ANNEX B

International Standards and Best Practice – Airport Landscape Design

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1 INTERNATIONAL STANDARDS AND BEST PRACTICE – AIRPORT LANDSCAPE DESIGN

1.1 *INTRODUCTION*

The **Airport Authority Hong Kong** ("AAHK") is responsible for operation of the Hong Kong International Airport (HKIA). The HKIA Master Plan 2030 (MP2030) recommended expansion of HKIA into a three-runway system (3RS) ("the Project") as the best way forward to cope with the projected increase in air traffic demand and to secure the continual growth of HKIA operation for the benefit of the economic development of Hong Kong. This development option for HKIA received approval in principle from the Government of the Hong Kong Special Administrative Region (HKSAR) on 20 March 2012.

An Environmental Impact Assessment (EIA) Study Report for the Project was prepared in accordance with the study brief requirements (ESB-250/2012) issued by the Environmental Protection Department (EPD). The EIA Report for the Project (Register No. AEIAR-185/2014) was approved by the EPD on 7 November 2014 and the Environmental Permit (EP) (EP No. EP-489/2014) granted on 7 November 2014.

According to Environmental Permit (EP-489/2014) Condition 2.18, the Airport Authority Hong Kong (AAHK) shall 'no later than 3 months before the commencement of construction works on the formed land of the Project'…submit a…Landscape and Visual Plan (LVP)…to specify quality criteria on the overall landscape and visual environment of the Project with broad-brush targets to be achieved for greening and planting as benchmarked against international standards and best practises. The LVP, with drawings in the scale of 1:1000 or other appropriate scales showing the landscape and visual mitigation measures of the Project, shall include at least the following information:

- aesthetic architectural designs for building structures and facilities;
- locations, size, number and plant species of trees to be transplanted and their final transplanting locations;
- locations, size, number and plant species to be felled;
- locations, size, number and plant species to be provided or compensated; and
- implementation programme, maintenance and management schedules.'

The exact facilities covered by the 3RS LVP will be detailed within the full LVP itself. Broadly it will include the Third Runway Concourse (TRC) which has a number of high-impact design concepts being explored such as an open courtyard area and provision of sunken gardens and interior landscaping, all of which provide opportunities for greening and creation of interesting areas within the future expanded airport. AAHK

has committed to become the world's greenest airport(1) and is looking to set a new benchmark for establishment of a passenger friendly, green and environmentally sustainable concourse at the airport. The LVP will cover all 3RS design aspects. It will fulfil the above EP requirements as well as requirements of the mitigation measures set out in the EIA with regard to landscape and visual impact, construction impact on existing trees, the management of transplanted trees and the provision of compensatory tree planting for trees that have been removed. .

In a broad context, the landscape design of the LVP is also an important aesthetic component of the visual environment, and together with the architectural design of building structures and facilities, will convey a sense of arrival and departure from Hong Kong, one of Asia's most important global cities.

The purpose of the current Report is to address one particular element of the EP requirement within the LVP:

- Specify **quality criteria on the overall landscape and visual environment** of the Project with **broad-brush targets to be achieved for greening and planting** as benchmarked against international standards and best practices.

1.1.1 Approach

The LVP will include full details of local requirements related to the landscape and visual environment of 3RS as well as local requirements for greening and planting and will add detail on the relevant mitigation measures and commitments from the EIAO process. This report focuses on identifying and reviewing available and relevant international standards and/or best practices relating to the landscape and visual environment and greening and planting in an airport setting.

The approach has been based primarily on web-based research. A wide range of readily available information sources were identified which focused on the landscape master planning and design of airports around the world but also included other documentation such as architectural award information and general guidelines concerning airport design and landscaping; key documents reviewed are listed in *Appendix A*. The focus was then a review of select aviation facility case studies to draw out any commonalities prior to drawing conclusions. For completeness, some international standards not directly applicable to an airport or to the 3RS landscape and visual environment, greening and planting but with some general relevance have also been included in *Appendix B*.

While a comprehensive review of local standards and guidelines in Hong Kong will form part of the Statutory Framework review within the full LVP, some key information has been included in the current Report. In addition the Land Grant documents for CLK

(1) As stated on Hong Kong International Airport, Website, Sustainability Page. (Available at http://www.hongkongairport.com/eng/sustainability/environmental-management/index.html). Note 'Green' relates to sustainability more broadly and not just to landscape and vegetation greening.

Lot No.1 (existing airport) and CLK Lot No. 3 (NCD) have been reviewed for any planting or greening requirements.

It should be noted that a planting scheme at the existing airport has been established for many years with the airport island generally divided into four zones according to distances from runways and land use. There is also an approved plant species list with the acceptability of each species and management strategy evaluated based on their growth form and attractiveness to wildlife, particularly birds which need to be avoided near the runways and in airside areas. Plants in landside areas are divided into five categories according to their growth form, namely tree; small tree/shrub herbs and ground cover; climber; and palm. The potential attractiveness of fruits of the selected plant species to birds were also reviewed in 2012 and relative abundance of each species was estimated at that time.

1.2 INTERNATIONAL & LOCAL STANDARDS

There are no internationally recognised quality criteria, broad-brush targets, standards or best practices for airport landscapes. While international standards regarding airports do exist and include 'environment', these are primarily focused on noise emissions, air quality and greenhouse gas emissions and improving efficiency to reduce use of natural resources. In particular the International Civil Aviation Organization (ICAO)[1] amongst its five strategic objectives[2] includes 'Environmental Protection'. However the major environmental goals of this strategic objective are to: limit or reduce the number of people affected by significant aircraft noise; limit or reduce the impact of aviation emissions on local air quality; and limit or reduce the impact of aviation greenhouse gas emissions on the global climate. Any ICAO documents available concerning Airport Planning and Design focus on operational opportunities to improve fuel efficiency and reduce emissions and while the use of environmental management systems is encouraged, there are no specific standards concerning landscape design criteria or greening.

Key points from two internationally recognized accreditation schemes with some landscape provisions, LEED and CEEQUAL, are provided below, with further details in *Appendix B*. These are not aimed at airports however and factors specific to airports, such as safety considerations such as birds roosting in vegetation or necessity of clear lines of sight in some areas, may not make them practical to implement for 3RS.

[1] ICAO is a UN specialized agency, established by States in 1944 to manage the administration and governance of the Convention on International Civil Aviation (Chicago Convention)

[2] http://www.icao.int/environmental-protection/Pages/environment-publications.aspx

1.2.1 LEED

Features to note that are of relevance to soft landscape design and earn accreditation points in LEED, although not directly to be used at airports, include:

- Landscape does not require a permanent irrigation system beyond a maximum two-year establishment period or if the landscape water requirement is reduced by at least 50% from a calculated baseline.

- Provision of a vegetation roof, use of existing plant material or installation of plants to provide shade over paving areas on the site (eg vegetated planted) to minimize heat island effects.

- Provision of shade from trees over at least 40% of the total length of existing and planned sidewalks within or bordering the Project, within 10 years of landscape installation.

- Provision of trees at intervals of no more than 12 m separation along at least 60% of the total existing and planned block length (exempting driveways).

1.2.2 CEEQUAL

While CEEQUAL does include some features regarding soft landscape design they are not directly developed for airports or are focused on development in a less modified environment. Credits earned by such benchmarks as what percentage of vegetation (of any kind) of high or moderate quality has been retained as part of the design, or whether planting design has taken the appropriateness of species selection into account (to include factors such as climate adaptation, local provenance and soil stability), are not necessarily applicable to 3RS given the system will be on reclaimed land or already modified land and planting will need to follow the Airport's approved planting list.

1.2.3 Hong Kong Standards

The full LVP will include a comprehensive review of local standards and guidelines in Hong Kong as part of the Statutory Framework information it will present. However some key information deemed applicable to the current Report are summarized below.

Greening, Landscape and Tree Management (GLTM) Section, Development Bureau

This section of the HK SAR Government's Development Bureau lists a number of technical circulars and guidelines that are relevant to greening and planting for new developments such as the 3RS. These will be fully reviewed in the full LVP and key points include:

- Minimum site coverage of greenery is given in ***DEVB Technical Circular (TC) (Works) (W) No. 3/2012 Site Coverage of Greenery for Government Building Projects***.

While this refers to government buildings it again provides some context to the standards being applied in Hong Kong, even if not directly applicable to the 3RS. It states that all new government buildings are required to achieve the minimum standards as set out in *Table 1.1* below. Examples of how greenery can be achieved include vertical greening, greening on slopes with gradient >45 degrees, grass pavers, covered greenery areas and aquatic planting in water features/ bodies as well as roof greening, podium greening/ sky gardens, greening on slopes with gradient <45 degrees and at-grade greening.

Table 1.1 Minimum Requirements on Site Coverage of Greenery

Area of Site	**Minimum Site Coverage of Greenery**		**Remark**
	Total Greenery Areas	At-grade Greenery Areas	Greenery Areas at other locations
≥20,000m^2	30%	15%	No minimum Greenery Areas requirement at other locations
≥1,000m^2, but <20,000m^2	20%	10%	

- Allocation of space for quality greening on roads is provided in ***DEVB Technical Circular (TC) (Works) (W) No. 2/2012 Allocation of Spaces for Quality Greening on Roads***. While not developed for roads within airport systems, it provides an indication of what might be achieved for some areas of the 3RS. Space requirements of greening zones on roads are given as:

  - For road hierarchies with central reserves to be provided, the following requirements for Central Medium Greening Zone (CMGZ) and Roadside Verge Greening Zone (RVGZ):

    - For trunk road and primary distributors, 2.5m minimum width shall be reserved for CMGZ

    - For roads other than trunk road and primary distributors, 2m minimum width shall be reserved for CMGZ

    - 2m minimum width shall be reserved for CMGZ.

  - For roads other than those above, 1.5m minimum shall be reserved for RVGZ.

  - The CMG and RVGZ act as planting strips for at-grade planting. The guideline goes on to provide the ideal characteristics of the planting strips.

- Some general principles for greening on footbridges and flyovers provided in ***DEVB Technical Circular (TC) (Works) (W) No. 2/2013 Greening on Footbridges and Flyovers***, which states that a balanced approach should be taken in the planning and design process taking into account factors including: Sustainability; Aesthetic effect; Compatibility with environment; Cost-effectiveness in terms of whole life-cycle costs; and Maintenance considerations.

- ***DEVB TC(W) No. 4/2020 - Tree Preservation*** set out policy for tree preservation including the procedures for control of tree felling, transplanting and pruning in Government projects and departmental responsibilities in handling proposals on tree preservation and removal. It set out the basic principles that compensation should be realistic, practicable and suitable and selection of tree species for compensatory planting should take into account resource requirement, suitability and cost-effectiveness in subsequent maintenance. It states that '**as far as possible, implementation of compensatory planting should be of a ratio not less than 1:1 in terms of number**' (with some possible exceptions such as on slopes), and in principle size of compensatory trees should be appropriate to the location and function. If this 1:1 ratio can be met in terms of number, additional planting to achieve **1:1 ration in terms of aggregated DBH should be undertaken as far as practicable.** This policy also states that 'quality aspect of greenery on site such as introduced themed planting, enhancing the ecological and conservation value, increasing overall site coverage of greenery, maximizing greening opportunity through vertical greening and roof greening, etc.' should be considered.

Hong Kong Planning Standards and Guidelines

The *Hong Kong Planning Standards and Guidelines (HKPSG)* is a Government manual of criteria for determining the scale, location and site requirements of various land uses and facilities. This manual is applied in planning studies, preparation/revision of town plans and development control. In particular Chapter 4 regarding 'Recreation, Open Space & Greening' is partially relevant to the current study. It has provisions for standards of open space but these are defined per 100,000 persons for district and local open space and therefore not directly applicable to the 3RS. It does note however that generally for site development, for tree planting a 3 m wide planting strip and a minimum 1.2m soil depth (excluding drains) should be reserved and for other plantings, a minimum 1 m wide planting strip is recommended. This guideline does also provide some criteria for greening, however these are for residential developments and quantified around numbers of people, so again are not applicable.

Guiding Principles on Green Coverage for Public Housing Developments

Guiding Principles on Green Coverage for Public Housing Developments has been jointly prepared by Planning Department and Housing Department and it focuses on public housing developments specifically and so is not necessarily applicable to an airport area. This guideline recommends an **overall target of 30% green coverage** for public housing developments but subject to individual site characteristics and constraints, **a lower percentage of green coverage could be considered on a case by case basis** while **20% should be considered as a minimum** unless constrained by special circumstances. There are **incentives** laid out in this guideline **to encourage greening** (eg communal sky gardens on residential buildings with greenery may enjoy exemption from Gross Floor Area (GFA) and/or Site Coverage (SC) calculations under the Buildings Ordinance (BO), Buildings Department (BD), Lands Department and Planning Department Joint Practice Note No. 1, Green and Innovative Buildings (JPN No. 1)). While the percentage green coverage targets and incentives set out in this guideline are not

necessarily applicable to 3RS, they are specific to Hong Kong and might be used as an initial reference to develop more specific airport greening targets.

For industrial and commercial developments, a minimum standard of 0.5m^2 local open space per worker for landscaping and passive recreation use is required. While this may not be directly applicable to 3RS, the system will need to consider its workforce, and for any open space requirement, a percentage should be available for greening and planting purposes.

In addition, *Appendix 3* of the HKPSG Standards lists a number of other references regarding greening, including:

- Architectural Services Department, Study on Green Roof Application in Hong Kong Final Report (2007);
- Architectural Services Department, Universal Accessibility: Best Practices and Guidelines (2004);
- Architectural Services Department, Universal Accessibility for External Areas, Open Spaces & Green Spaces (2007);
- Buildings Department, Lands Department and Planning Department Joint Practice Note No. 1, Green and Innovative Buildings (2011);
- Buildings Department, Lands Department and Planning Department Joint Practice Note No. 2, Second Package of Incentives to Promote Green and Innovative Buildings (2011);
- Geotechnical Engineering Office Publication No.1/2011, Technical Guidelines on Landscape Treatment for Slopes;
- Buildings Department, Practice Note for Authorized Persons, Registered Structural Engineers and Registered Geotechnical Engineers ADV-23, Improvement of Visual Appearance and Landscape Treatment for Man-made Slopes and Retaining Walls (2004);
- Development Bureau, Guidelines on Greening of Noise Barriers (2012);
- Development Bureau Technical Circular (Works) No. 4/2020, Tree Preservation;
- Environment, Transport and Works Bureau Technical Circular (Works) No. 2/2004, Maintenance of Vegetation and Hard Landscape Features; and
- Environment, Transport and Works Bureau Technical Circular (Works) No. 11/2004, Cyber Manual for Greening.

BEAM Plus

BEAM Plus is an accreditation scheme which has been set up by the Hong Kong Green Building Council Limited (HKGBC) which strives to promote the standards and development of sustainable buildings in Hong Kong and develop practical solutions for Hong Kong's unique, subtropical built environment of high-rise, high density urban area. HKGBC has developed various Building Environmental Assessment Methods (BEAM) to undertake assessments which cover the planning, design, construction and commissioning of a new building projects and as such could be applicable to 3RS.

Overall BEAM seeks to reduce the environmental impacts of a new building while also improving environmental quality and user satisfaction. There are no overarching assessment aspects for landscape or greening; however assessment criteria relevant to landscape and greening are included within Site Aspect categories of BEAM Plus Neighbourhoods and New Buildings. BEAM Plus concerning new buildings includes criteria for providing appropriate planting on site equivalent to at least 30%-50% of the site area in residential premises and Neighbourhoods has credits points if over 5% of the site area is green space, open space or blue assets. Since 3RS is not residential these are not directly applicable but BEAM does allow for refinement of criteria according to specific conditions and these criteria may be adapted to suite an aviation facility with other higher priorities such as and safety and functionality. To maximize the provision of greenery, however, internal landscapes could be provided where possible, to improve the indoor environmental quality and visual benefit of occupants within 3RS.

CEEQUAL

CEEQUAL is an international evidence-based sustainability assessment scheme for civil engineering and infrastructure projects that was first developed by the UK Institution of Civil Engineers in year 2003. CEEQUAL aims to assist clients, designers and contractors in the delivery of improved sustainability performance and strategy during the course of a project, covering the planning, design and construction phases.

The AA is pursuing a Whole Team Award for the Third Runway and Associated Works contract of the 3RS Project. The CEEQUAL assessment covers wide-ranging aspects of sustainability performance, including some landscape and visual issues. The AA has currently already completed the Interim Client and Design Award related sustainability assessment under CEEQUAL and has achieved an Excellent rating for the Interim Award.

1.2.4 Land Grant Requirements

Within the Land Grant documents for the Airport, there are specific provisions for Landscaping requiring development of a Landscape Master Plan or Conceptual Landscaping Submission.

For CLK Lot No. 3 (NCD) the Landscape Master Plan must show compliance with the following conditions which are relevant to this Report:

- **Not less than 30% of the area of the lot**, in which, as far as this Special Condition is concerned, shall exclude the site or sites for the provision of the Airport Operational Development, **shall be planted with trees, shrubs, or other plant**s and **not less than 50% of the said 30%** (hereinafter referred to as **"the Greenery Area"** shall be provided at such location or level as may be determined by the Director at his sole discretion, so that **the Greenery Area shall be visible to pedestrians or accessible by any person or persons entering the lot**. The decision of the Director on which landscaping works proposed by the Grantee constitutes the said 30% shall be final and binding on the Grantee. The Director at his sole discretion may accept other non-planting features proposed by the Grantee as an alternative to planting trees, shrubs or other plants.

- All landscaping within the lot shall comply with the latest version of the Approved Plant Species List as published by the Airport Authority.

- No tree growing on the lot or adjacent thereto shall be removed or interfered with without the prior written consent of the Director who may, in granting consent, impose such conditions as to transplanting, compensatory landscaping or replanting as he may deem appropriate.

For CLK Lot No.1 (existing airport) no specific conditions are provided but the following clauses relate to landscaping:

- The Grantee shall within three months from the date of the Agreement, submit a Conceptual Landscaping Submission indicating landscape treatment for the Lot, including the preservation and enhancement of the natural landscape reserve. The Conceptual Landscaping Submission will give such details of all planting and hard finishes of all landscape areas, slopes and retaining structures as the Director may require.

- Prior to commencement of any building works (other than site formation works) for each part or parts of the Lot, the Grantee shall submit Detailed Landscaping Submission which shall include schedules and drawings and such other information as the Director may require, giving details of the hard and soft landscaping layouts and works in accordance with the approved Conceptual Landscape Submission.

1.3 SELECT CASE STUDIES - INTERNATIONAL AIRPORTS' LANDSCAPE MASTER PLANNING

As confirmed in *Section 1.2* there are no relevant international quality criteria, broad-brush targets or standards for airport landscapes. A number of documents concerning airports' landscape master planning where therefore reviewed from around the globe, from publically available information. A full list of these documents is provided in *Appendix A* including summary information for each.

The reference sources were evaluated to identify standards and best practices applied to each airport landscape design. Overall many of the same themes kept emerging from the document review and several case studies were then selected for further elaboration, based on the following criteria:

- Developed within the last 10 years, which is a period considered most likely to include advancements in modern landscape design for airports;
- Included specific references to landscape standards, guidelines, principles and design criteria;
- Provided a good illustration of particular themes relevant to the Study; and
- In combination, present a cross section of different countries and climates/ situations.

The selected case studies are listed below and the key information for each one provided in *Sections 1.3.1 to 1.3.6*.

1. "Airport Landscape – Urban Ecologies in the Aerial Age", edited by Sonja Duempelmann and Charles Waldheim, published by the Harvard Graduate School of Design, 2014;
2. Terminal 3 Interior Landscape, Changi Airport. For the Civil Aviation Authority of Singapore (CAAS) **(Singapore)**;
3. "Brisbane Airport 2009 Landscape Masterplan (Revised 2010)", Brisbane Airport Corporation Pty Ltd, August 2010 **(Australia)**;
4. "Edmonton International Airport Landscape Design Guidelines", Edmonton Airport Airport, October 2010 **(Canada)**;
5. "Airport Landscape: Schipol", Adriaan Geuze & Maarten Buijs, Scenario Journal, May 2014 (**Netherlands**); and
6. Sustainable Airport Planning, Design and Construction Guidelines for Implementation on All Airport Project, Los Angeles World Airports, 2010 (**USA**) with case study of "Los Angeles International Airport Northside Plan: Design Guidelines and Standards", Rios Clementi Hale Studios, May 2014

1.3.1 Airport Landscape – Urban Ecologies in the Aerial Age

This document reviews the landscape design development of 26 airports of varying sizes located in North America, Europe, Asia-Pacific and North Africa. The evaluation identified a number of landscape themes:

- The use of landscape to mitigate air, soil and water pollution, manage stormwater runoff and risk to operations from wildlife and to enhance the airports appearance; and

- The conversion of airports into sites for urban agriculture, renewable energy and urban development to enhance environmental quality.

1.3.2 Terminal 3 Interior Landscape, Changi Airport, Singapore [(1)]

This document focuses on the design of the interior landscape for Singapore's Changi Airport. The landscape design criteria were to:

- use landscape elements to enhance and to become a dominant feature of the architecture, enhancing the city state's aim of being a 'city in a garden';

- develop a unique landscape design palette appropriate to the scale and use of the building;

- establish an interior environment where planting is part of the architecture, not just as accents and decoration.

- devise a low-cost, light-weight system for growing massed climbing plants.

Terminal 3 now contains a huge vertical garden, over 300 m wide and reaching five storeys high, with more than 10,000 plants and 25 species of climbers. It also has a an automatically controlled louvre system and unique roof with over 900 skylights with specific double-glazed low-emissivity low iron glass, which all work to help control temperature and reduce glare while still allowing penetration of natural spectrum of daylight into the building.

1.3.3 Brisbane Airport Landscape Masterplan, Brisbane, Australia [(2)]

This landscape masterplan for Brisbane International Airport was guided by three planning principles:

- Planning Principle 1: **Landscape Sustainability** - use sustainable landscape and open space planning and design with four main considerations:
  - Drought tolerance
  - Non-bird and flying fox/bat attracting
  - Subtropical design
  - Cost-effective maintenance.

  ie This included planting species which are drought tolerant, didn't attract birds and bats, are characteristic of the local micro-climate and cost-effective to maintain.

(1) https://www.asla.org/2009awards/043.html

(2) http://www.bne.com.au/sites/all/files/content/files/2009 Landscape Master Plan as at 3 August 2010.doc__0.pdf

- Planning Principle 2: **Landscape Values** - minimise adverse environmental impacts, balance the airport's built-form and complement biodiversity values with four main considerations:
  - encouraging connectivity between biodiversity and landscape;
  - enhancing scenic amenity;
  - minimising water use; and
  - separating urban areas.

  In separating urban areas, one strategy was to provide scenic landscape buffers that contributed to scenic amenity and outdoor recreation opportunities e.g where high traffic areas overlook low scenic preference areas such as car parks. It also recognises the potential to include landform modification eg mounding, for the buffer areas.

- Planning Principle 3: **Open Space Network** – facilitate public access through an attractive and innovative landscape setting for the enjoyment of the community consisting of:
  - Landscape character;
  - Cultural connection;
  - Outdoor recreation and connectivity;
  - Sport and recreation; and
  - Community focus and tourism.

The master plan did not refer to global best practice or guidelines but complied with several local and provincial-level government policies (e.g Queensland Tourism Strategy: A 10-year vision; South East Queensland (SEQ) Regional Plan; SEQ Active Trails Strategy; Water Sensitive Urban Design: Technical Guidelines for DEQ; SEQ Outdoor Recreation Strategy; Brisbane Airport Corporation (BAC)'s 2009 Master Plan; BAC's Airport Environment Strategy; BAC's Biodiversity Management Strategy and BAC's Drainage Master Plan).

Within this Landscape Master Plan a provision that landscape treatment must be consistent with the 'Landscape Area hierarchy and landscaping requirements' is made. Landscape areas are defined as including 'entrances, pedestrian areas and soft-scape within car parks'. In talking of landscape areas and plant selection this document stipulates minimum criteria for landscape treatment as:

- High Public Exposure Areas: 15% of Site

- Medium Public Exposure Areas: 10% of Site

- Low Public Exposure Areas: 5% of Site

1.3.4 Edmonton International Airport Landscape Design Guidelines, Edmonton, Canada[1]

The landscape design guidelines were guided by the following principles:

- create a '**sense of place**' by relating landscape design to the unique character of the city;
- '**greening**' of the airport by use of vegetation throughout the site with a definitive vegetated edge;
- **sustainable and maintainable** – use of low impact development techniques throughout development to mitigate environmental impacts;
- create a **welcoming gateway** to the airport to make an impression on visitors as they travel from the highway to the terminal;
- create **complimentary gateway**s within the airport lands and on its edge;
- develop a **healthy community** by providing opportunity for **passive outdoor recreation**;
- **reuse existing on-site materials** including boulders and fill excavated from the apron; and
- ensuring measures are **economically feasible**.

1.3.5 Landscape Strategy, Schipol Airport, Amsterdam, Netherlands [2]

The landscape strategy for Schipol had four "layers":

1. **Runway Verges**: For those arriving at Schiphol, Holland's green and tidy image should be confirmed by well-maintained green grassed verges at all times;
2. **Green Route**: Various airport services, facilities and centres are positioned along a loop road and should be linked by a uniform landscape treatment which characterizes these auxiliary areas;
3. **Infill Planting**: In amongst the airport buildings, facilities and services are many areas of open space and vacant land and all areas without an identifiable purpose, are planted with trees; and
4. **Visual Access**: The most impressive visual quality of an airport is the landing and take-off of planes and therefore visual corridors are kept open for people to enjoy this feature.

(1) http://corporate.flyeia.com/sites/default/files/Construction/eia_landscape_guidelines_oct_2010_v8.pdf

(2) http://scenariojournal.com/article/airport-landscape/

A key aspect of the strategy was the need for large areas of tree planting which meant that the species had to be carefully selected. They needed to be cost effective, easily-maintained, easily-propagated and not attract birds. Birch trees were selected and with the added advantage that their fibrous roots do not interfere with subterranean infrastructure.

1.3.6 *Sustainable Airport Planning, Design and Construction Guidelines for Implementation on All Airport Project*[1] with Case Study of *LAX Northside Plan, Los Angeles International Airport, USA*[2]

The overarching *Sustainable Airport Planning, Design and Construction Guidelines for Implementation on All Airport Projects* is a document for all Los Angeles International Airport. It lists just three performance measures for 'Landscape Design':

1. Reduce or eliminate potable water use for landscaping - Design landscaping to use 70% less potable water than allowed by local regulations once established OR 50% less than an average local baseline for similar facilities once established (temporary increased irrigation allowed for one-year maximum to establish new plantings calculated from a mid-summer baseline);

2. Reduce impact of fertilizer use

3. Provide Infrastructure for composting & Vermiculture.

In addition there are measures related to 'Heat Island Reduction – Roof' which target installation of '**a vegetation green-roof for greater than 50% of the total roof area**' and for 'Heat Island Reduction – Non-roof' targeting to '**install trees to provide shade within 5 years for at least 30% of dark colored impervious surfaces**' using native or climate-tolerant trees and large shrubs, vegetated trellises or other exterior structures supporting vegetation. It also states to 'substitute vegetated surfaces for impervious surfaces' and conversely to 'landscape to reduce heat through plant transpiration'.

The landscape design guidelines for LAX Northside case study specifically support the overall development concepts of the designated three districts: the LAX Northside Centre District, the LAX Northside Campus District and the LAX Northside Airport Support District. In addition, a key design principle was to prevent future interactions between birdlife and the working airfield. The landscape guidelines and standards have been organized around seven zones that exist within these three districts. These areas have been selected to help focus specific plants from the overall planting palette into appropriate locations. The seven zones designed were:

1. **Landscape setbacks** - used primarily to screen development from neighbouring communities and differentiate boundaries along property lines. These areas, depending on their location within the LAX Northside, consist of drought tolerant,

(1) https://www.lawa.org/uploadedFiles/LAXDev/News_for_LAXDev/Sustainable/Airport%20PDC/Guidelines/Jan08.pdf
(2) http://lawa.org/GDZ/pdf/LAXN%20Design%20Guidelines.pdf

low maintenance and durable materials that provide options for trees, shrubs and groundcover. The planting palette combined 50% non-native and 50% native plant material;

2. **Streetscapes** - primarily evergreen and non-native, allowing a consistent visual appeal year-round, in addition to being drought tolerant and non-invasive. The planting palette combined 70% non-native and 30% native plant material;

3. **Airport support zones** will have minimal planting owing to their proximity to the airfield. Most plant material was groundcover and shrubs and limited numbers of trees. This zone combined 80% native and 20%non-native plant material;

4. **Landscape buffer zones** consist of 100% percent locally-native, drought tolerant plant materials requiring limited to no maintenance;

5. **Recreation zones** are open space areas that required specific and particular groundcover for active playing fields, and intensive uses, such as dog parks and running paths. The planting palette for this area type was drought tolerant, non-invasive and will require frequent maintenance owing to heavy usage. The palette stipulated locally native species combining 80% native and 20% non-native plant material;

6. **Parking and development zones** were the largest landscaped areas within the LAX Northside area and are the surface parking areas required for each development. The planting palette for these areas consists of a hybrid mix of 40% non-native and 60% native plants. The trees, shrubs and groundcover options were compatible with storm water management systems, such as bioswales or permeable paving systems; and

7. **The urban tree line zone** is one of the most distinguished design features at LAX Northside. A line of trees runs the entire length of the LAX Northside and provides an edge through which development frontages engages and interacts. This row of trees is intended to be planted with a single tree species that is an evergreen species known for its low maintenance, capability for slender but tall growth in a conical form, and vibrant light green needles. This defining line creates an identity for the LAX Northside, while buffering visual and audible impacts from future developments on adjacent communities.

1.4 REVIEW OF CASE STUDIES

The case studies and documents reviewed went some way to illustrating the unique situation of each airport facility in terms of landscaping. Climate varies widely between locations influencing such matters as the nature of available vegetation species and the types of wildlife that may need to be considered. Equally how remote or integrated airports are with urban or developed environments and their linkages are all individual. It is therefore understandable that there are no internationally recognised quality criteria around greening or standards for planting

within airports. However, upon evaluating the case studies several general design objectives can be identified that are applicable to the majority of the case studies and these are summarised in *Table 1.2* below.

Table 1.2 Case Study Design Objectives

Design Objective (in order of case study)	26 Global Airports	Brisbane Airport	Singapore Terminal 3	Edmonton Airport	Schipol	LAX Northside	Applicable to 3RS
Use of landscape to mitigate air, soil and water pollution	✓	✓	n/a	✓	✓	×	✓
Manage risk to operations from birdlife	✓	✓	✓	✓	✓	✓	✓
Landscape design and visual quality: • enhance the airport's appearance • create an attractive and innovative landscape setting for the enjoyment of the community • balance the airport's built-form and complement biodiversity values by encouraging connectivity between biodiversity and landscape • create a welcoming gateway to the airport • provide opportunity for passive outdoor recreation • maintain landscape at all times • Design visual corridors are kept open for people to enjoy take off and landings	✓	✓	✓	✓	✓	✓	✓
Conversion of airports into sites for urban agriculture, renewable energy and urban development to enhance environmental quality	✓	×	×	×	×	×	×
Maximises internal landscapes within terminal buildings	×	×	✓	×	×	×	✓
Select planting species that doesn't attract wildlife, are characteristic of the local micro-climate and are economically feasible and cost-effective to maintain	✓	✓	✓	✓	✓	✓	✓
Minimise adverse environmental impacts minimising, for example, manage water use and stormwater runoff; use of low impact development techniques	✓	✓	✓	✓	×	×	✓
Create a 'sense of place' by relating landscape design to the unique character of the city	✓	×	✓	✓	×	✓	✓
Maximise "greening" of the airport by use of vegetation throughout the site	✓	✓	✓	✓	✓	✓	✓

It is evident from the case studies that greening and planting opportunities vary considerably according to a facilities' function (e.g. the safety considerations for bird strike when planning for vegetation within an airport), location (urban, rural, inland, by the sea etc.), climate (which in turn affects selection of plant species for planting but also the maintenance requirements), etc. The following text explores the applicability of each of the design objectives to the 3RS.

'Use of landscape to mitigate air, soil and water pollution'; 'Minimise adverse environmental impacts minimising, for example, manage water use and stormwater runoff; use of low impact development techniques'; 'Select planting species that doesn't attract wildlife, are characteristic of the local micro-climate and are economically feasible and cost-effective to maintain'; and 'Maximise "greening" of the airport by use of vegetation throughout the site' are relevant to all airports and therefore directly applicable to 3RS. In particular in Hong Kong where there are frequent typhoons and heavy rainy periods, the consideration of stormwater runoff and management of water use can be integrated into landscape design. Equally the Airport Authority have an approved planting list from which all planting species would need to be selected.

'Manage risk to operations from birdlife' is directly applicable. There is considerable birdlife in Hong Kong and this should be a key consideration when developing the landscape design and plant species.

The 'Landscape design and visual quality' elements listed in *Table 1.2* are all applicable to Hong Kong. In particular all airports should seek to create a welcoming gateway and for the landscape to enhance the airport's appearance and these elements of the objective are echoed in many of the documents reviewed. Given the constraint of land area for the 3RS how much area can be dedicated to providing opportunities for passive outdoor recreation will be more limited but must be developed with the context of Hong Kong standards.

'Conversion of airports into sites for urban agriculture, renewable energy and urban development to enhance environmental quality' is less directly relevant to 3RS given the land area constraint and lack of significant urban agriculture within Hong Kong. While this objective could be included for 3RS, it is not a key consideration and it is considered that other objectives have more direct relevance.

'Maximises internal landscapes within terminal buildings' is particularly relevant in Hong Kong and to the 3RS given the lack of outside space in general. Changi airport in Singapore has gone a long way to developing this objective, appropriately for a city state that aims to see itself as a 'city in a garden', vegetation is everywhere at the airport. 3RS equally could apply it directly to key buildings.

'Create a 'sense of place' by relating landscape design to the unique character of the city' is particularly relevant to Hong Kong and 3RS. Increasing thought is going into the experience that airports offer passengers and as part of this, airports are increasingly aiming to offer a distinctive experience, to make them 'of the place'.

1.5 *RECOMMENDED QUALITY CRITERIA & BROAD BRUSH TARGETS*

A key finding from the case study evaluation was that the landscape and visual designs at airports were developed without reference to a definitive and objective set of global quality criteria, broad-brush targets, or specific international standards. Instead they were developed through a detailed site analysis which established the site's context and existing landscape structures followed by a creative process which sought to exploit the context and structures and devise design solutions which expressed an aesthetic statement supporting the image of the airport's home city as well as fulfilling functional requirements. Within these no doubt local standards and requirements were adhered to but these are not explicitly expressed.

Recognizing there is a high degree of variation in quantified criteria as illustrated by the case of percentage green coverage and in the absence of a definitive and objective set of global quality criteria, broad-brush targets, or specific international standards for airport landscapes, the approach to fulfil the specific element of EP condition 2.18 addressed in this report has been to develop a qualitative set of international landscape design criteria based on the evaluation of the case studies. In addition a set of broad brush targets for greening and planting based largely on relevant local guidelines but recognising some of the targets in the case studies are set out.

In addition, the mitigation measures set out in the EIA with regard to landscape and visual impact will need to be taken into consideration for all Landscape Design works, as well as all relevant local requirements.

1.5.1 *Design Quality Criteria & Broad Brush Targets*

The proposed international design quality criteria and broad brush targets are indicated in *Table 1.3* below.

Table 1.3 Recommended Design Quality Criteria and Broad Brush Targets

#	Design Quality Criteria	Broad Brush Target
1	Create a 'sense of place' by relating the landscape design to the unique character of the site context in Hong Kong	*To be developed in conjunction with the landscape and detailed design of key 3RS buildings (e.g. TRC and T2 Expansion)* • Landscape themes will respond to the specific character and site context of each of the landscaped areas
2	Enhance the airport's appearance through an attractive and innovative landscape setting and the creation of a welcoming gateway on arrival and departure	• *To be developed in conjunction with the landscape and detailed design of key 3RS buildings (e.g. TRC and T2 Expansion)* Landscape themes will be coordinated across the different public exposure zones, with an emphasis on an exciting and attractive welcoming gateway to HKIA
3.	Maximise greening of external open space, including reclamation edge	• Target to achieve around 30% green coverage as far as practicable. Green coverage will include at grade greening, vertical greening, roof top greening, screen planting, indoor planting and airside turf planting.
4	Balance built form by connecting it to the external and surrounding landscape	*To be developed in conjunction with the landscape and detailed design of key 3RS buildings (e.g. TRC and T2 Expansion)* • Ensure interface areas between built form and the external spaces contain landscape hard and soft elements, unless otherwise justified • Integrate building and landscape design so that there is no abrupt boundary between the two environments
5	Maximise internal landscapes within building structures.	• Ensure consideration has been made to integrate greening (e.g. within planters, etc.) within key building structures, where feasible.
6	Minimise adverse impacts on the existing landscape and visual resources	• Compensate felled trees based on a target replacement ration of 1:1 • Requirement that 100% of disturbed areas (e.g. temporary works areas) shall be reinstated
7	Select planting species that are sustainable and do not attract wildlife, are characteristic of the local micro-climate and are economically feasible and cost-effective to maintain	• Ensure the planting species comply with the Airport's Approved Plant Species List • Reduce potable water use for landscaping to a practical, cost-effective minimum, beyond a 12-month establishment period

APPENDIX A

DOCUMENTS REVIEWED

A1. DOCUMENTS REVIEWED

The documents presented in the following table were reviewed as part of the current Report. These are comprised of variety of publically available landscape master plans of airports as well as other documentation including architectural award information and general guidelines concerning airport design and landscaping. These documents are relevant to the current Study, but not selected as case studies in particular as they largely reinforce landscape elements showcased by the selected case studies already.

Table A1.1 Information Sources Reviewed

Title	Link (where available)	Key Information
Ben Gurion International Airport, Lod, 2005 (Israel)	https://asla.org/awards/2005/05winners/068.html	The landscape area is divided into a large site of 65 acres which includes the Interchange and approach roads; and Courtyard-like central garden (5 acres) bounded on one end by the main entrance way and on opposing sides by the two large parking structures. Principles include: • Relate to the agricultural landscape of the surroundings: - Traditional citrus groves and agricultural fields. Done by planting new citrus groves on a massive scale (4,500 grapefruit and orange trees) in rows on a grid with no groundcover and plowed annually. - Sculpt areas between adjacent roads and ramps by moving quantities of soil, to create a continuous ground surface in spite of the complex topography • Low maintenance Landscape • Vegetation to suit the climate of the area. ie low water consumption was necessary at this location • Use of water in a traditional Mediterranean way, running in narrow channels with short falls. • Local materials – limestone used in both the paving and the walls with different dressing types for specific effects • Collaboration with local authorities - Forestry Commission provided early-stage management assistance with thinning, control of white-tailed deer and other nuisance species, nutrient and irrigation programmes - Working with local partners to plan and establish an non-profit organization to maintain mature trees. Local farmers maintain the newly planted citrus groves in exchange for fruit
Jandakot Airport Landscape Design Guidelines, 2013 V2 (Western Australia)	http://www.jandakotairport.com.au/images/files/Environment/Jandakot%20Airport%20Landscape%20Design%20Guidelines.pdf	Simple guidelines providing key plant lists to ensure they are indigenous to the area, native to Australia and some approved non-native water-wise plants. Landscaping areas are separated into Streetscapes, Verges, Building Setbacks, and Special Consideration for Leases Adjoining Air movement Areas.
Suvarnabhumi Airport, (Thailand)	http://www.archdaily.com/772509/passenger-terminal-complex-suvarnabhumi-airport-jahn	The focus of design for this airport has been on hardscape features such as careful shading of structures by trellises and provision of a low-energy building, maximizing the use of natural light.

Title	Link (where available)	Key Information
Design Manual for Washington Dulles International Airport – Airport Design Standards and Signing Guidelines, 2010 (USA)	http://www.mwaa.com/sites/default/files/archive/mwaa.com/file/IADVol12010.pdf	Landscape Guidelines within this Design Manual focus on facilitating the following key features: 1. Design of Plantings: Design of plantings within developed landside areas. 2. Preservation and Promotion: Preservation and promotion of the health, safety, and general welfare of the public and employees. 3. Convenient, Attractive and Harmonious; Creation of a convenient, attractive, and harmonious landside airport campus. 4. Preservation and Enhancement: Preservation and enhancement of the Saarinen-Kiley historic Main Terminal environs. 5. **Conservation of Natural Resources:** Conservation of natural resources including adequate air and water quality and the **appropriate use of land**. 6. Reduction of Harmful Effects: Result in the reduction of the harmful effects of wind and air turbulence, heat and noise, and the glare of motor vehicle lights. 7. Preserve Underground Water Resources: Preserve underground water resources and permit the return of precipitation to the ground water strata. 8. Drainage: Act as a natural drainage system and ameliorate storm water drainage problems. 9. Carbon Dioxide: Reduce the level of carbon dioxide and return pure oxygen to the atmosphere. 10. Soil Erosion: Prevent soil erosion. 11. Shade: Provide shade.
Pitking County Airport Landscape Master Plan, Aspen, Colorado, 2009 (USA)	https://aspenairport.com/sites/default/files/Pitkin%20County%20Airport%20Landscape%20Master%20Plan.pdf	

Title	Link (where available)	Key Information
Aviation Landscape and Sustainable Design Criteria, Engineering Department, Port Authority of NY & NJ, 2011 (USA)		The goal of the guidelines is (1) energy conservation and efficiency; (2) conservation of water and other natural resources; (3) waste reduction; and (4) healthy indoor environments. Breaks landscaped areas into five key areas: (a) Building Sites; (b) Primary Entrance/ Exit; (c) Roadways; (d) Secondary Roadways; (e) Airside; and (f) Tenanted spaces. It also stipulates that landscape design least likely to attract birds should have the following qualities: 1. Avoid plant material and design features that provide birds with a source of FOOD, WATER, COVER and SPATIAL DOMAIN. 2. Canopy trees should be planted in linear rows, **canopies spaced 15-20 feet apart at maturity. (Adjacent canopies should never be touching)** 3. Shrubs and small trees should be used moderately and not be planted under or directly adjacent to canopy trees. (Avoid creating eco-diversity) 4. Shrub beds should be small in size and discontinuous. 5. Flowering ornamental trees should be limited in quantity. 6. Groundcover should be well manicured, healthy, dense, moderately tall lawn, a fruitless low growing groundcover, gravel or bark mulch. 7. All plants should be planted at the same size and time.
Greenville Spartanburn (GSP) International Airport Landscape Master Plan, South California 2016 (USA)	https://gspairport.com/wp-content/uploads/2021/03/Landscape-Final-Document.pdf	Separates the GSP into distinct areas ie Terminal Approach; Terminal Mall; Terminal Drop off; and Airside Garden and is working to improve landscape including tree replacement to diversify away from a historic monoculture on the campus with two main species; improving roads with an effort to plant and maintain a mature tree canopy over the roadways and parking areas, enhance campus greening. There are no specific quantified goals however with the exception of: - a mixture of colours and heights shall be used, and turf relief areas mixed into the plan at a 50% ratio. - automatic irrigation system providing 100% coverage of maintaining lawn and landscape areas in healthy condition. Water conserving systems are encouraged

Title	Link (where available)	Key Information
Architectural and Urban Design Guidelines for the Airport, Santa Barbara City Council, California 1998 (USA)	https://santabarbaraca.gov/sites/default/files/documents/Services/Design%20Guidelines/Airport%20Design%20Guidelines.pdf	Includes Area-wide Guidelines for A. New Development; B. Historic Buildings; and C. Landscaping. For Landscaping these include: 1. Landscaping shall serve as a significant unifying element. 2. Major entry announcements at the Airline Terminal and along Hollister Avenue should be achieved with skyline trees. Landscaping should be used to complement the entrance to the Airport, both in the immediate area of the Airline Terminal and along James Fowler Road and William Moffett Place. Landscaping and tree heights may be restricted within the Airport Approach Zones. 3. Landscaping should be generally formal, compatible with existing on-site landscape and the neighborhood and complement the project's design and architecture. 4. Landscaping shall be simple and accent the walls as a sculptural element or color accent. 5. To the maximum extent feasible, storage, utility and parking areas shall be screened with fences, solid walls or landscaping along public rights-of-way. 6. Use landscaping in parking areas and along roadways to mitigate building mass from adjacent access roads. 7. Parking areas should incorporate canopy trees. However, tree height must not conflict with parking lot lighting or Federal Aviation Regulations. 8. The pedestrian environment shall be enhanced with suitable ground cover and low to medium shrubs. 9. All new landscaping shall be of the drought tolerant, low water using and low maintenance type with an emphasis on California native plant materials; irrigation systems are encouraged where appropriate. This requirement may be altered to the degree necessary for use of reclaimed water. 10. A buffer strip, a minimum of 100 feet in width, shall be maintained in a natural condition on the periphery of all wetland communities and creeks. Native vegetation shall be planted and maintained in this setback wherever feasible. 11. Promote a pedestrian friendly atmosphere by providing landscaping and pedestrian connections to surrounding areas, where appropriate.

Title	Link (where available)	Key Information
Longon International, Boston (USA)	https://www.hok.com/projects/view/boston-logan-international-airport-terminal-a/	In 2006 this airport became the first US airport to receive LEED certification, largely due to a major overhaul if one of its terminals (Terminal A). The primary focus for achieving LEED certification, however, was not focused on landscaping but rather on a roofing membrane feature, paving designed to reflect heat from the building, special storm water filtration devices removing suspended solids and total phosphorous from runways and a daylight strategy balancing drawing natural light and preventing glare. More recently (2015) the airport has drawn up a Sustainability Management Plan but again this has limited focus on landscape. Goals and KPIs are separated into ten categories (Energy and Greenhouse Gas Emissions; Water Conservation; Community, Employee and Passenger Well-being; Materials, Waste Management, and Recycling; Resiliency; Noise Abatement; Air Quality Improvement; Ground Access and Connectivity; **Natural Resources**; and Water Quality/Stormwater. KPIs related to landscaping include - Water Conservation: 'reduce landscaping water use by 10% by 2016' - Natural Resources: 'None'. The report simply states that mitigation must be implemented as per project requirements and the quality of nearby natural resource areas maintained/ expanded. In addition, with regards to Community, Employee and Passenger Well-being, a landscaped waterfront park well-suited for picnics, walks and scenic views of the harbor have been developed as well as a features playground, large open lawns and a community garden, but goals related to these features are not directly linked to greening or landscaping and rather focus on employee engagement/ retention/ hire and contribution to local economy.
NEWS: A tender has been floated for soft landscaping at the Abu Dhabi Midfield Terminal Building, 2015 (Abu Dhabi)		Soft landscaping is to be integrated with primary and secondary road infrastructure servicing for all Midfield Terminal Complex (MTC) operations ie part of the greater MTC development.

Title	Link (where available)	Key Information
Chicago Dep. of Aviation *Sustainable Airport Manual* including *Section 02905 Sustainable Airport Landscaping* (USA)		The Sustainable Airport Manual (SAM) has been created by the Chicago Department of Aviation (CDA) to incorporate and track sustainability in administrative procedures, planning, design and construction, operations and maintenance, and concessions and tenants with minimal impact to project schedules or budgets. The SAM not only guides the implementation of sustainability initiatives at O'Hare and Midway International Airports, but is reportedly used by several other airports around the world. Generally the SAM has thresholds and guidance that focus on: Site Selection; Stormwater; Reduction of Heat Islands, roof and non-roof; Water Efficiency; Energy Efficiency, Equipment and Appliances; Generation and/or Integration of Renewable Energy; Green Power; Materials and Resources; Waste Management and Recycling; Recycled content of materials; Use of Local/Regional Materials; and Alternative Fuels/Vehicles. ie Landscaping is not explicitly included but the thresholds for some areas are relevant. Within 'Reduction of Heat Islands' examples include green roofs, green walls and minimizing paved surfaces. Within 'Water Efficiency' the use of native, drought tolerant landscaping to minimize maintenance and irrigation needs is recognized in helping to achieve the reducing of potable water resources by 40%. The *Sustainable Airport Landscaping* section of the SAM is prepared as a general guideline and is not for a Specific Project. It defines landside areas as including 'all public and private roadways and buildings that are not within the Aircraft Operation Area (AOA) which is delineated by the perimeter security fence'. Sustainable design categories are focused around Construction Activity Pollution Prevention; Stormwater Design; Landscape & Exterior Design to Reduce Heat Islands (Non-Roof and Roof); Water Efficient Landscaping; and Innovation in Design/Construction. Landscaping criteria within the document are centered around ensuring plants are (1) native and (2) do not attract birds and/or mammals where relevant; (3) tolerate dry soil conditions and (4) are low-maintenance particularly in areas where aesthetics will play a larger role such as terminals, roadway approaches to the Airport, occupied buildings/ facilities and other areas of high visibility to the public. In addition guidance is provided regarding where trees can be planted (ie not within the Aircraft Operation Area), minimum plant spacing and maximum heights (no greater than 6 feet tall) and buffer distances to active runway or taxiways. (not within 600') Acceptable landscape elements for use include but are not limited to: Landscaped earthen berms or terraced flower beds; Raised planters, planter boxes, and containers; Hanging baskets; Free-standing trellises less than six feet above grade; Decorative stones or pavers; Benches and seating areas; Vine-covered retaining or free-standing walls less than four feet above grade; Ornamental fences.

Title	Link (where available)	Key Information
Transport Canada –TP 13549 - Sharing the Skies, Ch8 Solutions-Airport & Surroundings, 2010 (Canada)		With regards to the overlap of landscaping and safety concerns around bird strike and other wildlife, this document notes "It is the policy of Transport Canada to regard all wildlife on airports as potential hazards to airport and aircraft safety, and to site, construct, maintain, and operate the airport and its facilities in a manner that will minimize these hazards". A number of points are noted: • Effective programs encompass the entire airport, including buildings and structures but focus on aircraft-movement areas and approach and departure paths regardless of an airport's size. • Passive measures concerning wildlife including control of airport features that attract wildlife ie set out to reduce availability of food, water and shelter to ensure facilities are least attractive to wildlife. Examples measures include: - remove tree stand to eliminate roosting or nesting sites for birds etc.; - ensure adequate drainage to ensure no standing water areas; - increase slope of banks to eliminate shelter areas. • Suitable maintenance to ensure new habitat remains unattractive to problem species for an extended period of time. There is some debate around maintenance of grass – some suggest keep short to reduce loafing and feeding, others suggest long grass make it more difficult for birds to find food such as insects and reduces their visual contact with surrounding environments to inhibit their ability to detect predators. • Active measures including scaring and harassing wildlife to disperse.

APPENDIX B

FURTHER DETAILS OF INTERNATIONAL & LOCAL STANDARDS REFERENCED

B1. STANDARDS REFERENCED

Further details of international and local standards referenced in the main report are provided in this Appendix.

1.1 LEED

This is the accreditation scheme of the US Green Buildings Council (USGBC) and was developed to address all buildings everywhere, regardless of where they are in their life cycle. While it was developed by USGBC, it is used internationally with over 40 green building councils forming the LEED International Roundtable, an advisory group looking to supporting USGBC in advancing LEED worldwide and including Hong Kong and China (represented by a not-for profit organization 'Platinum'), Korea and India amongst others.

LEED has assessment tools focused on: Building Design and Construction; Operations and Maintenance; Interior Design and Construction; and Neighbourhood Development with specifications according to building type within those, but nothing specifically for Airports. Most relevant to greening and planting are some for the assessment criteria within 'LEED for Building Design and Construction' and 'LEED for Neighbourhood Development'.

1.1.1 LEED for Building Design and Construction

LEED for Building Design and Construction includes:

- **Water Efficiency: Outdoor Water Use Reduction** requires certain projects to reduce their landscape water requirement by at least 30% from the calculated baseline for the site's peak watering month. Reductions must be achieved through plant species selection and irrigation system efficiency, as calculated by the Environmental Protection Agency (EPA)'s Water Sense Water Budget Tool. Points are earnt as follows:

  - 2 points (1 point if healthcare), where no irrigation is required by showing the landscape does not require a permanent irrigation system beyond a maximum two-year establishment period;

  - 1-2 points (1 point if healthcare) if reducing a Project's landscape water requirements by at least 50% from the calculated baseline for the site's peak watering month (30% for Neighbourhood Development).

- **Sustainable Sites, Heat Island Effect (Roof and non-roof)** requires certain projects to minimize effects on microclimates and human and wildlife habitats by reducing heat islands and this can include provision of a vegetation roof, use of existing plant material or installation of plants to provide shade over paving areas (install vegetated planter) on the site within 10 years of planting. No specific criteria are provided as to the minimum area required etc. however.

1.1.2 *LEED for Neighbourhood Development*

LEED for Neighbourhood Development includes provision for minimum garden space by project density as detailed in *Table B1.1* and some quantitative measures for tree planting as detailed below.

Table B1.1 Minimum garden space, by Project density

Project Density (DU/hectare)	Growing Space (sq. meters/ DU)
> 17.5 and ≤ 35	18.5
> 35 and ≤ 55	9
> 55 and ≤ 69	7.5
> 69 and ≤ 87	6.5
> 87	5.5

- 1 point for tree-lined blocks where trees are provided at intervals of no more than 12m (exempting driveways) along at least 60% of the total existing and planned block length within the Project

- 1 point for provision of shade from trees or permanent structures over at least 40% of the total length of existing and planned sidewalks within or bordering the Project. Trees must provide shade within 10 years of landscape installation.

1.2 *CEEQUAL*

CEEQUAL is an UK accreditation scheme originally named '*Civil Engineering Environmental Quality Assessments and Awards Scheme*' but more recently updated to *'Sustainability Assessment, Rating and Awards Scheme for Civil Engineering, Infrastructure, Landscaping and Public Realm*[(1)] *Works*'. CEEQUAL-trained Assessors use this self-assessment process to assess projects or contracts and there is an International Manual for projects anywhere in the world. CEEQUAL has been used in UK, Hong Kong and Sweden and was also recently in talks with Malaysia's Sustainable Construction Excellence Centre (MAMPAN), a division of the Construction Research Institute of Malaysia (CREAM).

CEEQUAL includes nine sections in the Assessment Manuals covering: Project Strategy; Project Management; People and Communities; **Land Use and Landscape;** the Historic Environment; Ecology and Biodiversity; Water Environment (fresh and marine); Physical Resources Use and Management; and Transport. Within the Land Use and Landscape, relevant considerations that can earn credits are:

- whether the landscape proposals go beyond the aims of applicable landscape development or enhancement policies published by the relevant local, regional or national authority.

(1) 'Public Realm' is a term used to describe the spaces between buildings in built-up areas, where works on roadways and footways, pedestrianised areas, hard and soft landscaping and open spaces is undertaken

- what percentage of vegetation (of any kind) of high or moderate quality has been retained as part of the design. If retention is under 25% there is no credit given while 25-50% is the minimum scoring, with increments at 50-75%, 75-90% and 100%;

- whether planting design has taken the appropriateness of species selection into account to include factors such as climate adaptation, local provenance and soil stability;

- whether a long-term management plan is in place that defines long-term landscape objectives, established recommendations for work required to ensure those objectives are achieved and sets a programme for ongoing monitoring and review to assess the effectiveness.

Other than the first point, no quantitative criteria are suggested. Other considerations that are also not quantified include:

- whether there is evidence that landscape and visual factors have been considered by a suitably qualified landscape professional at each stage of the Project.

- whether there is evidence that the project design fits the local landscape character in terms of landform/ levels' materials; planting; style and detailing; scale; and landscape or townscape pattern;

- whether the impact of the development on the landscape character of the areas has been assessed, if the Project is located in an area of acknowledged and/or protected high amenity value for its landscape,. Coastal or townscape character;

- whether a system or plan was implemented during construction to ensure: commitments were implemented, beset practice applied for planting or habitat areas to avoid damage to landscape features, and soil conditions met the requirements for successful establishment of the landscape design.

1.3 BEAM PLUS

BEAM Plus is an accreditation scheme which has been set up by the Hong Kong Green Building Council Limited (HKGBC), a non-profit, member-led organisation established in 2009. Since 2012 HKGBC has been an Established Member (highest level of membership) of the global network organised by the World Green Building Council (WorldGBC) and joined the WorldGBC Directorship from July 2013 to June 2016. HKGBC strives to promote the standards and development of sustainable buildings in Hong Kong and develop practical solutions for Hong Kong's unique, subtropical built environment of high-rise, high density urban area.

HKGBC has developed various Building Environmental Assessment Methods (BEAM) to undertake assessments and covers the demolition, planning, design, construction and commissioning of a new building project and can also be applied to major renovations, alterations and additions. Overall it seeks to reduce the environmental

impacts of a new building while also improving environmental quality and user satisfaction. Assessment Aspects include: Community Aspects (CA); Site Aspects (SA); Green Building Attributes (GBA); Management (MAN); Materials and Waste Aspects (MWA); Energy Use (EU); Water Use (WU); Indoor/Outdoor Environmental Quality (IEQ/OEQ) and Innovations and Additions (IA). Assessment criteria relevant to landscape and greening are included within SA categories of BEAM Plus *New Buildings* (although this is regarding residential buildings), with provisions around green and open space (which may be partly be used for greening), in *Neighbourhoods*.

BEAM Plus – New Buildings v1.2 – SA7 Landscaping and Planters

For residential premises with site area larger than 1,000 m^2, it is required to demonstrate compliance with appropriate planting on site equivalent to at least 20% of the site area.

- 1 credit is awarded for providing appropriate planting on site equivalent to at least 30% of the site area.
- 2 credits are awarded for providing appropriate planting on site equivalent to at least 40% of the site area.
- 1 credit point is awarded for using previous materials for a minimum of 50% of hardscaped areas.

BEAM Plus – Neighbourhoods v1 - SA2 – Accessibility to Open Space, Greenspace and Blue Assets:

- 1 credit point is awarded where the two conditions are met:
  - (i) the total aggregate area of Open Space, natural woodland, shrub land, grassland, wetland and water bodies within the Assessment Area (Site Area and Impact Area combined) exceeds 5% of the Assessment Area; and
  - (ii) There is a pedestrian access not exceeding 500m walking distance that connects the above spaces to a notional entrance of any major occupied building within the site.
- 1 credit point is awarded where the two conditions are met:
  - (i) the site provided a total aggregate area of Open Space, Green Space and blue assets exceeding 5% of the Assessment Area; and
  - (ii) The Open Space, Green Space and blue assets provide a reasonable access by the public
- 1 credit point is awarded where:
  - (i) Open Space, Green Space and blue assets within the Site exceeds 5% of the Site Area; and

- (ii) At least one shaded or covered pedestrian route to Open Space, Green Space and blue assets is provided within the Site.

A number of credit points are also associated with ecological value and may be linked to landscape strategy but are not directly relevant to greening for landscape and visual purposes.

BEAM does allow for refinement of criteria according to specific conditions and none of these credits are geared towards aviation facilities and for 3RS, as certain types of landscaping and greenery provide food or shelter that attract birds in the aerodrome and may increase the risk of bird hazard, it is considered that the scale of soft landscaping would need to be controlled for safety reasons and the percentage thresholds listed above for credit requirements may need to be reduced. To maximize the provision of greenery, however, internal landscapes could be provided where possible, to improve the indoor environmental quality and visual benefit of occupants within 3RS.