# CAYMAN ISLANDS AIRPORTS

# AIRPORT MASTER PLAN 2032

Owen Roberts International Airport (ORIA)

Charles Kirkconnell International Airport (CKIA)

- Little Cayman Airport (LCA)

Project No. 131-25468-00
Date:July 2014, Rev 1

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# EXECUTIVE SUMMARY

This Airport Master Plan is intended to be a blueprint for future development of the Cayman Islands Airports including Owen Roberts International Airport (ORIA, Grand Cayman), Charles Kirkconnell International Airport (CKIA, Cayman Brac) and Little Cayman Airport (LCA), all of which will be managed and operated by the Cayman Islands Airport Authority (CIAA). This plan is a description of the most appropriate development options regarding land use, facilities, and services required to ensure CIAA meets its strategic objectives and accommodates expected levels of traffic over the next 18 years to the year 2032. It builds upon previous airport master plans and is guided by the progressive efforts of the CIAA and a policy directive of the Cayman Islands Government issued in October 2013 in which the government clearly established to further enhance the existing facilities at all three airports for passenger (international and domestic) arrivals to improve the travel experience. The government's policy was intended to support the Government's Broad Outcome Goal of "Setting the Stage for Success in the Tourism Industry" and developing further tourism opportunities in the Cayman Islands through increased air service development.

This Cayman Islands Airport Master Plan 2032 also serves to address the requirements of the CIAA's commitment to progressive, sustainable and customer focused airport development which requires periodic reviews and updates of all its Airport Master Plans. This plan further establishes priority investments ensuring affordability over the planning period as part of a substantive Outline Business Case (OBC) process taking into account all three airports in the Cayman Islands Airport System and the financing capacity of the CIAA.

The following summarizes the key recommendations made in this study:

**Owen Roberts International Airport (ORIA, Grand Cayman):**

The final recommended capital spend related to the ORIA was based on the short, medium and long-term planning periods. Figure ES-1 represents the final recommended prioritization of the various master plan recommendations balanced against CKIA and LCA priorities and financing capacity of the CIAA. The following highlights some of the key features of the ORIA implementation plan:

- Runway 08-26 works are planned within the short-term to ensure all safety priorities and strengthening are in place for the change in aircraft by British Airways to the B777 series aircraft in 2016;
- A number of immediate pre-Phase 1 activities have been accounted for including the major spend of $250,000 to install the long-await covered apron walkway for the terminal building;
- The existing ORIA passenger terminal phased expansion program is planned to commence in 2015 and be continuous up to 2022 based on the proposed phasing proposed in this master plan;
- The aviation fuel system relocation and associated landside access road should be prioritized in 2015 to permit the expansion of main terminal apron to the east can begin as soon a possible in 2015;
- Major work on the proposed parallel taxiway system has been deferred into years 12 to 15 due spend priorites associated with LCA. Shortly after LCA is complete funds become available which have been prioritized to complete the full parallel taxiway system at ORIA;
- Capital costs for certain airport master plan elements have not been included the financial forecast since these particular elements were considered as special triggered events that would require additional financial analysis to confirm affordability and to justify their implementation. Refer to the following table. This table also summarizes investments that have been accounted for in the financial analysis by the CIAA that enable future commercial development opportunities for private investment with particular emphasis on general aviation, commercial airside and FBO type facilities.

| Item No. | Description | Cost |
|---|---|---|
| 1 | Greenfield Terminal Development Including New Control Tower (East Development Area) | |
| 2 | Runway 08- 26 Extension and Associated Airfield Pavement Strengthening (8000 ft.) - BA can operated with some load restrictions | |
| 3 | Runway 08-26 Additional 1200 ft. Extension into North Sound (East) to achieve BA Desired 9,200 ft. Runway Length | |
| 4 | Bridge Option 1 - Phase 4 ATB Expansion Covered 2 -Storey Walkway with Passenger Jet Bridges. | |
| 5 | Bridge Option 2 - Alternative Ground Loaded Bridges (No need for 2 storey open walkway) | |
| 6 | Land Acquisition Grand Cayman (Reserve for Long-term Greenfield PTB Development) | |
| 7 | US Preclearance (To be part of Long-Term Greenfield Terminal Development) | |
| 8 | Existing Air Terminal Building Phase 1A (Upper) - Renovations As Required For Commercial Use | |
| 9 | FBO/GA Infrastructure (Excluding Buildings/Hangars) | |
| 10 | East Development Area Access Road and Services (Based on FBO/Commercial Investment) | |
| | **TOTAL** | **$227,428,942.56** |
| 11 | ***Costs Accounted in Cashflow/Master Plan by CIAA to Enable FBO/GA*** | |
| 12 | *East Partial Parallel Taxiway (From Taxiway Delta to Threshold 26)* | |
| 13 | *Existing GA/Cargo Apron Rehabilitation (Currently in Poor Condition)* | |
| 14 | *Relocation of ARFF Fire Training Facility* | |
| | ***Sub-total of CIAA Investment for FBO-GA Development*** | ***$10,307,831.65*** |

- An allowance for special studies that have been recommended as part of the environmental scoping process was included. These studies are recommended to be completed over the short-term as part of enabling and supporting new construction work and also to establish baseline information for future expansion projects in particular in the East Development Area and possible closure and re-routing of Crewe Road on the west end of the site.
- The total spend proposed for ORIA over the planning period is shown below:

| Item No. | Airport | Short-Term (0-5 years) | Medium-Term (6-10 years) | Long-Term (11-20 years) | Total |
|---|---|---|---|---|---|
| 1 | ORIA | $50,287,476 | $18,805,299 | $21,094,213 | $90,186,988 |

**Charles Kirkconnell International Airport (CKIA, Cayman Brac):**

The final recommended capital spend related to the CKIA was based on the short, medium and long-term planning periods. Figure ES-2 represents the final recommended prioritization of the various master plan recommendations balanced against ORIA and LCA priorities and financing capacity of the CIAA. The following highlights some of the key features of the CKIA financial implementation plan:

- Only the key safety priorities are proposed for years 1 through 7 to ensure maximization of funding available to the ORIA and LCA. These priorities are focussed on the west end RESA reconfigutation, ARFF road construction and obstacle/vegetation trimming/clearing;
- Major airside and landside rehabilitation has been scheduled to coincide just before the major spend is planned for Little Cayman in years 7 to 8. This approach will leverage the availability of construction resources in the Sister Islands for both the CKIA and LCA projects during this period;
- Other master planning recommendations related to terminal and apron expansion are long-term investments planned for the years 11 to 13;
- An allowance for special studies that have been recommended as part of the environmental scoping process was included. These studies are recommended to be completed over the short-term as part of enabling and supporting new construction work and also to establish baseline information for future expansion projects.
- The total spend proposed for ORIA over the planning period is shown below:

| Item No. | Airport | Short-Term (0-5 years) | Medium-Term (6-10 years) | Long-Term (11-20 years) | Total |
|---|---|---|---|---|---|
| 1 | CKIA | $2,515,000 | $3,214,000 | $5,855,148 | $11,584,148 |

**Little Cayman Airport (LCA, Little Cayman)**

Although the final preferred scenario has not been determined, for the purpose of this financial analysis, the cost for Scenario 3 was used as it represents the most reasonable cost for the new airport. . Figure ES-3 represents the final recommended prioritization of the various master plan recommendations balanced against ORIA and CKIA priorities and financing capacity of the CIAA. This layout should be considered a generalized airport layout and would be adapted to the final preferred site selected as part of a final analysis and Environmental Impact Assessment process. The following table highlights the key implementation plan for LCA:

| Item No. | Proposed Activity | Recommended Master Plan Period | Recommended Implementation Year | Cost |
|---|---|---|---|---|
| 1 | Environmental Impact Assessment | Short-term | 2015-2017 | $1,000,000 |
| 2 | Approvals and Design-Tender Period | Short-term | 2018-2019 | |
| 3 | Minor Works including environmental mitigation/ site clearing / drainage | Medium-term | 2019-2020 | $19,092,000 |
| 4 | Major Works Phase 1 – Earthworks and Granulars | Medium-term | 2021-2022 | |
| 5 | Major Works Phase 2 – Asphalt and Buildings and Commissioning | Medium-term | 2023-2024 | |
| **TOTAL** | | | | **$20,092,000** |

**Total Airport System Investment Plan**

The following table presents the overall airport system summary of the short, medium and long-term spend plan for ORIA, CKIA and LCA.

| Item No. | Airport | Short-Term (0-5 years) | Medium-Term (6-10 years) | Long-Term (11-20 years) | Total |
|---|---|---|---|---|---|
| 1 | ORIA | $50,287,476 | $18,805,299 | $21,094,213 | $90,186,988 |
| 2 | CKIA | $2,515,000 | $3,214,000 | $5,855,148 | $11,584,148 |
| 3 | LCA | $1,000,000 | $19,092,000 | | $20,092,000 |
| **TOTAL** | | **$53,802,476** | **$41,111,299** | **$26,949,361** | **$121,863,136** |

**Figure ES-1 - Owen Roberts International Airport (ORIA) Layout and Phasing 2032**

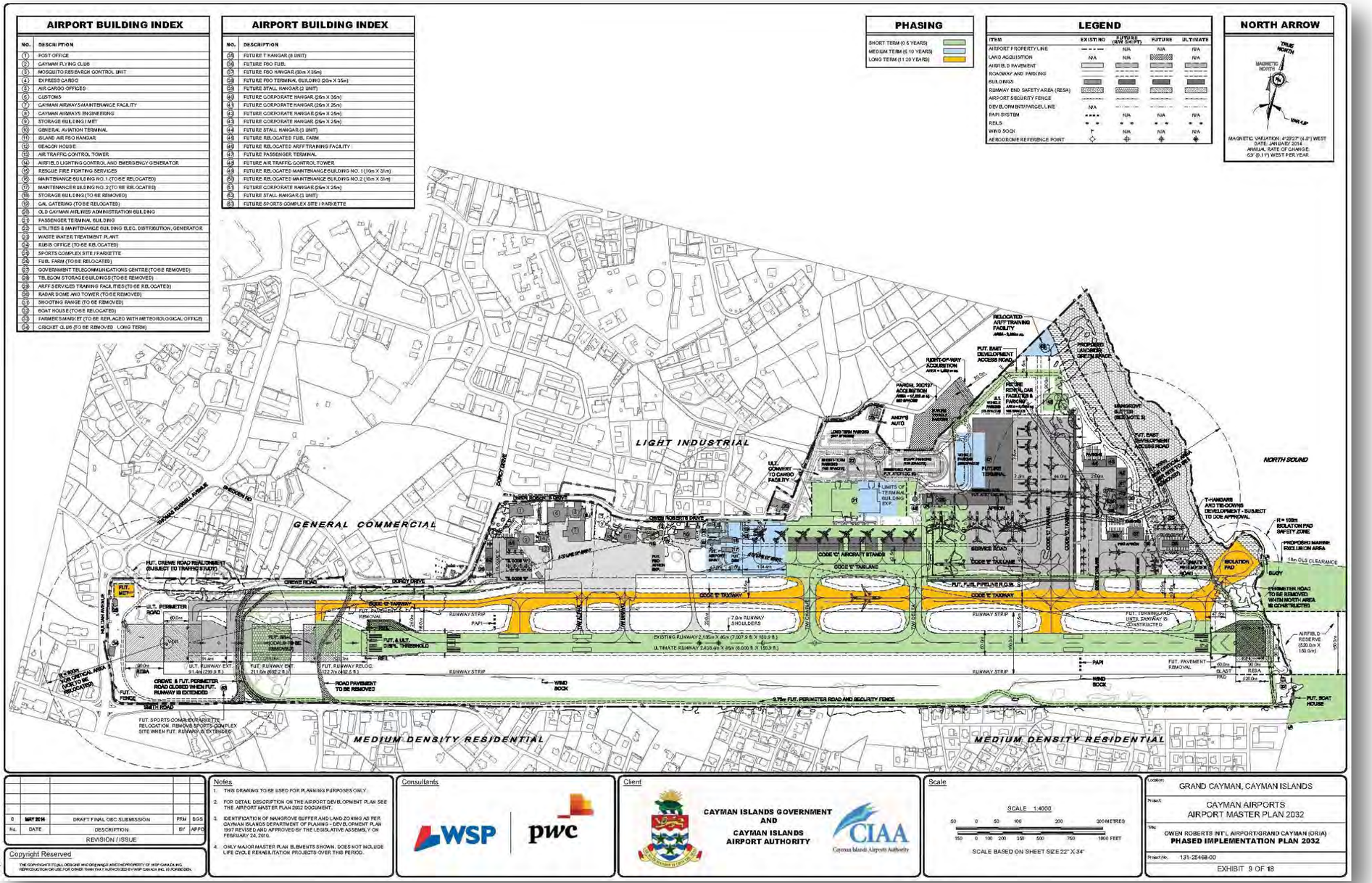


**Figure ES-2 – Charles Kirkconnell International Airport (CKIA) Layout and Phasing 2032**

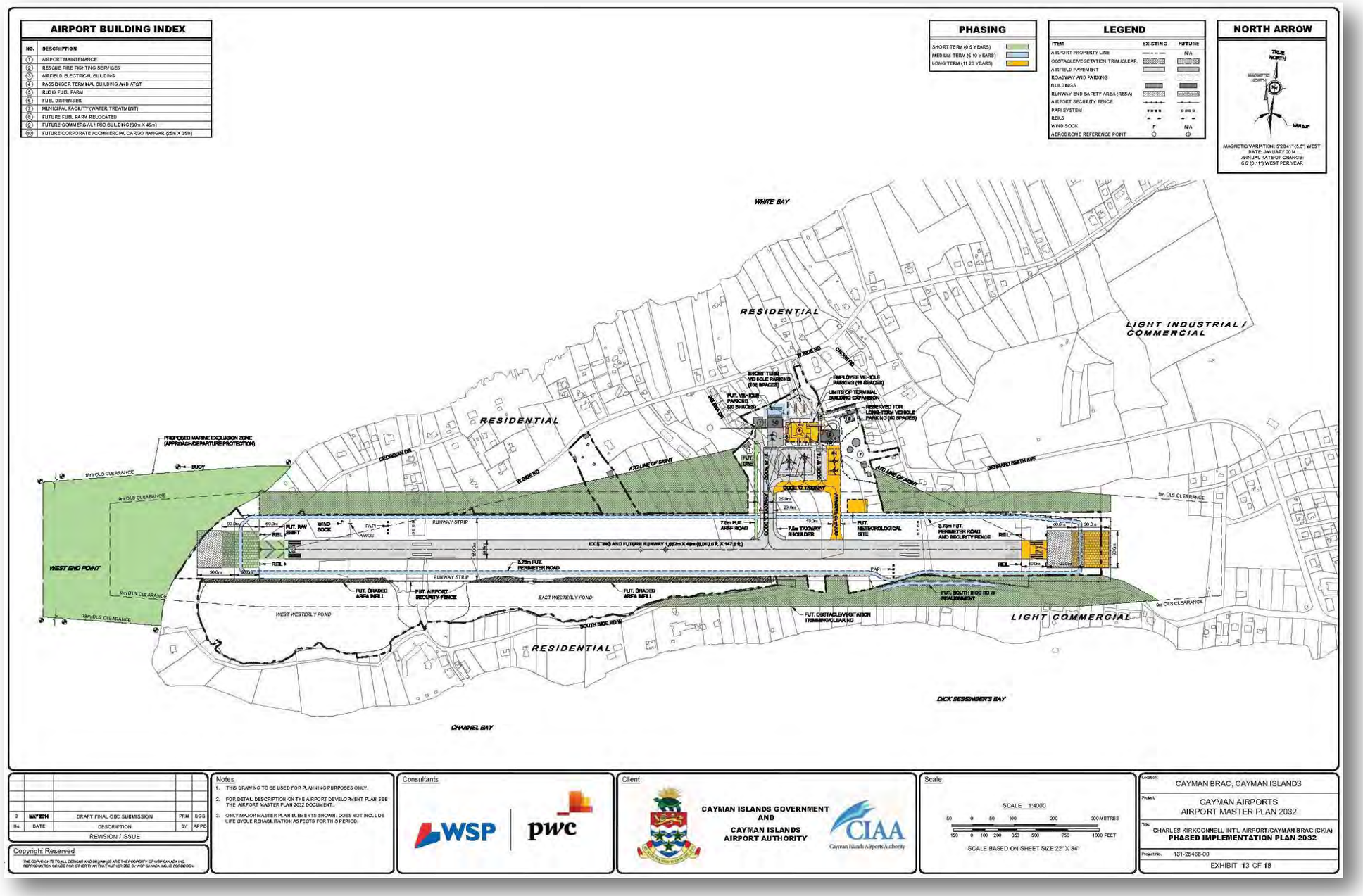
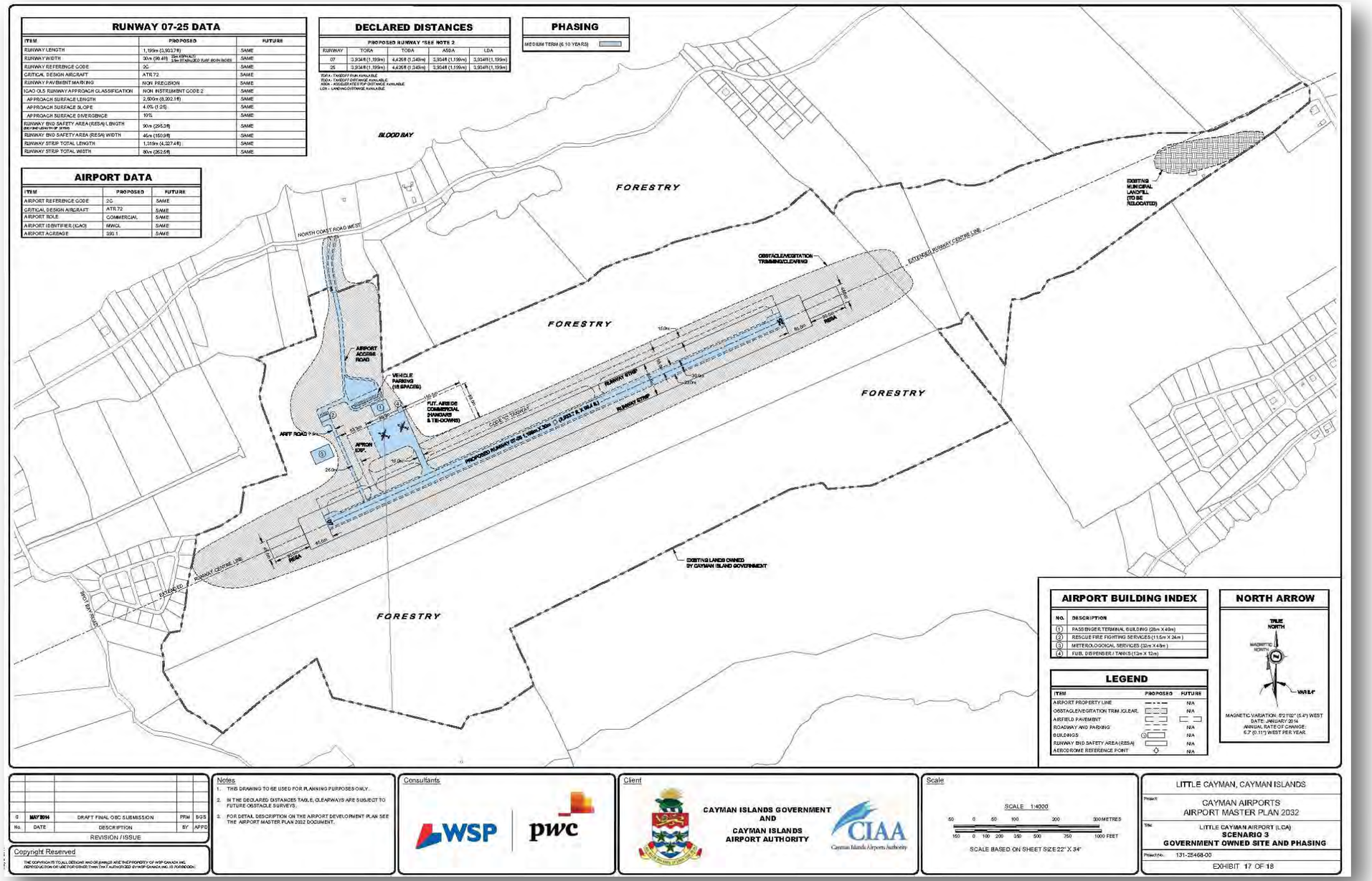


**Figure ES-3 Little Cayman Airport Scenario 3 Layout and Phasing (Government Owned Lands)**
**Final Selection of the Preferred Site Pending**



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# 1 INTRODUCTION

## 1.1 GOALS AND OBJECTIVES

In October 2013 the Cayman Islands Government clearly established a policy directive to further enhance the existing facilities at all three of its airports for passenger (international and domestic) arrivals to improve the travel experience. The government's policy was intended to support the Government's Broad Outcome Goal of "Setting the Stage for Success in the Tourism Industry" and developing further tourism opportunities in the Cayman Islands through increased air service development. The airport system in the Caymans Islands consists of the following three airports:

- Owen Roberts International Airport, Grand Cayman (ORIA) – Public/Certified Airport
- Charles Kirkconnell International Airport, Cayman Brac (CKIA) – Public/Certified Airport
- Little Cayman Airstrip, Edward Bodden Airfield (LCA) – Private/Uncertified Airstrip

This Airport Master Plan considered all three airport as a system and developed short (0-5 years), medium (6-10 years) and long-term (11-20 years) airport layout options that looked approximately 20 years into the future to the year 2032. It was guided by forward thinking and progressive initiatives, having consideration to current and projected fiscal, environmental, safety, capacity and community needs.

Generally an Airport Master Plan is not intended to define a specific order of development or specify exact timeframes for implementation. Various options are generally developed as a means to understand the flexibility of development opportunities. However, in this case, since the airport master plan forms part of substantive Outline Business Case (OBC) process, priority investments have been identified including approximate costs, timelines and confirmation of affordability.

All of the proposed projects are expected to deliver significant economic benefits to the Cayman Islands. These benefits include increased stay-over visitor spending, increased revenues for the government, job opportunities, and increased opportunities for additional airlift into Grand Cayman as well as greater overall profitability for the Cayman Islands Airports Authority.

## 1.2 CAYMAN ISLANDS AIRPORT AUTHORITY AND GOVERNMENT OF CAYMAN ISLANDS

The Cayman Islands Airports Authority (CIAA) is a statutory authority under the Ministry of Financial Services, Tourism & Development. The CIAA owns and operates Cayman's airport facilities, which consists of two international aerodromes, Owen Roberts International Airport on Grand Cayman and Charles Kirkconnell International Airport on Cayman Brac. Based on the Government of Cayman Islands directives, the CIAA is also being tasked with ownership and operation of a new airport on Little Cayman Island proposed under this master plan.

Under International Civil Aviation Regulations, the CIAA is obligated to:

- Comply with standards, and advise if able to comply with recommended practices;
- Employ an adequate number of qualified and competent staff;
- Operate its airports in accordance with the procedures set out in this Aerodrome Manual;
- Establish a Safety Management System;
- Arrange for audit of the Safety Management System and the management of airport organizations;
- Allow authorized Civil Aviation Authority of the Cayman Islands officers access for inspection and testing purposes related to safety at Owen Roberts International Airport;
- Conduct special inspections as necessary;
- Remove obstructions on the aerodrome which are likely to be a hazard;

- Erect warning signs when low flying or taxiing aircraft are likely to be hazardous to people or vehicles.

The Cayman Islands Airports Authority (CIAA) will retain ownership and operational responsibility of the three airports being considered under this Airport Master Plan throughout the master period up to 2032.

The role of the Government of Cayman Islands for this airport master plan was to provide project management services, guide the project through its status on the project Steering Committee and to communicate status of progress for government officials and departments.

## 1.3 KEY PLANNING PRINCIPLES

Airport Master Plans act as a guide for future physical development of airport lands and facilities. The planning of the Caymans Islands Airports should allow future generations the scope to make choices that best reflect the rapidly changing world. The following key planning principles have been applied in the development of this Airport Master Plan:

**Consistency with Community Objectives** – By integrating airport planning issues and community objectives, the Airport Master Plan ensures that the Cayman Islands Airports development is consistent with community economic growth strategies and that the Airport provides high levels of customer service for the community and other customers;

**Balanced Plans** – Balance between the key functions of the major airport components to achieve efficient operations and optimise future development;

**Land Use Hierarchy** – Careful stewardship of airport lands is essential so that short-term uses do not compromise future strategic options. The Airport Master Planning process generates a priority of land use reflecting strategic and business objectives for each airport;

**Adaptability** – Simplified and adaptable layout plans will be adopted to provide the CIAA flexibility in using land resources in order to adapt to new, unexpected challenges and take advantage of new opportunities that may arise over the course of the planning period;

**Energy Efficiency –**Any plans for all three airports should consider energy efficient design and make use of all available natural energy sources to reduce overall operational costs over the long term;

**Sustainability and Environment -** The plans for all three airports should be sustainable and in compliance with the latest legislative environmental framework in effect in the Cayman Islands.

## 1.4 PLANNING METHODOLOGY

The Cayman Islands Airports Master Plan 2032 has been prepared on the basis of a defined planning period and a systematic planning methodology. General planning principles and a hierarchy of land uses, consistent with typical planning methodologies used at Airports internationally were adopted for the preparation of this plan. Facilities and the land areas situated within the airport boundaries are the primary focus of this Airport Master Plan. Development issues are considered in relation to the characteristics and constraints that are specific to each airport site. Where warranted, consideration was also given to environmental conditions and adjacent land uses that may affect airport operations and future development areas.

The assessments and development requirements identified in this document comply with international planning standards and guidelines contained in ICAO, IATA and OTARS guidance materials which are applicable to the Cayman Islands.

Since this airport master plan forms part of an OBC, the plan further establishes priority investments ensuring affordability over the planning period as part of a substantive Outline Business Case (OBC) process taking into account all three airports in the Cayman Islands Airport system. To identify these priority investments, the various master planning recommendations were subjected to a hierarchy of decision making priorities as outlined below.

***Priority 1*** - Risk, safety and compliance issues - all Airports

***Priority 2*** - ORIA: terminal capacity shortfall

***Priority 3*** - ORIA: Short / Medium term Airfield Capacity Issues

***Priority 4*** - Little Cayman: long term public airport solution

***Priority 5*** - Long term capacity building / commercial opportunity

The final recommendation of projects and timeline of investments between all three airports was based on the above and financial projections of affordability, environmental considerations, execution risk and likely impact on airport operations.

## 1.5 CONSULTANT DATA GATHERING METHODOLOGY

The master planning process involved a significant effort by the Consultant to gather, organize and synthesize information from various sources throughout the study period. Reference documents included those contained in the original request for proposal and those gathered during the study from a number of stakeholders and other public resources. In addition to the collection of data, the Consultants conducted interviews with representatives of the CIAA, CIG, airlines, airport users, government agencies and departments as summarized in Section 5 of this report. In December 2013 and January 2014 the Consultant's Team also conducted personal site inspections of all three airports to better understand the physical conditions and setting of the facilities. During these site inspections, interviews with local stakeholders and airport management were also conducted. The preparation of this Airport Master Plan has taken into consideration all of these experiences and information in analysis and preparation of the various master planning recommendations.

# 2 AIRPORT SYSTEM OVERVIEW

## 2.1 THE CAYMAN ISLANDS AIRPORT SYSTEM

The Cayman Islands are served by a number of public and private airports and heliports. Of these, there are three that are considered the primary airports/aerodromes and are reflected in major aviation publications, charts and databases. These airports are used for international and domestic air transport throughout the islands and include:

- Owen Roberts International Airport, Grand Cayman (ORIA) – Public/Certified Airport
- Charles Kirkconnell International Airport, Cayman Brac (CKIA) – Public/Certified Airport
- Little Cayman Airstrip, Edward Bodden Airfield (LCA) – Private/Uncertified Airstrip

While the Little Cayman Airstrip is not a certified airport, it is used under special operating specifications by Cayman Airways using turboprop Twin Otter aircraft for domestic passenger service between Cayman Brac and Grand Cayman. A special aeronautical information circular (AC 01/10) is published explaining the special operating conditions at Little Cayman.

The other two airports, ORIA and CKIA are fully certified public airports serving both domestic and international air traffic. All flights originating from outside the Cayman Islands must make their first landing at either ORIA or CKIA to clear Customs, Health and Immigration before proceeding within the islands.

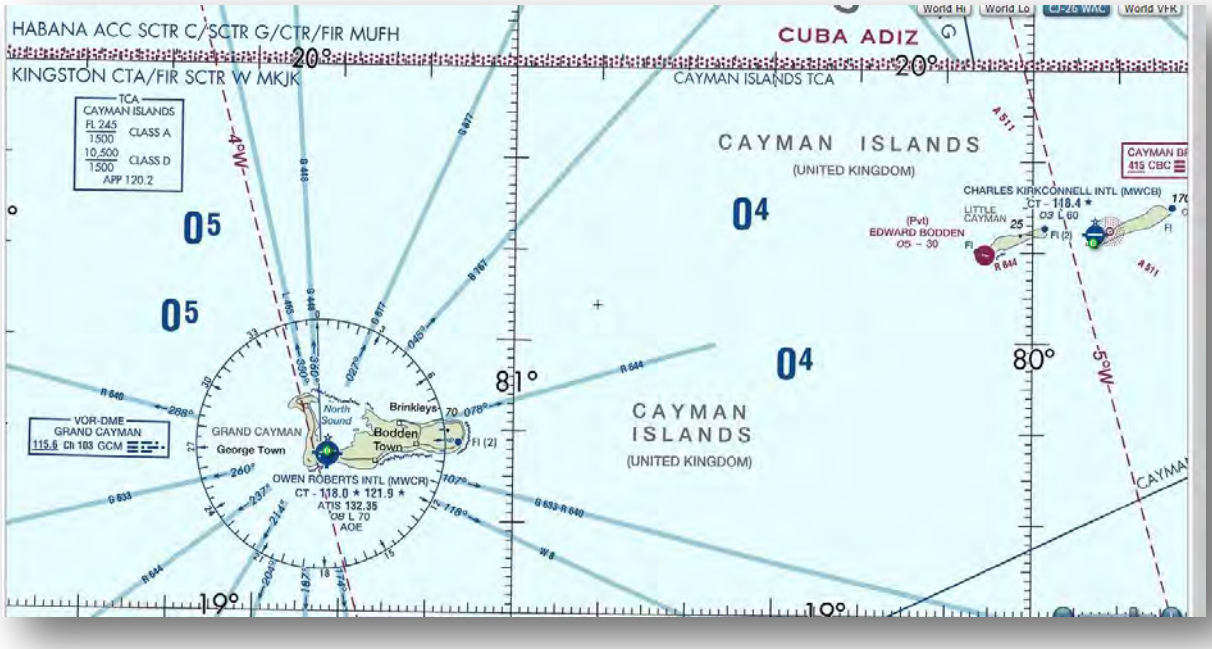
Other private airfields and heliports that operate within the islands are listed below but were not considered in the scope of this Airport Master Plan. This list was recently updated in an aeronautical information circular (AC 02/13):

- MWCC - Ritz Carlton Heliport;
- MWCD - Camana Bay Heliport/Grand Cayman;
- MWCF - Franksound Airfield;
- MWCG - George Town Heliport/Grand Cayman;
- MWCW - Windmill Hill Heliport.

The Cayman Islands airport system operates within the Kingston Jamaica CTA/FIR under the Cayman Islands Terminal Control Area (TCA). Figures 2-1 and 2-2 depict the location of the three primary airports/airstrips and their setting within the Kingston FIR and Cayman Island TCA.

**Figure 2-1 – Cayman Islands Airports and Regional Setting**


**Figure 2-2 – Cayman Islands Airports and Aeronautical Setting**



## 2.2 THE AVIATION REGULATORY ENVIRONMENT AND THE CAACI

The Civil Aviation Authority of the Cayman Islands (CAACI) primarily functions as the regulatory organization responsible for safety oversight and economic regulation of the aviation industry throughout the territory and to ensure that the Cayman Islands aviation industry conforms to the standards and recommended practices of the International Civil Aviation Organization (ICAO). The guiding legislation to ensure compliance with the ICAO standards and recommended practices is the Air Navigation (Overseas Territory) Order. Furthermore, the CAACI is also responsible for the certification and validation of aeronautical information/data to be published by the Cayman Islands Airports Authority (CIAA) Aeronautical Information Service (AIS), thus ensuring that the quality production requirements of AIS documents and charts and the distribution of the AIS integrated aeronautical information package of ICAO Annex 15 are met.[1]

The primary activities of the CAACI are as follows:

- Regulatory Functions – certification of aerodromes and heliports and air traffic services; registration of aircraft and the issuance, renewal, cancellation, revocation and variation of certificates of airworthiness of aircraft; validation of personnel licenses (crews and maintenance associated with the aircraft registry); and safety oversight for the local Air Operator Certificate (AOC) holders. The ultimate aim of the regulatory activities is to ensure the safety of the travelling public and surrounding environments.

- Economic Regulation – the grant of air transport permits and operating licenses for foreign registered scheduled and non-scheduled carriers operating to the jurisdiction; regulation of charges levied by airport operators with a view to creating equality and fair policies and practices; to provide a liaison to the C I Government and the UK Department for Transport as it pertains to bi-lateral negotiations for international air service agreements; provide input to the Air Transport Licensing Authority (ATLA) as it pertains to licensing of local carriers; provide advice for effective implementation of regulatory policy that is in the best interest of the travelling public/end user.

- The Air Navigation Services Regulation Division of the Civil Aviation Authority of the Cayman Islands is responsible for the certification and regulatory safety oversight of Air Navigation Services Systems. (See sidebar for services listing.)

- Obligations for this responsibility are based on a 1944 agreement called the Chicago Convention which organized its member states into the International Civil Aviation Organization (ICAO). This agreement put in place a commitment to foster the growth and safety of international air transportation through compliance with Standards and Recommended Practices (SARPs) that are attached to the Convention in detailed Annexes.

- The United Kingdom is a signatory to this agreement and the Cayman Islands, as one of its Overseas Territories, accepts the same commitments. The U.K. created the Air Navigation (Overseas Territory) Order 2013 (AN(OT)O), and the more detailed descriptions provided in the Overseas Territory Aviation Requirements (OTARs) to guide its Territorial members to comply with these requirements. More information on ICAO, its Annexes and its associated OTARs can be found in the side bar.

- The applicable OTARs were Gazetted into Law by the Cayman Government in Jan 2008.

- The United Kingdom provides oversight and guidance for its overseas territories through an independent non-profit organization called Air Safety Support International.

[1] www.caacayman.com

- The Air Navigation Services provides Air Traffic Services and Aeronautical Information Services to Owen Roberts and Charles Kirkconnell International Airports in accordance with Air Safety Support International (ASSI) Overseas Territory Aviation Requirements (OTARS) and Annexes to the International Civil Aviation Organization (ICAO).

- ICAO Annex 14 and OTARS Part 139 are applicable

- Aeronautical Information Publication updates (Most recently amended February 2014 , Amendment No. 19/2014)

The master planning process has had full regard for the regulatory environment and guiding principles outlined above and further was confirmed through consultations with the CAACI during the planning period as outlined in Section 5.

## 2.3 OWEN ROBERTS INTERNATIONAL AIRPORT (GRAND CAYMAN)

### 2.3.1 Airport Role and Strategic Importance

Owen Roberts International Airport (ORIA) is a vital part of the Cayman Islands Transportation System and an integral component of the transportation infrastructure for the region. The Airport and surrounding tropical landscape provide visitors and tourists arriving by air an impressive view of the Cayman Islands. ORIA is an International Commercial Service Airport, which serves a diverse aviation community. Scheduled domestic, international, and charter airline service, cargo operations, general aviation and recreational aviation use combine to formulate the major aviation activities at ORIA.

The tourism industry contributes approximately 24% of the Cayman Islands GDP (source: World Travel & Tourism Council). It provides significant employment and entrepreneurial opportunities for residents of the Islands and is also a significant contributor to CIG's revenues. These factors and several others make it one of the two main pillars of the economy. The continued enhancement and development of the airport is an important growth strategy for the Cayman Islands tourism market. As such, the airport is supported by key industry representative groups such as Airlines, Civil Aviation Authority Cayman Islands (CAACI), DoT, Airport concessionaires and Border Control Agencies and key business leaders and business partners. Furthermore, the airport plays a critical role in providing an air transportation hub for hurricane evacuation and relief efforts given that the Islands are located in the hurricane belt.

The growth in passenger, cargo and general aviation activity over the years has meant that the existing capacities of various elements of the airport are inadequate and a master planned approach to evaluating alternatives and recommendations required.

### 2.3.2 History and Airport Setting[2]

Owen Roberts International Airport (ORIA) is located approximately 1.5 km outside of George Town on the island of Grand Cayman in the Cayman Islands, a British Overseas Territory. The Cayman Islands are located in the western Caribbean Sea which is comprised of the islands of Grand Cayman, Cayman Brac, and Little Cayman as shown in Figure 2-1.

Grand Cayman is the largest of the three Cayman Islands at about 76 $mi^2$ (196 $km^2$) and contains the capital George Town. The island is a low-lying limestone reef and its highest elevation is approximately 60 ft. (18 m) Above Mean Sea Level (AMSL). The Island of Grand Cayman is located approximately 450 mi (725 km) southeast of Miami, Florida, USA and 315 mi (507 km) west of the Jamaican capital of Kingston. The eastern side of the island is mainly undeveloped land, while the western portion contains more development and is where the "district" of George Town is located. George Town and the nearby Seven Mile Beach corridor, is the heart of the financial and tourism industry of the Cayman Islands. The district contains an array of restaurants, hotels, shopping plazas, and cruise ship port for tourists to enjoy.

[2] Historical overview taken from 2007 Airport Master Plan and updated where appropriate

The primary way to access all three islands in the Cayman Islands is by air and has been since World War II. The first planes to touch down in the Cayman territory were flying boats that operated out of the North Sound in conjunction with the U.S. Navy base located in George Town, Grand Cayman during the war. King Parker, Jr., a Royal Air Force veteran, piloted the first passenger flights to Grand Cayman out of Tampa, Florida. Normal flight time was five hours and passengers were ferried via a motorboat between the floatplane and a thatch-roofed pier, where customs officers were stationed.

During a time in which Parker's airline was having financial troubles he met a former Royal Air Force wing commander by the name of Owen Roberts who agreed to take over King Parker's Catalina aeroplane and mail contract and by 1950 had established a fairly regular service out of Grand Cayman to Tampa, Kingston, and Belize that changed the lives of many Caymanians who previously relied on boats to get off of the islands.

Mr. Roberts lobbied vigorously for the construction of proper airfields in the Cayman Islands as he knew the civil aviation industry would change rapidly in the coming years. His wishes were soon granted with the construction of an airstrip on Grand Cayman that began in 1952.

The runway was planned to be 150 ft. (46 m) wide and 5,000 ft. (1,520 m) long and was a part of an aerodrome that was by far the largest project that had ever been undertaken in the Cayman Islands. The government purchased land, re-routed the Island's main east-west road, leveled the limestone rock, and filled in the swamps within the site in order to build the airfield. The Cayman Islands Corporation was charged with overseeing the airfield's construction and operation.

On November 28, 1952, Owen Roberts landed one of his Catalina floatplanes on the partially completed new runway. However, Owen Roberts was later killed on April 10, 1953 in a tragic plane crash enroute from Kingston to Grand Cayman. Subsequently, construction of the George Town aerodrome was completed in August 1953, officially opened in March 1954 and named Owen Roberts Field by Governor Sir Hugh Foot.

By 1964, Grand Cayman hosted 2,164 aircraft bringing in 7,283 passengers and the runway was resurfaced and extended to 6,000 ft. (1,830 m). Cayman Airways was established and made its inaugural flight into the United States from Owen Roberts Field in April of 1972. By the winter of 1972-73 Cayman Airways was bringing 1,600 passengers per week into Grand Cayman and other Airlines such as Eastern, Air Jamaica, and Southern Airways were all competing for the Grand Cayman-Miami route. In 1979, 8,733 flights carrying 121,561 passengers were serving Owen Roberts Airport.

The continued growth rates led to the development of a new passenger terminal that opened in 1984 and became fully operational in 1985. The Aerodrome continued to grow and by the end of the 20th century, the Cayman Islands were served by five U.S. airlines along with Cayman Airways, numerous charter operations, and a significant general aviation contingent. In fact, in 2001 over 3,000 private aircraft movements carrying more than 15,000 passengers were recorded resultant of the growing general aviation industry at ORIA.

Today, ORIA occupies approximately 139 hectares (343 acres) of land on Grand Cayman. Refer to Exhibit 1 in Appendix A which depicts the existing airport boundary. The airport is bounded by Owen Roberts Drive to the north, Crewe Road to the northwest, Huldah Avenue to the west and North Sound to the east. The airport lands are recognized in the Cayman Islands Government Development Plan (1997, rev 2010) as shown in Figures 2-3 and 2-4 below.

**Figure 2-3 –Overall Development Plan 1997 (2010 Rev) Grand Cayman Island**

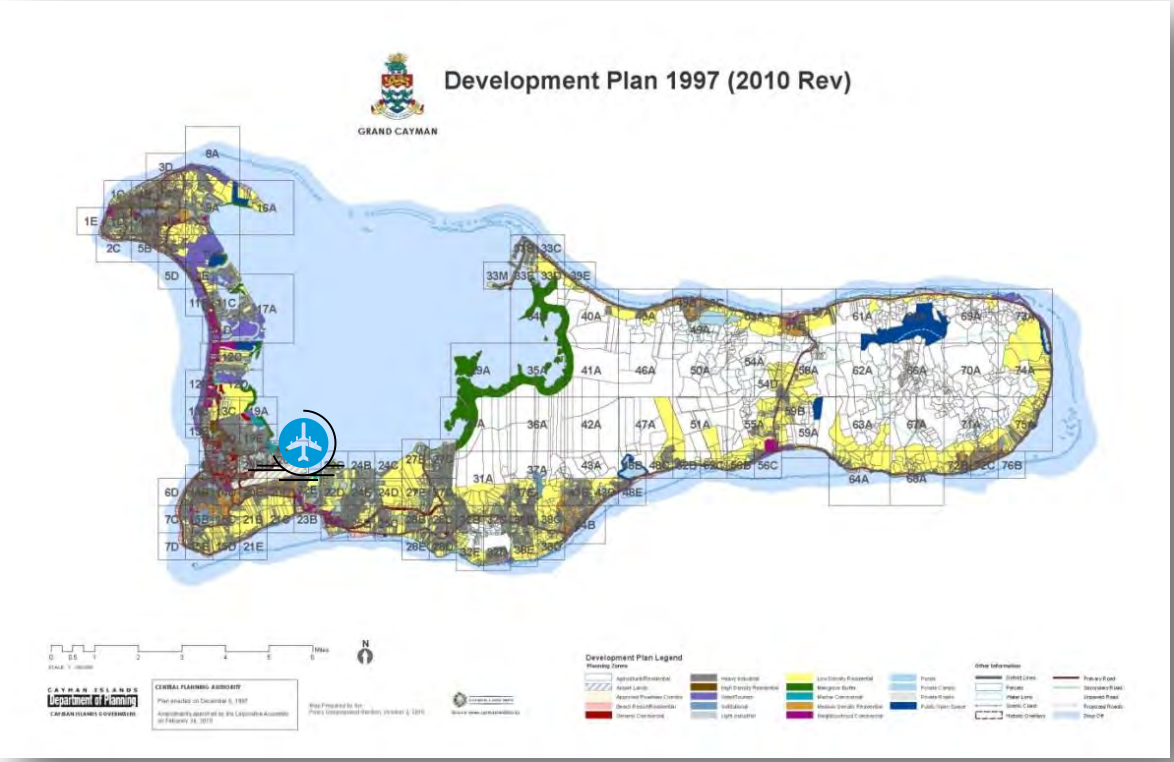
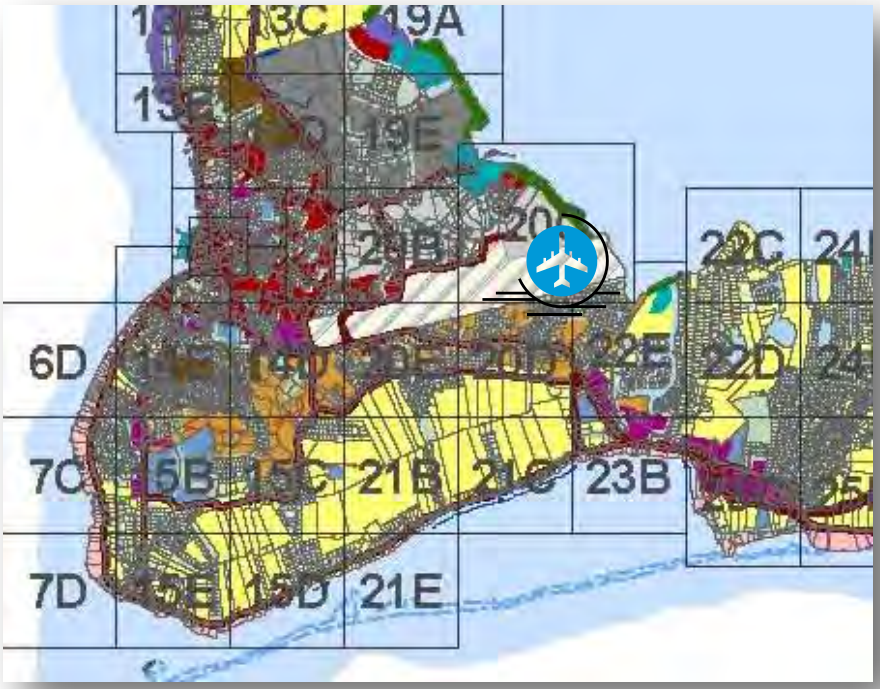



**Figure 2-4 –Development Plan 1997 (2010 Rev) – Airport and Surrounding Area**



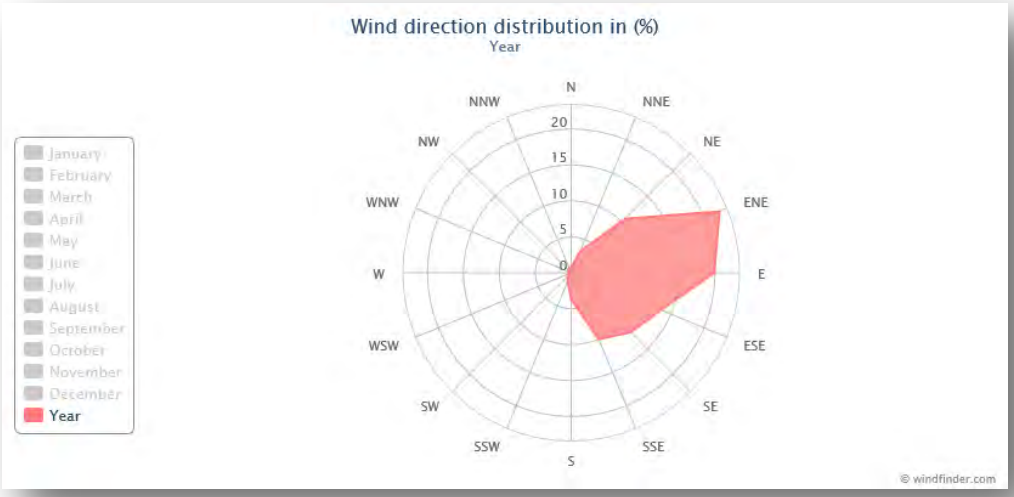
### 2.3.3 Geophysical Conditions and Climate

It is important to understand prevailing meteorological conditions in the general vicinity of an aerodrome to assist in the evaluation of aircraft performance characteristics and airfield design parameters. ORIA is situated at latitude of 53° 53'N and a longitude of 122° 41'W. The Cayman Islands area is located in the Cordilleran Climatic Region and it has a continental type climate with cold winters and hot summers.

In this case the climate is generally tropical in nature, but somewhat tempered due to the north-easterly trade winds. The islands are characterized by warm, rainy summers and cool, relatively dry winters. Average annual precipitation is approximately 56 in (142 cm) and the average temperature ranges from 24 to 32 degrees Celsius in May through October and from 16 to 24 degrees Celsius during the rest of the year. Hurricanes pose a threat from midsummer (June 1) until November 30th. Hurricane Ivan devastated the island in 2004.

Winds generally are from the northeast to east averaging about 9 knots (17 km/h) as shown in Figure 2-5 below.

**Figure 2-5 – ORIA Wind Direction Distribution in %**




Some flooding occurs at the airport but it has been described as not being significant and does not occur on major airfield operational surfaces. The most susceptible areas to flooding are at the east side of the airport including the eastern limits of the runway. Furthermore, Grand Cayman is vulnerable to erosion and flooding since it is located in an hurricane belt increasing the possible magnitude and chances for these phenomenon to happen. Figures 2–6 and 2-7 shows the effect of Hurricane Ivan in terms of the intensity of flooded areas, the airport site being one of the most affected areas with flooding in areas adjacent to the runways and in the eastern mangrove undeveloped areas.

Figure 2-8 also demonstrates ground levels within the airport boundary. The terminal development area and most of the runway system is more than 6 ft. above sea level and when compared to the flooding maps are the least flooded areas.

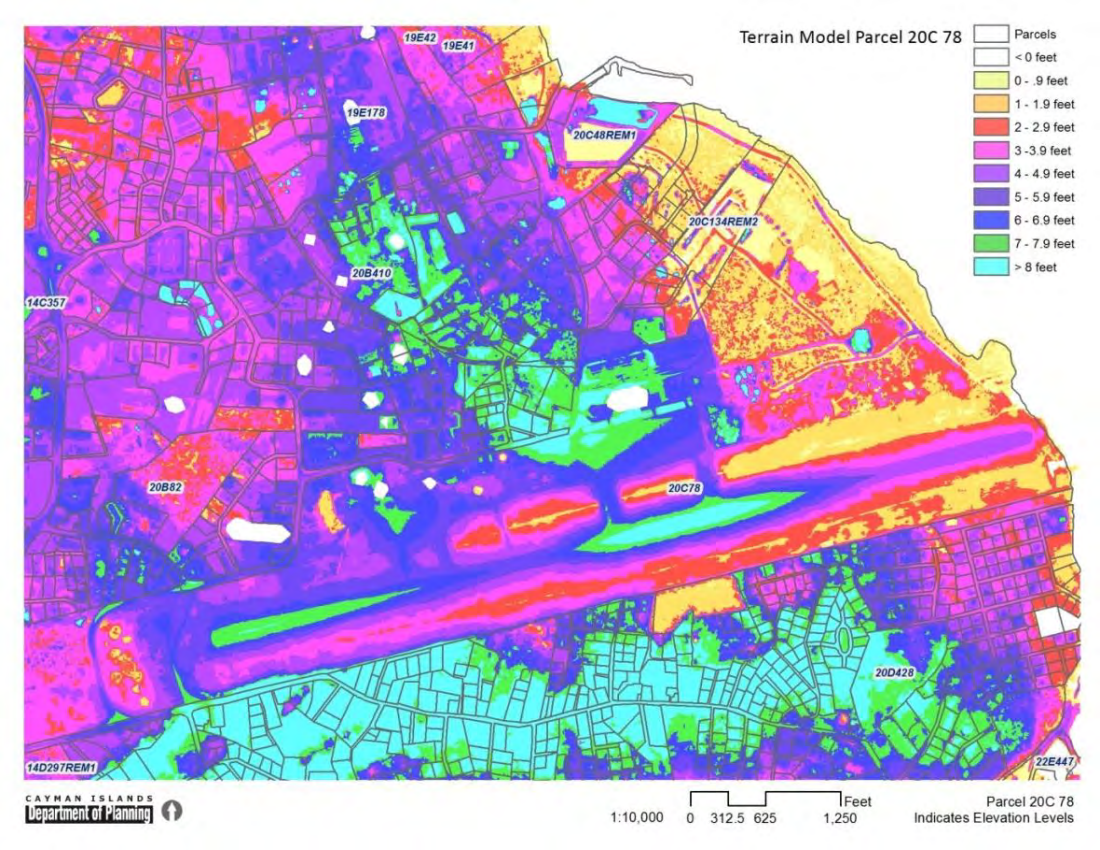
**Figure 2-6 - Grand Cayman Flooding Intensity from Hurricane Ivan**


**Figure 2-7 - ORIA Flooding Intensity from Hurricane Ivan**


*Source: Land and Surveys Department, 2013*

For Airport planning purposes, an aerodrome reference temperature of 22.1°C was used and any new development proposed on the airport was assumed to be built at least 8 ft. above sea level for planning purposes.

**Figure 2-8 - ORIA and Surrounding Area Terrain Model and Elevations**




## 2.3.4 Runway 08-26

The airfield is served by a single runway with an east-west orientation referred to as Runway 08-26. The runway is grooved and measures 7,008 ft. (2,136m) in length and has a width of 151 ft. (46 m). Turn pads are located at each end of the runway for aircraft to use for a full turn-around to either back-taxi or to setup for departure. Runway 08-26 operates under ICAO, Code 4D, non-instrument standards. The runway orientation provides greater than 95% usability under all weather conditions. Refer to Exhibit 1 in Appendix A for airport wind rose. Refer to Figure 2-9 for an existing conditions technical airport diagram as published in the Aeronautical Information Publication[3].

Runway 08-26 has adequate runway markings for non-precision approaches. In addition, Runway 08 is equipped with an Omni-directional Approach Light System, runway end identifier lights (REILS), and high intensity runway edge lights. Runway 26 is equipped with runway end identifier lights and high intensity runway edge lights. Both runway ends have Precision Approach Path Indicator (PAPI) visual approach landing aids. Overall the lighting systems are considered to be in fair to good condition.

The runway was resurfaced in 1993 and was given an overlay in 1998. A detailed pavement condition survey was performed on October 8, 2003 in accordance with the Micro PAVER Pavement Condition Index (PCI) and updated in 2011. The PCI is determined based on existing distresses in the pavement

[3] AIP, as amended February 2014

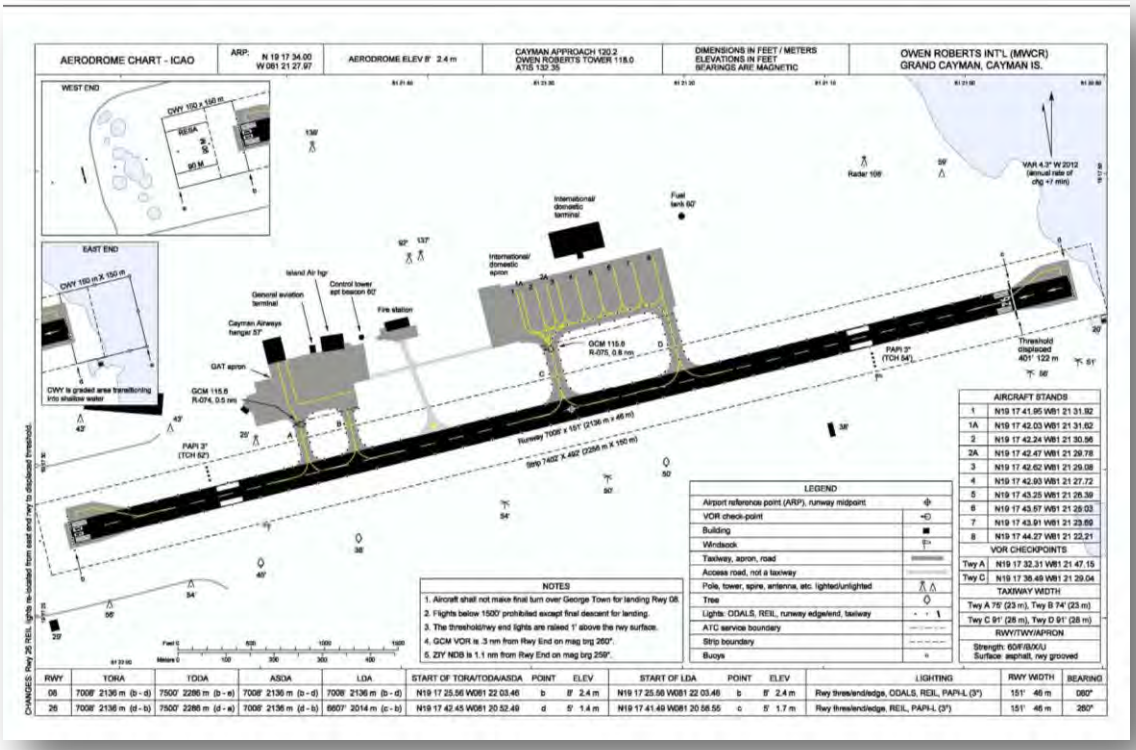
and is a numerical index from 0 to 100 which represents the pavement's functional condition, based on the quantity, severity, and type of visual distress. The latest 2011 survey determined PCI values for Runway 08-26 between 56 and 100. These values classify the runway surface as being between fair and good condition. Lower PCI's were observed in the turn pads at the ends of the runway which were rated at 41-55 or poor. For the remainder of the runway the pavement conditions are considered good and PCI values generally exceed 86. Refer to Figure 2-10.

Furthermore, the runway strength currently is adequate for the aircraft mix using the airport having a published Pavement Classification Number (PCN) of 60/F/B/X/U[4]. Strengthening may need to be considered as part of the planning process to support changes in the aircraft mix and heavier operating weights due to new markets and routes planned by air carriers.

The runway currently has a runway end safety area (RESA) off the western Threshold 08 meeting the minimum dimension for an internationally compliant RESA. There is however insufficient land area for a RESA at the east end Threshold 27 and therefore no RESA is published. Furthermore, the runway configuration at the east end including the threshold and turn pad for Threshold 26 is irregular and does not adequately account for an appropriate runway strip and graded area around the runway system. There are no aeronautical information advisories related to the current layout and it is recommended that as part of any improvements to RESAs at this end that this irregular layout be revised to comply with ICAO Annex 14.

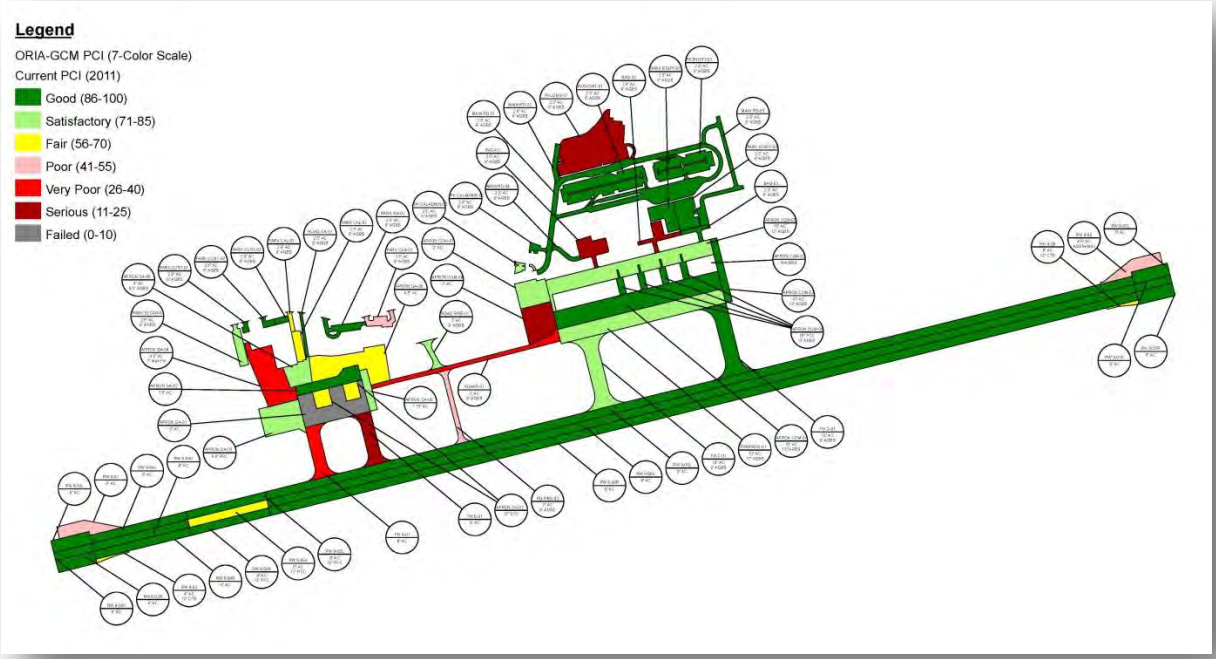
An aeronautical information circular (AC 01/11) describes infringement on the approach surface for Runway 08 (off the west end of the airport) which is a result of a series of power poles approximately 580 metres (1,906 ft.) west of the runway. During the Consultant's site inspections, other potential vegetation and structure infringements were observed along the sides of the runway related to transitional surface zoning but require further analysis.

**Figure 2-9 – Owen Roberts International Airport/Grand Cayman Existing Airport Facilities (AIP)** [5]




[4] AIP, as amended February 2014
[5] AIP, as amended February 2014

**Figure 2-10 – • Owen Roberts International Airport/Grand Cayman 2011 Pavement Conditions [6]**




## 2.3.5 Taxiways

Four taxiways connect two main aprons to Runway 08-26. Taxiways A and B directly connect the General Aviation (GA) apron with the Runway at 1,680 ft. (512 m) and 2,020 ft. (615 m), respectively, from the Runway 08 threshold. Each taxiway is equipped with taxiway edge lights and has a surface that is approximately 75 ft. (23m) in width. Taxiways A and B have 2011 PCI index ratings that conclude the pavements are very poor condition (A) and serious (B). These pavements require rehabilitation in the near future.

Taxiways C and D connect the commercial apron with Runway 08-26 at 3,410 ft. (1,039 m) and 4,220 ft. (1,286 m), respectively, from the Runway 08 threshold. Both taxiway surfaces are approximately 90 ft. (27 m) in width and their 2011 PCI index is satisfactory (C) and very good (D) , respectively. In addition, the taxiways are equipped with taxiway center line lights and taxiway edge lights and paved shoulders. Refer to Figures 2-9 and 2-10.

## 2.3.6 Aprons

***Terminal Apron (Commercial Apron)***

The terminal apron, used primarily for commercial air carriers to load and unload passengers, has a size of approximately 399,600 $ft^2$ (37,124 $m^2$). The apron is divided into eight aircraft stands for parking commercial aircraft. All ground equipment is currently stored to the west of the commercial apron on a paved area measuring approximately 52,000 $ft^2$ (4,830 $m^2$). The condition of the apron taxiway is reported to be between good and satisfactory except for the western portion of the apron, which is reported to be in very poor condition. This section is used for GSE and other support service equipment storage. Refer to Figures 2-9 and 2-10.

[6] Pavement Technical Solutions PTS, February 2012

There are currently eight aircraft parking stands in total on the main commercial apron. During peak period operations, the apron is congested requiring aircraft to hold on taxiways or on the runway. Furthermore, Stand No. 1 is used for B777-300 parking should this aircraft operate at the airport. During this time, the tail infringes on the existing tail of stand road on the apron due to greater length of the aircraft.

Many of the main apron aircraft stands consist of paving stones. The overall performance of these stands has been good over the years but localized failures are now occurring and there is a need for a long-term solution. Any future rehabilitation of these areas should consider concrete hard stands.

Ground services equipment including tugs, air stairs and other airlines support equipment are stored and parked at the western limits of the commercial apron. This area is located west of apron Stand No. 1.

***General Aviation and Commercial Apron (West Apron)***

The General Aviation (GA) apron is linked to the commercial apron via an airside access road used by ground vehicles only. The apron is 265,869 $ft^2$ (24,700 $m^2$) in size and provides parking for aircraft associated with the Cayman Airways maintenance hangar, the Island Air hangar, the GA terminal, the cargo warehouse, the Express Cargo warehouse, and any other GA aircraft using the field. The southern-most and western-most sections of the GA apron are reported to be in very poor condition based on the 2011 pavement condition survey. These sections are some of the oldest sections of pavement on the airport. The rest of the GA apron is reported to be in fair condition. Refer to Figures 2-9 and 2-10.

### 2.3.7 Electronic Navigational Aids and Secondary Surveillance Radar

Electronic navigational aids, commonly referred to as NAVAIDs, assist the pilot with en-route navigation and approaches into and out of airports based on electronic signals and instrumentation in the aircraft. These aids consist of both ground-based electronic systems and a space-based radio system.

The NAVAIDs present at ORIA consist of a Doppler Very High Frequency Omni-directional Range (DVOR), located off the west end of the airport. This DVOR station provides azimuth and distance information utilizing Distance Measuring Equipment (DME). The DVOR operates on the radio frequency 115.6 and provides approach guidance to the Aerodrome as well as en-route navigation assistance.

Aircraft using the airport are also aided by a Non-Directional Beacon (NDB). An NDB transmits non-directional signals whereby the pilot of an aircraft equipped with an Automatic Direction Finder (ADF) can determine bearings and track to or from the station. An NDB is subject to far more erroneous readings and disturbances than a VOR and is therefore used to a lesser extent, however, its simplicity and functionality has kept it in service over the years. The Aerodrome's NDB signal utilizes the 344 MHz frequency and provides en-route and approach assistance to aircraft in the vicinity and is located about 1.8 km or 1.1 miles west of the airport.

Instrument procedures associated with an aerodrome include Standard Instrument Departures (SIDs), Standard Terminal Arrivals (STARs), Instrument Approach Procedures (IAPs), Departure Procedures (DPs) and Visual Approach Procedures. There are published IAPs for Runways 08 and 26 including NDB, VOR, VOR/DME approaches with minimums down to as low as 602 ft. above ground level. These minimums align with ICAO non-instrument runway operations.

The airport is currently not served by a secondary or primary radar facility. A radar facility is located on airport property at the eastern limits of the site as shown in the adjacent image. This radar is owned and operated by COCENSA for monitoring airspace in the region

and for air traffic control and security. COCENSA (Central American Corporation for Air Navigation Services) has entered into a lease agreement with the CIAA which covers renewable periods of 10 years and includes provisions for the CIAA to connect to the facility to provide secondary surveillance feeds to the air traffic control. To date there has been no integration of this facility into the Cayman air traffic management systems.

As part of the master planning process, it was important to understand the development constraints imposed by the radar in particular with respect to potential future development on the airport. To this end, the following siting criteria was provided by COCENSA and used in the master planning process:

***Secondary Surveillance Radar (SSR) Siting Criteria***

1. *Within 300 m of the radar site, no building or other structure should be allowed to exceed a height of 5 m below the geodetic height of the antenna platform. The preference is to have no structure at all or to have trees surrounding the site.*
2. *From 300 to 1,000 m from the radar site, the upper limit on the height of an allowable structure is increased at a rate of approximately 0.007 m per metre. Thus at a distance of 1,000 m from the site, the structure can be as high as the geodetic height of the antenna tower platform.*
3. *Beyond 1,000 m from the radar site, no site protection requirement is specified; however, it is preferable not to have any large structure exceeding 0.25° above the radar horizon. Large structures are defined as having an azimuth of more than 0.43°. No structure that blocks critical airspace should be allowed. The consequences of building such a structure should be brought to the attention of those responsible for approving the proposal for construction.*
4. *In addition, it is essential that all buildings or other structures within 1,000 m of the radar be constructed with non-metallic materials having a low reflectivity at frequencies from 1.0 to 1.1 GHz.*
5. *Radar coordinates and elevation as follows:*

| | |
|---|---|
| *Latitude* | *19° 17' 50.7" N* |
| *Longitude* | *81° 21' 6.9" W* |
| *Height of Radar Antenna* | *33 metres (above ground level)* |

## 2.3.8 Air Terminal Building

### 2.3.8.1 Existing Facilities

The existing Passenger Terminal Building (PTB) at Owen Roberts International Airport was originally constructed in 1984. The PTB is a 2-storey structure with approximately 58,600 sq. ft. provided on the ground level and 13,600 sq. ft. provided on an upper level. All passenger processing functions are located on the ground level, while the upper level of the PTB is utilized for administrative space and accommodates a food and beverage concession, which is open to the public.

The building appears to be in generally good condition structurally, although the interior finishes are somewhat dated and in need of replacement. Mechanical and electrical systems are in fair condition. A number of building systems, including electrical distribution, require upgrading. At present the building does not have a sprinkler system. It should be noted that documentation was limited on as-built conditions of the terminal building. Apart from the two general layout floor plans there was no other documentation available for the existing terminal building. This may cause some difficulties during any proposed renovations. As such it is recommended that an as-built review should be completed for the building as part of any future expansion plans. In general however, maintenance of the building should not be costly (painting, fixing few deficiencies, patch ups, door leaks, perhaps replacing door hardware, repairs to plumbing fixtures, perhaps replacing some deteriorated millwork etc.). Mechanical/electrical systems will require more significant review and consideration.

The building lacks a number of IT systems common to a modern terminal facility. This includes flight information display systems and common use passenger processing capability.

Refer to Exhibits 4 and 5 in Appendix A for existing layouts of the PTB.

#### 2.3.8.2 Check-in/Ticketing

At present, there are approximately 29 check-in positions, which are fully utilized by the air carriers. The check-in positions are exclusively assigned to specific air carriers. Cayman Airways handles a number of air carriers at their assigned counters. In discussions with the air carriers, several indicated that there were an insufficient number of check-in positions. Air carriers would like to have additional check-in positions to accommodate dedicated bag drop functions, and to serve their premium class customers. In addition, there currently is little opportunity in which to accommodate new airline entrants.

The check-in queue area is approximately 29 feet in depth (excluding general circulation), and approximately 3,300 sq. ft. in area. Using an IATA LOS 'C' space standard of 14 sq. ft. per passenger, the area has the capacity to accommodate approximately 235 passengers. During peak periods there is not sufficient space in which to accommodate the check-in queuing demands. This often results in severe congestion in the check-in area and passenger queues that extend outside the building and along the frontage curb.

In discussions with air carriers, many indicated a desire to move towards a common-use passenger processing system (CUPPS) at the check-in counters, as well as the introduction of common use self-serve kiosks located in the departures hall. These initiatives would improve the efficiency of the check-in process and help to alleviate peak period congestion.

#### 2.3.8.3 Passenger Security Screening

At present, there are two (2) passenger screening lanes. Each lane has a processing capacity of approximately 120 – 140 passengers per hour. This is not sufficient to accommodate peak period demand, resulting in long queues that often extend outside the building. This facility is also used to accommodate the screening of non-passengers including airport and airline staff, as well as goods being delivered to the airside concessions.

The area identified for security screening passenger queuing is approximately 835 sq. ft. in area. Using an IATA LOS 'C' space standard of 11 sq. ft. per passenger, the area has the capacity to accommodate approximately 75 passengers. This is not sufficient to meet current or forecasted peak demands.

#### 2.3.8.4 Emigration

An outbound passport control point is located between the passenger screening point and the hold room. At present, specific airlines are providing emigration information electronically to the local authorities. Passengers departing on these airlines are permitted to bypass the emigration control point. Passengers travelling on other carriers, including Cayman Airways and airlines handled by Cayman Airways, are required to report to the emigration counters. In the near future, it is proposed that all air carriers will be providing electronic emigration information, and that this function will be eliminated.

#### 2.3.8.5 Holdroom

The current holdroom is approximately 8,175 sq. ft. in area, and this includes space required for circulation, gate podiums, gate queuing, and the seating area associated with the food and beverage concession. Given the peak period demands, the holdroom area is significantly undersized to accommodate these demands. Air carriers have identified the lack of holdroom space as the single most serious constraint associated with the current terminal operations.

In addition to the lack of space, a second significant constraint associated with the holdroom is the lack of departure gate positions. At present, there are only 4 gate podiums servicing 8 aircraft gate positions.

Washrooms located in the departures holdroom are significantly undersized resulting in poor levels of service.

#### 2.3.8.6 Concessions

The existing air terminal building has approximately 5,000 sq. ft. of concession space located on the two levels. Based on an industry planning metric of approximately 14 sq. ft. per enplaned passenger (for airports with 1 million or less annual enplaned passengers), there is a requirement for approximately 7,000 sq. ft. of concession space, including food and beverage. Based on this metric, the amount of concession space in the terminal is generally inadequate. This includes the lack of an appropriate food and beverage concession located in the holdroom.

In addition to the lack of concession space, there needs to be improvements made to the diversity of products sold and the aesthetics of the retail concessions.

In discussions with concessionaires, it was noted that there is a lack of space in which to store goods. This is often compounded by the fact that concessions are limited to when they can bring goods through the security checkpoint. Ideally, space needs to be provided airside to accommodate the storage of retail goods, included bonded merchandise. There also needs to be a non-passenger screening point that allows staff and goods to bypass the passenger security screening point.

Many of the air carriers indicated a desire to have access to a common-use lounge facility located post security that could be used by their premium passengers.

#### 2.3.8.7 Baggage Make-Up

The existing outbound baggage system is comprised of two (2) take-away conveyor belts that transport checked baggage from the check-in area through the hold bag screening to the baggage make-up area. The baggage make-up area is an open covered space of approximately 5,000 sq. ft. It is comprised of two small inclined-plate make-up devices. The area is congested and the layout of the carousels is not conducive to the efficient staging or flow of baggage carts.

#### 2.3.8.8 Immigration

Currently, there are 12 immigration positions, which depending upon demand, are divided into visitors and residents. In discussions with immigration officials, they indicated that in the future they would have a requirement for an additional 4 counters. Immigration officials also indicated that they are looking at the implementation of automated entry gates for residents.

A major constraint with the existing immigration process has been the lack of queuing space. This has been recently alleviated with the construction of an outdoor covered queuing area. A further constraint with immigration is the lack of administration and support space, which needs to be expanded. Immigration officials indicated they have a requirement for interview booths and soundproof interview rooms, as well as space for forensic investigation and English testing. It was also requested that a raised and enclosed supervisor position be installed with a view to the immigration queue.

Within the immigration area, there is a requirement from the Health Department for an interview/health assessment office as well as storage space.

#### 2.3.8.9 Baggage Claim

The existing baggage claim area is undersized and provides a poor level of service during peak periods. In addition there is no dedicated claim area for domestic arrivals. This presents problems when domestic arrivals occur during the same time period as international arrivals.

Air carriers noted that there needs to be a means whereby passengers can reclaim their checked bags when a flight has been canceled. This needs to be done outside of the international arrivals area. Again, this suggests the requirement for a domestic baggage claim device that does not require access through the customs facility.

#### 2.3.8.10 Customs

The existing customs facility is comprised of 8 inspection counters. Utilizing ‘red’ and ‘green’ flows, these counters are generally sufficient to accommodate peak period demands. There is however a deficiency

in the passenger queuing area and secondary inspection space, which includes space for an x-ray unit, interview/search rooms and storage space for uncleared baggage.

Customs officials expressed the need for a separate domestic airside entrance to the terminal building. At present, domestic arrivals must proceed through the international arrivals area.

#### 2.3.8.11 Airline Support

In discussions with air carriers, most indicated they were satisfied with their current administrative and support space. With any expansion of the terminal, consideration should be given to providing additional airlines support space in order to accommodate new entrants.

#### 2.3.8.12 Administration

At present, there is sufficient space to generally accommodate airport administration staff. There also exists opportunities to relocate some administrative functions to other facilities located on the airport such as the Beach House building.

### 2.3.9 General Aviation and Airside Commercial Facilities

Located to the west of the passenger terminal building, the GA terminal building is shared with the meteorological branch of the CIAA and offers customs and immigration services to general aviation aircraft. This provides some advantageous services as pilots can readily access reliable weather and other flight data information. The meteorological services take up an area of approximately 1,900 $ft^2$ (180 $m^2$), while the GA processing facilities and pilot's briefing room is an additional 2,000 $ft^2$ (185 $m^2$). The GA processing facilities consist of a waiting room, Immigration and Customs processing areas. The waiting room is currently too restricted to accommodate the number of passengers using the GA facilities on a regular basis. The Immigration and Customs facilities are also very small to effectively process pilots and passengers. There is a small parking lot dedicated to the GA terminal area directly to the north of the terminal.

Fixed Base Operator (FBO) and private charter handling services are provided by Island Air Ltd. In addition, Air Agencies and Cayman Airways also provide handling services for general aviation aircraft.

There are three hangars located in the general aviation area, two of which are large bay hangars that are used as maintenance facilities for Cayman Airways and Island Air. The third, smaller hangar is used by the Mosquito Research Control Unit (MRCU) which was recently expanded and redeveloped in 2007-2008.

As noted by the FBO operators during interviews, the existing facilities and apron exceed their capacities during peak periods about 3-4 times per year. During these periods, aircraft parking is cramped and the level of service is well below acceptable standards. Furthermore, many general aviation users will not park their aircraft and will only drop off passengers reducing commercial opportunities and resulting in poor service. Some aircraft will fly to CKIA at Cayman Brac for overnighting before returning to pick up their passengers or they will return to Miami or of their point of origin before returning to pick up their passengers. Overall, there is a need to expand the airside parking apron and improve the GA terminal experience.

### 2.3.10 Air Cargo

A cargo warehouse is located adjacent to the Cayman Airways maintenance hangar and can be accessed from the airside via the GA apron and from the landside by way of Owen Roberts Drive. The warehouse is operated by the customs staff and houses customs administration offices. The building is approximately 18,500 ft2 (1,720 m2). Cargo operators include Cayman Airways, IBC Airways and Ameriflight.

For the most part, cargo is transported in ORIA via the normally scheduled airline services in belly cargo holds. This cargo is load and off-loaded while aircraft are parked during passenger embarking/disembarking process. Some cargo is flown using dedicated cargo aircraft as follows, all to/from Miami:

- Cayman Airways (operated by IFL Group), with a 15,500 lb. capacity Convair 580
- IBC Airways: with a 7,500 lb. capacity Saab 340A
- Ameriflight: with a 4,000 lb. capacity Fairchild Metro

Cargo operations peak following hurricane events when rebuilding requires a major influx of materials to the Islands. During these periods the existing apron becomes extremely congested and has insufficient capacity to handle the required operations. Alternatives need to be considered in the master plan to plan interim apron relief during these peak periods and an ultimate long-term plan for an expanded dedicated cargo area on the airfield.

### 2.3.11 Airline Maintenance and Ground Handling Services

Aircraft maintenance on the Aerodrome is performed by the Aerodrome's only Fixed Base Operator (FBO), Island Air Service. The FBO performs maintenance primarily on GA aircraft through Authorized Inspector and (airframe and power plant) A&P Engineers that are available 24 hours a day and seven days a week. In addition, Cayman Airways provides maintenance to its own fleet in the Cayman Airways maintenance hangar located in the general aviation area. There are no dedicated engine run-up areas on the airfield which has been noted as a concern. Engine testing following maintenance is a frequent occurrence and is now managed during off peak periods on existing apron and taxiways. Future planning should consider designated engine testing areas on the airfield that would minimize noise impacts on surrounding properties and minimize impact on normal airport operations.

Ground handling equipment and services (GSE) are provided to airlines by Cayman Airways and American Airlines and equipment and storage is located at the west side of the Terminal Commercial Apron as described earlier. There is a need for a more organized and covered GSE equipment storage area in close proximity to the Terminal Commercial Apron.

### 2.3.12 Aviation Fuel

The fuel farm is situated to the east of the main terminal building. It is approximately 62,500 $ft^2$ (5,800 $m^2$) in area and has fuel storage for both Jet A-1 and Avgas. Jet A-1 is supplied to the fuel farm via a pipeline connected to a fuel storage area on the southwest coast of the island, while Avgas is transferred to the fuel farm by tanker trucks. The fuel farm supplies fuel to aircraft on both the main apron and GA apron through the use of mobile fuel trucks.

An underground fuel pipe is located within the airfield and feeds into the existing fuel farm. The condition of this fuel pipe is not known however it remains active and the operator (RUBIS) confirmed it is pressure tested annually. Any relocation or upgrades to the fuel facility will need to consider the condition and upgrades required to the existing fuel supply line.

The existing fuel farm restricts expansion of the terminal building to the east and limits the ability to expand the apron for deeper parking positions for larger Code E (B777, B747) aircraft at the airport. The fuel suppliers have jointly confirmed their willingness to relocate the facility.

As part of any fuel farm relocation/re-development, there should be a requirement for the supply of ground vehicle fuels for improved GSE and CIAA operations. Currently no ground vehicle fuels are available making it very inconvenient for airside vehicle operations.

Fuel is delivered on the airport via mobile bowsers. There are no fixed dispensing units and no fuel hydrants.

### 2.3.13 Meteorological and AIS Services

The CIAA operates the meteorological service located in the GA terminal building. The service gathers and disseminates data to aircraft and pilots as well as serving as the national weather service for the Cayman Islands. This station is one of two in the islands and is staffed by eight (8) weather observers and three (3) weather forecasters that split time with the other station located on Cayman Brac.

The station operates satellite data receiving equipment, an Aeronautical Fixed Telecommunication Network (AFTN) system, an automatic weather station, manual weather measuring equipment, plus facilities for a daily balloon release and monitor.

GCM has an operable ATIS and broadcasts the information over the radio frequency 132.35. ATIS is the continuous broadcast of recorded non-control information that is used to improve air traffic controller effectiveness and to relieve frequency congestion by automating certain repetitive information. The information is continuously broadcast over a discrete VHF radio frequency or the voice portion of a local NAVAID. The information includes:

- Time of the latest weather sequence • Altimeter
- Ceiling • Instrument approach and runway in
- Visibility use
- Temperature • Other pertinent remarks
- Dew point
- Wind direction and velocity

There have been known issues with the existing Meteorological compound in its current constrained location. The siting of the equipment is not ideal and a more spacious location is required. The relocation of this equipment is considered a priority to ensure the most accurate and compliant weather reporting is available.

### 2.3.14 Customs and Immigration

Flights originating from outside the Cayman Islands must make their first landing at either Owen Roberts International Airport (ORIA) or Charles Kirkconnell International Airport (CKIA) to clear Customs, Health and Immigration. Offices are located in the main Terminal and the General Aviation Terminal.

The Customs Service conducts the monitoring of incoming passengers and collecting of import duties. There are Customs administrative offices co-located with the cargo warehouse adjacent to the GA terminal area.

The monitoring of arriving and departing passengers falls under the responsibility of the Department of Immigration. Immigration staff based at the airport provide Immigration services in separate shifts. A majority of the staff is located in the passenger terminal where there are 12 arriving passenger positions, five (5) departing passenger positions, two (2) dedicated interview rooms, and two (2) shared detention areas. In addition, there is a desk in the GA terminal that can be used by a single assigned Immigration officer.

Refer to Section 2.3.8 for additional details related to existing customer and immigration facilities in the Passenger Terminal Building.

### 2.3.15 Health Services and Department of Agriculture

The Cayman Islands Department of Agriculture (DoA) maintains an office at the main terminal and is open daily until the last arriving international flight. An Agricultural Health Inspection Services (AHIS) office in also located in the Cargo Express Building. Areas of responsibility include inquiries related to importing plants, produce, animals, meats, seafood.

The Cayman Islands Health Services Authority (HSA), through its Public Health Office also maintains an office at the airport terminal. This office is not normally manned daily but during times of increased health alerts, it is staffed during the opening hours of the Airport

### 2.3.16 Air Traffic Control

The Cayman Islands Airports Authority (CIAA) is responsible for the provision of air traffic control services (ATC) for the entire territory of the Cayman Islands, including its territorial waters as well as the airspace over the high seas within the Cayman Islands TCA. Types of services provided include:

- Aeronautical Information Service (AIS)
- Aerodrome Control (TWR)
- Approach Control (APP)
- Automatic Terminal Information Service (ATIS) at Owen Roberts International Airport only.

Air traffic control is operated out of a 70 ft. (21 m) high tower located between the fire services building and the GA area. Ground, approach, and aerodrome control are all operated out of the tower staffed by six (6) controllers and two (2) supervisors. All operations are completed by established standard procedures as there is currently no radar equipment in the tower. The tower was refurbished with new controller consoles in 2002.

The Island Air maintenance hangar currently causes an obstruction to the view from the control tower of the northwest portion of the GA apron.

The existing tower height was validated against the Federal Aviation Administration's Human Factors Visibility Analysis Tool[7] which used an existing eye level of approximately 16 metres. This height is adequate for viewing the western Threshold 08 in accordance with the FAA criteria. However the furthest point from the tower on the runway is the eastern displacement noted as Point "c" on Figure 2-9 which would require a viewing height of about 22 metres. While the additional height is desirable to fully comply with the tower siting criteria, it can be mitigated through supplemental CCTV cameras for added situational awareness for the controllers. It should be noted that if the displaced threshold for Threshold 26 were used as the control point at the east end, the tower viewing height required would decrease to 20 metres.

### 2.3.17 Aircraft Rescue Fire Fighting (ARFF)

ARFF is provided at ORIA by suitably qualified personnel from the Cayman Islands Fire Service. The Cayman Islands Fire Service (CIFS) is responsible for the provision of airport ARFF in accordance with an MOU between the CIAA and the CIFS. ARFF is organized to ensure rapid deployment of resources to maximum capability when there is an accident, or during any event to satisfy the response time requirements of OTARs Part 140—Rescue and Fire Fighting Services.

The ARFF facility is provided from the fire station located to the north of Runway 08-26 between the GA area and the passenger terminal. This fire station provides both airport and civilian fire services in the area.

[7] https://www.hf.faa.gov/visibility/

The fire station was first constructed in 1988 and includes a major incident control room to handle communications during emergency situations. The fire station is well located, as first responders can reach both runway thresholds within the applicable standards for response time. It should also be noted that any response from this station to civilian incidents outside of the Aerodrome does not affect the response capability of firefighters to respond to Aerodrome incidents or accidents.

ICAO categorizes the level of fire service provided at an aerodrome into ten (10) categories depending on the overall length of aircraft that frequently use the airport. The fire service currently operates at Category 7 but can provide ARFF services up to Category 8 upon request ( up to Boeing 767). All airport fire services officers are trained and certified annually. To supplement the fire station, a rescue boat facility south of the Runway 26 threshold contains two rescue boats are co-located at the facility capacity of 200 persons per boat and all related equipment properly serve marine based rescue operations.

The facility has 3 bays but requires an additional bay to house the 4 ARFF vehicles. Four vehicles could support up to Category 9 ARFF (B777) services but additional staff training and resources would be required. Higher ARFF categories may be required as aircraft fleet mixes may change in the future.

There is also an existing open-air ARFF training facility to the east the terminal and north of the eastern Threshold 26 near the North Sound. The training facility and the associated equipment facilitates continuous training for the fire fighters within the airport property. During these training sessions the existing ARFF vehicles are deployed, tested and used for staff training. Access to this area is provided via airside surfaces.

### 2.3.18 Perimeter Roads and Security Fencing

The airport is surrounded by a chain-link fence with security barbed wire strands around the entire property. The perimeter fence is inspected on a daily basis using a poorly graded access pathway adjacent to the fence. The gravel topped road requires upgrades to provide a safe, smooth and properly interconnected network between the airfield, aprons, taxiways and access gates. Overall the fence condition is in fair condition.

### 2.3.19 Airport Operations and Utilities

Caribbean Utilities Co. Ltd. provides electrical services to ORIA. The main electrical feed is from a substation to the north of the passenger terminal that feeds the terminal on one line and the CIAA Beach House, ATC tower, general aviation area, and airfield lighting on a separate line. There are several standby generators located around the Aerodrome to provide essential services during periods of power outage. Normal operating parameters are: 208/120 Volts 3 Phase 60 Hz with minimal voltage fluctuation. All equipment have a +/- 10% redundancy ratio meaning that equipment can operate within a range of 200/115 to 216/130 Volts.

The runway also has independent automatic stand-by generator to provide backup power. The Stand-by generator is set to start and assume full load within 3 seconds of a loss of mains power. Field circuits for both high and low intensity runway lighting on 08-26 are interleaved. The loss of one circuit will therefore only affect every second runway light in the system. Similarly, loss of a single phase will only affect every other light. Runways 08/26 have a regulator supplying the PAPI system at each end with a selector switch for 08/26. Loss of a regulator will disable the PAPIS at that runway end.

ORIA is equipped with two 150 kW stand-by generators to ensure continuity of airport operations in the event of failure in the main supply. Generators will start within 3 seconds of a power failure and transfer load within 10 seconds. The stand-by generators have the capacity to provide power to sustain all aspects of airport operations such as: runway, taxiway apron lighting, PAPIS, and the ATC tower. The stand-by-generators are routinely tested once a week and fully serviced semi-annually to ensure operational functionality and quality assurance.

ATC Tower systems are all backed up by Uninterrupted Power Supply (UPS) source located in the data room on the second floor of Tower.

At present the batteries in the UPS have a 2.5 hour back-up capability in case of power failure. The generator once started will restore power to complete building and return UPS to stand-by mode.

The airfield Field Electrical Centre (FEC) located near the ATC tower, is in fair to good condition and does not require any major upgrades and has extra capacity for airfield expansions.

The current electrical supply is adequate for the airport's current needs however stakeholders have noted that power in the Passenger Terminal Building has been unreliable and there are frequent periods where only parts of the terminal are powered. Standby generators do not have sufficient capacity to support all areas of the terminal. Concessionaires lose power and must close their space when power is down.

There is also an adequate water supply for the Aerodrome that is fed from the main water plant in the Redgate Road area. This is supplied via a six-inch main water line that provides water pressure at 45 to 50 pounds per square inch (psi). In addition, there have been plans recorded to install a new twelve-inch main water line in order to adequately serve the airport's needs for the foreseeable future.

The existing sewage treatment which serves airport is in fair to poor condition and should be upgraded as part of any future terminal expansion project.

## 2.3.20 Landside Ground Access and Parking

Short-and long-term parking facilities are located directly north of the passenger terminal. Terminal users are provided with 180 short-term parking spaces and 341 long-term spaces. The short-term spaces are closest to the terminal and possess mechanical entry/exit barriers with automated payment facilities. Further to the north is the long-term parking with additional parking north of Owen Roberts Drive. These parking areas also have entry/exit barriers. A system of sidewalks and crosswalks provide pedestrian access to all automobile parking lots.

There also exists an employee parking lot directly to the east of the passenger terminal building that provides 122 spaces for airport staff and a commercial vehicle (taxi) parking and staging area located to the east of the arrivals curb.

Rental car parking facilities are located outside of the terminal building to the north and west of the terminal. Numerous operators provide rental car services on these sites; however, passengers must walk outside in order to access the facilities, which may be an issue in inclement weather.

The existing revenue management system for the car parking lots is outdated and inoperable for most of the time. Equipment is obsolete and the CIAA cannot source parts which are now over eight years old. A detailed review of the parking system and revenue management/collection options should be considered a high priority.

Table 2-1 summarizes all available parking facilities and the adjacent image provides a location map for the various parking facilities.

**Table 2-1 - Summary of Airport Parking Capacity At Grand Cayman**

| Parking lots | Number spaces | Disable | Comments | Total |
|---|---|---|---|---|
| Car rentals (leased land to Avis and Marshalls) | 26 | 0 | | 26 |
| Car rental behind old CAL (leased to Hertz) | 24 | 0 | | 24 |
| Short term | 180 | 5 | | 185 |
| Long Term | 341 | 0 | | 341 |
| Staff parking Gated | 129 | 5 | | 134 |
| Staff Parking | 120 | 2 | Also includes 8 bus parking positions | 130 |

### 2.3.21 Other Non-Aeronautical Uses

The airport is also home to a number of unique non-aeronautical uses. These include a small family amusement sportsplex-parkette west of the MRCU, a cricket pitch at the west end of the runway, a small farmers market at the western limit of the property and a firing range north east of the terminal. These uses are in place through appropriate lease agreements but may need to be reviewed as part of implementing future master plan projects. Where possible, impacts on these uses should be mitigated through relocation elsewhere on the airport or through phased and planned closures due to other higher priority airport expansion projects.

## 2.4 CHARLES KIRKCONNELL INTERNATIONAL AIRPORT (CAYMAN BRAC)

### 2.4.1 Airport Role and Strategic Importance

Charles Kirkconnell International Airport (CKIA) is located on Cayman Brac, about 90 miles northeast of Grand Cayman and 5 miles east of Little Cayman and is the only airport on Cayman Brac. The airport is one of the hubs for Cayman Airways with flights to ORIA on Grand Cayman, and Edward Bodden Airfield on Little Cayman. International flights are currently limited to a once weekly Cayman Airways arrival from Miami International Airport.

The Charles Kirkconnell Airport is pivotal to the growth and development of tourism as it is the only way visitors can access Cayman Brac. The majority of the tourism sector is concentrated on scuba diving with two hotels serving visitors. The long term goal is to create a high quality environment which provides Cayman Brac with well-connected access to the global marketplace.

CKIA currently does not have the proper facilities in place to effectively handle international flights. Some areas experience overcrowding when there are commercial jet operations. Additionally, there is no Hold

Baggage Screening (HBS) facility and checked baggage is currently hand searched. Although this method is allowed as an alternative by international standards, it is not the preferred method to use. Also, this method causes inefficient processing of passengers and consequently, these existing conditions result in a poor passenger travel experience when one commercial jet flight is operating at the airport. The CIAA is currently in the process of expanding the terminal to include the construction of a Hold Baggage Screening (HBS) Room, In-transit lounge, and arrivals hall. This work should be completed in 2014 and will further position the airport to handle more frequent international air traffic and improve the level of service and travelling experience of the passengers.

Similar to ORIA, the airport plays a critical role to providing air transportation for the community on Cayman Brac for hurricane evacuation and relief efforts. This role must be maintained throughout the master planning period.

### 2.4.2 History and Airport Setting

The Charles Kirkconnell International Airport (CKIA), formerly known as Gerrard-Smith International Airport, commenced operations in 1955 when Cayman Brac Airways started an air link to Grand Cayman. It is currently owned and operated by the Cayman Islands Airports Authority (CIAA).

The original apron can be seen north of the runway, in line with the midpoint of the east-west ponds. The airport was fully paved and the runway extended circa 1985 to the current pavement limits. The existing Air Terminal Building (ATB) was built around the same time and original apron was abandoned for the new larger apron that now serves the ATB. All airside pavements were rehabilitated in 2000 and the runway was repaved in 2009. An area between the west-east westerly ponds was filled in during the 2001 project and a runway end safety area (RESA) was constructed off the east end of the runway which involved partial filling of the pond off to the east of the airport and soil stabilization off Threshold 27.

The airport boundary encloses an area of 147 acres (60 hectares) and is located at the western limit of the airport. It connects to local road system via West End East Road. The airport is bounded on the south side by Bert Marson Drive and South Side West Road.

### 2.4.3 Geophysical Conditions and Climate

Cayman Brac lies about 90 miles east northeast of Grand Cayman. It is about 12 miles long and a little over a mile wide. The Bluff is the Brac's most outstanding feature, rising along the length of the island and reaching a height of 140 feet at the eastern end then falling in a sheer cliff to the sea.

Cayman Brac was formed of two distinct formations of calcareous rock. The older limestone, called bluff limestone, was formed in the Oligocene-Miocene period, about 30 million years ago. This limestone forms the central core of each island. It is a dense karst limestone. Surrounding this bluff limestone core is a coastal limestone terrace called "ironshore". Ironshore is a formation of consolidated coral, mollusk shells and marl with some limestone. It was formed about 120,000 years ago in the Pleistocene period. The Pleistocene period was marked by a series of ice ages. After the last ice age, the sea level began to rise slowly from a level about 400 feet below present sea level.

Cayman Brac along with the other islands lack rivers or streams because of the porous nature of the rock and the absence of hills or valleys. The lack of water and sediment runoff into the sea gives the islands the amazing clarity of water around them. In the rock are many cracks and fissures. Soil is found mainly in pockets, though there is arable land, noticeably on top of the Bluff on Cayman Brac.

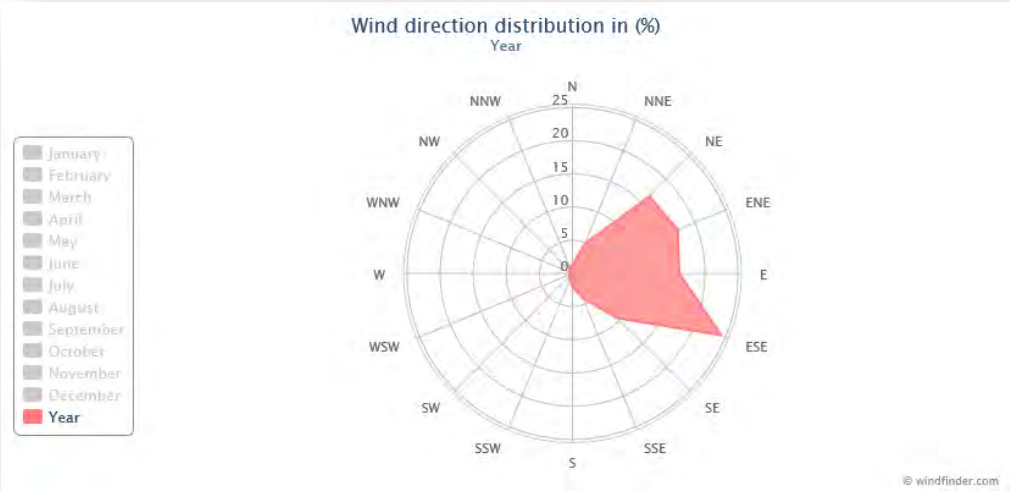
Cayman Brac has a tropical savanna climate with dry winters. The weather on Cayman Brac is pleasant and relatively predictable. The Brac's balmy tropical climate and many temperate days can make it feel like summer all year round with average temperatures ranging from temperatures range from 25°C (77°F) (Feb) to 29°C (83°F) (July). The rainy season occurs in May-August and hurricane season begins on June 1 and ends on November 30.[8]

[8] http://www.cayman.com.ky/geography-geology

Overall the CKIA has poor drainage patterns and generally slopes from north to south with drainage being directed into the ponds on the south side of the runway.

Winds generally are from the east, southeast averaging about 9 knots (17 km/h) as shown in Figure 2-11 below.

**Figure 2-11 – CKIA Wind Direction Distribution in %**




## 2.4.4 Runway 09-27

The airfield is served by a single runway with an east-west orientation referred to as Runway 09-27. The runway is grooved and measures 6,010 feet x 148 ft. (1,832m x 45m). There are no turn pads located at the runway ends since the aircraft using the airport are capable of conducting turn-arounds on the runway. Runway 09-27 operates under ICAO, Code 4C, non-instrument standards. The runway orientation provides greater than 95% usability under all weather conditions similar to ORIA. Refer to Figure 2-12 for an existing conditions technical airport diagram as published in the Aeronautical Information Publication[9].

Runway 09-27 has adequate runway markings for non-precision approaches. In addition, both runways are equipped with runway end identifier lights (REILS), high intensity runway edge lights and Precision Approach Path Indicator (PAPI) visual approach landing aids. Overall the lighting systems are considered to be in good condition.

The runway is both functionally and structurally sufficient for the future anticipated traffic forecast. The current 2011 PCI is 93 or Good and the remaining structural life is greater than 20 years. The last major rehabilitation of the runway was completed in 2009. Refer to Figure 2-13 for PCI ratings for all pavements as of 2012.

The runway currently is published with runway end safety areas (RESA) off both ends. The western RESA (Runway 27) as shown on aeronautical publications and through further analysis, projects into the sea which would not meet the definition of a RESA. As such, while published as RESA, it requires further review and possible alterations to the airfield layout to move this RESA onto land that can be managed by the airport as an ICAO compliant RESA. It is also understood that the CAACI also does not consider this RESA as compliant.

[9] AIP, as amended February 2014

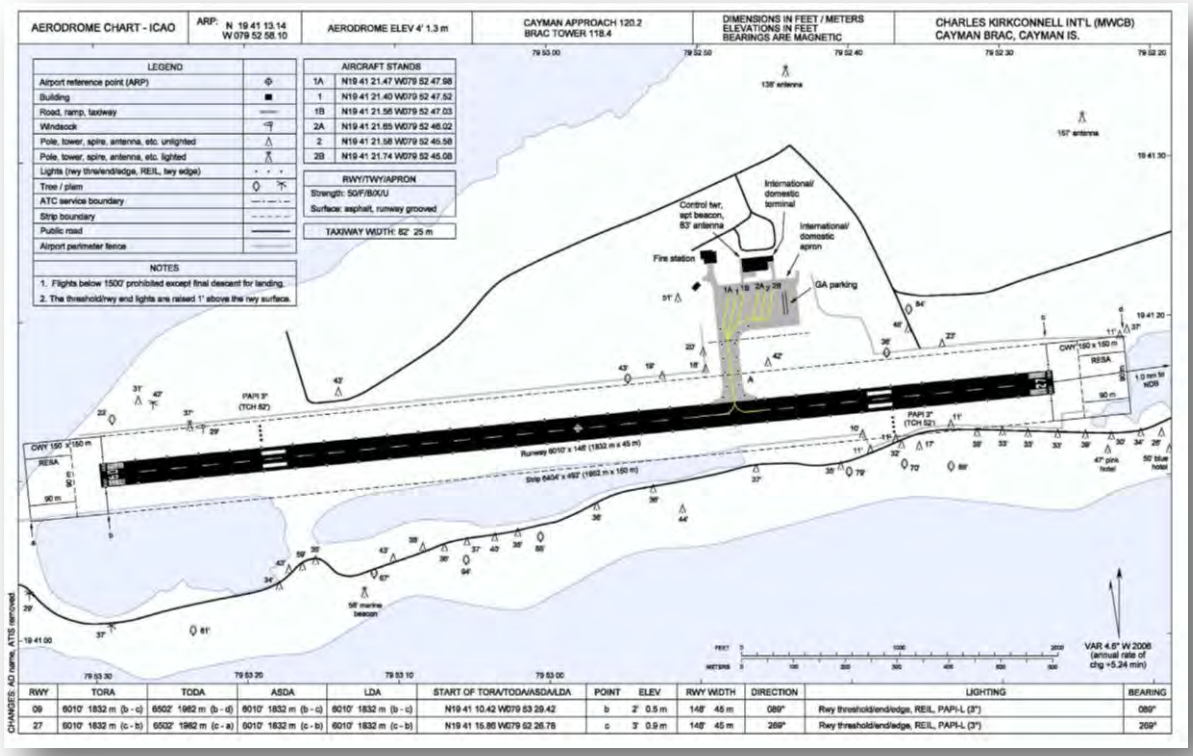
The eastern RESA (RESA 09) was constructed in the recent past and is fully contained on airport property and meets ICAO criteria for a RESA. Other than routine maintenance which has included filling of some sink holes in the past it has performed well.

There were a number of obstacle limitation surface infringements observed during the Consultant's site inspection in particular at the airport boundary limits along the length of the runway. For the most part, the infringements observed were related to transitional zoning since the airport boundary is just wide enough to accommodate the 75m runway strip on both sides of the runway. Vegetation/trees are located just outside of this boundary and can vary in height from approximately 4-15 metres. The transitional zoning surface commences at approximately the ground level at the limit of the strip and projects upward at a slope of 14.3%. Many of the trees including the security fence in close proximity of the airport boundary project well above this surface.

Furthermore, the first 1,500m of runway strip south of the threshold of Runway 27 is less than the required minimum of 75m from the runway centreline due to the property boundary narrowing and the presence of two large ponds.

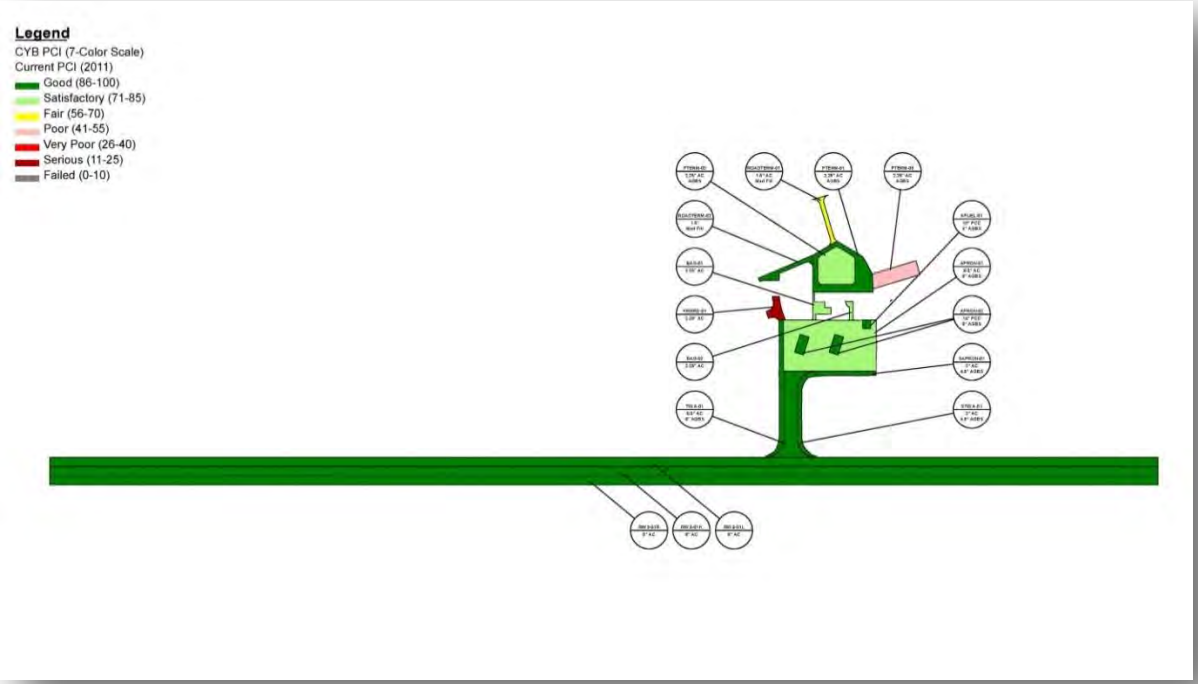
Drainage along the runway has been a challenge due to its relatively low elevation relative to sea level. The runway varies from about 2 ft. to 3 ft. above sea level. During heavy rains, there is a potential to lose 300-360m (1,000 – 1,200 ft.) of the western end of the runway because of flooding of the ponds. An average, the runway floods one to two times per year and lasts for two to three days. Records have indicated that in 33 years there have only been 2 instances of almost total flooding of the airfield. Future runway rehabilitation projects should consider raising the elevation of the runway and making improvements to the infield drainage systems.

**Figure 2-12 – Charles Kirkconnell International Airport/Cayman Brac Existing Airport Facilities[10]**




[10] AIP, as amended February 2014

**Figure 2-13 – Charles Kirkconnell International Airport/Cayman Brac 2011 Pavement Conditions [11]**




## 2.4.5 Taxiways

One Taxiway A connects the commercial apron with Runway 09-27 at about 500 ft. (150 m) in length. The taxiway surface is 23 m in width with a 2011 PCI index of 90 which is considered Good. The taxiway is also equipped with taxiway edge lights and illuminated signs.

The taxiway is both functionally and structurally sufficient for the future anticipated traffic forecast. With a current PCI of 90, the remaining structural life is greater than 20 years.

Refer to Figures 2-12 and 2-13.

## 2.4.6 Aprons

Only one apron serves the airport and provides aircraft parking for both commercial and general aviation aircraft. There are two Code C (B737) parking stands or up to four Code B (Twin Otter) stands. The apron is primarily used for commercial air carriers to load and unload passengers, has a size of approximately 130,000 $ft^2$ (12,100 $m^2$). The condition of the apron is reported to be good with a 2011 PCI Index of 83. The apron is equipped with blue apron edgelighting and flood lights.

The apron is both functionally and structurally sufficient for the future anticipated traffic forecast. The remaining structural life is greater than 20 years for both sections. Refer to Figures 2-12 and 2-13.

The existing apron adequately serves air traffic at CKIA. There are 2 - 3 peak periods throughout the year where some overflow general aviation aircraft will fly to CKIA to park on the apron due to parking congestion or unavailability at ORIA. Other than these peak periods, there is a limited demand for GA parking on the apron and it does not impact commercial air carrier operations.

[11] Pavement Technical Solutions PTS, February 2012

### 2.4.7 Navigational Aids and Secondary Surveillance Radar

The airport is served by a non-directional beacon (NDB) operating on a frequency of 415 Hz which is located about 1 nautical mile (1.8 km) to the east of the airport along the projected runway centreline. This electronic navigational aid provides the necessary ground-based guidance for aircraft conducting instrument approach procedures. Instrument procedures associated with the airport include NDB and RNAV (GNSS satellite based) Instrument Approach Procedures (IAPs) with minimums down to as low as 456 ft. above ground level.

There is no secondary surveillance radar at CKIA.

### 2.4.8 Air Terminal Building

#### 2.4.8.1 Existing Facilities

The Cayman Brac Passenger Terminal Building (PTB), originally constructed in 1989, is a one-storey facility with a partial second floor and an elevated air traffic control tower. The ground level is approximately 9,000 sq. ft., while the second level is approximately 2,970 sq. ft. All passenger processing functions are located on the ground level.

The building is currently undergoing an expansion/renovation to accommodate a future in transit lounge and expanded hold bag screening system which is expected to be complete in 2014.

The building appears to be in generally good condition, however it does appear dated and some elements, such as windows, require some minor repairs and a general refreshing.

#### 2.4.8.2 Check-in/Ticketing

At present, there are 4 check-in positions, plus a 5th position that was previously used as an air cargo counter. The departures hall is approximately 875 sq. ft. in area, which is appropriately sized to accommodate passenger demands associated with a single 50-seat regional turboprop, but is generally undersized to accommodate passenger demands associated with a Code C aircraft such as the B737.

#### 2.4.8.3 Passenger Security Screening

At present, there is a single screening lane, which is located in a physically constrained area. With longer divestment tables the throughput capacity of the passenger screening point would likely increase. The single passenger screening lane is sufficient to meet the long term needs of the airport.

#### 2.4.8.4 Holdroom

The current holdroom is approximately 1,485 sq. ft. This is sufficient area to accommodate passenger loads associated with regional turboprops and the B737. In addition to the existing holdroom, a second departure holdroom is to be constructed that will serve as an ‘in transit’ lounge and will be completed in 2014. This facility will be 1,165 sq. ft. in area and can serve as a second departure holdroom.

#### 2.4.8.5 Concessions

The existing air terminal building has accommodation for a small retail concession located off of the departures holdroom. Given the infrequency and size of flights originating from this airport, the airport is likely best served with the provision of vending machines.

#### 2.4.8.6 Baggage Make-Up

The existing outbound baggage system is comprised of a single take-away conveyor belt that transports checked baggage from the check-in area through hold bag screening to the baggage make-up area. This area is also being expanded and modified and will be completed in 2014 to include a separate search room and an expanded space for new screening equipment and handling areas. The expansion comprises about 1,056 ft. for new covered and enclosed space.

#### 2.4.8.7 Baggage Claim

The baggage claim area is comprised of a single claim device with an exposure of approximately 44 linear ft. This exposure is sufficient for a 50-seat regional aircraft, but undersized for Code C aircraft such as the B737.

#### 2.4.8.8 Customs

The existing customs facility is comprised of mobile inspection counters that are moved into the baggage claim area when required. Given the uncertainty of scheduled international flights, this arrangement is probably satisfactory for the short to medium term.

#### 2.4.8.9 Airline Support

Airline support requirements at Cayman Brac are minimal, and could likely be accommodated in the administrative area.

#### 2.4.8.10 Administration

At present, there is sufficient space to generally accommodate airport administration staff.

### 2.4.9 General Aviation and Airside Commercial Facilities

The eastern portion of the main terminal apron is allocated for general aviation parking. There is no General Aviation Terminal (GAT) or FBO operating at the airport. During peak periods general aviation aircraft will use Cayman Brac for parking due to congestion at ORIA.

### 2.4.10 Air Cargo

There are no dedicated cargo facilities at the airport. Cargo is handled on the main terminal apron in conjunction with other air carrier operations.

### 2.4.11 Airline Maintenance and Ground Handling Services

There are no dedicated airline maintenance facilities at the airport. Ground handling equipment is stored north of the apron in a grassed area between the Air Terminal Building and the ARFF facility. Ground handling at CKIA is provided by Cayman Airways.

### 2.4.12 Aviation Fuel

A fuel storage area is located east of the existing Air Terminal Building and directly north of the main apron. This location limits the expansion of the terminal to the east and restricts development of any potential commercial airside hangar or FBO facilities adjacent to the apron. Furthermore, given prevailing winds are from the east, any fire event at the fuel depot could negatively impact terminal operations. Alternative locations should be considered as part of long-term master planning.

Fuel is delivered via mobile bowsers and a fixed dispenser located at the northeast corner of the apron. The fixed dispenser is used primarily for small general aviation aircraft. There are no fuel hydrants serving the airport.

### 2.4.13 Meteorological and AIS Services

The airport is served by an automatic weather observation system (AWOS) which reports weather automatically via a dedicated frequency to pilots.

AIS services are available at the airport.

Some meteorological instrumentation exists in a grassed area between the Air Terminal Building and ARFF building. This equipment should be relocated within the airport boundary for improved separation and clearances from buildings and paved surfaces.

### 2.4.14 Customs and Immigration

Customs and immigration services are available to accommodate international arrivals at CKIA. Refer to Section 2.4.8 for additional details.

### 2.4.15 Health Services

Health and sanitation services are available.

### 2.4.16 Air Traffic Control

The Cayman Islands Airports Authority (CIAA) is responsible for the provision of air traffic control services (ATC) for the entire territory of the Cayman Islands, including its territorial waters as well as the airspace over the high seas within the Cayman Islands TCA. Types of services provided include:

- Aeronautical Information Service (AIS)
- Aerodrome Control (TWR)
- Approach Control (APP)
- Automatic Terminal Information Service (ATIS) at Owen Roberts International Airport only.

Air traffic control is operated out of a 70 ft. (21 m) high tower co-located with the Air Terminal Building. Ground, approach, and aerodrome control are all operated out of the tower. All operations are completed by established standard procedures as there is currently no radar equipment in the tower.

The tower height was validated against the Federal Aviation Administration's Human Factors Visibility Analysis Tool[12] which confirmed that the existing eye height is satisfactory. However, sight-lines are obstructed at the airport due to natural vegetation and some minor infringements by buildings. This issue is mitigated through Closed Circuit TV (CCTV) cameras allowing flight observation in the affected areas. This issue is directly related to the transitional zoning infringements referred to under Section 2.4.4. The removal or trimming of the vegetation will not only improve ATC sight-lines but will ensure regulatory compliance with obstacle height limitation requirements for the runway.

The tower should also be reviewed in terms of Code Compliance as related to fire exits. The existing tower only has one exit which may not be sufficient. The provision of a second exit may be complicated but requires further review as part of a full structure code compliance review.

### 2.4.17 Aircraft Rescue Fire Fighting

ARFF is provided by suitably qualified personnel from the Cayman Islands Fire Service and is located in a combined ARFF/domestic fire hall west of the Air Terminal Building. The CKIA Airport ARFF is responsible for the provision of airport ARFF at CKIA in accordance with an MOU between the CIAA and the ARFF.

The ARFF at CKIA operates at an ICAO Category 3; however, Category 6 service is available on request for B737 jet traffic. Scheduled jet operations are automatically covered at Category 6 level; ATC will notify ARFF when Category 6 coverage is required. In the event of non-scheduled movements ATC will notify the ARFF if there is a requirement above Cat 3.

[12] https://www.hf.faa.gov/visibility/

The ARFF service at CKIA is organized to ensure rapid deployment of resources to maximum capability when there is an accident, or during any event to satisfy the response time requirements of OTARs Part 140—Rescue and Fire Fighting Services.

Access to the runway for the ARFF vehicles is currently Taxiway A. This route can be potentially obstructed due to taxiing aircraft or an aircraft holding on the taxiway. There is a need to provide a dedicated ARFF access route to the runway that maintains appropriate aircraft clearances and does not impede either aircraft operations on the taxiway or the ARFF vehicles. There appears to be sufficient space between the taxiway and the property boundary to accommodate a dedicated road.

## 2.4.18 Perimeter Roads and Security Fencing

Most of the airport boundary is enclosed by a an airport perimeter fence. The fence varies in condition from poor to fair and is chain link, approx. 5 ft. high with a barbed wire top. There is no defined perimeter access road and patrol vehicles now follow the fence and water boundaries on existing terrain. This leads to added wear and tear to the patrol vehicles and inadequate control of vehicle position and control during aircraft operations.

The existing patrol vehicle pathways are a safety issue due to irregular locations of the patrol paths throughout the site relative to the runway. For many areas along the property perimeter, the pathway will be very close to if not inside the runway strip. Typically, this is not desirable as the strip should be clear of all objects during flight operations. Ideally the perimeter road is located outside the strip and clear of any obstacle limitation surfaces.

## 2.4.19 Airport Operations and Utilities

Water and sanitary services are provided through on-site desalination and a sewage tank with effluent wells, respectively.

Cayman Brac Power & Light provides electric power to CKIA for all its electrical operational needs. The service entrance for the CKIA is a 1000 Amp 208/120V 3 Phase system; the system enters the Terminal Building through an 800 Amp Transfer switch. The airport is also equipped with a standby power generator source to cover contingencies. The standby generator is 200 KVA 208/120V 3 Phase. The Standby Generator is set to start within 3 seconds, and to transfer full load within 10 seconds. The purpose of the Standby Generator is to supply power to the airport to ensure continuity of airport operations if there is failure in the main supply. The stand-by generator has the capacity to provide power to sustain all aspect of airport operations such as: runway, taxiway, apron lighting, PAPIS, and the Airport Fire Station. The stand-by-generator automatically performs a test run once a week to ensure operational functionality and quality assurance.

## 2.4.20 Landside Ground Access and Parking

Landside access is provided to CKIA via the West End East Road on the north side of the airport. Three designated landside parking areas are available including Short-term Parking, Long-Term Parking and Staff Parking. The approximate number of parking stalls are:

- Short-term – 103 plus 3 handicapped
- Long-term – 45
- Staff-Parking - 19

The only noted period of parking congestion occurs during B737 operations. The congestion is short-lived and is

cleared quickly following the arrival of the aircraft and passengers.

None of the landside pavements at CKIA are displaying structural deficiencies as of 2011. However, there are three (3) sections which are functionally deficient. The fire road is in the poorest condition with a PCI of 24 (serious). A complete reconstruction of this section should be considered in the short-term. Portions of the Terminal Parking are poor to fair and should also be considered for rehabilitation in the medium term. The primary distresses present in the above referenced sections are weathering, raveling, and some localized patching. Refer to Figure 2-11.

## 2.5 LITTLE CAYMAN AIRSTRIP

### 2.5.1 Role and Strategic Importance

Plans for a new airport in Little Cayman have been under consideration by the Cayman Islands Government (CIG) since the late 1990s which culminated in the preparation of a 2002 Airport Master Plan. The Airport Master Plan investigated the existing site but recommended the airport be developed on a new site for an expanded airport facility. The airport land for the new site is owned by the CIG.

The existing airstrip currently operates under an exemption of air worthiness as described in CAACI's Aeronautical Information Circular AC 01/10. In general, the advisory states *"Edward Bodden Airfield (MWCL) is a private, uncertified aerodrome. It is also uncontrolled and private operators use it at their own discretion and at their own risk."* Cayman Airways operate their Twin Otter turbo propeller aircraft at Little Cayman under their own special operations specification to provide domestic air service between CKIA and ORIA.

There are a number of constraints associated with the existing airstrip. The airport is situated on a number of privately owned parcels of land with no formal agreements in place between the landowners and the CIG. In addition, the airport does not meet international regulations for airports with the most significant infringements related to an adjacent roadway, electrical utility lines and mature vegetation all in close proximity to the runway. There is also residential coastal development being planned in close proximity to the existing facility which, if approved by CIG, could preclude the continued use of the airstrip.

CIG recognizes the need to ensure air travel options are available to Little Cayman due to growth in tourism opportunities and for hurricane evacuation and relief efforts. CIG and CIAA recognize that any expansion of the airstrip should be done in concert with the simplicity and environmental sensitivity of Little Cayman.

As part of the long term strategic plan for the Little Cayman Airport, the CIAA would own and operate the facility similar to ORIA and CKIA. CIAA will play an important role in the final airport development plans for Little Cayman.

### 2.5.2 History and Airstrip Setting

The land where the airfield is situated is owned by several different private landowners, and has been since the 1960s. In the past, two landowners have applied to create two new subdivisions on lots directly north of the runway.

The airport is located at the most southwestern limits of Little Cayman less than 500m from the sea and just west of Blossom Village. Road access is provide via Sam McCoy's road.

Sam McCoy's road is a paved road about 30 m south of the runway centreline. Power utility poles were measured at about 9-10m in height about 45m south of the runway centreline. Vegetation / low tree cover to the north was measured at about 7-9m in height. The cleared area on each side of runway centreline is estimated at about 60m. A dwelling is located about 60-70 metres south of the runway close the western end of the site. This dwelling infringes on the transitional zoning for the runway.

Blossom Village is a built up area just east of the airstrip and is located directly under the approach/departure path for the runway. The Preston Bay Westerly Ponds are considered ecologically important wetland and are located just off the west end of runway. These wetlands are shown as Crown Land on official environmental planning maps as shown in Exhibits 14 and 18 in Appendix A. The Habitat Action Plan identifies a number of key mangrove habitats that should be protected including Crown wetlands.


The Salt Rock Trail is another feature in the vicinity of the existing airport and is located north of the airstrip. This trail is considered very important to tourism since most visitors to Little Cayman walk the trail for its scenic and historic value.

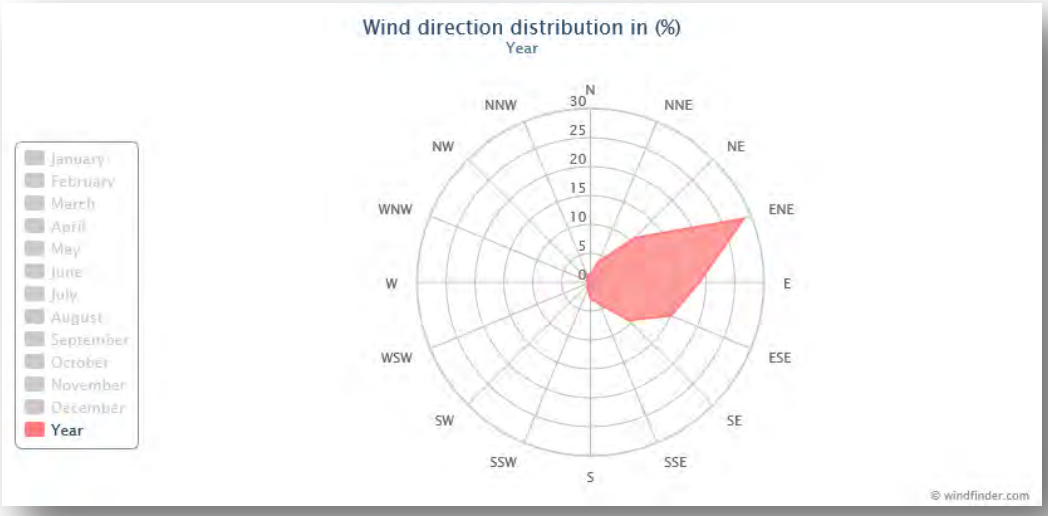
## 2.5.3 Geophysical Conditions and Climate

Little Cayman is five miles west of Cayman Brac and is ten miles long and two miles at its widest point. It is the flattest of the three islands with its highest elevation being 40 feet AMSL. To the west, a five mile channel separates Cayman Brac from Little Cayman. All the islands lack rivers or streams because of the porous nature of the rock and the absence of hills or valleys. The lack of water and sediment runoff into the sea gives the islands the amazing clarity of water around them. In the rock are many cracks and fissures. Soil is found mainly in pockets, though there is arable land.

Little Cayman has a tropical savanna climate with dry winters. Similar to Brac, the weather on Little Cayman is extremely pleasant and relatively predictable. Average temperatures range from 25°C to 30°C (July) and average about 29°C . The rainy season occurs in May - August and hurricane season begins on June 1 and ends on November 30.[13]

Prevailing winds are primarily from the east-northeast averaging about 12 knots (24 km/h) as shown in Figure 2-12 below.

**Figure 2-14 –LCA Wind Direction Distribution in %**




[13] http://www.cayman.com.ky/geography-geology

### 2.5.4 Existing Airstrip Facilities

The airfield is available seven days a week for day VFR operations only and operates as a private and uncertified facility as outlined in CAACI's Aeronautical Information Circular AC 01/10.

Flights operating to and from Little Cayman Airfield (LCA) are to operate in accordance with Visual Flight Rules (VFR) and will be given traffic information in respect of all other known flights operating within the Cayman Islands TMA, Class D and Class G Airspace.

The existing east-west Runway 10-28 is 998m (3,275 ft.) in length and 10m (35 ft.) in width. The runway is comprised of stabilized asphalt surrounded by a grass strip. There is a single transverse white line marking the threshold of each runway. In addition, the threshold of Runway 28 is marked with two white arrows indicating a 182m (600 ft.) displaced threshold. This is an uncertified strip and these markings are only provided for the use of Cayman Airways Express. The distance between the marked thresholds is 762m (2,500 ft.). The runway is not lighted but is served by one wind direction indicator near the middle of the runway on the north side. The runway provides in excess of 95% usability under all weather conditions based on a 13 knot crosswind limitation[14].

The runway connects at the eastern limits to an apron offset to the south of the runway centerline permitting temporary aircraft parking for passenger and cargo loading and unloading. The apron adjacent to the Airport Terminal is reserved for Cayman Airways Express. All other aircraft park on the grass area to the north east of the Runway 28's 'displaced threshold'. Tie-downs and chocks are not provided at the airport.

LCA has one terminal reception building structure about 10m x 12m in size. This building accommodates not only commercial passenger and general aviation operations, but fire department and post office services. This is a gravel parking facility capable of accommodating approximately 15 to 20 parking spaces adjacent to the terminal.

There are two Oshkosh aircraft fire rescue vehicles providing Category 3 ARFF coverage for the Cayman Airways Twin Otter aircraft. The vehicles are positioned adjacent to the air terminal building under one covered bay and one open parking space. Agents and other supplies are stored outside behind the air terminal building.

There are no Customs, Health or Immigration facilities at LCA as all arriving and departing international flights are cleared through either CKIA or ORIA before proceeding to LCA.

No fuel or hangars are available at LCA.

[14] 2002 Airport Master Plan

### 2.5.5 Government Lands – Future Airport Location

The Cayman Islands Government has assembled a tract of land about 2 kms northeast of the existing airstrip in an effort to relocate and redevelop a new fully certified public use airport on Little Cayman. The property is located just East of Spot Bay Road and South of Bloody Bay Point and was selected by the CAA and CIG as a suitable location for a new airport facility. There are three Crown Properties at this location to be utilized for the airport site with the following legal description (Refer to Exhibit 17 in Appendix A)

- Registration Section = Little Cayman West, Block = 80A, Parcel = 88
- Registration Section = Little Cayman West, Block = 80A, Parcel = 97
- Registration Section = Little Cayman West, Block = 82A, Parcel = 4

Although the proposed site is a Crown Property and owned by the Cayman Island Government, there are a number of constraints associated with the development of a new airport. Some of the more significant challenges based on the Consultant's site inspections and consultations include the following:

- The existing terrain on the proposed site is only a few feet above sea level. The runway will need to be situated to take advantage of some locations with higher ground to reduce grading. Still, a new runway and terminal area will require extensive grading to provide appropriate profiles. The proposed site is very wet and low lying in particular towards the east end, and on the south side.
- The airport is to be relocated requiring the construction of new terminal building facilities. This also requires clearing and grading of the site to accommodate the new terminal area and associated buildings. At a minimum, facilities will have to be provided to accommodate a small terminal reception building and aircraft rescue and firefighting facilities.
- A public land fill is located at the east end of the site but is under the control of CIG. It is located within the airport lands. This land fill will need to be relocated.
- The habitat around the proposed new airport consists of a mixture of dry shrubland and dry forest and woodland. DOE explained that these two vegetation types were very rare for the islands. The Little Cayman dry shrubland and woodland are considered the best example of these habitats for the islands.
- Near the east end of the site there is a mangrove area with black, white and red mangrove trees.
- Soils conditions were typical wetland soil which showed signs of periodic flooding.
- On the western side of the proposed site there was a system of paved roadways for what appeared to be a proposed sub-division which would could fall under the approach/departure path of a new airport on the proposed new site.
- Opposite the access road to the new site were a number of private parcels with a few houses.
- One of the most significant constraints related to the new site is the Booby Pond Nature Reserve immediately south. The National Trust owns four land parcels around Little Cayman, one of which lies immediately north of this Booby Pond reserve. The objective of that acquisition was for providing a buffer along the section of the Booby Reserve where it has been observed that the birds were moving their nesting areas. Other areas were acquired to protect the iguana habitat. The third was to allow additional similar habitat in the event of a major disturbance such as a hurricane.
- The Booby Pond is an important habitat for many migratory species. It is considered as an Important Bird Area (IBA).

Since the land acquisition and completion of the 2002 Airport Master, preparatory works had taken place some 5-10 years ago including clearing and some rock and terrain removals on the new site. Evidence of this exists on aerial photographs however much of the work area have re-vegetated and will require re-work should this site eventually be considered the preferred for the new airport.

# 3 STAKEHOLDER ENGAGEMENT

## 3.1 SCOPE AND OBJECTIVES

Key stakeholders consultations were held throughout the master planning process to ensure that the most comprehensive database of representations and concerns expressed by the various stakeholders were considered in the analysis, alternatives development and final recommendations. Consultations took place over the period of December 2013 through to April 2014 and took the form of group presentations or interviews, individual interviews, email communications or through written solicitation of comments or information.

## 3.2 SUMMARY OF STAKEHOLDER CONSULTATIONS

The following Table 3-1 summarizes all of the key stakeholder consultations completed including relevant details that were gathered and used in the airport planning process.

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**Table 3-1 - Stakeholder Consultation Summary Table**

| No. | Stakeholder | Dates of Consultation | Summary of Discussions and Inputs |
|---|---|---|---|
| 1 | Consultant Site visits to all Airport: ORIA, CKIA, and LCA.<br>• WSP, CIG Project team & CIAA management, Airport and Stakeholder meetings. | 19 – 21 December 2013<br>Week of January 13, 2014 | • Initial site visits Little Cayman, CKIA and ORIA in December 2013<br>• Detailed site visits and additional stakeholder consultations by Consultant team week of January 13, 2014. |
| 2 | Cayman Islands Government (CIG)<br>• Steering Group | Numerous meetings December – April, 2014 | • Various meetings held over the course of the study period covering various topics including strategic / operational / financial / procurement issues and draft submission comments and feedback. |
| 3 | CIAA Board<br>• Full board & CIAA Mgt. PwC, WSP & BCQS | 18 December 2013<br>February 2014<br>April 2014 | • PwC / WSP outline of process<br>• Review of Strategic considerations & control<br>• Review of Key infrastructure requirements<br>• Review of Project risks<br>• Review of Project management & stakeholders status<br>• Status presentations and working sub-groups to refine master planning of Grand Cayman.<br>• Options analysis for key decisions, incl. US pre-clearance, jet ways, runway extension and Little Cayman site selection. |
| 4 | Cayman Islands Airports Authority of the Cayman Islands (CIAA) | December 2013 – April 2014 | • Various interactions throughout study period related to information requests and technical inputs<br>• Fuel relocation is a priority as they are in active discussions in concessionaires. Study prioritized recommendations related to fuel facility relocation.<br>• Critical aircraft is the B777, although only the B767 currently operates.<br>• Where possible, some of the smaller aircraft use intersection |

**Table 3-1 - Stakeholder Consultation Summary Table**

| No. | Stakeholder | Dates of Consultation | Summary of Discussions and Inputs |
|---|---|---|---|
| | | | departures.<br>• Cayman Airways does apron management but the CIAA is reviewing options for them to take control of apron management and slot control.<br>• Customs currently manages cargo warehousing.<br>• There is a desire to investigate properly designed cross-dock facility capable of handling a B757 for long-term cargo growth.<br>• Consideration should be made to give control of aeronautical fee collection to IATA.<br>• There are only 65 Airport taxi licenses, which pay only $60/month to operate at the Airport. Room to improve revenue management systems.<br>• Tour buses pay $1/pax (self-reporting) which are typically 20-25 seat vehicles. Peak pax are typically around 10-12 pax. Room to improve revenue management systems.<br>• Limos are pre-arranged (no space) and pay per pax.<br>• Valet parting was discussed as a potential concession (given the returning wealthy landowners).<br>• Second floor building expansion was suggested as an opportunity to promote more commercial or other passenger facilities. Should be reviewed as part of Air Terminal expansion planning. |
| 5 | CI Civil Aviation Authority (CAACI) | December 2013 – January 2014 | • Until 2004, CAACI owned and operated the Airport.<br>• OTARS used as regulations – try to meet minimum requirements of ICAO. There is provision for deviations under OTARS. Now OTARs directive effective Jan 1, 2014.<br>• Standards are to be followed but there is opportunity for deviations where operational mitigation measures.<br>• Zoning assessment needs to include review of ships mooring in harbor.<br>• Certification application is available on-line. CAA should be |

**Table 3-1 - Stakeholder Consultation Summary Table**

| No. | Stakeholder | Dates of Consultation | Summary of Discussions and Inputs |
|---|---|---|---|
| | | | involved early in the process and would provide approvals. Normally takes three (3) months for certification or new facility applications.<br>• AOM/AIP identify deviations and can be obtained via website or requested from CIAA.<br>• RESA – 90m minimum required.<br>• Airport is currently considered non-instrument in order to minimize deviations.<br>• Unwritten agreement – CIAA has authority to make regulations regarding obstructions off airport which is not currently being exercised.<br>• At Grand Cayman no provision for protection of an extended runway are currently in place.<br>• CIAA preference is for the new site location in Little Cayman since significant investment and studies already completed.<br>• There have been a number of bird strikes on Grand Cayman<br>• On April 1 there may be a possible transfer of airport/aviation security responsibility to CIAA.<br>• The VOR does not have adequate electronic zoning, and therefor was replaced with a Doppler type, which is less susceptible to interference. VOR is an enroute VOR and could be relocated – possible location could be used for approaches into Cayman Brac.<br>• CIAA supports the closure and relocation of Crewe Road at the west end of runway and would be willing to provide political support.<br>• While a RESA is shown in the AIP for Brac, it is not approved since it extends into the water.<br>• There is a potential exemption for the graded area impacts at Brac but solutions should be proposed for filling.<br>• CAA is available during the Airport Master Plan for regulatory support.<br>• Met with Richard Smith – over 37 years of experience.<br>• Confirmed that ICAO Annex 14 and OTARS Part 139 are |

**Table 3-1 - Stakeholder Consultation Summary Table**

| No. | Stakeholder | Dates of Consultation | Summary of Discussions and Inputs |
|---|---|---|---|
| | | | applicable.<br>• Developments should including provisions for minimum RESA's, and where practical, construct to full (240m). Mr. Smith understands the sensitivities of environmental and other constraints but minimum 90m is required.<br>• Would be acceptable to CAACI if LCA only included RESA length equal to what was required to clear the trees off the end of the runway.<br>• Suggested CIAA are to make their own regulations to control obstacles, not CAACI. None currently in-place.<br>• For ORIA Noted that safeguarding plan for airport is in place with Planning Department based on 300m runway strip including transitional and approach/take-off surfaces. Nor safeguarding is in place for extensions.<br>• For LCA, CAACI advises there have been numerous studies in the past and that the existing master plan was approved by Planning in 2002. Plans to scope LCA to make it more financially feasible.<br>• CAACI noted it will be important for LCA to have wildlife management plan. |
| 6 | Financial Meeting<br>• PwC, Andrew McLaughlin and Melantha Wright | Regular meetings December 2013 – April 2014 | • PwC outline of process<br>• Financial budgeting / forecasting process<br>• PFC Revenue streams, ring-fencing and availability to finance project<br>• CIAA financial sustainability<br>• Impact of Cayman Airways<br>• Detailed review of historical financial performance and variances<br>• Examination of budgeted performance and identification of vulnerabilities / sensitivities<br>• Development of long term revenue forecasting<br>• Review of long term performance models |
| 7 | Cayman Islands Department of Tourism | January 2014 | • Airlift impacts hotel development. In 2013 there were 320,000 arriving visitors (640,000 E/D of a total of approximately 1 million |

**Table 3-1 - Stakeholder Consultation Summary Table**

| No. | Stakeholder | Dates of Consultation | Summary of Discussions and Inputs |
|---|---|---|---|
| | (DOT) | | E/D passengers). This was approximately 7% above estimates.<br>• In the short term DOT looking at 2% growth. Historical growth has been in the 3% to 5% range. 80% from the US, 6% from Canada, and 7% from UK.<br>• DOT see South America (Argentina/Brazil) as potential markets.<br>• Grand Cayman has approx. 2,300 condo units and 2,100 hotel units. Trying to move away from condos to full service hotels and boutique (40-50 room) hotels.<br>• Health City – 2,000 beds<br>• Camana Bay – multiple hotel sites, potential for approximately 1,000 new hotel rooms in the future. Kimpton (hotel 263 rooms) under construction.<br>• Prime tourist time is Dec – April.<br>• Requested zip code data from DOT.<br>• DOT would like to see more lift into sister islands and direct international access into Cayman Brac.<br>• DOT would like to see more promotion of island hopping.<br>• Cayman Brac best suited to boutique hotels. Island is limited with respect to utilities and services. Water is provided by desalinization plants.<br>• Concerns regarding ability of airports to support mass evacuation of passengers in the event of a hurricane. Need to accommodate sheltering of passengers in the event that not all passengers can get evacuated in time.<br>• Need for infusion of culture into airport – use of feature walls and media presentations.<br>• Visitor experience is very important – need for improved levels of service.<br>• DOT prefers to use air stairs rather than boarding bridges. Walking experience to terminal is important.<br>• DOT looking at Latin Markets and in longer term China and Russia. For China, package tours are required and need to train tourism industry in Chinese language and culture. Promote in Europe in |

**Table 3-1 - Stakeholder Consultation Summary Table**

| No. | Stakeholder | Dates of Consultation | Summary of Discussions and Inputs |
|---|---|---|---|
| | | | 10-15 years. Need for a relaxation in visa requirements.<br>• In long term there is a need for more room capacity. Looking for high level of service.<br>• Lots of competition for tourism.<br>• There has been a general increase in air arrivals with an average of 3-5% over the last few years.<br>• 2014/2015 is expected to demonstrate at least a 2% increase.<br>• 80% of visitors are from the US, 7% are from the UK and Europe, 6% are Canadian.<br>• There is a look towards the Brazil and Argentina market.<br>• At present the room stock is 5117. An increase of 1000 rooms is expected in the next 5 years.<br>• There is a larger room stock in the condo sector. The outlook is for the islands to develop the Boutique Hotels product.<br>• For the sister islands, they focus is on Cayman Brac from a development perspective what should lead to direct flights.<br>• Cayman Brac lacks piped water. This is now being implemented<br>• Development Projects:<br>a. Grand Cayman<br>o Cayman Enterprise City<br>o Health City<br>o Caymana Bay -Kimpton providing 263 rooms<br>o Hyatt Redevelopment -300 rooms (163 on website?)<br>o Beach Bay providing 190 rooms<br>o The Four Seasons providing 200 rooms<br>o The Blakes providing 50 rooms.<br>b. Cayman Brac<br>o Le Sol Boutique Hotel<br>• The concept of mass evacuation is a concern.<br>• The need to adhere to what is considered the Cayman vibe. There should be an infusion of culture and soul in architecture to welcome people<br>• Jet bridges are not considered critical at this stage. |

**Table 3-1 - Stakeholder Consultation Summary Table**

| No. | Stakeholder | Dates of Consultation | Summary of Discussions and Inputs |
|---|---|---|---|
| | | | • Targeting of long haul routes. In the short term would be Brazil, Argentina and possibly Russia. In the longer term China but significant changes will have to be made, not the least will be learning the language.<br>• There is also the need to consider targeting large groups. The present market for this is the American mid-west.<br>• European visitors more interested in package tourism. |
| 8 | Cayman Islands Tourism Association (CITA) | January 2014 | • Stakeholders are losing faith in the airport in that no action is being taken to improve the airport. Need to undertake improvements in the short term.<br>• ATB has space constraints and there is a need for adequate staffing of immigration and customs functions.<br>• Traveler experience very important. First and last impressions very important. Cayman is a prestige destination and the airport experience should reflect that. Need for an airport ambassador program (volunteers) that can welcome and assist air travelers.<br>• AOC Chair indicated they have been visited by IATA representative who indicated he can provide assistance in the redevelopment of the airport.<br>• Many visits to Cayman Islands are of a short duration, therefore processing at airport should be equally short.<br>• Airport should be designed to withstand hurricanes and act as an emergency shelter.<br>• Expanding role as connection is important – cater to Cubans holding Spanish passports that are travelling from the US.<br>• Western US/Canada is a potential market that should be promoted.<br>• North America remains the primary target market, less focus on development of UK / European markets.<br>• Existing arrangements for deplaning do provide some unique charm<br>• Need to introduce new technologies to enhance passenger experience including CUPPS, self-serve kiosks and automated immigration process. |

**Table 3-1 - Stakeholder Consultation Summary Table**

| No. | Stakeholder | Dates of Consultation | Summary of Discussions and Inputs |
|---|---|---|---|
| 9 | Cayman Airways<br>• Ivan Forbes Cayman Airways, PwC & WSP | December 2013 – January 2014 | • PwC / WSP outline of process<br>• Expected future volumes and fleet capacity / upgrades<br>• Route planning<br>• Cayman Brac development<br>• Discussion of CA's strategic role for promotion of CI<br>• Would like to see preclearance – would improve connection times if they could arrive at domestic gates in US.<br>• A common use club lounge would be desirable.<br>• A major concern is the departures holdroom. Important that it be expanded.<br>• Need for an in-transit lounge to accommodate flights to Cuba.<br>• Would like to develop Grand Cayman as a hub for the Caribbean and Central America.<br>• Suggested that as a short-term solution the airport purchase boarding ramps to accommodate disabled passengers.<br>• Cayman Airways handles approximately 250,000 lbs of cargo a month. Airline charters a Convair 580 3 times a week for air cargo.<br>• Cargo warehouse is operated by customs, sometimes cargo spills over to the Cayman hangar.<br>• Need for an engine runup area – currently uses the runway during off hours.<br>• Current hangar is satisfactory, but would like to see additional storage space to accommodate seats and containers if they move to combi aircraft.<br>• Looking for regional turboprop aircraft for regional flights to Cayman Brac and Caribbean destinations. Aircraft would likely be a combi (ATR42). A smaller aircraft may be used for flights between Cayman Brac and Little Cayman.<br>• Cayman Brac - potential to operate connections between Miami |

**Table 3-1 - Stakeholder Consultation Summary Table**

| No. | Stakeholder | Dates of Consultation | Summary of Discussions and Inputs |
|---|---|---|---|
| | | | and Cuba for Cubans holding Spanish passports.<br>• As of June 1 airline will be able to accommodate international arrivals and departures at Cayman Brac. Currently modifying terminal to include HBS and in-transit holdroom.<br>• Expanded ramp-ready room required. |
| 10 | American Airlines<br>• Nadine Jennings General Manager AA, PwC & WSP | 20 December 2013<br>January 2014 | • PwC / WSP outline of process<br>• Route planning, interest in DFW<br>• Pre-clearance (not a priority)<br>• Would support boarding bridges and US preclearance.<br>• Departure lounge is a priority<br>• Getting bags back when there is a cancelled flight is a problem.<br>• No area for uncleared bags.<br>• Need for wheelchair storage<br>• Need for covered walkway to gates – understanding that it is to be constructed in near future.<br>• Would like to see space for additional kiosks<br>• Would like to see improved security screening<br>• Would like to see prayer room and locker area for passengers. |
| 11 | British Airways<br>• Marlene Moore-Ebanks Airport Manager BA, PwC & WSP<br>• Paul Quinn, BA & WSP | 20 December 2013<br>January 2014<br>April 2014 | • PwC / WSP outline of process<br>• Traffic projections, volumes from Far East, linkage with JetBlue via JFK<br>• Departure lounge is very crowded and remains the priority issue<br>• Discussions re Health City impact<br>• Non-stop flights (not a priority)<br>• Operating 767-300ER, but likely to operate B777 or B787 as 767 gets phased out. Grand Cayman is one of the last airports in the Caribbean to operate with the B767. Need for widebody gates.<br>• Lots of passengers in wheelchairs (4-6 per flight) so would support |

**Table 3-1 - Stakeholder Consultation Summary Table**

| No. | Stakeholder | Dates of Consultation | Summary of Discussions and Inputs |
|---|---|---|---|
| | | | boarding bridges, albeit there should not be an impact on costs for airlines.<br>• Needs for CUPPS and FIDS<br>• Delayed bags at customs is an issue. Need for storage space.<br>• Concessions – would like to see more choice in food and beverage concessions.<br>• Would be interested in a common use club lounge.<br>• Email communications related to runway length requirements, transition from B767 to B777-200 in 2016 and potential for long-haul UK/Europe flights.<br>• Preferred runway length of 2,800m (9,200 ft.) for long-haul flights.<br>• Request to reconfirm turnpads at airport able to accommodate B777-200<br>• Could operate on 8,000 ft. with 100% pax but cargo weight restrictions for long-haul flights.<br>• Will transition to B777 series aircraft by January 2016. |
| 12 | JetBlue<br>• Shalico Christian, Supervisor, JetBlue, PwC & WSP | 20 December 2013<br>January 2014 | • PwC / WSP outline of process<br>• Traffic projections, strong growth, new US North East routes to open<br>• Pre-clearance (not a priority)<br>• Currently operate JFK (M,Th,Sa) – on May 1 going to daily flights. Operates seasonally to Boston (Sa)<br>• Operates A320 with 150 pax.<br>• Concerns about Saturdays – too much volume during peak with only 8 gate positions.<br>• Passenger screening area is too small<br>• No strong desire for passenger boarding bridges – only real benefit is accommodating disabled passengers – currently uses stair with lift device but it is broken. Passenger boarding bridges would need |

**Table 3-1 - Stakeholder Consultation Summary Table**

| No. | Stakeholder | Dates of Consultation | Summary of Discussions and Inputs |
|---|---|---|---|
| | | | to be on all gates.<br>• Front and rear doors are used for enplaning/deplaning<br>• 55 minute turn – customs need to inspect the aircraft after passengers have left the aircraft – this leads to delays.<br>• Non-passenger screening point is required to accommodate passenger agents and flight crews.<br>• Preference is for a CUPPS system.<br>• 8 aircraft gate positions but only 5 podium positions.<br>• Would like to see an automated immigration process and common-use self-serve kiosks<br>• No requirement for US Preclearance.<br>• Potential destinations include Orlando and Ft. Lauderdale.<br>• No west coast destinations are contemplated.<br>• Would consider joint lounge for business class pax. |
| 13 | Delta Airlines (Teleconf.)<br>• Kevin Bolen, Station manager, Delta Airlines, WSP | 3 January 2014 | • WSP outline of process<br>• Delta general update on traffic performance and outlook<br>• No additional gateways planned in short term but considering JFK non-stop for future |
| 14 | United Airlines | January 2014 | • Operate M, W, Sa (3x), S with 737-800/900. No plans to change aircraft type.<br>• Would like to see the airport developed in an economical manner – affordable to airlines.<br>• Storage is required.<br>• No interest in US preclearance facility – they fly into hubs. In Huston on-ward connections are about 80%<br>• Passenger boarding bridges not required.<br>• Don't want CUPPS – problems with shared systems, much easier to deal with in-house systems.<br>• Airline finds Grand Cayman one of the most expensive airports in |

**Table 3-1 - Stakeholder Consultation Summary Table**

| No. | Stakeholder | Dates of Consultation | Summary of Discussions and Inputs |
|---|---|---|---|
| | | | the Caribbean to fly into. |
| 15 | Department of Environment (DOE) | December 2013 – April 2014 | • Introduction meeting held December 20th, 2013.<br>• Significant concerns expressed about Little Cayman. Red footed boobie bird study completed in past may be dated and needs updating.<br>• Existing airports at Brac and Grand Cayman are existing airports and less of a concern, assuming no proposal to extend runway into Grand Cayman's North Sound. Work in North Sound would introduce a number of concerns from environmental perspective<br>• A lot of environmental considerations fall under the Development and Planning Law<br>• Needs of considerations of ecologically important natural habitats within the master plans development<br>• DOE has a number of environmental GIS layers available for use by the planning team. These can be made available.<br>• The 1998 Red-footed Booby bird report was provided without mapping and maps have been lost in the hurricane. DOE will try to get and provide a complete version of this report for distribution.<br>• DOE does not keep any bird strike data associated with the airports. CIAA or CAA should be the source for this data.<br>• Cayman Brac and Little Cayman don't have any development plans what raise the risk of biodiversity loss in sister islands.<br>• As far as they are aware, there have been no major incidents related to bird strikes in Little Cayman.<br>• Disturbance to the Rock Iguana is likely to impact environment of changing the airport location at Little Cayman.<br>• There is at present no development plan for the Rock Iguana.<br>• In December 2013 the new Conservation Law was passed. It is now waiting on a Commencement Order before it can be implemented.<br>• A lot of environmental considerations fall under the Development and Planning Law. The existing planning legislation does not speak to EIAs. With the new law a framework for an EIA process was |

**Table 3-1 - Stakeholder Consultation Summary Table**

| No. | Stakeholder | Dates of Consultation | Summary of Discussions and Inputs |
|---|---|---|---|
| | | | proposed.<br>• The DOE is one of the agencies asked to review proposed developments by Planning department. The DOE provides written advice regarding developments from an environmental stand-point.<br>• As it presently stands, an Environmental Advisory Board is convened if an EIA is requested during the planning approval process.<br>• This board drafts Terms of Reference for the EIA and reviews the EIA when it is submitted.<br>• Little Cayman<br>o The clearing for the new site at Little Cayman was done without consultation with the DOE.<br>o Can the existing Little Cayman airstrip be used?<br>o In terms of the Booby Pond reserve, it has been found (through recent monitoring) that the birds have been moving their nesting sites further inland towards the government owned airport site. The National Trust has purchased a block of land to the north of the existing reserve to maintain protection of these birds off the reserve.<br>o DOE to provide preliminary study of Rock Iguana 2010.<br>• Cayman Brac<br>o With respect to Cayman Brac, the ponds to the west were once protected but were de-registered to allow for the Cayman Brac airport.<br>o To the west end there is also a beach area which supports turtle nesting.<br>o There has been a Brac Iguana sighting study which can also be provided. North to the runway, iguanas are known to use the area.<br>• Grand Cayman<br>o The present mangrove buffer to the east is protected under the planning law.<br>o The North Sound area just east of the airstrip is not |

**Table 3-1 - Stakeholder Consultation Summary Table**

| No. | Stakeholder | Dates of Consultation | Summary of Discussions and Inputs |
|---|---|---|---|
| | | | protected.<br>○ It will however be important to treat and control any drainage from the strip into the North Sound. If wetland is lost, the draining and water retention capacity will have to be compensated and integrate in the master plan.<br>○ Relocation of fuel farm likely to trigger Phase I or II ESA. DEH capacities for hazardous waste management will have to be determined. |
| 16 | Chamber of Commerce (COC) | January 2014 | • COC expressed concern about redevelopment of airports on sister islands and that there is not the need to undertake major development. Important to prepare a priority list and undertake improvements that can be adequately funded. "Need to address low hanging fruit".<br>• COC indicated that cargo lift is very important and that adequate cargo facilities are required.<br>• Consideration should be given to a second airport on Grand Cayman Island that could be used for GA and air cargo.<br>• Need for a robust airport that can withstand hurricanes and return to service as soon as possible.<br>• Standby power should support airport functionality. Presently only portions of the ATB are connected to standby power.<br>• Major concern about capacity and level of service. Tourism compares similar Caribbean destinations and so should the Airport: "which airports do we measure against and which type of passenger / customer are we after?"<br>• There is the belief that the airport does not meet 'international standards', which is a concern.<br>• Overall customer service is perceived to be low due to capacity constraints and staff training.<br>• There is a GA impact that needs to be fixed.<br>• The Chamber of Commerce also provided a letter summarizing its concerns and priorities with respect to the Airports. |
| 17 | National Roads | December 2013 – | • Generally discussed during Kick off meetings Dec 18-20, 2013. |

**Table 3-1 - Stakeholder Consultation Summary Table**

| No. | Stakeholder | Dates of Consultation | Summary of Discussions and Inputs |
|---|---|---|---|
| | Authority (NRA)/Infrastructure Development: | January 2014 | Require better understanding of road and utility capacities / studies.<br>• Eastern Road demand is 23,900 movements daily. While Western Road is 17,200 movements.<br>• NRA indicated that eastern road cannot be eliminated because the western road cannot accommodate capacity. Concerns about congestion at the roundabout.<br>• No recent traffic count studies have been undertaken.<br>• Need to look at options for relocation of the eastern road (Crewe), which is located on airport land.<br>• It is not believed that the NRA has an easement for the eastern road.<br>• NRA indicated it could provide cost estimates for options to relocate the eastern road.<br>• A new road is proposed that would run north from the airport to 7-mile beach hotels.<br>• There is no legislation in place to protect OLS beyond the airport property. CIAA indicated that they believe they have the powers to implement such legislation.<br>• NRA shall begin developing initial plans for the road network solution for the required closure of Crewe Road. |
| 18 | Concessionaires | January 2014 | • Concessionaires described ongoing uncertainty regarding what is happening to the airport and are reluctant to re-invest in their establishments – “nothing ever gets done”. This is also a function of expired leases.<br>• During peak periods passengers are afraid to shop because they will lose their seats.<br>• Concessionaires need more storage space, including bonded storage for duty-free goods.<br>• Arrivals duty-free is desired because it is being introduced at other Caribbean airports and easier for passengers who are limited in carry-on liquids.<br>• A major constraint is getting goods through the passenger screening point – limited time period in which to transport goods to |

**Table 3-1 - Stakeholder Consultation Summary Table**

| No. | Stakeholder | Dates of Consultation | Summary of Discussions and Inputs |
|---|---|---|---|
| | | | secure area. There is a need for a non-passenger screening point that provides for the screening of goods.<br>• Need for implementation of retailing standards to provide high level of design.<br>• Concessions want CIAA to undertake practical approach to ATB expansion that reflects available funding.<br>• Airport has problems with reliability of electrical power. Standby generator does not have sufficient capacity to support all areas of the terminal. Concessionaires lose power and must close their space when power is down.<br>• There is also a lack in electrical capacity for food concessions to install the required food preparation equipment (i.e. deep fryers). As a result, food is cooked mostly off-site and transported to the airport.<br>• Flows of outbound domestic and international passengers should be separated. The combination of passengers creates problems with respect the sale of duty-free items.<br>• Advertising needs to be controlled and standards implemented. At present there are few controls with respect to the placement of standards. |
| 19 | Car Rental/Ground Transport Industry: | January 2014 | • 13 different car rental companies.<br>• Peak day is around 100 cars/rental agency.<br>• Car rental companies are currently off-site, which was a cost decision on their part. Existing land leases is limited. Expansion and growth limited.<br>• Concerns that there is inadequate way finding signage in the terminal.<br>• Need for potential rental car parking on airport or use of a shuttle with designated parking position on the terminal curb<br>• Government does not permit hotel or car rental shuttles at airport.<br>• Existing rental car locations have no opportunity for expansion.<br>• Airport does not receive any revenues from car rental agencies.<br>• Need for covered walkway to car rental location. |

**Table 3-1 - Stakeholder Consultation Summary Table**

| No. | Stakeholder | Dates of Consultation | Summary of Discussions and Inputs |
|---|---|---|---|
| | | | • Current bus coaches are 22 seats – likely to increase to 30 seats. There are five (5) companies who provide pre-arranged transportation service.<br>• Too few porters at the airport.<br>• Need to improvement to ground transportation curb and bus/taxi staging area.<br>• Complaints: congestions particularly during pick hours, concession areas are to small - limit sales, more seating area would increase sales, insufficient storage areas, need for a duty-free concession at arrivals, people who are in queue don't shop, deliveries are difficult - lost sales,<br>• Need for a modern space, more frontage, the uniform frontage standard,<br>• Customers complain about long wait at the taxi dispatch<br>• Advertising system needs to be reviewed, develop logistics of ad space for lease, more wall space<br>• Want to keep local flavour, character<br>• Concerns re: possible arrival of the new concessions, will the space allocation priority be based on how long in the facility<br>• Leases uncertainty doesn't allow/limits investment. |
| 20 | Aviation Fuel Suppliers | January 2014 | • SOL Petroleum<br>○ Previously ESSO/EXON<br>○ No storage at airport – bowsers transport fuel to the airport from terminal located on coast.<br>○ Need to park bowsers off-airport.<br>○ Does not provide fuel to GA but would like to. Provides fuel to commercial carriers.<br>○ Would like to see one location for on-airport fuel farm, either shared with RUBIS or co-located on same site<br>○ Consumption is approximately 378,000 gal. per month.<br>○ Fuel is trucked to the airport – pipeline not being considered.<br>○ Separation of aircraft on ramp has been an issue. Need for |

**Table 3-1 - Stakeholder Consultation Summary Table**

| No. | Stakeholder | Dates of Consultation | Summary of Discussions and Inputs |
|---|---|---|---|
| | | | wider separation to accommodate fuel bowser at wingtip.<br>• RUBIS Petroleum<br>○ Provides fuel on all islands. Aviation fuel provided at Grand Cayman and Cayman Brac.<br>○ Consumption is approximately 504,000 gal. per month.<br>○ Supports joint fuel storage facility.<br>○ Can provide costing for relocation of the existing fuel storage facility.<br>○ No requirement to expand fuel storage facility. With pipeline potential to reduce on-airport storage.<br>○ Fuel pipeline is about 30 years old and has a 30 – 40 year lifespan. Pipeline is pressure tested every year.<br>○ There is no easement for the pipeline and there is no lease for fuel storage area. |
| 21 | Sister Islands Tourism Association (SITA) | March 24, 2014 | • Meeting held March 24, 2014 to review status of Little Cayman Airport.<br>• Retaining the key selling point of the island, i.e. simplicity and unique charm. SITA views the current low key airfield arrangements as a major draw for tourists seeking tranquility, which is Little Cayman's core target market. As such, all representatives strongly emphasized their preference for; firstly, the airfield to remain in the current location; secondly, for no significant increase in size to cater for jets (although it was recognized an increase in length to 4,000 ft. to cater for larger prop planes makes sense; and finally, for the terminal building to remain low key/small and any fencing or other structures to be consistent with the surrounding area.<br>• Increasing airlift. SITA noted that the recent fall off in visitor numbers can be attributed to airlift issues and difficult connections from Grand Cayman. This issue is exacerbated by the presence of the local marine studies facility and associated students.<br>• Environmental issues were emphasized as being a key concern regarding any new development.<br>• SITA noted that the new proposed site held by CIG is poor quality land, requires significant fill and is adjacent to the dump [Note: |

**Table 3-1 - Stakeholder Consultation Summary Table**

| No. | Stakeholder | Dates of Consultation | Summary of Discussions and Inputs |
|---|---|---|---|
| | | | subsequent to the meeting, SITA provided a tour of the site to demonstrate this].<br>• SITA emphasized that the existing site is a core part of the Little Cayman tourist product and from a safety perspective is favourable, given the very low incidence of bird strikes and the lower level of nearby hazards.<br>• SITA highlighted that while land acquisition is a key issue with the existing site, the current landowners are likely to be cooperative in this respect, particularly if the proposed solution is in line with the broader priorities for the island, as noted above.<br>• CIG noted the importance of engaging the landowners on this and advised that CIG's intention had been to commence these<br>• It was highlighted that any move to a new site would have three key environmental impacts:<br>o The direct impacts on the new site;<br>o The impact on the existing site, which would then be developed across a wide area into new residential; and<br>o The impact on the island of the major new airport construction. Given the very low population, the new build would require a significant influx of labour, raising concerns amongst SITA that this would present a significant burden on local accommodation, infrastructure and possible crime prevention.<br>• SITA highlighted a number of options it would like CIG to consider in terms of improving airlift.<br>o Firstly, the option of a frequent shuttle run by twin otters from Cayman Brac was proposed. This would increase airlift frequency while also reducing overall fuel costs for Cayman Airways.<br>o An alternative approach of using a two helicopter ferry service from Little Cayman to Cayman Brac was proposed. SITA saw this as an innovative solution, which could further enhance the unique selling product, while avoiding the need to fund a new public airstrip. However, it was |

**Table 3-1 - Stakeholder Consultation Summary Table**

| No. | Stakeholder | Dates of Consultation | Summary of Discussions and Inputs |
|---|---|---|---|
| | | | acknowledged that by retaining only a helipad facility, the island would be effectively ruling out fixed wing access, while may not be desirable.<br>○ Finally, the proposed acquisition of ATR's by Cayman Airways was discussed, and it was acknowledged that this would require a longer runway.<br>• SITA re-emphasized their preference for the existing site but acknowledged that, if use of the existing site is not feasible, then an alternative long term solution would need to be agreed upon.<br>• SITA highlighted the need to arrive at the decision on this as soon as possible, in order to enable investment in the island tourism product. |
| 22 | Cayman Islands National Trust | January 2014 | • An airport development on the Sister Islands with the potential to host bigger aircrafts cause an undeniable risk to wildlife, even more for birds.<br>• Local communities should be involved in any further airport development in Little Cayman<br>• Suggested water shuttle service between Cayman Brac and Little Cayman as the best scenario in order to avoid any airport within Little Cayman<br>• The National Trust owns four land parcels around Little Cayman, one of which lies immediately north of the Booby Pond reserve. The objective of that acquisition was for providing a buffer along the section of the Booby Reserve where it has been observed that the birds were moving their nesting areas.<br>• Other areas were acquired to protect the iguana habitat. The third was to allow additional similar habitat in the event of a major disturbance such as a hurricane.<br>• Even with the acquisition by the National Trust, there are still small parcels of land between the pond and the roads that are privately owned. These were not being aggressively acquired since the plots are very small and almost un-developable.<br>• Large rock iguanas observed on Little Cayman within the |

**Table 3-1 - Stakeholder Consultation Summary Table**

| No. | Stakeholder | Dates of Consultation | Summary of Discussions and Inputs |
|---|---|---|---|
| | | | government airport site north of the Booby Pond.<br>• The Booby Pond is an important habitat for many migratory species. It is considered as an Important Bird Area (IBA). There are few IBA in Cayman Brac<br>• Both DOE and the National Trust indicated that any airport construction / expansion should be at the existing site and not moved to a new site.<br>• At present, there are no environmental aspects which fall under the UK law. But environmental aspects have been considered within the Framework for Fiscal Responsibility which was assented to by the Cayman Islands under the Public Management and Finance Law. New projects would therefore have to be implemented, among others, within this framework.<br>• Endemic orchids have been found within the western end of Little Cayman in similar habitat. This information can be found in the National Biodiversity Action Plan.<br>• Stakeholder engagement is important for this project. Local communities should be involved in any further airport development in Little Cayman<br>• The only other group that considers environmental issues on Little Cayman is the Little Cayman District committee of the National Trust. |
| 23 | Border Control Agencies | | |
| *23.1* | *Customs* | January 2014 | • Customs hall is too small.<br>• Need to separate domestic arrivals from international arrivals |
| *23.2* | *Immigration* | January 2014 | • Requirement for a raised rover/supervisor position that can look over the immigration queue.<br>• Immigration needs to have interview booths as part of secondary immigration area. They do not need to be enclosed rooms.<br>• Enclosed interview rooms need to be soundproof.<br>• Room required for forensic investigation.<br>• Room required for English testing. |

**Table 3-1 - Stakeholder Consultation Summary Table**

| No. | Stakeholder | Dates of Consultation | Summary of Discussions and Inputs |
|---|---|---|---|
| | | | • Need to be on standby power.<br>• Looking at automated gates for residents.<br>• Need for 16 booths plus 2 gates for residents.<br>• Training room is required.<br>• 22/24 staff on duty. |
| *23.3* | *Police* | January 2014 | • Decision needs to be made if police to have a permanent post at airport. At present, pay duty police provide security.<br>• Requirement for office for 2 officers plus interview room. Would share cell with customs/immigration. |
| *23.5* | *Health Services Authority* | January 2014 | • Need for office (3 staff) and health assessment office.<br>• Need for storage of supplies in the event of a hurricane – space for one pallet.<br>• Terminal building should be designed as hurricane shelter.<br>• Terminal should be accessible for passengers with disabilities.<br>• Need for a mobile command unit.<br>• Elevators should be designed to accommodate stretchers. |
| 24 | Air Agencies & Ground Handling Services | January 2014 | • Ground handlers at airport.<br>• Need for additional aircraft parking stands.<br>• Need for storage space and break rooms.<br>• Need for covered area for GSE storage.<br>• Fuel for GSE equipment not readily available at airport – 3,000 – 4,000 gals per month required.<br>• Need for non-passenger screening point.<br>• Administration space is required.<br>• 3rd passenger screening lane is required processing is approximately 600 passengers per hour.<br>• No search room is provided at screening point.<br>• No bag isolation area or aircraft isolation area.<br>• Need for wheelchair lane at passenger screening point.<br>• Poor tech service on x-ray units<br>• More baggage makeup space is required<br>• HBS can accommodate approximately 400 -600 bags per hour. |

**Table 3-1 - Stakeholder Consultation Summary Table**

| No. | Stakeholder | Dates of Consultation | Summary of Discussions and Inputs |
|---|---|---|---|
| | | | • Problems with cancelled flights and getting bags back to passengers.<br>• traffic, security and efficiency for future expansion<br>• Keeping vehicles as far away from terminal building as possible<br>• Security of perimeter and perimeter road<br>Efficiency of cargo operations<br>• Passenger check points. |
| 25 | Cayman Health City (HC) | 20 December 2013<br><br>Follow-up meeting, January 2014 | • PwC / WSP outline of process<br>• Health City vision & volume projection<br>• Health City infrastructure requirements<br>• Health City sees the need for passenger boarding bridges<br>• HC would like to see a designated pick-up/drop-off at the curb for their vehicles as well as having access to the apron for ambulance<br>• HC would like to provide staff to assist client in immigration and customs processing with possibly having their own dedicated lines. Ideal to get patients in and out ASAP.<br>• HC looking at the potential for 100,000 annual arrivals<br>• HC have not thought about exclusive space, but in meeting there was some discussion about a quiet room for their clients. HC to consider.<br>• Travel experience is very important.<br>• In 5 years they hope to have 600 beds and a 190 room hotel. In 15 years hope to have 2000 beds and 800 hotel rooms plus a university<br>• Phase I is 350 beds, 190 room hotel plus 90 apartments – currently under construction.<br>• Phase II to start in 2017 to expand facilities is dependent on improvements made to the airport.<br>• HC also considering the development of an IT Centre that would |

**Table 3-1 - Stakeholder Consultation Summary Table**

| No. | Stakeholder | Dates of Consultation | Summary of Discussions and Inputs |
|---|---|---|---|
| | | | focus on medical IT/software solutions.<br>• HC anticipates a staff of approximately 10,000<br>• Much of the staff (50% - 60%) will be East Indian – will generate approximately 450 return trips to India – likely avoid travelling through the US because of visa restrictions, so flights through the UK.<br>• In the subsequent meeting various follow-up issues were covered, notable affordability of jetways, priority investments for capacity and the need to ensure regular updates and liaison with Health City during the investment program to ensure needs are met and actual medic traffic numbers are tracked. |
| 26 | CI Fire Service | January 2014 | • CAT 8 is available but can go up to CAT 9 with equipment but additional staff required.<br>• An additional apparatus bay is required.<br>• Need for 2nd fire hall should be reviewed if runway is to be expanded.<br>• CIAA needs to pay for relocation of the fire training area should it be necessary in the future.<br>• CIAA to cover additional cost of fire service that is not already provided.<br>• CAT 6 provided at Cayman Brac – consideration should be given to providing a new access road from fire hall to the runway in order that vehicles can bypass the taxiway.<br>• Little Cayman – CAT 3 provided but equipment can support CAT 6<br>• Fire department has staffing and training issues – constrained by lack of funds. |
| 27 | Fixed-base Operator (FBO)<br><br>Marcus Cumber Islands Air, WSP (2 January 2014) | January 2014 | • WSP outline of process<br>• Provide FBO services and manage/operate GA terminal on behalf of the airport. Capital infrastructure is the responsibility of the CIAA.<br>• Islands Air general update on traffic performance and outlook |

**Table 3-1 - Stakeholder Consultation Summary Table**

| No. | Stakeholder | Dates of Consultation | Summary of Discussions and Inputs |
|---|---|---|---|
| | | | • Margin pressure from fuel supply<br>• Potential impact of medical tourism<br>• Apron becomes congested about 3-4 times per year. With planning for approximately 53 aircraft (peak).<br>• They believe that a 15,000 sq. ft. expansion to the east would satisfy their needs.<br>• Do not operate aircraft any more.<br>• Very poor GA terminal experience – need for improved facility.<br>• Ground handles courier flights – SAAB and Metroliner<br>• Previously provided proposal to develop a new GA terminal in exchange for exclusive FBO rights (30 year lease).<br>• Island Air s willing to work with the airport in developing a new GA terminal. Concerns that if it goes to competition that big operators would move in and push Island Air out.<br>• Island Air has some hangar space available for itinerant aircraft. Police helicopter is stored in the hangar.<br>• MRCU hangar is being torn down. This could be used for expanded apron space. (West of cargo apron).<br>• An air ambulance based in Grand Cayman would be desirable.<br>• Fuel is expensive in Grand Cayman ($6.00/gal versus $4.50 in Miami)<br>• Island Air expects GA activity to be flat for the next two years.<br>• Need for more stands for airplanes<br>• Space requirements on parking apron should be looked into<br>• There is need for proper RADAR to assist in flight sequencing<br>• General concerns for existing terminal capacity<br>• Need for more up-to-date electrical rooms. |
| 28 | Mosquito Research Control Unit (MRCU) | January 2014 | • New hangar/workshop/storage facilities built recently.<br>• Aircraft based at Grand Cayman but operate on all islands 365 days a year.<br>• Facilities hurricane rated.<br>• Undertake intersection takeoffs – 15 kt crosswind limit – operate at 80-100 ft. |

**Table 3-1 - Stakeholder Consultation Summary Table**

| No. | Stakeholder | Dates of Consultation | Summary of Discussions and Inputs |
|---|---|---|---|
| | | | • No plans for further expansion at Grand or other airports. |
| 29 | CI Planning Department / Development Control Board (Land Use / Development Plans) | December 2013 – April 2014 | • Various queries addressed through CIG pertaining to the Development Planning and planning and approvals process.<br>• Identification of stages of the Approval process from the Planning authority when environmental conditions can be asked.<br>• Clarifications of the three levels of approval under the Planning law<br>• Confirmation that standards to be respected could be asked by competent authorities and will have to be complied with.<br>• Should an external agency or the Department of Planning feel that an environmental analysis or a site analysis report is needed, it will be requested as part of approval process.<br>• A coastal work license is subject to a separate process and must be approved before the CPA can consider the application for planning permission. |
| 30 | National Weather Service | December 2013 – April 2014 | • Introductions made on December 20, 2013 during kick off meetings.<br>• Expanded and more robust space is required (20,000 sq. ft.) for their facilities.<br>• Need to relocate MET compound – influenced by proximity to buildings.<br>• MET can provide historical information for Grand Cayman and some limited information for Cayman Brac – formal request to be issued. |
| 31 | Water Authority | January 2014 | • Groundwater is limited by the rare presence of watercourses on the islands, potable water is provided by reverse osmosis plants in all the islands<br>• Legislation for the septic tanks should be considered as part of expansion plans.<br>• Little Cayman has possible shallow groundwater at the existing airport site and should be reviewed and considered in the analysis |
| 32 | Department of the | January 2014 | • At present hazardous material is shipped off island. The |

**Table 3-1 - Stakeholder Consultation Summary Table**

| No. | Stakeholder | Dates of Consultation | Summary of Discussions and Inputs |
|---|---|---|---|
| | Environmental Health | | Department assists persons with collection, storage and then shipping of these materials. The Department has agreements with a number of recycling companies abroad to facilitate this.<br>• The Little Cayman proposed airport site next to the existing landfill is not desirable due to the issue of bird strikes.<br>• DEH usually identify with the developer the standards to be respected for noise and air quality by a case by case approach. |
| 33 | Charles Kirkconnell Airport Management Team | January 2014 | • The main issue identified by the manager of Operations was safety. Birds presence is one of the main safety issues<br>• Trees and natural habitats around create the presence of (OLS) Obstacle Limitation Surfaces infringements and also provide foraging and nesting habitat for local fauna representing hazards (Iguana nesting occurred on the shoulder of the airstrip from March to April last year/a lot of birds because of wetlands and sea)<br>• Recurrence of flooding of the airfield (twice in 30 years)<br>• The terminal is downwind of the fuel farm and if there is an incident the whole airport is at risk<br>• Runoff management is an important for flood control and water quality management. |

# 4 ACTIVITY FORECASTS

## 4.1 GENERAL

The Cayman Islands consist of three inhabited islands: Grand Cayman, Cayman Brac and Little Cayman. For 2012, the total population was estimated as 56,732, of which 54,582 (96.2%) lived on Grand Cayman, 1,965 (3.5%) on Cayman Brac, and 185 (0.3%) on Little Cayman. Approximately 57% of the population is Caymanian, while 43% of the population is not.

The territory is served by three airports, one for each of the islands. Owen Roberts International Airport (ORIA/*GCM*) serves Grand Cayman, Charles Kirkconnell International Airport (CKIA/C*YB*) serves Cayman Brac while Edward Bodden Airfield (LCA/*LYB*) serves Little Cayman. (Note: *GCM, CYB and LYB* are IATA airport identifiers and have been used for consistency with international airport coding practices for forecasting purposes throughout this section of the report).

Grand Cayman is currently served by ten scheduled passenger airlines: Cayman Airways (including its domestic subsidiary, Cayman Airways Express), Aerolineas SOSA, Air Canada, American, British Airways, Delta, JetBlue, United, US Airways and WestJet. Cayman Airways operates domestic, regional and international services, British Airways flies to the UK via Nassau, Aerolineas SOSA serves Honduras, while the remaining airlines operate routes to the US and Canada. Cayman Brac is served by both Cayman Airways (Grand Cayman plus limited service to Miami) and Cayman Airways Express (domestic routes). Service at Little Cayman is limited to domestic flights operated by Cayman Airways Express.

Three carriers operate all-cargo flights at Grand Cayman; Cayman Airways, IBC Airlines and Ameriflight. All operate with twin-turboprop equipment to Miami.

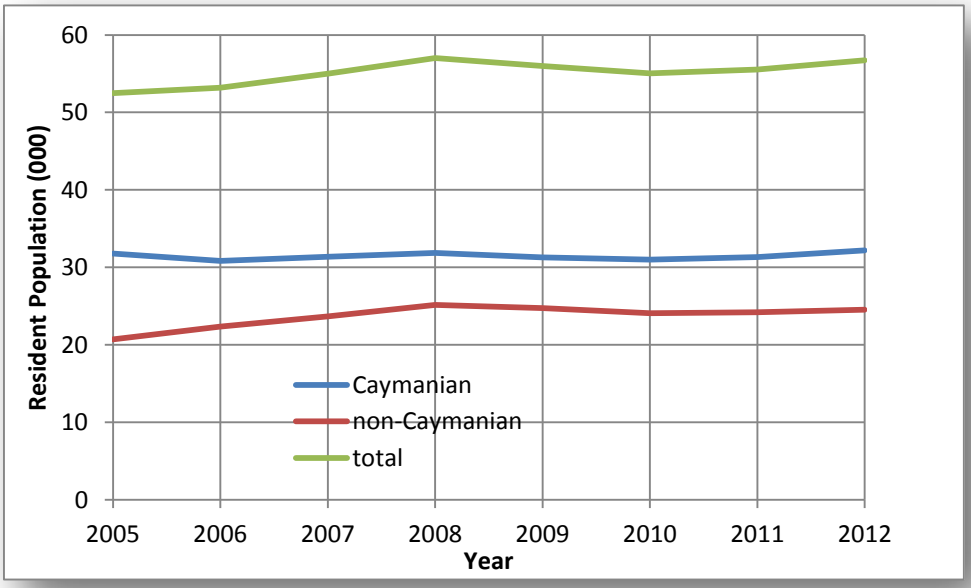
Traffic at the major port of entry in the Cayman Islands, ORIA/GCM, is analyzed and forecast in Sections 4.5, while traffic at both CKIA/CYB and LCA/LYB is dealt with in Section 4.6.

On 11/12 September, 2004, the territory was devastated by Hurricane Ivan, which passed within 50 kilometres of Grand Cayman, packing winds of up to 270 km. per hour. Whole residential developments were wiped out. Huge waves, estimated at 50 feet or more, destroyed mansions and old Caymanian homes alike. As Hurricane Ivan began pulling away from Grand Cayman, the large storm continued to keep pounding the Island. In the end, it was estimated that Ivan caused US$3.5 billion of damage and massive trauma for those who stayed to ride it out. In the days that followed, looting became a problem and there were vast queues at banks, petrol stations, supermarkets and building supply stores. Residents had to endure weeks and months of hardship. Electricity wasn't fully restored for months. The reconstruction following Ivan saw millions injected into the local economy and development surged as the islands were awash in insurance payouts. Many thousands of new workers were brought to the island to help in the rebuilding effort and many local businesses were formed to meet the demand it created.

Most demographic and socio-economic statistics reached an inflection point in 2004. For example, the population dropped by 12,000 between 2003 and 2004 as people abandoned the territory. It then rose by 16,000 in 2005, as residents returned, as well as a large number of foreign workers required to assist with the rebuilding process. Because of these massive socio-economic anomalies, it was not believed relevant to analyze statistics and forecasts based on long-term trends prior to 2004.

Overall population has remained relatively static since 2005, with a net overall growth rate of 1.1% as noted in Figure 4-1, below. However, there was almost no growth in the Caymanian population, while the non-Caymanian portion has risen at an average rate of about 2.5% per year during the few years following the devastation of Hurricane Ivan.

**Figure 4-1 – Resident Population**




Source: ESO Compendium of Statistics, 2012

The Government issues approximately 23,000 work permits annually to foreign nationals. For 2012, about 40% were held by Jamaicans, 13 % by Filipinos, 9% by UK nationals, 6% each by Americans and Canadians.

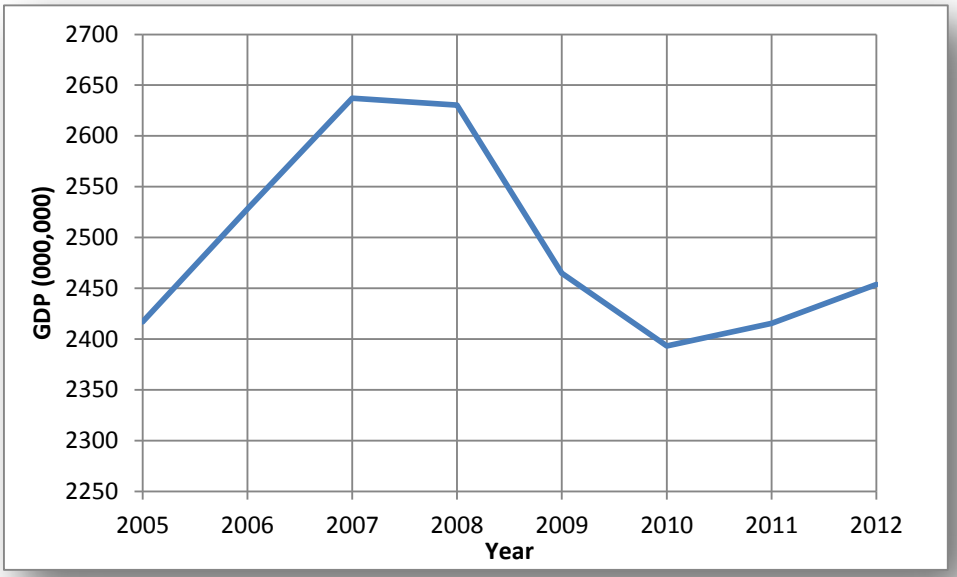
The economy of the territory is based largely upon tourism and the financial services industry. Most locally consumed goods must be imported, and almost all food, clothing, electronics, building materials, automobiles, etc. are imported directly from South Florida. The financial services industry continues to boom, and there are now over 90,000 companies registered in the Cayman Islands. There is no income tax in the Cayman Islands, but government is funded by fees and import duties assessed on many items and services, including imported goods, including food, building materials, automobiles, fuel and alcoholic beverages, land or property transfers, tourist accommodations, airport and cruise ship passenger departures, banks, trust and insurance company licenses, company registrations, telecommunications operating licenses, work permits and visas, and various business licenses.

In February 2014, the first phase of Health City Cayman Islands (HCCI) will open. The state of the art medical facility will eventually include hospitals, a medical university, assisted living quarters and a biotech research facility. If and when fully implemented, HCCI will generate a substantial increase in air traffic, and that traffic will require additional infrastructure such as hotel rooms, etc. Because of the uncertainty regarding the timing and growth of HCCI, the traffic forecasts have been developed according to different scenarios, one of which assumes the full implementation of HCCI based on their own projections.

Population growth estimates suggest that the overall population of the Cayman Islands will reach the 67 - 77,000 range by 2034, an average annual growth rate range of between 0.75% and 1.5%.

Because of its dependence on the financial services industry, the Cayman Islands were significantly hurt by the 2009 economic crash, but recovery has been underway since 2011. GDP growth, measured in constant dollars, has been shown in Figure 4-2, below.

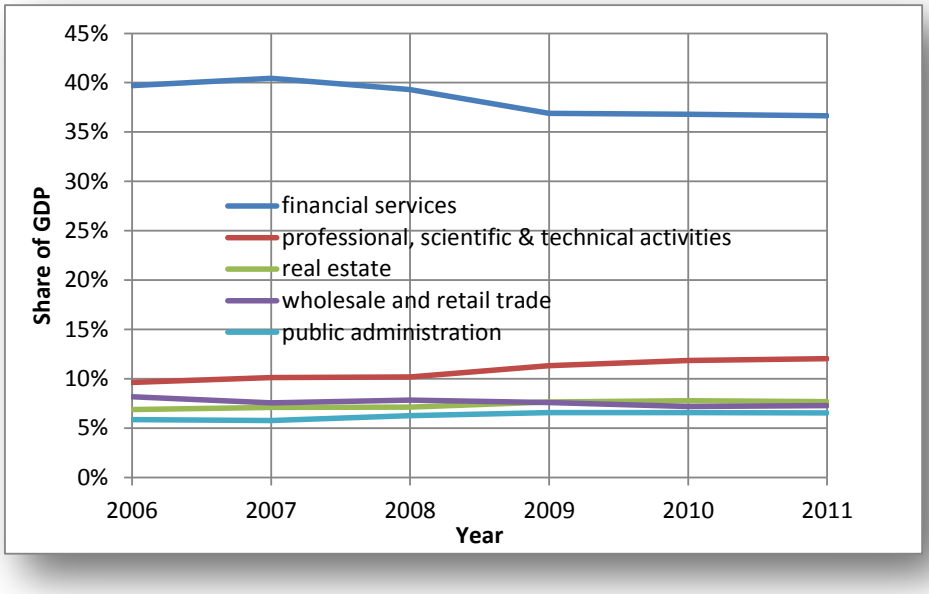
**Figure 4-2 – GDP at Constant 2007 Basic Prices (CI$)**




Source: ESO Compendium of Statistics, 2012

The reliance on the financial services industry can best be seen by the breakdown of GDP by sector, as shown in Table 4-3, below. It accounts for over 35% of the overall economy, with no other sector accounting for as much as 15%. The goods producing sector accounted for less than 5% of the total in 2011.

**Figure 4-3 – Share of Overall GDP**




Source: ESO Compendium of Statistics, 2012; National Accounts Report, 2012

The domestic economy continued to recover in 2012 following its initial emergence from recession in 2011. The Cayman Islands Government expects moderate growth for 2013, conditional on the upturn of

domestic private sector investments amidst a weaker global economy. For the first half of 2013, GDP growth was estimated at 0.9 percent as all the main sectors excluding wholesale and retail trade and government services recorded positive growth.

In 2011, the curtailment of demand caused a double-digit decline in construction indicators (total value of building permits and project approvals). Construction activity in 2012 increased for the first time in four years by an estimated 6.7 percent. The growth estimate is supported by increases in imported building materials partly due to duty-free concessions from a building incentive scheme. During the first half of 2013, the value of building permits increased by 4.6 percent, while the value of building intentions doubled.

In 2012, the financing and insurance services sector which accounted for approximately 42.3 percent of GDP was estimated to have expanded by 2.0 percent compared to 0.1 percent in 2011.

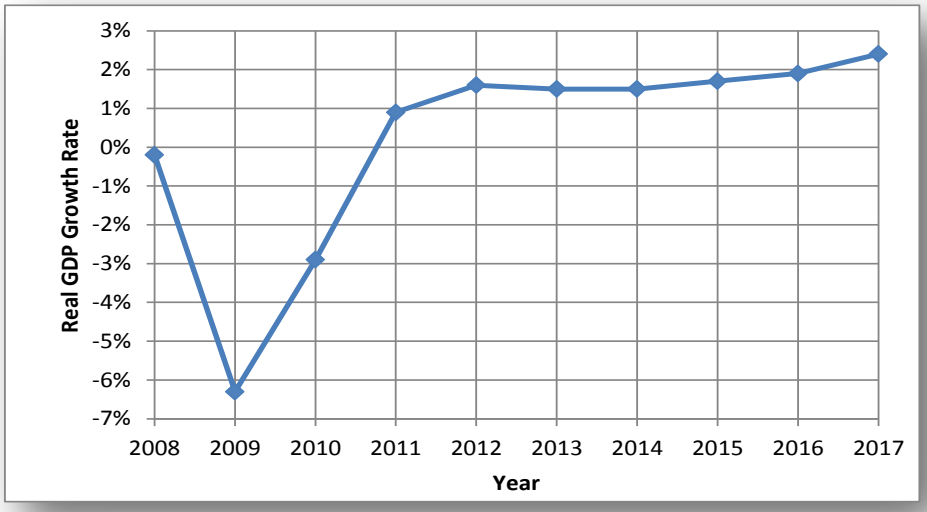
In 2012, labour market indicators improved in general as a higher population size and improved labor participation rate led to an increase in the labour force by 3.2%. There was a 4.7% increase in work permits. The unemployment rate improved modestly to 6.2 percent; however Caymanian unemployment rate rose to 10.5 percent from 9.8 percent in 2011 despite a growth in employment by 3.3 percent in 2012.

Conditional on improved growth projection for the advanced economies starting in 2014, the Government expects overall economic growth of the Cayman Islands in the next three fiscal years to be on the uptrend. This will also continue to rely heavily on domestic private investments as government spending is not expected to play a direct role in stimulating the economy.

Construction is assumed to contribute towards GDP growth in the medium-term with the implementation of recently announced private sector investment projects such as the redevelopment of the Owen Roberts International Airport Terminal; a modern cruise ship berthing facility; the development of the new Kimpton Hotel on Seven Mile Beach; redevelopment of the former Hyatt Beach Suites Hotel; and the development of new hotels near Cayman Health City and in Beach Bay, Bodden Town. Construction of Cayman Health City (Phase 1) has already commenced and is at an advanced stage of completion. The construction phase of these projects is expected to stimulate the demand for services in several sectors such as wholesale and retail; real estate, renting and business activities; hotels and restaurants; financing and insurance.

The upbeat forecasts assume that the positive growth outlook, albeit moderate, for the advanced economies over the medium-term is likely to contribute to increasing growth in tourism services. The Government's GDP forecast has been summarized in Figure 4-4, below.

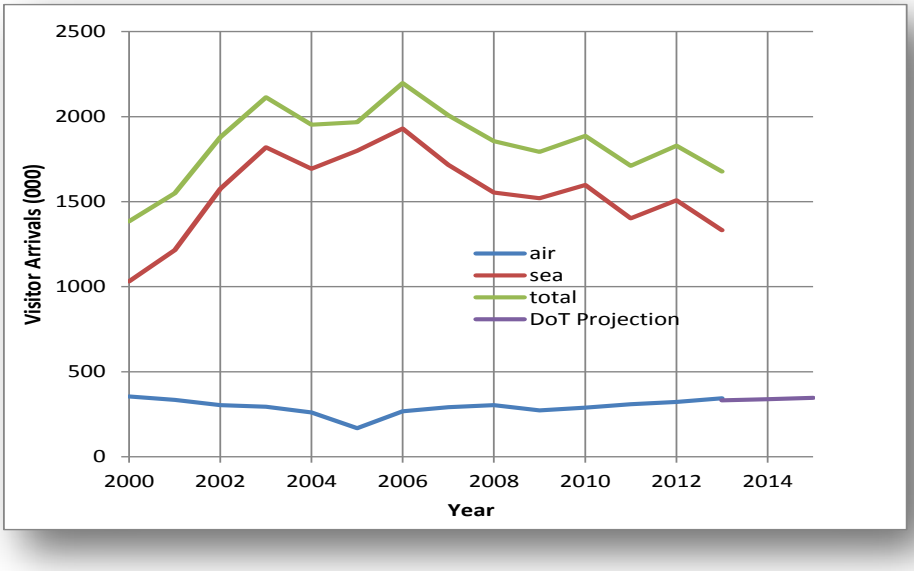
**Figure 4-4 – Historical and Forecast GDP Growth**




Sources: ESO Compendium of Statistics, 2012; CIG Strategic Policy Statement, 2014-15

Tourism is a major component of the economy, and as well as contributing substantially to air travel, Grand Cayman is also a large cruise port destination. Figure 4-5 tracks visitor arrivals by both land and sea (cruise ships). Cruise ship passengers generally stay for only one day, while visitors by air include all passengers with a foreign passport, not just tourists. In 2012, tourists accounted for 78% of visitors by air, business people 6%, with the balance of the traffic travelled for either personal reasons, or the purpose was unknown. While cruise ship passengers have been declining, visitors by air have been growing slowly. However, the vast majority of air travellers are tourists. The Department of Tourism projections through 2015 estimate continued slow growth in the 2-3% per annum range.

**Figure 4-5 – Visitor Arrivals**




Source: ESO Compendium of Statistics, 2012, NTMP 2009-13, DoT presentation

Since 2007, when the effects of Hurricane Ivan had largely dissipated, visitor arrivals by air have been growing at an average annual compound rate of 2.8%. However, the estimated number of visitor arrivals for 2013 is still slightly below the total for 2000.

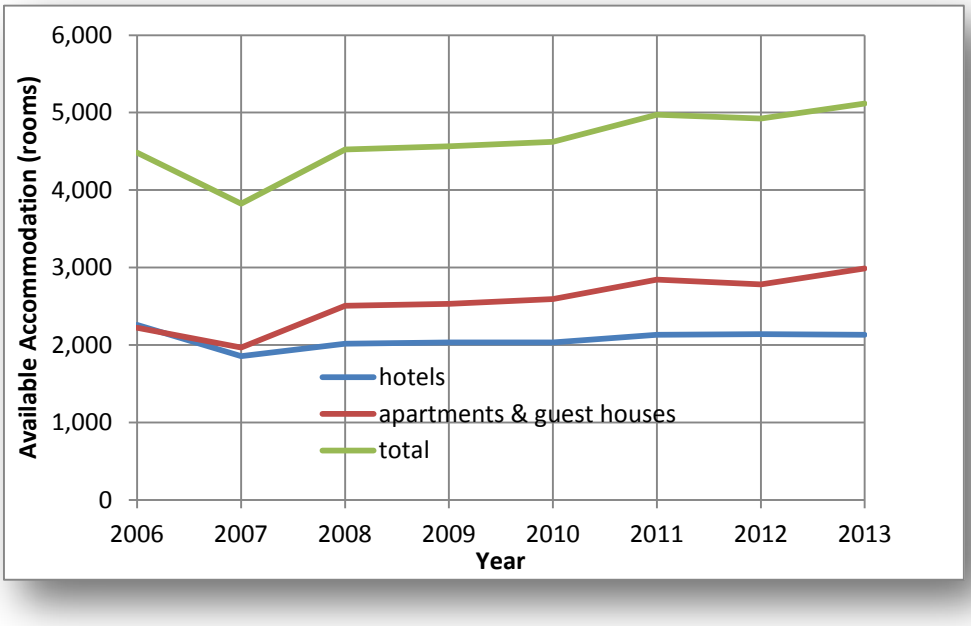
Visitors by air from the US represented 79% of the total in 2012, with Canadians adding another 9%. The UK accounted for 5 %, the rest of Europe 3%, with the balance scattered around the world. The Cayman Islands community of interest is largely with North America.

The 2009 NTMP had two major recommendations in target terms:

- To restore stayover visitor numbers to the year 2000 level of about 350,000 visitors per annum by 2012. This has been achieved almost exactly.
- Thereafter the Cayman Islands should assume modest and sustainable growth in line with the capacity of the Islands' resources; i.e. a long-term growth rate that is sustainable, manageable and measured, monitoring environmental, social and economic impacts. The Department of Tourism suggests that 2104 and 2015 visitor increases will be in the range of 2% per year.

The potential for growth in the tourist market is generally capped by the available accommodation. Figure 4-6 graphs available hotel rooms in the Cayman Islands. The supply of rooms has been growing slowly since 2008.

**Figure 4-6 – Available Hotel Rooms**




Source: ESO Compendium of Statistics, 2012, DoT presentation

Based on a nominal capacity of 5,000 rooms, there are approximately 1.8 million available room-nights. Based on 2011 data, the average group size was 2.2, and the average length of stay was 4.8 nights. That implies an overall capacity cap of roughly 835,000 annual visitors. However, tourism peaks during the North American winter, and the two peak months are March and February, with 12.7% and 10.0% of the annual total, respectively.

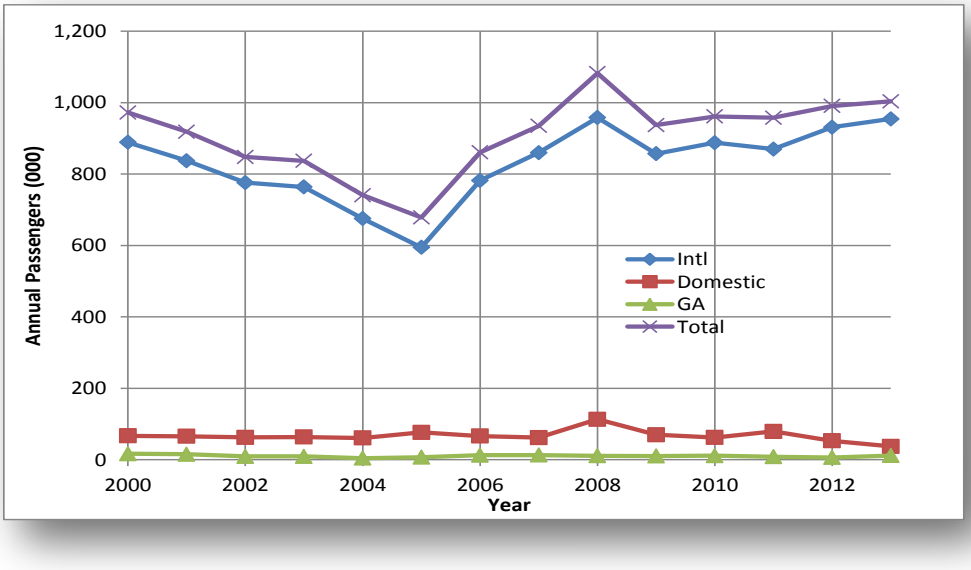
Although there are several major proposed new developments, the only one with a firm timeline is the Kimpton Hotel, which is scheduled to add 263 rooms when it opens in 2016. There are four additional projects totalling 515 rooms without a firm scheduled completion date, and several other proposed developments, which could add an additional 250 (more or less) rooms. The implications of this that, if construction proceeds as programmed, the stock of hotel rooms could increase by about 20% by the end

of the decade. If the DoT's short-term estimate of 2-3% annual growth were to hold through this period, then traffic would have increased by 15-23% when compounded over a seven year period, in balance with the added infrastructure. This estimate, however, does not factor in projected demand for accommodation if the Health City initiative were to expand to its maximum potential.

## 4.2 HISTORICAL TRAFFIC ANALYSIS– GRAND CAYMAN

Historical passenger traffic statistics since 2000 have been shown in Figure 4-7. As noted above, the rebuilding of the island's physical plant following Hurricane Ivan has coincided with a reversal of the previous negative traffic trends. However, total traffic in 2012 has only just recovered to the levels experienced 12 years ago. About 94% of the traffic is international, 5% domestic, and less than 1% is carried on general aviation aircraft. Statistically, pure domestic traffic is overstated, as some of it is connecting to international flights, and is really the domestic leg of an international journey.

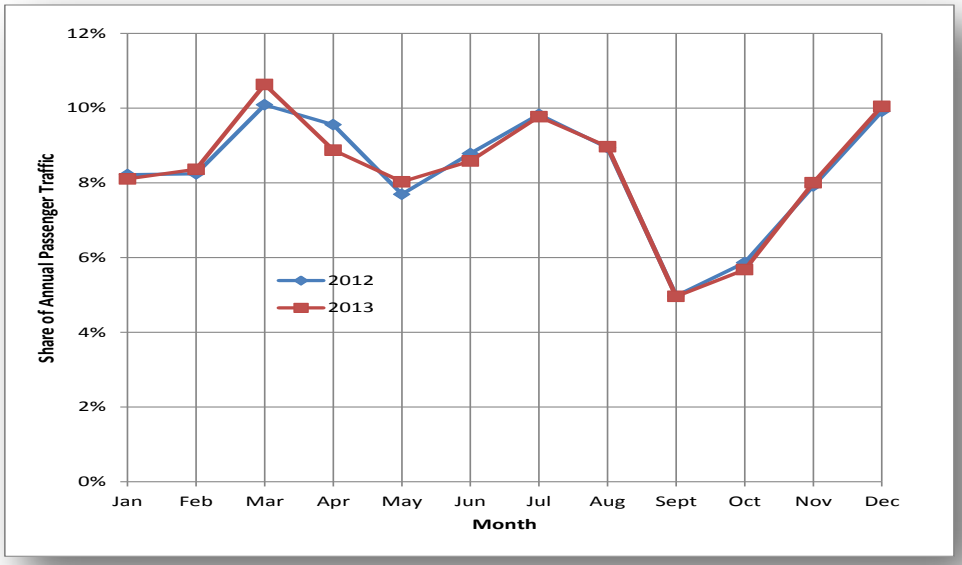
**Figure 4-7 – Historical Passenger Traffic, Grand Cayman**




Source: Cayman Islands Airport Authority

Traffic is also seasonal, as shown in Figure4-8 for both 2012 and 2013. Traffic peaks during Christmas, mid-summer and Easter, and is a lowest in the fall.

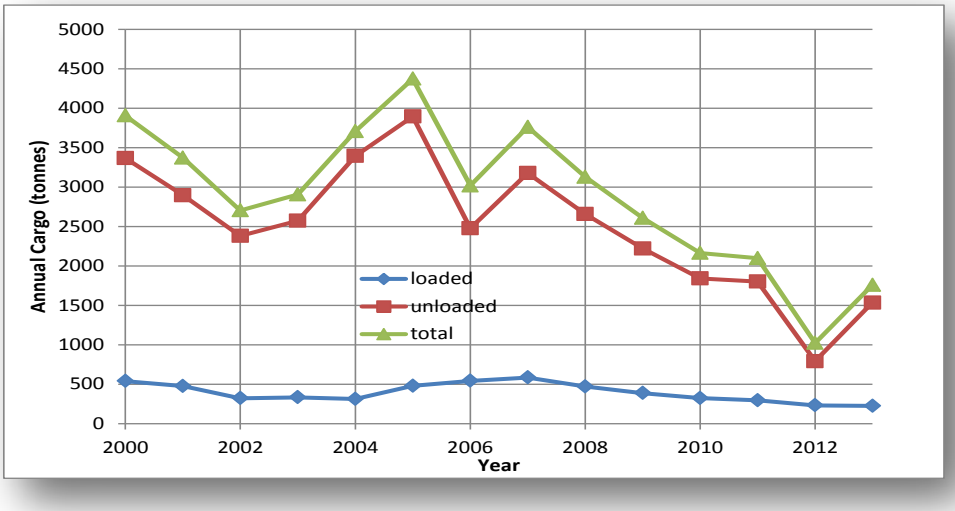
**Figure 4-8 – Monthly Traffic 2012 and 2013**




Source: Consultants analysis of Cayman Islands Airport Authority statistics

As seen in Figure 4-9, cargo activity at GCM has declined substantially since a localized peak in 2005, when reconstruction following Hurricane Ivan was at its peak. As expected, there is a huge imbalance in favour of deplaning cargo, which corresponds to a similar imbalance in imports vs. exports.

**Figure 4-9 – Historical Cargo Traffic, Grand Cayman**

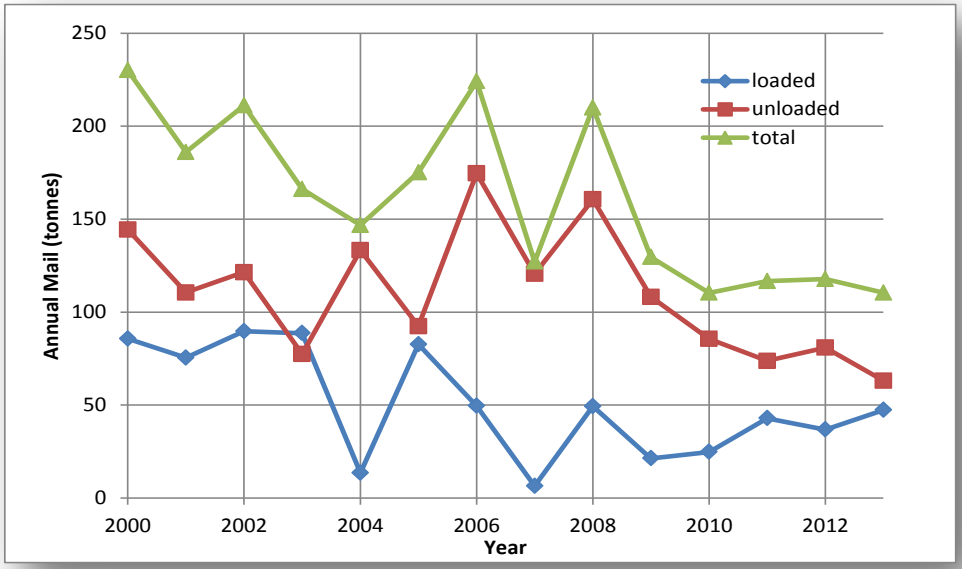



Source: Consultants analysis of Cayman Islands Airport Authority statistics

International cargo represented about 95% of the overall total in 2013, while domestic cargo (some of which consists of international transshipments) accounted for 5%. Domestic cargo, as expected, is heavily unbalanced in favour of enplanements, with about 80% of the total destined for the sister islands.

Historical mail traffic is shown in Figure 4-10. Overall totals have been declining in line with worldwide trends towards electronic communications, although there is still a substantial amount of year-to-year variation.

**Figure 4-10 – Historical Mail Traffic, Grand Cayman**




Source: Consultants analysis of Cayman Islands Airport Authority statistics

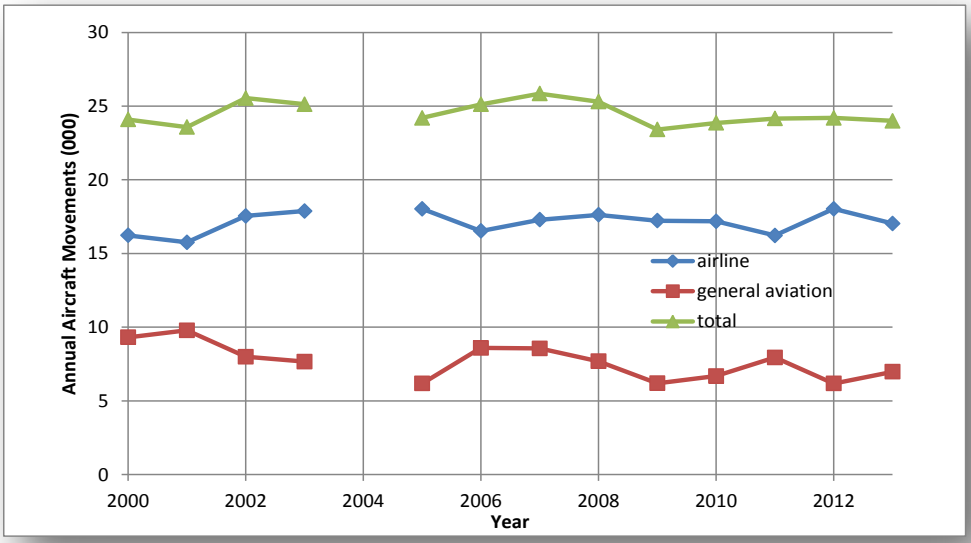
Scheduled cargo services are currently offered by a number of different carriers, as follows, all to/from Miami:

- Cayman Airways (operated by IFL Group), with a 15,500 lb. capacity Convair 580 (Tuesdays and Thursdays)
- IBC Airways: with a 7,500 lb. capacity Saab 340A (weekdays).
- Ameriflight: with a 4,000 lb. capacity Fairchild Metro (weekdays).

On a daily basis, current (December, 2013) scheduled weekly capacity in all-cargo aircraft is about 40 tonnes in each direction, or about 4,100 tonnes totally annually, well in excess of the amount of cargo actually carried. This calculation also does not account for cargo carried in the belly compartments of passenger aircraft.

A series for total annual aircraft movements has been shown in Figure 4-11. Movement statistics for 2004 are incomplete, due to Hurricane Ivan, and that year has been omitted from the graph. Totals have remained relatively constant at the 25,000 level, although airline movements have been increasing slowly, while GA movements have experienced a slight counterbalancing decline.

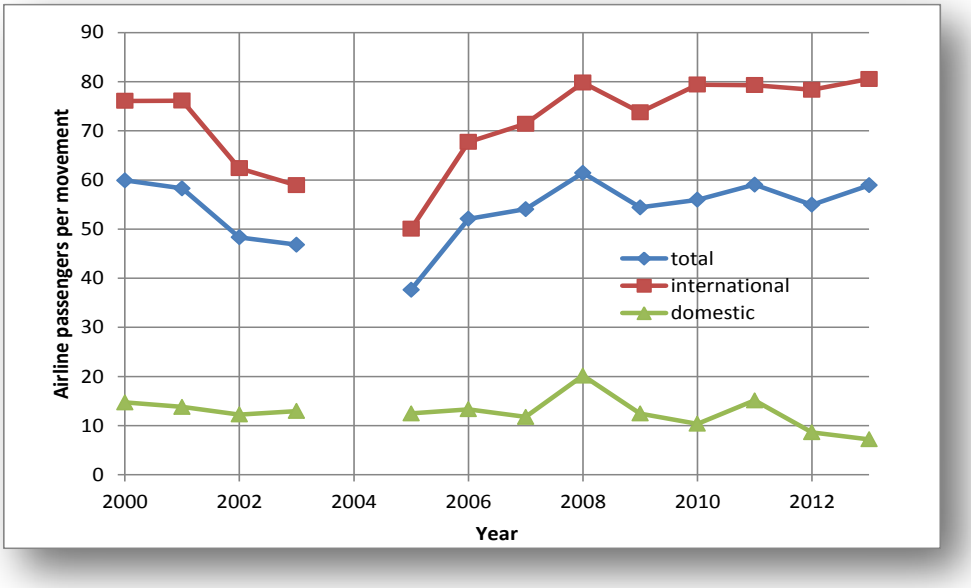
**Figure 4-11 – Total Aircraft Movements, Grand Cayman**




Source: Consultants analysis of Cayman Islands Airport Authority statistics

While the correspondence is not accurate, a rough comparison can be made between passengers and airline movements to determine the number of passengers per movement, as per Figure 4-12[15]. International loads have fluctuated around 80 passengers per aircraft over the past five years or so, while domestic loads on the Twin Otters have been dropping slowly, and now average well under 10 passengers.

**Figure 4-12 – Historical Passengers per Aircraft Movement, Grand Cayman**




Source: Consultants analysis of Cayman Islands Airport Authority statistics

[15] Because the historical airline data does not differentiate between passenger and cargo movements, the resultant figure for average passengers per flight will be somewhat lower than actual. However, the intent of this analysis is to show the overall trend, rather than the absolute value.

## 4.3 MARKET ASSESSMENT

Despite the Cayman Islands' reputation as a financial services centre, the vast majority of air traffic at Grand Cayman is tourist-oriented. For 2012, the listed purpose of air visitors was 78% "recreational" and "dive", 7% "visiting friends and family" and 6% "business". The remaining categories were listed as "unknown" or "other". This suggests that while the Cayman Islands have a reputation as an upscale market, most of the travel is being paid for by discretionary personal income, and can be expected to be price-sensitive.

Airline capacity at GCM was sampled for current 2013/14 winter peak schedules, as shown in Table 4-1. On a route basis (Cayman Airways excepted), most airlines operate to their hub airports rather than to a specific origin-destination location. The four largest airlines (Cayman, American, United and US Airways) account for over 83% of total seat capacity at GCM. To track changes over time, weekly capacity in the winter of 2013/14 was compared to capacity in the winter of 2006/07, the first "reasonable" year following the destruction caused by Hurricane Ivan. Capacity rose by about 20%, although annual traffic growth was relatively flat. Suggesting that the distribution of traffic (and, presumably, capacity) has intensified during the winter peaks.

**Table 4-1 - Weekly Airline Capacity, Winter (arriving + departing)**

| AIRLINE | 2013/14 | | 2006/07 | |
|---|---|---|---|---|
| | seats | Per cent | seats | Per cent |
| Cayman Airways, US | 6,832 | 18.0 | 7,480 | 23.6 |
| American | 6,300 | 16.6 | 4,432 | 14.0 |
| United/Continental | 5,832 | 15.4 | 1,480 | 4.7 |
| Cayman Airways, Caribbean | 5,124 | 13.5 | 2,420 | 7.6 |
| US Airways | 4,696 | 12.4 | 2,792 | 8.8 |
| Delta/Northwest | 2,088 | 5.5 | 3,420 | 10.8 |
| British Airways | 1,512 | 4.0 | 1,512 | 4.8 |
| JetBlue | 1,200 | 3.2 | 0 | 0.0 |
| Air Canada | 776 | 2.0 | 1,056 | 3.3 |
| WestJet | 544 | 1.4 | 0 | 0.0 |
| Aerolineas SOSA | 76 | 0.2 | 0 | 0.0 |
| Spirit | | | 2,492 | 7.9 |
| Air Jamaica | | | 1,596 | 5.0 |
| Isleña | | | 160 | 0.5 |
| Atlantic de Honduras | | | 264 | 0.8 |
| Subtotal: International | 34,980 | 92.4 | 29,104 | 91.9 |
| Cayman Airways - CYB | 1,942 | 5.1 | 1,784 | 5.6 |
| Cayman Airways - LYB | 950 | 2.5 | 798 | 2.5 |
| Subtotal: Domestic | 2,892 | 7.6 | 2,582 | 8.1 |
| TOTAL | 37,872 | 100.0 | 31,686 | 100.0 |

Sources: CIAA, OAG and airline web sites. Percentages may not add due to rounding

The major changes were as follows:

- Cayman Airways has redeployed some relative capacity from the US, where it faced substantial levels of competition, to regional routes in the Caribbean (Panama City, La Ceiba).
- United Airlines (including the recently merged Continental) has added a lot of capacity.
- Both Spirit and Air Jamaica (since taken over by Caribbean) have withdrawn for the Cayman Islands.

While the Cayman Islands have the ability to negotiate their own Air Service Agreements, the accords must be included in an applicable treaty signed by the United Kingdom. With one exception, this is not a problem, and the Islands operate under UK open skies agreements with Panama and Canada. The Cayman Islands supports the concept of open skies, and in general, will give permission to anyone wishing to fly to Grand Cayman, regardless as to whether or not an ASA exists.

The exception is the agreement with the United States. The Cayman Islands were included in the restrictive Bermuda II US-UK agreement signed in 1977, which limited Cayman Airways to serving Miami and Houston, plus no more than five additional points in the US. A side letter to that agreement restricted capacity on the Miami route to no more than three daily frequencies for carriers of each country. In 2008, the UK joined with the European Union in negotiating a comprehensive open skies agreement with the US, replacing Bermuda II, but specifically exempted the Cayman Islands from its provisions. Effectively, routes to the US are currently operated on an ad hoc basis, in the absence of a formal bilateral agreement.

While the Cayman Islands CAA is philosophically in favour of open skies, and believes that it will eventually agree to an open skies agreement with the US, it also feels a need to protect the national carrier, but intends to do so in as non-obtrusive a manner as possible.

There are no slot restrictions currently in effect for ORIA, and none are anticipated in the foreseeable future. To the best of the consultant's knowledge, no carrier wishing to serve the Cayman Islands has been turned down due to bilateral ASA restrictions.

## 4.4 TRAFFIC PROJECTIONS–GRAND CAYMAN

Air traffic is broadly related to a number of key socio-economic variables, such as:

- population
- gross domestic product (GDP) – largely related to business travel
- personal disposable income (PDI) – largely related to personal travel
- air fares
- modal competition

There are three broad classes of air passengers, whose magnitude will be based on differing sets of socioeconomic variables.

- business traffic will be related to economic conditions in both the Cayman Islands and related countries
- tourist traffic will be related to the attractiveness of tourist facilities relative to other locations, available hotel beds, and the extent to which these facilities have been (or will be) successfully marketed.
- VFR (visiting friends and relatives) will be related to population and disposable income, as well as the level of air fares in the market.

Traffic forecasts have been developed according to the following three scenarios;

- **Baseline:** This is effectively a status quo scenario. The economy will continue to grow at long-term historic rates. Following the spate of new developments expected to open in the 2016 time frame, tourism will continue to be concentrated on the upscale market, and will continue to grow slowly. The Health City initiative will proceed through at least Phase 1. There will be no major changes to regulations governing the financial services industry.

- **Optimistic:** General conditions slightly more optimistic than the baseline forecast, but assumes that Health City will continue to grow to become a major economic engine for the Islands. In

addition to the direct travel requirements related to the hospital itself, additional travel will be generated indirectly as a result of the additional income injected into the local economy.

- **Pessimistic:** Tourism remains stagnant, but the economy continues to grow, albeit at a slightly lower rate than for the baseline.

It has proven difficult to develop a statistically valid correlation between historical traffic and the underlying economic factors, particularly in view of the havoc wrought by Hurricane Ivan, and the resulting injection of activity during the following few years. However, Ivan notwithstanding, the travel patterns themselves have proven remarkably consistent over the past few years, with an average passenger growth rate of 1-2% per annum during the last four years.

The Cayman Islands Government projects economic recovery will continue, and that real GDP will grow at the rate of 1.5% for FY 2014, rising to 1.7% for FY 2015, 1.9% for FY 2016, and 2.4% for FY 2017.

As noted earlier, the Department of Tourism projects air arrival growth in the 2% per annum range through 2016, after which traffic may rise as new developments come on stream.

While Boeing does not produce a Caribbean-specific market forecast, its projection of internal North American traffic growth averages 2.3% per annum for the next 20 years, while the equivalent forecast by Airbus is 1.9%. However, Airbus has also projected specific Caribbean growth on a market basis, as noted in Table 4-2, below.

**Table 4-2 - Regional Passenger Traffic Growth Rates (Selected Regions)**

| ROUTE | AAGR (%) 2013-2032 |
|---|---|
| Caribbean – Canada | 6.0 |
| Caribbean – Central America | 5.2 |
| Caribbean – South America | 5.4 |
| Caribbean – United States | 2.4 |
| Caribbean – Western Europe | 3.5 |
| Sources: Airbus Global Market Forecast, 2013-2032 | |

If traffic growth in the Cayman Islands is similar to that elsewhere in the Caribbean, then based on the current distribution of visitor arrivals by air, the weighted average Airbus growth rate would be about 2.7%. However, these long-term forecasts are somewhat above recently experienced growth levels at Grand Cayman.

On a judgemental basis, the baseline international passenger traffic forecast has been projected at a rate of 2% through 2016, when new hotel developments will come on-line, and the Health City initiative will have been in operation for a few years. The rate has been increased to the 3%, slightly above the Airbus weighted average, through 2022, followed by small annual declines to reach 2.5% by 2032.

Domestic traffic, which has been declining for the past several years, has been held constant, as any internal growth is expected to be countered by new direct international services to Cayman Brac.

The pessimistic forecast has been projected at a nominal rate of increase of 1% per annum.

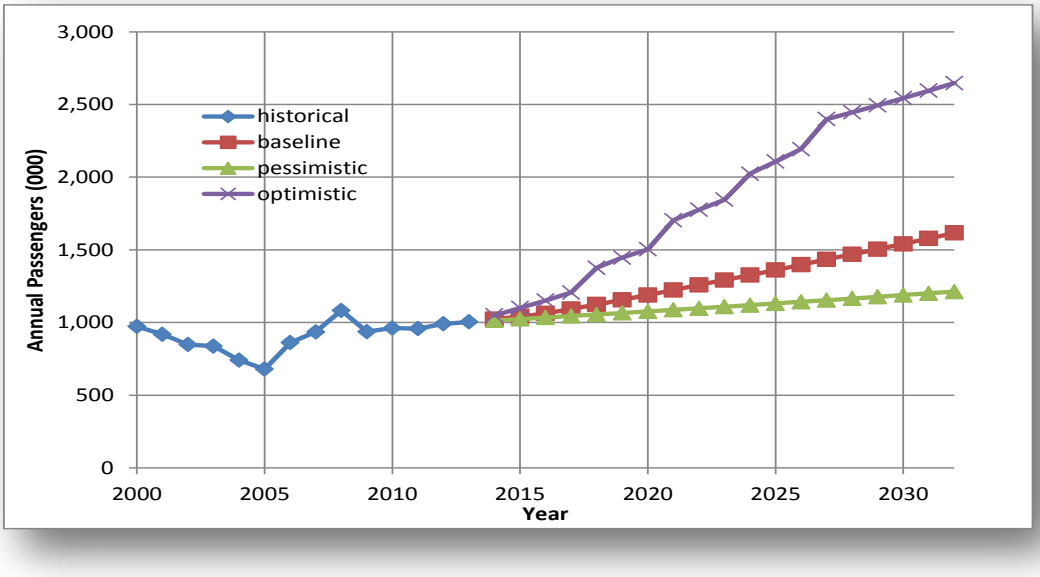
For the optimistic forecast, the consultants were allowed to examine detailed projections of traffic generated by Health City, but are bound by a confidentiality agreement not to disclose any details. These, adjusted for some delays in the project implementation since the initial report was issued, were incorporated into other more optimistic assumptions to provide the overall optimistic projections. The net result was an average overall growth rate of about 6.6% per annum through 2022, and an average rate of 4.1% per annum thereafter.

The three forecasts are summarized in Table 4-3 and have been graphed in Figure 4-13, below.

**Table 4-3 - Passenger Forecasts, Grand Cayman**

| YEAR | TOTAL PASSENGERS (000) | | |
|---|---|---|---|
| | Baseline | Optimistic | Pessimistic |
| 2012 | 991 | | |
| 2013 | 1,004 | | |
| 2017 | 1,092 | 1,206 | 1,044 |
| 2022 | 1,259 | 1,776 | 1,098 |
| 2027 | 1,434 | 2,399 | 1,154 |
| 2032 | 1,616 | 2,647 | 1,213 |
| Source: Consultants analysis | | | |

**Figure 4-13 – Passenger Traffic Forecasts**




Source: Consultants analysis and NMIA

As with passengers, cargo traffic is predominately international, as even domestic enplanements are largely the result of transshipment of international arrivals. Activity levels have been consistently declining over the past five years, after a burst of construction activity following Hurricane Ivan. With overall activity averaging less than five tonnes daily, even a substantial increase will not have a major effect on airport capacity. Despite a decade of negative growth, Boeing predicts that cargo traffic between the Caribbean and North America will average a 1.9% per annum growth rate through 2031. Boeing, however, also notes that "relatively short transit times and lower costs make ocean shipping a more cost-effective option for many shippers in this market".

There has been some recent discussion regarding the development of a major Caribbean cargo transhipment facility. However, if and when such a port is developed, it is most likely to occur at a point where there is both local demand and existing facilities. Recent studies suggest that there are already three global hubs in the Caribbean (Freeport, Bahamas; Kingston, Jamaica; and Caucedo, Dominican Republic) and three sub-regional hubs (Port of Spain and Port Lisas, Trinidad; and Bridgetown, Barbados). Absent more concrete proposals, this possibility has not been factored into the cargo forecasts.

In the absence of any other practical information, the above Boeing growth rates have been applied as the baseline forecast. The enplaned/deplaned ratios have been held constant at about 85% inbound. For the pessimistic forecast, a nominal 1% per annum growth rate was applied.

For the optimistic forecast, although the level of construction activity related to Health City and the associated developments will be substantial, the bulk of the imports are expected to arrive by sea. Time-sensitive medical equipment may require air transport, but the both the number of shipments and their weight is not expected to be substantial. Activity has been forecast to only grow at annual rates about one percentage point above the baseline level.

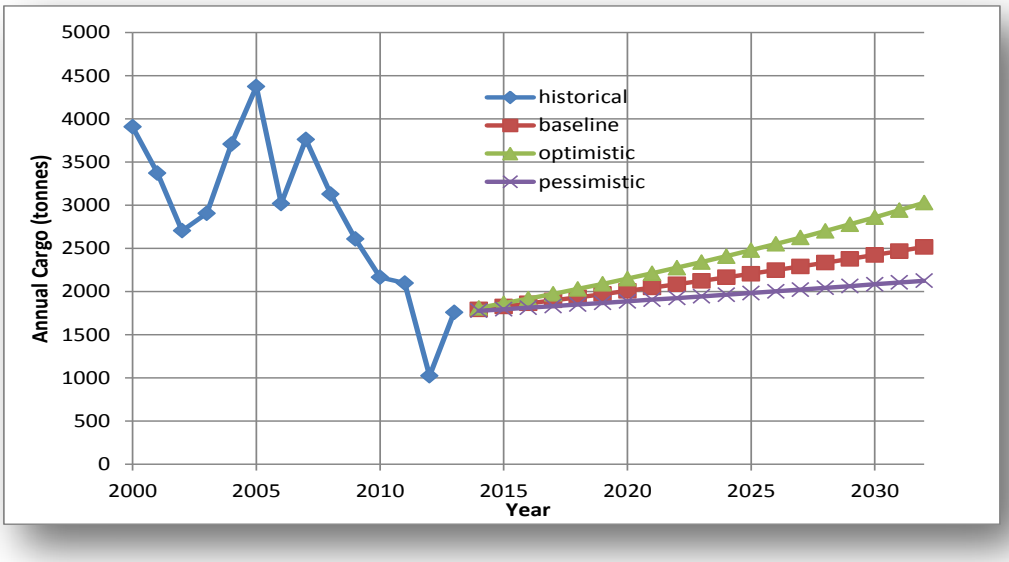
The three cargo forecasts are summarized in Table 4-4 and have been graphed in Figure 4-14.

**Table 4-4 - Cargo Forecasts, Grand Cayman**

| YEAR | E/D CARGO (000 tonnes) | | |
|---|---|---|---|
| | Baseline | Optimistic | Pessimistic |
| 2012 | 1.0 | | |
| 2013 | 1.8 | | |
| 2017 | 1.9 | 2.0 | 1.8 |
| 2022 | 2.1 | 2.3 | 1.9 |
| 2027 | 2.3 | 2.6 | 2.0 |
| 2032 | 2.5 | 3.0 | 2.1 |

Source: Consultants analysis

**Figure 4-14 – Cargo Forecasts**




Source: Consultants analysis

Long-term trends in the developed world strongly suggest that the use of mail will continue to diminish as online communication and e-commerce expand. In the US, for the first time, in 2010, fewer than 50 percent of all bills were paid by mail, and the Government Accountability Office suggests that by 2020, first-class mail is expected to decrease by 50 percent, and standard mail volume is projected to remain flat. Boeing's most recent cargo forecast suggests that on a world-wide basis, air mail is expected to increase slightly, at an annual rate of only 0.9%.

In the absence of any additional Cayman-specific information, the baseline forecast utilizes the Boeing growth rates, while the baseline low projection assumes that there will be no further growth. For the optimistic scenario, it is considered unlikely that growth will exceed 2% per year. In all cases, it has been assumed that the split between inbound and outbound components will be maintained at roughly two-thirds deplaned, and one-third enplaned.

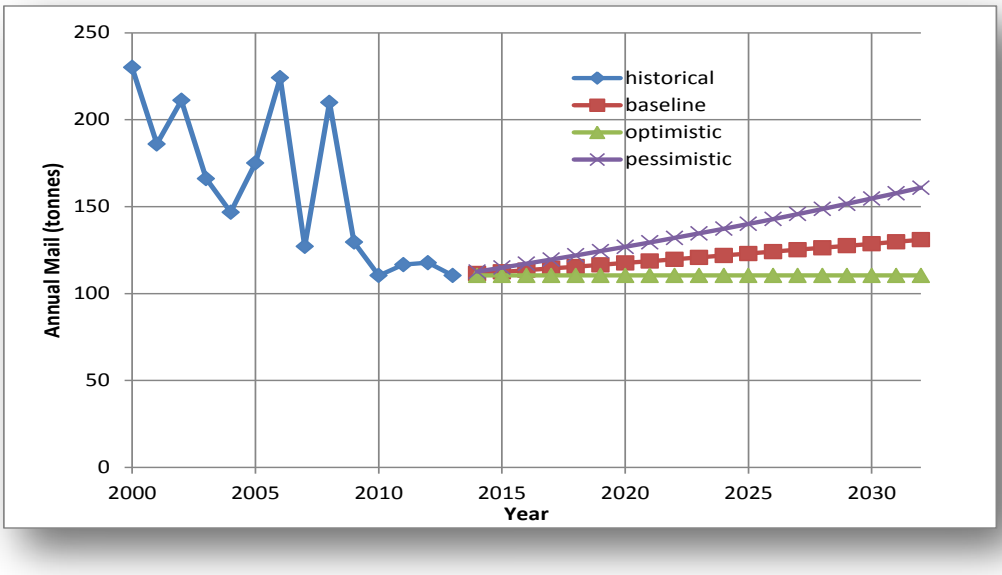
The three mail forecasts are summarized in Table 4-5 and have been graphed in Figure 4-15.

**Table 4-5 – Mail Forecasts, Grand Cayman**

| YEAR | E/D MAIL (tonnes) | | |
|---|---|---|---|
| | Baseline | Optimistic | Pessimistic |
| 2012 | 118 | | |
| 2013 | 110 | | |
| 2017 | 114 | 120 | 110 |
| 2022 | 120 | 132 | 110 |
| 2027 | 125 | 146 | 110 |
| 2032 | 131 | 161 | 110 |

Source: Consultants analysis

**Figure 4-15 – Mail Forecasts**




Source: Consultants analysis and NMIA

Aircraft movement forecasts have been developed individually, by category.

In 2013, there were an estimated 11,850 international airline movements. These movements carried an estimated 954,000 passengers for an average of about 80 passengers per movement. As shown in Figure 2.10, this number has remained relatively constant for the past five years. As it is expected that airline growth will tend to be concentrated on service to new hubs, as additional airlines initiate service, rather than substantially increased frequency on existing routes, it is doubtful whether the average aircraft size will actually rise over the forecast period for either the baseline or the baseline low scenarios. For the optimistic scenario, however, aircraft size will have to increase in order to accommodate the increased traffic levels. This has been projected to increase 1% per year throughout the forecast period.

In 2013, there were an estimated 5,183 domestic airline movements, carrying an estimated 37,000 passengers, for an average of about 7 passengers per movement. However, this low figure is believed to be an anomaly, and the prior years' averages of 10–11 passengers per flight has been used instead. Almost all domestic flights are operated by 19 seat Twin Otters. In the future, once a new airport at Little Cayman has been completed, it is expected that Cayman Airways will retire the Twin Otter fleet in favour of substantially larger equipment in the 35 – 50 seat class, which can be used for both domestic and regional flights. For that reason, the number of passengers per aircraft has been raised to 25 beginning in about 2017. As there is little growth forecast for domestic traffic, this number has been held constant throughout the forecast period.

General aviation movements have been actually declining in the years since Hurricane Ivan. GA activity at GCM tends to be made up of larger business-oriented equipment operating internationally. On a judgmental basis, the baseline forecast has been grown at the rate of 1% per annum through the forecast horizon, while the baseline low scenario has assumed no growth at all.

The optimistic forecast, which is largely related to the expansion of the Health City initiative, implies that GA activity may increase sharply. Already, an air ambulance service is planned for 2014, and an aircraft will be based at GCM. For the future, GA activity has been forecast based on the ratio of passenger activity between the optimistic and baseline forecasts.

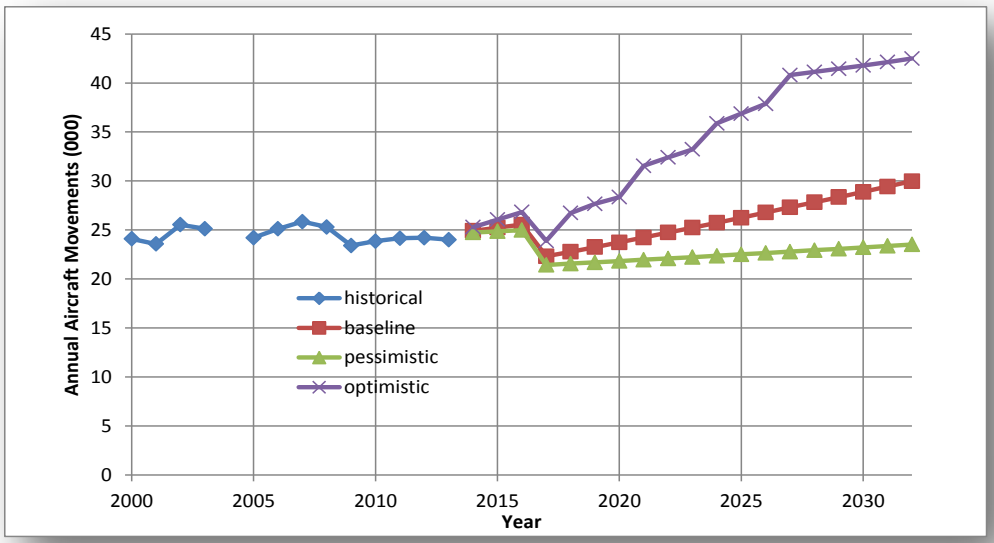
The three aircraft movement forecasts are summarized in Table 4-6 and have been graphed in Figure 4-16. Note that the overall reduction in 2017 is due to the replacement of the domestic Twin Otters with much larger equipment, implying a corresponding reduction in domestic airline movements.

**Table 4-6 - Aircraft Movement Forecasts, Grand Cayman**

| YEAR | AIRCRAFT MOVEMENTS (000) | | |
|---|---|---|---|
| | Baseline | Optimistic | Pessimistic |
| 2012 | 24 | | |
| 2013 | 24 | | |
| 2017 | 22 | 24 | 21 |
| 2022 | 25 | 32 | 22 |
| 2027 | 27 | 41 | 23 |
| 2032 | 30 | 42 | 24 |

Source: Consultants analysis and NMIA

**Figure 4-16 – Aircraft Movement Forecasts**




Source: Consultants analysis

## 4.5 NOMINAL SCHEDULES– GRAND CAYMAN

A forecast of airline schedules in some future year is considered 'nominal' in the sense that it represents a combination of assumptions, all of which are subject to uncertainty. A nominal schedule can be thought of as a pattern of arrivals and departures with a less than one hundred per cent probability of actually occurring as forecast. As with any other forecast, a nominal schedule will always represent only one of various possible outcomes.

A nominal schedule is also a projected pattern of arrivals and departures prepared under the assumption that facilities will be available to accommodate unconstrained demands on the system. Since a nominal schedule is only a starting point, it does not imply that facilities will actually be put in place to handle all unconstrained demand, regardless of cost. In fact, in many cases where facilities are limited, it is likely that the actual schedule will vary sharply from the nominal schedule due to such techniques as slot controls, differential pricing, gate limitations, or simply other unforeseen factors.

Given the above caveats, five sets of nominal schedules have been produced, for the baseline year of 2014, and for the baseline forecast years of 2024 and 2034. As well, nominal schedules for both the baseline low and high forecasts have been prepared for 2034. In all cases beyond 2014, the aircraft types listed should be considered generic, in that upgrades will be expected to occur as older aircraft are replaced by more modern counterparts.

As the peak month for traffic has consistently been in the winter, scheduled services for the winter of 2013/14, have been selected by WSP as the baseline for this report. Scheduled aircraft movements peak during the three last days of the week, as noted in Table 4-7, with the largest number of movements on a Saturday. Therefore, a winter Saturday has been selected as the planning day.

**Table 4-7 - Distribution of Scheduled Aircraft Movements Winter Friday, 2013/14**

| SECTOR | AIRCRAFT MOVEMENTS | | | | | | |
|---|---|---|---|---|---|---|---|
| | Mon | Tue | Wed | Thu | Fri | Sat | Sun |
| International Dep. | 18 | 12 | 17 | 19 | 23 | 22 | 22 |
| Domestic Dep. | 5 | 5 | 6 | 6 | 7 | 9 | 6 |
| Total Departures | 23 | 17 | 23 | 25 | 30 | 31 | 28 |
| International Arr. | 18 | 12 | 16 | 18 | 24 | 23 | 22 |
| Domestic Arr. | 6 | 4 | 6 | 7 | 7 | 8 | 6 |
| Total Arrivals | 24 | 16 | 22 | 25 | 31 | 31 | 28 |
| International Mvts. | 36 | 24 | 33 | 37 | 47 | 45 | 44 |
| Domestic Mvts. | 11 | 9 | 12 | 13 | 14 | 17 | 12 |
| Total Movements | 47 | 33 | 45 | 50 | 61 | 62 | 56 |

Source: Consultants analysis of schedule data

Daily flight by flight traffic information is not available for GCM. As most airlines now operate with average load factors in the low 80% range, it is not unreasonable to assume that passengers loads on the peak day will average at least 90%. The baseline nominal schedule has been shown in Table 4-8, below. Arriving and departing aircraft have been matched according to reasonably efficient assumptions. A summary of planning day capacity and passenger loads has been shown in Table 4-9, below.

**Table 4-8 - 2013/14 Baseline Nominal Schedule, Grand Cayman**

| AIR LINE | FLIGHT # | A/C TYPE | SEATS | PAX | FROM | ARR TIME | DEP TIME | TO | PAX | FLIGHT # |
|---|---|---|---|---|---|---|---|---|---|---|
| KX | 102 | 733 | 122 | 110 | CYB | 700 | 750 | MIA | 110 | 102 |
| KYX | 4421 | DTO | 19 | 17 | LYB | 950 | 1000 | LYB | 17 | 4422 |
| KYX | 4721 | DTO | 19 | 17 | LYB | 950 | 1010 | LYB | 17 | 4722 |
| KX | 601 | 733 | 122 | 110 | KIN | 950 | 1140 | TPA | 110 | 200 |
| KYX | 4722 | DTO | 19 | 17 | LYB | 1130 | 1430 | CYB | 17 | 4424 |
| KYX | 4422 | DTO | 19 | 17 | CYB | 1150 | 1310 | CYB | 17 | 4523 |
| UA | 1258 | 738 | 152 | 137 | IAD | 1151 | 1246 | IAD | 137 | 1259 |
| B6 | 765 | 320 | 150 | 135 | JFK | 1229 | 1325 | JFK | 135 | 766 |
| KX | 793 | 733 | 122 | 110 | JFK | 1230 | | | | |
| US | 819 | 319 | 124 | 112 | CLT | 1239 | 1330 | CLT | 112 | 820 |
| UA | 1496 | 739 | 167 | 150 | IAH | 1245 | 1347 | IAH | 150 | 1497 |
| KX | 123 | 733 | 122 | 110 | CYB | 1255 | | | | |
| AA | 1552 | 738 | 150 | 135 | MIA | 1300 | 1405 | MIA | 135 | 1257 |
| DL | 569 | 320 | 150 | 135 | DTW | 1303 | 1405 | DTW | 135 | 568 |
| AC | 972 | E90 | 97 | 87 | YYZ | 1315 | 1415 | YYZ | 87 | 973 |
| US | 861 | 320 | 150 | 135 | PHL | 1336 | 1445 | PHL | 135 | 861 |
| DL | 687 | 320 | 150 | 135 | ATL | 1340 | 1442 | MSP | 135 | 2017 |
| UA | 1436 | 739 | 167 | 150 | EWR | 1403 | 1453 | EWR | 150 | 1440 |
| US | 821 | 320 | 150 | 135 | CLT | 1425 | 1535 | CLT | 135 | 822 |
| B6 | 1042 | 320 | 150 | 135 | BOS | 1434 | 1550 | BOS | 135 | 1043 |
| DL | 678 | 320 | 150 | 135 | MSP | 1446 | 1546 | ATL | 135 | 698 |
| KYX | 4523 | DTO | 19 | 17 | LYB | 1455 | 1520 | LYB | 17 | 4724 |
| AA | 2352 | 738 | 150 | 135 | MIA | 1550 | 1655 | MIA | 135 | 1640 |
| KX | 201 | 733 | 122 | 110 | TPA | 1600 | 1715 | JFK | 110 | 792 |
| KYX | 4424 | DTO | 19 | 17 | LYB | 1615 | 1640 | LYB | 17 | 4725 |
| KYX | 4724 | DTO | 19 | 17 | LYB | 1640 | 1700 | LYB | 17 | 4425 |
| UA | 1494 | 739 | 167 | 150 | IAH | 1649 | 1744 | IAH | 150 | 1495 |
| KX | 321 | 733 | 122 | 110 | DFW | 1730 | 1830 | CYB | 110 | 606 |
| BA | 253 | 767 | 189 | 170 | NAS | 1735 | 1915 | NAS | 170 | 252 |
| KYX | 4425 | DTO | 19 | 17 | CYB | 1850 | | | | |
| AA | 1007 | 738 | 150 | 135 | MIA | 2045 | | | | |
| US | 2050 | E90 | 99 | 90 | PHL | 2135 | | | | |
| KX | 107 | 733 | 122 | 110 | MIA | 2150 | | | | |

| AIR LINE | FLIGHT # | A/C TYPE | SEATS | PAX | FROM | ARR TIME | DEP TIME | TO | PAX | FLIGHT # |
|---|---|---|---|---|---|---|---|---|---|---|
| KX | | 733 | | | | | 530 | CYB | 110 | 401 |
| KX | | 733 | | | | | 700 | KIN | 110 | 600 |
| KYX | | DTO | | | | | 800 | CYB | 17 | 4421 |
| KX | | 733 | | | | | 810 | DFW | 110 | 320 |
| KYX | | DTO | | | | | 830 | LYB | 17 | 4721 |
| AA | | 738 | | | | | 845 | MIA | 135 | 1250 |
| | | | | 3302 | | | | | 499 | |

Source: Consultants analysis

**Table 4-9 - 2013/14 Planning Day Loads, Grand Cayman**

| SECTOR | Passengers | Seats |
|---|---|---|
| Arriving Domestic | 136 | 152 |
| Arriving International | 3,166 | 3,516 |
| Total Arriving | 3,302 | 3,668 |
| Departing Domestic | 153 | 171 |
| Departing International | 3,076 | 3,417 |
| Total Departing | 3,229 | 3,588 |

Source: Consultants analysis

The schedule has some extremely sharp mid-day peaks, with eight arrivals (974 arriving passengers) scheduled in the 60 minute period beginning at 12:29. This represents over 30% of the daily departing passenger total.

The critical aircraft at present is the 189 seat British Airways B767-300, and it is considered unlikely that any aircraft larger than 250 seats will be operated during the baseline forecast period on a regular basis. However, some existing equipment may be upsized in later years.

The following assumptions have been made regarding new services to be introduced during the forecast period.

- Cayman Airways will continue to operate both domestic and international services, more or less in its current configuration
- In general, airlines currently operating on a Saturday will add flights on other days before increasing Saturday frequencies. By the same token, airlines not currently operating on a Saturday will tend to add Saturday flights to their schedule.
- Some US airlines not currently in the market are expected to eventually inaugurate service, with the most probable candidates being Southwest (likely from Atlanta, Baltimore, Houston and/or Chicago), and Spirit (Fort Lauderdale).
- American will likely add flights to their hub at Dallas
- The most obvious candidates for additional regional services include COPA (Panama City) and perhaps Caribbean/LIAT (from Jamaica). COPA services to Panama City will provide connections to most major Latin American cities until such time as traffic growth warrants more direct flights.
- There does not appear enough European traffic demand to warrant non-stop service to the Cayman Islands. At present, British Airways fills about 50% of a B767-300 four days a week, and prefers the higher frequency with a transit stop at Nassau, to a twice weekly non-stop. UK service via Nassau would probably have to operate on a daily basis before non-stop flights (runway length permitting) would become practicable. This has been assumed to occur in 2032

(baseline and optimistic scenarios). Additional service by Virgin Atlantic has also been added in the 2032 (optimistic scenario) schedule

- Cayman Airways will obtain aircraft in the 35-50 seat range to operate both domestic services and regional routes. Cayman Airways will also upgrade their B737 fleet to a more fuel-efficient, and probably larger, version.
- Relations between Cuba and the US will improve slowly, to the point where direct services will eventually be initiated. While there is legitimate traffic demand between the Cayman Islands and Cuba, it is not believed that there is any long-run potential in acting as a transit point for Cuba-US traffic.
- Traffic related to the Health City initiative will have a flatter distribution throughout the week, as opposed to tourist traffic which tends to peak on weekends. Thus the "peak to annual" traffic ratio will be lower for the optimistic scenario, which is dependent upon Health City-related traffic, than for the baseline scenario.
- The schedules are based on unconstrained demand, and no slot management program has been assumed.

For the baseline schedule in 2013, the planning day represents 1/154 of the annual total; or 2.37 times the average day. This is a function both of peak months occurring during the winter, and a huge daily peak over the weekend. A peaking factor of this magnitude is unlikely to continue into the future, and it has been reduced somewhat, on a judgemental basis, in the future. As well, the slight imbalance between arriving and departing flights has been eliminated. Table 4-10 provides a forecast of the planning day totals for the baseline scenario in future years, as well as both the pessimistic and optimistic scenarios for 2032. Note that in preparing an actual nominal schedule, the daily totals may vary slightly because of the requirement to use fixed aircraft sizes.

**Table 4-10 - Planning Day Passengers, Grand Cayman**

| YEAR | ANNUAL | PEAK | ARR | DEP |
|---|---|---|---|---|
| | E/D PAX | RATIO | PAX | PAX |
| 2013 | 1,003,000 | 1/154 | 3,302 | 3,229 |
| 2022 baseline | 1,258,000 | 1/175 | 3,594 | 3,594 |
| 2032 baseline | 1,617,000 | 1/200 | 4,043 | 4,043 |
| 2032 optimistic | 2,646,000 | 1/225 | 5,880 | 5,880 |
| 2032 pessimistic | 1,212,000 | 1/175 | 3,463 | 3,463 |
| Source: Consultant's analysis | | | | |

The future year baseline nominal schedules have been shown in Tables 4-11 to 4-14, below. The specific aircraft types noted in these tables are intended to indicate size requirements, and will probably be replaced by more modern equipment in the equivalent size category. Where specific airline re-equipment programs are known, appropriate aircraft substitutions have been made.

**Table 4-11 - 2022 - Baseline Nominal Schedule, Grand Cayman**

| AIR LINE | FLIGHT # | A/C TYPE | SEATS | PAX | FROM | ARR TIME | DEP TIME | TO | PAX | FLIGHT # |
|---|---|---|---|---|---|---|---|---|---|---|
| KYX | new22 | TP40 | 40 | 36 | HAV | 600 | 800 | CYB/LYB | 36 | new22 |
| KYX | new22 | TP40 | 40 | 36 | CYB/LYB | 950 | 1020 | CYB/LYB | 36 | new22 |
| KX | 601 | 733 | 122 | 110 | KIN | 950 | 1140 | TPA | 110 | 200 |
| CM | new22 | E90 | 99 | 90 | PTY | 1130 | 1230 | PTY | 90 | new22 |

| AIR LINE | FLIGHT # | A/C TYPE | SEATS | PAX | FROM | ARR TIME | DEP TIME | TO | PAX | FLIGHT # |
|---|---|---|---|---|---|---|---|---|---|---|
| UA | 1258 | 738 | 152 | 137 | IAD | 1151 | 1246 | IAD | 137 | 1259 |
| B6 | 765 | 320 | 150 | 135 | JFK | 1229 | 1325 | JFK | 135 | 766 |
| KYX | new22 | TP40 | 40 | 36 | CYB/LYB | 1230 | 1330 | CYB/LYB | 36 | new22 |
| AA | 819 | 319 | 124 | 112 | CLT | 1239 | 1330 | CLT | 112 | 820 |
| UA | 1496 | 739 | 167 | 150 | IAH | 1245 | 1347 | IAH | 150 | 1497 |
| KX | 123 | 733 | 122 | 110 | CYB | 1255 | 1400 | JFK | 110 | 792 |
| AA | 1552 | 738 | 150 | 135 | MIA | 1300 | 1405 | MIA | 135 | 1257 |
| DL | 569 | 320 | 150 | 135 | DTW | 1303 | 1405 | DTW | 135 | 568 |
| AC | 972 | E90 | 97 | 87 | YYZ | 1315 | 1415 | YYZ | 87 | 973 |
| AA | 861 | 320 | 150 | 135 | PHL | 1336 | 1445 | PHL | 135 | 861 |
| DL | 687 | 320 | 150 | 135 | ATL | 1340 | 1442 | MSP | 135 | 2017 |
| UA | 1436 | 739 | 167 | 150 | EWR | 1403 | 1453 | EWR | 150 | 1440 |
| AA | 821 | 320 | 150 | 135 | CLT | 1425 | 1535 | CLT | 135 | 822 |
| AA | new22 | 738 | 150 | 135 | DFW | 1430 | 1535 | DFW | 135 | new22 |
| B6 | 1042 | 320 | 150 | 135 | BOS | 1434 | 1550 | BOS | 135 | 1043 |
| WS | 2790 | 73W | 136 | 122 | YYZ | 1434 | 1525 | YYZ | 122 | 2791 |
| DL | 678 | 320 | 150 | 135 | MSP | 1446 | 1546 | ATL | 135 | 698 |
| KYX | new22 | TP40 | 40 | 36 | CYB/LYB | 1540 | 1640 | CYB/LYB | 36 | new22 |
| AA | 2352 | 738 | 150 | 135 | MIA | 1550 | 1655 | MIA | 135 | 1640 |
| KX | 201 | 733 | 122 | 110 | TPA | 1600 | | | | |
| UA | 1494 | 739 | 167 | 150 | IAH | 1649 | 1744 | IAH | 150 | 1495 |
| KX | 321 | 733 | 122 | 110 | DFW | 1730 | 1830 | MIA | 110 | 606 |
| BA | 253 | 787 | 214 | 193 | NAS | 1735 | 1915 | NAS | 193 | 252 |
| KYX | new22 | TP40 | 40 | 36 | CYB/LYB | 1850 | 2300 | HAV | 36 | new22 |
| AA | 1007 | 738 | 150 | 135 | MIA | 2045 | | | | |
| KX | 793 | 733 | 122 | 110 | JFK | 2130 | | | | |
| AA | 2050 | E90 | 99 | 90 | PHL | 2135 | | | | |
| KX | 107 | 733 | 122 | 110 | MIA | 2150 | | | | |
| KX | | 733 | | | | | 530 | CYB | 110 | 401 |
| KX | | 733 | | | | | 700 | KIN | 110 | 600 |
| KX | | 733 | | | | | 810 | DFW | 110 | 320 |
| AA | | 738 | | | | | 845 | MIA | 135 | 1250 |
| AA | | E90 | | | | | 900 | PHL | 90 | 1762 |
| | | | | 3,606 | | | | | 3,606 | |

Source: Consultants analysis

## Table 4-12 - 2032 Baseline Nominal Schedule, Grand Cayman

| AIR LINE | FLIGHT # | A/C TYPE | SEATS | PAX | FROM | ARR TIME | DEP TIME | TO | PAX | FLIGHT # |
|---|---|---|---|---|---|---|---|---|---|---|
| KYX | new22 | TP50 | 50 | 40 | HAV | 600 | 800 | CYB/LYB | 40 | new22 |
| KYX | new32 | TP50 | 50 | 40 | CYB/LYB | 800 | 900 | KIN/MBJ | 40 | new32 |
| KYX | new22 | TP50 | 50 | 40 | CYB/LYB | 950 | 1020 | CYB/LYB | 40 | new22 |
| KX | 601 | 738 | 150 | 135 | KIN | 950 | 1140 | TPA | 135 | 200 |
| CM | new22 | E90 | 99 | 90 | PTY | 1130 | 1230 | PTY | 90 | new22 |
| UA | 1258 | 738 | 152 | 137 | IAD | 1151 | 1246 | IAD | 137 | 1259 |
| KYX | new32 | TP50 | 50 | 40 | KIN/MBJ | 1200 | 1300 | LCE | 40 | new32 |
| B6 | 765 | 320 | 150 | 135 | JFK | 1229 | 1325 | JFK | 135 | 766 |
| KYX | new22 | TP50 | 50 | 40 | CYB/LYB | 1230 | 1330 | CYB/LYB | 40 | new22 |
| AA | 819 | 319 | 124 | 112 | CLT | 1239 | 1330 | CLT | 112 | 820 |
| UA | 1496 | 739 | 167 | 150 | IAH | 1245 | 1347 | IAH | 150 | 1497 |
| KX | 123 | 738 | 150 | 135 | CYB | 1255 | 1400 | JFK | 135 | 792 |
| AA | 1552 | 738 | 150 | 135 | MIA | 1300 | 1405 | MIA | 135 | 1257 |
| DL | 569 | 320 | 150 | 135 | DTW | 1303 | 1405 | DTW | 135 | 568 |
| WN | new32 | 73W | 143 | 129 | BWI | 1310 | 1350 | BWI | 129 | new32 |
| AC | 972 | 320 | 146 | 131 | YYZ | 1315 | 1415 | YYZ | 131 | 973 |

| AIR LINE | FLIGHT # | A/C TYPE | SEATS | PAX | FROM | ARR TIME | DEP TIME | TO | PAX | FLIGHT # |
|---|---|---|---|---|---|---|---|---|---|---|
| AA | 861 | 320 | 150 | 135 | PHL | 1336 | 1445 | PHL | 135 | 861 |
| DL | 687 | 320 | 150 | 135 | ATL | 1340 | 1442 | MSP | 135 | 2017 |
| UA | 1436 | 739 | 167 | 150 | EWR | 1403 | 1453 | EWR | 150 | 1440 |
| AA | 821 | 320 | 150 | 135 | CLT | 1425 | 1535 | CLT | 135 | 822 |
| AA | new22 | 738 | 150 | 135 | DFW | 1430 | 1535 | DFW | 135 | new22 |
| B6 | 1042 | 320 | 150 | 135 | BOS | 1434 | 1550 | BOS | 135 | 1043 |
| WS | 2790 | 738 | 174 | 157 | YYZ | 1434 | 1525 | YYZ | 157 | 2791 |
| DL | 678 | 320 | 150 | 135 | MSP | 1446 | 1546 | ATL | 135 | 698 |
| KYX | new22 | TP50 | 50 | 40 | CYB/LYB | 1540 | 1640 | CYB/LYB | 40 | new22 |
| AA | 2352 | 738 | 150 | 135 | MIA | 1550 | 1655 | MIA | 135 | 1640 |
| KX | 201 | 738 | 150 | 135 | TPA | 1600 | | | | |
| UA | 1494 | 739 | 167 | 150 | IAH | 1649 | 1744 | IAH | 150 | 1495 |
| KX | 321 | 738 | 150 | 135 | DFW | 1730 | 1830 | MIA | 135 | 606 |
| BA | 253 | 787 | 214 | 193 | LHR | 1735 | 1915 | LHR | 193 | 252 |
| KYX | new32 | TP50 | 50 | 40 | LCE | 1800 | 1900 | CYB/LYB | 40 | new32 |
| KYX | new22 | TP50 | 50 | 40 | CYB/LYB | 1850 | 2300 | HAV | 40 | new22 |
| AA | 1007 | 738 | 150 | 135 | MIA | 2045 | | | | |
| KX | 793 | 738 | 150 | 135 | JFK | 2130 | | | | |
| AA | 2050 | E90 | 99 | 90 | PHL | 2135 | | | | |
| KX | 107 | 738 | 150 | 135 | MIA | 2150 | | | | |
| KX | | 738 | | | | | 530 | CYB | 135 | 401 |
| KX | | 738 | | | | | 700 | KIN | 135 | 600 |
| KX | | 738 | | | | | 810 | DFW | 135 | 320 |
| AA | | 738 | | | | | 845 | MIA | 135 | 1250 |
| AA | | E90 | | | | | 900 | PHL | 90 | 1762 |
| | | | | 4104 | | | | | 630 | |

Source: Consultants analysis

## Table 4-13 - 2032 Pessimistic Nominal Schedule, Grand Cayman

| AIR LINE | FLIGHT # | A/C TYPE | SEATS | PAX | FROM | ARR TIME | DEP TIME | TO | PAX | FLIGHT # |
|---|---|---|---|---|---|---|---|---|---|---|
| KYX | new22 | TP40 | 40 | 36 | HAV | 600 | 800 | CYB/LYB | 36 | new22 |
| KYX | new22 | TP40 | 40 | 36 | CYB/LYB | 950 | 1020 | CYB/LYB | 36 | new22 |
| KX | 601 | 733 | 122 | 110 | KIN | 950 | 1140 | TPA | 110 | 200 |
| CM | new22 | E90 | 99 | 90 | PTY | 1130 | 1230 | PTY | 90 | new22 |
| UA | 1258 | 738 | 152 | 137 | IAD | 1151 | 1246 | IAD | 137 | 1259 |
| B6 | 765 | 320 | 150 | 135 | JFK | 1229 | 1325 | JFK | 135 | 766 |
| KYX | new22 | TP40 | 40 | 36 | CYB/LYB | 1230 | 1330 | CYB/LYB | 36 | new22 |
| AA | 819 | 319 | 124 | 112 | CLT | 1239 | 1330 | CLT | 112 | 820 |
| UA | 1496 | 739 | 167 | 150 | IAH | 1245 | 1347 | IAH | 150 | 1497 |
| KX | 123 | 733 | 122 | 110 | CYB | 1255 | 1400 | JFK | 110 | 792 |
| AA | 1552 | 738 | 150 | 135 | MIA | 1300 | 1405 | MIA | 135 | 1257 |
| DL | 569 | 320 | 150 | 135 | DTW | 1303 | 1405 | DTW | 135 | 568 |
| AC | 972 | E90 | 97 | 87 | YYZ | 1315 | 1415 | YYZ | 87 | 973 |
| AA | 861 | 320 | 150 | 135 | PHL | 1336 | 1445 | PHL | 135 | 861 |
| DL | 687 | 320 | 150 | 135 | ATL | 1340 | 1442 | MSP | 135 | 2017 |
| UA | 1436 | 739 | 167 | 150 | EWR | 1403 | 1453 | EWR | 150 | 1440 |
| AA | 821 | 320 | 150 | 135 | CLT | 1425 | 1535 | CLT | 135 | 822 |
| B6 | 1042 | 320 | 150 | 135 | BOS | 1434 | 1550 | BOS | 135 | 1043 |
| WS | 2790 | 73W | 136 | 122 | YYZ | 1434 | 1525 | YYZ | 122 | 2791 |
| DL | 678 | 320 | 150 | 135 | MSP | 1446 | 1546 | ATL | 135 | 698 |
| KYX | new22 | TP40 | 40 | 36 | CYB/LYB | 1540 | 1640 | CYB/LYB | 36 | new22 |
| AA | 2352 | 738 | 150 | 135 | MIA | 1550 | 1655 | MIA | 135 | 1640 |
| KX | 201 | 733 | 122 | 110 | TPA | 1600 | | | | |
| UA | 1494 | 739 | 167 | 150 | IAH | 1649 | 1744 | IAH | 150 | 1495 |
| KX | 321 | 733 | 122 | 110 | DFW | 1730 | 1830 | MIA | 110 | 606 |
| BA | 253 | 787 | 214 | 193 | NAS | 1735 | 1915 | NAS | 193 | 252 |
| KYX | new22 | TP40 | 40 | 36 | CYB/LYB | 1850 | 2300 | HAV | 36 | new22 |
| AA | 1007 | 738 | 150 | 135 | MIA | 2045 | | | | |
| KX | 793 | 733 | 122 | 110 | JFK | 2130 | | | | |
| AA | 2050 | E90 | 99 | 90 | PHL | 2135 | | | | |
| KX | 107 | 733 | 122 | 110 | MIA | 2150 | | | | |
| KX | | 733 | | | | | 530 | CYB | 110 | 401 |
| KX | | 733 | | | | | 700 | KIN | 110 | 600 |
| KX | | 733 | | | | | 810 | DFW | 110 | 320 |
| AA | | 738 | | | | | 845 | MIA | 135 | 1250 |
| AA | | E90 | | | | | 900 | PHL | 90 | 1762 |
| | | | | 3471 | | | | | 555 | |

Source: Consultants analysis

## Table 4-14 - 2032 Optimistic Nominal Schedule, Grand Cayman

| AIR LINE | FLIGHT # | A/C TYPE | SEATS | PAX | FROM | ARR TIME | DEP TIME | TO | PAX | FLIGHT # |
|---|---|---|---|---|---|---|---|---|---|---|
| KYX | new22 | TP50 | 50 | 40 | HAV | 600 | 800 | CYB/LYB | 40 | new22 |
| KYX | new32 | TP50 | 50 | 40 | CYB/LYB | 800 | 900 | KIN/MBJ | 40 | new32 |
| KYX | new22 | TP50 | 50 | 40 | CYB/LYB | 950 | 1020 | CYB/LYB | 40 | new22 |
| KX | 601 | 738 | 150 | 135 | KIN | 950 | 1140 | TPA | 135 | 200 |
| CM | new22 | 738 | 160 | 144 | PTY | 1130 | 1230 | PTY | 144 | new22 |
| B6 | new 32 | 320 | 150 | 135 | FLL | 1140 | 1235 | FLL | 135 | new 32 |
| UA | 1258 | 738 | 152 | 137 | IAD | 1151 | 1246 | IAD | 137 | 1259 |
| KYX | new32 | TP50 | 50 | 40 | KIN/MBJ | 1200 | 1300 | LCE | 40 | new32 |
| AA | new 32 | 738 | 150 | 135 | ORD | 1200 | 1305 | ORD | 135 | new 32 |
| B6 | 765 | 320 | 150 | 135 | JFK | 1229 | 1325 | JFK | 135 | 766 |
| KYX | new22 | TP50 | 50 | 40 | CYB/LYB | 1230 | 1330 | CYB/LYB | 40 | new22 |
| AA | 819 | 319 | 124 | 112 | CLT | 1239 | 1330 | CLT | 112 | 820 |
| UA | 1496 | 739 | 167 | 150 | IAH | 1245 | 1347 | IAH | 150 | 1497 |
| KX | 123 | 738 | 150 | 135 | CYB | 1255 | 1400 | JFK | 135 | 792 |
| AA | 1552 | 738 | 150 | 135 | MIA | 1300 | 1405 | MIA | 135 | 1257 |
| DL | 569 | 320 | 150 | 135 | DTW | 1303 | 1405 | DTW | 135 | 568 |
| WN | new32 | 73W | 143 | 129 | BWI | 1310 | 1350 | BWI | 129 | new32 |
| AC | 972 | 320 | 146 | 131 | YYZ | 1315 | 1415 | YYZ | 131 | 973 |
| AA | 861 | 320 | 150 | 135 | PHL | 1336 | 1445 | PHL | 135 | 861 |
| DL | 687 | 320 | 150 | 135 | ATL | 1340 | 1442 | MSP | 135 | 2017 |
| UA | 1436 | 739 | 167 | 150 | EWR | 1403 | 1453 | EWR | 150 | 1440 |
| AA | 821 | 320 | 150 | 135 | CLT | 1425 | 1535 | CLT | 135 | 822 |
| AA | new22 | 738 | 150 | 135 | DFW | 1430 | 1535 | DFW | 135 | new22 |
| B6 | 1042 | 320 | 150 | 135 | BOS | 1434 | 1550 | BOS | 135 | 1043 |
| WS | 2790 | 738 | 174 | 157 | YYZ | 1434 | 1525 | YYZ | 157 | 2791 |
| DL | 678 | 320 | 150 | 135 | MSP | 1446 | 1546 | ATL | 135 | 698 |
| UA | new32 | 320 | 150 | 135 | ORD | 1450 | 1550 | ORD | 135 | new32 |
| NK | new32 | 319 | 145 | 131 | FLL | 1455 | 1545 | FLL | 131 | new32 |
| KYX | new22 | TP50 | 50 | 40 | CYB/LYB | 1540 | 1640 | CYB/LYB | 40 | new22 |
| WN | new32 | 73W | 143 | 129 | HOU | 1550 | 1640 | HOU | 129 | new32 |
| AA | 2352 | 738 | 150 | 135 | MIA | 1550 | 1655 | MIA | 135 | 1640 |
| KX | 201 | 738 | 150 | 135 | TPA | 1600 | 1700 | PTY | 135 | new 32 |
| UA | 1494 | 739 | 167 | 150 | IAH | 1649 | 1744 | IAH | 150 | 1495 |
| KX | new 32 | 738 | 150 | 135 | ORD | 1705 | | | | |
| KX | 321 | 738 | 150 | 135 | DFW | 1730 | 1830 | MIA | 135 | 606 |
| BA | 253 | 787 | 214 | 193 | LHR | 1735 | 1915 | LHR | 193 | 252 |
| KYX | new32 | TP50 | 50 | 40 | LCE | 1800 | 1900 | CYB/LYB | 40 | new32 |
| VS | new 32 | 787 | 214 | 193 | LGW | 1830 | 2015 | LGW | 193 | new 32 |
| KX | new 32 | 738 | 150 | 135 | PTY | 1845 | | | | |
| KYX | new22 | TP50 | 50 | 40 | CYB/LYB | 1850 | 2300 | HAV | 40 | new22 |
| JJ | new 32 | 787 | 214 | 193 | GRU | 1945 | 2130 | GRU | 193 | new 32 |
| AA | 1007 | 738 | 150 | 135 | MIA | 2045 | | | | |
| DL | new 32 | 320 | 150 | 135 | ATL | 2100 | | | | |
| KX | 793 | 738 | 150 | 135 | JFK | 2130 | | | | |
| KX | new 32 | 738 | 150 | 135 | DEN | 2130 | | | | |
| AA | 2050 | 320 | 150 | 135 | PHL | 2135 | | | | |
| KX | 107 | 738 | 150 | 135 | MIA | 2150 | | | | |
| B6 | new 32 | 320 | 150 | 135 | FLL | 2320 | | | | |
| KX | | 738 | | | | | 530 | CYB | 135 | 401 |
| KX | | 738 | | | | | 700 | KIN | 135 | 600 |
| B6 | | 320 | | | | | 720 | FLL | 135 | new 32 |
| DL | | 738 | | | | | 730 | ATL | 135 | new 32 |
| KX | | 738 | | | | | 805 | ORD | 135 | new 32 |
| KX | | 738 | | | | | 810 | DFW | 135 | 320 |
| KX | | 738 | | | | | 840 | DEN | 135 | new 32 |
| AA | | 738 | | | | | 845 | MIA | 135 | 1250 |
| AA | | 320 | | | | | 900 | PHL | 135 | 1762 |
| | | | | 5929 | | | | | 1215 | |

Source: Consultants analysis

## 4.6 TRAFFIC PROJECTIONS– SISTER ISLAND AIRPORTS

Traffic forecasts have been also developed for two smaller aerodromes:

- Charles Kirkconnell International Airport (CKIA or CYB)
- Little Cayman Airfield (LCA or LYB)

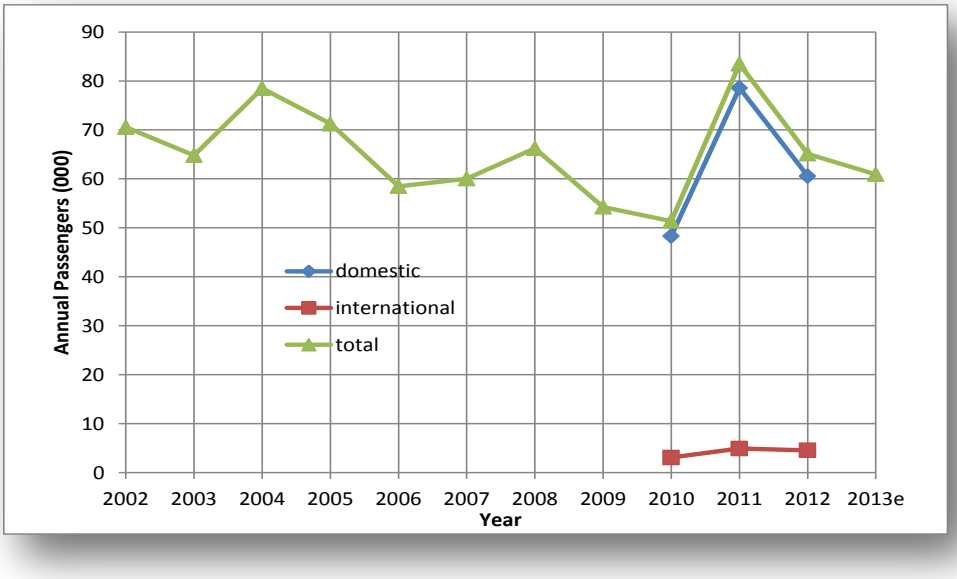
*Note: CYB and LYB are IATA airport identifiers and have been used for consistency with international airport coding for forecasting purposes.*

The current population of Cayman Brac is roughly 2,000, while that of Little Cayman is approximately 200. This compares to about 54,000 on Grand Cayman. Both islands market themselves as offering "privac

Detailed aviation statistics are only available for CKIA. Little Cayman is only served by Cayman Airways Express' Twin Otters, and has limited general aviation facilities.

As can be seen from Figure 4-17, passenger traffic at CKIA has remained relatively constant at the 60,000 passenger level, and almost all of this traffic is carried on scheduled domestic flights.

**Figure 4-17 – Historical Passenger Traffic, CKIA**



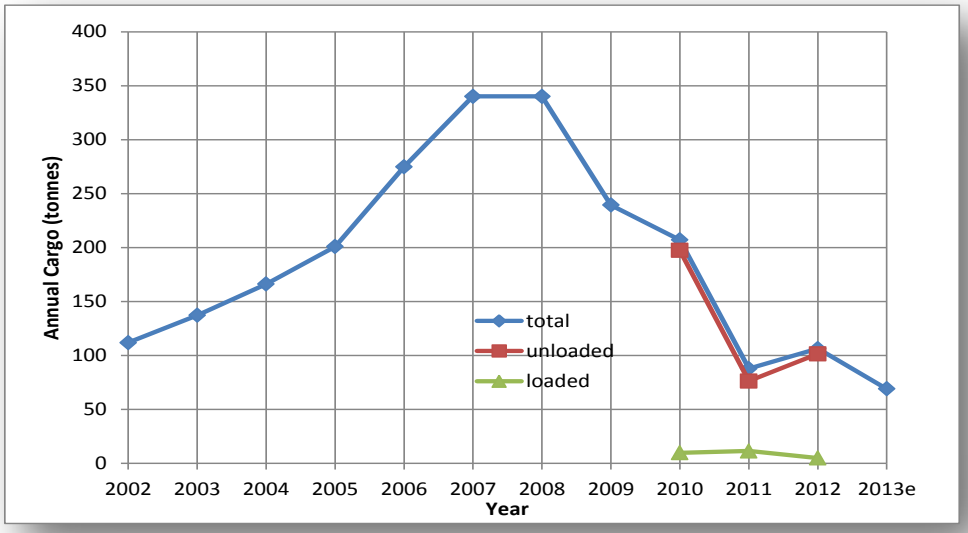

Source: Consultants analysis of Cayman Islands Airport Authority statistics

Service to Little Cayman currently consists of 40 weekly Twin Otter flights or 39,500 annual arriving seats. At a current domestic load of about 6 passengers per flight, it can be estimated that the current annual traffic level is roughly 25,000 annual passengers.

Historical cargo traffic at CKIA has been shown in Figure 4-18. Traffic increased in the years following Hurricane Ivan, but has declined sharply since a peak in 2008. Almost all of the cargo is deplaned.

No statistics are available for Little Cayman, but the cargo capacity of the Twin Otters serving the island is negligible.

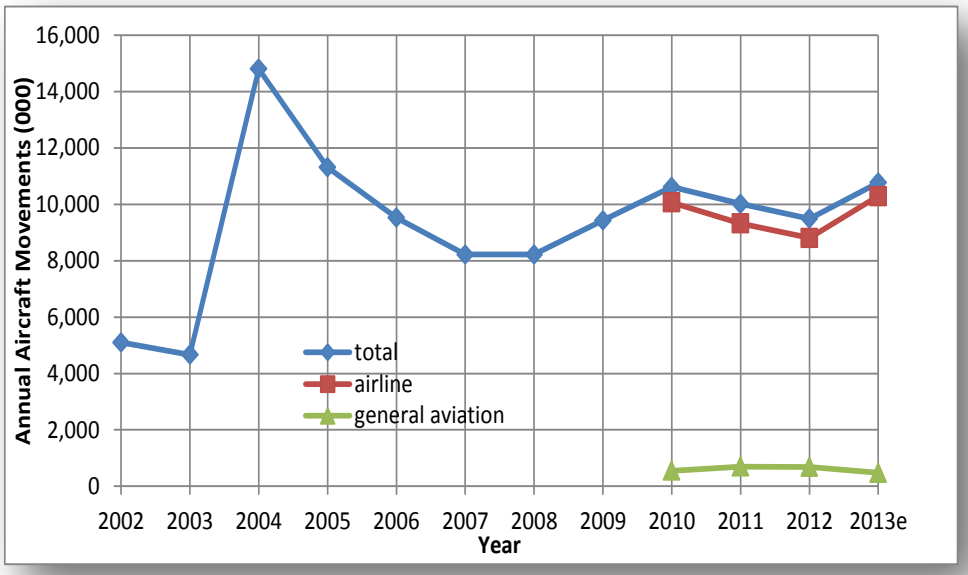
**Figure 4-18 – Historical Cargo Traffic, Cayman Brac**




Source: Consultants analysis of Cayman Islands Airport Authority statistics

Aircraft movement data for Cayman Brac has been shown in Figure 4-19 Traffic levels have remained relatively flat, and the vast majority of aircraft movements are flown by Cayman Airways.

**Figure 4-19 – Historical Aircraft Movements, Cayman Brac**




Source: Consultants analysis of Cayman Islands Airport Authority statistics

There are currently 80 scheduled movements per week by Cayman Airways Express at Little Cayman, or 4,160 annually. GA traffic is assumed to be negligible.

Different scenarios have not been postulated for the Sister Islands for three basic reasons:

- Almost all of the proposed infrastructure investments, hotel and otherwise, (e.g., Health City) will be made in Grand Cayman, and will have little direct effect on the Sister Islands.
- Current airport capacity at Cayman Brac already exceeds the most optimistic reasonable forecast over the next twenty years.
- It has been assumed that a new airport will be built in Little Cayman within the next five years or so, with adequate capacity to support the operation of 50-passenger turboprop equipment. Once completed, the capacity of this facility will also exceed the most optimistic reasonable traffic projection.

The baseline forecast assumes that traffic will continue to grow at a moderate rate, but will be limited by the available infrastructure. Most traffic at Cayman Brac will be domestic, but a limited number of international flights will also be offered. It is not believed that the provision of transit facilities for Cuban traffic destined for the United States will be viable in the long term, as it is expected that direct Cuba – US flights will be inaugurated within the next decade.

Little Cayman will continue to be served by domestic flights only.

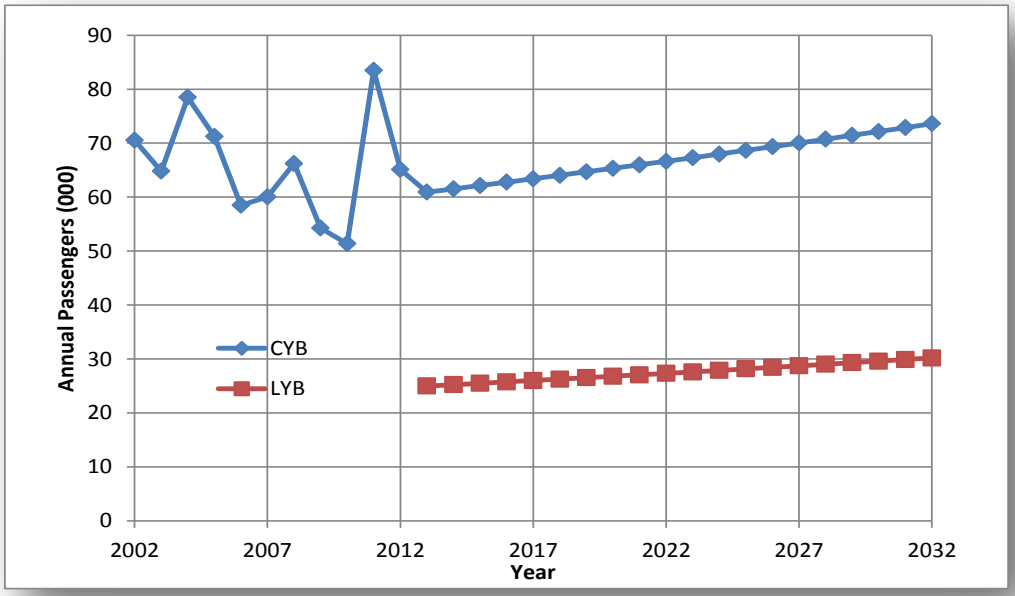
Passenger traffic forecasts have, of necessity, been based on informed judgment, and have been summarized in Table 4-15 and Figure 4-20.

**Table 4-15 - Passenger Forecasts – Sister Islands**

| YEAR | E/D PASSENGERS (000) | |
|---|---|---|
| | Cayman Brac (CKIA) | Little Cayman (LCA) |
| 2012 | 65.1 | na |
| 2013e | 60.9 | 25.0 |
| 2017 | 63.4 | 26.0 |
| 2022 | 66.6 | 27.3 |
| 2027 | 70.0 | 28.7 |
| 2032 | 73.6 | 30.2 |

Source: Consultants analysis of CIAA statistics

**Figure 4-20 – Forecast Passenger Traffic, Sister Islands**




Source: Consultants analysis of CIAA statistics

Cargo and mail traffic for all airports is not expected to be significant during the forecast period, and have not been projected.

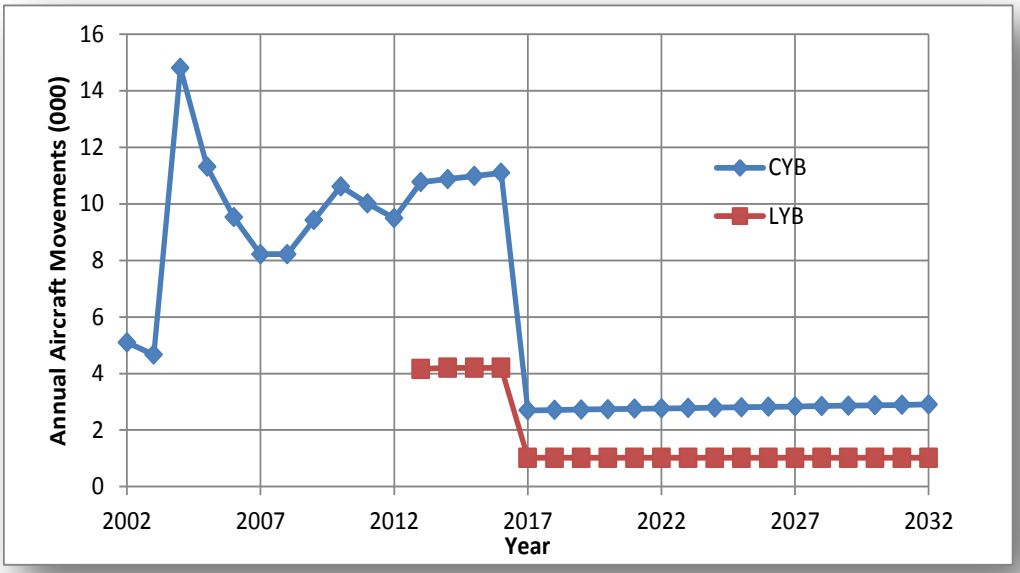
Aircraft movements are expected to drop substantially, as the Twin Otters are replaced by larger equipment. The aircraft movement forecasts have been summarized in Table 4-16, and graphed in Figure 4-21.

**Table 4-16 – 2032 Aircraft Movement Forecasts – Sister Islands**

| YEAR | AIRCRAFT MOVEMENTS (000) | |
|---|---|---|
| | Cayman Brac | Little Cayman |
| 2012 | 9.5 | na |
| 2013e | 10.8 | 4.2 |
| 2017 | 2.7 | 1.0 |
| 2022 | 2.8 | 1.0 |
| 2027 | 2.8 | 1.0 |
| 2032 | 2.9 | 1.0 |

Source: Consultants analysis of CIAA statistics

**Figure 4-21 – Forecast Aircraft Movements, Sister Islands**




Source: Consultants analysis of NMIA data

Nominal schedules for both airports are quite simplistic. For Cayman Brac, the peak hour will consist of one jet aircraft, on an international route, with a capacity of up to 150 passengers, as well as one 50-passenger domestic turboprop, possibly at the same time. For Little Cayman, it is unlikely that the peak hour will ever exceed a single 50-passenger turboprop.

# 5 MASTER PLANNING GUIDING PRINCIPLES AND ENVIRONMENTAL SCOPING

## 5.1 GLOBAL MASTER PLANNING GUIDING PRINCIPLES

One of the main objectives of this Airport Master Plan was to provide guidance for future land development and phasing at ORIA, CKIA and LCA. Furthermore, the master planning process considered all three airports as a system and their combined strategic roles to provide air transportation within the Cayman Islands.

The purpose of each airport's master plan was to integrate the requirements and synthesise the recommendations derived from the analysis of the various airport elements as part of the master planning process. The integration process resolves competing or conflicting requirements, and attempts to achieve an efficient and logical airport development scheme for the year 2032 for all three airports.

The Airport Master Plans place existing airport infrastructure and land reserves in the context of the current operating and market environment within the Cayman Islands, and establishes an approach to meet forecast requirements up to 2032. Key overall guiding planning principles included:

- Protect existing airport operations areas and provide for airfield expansion requirements that may occur over the long-term and beyond the planning horizon;
- Designate sufficient land to permit expansion of passenger facilities and related services;
- Facilitate commercial development strategies through flexible commercial land use designations;
- Maximize airport development opportunities and expansion within the boundaries of the existing airport in an effort to limit the physical environmental impact footprint to the existing site;
- The airport master planning process only considered the existing airport sites for ORIA and CKIA and did not include greenfield airport studies for these airports;
- The airport planning process was guided by an overall principle that that all of the airports are planned and designed as robust facilities to support hurricane evacuation and relief efforts for both passengers and cargo operations; and
- Undertake all development in a manner that will protect or enhance environmental conditions on the Airport and for the stakeholders and community at large. The conservation of the natural environment is of significant importance in Cayman Islands.

## 5.2 ENVIRONMENTAL AND SOCIAL SCOPING

### 5.2.1 General

Environmental scoping is a process undertaken to identify key issues to be addressed as part of the planning and implementation process. Environmental and social scoping in the early stages of a project development promotes the reduction of associated impacts and enhances its environmental and social acceptability. The airport master plans will integrate design elements based upon a sustainability strategy which could reduce consequently the overall project impairments in the receiving environment.

Environmental considerations and mitigations were applied throughout the planning process and interactively and at times alternatives developed during the planning process were subject to a number of iterations until a preferred option was finalized.

For the Cayman Islands Airports Master Plan 2032 (refered to as “the Project” in the following sections), environmental and social scoping included the following steps:

- The engagement of key stakeholders in order to obtain their issues and concerns about the Project;
- The consideration of key issues and reasonable alternatives at an early stage of Project definition;
- The integration of environmental and social considerations within the Project plan;
- The identification of anticipated impacts and guidance for mitigation measures in order to avoid, reduce or compensate them; and
- The identification of environmental and social studies to be undertaken to provide additional input to guide master plans elaboration and to provide future background baseline environmental data as part of medium and long-term proposals.

The airport master plans are proposed to be implemented in the rich biophysical and socio-economic context of the Cayman Islands. It consequently implies the considerations of various environmental and social aspects in order to execute the Project in a sustainable approach which is to be ultimately endorsed by stakeholders.

The flora and fauna of the Cayman Islands, comprising rare protected, endangered and endemic species, are distributed within a variety of highly valuable terrestrial, aquatic and marine natural habitats. Terrestrial habitats comprise dry forest and shrubland considered as primary habitats and Cayman Islands are mostly surrounded by coastal mangrove and fringing reefs enclosing shallow lagoons representing valuable habitats for a diverse marine life. However, the existing airport sites are mainly located within a man-modified context with more of a focus on integration of the airport environment with the social aspects associated with the surrounding residential and commercial areas. Additionally, given that the airport sites are coastal in Grand Cayman and Cayman Brac, specific aspects associated with these environments are to consider including material supply, hurricane protection, energetic efficiency, waste management, coastal erosion. These airports play a significant role to the social environment of the Islands.

The environmental and social legal requirements as well as national plans to consider are presented in the following sub-sections and constitute the basis upon which the environmental scoping has been conducted. This summary was developed to demonstrate a clear understanding of the legal framework related to environmental matters for this project. With this, general concerns were identified with the various master plan elements and recommendations development to mitigate design and residual impacts for both the construction and operation phases of projects.

### 5.2.2 Environmental Legal and Regulatory Framework

This section describes the key environmental legal and regulatory aspects that guide national requirements for the consideration as part of the Project.

#### 5.2.2.1.1 Development Planning Law (2011 Revision)

Under the Development Planning Law, the definition of *“development” means the carrying out of building, engineering or other operations in, on, over or under any land, the making of any material change in the use of any building or other land, or the subdivision of any land..."*

Under the Planning Department, the Central Planning Authority (CPA) reviews development and planning matters for Grand Cayman while the Development Control Board reviews development and planning matters for Cayman Brac and Little Cayman.

**Planning Permission**

Three levels of planning permission are recognised under the law:

- Outline Planning Permission;
- Permission to Develop Land; and
- Planned Area Development.

Permission to develop land is gained through the grant of planning permission by the CPA. This is the standard process for obtaining planning approval.

***Tree Preservation Order***

There is the provision in Section 25 (1) for a Tree Preservation Order which may include conditions for replanting of woodland habitat. There is also provision for prohibition of clearing of trees.

#### 5.2.2.1.2 Development and Planning Regulations 2013

These regulations discuss the concepts of Permitted Development and the Control of Development in the context of the existing Development Plan of 1997. The regulations outline the procedures for applications for buildings and makes reference to the planning zones as defined in the Development Plan of 1997.

***Setbacks***

Sections 8. (6)-(11) introduce the concept of setbacks both from facilities and from the high water mark. Of specific relevance to this project is the setback required from the high water mark where the shoreline is beach or mangrove (Section 8. (10) (b):

> *"in areas where the shoreline is beach or mangrove (except in a Hotel/Tourism zone), all structures and buildings, including ancillary buildings, walls and structures, shall be setback a minimum of seventy-five feet from the high water mark;"*

Further, the Authority has the legal right to stipulate a lesser setback under certain conditions and at its own discretion:

> *(11) Notwithstanding paragraphs (a) to (h) of sub regulation (10), the Authority may grant permission for a setback to be located at a lesser distance than that prescribed in those paragraphs, having regard to-*
> *(a) the elevation of the property and its environs;*
> *(b) the geology of the property;*
> *(c) the storm/beach ridge;*
> *(d) the existence of a protective reef adjacent to the proposed development;*
> *(e) the location of adjacent development; and*
> *(f) any other material consideration which the Authority considers will affect the proposal.*

***Mangrove Buffer***

Of relevance to this project is the concept of a 'mangrove buffer' in Section 18. (1)-(6) where development is restricted. The exact location and extend of mangrove buffer for Grand Cayman Island appear on the Development Plan of 1997. The Owen Roberts International Airport hosts a mangrove buffer on its property.

*"All forms of development shall be prohibited in a Mangrove Buffer zone except in exceptional circumstances, and only where equivalent storm protection is provided by some other means and it can be demonstrated to the Authority that the ecological role of the peripheral mangroves will not be substantially adversely affected by the proposed development."*

*All development permitted within an area abutting a Mangrove Buffer zone shall be setback a minimum distance of fifteen feet from the inland boundary of a Mangrove Buffer zone, unless, in the opinion of the Authority, it is not feasible to achieve this standard, in which case the minimum setback shall be at the discretion of the Authority.*

***Public Open Spaces***

Under Section 17. (1) to (5) there is reference to Public Open Spaces which includes sports grounds and playing fields. Sub-section (3) stipulates that permission may only be granted for development in Public Open Spaces if the development:

*"(a) is compatible with the character and function of the zone; and*
*(b) buildings forming part of such development are directly associated with, and promote, the principal purposes and actual use of the zone."*

***Sewerage Requirements***

Section 27 of the regulations stipulates the requirements for including plans for a sewerage system as part of the Planning Approval application. These plans have to be reviewed in conjunction with the Water Authority.

#### 5.2.2.1.3 Animals Law (2013 Revision)

This law contains a number of sections of relevance to this project:

- Sections 78 and 79 identifies animals that are protected animals which includes the Grand Cayman Blue Iguana (*Cyclura lewisi*), the Cayman Brac and Little Cayman Rock Iguana (*Cyclura nubila caymanensis*) and all non-domestic birds other than game birds.
- Section 82 designates the Little Cayman Booby Pond and Rookery as a protected area.
- Section 83 makes it illegal to hunt or otherwise harm an animal or disturb the vegetation within the sanctuary.
- Section 86 allows for regulations to prescribe new sanctuaries or protected animals.

#### 5.2.2.1.4 Marine Conservation (Turtle Protection) Regulations

These regulations refer to marine turtles: Chelonia mydas, the green turtle; Eretmochelys imbricata, the hawksbill turtle; Caretta caretta, the loggerhead turtle; Dermochelys coriacea, the trunkback turtle; Chelonia depressa, the Australian sea turtle; Lepidochelys olivacea, the Ridley turtle. The regulations mainly deal with protection of the species during May to October but the protection of turtle eggs at any time.

For example, the beach at the west end of the runway at Charles Kirkconnell International Airport is considered a turtle nesting site under this regulation.

#### 5.2.2.1.5 Water Authority Law (2011 Revision)

Section 67 (1) of the law requires the provision of plans for water and sewerage disposal to the Water Authority in parallel with the application for Planning Permission for their recommendation (see Section 1.1.2.4). The section also stipulates that the Central Planning Authority must adopt the recommendations of the Authority with respect to sewage treatment, disposal and water supply. Recommendations are made in consultation with the Department of Environmental Health.

#### 5.2.2.1.6 Water Authority Regulations (1999 Revision)

Section 11 of the regulations requires that a permit must be obtained for discharge of wastewater into the ground, territorial waters or groundwater.

Sections 18 and 19 states that domestic and trade or commercial effluent that is being discharged into or onto the ground, groundwater or territorial waters must conform to the minimum standard of 30 mg/L suspended solids and 30 mg/l Biochemical Oxygen Demand. In addition Section 19 further states that trade or commercial effluent must also contain "...no toxic or harmful substances, which, in the opinion of the Chief Environmental Health Officer, are likely to be harmful to the health of the inhabitants or the environment."

#### 5.2.2.1.7 Sewerage Treatment

The Water Authority's website provides additional information on the type of wastewater system that should be installed for different types of development. It states that where wastewater flow on a given parcel is estimated to be less than 1,800 gallons per day (gpd), septic tanks may be utilised for wastewater treatment while an approved Aerobic Treatment Unit (ATU) is required if the flow exceeds 1,800 gallons per day (gpd). The developer is required to submit a proposal for the provision of an Aerobic Treatment Unit for approval by the Authority prior to commencing construction/installation of the plant.

Other requirements include:

- Aerobic Treatment Unit shall be certified by a third-party testing facility (NSF or equivalent organization).
- The Authority will only consider custom designed plants in cases where wastewater flows exceed the hydraulic or organic treatment capacity of readily available third-party certified package wastewater treatment plants.
- All custom designed plants must be designed by a professional engineer.

#### 5.2.2.1.8 Town and Communities Law 1995 Revision

Section 12 (3) and 13 refer to noise levels which causes annoyance or disturbance. Section 13 refers to a prescribed level but does not state the prescribed level.

#### 5.2.2.1.9 Roads Law 2005 Revision

Section 14. (1) allows for the discontinuance of a roadway. This decision must be gazetted. There is also provision for compensation in the event of disruption of neighbouring landowners .

#### 5.2.2.1.10 Land Acquisition Law 1995 Revision

If land is deemed to be needed for any public purpose, the intent to acquire this land is published in the newspaper (gazetted). Once this notification has been published, this allows for the entering of the land to do a number of acts as stipulated in Section 4 (1) of the Law. This process is administered by the Lands and Survey Department. This department has prepared Procurement & Acquisitions Procedures which are included as Attachment 2. These procedures provide guidance for undertaking acquisitions.

Section 8 allows for compulsory acquisition for a number of reasons:

- It has not been possible to conclude a satisfactory agreement under section 7;
- The negotiations in connection with any such agreement have been or are being unduly delayed; or,
- It is not in the public interest to enter into such negotiations.

Other than the National Roads Authority, no Government Authority has powers of compulsory purchase but do purchase by private treaty negotiation. Where such Authority would wish / need to purchase by compulsory purchase then Government / Cabinet may agree to use its powers then vest the land to the respective Authority.

#### 5.2.2.1.11 Land Surveyors Regulations (1996 Revision)

Section 28 (3) of the Land Surveyors Regulations (1996 Revision) states that in areas of mangrove coastline, the high water mark is defined as “the edge of the mangrove vegetation”, regardless of the extent of tidal inundation landward of this point. As such, landowners legally own land to the extent of the mangrove fringe. As noted above in Section 1.1.2.1, under the Development and Planning Regulations, the minimum setback for development in mangrove areas is 75 ft. from the high water mark.

#### 5.2.2.1.12 Department of Environmental Health (DEH)

The Department of Environmental Health has a mandate to protect the public from environmental health related hazards. DEH is governed by two laws: the Litter Law and the Public Health Law and Regulations. However, only the latter is considered relevant to the proposed project. Under the Public Health Law, the Public Health (Garbage and Refuse Disposal) Regulations are also considered applicable.

At present, there are no local standards in force for air and noise emissions. Information received during a meeting with the Department is that standards from other jurisdictions such as United States (US EPA, US NAAQs) and United Kingdom (for airport noise) are used.

#### 5.2.2.1.13 Public Health Law (2002) Revision

Part III, Section 7 (t) and (w) refer to air emissions and noise as constituting nuisances. However, airplane noise is exempt from the Law. Under this Law, the Chief Environmental Health Officer can serve an Abatement Order on the person(s) causing the nuisance.

#### 5.2.2.1.14 Public Health (Garbage and Refuse Disposal) Regulations (2011 Revision)

Section 7 states that contractors are responsible for the removal and disposal of garbage from construction sites to the landfill. Under these regulations, garbage " includes waste food, vegetables, fruits, meats and other putrescible matter;"

There is no mention of hazardous wastes anywhere in these regulations. During a meeting with the DEH it was stated that disposal of hazardous wastes is dealt with on a case-by-case basis.

#### 5.2.2.1.15 Relevant Policies and Plans

The following policies and plans are considered of relevance to the proposed project and the reach of their objectives should be part of the project strategy:

- National Environmental Policy,
- National Biodiversity Action Plan,
- Climate Change Policy,
- Vision 2008: Cayman Islands National Strategic Plan 1999-2008.

## National Environmental Policy (NEP)

The National Environmental Policy for the Cayman Islands is a framework policy which was developed in 2002. The policy outlines several broad goals which are considered applicable to the Project:

- To integrate consideration of the conservation and sustainable use of the natural environment into national physical and economic development planning and, in so doing, to aim for solutions which benefit both the environment and development.
- To promote the protection of ecologically critical terrestrial, marine and coastal areas, and preserve essential habitat for the flora and fauna of the Cayman Islands.
- To effectively implement obligations under the Multilateral Environmental Agreements extended to the Cayman Islands, and to continue to cooperate with and contribute to regional conservation initiatives.
- To seek expert advice and consult openly with interested parties on decisions affecting the environment.

## National Biodiversity Action Plan

The Cayman Islands National Biodiversity Action Plan was drafted in fulfilment of obligations under the Convention of Biological Diversity. The Plan was drafted along the lines of:

- preservation of key habitats, through Habitat Action Plans (HAPs) and
- preservation of key individual species, through Species Action Plans (SAPs).

The CINBAP will therefore *"...seek to establish and maintain a diverse system of national protected areas, to protected areas for wildlife, develop and improve sustainable recreational opportunities, and where feasible, restore aspects of the environment, towards recovering some of the natural value which has been lost from these islands in recent years."*

The CINBAP includes a number of Habitat and Species Action Plans which are considered relevant to the Project.

- Local Habitat Action Plan For Mangrove
- Local Habitat Action Plan For Coastal Shrubland
- Habitat Action Plan For Pools, Ponds And Mangrove Lagoons
- Habitat Action Plan For Dry Shrubland
- Habitat Action Plan For Forest And Woodland
- Habitat Action Plan For Sandy Beach and Cobble
- Species Action Plan for Marine Turtles
- Species Action Plan For Silver Thatch
- Species Action Plan For Rock Iguana
- Species Action Plan For Red-Footed Booby
- Species Action Plan For West Indian Whistling-Duck

## Climate Change Policy

The Cayman Islands Climate Change Policy has targeted elements which are relevant to the Project:

- Reduce Greenhouse Gas Emissions, in line with agreed national targets, through promoting energy conservation, reducing energy use and encouraging greater use of renewable energy;

- Enhance the resilience of existing critical infrastructure to climate change impacts, while avoiding the construction of new infrastructure in vulnerable areas or with materials prone to climate hazards;
- Promote water conservation and improved rainwater harvesting while reducing impacts from flooding and enhancing the resilience of natural water resources;
- Enhance the resilience and natural adaptive capacity of terrestrial, marine and coastal biodiversity and ecosystems.

### 5.2.3 Environmental Scoping Summary

Although the framework described and highlighted above is extensive, there is currently no centralized law regarding the need for an environmental and social impact assessment to be conducted in Cayman Islands. Various multilateral environmental agreements for which the Cayman is a contracting party through the United Kingdom, as the Convention on Biological Diversity, dictate that development planning must be carried out with regard for the protection and sustainable use of the natural environment and resources. Environmental impact assessments are targeted as an efficient tool for decision making and for the integration of environmental and social considerations in project implementation. The Cayman Islands Framework for Fiscal Responsibility also stipulates that:

> *«For all projects, the business case which results from the appraisal process should: demonstrate the economic need for the project; include a fully argued and costed risk and impact assessment; and specify the benefits the project is designed to deliver to ensure that an informed decision can be made on whether or not to proceed to the procurement stage.»*

The Conservation Law of 2013 is intended to address all environmental management issues under one piece of legislation. The Law has been passed in Cabinet but is now awaiting a Commencement Order before it is enforceable. As stated in the law, it shall come into force as may be appointed by order made by the Cabinet, and different dates may be appointed for different provisions of this Law and in relation to different cases. The Law provides for the establishment of a National Conservation Council that will, among other things, act as an advisory body with respect to decisions made through the existing Planning Application Process. As it stands consultation with the Council will occur under 3 distinct approval processes: Planning Permission; Coastal Works Licence Approval; and Authorization under other laws, policies or plans. The National Council does not have the power to make decisions regarding the granting of Planning Permission only to make recommendations. The exception is where the application involves an action that could potentially impact a designated protected area or a critical habitat of a protected species. It is envisaged that consultation with the Council by the CPA or the DCB will be based on developments in certain locations or type of development:

> *41. (3) Every entity shall, in accordance with any directives issued by the Council, consult with the Council and take into account any views of the Council before taking any action including the grant of any permit or licence and the making of any decision or the giving of any undertaking or approval that would or would be likely to have an adverse effect on the environment generally or on any natural resource.*
>
> *(4) Every entity in accordance with any directives issued by the Council and regulations made under this Law shall apply for and obtain the approval of the Council before taking any action including the grant of any permit or licence and the making of any decision or the giving of any undertaking or approval that would or would be likely to have an adverse effect, whether directly or indirectly, on a protected area or on the critical habitat of a protected species.*

Currently, the objectives and strategies contained in Sections 1.2 and 1.3 of The Development Plan 1997 allow the Central Planning Authority (CPA) in certain situations to require either an environmental analysis per Schedule 3 of the Plan or a comprehensive Site Analysis Report. Additionally, Section 6 (1), (4), (5) and (6) of the Development and Planning Law (2001 Revision) does allow the CPA to address in some detail environmental and social aspects of certain proposed developments. There is also provision

for the CPA or the DCB to consult with a number of Government Agencies in consideration of the application. Under Section 15 (1) permission may be: granted unconditionally; granted subject to conditions; or refused.

It is anticipated that the new Conservation Law will allow for the formation of a National Conservation Council which will review development projects and recommend environmental considerations to be included in Planning Permission. The Council may decide that an EIA is needed. In other jurisdictions, there has been the establishment of an Environmental Regulatory Agency which administers an environmental permitting process applicable to certain development projects.

In summary, for this project, the scoping exercise will attempt to capture impacts related to the most relevant aspects of the legislative and legal review completed above. Recommendations related to the preparation of additional studies or an EIA for the Project will have to be determined in consultation with the various regulatory agencies for both construction and operational phase and may include aspects related to aircraft noise levels, air quality, effluent quality, marine water quality, surface water quality as well as soil quality. To do this the following approach was taken:

- Each airport was subject to an environmental scoping exercise associated with proposed Project components. An environmental scoping table was used to assess environmental and social components in order to identify issues. For each issue, mitigation were either integrated into the master plan to avoid/reduce the impact and are identified, anticipated residual impacts and management measures to implement are described as well as studies to be undertaken with their implementation frame are proposed. The proposed studies are suggested based on international best practices and in order to measure and assess the compliance with identified regulatory requirements. However, according to the approval process from the Department of Planning, an external agency (e.g. Department of Environmental Health, Department of Environment and Water Authority) could ask for additional studies or monitoring that could be added or substitute to identified studies.

- In addition to the tabular analysis being completed as described above, environmental mapping of environmental and social constraints on and off-site around the airports was completed. This provided an overview of the surrounding environment, based on localized information received from the stakeholders and data acquired during the Consultant's site inspections. These maps are very valuable in depicting physical relationships between the Projects and various environmental features around in the airports.

The following additional environmental and social impact mitigation guiding principles were applied to the Project throughout the planning process:

- Use of existing airport site and improvement of existing airport infrastructures in order to reduce Project footprint, material import, waste generation, etc.;
- Protection of natural habitats with specific attention on protected areas and ones susceptible to host protected species. Key elements of the National Biodiversity Action Plan have been integrated;
- Protection of water quality in both terrestrial and marine environments;
- Limitation of air quality, ambient noise and visual impairments to reduce nuisance for local population, avoid water quality impacts and disturbances for wildlife and their habitats;
- Restriction of construction within the boundaries of high water marks and integration of hurricane protection features;
- Avoidance of any contamination within the receiving environment and promotion of a proper waste management system;
- Integrate hazard vulnerability and risk assessments into development planning processes as promoted by Cayman Islands Climate Change Policy;
- Security for airport activities, surrounding populations and wildlife;
- Resettlement of local populations and activities should be minimalized; and

- Stakeholders engagement should be promoted in each stage of Project implementation in order to avoid or reduce some social impacts and increase social acceptability.

It should be noted that both ORIA and CKIA operate under a highly regulated airport/aeronautical environment which includes the requirement to prepare and follow various operational plans including safety management system plans, environmental monitoring, emergency management plans, and wildlife hazard management plans. All of these obligate the CIAA to operate with strict adherence to applicable environmental laws, regulations and best practices. These are reviewed and updated on a regular basis ensuring the most updated practices are incorporated into the day-to-day operations of all CIAA airports. These plans are a fundamental part of the airport's operating certificate and as such the CIAA already operates with a high regard for the environment compliance and good stewardship.

# 6 OWEN ROBERTS INTERNATIONAL AIRPORT (GRAND CAYMAN) – AIRPORT MASTER PLAN 2032

## 6.1 CLIENT OBJECTIVES AND GUIDING PRINCIPLES

A series of client objectives were provided at the start of the master planning process prior to any analysis being completed. These objectives are listed the following Table 6-1. These client objectives have been considered and addressed as part of the analysis.

**Table 6-1 - Client Airport Master Plan Objectives, ORIA**

| No. | Facility | Client Objective |
|---|---|---|
| CO1 | Air Terminal Building | ***General***<br><br>The objective is to address the deficiencies with the current terminal building in order to comfortably accommodate existing and future passenger demand.<br><br>The current ORIA commercial airline terminal building was opened in 1984 and designed with space to handle a maximum of 500,000 passengers by the year 2000. Today ORIA handles approximately one million passengers per year, a100% capacity increase over design intent.<br><br>***Common Use Passenger Processing Systems (CUPPS)***<br><br>The objective Is to provide common use facilities and systems such as common use airline check in counters, baggage information displays and flight information displays, throughout the airport to enhance the passengers' travel experience and convenience<br><br>***Concessions***<br><br>The objective is to enhance concession spaces to generate additional revenue<br><br>Office Space Rental<br><br>The objective is to enhance office space rental to generate additional revenue<br><br>Advertising Space<br><br>The objective is to enhance advertising space to generate additional revenue |

**Table 6-1 - Client Airport Master Plan Objectives, ORIA**

| No. | Facility | Client Objective |
|---|---|---|
| CO2 | Boarding Bridges | The objective is to evaluate the need and feasibility to install boarding bridges. The impact of other projects such as Health City should be considered due to the projected number of patients and passengers with reduced mobility expected to visit the facility. |
| CO3 | US Border Control Pre-Clearance | The objective is to conduct an analysis, including key agencies such as United Kingdom Department for Transport UKDFT and US Transport Security Administration (TSA), to determine if US border control pre-clearance facilities can be provided at the airport. The overall objective being to enhance the passenger experience, allowing them to fly into domestic terminals in the USA, and avoiding the long waiting times regularly experienced at US Border controls. |
| CO4 | Apron Expansion | The objective is to relieve current congestion on the apron and accommodate present and future aircraft demand. Currently the apron provides a maximum of eight aircraft parking stands. This contributes to congestion on the apron during the peak periods and limits our potential to accommodate added air service at peak times. |
| CO5 | General Aviation Terminal (GAT) | The objective is to address the current deficiencies with the GAT. The GAT provides facilities for general aviation users. The current facility is inadequate and restricted in size and cannot accommodate the number passengers and aircraft using the GA facilities. There has been private sector interest in partnering with CIAA to develop the GAT. |
| CO6 | Airport Pavements –Apron, Runway, Taxiways | The objective is to assess the state of the pavements and the requirement for surveys and or improvements. |
| CO7 | Runway Extension and Taxiways | The objective is to evaluate the need to extend the runway to accommodate long-haul flights. |
| CO8 | Parallel Taxiway | The objective is to evaluate the need to develop a parallel taxiway from end of runway to main apron. Currently no parallel taxiway exists. This would allow for traffic to be handled more expeditiously on |

**Table 6-1 - Client Airport Master Plan Objectives, ORIA**

| No. | Facility | Client Objective |
|---|---|---|
| | | landing and take-off. |
| CO9 | Cargo Facilities | The objective is to evaluate the need to improve and enhance current cargo processes and facilities. With the expectation of increased air traffic it is anticipated that cargo throughput will also be increased. |
| CO10 | Fuel Facility | The objective is to evaluate the current location of the fuel facility as it is location will impact on both the terminal and the apron development. The CIAA is also in discussions with the two existing fuel providers to consolidate the facility; the fuel operators have indicated interest in partnering with the CIAA to develop the facility. |
| CO11 | Fire Service | The objective is to evaluate the current infrastructure of the Fire Service to ensure it meets existing and future demand while complying with international regulations. |
| CO12 | Transportation Network | The objective is to evaluate and address the development of the ground transportation infrastructure in the airport vicinity. |
| CO13 | Runway End Safety Area (RESA) | The objective is to provide a RESA as required by local and international regulations and to respond to the findings of recent CAACI audit.<br><br>Currently there Is no RESA on the eastern end of Runway08. The purpose of this is to enhance the safety of airport operations by providing an International Civil Aviation Organization (ICAO) specified safety buffer in the event an aircraft overruns on landing. This scenario is currently deemed one of the two most serious safety concerns by ICAO. |
| CO14 | Secondary Surveillance Radar | The objective is to evaluate the implementation of secondary surveillance radar to enhance the safe and expeditious movement of flight operations. |
| CO15 | Runway Perimeter Road and Perimeter Fence | The objective is to provide a runway perimeter road as recommended by international regulations.<br><br>The perimeter fence is inspected regularly on a daily |

**Table 6-1 - Client Airport Master Plan Objectives, ORIA**

| No. | Facility | Client Objective |
|---|---|---|
| | | basis. To ensure ease of access to carry out these inspections, it is recommended to provide a runway perimeter road. The current path is inadequate and needs to be upgraded to a proper road. This is causing excessive wear on patrol vehicles which creates high maintenance costs. |
| CO16 | Vehicle Parking Facilities | The objective is to enhance vehicle parking facilities and generate additional revenue. |

In addition to the client objective described above, a number of additional master planning guidelines evolved through the master planning process specific to ORIA and are summarized in Table 6-2 below. These guiding principles have been developed specifically as a result of communications with the client, stakeholders and a detailed review of the site conditions during the preparation of this master plan.

**Table 6-2 - Master Planning Special Guiding Principles, ORIA**

| No. | Facility | Guiding Principle |
|---|---|---|
| GP1 | All development areas | Where possible elevations of the airfield should be raised to at least 8 ft. ASL to avoid flooding during hurricane events. This is of particular importance in the future east terminal and commercial GA apron expansion areas. Where possible any buildings should be designed for higher elevations. As per planning requirements the finished floor levels shall be at least five feet (5') above mean sea level, [i.e. two feet (2') above the Vidal Bench Mark]. For planning and financial analysis purposes 8 ft. above sea level will be used. |
| GP2 | Terminal and Commercial Development Areas | Priority shall be to the protection of the commercial airline/cargo operations from the North Sound flooding potential. |
| GP3 | All development areas | Overall there is a desire to recognize and enable the eastern land development within the airport boundary through phased landside and airside expansions. Particular emphasis shall be placed on making new commercial hangar, FBO, airline maintenance and cargo development opportunities available. |
| GP4 | All development areas | The master plan should avoid or minimize any relocation of existing leased properties as part of the long-term airport layout plans. Where relocation is required, options shall be considered to relocate within the airport boundary. |

**Table 6-2 - Master Planning Special Guiding Principles, ORIA**

| No. | Facility | Guiding Principle |
|---|---|---|
| GP5 | All development areas | The master plan shall provide a long-term practical airport development foot-print providing the CIAA options for phased expansion. The CIAA should be able to market and react to prospective developers by offering specific areas within the airport for use as commercial airside or landside development. |
| GP6 | All development areas | Regard for the environment and minimizing impacts is paramount. |

## 6.2 AIRPORT ROLE AND CLASSIFICATION

ORIA will continue to operate and represent the top tier airport in the Cayman Islands representing the most vital and integral part of the Cayman Islands Air Transportation System. ORIA will provide scheduled domestic, international, and charter airline service, cargo operations, general aviation and recreational aviation. The visitor experience is very important and the infusion of culture into the airport designs is paramount. ORIA will also provide a robust airport capable of supporting hurricane evacuation and relief efforts to the Islands.

ORIA's current design aircraft is the Boeing 767-300 ER meeting an ICAO aerodrome reference code of 4D . This master plan has considered this aircraft but also the eventual shift in the fleet mix at the airport to larger ICAO Code 4E aircraft including in particular the Boeing B777 and 787 series aircraft. British Airways have identified that they will be retiring their B767 aircraft and replacing them with B777 by January 2016.

Another critical airport operating criteria established for ORIA was to maintain its ICAO non-instrument classification. Given the very limited land available within the airport's existing boundary combined with the encroachment of development around the airport, reducing the on and off-site airspace restrictions and reducing airfield facility separations was considered a prudent and practical approach to maximizing development capacity within the airport while minimizing impacts off-site. This is further supported by the very high airport usability with respect to wind, cloud ceilings and visibility. Weather records demonstrate that ceilings are recorded seldom less than 500-600 ft. above ground level and visibilities rarely fall below 4-6 statute miles. These weather conditions are consistent with non-instrument airport design criteria. It should be noted that while the airport will be planned to non-instrument criteria, it does not preclude the use of instrument approach procedures using navigational aids such as the existing DVOR, NDB and future ILS or GNSS satellite based approaches.

## 6.3 RUNWAY 08-26

***Runway 08 RESA / Threshold Reconfigurations***

There is an immediate need to reconfigure the Threshold 26 (east end) to comply with ICAO strip and graded area requirements. As part of this reconfiguration, the provision of a 90m x 90m RESA was also considered. Two alternatives were considered including one that extended the runway by about 150m into the North Sound and one that extended the west end Threshold 08 by 122.7 metres on existing airport land. Cost and environmental considerations supported the western extension to avoid costly land reclamation and environmental impacts in the North Sound. This western shift in the Threshold 08 by 122.7 metres (403 ft.) and reconfiguration of the east end Threshold 26, maintains the published runway length of 7,008 ft. but introduces a slight displacement for landing aircraft on Runway 08 of 403 ft. As a result the published land distance available for Runway 08 changes from 7,008 ft. to 6,605 ft. This displacement may be modified through additional flight way surveys and analysis of the western

approach. A detailed flight way survey and obstacle limitation surface analysis is proposed.as part of implementing this project.

As part of this runway reconfiguration, new turnpads will need to be constructed at the new runway ends to permit larger aircraft i.e. B777, to conduct turn arounds at the ends. The existing turn pad geometry at ORIA was tested and found to accommodate the B777-200 and B777-300 based on maximum effective steering angles on the nose wheel. ICAO recommends a 45 degree angle on the nose wheel be considered but by doing so, the size of the turn pads would increase by close to 4,000-4,500 sq. metres. The master plan recommends maintaining the existing turn pad geometry on the basis that they can accommodate the design aircraft and that a future parallel taxiway system will be implemented within the planning period.

This runway reconfiguration could be completed without any impact on the existing Crewe Road to the west and the DVOR navigational aid to the west and does not affect North Sound.

It should be noted that new 90m x 90m RESAs will be constructed at the ends of the reconfigured thresholds to comply with ICAO minimum recommendations. The RESAs will be constructed of underlying compacted granular material and topping of topsoil and turf. The RESAs are intended to support the airport design aircraft but also permitting the landing gear to sink sufficiently into the turf/topsoil to assist in decelerating the aircraft while not damaging the aircraft.

***Runway 08-26 Length Analysis***

The runway length at ORIA was studied in great detailed as part of the master planning process as it was identified as a significant client objective at the start of the project. The guiding principle initially was to understand the maximum runway length that could be achieved within the existing airport boundary with no extension into the North Sound. Any extension into the North Sound would involve a considerable level of environmental assessment and planning that could be costly both in time and cost to complete the necessary investigations, impact assessment and mitigation planning. To this end, the master plan determined that a runway length of 8,000 ft. could be achieved on existing land by extending the runway to the western limits of the airport boundary while reserving land for a 90m x 90m RESA at both ends. An extension to 8,000 ft. would require the relocation of the existing DVOR navigational aid which is recommended to be off-site to maximize the use of airport land for airfield and commercial development. The extension would also require the closure of Crewe Road and re-routing it likely towards the west to the exiting roundabout. The impacts on traffic patterns and flows would need to be studied and is recommended study in the short-term.

The extension to 8,000 ft. was further premised on the basis that the threshold position for Runway 08 would not change from its current location assuming it is currently controlled by off-site obstructions. This was confirmed by way of Aeronautical Information Circular AC 01/11 which identifies a number of power poles infringing the existing approach surface for Runway 08. Similar to the discussion of the threshold reconfigurations above, it is recommended that this displacement may be modified through additional flightway surveys and analysis of the western approach. A detailed flightway survey and obstacle limitation surface analysis is proposed.as part of implementing this project.

Having established that the existing airport lands can support a maximum runway length of 8,000 ft., a detailed analysis was completed of various aircraft types and routes to determine the markets that could be served from the existing and extended runway. Figure 6-1 provides a map and summary of the results while Tables 6-3 to 6-5 show the detailed analysis for the three planning aircraft used including the B737-900, B777-300ER, and the B787-800.

For planning purposes aircraft operating conditions using 80% load factors are used and may differ from airline desired planning criteria of 100% load factors with no limitations. Based on our planning criteria an 8,000 ft. runway length would provide ORIA the ability to cater to long-haul flights with some load restrictions. A runway length of 7,700 ft. will support flights to the London based on an 80% load factor. 8,000 ft. will reduce result in a slight increase in load factor likely in the order of and addition 3 to 5% or it would provide additional margins of safety for wet runway conditions at 80%.

Through consultations with British Airways (BA) who plan to operate a B777-200 by January 2016 at ORIA, they confirmed that existing runway length of 7,008 ft. would satisfy their requirements for their existing route structure which makes ORIA part of stops that include the Nassau, Bahamas. These short flight segments permit the aircraft to operate on the shorter runway lengths due to significantly less fuel and passenger loads. BA however noted that it would be desirable to operate off a runway length of 9.200 ft. for future route planning for long-haul direct flights to the UK or Europe. They also did acknowledge that at 8,000 ft., they could operate with 100% passenger loads and some limitations on cargo by up to 8-10 tonnes.

If an additional 1,200 ft. of runway length is required to achieve 9.200 ft., it will have to be constructed into the North Sound. Since marine reclamation is needed, the implementation of fixed structures in the environment could lead to the impairment of local water currents as well as sedimentological and coastal impacts. These impacts could raise further coastal development impacts. Marine reclamation projects will also generate degradation and loss of valuable marine habitats (mainly seagrass but previous environmental investigations in the offshore area recommended for the RESA extension for Runway End 26, confirmed the presence of scattered and very small coral heads). Anticipated changes in marine flora and fauna are then anticipated. It also raises the risk of interference with boats traffic associated with the Tropical Gardens Marina, the Cayman Sailing Club, and the Grand Harbour development. The height of boat masts may be restricted by runway safety requirements. The width of the channel remaining between the RESA and the marina entrance may also limit the size or number of boats traveling to and from the marina at any one time.

The environmental cost will be significant and some environmental studies should be initiated immediately given the time required to collect, process the data and analyze the technical and economic potential for this option. For this technical and economic analysis, some recommended studies are:

- Bathymetry study
- Hydro-sedimentology study
- Wind/wave analysis
- Geotechnical studies
- Marine biological surveys for habitats and marine fauna and flora

These studies combined can cost in the order of $350,000 to $500,000 and require one to two years to complete. However, it is important to note that if the runway needs to be extended into the North Sound, a complete EIA will have to be undertaken to fully assess associated impacts and implement proper mitigation measures. It would be very important to plan and consult with the DoE on the scope and objectives for this study.

The Airport Master Plan did not identify a clear requirement for a runway extension for long-haul flights due to lack of a clear business case from any particular airline. The master plan however clearly demonstrates that the existing runway length of 7,008 ft. provides excellent access to the US, Canada, Central and South American markets. Furthermore, by maximizing the use of existing airport lands to the west, an 8,000 ft. runway can be achieved providing long-haul opportunities in the future.

The approximate cost to extend the runway to 8,000 ft. to the west which includes related pavement strengthening to support the heavier aircraft is in the order of $20.5 million. The cost to extend the additional 1,200 ft. into the North Sound is in the order of $21.6 million for a total value of $42.1 million for a 9,200 ft. runway at ORIA.

It is recommended that the CIAA initiate the appropriate studies related to extending the runway to 8,000 ft. including the Traffic Impact Study due to closure and re-routing of Crewe Road. Flightway Surveys and Navigational Aid Relocation studies are recommended in the short-term to ensure the appropriate planning process is initiated to permit the project to be executed efficiently in the future should it be triggered by a financial sound business opportunity for ORIA.

***Runway 08-26 Strengthening***

The existing runway PCN reported in the AIP (amended February 2014) for Grand Cayman is 60/F/B/X/U. Based on this the runway can support the current air traffic mix which include the B767 series aircraft. However, with changes proposed by the likes of British Airways to shift to the B777, the pavements will need to be upgraded. The ACN for the B777 series varies from 68-71. While some overloading is permitted on the pavements a properly design pavement structure should be constructed for long-term performance of the pavements.

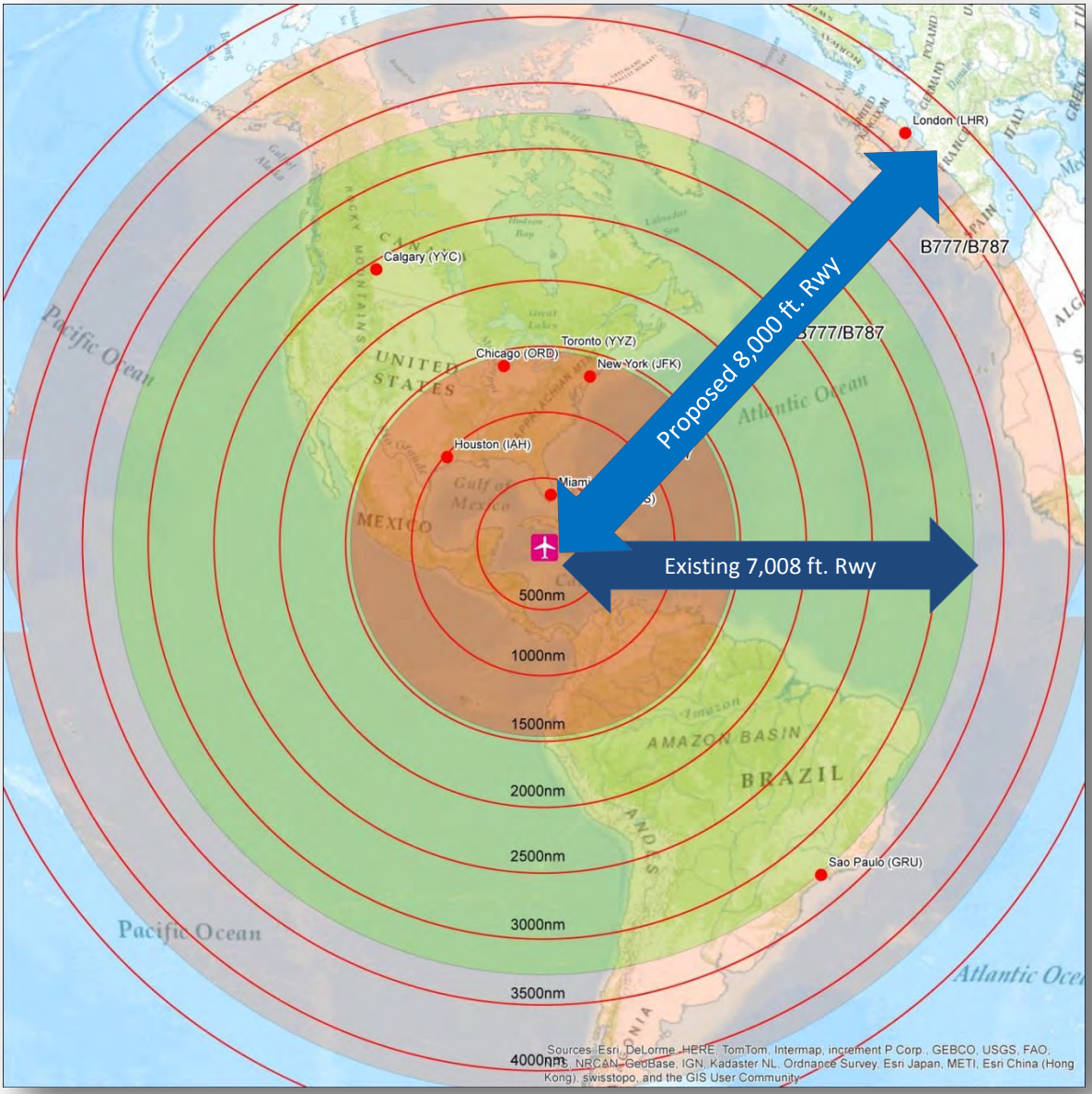
The 2011 pavement condition report identified however, a need to structurally improve Runway 08-26 based on the existing air traffic mix. As a minimum it is recommended that a 65mm overlay be programmed as part of the short-term runway threshold-RESA reconfigurations. This will provide sufficient protection against overloading by the proposed BA B777 series aircraft transition planned for early 2016. Long-term structural improvements to the runway will still be required for long-haul flights for fully loaded B777 or other Code E aircraft. These structural improvements will be substantial and must be considered as part of any runway extension proposal as described above.

***Marine Exclusion Zone in North Sound (Protection of Runway 08-26 Approach and Departures)***

It is recommended that a marine exclusion zone be marked with buoys off the east end of the airport in the North Sound. The markers would delineate an area that would protect the approach and departures off Runway 08-26 for objects up to 18m in height (typical height of sail boat masts). These buoys would also be published on local marine maps to advise boaters of the restrictions off the end of the runway.

Refer to Exhibits 1, 2 and 3 in Appendix A for the proposed runway master plan layout.

**Figure 6-1 – ORIA Runway Length and Aircraft Stage Lengths and Markets**




**Note:** Based on 80% load factors

**Table 6-3 - B737-900 Analysis, ORIA**

| Destination | Distance from Grand Cayman (nm) | Operational Take-off Weight (lbs.) | | Take-Off Runway length Required (ft.) | |
|---|---|---|---|---|---|
| | | 80% Payload | 100% Payload | 80% Payload | 100% Payload |
| Miami | 393 | 143,000 | 152,000 | 5,400 | 6,100 |
| Nassau | 406 | 143,000 | 152,000 | 5,400 | 6,100 |
| Houston | 995 | 150,000 | 159,000 | 5,900 | 6,500 |
| New York | 1,336 | 154,000 | 162,500 | 6,150 | 6,800 |
| Chicago | 1,399 | 154,000 | 162,500 | 6,150 | 6,800 |
| Toronto | 1,463 | 157,000 | 166,000 | 6,400 | 7,150 |
| Calgary | 2,454 | 172,000 | 174,200 | 7,500 | 7,800 |
| Sao Paulo | 3,271 | 152,000 with 27% Payload | | 6,100 | |
| London | 4,173 | Unreachable | | | |

**Table 6-4 - B777-300ER Analysis B787-800, ORIA**

| Destination | Distance from Grand Cayman (nm) | Operational Take-off Weight (lbs.) | | Take-Off Runway length Required (ft.) | |
|---|---|---|---|---|---|
| | | 80% Payload | 100% Payload | 80% Payload | 100% Payload |
| Miami | 393 | 525,000 | 560,000 | 4,900 | 5,500 |
| Nassau | 406 | 525,000 | 560,000 | 4,900 | 5,500 |
| Houston | 995 | 545,000 | 580,000 | 5,200 | 5,800 |
| New York | 1,336 | 555,000 | 590,000 | 5,400 | 6,000 |
| Chicago | 1,399 | 555,000 | 590,000 | 5,400 | 6,000 |
| Toronto | 1,463 | 560,000 | 595,000 | 5,500 | 6,200 |
| Calgary | 2,454 | 595,000 | 635,000 | 6,200 | 6,900 |
| Sao Paulo | 3,271 | 630,000 | 665,000 | 6,800 | 7,700 |
| London | 4,173 | 665,000 | 705,000 | 7,700 | 8,600 |

**Table 6-5- B787-800 Analysis, ORIA**

| Destination | Distance from Grand Cayman (nm) | Operational Take-off Weight (lbs.) | | Take-Off Runway length Required (ft.) | |
|---|---|---|---|---|---|
| | | 80% Payload | 100% Payload | 80% Payload | 100% Payload |
| Miami | 393 | 357,000 | 375,000 | 5,250 | 5,700 |
| Nassau | 406 | 357,000 | 375,000 | 5,250 | 5,700 |
| Houston | 995 | 370,000 | 390,000 | 5,500 | 5,900 |
| New York | 1,336 | 375,000 | 396,000 | 5,700 | 6,200 |
| Chicago | 1,399 | 375,000 | 396,000 | 5,700 | 6,200 |
| Toronto | 1,463 | 379,000 | 400,000 | 5,800 | 6,300 |

| | | | | | |
|---|---|---|---|---|---|
| **Calgary** | 2,454 | 400,000 | 422,000 | 6,300 | 6,850 |
| **Sao Paulo** | 3,271 | 420,000 | 441,000 | 6,800 | 7,200 |
| **London** | 4,173 | 441,000 | 465,000 | 7,200 | 8,400 |

***Height and Land Use Controls (Aeronautical Zoning)***

The master plan also recommends that appropriate land use controls be establishing around the airport to project the various obstacle limitation surfaces around the airport the limit the height of objects off the runway ends and sides. This protection measures should be enacted under the authority of aeronautical safety and be controlled and managed by the CIAA. In general the purpose of these types of controls and regulations is to protect the safety of aircraft operations in the vicinity of the airport by imposing height restrictions on buildings and obstacles within defined areas. In addition, these controls could also regulate or prohibit some land uses, such as landfills, which, by attracting birds, would pose a hazard to aircraft. Such controls or regulations should be implemented or ORIA based on the proposed 2032 Airport Master Plan.

***Municipal Land Use Planning and Aircraft Noise***

It is recommended that local planning authorities consider embodying aircraft noise factors into local development plans. Where possible noise sensitive land uses should be limited or prohibited in areas of high aircraft noise like near the ends of the runway or in close proximity to the sides of the runway. Typical noise sensitive uses included residential hospitals, day cares or schools. International guidelines can be used including either the FAA based DNL system or Canadian Noise Exposure Forecast Contours (NEF). Both are recognized by ICAO as means to predict noise and land use compatibility around airports. It should be noted that the CIAA currently publishes noise abatement procedures in the AIP which promotes reduced noise operations by air carriers at ORIA.

## 6.4 APRONS

***Main Terminal Apron***

The future expansion and ultimate development of the passenger terminal is shown both east and west of the existing terminal. The aviation forecast by 2032 indicates the need for eleven (11) Code “C” and three (3) Code “E” aircraft gates. This development site provides apron space and taxiway/taxilane system that supports the future forecast of aircraft operations. Refer to Exhibits 1, 2 and 3 in Appendix A for the proposed master plan apron layouts.

The direction of expansion for the terminal and apron are recommended based on minimum separation distances dictated by the most demanding aircraft codes utilizing the airport as well as height limitations as defined in the ICAO Obstacle Limitation Surfaces (OLS). For example the most demanding aircraft in the family of Code “E” aircraft is B747-400ER with respect to maximum tail height. The tail height is 19.59m. Assuming the elevation at the apron stands is the same as at the runway, the aircraft should be parked no closer than 212.13m (699.2 ft.) from the runway centreline.

The following details pertain to the ultimate long-term recommended terminal apron area development which will expand both the existing terminal apron but also will see new greenfield apron constructed in the East Development Area:

- Relocation of existing fuel farm to the northeast and a newly designated fuel farm location;
- 11 Code ‘C’ stands (aircraft wingtip separation of 7.5m);
- 3 Code ‘E’ stands (aircraft tails clear of OLS transitional surface (slope 1:7));
- All aircraft parking positions provide minimum 15m separation between aircraft nose and terminal building.

- Service road width is 7.5m;
- Code 'E' taxiway/taxilane is 23m wide;
- Code 'C' taxiway/taxilane is18m wide;
- Apron area (including access taxiways/taxilanes and connectors) 95,018sq.m (1,022,761sq. ft.);

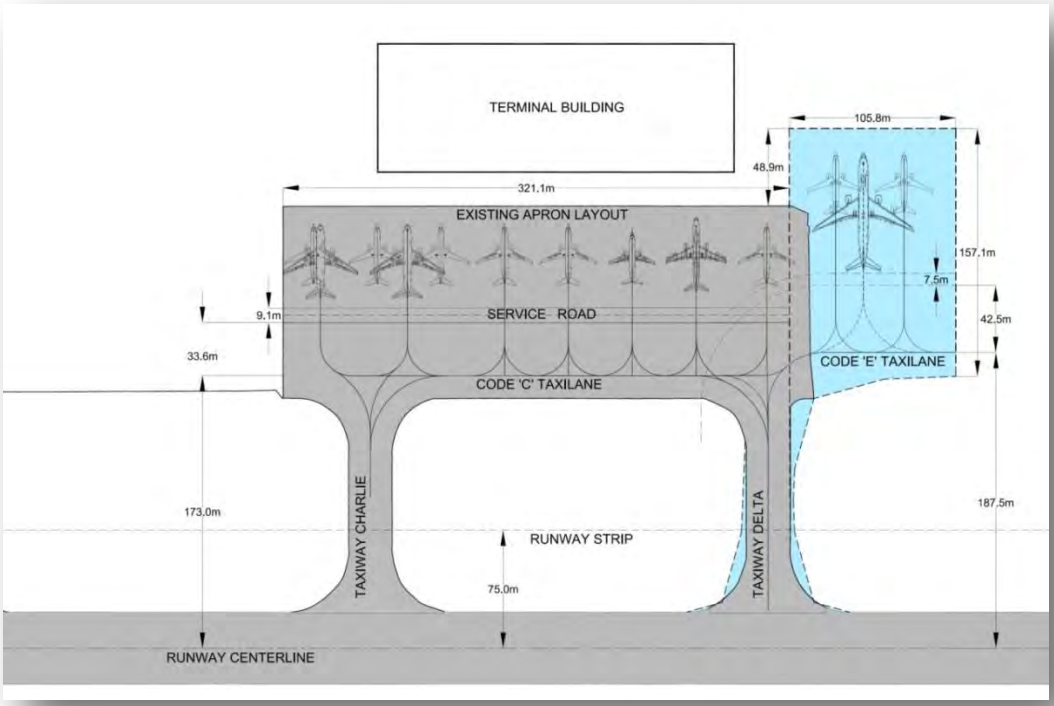
The long-term apron will utilize a dual Code "C" taxiway/taxilane on new apron area which eliminates potential congestion for aircraft taxiing towards the gates located to the most northern aircraft stand positions. Additionally, the GA aircraft have a secondary access to the GA hangar area that has less operational impact than having just single taxiway maneuverability. Refer to Exhibit 1 in Appendix A for a layout of the long-term terminal commercial apron.

In addition to the eastern expansion of the existing and future apron, a westerly expansion is also proposed off the existing apron. This expansion would see a reconstruction and expansion of the existing area to the west of the apron by 104 m order to accommodate two additional Code "C" aircraft. Furthermore, an additional 40m is designated for future Ground Support Equipment (GSE) staging and covered areas.

***Short Term Main Terminal Apron Expansion***

While the above captures the long-term planning requirements for the main terminal commercial apron, the master plan recommends an immediate short-term expansion of the main terminal apron to the east to accommodate two additional Code C (B737) aircraft parking positions. This will provide the required immediate 10 parking positions required to meet current peak operations. Furthermore, this apron expansion will further support the proposed changes in British Airways fleet to B777 series and other Code E aircraft like a B747 or A340. This apron would act as a MARS stand accommodating either two Code C positions or one Code E position. Refer to the following Figure 6-2 for the proposed short term apron expansion configuration. This build is contingent on the relocation of the fuel farm that must is also a short-term priority for implantation.

**Figure 6-2 – ORIA Short-Term Main Terminal East Expansion**




***General Aviation and Cargo/Commercial Apron***

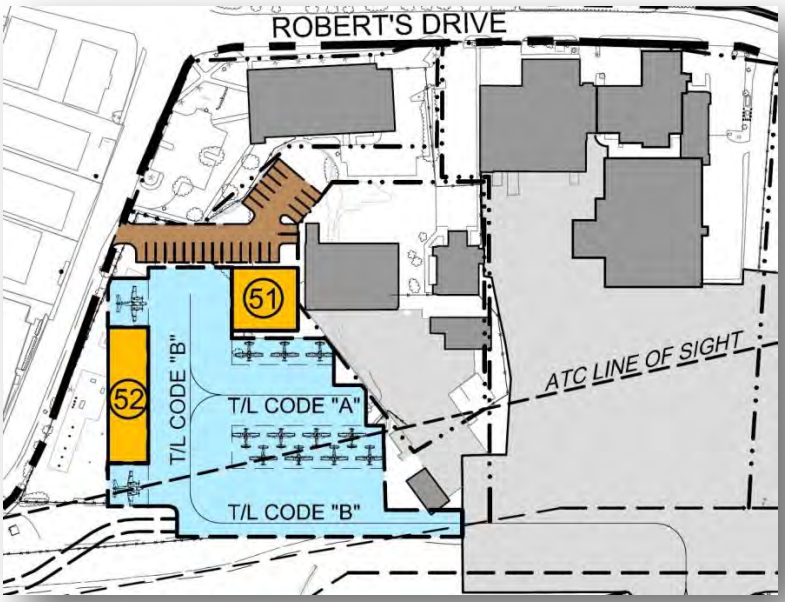
Exhibit 1 in Appendix A shows an ultimate long-term commercial apron expansion along the east boundary of the airport site and clear of the mandated mangrove buffer area. These aprons are all associated with future potential General Aviation/FBO development opportunities. These areas are described in greater detail under the General Aviation section of the report.

Exhibit 1 in Appendix A also shows two proposed apron expansions associated with the existing GAT/ FBO and an option to expand a parking apron west of the MRCU facility. These aprons have been maximized within the existing airport boundaries and account for applicable offsets in particular around the ARFF facility and to permit clearances from an future parallel taxiways associated with the runway. It is estimated that the additional area will provide some relief to parking limitations currently experienced on the cargo and GA aprons and will also help offset the loss of parking due to the proposed parallel taxiway system.

The eastern expansion of the existing GAT/Island Air FBO apron is about 20,000 sq. ft. and would provide additional parking of Code B jet and turbo prop general aviation aircraft for needed relief during peak periods. The expansion could occur at any time and likely should be coordinated with any proposed redevelopment planned by Island Air

For the area west of the MRCU, there is potential land available for future additional GA and commercial apron expansion. The existing sportsplex-parkette currently located in this area would need to be relocated. This area could potentially accommodate the following key features or cold act as an relief apron for peak cargo operations. Refer to Figure 6-3 below for the proposed layout of this area. Overall, this space maximizes the use of available land within the existing airport boundary. This area could be phased initially as added cargo/GA parking and then redeveloped for commercial hangars and GA tie-downs.

**Figure 6-3 – ORIA Apron – GA/Commercial Expansion West of MRCU**




## 6.5 TAXIWAYS

Currently, the airport does not have a partial or full-length parallel taxiway for Runway 08-26. Interviews with ATC and additional analysis has demonstrated that distance/time of back taxiing on the runway can take up to 4 minutes from the hold position on Taxiway Charlie, to the western Threshold 08, and wheels up. Since this route is used well over 90% of the time due to prevailing wind conditions, prioritizing the construction of a full or partial parallel taxiway from the terminal apron to the west end of the runway should be considered a short to medium term objective by the CIAA. A phased approach could be taken whereby a partial parallel taxiway is constructed from Taxiway Charlie to Taxiway Alpha. The provision of this partial parallel taxiway could reduce runway occupancy times by as much as 50%. While this recommendation is based on optimizing runway efficiency, it may need to be balanced against the CIAA's desire to provide airside access to the future East Development Area for commercial development opportunities. Revenue opportunities may increase if the CIAA were to construct the parallel taxiway segment from Taxiway Delta to the Threshold of 26. This segment will enable airside access to the East Development Area but it will have only a marginal benefit to reducing runway occupancy times. As an alternative, the CIAA may consider constructing only an enabling taxiway i.e. reduced width, or make it the responsibility of the private developer to construct an enabling taxiway to provide access to the eastern commercial development areas. The master plan recommends that the priority should be to improve runway safety and efficiency and as such any phased implementation of the parallel taxiway should proceed from the terminal apron to the west initially.

This master plan recommends that a full-length parallel taxiway be constructed to support the existing and future operations including future Code E design aircraft i.e. B777. Given the limits of the airport property to the west of the airport i.e. west of Taxiway Alpha, the proposed taxiway system will impact the General Aviation (GA) and commercial/cargo aprons located north of the existing runway. The future parallel taxiway will require the relocation of a number of parking positions currently being used on the cargo and GA apron in order provide sufficient clearances for taxiway/taxilane minimum safety separations. For this reason, the master plan also proposes expansions to the GA and commercial/cargo aprons as discussed in the previous section.

The proposed parallel taxiway system will be split into two sections. Approximately 1,635 meters (5,364 ft.) of new partial parallel taxiway is recommended to be constructed supporting Code "E" aircraft. This

partial taxiway will connect from Runway 26 end and continue to just west of the existing Taxiway Alpha. From this point the parallel taxiway will be designed to Code C standards (i.e. for Boeing 737 and Airbus A320) to the Threshold of 08. For Code "E" aircraft take-offs from the Runway 08 end, an aircraft can utilize the partial parallel taxiway to the location where the further section is limited to Code "C" aircraft. At this point the Code E aircraft would need to enter the runway for a short back taxi and turnaround. The parallel taxiway will be designed to Code E standards of 23m wide with 10.5m of taxiway shoulders. The Code C sections will also be constructed to 18m in width but with no shoulders.

## 6.6 NAVIGATIONAL AIDS AND SECONDARY SURVEILLANCE RADAR

It is recommended that the existing DVOR is retained but that an aeronautical study be initiated in the short-term to review relocation options of the facility should a runway extension be triggered at some point in the future. The study should review relocation options within the open spaces reserved on the airfield within the proposed airport layout plan and off-site options. Furthermore, the study should consider the installation of an ILS on Runway 08 as a replacement and implementation of GNSS satellite based instrument approaches. Given the very limited open space and narrow property boundaries, a detailed study will be required to confirm the optimum long-term navigational aid solution for ORIA.

The existing COCENSA secondary radar facility could be used to provide radar signals for ATC at CIAA and potentially for CKIA. Under the current lease agreement COCENSA has agreed to the provision to provide CIAA the option for interconnection to the radar feed from this facility. It is recommended that this option be exercised immediately.

The airport master plan has considered the existing COCENSA radar facility in the overall airport layout plans. Using the radar siting criteria presented earlier, two alternatives for the future general aviation development options around the facility are shown in Figure 6-4.

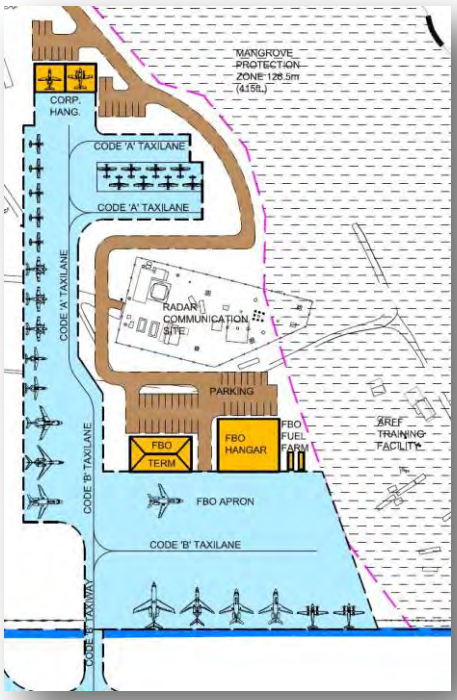
It should also be noted that the all future air terminal development and aircraft parking option shown in the airport layout plans have also been tested against the siting criteria for the COCENSA radar facility and found to be acceptable with the radar either operational or removed.

Furth more, if this existing radar is ever decommissioned, this space could either be developed into general aviation commercial lots/hangars/aprons or CIAA could install their own secondary radar while not impacting the proposed airport layout plans.

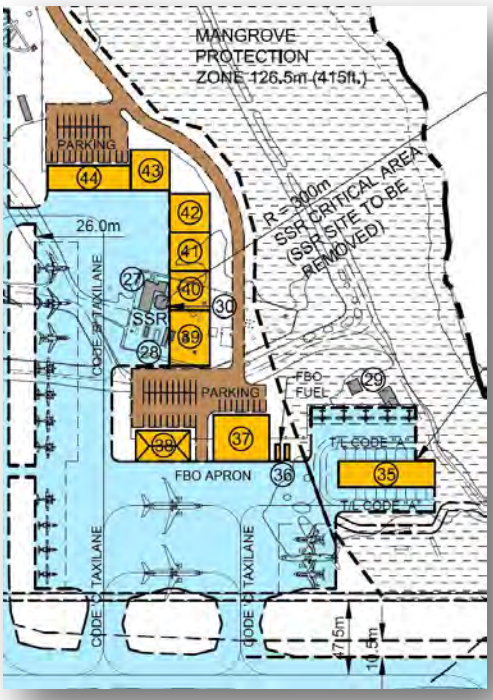
***Electronic Protection (Aeronautical Zoning)***

The master plan also recommends that appropriate land use controls be established around the airport in consultation with land use planning authorities for the existing radar, DVOR, NDB and the integrity of the communication towers serving ORIA. These protection measures should be enacted under the authority of aeronautical safety and be controlled and managed by the CIAA.

**Figure 6-4 – ORIA COCENSA Radar Impacts on GA Development Options**




**Alternative 1 - With Active Radar**




**Alternative 2 - Radar Removed**

## 6.7 US PRE-CLEARANCE

***General Discussion***

Passengers generally have a strong preference for US preclearance, if available, because the wait times and processing times tend to be shorter than those at a major international US hub such as Miami. However, the costs of establishing preclearance facilities on Grand Cayman will be extensive, and it is not clear that the benefits outweigh the costs.

From a route analysis point of view, almost all flights to the US are currently routed through an existing airline hub, and all of these points have US customs and immigration facilities. In terms of new routes, discussions with the airlines could not identify any likely locations, with reasonable traffic potential, (which really mean large cities) that do not have US inspection facilities available. As well, the airlines that were interviewed did not indicate any operational difficulties with routing their equipment through international terminals in the US. In fact, several airlines (American at Miami, and JetBlue at JFK, for example) have dedicated inspection facilities integrated within their own terminals. Airlines such as Jetblue, and United specifically indicated that they had no interest in US Preclearance facilities at Grand Cayman. Cayman Airways, on the other hand would like to see US Preclearance because it would allow them to arrive into the US as a domestic flight, which in turn would improve their connections with other US domestic flights.

Thus, the question of preclearance is largely one of relative passenger convenience, and its presence or absence is unlikely to affect traffic potential in any meaningful way.

In the future, it is expected that the expansion of various “trusted traveler” programs such as Global Entry, will allow more and more frequent fliers to either bypass or short-circuit the US inspection requirements, reducing the “convenience” differential between pre- and post-clearance. Similarly, the recent

introduction of automated immigration technologies currently allow US residents to enter the United States without having to see an agent. This again significantly increases traveler convenience.

The costs of preclearance, however, must be borne by the location, and generally recovered through a specific fee added on to the airline ticket price. A study completed by the Carmen Group estimated the annual operating cost of preclearance at Grand Cayman to be in the range of $4.25million to - $6 million dollars, for the "fully loaded" costs of providing salaries and expenses for twenty officers. Based on 253,000 departures to the US in 2012 (as per the Carmen report), this would amount to an additional charge of $17 - $24 per ticket. At the same time, however, the passenger would not be charged for international inspection fees in the US, which are currently set at $17.50 per arrival ($5.00 agriculture, $5.50 customs and $7.00 immigration). From the point of view of the passenger, any air fare differential would be negligible.

A major caveat, however, is that the above calculation does not take into account the additional terminal space required to house the preclearance facility, as well as appropriately segregated departure gates, additional office space, etc. These additional capital costs could be substantial.

***Spatial Requirements Analysis***

Should US Preclearance be a requisite of any future terminal expansion at Owen Roberts International Airport it would have to fully comply with the requirements of US Customs and Border Protection (US CBP). Under US Preclearance, passengers and checked baggage must be completely segregated from all other departing passengers, and from arriving passengers. This would entail the provision of a dedicated departures lounge and baggage make-up area. In accommodating US Preclearance, other modifications to the terminal would be required in order to support simultaneous International and Domestic operations. All of these modifications would be in addition to the proposed terminal expansion and modifications identified as part of the proposed terminal development described in the following section of the master plan.

***Passenger Processing***

The process for departing US preclearance passengers includes the following flow.

**Check-in → Passenger Screening → US Primary Inspection → US Secondary Inspection (if required) → Departures Lounge → Aircraft.**

Beyond the passenger screening point, US-bound passengers must be separated from other departure passengers. If a common passenger screening point cannot be accommodated, then separate screening points would be required.

Given the current layout of the existing PTB, it is likely that a US preclearance could only be accommodated with an expansion to the terminal that would necessitate separate passenger screening facilities, one for International/Domestic passengers and one for US passengers. Based on the forecast 2032 baseline nominal schedule, the peak International (non-US) and Domestic demand would be 1 B787 and 1 B737. Assuming a peak hour passenger demand of approximately 350 passengers, the International/Domestic passenger security checkpoint would require two screening lanes and would be approximately 1,800 sq. ft. in area. An additional 700 sq. ft. would be required for queuing.

The net area required for US Primary Inspection (including queuing), based on current and projected passenger demand, would be approximately 16,564 sq. ft.[16] Similarly, the net area required for US Preclearance Secondary Inspection and support facilities would be approximately 8,300 sq. ft.[17]

Given the peak demand for flights to the US, the primary holdroom would be used to accommodate US-bound passengers. Domestic and International flights are typically off-peak, the exception being Air Canada flights. To accommodate International and Domestic departure passengers, a separate holdroom would be required. This holdroom should be sized to accommodate passenger loads

[16] Source: Airport Design Standards – Passenger Processing Facilities, US Customs and Border Protection, 2006

[17] Source: Airport Design Standards – Passenger Processing Facilities, US Customs and Border Protection, 2006

associated with 1 Code E and 1 Code C aircraft. This would result in a net area requirement of approximately 7,600 sq. ft., including washrooms and a small concessions area.

While transiting between the departures lounge and the aircraft, US-bound passengers would always have to be segregated from other passengers. This would likely require a physical separation of walkways leading to US-bound aircraft, and physical separations between arriving and departing passengers. To manage passenger flows and maintain sterility, a much larger security presence would be required on airside to ensure compliance with US requirements.

***Baggage Processing***

The process for baggage bound for the US includes the following flow:

**Check-in → Bags Weighed and Photographed → Radiation Screening → Hold Bag Screening → US Baggage Make-Up → Aircraft.**

In addition to the standard hold bag screening process, US-bound checked baggage must also be screened for radiation, and weighed and photographed. There must also be in place a process that allows checked bags to be brought from the baggage make-up area to the US Secondary Inspection facility, if requested by a CBP agent. The baggage make-up area for US-bound flights must also be physically segregated from the International/Domestic baggage area.

The majority of baggage at ORIA is destined to the US. Therefore, a smaller baggage make-up area would be required for International/Domestic destinations. The size of this make-up area would be approximately 4,000 sq. ft. and require a dedicated make-up device.

***Summary***

The following Table 6-6 summarizes the preliminary area requirements associated with the implementation of a US preclearance facility.

**Table 6-6 - US Pre Clearance Preliminary Area Requirements**

| Item No. | Function | Area (sq. ft.) |
|---|---|---|
| 1. | US Primary Inspection | 16,564 |
| 2. | US Secondary Inspection | 8,300 |
| 3. | International/Domestic Passenger Screening Point/Queuing | 2,500 |
| 4. | International/Domestic Departures Lounge | 7,600 |
| 5. | US Baggage Make-Up Area | 4,000 |
| 6. | Sub -Total | 38,964 |
| 7. | 30% Allowance for General Circulation, Additional Baggage Runs & Screening, Structure, Mechanical. | 11,689 |
| 8. | **TOTAL** | **50,653** |

Based on an approximate unit cost of CI$340 per sq. ft., the cost of the terminal expansion associated with the provision of a US Preclearance facility would be approximately CI$17.2 million.

In addition to the capital cost, there would be additional ongoing operational costs associated with providing an expanded security presence to ensure proper sterility of US-bound passengers and baggage.

With the proposed terminal expansion layout described in the next section, one option for providing a US Preclearance facility would be to locate it to the west of the existing check-in area, between check-in and the relocated baggage make-up area. However, given the limited availability of land to the west of the

terminal, and the fact that the proposed terminal expansion already makes use of lands to the west of the terminal, such an expansion may not be possible.

The introduction of a US Preclearance facility introduces an increased complexity with respect to passenger flows and segregation of passengers and baggage. This increased complexity is likely best accommodated as a component of a new greenfield terminal development.

The master plan recommends that the expansion of the existing terminal as described in the following section does not include the provision of US Preclearance given the added complexities in operation, costs, and lack of sufficient space within the existing airport boundaries. US Preclearance should be considered only as part of a long-term greenfield terminal build.

## 6.8 AIR TERMINAL BUILDING

### 6.8.1 Forecasted Nominal Flight Schedules

As a function of the activity forecasts presented in this report, nominal flight schedules were developed for 2014 baseline, 2022, and 2032 baseline, pessimistic and optimistic. These nominal schedules identified reasonable flight schedules and aircraft mixes required to support the planning day and annual passenger volumes developed under the activity forecast. The following analysis used these forecasts to assess the existing and future passenger terminal building requirements for the master planning period to 2032.

### 6.8.2 Peak Period Demand

From the nominal schedules were derived the planning peak hour passenger (PPHP) arrivals and departures demand, which in turn were used to identify future peak hour requirements. The 2032 pessimistic nominal schedule was excluded from the analysis in that the medium forecast is typically used as the baseline to derive future requirements. Table 6-7 describes the PPHP associated with the various nominal schedules. The PPHP assumes a 90% aircraft load factor.

**Table 6-7 - Peak Hour Passenger Demand**

| | 2014 | 2022 | 2032 | |
|---|---|---|---|---|
| | | | Baseline | Optimistic |
| Arrivals | 974 | 887 | 1085 | 1112 |
| Departures | 864 | 864 | 1062 | 1112 |
| Peak 3-Hour Flight Departures | 16 | 16 | 18 | 18 |

### 6.8.3 Functional Requirements

The following text describes the functional requirements for the Passenger Terminal Building based on nominal schedules prepared as part of 2014, 2022 and 2032 activity forecasts. The 2032 forecast is broken down by ‘Baseline’ and ‘Optimistic’ forecast. The ‘Optimistic’ forecast assumes that travel activity associated with Health City will develop significantly over the coming years.

It should be noted that under the 2032 Optimistic forecast, the peak hour demand does not significantly increase over that identified for the 2032 baseline forecast. This is because under the Optimistic forecast it is assumed that additional movements would not occur in the peak period, but rather, would occur during the shoulder periods as airlines add additional frequency. Under the Optimistic forecast US air carriers would likely add additional arrivals in the late afternoon or evening, which would then overnight and depart in the early morning. This would allow air carriers with opportunities to connect these flights into their domestic system.

Table 6-8 describes the functional requirements associated with key functional elements and processors associated with the air terminal building at Owen Roberts International Airport. The table also describes the peak hour arrivals and departures activity associated with the forecast milestones. These peak hour demands are then used to determine functional requirements. Functional requirements are based on IATA Level of Service (LOS) 'C' spatial requirements and other industry accepted planning standards.

**Table 6-8 - Passenger Terminal Building Functional Requirements**

| | Requirements | | | | |
|---|---|---|---|---|---|
| **Activity** | **Existing** | **2014** | **2022** | **2032 Baseline** | **2032 Optimistic** |
| Check-in / Bag Drop Positions | ± 30 | 45[18] | 45[19] | 50 | 50 |
| Check-in Queue Depth (ft.)[20] | 29 | 35 | 35 | 35 | 35 |
| Check-in Queue Area (sq.ft.) | 3,297 | 7,875 | 7,875 | 8,750 | 8,750 |
| Security Screening Check Point (Units)[21] | 2 | 5 | 5 | 6 | 6 |
| Security Screening Check Point Area (sq.ft.) | 800 | 3,530 | 3,530 | 4,390 | 4,390 |
| Security Screening Queue Area (sq.ft.) | 700 | 2,215 | 2,215 | 1,955 | 2,225 |
| Outbound Immigration[22] | 480 | - | - | - | - |
| Sterile Holdroom (Based on Gates) | 8,373 | 23,130 | 25,692 | 28,249 | 28,249 |
| Airline Lounges (sq. ft.) | - | 2,592 | 2,592 | 3,186 | 3,336 |
| Airside Concessions[23] (sq. ft.) | 2,875[24] | 4,200 | 5,283 | 6,791 | 9,525 |
| Landside Concessions[25] (sq. ft.) | 2,073[26] | 2,800 | 3,523 | 5,660 | 6,351 |
| Concessions Storage[27] | - | 1,400 | 1,760 | 2,490 | 3,175 |
| Outbound Baggage | 2 | 3 | 3 | 3 | 3 |

[18] Based on air carriers input for 50% more positions

[19] Assumes that with common use and improved kiosk/bag drop usage, number of check-in positions will remain the same.

[20] Includes active area in front of counters.

[21] Assumes max 15 minute wait in queue.

[22] Assumes Outbound immigration eliminated in near future.

[23] Based on 14 sq. ft. per annual enplaned passenger

[24] Excludes food & beverage seating area

[25] Based on 14 sq. ft. per annual enplaned passenger / Based on annual and planning day passenger volume rather than peak hour volumes

[26] Excludes food & beverage seating area on second level.

[27] Calculated at 20% of concessions space

| | Requirements | | | | |
|---|---|---|---|---|---|
| **Activity** | **Existing** | **2014** | **2022** | **2032 Baseline** | **2032 Optimistic** |
| Screening (Units) | | | | | |
| Baggage Makeup (sq. ft.) | 5,000 | 28,800 - 33,800 | 28,800 - 33,800 | 32,400 - 38,100 | 32,400-38,100 |
| Immigration Counters | 12 | 16 | 16 | 16 | 16 |
| Immigration Processing Area | 1,000 | 2,230 | 2,230 | 2,230 | 2,230 |
| Immigration Queue Area | 6,180 | 6,000 | 6,000 | 6,000 | 6,000 |
| Immigration Admin / Support Area | - | 4,640 | 4,640 | 4,640 | 4,640 |
| Baggage Claim Area | 4700 | 8,486 | 8,486 | 9,455 | 9,687 |
| Baggage Claim Frontage (lin. Ft.) | - | 500 | 500 | 563 | 577 |
| Customs Counters | 8 | 10 | 10 | 10 | 10 |
| Customs Area | 3,200 | 4,852 | 4,852 | 5,602 | 5,602 |
| Customs Admin / Support Areas | - | 3,864 | 3,864 | 4,640 | 4,640 |
| Health Admin / Support | - | 400 | 400 | 400 | 400 |
| Airline Support[28] | - | 7,680 | 9,442 | 12,120 | 19,852 |

### 6.8.3.1 Check-In

It is assumed that a 50% increase in check-in positions would meet the short to medium term requirements of air carriers. In the medium to long-term, the proposed introduction of a common use passenger processing system (CUPPS) will increase the efficiency of check-in processing. This together with increased usage of new technologies such as common-use self-serve kiosks and self-bag tagging, it is anticipated that the demand for check-in positions will not grow beyond a requirement for approximately 50 check-in/bag drop positions.

In order to accommodate a greater check-in queue depth it is proposed that the departures hall be expanded to the north in order to accommodate a minimum queue depth of 35 ft. The greater queue depth, together with an extended arrivals hall would accommodate peak period demand associated with the 2032 Optimistic schedule.

### 6.8.3.2 Passenger Security Screening

To accommodate short to medium peak period demands, and provide for a minimum queue wait time of 15 minutes, 5 screening lanes would be required. This is based on an average throughput of 120 passengers per screening lane per hour. In the medium to long term, the requirement would increase to 6 screening lanes. To accommodate peak period passenger queues the security screening queuing area would need to be approximately 2,215 sq. ft. in the short to medium term, and 1,955 – 2,225 sq. ft. in the long term.

[28] Based on 0.0075 sq. ft. per annual passenger.

In the short term there may be an opportunity to provide a third screening lane in the space currently occupied by the queue space for the emigration function. This would likely be dependent upon the removal of the emigration function.

#### 6.8.3.3 Emigration

It is proposed that in the short term, all air carriers would transfer passenger emigration information electronically to the Immigration Authority that would in turn allow for this function to be eliminated. As indicated above, the elimination of the emigration counters would likely permit the provision of a third passenger screening lane.

#### 6.8.3.4 Departures Holdroom

To accommodate the long term peak period requirements the holdroom in the short to medium term should be approximately 25,700 sq. ft. This would include space for additional gate podiums and general circulation within the holdroom. In the longer term the space requirement would increase to 28,249 sq. ft. In addition to the expanded holdroom space, various amenities, including washrooms, would also have to be expanded to provide appropriate levels of service.

The expanded departures holdroom should also be configured such that a portion of the holdroom could be utilized for 'in-transit' functions. This would require the provision of a movable partition that could separate in in-transit passengers from originating passengers. The in-transit area would also require the means to screen passengers prior to entering the holdroom area. The size of the in-transit area would be sized to accommodate passenger loads associated with a B737 aircraft.

#### 6.8.3.5 Concessions

With the expansion of the holdroom, it is proposed that concession space would also be expanded. Retail sales are typically a function of annual passenger volumes. Therefore as annual passenger volumes increase there should be a corresponding increase in retail space. Expanded concession space should include full service food and beverage facilities, as well as retail concessions and duty free. It is proposed that concession space could be accommodated both on the ground level as well as an upper level that would be accessed from the departures holdroom. In addition to expanding the retail area, it is also suggested that the ambiance and aesthetic appeal of the retail area be improved along with an increase in the selection of goods offered. This in turn would likely encourage an increase in retail sales per passenger.

In addition, concession space would be provided at the arrivals concourse to accommodate ground transportation services, information counters, as well as a small café.

In the medium term approximately 8,800 sq. ft. of concession space is required. Of this, approximately 60% should be located airside and 30% landside. In the longer term (2032 baseline forecast) the requirement for concession space would increase to approximately 12,450 sq. ft., and under a long term optimistic schedule the requirement for retail space could increase to approximately 15,876 sq. ft.

In recent years concession programs have gained a higher profile as airports examine opportunities to increase non-aeronautical revenues, which in turn has led to the provision of increased concession space and the aesthetic enhancement of such space.

It should be noted that the concession area requirements identified in Table 6-8 are based upon generalized requirements associated with annual passenger movements and do not take into account local or regional retail trends. In order to derive a realistic determination of concession space requirements, it is recommended that a concessions study be undertaken to develop an in-depth understanding of the passenger characteristics specific to Grand Cayman and to benchmark other airports in the Caribbean with respect to retail sales.

#### 6.8.3.6 Baggage Make-Up

The baggage make-up area should be designed to support the staging of baggage carts and ULDs for a three-hour peak period. In the short to medium term there are approximately 16 departures during a three-hour peak period. In the long term, this increases to 18 departures. Approximately 32,400 – 38,100 sq. ft. is likely required to accommodate baggage make-up area in the long term. This would include space for two large make-up carousels as well as space for cart staging and flow-through circulation.

#### 6.8.3.7 Domestic / International Arrivals

A concern identified with the existing passenger terminal building is that arriving domestic passengers currently must enter the terminal through the international arrivals area. During periods of international arrivals, this procedure poses both security and immigration risks. To resolve this concern, the expanded terminal facility will have a dedicated domestic arrivals corridor that has controlled access and is physically separated from international arrivals.

Domestic passengers would be directed through this corridor to the public arrivals hall, where they would then proceed to the baggage claim area. The baggage claim area would be designed such that one of the baggage claim devices would have a 'swing' capability, whereby it could be temporarily cordoned off from international arrivals with the use of movable partitions, and function as a domestic claim device.

#### 6.8.3.8 Immigration

To accommodate forecasted peak period passenger demand, the immigration area would be expanded to accommodate additional processing counters as well as passenger queuing space. The required passenger queuing area is approximately 6,000 sq. ft., which is equivalent to the existing indoor and outdoor queuing areas. The expanded immigration area would include space a raised supervisor's area, and space for the Health Department.

In discussions with Health City, that group put forth a recommendation that the immigration area provide additional passport control lanes for those medical tourists and other passengers who are infirm or have special needs. It was also suggested that there be an area within the international arrivals area where Health City representatives could greet arriving health tourists and assist with the immigration and customs process.

#### 6.8.3.9 Baggage Claim

The baggage claim area would be expanded to accommodate long term peak passenger demands. This would include approximately 9,700 sq. ft. of space as well as additional baggage claim devices. In addition to the dedicated international claim devices, a 'swing' claim device would be provided that could be used for either international or domestic arrivals. When required, a movable partition would be used to physically separate the 'swing' claim device from the international arrivals area. The claim device could then be accessed from the common arrivals area. The 'swing' claim device could also be used by passengers to reclaim checked baggage when flights have been canceled.

#### 6.8.3.10 Customs

The customs area would be expanded to accommodate a larger secondary inspections area that would include interview booths an interview rooms, as well as expanded staff support areas.

#### 6.8.3.11 Airline Support

Airline support would be expanded as required to accommodate new entrant air carriers.

### 6.8.3.12 Administration

It is assumed that any expansion of the airport administration function could be accommodated elsewhere, and that the area currently used for this function could be used for airline support and/or other revenue generating functions if required.

## 6.8.4 Development Concept

Given the immediate requirement to address significant constraints and reduced levels of service associated with the existing terminal building, the preferred development approach in the short to medium term is to expand and modify the existing terminal facilities, rather than construct a new greenfield passenger terminal building. An analysis of the existing terminal site suggests that the existing terminal could be expanded to the west and east in order to meet passenger demands associated with the 2032 Optimistic forecast. This assumes that a US Preclearance facility is not a component of any future terminal expansion program.

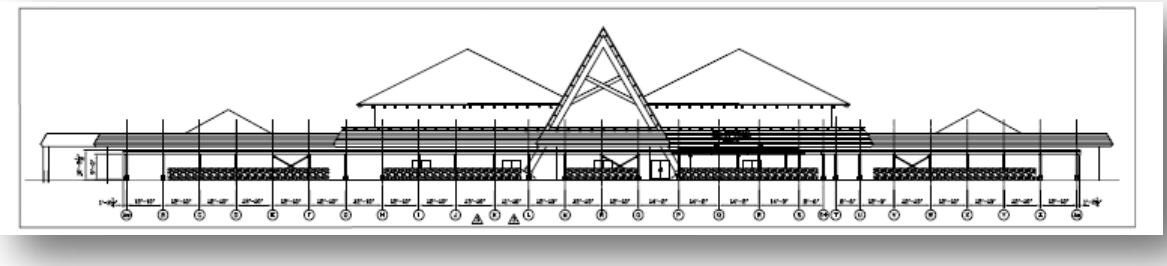
It has also been assumed that the terminal building will have all passenger processing functions located on the ground level. Although it is understood that the existing building has been designed to accommodate a full second level, there is an outstanding question as to whether passenger boarding bridges are to be added in the future. With the continued ground loading of aircraft, ideally, the passenger processing functions should remain on the ground level. Should passenger boarding bridges be added in the future, they could be accessed by ramps from the ground level or from a second level airside walkway with access to the ground level.

Block diagrams illustrating the potential expansion and redevelopment of the existing terminal building are provided in Exhibits 4 and 5 in Appendix A. The proposed expansion has been phased in order to minimize disruption to existing operations. The principal phases of development are illustrated in Exhibits 4 and 5 in Appendix A and are described in the following text. Exhibits 6 and 7 show architectural concept renderings of the expanded terminal both with without bridges and with bridges, respectively.

***Pre-Phase 1 Build Options***

Given that it may require a period of time between approval of the master plan, procurement and award of a design architect for the terminal improvements, it is recommended that some pre-Phase 1 work be initiated by the CIAA to offer its customers and stakeholders some incremental improvements until the full build-out is initiated. One recommended pre-Phase 1 build should be the construction of the covered apron walkway as shown in the following Figure 6-5. This covered walkway has been identified as a priority by the airlines and can be adapted to the phased expansion plans proposed in this master plan. The cost of the project at about $250,000 has been reflected in the in overall financial analysis and prioritization and the architectural drawings and specifications are already complete. This work could be initiated immediately.

**Figure 6-5 – ORIA Covered Apron Walkway – Pre-Phase 1 Build**



Additional pre-Phase 1 activities that the CIAA could implement immediately include:

- Force remaining air carriers to provide emigration information electronically and utilize that space to accommodate a third passenger screening lane;

- Maximize covered outdoor space to supplement check-in areas and departures lounge. The building could start with covered open space and then enclose the space at a later date. There may be some opportunity to provide open covered areas for the departures lounge by extending to the south (airside) but there may be issues with relocating gate podiums that would need to be resolved. Similarly, CIAA could review expanding the check-in area by providing a covered open area to the north of the existing check-in hall to accommodate overflow; and

- If a temporary solution could be found for the relocation of baggage make-up, this existing covered area could be utilized for the temporary expansion of the departures holdroom.

***Phase 1***

Phase 1 would include the expansion of the passenger terminal building to the west and to the north. This would provide for the relocation and expansion of the baggage make-up area which in turn would allow for the opportunity to expand the departures holdroom and retail concessions. The expanded departures holdroom would also provide opportunities to accommodate additional departure gate positions. The first phase would also support a new concessions area on the Second Level, which would include a common-use airline lounge, a large full service food and beverage concession and additional retail concessions. Phase 1 would also provide for the expansion of the departures hall and check-in area.

Phase 1 would address the primary constraint of the existing terminal building, which is the undersized departures holdroom. This initial phase would also provide significant opportunities for increased revenue generation through the development of new and expanded concession areas.

***Phase 1A***

Phase 1A would be a continuation of the work undertaken under Phase 1. Under Phase 1A, existing portions of the terminal building would be renovated and interior finishes brought up to a new standard.

***Phase 2***

Phase 2 would include a major expansion to the east and north that would include an expanded baggage claim area and customs facility. Relocating these functions into the new addition would make way for the expansion of the immigration area under Phase 3. Phase 2 would also include an expanded arrivals hall and space for landside concessions. The arrivals hall could be either fully enclosed or developed as a covered outdoor space.

***Phase 3***

Phase 3 would include a renovation of the existing terminal building to accommodate an expanded immigration area and support space as well as an expansion to the departures holdroom and security screening function. The proposed renovation would also include the dedicated domestic entrance for arriving domestic passengers.

### 6.8.5 Passenger Loading Bridges

Under the development concepts described above, a Phase 4 was developed that could accommodate the future provision of passenger loading bridges at ORIA. Phase 4 as proposed, could be undertaken independent of the other expansion phases and be implemented at any time and would permit a unique approach of providing a 2 storey, open walkway for passengers to use to embark/disembark from aircraft using passenger boarding bridges.

Phase 4 would be the development of a second level airside walkway that could be used in conjunction with the installation of passenger boarding bridges. Passengers would access the second level of the walkway from vertical circulation nodes that would include escalators, elevators and stairs. It is proposed that the second level walkway be covered, but open, such that arriving passengers could still experience the inviting warm of the Caribbean air and have a visual connection to the adjacent gardens located between the terminal building and the airside walkway. A glazed corridor down the middle of the walkway would help to separate inbound from outbound passengers. Refer to Exhibit 7 in Appendix A that presents architectural renderings of this proposed concept.

A less costly alternative to this approach would be ground level connected passenger bridges as shown in the Figure 6-6. In this case, a ramp would be required at each bridge to bring passengers up to a height of about 3 - 5 feet off of the ground (ramps would have to be 36 – 60 feet long @ 1:12 slope). This is necessary in order to accommodate the bridge rotunda pedestal and foundation. The bridges could be used for B737, B767 and the B777. The ground installed bridges would eliminate the need for the second level walkway and associated elevators/escalators as proposed under Phase 4 described above.

**Figure 6-6 – ORIA Ground Level Connected Passenger Loading Bridges Alternative**

Another alternative would be to introduce the use of portable passenger ramps as shown in Figure 6-7. In this case, the portable ramps offer a passenger ramp using portable units which could be available at each aircraft gate. In this cases 10 units would be recommended for the short-term for the proposed ten peak period aircraft gate positions.

**Figure 6-7 – ORIA Portable Passenger Boarding Ramp Concept**

Table 6-9 presents a cost comparison between the three boarding bridge alternatives described above.

**Table 6-9 - Cost Comparison of Passenger Loading Bridge Alternatives**

| Alternative | Approximate Cost |
|---|---|
| Phase 4 - 2 Storey Covered Walkway/Loading Bridge (10 Units) | $20.5 million |
| Ground Level Connected Passenger Loading Bridges (10 Units) | $12 million |
| Portable/Mobile Passenger Boarding Ramps (10 Units) | $1 million |

The master plan recommends that the requirements and financial business case for passenger loading bridges dictate when and what alternative is implemented. For the short-term it is recommended that the CIAA implement the portable passenger boarding ramps in conjunction with the Pre-Phase 1 construction of the covered apron walkway. This will add a significant level of added customer service and maintain the overall Caribbean experience of disembarking/embarking an aircraft into the open air environment.

### 6.8.6 Long-term Re-Purposing of the Air Terminal Building

With the development of an ultimate new greenfield passenger terminal facility in the long term as shown in Exhibit 1 in Appendix A, the existing passenger terminal building and the proposed expansions could eventually be potentially repurposed for other uses including a general aviation terminal, dedicated in-transit facility, or dedicated domestic terminal. Connected to the new terminal, the existing facility could also be used as a holdroom facility. Potential non-passenger functions could include a mail/courier sortation facility, an air cargo warehouse, or a maintenance/ramp support facility for airlines and ground handlers. The ultimate vision under this master plan is to see the existing terminal area and apron be fully repurposed as a dedicated cargo/mail facility as described in subsequent sections of this report.

### 6.8.7 Sustainable Passenger Terminal Design Principles

It is proposed that the expansion and renovation of the passenger terminal building would incorporate design principles associated with sustainable design. Sustainable design seeks to reduce negative impacts on the environment, and the health and comfort of building occupants, thereby improving building performance. The basic objectives of sustainability are to reduce consumption of non-renewable resources, minimize waste, and create healthy, productive environments. Sustainable design principles include the ability to:

- optimize site potential;
- minimize non-renewable energy consumption;
- use environmentally preferable products;
- protect and conserve water;
- enhance indoor environmental quality; and
- optimize operational and maintenance practices.

Elements of the proposed design would include the use of:

- indirect natural lighting and high efficiency lighting systems;
- water efficiency through the use water conserving plumbing fixtures as well as storage and reuse of roof storm water for site irrigation; and
- use of a high performance building envelope for reduced energy requirements.

## 6.9 GENERAL AVIATION AND AIRSIDE COMMERCIAL FACILITIES

The recommended space reservation for a future general aviation terminal building is 10,000 square feet. This is considerably larger than the current facility and would be a completely different type of terminal building than the current facility. It is recommended that a new GAT be developed by private interests through an FBO proposal and that AIS and MET lease space within this building. The CIAA should issue RFPs to solicit competing bids for a facility and it should include provisions for space for Customs, Immigration, pilots lounge, dedicated aircraft parking apron, and auto parking area. Additionally, the terminal should be highly visible from the airside and be a signature gateway to a world-class resort destination. Generally, the development of a Fixed Base Operators (FBO) and associated services provided at the Airport is based upon private party investment and development of the business. Many airports have more than one FBO to encourage a competitive environment and options for the GA aviation community.

It is recommended that the existing General Aviation Terminal (GAT) remain in its current location until such time as a new FBO development is either redeveloped in the area of the existing GAT or in a new location as proposed in the master plan in the East Development Area. The East Development Area is located in the undeveloped lands east of the main terminal building. The future development of a General Aviation (GA) and commercial airside area is depicted east of the existing terminal area adjacent to the mangrove buffer zone. This option accommodates a larger mix of aircraft sizes and flexibility to utilize proposed hangar space. This development site option could potentially accommodate the following:

- Radar Communication Site should be removed but can remain if required;
- Existing ARFF training facility must be relocated north and this area used for GA apron/hangars;
- Code ‘B’ taxiway/taxilane – 10.5m wide;
- Code ‘C’ taxiway/taxilane – 18m wide;
- T-hangar (8-unit) and 5 aircraft parking spaces for Code “A” aircraft;
- FBO apron area;
- FBO terminal building 20m X 36m;
- FBO hangar 30m X 36m;

- FBO above ground fuel storage/dispensing system (two 10,000 gallon tanks each – Jet A and AVGAS (potential for additional tanks);
- FBO access road (7.5m wide) and 37 vehicle parking spaces;
- 2 Corporate hangars for max. Code 'A' aircraft – each 26m X 25m;
- 4 Corporate hangars for max. Code 'B' aircraft – each 26m X 25m;
- One 2-unit stall hangar for max. Code 'B' aircraft or two Code 'A' aircraft;
- One 3-unit stall hangar for max. Code 'A' aircraft;
- Corporate/Private 30 vehicle parking spaces; and
- Designated mix of Code 'A' and 'B' aircraft parking

The layout has been shown as a concept and could accommodate growth of GA and commercial airside development in a phased manner. The final requirement for hangars and apron would be determined through consultation with airport users and/or private hangar developers and an appropriate business plan in support of the investments.

Additional GA and commercial development has been planned west of the MRCU which could accommodate the following in the short-term:

- 13 Code "A" aircraft parking spaces;
- 1 Corporate hangar for max. Code 'B' aircraft – 26m X 25m;
- Code 'B' taxiway/taxilane – 10.5m wide;
- One 3-unit stall hangar for max. Code 'A' aircraft; and
- Corporate/Private 27 vehicle parking spaces

All of these commercial aprons and facilities would be implemented by private/commercial investment and not by the CIAA. CIAA would facilitate these expansion projects by entering into long-term lease arrangements and providing landside and airside access.

## 6.10 AIR CARGO

Air cargo operations will continue to be supported in on the existing GA/Commercial apron off of Taxiways A and B. It has been noted that the apron can become congested during peak operating periods and in particular during hurricane relief efforts. To provide interim relief, the apron expansions described above to the west and east of the commercial apron have been proposed as short-medium term solutions. These additional apron areas would permit additional parking of cargo aircraft either on the western expansion or through increased area due to moving GA parking into the eastern expansion. The master plan has maximized apron opportunity within the existing boundary on the west end of the airport.

Ultimately, as part of the long-term plan, cargo operations would eventually move to the existing main terminal apron once the terminal is moved in the Eastern Development Area as part of a major greenfield new build expansion. It is proposed that the existing terminal be replaced by an appropriate cargo storage or cross-dock facilities or partially repurposed for such operations as part of the transition strategy. All passenger terminal building functions would be moved to a new apron and terminal building in the east apron expansion area and substantially increase the cargo operating areas.

## 6.11 AIRLINE MAINTENANCE AND GROUND HANDLING SERVICES

There are no changes proposed to the existing Cayman Airways and Island Air maintenance facilities. As described in other sections of the plan, apron space is proposed to be expanded in the area of the existing hangars. Furthermore, future expansion areas are shown in the East Development Area where airside commercial lots, apron and landside access has been allocated for future growth and the establishment of larger MRO facilities. Refer to Exhibits 1, 2 and 3 in Appendix A for layout details of the existing and proposed eastern expansion areas.

The master plan also shows a proposed engine runup area at the eastern limits of the site north of Threshold 26. A designated engine run-up area was identified as a short-fall in the existing facility and that one should planned. The location was chosen on the basis that is represents a location the maximizes separation between airport facility and surrounding noise sensitive residential areas. Furthermore, the master plan recommends this area can also be designated as an aircraft isolated parking position as part of the airport's emergency planning plans. Refer to Exhibit 1 and 3 in Appendix A for the layout of this area.

Ground handling facilities have been shown to be expanded on the west side of the main terminal commercial apron. As part of the apron expansion to the west, an area has been reserved for covered and uncovered GSE storage and staging. The GSE area is proposed be to be located between the airport maintenance facilities and the western apron expansion area.

Ground service equipment (GSE) which support aircraft on the aprons have been under continuous development for improved for reduced emissions. Below are some examples of integrated fixed power and other services to the aircraft stands. As part of the terminal and apron expansion, this technology should be reviewed and assessed for cost/viability in an effort to reduce overall airport related environmental impacts and emissions. The benefits of these special systems include:

- Reduced GSE's
- Reduced Air pollution
- Faster turnaround
- Less traffic on the ramp
- Reduced possibility of collisions
- Lower operating costs
- Carbon credits

Below are a few photos of a typical Combi-box systems that would be integrated into the apron:

**Drinking Water Pit**

**Lavatory Service Pit**

**400 Hz Power Pit**

Many Airports have or are considering such systems to comply with environmental regulations related to emissions and for improved operational efficiencies. This technology may be considered for future consideration at the CIAA as a means to improve overall air quality. More immediate practical initiates that should be considered for GSE service provisions by the CIAA include:

- Integrating power and pre-conditioned air into any new air bridges.

- Ensuring sufficient gates are available during peak operations will reduce aircraft idling time for those waiting for the gates. (Being addressed through apron expansion and Air Terminal Building Expansion)
- Provide incentives to the airlines and ground handlers to utilize electric vehicles for aircraft support and servicing and for airside operations.

## 6.12 AVIATION FUEL

The existing fuel farm is located approximately 150 metres east of the existing terminal building adjacent to the main terminal apron. The existing fuel depot is about 1,050 sq. metres in size and has both landside and airside access. It is connected to an underground fuel line that travels within the airport boundary and to an offsite termination point. The fuel line is pressure tested annually according to the existing fuel provider.

It is recommended that the fuel facility be relocated as early as possible in 2015 to permit the eastern main terminal and apron expansion to occur in mid-2015. This applicable environmental studies should be initiated in 2014 as part of decommissioning the existing site to avoid costly delays in its relocation. The eastern short-term apron expansion is very important for construction in 2015.

The master plan also shows the extension of the underground fuel pipe through the various areas of the airfield. A special fuel pipeline easement/right-of-way has been reserved for this purpose on the plans.

Space has been allocated for the new fuel farm to the northeast in the undeveloped East Development Area. An area of 2,400 sq. metres has been reserved in the airport master plan as shown in Exhibit 1 and 3 in Appendix A. Landside access to the new fuel farm would be provided by the CIAA via 300m a landside road extension off the existing terminal landside roads. This road would be fully serviced and could be extended in accordance with the airport layout plan to provide future landside access to the East Development Area. Furthermore, this road would also provide access to the relocated ARFF training area. Alternatively, this portion of road may be considered a cost to be assessed fully or partially to the fuel farm operators.

Fueling will continue to be provided by mobile bowsers and no apron hydrants are proposed primarily due to the very high costs associated with such systems.

## 6.13 METEOROLOGICAL AND AIS SERVICES

The area around the current MET building location is congested and not an optimal setting for MET equipment. It is recommended that the MET equipment be relocated to the western limits of the airport site as shown on the airport layout drawings in Exhibits 1 and 2 in Appendix A. In the long-term the MET offices should either be relocated to a stand alone building in the order of 4,000 square feet or should be incorporated into any future GAT or FBO where office space could be leased.

The significant role that the MET building serves as the National Weather Service for the Cayman Islands requires it to be functional during tropical storms or hurricanes. The Meteorological (MET) building requires good ground access for all employees. However, the operations conducted by employees do not require direct airside access. A critical site requirement ideally includes a clear area with a 1,000-foot diameter for daily launches of weather balloons however this space is not available within the airport boundary. The western limits of the airport provides the best long-term option for MET facilities as the Eastern Development Area should be reserved for commercial revenue generating development. Furthermore, keeping the MET facilities as far from the open water will mitigate hurricane impacts on the facilities. Alternatively, an alternative location off-site could be investigated through a separate MET siting study.

The master plan does not propose a separate facility for AIS services. It is proposed that AIS be located in a future GAT/FBO building and office space leased through contractual arrangements with private operators.

## 6.14 AIR TRAFFIC CONTROL

The Air Traffic Control Tower (ATCT) was analyzed using the Federal Aviation Administration's Human Factors Visibility Analysis Tool[29] for various runway lengths considered under this airport master plan. Figures 6-8 present the results of the analysis and the following was concluded:

**Scenario 1 - Proposed Runway reconfiguration to provide RESA and retain existing 7,008 ft. in length. (Runway points D to B, Figure 6-8)**

- ATC tower height is sufficient for Threshold 08 (western end) but would need to be raised about 4 metres for a revised viewing height of 20m to comply with the viewing angle for Threshold 26 (easterly end). It should be noted that the existing tower location is constrained by the runway's transitional zoning which only permits a maximum height of about 23m in the location of the existing ATCT. Although the viewing height is less, to construct the required structure/glass, communication towers etc. for the new tower, it is very likely that it cannot be accommodated within these height restrictions.

**Scenario 2 - Proposed 8000 ft. runway with full extension to the West (Runway Point F to B, Figure 6-8)**

- ATC tower height would need to be 27m (eye height) based on the long-term recommendation to construct a new tower at Location 3 shown in Figure 6-8. Alternatively, Location 4 would be an integrate ATCT with the new greenfield terminal building requiring a height of 28m (eye-height).

**Scenario 3 – Proposed 9,200 ft. runway with maximum extension to the west and 1,200 ft. extension to the east into North Sound (Runway Points F to G, Figure 6-8)**

- Same as Scenario 2. ATC tower height to be to 27m (eye height) based on the long-term recommendation to construct a new tower at Location 3 shown in Figure 6-8. Alternatively, Location 4 would be an integrate ATCT with the new greenfield terminal building requiring a height of 28m (eye-height)

Given the height constraints in the area of the existing tower, investment into reconstruction or raising of the tower in this location is not recommended. Relocation of the ATCT should be considered when it is financially feasible for CIAA and it should be considered as part of new greenfield terminal development. Alternatively, a proposed stand-alone ATCT location could be planned in Location 4 that could be integrated into the ultimate greenfield terminal building. This position would provide a more central location and would be constructed to a height to accommodate the long-term runway length at a height of 28m (eye level). It would ultimately provide improved line of sight for the airfield and future apron areas in the East Development Area. Height constraints in this area due to the runway are in excess of 35m and as such is sufficient to support the new tower height.

It is recommended that the short-medium sight-line challenges for the existing ATCT be mitigated through additional CCTV cameras until such time as a major runway extension or a new greenfield terminal is proposed which should be used as a trigger to construct a new ATCT with compliant and unmitigated sight-lines.

[29] https://www.hf.faa.gov/visibility/

**Figure 6-8 – ORIA ATC Tower Analysis – Tower and Threshold Location Options**

| Required Tower height for ACT Towers to Meet LOS (ft.) | | | | |
|---|---|---|---|---|
| | ATC Location 1 | ATC Location 2 | ATC Location 3 | ATC Location 4 |
| Location A | 72 | 54 | 45 | 40 |
| Location B | 67 | 49 | 41 | 36 |
| Location C | 41 | 60 | 69 | 75 |
| Location D | 47 | 66 | 74 | 80 |
| Location E | 56 | 75 | 84 | 90 |
| Location F | 60 | 79* | 89* | 94* |
| Location G | 85* | 65 | 57 | 51 |

*The tower height needed at that location that would meet all LOS requirements to all locations


Locations shown on a map of Grand Cayman Airport.

## 6.15 AIRCRAFT RESCUE FIRE FIGHTING

The existing ARFF facility should be retained in its existing location. It is centrally located and provides response times within ICAO recommendations for the existing and all the runway length alternatives analyzed under this airport master plan including 8,000 ft. and 9,200 ft. Response times from the existing location were modelled and provided no more than a 131 second response time. This is below the 180 second ICAO standard.

The introduction of larger aircraft by BA including the B777-200 and B777-300 would require an increase in the ICAO ARFF Category from 8 to 9. The airport currently provides full-time Category 7 and call-out Category 8 ARFF services. There are sufficient number ARRF vehicles available so the increased level of service may require hiring and training of additional staff.

Alternatively, under ICAO, Annex 14 Section 9.2.3 *The level of protection provided at an aerodrome for rescue and firefighting shall be appropriate to the aerodrome category determined using the principles in 9.2.5 and 9.2.6, except that, where the number of movements of the aeroplanes highest category normally using the aerodrome is less than 700 in the busiest consecutive three months, the level of protection provided shall be not less than one category below the determined category.* It is anticipated that initially the number of flights offered by BA or others using these larger aircraft may not exceed this criteria and as such the existing Category 8 level of service would be sufficient. It is however recommended that the a transition plan be developed to increase the level of service from Category 8 to 9 and that appropriate training and equipment upgrades are planned and budgeted.

The airport master layout plan also recommends that the existing ARFF training facility located at the east of the site north of Threshold 26 be relocated to the northeastern limits of the airport. The existing ARFF location is much better utilized for GA/commercial development given its proximity to the runway and taxiway system. Furthermore, by relocating the training area, the potential for smoke and fumes to travel within the runway limits and the existing terminal area is minimized. In the proposed location, prevailing easterly winds would carry the smoke away from the airport facilities. The existing ARFF space is about 4,000 sq. metres and a similar space allocation has been provided in the master plan. Additional expansion is available in the proposed area depending on the final layout of the new ARFF facility. As part of the re-design and relocation of the training facility new, cleaner burning fuels should be considered including propane.

The existing boat house south of the Threshold 26 should also be relocated due to zoning infringements. It is recommended that it be relocate to north side of the Threshold 26 to make it accessible via the proposed future GA access road and ultimate perimeter road system. The new location would provide access to North Sound and would not infringe the runway zoning.

Access to this new training area would be provided via the same landside road extension proposed for the new fuel farm location and be constructed by CIAA.

Both, fuel farm and ARFF training facility relocations are shown in Exhibits 1 and 3 in Appendix A. The safety distance between each site is sufficient as it provides a minimum safety margin of 90m and is separated by the roadway and natural open space buffer.

## 6.16 PATROL ROADS AND SECURITY FENCING

A fully connected airside patrol road has been shown on the airport layout plans. The road should be minimum 3.75m wide and generally comply with local road standards in terms of design criteria, marking and signage. The road as proposed under the airport master plan is a graded road and travels around the perimeter of the airport following the recommended perimeter fence location. Appropriate signage should be included for road traffic controls and for hold positions connecting to airfield surfaces and for control through electronic sensitive areas. Rehabilitation or extensions to the existing perimeter security fence should be planned and implemented using minimum 2.1m chain-link and 0.3m barbed wire tops complying with ICAO requirements.

## 6.17 AIRPORT OPERATIONS AND UTILITIES

The proposed airport maintenance facilities are depicted in approximately the same location as the existing facility which includes about a 5,400 sq. metre allocation for buildings, parking and ancillary requirements. The proposed maintenance facilities are recommended to be upgraded with two 10m x 31m buildings that can be utilized for airport storage equipment and repair shop purposes. The site also provides up to 10 employee parking spaces.

The master plan recommends a master servicing study be initiated by the CIAA to fully evaluate the existing and future servicing requirements associate with the airport and this master plan. This study would set out any upgrades required to support the airport master plan expansion for power, domestic and fire water supply, sewage collection and treatment and communication facilities.

## 6.18 LANDSIDE GROUND ACCESS AND PARKING

A number of new car parking lots have been development as part of the airport master plan. These areas are shown on the airport layout plans as shown in Exhibits 1, 2 and 3 in Appendix A.

As part of the overall landside expansion plan, the master plan recommends land acquisition for future car park and ground access roads in the areas of the future ultimate greenfield terminal development area. The area is located east of Andy's Auto and comprises an area of about 11,222 sq. metres and is referred to as Parcel No. 20C137. This area would be capable of accommodating up to 320 car parking spaces. Furthermore, the land would permit a new roundabout and terminal ring-road for the ultimate greenfield terminal build. The airport layout plan shown in Exhibit 1 in Appendix A does not show the

ultimate potential layout in this area assuming the property cannot be acquired. The layout drawings show how the long-term terminal road can be planned and accommodated within the existing airport boundary. The master plan however recommends that the CIAA continue to pursue this property as part of a long-term investment for airport expansion as it would improve the overall layout of the landside elements.

Another land parcel is recommend for acquisition by the CIAA. This parcel is located on the north side of the airport and would be used as a road right-of-way for potential future access to the GA area in the East Development Area. This area is about 1,352 sq. metres.

The master plan proposes the construction of a new east commercial access road to provide landside access to the East Development Area. The road would be fully serviced and can be phased as demand dictates or as funding becomes available through private development opportunities. As a minimum the CIAA should prioritize approximately 300m of this road to provide access to the new relocated fuel and ARFF training areas at the north end of the development area. This portion of the road may also be funded in part or whole as a direct cost to the relocation of the fuel system and those costs made the responsibility of the fuel suppliers.

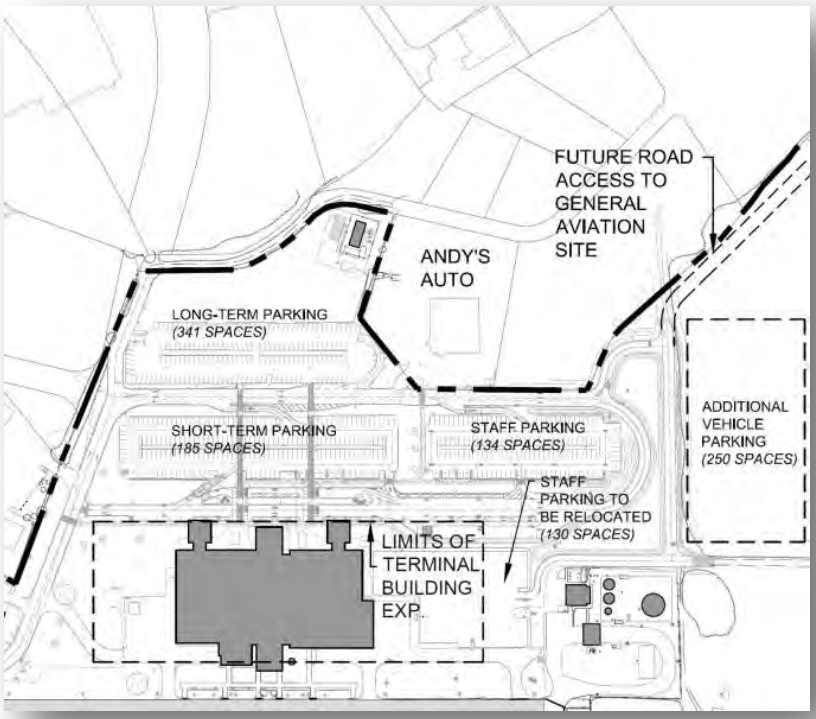
This road is shown on Exhibits 1 and 3 in Appendix A and includes a proposed open space/landside lot buffer between it and the 315 ft. natural mangrove buffer. This provides the CIAA with opportunities to market landside airport lots approximately 30m (100 ft.) in depth or use the open space for the integration of water quality and quantity controls using the open space. These areas could incorporate water controls inconjunction with at-source water treatment/oil/water separation devices throughout the site.

The car parking plans within the area of the existing Passenger Terminal Building was reviewed in context of a phased approach to expansion. As the terminal building and airside apron is expanded to the east existing car parking areas will be displaced and provisions are required to compensate for this loss of parking. An overall phasing plan was developed and described below:

***Phase 1 (Short-Term) – Refer to Figure 6-9***

- Access to the future GA/Commercial sites in the East Development Area would be accommodated via a newly constructed access road. The GA/Commercial access road is to be connected to the existing terminal roadway system;
- Additional parking to be constructed east of the existing employee parking area with approx. 250 vehicle spaces. This vehicle parking will have an additional 86 parking spaces after the employee parking is relocated to this new parking site. If more parking space is needed, this site can be expanded to accommodate the need.
- Move employee parking with 164 vehicle spaces to the newly constructed parking area to free this site for future ATB expansion.

**Figure 6-9 – ORIA Short-Term Terminal Parking Expansion (Phase 1)**




***Phase 2 (Intermediate-Term***)

- Acquisition of parcel 20C137 Area = 11,222 sq. m for approx. 320 vehicle spaces
- Acquisition of Right-of-Way Area = 1,352 sq. m for future access of construction vehicles onto a new ATB development.

***Phase 3 (Long-Term)***

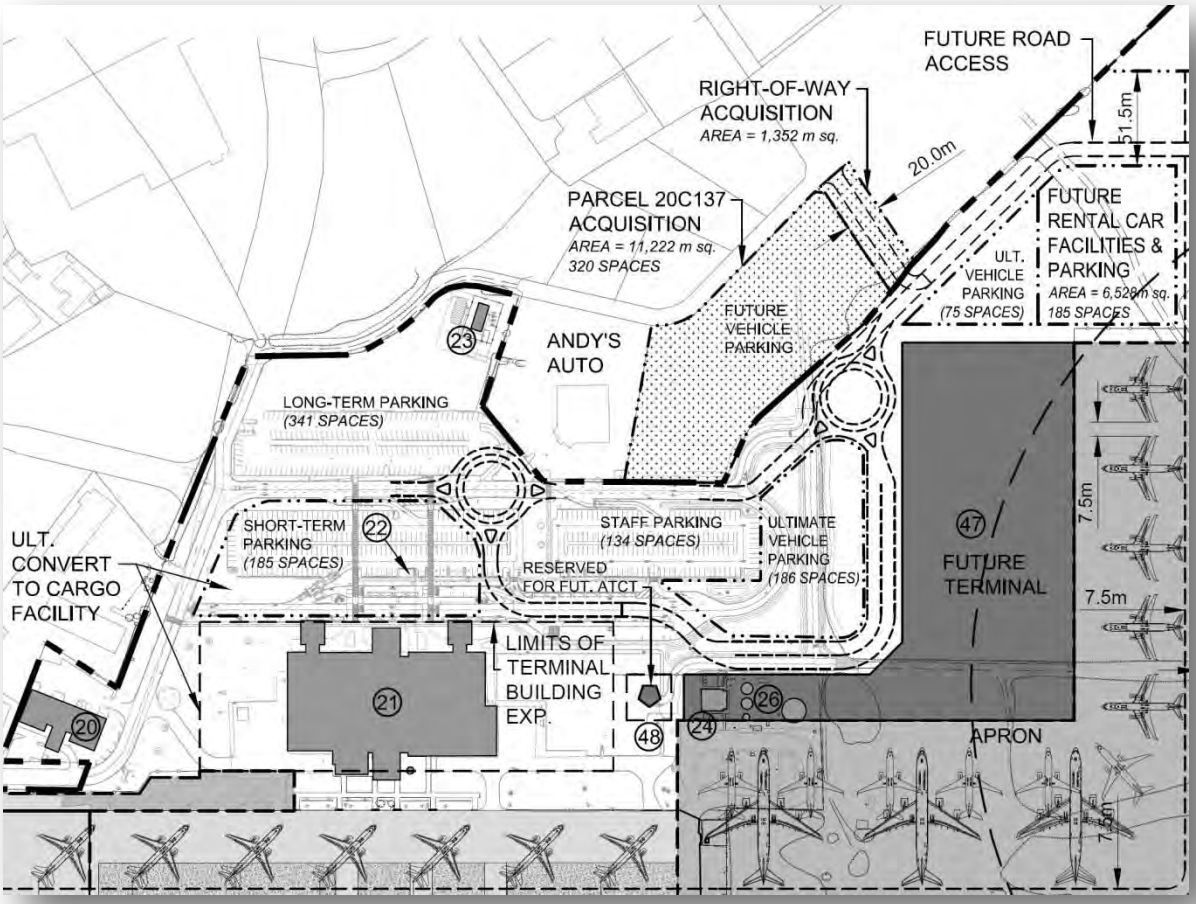
- Move 250 vehicle parking spaces onto new acquired parcel 20C137 for approx. 320 vehicle spaces. This will free the site for new greenfield ultimate ATB/apron construction.
- Acquired Right-of-Way provides access of construction vehicles onto a new ATB site not using Terminal access road.
- Redesign the main access road into 2-lane traffic road to provide flow through access to the GA/Commercial access road as access to new parking site east of Andy's auto.
- Additional vehicle parking space can be accommodated in a new area designated in front of the future ATB with approx. 107 additional vehicle parking spaces that could be expanded to a total of 186 vehicle spaces.

***Ultimate – Refer to Figure 6-10***

- Two new roundabouts constructed on airport property. While the roundabouts are being constructed, the temporary access to GA site will be via road (right-of-way acquired land).
- When the terminal access road loop is completed and a second roundabout is completed the vehicle parking on front of the new ATB can be expanded to a total of 186 vehicle spaces. The parking space impacted by the second roundabout would be minimal.

- The existing ATB would be ultimately changed to cargo facility and would have the short-term parking with 180 parking spaces be converted for cargo use (8,600 sq. m). The Short-Term parking spaces would then be relocated to a new site with 320 and 186 parking spaces. As an option and if additional space is needed, a site north of new ATB can accommodate additional 75 vehicle spaces, leaving future car rental with approx. 185 vehicle spaces available.
- Total vehicle parking spaces under this scenario is approximately 1,040.

**Figure 6-10 – ORIA Ultimate Terminal Area Parking Master Plan**




The master plan recommends that in conjunction with short-term car parking improvements proposed above that a detailed revenue management and options study be completed for the existing and future car parking facilities. Currently the systems are in dis-repair and new technology and planning is required to ensure maximization of revenues and optimization of the customer experience.

The master plan also recommends a comprehensive traffic study be completed in the short-term to better understand the impacts of the Airport Master Plan recommendation on the local road networks including the potential to close Crewe Road which crosses through the west end of the airport site and restricts runway expansion to the west. These studies should be initiated in the short-term to ensure any planning of infrastructure improvements that may be identified can be properly be programmed and synchronized with future expansions at the airport.

## 6.19 OTHER NON-AERONAUTICAL USES

The following non-aeronautical land uses will be potentially displaced as a result of the proposed airport master planning recommendations. Any lease extensions should be based on no more than 5-10 year increments with a cancellation clause to provide sufficient flexibility to the CIAA for managing the land use with master planning expansions. To this end, the airport layout plans have shown alternative locations within the airport boundaries to offer alternatives to their existing locations where practical.

- Sportsplex-Parkette West of MRCU
    - Subject to the expansion of the GA/commercial apron, this sportsplex-parkette could be relocated to the western limits of the site off Crewe Road. This location would only be permitted until the runway is extended to 8,000 ft. across Crewe Road.
- Cricket Pitch
    - Can remain in its existing location until the runway is extended across Crewe Road. Once the runway has been extended, it will need to be relocated off-site.
- Farmer's Market
    - Can remain in its existing location until the runway is extended across Crewe Road. Once the runway has been extended, it will need to be relocated off-site.
- Firing Range
    - Can remain until such time as the East Development Area is developed.

## 6.20 ENVIRONMENTAL SCOPING AND MITIGATIONS

The airport master plan elements for ORIA will be primarily introduced in an area already dedicated to airport activities where the natural environment has been mainly cleared. However, environmental and social issues are raised by the airport redevelopment according to site features, a coastal area in the East Development Area with remaining mangrove forest adjacent to the North Sound Bay, and furthermore, the airport is surrounded by residential and commercial areas. Refer to Exhibit 8 in Appendix A for a summary of the environmental setting and constraints around ORIA.

Based on the project master plan recommendations developed in the previous sections the expected impacts sources are identified in Table 6-10. Impact sources are project components and activities that can potentially affect the receptor environment. They are grouped into project stages: construction and operations.

**Table 6-10 - Impact Sources Associated with the Proposed ORIA Master Plan Recommendations**

| Impact sources | Description |
|---|---|
| **Construction** | |
| Land acquisition | A small area of land acquisition is proposed in the order of about 1.2 hectares to permit future expansion of landside car parking and a rental car lot. The land should be acquired to enable the master plan to evolve optimally. |
| Land preparation | Overburden removal, excavation, earthworks, granular material, asphalt and line marking operations to allow for the construction of temporary and permanent infrastructures related to pavement structures, building and instrumentation. |

| Impact sources | Description |
|---|---|
| Instream , wetland (Mangrove) works and installation of water crossings | Work in engineered and natural watercourses to build temporary and permanent facilities, putting into place water crossings or drainage wells. There are also construction projects proposed to build within an existing coastal mangrove area which would include stripping, filling and removal of mangroves to constructed pavement and building platforms. The master plan respects a mangrove buffer of 315 ft. between the proposed new development and the North Sound. |
| Pavement removals due to revised airfield or landside geometry | Work includes either the removal of existing asphalt pavements and restoration to landscaped turf surfaces or milling or full depth removal of the asphalt with disposal off-site followed by restoration to landscaped turf surfaces. |
| Construction site setup | Preparing on-site construction lay-down areas or other temporary including temporary sanitation, equipment and material storage yard. Most of the projects proposed are of short duration i.e. 2-4 months, and do not require construction camps or any significant built-up of temporary construction support facilities. Some building projects may extend to12-24 months but due to the built up areas and labour and amenities available within close proximity, no construction camps will be required. |
| Fuel System Relocation | Work proposed includes the relocation of an existing above-ground aviation fuel depot. Would include appropriate decommissioning and site clean-up. Relocation of the fuel facility will be within the existing airport boundary. Associated with the fuel farm relocation may be and extension of an existing underground fuel pipe line by approximately 800m. |
| Aircraft Rescue Fire Fighting Training Area Relocation | Work proposed includes the relocation of an existing aircraft rescue fire-fighting training area that is currently located within the mangrove buffer at the eastern limits of the airport site. Work would include appropriate decommissioning and site clean-up. Relocation of the training area will be within the existing airport boundary and include land preparation works for the relocated or new infrastructure which include small buildings, metal tubes/structures simulating aircraft wings and fuselages. |
| Relocation of Meteorological Equipment | Relocation of existing MET equipment within existing airport site. Minor excavation and power and communication cable installations. |
| Airfield Electrical Works | Installation of new airfield lighting including trench excavation, backfilling, conduits, cables, light fixtures and restoration. |
| Natural Vegetation Management | Trimming and clearing will be required of natural growth on and immediately surrounding the airport. Regulatory requirements dictate maximum allowable heights of objects and must be complied with for the safe operation of the airport. |
| Transportation and traffic | Road transportation of workers, materials and equipment required for construction activities on-site and in the airport area. Includes on-site traffic related to construction machinery. Road and access maintenance. The projects proposed are of short duration i.e. 2-4 months, and do not require a significant build-up of traffic. Longer term construction project for buildings 12-24 months will have some impact but not significant on local traffic patterns over a longer period. |

| Impact sources | Description |
|---|---|
| Municipal Road Closure and Re-Alignment (Terrestrial Road Systems) | The project includes a potential project to close a portion of the municipal road network at the west end of the site to permit a runway extension from the existing runway length of 7,000 ft. to potentially 8,000 ft. The closure would require a relocation and reconfiguration of the road around the airport boundary and to connect to an existing (and possibly improved) roundabout. Work construction work would include land preparation, asphalt removal. |
| Relocation of an Electronic Navigational Aid (DVOR) | The project involves the removal/decommissioning for an existing electronic air navigational instrument on the west end of the airport site to permit a future runway extension. Insufficient land existing on the airport and this instrument would need to be relocated offsite. Construction involves a foot print of about 25 metres in diameter including footings to support a small electronics shelter and a metal antenna array. |
| Ocean Buoys (To delineate protected area on water for aircraft operations at low level) | Installation of buoys in an area close the runway end in the ocean waters (North Sound) to delineate an area within which no sail boats shall traverse. Installation per normal buoys installation methods. |
| Security Fencing | The removal of existing fencing and replacement with new regulatory compliance security fencing including fence post foundation construction and installation of 2.1 metre chain-link fence with 300mm 3-strand barbed wire. This work can be phased over a 1-2 years. |
| Sewage Treatment | This may involve the expansion of the existing Sewage Treatment System to accommodate the expanded terminal building in the short-medium term. Upgrade of the facility may be necessary since there are existing issues with effluent quality. |
| **Operation** | |
| Presence and operation of the airport | The proposed projects are anticipated to change the existing airport operating environment as it exists presently due to increased air traffic and changes to the aircraft fleet mix over the master planning period. The airport will see increased use through natural growth in air traffic or the establishment of a new airline or air operator at the airport. Many airport master planning projects will encourage commercial development within the airport boundary resulting in increased landside traffic and increased noise levels associated with increases in aircraft movements. Some of the aircraft noise impacts will be offset by the use of newer technology aircraft like the Boeing 787 Dreamliner, Bombardier's Q400 and the ATR42/72 turbo-prop aircraft for example. |
| Fuel System Operation | Fuel system and dispensing to comply with applicable local and national standards. |
| Aircraft Rescue Fire Fighting Training Area Operation | Use of the training area will be as required by regulation to ensure staff are trained to meet international standards for aircraft rescue and fire-fighting. This facility is used intermittently throughout the year for short durations. |

| Impact sources | Description |
|---|---|
| Transportation and traffic | The proposed projects are anticipated to change the existing terrestrial road traffic to and from the airport significantly. The airport will increased traffic levels and parking requirements through the natural growth of the airport and new opportunities resulting from the master plan. |
| Natural Vegetation Management | Trimming and clearing will be required of natural growth on and immediately surrounding the airport. Regulatory requirements dictate maximum allowable heights of objects and must be complied with for the safe operation of the airport. These activities will continue during the operational period of the airport likely on an annual or bi-annual basis. |
| Wildlife hazard management | Any activity to reduce animal presence on-site for security reason, comprising vegetation maintenance, birds shooting, etc. |

An interaction matrix was developed based on the above and is shown as Table 6-11. This table shows the interaction between the site environmental and social components and the master plan elements. Table 6-12 then details the environmental and social scoping related to ORIA.

**Table 6-11 - Interaction Matrix Between Receiving Environment and Master Plan Elements for ORIA**

| Impacts Sources | Environmental and Social Components | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Air quality | Noise | Water Resources | Climatic events | Contamination waste and management | Marine environ-ment | Wildlife – Natural habitats | Security | Life Quality | Existing infrastructures |
| **Constuction phase** | | | | | | | | | | |
| Land acquisition | | | | | | | | | X | X |
| Land preparation | X | X | X | | X | | X | | X | |
| Instream, wetland (mangrove) works and installation of water crossing | | | X | | | X | | | | |
| Pavement removals due to revised airfield or landside geometry | | X | | | X | | | | | |
| Construction site setup | | | X | | X | | | | X | |
| Fuel System relocation | | | X | | X | X | X | X | | |
| Aircraft Rescue Fire Fighting Training Area Relocation | | | X | | X | X | X | X | | |
| Relocation of Meteorological Equipment | | | | | X | | | | | X |
| Airfield Electrical Works | | | X | | X | | | | | |
| Natural Vegetation Management | | | | | | | X | | | |
| Transportation and traffic | | | | | | | | | X | X |
| Municipal Road Closure and Re-Alignment (Terrestrial Road Systems) | | | | | | | | | X | X |
| Relocation of an Electronic Navigational Aid (DVOR) | | | | | X | X | | | | X |
| Ocean Buoys (To delineate protected area on water for aircraft operations at low level) | | | | | | X | | | X | |
| Security Fencing | | | | | | | X | X | | |
| STP expansion | | | X | | X | | | | | X |
| **Operation** | | | | | | | | | | |
| Presence and operation of the airport | X | X | X | X | X | | X | | X | X |
| Fuel System Operation | | | X | | X | | | | | |
| Aircraft Rescue Fire Fighting Training Area Operation | X | | X | | X | | | | | |
| Transportation and traffic | | | | | | | | | X | X |
| Natural Vegetation Management | | | | | | | X | | | |
| Wildlife Hazard Management | | X | | | | X | | | | |

**Table 6-12 - Environmental Scoping Associated with ORIA Proposed Airport Master Plan**

| Environmental and social issues at the site | Environmental aspects introduced within the masterplan | Potential Environmental Impact | Mitigation measures | Construction phase | Operation phase | Recommended Future Studies | Stakeholders to be engaged | Estimated Costs for Future Studies |
|---|---|---|---|---|---|---|---|---|
| **Air Quality** | | | | | | | | |
| The airport site is located in an urban area, shows surface water and is adjacent to the North Sound. | Use new emergency diesel powered generators that are more efficient and cleaner burning meeting the 2007 IFC or requirements for emissions,<br><br>Air cooling systems that do not use ozone depleting substances. | Reduction of air quality by the emission of pollutants, dust and particle matter that could ultimately reach surface water during construction works and operational activities. | Use dust suppression and control during demolition and construction works. | X | | Air quality monitoring prior to construction works (to establish baseline conditions). , and at regular interval during construction and operation.<br><br>Baseline data will be compared to monitoring data during construction phase and operation. Air quality standards to be respected will have to be identified in collaboration with the Department of the Environmental Health | Department of the Environmental Health. | Baseline characterization for $PM_{tot}$, $PM_{10,}$ $PM_{2,5}$, $NO_2$, $SO_2$, CO and $O_3$ with a MicroVol sampler :<br><br>$40,000 |
| | | | Wash tires of transport vehicles prior to leaving work areas. | X | | | | |
| | | | Consider weather conditions and wind direction in site management and works planning. | X | X | | | |
| | | | Implement good management practices on construction site, regular maintenance of construction vehicles. | X | | | | |
| | | | Minimize the area and duration of exposed soil during construction. | X | | | | |
| | | | Conduct regular maintenance of vehicles and machinery. | X | X | | | |
| | | | Use clean air technologies (catalytic converters) for all equipment and motor vehicles. Idling equipment will not be permitted. | X | X | | | |
| | | | In fire-fighting drills, selecting cleaner fuels such as liquefied petroleum gas, avoiding the use of waste oil or jet fuel (jet kerosene) where possible, and selecting firefighting drill locations and atmospheric conditions that best avoid short-term impacts to the air quality of nearby populated areas. | | X | | | |
| | | | Implement an air quality monitoring program. Set up standards to be | X | X | | | |

| Environmental and social issues at the site | Environmental aspects introduced within the masterplan | Potential Environmental Impact | Mitigation measures | Construction phase | Operation phase | Recommended Future Studies | Stakeholders to be engaged | Estimated Costs for Future Studies |
|---|---|---|---|---|---|---|---|---|
| | | | respected in collaboration with DEH. | | | | | |
| **Noise** | | | | | | | | |
| Residential properties and commercial areas are founded in the surrounding environment. | Selection of efficient and low-noise equipment;<br>Best practices in terms of building noise insulation.<br>Selection of optimal routes for aircraft considering noise impacts for island residents | Increase of the ambient noise during construction phase with associated nuisances to local population<br><br>Operational activities lead to noise emission during landing and take-off along the aircrafts routes. | Comply with noise standards to minimize the disturbance to wildlife and local residents. Establish standards to be respected in collaboration with DEH. | X | X | Noise monitoring prior to construction works in order to establish baseline data. , A noise modelling around the airport with isocontours to show airport activities influence in the surrounding environment.<br><br>Baseline data will be compared to monitoring data during construction phase and operation. and at regular intervals during construction works and operational activities. Standards to be respected for ambient noise inside buildings and in the surrounding environment will need to be establish by the Department of the Environmental Health | Department of the Environmental Health. | Baseline characterization and isocontours modelling including aircraft noise modeling for land use compatibility planning (DNL or NEF)<br><br>$20,000 |
| | | | Comply with UK Noise standards for airport area | | X | | | |
| | | | Maintain a tight schedule during the construction phase in order to minimise impact period. | X | | | | |
| | | | Reduce noise of ground activities at the source or through the use of sound barriers and deflectors. | X | X | | | |
| | | | Inform surrounding communities and commercial stakeholders of noisy construction activities ahead of the start of works. | X | | | | |
| | | | Implement preferred procedures and routes for landing and takeoff (LTO) to minimize potential noise from approaching and departing aircraft for noise-sensitive areas. | | X | | | |
| | | | Transition to new technology aircraft and lower emission standards. (ICAO Stage 3 and 4 aircraft) | | X | | | |
| **Water resources** | | | | | | | | |
| Presence of an important runoff on site, with ephemeral water accumulations after periods of heavy rainfall, multiples swamps, wetlands | Water retention capacity of ponds lost will be compensated by an increased water capture in the runoff | Sediment migration during the construction period may increase the suspended solids loading | Obtain a permit for construction works in Cayman waters and comply with its prescriptions. | X | | Set up water quality monitoring program (prior to construction works to establish | Water Authority<br><br>Department of | Sample collection and analysis for two seasons |

| Environmental and social issues at the site | Environmental aspects introduced within the masterplan | Potential Environmental Impact | Mitigation measures | Construction phase | Operation phase | Recommended Future Studies | Stakeholders to be engaged | Estimated Costs for Future Studies |
|---|---|---|---|---|---|---|---|---|
| and marine environment (North Sound) adjacent to the runway. Ponds help in water retention on site, prevent flooding extend and constitute a non-negligible fauna habitats. The reduction of the capacity of natural infiltration and capture by the pond loss and the apron extension could increase runoff management problems.<br><br>In the vicinity of the Tropical Garden development, to the east of the Airport along the North Sound coastline, the area is characterized by relatively poor circulation and tendency to accumulate organic matter. The release of runoff water in the vicinity of the airport site could consequently affect marine water quality, with local limited dilution potential. | water management<br><br>Installation of effective interceptor, oil/water separators and treatment capacity in drainage system.<br><br>Specific attention to runoff treatment at fuel and chemical storage, transport and dispensing facilities, fire training areas, airplane maintenance hangars, and ground service vehicle maintenance facilities.<br><br>Fire training area should be an impermeable surface surrounded by a retaining dyke to prevent foam and powder or other environmentally hazardous fire extinguishing agents or polluted fire water from entering the storm water system. | on the aquatic habitat and in the drainage system.<br><br>Works within the swamps and for water crossing construction could impair water quality (mainly suspended particles and hydrocarbon contamination).<br><br>Possible release of pollutants from the fire training activities, presence of the fuel farm and runoff on the apron. | Avoid works, material deposit within the high water marks borders. | X | | baseline conditions) in North Sound, in mangrove wetlands and in *Typha sp*. swamps. | Environment | $15,000 |
| | | | Install and maintain silt fence and rock flow check dams for the duration of the construction phase. Maintenance would include the clean-up and disposal of silt after each rainfall and as directed by the airport manager. | X | | | | |
| | | | Keep stockpiles of materials and excavated material away from natural water, and ensure that they are confined using wooden “cribs” (or other means). | X | | | | |
| | | | Re-vegetate or pave denuded areas as early as practical. | X | | | | |
| | | | Schedule works where possible in the drier months to minimize the potential for silt migration. | X | | | | |
| | | | Use biodegradable hydraulic oil for machinery and other equipment used near the bank, in the tidal zone and in water. | X | X | | | |
| | | | Store all bulk fuel and lubricants in a secure area (bund walls with an impervious layer). Use existing facilities for storage and handling of hazardous materials and maintenance of machinery. | X | | | | |
| | | | Conduct any fuelling and services at a designated site away from surface water and marine environment. | X | X | | | |
| | | | Monitor effluents prior to discharge to surface water. | X | X | | | |

| Environmental and social issues at the site | Environmental aspects introduced within the masterplan | Potential Environmental Impact | Mitigation measures | Construction phase | Operation phase | Recommended Future Studies | Stakeholders to be engaged | Estimated Costs for Future Studies |
|---|---|---|---|---|---|---|---|---|
| | | | Water containing fire extinguishing agents and non-combusted flammable materials should be treated prior to discharge to surface water. | | X | | | |
| STP didn't meet water quality standards in 2012. Water is released in the natural environment which causes water quality issues. | The STP must have NSF (National Sanitation Foundation) Certification and be properly designed according to treated water needs. | To a lesser intensity, release of treated water with a quality that could not meet standards for effluents. | Undertake regular maintenance of the STP according to manufacturer's specifications | | X | | | |
| | | | Obtain a permit for the discharge of wastewaters. | | X | | | |
| | | | Monitor water quality of the STP effluent to ensure compliance with existing effluent standards. Establish with Water Authorities if other standards for effluents that could be applicable | | X | | | |
| **Climatic events** | | | | | | | | |
| Cayman Islands lie within the North Atlantic hurricane belt and are seasonally affected by tropical depressions, tropical storms, and tropical cyclones. Coastal erosion on the ocean side of the airfield with expected flooding events coming from marine water.<br><br>Islands over the world are also considered as more vulnerable to climate change. Cayman Islands Climate Change Policy identifies the need for integration of climate changes considerations in developments as:<br><br>Increase site-specific coastal construction setbacks<br><br>Build a Climate-proof fuel terminal as proposed by the | Respect and protection of the mangrove buffer of 315 ft.<br><br>Avoidance of further development of the runway within the flooding plain and within the limit of the high water marks<br><br>Hurricane protection measures | Risk of major climatic event and degradation of airport infrastructures<br><br>This situation will reduce the potential of evacuation by plane during major natural event. | Develop and update the emergency plan in case of major climatic event. | | X | Detailed flood study is recommended to assess the potential for serious flooding, associated risks and appropriate works and measures to reduce these risks and associated impacts, if necessary.<br>Submersion and Extreme Events Flooding Vulnerability Study<br><br>Erosion Vulnerability Study | Department of the Environment<br><br>National Emergency Operations Centre | Submersion and Extreme Events Flooding Vulnerability Study : $40,000 to $60,000<br><br>Erosion Vulnerability Study $50,000 |

| Environmental and social issues at the site | Environmental aspects introduced within the masterplan | Potential Environmental Impact | Mitigation measures | Construction phase | Operation phase | Recommended Future Studies | Stakeholders to be engaged | Estimated Costs for Future Studies |
|---|---|---|---|---|---|---|---|---|
| Climate Change Policy<br>Improve storm-water management<br><br>Integrate hazard vulnerability and risk assessments into development planning processes<br><br>Establish coastal construction setbacks based on flood risk mapping | | | | | | | | |
| **Contamination and waste management** | | | | | | | | |
| Relocation of the existing fuel tank and the Aircraft rescue firefighting training area, potential contamination and needs for remediation and hazardous material management.<br><br>Demolition of existing building, pavement and other infrastructures. Related waste management with a potential for hazardous material.<br><br>Increased in pre-construction costs for site remediation and shipping of hazardous wastes out of the Islands<br>.<br>Contamination risks during construction works related to possible spills of oils, hydrocarbons and hazardous wastes | Expansion of the existing building with limited demolition works.<br><br>Decommission of the existing fuel farm and the aircraft rescue firefighting area, and rehabilitation of the site as a part of the pre-construction works. | Contamination of the receiving environment from construction and operational activities. | In consultation with DEH, develop a proper waste management plan, based on the 4Rs-D, including hazardous waste and a contaminated soils management plan. | X | X | Environmental site assessment Phase 1 and Phase 2 at the fuel farm and at the Aircraft rescue firefighting training areas. Fuel farm to be responsibility of fuel supplier. CIAA responsible for firefighting training relocation only. | Department of the Environmental Health. | Analysis of soil samples for PHC F1-F4, PAH, VOCs and metals :<br><br>$35,000 (For firetraining area relocation) |
| | | | If contaminated soil is suspected/discovered, cease work in the area until it has been tested by an expert in contaminated sites management. Soils with levels of contamination exceeding relevant guidelines will be disposed of accordingly and not used elsewhere onsite. Remediation at the site. | X | | | | |
| | | | Minimize spills of hydrocarbons by the implementation of “good practices” during construction activities | X | | | | |
| | | | Limit the movement of machinery to the work areas. | X | X | | | |
| | | | Store all bulk fuel and lubricants in a secure area (bund walls with an impervious layer). Use existing facilities for storage and handling of hazardous materials and maintenance of machinery. | X | X | | | |

| Environmental and social issues at the site | Environmental aspects introduced within the masterplan | Potential Environmental Impact | Mitigation measures | Construction phase | Operation phase | Recommended Future Studies | Stakeholders to be engaged | Estimated Costs for Future Studies |
|---|---|---|---|---|---|---|---|---|
| | | | Continuously maintain vehicles and heavy equipment to ensure no leakage. | X | X | | | |
| | | | Prepare a spill contingency plan in the event of accidental spillage of contaminants. | X | X | | | |
| | | | Prepare an emergency preparedness and response plan that are specific to the nature of the operational activities, comprising all the risks related to the operation of the fuel farm. | | X | | | |
| Unconformity noted by the DEH for the waste management at the airport | Waste management facilities and routing will be improved | | Develop a strict waste management programme, involving the DEH. Some wastes such as hazardous liquid and solid wastes from the airport operations will require special storage and treatment. | X | X | | | |
| **Wildlife – Natural habitats** | | | | | | | | |
| Aggregates and materials supply needed for construction works could cause :<br>• Destruction of natural habitats and ground water quality impairment at local quarries<br>• Risks of introduction of invasive species from oversea quarries and potential impacts on local biodiversity | Conservation of existing airport elements to reduce need for more developments. | Risks of invasive species introduction with associated modification in local flora and fauna communities. | Re-use material from site pre-construction activities to minimize additional volume required. | X | | | | |
| | | | Collaborate with a certified quarry, with consideration of their environmental practices and invasive species eradication practices. | X | | | | |
| | | | Remove topsoil where re-grading is required. Topsoil removed during construction will be stockpiled onsite and re-used during the restoration works. | X | | | | |
| | | | Require from suppliers that they implement invasive species control measures (flora and fauna) so that any imported good, as well as the packaging, will be invasive-species free. | X | X | | | |

| Environmental and social issues at the site | Environmental aspects introduced within the masterplan | Potential Environmental Impact | Mitigation measures | Construction phase | Operation phase | Recommended Future Studies | Stakeholders to be engaged | Estimated Costs for Future Studies |
|---|---|---|---|---|---|---|---|---|
| Degradation and loss of valuable mangroves forests are expected for developments planned in north-east area, comprising loss and degradation of habitat for local species and loss of ecosystem services related to mangrove. According to the Planning regulations, a mangrove buffer should be protected from any construction. Water quality impacts related to construction and operation activities in the mangroves wetland. There is potential for water loaded with organic material and with low oxygen content to be released in marine environment during construction in this wetland area. The endemics Blue Anole and the Grand Cayman Racer were also present throughout the mangroves. With their important role in erosion limitation, protection against extreme climatic event, and sediment load reduction, mangroves also provide an important nursery and feeding area for a rich diversity of marine life. | Avoidance of any development in a mangrove buffer zone. | Degradation and loss of the mangroves habitat in the site area. | Protect mangroves habitat from construction activities. | X | | Flora surveys in the mangrove and habitat description in the marine environment with identification of associated species | Department of Environment<br><br>National Trust | Fauna and Flora surveys in the mangroves area and adjacent marine environment: $10,000 |
| | | | Respect No net loss of wetlands as promoted by the Biodiversity Action Plan. Use of Economic compensation for natural habitats protection in Grand Cayman. This could be reached by the planting of an equivalent mangrove area elsewhere or by the protection of natural mangroves to be managed by the National Trust. | X | | | | |
| Clearance and drainage of the Typha swamps at the western end of runway would result in loss of an increasingly threatened habitat. Only limited areas of this ecologically important habitat remain following rapid growth on the island. However, this habitat at the airport site is already heavily disturbed | | Loss of Typha swamps habitat | Respect No net loss of wetlands as promoted by the Biodiversity Action Plan and the Habitat Action Plan. Use of Economic compensation for natural habitats protection in Grand Cayman. This could be reached by the protection of an equivalent *Typha* swamps to be managed by the National Trust. | | | | | |
| The increase in the total flights volume expected from the airport improvements is likely to result in secondary developments that could lead to an increase in habitats loss and natural resources consumption. | | Secondary developments with an increase in habitat loss and natural resources consumption. | Any secondary developments should be carefully planned, controlled and managed to minimize land take and encourage sustainable use of natural resources. | | X | | | |

| Environmental and social issues at the site | Environmental aspects introduced within the masterplan | Potential Environmental Impact | Mitigation measures | Construction phase | Operation phase | Recommended Future Studies | Stakeholders to be engaged | Estimated Costs for Future Studies |
|---|---|---|---|---|---|---|---|---|
| **Marine environment** | | | | | | | | |
| As the mangrove wetland shows stagnant water and is located adjacent to North Sound, works in this area could cause the release of stagnant water with a low oxygen content and high concentration of organic material and suspended particles. | | Impairment to marine water quality and mortality for marine life. | Make sure stagnant water within the mangrove buffer will not be released in the marine environment causing impairment to marine water quality and natural habitats. Explore the possibilities like pumping, preliminary treatment to reduce organic material and sediments before releasing, etc. Ensure that water will be released progressively in order to not impair adversely marine water flow and marine water quality. | X | | Set up marine water quality monitoring program in North Sound close to the airport site. The baseline data will be established.<br>Marine biological surveys assessing natural habitats and benthos communities | Water Authority<br><br>Department of Environment | See in Water Resources |
| **Wildlife hazards** | | | | | | | | |
| Animal and birds strikes related to the presence of birds which could be associated with the presence of as attractive habitats as *Typha* ponds and mangrove on-site, as well as private ponds, vegetation and fruits plantations in the vicinity of the airport.<br><br>Birds include residents and migratory species. Indeed, various species of migrant water birds can be observed frequently during the winter months. Under the Animal Law, all non-domestic birds are considered as protected species. Landfill operations, located app. 2.2 km from the airport, are cause of risks for airport activities because of the presence of multiple birds | Improvement of the drainage system in order to reduce water accumulation on-site.<br><br>Reduction of Typha swamps extend west of the runway.<br><br>Anti-perching devises to avoid nesting in existing structures<br><br>Vegetation and trees maintenance | To a lesser intensity, birds strikes by the airport operational activities.<br><br>Birds and other fauna kills to prevent wildlife hazards, with potential impacts on national protected species. | Update gradually the wildlife hazard management plan and explore additional wildlife repellent and harassment techniques measures as falconry. | | X | | | |
| **Security** | | | | | | | | |
| Visual observations suggest that many buildings and trees violate transitional zoning adjacent to the runway. | Complete and selective trees cutting. | Loss of trees and associated natural habitats within the urban area. | Clear trees in safety zone around Airport. | X | X | | | |
| | | | Replant at least an equivalent number of trees in alternative location using native | X | X | | | |

| Environmental and social issues at the site | Environmental aspects introduced within the masterplan | Potential Environmental Impact | Mitigation measures | Construction phase | Operation phase | Recommended Future Studies | Stakeholders to be engaged | Estimated Costs for Future Studies |
|---|---|---|---|---|---|---|---|---|
| | | | species. | | | | | |
| | | | Undertake a regular maintenance of elements constituting a potential impairment to safety. Implementation of planning restrictions regarding buildings in vicinity of airport. | | X | | | |
| **Life Quality** | | | | | | | | |
| Residential properties are founded around the airport area, mainly along the southern part of the runway and the aircraft routes for the arrival are over residential area | Selection of efficient and low-noise equipment;<br>Best practices in terms of building noise insulation.<br>Selection of optimal routes for aircraft considering noise impacts for island residents | Reduction of Air Quality from an increased in flight frequency. | Liaise with local communities prior to the beginning of construction works to explain the objective and benefits of the Project. | X | | | | |
| | | | Undertake air quality monitoring during construction and operational phase | X | X | | | |
| | | | Prior to construction works, put in place a grievance mechanism for local population in order to have a formal process for any complaints associated with the airport activities. | X | X | | | |
| | | Visual impact of works and light pollution | Undertake good site management, hoarding, limited night working | X | | | | |
| | | Noise disturbance to local residents from increased flights | Make sure that aircraft transport routes ensure that aircraft approach and depart from the airport along specified corridors to minimise the impacts of noise. | | X | | | |
| | | | Do not permit aircraft to conduct any circling approaches of maneuvers on the east side of the airport. This will ensure the entire coastal area is not over flown by aircraft. | | X | | | |
| | | | Promote departures that are straight out until reaching at least 5000-6000 ft. | | X | | | |

| Environmental and social issues at the site | Environmental aspects introduced within the masterplan | Potential Environmental Impact | Mitigation measures | Construction phase | Operation phase | Recommended Future Studies | Stakeholders to be engaged | Estimated Costs for Future Studies |
|---|---|---|---|---|---|---|---|---|
| | | | before turning away from the coastal areas. | | | | | |
| | | | Limit aircraft use during the night time, to ensure impacts to proximate receptors are kept to a minimum. | | X | | | |
| | | | Undertake noise monitoring at regular intervals during construction works and operational activities. | X | X | | | |
| | | | Monitor noise levels on an annual basis to generate annual updates to the airport NEF contours to determine the noise environment following construction. | | X | | | |
| Presence of buildings in close proximity to the airport boundaries with the need for acquisition of 12ha. | Restriction of Project footprint | Social impacts related to the relocation of buildings and activities on-site. | Implement Resettlement and compensation process complying with Land Acquisition Law and associated process.<br><br>Undertake a survey of the assets for displaced properties with the Land & Survey Department | X | | | | |
| Presence of Cricket club ground to the west of runway in area possibly demarcated for runway extension. | | Conflicts with existing use of the airport property by the Cricket club. | Coordinate with the Cricket club their move to another site in order to figure in collaboration the best schedule | X | | | | |
| **Existing infrastructures** | | | | | | | | |
| Presence of existing airport infrastructures on-site and modification of power line and pipes routes | Integration of the existing infrastructures within the project design. | Risks of damages during construction activities<br><br>Restriction of access | Integrate participation of CIAA and other relevant competent authorities in the infrastructure design phase and during construction planning. | X | | | | |
| Presence of facilities on-site (Shooting training area, Radar Communication Site, etc.) | Conservation and integration of the Radar Communication Site | Dedication of shooting training area for airport purposes.<br><br>Restriction of access | Integrate participation of radar owner in the planning of construction works.<br><br>Collaboration with the Gun Club Association for the reuse of their facilities on-site if wanted. | X | | | | |

| Environmental and social issues at the site | Environmental aspects introduced within the masterplan | Potential Environmental Impact | Mitigation measures | Construction phase | Operation phase | Recommended Future Studies | Stakeholders to be engaged | Estimated Costs for Future Studies |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| Congestion of George Town harbour during importation of material.<br><br>The harbour is located 2 km from the airport and George Town already experiments traffic congestion | | Congestion at the harbor but also along the route taken through the airport | Target low-traffic periods for moving material to the site while considering potential nuisances for communities located along roads. | X | | | | |
| | | | Optimize the route through the airport in order to select the most optimal one. | X | | | | |
| Construction works in the context of an airport with on-going activities. | | Interference of construction with air traffic movements. | Liaise with air traffic control to select best timing of work, use of dedicated airside routes for construction traffic, regulation of types of vehicles in use airside. | X | | | | |
| | | Potential for visitors to experiment bad experience at the airport and raise of complaints from visitors | Put in place adequate signage in construction areas. | X | | | | |
| | | | Promote the fluidity of visitors movement within the airport in order to provide the best experience possible. | X | | | | |
| | | | Prior to construction, put in place a dedicated area to collect visitors complaints. | X | | | | |
| The network of roads on Grand Cayman is relatively limited, although improvements and new road connections are being implemented or are planned. Significant congestion is reported on the main roads through George Town during the peak traffic periods, namely between 8 AM and 9AM in the morning and between 5PM and 6PM in the evening on weekdays. Some businesses are located along this road and could encounter a reduction in economic activities from | Integration of a Crewe road bypass | Crewe road closure and related impacts on Traffic. Economic impacts on businesses located along the road | Provide alternative road access to properties and activities affected by the extension of Runway 8 and associated RESA | X | X | Undertake Traffic study on Crewe road and prior to any development blocking its access. | Ministry of District Administration, Tourism and Transport | $50,000 - $100,000 |
| | | | Support of commercial advertising and publicity | | X | | | |

| Environmental and social issues at the site | Environmental aspects introduced within the masterplan | Potential Environmental Impact | Mitigation measures | Construction phase | Operation phase | Recommended Future Studies | Stakeholders to be engaged | Estimated Costs for Future Studies |
|---|---|---|---|---|---|---|---|---|
| road rerouting. | | | | | | | | |

### 6.20.1 Environmental Conclusions and Recommendations

Based on the foregoing, the following conclusions and recommendations were derived for ORIA:

**Management and Protection of Water Resources**

Water runoff management on-site is currently lacking as water accumulation are visible on various topographic maps showing depressions within the airport property. An increase in the total paved coverage, with loss of local ponds, limit the natural infiltration and consequently increase the amount of water to manage in a draining system. Surface and marine water quality impairment is a potential and could be related to the construction works in the mangrove area (with potential release of water with low oxygen and high organic material content). Furthermore, decommission of the fuel farm and the firefighting area as well as operational activities with potential release of hydrocarbons and pollutants coming from the runoff on the paved apron and the fire training activities cand impact local water resources.

**Integration of the infrastructures in a Coastal Area, Vulnerable to Flood and Erosion**

The runway as it is planned come at withn about 180m from the margins of the coast. During the Ivan hurricane. The airport site has been flooded considerably in the past and erosion phenomenon are visible but moderate along the coastal area. Cayman Islands climate change policy aims to consider more precaution in coastal development in order to reduce their vulnerability over time. Considering the importance of the OIRA for hurricane evacuation and relief, coastal vulnerability risk management should be highly integrated in airport redevelopment.

**Environment contamination management**

The nature of activities at the fuel farm and the aircraft rescue firefighting training area leads to the need for the consideration of contaminants release during their decommissioning and operation. An environmental site assessment Phase 1 and Phase 2 will allow identification of potential problematic areas and planning of proper site remediation.

**Loss of habitats**

**T**he master plan has integrated the protection of the mangrove buffer (as it is in the 1997 Development Plan). However, more than the half of the remaining mangrove located on the airport site will be lost. One objective of the Habitat Action Plan for Mangrove is the protection of 90% of currently remaining mangrove habitat in the Cayman Islands. The ratio is not reached at the airport site following the long term airport redevelopment. Compensation actions will need to be organized with DoE and National Trust to contribute to mangrove conservation elsewhere. Additionally, as the Typha swamps are rare aquatic habitat, even if the ecological integrity of the ones on-site is restricted, their loss is significant and some compensation actions should be selected.

**Closure of Crewe Road**

The potential long-term road rerouting could impact economically businesses located along the road. Investigation of traffic movement and current levels of business in the areas likely to be affected by the Airport expansion should be planned to guide the long-term planning for the master plan and to permit the CIAA to be prepared for the potential triggered runway extension event at some point in the future.

The environmental scoping process identified a number of key recommendations which could be integrated into the project implementation to reduce the potential for significant environmental and social impacts to occur. Environmental and social considerations in the master plan focused on the following:

- Maximise the existing airport infrastructures conservation and restrict Project foot print
- Reduce expected air quality impairment
- Reduce emitted noise level with associated nuisances
- Properly managed runoff water with interception of pollutants that can be emitted to the environment
- Protect the mangrove buffer, with consideration of its ecological role and role in coastal protection, and limit development close of the coastal margins

Various studies recommended to be undertaken have been identified in the scoping tables and summarized below in Table 6-13 . The proposed studies have been separated here in two categories:

- Recommended studies to support the short-medium term master plan projects to guide the final design and construction process; and

- Recommended studies to develop baseline data for the long-term expansion projects proposed in the master plan. These are primarily focused on understanding the existing environment before major projects are implemented including developing the eastern area of the site and in anticipation of the potential triggered projects like the runway extension or major commercial develops to the east.

**Table 6-13 - Summary of Recommended Environmental Studies**

| Recommended Studies | Cost Range | Schedule |
|---|---|---|
| **For Short to Medium Term Master Planning Recommendations** | | |
| Submersion and Extreme Events Flooding Vulnerability Study | $40,000 to $60,000 | Short-Term |
| Erosion Vulnerability Study | $50,000 | Short-Term |
| Traffic study on Crewe road | $50,000 - $100,00 | Short-Term |
| **Long-term Baseline Data Development** | | |
| Air quality baseline characterization | $40,000 | Short-Medium-Term |
| Noise baseline characterization and isocontours modelling | $20,000 | Short-Medium-Term |
| Water quality in North Sound, in Mangrove wetland and in *Typha sp.* swamps | $15,000 | Short-Medium-Term |
| Environmental site Phase 1 and Phase 2 for the fuel farm and Aircraft rescue firefighting training areas<br><br>*Note: Fuel Farm Phase 1/ 2 by Fuel Suppliers per lease agreement* | $35,000 | Short-Medium-Term |

| Recommended Studies | Cost Range | Schedule |
|---|---|---|
| *conditions* | | |
| Flora surveys in the mangrove and habitat description in the marine environment with identification of associated species | $10,000 | Short-Medium-Term |

## 6.21 SUMMARY OF AIRPORT MASTER PLAN RECOMMENDATIONS

Based on the foregoing and considering both technical and environmental aspects of the various airport layouts proposed, Tables 6-14 and 6-15 present a summary of the recommended master plan elements for ORIA in addition to key technical and environmental studies that should be considered in support of the next phases of implementation.

Each master plan and study recommendation has been categorized in accordance with the following prioritization criteria established for this study:

***Priority 1*** - Risk, safety and compliance issues - all Airports

***Priority 2*** - ORIA: terminal capacity shortfall

***Priority 3*** - ORIA: Short / Medium term Airfield Capacity Issues

***Priority 4*** - Little Cayman: long term public airport solution

***Priority 5*** - Long term capacity building / commercial opportunity

In addition, a target implementation schedule is also proposed based on the following groupings established for this master plan:

**Short-term:** 0-5 years

**Medium-term:** 6 -10 years

**Long-term:** 11-20 years

The target implementation schedule as proposed in this section represents the desired schedule notwithstanding financial limitations and other prioritizations established for CKIA and LCA airports. The target implementation periods shown in Tables 6-14 and 6-15 only consider ORIA.

Section 9 of this report further assesses ORIA projects and establishes the final recommended phasing time frames through more detailed financial analysis taking into consideration the total Cayman Islands Airport System needs and priorities. As such, Section 9 should be referenced for the final recommended phasing plans for ORIA.

**Table 6-14 - ORIA Master Plan Recommendations Summary including Prioritization and Target Implementation Schedule**

| Item No. | Description of Master Plan Element | Prioritization Criteria | Target Implementation Schedule |
|---|---|---|---|
| 1 | Runway 08-26 Threshold Reconfigurations-Turnpads and Runway 08 RESA (East End) (*Note: Partial pavement strengthening to accommodate change in aircraft mix in 2016 (B777) costs included under Life Cycle Rehabilitation Costs and not CAPEX)* | Risk, safety and compliance | Short-Term |
| 2 | ATC Tower Enhanced CCTV coverage and Secondary Surveillance Radar Interconnection to CONCENSA facility | Risk, safety and compliance | Short-Term |
| 3 | Airside Perimeter Road and Fencing | Risk, safety and compliance | Short-Term |
| 4 | Marine Exclusion Zone Protection Buoys (Approach/Departure Protection for Marine Craft) | Risk, safety and compliance | Short-Term |
| 5 | Relocation of MET Garden facilities | Risk, safety and compliance | Short-Term |
| 6 | Existing Terminal Building Covered Apron Walkway/Minor Renovations | ORIA: terminal capacity shortfall | Short-term |
| 7 | Existing Terminal Building Expansion and Improvement Program: Phases 1, 1A, Phase 2 and Phase 3 | ORIA: terminal capacity shortfall | Short to Medium-term |
| 8 | Passenger Loading Bridges (Portable/Mobile Ramp Option) | ORIA: terminal capacity shortfall | Short-term |
| 9 | Main Terminal Expansion (East) to accommodate additional two Code C (B737/A320) parking positions or one Code E (B777) | ORIA: Short / Medium term Airfield Capacity | Short-term |
| 10 | Aviation Fuel relocation to new facility within East Commercial Development Area. (Enabling Apron and Terminal Expansion) | ORIA: Short / Medium term Airfield Capacity | Short-term |
| 11 | East commercial road extension (Phase 1 – 300m to relocated ARFF and Fuel Facility) | ORIA: Short / Medium term Airfield Capacity | Short-term |
| 12 | Main Terminal Expansion (West) to accommodate additional two Code C (B737/A320) parking positions and re-organization of GSE equipment parking/storage. | ORIA: Short / Medium term Airfield Capacity | Medium to Long-term |
| 13 | Commercial/GA Apron Expansion (Island Air/GAT) | ORIA: Short / Medium term Airfield Capacity | Short-term (Triggered by opportunity) |
| 14 | Commercial/GA Apron Expansion (West of MRCU) | ORIA: Short / Medium term Airfield | Short-term (Triggered by |

**Table 6-14 - ORIA Master Plan Recommendations Summary including Prioritization and Target Implementation Schedule**

| Item No. | Description of Master Plan Element | Prioritization Criteria | Target Implementation Schedule |
|---|---|---|---|
| | | Capacity | opportunity) |
| 15 | ARFF Training Facility Relocation | ORIA: Short / Medium term Airfield Capacity | Medium-term |
| 16 | Partial Parallel Taxiway (Taxiway Delta to Taxiway Alpha) or Partial Parallel Taxiway to Open East Development Area GA (CIAA to Develop Priorities based on Commercial/Airfield Capacity Status at the time) | Long term capacity building / commercial opportunity | Short to Medium-term |
| 17 | Balance of Full Parallel Taxiway (Threshold 08 to Threshold 26) | Long term capacity building / commercial opportunity | Medium-term |
| 18 | Runway 08-26 Extension to the West for 8000 ft. (Extend to west by 1000 ft.) | Long term capacity building / commercial opportunity | Long-Term (Triggered by opportunity) |
| 19 | Runway 08-26 Extension to the West for 9200 ft. (Extend to west by 1,000 ft. and east into North Sound by 1,200 ft.) | Long term capacity building / commercial opportunity | Long-Term (Triggered by opportunity) |
| 20 | Long-Term Greenfield terminal expansion part of long-term new greenfield terminal build | Long term capacity building / commercial opportunity | Long-Term (Triggered by major change in operating conditions/growth) |
| 21 | Removal of CONCENSA facility if not integrated into CIAA ATS system | Long term capacity building / commercial opportunity | Medium to Long-Term |
| 22 | Provision of US Preclearance | Long term capacity building / commercial opportunity | Long-Term (Triggered by new greenfield terminal development) |
| 23 | Existing Terminal Building Expansion and Improvement Program: Phase 1A Renovations to the second flow Commercial Offices) | Long term capacity building / commercial opportunity | Long-Term (Triggered by commercial opportunity) |
| 24 | Passenger Loading Bridges (Ground loading or 2 storey covered walkway with ramp down bridge) | Long term capacity building / commercial opportunity | Long-Term (Triggered major change in operating conditions or growth) |
| 25 | General Aviation / FBO Expansion into the East Development Area or into | Long term capacity building / commercial | Long-term (Triggered by |

**Table 6-14 - ORIA Master Plan Recommendations Summary including Prioritization and Target Implementation Schedule**

| Item No. | Description of Master Plan Element | Prioritization Criteria | Target Implementation Schedule |
|---|---|---|---|
| | GA/Commercial reserve area west of MRCU | opportunity | private investment) |
| 26 | Air cargo expansion from existing location to main terminal apron (part of long-term triggered event to construct greenfield terminal in the East Development Area | Long term capacity building / commercial opportunity | Long-Term (Triggered major change in operating conditions or growth) |
| 27 | Airline Maintenance/MRO expansion into East Commercial Development Area | Long term capacity building / commercial opportunity | Long-Term (Triggered major change in operating conditions or growth) |
| 28 | ATC Tower relocation and increased height | Long term capacity building / commercial opportunity | Long-Term (Triggered by new greenfield terminal development or runway extensions) |
| 29 | East commercial road extension (Phase 2 – 500m to fully developed East Development Area limits) | Long term capacity building / commercial opportunity | Long-Term (Triggered by commercial opportunity) |
| 30 | Land Acquisition for future long-term terminal and landside access and parking improvements. | Long term capacity building / commercial opportunity | Long-Term (Triggered by commercial opportunity) |

**Table 6-15- ORIA Master Plan Recommended Supplemental Studies including Prioritization and Target Implementation Schedule**

| Item No. | Description of Recommended Supplemental Study | Prioritization Criteria | Target Implementation Schedule |
|---|---|---|---|
| **TECHNICAL STUDIES** | | | |
| 1 | Obstacle Surveys and ICAO Obstacle Limitation Surface Analysis and Mitigation Plans for existing and Extended Runway 08-26 | Risk, safety and compliance | Short-Term |
| 2 | Secondary Surveillance Radar Options Analysis – To review new stand alone facility or developing feed from existing radar per lease agreement and providing composite feeds to Brac. (System-wide based study) | Risk, safety and compliance | Short-Term |
| 3 | As-built Documentation/Condition and Code Compliance Assessment Study for Existing Air Terminal Building and Air Traffic Control Tower. | ORIA: terminal capacity shortfall | Short-term |
| 4 | Air Terminal Building Retail Concession Study | ORIA: terminal capacity shortfall | Short-term |
| 5 | Air Terminal Car Parking Revenue Management Systems Review | ORIA: terminal capacity shortfall | Short-term |
| 6 | Airport Business Process Review and Optimization Study to maximize Revenue Capture and Automation | ORIA: terminal capacity shortfall | Short-term |
| 7 | Road Traffic Study for Airport Master Plan Impacts– Including Closure of Crewe and re-routing traffic for long-term runway extension. | Long term capacity building / commercial opportunity | Short Medium-term |
| 8 | Master Servicing Study for Airport Master Plan Impacts | Long term capacity building / commercial opportunity | Medium-term |
| 9 | Airspace and Instrument Approach Procedure Design Study – Including DVOR Relocation Options Analysis | Long term capacity building / commercial opportunity | Medium-term |
| 10 | ATCT Sight-Line and Facility Improvement Study and Mitigation Plan – Existing and Future Tower Location Options | Long term capacity building / commercial opportunity | Medium-term |
| | | | |

**Table 6-15- ORIA Master Plan Recommended Supplemental Studies including Prioritization and Target Implementation Schedule**

| Item No. | Description of Recommended Supplemental Study | Prioritization Criteria | Target Implementation Schedule |
|---|---|---|---|
| **ENVIRONMENTAL STUDIES** | | | |
| 1 | Submersion and Extreme Events Flooding Vulnerability Study (Short-term requirements to support master plan recommendations) | ORIA: Short / Medium term Airfield Capacity | Short-term |
| 2 | Erosion Vulnerability Study (Short-term requirements to support master plan recommendations) | ORIA: Short / Medium term Airfield Capacity | Short-term |
| 3 | Air quality baseline characterization (Recommended for future baseline comparisons as airport continues to develop) | Long term capacity building / commercial opportunity | Short-term |
| 4 | Noise baseline characterization and isocontours modelling (Recommended for future baseline comparisons as airport continues to develop) | Long term capacity building / commercial opportunity | Short-term |
| 5 | Water quality in North Sound, in Mangrove wetland and in *Typha sp.* Swamps (Recommended for future baseline comparisons as airport continues to develop) | Long term capacity building / commercial opportunity | Short-term |
| 6 | Environmental site Phase 1 and Phase 2 for the Aircraft rescue firefighting training areas (In order to properly plan their decommissioning and reduce potential contamination) | Long term capacity building / commercial opportunity | Short-term |
| 7 | Flora surveys in the mangrove and habitat description in the marine environment with identification of associated species (Recommended for future baseline comparisons as airport continues to develop) | Long term capacity building / commercial opportunity | Short-term |

# 7 CHARLES KIRKCONNELL INTERNATIONAL AIRPORT (CAYMAN BRAC) – MASTER PLAN 2032

## 7.1 CLIENT OBJECTIVES AND GUIDING PRINCIPLES

A series of client objectives were provided at the start of the master planning process prior to any analysis being completed. These objectives are listed the following Table 7-1. These client objectives have been considered and addressed as part of the analysis.

**Table 7-1 - Client Airport Master Plan Objectives, CKIA**

| No. | Facility | Client Objective |
|---|---|---|
| CO1 | Terminal Building Expansion | ***General***<br><br>The objective is to provide infrastructure to accommodate international jet direct flights. The terminal is in need of a HBS room, as well as additional space in the passenger circulation areas such as the check-in lobby, security screening, outgoing immigration, departure hall, immigration arrival hall, baggage claim, and customs areas.<br><br>***Concessions***<br><br>The objective is to enhance concession space to generate additional revenue<br><br>***Office Space Rental***<br><br>The objective is to enhance offices space rental to generate additional revenue.<br><br>***Advertising Space***<br><br>The objective is to enhance advertising space to generate additional revenue |
| CO2 | Cargo Facilities | The objective is to evaluate the need to provide cargo facilities at CKIA. |
| CO3 | Aeronautical Information Services (AIS) | The objective is to evaluate the current AIS office location to address access needs of staff and pilots. |
| CO4 | Transportation Network | The objective is to evaluate the need to develop the ground transportation infrastructure in the vicinity of the airport. |

**Table 7-1 - Client Airport Master Plan Objectives, CKIA**

| No. | Facility | Client Objective |
|---|---|---|
| CO5 | Fire Service | The objective is to evaluate the current infrastructure of the Fire Service to ensure it meets existing and future demand while complying with international regulations. |
| CO6 | Air Traffic Control (ATC) Tower | The objective is to evaluate the current height, floor area and location of the ATC tower.<br><br>Currently, the air traffic control tower height doesn't meet the regulatory requirements in regards to the ability of the controller to view the entire runway length. Current line of sight is obstructed by mature vegetation. Floor area is also limited and there is currently no fire escape which impacts the safety of the staff. |
| CO7 | Fire Service Access Road | To provide an access road directly to the runway as required by international regulations. |
| CO8 | Airport Pavements –Apron, Runway, Taxiways | The objective is to assess the state of the pavements and the requirement for surveys and or improvements. |
| CO9 | Runway Perimeter Road and Perimeter Fence | The objective is to provide a runway perimeter road as recommended by international regulations. The perimeter fence is inspected regularly on a daily basis. To ensure ease of access to carry out these inspections, it is recommended to provide a runway perimeter road. |
| CO10 | Runway End Safety Area (RESA) | To evaluate the need to provide a RESA as required by international standards. |

In addition to the client objective described above, a number of additional master planning guidelines evolved through the master planning process specific to CKIA and are summarized in Table 7-2 below. These guiding principles have been developed specifically as a result of communications with the client, stakeholders and a detailed review of the site conditions during the preparation of this master plan.

**Table 7-2 - Master Planning Special Guiding Principles, CKIA**

| No. | Facility | Guiding Principle |
|---|---|---|
| GP1 | All development areas | Where possible elevations of the airfield should be raised as part of any future rehabilitation or |

**Table 7-2 - Master Planning Special Guiding Principles, CKIA**

| No. | Facility | Guiding Principle |
|---|---|---|
| | | expansion. In particular the runway system should be raised when possible during future rehabilitation of the surfaces. |
| GP2 | All development areas | Regard for the environment and minimizing impacts is paramount. |

## 7.2 AIRPORT ROLE AND CLASSIFICATION

CKIA will continue to operate and act as a second tier airport to ORIA. It will continue to play a vital and integral part of the Cayman Islands Transportation System by providing scheduled domestic, international, and charter airline service, limited cargo and general aviation services to the Sister Islands. CKIA also will continue to act as a general aviation reliever for ORIA during peak periods. Similar to ORIA, CKIA will cater to the tourist experience through modern, safe and effective facilities. Any public designs should incorporate an infusion of island culture. CKIA will also provide a robust airport capable of supporting hurricane evacuation and relief efforts to the Islands.

The current design aircraft for CKIA is the Boeing 737 series aircraft meeting an ICAO aerodrome reference code of 4C . This master plan has re-confirmed that this aircraft is appropriate for the planning period and no changes are proposed.

Similar to ORIA, another critical airport operating criteria established for CKIA was to maintain its ICAO non-instrument classification. Given the very limited land available within the airport's existing boundary combined with the encroachment of development around the airport, reducing the on and off-site airspace restrictions and reducing airfield facility separations was considered a prudent and practical approach to maximizing development capacity within the airport while minimizing impacts off-site. This is further supported by the very high airport usability with respect to wind, cloud ceilings and visibility. Weather records demonstrate that ceilings are recorded seldom less than 500-600 ft. above ground level and visibilities rarely fall below 4-6 statute miles. These weather conditions are consistent with non-instrument airport design criteria. It should be noted that while the airport will be planned to non-instrument criteria, it does not preclude the use of instrument approach procedures using navigational aids such as DVOR, NDB and or a future ILS system.

## 7.3 RUNWAY 09-27

Runway 09-27 at 6,010 ft. x 148 ft. is considered adequate. Table 7-3 summarizes the runway length analysis completed assuming continued international service direct to Miami using B737-200 aircraft. It was confirmed that the 6,010 ft. is adequate for these operations and is a suitable length for medium-large corporate jet aircraft. The master plan does not recommend a runway extension for CKIA.

**Table 7-3 - CKIA Runway Length Analysis – B737-200**

| Destination | Distance (nm) | Operational Take-off Weight (lbs.) | | Take-Off Runway length Required (ft.) | |
|---|---|---|---|---|---|
| | | 80% Payload | 100% Payload | 80% Payload | 100% Payload |
| **Miami** | 366 | 103,000 | 128,000 | 4,500 | 5,500 |

Each runway end at CKIA is published with runway end safety area (RESA). However, the Runway 27 RESA (west end) is partially located in the sea which does not comply with ICAO RESA standards. The master plan recommends this RESA is relocated by shifting Threshold 09 by 60metres to the east which will permit the RESA to be constructed fully on land and off the beach area to minimize erosion and impacts on turtle nesting areas. If the east end of the runway is not shifted the equivalent length, the overall runway length will be reduced to 5,810 ft. To avoid costly relocation of both ends of the runway and based on the runway length analysis, a 5,810 ft. runway should be sufficient in the short to medium-term. It is however recommended that in the long-term the east end of the runway and its RESA be relocated 200 ft. (60m) to the east to return the runway to its full length of 6,010 ft. An ultimate 6,010 ft. runway is recommended at CKIA to serve the design aircraft and to maximize general aviation operations by medium to large corporate jet traffic.

On the south side of Runway 09-27 the existing ponds infringe on the runway's graded area. In accordance with ICAO Annex 14, the graded area shall be designed to support the design aircraft. In order to achieve this, long narrow strips ranging in width to about 15-20 metres along the south side of the runway need to be filled, graded and restored to a turf surface capable of supporting the design aircraft. This is considered a short-term safety priority.

The 150m runway strip associated with Runway 09-27 just fits within the airport boundary and some localized areas project beyond the boundary . A municipal road at the south east limit of site will need to be relocated to remain outside this strip. Furthermore, a number of fixed objects and vegetation infringe upon the runway's obstacle limitation surfaces, in particular the transitional surface which projects upwards at an angle of 14.3% from the limit of the runway strip along the entire length of the runway. A significant level of trimming and clearing is recommended to comply with ICAO Annex 14 clearances. A systematic obstacle limitation surface analysis and clearing program should be implemented at CKIA in the short-term.

***Marine Exclusion Zone in Sea (Protection of Runway 09-27 Approach and Departures)***

It is recommended that a marine exclusion zone be marked with buoys off the west end of the airport in the sea. The markers would delineate an area that would protect the approach and departures off Runway 09-27 for objects up to 18m in height (typical height of sail boat masts). These buoys would also be published on local marine maps to advise boaters of the restrictions off the end of the runway.

***Height and Land Use Controls (Aeronautical Zoning)***

The master plan also recommends that appropriate land use controls be establishing around the airport to project the various obstacle limitation surfaces around the airport the limit the height of objects off the runway ends and sides. This protection measures should be enacted under the authority of aeronautical safety and be controlled and managed by the CIAA. In general the purpose of these types of controls and regulations is to protect the safety of aircraft operations in the vicinity of the airport by imposing height restrictions on buildings and obstacles within defined areas. In addition, these controls could also regulate or prohibit some land uses, such as landfills, which, by attracting birds, would pose a hazard to aircraft. Such controls or regulations should be implemented or CKIA based on the proposed 2032 Airport Master Plan.

***Municipal Land Use Planning and Aircraft Noise***

It is recommended that local planning authorities consider embodying aircraft noise factors into local development plans. Where possible noise sensitive land uses should be limited or prohibited in areas of high aircraft noise like near the ends of the runway or in close proximity to the sides of the runway. Typical noise sensitive uses including residential hospitals, day cares or schools, for example. International guidelines can be used including either the FAA based DNL system or Canadian Noise Exposure Forecast Contours (NEF). Both are recognized by ICAO as means to predict noise and land use compatibility around airports. It should be noted that the CIAA publishes noise abatement procedures in the AIP which promotes reduced noise operations by air carriers at CKIA.

Refer to Exhibit 10 in Appendix A for the proposed master plan runway layout.

## 7.4 TAXIWAYS

The existing single Taxiway Alpha is sufficient to support the design aircraft and forecast movements at the airport. The master plan however recommends provisions for an additional taxiway connector between the runway and apron to improve the maneuverability for commercial and GA aircraft as well as will eliminate potential congestion for aircraft parked on the east side of the apron. Having two points of entry/exit also provides for alternative taxi routes during pavement maintenance or other activities that may require closure of a taxiway or portion of the apron or runway. The proposed taxiway would be and ICAO Code C taxiway, 18m in width with no paved shoulders. Refer to Exhibit 10 in Appendix A for the proposed master plan taxiway layout.

## 7.5 APRONS

***Main Terminal Apron***

Future expansion of the main terminal will be towards the east. The most demanding aircraft operating at the airport today and in the future is the Code "C", B737-200/800W. While there is no immediate need to expand the apron, the following outlined the required implementation plan:

- Relocation of existing fuel farm to the northeast. This should be initiated in the short-term to open up airside commercial opportunity off the northeast corner of the existing expanded apron.
- 2 Code 'C' stands for B737-800W and ATR 42-500 (aircraft wingtip separation of 7.5m. Aircraft tails clear of OLS transitional surface (slope 1:7));
- Aircraft parking positions provide minimum 15 m separation between aircraft nose and terminal building;
- Airside service road width is 7.5m;
- Code 'C' taxiway/taxilane is18m wide;
- Code 'B' taxilane is 10.5m wide; and
- New Apron area (including additional access taxiway connectors to the east) 8,807.7sq.m (94,805sq. ft.).

The proposed apron expansion will provide additional parking flexibility for cargo/commercial operations on the west side and general aviation/commercial operations on the east side while reserving the central area of passenger aircraft. Refer to Exhibit 10 in Appendix A for the proposed master plan apron layout.

## 7.6 NAVIGATIONAL AIDS AND SECONDARY SURVEILLANCE RADAR

The existing NDB serving the airport should remain. This land based radio navigational supplements the more modern GNSS satellite based instrument approaches available at CKIA. The combination of the NDB and GNSS instrument approaches provide adequate instrument procedures at the airport.

Given the low volume of air traffic projected for CKIA, the need to for secondary surveillance radar is not warranted. However, a composite feed from a secondary radar installation in ORIA should be investigated as it could provide an indirect display of aircraft in the area using the radar interrogations from ORIA. This information can be displayed on computer monitors for advisory purposes in CKIA. This option should be reviewed in conjunction with an overall radar study proposed under the ORIA master plan.

***Electronic Protection (Aeronautical Zoning)***

The master plan also recommends that appropriate land use controls be established around the airport in consultation with land use planning authorities for the existing NDB and the integrity of the communication towers serving CKIA. These protection measures should be enacted under the authority of aeronautical safety and be controlled and managed by the CIAA.

## 7.7 AIR TERMINAL BUILDING

### 7.7.1 Forecasted Demand

Peak hour passenger forecasts or nominal flight schedules were not prepared for Cayman Brac Airport. It has been assumed the peak period is based on a single B737 aircraft event with a passenger load of approximately 135 passengers.

### 7.7.2 Functional Requirements

As currently designed, the passenger terminal building at Cayman Brac Airport is sized to adequately accommodate passenger loads associated with regional aircraft at a 'good' level of service. The terminal can also accommodate the occasional narrow-body jet aircraft, such as the B737, at a reduced level of service. To support passenger loads associated with regular B737 service a number of improvements need to be considered. These would include:

- Expansion of the departures hall to accommodate increased passenger queuing requirements. This could be accommodated with a covered exterior space;
- Expansion of the baggage claim area including an enlarged baggage claim device;
- Provision of a covered area located on airside to accommodate passenger queues associated with immigration process;
- Expansion of the passenger screening point to accommodate extended divestiture tables; and
- Expansion of the terminal to the east to accommodate functions displaced by the expanded passenger screening point and to accommodate an improved baggage make-up area.

### 7.7.3 Development Concept

Exhibit 11 in Appendix A illustrates the potential modification and expansion of the passenger terminal building that may be required in the future should the airport receive jet service on a regular basis.

## 7.8 GENERAL AVIATION

Allocation has been made in the master plan for an FBO operation on the east side of the apron. This will require the relocation of the existing fuel facility. This area should be reserved for a commercially viable FBO where both MET and AIS offices could be located and space leased from the private operator in the future. The following facilities could be accommodated in this area and have been shown in the master plan layout in Exhibit 10 in Appendix A:

- 3 aircraft parking spaces for Code "B" aircraft; and
- FBO terminal building reserve area of 30m x 46m.

## 7.9 COMMERCIAL AND AIR CARGO FACILITIES

The master plan reserves and area west of the existing PTB for an apron expansion associated with a cargo or commercial operation. Sufficient land and apron is available to support additional aircraft

parking and a hangar facility. The following facilities could be accommodated in this area and have been shown in the master plan layout in Exhibit 10 in Appendix A:

- 1 Corporate/commercial hangar reserve area 25m x 35m;
- Apron for corporate/commercial hangar, size 1,621 sq.m (17,448 sq.ft.);
- Corporate/Private 11 vehicle parking spaces; and
- Vehicle access to apron area

## 7.10 AIRLINE MAINTENANCE AND GROUND HANDLING SERVICES

The master plan does not recommend an airline maintenance hangar as ORIA will act as the primary airport for these services.

The GSE area at CKIA is proposed to be relocated west of the apron area adjacent to the proposed ARFF airfield road access. This will free up the area between the PTB and the ARFF building to permit the expansion of a commercial apron/development area described above.

## 7.11 AVIATION FUEL

The master plan recommends that the fuel farm be relocated as shown in Exhibit 10 in Appendix A. The area proposed is on the northeast side of the airport terminal property and is as far away and as far north of the existing PTB as possible. Concerns have been expressed about the potential downwind impacts should a fire occur in the fuel farm. Relocating the fuel farm to the northwest of the PTB wasn't considered feasible given the property limitations. The relocation should occur in the short-term to maximize the opportunity for airside commercial development along the apron. The master plan has shown this area to be valuable for an FBO operation. An area of 366 sq. metres has been reserved for the relocated fuel facility.

It is recommended that mobile fuel bowsers continue to be used for fuel dispensing at the airport. The existing fixed fuel cabinet dispenser should be removed or replaced by a small above ground Avgas tank system that can be easily moved should an FBO operation be proposed on the east side of the apron.

## 7.12 METEOROLOGICAL AND AIS SERVICES

Existing meteorological equipment that is currently located between the existing PTB and the ARFF facility should be relocated east of the future Code 'C' taxiway connector. The minimum separation between the Code 'C' taxiway connector and the meteorological site is 26.0m but may be more due to siting criteria associated with the MET equipment. The equipment needs to be relocated to accommodate future commercial hangar and apron expansion on the northwest side of the apron.

The existing AWOS serving the airport should remain in its current location even though it is located inside the runway strip. Over the medium term an alternative location should be investigated so that it remains outside the runway strip and clears all applicable runway obstacle limitation surfaces.

There would be an opportunity to relocate the AIS offices to the ground level of the terminal as part of any future terminal expansion or ideally it should be accommodated as part of a private FBO, should one be constructed in the future. Space in the FBO could be leased for this purpose.

## 7.13 AIR TRAFFIC CONTROL

The master plan makes no provisions to relocate or raise the tower height. The existing tower is of sufficient height to serve the airfield. The master plan however has identified a large area of off-airport vegetation management that involves trimming or removal of trees to ensure adequate line of sight for the tower and for compliance with runway obstacle limitation zoning surfaces. By trimming or clearing the trees, sight-lines will be improved and infringements on the runway's zoning surfaces will be removed.

It is also recommended that a code compliance and condition survey be completed for the existing tower to determine what improvement may be need to comply with fire exits and any other code non-compliance.

## 7.14 AIRCRAFT RESCUE FIRE FIGHTING

It is proposed that a new ARFF airfield access road be constructed providing direct and unobstructed access to the runway. The location of the road as shown in Exhibit 10 in Appendix A, remains clear of the Code C taxiway offsets. The minimum separation between the Code 'C' taxiway and the ARFF airfield road is 26.0m. The road should be 7.5m wide and paved to provide a smooth and treated surface permitting two-way traffic.

The design aircraft for CKIA is the B737 series aircraft. This aircraft requires ICAO Category 6 ARFF coverage. Category 6 is already provided on a limited basis at CKIA and as such no significant changes are expected during the master planning period. The airport may need to transition to full-time Category 6 coverage depending on how the air traffic services develop at the airport.

## 7.15 AIRSIDE PATROL ROADS AND SECURITY FENCING

A fully connected airside patrol road has been shown on the airport layout plans. The road should be minimum 3.75m wide and generally comply with local road standards in terms of design criteria, marking and signage. The road as proposed under the airport master plan is a graded road and travels around the perimeter of the airport following the recommended perimeter fence location. Appropriate signage should be included for road traffic controls and for hold positions connecting to airfield surfaces and for control through electronic sensitive areas. Rehabilitation or extensions to the existing perimeter security fence should be planned and implemented using minimum 2.1m chain-link and 0.3m barbed wire tops complying with ICAO requirements.

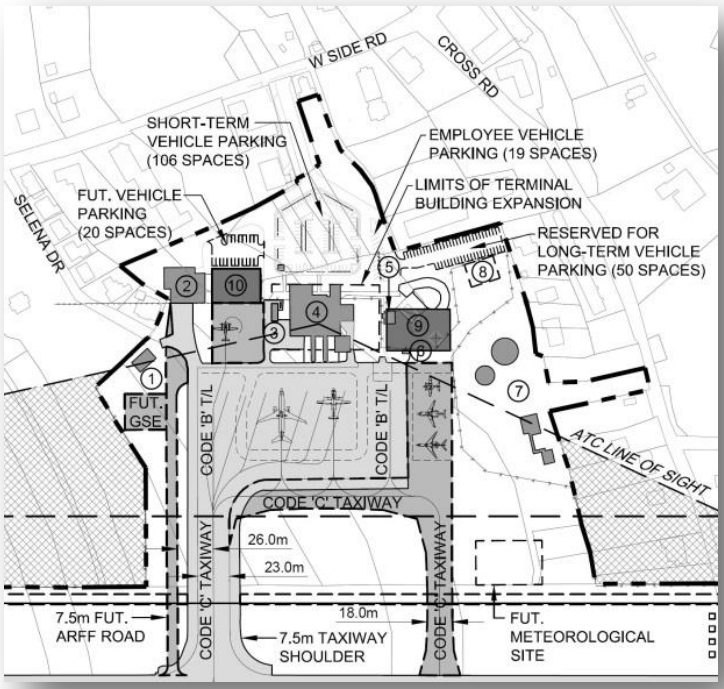
## 7.16 AIRPORT OPERATIONS AND UTILITIES

No changes are proposed for the airport operations and utilities. Upgrades to the water and sewage systems associated with any Passenger Terminal Building Expansion or other commercial building plans should be considered part of the design and planning of those developments. Based on the forecast expansion of the terminal, no significant changes are anticipated related to servicing at the airport. No changes in the area of the existing maintenance building is proposed in the master plan.

## 7.17 LANDSIDE GROUND ACCESS AND PARKING

Parking improvements include an additional allocation of 20 parking stalls that would serve both the public air terminal and the commercial facilities at the airport. Figure 7-1 below shows the proposed landside parking master plan layout for CKIA.

**Figure 7-1 – CKIA Ultimate Terminal Area Parking Master Plan**




## 7.18 ENVIRONMENTAL SCOPING AND MITIGATIONS

CKIS is located in the built environment of West Bay. It is consequently located in close proximity to residential, commercial and public areas. Moreover, the site is surrounded by valuable aquatic habitats. Along the south and east boundaries of the runway, the Westerly ponds are found and constitute the only natural ponds in the Cayman Brac Island, as such they have an important ecological value. The west side of the airport property is fringed by the Caribbean Sea and the quality of the marine life close to the site has led to designate the area as a proposed Marine Reserve. The beach along the site is also known for turtle nesting. This coastal site is vulnerable to flooding and erosion phenomenon. Moreover, as the Cayman Islands are located in an hurricane belt and considering the global warming, it increases the possible magnitude and chances for these phenomenon to happen.

The airport master plan elements for CKIA will be primarily introduced in an area already dedicated to airport activities where the natural environment has been mainly cleared. However, environmental and social issues are raised by the airport redevelopment and need to to be considerd. Refer to Exhibit 12 in Appendix A for a summary of the environmental setting and constraints around CKIA.

Based on the project master plan recommendations developed in the previous sections, the expected impacts sources are identified in Table 7-4. Impact sources are project components and activities that can potentially affect the receptor environment. They are grouped into project stages: construction and operations.

**Table 7-4 – Impact Sources Associated with the Proposed CKIA Master Plan Recommendations**

| Impact sources | Description |
|---|---|
| **Construction** | |
| Land acquisition | Land acquisition is not included in the master plan but should be considered as a long-term solution to airport expansion and regulatory compliance in particular around the immediate perimeter of the airport to better control natural growth and other man-made objects. These areas must comply with specific aeronautical zoning requirements for safe operation of the airport. |
| Land preparation | Overburden removal, excavation, earthworks, granular material, asphalt and line marking operations to allow for the construction of temporary and permanent infrastructures related to pavement structures, building and instrumentation. |
| Instream , wetland works and installation of water crossings | Work in engineered and natural watercourses to build temporary and permanent facilities, putting into place water crossings or drainage wells. There are also construction projects proposed to infill a narrow strip of existing wetland to the east and south of the existing runway. |
| Construction site setup | Preparing on-site construction lay-down areas or other temporary including temporary sanitation, equipment and material storage yard. The projects proposed are of short duration i.e. 2-3 months, and do not require construction camps or any significant buildup of temporary construction support facilities. |
| RESA Construction (West End) | Construction of a runway end safety area to the west would involve some construction on ocean front beach area. Work would include excavation, filling and restoration with granular materials sufficient to support an aircraft in an overrun. Surface treatment can be natural topsoil and grass or a granular material. RESA was relocated to avoid land reclamation into the ocean and to mitigate impact to beach area as much as possible. |
| Fuel System Relocation | Work proposed includes the relocation of an existing above-ground aviation fuel depot. Would include appropriate decommissioning and site clean-up. Relocation of the fuel system will be within the existing airport boundary. |
| Relocation of Meteorological Equipment | Relocation of existing MET equipment within existing airport site. Minor excavation and power and communication cable installations. |
| Airfield Electrical Works | Installation of new airfield lighting including trench excavation, backfilling, conduits, cables, light fixtures and restoration. |
| Natural Vegetation Management | Trimming and clearing will be required of natural growth on and immediately surrounding the airport. Regulatory requirements dictate maximum allowable heights of objects and must be complied with for the safe operation of the airport. |
| Transportation and traffic | Road transportation of workers, materials and equipment required for construction activities on-site and in the airport area. Includes on-site traffic related to construction machinery. Road and access maintenance. The projects proposed are of short duration i.e. 2-3 months, and do not require a significant build-up of traffic. |

| Impact sources | Description |
|---|---|
| Ocean Buoys (To delineate protected area on water for aircraft operations at low level) | Installation of buoys in an area close the runway end in the ocean waters to delineate an area within which no sail boats shall traverse. Installation per normal buoys installation methods. |
| Security Fencing | The removal of existing fencing and replacement with new regulatory compliance security fencing including fence post foundation construction and installation of 2.1 metre chain-link fence with 300mm 3-strand barbed wire. |
| **Operation** | |
| Presence and operation of the airport | The proposed projects are not anticipated to change the existing airport operating environment as it exists presently. The airport may see some increased use through natural growth in air traffic or the establishment of a new airline or air operator at the airport. |
| Fuel System Operation | Fuel system and dispensing to comply with applicable local and national standards. |
| Transportation and traffic | The proposed projects are not anticipated to change the existing terrestrial road traffic to and from the airport significantly. The airport may see some increased use through natural growth in air traffic or the establishment of a new airline or air operator at the airport. Sufficient capacity exists for local parking and road network access to the airport. |
| Natural Vegetation Management | Trimming and clearing will be required of natural growth on and immediately surrounding the airport. Regulatory requirements dictate maximum allowable heights of objects and must be complied with for the safe operation of the airport. These activities will continue during the operational period of the airport likely on an annual or bi-annual basis. |
| Wildlife hazard management | Any activity to reduce animal presence on-site for security reason, comprising vegetation maintenance, birds shooting, etc. |

An interaction matrix was developed based on the above and is shown as Table 7-5. This table shows the interaction between the site environmental and social components and the master plan elements. Table 7-6 then details the environmental and social scoping related to CKIA.

**Table 7-5 - Interaction Matrix Between Receiving Environment And Master Plan Elements for CKIA**

| Impacts sources | Environmental and Social Components | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Air quality | Noise | Water Resources | Climatic events | Contamination and waste management | Marine environ-ment | Wildlife – Natural habitats | Security | Quality of life | Existing infrastructures |
| **Constuction phase** | | | | | | | | | | |
| Land acquisition | | | | | | | | | X | X |
| Land preparation | X | X | X | | X | X | X | | X | |
| Instream, wetland works and installation of water crossing | | | X | | | X | | | | |
| Construction site setup | | | X | | X | | | | | |
| RESA Construction (West End) | X | X | X | | | X | | | X | |
| Fuel System Relocation | | | X | | X | X | X | X | | |
| Relocation of Meteorological Equipment | | | | | X | | | | | X |
| Airfield Electrical Works | | | X | | X | | | | | |
| Natural Vegetation Management | | | | | | | X | | | |
| Transportation and traffic | | | | | | | | | X | X |
| Ocean Buoys (To delineate protected area on water for aircraft operations at low level) | | | | | | X | X | | | |
| Security Fencing | | | | | | | X | X | | |
| **Operation** | | | | | | | | | | |
| Presence and operation of the airport | X | X | X | X | X | | X | | X | X |
| Fuel System Operation | | | X | | X | | | | | |
| Transportation and traffic | | | | | | | | | X | X |
| Natural Vegetation Management | | | | | | | X | | | |
| Wildlife hazard management | | | X | | | X | | | | |

**Table 7-6 - Environmental Scoping Associated with CKIA Proposed Airport Master Plan**

| Environmental and social issues at the site | Environmental aspects introduced within the masterplan | Potential Environmental Impact | Mitigation measures | Construction phase | Operation phase | Recommended Future Studies | Stakeholders to be engaged | Estimated Costs for Future Studies |
|---|---|---|---|---|---|---|---|---|
| **Air Quality** | | | | | | | | |
| The airport site is located in an urban area, shows surface water and is adjacent to Caribbean Sea. | | Reduction of air quality by the emission of pollutants, dust and particle matter that could ultimately reach surface water during construction works and operational activities. | Use dust suppression and control during demolition and construction works. | X | | Air quality monitoring prior to construction works (to establish baseline conditions). , and at regular interval during construction and operation.<br><br>Baseline data will be compared to monitoring data during construction phase and operation. Air quality standards to be respected will have to be identified in collaboration with the Department of the Environmental Health | Department of the Environmental Health. | Baseline characterization for PMtot, $PM_{10,}$ $PM_{2,5}$, $NO_2$, $SO_2$, CO and $O_3$ with a MicroVol sampler :<br><br>$40,000 |
| | | | Wash tires of transport vehicles prior to leaving work areas. | X | | | | |
| | | | Consider weather conditions and wind direction in site management and works planning. | X | X | | | |
| | | | Implement good management practices on construction site, regular maintenance of construction vehicles. | X | | | | |
| | | | Minimize the area and duration of exposed soil during construction. | X | | | | |
| | | | Conduct regular maintenance of vehicles and machinery. | X | X | | | |
| | | | Use clean air technologies (catalytic converters) for all equipment and motor vehicles. Idling equipment will not be permitted. | X | X | | | |
| | | | Implement an air quality monitoring program. Set up standards to be respected in collaboration with DEH. | X | X | | | |
| **Noise** | | | | | | | | |
| Residential properties and commercial areas are founded in the surrounding environment. Aircrafts fly over residential properties. . | Selection of efficient and low-noise equipment;<br>Best practices in terms of building noise insulation.<br>Selection of optimal routes for aircraft considering noise | Increase of the ambient noise during construction phase with associated nuisances to local population | Comply with noise standards during the construction to minimize the disturbance to wildlife and local residents. Establish standards to be respected in collaboration with DEH. | X | X | Noise monitoring prior to construction works in order to establish baseline data. A noise modelling around the airport with isocontours | Department of the Environmental Health. | Baseline characterization and isocontours modelling including aircraft noise modeling for |

| Environmental and social issues at the site | Environmental aspects introduced within the masterplan | Potential Environmental Impact | Mitigation measures | Construction phase | Operation phase | Recommended Future Studies | Stakeholders to be engaged | Estimated Costs for Future Studies |
|---|---|---|---|---|---|---|---|---|
| | impacts for island residents | Operational activities lead to noise emission during landing and take-off along the aircrafts routes. | | | | to show airport activities influence in the surrounding environment.<br><br>Baseline data will be compared to monitoring data during construction phase and operation. Standards to be respected for ambient noise inside buildings and in the surrounding environment will need to be establish by the Department of the Environmental Health | | land use compatibility planning (DNL or NEF)<br><br>$20,000 |
| | | | Comply with UK Noise standards for aircraft noise | | X | | | |
| | | | Maintain a tight schedule during the construction phase in order to minimise impact period. | X | | | | |
| | | | Reduce noise of ground activities at the source or through the use of sound barriers and deflectors. | X | X | | | |
| | | | Inform surrounding communities and commercial stakeholders of noisy construction activities ahead of the start of works. | X | | | | |
| | | | Implement preferred procedures and routes for landing and takeoff (LTO) to minimize potential noise from approaching and departing aircraft for noise-sensitive areas. | | X | | | |
| | | | Use of night time or other operating restrictions. | | X | | | |
| **Water Resources** | | | | | | | | |
| The airport site shows a lot of runoff water, apparent ephemeral ponds and water retention during important rain event..<br><br>Ponds help in water retention on site, prevent flooding extend and constitute a non-negligible fauna habitats. | Optimization of the runway footprint in order to reduce encroachment within the ponds<br><br>Water retention capacity of ponds lost will be compensated by an increased water capture in the runoff water management<br><br>Install effective interceptor, oil/water separators and | The runway reconfiguration will lead to a loss of about 5,000 $m^2$ of the easterly wetland area and along the east-west ponds.<br><br>Sediment migration during the construction period may increase the suspended solids loading on the aquatic habitat and | Obtain a permit for construction works in Cayman waters and comply with its prescriptions. | X | | Set up water quality monitoring program in marine environment and in natural ponds (prior to construction works to establish baseline conditions). | Water Authority<br><br>Department of Environment | Samples collection and analysis for two seasons<br><br>$15,000 |
| | | | Develop a complete in water works protocol to be strictly followed during construction phase. | X | | | | |
| | | | Avoid works, material deposit within the high water marks borders. | X | | | | |

| Environmental and social issues at the site | Environmental aspects introduced within the masterplan | Potential Environmental Impact | Mitigation measures | Construction phase | Operation phase | Recommended Future Studies | Stakeholders to be engaged | Estimated Costs for Future Studies |
|---|---|---|---|---|---|---|---|---|
| | treatment capacity in drainage system.<br><br>Avoidance of any development within the high water marks<br><br>Specific attention to runoff treatment at fuel and chemical storage, transport and dispensing facilities, airplane maintenance hangars, and ground service vehicle maintenance facilities. | in the drainage system.<br><br>Construction works within the swamps could impair water quality (mainly suspended particles and hydrocarbon contamination) | Install and maintain silt fence and rock flow check dams would for the duration of the construction phase. Maintenance would include the clean-up and disposal of silt after each rainfall and as directed by the airport manager. | X | | | | |
| | | | Keep stockpiles of materials and excavated material away from natural water, and ensure that they are confined using wooden “cribs” (or other means). | X | | | | |
| | | | Re-vegetate or pave denuded areas as early as practical. | X | | | | |
| | | | Schedule works where possible in the drier months to minimize the potential for silt migration. | X | | | | |
| | | | Use biodegradable hydraulic oil for machinery and other equipment used near the ponds bank, in the tidal zone and in water. | X | X | | | |
| | | | Store all bulk fuel and lubricants in a secure area (bund walls with an impervious layer). Use existing facilities for storage and handling of hazardous materials and maintenance of machinery. | X | | | | |
| | | | Conduct any fuelling and services at a designated site away from surface water and marine environment. | X | X | | | |
| **Climatic events** | | | | | | | | |
| Cayman Islands lie within the North Atlantic hurricane belt and are seasonally affected by tropical depressions, tropical storms, and tropical cyclones. | Avoidance of further development of the runway within the flooding plain and within the limit of the high water marks, except for a | Risk of major climatic event and degradation of airport infrastructures.<br><br>This situation will reduce | Develop and update the emergency plan in case of major climatic event. | | X | Detailed flood study is recommended to assess the potential for serious flooding, associated risks and | Department of the Environment<br><br>National Emergency | Submersion and Extreme Events Flooding Vulnerability Study : $40,000 to |

| Environmental and social issues at the site | Environmental aspects introduced within the masterplan | Potential Environmental Impact | Mitigation measures | Construction phase | Operation phase | Recommended Future Studies | Stakeholders to be engaged | Estimated Costs for Future Studies |
|---|---|---|---|---|---|---|---|---|
| Expected flooding events coming from marine water and on-site ponds.<br>Island over the world are also considered as more vulnerable to climate change. Cayman Islands Climate Change Policy identifies the need for integration of climate changes considerations in developments as:<br><br>Increase site-specific coastal construction setbacks<br><br>Build a Climate-proof fuel terminal as proposed by the Climate Change Policy<br><br>Improve storm-water management<br><br>Integrate hazard vulnerability and risk assessments into development planning processes<br><br>Establish coastal construction setbacks based on flood risk mapping | limited area.<br>Hurricane protection measures | the potential of evacuation by plane during major natural event. | | | | appropriate works and measures to reduce these risks and associated impacts, if necessary.<br>Submersion and Extreme Events Flooding Vulnerability Study<br><br>Erosion Vulnerability Study | Operations Centre | $60,000<br><br>Erosion Vulnerability Study $50,000 |
| **Contamination and waste management** | | | | | | | | |
| Relocation of the existing fuel tank with potential contamination and needs for remediation and hazardous material management.<br><br>Demolition of existing building and waste management (potential for hazardous material)<br><br>Limited facilities for management of hazardous waste on Cayman Brac and needs for shipping of hazardous | Expansion of the existing building with limited demolition works.<br>Decommission of the existing fuel farm and rehabilitation of the site as a part of the pre-construction works. | Contamination of the receiving environment from construction and operational activities. | In consultation with DEH, develop a proper waste management plan, based on the 4Rs-D, including hazardous waste and a contaminated soils management plan. | X | X | Environmental site assessment Phase 1 and Phase 2 at the fuel farm<br><br>*Note: Fuel farm Phase 1 and 2 to be responsibility of fuel supplier.* | Department of the Environmental Health. | $20,000 |
| | | | If contaminated soil is suspected/discovered, cease work in the area until it has been tested by an expert in contaminated sites management. | | | | | |

| Environmental and social issues at the site | Environmental aspects introduced within the masterplan | Potential Environmental Impact | Mitigation measures | Construction phase | Operation phase | Recommended Future Studies | Stakeholders to be engaged | Estimated Costs for Future Studies |
|---|---|---|---|---|---|---|---|---|
| wastes out of the Islands. Contamination risks during construction works related to possible spills of oils, hydrocarbons and hazardous wastes<br><br>*Note: Fuel farm Phase 1 and 2 to be responsibility of fuel supplier.* | | | Soils with levels of contamination exceeding relevant guidelines will be disposed of accordingly and not used elsewhere onsite. Remediation at the site. | | | | | |
| | | | Minimize spills of hydrocarbons by the implementation of “good practices” | X | X | | | |
| | | | Limit the movement of machinery to the work areas. | X | X | | | |
| | | | Store all bulk fuel and lubricants in a secure area (bund walls with an impervious layer). Use existing facilities for storage and handling of hazardous materials and maintenance of machinery. | X | X | | | |
| | | | Continuously maintain vehicles and heavy equipment to ensure no leakage. | X | X | | | |
| | | | Prepare a spill contingency plan in the event of accidental spillage of contaminants. | X | X | | | |
| | | | Prepare an emergency preparedness and response plan that are specific to the nature of the operational activities. | | X | | | |
| | Waste management facilities and routing will be improved | | Develop a strict waste management programme, involving DEH. Some wastes such as hazardous liquid and solid wastes from the airport operations will require special storage and treatment. | X | X | | | |
| **Wildlife – Natural habitats** | | | | | | | | |
| Presence of turtles nesting area on the ocean side of the runway and | Minimization of RESA encroachment on the beach | Potential loss of turtle nesting habitat on a extend | Due to potential impacts to nesting turtles, do not permit piling and heavy | X | | Turtle nesting surveys in the vicinity of the | National Trust | $10,000 |

| Environmental and social issues at the site | Environmental aspects introduced within the masterplan | Potential Environmental Impact | Mitigation measures | Construction phase | Operation phase | Recommended Future Studies | Stakeholders to be engaged | Estimated Costs for Future Studies |
|---|---|---|---|---|---|---|---|---|
| risks of habitats degradation and behavior modification for turtles. | Surface treatment will be with non-compacted sand in order to not reduce nesting potential on-site<br><br>Avoidance of runway extension on the beach area.<br><br>A choice of buoys without light to limit interference with marine life behavior<br><br>The number of elevated light sources should be minimised and those that are elevated should be shielded on the seaward side (if feasible) with opaque, sufficiently large shielding devices. | of 1500 $m^2$<br><br>Disturbances of turtles behavior from nuisances on site<br><br>Risks of impacts on nesting sites from construction activities | construction in the coastal area.<br><br>Delineate the beach area and restrict any access in the sandy beach. | | | site. | DoE | |
| | | | Avoid construction of the RESA during the nesting season. Collaborate with the National Trust in order to select the best schedule for works. | X | | | | |
| | | | Avoid machinery and material pilling on the beach. Avoid working area on the beach. | X | | | | |
| | | | Keep night time works and operations to a minimum | X | X | | | |
| The site is bordered at the south and east by ponds which constitute the only natural ponds in Cayman Brac. | Optimization of the runway strip footprint in order to reduce encroachment within the ponds | The runway strip/graded area extension will lead to a loss of about 15-20,000 $m^2$ of the ponds. | Respect No net loss of wetlands as promoted by the Biodiversity Action Plan. Participate to compensation activities for wetland protection in Cayman Islands in collaboration with the National Trust and the Department of Environment. | X | | Prior to construction works undertake biological surveys in the ponds comprising minimally :<br><br>Birds surveys in the migration period<br><br>Aquatic fauna (fish and benthos) and habitats, including sediment quality | Department of Environment | $25,000 |
| | | | According to surveys results, schedule construction works, in collaboration with the Natural Trust and the DoE, during the most optimal period. | | | | | |
| Presence of Rock Iguanas (endangered species) nesting along | Replacement of the fence with concrete foundations including | Destruction of Rock | If Rock Iguanas nests are found within the airport boundaries, communicate | X | X | | | |

| Environmental and social issues at the site | Environmental aspects introduced within the masterplan | Potential Environmental Impact | Mitigation measures | Construction phase | Operation phase | Recommended Future Studies | Stakeholders to be engaged | Estimated Costs for Future Studies |
|---|---|---|---|---|---|---|---|---|
| the fence at the northern part of the site. They come from the dry shrubland to the north and dig holes to enter within the boundaries of the airport. Many holes at the bottom of the fence have been seen. | fence post foundation construction and installation of 2.1 metre chain-link fence with 300mm 3-strand barbed wire. | Iguanas habitats | with Department of Environment to develop the proper management strategy. | | | | | |
| | | | Schedule fence construction period with the National Trust and the DoE in order to minimize impacts on the Rock Iguanas. | X | | | | |
| | | | Reduce habitat encroachment during works and use existing cleared areas for material pilling and works areas. | X | | | | |
| The tree clearing zone overlaps a Rock Iguana habitat | | | Undertaken selective clearing within the anticipated clearing area in order to minimize Rock iguana habitat degradation and loss | X | X | | | |
| | | | Schedule tree clearing with National Trust and DoE in order to minimize impacts on the Rock Iguanas. | X | X | | | |
| Aggregates and materials supply needed for construction works could cause :<br>• Destruction of natural habitats and ground water quality impairment at local quarries<br>• Risks of introduction of invasive species from oversea quarries and potential impacts on local biodiversity | Conservation of existing airport elements to reduce need for more developments. | Risks of invasive species introduction with associated modification in local flora and fauna communities. | Re-use material from site pre-construction activities to minimize additional volume required. | X | | | | |
| | | | Collaborate with a certified quarry, with consideration of their environmental practices and invasive species eradication practices. | X | | | | |
| | | | Remove topsoil where re-grading is required. Topsoil removed during construction will be stockpiled onsite and re-used during the restoration works. | X | | | | |
| | | | Require from suppliers that they implement invasive species control measures (flora and fauna) so that any imported good, as well as the packaging, | X | X | | | |

| Environmental and social issues at the site | Environmental aspects introduced within the masterplan | Potential Environmental Impact | Mitigation measures | Construction phase | Operation phase | Recommended Future Studies | Stakeholders to be engaged | Estimated Costs for Future Studies |
|---|---|---|---|---|---|---|---|---|
| | | | will be invasive-species free. | | | | | |
| The increase in the total flights volume expected from the airport improvements is likely to result in secondary developments that could lead to an increase in habitats loss and natural resources consumption. This is particularly problematic in Cayman Brac as there is no Development plan for the island. | | Secondary developments with an increase in habitat loss and natural resources consumption. | Any secondary developments should be carefully planned, controlled and managed to minimize land take and encourage sustainable use of natural resources. | | X | | | |
| **Marine environment** | | | | | | | | |
| The west side of the airport property is fringed by a proposed Marine Reserve. The area hosts rich and diverse marine habitats which attract divers.<br><br>Installation of buoys could lead to habitat degradation if installed in a hard substrate as coral | Extension through the west in order to avoid any marine reclamation. | Risks of marine habitats degradation by construction and operational activities<br><br>Impairment of marine water quality | Do not discharge debris, trash, waste, materials, etc., in the aquatic environment. If necessary, immediately recover the debris, garbage, waste, materials, etc.<br>On a daily basis, collect and sort various waste as either recoverable waste or waste to be eliminated | **X** | | Set up marine water quality monitoring program in adjacent marine environment. The baseline data will be established.<br>Marine biological surveys assessing natural habitats and benthic communities | Department of Environment<br><br>Water Authority | See Water quality |
| | Selection of optimal location for the buoys | Destruction of marine habitat | Based on marine habitats characterization select the optimal location for the buoys in order to avoid coral. | X | | | | |
| **Wildlife hazards** | | | | | | | | |
| Animal and birds strikes (2-5 bird strikes/year) are related to the presence of birds which could be associated with the presence of water extensive ponds area, proximity to marine environment and presence of vegetation around the airport. Birds include residents and migratory species. Indeed, various<br>species of migrant water birds can be observed frequently during the winter months. Under the Animal Law, all | Improvement of the drainage system in order to reduce water accumulation on-site.<br><br>Vegetation and trees maintenance | To a lesser intensity, birds strikes by the airport operational activities.<br><br>Birds and other fauna kills to prevent wildlife hazards, with potential impacts on national protected species. | Update gradually the wildlife hazard management plan and explore additional wildlife repellent and harassment techniques measures as falconry. Pilot study for non-lethal repellent methods should be undertaken | | X | | | |

| Environmental and social issues at the site | Environmental aspects introduced within the masterplan | Potential Environmental Impact | Mitigation measures | Construction phase | Operation phase | Recommended Future Studies | Stakeholders to be engaged | Estimated Costs for Future Studies |
|---|---|---|---|---|---|---|---|---|
| non-domestic birds are considered as protected species. | | | | | | | | |
| **Security** | | | | | | | | |
| Visual observations suggest that many buildings and trees violate transitional zoning adjacent to the runway. | Complete a selective trees cutting<br><br>Vegetation and trees maintenance | Loss of trees and associated natural habitats within the urban area. | Undertake selective tree clearing | X | X | | | |
| | | | Replant at least an equivalent number of trees in alternative location using native species. | X | X | | | |
| | | | Undertake a regular maintenance of elements constituting a potential impairment to safety. Implementation of planning restrictions regarding buildings in vicinity of airport. | | X | | | |
| **Life Quality** | | | | | | | | |
| Residential properties are founded around the airport area, mainly along the southern part of the runway and the aircraft routes for the arrival are over residential area | | Reduction of Air Quality from an increased in flight frequency. | Liaise with local communities prior to the beginning of construction works to explain the objective and benefits of the Project. | X | | | | |
| | | | Prior to construction works, put in place a grievance mechanism for local population in order to have a formal process for any complaints associated with the airport activities. | X | X | | | |
| | | | Undertake air quality monitoring during construction and operational phase | X | X | | | |
| | | Visual impact of works and light pollution | Undertake good site management, hoarding, limited night working | X | | | | |
| | | Noise disturbance to local residents from increased | Make sure that aircraft transport routes ensure that aircraft approach and depart | | X | | | |

| Environmental and social issues at the site | Environmental aspects introduced within the masterplan | Potential Environmental Impact | Mitigation measures | Construction phase | Operation phase | Recommended Future Studies | Stakeholders to be engaged | Estimated Costs for Future Studies |
|---|---|---|---|---|---|---|---|---|
| | | flights | from the airport along specified corridors to minimise the impacts of noise. | | | | | |
| | | | Do not permit aircraft to conduct any circling approaches of manoeuvres on the east side of the airport. This will ensure the entire coastal area is not over flown by aircraft. | | X | | | |
| | | | Promote departures that are straight out until reaching at least 5000-6000 ft. before turning away from the coastal areas. | | X | | | |
| | | | Undertake noise monitoring at regular intervals during construction works and operational activities. | X | X | | | |
| | | | Monitor noise levels on an annual basis to generate annual updates to the airport NEF contours to determine the noise environment following construction. | | X | | | |
| | | Potential tree clearing on private properties | Compensate tree clearing by the funding of other low landscape meanings | X | X | | | |
| Presence of properties and buildings in close proximity to the airport boundaries with the potential need for land acquisition for further airport expansion. | Restriction of Project footprint | Social impacts related to the relocation of buildings and activities on-site. | Implement Resettlement and compensation process complying with Land Acquisition Law and associated process.<br><br>Undertake a survey of the assets for displaced properties with the Land & Survey Department | X | | | | |
| **Existing infrastructures** | | | | | | | | |
| Presence of existing infrastructures on-site and modification of power line and pipes routes | Integration of the existing infrastructures within the | Risks of damages during construction activities | Integrate participation of CIAA and competent authorities in the infrastructure design phase and during | X | | | | |

| Environmental and social issues at the site | Environmental aspects introduced within the masterplan | Potential Environmental Impact | Mitigation measures | Construction phase | Operation phase | Recommended Future Studies | Stakeholders to be engaged | Estimated Costs for Future Studies |
|---|---|---|---|---|---|---|---|---|
| | project design. | Restriction of access | construction planning. | | | | | |
| Increase of traffic on used roads for material transport | | Congestion along the route taken through the airport | Target low-traffic periods for moving material to the site while considering potential nuisances for communities located along roads. | X | | | | |
| | | | Optimize the transport route through the airport in order to select the most optimal. | X | | | | |
| | | | Community engagement to inform stakeholders of construction activities with potential for nuisances (i.e. long convoys, construction traffic movement schedules etc.) | X | | | | |
| Construction works in the context of an airport with on-going activities. | | Interference of construction with air traffic movements | Liaise with air traffic control to select best timing of work, use of dedicated airside routes for construction traffic, regulation of types of vehicles in use airside. | X | | | | |
| | | Potential for visitors to experiment bad experience at the airport and raise of complaints from visitors | Put in place adequate signage in construction areas. | X | | | | |
| | | | Promote the fluidity of visitors movement within the airport in order to provide the best experience possible. | X | | | | |
| | | | Prior to construction, put in place a dedicated area to collect visitors complaints. | X | | | | |

### 7.18.1 Environmental Conclusions and Recommendations

Based on the foregoing, the following conclusions and recommendations were derived for CKIA:

**Encroachment within the Westerly ponds**

The Westerly ponds located within the site constitute important ecological habitats as they represent the only natural ponds on Cayman Brac. Even if the proposed runway strip has been optimized and graded with some filling the ponds will remain and function as they do today. The work in the ponds will necessitate some in-water works with possible associated impacts on water quality and local biodiversity. The mitigation measures proposed in Table 7-6 allow for a considerable reduction of the anticipated impacts. As the airport opeations has impacted the ecological integrity of the ponds, notably from wildlife management, compensation measures could be planned with the National Trust and the DoE.

**Sensitive marine and coastal ecological area**

The extreme western side of the runway is bordered by a turtle nesting site and fringed by a proposed Marine Reserve hosting a rich biodiversity. Construction works for the RESA will need to follow best environmental practices in order to avoid degradation of a turtle nesting sites and local contamination from hydrocarbons. The location of the buoys should be carefully selected to avoid any benthic habitat destruction. No pollutants should be released to the beach and the marine environment, which involves a good management of runoff water on-site in order to avoid any physic-chemical impairment in the natural environment.

**Rock Iguanas habitats**

There are Rock iguanas actually coming within the airport boundaries since the north side of the site hosts a habitat for such species. The presence of this endangered species habitat will require carefully planned works during the replacement of the fence as well as during the vegetation trimming and tree clearing to avoid any impairments to the species population. Habitat encroachment will need to be minimized and works well planned to avoid any sensitive period according to the species ecology.

**AeronauticalSafety**

Safety of aircraft operations has been identified as one of the major priority for this airport redevelopment. Vegetation trimming, tree clearing and restrictions on building and other obstacle heights are required now and in the future to comply with regulatory requirements which dictates maximum allowable heights of objects. However, as private properties are located in the airport surrounding environment, safety needs could involve vegetation management on private land and potentially land acquisition for improved control by the CIAA.

**Environment contamination management**

The fuel farm leads to the need for the consideration of contaminants release during their decommissioning. An environmental site assessment phase 1 and phase 2 will allow identification potential problematic areas and planning of proper site remediation. These studies would be the responsibility of the fuel supplier who hold the lease for this area on the airport property.

The environmental scoping process identified a number of key recommendations which could be integrated into the project implementation to reduce the potential for significant environmental and social impacts to occur. Environmental and social considerations in the master plan focused on the following:

- Maximise the existing airport infrastructures conservation and restrict Project foot print
- Reduce expected air quality impairment
- Reduce emitted noise level with associated nuisances
- Properly managed runoff water with interception of pollutants that can be emitted to the environment
- Protect the mangrove buffer, with consideration of its ecological role and role in coastal protection, and limit development close of the coastal margins

Various studies recommended to be undertaken have been identified in the scoping tables and summarized below in Table 7-7 for CKIA. The proposed studies have been separated into two categories:

- Recommended studies to support the short-medium term master plan projects to guide the final design and construction process; and

- Recommended studies to develop baseline data for the long-term expansion projects proposed in the master plan. These are primarily focused on understanding the existing environment before major projects are implemented including expansion of the apron and commercial areas and the long-term terminal building expansion.

**Table 7-7 - Summary of Recommended Envrironmental Studies**

| Recommended Studies | Cost Range | Schedule |
|---|---|---|
| **For Short to Medium Term Master Planning Recommendations** | | |
| Submersion and Extreme Events Flooding Vulnerability Study | $40,000 to $60,000 | Short-Term |
| Erosion Vulnerability Study | $50,000 | Short-Term |
| Turtle nesting surveys | $10.000 | Short-Term |
| Benthic habitats characterization and location, and sediment sampling | $15,000 | Short-Term |
| Water quality in the marine environment and in natural ponds (prior to construction | $15,000 | Short-Term |
| **Long-term Baseline Data Development** | | |
| Air quality baseline characterization | $40,000 | Short-Medium Term |
| Noise baseline characterization and isocontours modelling | $20,000 | Short-Medium Term |
| Birds surveys | $10,000 | Short-Medium Term |

## 7.19 SUMMARY OF AIRPORT MASTER PLAN RECOMMENDATIONS

Based on the foregoing and considering both technical and environmental aspects of the various airport layouts proposed, Tables 7-8 and 7-9 present a summary of the recommended master plan elements for CKIA in addition to key technical and environmental studies that should be considered in support of the next phases of implementation.

Each master plan and study recommendation has been categorized in accordance with the following prioritization criteria established for this study:

***Priority 1*** - Risk, safety and compliance issues - all Airports

***Priority 2*** - ORIA: terminal capacity shortfall

***Priority 3*** - ORIA: Short / Medium term Airfield Capacity Issues

***Priority 4*** - Little Cayman: long term public airport solution

***Priority 5*** - Long term capacity building / commercial opportunity

In addition, a target implementation schedule is also proposed based on the following groupings established for this master plan:

**Short-term:** 0-5 years

**Medium-term:** 6 -10 years

**Long-term:** 11-20 years

The target implementation schedule as proposed in this section represents the desired schedule notwithstanding financial limitations and other prioritizations established for ORIA and LCA airports. The target implementation periods shown in Tables 7-8 and 7-9 only consider CKIA.

Section 9 of this report further assesses CKIA projects and establishes the final recommended phasing time frames through more detailed financial analysis taking into consideration the total Cayman Islands Airport System needs and priorities. As such, Section 9 should be referenced for the final recommended phasing plans for ORIA.

**Table 7-8 - CKIA Master Plan Recommendation Summary including Prioritization and Target ImplemenationSchedule**

| Item No. | Description of Master Plan Element | Prioritization Criteria | Target Implementation Schedule |
|---|---|---|---|
| 1 | Runway 09-27 Threshold -09 Reconfiguration and Runway 27 RESA (West End) relocation resulting in temporary reduction in published runway length to 5,800 ft. | Risk, safety and compliance | Short-Term |
| 2 | Runway 09-27 Threshold -27 Reconfiguration and Runway 09 RESA (East End) relocation to re-instate 6,010 ft. published runway length) | Risk, safety and compliance | Long-Term |
| 3 | Runway 09-27 – Graded area improvements (South side widening into ponds) | Risk, safety and compliance | Short to Medium-Term |
| 4 | Runway 09-27 – Municipal road re-alignment due to infringement on runway strip and obstacle limitation surfaces | Risk, safety and compliance | Short-Term |
| 5 | Runway 09-27 – Vegetation and object trimming and removals (Obstacle Limitation Surface infringements) | Risk, safety and compliance | Short-Term |
| 6 | ARFF Road construction parallel to Taxiway A | Risk, safety and compliance | Short-Term and Medium (Phased Construction) |
| 7 | Perimeter Road and Security Fencing | Risk, safety and compliance | Short to Medium Term |
| 8 | Marine Exclusion Zone Marker Buoys of West end of Airport | Risk, safety and compliance | Short-term |
| 9 | Relocation of MET Garden facilities | Risk, safety and compliance | Long-term (Triggered by Commercial Apron Expansion) |
| 10 | New Code C Taxiway Bravo to permit dual connections to the main terminal Apron | Long term capacity building / commercial opportunity | Long-Term |
| 11 | Relocation of the Fuel Facility to permit commercial airside FBO/Commercial development opportunity on the main apron | Long term capacity building / commercial opportunity | Short-term |
| 12 | Future East Apron Expansion to support growth in commercial and general aviation activity | Long term capacity building / commercial opportunity | Long-Term (Triggered by Commercial Opportunity) |
| 13 | Air Terminal Building Expansion | Long term capacity building / commercial opportunity | Long-Term triggered by major change in airline activity |
| 14 | Air Terminal Building Car park Expansion | Long term capacity building / commercial opportunity | Short-term |
| 15 | FBO/Commercial and Cargo Expansion on north side of main terminal apron (East and West sides) | Long term capacity building / commercial | Medium to Long-Term Triggered by |

**Table 7-8 - CKIA Master Plan Recommendation Summary including Prioritization and Target ImplemenationSchedule**

| Item No. | Description of Master Plan Element | Prioritization Criteria | Target Implementation Schedule |
|---|---|---|---|
| | | opportunity | Commercial Opportunity |
| 16 | AIS relocation into future FBO building/Leased offices | Long term capacity building / commercial opportunity | Medium to Long-Term Triggered by Commercial Opportunity |

**Table 7-9 - CKIA Master Plan Supplemental Studies including Prioritization and Target Implemenation Schedule**

| Item No. | Description of Recommended Supplemental Study | Prioritization Criteria | Target Implementation Schedule |
|---|---|---|---|
| **TECHNICAL STUDIES** | | | |
| 1 | Obstacle Surveys and ICAO Obstacle Limitation Surface Analysis and Mitigation Plans for Runway 09-27 | Risk, safety and compliance | Short-Term |
| 2 | Secondary Surveillance Radar Options Analysis – To review capability of CONCENSA radar to provide composite feeds to Brac. (System-wide based study) | Risk, safety and compliance | Short-Term |
| 3 | As-built Documentation/Condition and Code Compliance Assessment Study for Existing Air Terminal Building and Air Traffic Control Tower. | Risk, safety and compliance | Short-Term |
| **ENVIRONMENTAL STUDIES** | | | |
| 1 | Submersion and Extreme Events Flooding Vulnerability Study (Short-term requirements to support master plan recommendations) | Risk, safety and compliance | Short-Term |
| 2 | Erosion Vulnerability Study (Short-term requirements to support master plan recommendations) | Risk, safety and compliance | Short-Term |
| 3 | Turtle nesting surveys | Risk, safety and compliance | Short-Term |
| 4 | Benthic habitats characterization and location, and sediment sampling | Long term capacity building / commercial | Short-term |

**Table 7-9 - CKIA Master Plan Supplemental Studies including Prioritization and Target Implemenation Schedule**

| Item No. | Description of Recommended Supplemental Study | Prioritization Criteria | Target Implementation Schedule |
|---|---|---|---|
| | | opportunity | |
| 5 | Air quality baseline characterization (Recommended for future baseline comparisons as airport continues to develop) | Long term capacity building / commercial opportunity | Short-term |
| 6 | Noise baseline characterization and isocontours modelling (Recommended for future baseline comparisons as airport continues to develop) | Long term capacity building / commercial opportunity | Short-term |
| 7 | Water quality in the marine environment and in natural ponds (Recommended for future baseline comparisons as airport continues to develop) | Long term capacity building / commercial opportunity | Short-term |
| 8 | Birds surveys | Long term capacity building / commercial opportunity | Short-term |

# 8 LITTLE CAYMAN AIRPORT

## 8.1 CLIENT OBJECTIVES AND GUIDING PRINCIPLES

A series of client objectives were provided at the start of the master planning process prior to any analysis being completed. These objectives are listed the following Table 8-1. These client objectives have been considered and addressed as part of the analysis.

It was clearly established early in the master planning process that both the existing and proposed new airport site should be considered and evaluated as part of the planning process. As such, the following four scenarios were established and studied:

- Scenario 1 – Existing Site and Facilities (*Baseline Existing Conditions*)
- Scenario 1A – Existing Site with Extend Runway and Regulatory Improvements.
- Scenario 2 – Existing Site and Northern Expansion with New Runway and Regulatory Improvements
- Scenario 3 – New Site and New Airport (on CIG Owned Lands)

Refer to Exhibits 14 to 17 in Appendix A for graphical presentations of the above described scenarios.

**Table 8-1 - LCA Airport Client Objectives**

| No. | Facility | Client Objective |
|---|---|---|
| CO1 | CIAA Ownership | The objective is to provide an airport owned and operated by CIAA that complies with the regulations. |
| CO2 | Terminal Facilities | The objective is to provide an airport terminal to accommodate current and future passenger demand. |
| CO3 | Aircraft Storage and Maintenance Facility | The objective is to evaluate the need to provide infrastructure to accommodate aircraft storage or aircraft maintenance. |
| CO4 | Fire Service | The objective is to provide infrastructure for the Fire Service to ensure it meets existing and future demand while complying with international regulations. |
| CO5 | Aircraft Apron and Fuelling Area | The objective is to provide apron space and a fuel facility at the airport. The Little Cayman Airport currently does not have an apron or a fuel facility for airport operations |
| CO6 | Development of a New Runway | The objective is to evaluate the need to develop a new runway to accommodate flight operations into Little Cayman while meeting existing and future aircraft type demand and international |

**Table 8-1 - LCA Airport Client Objectives**

| No. | Facility | Client Objective |
|---|---|---|
| | | regulations. |
| CO7 | Airport Access | The objective is to provide a hard surfaced primary access road to the terminal area. |
| CO8 | Vehicle Airport Parking Facility | The objective is to provide a hard surfaced area capable of accommodating an appropriate number of vehicle parking spaces. |
| CO9 | Existing Site Constraints: | There are numerous constraints with the current airport location which will require to be considered. |
| CO10 | Natural Environment | The development of the airport, either at the existing site or a new site will have an impact on the natural environment. For example, there is an existing Red-footed Boobies Nature Reserve located directly south of the proposed airport site. This reserve is protected under the National Trust Law and the area has been designated an Animal Sanctuary and a wetland of international importance under the United Nations RAMSAR Convention. The conservation of the natural environment is of significance to the Cayman Islands including during and after any construction activities, and the Department of Environment (DOE), the Environmental Assessment Board (EAB) are to be closely involved. The master plan will include advice on the impact of any developments on the environment and will identify the assessments that will be required to be undertaken to identify the key issues, together with mitigation measures. |

In addition to the client objective described above, a number of additional master planning guidelines evolved through the master planning process specific to LCA and are summarized in Table 8-2 below. These guiding principles have been developed specifically as a result of communications with the client, stakeholders and a detailed review of the site conditions during the preparation of this master plan.

**Table 8-2 - Master Planning Special Guiding Principles, LCA**

| No. | Facility | Guiding Principle |
|---|---|---|
| GP1 | All development areas | Keep the airport very simple and basic to capture a similar feel and atmosphere of the existing airstrip. Minimize the size and complexity of the terminal building and keep the airfield simple. |
| GP2 | All development areas | The desire to begin implementation is very strong by the CIG and CIAA and the regulator. Consider a phased implementation that may even include an initial gravel topped airfield with no or limited reception building. |
| GP3 | All development areas | Regard for the environment and minimizing impacts is paramount. |

## 8.2 AIRPORT ROLE AND CLASSIFICATION

The proposed new Little Cayman Island airport will operate as a third tier airport to ORIA. It should be able to accommodate small to medium sized commercial and general aviation aircraft. Its primary role will be continuing to serve the domestic tourism industry on the island and to provide emergency air transport for medical and hurricane evacuations and relief efforts. LCA will play a vital and integral part of the Cayman Islands Transportation System.

The airport should be designed and operate to minimize its overall development footprint. To this end the airport will be designed to an ICAO, Code 2C, non-instrument operational classification. This restricts the runway length to 3,934 ft. but provides adequate operational flexibility to support the existing and future air traffic mix which include the aircraft being contemplated by Cayman Airways which may include the ATR 42/72 or the Saab 340.

It should be noted that the ATR and Saab 340 aircraft are classified as Code C aircraft but are certified to operate on runways that are 23m (75 ft. ) in width. To achieve Code C at Little Cayman, the proposed runway shall have a 75 ft. asphalt keel with 12.5 ft. turf sides to provide a published 100 ft. runway width complying with Code C requirements. Introducing a composite runway structure strives to minimize environmental impacts of the proposed airport while complying with aeronautical regulations.

Given the environmental setting of the airfield in an area of extensive bird activity, night time operations should be restricted or prohibited. The airport should only operate normally under day-time conditions. Furthermore, if required, special approach, circuit and departure procedures will be implemented to ensure safety of operations while minimizing impacts on the local environment.

The airport should be equipped with lighting systems for emergency purposes only.

## 8.3 PROPOSED AIRPORT FACILITIES

As part of the planning process, Table 8-3 summarizes the fundamental airport facilities contemplated for the initial build of the airport and those facilities that may be considered for long-term reserve purposes. This master plan identified appropriate space allocations for all facilities but only recommended the minimum facilities required to enable the project and to remain as operationally simple as possible while complying with regulatory requirements.

**Table 8-3 - LCA Master Planned Elements and Long-term Land Use Reserves**

| Item No. | Primary Airport Element | Master Plan Recommended Build | Long-term Reserve |
|---|---|---|---|
| 1 | Runway | Code 2C, non-instrument complete with RESAs<br><br>1,199 m x 30 m,<br>(3,934 ft. x 100 ft.)<br><br>*Note: Runway surface to have a 75 ft. asphalt keel with 12.5 ft. turf sides.*<br><br>Capable of supporting instrument approach procedures using land based or GNSS satellite based procedures down to 500 ft. and 2 statute miles.<br><br>Solar airfield lighting is proposed for use under emergencies only i.e. Medevac operations or aircraft emergencies. | No reserve for a runway extension |
| | Apron and taxiway | Capable of supporting one Code C aircraft and up to 4 Code A small single or twin engine general aircraft.<br><br>A single Code C taxiway connecting the apron and runway.<br><br>Solar airfield lighting is proposed for use under emergencies only.<br><br>Taxiway width proposed is 15m (50 ft.) | Apron expansion to support up to two Code C commercial air carrier aircraft and up to eight single engine Code A small single and twin engine aircraft<br><br>A long-term reserve for a full length parallel taxiway and an additional connector taxiway to the apron. The parallel taxiway will provide both more efficient long-term taxi operations but can also be phased should there be demand for general aviation hangars or additional tie down areas. |
| | Terminal Building | Initial build to provide a Terminal/Reception Building similar in size to that of the Existing Airstrip (10m x 12m)<br><br>Terminal/general public vehicle parking – 16 spaces<br><br>Water supply for terminal as well as for the outlying buildings would initially be | Future expansion of the terminal up to 20m x 20m<br><br>The future interior of the terminal shall be designed to provide space for:<br><br>• circulation and queuing space within the lobby area,<br>• snack bar and small retail space, |

**Table 8-3 - LCA Master Planned Elements and Long-term Land Use Reserves**

| Item No. | Primary Airport Element | Master Plan Recommended Build | Long-term Reserve |
|---|---|---|---|
| | | from a cistern and sewage collection via holding tank or small wastewater treatment package plant should be installed. | • airline check-in counters,<br>• departure baggage storage,<br>• security screening,<br>• a secure departure lounge with restrooms,<br>• restrooms for arriving passengers,<br>• an arrival queuing area and baggage claim area,<br>• an airport manager's office, and<br>• storage, electrical and mechanical rooms.<br>• A reverse osmosis plant may be necessary when the terminal is expanded or a deep supply well should be provided |
| | Air Navigation System | No land based electronic air navigation systems are proposed. GNSS Satellite based approaches should be basis of any future instrument approach procedure design. | No reserves for land based navigational aids are proposed. |
| | Cargo Operation | No dedicated cargo aprons or facilities are proposed. | No dedicated cargo aprons or facilities are proposed. |
| | General Aviation | Apron space has been allocated for limited hard top parking/tie-downs. Grass tie-down areas will be provided as part of initial airport development. | Reserves will be shown for a small General Aviation hangar and private taxiway for long-term planning purposes. |
| | Fuel Farm | Space will be allocated for a small above ground fuel tank system to supply avgas and Jet A-1. (approximately 5000 or 10,000 gal tanks) The final decision to supply fuel will need to consider the anticipated limited air traffic and impact on turn-over of the fuel. It is unlikely a fuel system will be practical due to low volume of air traffic. | No additional reserve provided |

**Table 8-3 - LCA Master Planned Elements and Long-term Land Use Reserves**

| Item No. | Primary Airport Element | Master Plan Recommended Build | Long-term Reserve |
|---|---|---|---|
| | Customs and Immigration and AIS | No provisions for government agencies are proposed. These services are available in CKIA.<br><br>AIS services can be offered via telephone or internet services. | No reserves/provisions planned. |
| | ARFF/Fire Service | ARFF service will be required to support commercial air service. It is anticipated that Category 3 will be required initially with a transition to Category up to 5 or 6 depending on the final aircraft mix.<br><br>Initially the existing ARFF facilities could be relocated from the existing airstrip which includes two ARFF Oshkosh vehicles and associated equipment.<br><br>ARFF area 11.5m x 24m (276 sq.m)<br><br>ARFF/Staff vehicle parking - 6 spaces | Provisions for ICAO ARFF Category 6 is planned to accommodate up to a Q400.<br><br>The long-term ARFF facility should consider the following design requirements:<br><br>• The Fire department facilities shall be a separate entity on-site. It shall be located in such a way that the apron, landing and take-off points will be visible. The Fire Station shall have 2 parking bays to accommodate one (1) fire truck plus one (1) back-up truck. The building shall have storage for hoses, fire extinguishers, etc. all around the vehicle bays and there shall be a space for one (1) 20' boat and a small tractor. It must also have an area for a workshop.<br><br>• There should be a lunchroom with kitchenette, a lecture room for at least 7 people, a communication room that will have direct communication with ORIA and CKIA towers, a control room and a mast/antenna. |

**Table 8-3 - LCA Master Planned Elements and Long-term Land Use Reserves**

| Item No. | Primary Airport Element | Master Plan Recommended Build | Long-term Reserve |
|---|---|---|---|
| | Perimeter Security | Provisions for a 2.4m security fence provided around the airport boundary. | Not applicable. |
| | ATC Tower | No ATC Tower is proposed. Using a local Unicom or mandatory frequency is proposed for air/ground communications or control via CKIA ATC similar to existing procedures. The number of aircraft movement forecast does not warrant an ATC Tower. | No reserves are proposed for a control tower. |
| | Meteorological Facilities | Provisions have been included for wind direction, temperature, and barometric pressure instrumentation. | Long term airfield reserve protects for an automatic weather observation system (AWOS). |

## 8.4 DESCRIPTION OF AIRPORT DEVELOPMENT SCENARIOS

### 8.4.1 General

The following describes the three scenarios assessed for Little Cayman in greater detail. These scenarios were developed over the course of the planning period and involved consideration of various inputs including those provided by the regulator, CIAA, CIG and very importantly the various stakeholders. It should be noted that all scenarios can be designed to achieve full airport certification in accordance with regulatory requirements.

### 8.4.2 Scenario 1/1A - Existing Site and Facilities

Under this scenario the existing airfield would be retained but all necessary airport regulatory improvements to provide a certifiable airport in compliance with ICAO/OTARs would be implemented. Minor renovations to the existing buildings (PTB and ARFF) would be included. This scenario was originally investigated as a standalone Scenario 1. However, as the study progressed, this scenario was re-evaluated as an intermediate phase of an expanded Scenario 1A Under Scenario 1A, the existing runway would be extended and widened along its existing alignment and necessary clearing and land preparation completed to achieve the a runway length of 3,934 ft. As part of a phased implementation plan, the existing airstrip with associated regulatory improvements could provide a suitable facility until sufficient funds and environmental mitigation planning is completed for fully expanded facility under Scenario 1A. Refer to Exhibits 14 and 15 in Appendix A.

### 8.4.3 Scenario 2 - Existing Site and Northern Expansion with New Runway and Regulatory Improvements

Under this scenario part of the existing airfield would be retained (east portion of runway and all of the taxiway, apron and buildings). A new realigned runway is proposed to a total length of 1199m x 30 m (3,934 ft. x 100 ft.) and would meet all regulatory requirements for a certifiable airport in compliance with ICAO/OTARs. Minor renovations to the existing buildings (PTB and ARFF) are also included and would be similar to those proposed under Scenario 1/1A. Refer to Exhibit 16 in Appendix A.

### 8.4.4 Scenario 3 - New Site and New Airport (CIG Owned Lands)

Under this scenario an entirely new airport is proposed on CIG owned lands about 2 kilometers northeast of the existing airstrip. A new paved runway is proposed to a total length of 1199m x 30 m (3,934 ft. x 100 ft.) and would meet all regulatory requirements for a certifiable airport in compliance with ICAO/OTARs. A new paved taxiway/apron will also be provided including a landside access road. The ARFF and Passenger Terminal Building would include a minimum build to model approximately the size and level of service currently provided by the existing airstrip facilities. Refer to Exhibit 17 in Appendix A.

## 8.5 COMPARATIVE ANALYSIS OF AIRPORT DEVELOPMENT SCENARIOS

Little Cayman with a population of less than 200, has until recently remained relatively undisturbed. However, the number of buildings has doubled in just the past few years (Procter & Fleming 1999). The airport is located at the south-east end of island in the higher concentration of human development in Blossom Village. The existing site lies approximately 350 m from the Booby Pond Nature Reserve hosting a rich associated biodiversity comprising a colony of red-footed boobies. The west side of the runway is adjacent to Crown owned wetland part of which is considered the Preston Bay Wetlands. The CIG government site lies immediately north of the Booby Pond Nature Reserve and about 2 kilometres northeast of the existing airstrip.

There are a number of evaluation criteria to consider as part of finalizing a preferred airport location of the Little Cayman Airport redevelopment. The primary factors to consider are cost, regulatory and most importantly for this airport is its environmental impact and any associated mitigation plans. To facilitate a high level comparative analysis, Table 8-4 was prepared that provides a matrix summary of the various factors considered and how each scenario compares. This comparative analysis aims to provide both technical and environmental justifications to either permit the selection of a preferred site or to suggest additional studies or actions be taken before a final decision is made.

Refer also to Exhibit 18 in Appendix A that presents the four scenarios in context of the local environmental and social features and constraints.

**Table 8-4 - LCA Scenarios 1/1A, 2 and 3 Comparative Analysis**

| COMPARATIVE FACTOR | EXISTING SITE | | PROPOSED NEW SITE |
|---|---|---|---|
| | Scenario 1/1A | Scenario 2 | Scenario 3 |
| **ENVIRONMENTAL CONSIDERATIONS** | | | |
| **Water Resources** | The existing site is located adjacent to a mangrove wetland (Known as the Preston Bay Westerly Ponds). No construction is expected within the wetland initially under Scenario 1. However Scenario 1A will expand the runway into this wetland requiring mitigation measures for water resources protection. Approximately 1.5 ha of this pond will be impacted due to the runway extension of approximately 300m (1,000 ft.).<br><br>This wetland is ecologically important for the protection of local species but also because the Cayman islands host seasonally migrant species that could use the wetland as a feeding or resting area. The ***Habitat Action Plan*** identifies a number of key mangrove habitats that should be protected including those on Crown land/wetland. This wetland is located on Crown land per Exhibit 18 in Appendix A and it is therefore considered protected by inference. | Limited interaction with the adjacent wetland in terms of infrastructures is proposed under this scenario. To achieve this, the proposed runway is rotated slightly to avoid the wetland while balancing its alignment with respect to prevailing winds. Approximately 2.4 ha of wetland area, comprising mangroves, will have to be cleared. Mitigation measures for adjacent water resources protection will have to be followed. | Site is introduced in the Dwarf Red Mangrove Wetland. The project footprint could cover 1.4 ha of wetland area. The soil is typical to wetland soil, hydromorphic, which shows signs of permanent water presence and periodic flooding.<br><br>Extensive in-water works and operation activities could results in an impairment of water quality in the wetland that could migrate to adjacent habitats via hydrological connectivity. Additional costs are expected in the management of water quality issues and reduction in expected hydrological impacts. |
| **Wildlife – Natural habitats** | Minimized encroachment in natural habitats by the optimization of existing anthropic area. In terms of concerns for natural habitats and associated species, this constitutes the “least impact scenario” under Scenario 1. Scenario | The runway construction avoids the encroachment in the mangrove area but will require the clearing of a substantial area of dry forest and shrubland on 12 in an ecologically interesting habitat | Development on a greenfield with associated habitat loss, degradation and fragmentation representing a mixture of mangrove, dry scrublands and dry forest and woodland. It goes against multiple targets integrated in |

**Table 8-4 - LCA Scenarios 1/1A, 2 and 3 Comparative Analysis**

| COMPARATIVE FACTOR | EXISTING SITE | | PROPOSED NEW SITE |
|---|---|---|---|
| | Scenario 1/1A | Scenario 2 | Scenario 3 |
| | 1A, extension into the wetland will impact natural habitats to a greater extent.<br><br>With respect to the visual zone, there will be a need for clearing of an area of 12 ha in the mangrove, dry shrubland and forest. The mangrove consists of button mangrove species and has typical hydromorphic soils. | in terms of interface in between aquatic and terrestrial habitats.<br><br>Lands to be acquired comprise lands associated with the National Trust Land. | the Cayman islands National Biodiversity Action Plan. About 30 ha will need to cleared for the new airport.<br><br>The Mangrove wetland in which the Project will be inserted is the only Interior mangrove wetland in Little Cayman, being totally isolated from the coast, giving to it a unique characteristic. It is a mangrove area with black, white and red mangrove trees.<br><br>Even if the site has been cleared in the past, the vegetation has regrown densely and natural habitats are regenerating.<br><br>Birds from the Booby Nature Reserve are moving north through the projected airport site. National Trust already expanded the Booby nature Reserve by the acquisition of a buffer zone adjacent to the Nature Reserve towards the north.<br><br>Rock Iguanas have been recently observed in the area. |
| **Wildlife hazards**<br><br>*(Refer to the diagram below the most up to date* | Even considering the high number of boobies on the island and that the existing airport is located such that departing aircraft fly through the primary | As the proposed runway is located adjacent to the existing runway, the ecological context for birds presence could be similar to | Movements of birds in this area have not been assessed. However, the red-footed boobies are known to fly north and the colony is moving toward this |

**Table 8-4 - LCA Scenarios 1/1A, 2 and 3 Comparative Analysis**

| COMPARATIVE FACTOR | EXISTING SITE | | PROPOSED NEW SITE |
|---|---|---|---|
| | Scenario 1/1A | Scenario 2 | Scenario 3 |
| *plot of red-footed booby flight paths)* | flight line of Boobies as they leave and return to and from the colony, there are few birds strikes (2-4) implicating mainly egrets and ducks. They occur mainly during the rainy season, when there are more ephemeral ponds and when planes take off or are on the ground. | Scenario 1/1A. However, birds surveys at the proposed airfield should be undertaken since the last known mapping of bird flight paths was in 1998. | site. The presence of a consequent mangrove area closed to the airport (Interior Dwarf Red Mangrove Wetland) raise wildlife hazards issues according to its ecological role for birds.<br><br>The existing landfill is approximately 2 kms directly east of the proposed new airport site but the dedicated area has a larger extent which is adjacent to the proposed new site This has the potential of introducing hazards from bird-feeding activity or a risk for visibility due to burning of trash. Birds use of habitats within the approach and departure zones increase the likelihood of wildlife strikes (Blackwell et al., 2009).<br><br>A study on the flight patterns of the boobies in 1998 advised against an airport north of the Booby pond, owing to flight patterns taking boobies in that direction and because that magnificent frigate birds tend to ride thermal just north of the colony (National Trust, 2011). Refer to the flight path diagram below.<br><br>Ecosystems degradation, which is anticipated for the new site, could lead to a positive species response leading to a local increase in |

**Table 8-4 - LCA Scenarios 1/1A, 2 and 3 Comparative Analysis**

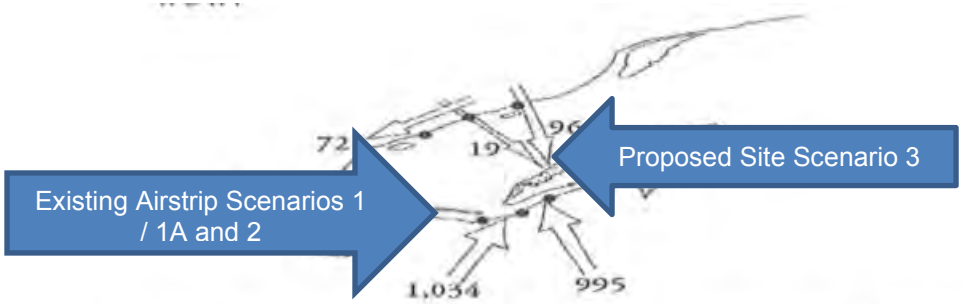
| COMPARATIVE FACTOR | EXISTING SITE | | PROPOSED NEW SITE |
|---|---|---|---|
| | Scenario 1/1A | Scenario 2 | Scenario 3 |
| | | | generic species (Dao-De, 2010) associate with birds strikes in Little Cayman. |
|  *Fig. 4: Shore watch counts of Red-footed Boobies returning to the colony. Black circles indicate stations occupied for 3 hours ending at nightfall, 3rd to 11th February. Note the overland returns were only observed late, in near darkness.* | | | |
| **Life Quality** | The Salt Rock Trail is a notable feature in the vicinity of the existing airport. This is located north of the airstrip. This trail is considered very important to tourism since most visitors to Little Cayman walked the trail. The trail has scenic, historic value. | | Introduction of an airport in a planned residential area in close proximity of the west end of the site. |
| | Limited interaction with the entrance of the trail, but tree clearing along the trail on 125m which will impact the scenery. | Overlapping of the runway with 300 m of the trail. | |
| | Existing roadway crosses the southern and eastern end of the airport. Traffic restrictions during aircraft landing. | | |
| **Land acquisition/Total Airport Property Area** | Needs for land acquisition of up to 187 ha for full lots. Associated impacts and complications associated with negotiating with numerous land owners. | Needs for land acquisition of up to 152 ha for full lots. and complications associated with negotiating with numerous land | Land has already been acquired by CIAA so there is no need for land acquisition. Land area owned is 160 ha. |

**Table 8-4 - LCA Scenarios 1/1A, 2 and 3 Comparative Analysis**

| COMPARATIVE FACTOR | EXISTING SITE | | PROPOSED NEW SITE |
|---|---|---|---|
| | Scenario 1/1A | Scenario 2 | Scenario 3 |
| | Related compensation and relocation issues for residential properties must consider both cost and social impacts. | owners. | |
| **Little Cayman experience for tourism** *(SITA has identified the simplicity and the unique charm of Little Cayman as a key selling point for local tourism)* | The existing airport is totally unique and contributes to the experience of the trip to Little Cayman. The location is directly adjacent to Blossom Village and the tourist is consequently introduced at arrival to the island main features and vibe. | Similar to Scenario 1 / 1A. | The proposed airport at the new site is a more typical airport development. It is relatively far from the main area and does not contribute to the instant experience compared to the existing site. |
| **Valorization (Re-use) of existing infrastructures and limitation of additional encroachment** | Full optimization of existing infrastructures. | Partial optimization of the east portion of runway and all of the taxiway, apron and buildings. | Development on a greenfield so no re-use of existing infrastructures with the exception of the ARFF vehicles/equipment.<br><br>Given the very low population, the new build would require a significant influx of labour, raising concerns amongst SITA that this would present a significant burden on local accommodation, infrastructure and possible crime prevention. |
| **Runway Alignment and Prevailing Winds** | Runway 10-28 is well aligned with the prevailing easterly winds. | Although the runway has been rotate, it remains Runway 10-28. The rotation makes this runway less aligned with the easterly prevailing wind conditions. | The proposed Runway 06-24 is the most aligned runway with respect to prevailing wind conditions on Little Cayman. |

**Table 8-4 - LCA Scenarios 1/1A, 2 and 3 Comparative Analysis**

| COMPARATIVE FACTOR | EXISTING SITE | | PROPOSED NEW SITE |
|---|---|---|---|
| | Scenario 1/1A | Scenario 2 | Scenario 3 |
| **Implementation Schedule** | Subject to expedient negotiations with existing land owners, the existing airstrip can be brought into regulatory compliance in a reasonable amount of time through primarily appropriate vegetation trimming and cutting and signalization for car traffic control along the existing road. Subject to agreements with landowners. The existing airstrip could be brought up to regulatory compliance in a few months. The full development Scenario 1A would require a multi-year approach for phased construction. Likely a 2 year construction period would be required. | Implementation would have to occur over a number of years to permit the construction of the new runway. The work can be phased to permit the use of a gravel runway until either a seal coat or full asphalt topping can be completed.<br><br>This scenario has some benefits in that it proposed to re-use the existing and ARFF facility reducing some of the implementation period.<br><br>Similar to Scenario 1A, the full development Scenario 2 would require a multi-year approach for phased construction. Likely a 2-3 year construction period would be required. | Similar to Scenario 2 implementation would have to occur over a number of years to permit the construction of the new runway. The work can be phased to permit the use of a gravel runway until either a seal coat or full asphalt topping can be completed.<br><br>Unlike Scenario 2, a new terminal and ARFF facility will need to be constructed although the airport could operate with temporary portable buildings initially to minimize investment costs and implementation time.<br><br>Similar to Scenario 2, the full development Scenario 2 would require a multi-year approach for phased construction. Likely a 3 year construction period would be required. |
| **Development Costs** | $20.5 million<br><br>*Note 1: Based on assumed land costs which would still have to be negotiated with land owners. Value of land acquisition for Scenario 1A was estimated a $8.02 million.*<br><br>*Note 2: Through a phased implementation, initial costs may only be $10.9 million if the existing airstrip were used with the appropriate regulatory upgrades. This would retain the existing* | $20.2 million<br><br>*Note 1 : Based on assumed land costs which would still have to be negotiated with land owners.*<br><br>*Note 2: Land acquisition costs make up $5.7 million of these costs.* | $20.1 million<br><br>*Note 1: This cost does not include any costs to the CIG associated with relocating the existing land fill located on the airport site to the east. It is recommended that this landfill be closed and relocated to avoid bird attraction in close proximity to the airport.*<br><br>*Note 2: There are no land acquisition costs. CIG owns these lands and will* |

**Table 8-4 - LCA Scenarios 1/1A, 2 and 3 Comparative Analysis**

| COMPARATIVE FACTOR | EXISTING SITE | | PROPOSED NEW SITE |
|---|---|---|---|
| | Scenario 1/1A | Scenario 2 | Scenario 3 |
| | *runway length and not include the western extension to 3,934 ft. The majority of these costs are associated with land acquisition. Land acquisition costs make up $6.95 million of these costs.* | | *transfer ownership to CIAA.* |
| **Stakeholder Consultations** | Generally, the DoE and National Trust appear to support his option on the basis it minimizing the total environmental impact since existing infrastructure is being re-used and the environment has adapted to an extent to the existing aviation activity.<br><br>Concerns have been expressed by the CIAA and CAACI on the potential impact on expanded air operations with respect to bird strike potential based on the location of the existing airstrip and the Booby Reserve.<br><br>SITA supports the redevelopment of the airport on the existing site. | Similar to Scenario 1/1A, the DoE and National Trust support this option over Scenario 3. This option is further supported above Scenario 1/1A on the basis that it further mitigates the encroachment in the wetlands to the west of the airstrip.<br><br>Concerns have been expressed by the CIAA and CAACI on the potential impact on expanded air operations with respect to bird strike potential based on the location of the existing airstrip and the Booby Reserve.<br><br>SITA supports the redevelopment of the airport on the existing site. | This option is the least supported from an environmental impact perspective.<br><br>CIAA and CAACI support this site given the investment in physical land, preparations and previous consultations and studies completed to date. |
| **Requirement for additional Environmental Assessment** | A detailed Environmental Impact Assessment is proposed before the final selection of the preferred option. | | |
| | | | |

**Table 8-4 - LCA Scenarios 1/1A, 2 and 3 Comparative Analysis**

| COMPARATIVE FACTOR | EXISTING SITE | | PROPOSED NEW SITE |
|---|---|---|---|
| | Scenario 1/1A | Scenario 2 | Scenario 3 |
| *Related references:*<br><br>• *Blackwell, B.F., Devault, L.T. and Fernandez-Juridic E. (2009). Wildlife collisions with aircraft: A missing component of land-use planning for airports, Landscape and Urban Planning 93, 1–9p.*<br>• *Dao-De, Y., Zhi-Qiang, Z. and Mao-Wang, H. (2010). Ranking birdstrike risk: A case study at Huanghua International Airport, Changsha, China, Acta Ecologica Sinica 30, 85–92 p.*<br>• *National Trust. (2011). Booby Pond Nature Reserve Management plan 2012-2015, Cayman Islands.* | | | |

## 8.6 CONCLUSIONS AND RECOMMENDATIONS

Based on the comparative analysis, there are number of benefits and dis-benefits associated with each scenario combined with the fact that the overall development costs are almost even between all scenarios. It appears that a final preferred scenario cannot be determined at this time. Since the costs for all scenarios are similar, the remaining factors that can affect the final decision making for a final preferred scenario appears to be related to the following two issues:

- Real value and complexity in acquiring the necessary private lands to permit Scenarios 1/1A or 2; and

- Potential impairment of the island's unique and threatened biodiversity, with an important focus on birds dynamic and flight patterns and the effects on aeraunatical safety i.e. Red Footed Booby Birds.

Both of these issues could not be fully assessed as part of this planning process and require future involvement by the CIG/CIAA in land negotiations and support to proceed with an Environmental Impact Assessment to further assess and quantify the environmental impacts of the scenarios.

For the Little Cayman airport, social acceptability should be ensured and consultation with local stakeholders, comprising land owners of potential acquired lands in the surrounding of the existing airport and National Trust, should be considered as a fundamental component guiding the final scenario selection. Additional consultations and detailed environmental studies should be planned in order to feed the comparative analysis and avoid any risks related to the options. One important study should be related to the birds movement on the islands in order to assess their flight patterns/routes and their ecological requirements.

Based on all of the above, it is recommended that the Little Cayman Airport project proceed to an Environmental Impact Assessment and that the CIG/CIAA enter into discussion with local land owner to determine the feasibility of land sales and values in support of developing the new airport based on the existing airstrip location and to make a final decision on the preferred site for the new airport.

# 9 FINANCIAL PLAN AND PHASING RECOMMENDATIONS

## 9.1 GENERAL

The purpose of the this section was to generate a realistic, practical and affordable airport system wide master plan phasing plan for the Cayman Islands Airport System. This process required a careful assessment of a number of priorities across each airport including:

***Priority 1*** - Risk, safety and compliance issues - all Airports

***Priority 2*** - ORIA: terminal capacity shortfall

***Priority 3*** - ORIA: Short / Medium term Airfield Capacity Issues

***Priority 4*** - Little Cayman: long term public airport solution

***Priority 5*** - Long term capacity building / commercial opportunity

All of the above was balanced against the financial constraints of the CIAA which include the inability to borrow money to finance the projects and, to ensure affordability of the projects using the cash flow generated by the CIAA over the master planning period. An annual cash flow from 2015 to 2032 of available financing for capital works and life cycle rehabilitation was provided through models developed by PwC.

To this end, all of the master planning recommendations generated for each airport were combined, costed and then logically phased on an annual basis to ensure affordability and that the desired priorities were optimized for each airport. All costs considered were fully loaded and included capital, life cycle rehabilitation costs and special study allowances which were recommended as part of the master planning process.

## 9.2 BASIS OF COST ESTIMATES AND ASSUMPTIONS

The following generally summarizes the basis of the capital costs estimates prepared to for this study:

- All costs were developed in 2014 CI$;
- 20% Contingencies were applied to all estimates;
- 10% soft costs were applied to all estimates;
- Costs for the Sister Islands were escalated by 25% to reflect additional costs for mobilization and remote construction;
- No inflation was applied to values. All costs are presented in 2014 CI$
- All costs are fully loaded and considered inclusive all of hard and soft costs to complete the work.
- CAPEX information provided by CIAA for years 2014-2015 considered in the models and where overlaps noted they were adjusted accordingly;
- An ongoing CAPEX and life cycle rehabilitation allowance was applied to ORIA, CKIA and LCA throughout the planning period;
- Building costs include an allowance for furniture, fixtures and equipment (FFE) including elevators, and other speciality airport systems like CUPP, CUSS, FIDS, HBS etc.

## 9.3 EXISTING FACILITIES LIFE CYCLE REHABILITATION

Rehabilitation of major airfield and landside infrastructure was included in the financial models based on conditions observed by the Consultant, reports provided by CIAA and the latest pavement condition report prepared in 2012 by the firm Pavement Technical Solutions which document 2011 pavement conditions at ORIA and CKIA. Where new infrastructure was constructed as part of the new master plan recommendations, applicable long-term rehabilitation was included where applicable over the life of the asset within the forecast term.

## 9.4 DETAILED PHASING AND FINANCIAL PLAN

### 9.4.1 Owen Roberts International Airport (Grand Cayman)

Table 9-1 presents the final recommended capital spend related to ORIA based on the short, medium and long-term planning periods. This table represents the final recommended prioritization of the various master plan recommendations balanced against CKIA and LCA priorities and financing capacity of the CIAA.

The following highlights some of the key features of the ORIA financial implementation plan:

- Runway 08-26 works are planned within the short-term to ensure all safety priorities and strengthening are in place for the change in aircraft by British Airways to the B777 series aircraft in 2016;
- A number of immediate pre-Phase 1 activities have been accounted for including the major spend of $250,000 to install the long-await covered apron walkway for the terminal building;
- The existing ORIA phased terminal expansion is planned to commence in 2015 and be continuous up to 2022 based on the proposed phasing priorities in this master plan;
- The fuel system relocation and associated landside access road should be prioritized in 2015 to ensure the initial expansion of the apron to the east can begin as soon a possible in 2015;
- Major work on the proposed parallel taxiway system has been deferred into years 12 to 15 due spend priorites associated with LCA. Shortly after LCA is complete funds become available which have been prioritized to complete the full parallel taxiway system at ORIA;
- Capital costs for certain airport master plan elements have not been included in the financial forecast since these particular elements were considered as special triggered events that would require additional financial analysis to confirm affordability and to justify the implementation. Refer to Table 9-2 below.
- Table 9-2 also includes a summary of investments that have been accounted for in the financial analysis by the CIAA that enable future commercial development opportunities for private investment with particular emphasis on general aviation, commercial airside and FBO type facilities.
- Table 9-1 also shows an allowance for special studies that have been recommended as part of the environmental scoping process. These studies are recommended to be completed over the short-term as part of enabling and supporting new construction work and also to establish baseline information for future expansion projects in particular in the East Development Area and the potential runway extension and closure and re-routing of Crewe Rd.
- Refer to Exhibit 9 in Appendix A.

**Table 9-2 –ORIA Special Triggered Master Plan Recommendations (Not included in Financial Analysis)**

| Item No. | Description | Cost |
|---|---|---|
| 1 | Greenfield Terminal Development Including New Control Tower (East Development Area) | |
| 2 | Runway 08- 26 Extension and Associated Airfield Pavement Strengthening (8000 ft.) - BA can operated with some load restrictions | |
| 3 | Runway 08-26 Additional 1200 ft. Extension into North Sound (East) to achieve BA Desired 9,200 ft. Runway Length | |
| 4 | Bridge Option 1 - Phase 4 ATB Expansion Covered 2 -Storey Walkway with Passenger Jet Bridges. | |
| 5 | Bridge Option 2 - Alternative Ground Loaded Bridges (No need for 2 storey open walkway) | |
| 6 | Land Acquisition Grand Cayman (Reserve for Long-term Greenfield PTB Development) | |
| 7 | US Preclearance (To be part of Long-Term Greenfield Terminal Development) | |
| 8 | Existing Air Terminal Building Phase 1A (Upper) - Renovations As Required For Commercial Use | |
| 9 | FBO/GA Infrastructure (Excluding Buildings/Hangars) | |
| 10 | East Development Area Access Road and Services (Based on FBO/Commercial Investment) | |
| | **TOTAL** | **$227,428,942.56** |
| 11 | ***Costs Accounted in Cashflow/Master Plan by CIAA to Enable FBO/GA*** | |
| 12 | *East Partial Parallel Taxiway (From Taxiway Delta to Threshold 26)* | |
| 13 | *Existing GA/Cargo Apron Rehabilitation (Currently in Poor Condition)* | |
| 14 | *Relocation of ARFF Fire Training Facility* | |
| | ***Sub-total of CIAA Investment for FBO-GA Development*** | ***$10,307,831.65*** |

**Table 9-1 - ORIA Master Plan Final Recommended Implementation Plan and Costs**

| Item No. | Description of Master Plan Element | Balanaced Prioritization Criteria | Balanced Phasing Period | Costs (CI$) Balanced - Recommended Implementation Short -Term | Costs (CI$) Balanced - Recommended Implementation Medium -Term | Costs (CI$) Balanced - Recommended Implementation Long -Term |
|---|---|---|---|---|---|---|
| 1 | Runway 08-26 Threshold Reconfigurations-Turnpads and Runway 08 RESA (East End) (*Note: Partial pavement strengthening to accommodate change in aircraft mix in 2016 (B777) costs included under Life Cycle Rehabilitation Costs and not CAPEX)* | Risk, safety and compliance | Short-Term | | | |
| 2 | ATC Tower Enhanced CCTV coverage and Secondary Surveillance Radar Interconnection to CONCENSA facility | Risk, safety and compliance | Short-Term | | | |
| 3 | Airside Perimeter Road and Fencing | Risk, safety and compliance | Short-Term | | | |
| 4 | Marine Exclusion Zone Protection Bouys (Approach/Departure Protection for Marine Craft) | Risk, safety and compliance | Short-Term | | | |
| 5 | Relocation of MET Garden facilities | Risk, safety and compliance | Short-Term | | | |
| **SUB-TOTAL** | | | | **$6,625,605.93** | | |
| 6 | Existing Terminal Building Covered Apron Walkway/Minor Renovations | ORIA: terminal capacity shortfall | Short-term | | | |
| 7 | Existing Terminal Building Expansion and Improvement Program: Phases 1, 1A, Phase 2 and Phase 3 | ORIA: terminal capacity shortfall | Short to Medium-term | | | |

**Table 9-1 - ORIA Master Plan Final Recommended Implementation Plan and Costs**

| Item No. | Description of Master Plan Element | Balanaced Prioritization Criteria | Balanced Phasing Period | Costs (CI$) Balanced - Recommended Implementation Short -Term | Costs (CI$) Balanced - Recommended Implementation Medium -Term | Costs (CI$) Balanced - Recommended Implementation Long -Term |
|---|---|---|---|---|---|---|
| 8 | Passenger Loading Bridges (Portable/Mobile Ramp Option) | ORIA: terminal capacity shortfall | Short-term | | | |
| **SUB-TOTAL** | | | | **$37,845,309.12** | **$15,822,835.05** | |
| 9 | Special Studies Allocation | ORIA: Short / Medium term Airfield Capacity | Short-term | | | |
| 10 | Main Terminal Expansion (East) to accommodate additional two Code C (B737/A320) parking positions or one Code E (B777) | ORIA: Short / Medium term Airfield Capacity | Short-term | | | |
| 11 | Aviation Fuel relocation to new facility within East Commercial Development Area. (Enabling Apron and Terminal Expansion) | ORIA: Short / Medium term Airfield Capacity | Short-term | | | |
| 12 | East commercial road extension (Phase 1 – 300m to relocated ARFF and Fuel Facility) | ORIA: Short / Medium term Airfield Capacity | Short-term | | | |
| 13 | Main Terminal Expansion (West) to accommodate additional two Code C (B737/A320) parking positions and re-organization of GSE equipment parking/storage. | ORIA: Short / Medium term Airfield Capacity | Medium to Long-term | | | |
| 14 | Commerical/GA Apron Expansion (Island Air/GAT) | ORIA: Short / Medium term Airfield Capacity | Short-term (Triggered by opportunity) | | | |
| 15 | Commerical/GA Apron Expansion (West of MRCU) | ORIA: Short / Medium term Airfield Capacity | Short-term (Triggered by opportunity) | | | |

**Table 9-1 - ORIA Master Plan Final Recommended Implementation Plan and Costs**

| Item No. | Description of Master Plan Element | Balanaced Prioritization Criteria | Balanced Phasing Period | Costs (CI$) Balanced - Recommended Implementation Short -Term | Costs (CI$) Balanced - Recommended Implementation Medium -Term | Costs (CI$) Balanced - Recommended Implementation Long -Term |
|---|---|---|---|---|---|---|
| 16 | ARFF Training Facility Relocation | ORIA: Short / Medium term Airfield Capacity | Medium-term | | | |
| **SUB-TOTAL** | | | | **$5,816,560.67** | **$2,982,463.59** | **$1,982,463.59** |
| 17 | Partial Parallel Taxiway (Taxiway Delta to Taxiway Alpha) or Partial Parallel Taxiway to Open East Development Area GA (CIAA to Develop Priorities based on Commercial/Airfield Capacity Status at the time) | Long term capacity building / commercial opportunity | Long-term | | | |
| 18 | Balance of Full Parallel Taxiway (Threshold 08 to Threshold 26) | Long term capacity building / commercial opportunity | Long-term | | | |
| 19 | Runway 08-26 Extension to the West for 8000 ft. (Extend to west by 1000 ft.) | Long term capacity building / commercial opportunity | Long-Term (Triggered by opportunity) | | | |
| 20 | Runway 08-26 Extension to the West for 9200 ft. (Extend to west by 1,000 ft. and east into North Sound by 1,200 ft.) | Long term capacity building / commercial opportunity | Long-Term (Triggered by opportunity) | | | |
| 21 | Long-Term Greenfield terminal expansion part of long-term new greenfield terminal build | Long term capacity building / commercial opportunity | Long-Term (Triggered by major change in operating conditions/growth ) | | | |

**Table 9-1 - ORIA Master Plan Final Recommended Implementation Plan and Costs**

| Item No. | Description of Master Plan Element | Balanaced Prioritization Criteria | Balanced Phasing Period | Costs (CI$) Balanced - Recommended Implementation Short -Term | Costs (CI$) Balanced - Recommended Implementation Medium -Term | Costs (CI$) Balanced - Recommended Implementation Long -Term |
|---|---|---|---|---|---|---|
| 22 | Removal of CONCENSA facility if not integrated into CIAA ATS system | Long term capacity building / commercial opportunity | Long-Term | | | |
| 23 | Provision of US Preclearance | Long term capacity building / commercial opportunity | Long-Term (Triggered by new greenfield terminal development) | | | |
| 24 | Existing Terminal Building Expansion and Improvement Program: Phase 1A Renovations to the second flow Commercial Offices) | Long term capacity building / commercial opportunity | Long-Term (Triggered by commercial opportunity) | | | |
| 25 | Passenger Loading Bridges (Ground loading or 2 storey covered walkway with ramp down bridge) | Long term capacity building / commercial opportunity | Long-Term (Triggered major change in operating conditions or growth) | | | |
| 26 | General Aviation / FBO Expansion into the East Development Area or into GA/Commercial reserve area west of MRCU | Long term capacity building / commercial opportunity | Long-term (Triggered by private investment) | | | |
| 27 | Air cargo expansion from existing location to main terminal apron (part of long-term triggered event to construct greenfield terminal in the East Development Area | Long term capacity building / commercial opportunity | Long-Term (Triggered major change in operating conditions or growth) | | | |

**Table 9-1 - ORIA Master Plan Final Recommended Implementation Plan and Costs**

| Item No. | Description of Master Plan Element | Balanaced Prioritization Criteria | Balanced Phasing Period | Costs (CI$) Balanced - Recommended Implementation Short -Term | Costs (CI$) Balanced - Recommended Implementation Medium -Term | Costs (CI$) Balanced - Recommended Implementation Long -Term |
|---|---|---|---|---|---|---|
| 28 | Airline Maintenance/MRO expansion into East Commercial Development Area | Long term capacity building / commercial opportunity | Long-Term (Triggered major change in operating conditions or growth) | | | |
| 29 | ATC Tower relocation and increased height | Long term capacity building / commercial opportunity | Long-Term (Triggered by new greenfield terminal development or runway extensions) | | | |
| 30 | East commercial road extension (Phase 2 – 500m to fully developed East Development Area limits) | Long term capacity building / commercial opportunity | Long-Term (Triggered by commercial opportunity) | | | |
| 31 | Land Acquisition for future long-term terminal and landside access and parking improvements. | Long term capacity building / commercial opportunity | Long-Term (Triggered by commercial opportunity) | | | |
| | | **SUB-TOTAL** | | | | **$19,111,749.24** |

**Table 9-1 - ORIA Master Plan Final Recommended Implementation Plan and Costs**

| Item No. | Description of Master Plan Element | Balanaced Prioritization Criteria | Balanced Phasing Period | Costs (CI$) Balanced - Recommended Implementation Short -Term | Costs (CI$) Balanced - Recommended Implementation Medium -Term | Costs (CI$) Balanced - Recommended Implementation Long -Term |
|---|---|---|---|---|---|---|
| | | GRAND TOTAL | | $50,287,475.72 | $18,805,298.64 | $21,094,212.84 |

### 9.4.2 Charles Kirkconnell International Airport (Cayman Brac)

Table 9-3 presents the final recommended capital spend related to CKIA based on the short, medium and long-term planning periods. This table represents the final recommended prioritization of the various master plan recommendations balanced against ORIA and LCA priorities and financing capacity of the CIAA.

The following highlights some of the key features of the CKIA financial implementation plan:

- Only the key safety priorities are proposed for years 1 through 7 to ensure maximization of funding available to the ORIA and LCA. These priorities are focussed on the west end RESA reconfigutation, ARFF road construction and obstacle/vegetation trimming/clearing;
- Major airside and landside rehabilitation has been scheduled to coincide just before the major spend is planned for Little Cayman in years 7 to 8. This approach will leverage the availability of construction resources in the Sister Islands for both the CKIA and LCA projects during this period;
- Other master planning recommendations related to terminal and apron expansion are long-term investments planned for the years 11 to 13;
- Table 9-3 shows an allowance for special studies that have been recommended as part of the environmental scoping process. These studies are recommended to be completed over the short-term as part of enabling and supporting new construction work and also to establish baseline information for future expansion projects.
- Refer to Exhibit 13 in Appendix A.

**Table 9-3 – CKIA Master Plan Final Recommended Implementation Plan and Costs**

| Item No. | Description of Master Plan Element | Balanaced Prioritization Criteria | Balanced Phasing Period | Costs (CI$) Balanced - Recommended Implementation Short -Term | Costs (CI$) Balanced - Recommended Implementation Medium -Term | Costs (CI$) Balanced - Recommended Implementation Long -Term |
|---|---|---|---|---|---|---|
| 1 | Runway 09-27 Threshold -09 Reconfiguration and Runway 27 RESA (West End) relocation resulting in temporary reduction in published runway length to 5,800 ft. | Risk, safety and compliance | Short-Term | | | |
| 2 | Runway 09-27 Threshold -27 Reconfiguration and Runway 09 RESA (East End) relocation to re-instated 6,010 ft. published runway length) | Risk, safety and compliance | Long-Term | | | |
| 3 | Runway 09-27 – Graded area improvements (South side widening into ponds) | Risk, safety and compliance | Short to Medium-Term | | | |
| 4 | Runway 09-27 – Municipal road re-alignment due to infringement on runway strip and obstacle limitation surfaces | Risk, safety and compliance | Medium-Term | | | |
| 5 | Runway 09-27 – Vegetation and object trimming and removals (Obstacle Limitation Surface infringements) | Risk, safety and compliance | Short-Term | | | |
| 6 | ARFF Road construction parallel to Taxiway A | Risk, safety and compliance | Short-Term and Medium (Phased Construction) | | | |
| 7 | Perimeter Road and Security Fencing | Risk, safety and compliance | Medium Term | | | |
| 8 | Marine Exclusion Zone Marker Bouys of West end of Airport | Risk, safety and compliance | Short-term | | | |
| 9 | Relocation of MET Garden facilities | Risk, safety | Long-term | | | |

**Table 9-3 – CKIA Master Plan Final Recommended Implementation Plan and Costs**

| Item No. | Description of Master Plan Element | Balanaced Prioritization Criteria | Balanced Phasing Period | Costs (CI$) Balanced - Recommended Implementation Short -Term | Costs (CI$) Balanced - Recommended Implementation Medium -Term | Costs (CI$) Balanced - Recommended Implementation Long -Term |
|---|---|---|---|---|---|---|
| | | and compliance | (Triggered by Commercial Apron Expansion) | | | |
| 10 | Special Studies Allocation | Risk, safety and compliance | Short-term | | | |
| | **SUB-TOTAL** | | | **$2,515,000.00** | **$3,109,000.00** | **$1,557,000.00** |
| 11 | New Code C Taxiway Bravo to permit dual connections to the main terminal Apron | Long term capacity building / commercial opportunity | Long-Term | | | |
| 12 | Relocation of the Fuel Facility to permit commercial airside FBO/Commercial development opportunity on the main apron | Long term capacity building / commercial opportunity | Short to Medium Term | | | |
| 13 | Future East Apron Expansion to support growth in commercial and general aviation activity | Long term capacity building / commercial opportunity | Long-Term Triggered by Commercial Opportunity | | | |
| 14 | Air Terminal Building Expansion | Long term capacity building / commercial opportunity | Long-Term triggered by major change in airline activity | | | |
| 15 | Air Terminal Building Carpark Expansion | Long term capacity | Medium-Term | | | |

**Table 9-3 – CKIA Master Plan Final Recommended Implementation Plan and Costs**

| Item No. | Description of Master Plan Element | Balanaced Prioritization Criteria | Balanced Phasing Period | Costs (CI$) Balanced - Recommended Implementation Short -Term | Costs (CI$) Balanced - Recommended Implementation Medium -Term | Costs (CI$) Balanced - Recommended Implementation Long -Term |
|---|---|---|---|---|---|---|
| | | building / commercial opportunity | | | | |
| 16 | FBO/Commercial and Cargo Expansion on northside of main terminal apron (East and West sides) | Long term capacity building / commercial opportunity | Medium to Long-Term Triggered by Commercial Opportunity | | | |
| 17 | AIS relocation into future FBO building/Leased offices | Long term capacity building / commercial opportunity | Medium to Long-Term Triggered by Commercial Opportunity | | | |
| **SUB-TOTAL** | | | | | **$105,000.00** | **$4,298,147.50** |
| **GRAND TOTAL** | | | | **$2,515,000.00** | **$3,214,000.00** | **$5,855,147.50** |

### 9.4.3 Little Cayman Airport

Although the final preferred scenario has not been determined, for the purpose of this financial analysis, the cost for Scenario 3 was used as it represents the most reasonable cost for the new airport. Refer to Table 9-4 for the proposed implementation plan, cost and schedule and Exhibit 17 in Appendix A.

**Table 9-4 - LCA Master Plan Final Implementation Plan (2015-2024)**

| Item No. | Proposed Activity | Recommended Master Plan Period | Recommended Implementation Year | Cost |
|---|---|---|---|---|
| 1 | Environmental Impact Assessment | Short-term | 2015-2017 | $1,000,000 |
| 2 | Approvals and Design-Tender Period | Short-term | 2018-2019 | |
| 3 | Minor Works including environmental mitigation/ site clearing / drainage | Medium-term | 2019-2020 | $19,092,000 |
| 4 | Major Works Phase 1 – Earthworks and Granulars | Medium-term | 2021-2022 | |
| 5 | Major Works Phase 2 – Asphalt and Buildings and Commissioning | Medium-term | 2023-2024 | |
| | | **TOTAL** | | **$20,092,000** |

### 9.4.4 The Airport System Financial Plan Summary

Refer to Appendix B for a detailed summary of the final total airport system financial plan. Table 9-5 below presents an overall airport system summary of the short, medium and long-term spend plan for ORIA, CKIA and LCA. Refer to Exhibits 9, 13 and 17 in Appendix A which presents the airport phasing plans for all three airports.

**Table 9-5 -Total Airport System Financial Plan Summary**

| Item No. | Airport | Short-Term (0-5 years) | Medium-Term (6-10 years) | Long-Term (11-20 years) | Total |
|---|---|---|---|---|---|
| 1 | ORIA | $50,287,476 | $18,805,299 | $21,094,213 | $90,186,988 |
| 2 | CKIA | $2,515,000 | $3,214,000 | $5,855,148 | $11,584,148 |
| 3 | LCA | $1,000,000 | $19,092,000 | | $20,092,000 |
| **TOTAL** | | **$53,802,476** | **$41,111,299** | **$26,949,361** | **$121,863,136** |

# 10 GLOSSARY OF TERMS

| Term | Definition |
|---|---|
| Aerodrome | Any area of land, water (including frozen surface thereof) or other supporting surface used or designed, prepared, equipped or set apart for use either in whole or in part for the arrival and departure, movement or servicing of aircraft and includes any building, installations and equipment in connection therewith. |
| Aerodrome Beacon | Aeronautical beacon used to indicate the location of an aerodrome from the air. |
| Aerodrome Elevation | The elevation of the highest point of the landing area. |
| Aerodrome Reference Code | A code-number and code-letter that provides a simple method to interrelate and identify standards for various sizes of airports and match the aircraft that can operate on them. The code-number (1 to 4) reference the field length (than 800 m to 1,800 m and over). The code letters (A to E) reference the wingspan and the outer main gear wheel span (Up to 15 m wingspan and 4.5 gear wheel span to 52-65 m wing span and 9-14 m gear wheel span). |
| Aerodrome Reference Point | The designated point or points on an aerodrome normally located at or near the geometric centre of the runway complex that establishes the locus of the radius or radii of the outer surface (as defined in a Zoning Regulation). |
| Aerodrome Reference Temperature | The monthly mean of the maximum daily temperature for the hottest month of the year (the hottest month being that which has the highest monthly mean temperature). |
| Aeronautical Beacon | An aeronautical ground light visible at all azimuths, either continuously or intermittently, to designate a particular point on the surface of the earth. |
| Aeroplane Reference Field Length | The minimum field length required for take-off at maximum certificated take-off mass, sea level, standard atmospheric conditions, still air and zero runway slope, as shown in the appropriate aeroplane flight manual prescribed by the certificating authority or equivalent data from the aeroplane manufacturer. Field length means balanced field length for aeroplanes, if applicable, or take-off distance in other cases. |
| AIP | Aeronautical Information Publication |
| Air Carrier | Any company or person operating a commercial air service. |
| Air Terminal Building (ATB)/Passenger Terminal Building (PTB) | An installation provided with the facilities for loading and unloading aircraft and the in transit handling of traffic (passengers, cargo and mail) which is moved by aircraft. |
| Air Traffic | All aircraft in flight and aircraft on the manoeuvring area of an aerodrome. |
| Air Traffic Control (ATC) | A service as specified in Part VI of the Air Regulations provided for the purposes of preventing collisions between aircraft, and on the manoeuvring area between aircraft and obstructions, and expediting and maintaining an orderly flow of air traffic. |
| Air Traffic Control Tower (ATCT) | A facility established on an airport to provide air traffic control services on and in the vicinity of that airport; a structure containing facilities for the control of airport traffic, including the movement of aircraft, vehicles and pedestrians in the manoeuvring areas, as well as aircraft in flight. This structure may be associated with an Air Terminal Building or an operational building or it may be a freestanding structure. |
| Aircraft | A machine capable of deriving support in the atmosphere from the reactions of the air |

| Term | Definition |
|---|---|
| Aircraft Approach Category | Category of aircraft based on their approach speed in knots.<br>Categories are the following:<br>A Up to 90 kt<br>B 91 to 120 kt<br>C 121 to 140 kt<br>D 141 to 165 kt<br>E Over 165 kt |
| Aircraft Mix | The various types of aircraft operating at an airport or in a region. Generally classified on the basis of weight and engine type. Category:<br><br>Light – 0 to 12,499 lbs. (e.g. Cessna 402)<br>Medium – 12,500 to 299,999 lbs (e.g. Airbus A320)<br>Heavy – over 300,000 lbs (e.g. Boeing B767) |
| Aircraft Movement | Take-off, landing, or simulated approach by an aircraft.<br>Itinerant movement Movements proceeding to or arriving from another location; or leaves the aerodrome traffic circuit but will be returning to land. Includes all fixed wing runway movements and helicopter operations. Excludes flights only passing through the control zone of the airport in question.<br>Local movement Local aircraft are considered as aircraft which remain in the circuit or in the vicinity of the airport and will return to the airport. |
| Aircraft Stand | A designated area on an apron intended to be used for parking an aircraft. |
| Aircraft Stand Taxilane | A portion of an apron designated as a taxiway and intended to provide access to aircraft stands only. |
| Airport | An aerodrome for which an airport certificate is in force and made up of a complex of runways and buildings for the take-off, landing, and maintenance of civil aircraft, with facilities for passengers. |
| Airport Operator | The holder of an airport certificate, or the person in charge of such airport, whether, an employee, agent or representative. |
| Airport Reference Temperature | The monthly mean of the maximum daily temperature for the hottest month of the year (the hottest month being that which has the highest monthly mean temperature). |
| Airport Zoning | The establishment of obstacle limitation surfaces to define the limits to which objects may project into the airspace around airports. |
| Airport Zoning Regulations | A zoning or legal instrument which will prohibit the erection of structures which would violate any of the defined plane surfaces. |
| Airside | Movement area of an airport, including adjacent terrain and buildings or portions thereof where access is controlled. |
| AIS | Aeronautical Information Services |
| ALPA | Air Line Pilots Association |
| AOA (Airport Operations Area) | Any area of an airport used or intended to be used for landing, takeoff, or surface maneuvering of aircraft. An air operations area includes such paved areas or unpaved areas that are used or intended to be used for the unobstructed movement of aircraft in addition to its associated runway, taxiways, or apron |
| ANMS | Aircraft Noise Monitoring System |
| Annex 16 | ICAO Environmental Protection Document (details noise certification and limits) |

| Term | Definition |
|---|---|
| Apron | That part of an aerodrome, other than the manoeuvring area, intended to accommodate the loading and unloading of passengers and cargo, the refuelling, servicing, maintenance and parking of aircraft, and any movement of aircraft, vehicles and pedestrians necessary for such purposes. |
| Apron Management Service | A service provided to regulate the activities and the movement of aircraft and vehicles on an apron. |
| Area Control Centre (ACC) | A unit established to provide air traffic control service to controlled flights (IFR and CVFR) in control areas under its jurisdiction. |
| ARF (ARFF) | Aircraft Rescue and Fire Fighting |
| ASDA | Acceleration Stop Distance Available. The length of the take-off runway available plus the length of the stopway, if provided. |
| ASL | Above Mean Sea Level |
| ATAC | Air Transport Association of Canada |
| ATC | Air Traffic Control |
| ATCT | Air Traffic Control Tower |
| ATS | Air Traffic Services |
| Automated Weather Observation System (AWOS) | A set of meteorological sensors, and associated systems designed to electronically collect and disseminate meteorological data. |
| AVDP | Airport Vicinity Development Plan |
| Balanced Field Length | A field length where the distance to accelerate and stop is equal to the take-off distance of an aeroplane experiencing an engine failure at the critical engine failure recognition speed (V1). |
| Bearing Strength | The structural ability of a surface to support loads imposed by aircraft. |
| BPOC | Before proceeding on course |
| BPR | Bypass Ratio |
| CAACI | Civil Aviation Authority Cayman Islands |
| Capacitor Discharge Light | A lamp in which high-intensity flashes of extremely short duration are produced by the discharge of electricity at high voltage through a gas enclosed in a tube. |
| Chapter 2 | Noise certification class for jet aircraft - noisier and older technology (also known as Stage 2) |
| Chapter 2 Aircraft | An aeroplane that does not conform to the noise emission standards set out in Chapter 3 of ICAO Annex 16, Volume I, second edition, 1988, or the Stage # noise limits set out in section C36.5 (a) (3) of Appendix C of Part 36 of the Federal Aviation Regulations, published by the Government of the United States, in effect on August 18, 1990. |
| Chapter 3 | Noise certification class for jet aircraft - quieter and newer technology (also known as Stage 3) |
| | |
| CIAA | Cayman Islands Airports Authority |
| CIDOT | Cayman Islands Department of Tourism |
| CIG | Cayman Islands Government |
| Circling Procedure | Visual manoeuvring required after completing an instrument approach procedure. |
| CITA | Cayman Islands Tourism Association |
| CKIA | Charles Kirkconnell International Airport |

| Term | Definition |
|---|---|
| Clearway | A defined rectangular area on the ground or water under the control of the appropriate authority, selected or prepared as a suitable area over which an aeroplane may make a portion of its initial climb to a specified height. |
| Commercial Air Service | Any use of aircraft for hire or reward. |
| Commercial Aircraft | An aircraft operated or available for operation for hire or reward. |
| Control Tower | A structure containing facilities for the control of airport traffic, including the movement of aircraft, vehicles and pedestrians on the manoeuvring areas, as well as aircraft in flight. This structure may be associated with an air terminal building or an operational building or it may be a free standing structure. |
| CPA | Central Planning Authority |
| Critical Aeroplane | The aeroplane or aeroplanes identified from among the aeroplanes the aerodrome is intended to serve as having the most demanding operational requirements with respect to the determination of movement area dimensions, pavement bearing strength and other physical characteristics in the design of aerodromes. |
| Critical Aircraft | The aircraft whose operational requirements are most demanding with respect to the determination of runway lengths, pavement load rating and other physical characteristics of the airport design. The airplane (s) the aerodrome is intended to serve as having the most demanding operational requirements |
| CUC | Central Utility Complex |
| CUPPS | Common Use Passenger Processing Systems |
| Day Average Sound Level | Time-average sound level between 0700 and 2200 hours. Unit, decibel (dB); abbreviation, DL; symbol, Ld. Note: Day average sound level in decibels is related to the corresponding day sound exposure level, LEd. |
| Day-Night Average Sound Level | Twenty-four hour average sound level for a given day, after addition of 10 decibels to levels from 0000 to 0700 hours and from 2200 (10 p.m.) to 2400 hours. Unit, decibel (dB); abbreviation, DNL; symbol, Ldn. Note: Day-night average sound level in decibels is related to the corresponding day-night sound exposure level, LEdn, where 86,400 is the number of seconds in a 24-hour day. A-frequency weighting is understood, unless another frequency weighting is specified explicitly. |
| dBA | A-weighted decibel |
| Decision Height (DH) | A specified height at which a missed approach must be initiated during a precision approach if the required visual reference to continue the approach to land has not been established. |
| Declared Distances | Take-off run available (TORA). The length of runway declared available and suitable for the ground run of an aeroplane taking off.<br>Take-off distance available (TODA). The length of the take-off run available plus the length of the clearway, if provided.<br>Accelerate-stop distance available (ASDA). The length of the take-off run available plus the length of the stopway, if provided.<br>Landing distance available (LDA). The length of runway which is declared available and suitable for the ground run of an aeroplane landing. |
| Deplaned | Traffic (passengers, mail and cargo) which lands and disembarks form an aircraft at an airport. |

| Term | Definition |
|---|---|
| Derived Forecast | Is defined to include the following:<br>indirect forecasts (e.g. terminal or parking lot occupancy, ticket counter queues, etc.);<br>predicted schedules. |
| Direct Aviation Forecasts | Refers to annual and peak period forecasts of aircraft, passengers, cargo and mail. |
| Displaced Threshold | A threshold not located at the extremity of a runway. Displaced thresholds are used when an obstacle in the final approach area intrudes into the specific obstruction clearance surfaces.<br>Displacing the threshold provides the required obstacle free slope. The declared landing distance (LDA) which assumes a specified obstacle clearance plane is therefore measured from the displaced threshold. However, there is no restriction to an aircraft actually landing on the usable runway prior to the displaced threshold. This portion of the runway is also available for take-off or rollout. |
| DME – Distance Measuring Equipment | Radio navigation equipment which provides a pilot with the slope distance from the aircraft to the transmitter/receiver station. Equipment (airborne and ground) used to measure, in nautical miles, the slant range distance of an aircraft from the DME navigational aid. |
| DOE | Department of Environment |
| Domestic Flight/Passenger | Movements at a Canadian airport departing to or arriving from a point in Canada and which, therefore, do not involve inspection services. |
| EAB | Environmental Assessment Board |
| EIA | Environmental Impact Assessment |
| Elevation | The vertical distance of a point or a level, on or affixed to the surface of the earth, measured from mean sea level. |
| EMU | Environmental Monitoring Unit |
| Energy Average | Colloquial term for time-mean-square average of the sound pressures for of a series of sound signals. |
| Energy Summation | Colloquial term loosely used to indicate addition of noncoherent sound signals by the sum of the squares of their sound pressures or the sum of their sound exposures. |
| Enplaned | Traffic (passengers, mail and cargo) which boards an aircraft and takes off from an airport. |
| Enplaned And Deplaned (E D) | E D passengers leave or board an aircraft at an airport and include all O D passengers plus those who connect to or from other flights. |
| EPNdB | Effective Perceived Noise Level in decibels |
| EPR | Engine Pressure Ratio |
| FAF | Final Approach Fix |
| FEC | Field Electric Center |
| Federal Aviation Administration (FAA) | The U.S. federal authority responsible for civil aviation. http://www.faa.gov |
| FICON | Federal Interagency Committee on Noise (U.S.) |
| Fixed Base Operator (FBO) | Private operator located on the airport, providing space including hangars and other services, primarily aircraft related. |
| Fixed Light | A light having constant luminous intensity when observed from a fixed point. |
| Fleet Mix | The various types of aircraft operating at an airport or in a region. Generally classified on the basis of weight and engine type. |
| Flight Service Station (FSS) | An aeronautical facility providing mobile and fixed communications, flight information, search and rescue alerting, and weather advising services to pilots and other users. |

| Term | Definition |
|---|---|
| Frangible Object | An object of low mass designed to break, distort or yield on impact so as to present the minimum hazard to aircraft.<br>Note.- Guidance on design for frangibility is contained in the ICAO Aerodrome Design Manual Part 6. |
| General Aviation | All civil aviation operations, other than scheduled air services and non-scheduled air transport operations for remuneration or hire. |
| Geometric Centre | The geographical co-ordinates of the centre of the runway complex that locates the aerodrome for charting purposes. It is determined by the mean of the latitudes of the furthest north runway threshold and furthest south runway threshold and the mean of the longitudes of the furthest east runway threshold and furthest west runway threshold. |
| GIS | Geographic Information System |
| Glide Path (GP) | A descent profile determined for vertical guidance during a final approach. |
| GPS | Global Positioning System |
| GPS – Global Positioning Equipment | Navigation equipment which provides a pilot with the exact position of the runway based on satellite transmissions. |
| Graded Area | An area adjacent to a runway which is graded to a specified standard to minimize hazards to aircraft which may accidentally run off of the runway surface. |
| Groundside | That area of an aerodrome not intended to be used for activities related to aircraft operations and to which the public normally has unrestricted access. |
| GSE | Ground Support Equipment – miscellaneous equipment used for aircraft servicing |
| GTOW | Gross Take-Off Weight |
| Hangar | A building which houses aircraft. |
| Hazard Beacon | An aeronautical beacon used to designate danger to air navigation. |
| HBS | Hold Baggage Screening |
| Head Of Stand (HOS) Road | Service road provided between the terminal building and the aircraft parking position (stand) for movement of ground vehicles. |
| Height Above Aerodrome (HAA) | The height in feet of the MDA (for circling approaches) above the aerodrome elevation. |
| Height Above Touchdown Zone Elevation (HAT) | The height in feet of the DH and the MDA (for straight-in approaches) above the Touchdown Zone Elevation. |
| Holding Bay | A defined area where aircraft can be held, or bypassed, to facilitate efficient surface movement of aircraft. |
| IATA | International Air Transport Association |
| ICAO | International Civil Aviation Organization |
| IFR | Instrument Flight Rules |
| IFR Flight | A flight conducted in accordance with the instrument flight rules. |
| IFR Weather Conditions | Weather conditions below the minima prescribed pursuant to Section 541 (of the Air Regulations). |
| ILS | Instrument Landing System, made up of 3 degree glide-path and localizer |
| ILS – Instrument Landing System | An arrangement of radio transmitters which provide a pilot with horizontal and vertical guidance to a runway touchdown point. |
| Instrument Approach Procedure | A series of predetermined manoeuvres by reference to flight instruments for the orderly transfer of an aircraft from the beginning of the initial approach to a landing, or to a point from which a landing may be made. |

| Term | Definition |
|---|---|
| Instrument Landing System (ILS) | A radio navigation system which provides aircraft with horizontal and vertical guidance during an approach landing. ILS equipment includes: a localizer for an azimuth guidance and glidepath transmitter for vertical guidance. |
| Instrument Landing System (ILS) | ILS Category I: an approach procedure to a height above touchdown of not less than 200 feet and with runway visual range of not less than 1,800 feet. |
| Instrument Landing System (ILS) | ILS Category II: an approach procedure to a height above touchdown of not less than 100 feet and with runway visual range of not less than 1,200 feet. |
| Instrument Landing System (ILS) | ILS Category IIIA: an ILS approach procedure which provides for approach without a decision height minimum and with runway visual range of not less than 700 feet. |
| Instrument Landing System (ILS) | ILS Category IIIB: an ILS approach procedure which provides for approach without a decision height minimum and with runway visual range of not less than 150 feet. |
| Instrument Landing System (ILS) | ILS Category IIIC: an ILS approach procedure which provides for approach without a decision height minimum and without runway visual range minimum. |
| Instrument Landing System (ILS) | An instrument landing system whereby the pilot glides his approach to a runway solely by reference to instruments in the cockpit. In some instances the signals received from the ground can be fed into the automatic pilot for automatically controlled approaches. |
| Instrument Meteorological Conditions (IMC) | Meteorological conditions expressed in terms of visibility, distance from cloud, and ceiling less than the minima specified for visual meteorological conditions. |
| Instrument Runway | A runway suitably equipped for the operation of aircraft under IFR conditions.<br>Instrument Approach Runway – an instrument runway served by visual and non-visual aids providing directional guidance adequate for a straight-in approach.<br>Precision Approach Runway - an instrument runway served by ILS approach aids and associate visual aids. |
| International Airport | An airport designated by Transport Canada to support international commercial air transport and listed as such in the ICAO Air Navigation Plan - North Atlantic, North American, and Pacific Regions (ICAO Doc 8755/13). |
| International Civil Aviation Organization (ICAO) | A specialized agency of the United Nations, the objective of which is to develop the principles and techniques of international air navigation and to foster planning and development of international civil air transport, http://www.icao.org |
| ISS | Internal Security Service |
| JAA | European Joint Aviation Authorities |
| Kts | Knots (speed expressed in nautical miles per hour) |
| L90 | Background noise level (which is exceeded 90% of the time) |
| LAA | Local Airport Authority |
| Landing Area | That part of a movement area intended for the landing or take-off of aircraft. |
| LCA | Little Cayman Airport |
| LDA | Landing Distance Available. The length of runway which is declared available and suitable for the ground run of an aeroplane landing. |
| Leq | Continuous equivalent sound level (average level) |

| Term | Definition |
|---|---|
| LIAL | Low Intensity Approach Lighting |
| Localizer | The component of an instrument landing system (ILS) which provides lateral guidance with respect to the runway centreline. |
| Manoeuvring Area | That part of an aerodrome to be used for the take-off, landing and taxiing of aircraft, excluding aprons. |
| Marker | An object displayed above ground level in order to indicate an obstacle or delineate a boundary. |
| Marking | A symbol or group of symbols displayed on the surface of the movement area in order to convey aeronautical information. |
| Maximum Sound Level; Maximum Frequency-Weighted Sound Pressure Level | Greatest fast (125 ms) A-weighted sound level within a stated time interval. Alternatively, slow (1000 ms) time-weighting and C-frequency-weighting may be specified. Unit, decibel (dB); abbreviation, MXFA; symbol, LAFmx (or C and 5). |
| MEP | Mechanical, Electrical and Plumbing |
| Minimum Descent Altitude (MDA) | A specified altitude referenced to sea level for a non-precision approach below which descent must not be made until the required visual reference to continue the approach to land has been established. |
| MOTC | Ministry of Transport and Communications |
| Movement | A take-off or a landing |
| Movement Area | That part of an aerodrome to be used for the take-off, landing and taxiing of aircraft, consisting of the manoeuvring area and the apron(s). |
| MRCU | Mosquito Research Control Unit |
| NAP | Noise Abatement Procedures, which are federally regulated |
| Navaid | A navigational aid located on the ground. |
| NDB – Non-Directional Beacon | Radio navigation aid which enables a pilot to fly an aircraft to a transmitter. Operates in the medium frequency (AM) band. |
| NEF | Noise Exposure Forecast (based on 5 to 10 year forecasts) |
| NEP | Noise Exposure Projection (based on forecasts beyond 10 years but not past 20 years) |
| Night | The period beginning one half-hour after sunset and ending one half-hour before sunrise and, in respect of any place where the sun does not rise or set daily, the period during which the centre of the sun's disc is more than six degrees below the horizon. |
| NLA | New Large Aircraft |
| Nm | Nautical Mile (1.152 Statute Miles, 1.853 kilometres) |
| NMT | Noise Monitoring Terminal |
| Noise Abatement Procedures | Noise operating restrictions may be applied at any aerodrome where there is an identified requirement. When applied at an aerodrome, the procedures and restrictions will be set out in the AIP. |
| Noise Exposure Forecast (NEF) | The officially recognized ICAO noise metric measurement used for airport noise assessment. |
| Noise Exposure Projections (NEP) | A system of estimating aircraft noise levels in vicinity of airports. The noise estimates are provided in the form of contours overlaid on 1:50,000 map of the airport and its surrounding communities. The noise level of each contour is indicated by the Noise Exposure Projections (NEP) index. The NEP index values are calculated using a computer program, developed and maintained by the Airport Regulator. Projections of aircraft traffic movements, aircraft types, night/day split, runway and flight path utilization, and airport configurations are provided as data for the calculation. |

| Term | Definition |
|---|---|
| Non-Directional Beacon (NDB) | A radio beacon transmitting non-directional signals whereby the pilot of an aircraft equipped with direction-finding equipment can determine bearing to or from the radio beacon. |
| Non-Instrument Runway | A runway intended for the operation of aircraft under visual flight conditions. This will include circling approaches. |
| Non-precision Approach Runway. | An instrument runway served by visual aids and a non-visual aid providing at least directional guidance for a straight in approach. |
| Normal Peak Hour | The peak hour of the week averaged for one year; however, as applied to instrument approaches it is the highest 10 per cent of the hours during which time instrument approaches are being made. |
| NRA | National Roads Authority |
| OBC | Outline Business Case |
| Obstacle Limitation Surface (OLS) | A surface that establishes the limit to which objects may project into the airspace associated with an aerodrome so that aircraft operations at the aerodrome may be conducted safely. Obstacle limitation surfaces consist of the following:<br>Outer surface. A surface located in a horizontal plane above an aerodrome and its environs.<br>Take-off/Approach surface. An inclined plane beyond the end of a runway and preceding the threshold of a runway.<br>Transitional surface. A complex surface along the side of the strip and part of the side of the approach surface, that slopes upwards and outwards to the outer surface, when provided. |
| ODALS | Omni Directional Approach Lighting System (FAA/US). |
| Operator | In respect of an aircraft, means the person in possession of the aircraft, whether as owner, lessee, hire or otherwise and, in respect of an airport, means the holder of the airport licence, or the person in charge of such airport, whether as employee, agent or representative of the holder of such licence. |
| ORIA | Owen Roberts International Airport |
| Origin And Destination (O D) | O D passengers are those who either start or terminate their trips at an airport. |
| PANCAP | Practical Annual Capacity, used in reference to theoretical runway capacity. |
| PAPI | Precision Approach Path Indicator |
| PAPI – Precision Approach Path Indicator | A set of lights near the threshold of a runway to provide the pilot with an indication of the correct approach. |
| Passenger | A person, who pays a fare and receives air transportation, including a free baggage allowance, is counted as one revenue passenger. |
| Passenger Origin And Destination | The first and last airport in a passenger's itinerary. |
| Passenger Terminal Building | PTB |
| Pavement Classification Number (PCN) | A number expressing the bearing strength of a pavement for unrestricted operations. |
| PBB | Passenger Boarding Bridge. A jet bridge (also termed loading bridge, aerobridge/airbridge, Jetway, Passenger Walkway or passenger boarding bridge) - enclosed, movable connector which extends from an airport terminal gate to an airplane, allowing passengers to board and disembark without having to go outside. |
| Peak Hour Movements | Aircraft movements operated during the busiest hour (minutes 00 to 59 inclusive). |

| Term | Definition |
|---|---|
| Peak Profile Hour | (aka Average Daily Peak)<br>First the peak month is selected. Then, for each hour, the average hourly volume is computed across the month. This gives an average hourly volume for an "average peak day". |
| PFC | Passenger Facility Charge |
| PHOCAP | Practical Hourly Capacity; used in reference to theoretical runway capacity. |
| Planning Peak Day (PPD) | An average day of the peak month. |
| Planning Peak Hour (Day) Passengers | The hourly (daily) traffic volume used for terminal facility planning purposes. This level (which falls between the average traffic volume and the absolute peak) is determined in accordance with planning standard. For example, the planning peak hour passenger volume or PPHP, for terminal planning at large airports is defined as the 90th percentile of the annual distribution of hourly passengers. Note: The hourly passenger volume refers to clock hour. |
| Planning Peak Hour (PPH) | The busiest hour during the PPD. |
| Planning Peak Hour Aircraft Movements (PPHM) | Benchmark of the activity of the airport during busy periods. It is important to recognize that PPHM is not the absolute peak, but in fact equates to approximately the 95th percentile busy hour through an averaging process. |
| Primary Runway | The runway(s) intended to serve the critical aircraft. |
| Private Aircraft | A civil aircraft, other than a commercial aircraft or a state aircraft. |
| PTB | Passenger Terminal Building |
| Road-Holding Position | A designated position at which vehicles may be required to hold. |
| ROP | Royal Oman Police |
| Runway | The defined area on a land aerodrome prepared for the landing and take-off of aircraft. |
| Runway End Safety Area (RESA) | An area symmetrical about the extended runway centre line and adjacent to the end of the strip primarily intended to reduce the risk of damage to an aeroplane undershooting or overrunning the runway. |
| Runway Identification Light (RILs) | Lights provided at aerodromes where terrain precludes the installation of approach lights, or where extraneous non-- aeronautical lights or the lack of daytime contrast reduces the effects of approach lights. |
| Runway Strip | A defined area including the runway and stopway, if provided, intended:<br>To reduce the risk of damage to aircraft running off a runway; and<br>To protect aircraft flying over it during take-off or landing operations. |
| Runway Visual Range (RVR) | The range over which the pilot of an aircraft on the centre line of a runway can see the runway surface markings or the lights delineating the runway or identifying its centre line. |
| RWY Or Rwy | Runway |
| Secondary Runway | The runway (s) designed to serve less critical airplanes and not necessarily sufficient for all airplanes which the primary runway is intended to serve, and is provided to take account of the effect of particular winds of high velocity. |
| SEL | Single event noise exposure level in dBA accounting for maximum noise level and duration |
| Shoulder | An area adjacent to the edge of a pavement so prepared as to provide a transition between the pavement and the adjacent surface. |
| SID | Standard Instrument Departure |
| SITA | Sister Islands Tourism Association |
| SMS | Safety Management Systems |

| Term | Definition |
|---|---|
| Sound Exposure | Time integral of squared, instantaneous frequency-weighted sound pressure over a stated time interval or event. Unit: pascal-squared second; symbol, E. Note: If frequency weighting is not specified, A-frequency weighting is understood. If other than A-frequency weighting is used, such as C-frequency weighting, an appropriate subscript should be added to the symbol; e.g., EC.<br>Duration of integration is implicitly included in the time integral and need not be reported explicitly. For the sound exposure measured over a specified time interval such as one hour, a 15- hour day, or a 9-hour night, the duration should be indicated by the abbreviation or letter symbol, for example one-hour sound exposure (1 HSE or E1h) for a particular hour; day sound exposure (DSE or Ed) from 0700 to 2200 hours; and night sound exposure (NSE or En) from 0000 to 0700 hours plus from 2200 to 2400 hours.<br>Day-night sound exposure (DNSE or Edn) for a 24-hour day is the sum of the day sound exposure and 10 times the night sound exposure. Unless otherwise stated, the normal unit for sound exposure is the pascal-squared second. |
| Sound Exposure Level | Ten times the logarithm to the base ten of the ratio of a given time integral of squared instantaneous A-weighted sound pressure, over a stated time interval or event, to the product of the squared reference sound pressure of 20 micropascals and reference duration of one second. The frequency weighting and reference sound exposure may be otherwise if stated explicitly. |
| Sound Level | Ten times the logarithm to the base ten of the ratio of time-mean-square instantaneous A-weighted sound pressure, during a stated time interval T, to the square of the standard reference sound pressure. Unit, decibel (dB); respective abbreviations, TAV and TEQ; respective symbols, LAT and LaeqT. |
| Sound Level;<br>Weighted Sound Pressure Level | Ten times the logarithm to the base ten of the ratio of A-weighted squared sound pressure to the squared reference sound pressure of 20 ,µPa, the squared sound pressure being obtained with fast (F) (125 ms) exponentially weighted time-averaging. Alternatively, slow (S) (1000 ms) exponentially weighted time-averaging may be specified; also C-frequency weighting. |
| Sound Pressure Level | Ten times the logarithm to the base ten of the ratio of the time-mean-square pressure of a sound, in a stated frequency band, to the square of the reference sound pressure in gases of 20 µPa. Unit, decibel (dB); abbreviation, SPL; symbol, Lp. |
| Sound Pressure;<br>Effective Sound Pressure | Root-mean-square instantaneous sound pressure at a point, during a given time interval. Unit, pascal (Pa). Note: In the case of periodic sound pressures, the interval is an integral number of periods or an interval that is long compared with a period. In the case of nonperiodic sound pressures, the interval should be long enough to make the measured sound pressure essentially independent of small changes in the duration of the interval. |
| SPID | Simultaneous Parallel Independent Departure |
| Step-Down Fix | A fix permitting additional descent within a segment of an instrument approach procedure by identifying a point beyond which further descent can be made. |
| Stopway | A defined rectangular area on the ground at the end of take-off run available prepared as a suitable area in which an aircraft can be stopped in the case of an abandoned take-off. |

| Term | Definition |
|---|---|
| Taxi | To operate an airplane under its own power on the ground, except that movement incident to actual take-off and landing. |
| Taxi-Holding Position | A designated position at which taxiing aircraft and vehicles may be required to hold in order to provide adequate clearance from a runway. |
| Taxiway | A defined path on a land aerodrome established for the taxiing of aircraft and intended to provide a link between one part of the aerodrome and another, including:<br>Apron taxiway. A portion of a taxiway system located on an apron and intended to provide a through taxi route across the apron.<br>Rapid exit taxiway. A taxiway connected to a runway at an acute angle and designed to allow landing aeroplanes to turn off at higher speeds than are achieved on other exit taxiways thereby minimising runway occupancy times. |
| Taxiway Strip | An area including a taxiway intended to protect an aircraft operating on the taxiway and to reduce the risk of damage to an aircraft accidentally running off the taxiway. |
| TDP | Track Density Plot |
| TDZ – Touchdown Zone | The portion of the runway, beyond the threshold, where it is intended landing airplanes first contact the runway. |
| Threshold | The beginning of that portion of the runway usable for landing. |
| Threshold Crossing Height (TCH) | The height of the glide path above the runway threshold. |
| Threshold Lights | Lights placed across the ends of a runway or landing strip to indicate the usable limits thereof. |
| TODA | Take-Off Distance Available. The length of the take-off run available plus the length of the clearway, if provided. |
| TORA | Take-Off Run Available. The length of runway declared available and suitable for ground run of an aeroplane taking off. |
| Touchdown Zone (TDZ) | The portion of a runway, beyond the threshold, where it is intended landing aeroplanes first contact the runway. |
| Touchdown Zone Elevation (TDZE) | The highest elevation in the Touchdown Zone. |
| Traffic Density | Light: not greater than 15 movements per runway or less than 20 total aerodrome movements;<br>Medium. 16 to 25 movements per runway or between 20 to 35 total aerodrome movements; and<br>Heavy. 26 or more movements per runway or more than 35 total aerodrome movements. |
| TSA | Transport Security Administration |
| T/W, TW or TWA | Taxiway |
| UKDFT | United Kingdom Department for Transport |
| ULD | Universal Loading Device |
| Universal Loading Device | ULD |
| Usability Factor | The percentage of time during which the use of a runway or system of runways is not restricted because of the cross-wind component.<br>Note. - Cross-wind component means the surface wind component at right angles to the runway centre line. |
| Very High Frequency Omni-range Navigation Equipment (VOR) | A type of electronic navigation equipment. VOR is a phase comparison system in which an instrument in the cockpit shows the direction of the VOR station. |
| VFR | Visual Flight Rules |
| VFR Flight | A flight conducted in accordance with the visual flight rules. |
| VFR Weather Conditions | Weather conditions equal to or above the minima prescribed pursuant to Section 541 (of the Air Regulations). |

| Term | Definition |
|---|---|
| VHF – Very High Frequency | The band of radio frequencies used for air radio communications and navigation. |
| Visual Approach | An approach by an IFR aircraft operating clear of clouds and with at least one statute mile flight visibility, in which all or part of an instrument approach procedure is not completed and the approach is executed by visual reference to the surface of the earth. |
| Visual Approach Slope Indicator System (VASIS) | An airport lighting facility providing vertical approach slope guidance to aircraft during approach to landing by radiating a directional pattern of high intensity red and white focused light beams. |
| Visual Flight Rules (VFR) | The rules that govern the procedures for conducting flight under visual conditions. The abbreviation "VFR" is also used to indicate weather conditions that are equal to or greater than minimum VFR requirements. In addition, it is used by pilots and controllers to indicate type of flight plan. |
| Visual Meteorological Conditions (VMC) | Meteorological conditions expressed in terms of visibility, distance from cloud, and ceiling, equal to or better than specified minima. |
| VNAP | Vertical Noise Abatement Procedure |
| VOR – Very High Frequency Omnidirectional Range | A type of radio navigation system using VHF radio frequencies which provides an aircraft pilot with immediate information on the heading to the transmitter. |

# APPENDIX A

# Cayman Islands Airports Master Plan Exhibits

*Exhibit 1 – Owen Roberts Int'l Airport/Grand Cayman (ORIA) - Airport Layout Plan 2032*
*Exhibit 2 – Owen Roberts Int'l Airport/Grand Cayman (ORIA) – West Development 2032*
*Exhibit 3 – Owen Roberts Int'l Airport/Grand Cayman (ORIA) – East Development 2032*
*Exhibit 4 – Owen Roberts Int'l Airport/Grand Cayman (ORIA) – Air Terminal Building Ground Floor Phasing*
*Exhibit 5 – Owen Roberts Int'l Airport/Grand Cayman (ORIA) – Air Terminal Building Second Floor Phasing*
*Exhibit 6 – Owen Roberts Int'l Airport/Grand Cayman (ORIA) – Air Terminal Concept Rendering Without Air Bridges*
*Exhibit 7 – Owen Roberts Int'l Airport/Grand Cayman (ORIA) – Air Terminal Concept Rendering With Air Bridges*
*Exhibit 8 – Owen Roberts Int'l Airport/Grand Cayman (ORIA) – Environment and Social Baseline Conditions*
*Exhibit 9 – Owen Roberts Int'l Airport/Grand Cayman (ORIA) – Phased Implementation Plan 2032*
*Exhibit 10 – Charles Kirkconnell Int'l Airport/Cayman Brac (CKIA) – Airport Layout Plan 2032*
*Exhibit 11 – Charles Kirkconnell Int'l Airport/Cayman Brac (CKIA) – Air Terminal Building Ground Floor Phasing*
*Exhibit 12 – Charles Kirkconnell Int'l Airport/Cayman Brac (CKIA) – Environment and Social Baseline Conditions*
*Exhibit 13 – Charles Kirkconnell Int'l Airport/Cayman Brac (CKIA) – Phased Implementation Plan 2032*
*Exhibit 14 – Little Cayman Airport (LCA) – Scenario 1 Existing Airstrip*
*Exhibit 15 – Little Cayman Airport (LCA) – Scenario 1A Expansion to Existing*
*Exhibit 16 – Little Cayman Airport (LCA) – Scenario 2 Expansion to Existing (Rotated Runway)*
*Exhibit 17 – Little Cayman Airport (LCA) – Scenario 3 Government Owned Site and Phasing*
*Exhibit 18 – Little Cayman Airport (LCA) – Environment and Social Baseline Conditions*