# Airport Master Plan

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**Airport Planning and Management**

**Module 18**

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# Outline

A. Master Plan Introduction

B. Process Strategy

C. Planning Principles

D. Design Optioneering

E. Multiple Account Evaluation

F. Master Plan Requirements

G. Conclusion

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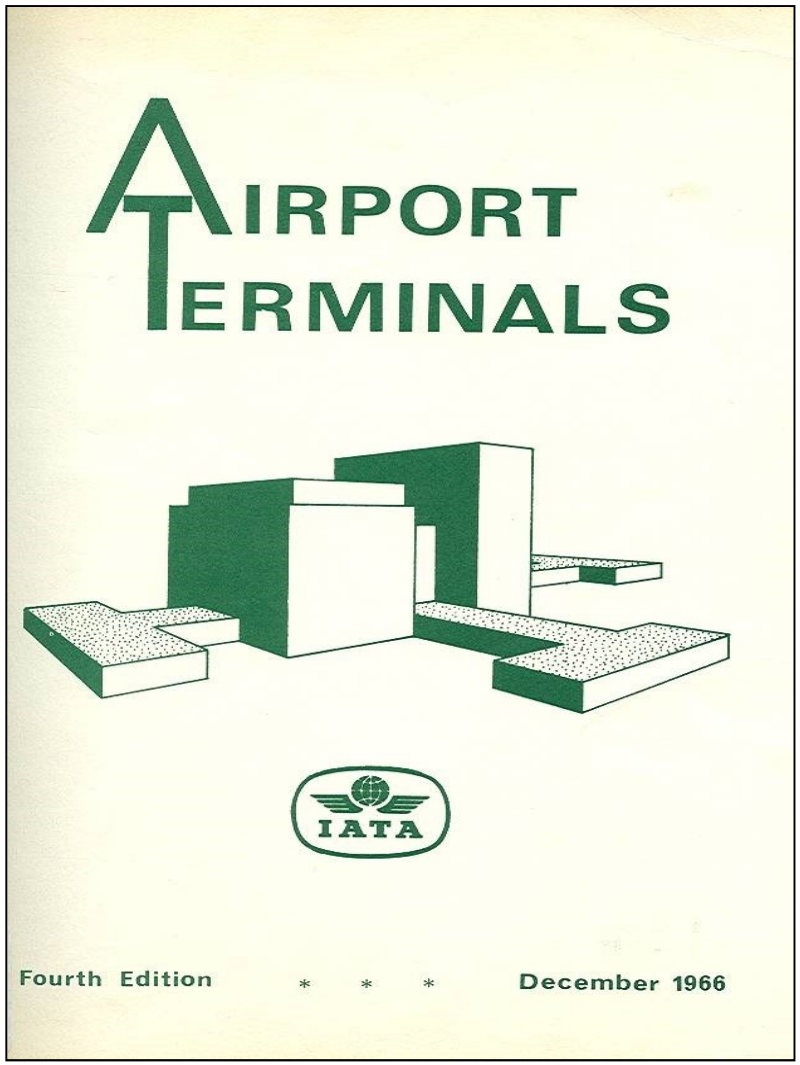
# Introduction

# Airport Master Plan History

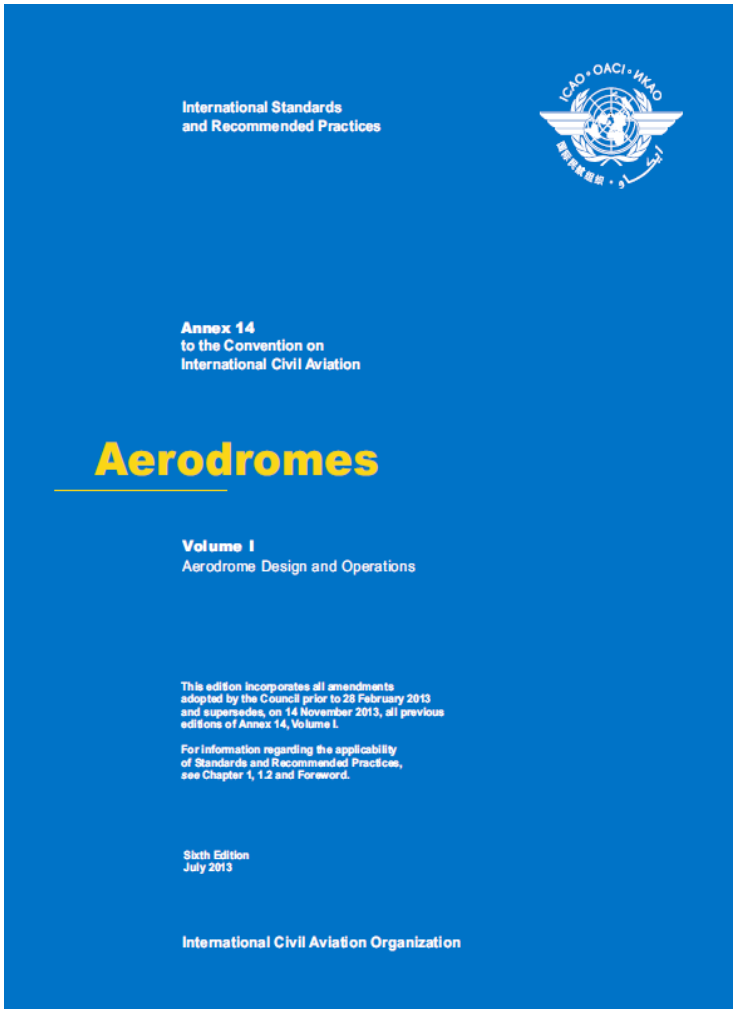



# Airport Master Plan History

- **"Airports have responsibility to work with airlines and others to (IATA, 1966):**
  - *Provide good service*
  - *Enable efficient handling*
  - *Meet space requirements*
  - *Be efficient at reasonable cost*
  - *Future oriented*
  - *Consistent with MasterPlan*"

# Legal Aspects

- **ICAO Aerodromes Annex 14**
  - Aerodrome Standards and Recommended Practices first adopted by ICAO on 29 May 1951 pursuant to Article 37 provisions of the Convention on International Civil Aviation (Chicago 1944) and designated as Annex 14 to the Convention
  - Currently in 6th edition



# Legal Aspects

- **Annex 14 Aerodromes, Volume I**
  - Table of Contents
  - Chapter 1. General
  - Chapter 2. Aerodrome Data
  - Chapter 3. Physical Characteristics
  - Chapter 4. Obstacle Restriction And Removal
  - Chapter 5. Visual Aids For Navigation
  - Chapter 6. Visual Aids For Denoting Obstacles
  - Chapter 7. Visual Aids For Restricted Use Areas
  - Chapter 8. Equipment And Installations
  - Chapter 9. Emergency And Other Services

# Legal Aspects

- **Annex 14 Aerodromes, Support Materials**
  - Does not include specifications relating to overall planning of aerodromes (such as separation between adjacent aerodromes or capacity of individual aerodromes), impact on environment, or to economic and other non-technical factors that need to be considered in aerodrome development
  - These subjects addressed in the Airport Planning Manual (Doc 9184), Part 1
  - Guidance material on environmental aspects is included in Doc 9184, Part 2

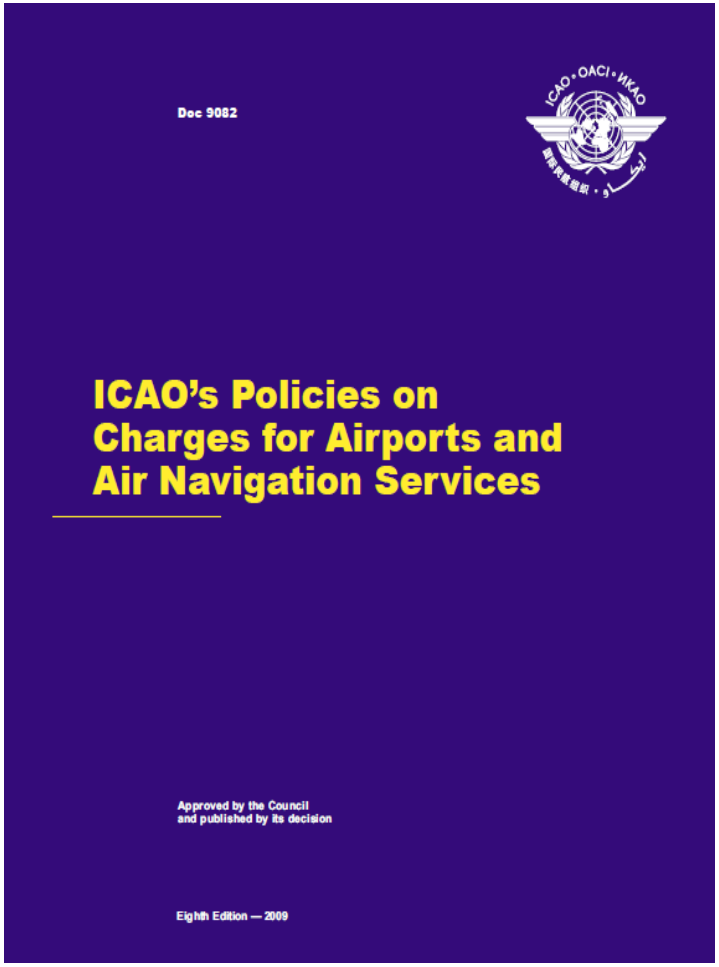
# Legal Aspects

- **Part 1 - Master Planning Manual (Doc 9184)**
  - Airport Site Evaluation and Selection
  - Physical planning – airspace, land area
  - Environment – people, flora, noise, air, water, soil
  - Hazards – smoke, wildlife
  - Surrounding land use – compatibility

- **Part 2 – Land Use and Environmental Control**
  - Ecological considerations
  - Environmental control measures
  - Land use planning

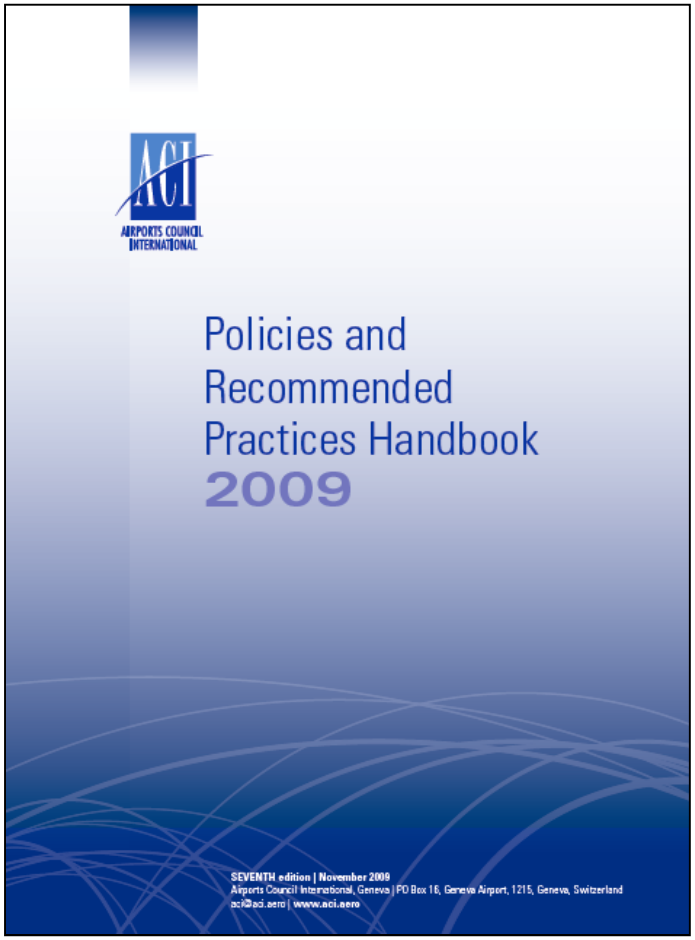
# Commercial Master Plan Drivers

- **ICAO Policy 9082**
  - Financially independent airports mean new policies on role of the market in planning, development and operational phases
  - Consensus needed to ensure customers are well served at a cost-effective level, and also ensure investors achieve a reasonable rate-of-return



# Commercial Master Plan Drivers

- **Airports Council International**
  - Airports strongly encouraged to develop and optimize non-aeronautical revenue activities
  - Should be NO requirement to use non-aeronautical revenues to reduce airline user charges, although some airports do use commercial revenues to reduce airline charges to remain competitive



# Process Strategy

# Process Strategy

- **Master Plan proceeds from general to detail**
  - System components addressed both independently and an iterative manner to ensure system integration
  - Some perspectives exist that demand forecasts are independent of supply capability leading to unrealistic expectations of true demand potential
  - Some customer demands may not be affordable or generate insufficient revenues to offset investor risks
  - Master Plan process ultimately is negotiation between ALL stakeholders, and must avoid the perspective this is solely a technical exercise

# Rationale

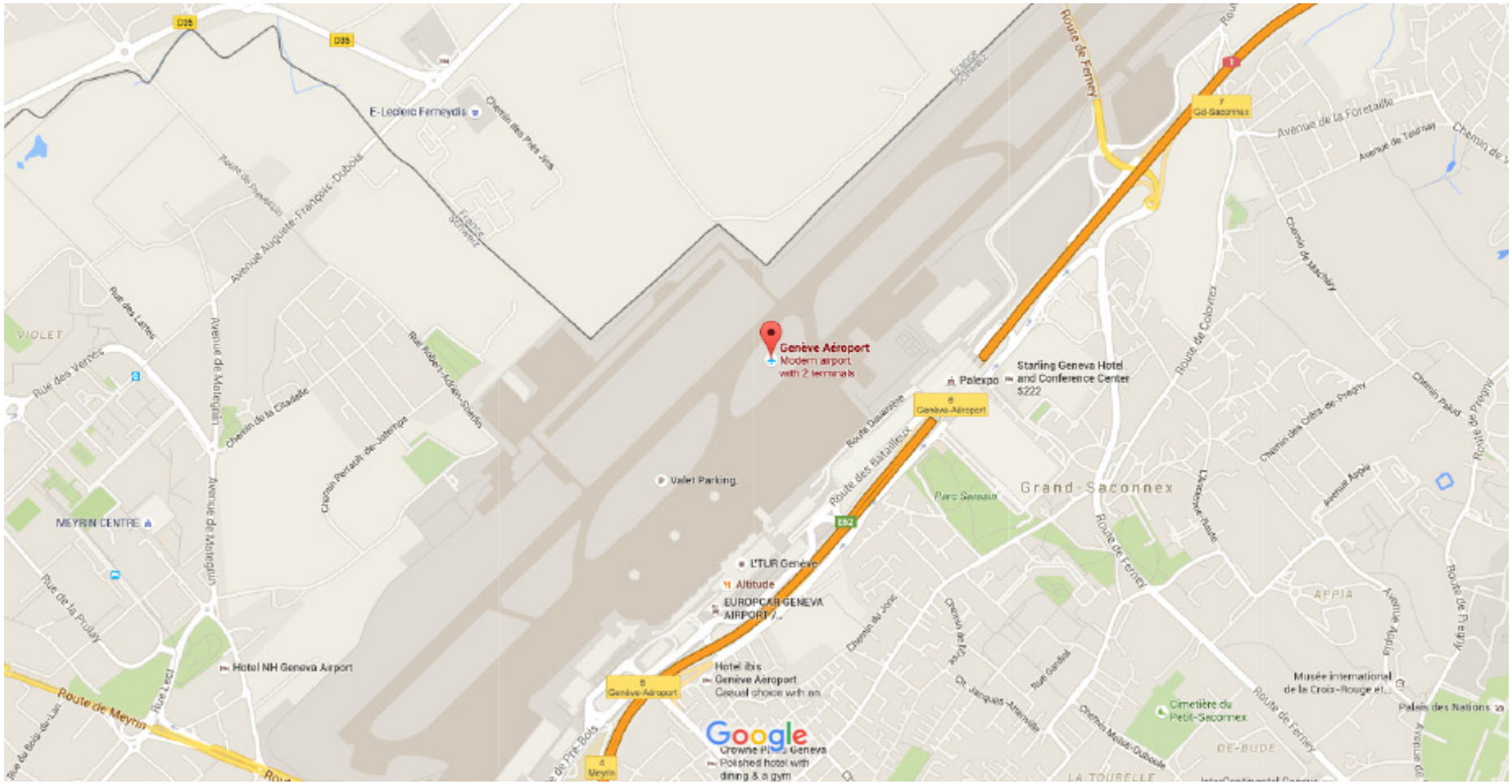
- **Master Plan is only chapter in Airport Strategic Plan**
  - Airports that lack comprehensive vision of the future run serious technical and business continuity risks
  - Lack of investment clarity leads to poorly timed, ill-judged, misconceived, inappropriately sized and/or poorly located capacity projects
  - Lack of vision impact airport's ability to delivery timely, cost-effective, and competitive services
  - Demands planning of airfield, terminal, groundside and other facilities in a manner that supports operational flexibility and business efficiency

# Future Decision Guide

- **Master Plan ties hands of future decision-makers**
  - Confirm investments are best-practice technical, social, economic and environment concepts
  - Assess alternatives in a thorough manner and the best outcome selected by serious appraisal process
  - Airport land use impacts local government decisions / even nearby foreign jurisdictions so crucial to achieve agreement with competing interests
  - Requires understanding relationships between local, regional, national and international networks, such as surface access systems and airspace development

# Future Decision Guide

- **Swiss government cooperation with France vital here**



# Investment Guide

- **Master Plan fundamental to investment decisions**
  - Explain in considerable detail the expected Capital Plan over the planning horizon (5, 10, 20 + years)
  - Define consultations towards agreements to obtain customer support for financial plan acceptance
  - Propose implementation schedule tied to forecast demand, and timing of approvals/construction
  - Explain phased investment strategy to ensure timely facility delivery and to avoid over-construction
  - Determine whether land acquisitions beyond the immediate airport boundary is necessary

# Process Outcomes

- **Master Plan Limitations**
  - NOT a development and construction plan
  - Instead, must be viewed as long-term guide for delivery of the physical improvements necessary to achieve an airport's business plan objectives
  - Only conceptual program for considering future investment, based on different periods that relate to airport expansion, should market forces dictate
  - A responsive document recognizes changing nature of transportation industry that demands flexibility and creativity to prepare the airport for change

# Planning Principles

# Planning Principles

- **Challenge to achieve sustainable outcomes**
  - Optimal resource use throughout planning period
  - Use phased investment to match capacity / demand
  - Meet regulatory standards, recognizing intensifying efforts to protect people and planet from harm
  - Deliver flexible plans to address future uncertainties
  - Balance current customer expectations with future trends towards industry supply chain integration
  - Pursue new ways of delivering capacity that could alter the definition of “ultimate capacity”

# Planning Constraints

- **Challenge to achieve sustainable outcomes**
  - Even “green / blue field” airports face constraints, so achieving balance between systems crucial
  - Lack of on and off-site coordination will limit future choices and may prevent future expansion
  - Natural topography, nearby infrastructure, and human settlements will impact overall performance
  - Social concerns heavily impacting operational systems and often create curfews or restrictions
  - Availability of land and / or acquisition costs crucial

# Planning Trade-Offs

- **Setting priorities requires stakeholder process**
  - Technical capability
  - Regulatory obligation
  - System integration
  - Conflict resolution
  - Financial issues
  - Environment impact
  - Social responsibility
  - Economic contribution
  - Community issues

# Design Principles

- **Basic principles of space design apply**
  - **Equality of Access** reflects need for all users to receive high quality performance
  - **Flexibility of Use** defines core aspects of modern life with customers demanding choice and adaptability
  - **Simplicity of Use** requires easily understandable processes and way-finding for users
  - **Universal Information** that effectively communicates information to users regardless of ambient conditions

# Design Principles

- **Basic principles of space design apply**
  - **Error Acceptance** that reduces exposure to risk and negative consequences from adverse events
  - **Minimal Resource Utilization** accepts that users require airports to deliver efficient, comfortable, and affordable outputs
  - **Fit-for-Purpose Scale** that recognizes that whatever size of operations the facilities and operational processes must meet human scale needs

# Passenger Planning Objectives

- **Remember, passenger expectations evolve**
  - Simple surface access
  - Understandable building design
  - Short walk between mandatory airport processes
  - Few delays or queues
  - Timely and reliable operations
  - Signage and way-finding clarity
  - Affordable commercial services
  - Ambiance and sense-of-place

# Airline Planning Objectives

- **Airlines are airport partners so consult always**
  - Comprehensive airport design
  - Efficient airfield layout with minimal taxi distance and apron congestion
  - Simple connections from aircraft to terminal to curb
  - Reliable baggage handling
  - Value-for-money airport services
  - Air carriers provided options for terminal operations, including alliance combined services
  - Willingness to adapt to changing conditions

# Planning Innovations

- **Airport system evolution demand best-practice**
  - Airports are complex machines run by people
  - Customer defined qualitative / quantitative outputs
  - Change necessary to maintain customer confidence
  - Requires complete organizational transformation
  - Airport processes must extend across supply chains demanding alliance / journey management strategy
  - Manner and timing of innovative transformation can create enormous competitive advantage

http://airportdynamics.tv/videos/watch/185

# Planning Innovations

- **Examples**
  - Automated Air Traffic Control
  - Airfield Design
  - IATA "Simplify the Business"
  - "Smart Security"
  - Commercial services
  - Cargo Automation
  - Inter-Modal bookings
  - Airport City concept

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# Design Optioneering

# Option Development

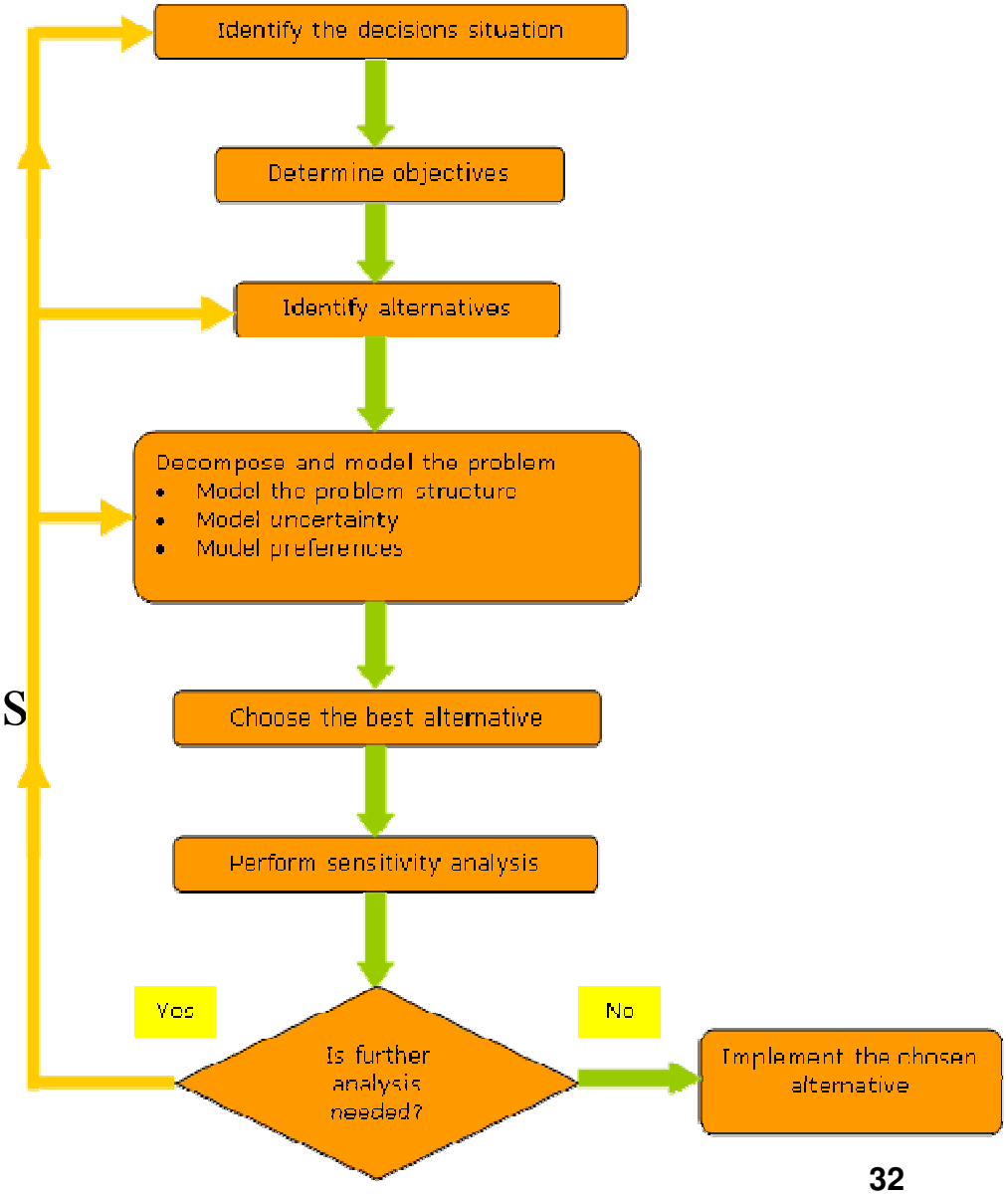
- **Integrated design to avoid "incrementalism" problem**
  - While recognizing that facility location is often permanent, where dated or no longer fit-for-purpose, then removal and replacement is valid
  - New concepts requires multi-disciplinary commitment and openness to alternatives
  - Innovation potential demands option design must include continuous improvement methodology
  - But, "*Value Engineering*" required to ensure that design options are affordable and practical

# Iterative Design Steps

- **Option development is NOT linear process**
  - Option assessment frequently generates more concepts from intellectual / challenge process
  - Involve experienced cost estimators to eliminate concepts that are unaffordable or inefficient
  - Environment and community design issues will assist in mitigating or avoiding impacts
  - Engaged consultation will identify new options, design modifications, or delete poor concepts
  - Integration process will identify compatibility issues that will certainly alter option viability

# Optioneering Priorities

- **Decision Hierarchy must support Airport Strategic Plan**
  - Airfield (runways, taxiways, aprons)
  - Cargo, Passenger speciality terminals
  - Support facilities
  - Surface access
  - Commercial uses



# Option Screening

- **Reducing options to manage project costs**
  - Screening process involves preliminary options evaluation
  - Generally involves high-level financial and technical assessments
  - May involve environmental and public acceptability considerations
  - Caution to avoid too early elimination of viable concepts, so more testing useful
  - Remain vigilant that discarded options could be re-used in future iterations

# Multiple Account Evaluation

# Project Evaluation

- **Multiple Account Evaluation (MAE)**
  - Traditional Cost-Benefit Analysis (CBA) useful only for small, non-controversial projects
  - MAE provides better decision matrix tool, and generates broad assessment for decision-makers
  - Explicit about qualitative and non-qualitative necessary compromises (trade-offs)
  - Better for comparing complex options within a project that have wide impacts
  - Permits comparison with non-project options such as process / technical innovations

# Typical MAE Criteria

- **Relevant criteria depends on criticality of interests**
  - Financial
  - Cost, Revenues, Opportunity/Salvage Value
  - Customer Service
  - Time Savings, Service Quality, Experience
  - Operational, Reliability, Flexibility, Expandability
  - Social, Environment, Economic Impact
  - Community integration, Local plan consistency, Equitable outcomes, Value-added production

# Best Practice MAE Criteria

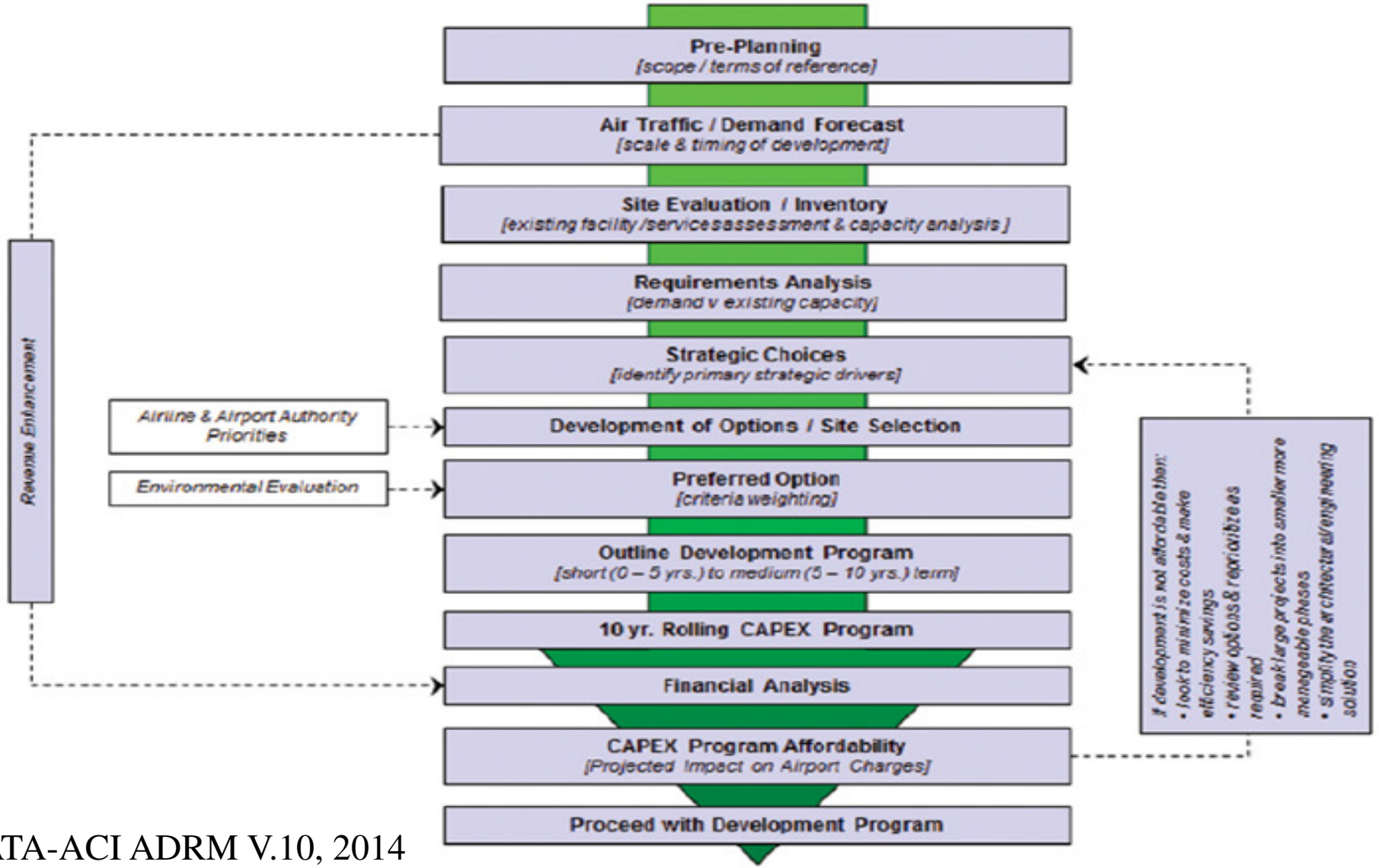
- **"Green Airport" Way of the Future**
  - Establish strategic "sustainability" objectives
  - Limit climate change emissions and noise
  - Operational principles demand laser-focus on operational delays / conflicts of any kind
  - Improve customer service and efficiency
  - Re-use, re-invent, and remove waste / energy
  - Evaluation criteria must assess all aspects of airfield-terminal-surface operations, land-use, energy programming, and community integration

# Master Plan Requirements

# Master Plan Requirements

- **General Structure**
  - Stakeholder consensus per IATA–ACI Aerodrome Development Reference Manual, V. 10, 2014
  - Technical requirements in ICAO Annex 14
  - National policy supreme but must converge with ICAO for international airports to avoid conflicts

# Master Plan Steps




IATA-ACI ADRM V.10, 2014

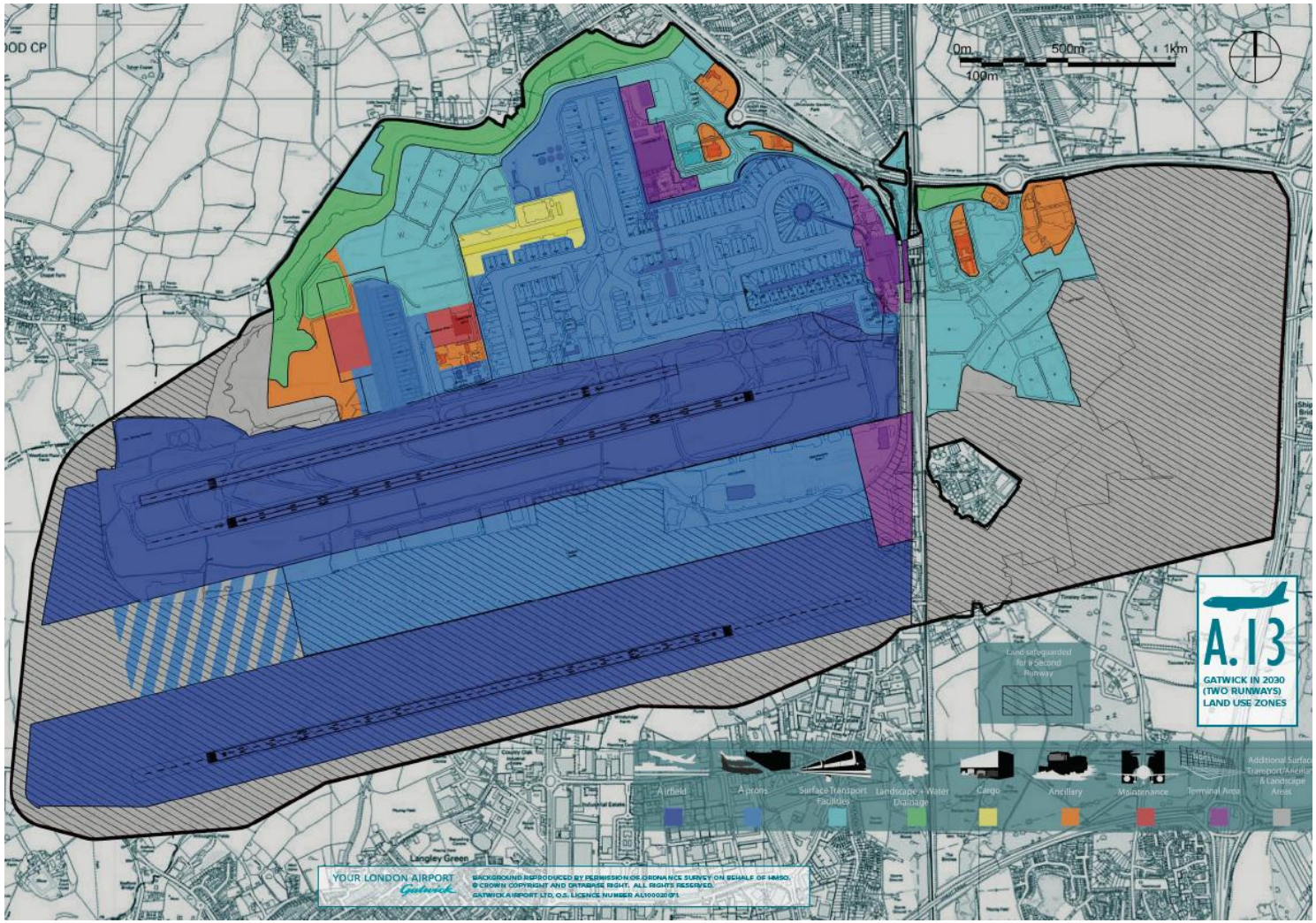
# Pre-Project Considerations

- **Determine Component Management**
  - Define planning program, terms of reference, requests for proposals, schedule, and budgets
  - Milestone and deliverable clarity, particularly with external consultants / confidentiality
  - Huge data volumes so policy needed regarding disclosure, especially where regulatory approvals involve public process data sharing
  - Senior management to coordinate and monitor to ensure sufficient due diligence accomplished
  - Board of Directors / investor involvement?

# Project Outputs

- **Land Use Plan**
  - Confirm land boundary controlled by the airport
  - No compromise of airfield protection areas
  - Prioritize land uses based on strategic objectives
  - Ensures commercial development opportunities
  - Must integrate with local planning jurisdictions
  - Establish expansion areas for land acquisition through commercial methods or state action
  - Identify areas outside airport boundary that may compromise future airport development

# Best-Practice Example

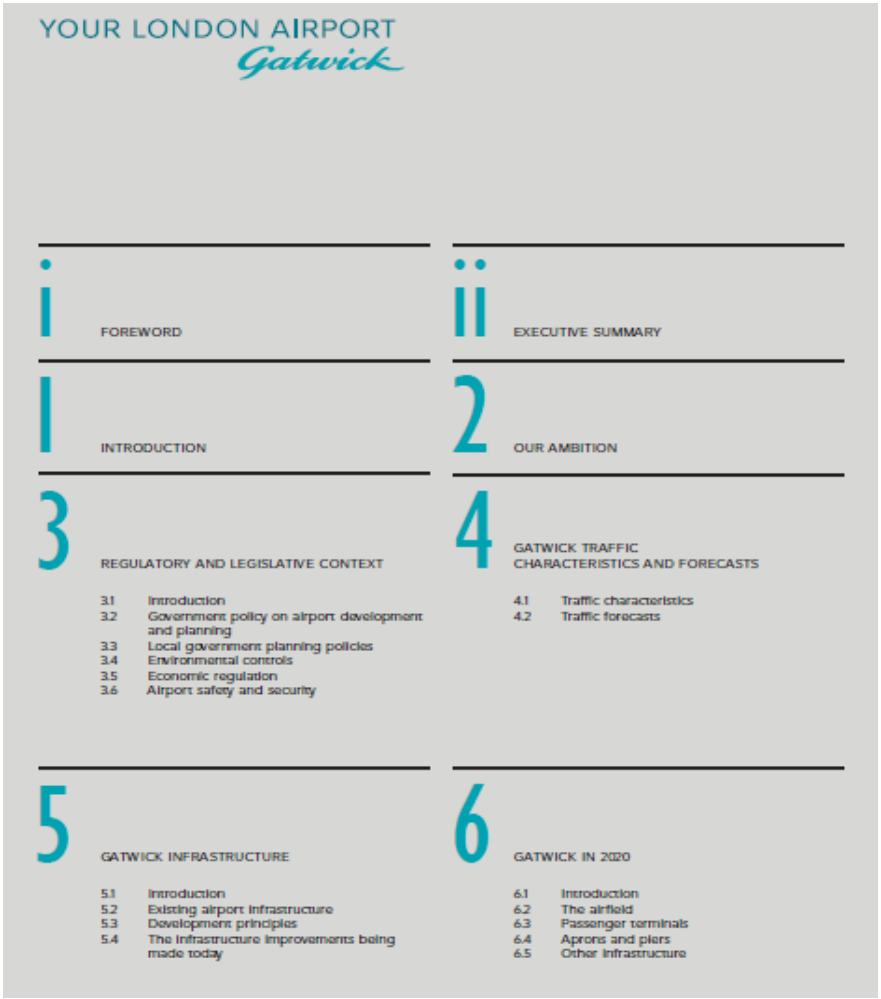



Courtesy of Gatwick Airport Ltd.

# Master Plan Project Outputs

- **Type of Report depends on audience**
  - Airport strategy
  - Situation analysis
  - Traffic forecasts
  - System capacity
  - Demand / Capacity “Gap” analysis
  - Design options analysis
  - Evaluation criteria
  - Stakeholder engagement
  - Financial assessment
  - Capital development program
  - Implementation Monitoring

# Best-Practice Example



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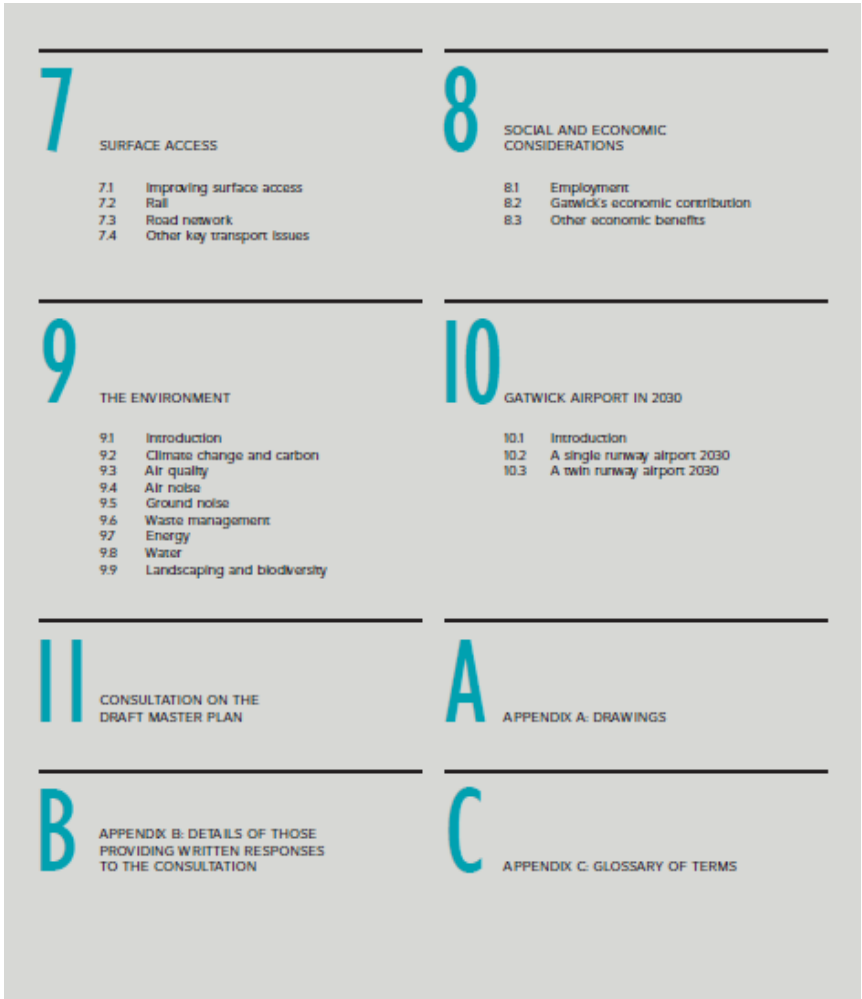



Courtesy of Gatwick Airport Ltd.

# Conclusion

# Conclusion

- **Successful Airport Master Plan process must be Strategic and Performance Orientated**
  - Challenge future forecast scenarios
  - Develop user risk and reward understanding
  - Best-practice demands views from outside of airport organization / peer reviews can help
  - Relentlessly pursue technology / process innovation prior to Master Plan implementation
  - Ultimately, ensuring stakeholder integration and acceptance will deliver best results

# Select References


- ICAO Annex 14, 2013, "*Aerodromes*", v.6
- IATA – ACI, 2014, "*Aerodrome Development Reference Manual*", v.10,
- ICAO, 2012, "*Policies on Charges for Airports and Air Navigation Services*", Doc. 9082, v.9
- Airport Council International, 2009, "*Policies and Recommended Practices Handbook*", v.7

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# Questions ?