again, and because of this belief is deeply committed to persuading its passengers to visit Sri Lanka.

The development of Sri Lanka as a Hub for International Civil Aviation

The development of Sri Lanka tourism is merely one facet of improving economic and social development. The Sri Lankan Government, as has been expressed by the former Minister of Civil Aviation, the present Minister, and SriLankan Airlines wish the development of Bandaranaike International Airport to be a major passenger and cargo hub linking not only the east and west, but also serving South Asia.

SriLankan Airlines with the help of code-share partners has developed comprehensive network of flights between Colombo and destinations in India.

Following the report of the Naresh Chandra committee, considering the basis for the new civil aviation policy, the Indian Cabinet has allowed private airlines to fly to all SAARC nations. Private domestic operators, such as Jet Airways and Air Sahara, could now pin their hopes on flying to Colombo, as it would need the approval of flight plans from the Indian Director-General of Civil Aviation.

In addition, SriLankan Airlines has identified the most popular internal tourist destinations and has introduced facilities to make these locations more accessible within the island. There are a number of waterways, lakes and domestic airstrips in Sri Lanka located in close proximity to tourist attractions. Their latest venture is to operate an Air Taxi service, which will utilise these to host the Air Taxi operations with minimal development and associated costs.

The vision of the Government owned operator of Bandaranaike International Airport (BIA), the Airport and Aviation Services (Sri Lanka) Limited (AASL) spells out the direction in which the company intends moving in the long term. It intends being the safest or among the safest airports in Asia. It also intends making the BIA an aviation hub play a role similar to that of Hong Kong. The Company will constantly strive to achieve excellence in safety and efficiency of services while being the friendliest airport in the Asian Region.

Despite the desire for Bandaranaike International Airport to become an aviation hub, it must be understood that the events of the last twenty years have placed Sri Lankan at a major disadvantage. In the last twenty years, trade and tourism in South East Asia have grown rapidly. Nearly all the Asian countries have outward looking economies and have extensive involvement in manufacturing and trade, not only amongst themselves but

also with North America and Europe. As the consequence of substantial and sustained growth, the Asia-Pacific region has put far more investment into airports in the past twenty years, than any other region of the world. Some of these airports have developed into major hubs. Factors facilitating this 'hub' status include:

- A Favourable Geographic Location;
- Substantial Origin & Destination Traffic;
- A well-developed Tourism industry;
- The Economic stimulus of Industrial Growth;
- Strong 'Base' Carrier; and
- High Airport Efficiency, including Capacity & Cost.

Regional Examples and Considerations

Singapore's Changi Airport is a typical example of how a major air hub in the Asia Pacific region has developed. In 1975, a decision was made to build a new airport on the site of the old Royal Air Force aerodrome at Changi. The Phase I development of Changi Airport was opened in July 1981. Since then a second parallel runway and a second Passenger Terminal have been constructed — Changi Airport has come a long way and it now has 2 terminals, with the third one under construction. When opened in early 2008, Terminal 3 will add a capacity of 20 million passengers a year, bringing the total capacity of Changi Airport to 64 million passengers. This will provide adequate passenger terminal capacity until the year 2020. Terminal 3 will add another 28 aerobridge gates, with up to eight that will be designed to handle the new generation of large aircraft, the Airbus A380.

A little known fact is that Changi has reclaimed more land and on it has constructed a third runway. While this runway is not yet available for civil aircraft, it is noteworthy that all land between the third Runway and the airport is in the State's possession enabling the area to be developed for civil aviation very rapidly.

There is intense rivalry between major airports in South East Asia who are all vying to be the best and most profitable hub. Hong Kong's new airport at Chek Lap Kok, Singapore's Changi airport, Malaysia's new Sepang airport and Bangkok's Suvarnabhumi are all aspiring to be 'mega' airports with passenger handling capacities of more than 50 million passengers per annum.

The chart in the Attachment A shows the growth of passengers at Bangkok & Dubai. It is unlikely that Colombo can replicate their achievements.

However, Colombo has the possibility of becoming a niche hub for South Asia.

India as a Rival

Over the years, successive Indian governments have maintained a very restrictive civil aviation policy. Despite the size of the country, its population and an increased middle class with significant disposable incomes, civil aviation has not kept pace with those in South East Asia. First steps to a more liberal regime were started in 2003 when airlines as well as airport infrastructure areas were thrown open to competition and traveller-centric activities undertaken. Three events signalled the fall of 'one of the last strongholds of the government control', as described by a bureaucrat:

- First, the privatisation of the Delhi and Mumbai airports was set into motion;
- Second, the government allowed private domestic scheduled airlines to fly abroad; and
- Third the high-powered Naresh Chandra committee put forth a liberal report, which would form a basis for the new civil aviation policy.

However, industry sources say the Naresh Chandra committee report is not a carefully thought out road map for the sector, but a reflection of the lobbying by some of the private players. If the exercise was comprehensive, they argue, the report would have looked in detail at ways to develop Mumbai as a hub. "Singapore Airlines and Emirates are not what they are because they are the prime carriers in Singapore or Dubai, but because they operate from airports that are hubs for the entire region.

Once again, the much-awaited Indian Government "go-ahead" to private domestic carriers to fly abroad, barring the Gulf region, and a green signal to the new civil aviation policy has failed to materialise. Sri Lanka still has an opportunity to capitalise on this failure and become a hub for South Asia, and compete strongly against Bangalore and Chennai. But any failure to act now and delay a decision on the construction of a second runway at BIA could open the way for private airports such as that at Bangalore to develop hub status at the expense of Colombo's entire aviation future.

Bandaranaike International Airport (BIA)

Colombo's Bandaranaike International Airport is undergoing development. The principal work is to provide additional aircraft parking, hard standing areas and a finger pier to provide a number of in-contact parking stands. While this long overdue work is welcome, and the new parking area will increase capacity, only the finger piers provide an improvement to passenger service.

However, there are a number of problems with the current runway 04/22;

- It is the only runway in the entire country that can support civil aviation operations by international airlines, and can support the fast-jet operations of the Sri Lankan Air force;
- Its length and width are inadequate for some current operations and potential future developments;
- The runway was constructed in 1986 and is now some seventeen years old. Within the next 4 to 5 years it will be necessary for it to undergo major refurbishment to sustain heavy civil air transport movements;
- There are concerns about the safety implications of using a single runway for both Civil & Military operations.

The Single Runway Dilemma

Unlike BIA, none of the world's major international airports, and those aspiring to that status, has both a single runway and joint civil military operations. The current civil airline level of operations at BIA being only 3 million passengers per year and the daily peak hourly movements of around 10 movements when viewed from capacity enhancement alone, does not justify a second runway to provide additional capacity. Under normal circumstances a peak runway use exceeding 30 to 35 movements per hour would be the time when an additional runway would be given consideration.

However, not only has the airport just a single runway, it is also the only runway in the entire country that can support the operations of international civil aviation and the fast jet operations of the Sri Lankan Air Force. The closure of the runway, from an accident or incident, such as that which recently occurred on the evening of February 4th 2004, could have major repercussions on the airline industry, especially on Sri Lankan Airlines, as well as the operational effectiveness of the Sri Lankan Air Force. This is a precarious and shameful situation as was seen when the BIA was paralysed for 10 hrs on Sri Lanka's National Day this year.

Impact of Current Runway Length

The single runway at Bandaranaike International Airport 04/22 is 3,350 metres in length and 45 metres wide. It was built in 1985 to replace the existing runway, which is now used as a parallel taxiway. The landing distance is 3,350 metres in both directions. Paved stop-ways are provided in both directions (04 – 91 metres & 22 – 66 metres), which increase the Take-Off Distance values to 04 – 3441 metres & 22 – 3416 metres.

Whilst the runway length was adequate to meet the commercial operations at that time by the Lockheed L1011-500 operated by Air Lanka. However, the length is no longer sufficient to either meet current or future potential operations. SriLankan Airlines now operates 14 flights each week non-stop with the Airbus A340-300 from Colombo to London. Afternoon Flights to London were introduced during last year and are very popular with passengers. However, the runway length at BIA cannot support A340-300 operations at its Maximum Take-off Weight (MTOW) of 275 tonnes during the daytime when temperatures exceed 31°C. The reduced Runway Take-off Weight (RTOW) available with the existing runway length at these temperatures results in a payload loss and a significant commercial penalty on each flight. More often than not this occurs during the months of December, January and February, and during August. Most importantly, the three-month period December to February is the peak season for passengers as well as cargo.

During these months, SriLankan Airlines is compelled to offload revenue-earning cargo. Since the introduction of the commercially desirable afternoon flights in 2003, approximately 35 flights have been affected and the total amount of freight off-loaded amounts to nearly 100 tonnes.

Near-term Runway Requirements

The appearance of new ultra long-range aircraft such as the Airbus A340-500, the New Large Aircraft the Airbus A380 and the Boeing 747-400ER, will enable airlines to develop new and innovative services. However, the present runway length will preclude the development of such services from Colombo.

A340-500: The A340-300 currently operated by SriLankan Airlines flies 281 passengers in a two-class cabin layout and a cargo capacity of 14,000 kg over 7,300 nautical miles range. A six-frame stretch over the A340-300, the A340-500 offers the longest-range capability of any airliner, flying 313 passengers in a three-class cabin layout over 8,650 nautical miles. The A340-500 will allow airlines to fly non-stop even further than with the A340-300 in use today. It will reliably and profitably expand the possibilities for direct non-stop

services between distant destinations not served today, with four-engine capability for uncompromising security and comfortable travel on the longest journeys.

A380: The Airbus A380 Family starts from a baseline passenger aircraft with a capacity of 555 passengers in three classes over a range of up to 8,000 nautical miles. Larger and longer-range members of the family are anticipated in the basic design concept. With the capability to carry 150 tonnes of payload on standard pallets, on all three decks, over more than 5,600 nautical miles, the A380F will bring new levels of efficiency to the cargo market. A whole new reference in freighter cost due to its range advantage allows the A380F to simplify operations and eliminate intermediate stops, further lowering costs and accelerating freight service.

Non stop services from BIA to US airports would become possible for the first time with this aircraft hitherto that have not been possible. The A380 freighter will change how US bound air cargo from Colombo will be carried if a runway having the required length and width is available at BIA by the time the world's largest freighter starts operating in 2007.

However, the A380 passenger versions carry engines with 70,000-lbs. thrust nearly 20% more powerful than those on Boeing 747's. Hanging from wings almost 80 metres across, the A380's outer engines will be 47 metres apart, just beyond the width of a 45 metre standard runway. The jet blast could cause serious soil erosion and destroy runway signs and lights unless runway shoulders were paved and the signs and lights were moved. The A380 freighters will have engines of 76,500-lbs. thrust thus adding to the problem.

B747-400: The current Boeing 747-400 has a range of approximately 7,260 nautical miles. The Longer-Range 747-400ER is available in both passenger and freighter versions and has an increased takeoff weight. This takeoff weight increase of 15,876 kg over existing -400s allows operators to fly about 410 nautical miles farther or carry up to 6,800 kg more "payload," either in the form of extra cargo or a full load of 416 passengers. The 747-400ER passenger aeroplane has a range of 7,670 nautical miles (14,205 km). The 747-400ER Freighter, at its maximum takeoff weight of 412,770 kg, has a range of 4,970 nautical miles (9,200 km).

The following table shows great circle distance between Colombo and some major cities.

From – To	Distance
Colombo – London	4704 nautical miles
Colombo – Los Angeles	8138 nautical miles
Colombo – New York	7610 nautical miles
Colombo – Sydney	4728 nautical miles
Colombo – Auckland	5890 nautical miles
Colombo – Rio De Janeiro	7374 nautical miles

As already indicated the new ultra-long range aircraft will be able to fly non-stop between such city pairs, however, the current runway length at Bandaranaike International Airport cannot support commercially viable operations because of its limited length. The current daytime operations from Colombo to London, which are well within the maximum payload range of the A340-300, cannot be operated all year round without commercial penalties. The development of new and innovative services – which are essential if Colombo is to aspire to 'hub status', will require a runway of greater length. Operations at Maximum Take off weight of the new aircraft such as the A380 & the B747-400ER will require a runway of around 4,000 metres in length. The take off formulas below assume a dry runway in nil wind conditions. However, a wet runway will require the minimum take off distance to be increased by 10-15%.

- **Boeing 747-400 & Boeing 747-400ER.** Based on ISA +25 in a Flaps 10 configuration for the current B747-400, 4130m is required for a max takeoff weight of 396,000kg. While the B747 400ER is expected to be an addition 7 tonnes, Boeing indicates that more powerful engines will allow Maximum Take-Off Weight to be achieved with a runway distance close to 4,000 metres.
- **Airbus A380-800.** The A380-800 at a MTOW of 560,000kg taking off at ISA +15 will require a takeoff distance of 3500m. A more realistic ISA+20 condition for Bandaranaike International Airport will require a takeoff distance of 3800 metres.

Around 200 airports accept the Boeing 747 today. As aircraft capacity has not changed for more than 3 decades, it is time for Sri Lanka to prepare for the future.

Runway Width

The requirement for Colombo is now therefore for a 4,000-metre runway. However, as previously mentioned the A380's outer engines will be 47 metres apart, just beyond the width of a 45 metre standard runway. The jet blast from these powerful engines will cause 'serious soil erosion' and damage to runway lights and signs unless runway shoulders were paved and the lights and signs were moved. The requirement for A380 operations is for a Code F 60 metre wide runway.

Life of Existing Runway & Maintenance Requirements

The current runway was constructed in 1986 and is now some seventeen years old. Within the next 4 to 5 years, it will be necessary for it to undergo major refurbishment. This will involve putting an asphalt overlay on the entire runway length. Closure of the runway to enable the work to be carried out would have to be in small time widows so as not to disrupt airline operations. Work would be a lengthy process and a major disruption to civil operations at a time when Sri Lanka is battling to regain its place as a major tourist destination. During such a closure, the SLAF will not be able to respond to any operational needs requiring aircraft in the Base to take-off or land. This would include any Search and Rescue missions by fixed wing aircraft will not be possible even if such a need were for civilian purposes.

Recommendation for Immediate Action

As an interim step, it is recommended that consideration be given to extending the current runway so as to eliminate the payload penalties that SriLankan Airlines is encountering on its daylight services to London. The increase in runway length must be determined in consultation with SriLankan Airlines. It is likely that the increase will be relatively small, and would certainly not require it to be extended to 4,000 metres.

Although extending the runway could be undertaken without major disruption to operations, this would not resolve the precarious and vulnerable situation of Sri Lanka only having a single runway in the entire country that could be used for international civil aviation.

In regard to the possibility of widening the runway to 60 metres, this would be a far more difficult proposition and would not be recommended.

Joint Civil/Military operations

While there are many airports in the world which are on a Civil/Military Joint User basis, the concentration of civil aviation operations and military fast-jet

operations on a single runway imposes an unacceptable level of risk. This is not only to civil aircraft when they have to give way to fast-jet operations returning to base with low fuel states but also to the military aircraft which can be adversely affected by the wake turbulence of the large civil aircraft using the airport. It is viewed as unwise to mix military fast-jet operations, especially training sorties with civil aircraft.

Although a second parallel runway could be shared by civil and military operations, this should not be a normal practice and should only be done when tactically necessary. However, SLAF fast-jet movements and civil operations can routinely operate very safely without disruptions to each other when segregated on separate parallel runways that allow independent parallel operations. An extenuating circumstance would be when the old runway needs repairs. Then the availability of the second runway would permit the old runway to be refurbished in a shorter time and at lower cost, with all work being done during daylight periods and most importantly without causing major disruption either to civil or military operations.

Runway Separation

ICAO Annex 14 - Aerodromes contains the following Recommendation in Paragraph 3.1.11:

Recommendation- where parallel instrument runways are intended for simultaneous use subject to conditions specified in the PANS-ATM (Doc 4444) and the PANS-OPS (Doc 8168), Volume I, the minimum distance between their centre lines should be:

- 1,035 m for independent parallel approaches;
- 915 m for dependent parallel approaches;
- 760 m for independent parallel departures;
- 760 m for segregated parallel operations;

In the past, it has been argued that a new closely spaced parallel runway could be a cost-effective way of providing two runways at Bandaranaike International Airport. It could provide a second runway for operational use while maintenance was carried out on the first runway, and provide an alternative if an accident or incident blocked the first runway. It could also minimise land acquisition. However, the use of a closely spaced runway would not meet the long-term operational requirements for capacity and operations on one runway would always be dependent on the operations of the other. Furthermore, the concept of two closely spaced runways, with a passenger terminal on one side, is operationally difficult, as traffic to and from the farthest runway would have to cross an active runway. Not only

does this limit capacity, but it also significantly increases the risk of runway incursions. Runway incursions are defined as 'any occurrence at an airport involving an aircraft, vehicle, or person on the ground that creates a collision hazard or results in a loss of separation with an aircraft taking off, intending to take off, landing, or intending to land.' Recently, runway safety has become a major concern in international civil aviation, as the problem has increased steadily since the 1980's. This risk factor should not be engineered into any new runway combination at an airport seeking 'hub' status.

The inability of some airports to permit independent and simultaneous use of both runways, in all weather conditions has created extremely expensive capacity limits. The inability of Bangkok's Don Muang airport, with closely spaced runways 400 metres apart, to support future traffic growth resulted in a decision to construct an entirely new airport. The very small separation of only 384 metres between the runways at Dubai International Airport remains the pre-eminent factor that will limit capacity and this eventually will force the government into a costly move to a new airport site.

The construction of a closely spaced second runway at Bandaranaike International Airport would be foolhardy. In the distant future a third runway would then have to be added, or a completely new airport developed as in Bangkok and most probably in Dubai. Sri Lanka cannot afford to make a heavy investment in a runway and repeat the mistakes made by others with close spaced runways.

In the 1970's, airport master planning used a nominal separation of 1,600 metres between runways. This spacing permitted independent use of the runways and some development of terminal and taxiway facilities between the runways. The earlier practice of having two closely spaced parallel runways, with the terminals to one side of the runways, such as at Dubai & Bangkok, was seen to be grossly inefficient as traffic to and from the farthest runway had to cross an active runway. Not only did this result in significant constraints, which affected capacity, but also resulted in concerns with safety from potential runway incursions. However, in practice this spacing also limited the development of terminal and taxiway facilities between the runways.

The Civil Aviation Authority of Singapore selected a runway separation of 1,600 metres when they designed Changi Airport. New Large Aircraft such as the A380 were not even thought of at that time. However, as Terminal development proceeded this separation became inadequate, the construction of finger piers on terminal 2 resulted in the loss of a taxiway which was an important tool in minimising airfield congestion. They have now constructed

a third runway after incurring large expenditure in reclamation of land, so that their position as a 'hub' will not be reduced in the future.

In the 1990's, airport master planning began to use a nominal separation of 2,000 to 2,500 metres between runways. Recent new airports, such as Bangkok's NBIA & Kuala Lumpur's Sepang are based upon a minimum of 2,500 metre separation between the runways.

Military Considerations

Any recommendations to the siting of the runway must consider the existing Sri Lankan Air Force Base adjacent to the BIA. It has been suggested that any further development of the Bandaranaike International Airport should include relocation of the present military airbase at Katunayake. The SLAF base covers some 400 hectares and its removal could reduce the need for some of the land acquisition. However, if the construction of the second runway is delayed until a new airbase is constructed for the Sri Lankan Air Force, Sri Lanka would have lost a golden opportunity of pursuing their dream of becoming a hub. Furthermore, the cost associated with the construction of a new airbase would be a significant drain on the government funds. It is also highly unlikely that any grant aid would be forthcoming for the construction of a new military airbase. As Sri Lanka is recovering from turbulent times, there are much more urgent projects than the relocation of the main Air Force base from Katunayake.

There is no valid reason why the SLAF and the AASL cannot co-exist. There are a number of successful international airports, which are joint civil/military ventures. The retention of the current base and the maximisation of the joint use of facilities are seen as a very cost-effective approach and with the addition of a second runway, BIA would meet both civil and military requirements.

The possibility of closing the Ratmalana airport and transferring all its operations to Bandaranaike International Airport should be explored. As the sale of the land at Ratmalana, which has increased many fold, could release significant funds to assist in the improvement of services and facilities at BIA.

Examination of the current land-use shows that it is possible to construct a runway 2,000 metres north of the existing runway. However, this would divide the military site into two and would require the demolition of the recently constructed Airmen's Married Quarters. The required parallel taxiway located south of the new runway would further disrupt the Base

A runway constructed 2,500 metres north of the existing runway would impinge only on the northernmost area currently allocated to the SLAF. The required full-length parallel taxiway to the south of the new runway and a taxiway linking the new and old runways and providing access to and from the terminal building could be accommodated with no impact to existing Base infrastructure.

In due course, when the airport grows, a new Passenger/Cargo Terminal and Maintenance facilities could be constructed on a mid-field site. This would be of modern design and replace entirely the existing facility south of the current runway.

The coastline and railway line form a boundary limiting the present runway at the western (04) approach end. As the railway line is not perpendicular to the centre line of the runway, the approach end of a new runway could not be aligned with that of the existing runway. The second runway being longer than the present makes the eastern ends of the runways also out of alignment, thus staggering is inevitable. In order to reduce the taxi-time for aircraft, the obvious location for a future new Terminal building would be symmetrically between the two runways.

Areas that must be Restricted

While it is relatively easy to remove obstructions such as trees, what is a continuing and increasing difficulty to airport owners has been the constructions that rapidly spring-up near International airports. When these constructions appear in areas close to the extended centreline of a new runway, they are harmful to the long-term interest of the airport.

Further, as is well documented that the area straddling the extended centreline, and between the Outer Marker Beacon location and the threshold are the most likely areas where an aircraft accident is likely to happen. The numerous 'under-shoot' and 'over-shoot' accidents that have happened world wide, makes the area within the Middle Marker Beacon and the threshold even more vulnerable.

It is noted that at BIA, action has been taken to acquire the land straddling the present runway as well as the former runway (now converted into a parallel taxiway). It is noteworthy that at the western approach (04) end, the land acquisition has been done up to the Negambo lagoon crossing the railway line and the main Colombo-Negambo road. The entire width acquired has been cleared of habitation. While this permits rapid access to fire vehicles, it also ensures that the Approach Lighting System (ALS), which requires high voltage cables, will not be within accidental reach or wilful tampering by

members of the public as they are denied access to these areas. This preemptive action at the current western end needs to be repeated at the both the approach ends of the new runway.

For a new runway to be constructed, several roads have to be diverted or closed. Sections of new, wider roads running approximately parallel to the runway centreline need to be made along the outer boundaries of the acquired area. This would prevent total closure of these roads and a means of linking sections of roads presently in use to divert traffic along the new outer boundaries of the enlarged area. This will need to be accomplished once acquisition is complete.

In order that the construction of the runway should not be hampered due to delays in closure of affected roads, the construction of these new sections of wider roads along the new periphery should be done ahead of commencement of runway construction. This would also permit the construction of the new airport boundary fence and enable vacant possession of acquired areas to be taken, which will enable contractors engaged in the construction of the runway to proceed unhindered within the fenced-in area.

Cargo and Express Package Considerations

There are several factors to consider should any serious Cargo/Express Package operations are pursued. As there are no major cargo facilities located at the South Asian airports, such as the SuperTerminal 1 at Chep Lap Kok or the FedEx Hub at Subic Bay, there may be opportunity for BIA to compete in this market with the introduction of a second runway. However, the following elements are essential in order to attract serious cargo operations:

- Cargo haulers follow the business. Therefore it is important that a local economy or production is there to drive the need. However, there is a significant difference between the two examples above (Hong Kong and Philippines) to be noted;
- Security is paramount! Security includes the safe loading and off-loading of cargo in a guaranteed secure and guarded location;
- This business requires Customs and other government services that will work with the airline and not drown the system with bureaucrat paperwork;
- There should be an English speaking work force that is reasonably priced;

- There needs to be flexibility in air route entry/exit points. Cargo operations are not always the "canned" flight plans of scheduled passenger service. Because of this;
- There must be the ability to add flights simply and quickly; and
- There must be an automated means to send/receive flight and route approvals, changes, etc. In this business speed and flexibility is paramount to success.

To achieve such an objective wherein BIA could be considered a 'Cargo hub', there would need to be ample facilities for the retention of cargo ranging from perishable cargo to live cargo, covered areas, as well as open cargo storage areas would also be a prerequisite.

If such a venture is pursued, land acquisition for the new runway should consider the construction of parallel taxiways on both sides of the new runway. Storage for cargo or other dedicated aviation related activities would require buildings located within the new boundary fence, most likely to the north of the new runway.

Land Acquisition: Essential and Recommended

Land acquisition is a significant exercise both in cost and investment and therefore must be considered very carefully. Significant assets are invested into airport development projects and some of the most costly mistakes historically made are that of initial land acquisitions that were insufficient for airport growth. Therefore the focus and vision of land acquisition must be matched with the vision and operational requirements required for the life span of civil aviation as we know it. What could be assumed as an overkill of land acquisition today could in 40 years time be seen as a gross underestimate in planning.

The chart found at Attachment B shows IATA's suggestions on land requirements, categorised into the categories of 'Essential' and 'Recommended'. While the areas that fall into the essential category ensure the requirement for safe operation of the second runway, the areas that are categorised as recommended would ensure a more long-term objective of future growth. As an example, the area marked recommended which encompasses the land between the waterway (river), the road way at the end of Runway 04 and lying between the runways, would prevent further housing units to be constructed by private owners in land of significant 'aviation value'. It would also permit the diversion of the stream when the demand for land between the runways increases with airport growth.

It is also recommended that bare or cultivated land falling close to the areas of 'aviation interest' be acquired so that some of those that may desire to be relocated close to their present location could then be relocated nearby.

Recommended Action Plan

The acquisition of land is the first and most important step to be taken. After land acquisition it will be important to halt further airport construction projects until a new Airport/Aerodrome Master Plan is developed. Civil works that will most likely follow land acquisition will be:

- The construction of the second runway,
- A parallel taxiway associated with that runway,
- A taxiway linking the present runway to this new parallel taxiway, which will be perpendicular to the runway, and
- Zoning Regulations that will protect instrument operations of aircraft as well as normal management of land-use.

There should be serious attention to the development of a new Airport/Aerodrome Master Plan. A Master Plan is not just a set of "drawings" but should be a living document that captures:

- The government's vision for economic growth,
- the operational requirements of the airlines, facilitation, ground handling, etc.,
- the commercial requirements of both airlines and institution of the airport, and
- infrastructure requirements that will be jointly used by both civil and military, such as rescue/fire fighting capabilities.

Consultation with the airline industry is critical and IATA can play a significant role in capturing the issues and requirements that must be addressed; based on its experience in working with airports worldwide. Therefore the best practices of the industry can be designed into the master plan that are based on the experiences of the successes and failures at other airports.

These upcoming decisions are of significant importance to the health and welfare of Sri Lanka, its air force and its national airline.

Bangkok & Dubai

Passengers - Growth 1985-2003



Second Runway for BIA

Provisioning for Future Taxways for Runway 22R - 04L

Scale 1 : 10000

Transverse Mercator Projection

Origin of Meridian Grid System is 200,000 metres South and 200,000 metres West of Pulau Tekong

Year of Photography - 1999

Scale of Photography - 1 : 20000



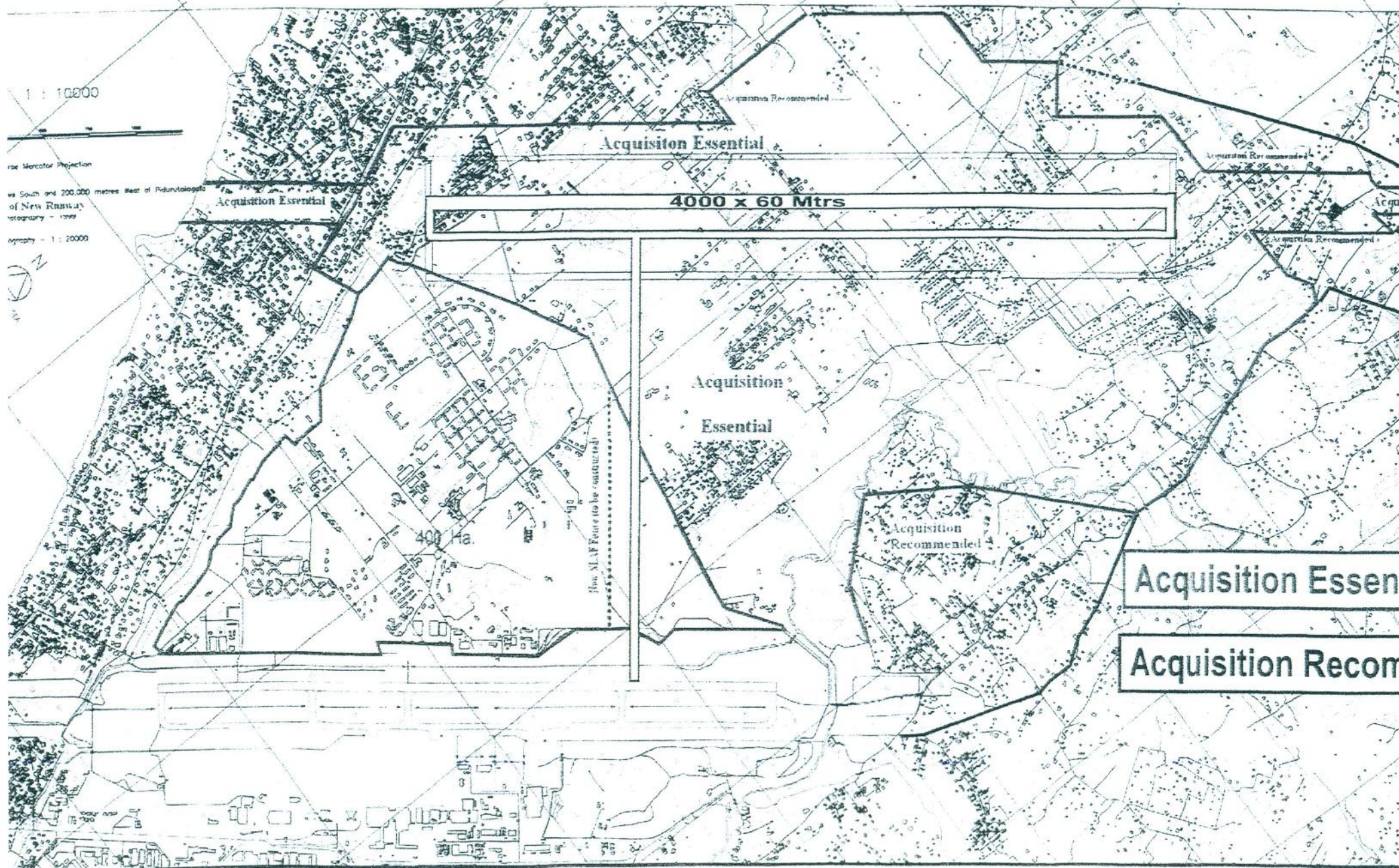
1 : 10000

Transverse Mercator Projection

Origin of Meridian Grid System is 200,000 metres South and 200,000 metres West of Pulau Tekong

Year of Photography - 1999

Scale of Photography - 1 : 20000



Acquisition Essential

4000 x 60 Mtrs

Acquisition
Essential

Acquisition
Recommended

Acquisition Essential

Acquisition Recommended