

BEAM Plus Existing Buildings

Version 2.0
(2016.03)

Selective Scheme



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1 BEAM Plus for Existing Buildings

1.1 Introduction Building Environmental Assessment Method (BEAM) Plus is a comprehensive environmental assessment scheme for buildings on a voluntary basis. It defines the best practice criteria for a range of sustainability issues across the whole life-cycle of buildings and projects, such as how buildings should be designed, constructed, operated, etc. Recognised as one of the world's leading green building assessment systems, it provides a comprehensive set of performance standards that can be pursued by developers and owners.

Owned and operated by the BEAM Society Limited (BSL), BEAM Plus for Existing Buildings is one of a series of rating systems that covers the management, operation and maintenance of a building and may be initiated at any time.

It aims to reduce the environmental impacts of existing buildings whilst improving quality and user satisfaction by the adoption of the best techniques available with reasonable cost.

1.1.1 BEAM Plus Existing Buildings Version 2.0 Hong Kong has over 42,000 existing buildings stocks. Majority of them are over thirty years old. Encouraging building owners of these buildings especially in private sector to adopt green building management and upgrading the building services systems can play a significant role in the world of sustainability. Improving their energy efficiency is also an essential step towards the achievement of Energy Saving Plan target by 2025.

BEAM Plus Existing Buildings Version 2.0 contains a number of major amendments to the guideline. The new version aims to embrace more participation in "Green" Existing Building, encourage more energy saving towards Energy Saving Plan Target, and educate and induce behavioural change.

The BEAM Plus Existing Buildings Version 2.0 is unique in the way with the following features:

- i. Copes with the local climatic, physical, constraints and ease of long-term facility management;
- ii. Is unique in new features which may set precedent to promote sustainability in Hong Kong with high living density;
- iii. Incorporates new initiatives to improve the energy efficiency and environmental performance;
- iv. Echoes with Government's latest target under the Energy Saving Plan;
- v. Moulds inhabitant's behaviour lifestyle through demand-side management (DSM);
- vi. Encourages enhancement to aged buildings;
- vii. Embraces existing buildings of all ages;
- viii. Contains various levels of practical requirements; and
- ix. Provides flexible implementation options to encourage participation.

There are 2 major schemes under BEAM Plus Existing Buildings Version 2.0, i.e. Comprehensive Scheme and Selective Scheme. Comprehensive Scheme adopts the 'Plan-Do-Check-Act' approach for the continual improvement of the buildings while Selective Scheme embraces the 'Better than yesterday' principal to recognise the efforts made by the building management of the aged existing buildings to achieve better building performance.

1.1.2 BEAM Society Limited (BSL)

BSL is committed to promoting and developing the BEAM assessment tools, assessing green buildings and training professionals.

BSL owns and operates BEAM Plus and undertakes assessments, training and examinations as a basis for certification and accreditation by the Hong Kong Green Building Council Limited (HKGBC). Oversight of BEAM Plus for Existing Buildings, including assessment monitoring and deliberation of Credit Interpretation Request (CIR), is performed by the BSL Technical Review Committee (TRC).

BSL Board of Directors (2014 – 2016/17):

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1st Vice Chairperson – Mr K M SO

2nd Vice Chairperson – Ms Ivy LEE

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1.1.3 Hong Kong Green Building Council Limited (HKGBC)

HKGBC was established in 2009 as Hong Kong's industry body that coordinates efforts towards green building. HKGBC certifies BEAM Plus projects, accredits BEAM Professional (BEAM Pro), BEAM Affiliate (BA) and BEAM Assessors (BAS).

**1.1.4 Development of
BEAM Plus EB
Version 2.0**

The development of BEAM Plus EB Version 2.0 was led by a BSL Steering Committee comprising industry practitioners and experts. Industry stakeholders have been consulted via engagement workshops for feedback and opinion on areas including but not limited to the overall framework, performance categories and their relative emphasis, assessment criteria, submission requirement and grading methodology. The Steering Committee comprises:

Convenor – Mr K M SO

Members – Mr Benny AU, Ir Cary CHAN, Ir Prof Daniel W T CHAN, Ir Dr Ka Lung CHAN, Mr W M CHAN, Mr Arthur CHEUNG, Dr Tin Tai CHOW, Ir Colin CHUNG, Ms Yvonne IEONG, Ir Timmy KWAN, Dr Joseph LAI, Ms Susan LEUNG, Ms Meiling NG, Mr Clarence TSZ, Mr Martin WAN, Ir Dr Sammy WAN, Sr Bay WONG, Mr Romulus WONG, Ir Dr Raymond YAU.

Advisors – Mr Stephen CATLIN, Mr Oliver CHAN, Ir Thomas CHAN, Ms Ellen CHENG, Ms Karen CHEUNG, Mr Michael CHEUNG, Ir Patrick CHEUNG, Mr Rico CHEUNG, Mr Joe FONG, Dr Shermann FONG, Ir S K HO, Mr William HO, Mr John LAM, Mr Horace LEE, Ms Wendy LEUNG, Ir K C MAK, Mr W K WONG, Ms Veronica YING.

1.1.5 Disclaimer

BEAM Plus has been prepared with the assistance and participation of many individuals and representatives from various organisations. The final outcome represents a general consensus, but unanimous support from each and every organisation and individual consulted is not implied. The BEAM Plus documentation shall be revised on a regular basis and revised as frequently as necessary. BSL reserves the right to amend, update and change this Manual from time to time without prior notice. Where changes in regulations necessitate changes to the assessment criteria, they will be issued to all parties involved in an assessment and will be announced on the BSL's website. An appropriate transitional period shall be allowed for projects undergoing assessment process.

It should be noted that none of the parties involved in the funding of BEAM, including BSL and its members, provide any warranties or assume any liability or responsibility to the users of BEAM, or any third parties for the accuracy, completeness or use of, or reliance on, any information contained in BEAM, or from any injuries, losses, or damages arising out of such use or reliance.

As a condition of use, users covenant not to sue, and agree to waive and release BSL and its members from any and all claims, demands and causes of actions for any injuries, losses and damages that users may now or hereafter have a right to assert against such parties as a result of the use of, or reliance of BEAM.

1.1.6 Limitations

BSL does not endorse any self-assessed grading awarded by the use of BEAM Plus for Existing Buildings.

HKGBC offers a formal certification process of grading, this service provides for independent third party review of credits claimed to ensure all credits can be demonstrated to be achieved by the provision of the necessary documentary evidence. The use of BEAM Plus for Existing Buildings without formal certification does not entitle the user or any other party to promote any grading awarded.

1.2 Application and Eligibility

BEAM Plus Existing Buildings Version 2.0 attempts to cover the management, operation and maintenance of all types and ages of existing buildings, from small single building to large buildings, including but not limited to commercial, educational, government, industrial, office and residential buildings, hotels and shopping centres etc.

Buildings with BEAM 4/04 or BEAM Plus certificate are encouraged to renew their certificates by participating in this Scheme.

Newly completed buildings that have not been certified by BEAM Plus are also encouraged to participate in this Scheme. However, it is essential for the building management to have at least one year operational data of the building before registration.

Building with building services upgrades or minor renovations without changing the use of the building can be assessed under this Scheme.

Buildings undergone major renovation with structural alternations (such as the revitalisation of the entire industrial buildings or change of building use) cannot be assessed by this Scheme.

BEAM Plus does not assess any unauthorised or any unauthorised portions of any buildings, i.e. any buildings or building works not complying with the Buildings Ordinance. In case any non-compliance works or unauthorised portions in a building are reported, both HKGBC and BSL reserve the right to deprive the awarded rating from the Applicant.

1.2.1 Assessment Boundaries

BEAM Plus concerns about the interactions between the assessed building, neighbouring properties, and the neighbourhood in general. The assessment seeks to reduce negative impacts on neighbours and rewards efforts to improve the quality of the immediate surroundings to the benefit of the neighbourhood: the concept of 'good neighbour' buildings.

Under normal circumstances, BEAM Plus Existing Buildings Version 2.0 only assesses those areas which are under the control of the Applicant. It is understood that the involvement of tenants also plays an important role in improving the building's environmental performance. Therefore, additional or bonus credits could be awarded when the Applicant can demonstrate that their tenants are also getting involved in the assessment. Details shall be referred to the assessment criteria of individual credit.

1.2.2 Area weighting

The credits under BEAM Plus Existing Buildings 2.0 are carefully designed under the 'Plan-do-check-act' and 'Better than yesterday' approach. It is not necessary for the Applicant to apply area weighting for the credits in EU and IEQ under this Scheme.

1.3 Certification Framework

BEAM Plus for Existing Buildings Version 2.0 provides Applicants with more flexibility to participate in this green assessment to suit their program, budget and technical capability. A new assessment framework with 2 Schemes are designed and presented in Figure 1.1, including:

i. Comprehensive Schemes A & B (One-step or Step-wise approach)

For the details of the Comprehensive Scheme, please refer to the Manual of the Comprehensive Scheme.

ii. Selective Scheme

It is individual aspect assessment approach, and certificate will be issued for each individual assessed aspect. Should the same project completed the assessment for more than one aspects, "Record of Achievement" may be issued upon request to document result of each aspect assessed.

Building Owners/ Building Management Companies may choose to apply BEAM Plus certification via Selective Scheme if they do not intend to achieve the performance requirements for all aspects via Comprehensive Scheme. Certification under Selective Scheme has a lower threshold than Comprehensive Scheme, with aspect by aspect assessment.

This Manual focuses on the criteria of Selective Scheme only.

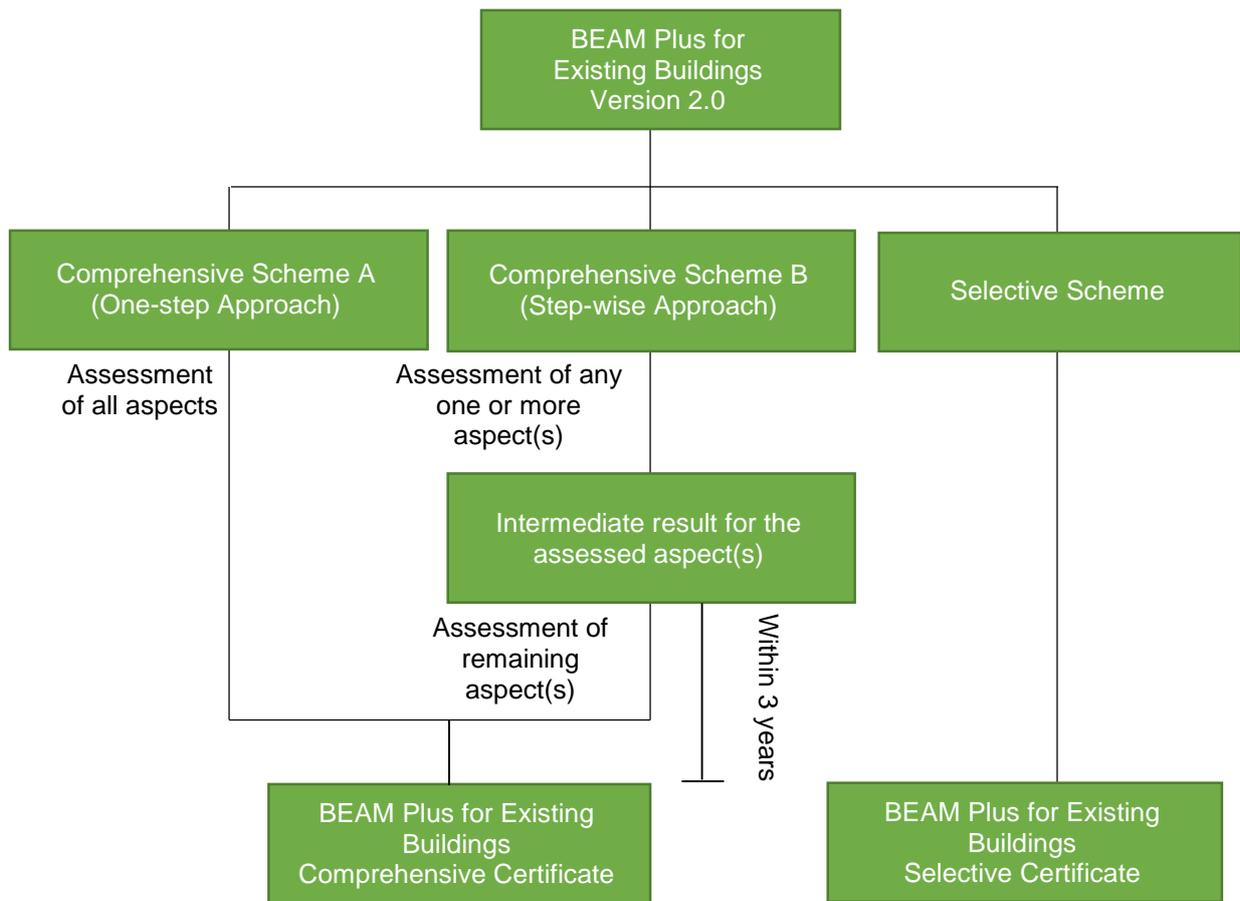


Figure 1.1 Assessment Flowchart of BEAM Plus Existing Buildings Version 2.0.

1.3.1 Certification Process Guidance materials of certification under BEAM Plus Existing Buildings Version 2.0 Selective Scheme are available on the HKGBC and BSL website [1].

1.3.2 Provisional Assessment Provisional assessment (PA) is NOT applicable for Selective Scheme.

1.3.3 Certificate Validity BEAM Plus for Existing Buildings Certificate (Selective Scheme) is valid for 5 years from the date of their issuance.

Certified projects are listed in a website database to indicate their address, location, type, developer/ owner, BEAM Pro, tool and rating.

Upon the expiry date, the BEAM Plus certificate and grading are no longer effective or recognised by the BSL. Applicants are encouraged to commission and submit separate certification assessments to renew their certificate.

Record of Achievement may be issued upon request to document result of each applied aspect if the same project completed the assessment for more than one aspect.

1.3.4 Certification Fees Certification fees for BEAM Plus Existing Buildings Version 2.0 Selective Scheme depend on the size and complexity of the project as determined by the HKGBC and BSL. Submission of credit interpretation request (CIR) and Appeals are subject to separate published charges. More details of fee structure can be found in HKGBC and BSL website.

1.3.5 Credit Interpretation Request (CIR) CIR process is a means whereby Applicants can seek technical and administrative guidance from the BSL TRC on the application of BEAM Plus credits to their projects. Examples may include:

- i. alternative compliance approaches to fulfilling the objectives of a particular credit;
- ii. clarifications of credit options and special circumstances; and
- iii. petitioning for higher credit allocation (performance enhancements).

CIR submissions should comprise a method statement identifying the objective of BEAM Plus Existing Buildings Version 2.0 Selective Scheme for which credit is being sought, a description of the approach being adopted and, where appropriate, the proposed alternative and method for assessment. More details of CIR can be found in HKGBC and BSL website.

1.3.6 Appeals The Applicants may submit an appeal on individual credit should they disagree to and not accept the decision made by the BSL. More details can be found in HKGBC and BSL website.

1 BEAM Society Limited. Retrieved 1 March 2016, from http://www.beamsociety.org.hk/en_index.php

- 1.4 Credit Performance Categories** Different assessment methods assign their aspects under different categories according to the preferences of the tool developer. In BEAM Plus Existing Buildings Version 2.0 Selective Scheme, aspects are grouped into the following categories:
- i. Management (MAN);
 - ii. Site Aspects (SA);
 - iii. Materials and Waste Aspects (MWA);
 - iv. Energy Use (EU);
 - v. Water Use (WU); and
 - vi. Indoor Environmental Quality (IEQ).
- Whilst BEAM Plus Existing Buildings Version 2.0 Selective Scheme adopts similar categories as other versions of BEAM Plus (for new buildings and interiors), the number and nature of credits within each category is specific to the context of operation, maintenance and management of existing buildings.
- 1.4.1 Management (MAN)** MAN assesses the policies, procedures and strategies implemented to ensure buildings are operated in a sustainable manner:
- i. Green procurement;
 - ii. Environmental, Health and Safety (EHS), and energy management;
 - iii. Environmental, social and governance (ESG) disclosure;
 - iv. Staff training;
 - v. Operation and maintenance;
 - vi. IAQ management for renovation;
 - vii. Cleaning and pest control; and
 - viii. Building users involvement.
- 1.4.2 Site Aspects (SA)** In general, the location of the building determines the extent of its environmental aspects. SA include:
- i. Site location;
 - ii. Emissions from the site;
 - iii. Greenery; and
 - iv. Site amenities.
- 1.4.3 Materials and Waste Aspects (MWA)** MWA focuses on materials in (green purchasing) and out (waste disposal) of the building. MWA include:
- i. Selection of materials; and
 - ii. Waste management and reduction.

1.4.4 Energy Use (EU) Assessments of EU in a building contain variety of uses, energy sources and building services systems or equipment, which are complex processes given the number of influencing variables. By comparing with the benchmarks derived from audits of similar type of buildings, and/or a computational approach, the energy uses, in addition to features known to have impact on overall performance will be determined. EU includes:

- i. Energy performance;
- ii. Energy management and analysis;
- iii. Energy efficient practices and measures; and
- iv. Energy efficient improvement.

1.4.5 Water Use (WU) Assessments under WU include quality and features that improve utilisation and reduce effluent. Water Use includes:

- i. Water conservation;
- ii. Water management; and
- iii. Effluent.

1.4.6 Indoor Environmental Quality (IEQ) Indoor environmental issues include those aspects of building performance that impact on the health, comfort, or well-being of the occupants, as well as aspects of performance that improve quality and functionality. IEQ includes:

- i. Occupants satisfaction;
- ii. Ventilation;
- iii. Thermal comfort;
- iv. Hygiene;
- v. Indoor air quality;
- vi. Lighting quality; and
- vii. Acoustics and noise.

1.4.7 Alternative Assessment Methods BEAM Plus does not seek to be overly prescriptive in setting the criteria and compliance methods. As such it is possible that some projects may not be fully embraced by the current criteria due to their unusual nature, system designs, etc. In such cases Applicants can consider alternative approaches that also meet the same objectives, and submit a CIR that details:

- i. BEAM Plus for Existing Buildings objective (clause number) for which credit(s) is being sought;
- ii. proposed alternative criteria; and
- iii. proposed method for assessment.

Proposals should be made at the earliest opportunity during the assessment, via submission of a CIR.

It is the sole responsibility of the Applicant to provide a comprehensive submission in the first instance. Inadequate submissions increase administration and will delay the assessment process.

1.5 Grading Methodology

- 1.5.1 Credits Allocation** Credits have been broadly allocated to each assessment criterion by taking into account other internationally recognised green building assessment tools as well as the sensitivity analysis and the comments received during the stakeholder engagement workshops.
- 1.5.2 Category Weighting** Category weighting is not applicable under Selective Scheme.
- 1.5.3 Exclusions** Exclusions are allowed where an issue or part of an assessment is not applicable to particular circumstances or building type.
- 1.5.4 Pre-requisites** There are no pre-requisites under Selective Scheme.
- 1.5.5 Assessment** The assessment shall be undertaken by independent BAS on behalf of BSL. The Applicant shall provide documentation and photographic evidence.
- 1.5.6 Bonus Credits** These credits would not be counted towards the total number of credits available, but would be counted towards the total of credits qualifying for an award classification.
- 1.5.7 Determination of Grade** The final certificate grading for projects certified under BEAM Plus Existing Buildings Version 2.0 Selective Scheme is determined by the overall percentage (%) of credits achieved for the assessed category/categories. Grading is awarded separately for each individual category.

Grade	Overall percentage (%) of credits achieved
 (Excellent)	70%
 (Very Good)	60%
 (Good)	50%
 (Satisfactory)	40%

If the credit achievement is less than 40% in the assessed category, this category will be graded as “Unsatisfactory”.

1.6 Abbreviation

ACRQWS	Advisory Committee on Water Resources and Quality of Water Supplies
AFCD	Agriculture, Fisheries and Conservation Department
ANL	Acceptable Noise Level
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.
BAS	BEAM Assessor
BD	Buildings Department
BEAM Pro	BEAM Professionals
BEC	Building Energy Code
BEEO	Buildings Energy Efficiency Ordinance
BMS	Building Management System
BS EN	British Standard
BSL	BEAM Society Limited
CFC	Chlorofluorocarbons
CFL	Compact Fluorescent Lamp
CIC	Construction Industry Council
CIB	Certificate Issuing Body
CIBSE	The Chartered Institution of Building Services Engineers (UK)
CIE	Commission Internationale de l'Eclairage
CIR	Credit Interpretation Request
CO	Carbon Monoxide
CSR	Corporate Social Responsibility
Cx	Commissioning
DSM	Demand Side Management
EHS	Environmental, Health and Safety
EMS	Environmental Management System
EMSD	Electrical and Mechanical Services Department
EnMS	Energy Management System
EPD	Environmental Protection Department
ESG	Environmental, Social and Governance
EU	Energy Use
FSC	Forest Stewardship Council
GHG	Greenhouse Gas

GLTMS	Greening, Landscape and Tree Management Section of Development Bureau
GRI	Global Reporting Initiative
GWP	Global Warming Potential
HCFC	Hydrochlorofluorocarbon
HFC	Hydrofluorocarbon
HKAEE	Hong Kong Awards for Environmental Excellence
HKAS	Hong Kong Accreditation Service
HKGBC	Hong Kong Green Building Council Limited
HK BESTOF	HKGBC Benchmarking & Energy Saving Tool – Office Buildings
HK G-PASS	HKGBC Green Product Accreditation and Standards
HKGOCC	Hong Kong Green Organisation Certification
HKIE	Hong Kong Institution of Engineers
HKIOA	Hong Kong Institute of Acoustics
HKPSG	Hong Kong Planning Standards and Guidelines
HKSAR	Hong Kong Special Administrative Region
HOKLAS	Hong Kong Laboratory Accreditation Scheme
HVAC&R	Heating, Ventilating, Air-Conditioning and Refrigeration
IAQ	Indoor Air Quality
IEC	International Electrotechnical Commission
IEQ	Indoor Environmental Quality
IPM	Integrated Pest Management
LD	Legionnaires Disease
LPD	Lighting Power Density
MAN	Management Aspects
MRC	Material Recovery Chambers
MWA	Materials and Waste Aspects
NO₂	Nitrogen Dioxide
NSR	Noise Sensitive Receiver
O₃	Ozone
O&M	Operation and Maintenance
ODP	Ozone Depleting Potential
ODS	Ozone Depleting Substances
OHSAS	Occupational Health & Safety System
REA	Registered Energy Assessor
RS&MRC	Refuse Storage and Material Recovery Chambers

RS&MRR	Refuse Storage and Material Recovery Rooms
RSP	Respirable Suspended Particulates
QMS	Quality Management System
QSP	Qualified Service Provider
SA	Site Aspects
SR	Solar Reflectance
SRI	Sound Reduction Index
SWL	Sound Power Level
THD	Total Harmonic Distortion
TRC	Technical Review Committee of BEAM Society Limited
TVOC	Total Volatile Organic Compound
UGR	Unified Glare Rating
US EPA	The United States Environmental Protection Agency
VBAS	Voluntary Building Assessment Scheme
VRF	Variable Refrigerant Flow
VSD	Variable Speed Drive
VVVF	Variable Voltage Variable Frequency
WACS	Water-cooled Air-Conditioning Systems
WEEE	Waste Electrical and Electronic Equipment
WELS	Water Efficiency Labelling Scheme by Water Supplies Department
WHO	World Health Organization
WSD	Water Supplies Department
WU	Water Use
WWF	World Wildlife Fund

1.7 Summary of Credits

	Section	Credit Requirement	Credit
2	Management (MAN)		44 + 5B
MAN 1	Green Purchasing Plan	1 credit for providing an endorsed green purchasing policy.	1
		1 credit for providing a green purchasing plan with objective, target and reporting on progress.	1
		1 credit for demonstrating that the plan is endorsed by top management endorsed by Building Owner/ Building Management Company.	1
MAN 2	Quality, EHS and Energy Management System	1 credit where the building management operates a Quality Management System (QMS) certified to ISO 9001.	1
		1 credit where the building management operates an Environmental Management System (EMS) certified to ISO14001.	1
		1 credit where the building management operates an Occupational Health and Safety System (OHSAS).	1
		1 Bonus credit where the building management operates an OHSAS certified to BS OHSAS 18001.	1B
		1 credit where the building management operates all of the above management systems for 1 year or more.	1
		1 credit where the building management operates an Energy Management System (EnMS).	1
MAN 3	Environmental, Social and Governance (ESG) Disclosure	a) Disclosure of Sustainability Policy and Targets 1 credit where the Building Owner/ Building Management Company discloses sustainability policy and targets to the public.	1
		b) ESG Reporting 1 Bonus credit where the Building Owner/ Building Management Company follows Global Reporting Initiative™ (GRI) Sustainability Reporting Guidelines and discloses the G4 sustainability report to the public.	1B
MAN 4	BEAM Professional	1 credit for at least 1 member from the Building Management Company is certified BEAM Professional with EB credential or BEAM Affiliate.	1
		1 credit for the building-in-charge being a certified BEAM Professional with EB credential and with at least 1 professional corporate membership qualification (e.g. HKIH, HKIA, HKIE, HKIS (BS/PFM), RICS (BS/FM), IFMA, HKIFM, BSOMES, or equivalent).	1
MAN 5	Staff Training and Resources	a) Staff and Technical Resources 1 credit for having adequate staff and technical resources to meet the O&M requirements of the building.	1
		b) Staff Training 1 credit for providing adequate and periodic training for the staff responsible for the O&M of the building.	1
MAN 6	Building Records	Maximum 7 credits for demonstrating that the following building records are in place. i. Building, structural, drainage, site formation, alterations and additions plans approved by the Building Authority; ii. Plumbing drawings accepted by the Water Supplies Department; iii. Fire Services Installation plans accepted by the Fire Services Department; iv. Layout plan for hidden utilities such as electricity cables, gas pipes, telephone lines, etc.;	7

Section	Credit Requirement	Credit
2	Management (MAN)	44 + 5B
	<ul style="list-style-type: none"> v. History of maintenance including records of installations and replacements, certifications and statutory forms; vi. T&C records and operation manuals for building services, mechanical components and installations; vii. Certification for the performance of specific materials and components as well as warranties from specialist contractors or suppliers (e.g. on water proofing materials and its installation work); and viii. Deed of Mutual Covenant. 	
MAN 7	<p>Building and Site Operation and Maintenance</p> <p>a) Building Maintenance 1 credit for demonstrating the operation of a planned programme of regular inspection, cleaning and maintenance of the building's fabric and structure under the control of the Applicant.</p> <p>b) External Areas and Facilities 1 credit for demonstrating the operation of a planned programme of regular inspection, cleaning and maintenance of external areas and facilities.</p>	<p>1</p> <p>1</p>
MAN 8	<p>Building Services Operation and Maintenance</p> <p>Maximum 5 credits for operating a planned programme of regular inspection, cleaning and maintenance of the following listed systems:</p> <ul style="list-style-type: none"> i. Air-conditioning system; ii. Lift and/or Escalator system; iii. Electrical system; iv. Lighting system; v. Plumbing and Drainage system; and vi. Fire Services system. 	5
MAN 9	<p>Electronic Operation and Maintenance Platform</p> <p>1 Bonus credit for operating an electronic O&M platform by the Building Owner/ Building Management Company.</p>	1B
MAN 10	<p>Renovation Management Plan</p> <p>a) Renovation Management Plan Maximum 4 credits for providing the renovation management plan and complying with the recommendation practices given by the Environmental Protection Department (EPD) for the listed aspects during renovation:</p> <ul style="list-style-type: none"> i. Indoor air quality; ii. Noise; iii. Wastewater; and iv. Waste. <p>b) Implementation of Renovation Management Plan Maximum 4 credits for providing records for the past 2 years that the renovation management plan of the listed aspects have been implemented by the contractors during renovation:</p> <ul style="list-style-type: none"> i. Indoor air quality; ii. Noise; iii. Wastewater; and iv. Waste. 	<p>4</p> <p>4</p>
MAN 11	<p>Green Cleaning</p> <p>a) Implementation of Green Cleaning 1 credit for implementing the green cleaning procedures/ practices.</p> <p>b) Use of Green Cleaning Detergent 1 credit for demonstrating the use of at least 5% of green cleaning detergents.</p>	<p>1</p> <p>1</p>
MAN 12	<p>Integrated Pest Management</p> <p>1 credit for implementing an integrated programme for pest management.</p>	1

Section	Credit Requirement	Credit
2	Management (MAN)	44 + 5B
MAN 13	User Guidance 1 credit for providing user guide to encourage and promote environmentally friendly activities.	1
MAN 14	Green Lease a) Green Lease Guideline 1 credit for providing green lease guideline to the tenants of the building.	1
	b) Implementation of Green Lease 1 credit for implementing green lease to the tenants of the building.	1
MAN 15	Educational and Promotional Programme 2 credits for Building Owner/ Building Management Company to advocate the behavioural change of building users in respect of Management by: i. Organising educational seminar/ promotion campaign; or ii. Arranging workshop for building users to read through and review the building user guide; or iii. Promoting or participating in Hong Kong Green Building Week organised by Construction Industry Council (CIC) and the Hong Kong Green Building Council Limited (HKGBC).	2
MAN 16	Recognition and Appreciation Awarded from Other Organisations 1 credit for the building has been certified under BEAM Plus Version 1.1 or 1.2/ BEAM 4/04 or 5/04. Maximum 2 Bonus credits for obtaining the following listed environmental award/ certification scheme/ campaign: i. EarthCheck Certification; ii. Green Building Award; iii. Green Globe Certification; iv. CLP Green ^{PLUS} Award; v. Hong Kong Awards for Environmental Excellence (HKAEE) – Property Management Sector Award; vi. Hong Kong Green Mark Certification Scheme; vii. Sustainable Building Index; Voluntary Building Assessment Scheme (VBAS) – Environmental Awareness Quality Label; and viii. Other green building related awards/ certification schemes/ campaigns which are not listed above.	1 2B
3	Site Aspects (SA)	49 + 2B
SA 1	Site Location and Amenities a) Public Transport 1 credit for availability of convenient pedestrian access to main stream public transport.	1
	b) Provision of Basic Service 1 credit where at least 10 different basic services are located within 500m walking distance from the building entrance(s).	1
	c) Neighbourhood Recreational Facility 1 credit where at least 2 different recreational facilities are located within 500m walking distance from the building entrance(s).	1
	d) Provision of Sitting Facility 1 credit for providing sitting facilities which are open to public during building operation period.	1
SA 2	Noise Pollution a) Provision of Acoustic Treatment Maximum 5 credits for providing the following listed acoustic Treatment: i. Air-cooled Chiller – Erect a barrier/ install silencer for air-cool chiller; ii. Water-cooled Chiller – Being enclosed in an acoustic enclosure or plantroom	5

Section	Credit Requirement	Credit
3	Site Aspects (SA)	49 + 2B
	<ul style="list-style-type: none"> iii. Cooling Tower – Erect a barrier/ install silencer for cooling tower; iv. Fan – Installation of flexible connector; v. Fan (for sound power level > 80dB(A)) – Provide silencers at major fan discharge outlets (for exhaust fans) or at air inlets (for intake fans); vi. Fan – Reduce the speed of fans at non-rushed hours; vii. Air duct – Stiffen the vibrating duct surface with supporting webs; viii. Air duct – Apply damping material to the vibrating duct surface; ix. Air duct – Apply composite lagging of sound absorbing materials; x. Chiller pumps – Erect a barrier/ located indoor; and xi. Water pumps – Erect a barrier/ located indoor. <p>b) Demonstration of Compliance with HKPSG Criteria 1 credit for demonstrating that the level of the intruding noise at the façade of the potential Noise Sensitive Receivers (NSRs) is in compliance with the criteria recommended in the Hong Kong Planning Standards and Guidelines (HKPSG).</p>	1
<u>SA 3</u>	<p>Light Pollution</p> <p>6 credits if there are no external lightings installed for the building.</p> <p>Alternatively</p> <p>Maximum 6 credits for implementing the following listed features:</p> <ul style="list-style-type: none"> i. Provide automatic control (e.g. timer switch) to switch off the external lightings (23:00 to 07:00 hours); ii. Avoid over-illumination of signs, facades, shop fronts, video walls and facilities with lighting. Over-illumination will increase possibility of light pollution; iii. Position and aim the lighting properly to avoid overspill of light to outside the area being lit up; iv. Use lighting with appropriate shields, baffles, louvers and cut-off features to prevent light overspill to nearby residence and into the sky, and glare from the light source; v. Circulate the Guidelines on Industry Best Practices for External Lighting Installations to building users; vi. Switch off all external lightings from the Building Owners/ Building Management Company (23:00 to 07:00 hours); and vii. Switch off all external lightings from all building users (23:00 to 07:00 hours). 	6
<u>SA 4</u>	<p>Heat Island Reduction</p> <p>Maximum 5 credits for providing the following listed items for the external non-roof area (i.e. ground floor and podium with less than 15m in height):</p> <ul style="list-style-type: none"> i. Greenery; ii. Water feature; iii. Outdoor green wall or vertical greening; iv. Shading device; and/or v. Paving materials with solar reflectance (SR) of 0.33. <p>Alternatively</p> <p>3 credits for implementing any combination of strategies (i) to (v) for 5% of the available exterior area.</p> <p>5 credits for implementing any combination of strategies (i) to (v) for 10% of the available exterior area.</p>	5
<u>SA 5</u>	<p>Green Roof</p> <p>5 credits for using green roof and/or roof material that meets the solar reflectance index of 82 for 50% of the available roof area.</p> <p>Alternatively</p> <p>2 credits for providing green roof/ urban farm on roof area.</p>	5

Section	Credit Requirement	Credit
3	Site Aspects (SA)	49 + 2B
	<p>1 additional credit if the green roof/ urban farm is more than 10% of the available roof area.</p> <p>1 credit for demonstrating plant selection fulfilling at least 2 of the following listed requirements:</p> <ul style="list-style-type: none"> i. Do well in lightweight and shallow soils; ii. Wind tolerant; iii. Drought tolerant; iv. Pollution tolerant; and v. Have non-invasive root systems. <p>1 credit for demonstrating plant growing media selection fulfilling at least 2 of the following listed requirements:</p> <ul style="list-style-type: none"> i. Super light-weight; ii. Inert; iii. Well-drained; iv. Well-aerated; v. Fire resistant; and vi. Nutrient retentive. 	
<u>SA 6</u>	<p>Security</p> <p>Maximum 6 credits for providing the following listed security measures.</p> <ul style="list-style-type: none"> i. Site is fenced; ii. Site is illuminated by building exterior lighting; iii. Provide a security control counter; iv. CCTV to monitor the building entrance(s); v. CCTV to monitor the elevators; vi. Frequent patrol of building and fence perimeter; vii. Access from adjacent building is inhibited by barriers; viii. Illuminance of footpaths is at least 50 lux at night time; ix. Alarm locally for opening and breakage; x. Meters are located in common areas; xi. Indoor parking; xii. Car park is fenced; and xiii. Others to be proposed by the Applicant. 	6
<u>SA 7</u>	<p>Corporate Social Responsibility Facilities/ Services</p> <p>Maximum 5 credits for providing the following listed CSR facilities/ services :</p> <ul style="list-style-type: none"> i. Allowing person with visual impairment to bring along with their guide dogs; ii. Automated External Defibrillator. iii. Baby-care room; iv. Bicycle parking; v. Breast feeding room; vi. Free baby stroller lending service; vii. Free drinking fountain; viii. Free wheelchair lending service; ix. Free Wi-Fi in common area; x. Organic farm; xi. Permanent art work; xii. Permanent green building education show board; and xiii. Others to be proposed by the Applicant. 	5
<u>SA 8</u>	<p>Amenities for Operation and Maintenance</p> <p>Maximum 6 credits for providing the following listed amenities that improve the operation and maintenance of the building and its engineering services:</p> <ul style="list-style-type: none"> i. Aerial working platform; ii. Building Management System (BMS); iii. Cat ladder; iv. Davit arm system; v. External pipe duct; 	6

Section	Credit Requirement	Credit
4	Materials and Waste Aspects (MWA)	53 + 2B

- vii. Printing ink – 20% vegetable or soybean oil;
- viii. Toner cartridge – Refillable;
- ix. Pen – Refillable ink and provide refill;
- x. Plastic garbage bags – 50% recycle content;
- xi. Plastic bag – Biodegradable;
- xii. Battery – Rechargeable;
- xiii. Detergent – Low VOC and without halogenated substances;
- xiv. Computer – With energy label;
- xv. LCD Monitor – With energy label;
- xvi. Printer – With energy label and energy saving mode;
- xvii. Fluorescent Lamp – Grade 1 energy label;
- xviii. Furniture – 2nd hand product;
- xix. Water dispenser – Bottleless; and
- xx. Other ongoing consumables with environmental attributes proposed by the Applicant.

No. of Credits	2	4	6	8	10
Percentage of environmentally friendly items purchased	30%	35%	40%	45%	50%

Maximum 5 credits for purchasing environmentally friendly product during refurbishment:

5

- i. Sustainable/ recycled timber (e.g. FSC);
- ii. Recycled/ reused materials;
- iii. Regionally manufactured materials (within 800km);
- iv. Second-hand products;
- v. Glue/ Adhesive – <5% VOC;
- vi. Paint – VOC free;
- vii. Carpet – Removable & reusable tiles;
- viii. Carpet – PVC free;
- ix. Product certified under CIC Carbon Labelling Scheme, HKGBC Green Building Product Accreditation and Standards (HK G-PASS); and
- x. Other products for refurbishment with environmental attribute proposed by the Applicant.

No. of Credit(s)	1	2	3	4	5
Percentage of environmentally friendly items purchased	30%	35%	40%	45%	50%

Maximum 3 credits for increment of purchasing amount of environmentally friendly items when compared with last year.

3

No. of Credit(s)	1	2	3
Percentage Increment of purchased environmentally friendly items	3%	5%	10%

b) Targets on Environmentally Procurement

2 credits for providing new target on procurement rate of environmentally purchasing based on the past 12 months performance.

2

MWA 3	Ozone Depleting Substances	a) Phase Out Plan for Existing Equipment with Ozone Depleting Substances Maximum 2 credits for providing phase out plan for existing equipment with ozone depleting substances:	2
		i. Refrigerants; and ii. Fire suppression.	

	Section	Credit Requirement	Credit
4	Materials and Waste Aspects (MWA)		53 + 2B
		(Note: 2 credits are achieved if there is no equipment with ozone depleting substances in the building.)	
		b) Newly Installed Equipment using Refrigerants 1 credit for newly installed equipment using the refrigerants with Global Warming Potential (GWP) less than 1,900.	1
		(Note: Credit can be excluded for no equipment using the refrigerants is installed in the past 12 months.)	
		c) Fire Suppression Materials 1 credit for using the fire suppression and other materials that avoids the use of ozone depleting substances in their manufacture, composition or use.	1
MWA 4	Waste Management Plan	1 credit for providing a waste management policy endorsed by top management.	1
		1 credit for providing a waste management plan with objectives and 5R principles.	1
		1 credit for the waste management plan is endorsed by top management.	1
MWA 5	Basic Waste Recycling Facilities	Maximum 3 credits for providing on-site recycling facilities for paper, plastic and metal waste at easily accessible locations.	3
MWA 6	Recycling Facilities For Different Waste Streams	a) On-site recycling facilities Maximum 5 credits for providing the following listed on-site recycling facilities: i. Clothes; ii. Fluorescent lamp (CFLs and fluorescent tubes); iii. Glass bottle; iv. Rechargeable battery; v. Waste Electrical and Electronic Equipment (WEEE); and vi. Others to be proposed by the Applicant.	5
		b) Notification to Building Users 1 credit for notifying the building users the locations of the above mentioned recycling facilities.	1
MWA 7	Food Waste Management	1 credit for signing the Food Wise Charter.	1
		Maximum 3 credits for adopting the following good practices as per Hong Kong Food Wise Campaign: i. Promote best practices and behavioural changes to reduce food waste; ii. Provide a food waste management plan; iii. Implement the plan with measurable targets; iv. Encourage the building management to conduct in-house waste audit and improve the performance in accordance with the results; v. Promote and adopt recipes that make use of food trimmings; vi. Engage in Government's/ non-governmental organisations' food waste reduction activities; vii. Support the Food Wise Hong Kong Campaign and similar initiatives; viii. Donate surplus food; and ix. Others to be proposed by the Applicant.	3
MWA 8	Action to Waste Reduction	a) Implementation of the Waste Management Plan 1 credit for demonstrating the implementation of the waste management plan.	1

Section	Credit Requirement	Credit
5	Energy Use (EU)	51 + 2B
	b) Data Collection Record 1 credit for providing total building energy consumption data record of at least 2 years for building services under the control of Building Owner/ Building Management Company.	1
	c) Energy Audit Report 1 credit for conducting energy audit in accordance with the Buildings Energy Efficiency Ordinance (Cap 610) requirement for existing buildings. 1 credit for filling up Table (II) to Table (VIII) under the Template 1 on Additional Information to Executive Summary of Energy Audit Report.	1
	d) Carbon Audit Report 1 credit for conducting carbon audit in accordance with the requirements as stipulated in the guideline issued by the Authority.	1
EU 3	Energy Efficient Practices and Measures a) Energy Efficient Practices Maximum 5 credits for implementing the following energy saving practices: <ol style="list-style-type: none"> i. Turn on equipment/ systems based on operational hours of buildings. (Operation schedule); ii. Avoid pre-cooling. Switch on centralised A/C system not more than 30 minutes in advance in the morning. (Operation schedules of AC and building); iii. For premises where the A/C systems are provided with heaters, avoid operating the heaters when the outdoor air temperature is above 20°C. (Operation schedule and/or print screen of BMS showing temperature setting); iv. Turn off lighting if it is not needed. (Operation schedule and/or photograph showing timer setting); v. Cut down number of lamps/ luminaires in area over-lit (over CIBSE recommendation) by artificial lighting and in perimeter area sufficiently lit by natural daylight. (Photographs showing lux measurement and de-lamping); vi. Encourage using the stairs (for one or two floors up or down) rather than taking the lift. (Site photograph showing notice/ poster to encourage tenant/ building user); vii. Shut down some of the lifts and escalators during non-peak hours. (Operation schedule); and viii. Arrange routine cleaning schedule for light diffusers, globes and reflectors to ensure light output efficiency (Cleaning schedule). 	5
	b) Energy Efficient Measures Maximum 20 credits for demonstrating the following upgrades in the past 3 years: <ol style="list-style-type: none"> i. 8 credits for replacing at least 30% by total cooling capacity serving the building from air-cooled chiller to either water-cooled chiller or oil free variable speed air/ water cooled chiller; ii. 6 credits for at least 50% by total cooling capacity serving the building are high efficiency chiller (>15% higher than BEC 2012's COP at full load in the same category); iii. 6 credits for at least 80% by total cooling capacity of all VRF are high efficiency VRF (>15% higher than BEC 2012's COP at full load in the same category); iv. 4 credits for at least 50% of total fresh air flow rate to the building are controlled by CO₂ sensors; v. 3 credits for at least 50% of air-conditioned areas not frequently used (e.g. meeting room, conference room, etc.) are served by air-conditioning with motion sensors controlling its operation; vi. 4 credits for at least 30% of total fresh air flow rate to the building are pre-treated by heat recovery system; vii. 4 credits for at least 30% of air-conditioned areas are served by enthalpy controlled free cooling; 	20

Section	Credit Requirement	Credit
5	Energy Use (EU)	51 + 2B
	viii. 4 credits for at least 50% of total supply air flow rate of all PAU/ AHU are supplied by VSD fans;	
	ix. 4 credits for at least 50% of total supply air flow rate of all FCU are supplied by VSD fans;	
	x. 4 credits for at least 50% of total chilled water flow rate of all chilled water pumps are VSD driven;	
	xi. 4 credits for at least 50% of total condensing water flow rate of all condensing water pumps are VSD driven;	
	xii. 3 credits for having "automatic tube cleaning systems" on all water-cooled chillers;	
	xiii. 4 credits for electronic ballasts for all fluorescent lamps;	
	xiv. 4 credits for replacing >80% of T8 to T5;	
	xv. 4 credits for at least 30% of all areas are served by LED lighting;	
	xvi. 3 credits for at least 30% of all public areas such as corridors, toilets, etc. are served by lighting with motion/ occupancy sensor controls;	
	xvii. 3 credits for at least 30% of all areas accessible to daylight are served by lighting with dimming controls to adjust lighting level to suit the space's need;	
	xviii. 2 credits for having separate lighting controls for the window perimeter and that for the interior. Lighting at the window perimeter can be turned down or off on a sunny day;	
	xix. 5 credits for at least 50% of all window areas with direct access to daylight are applied with solar window film (i.e. windows that are heavily shaded or not having a direct view to the sky are excluded);	
	xx. 3 credits for at least 30% of all lift motor power are re-generative lift;	
	xxi. 1 credit for at least 30% of all lift motor power are Variable Voltage Variable Frequency (VVVF) drives and/or direct current motor controlled by solid-state elements for lifts;	
	xxii. 1 credit for at least 30% of all escalator motor power are VVVF drive systems and high gear systems for escalators;	
	xxiii. 1 credit for at least 30% of all escalator motor power are controlled by optical sensors to allow escalators to be stopped or slowed down when there are no users;	
	xxiv. 1 credit for at least 50% of all lift (by quantity) have automatic switch off lighting and ventilation fan inside the lift car when the lift is in standby/ idle mode;	
	xxv. 2 credits for adding harmonics filter to reduce total harmonics distortion (THD) in electricity distribution system;	
	xxvi. 1 credit for having heat pump pre-heating at least 50% of domestic hot water (by quantity of sanitary fitting);	
	xxvii. 1 credit for having thermostat on/off and/or speed control for exhaust fans serving at least 50% of plant rooms area but exclude those rooms that require continuous exhaust due to health and safety issues (e.g. chemical storage room, refuse storage room); and	
	xxviii. 1 credit for openable windows for mixed mode/ natural ventilation.	

EU 4	Energy Benchmarking	a) Benchmarking	3								
		For applicable types of buildings: Credit(s) can be achieved based on the benchmarking results obtained from EMSD Benchmarking Tool.									
		<table border="1"> <thead> <tr> <th>No. of Credit(s)</th> <th>1</th> <th>2</th> <th>3</th> </tr> </thead> <tbody> <tr> <td>Percentile</td> <td>50th</td> <td>40th</td> <td>30th</td> </tr> </tbody> </table>	No. of Credit(s)	1	2	3	Percentile	50 th	40 th	30 th	
No. of Credit(s)	1	2	3								
Percentile	50 th	40 th	30 th								
		Alternative for Commercial Buildings: Credit(s) can be achieved based on the label obtained from HKGBC Benchmarking & Energy Saving Tool – Office Buildings (HK BESTOF).									
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No. of Credit(s)	1	2	3								
HK BESTOF	Green	Bronze	Silver or above								

Section	Credit Requirement	Credit																
5	Energy Use (EU)	51 + 2B																
	b) Self-Improvement	8																
	Credit(s) can be achieved based on the reduction percentage by comparing electricity bill/ metering data. (Baseline year can be any year in the past 5 years).																	
	i. For buildings ranked at the 40 th percentile or below under EMSD Benchmarking Tool/ "Bronze" or below label obtained from HK BESTOF:																	
	<table border="1"> <thead> <tr> <th>No. of Credits</th> <th>2</th> <th>3</th> <th>4</th> <th>5</th> <th>6</th> <th>7</th> <th>8</th> </tr> </thead> <tbody> <tr> <td>Annual energy use reduction</td> <td>2%</td> <td>3%</td> <td>4%</td> <td>5%</td> <td>6%</td> <td>7%</td> <td>8%</td> </tr> </tbody> </table>	No. of Credits	2	3	4	5	6	7	8	Annual energy use reduction	2%	3%	4%	5%	6%	7%	8%	
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	ii. For buildings ranked at the 30 th percentile or above under EMSD Benchmarking Tool or "Silver"/ "Gold"/ "Platinum" label obtained from HK BESTOF:																	
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Annual energy use reduction	1%	1.5%	2%	2.5%	3%	3.5%	4%											
EU 5	Achievement of Energywise and Carbon Reduction Certificate	Maximum 2 credits for obtaining the following valid Environmental Certificate of Hong Kong Green Organisation Certification (HKGOC): i. Energywise Certificate; and ii. Carbon Reduction Certificate.	2															
EU 6	Educational and Promotional Programme	2 credits for Building Owner/ Building Management Company to educate and advocate the behavioural change of building users in respect of Energy Use by: i. Organising educational seminar/ promotion campaign; or ii. Promoting or participating in Hong Kong Green Building Week organised by Construction Industry Council (CIC) and the Hong Kong Green Building Council Limited (HKGBC).	2															
EU 7	Innovative Techniques/ Performance Enhancements	a) Innovative Techniques 1 Bonus credit for applying innovation technique in respect of Energy Use that will improve the performance of the building. b) Performance Enhancements 1 Bonus credit for building with exemplary performance over and above the criteria identified in Energy Use of the BEAM Plus for Existing Buildings.	2B															
Section	Credit Requirement	Credit																
6	Water Use (WU)	41 + 14B																
WU 1	Water Conservation Plan	1 credit for providing an endorsed water conservation policy.	1															
		1 credit for providing a water conservation plan with objectives, targets and strategies in reduction of fresh water consumption.	1															
		1 credit for demonstrating that the water conservation plan is endorsed by top management.	1															
WU 2	Water Efficient Devices	Maximum 9 credits for installing the listed water efficient devices. i. 1 credit for automatic infrared sensor water taps; ii. 2 credits for 80% of all water taps are certified under Voluntary Water Efficiency Labelling Scheme (WELS) Grade 2 or above, or fitted with flow controllers of WELS Grade 2 or above; or	9															

	Section	Credit Requirement	Credit														
6	Water Use (WU)		41 + 14B														
		4 credits for 80% of all water taps are certified under WELS Grade 1 or fitted with flow controllers of WELS Grade 1;															
		iii. 2 credits for 80% of all showers for bathing are certified under WELS Grade 2 or above, or fitted with flow controllers of WELS Grade 2 or above; or															
		4 credits for 80% of all showers for bathing are certified under WELS Grade 1 or fitted with flow controllers of WELS Grade 1.															
WU 3	Cooling Tower Water	a) Cooling Tower Water Management Plan 1 Bonus credit for providing a cooling tower water management plan.	1B														
		b) Monitoring of Water Quality of Cooling Tower System 1 Bonus credit for conducting and monitoring the water quality parameters of cooling tower system on a routine and regular basis.	1B														
		c) Routine inspection and maintenance of cooling tower system 1 Bonus credit for conducting routine inspection of cooling tower system.	1B														
		1 Bonus credit for conducting routine and prevention maintenance of cooling tower system.	1B														
WU 4	Water Recycling	a) Rainwater Recycling 1 Bonus credit for provisions of rainwater capture, recycle and reuse facilities.	1B														
		1 Bonus credit for demonstrating the amount of rainwater for recycling \geq 1% of total amount of fresh water consumption.	1B														
		b) Grey Water Recycling 1 Bonus credit for provisions of grey water capture, recycle and reuse facilities.	1B														
		1 Bonus credit for demonstrating the amount of grey water for recycling \geq 1% of total amount of fresh water consumption.	1B														
WU 5	Water Saving Performance	Maximum 6 credits can be achieved based on the reduction percentage by comparing water bill/ metering data. (Reference year can be any year in the past 5 years).	6														
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No. of Credit(s)	1	2	3	4	5	6											
Annual fresh water use reduction	1%	2%	5%	8%	10%	15%											
WU 6	Water Quality Survey	1 credit for demonstrating that the quality of fresh water at all fresh water tanks and the farthest point of each water tank meets WSD's requirements.	1														
		1 credit for monitoring the quality of fresh water at least once a year for consecutive 3 years or providing undertaking letter, which indicate the above requirement.	1														
WU 7	Fresh Water Plumbing System Maintenance	1 credit for cleaning the fresh water tanks at least once every three months.	1														
		2 credits for inspecting the fresh water plumbing system at least once every three months and rectifying defects found during routine inspection.	2														

Section	Credit Requirement	Credit								
6	Water Use (WU)	41 + 14B								
	Maximum 3 credits can be achieved based on the participation of the Quality Water Supply Schemes For Buildings – Fresh Water (Plus)	3								
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No. of Credit(s)	1	2	3							
Type of Certificate	Blue	Silver	Gold							
WU 8	Water Metering Maximum 2 credits for permanent installation of water meters for the following water sub-systems: i. Irrigation; ii. Indoor plumbing fixtures and fittings; iii. Cooling towers; iv. Water features/ pool; and v. Other process water.	2								
WU 9	Water Leakage Monitoring Maximum 2 Bonus credits for installation of devices for detecting water leakage at the communal water supply system within the building lot. i. Underground buried pipes; and ii. Water pipes at all fresh water pump rooms.	2B								
WU 10	Water Audit 2 credits for undertaking a water audit.	2								
	1 credit for maintaining a water use inventory.	1								
	1 credit for implementing water saving recommendations as stipulated in the water audit.	1								
WU 11	Twin-tank System Maximum 2 Bonus credits for providing twin-tank system for: i. Fresh water supply system; and ii. Flushing water supply system.	2B								
WU 12	Water Efficient Flushing System Maximum 2 credits for installing water efficient flushing systems: i. Water closet with no more than 6L per flush; and ii. Dual flush water closet. Maximum 1 credit for installing water efficient flushing urinal equipment: i. Sensor type urinal; ii. Waterless urinal; and iii. Urinal equipment (WELS Grade 2 or above).	2 1								
WU 13	Flushing Water Quality 1 credit for cleaning the flushing water storage tanks at least once in every 6 months. Maximum 3 credits can be achieved based on the participation of the Quality Water Supply Schemes For Buildings – Flushing Water.	1 3								
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No. of Credit(s)	1	2	3							
Type of Certificate	Blue	Silver	Gold							
WU 14	Educational and Promotional Programme 2 credits for Building Owner/ Building Management Company to educate and advocate the behavioural change of building users in respect of Water Use by: i. Organising educational seminar/ promotion campaign; or ii. Promoting or participating in Hong Kong Green Building Week organised by Construction Industry Council (CIC) and the Hong Kong Green Building Council Limited (HKGBC).	2								

	Section	Credit Requirement	Credit
6	Water Use (WU)		41 + 14B
WU 15	Innovative Techniques/ Performance Enhancements	<p>a) Innovative Techniques 1 Bonus credit for applying innovation technique in respect of Water Use that will improve the performance of the building.</p> <p>b) Performance Enhancements 1 Bonus credit for building with exemplary performance over and above the criteria identified in the Water Use of the BEAM Plus for Existing Buildings, such as:</p> <ul style="list-style-type: none"> i. Providing backwater capture, recycle and reuse facilities; and ii. Installing water leakage device at water mains, etc. 	2B

	Section	Credit Requirement	Credit
7	Indoor Environmental Quality (IEQ)		50 + 2B
IEQ 1	Building User Satisfaction Survey on Indoor Comfort	<p>1 credit for conducting building user satisfaction survey to collect anonymous responses regarding the indoor environmental quality regularly, or, at a minimum conduct the survey within 1 year at the time of submission.</p> <p>1 credit for demonstrating the survey covered the aspects of hygiene, IAQ, ventilation, thermal comfort, lighting quality, and aural environment.</p> <p>1 credit for implementing a complaint response and action system for continual improvement of indoor comfort.</p>	1 1 1
IEQ 2	Minimum Ventilation Performance	<p>a) Fresh Air Intakes 1 credit for demonstrating the fresh air intakes are free from potential pollutant sources.</p> <p>b) Ventilation for Normally Occupied Areas and Common Areas 2 credits for providing adequate ventilation for the normally occupied areas.</p> <ul style="list-style-type: none"> i. 1 credit for 80% area compliance; and ii. 2 credits for 100% area compliance. <p>1 credit for providing adequate ventilation for 80% of the common areas in a building.</p>	1 2 1
IEQ 3	Localised Ventilation	<p>Maximum 3 credits for providing adequate ventilation for the following rooms/ areas with significant indoor pollution sources:</p> <ul style="list-style-type: none"> i. Toilets; ii. Kitchens; iii. Printing/ Photocopier rooms; iv. Chemical storage areas; and v. Other relevant area. 	3
IEQ 4	Thermal Comfort	<p>1 credit for demonstrating the air temperature within the air-conditioned space is in the range of 24 – 26°C during April to October.</p> <p>1 credit for demonstrating the relative humidity within the air-conditioned space is in the range of 40 – 70% during April to October.</p> <p>1 credit for demonstrating the air velocity within the air-conditioned space is <0.3 m/s.</p>	1 1 1

	Section	Credit Requirement	Credit
7	Indoor Environmental Quality (IEQ)		50 + 2B
IEQ 5	Biological Contamination	<p>Maximum 3 credits for demonstrating compliance with the Operation and Maintenance Precautions recommended in the Code of Practice – Prevention of Legionnaires Disease, for the following systems:</p> <ul style="list-style-type: none"> i. Components in Air-Conditioning System except Cooling Tower; ii. Plumbing and Drainage System; iii. Heat Water System; iv. Fountains; and v. Pools. <p>(Note: credit(s) can be excluded for buildings with less than 3 of the listed systems)</p> <p>1 credit for maintaining water trapping of the floor drain.</p>	<p>3</p> <p>1</p>
IEQ 6	Waste Disposal Facilities	<p>3 credits for providing de-odourising system in refuse storage or materials recovery area.</p> <ul style="list-style-type: none"> i. 1 credit for provision at main RS&MRC; and ii. 2 credits for provisions at all other rooms designated for refuse storage or materials recovery. 	3
IEQ 7	Control of Environmental Tobacco Smoke	1 credit for implementing no smoking policy outside the building except in designated smoking areas.	1
IEQ 8	IAQ Monitoring	<p>Maximum 9 credits for demonstrating compliance with appropriate criteria for indoor pollutant levels, for following parameters:</p> <ul style="list-style-type: none"> i. Carbon Dioxide; ii. Carbon Monoxide; iii. Respirable Suspended Particulate; iv. Nitrogen Dioxide; v. Ozone; vi. Formaldehyde; vii. Total Volatile Organic Compounds; viii. Radon; and ix. Bacteria. <p>1 credit for obtaining Excellent Class for the IAQ Certification Scheme for Offices and Public Places.</p> <p>1 credit for demonstrating the continuous participation in the 'Indoor Air Quality Certification Scheme for Office and Public Place' for past 3 consecutive years.</p>	<p>9</p> <p>1</p> <p>1</p>
IEQ 9	IAQ in Car Parks	2 credits for complying with the recommended CO and NO ₂ level as stipulated in ProPECC PN 2/96.	2
IEQ 10	Interior Lighting	<p>1 credit for conducting site illuminance measurement.</p> <p>Maximum 3 credits for achieving the prescribed lighting performance in each type of premises, regarding the illuminance and lighting quality as listed below:</p> <ul style="list-style-type: none"> i. Maintained illuminance and illuminance uniformity; ii. Achieving the limiting unified glare rating; and iii. Light sources with an appropriate colour rendering index. <p>2 credits for fulfilling the above requirement in tenant's area.</p> <ul style="list-style-type: none"> i. 1 credit for assessing not less than 25% of area; and ii. 2 credits for assessing not less than 50% of area. <p>1 credit for providing automatic control of artificial lighting such as daylight sensors at perimeter zones and/or occupancy sensor.</p>	<p>1</p> <p>3</p> <p>2</p> <p>1</p>

Section	Credit Requirement	Credit
7	Indoor Environmental Quality (IEQ)	50 + 2B
	1 credit for providing individual control of a small group of artificial lighting.	1
IEQ 11	Background Noise 1 credit for demonstrating background noise levels from both external sources and building services equipment are within the prescribed criteria. Based on the nature of the building, relaxation shall be allowed in considering the acceptance of this credit. The Applicant shall submit both the design and calculation to justify such relaxation.	1
IEQ 12	Room Acoustics 1 credit for demonstrating that the mid-frequency reverberation time in applicable rooms meets the prescribed criteria of different types of premises. Based on the nature of the building, relaxation shall be allowed in considering the acceptance of this credit. The Applicant shall submit both the design and calculation to justify such relaxation.	1
IEQ 13	Noise Isolation 1 credit for demonstrating airborne noise isolation between rooms, spaces and premises fulfils the prescribed criteria.	1
IEQ 14	Vibration a) Vibration Isolation Devices 1 credit for providing vibration isolation devices for building services equipment. b) Vibration Level 1 credit for vibration levels not exceeding the prescribed criteria.	1 1
IEQ 15	Achievement of IAQwi\$e Certificate 1 credit for obtaining the valid IAQwi\$e Certificate of Hong Kong Green Organisation Certification (HKGOC).	1
IEQ 16	Educational and Promotional Programme 2 credits for Building Owner/ Building Management Company to educate and advocate the behavioural change of building users in respect of Indoor Environmental Quality by: i. Organising educational seminar/ promotion campaign; or ii. Promoting or participating in Hong Kong Green Building Week organised by Construction Industry Council (CIC) and the Hong Kong Green Building Council Limited (HKGBC).	2
IEQ 17	Innovative Techniques/ Performance Enhancements a) Innovative Techniques 1 Bonus credit for applying innovation technique in respect of Indoor Environmental Quality that will improve the performance of the building. b) Performance Enhancements 1 Bonus credit for building with exemplary performance over and above the criteria identified in Indoor Environmental Quality of the BEAM Plus for Existing Buildings.	2B

- 2 Management**
- 2.1 Green procurement**
- 2.2 Environmental, Health and Safety (EHS), and energy management**
- 2.3 Environmental, Social and Governance (ESG) disclosure**
- 2.4 Staff training**
- 2.5 Operation and maintenance**
- 2.6 IAQ management for renovation**
- 2.7 Cleaning and pest control**
- 2.8 Building users involvement**
- 2.9 Innovations and additions**

Background An effective management of building operations and maintenance is the key factor for better environmental performance of the building, especially for existing buildings. The 'Management' category assesses the overarching management system, policies and procedures put in place, staffing and resources, and the involvement of building users to ensure buildings are operating in their maximum sustainable potential.

2.1 Green procurement **MAN 1 Green Purchasing Plan**
Background It is encouraged to investigate the products that are purchased for the building and to replace them with environmentally friendly alternatives. A purchasing plan or practice shall be formulated to use green products whenever possible.

2.2 EHS and Energy Management **MAN 2 Quality, EHS and Energy Management System**
Background Regardless the age and condition of a building, there are initiatives that the management can undertake to improve the quality and performance of a building. The Applicant is expected to carry out programmes to enhance health and safety, and reduce environmental impacts in the building operation.

2.3 ESG disclosure **MAN 3 Environmental, Social and Governance (ESG) Disclosure**
Background ESG reporting helps a company to better understand the impacts of their activities, set goals, measure performance and mitigate risks and identify opportunities of certain environmental and social issues.

2.4 Staff training **MAN 4 BEAM Professional**
MAN 5 Staff Training and Resources
Background Staff skills and experience are important factors in improving building performance. The qualifications and experience of the management, operation and maintenance staff should be commensurate with the engineering systems, size and complexity of the buildings.

2.5	Operation and maintenance	MAN 6 Building Records MAN 7 Building and Site Operation and Maintenance MAN 8 Building Services Operation and Maintenance MAN 9 Electronic Operation and Maintenance Platform
	Background	Effective operation and maintenance of the building, systems and equipment significantly impact on the building performance. Proper O&M can also extend the life of building structure and equipment, avoid wastage of resources for premature refurbishment or replacements.
2.6	IAQ management for renovation	MAN 10 Renovation Management Plan
	Background	Dust and odours generated by various renovation, fit-out and decoration activities can cause air pollution. Good management practices reduce the impacts of air pollution on the workers and adjacent neighbours, and protect the HVAC&R systems in the building.
2.7	Cleaning and pest control	MAN 11 Green Cleaning MAN 12 Integrated Pest Management
	Background	Green housekeeping ensures the products and procedures for cleaning and pest control are safe, hygienic and with limited environmental impacts.
2.8	Building users involvement	MAN 13 User Guidance MAN 14 Green Lease
	Background	Sustainable operation of a building can be achieved if the tenants or building users are willing to work with the Building Owner/ Building Management Company. Building environmental performance can then be improved with such collaborative efforts.
2.9	Innovations and additions	MAN 15 Educational and Promotional Programme MAN 16 Recognition and Appreciation Awarded from Other Organisations
	Background	It is encouraged to drive behavioural change through educational and promotional programme. Companies are also encouraged to apply for recognition on their efforts and commitments in green building management and operations.

	MAN 1	Green Purchasing Plan
Exclusion	None.	
Objective	To encourage the purchase of products used in the Operation and Maintenance (O&M) of buildings with reducing environmental impacts through the formulation of procedures or plans.	
Credit Attainable	3	
Credit Requirement	1 credit for providing an endorsed green purchasing policy. 1 credit for providing a green purchasing plan with objective, target and reporting on progress. 1 credit for demonstrating that the plan is endorsed by top management of Building Owner/ Building Management Company.	
Assessment	<u>Criteria</u> The Applicant shall provide a green purchasing policy endorsed by top management of Building Owner/ Building Management Company to demonstrate the commitment. The Applicant shall provide documentary evidence that purchasing plans and procedures endorsed by top management are in place for governing the procurement of materials, products and equipment, which shall have no significant negative impacts on the environment and the safety and health of employees and building users. The green purchasing plan may include the procurement of: <ul style="list-style-type: none">i. Durable goods, products and equipment;ii. Materials with low embodied energy;iii. Locally produced materials where available;iv. Wood products from well-managed sources;v. Products which do not use CFCs, HCFCs, halons;vi. Salvaged materials and components;vii. Rapidly renewable materials;viii. Finishes, paints, adhesives, etc. with low levels of emissions;ix. Minimal packaging and/or recyclable packaging;x. Products having high recyclable content;xi. Products that are recyclable;xii. Energy efficient appliances and equipment; andxiii. Water efficient appliances, etc. The above list is not exhaustive and it is not necessary to include all abovementioned items in their own green purchasing plan. The Applicant shall compose their green purchasing plan which suits their own operational needs. <u>Documentation</u> The Applicant shall provide the following document:	

- i. A green purchasing policy endorsed by top management of Building Owner/ Building Management Company; and
- ii. Green purchasing plan with objective, target and reporting on progress endorsed by top management of Building Owner/ Building Management Company.

Background

Purchasing practices should form part of environmental management system of an organisation. Where major consumers include safety, health and environmental considerations in purchasing decisions, the market place does respond. BEAM Plus encourages purchasing practices that promote the supply and use of environmentally friendly products, materials and equipment in building operations and maintenance, redecoration, fit-out, etc.

Although life-cycle analysis can be used to assess materials and products, there are no well-defined criteria for categorizing materials as green or environmentally friendly. This involves the identification and quantification of all of the raw materials and energy consumed in the production, use, and disposal of the product, as well as the pollutants and by-products generated. Two of the most significant environmental impact caused by materials used in buildings are effects generated from waste streams and the possible impacts on the health and comfort of occupants. There are many environmentally friendly alternatives that are available in market to substitute the products currently used in buildings.

As early as year 2000, the Government amended its procurement regulations to require bureaux and departments to take environmental considerations into account when procuring goods and services [1]. Specifically, bureaux and departments are encouraged to avoid using single-use disposable items and purchase products with the following features:

- i. Improved recyclability, high recycled content, reduced packing and greater durability;
- ii. Higher energy efficiency;
- iii. Utilising clean technology and/or clean fuels;
- iv. Resulting in reduced water consumption;
- v. Emitting fewer irritating or toxic substances during installation or use; and/or
- vi. Resulting in decrease in production of toxic substances, or of substance with lower toxicity, upon disposal.

1 Environmental Protection Department. Green Procurement. Retrieved 1 March 2016, from http://www.epd.gov.hk/epd/english/how_help/green_procure/green_procure.html

MAN 2 Quality, EHS and Energy Management System

Exclusion	None.
Objective	To encourage the building management to implement systematic management systems that embrace quality, environmental, health and safety (EHS), and energy.
Credit Attainable	5 + 1 Bonus
Credit Requirement	<p>1 credit where the building management operates a Quality Management System (QMS) certified to ISO 9001.</p> <p>1 credit where the building management operates an Environmental Management System (EMS) certified to ISO 14001.</p> <p>1 credit where the building management operates an Occupational Health and Safety System (OHSAS).</p> <p>1 Bonus credit where building management operates an OHSAS certified to BS OHSAS 18001.</p> <p>1 credit where the building management operates all of the above management systems for 1 year or more.</p> <p>1 credit where the building management operates an Energy Management System (EnMS).</p>
Assessment	<p><u>Criteria</u></p> <p>The Applicant shall provide the documentation such as the manuals, operation procedures, policies and audit records to demonstrate that the building management company is operating the QMS, EMS, OHSAS and EnMS.</p> <p>Note: Only internal audit records for the OHSAS are required when the Applicant does not intend to attempt the bonus credit.</p> <p>Bonus credit can be achieved when the Applicant can provide the BS OHSAS 18001 certificate. The name of the building should be stated in the certificate. Bonus credit will not be granted if only the head office operation of the building management company is awarded with the certificate.</p> <p><u>Documentation</u></p> <p>The Applicant shall provide the following documents:</p> <ol style="list-style-type: none">i. A valid ISO 9001 certificate of the building;ii. A valid ISO 14001 certificate of the building;

- iii. Internal, audit records of the OHSAS system of the building (for the Applicant who cannot present the BS OHSAS 18001 certificate);
- iv. A valid BS OHSAS 18001 certificate of the building;
- v. Evidence to show all of the above management systems have been operating for 1 year or more; and
- vi. The manuals, operations procedures, policies, audit records of the Energy Management system of the building.

Background

ISO 9001 [1] is an internationally recognised standard that specifies requirements for a quality management system to provide guidance and tools for organisations who want to ensure that their products and services consistently meet customer's requirements, and that quality is consistently improved. This standard is based on a number of quality management principles including a strong customer focus, the motivation and implication of top management, the process approach and continual improvement.

ISO 14001 [2] is an internationally recognised standard that specifies requirements for an environmental management system to enable organisations to develop and implement policies and objectives which take into account the legal and other requirements to which the organisation subscribes, and information about significant environmental aspects. It applies to those environmental aspects that the organisation identifies as those which it can control and those which it can influence. It does not itself state specific environmental performance criteria.

BS OHSAS 18001 [3] is an international standard which sets out the requirements for occupational health and safety management good practice for organisation with any scale. It provides guidance to help organisation design its own health and safety framework. BS OHSAS 18001 can also be adapted to all types of organisations to help eliminate or minimise operational risks and hazards. The standard is designed to help organisation create the best possible working conditions and meet legal, industry and customer requirements.

1 International Organization for Standardization. ISO 9001 Quality Management. Retrieved 1 March 2016 , from http://www.iso.org/iso/home/standards/management-standards/iso_9000.htm

2 International Organization for Standardization. ISO 14000 Environmental Management. Retrieved 1 March 2016, from <http://www.iso.org/iso/home/standards/management-standards/iso14000.htm>

3 BSI Group. Getting Started with BS OHSAS 18001 Occupational Health and Safety Management. Retrieved 1 March 2016, from <http://www.bsigroup.com/en-GB/ohsas-18001-occupational-health-and-safety/Introduction-to-BS-OHSAS-18001>

	MAN 3 Environmental, Social and Governance (ESG) Disclosure
Exclusion	None.
Objective	To encourage Building Owner/ Building Management Company to have ESG reporting and to disclose its operational performance to the public.
Credit Attainable	1 + 1 Bonus
Credit Requirement	<p>a) Disclosure of Sustainability Policy and Targets</p> <p>1 credit where the Building Owner/ Building Management Company discloses sustainability policy and targets to the public.</p> <p>b) ESG Reporting</p> <p>1 Bonus credit where the Building Owner/ Building Management Company follows Global Reporting Initiative™ (GRI) Sustainability Reporting Guidelines and discloses the G4 sustainability report to the public.</p>
Assessment	<p><u>Criteria</u></p> <p>a) Disclosure of Sustainability Policy and Targets</p> <p>The Applicant shall provide the sustainability policy and targets of the Building Owner/ Building Management Company. The scope of the sustainability policy is not regulated but it shall cover at least the environmental issues.</p> <p>b) ESG Reporting</p> <p>The ESG report shall be composed under the Reporting Principles and either “Core” or “Comprehensive” in accordance options of the GRI G4 guidelines.</p> <p><u>Documentation</u></p> <p>The Applicant shall provide the following documents:</p> <p>a) Disclosure of Sustainability Policy and Targets</p> <p>i. Sustainability policy and targets, and evidence showing such information is disclosed to public.</p> <p>b) ESG Reporting</p> <p>i. The ESG report of the Building Owner/ Building Management Company that follows the GRI G4 requirements; and</p> <p>ii. Evidence showing the ESG report is publicly available.</p>

Background

Corporate sustainability reporting, also known as ESG Reporting, plays an important role in business sustainability and is rapidly becoming an essential business management tool. Its importance is recognised by companies, investors and regulators alike. It is a means by which businesses can better understand the impacts of their activities, set goals, measure performance and mitigate risks and identify opportunities [1].

The GRI Sustainability Reporting Guidelines are the most widely used sustainability reporting framework in the world. They offer Reporting Principles, Standard Disclosures and an Implementation Manual for the preparation of sustainability reports by organisations, regardless of their size, sector or location. Such information is available at GRI website [2].

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- 1 Business Environment Council Handbook: Understanding Materiality for Environmental, Social and Governance Reporting. Retrieved 1 March 2016, from http://bec.org.hk/files/images/BEC_advisorygroups/BEC_ESG_Handbook_web.pdf
 - 2 Global Reporting Initiative. G4 Sustainability Reporting Guidelines. Retrieved 1 March 2016, from <https://www.globalreporting.org/STANDARDS/G4/Pages/default.aspx>

	MAN 4	BEAM Professional
Exclusion	None.	
Objective	To facilitate the application for the BEAM Plus certification process and ensure the operation of the building complies with the BEAM Plus requirements.	
Credit Attainable	2	
Credit Requirement	1 credit for at least 1 member from the Building Management Company is certified BEAM Professional with EB credential or BEAM Affiliate. 1 credit for the building-in-charge being a certified BEAM Professional with EB credential and with at least 1 professional corporate membership qualification (e.g. HKIH, HKIA, HKIE, HKIS (BS/PFM), RICS (BS/FM), IFMA, HKIFM, BSOMES, or equivalent).	
Assessment	<u>Criteria</u> The Applicant shall provide evidence that at least 1 member from the Building Management Company are BEAM Professional with EB credential or BEAM Affiliate. The involved personal shall meet the following requirements: <ol style="list-style-type: none">i. He/ she has been working at that Building Management Company for at least 6 months at the time of submission;ii. He/ she is accredited as BEAM Professional with EB credential/ BEAM Affiliate at the time of submission;iii. He/ she shall not be in the BEAM Professional/ BEAM Affiliate suspension list throughout the entire BEAM Plus certification period; andiv. For the 'building-in-charge', he/she shall have obtained the BEAM Professional accreditation and professional corporate membership qualification at least 12 months at the time of submission. <u>Documentation</u> The Applicant shall provide the following documents: <ol style="list-style-type: none">i. The organisation chart of the Building Management Company;ii. Documents such as meeting minutes, memo, internal emails etc. showing the involved personal has been working in the Building Management Company for at least 6 months;iii. The BEAM Professional/ BEAM Affiliate certificate; andiv. The CV and professional certificate of the "building-in-charge".	

Background

BEAM Professionals [1] are green building professionals accredited by the Hong Kong Green Building Council Limited (HKGBC) in various aspects of the entire green building life cycle. A key role of BEAM Professional is to integrate the latest green building standards and practices into building planning, design, construction and operation.

A BEAM Affiliate [2] is a person accredited by HKGBC as being competent to support green building design, construction and operation. This qualification welcomes members of sub-professional or technical staff working in the construction/ real estate industry, interior design practitioners and recent degree graduates who are in the process of working towards a professional qualification. The credential also serves as an alternative route to become a BEAM Professional if one have not yet meet with the BEAM Professional requirement.

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- 1 Hong Kong Green Building Council Limited. BEAM Professional. Retrieved 1 March 2016, from <https://www.hkgbc.org.hk/eng/beam-Professional.aspx>
 - 2 Hong Kong Green Building Council Limited. BEAM Affiliate. Retrieved 1 March 2016, from <https://www.hkgbc.org.hk/eng/beam-affiliate.aspx>

	MAN 5	Staff Training and Resources
Exclusion		None.
Objective		To ensure the staff training and technical resources are adequate for the Operation and Maintenance (O&M) of the building.
Credit Attainable		2
Credit Requirement		a) Staff and Technical Resources 1 credit for having adequate staff and technical resources to meet the O&M requirements of the building. b) Staff Training 1 credit for providing adequate and periodic training for the staff responsible for the O&M of the building.
Assessment		<u>Criteria</u> a) Staff and Technical Resources The Applicant shall provide the organisation chart (O-chart) clearly indicating the responsibility and job duties of each building management staff for the O&M of the building. If the O&M of a certain system is outsourced, the Applicant shall provide the tender/ contract documents requiring the sub-contractor to have sufficient resources for the works. The building-in-charge shall also submit a statement stating the staffing and resources are adequate for the O&M of the building. b) Staff Training The Applicant shall provide the training records for the staff members responsible for O&M for the past 12 months. The topics of the training are not regulated but the training shall be related to the operation of the building. The minimum training requirements are 15 hours and 3 hours per year for the building-in-charge and other staff respectively. Only staff members of the Building Management Company are included in the assessment. Staff members of sub-contractors are excluded from the assessment. <u>Documentation</u> The Applicant shall provide the following documents: a) Staff and Technical Resources i. The O-chart of the building;

- ii. Tender/ contract documents requiring the sub-contractor to have sufficient resources for the O&M works (if any);
- iii. Statement stating the staffing and resources are adequate for the O&M of the building; and
- iv. Job duties and responsibilities of the staff responsible for O&M.

b) Staff Training

- i. Staff training records for the past 12 months.

Background

Staff skills and experience are important factors in improving building performance. The qualifications and experience of the management, O&M staff should be commensurate with the engineering systems, size and complexity of the buildings.

With different initiatives and requirements such as the implementation of Buildings Energy Efficiency Ordinance (Cap 610) and Lifts and Escalators Ordinance (Cap 618), the O&M staff needs to maintain their knowledge and skills to satisfy new demands from a building and its users. Therefore, the O&M staff is encouraged to have sufficient training sessions to acquire updated knowledge and uphold the latest requirements.

	MAN 6	Building Records
Exclusion		None.
Objective		To encourage comprehensive and well saved building records for effective and organised practices of building management, operations and maintenance.
Credit Attainable		7
Credit Requirement		<p>Maximum 7 credits for demonstrating that the following building records are in place.</p> <ol style="list-style-type: none">i. Building, structural, drainage, site formation, alterations and additions plans approved by the Building Authority;ii. Plumbing drawings approved by the Water Supplies Department;iii. Fire Services Installation plans approved by the Fire Services Department;iv. Layout plans for hidden utilities such as electricity cables, gas pipes, telephone lines, etc.;v. History of maintenance works including records of inspection and replacements, certifications and statutory forms;vi. T&C records and operation manuals for building services, mechanical components and installations;vii. Certification for the performance of specific materials and components as well as warranties from specialist contractors or suppliers (e.g. on water proofing materials and its installation work); andviii. Deed of Mutual Covenant.
Assessment		<p><u>Criteria</u></p> <p>1 credit can be achieved for providing each of the above listed building records.</p> <p>The Applicant shall provide the clear and formal building records to fulfil the credit requirement.</p> <p><u>Documentation</u></p> <p>The Applicant shall provide the following document:</p> <ol style="list-style-type: none">i. Copy of the above-listed available building records.
Background		<p>Building Owners and their Building Management Companies shall be obliged to keep the updated building records, whatever the age of their buildings. For effective maintenance and management of the buildings, a complete set of building records is essential and should therefore be kept by the Building Owners/ Building Management Companies.</p>

For those buildings completed over a considerable period of time,

some of building records might not be available, Building Owners/
Building Management Companies may approach Buildings
Department for some legal documents such as Occupation Permits
and approved General Building Plans.

MAN 7 Building and Site Operation and Maintenance

Exclusion	For part b only, Building footprint exceeds 80% of the site area.
Objective	To encourage planned inspection, maintenance and repairing of the building fabric, structure, and external areas in order to enhance safety and reduce environmental impacts.
Credit Attainable	2
Credit Requirement	<p>a) Building Maintenance</p> <p>1 credit for demonstrating the operation of a planned programme of regular inspection, cleaning and maintenance of the building's fabric and structure under the control of the Applicant.</p> <p>b) External Areas and Facilities</p> <p>1 credit for demonstrating the operation of a planned programme of regular inspection, cleaning and maintenance of external areas and facilities.</p>
Assessment	<p><u>Criteria</u></p> <p>a) Building Maintenance</p> <p>The Applicant shall provide documentation to demonstrate that the system of inspection, cleaning, maintenance and general repairs to the building fabric and structural elements are effective in maintaining reliability and prolonging service life of the building. Building fabric and structure shall include:</p> <ul style="list-style-type: none">i. Building façade;ii. Curtain wall; andiii. External cladding. <p>b) External Areas and Facilities</p> <p>The following external areas and facilities which are under the control of the Applicant shall be assessed:</p> <ul style="list-style-type: none">i. Roads and pavements;ii. Hard and soft landscape areas;iii. Stairs and ramps; andiv. Recreational facilities. <p>The Applicant shall provide the planned programme of regular inspection, cleaning and maintenance of the external areas and facilities. The frequency of these activities is not regulated and it is subject to the Applicant's operation requirement. The Applicant shall provide the undertaking letter stating that the frequency for inspection, cleaning and maintenance is sufficient.</p>

This credit shall be excluded where the building footprint exceeds 80% of the site area.

Documentation

The Applicant shall provide the following documents:

- i. A list of all the elements of the building fabric and structure (for Part a)/ external areas and facilities (for Part b) subject to regular inspection, cleaning and maintenance;
- ii. Maintenance procedures of the elements as stated (i) above;
- iii. Personnel that are responsible for the inspection, cleaning and maintenance;
- iv. Records of inspection, maintenance and repairs for the past 12 months;
- v. The planned inspection, maintenance and repairs programme for the next 12 months; and
- vi. Undertaking letter.

Background

Where buildings are not properly maintained, they deteriorate more quickly, where in extreme cases major refurbishment or demolition may be required. In such cases, the process of refurbishment or reconstruction will consume significant amount of both energy and materials, unnecessarily increases the burden on natural resources. Appropriate planned inspection, cleaning and maintenance is essential to retain the value of a building as an asset, sustain utility, ensure compliance with legal requirements such as health and safety regulations, and to assist owners and occupants in managing the building in a more efficient and hence environmentally conscious manner. Regular inspections of the building fabric and structural elements should be carried out, with proper system to manage the long-term maintenance planning programme to ensure that all maintenance will be continued in order to retain asset value of the building and maintain the performance requirements.

MAN 8 Building Services Operation and Maintenance

Exclusion	None.
Objective	To encourage proper and efficient operation of the engineering systems by operation and maintenance programme.
Credit Attainable	5
Credit Requirement	<p>Maximum 5 credits for operating a planned programme of regular inspection, cleaning and maintenance of the following listed systems.</p> <ol style="list-style-type: none">i. Air-conditioning system;ii. Lift and/or Escalator system;iii. Electrical system;iv. Lighting system;v. Plumbing and Drainage system; andvi. Fire Services system.
Assessment	<p><u>Criteria</u></p> <p>1 credit can be achieved for the provision of a planned programme for each of the listed items.</p> <p>The Applicant shall provide the planned programme of regular inspection and maintenance of the Air-conditioning system, Lift and/or Escalator system, Electrical system, Lighting system, Plumbing & Drainage system and Fire Services system. The frequency of these activities is not regulated and it is subject to the Applicant's operation requirement. However, the works of the planned programme shall not be less than the statutory required works. The Applicant shall provide the undertaking letter stating that the frequency for inspection and maintenance is sufficient.</p> <p><u>Documentation</u></p> <p>The Applicant shall provide the following documents:</p> <ol style="list-style-type: none">i. Frequencies of cleaning and inspection of the applicable engineering system(s);ii. Maintenance procedures of the system(s) as stated above;iii. Personnel that are responsible for the inspection, cleaning and maintenance;iv. Records of inspection, maintenance and repairs for the past 12 months; andv. The planned inspection, maintenance and repairs programme for the next 12 months.
Background	Building Owner/ Building Management Company conducting the O&M should adapt in size and complexity to ensure that operating performance is sustained. All O&M requires knowledgeable, skilled, and well trained management and technical staff and a well planned

maintenance program.

Although it is a general practice for Building Owner/ Building Management Company to conduct routine inspections, maintenance works and fulfil statutory requirements for the building services systems, a well-planned operation and sufficient maintenance works would maintain higher operation efficiencies, reduce breakdown rate, prolong the operation life of the systems while the system can still meet with the comfort, health, and safety requirements of the building users.

MAN 9 Electronic Operation and Maintenance Platform

Exclusion	None.
Objective	To improve the O&M efficiency of the building.
Credit Attainable	1 Bonus
Credit Requirement	1 Bonus credit for operating an electronic O&M platform by the Building Owner/ Building Management Company.
Assessment	<p><u>Criteria</u></p> <p>The Applicant shall demonstrate an electronic O&M platform is adopted by the Building Management Company. Screenshots shall be provided justify that the following documents are already uploaded to the platform:</p> <ul style="list-style-type: none">i. Building layout drawings;ii. Air-side and water-side schematic diagrams;iii. Equipment schedules of the MVAC, plumbing & drainage, electrical and lift & escalator systems (if any); andiv. O&M manuals of the aforesaid systems. <p><u>Documentation</u></p> <p>The Applicant shall provide the following documents:</p> <ul style="list-style-type: none">i. Description of the electronic O&M platform; andii. Screenshots showing the required documentations are uploaded to the O&M platform.
Background	<p>Conventionally, the O&M manuals are large volumes of information covering installation, operation and maintenance details for the packaged equipment, systems and plant facilities. Feedbacks from the industry show that using these hard copy manuals in operations has caused problems for detailed component information from manufacturers. Significant time and effort have to be invested to clarify particular equipment details for maintenance, repair or even reordering. The hard copy formats of these manuals are also inconvenient to store, hard to maintain and soon become outdated when new equipment is installed.</p> <p>The electronic O&M platform is a system that can store all the necessary contract documents, as-built drawings, equipment O&M manuals, etc. It ensures the building operators can retrieve the documents easily and allows effective communication among the management staff and the working team.</p>

	MAN 10 Renovation Management Plan
Exclusion	None.
Objective	To reduce the potential for having indoor air quality, noise, waste and wastewater problems caused by renovation, fit-out and decoration works and where applicable demolition, with the consideration of the benefit of workers, and adjacent neighbours.
Credit Attainable	8
Credit Requirement	<p>a) Renovation Management Plan</p> <p>Maximum 4 credits for providing the renovation management plan and complying with the recommendation practices given by the Environmental Protection Department (EPD) for the listed aspects during renovation:</p> <ol style="list-style-type: none">i. Indoor air quality;ii. Noise;iii. Wastewater; andiv. Waste. <p>b) Implementation of Renovation Management Plan</p> <p>Maximum 4 credits for providing records for the past 2 years that the renovation management plan of the listed aspects have been implemented by the contractors during renovation:</p> <ol style="list-style-type: none">i. Indoor air quality;ii. Noise;iii. Wastewater; andiv. Waste.
Assessment	<p><u>Criteria</u></p> <p>a) Renovation Management Plan</p> <p>1 credit can be achieved for providing the renovation management plan for each of the above listed aspects with the compliance of EPD recommendation practices.</p> <p>The Applicant shall provide a renovation management plan including but not limited to the following items:</p> <ol style="list-style-type: none">i. Indoor air quality<ul style="list-style-type: none">• Measures to avoid indoor air contamination of adjacent normally occupied areas and common areas;• Measures to protect the air ducts, on-site storage or protection of installed absorptive materials; and• Cleaning procedures to be employed.

- ii. Noise
 - Measures to restrict noisy works and use of noisy equipment during renovation, fit-out and decoration works.
- iii. Wastewater
 - Measures to restrict the discharge of the chemical wastes such as residual paint and solvent, into storm or foul drain.
- iv. Waste
 - Measures to dispose properly the waste generated from the renovation works; and
 - Measures to arrange with recyclers for regular collection schedule of the recyclable materials.

b) Implementation of Renovation Management Plan

The Applicant shall also provide site records for the past 2 years to demonstrate the actions from the Renovation Management Plan is properly implemented. 1 credit can be achieved for the provision of site record of each of the above listed aspects.

Documentation

The Applicant shall provide the following documents:

a) Renovation Management Plan

- i. Renovation management plan indicating those listed requirements.

b) Implementation of Renovation Management Plan

- i. Records showing the renovation management plan is properly implemented during renovation, fit-out and decoration works.

Background

Noise, waste, dust and odours generated from various renovation activities result in various pollutions and nuisance. Implementation of the Renovation Management Plan would help to minimise the generation of nuisance and to reduce pollution at sources. Building Management Companies are advised to make reference to these guidelines in formulating house-rules to suit their specific buildings.

Practical guidance for the control of air pollution, noise, wastewater and waste disposal during renovation is available from EPD [1]. Though the guidance focuses on managing the activities in occupied buildings, measures are also applicable in managing construction activities in new buildings. The guide provides recommendation in

1 Environmental Protection Department. Green Property Management. Pollution Problems & Practical Solutions. Retrieved 1 March 2016, from http://www.epd.gov.hk/epd/english/greenproperty/poll_pro/poll_pro_ren.html

scheduling activities, source control, pathway interruption, protecting installed HVAC&R systems and equipment, and good housekeeping.

	MAN 11	Green Cleaning
Exclusion		None.
Objective		To encourage environmentally friendly cleaning products and procedures to protect human health and environmental quality.
Credit Attainable		2
Credit Requirement		a) Implementation of Green Cleaning 1 credit for implementing the green cleaning procedures/ practices. b) Use of Green Cleaning Detergent 1 credit for demonstrating the use of at least 5% of green cleaning detergents.
Assessment		<u>Criteria</u> a) Implementation of Green Cleaning The Applicant shall provide the green cleaning procedures/ practices including but not limited to the following: i. Method statements for the routine cleaning procedures; ii. Purchase of green cleaning products whenever possible; and iii. Staff and training requirements. b) Use of Green Cleaning Detergent The Applicant shall also demonstrate at least 5% (in terms of volume) of the cleaning detergents purchased in the past 12 months are certified green products. <u>Documentation</u> The Applicant shall provide the following documents: a) Implementation of Green Cleaning i. The green cleaning procedures/ practices; ii. Catalogues and certificates of the green cleaning detergents; iii. Purchase order or delivery notes of the green cleaning detergents; and iv. Staff and training requirements. b) Use of Green Cleaning Detergent i. Summary table showing at least 5% of the total volume of cleaning detergents purchased in the past 12 months are green cleaning detergents.

Background

Using less hazardous cleaning products (e.g. biodegradable, low toxicity, lower VOC emission, reduced packaging, etc.) can minimise harmful effect on cleaning staff and occupants and help maintaining a good indoor air quality.

Furthermore, putting environmental consideration in the first priority when making choice in purchasing cleaning materials and products can reduce related water, waste, and ambient air pollution.

Green Seal [1] establishes requirements for cleaning service providers, including in-house and external cleaning services, to create a green cleaning system that protects human health and the environment.

Information on environmentally friendly cleaning products can be found in many organisations including: Green Seal, EPD [2] (publishes green specifications of cleansing products requirements and USEPA [3], etc.

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- 1 Green Seal. Retrieved 1 Mach 2016, from <http://www.greenseal.org/>
 - 2 Environmental Protection Department. List of Products with Recommended Green Specifications. Retrieved 1 Mach 2016, from http://www.epd.gov.hk/epd/english/how_help/green_procure/files/Green_Specifications.pdf
 - 3 United States Government Environmental Protection Agency. Environmentally Preferable Purchasing (EPP). Cleaning. Retrieved 1 Mach 2016, from <http://www.epa.gov/epp/pubs/products/cleaning.htm>

	MAN 12	Integrated Pest Management
Exclusion		None.
Objective		To ensure the management of pest is safe, hygienic and with limited environmental impacts.
Credit Attainable		1
Credit Requirement		1 credit for implementing an integrated programme for pest management.
Assessment		<p><u>Criteria</u></p> <p>The Applicant shall provide an integrated pest management plan which details the following:</p> <ol style="list-style-type: none">Roles and responsibilities of the pest control service provider;Methods for pest control;Identification of root causes of pest problems;Pest-specific strategies;Use of pesticides;Record keeping; andTraining requirements. <p><u>Documentation</u></p> <p>The Applicant shall provide the following documents:</p> <ol style="list-style-type: none">The integrated pest management plan adopted by the service provider;Frequency of the pest control; andPest control records for the past 12 months.
Background		<p>Pesticides pose risks to human health and the environment when users' directions of the products are not followed. Irresponsible use of pesticides, for example unnecessary or excess usage, disposing pesticides in a bad manner, could contaminate the environment. Even alternative or organic pesticides can result in the above environmental issues if they are not used properly. Building management should adopt pest control in ways that offer a means to reduce the risk, and in some cases, the amount of pesticides needed.</p> <p>Integrated pest management (IPM) is an approach to pest control by utilising regular monitoring and record keeping to determine if and when treatments are needed. It employs a combination of strategies and tactics to keep pest numbers low enough to prevent unacceptable damage or annoyance. Biological, cultural, physical, mechanical, educational, and chemical methods are used in site-specific combinations to solve the pest problems. Chemical controls are used only if necessary, and in the least-toxic formulation that is effective against the pest. Educational strategies are used to enhance pest</p>

prevention and to build up support for the IPM program.

The USEPA promotes integrated pest management through documents such as for schools [1], because IPM represents a prudent approach to understanding and dealing with environmental concerns. Because IPM is a decision-making process instead of a rote method, an IPM program will always be able to take into account different kind of pest problems.

1 United States Environmental Protection Agency. Managing Pests in Schools. Retrieved 1 March 2016, from <http://www2.epa.gov/managing-pests-schools>

	MAN 13	User Guidance
Exclusion		None.
Objective		To inform and educate the building users the environmental, comfort and health impacts of their activities and encourage them to change their behaviour in order to reduce the environmental impacts.
Credit Attainable	1	
Credit Requirement	1 credit for providing user guide to encourage and promote environmentally friendly activities.	
Assessment	<u>Criteria</u>	<p>The Applicant shall provide a user guide which encourages and promotes environmentally friendly building use and activities. The guide shall include, but not limited to, the following sections:</p> <ol style="list-style-type: none">i. Health and hygiene;ii. Energy efficient use;iii. Water Conservation;iv. Sustainable materials for fit-out and redecoration;v. Waste management; andvi. Indoor environmental quality. <p>Evidence shall also be submitted to demonstrate the user guide has been distributed to the building users. Feedback channel shall also be established for continual improvement.</p> <u>Documentation</u>
		<p>The Applicant shall provide the following documents:</p> <ol style="list-style-type: none">i. The building user guide;ii. Records showing the building user guide is distributed to the building users; andiii. Evidence showing that the feedback channel(s) from the building users to the Building Owner/ Building Management Company is established.
Background		<p>The overall building performance can be improved and the environmental impacts during operation can be reduced with the co-operation of the tenants or sub-owners of premises. Very often users are not aware of hygiene, comfort and environmental issues. It is good practice to provide guidance on the design and use of premises as they largely affect the overall building performance. It should contain guidance and information of applicable regulations, recommendations or requirements regarding the internal decorations and fit-out works in occupied areas, etc.</p>

MAN 14 Green Lease

Exclusion	Buildings without any tenants.
Objective	To ensure the Building Owner/ Building Management Company and building users can work together to achieve sustainable operation of the building.
Credit Attainable	2
Credit Requirement	<p>a) Green Lease Guideline</p> <p>1 credit for providing green lease guideline to the tenants of the building.</p> <p>b) Implementation of Green Lease</p> <p>1 credit for implementing green lease to the tenants of the building.</p>
Assessment	<p><u>Criteria</u></p> <p>The Applicant shall demonstrate the provisions of the green lease guideline to the building users and/or the green lease, either 'Soft' or 'Hard' approach is implemented for the building. The contents of the green lease are not regulated and shall be subject to the operation of the Applicant.</p> <p><u>Documentation</u></p> <p>The Applicant shall provide the following document:</p> <p>a) Green Lease Guideline</p> <p>i. The green lease between Building Owner/ Building Management Company and the tenants.</p> <p>b) Implementation of Green Lease</p> <p>i. Records showing that the green lease is being implemented to the tenants.</p>
Background	<p>Green lease is an arrangement that offers substantial benefits, in both quantitatively and qualitatively, to both Building Owner/ Building Management Company and the tenants by [1]:</p> <p>i. Improving environmental performance of the leased space by securing a few critical commitments from both landlord and tenants;</p>

1 Jones Lang LaSalle. Perspectives on Sustainable Tenant Strategies. Retrieved 1 March 2016, from <http://www.joneslanglasalle.com/SiteCollectionDocuments/United%20States/JLL-Perspectives-on-sustainable-tenant-strategies.pdf>

- ii. Aligning financial incentives so that both parties benefit from adopting green measures; and
- iii. Improving environmental data reporting transparency to enable landlord and tenants to measure success against agreed-upon goals.

HKGBC has issued the “Green Tenancy Driver for Office Buildings” [2] in 2014. The Guide introduces a 5-stage roadmap, including Green Awareness, Voluntary Pilot Run, Graduated Collaborative Approach, Split Incentive Consent and Green Lease. It aims at encouraging landlord-tenant collaboration to create a sustainable working environment.

2 Hong Kong Green Building Council Limited. Green Tenancy Driver for Office Buildings. Retrieved 1 March 2016, from <https://www.hkgbc.org.hk/eng/got.aspx>

MAN 15 Educational and Promotional Programme

Exclusion	None.
Objective	To encourage behavioural change through educational and promotional programme.
Credit Attainable	2
Credit Requirement	<p>2 credits for Building Owner/ Building Management Company to advocate the behavioural change of building users in respect of Management by:</p> <ul style="list-style-type: none">i. Organising educational seminar/ promotion campaign; orii. Arranging workshop for building users to read through and review the building user guide; oriii. Promoting or participating in Hong Kong Green Building Week organised by Construction Industry Council (CIC) and the Hong Kong Green Building Council Limited (HKGBC).
Assessment	<p><u>Criteria</u></p> <p>Credits can be achieved when the Applicant organises at least one of the activities within the 1 year period at the time of submission.</p> <p><u>Documentation</u></p> <p>The Applicant shall provide the following documents:</p> <ul style="list-style-type: none">i. Promotional materials such as posters, notice of the programme; andii. Record photographs.
Background	BEAM Plus encourages the Applicant to transfer knowledge through seminar or exhibition for building users, so that they can acquire necessary knowledge, shape the standings and behaviour.

**MAN 16 Recognition and Appreciation Awarded from
Other Organisations**

Exclusion	None.
Objective	To recognise the effort of achieving previous BEAM/ BEAM Plus certifications and/or similar awards organised by other organisations.
Credit Attainable	1 + 2 Bonus
Credit Requirement	<p>1 credit for the building has been certified under BEAM Plus Version 1.1 or 1.2/ BEAM 4/04 or 5/04.</p> <p>Maximum 2 Bonus credits for obtaining the following listed environmental award/ certification scheme/ campaign:</p> <ol style="list-style-type: none">i. EarthCheck Certification;ii. Green Building Award;iii. Green Globe Certification;iv. CLP Green^{PLUS} Award;v. Hong Kong Awards for Environmental Excellence (HKAEE) – Property Management Sector Award;vi. Hong Kong Green Mark Certification Scheme;vii. Sustainable Building Index;viii. Voluntary Building Assessment Scheme (VBAS) – Environmental Awareness Quality Label; andix. Other green building related awards/ certification schemes/ campaigns which are not listed above.
Assessment	<p><u>Criteria</u></p> <p>Only a valid BEAM/ BEAM Plus certificate shall be eligible to achieve the credit via this path. For BEAM 4/04 and 5/04 certified building, it shall be only considered as valid when the project was awarded less than 5 years at the time of first submission.</p> <p>The Applicant shall provide valid certificate(s) at the time of submission in order to achieve the Bonus credit(s). 1 Bonus credit can be achieved for obtaining each listed environmental award/ certification scheme/ campaign. For the certificate(s) without expiry date, it shall be only considered as valid when it was awarded less than 5 years at the time of first submission.</p> <p><u>Documentation</u></p> <p>The Applicant shall provide the following document:</p> <ol style="list-style-type: none">i. A copy of the certificate(s).
Background	In Hong Kong there are numerous environmental related awards/ certification schemes/ campaigns which are organised for the Building Owners/ Building Management Companies to apply for the

recognitions of their efforts and commitments in green building management and operations in sustainable ways.

Building owners/ Building Management Companies applying for these certificates shall be required to demonstrate their commitments to environmental protection in green management aspect in order to grant a certificate.

- 3 Site Aspects**
- 3.1 Site location**
- 3.2 Emissions from the site**
- 3.3 Greenery**
- 3.4 Site amenities**
- 3.5 Innovations and additions**

Background

The assessment criteria in this category focus on the location of the building, emissions from the site, microclimate enhancement to the surroundings, and amenities provisions. Site location is important with regard to adequacy of local amenities and public transport provisions, reduction of travel needs and reliance on private vehicles. There is often an opportunity to enhance the quality of buildings through more thoughtful 'greening' and other features. The impacts on neighbouring developments and various discharges and emissions from the site can be significant throughout a building's lifetime.

**3.1 Site location
 Background**

SA 1 Site Location and Amenities

Building location is important in respect of adequacy of local amenities and public transport provisions in order to reduce travel needs and reliance on private vehicles.

**3.2 Emissions from the
 site**

SA 2 Noise Pollution

SA 3 Light Pollution

Background

Various emissions from the building can have a negative impact on neighbouring properties. Certain emissions are within control of the building management and efforts should be made to minimise any potential negative impacts on neighbours and anyone passing by the development.

Discharges and emissions from the site should be considered over a building's lifetime. Noise pollution and light pollution arising from the building engineering systems and equipment is of concern, all of these can be alleviated by good design and proper installation and maintenance.

3.3 Greenery

SA 4 Heat Island Reduction

SA 5 Green Roof

Background

It is important to adequately consider the microclimate in the surrounding during the construction and operation of the building. In cities with high building density like Hong Kong, green roof contributes to preserve and expand urban greenery at the same time enhance the quality of living environment. A building rooftop covered with greenery can also significantly reduce surface temperature in summer.

3.4 Site amenities

SA 6 Security

SA 7 Corporate Social Responsibility Facilities/ Services

SA 8 Amenities for Operation and Maintenance

SA 9 Barrier Free Access

Background

In recent years the HKSAR Government has sought to encourage better building designs through various 'green and innovative' features that can enhance the quality of buildings, and has put in place a number of incentives to encourage the adoption of such features. Measures which aim at improving accessibility for users, creating more enjoyable living and working spaces and ensuring efficient services cater the needs of users, etc. are examples that enhance the quality and efficiency of built environments and thereby ensure buildings are sustainable.

3.5 Innovations and additions

Background

SA 10 Educational and Promotional Programme

SA 11 Innovative Techniques/ Performance Enhancements

It is encouraged to drive behavioural change through educational and promotional programme. This section also allows the applicant to submit for consideration for the award of bonus credits on any innovative techniques or performance enhancements which the applicant deems to provide environmental benefits additional to those already covered in this Manual.

	SA 1	Site Location and Amenities
Exclusion		None.
Objective		<p>To discourage the use of private vehicles and taxis by building users, with the aim to reduce air pollution, energy use, and noise from traffic;</p> <p>To encourage building development that is integrated within, and an asset to the immediate neighbourhood; and</p> <p>To meet the leisure requirements of the public and improve the network of civic space within the district.</p>
Credit Attainable	4	
Credit Requirement		<p>a) Public Transport</p> <p>1 credit for availability of convenient pedestrian access to main stream public transport.</p> <p>b) Provision of Basic Service</p> <p>1 credit where at least 10 different basic services are located within 500m walking distance from the building main entrance(s).</p> <p>c) Neighbourhood Recreational Facility</p> <p>1 credit where at least 2 different recreational facilities are located within 500m walking distance from the building main entrance(s).</p> <p>d) Provision of Sitting Facility</p> <p>1 credit for providing sitting facilities which are open to public during building operation period.</p>
Assessment		<p><u>Criteria</u></p> <p>a) Public Transport</p> <p>Public transport shall be within 500m walking distance from the building entrance(s), and the scheduled operating frequency between 07.00 to 19.00 hours shall be 10 minutes or less.</p> <p>For buildings not directly served by public transport, the provision of shuttle bus service which links to public transport operating at the stated frequency may satisfy the criteria.</p> <p>b) Provision of Basic Service</p> <p>Adequate provision of basic services near the site for building users shall be demonstrated. Basic services shall include (1) Restaurants; (2) Banks (including Automated Teller Machine); (3) Medical Facility;</p>

(4) Dental Clinic; (5) Pharmacy; (6) Supermarket; (7) Convenience Stores; (8) School; (9) Kindergarten or Day Care Centre; (10) Library; (11) Post Box; (12) Laundry or Dry Cleaner; (13) Hairdresser; (14) Retail shops; (15) Place of Worship; (16) Community Centre, (17) Cinema; and (18) Performing Venues.

Only one basic service can be counted twice for any one type of the abovementioned services.

c) Neighbourhood Recreational Facility

Adequate provision of recreational facilities and open space near the site for building users shall be demonstrated. Recreational facilities shall include (1) Shaded/ covered sitting out areas/ garden/ park with seating facilities; (2) Waterfront Promenade; (3) Public Swimming pool; (4) Public Indoor Sports Hall; (5) Public Outdoor Sports Facility such as football field, basketball court, tennis court, etc.; and (6) Bicycle Tracks.

d) Provision of Sitting Facility

Adequate sitting facilities, which are open to public during building operation period shall be demonstrated. Sitting Facilities shall be supported with a notice endorsed by the Building Owners/ Building Management Company. The notice can be one page in-length listing person-in-charge, operating schedule, access route and usage rules for the sitting facilities.

Documentation

The Applicant shall provide the following documents:

a) Public Transport

- i. A survey map of the building and public transport nearby. The map shall identify the location of the building main entrance(s) and public transport. The unencumbered walking route from the building main entrance(s) to the main entrance to each public transport stop/ station shall be clearly marked by lines on the drawing and the walking distance shown alongside. An legend shall be included on the drawing identifying the public transport, the walking distance, and the frequency of services during 07.00 to 19.00 hours; or
- ii. Record photographs and summary table showing the name of the shuttle bus service provider, starting and final destination, frequency of services and fleet size.

b) Provision of Basic Service and c) Neighbourhood Recreational Facility

- i. A survey map identifying the location of the building main

entrance(s) and each of the listed services/ facilities nearby. The unencumbered walking route from the building main entrance(s) to the main entrance of the services/ facilities shall be clearly marked by lines on the drawing and the walking distance shown alongside.

d) Provision of Sitting Facility

- i. Location plan to indicate the sitting facilities;
- ii. Endorsed notice; and
- iii. Record photographs.

Background

The increasing number of private vehicles in Hong Kong not only increases pressure on the highway and urban traffic system, but also worsens local air pollution. The most urgent problem to be resolved comes from fossil fuel burning vehicles, often aggravated by the street canyon effect of high-rise buildings. Exhaust fumes from cars contain volatile organic compounds: some of these are known carcinogens while others contribute to photochemical smog by assisting in the rapid formation of ozone in the atmosphere. The exhaust fumes also contain CO, CO₂, NO_x and SO₂ which contribute a variety of environmental problems. Apart from the health effects of traffic fumes, motor vehicles also generate noise, another environmental nuisance.

Part of the solution to the air pollution problem is to reduce the use of private vehicles and taxis. Building users shall be encouraged to use public transport to and from the building. Provision of pedestrian links which allow easy access to major public transport systems and local amenities can discourage use of private transport, thereby reducing air and noise pollution.

The adequacy of a shuttle bus service may be demonstrated by data showing capacity, frequency, service hours, and the percentage of building users that can be transported during peak periods of commuting.

The provision of basic services such as shops, restaurants, clinics, etc., in the immediate vicinity of a building improves efficiency and the quality of living. Building users can benefit from existing provisions as well as those provided by the development that adds to the neighbourhood. Provision of recreational facilities and open space [1] are essential to the mental and physical well-being of the individual and the community as a whole. It contributes to the quality of life of building users, and is more sustainability. Recreational open space is outdoor open-air space used for active and/or passive recreation use. Active recreation facilities include core activities such as ball games, swimming pool and sports facilities, etc., while passive recreational facilities refer to parks, gardens, sitting-out areas, waterfront

1 Planning Department. Hong Kong Planning and Standards Guidelines. Chapter 4: Recreation, Open Space and Greening. Retrieved 1 March 2016, from http://www.pland.gov.hk/pland_en/tech_doc/hkpsg/full/ch4/ch4_text.htm

promenades, paved areas for informal games, children's playgrounds, etc. The design and layout of these facilities shall be of a high quality which meets the needs of the users and are perform to high environmental standards.

To improve the network of civic space within the district, especially in the urban area, a development can bring sitting out facilities that is accessible by the public with reasonable restrictions on time of use.

	SA 2	Noise Pollution
Exclusion	None.	
Objective	To reduce the noise nuisance to neighbours caused by building services equipment.	
Credit Attainable	6	
Credit Requirement	a) Provision of Acoustic Treatment Maximum 5 credits for providing the following listed acoustic treatment: i. Air-cooled Chiller – Erect a barrier/ install silencer for air-cool chiller; ii. Water-cooled Chiller – Being enclosed in an acoustic enclosure or plantroom; iii. Cooling Tower – Erect a barrier/ install silencer for cooling tower; iv. Fan – Installation of flexible connector; v. Fan (for sound power level (SWL) > 80dB(A)) – Provide silencers at major fan discharge outlets (for exhaust fans) or at air inlets (for intake fans); vi. Fan – Reduce the speed of fans at non-rushed hours; vii. Air duct – Stiffen the vibrating duct surface with supporting webs; viii. Air duct – Apply damping material to the vibrating duct surface; ix. Air duct – Apply composite lagging of sound absorbing materials; x. Chiller pumps – Erect a barrier/ located indoor; and xi. Water pumps – Erect a barrier/ located indoor. b) Demonstration of Compliance with HKPSG Criteria 1 credit for demonstrating that the level of the intruding noise at the façade of the potential Noise Sensitive Receivers (NSRs) is in compliance with the criteria recommended in the Hong Kong Planning Standards and Guidelines (HKPSG).	
Assessment	<u>Criteria</u> a) Provision of Acoustic Treatment 1 credit can be achieved for providing each of the above listed acoustic treatment strategies. Same type of provision in multiple locations can only be counted once. b) Demonstration of Compliance with HKPSG Criteria 1 credit can be achieved for demonstrating that the level of the intruding noise at the façade of the potential NSRs is in compliance with the criteria recommended in HKPSG.	

Assessment shall be made at the façade of the potential NSRs.

When assessed in accordance with the Technical Memorandum, the level of the intruding noise at the facade of the NSR shall be at least 5 dB(A) below the appropriate ANL shown in Table 3 of the Technical Memorandum or, in the case of the background being 5 dB(A) lower than the ANL, shall not be higher than the background, in accordance with paragraph 4.2.13, Chapter 9 of the Hong Kong Planning and Standards Guidelines [1]. The Applicant shall provide evidence in form of detailed analysis, appropriate calculations and/or measurements that the building complies with the assessment criteria. In case where a Noise Abatement Notice has been served, evidence of full compliance with the required remedial action shall also be presented.

Documentation

The Applicant shall provide the following documents:

a) Provision of Acoustic Treatment

- i. Equipment catalogues with sound power level indicated, operation schedule, drawings showing the provision of acoustic treatment for chillers, cooling towers, ventilation fans, air ducts, pumps; and
- ii. Record photographs of the acoustic treatment.

b) Demonstration of Compliance with HKPSG Criteria

- i. Summary table listing the nearest NSRs, building equipment sound level, quantities, ANL and noise level at the façade of the nearest NSRs;
- ii. Location plan to indicate the positions of the NSRs and building equipment;
- iii. Equipment catalogues; and
- iv. Calculation or measurement.

Background

Unwanted sound from equipment on and around buildings contributes to noise pollution with potential impacts on neighbouring properties. Under the Noise Control Ordinance noise emanating from certain types of premises is controlled by means of Noise Abatement Notices which may be served on owners or occupiers of offending premises if the noise emitted:

- i. Does not comply with the ANLs as set out in a technical memorandum;
- ii. Is a source of annoyance to any person other than persons on the premises; and

1 Planning Department. Hong Kong Planning and Standards Guidelines, Chapter 9 Environment. Retrieved 1 March 2016, from http://www.pland.gov.hk/pland_en/tech_doc/hkpsg/full/ch9/ch9_text.htm

- iii. Does not comply with any standard or limit contained in any current regulations.

In practice the Authority will respond to complaints and compliance with the ANL will be required only after a Noise Abatement Notice has been served. Non-compliance with such a notice will be an offence. The Technical Memorandum contains the technical procedures that shall be adopted by the Authority when investigating a complaint regarding noise emanating from such premises to determine whether or not a noise abatement notice shall be issued. BS 4142 [2] suggests methods for noise prediction and a generalised description of prediction is given in ISO 9613-2 [3]. Good practices on building services system noise control is published by the Environmental Protection Department (EPD) [4] [5].

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- 2 British Standards Institution. Method for rating industrial noise affecting mixed residential and industrial areas. British Standard BS 4142:1997. London, BSI. 1997.
- 3 International Standards Organisation. ISO 9613-2. Attenuation of Sound During Propagation Outdoors Part 2. General Method of Calculation 1st ed. 1996.
- 4 Environmental Protection Department. Good practices on pumping system noise control. Retrieved 1 March 2016, from http://www.epd.gov.hk/epd/sites/default/files/epd/english/environmentinhk/noise/guide_ref/files/Pump_sys_E-06.pdf
- 5 Environmental Protection Department. Good practices on ventilation system noise control. Retrieved 1 March 2016, from http://www.epd.gov.hk/epd/sites/default/files/epd/english/environmentinhk/noise/guide_ref/files/Vent_sys_E-06.pdf

	SA 3	Light Pollution
Exclusion		None.
Objective		To minimise light pollution caused by external lighting.
Credit Attainable		6
Credit Requirement		6 credits if there are no external lightings installed for the building.

Alternatively

Maximum 6 credits for implementing the following listed features:

- i. Provide automatic control (e.g. timer switch) to switch off the external lightings (23:00 to 07:00 hours);
- ii. Avoid over-illumination of signs, facades, shop fronts, video walls and facilities with lighting. Over-illumination will increase possibility of light pollution;
- iii. Position and aim the lightings properly to avoid overspill of light to outside the area being lit up;
- iv. Use lightings with appropriate shields, baffles, louvers and cut-off features to prevent light overspill to nearby residence and into the sky, and glare from the light source;
- v. Circulate the Guidelines on Industry Best Practices for External Lighting Installations to building users;
- vi. Switch off all external lightings from the Building Owners/ Building Management Company (23:00 to 07:00 hours); and
- vii. Switch off all external lightings from all building users (23:00 to 07:00 hours).

Assessment

Criteria

6 credits can be achieved if there are no external lightings, including advertisement boards, façade lightings and video walls, installed on exterior of the building.

Alternatively

1 credit can be achieved for implementing each of the above listed features. Same type of provision in multiple locations can only be counted once.

The scope and exemption of switch the lights off is made reference to the Document for Engaging Stakeholders and the Public set up by the Task Force on External Lighting clauses 38 to 43 [1].

1 Task Force on External Lighting. Document for Engaging Stakeholders and the Public. Retrieved 1 March 2016, from <http://www.enb.gov.hk/sites/default/files/pdf/ExternalLightingEng.pdf>

Documentation

The Applicant shall provide the following documents:

- i. Record photographs of external area and exterior of the building; and
- ii. Layouts/ building services drawings demonstrating that there are no external lightings installed for the building.

Alternatively

- i. Narrative of the strategies and the combination (if any);
- ii. Summary table listing quantities and operation schedule of all external lightings;
- iii. Control schematic diagram and electrical wiring diagram, showing provision of automatic control;
- iv. Location plan to indicate the external lightings;
- v. External light management policy endorsed by top management;
- vi. Record photographs (before and after the switch off of external lightings and lighting with appropriate shields, baffles, louvers and cut-off features); and
- vii. Acknowledgement receipt from building users for receiving the Guidelines on Industry Best Practices for External Lighting Installations.

Background

In view of growing public concerns on light nuisance and energy wastage caused by external lightings, the Government has taken a series of actions to identify the problems arising from external lightings and to come up with possible measures to mitigate the issues. The actions include the commissioning of a consultancy study on energy wastage and light nuisance of external lightings in 2009 (the Study) and the promulgation of the Guidelines on Industry Best Practices for External Lighting in January 2012 to encourage early action for minimising light nuisance and energy wastage. In addition, the Government set up the Task Force on External Lighting (the Task Force) in August 2011 to give advices on the appropriate strategy and measures for tackling nuisance and energy wastage problems caused by external lightings with regard to international experience and practices.

As per the Document for Engaging Stakeholders and the Public issued by the Task Force on External Lighting (set up by Environment Bureau), limiting the use of external lightings in a specified time period at night (suggested to be 23:00 to 07:00 hours) could reduce the effects of light pollution.

	SA 4 Heat Island Reduction
Exclusion	None.
Objective	To ensure the microclimate has been adequately considered, and where appropriate, suitable mitigation measures are provided.
Credit Attainable	5
Credit Requirement	<p>Maximum 5 credits for providing the following listed items for the external non-roof area (i.e. ground floor and podium with less than 15m in height):</p> <ol style="list-style-type: none">i. Greenery;ii. Water feature;iii. Outdoor green wall or vertical greening;iv. Shading device; and/orv. Paving materials with solar reflectance (SR) of 0.33. <p><i>Alternatively</i></p> <p>3 credits for implementing any combination of strategies (i) to (v) for 5% of the available exterior area.</p> <p>5 credits for implementing any combination of strategies (i) to (v) for 10% of the available exterior area.</p>
Assessment	<p><u>Criteria</u></p> <p>1 credit can be achieved for providing each of the above listed items for the external non-roof area (i.e. ground floor and podium with less than 15m in height).</p> <p><i>Alternatively</i></p> <p>3 credits can be achieved for implementation of any combination of strategies (i) to (v) for 5% of the available exterior area. 5 credits can be achieved for the implementation of any combination of strategies (i) to (v) for 10% of the available exterior area.</p> <p><u>Documentation</u></p> <p>The Applicant shall provide the following documents:</p> <ol style="list-style-type: none">i. Narrative of the strategies and the combination (if any);ii. Layouts and calculations;iii. Record photographs of green walls or vertical greenings or shading devices; andiv. Catalogue or laboratory test reports on solar reflectance (SR) of paving materials.

Background

Urban greenery and vegetation in a densely built city can lower the temperature of unprotected open space and roof in summer and also mitigate the heat island effect. Also, vegetation helps to increase the rainwater retention time such that local thermal comfort can be enhanced. [1]. Installing shading devise, using paving material with high reflectance materials and water features are some of the strategies to mitigate the effect of urban heat island. More details can be found in the publication by Green Power [2] and USGBC LEED [3] etc.

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- 1 Buildings Department. CEPAS for Buildings, Operation Stage. Retrieved from 1 March 2016, from <http://www.bd.gov.hk/english/documents/code/cepas/OperationStageE.pdf>
 - 2 Green Power. Report on Urban Heat Island Effect in Hong Kong. Retrieved from 1 March 2016, from http://www.greenpower.org.hk/html/download/concern/gp_urban_heat_island_report_2012.pdf
 - 3 USGBC, LEED v4 for Building Operations and Maintenance.

	SA 5	Green Roof
Exclusion	None.	
Objective	To ensure the microclimate at the roof areas and reduce the temperature underneath, which in turn saving air-conditioning energy.	
Credit Attainable	5	
Credit Requirement	<p>5 credits for using green roof and/or organic farm and/or roof material that meets the solar reflectance index of 82 for 50% of the available roof area.</p> <p><i>Alternatively</i></p> <p>2 credits for providing green roof and/or organic farm on roof area.</p> <p>1 additional credit if the green roof and/or organic farm is more than 10% of the available roof area.</p> <p>1 credit for demonstrating plant selection fulfilling at least 2 of the following listed requirements:</p> <ul style="list-style-type: none">i. Do well in lightweight and shallow soils;ii. Wind tolerant;iii. Drought tolerant;iv. Pollution tolerant; andv. Have non-invasive root systems. <p>1 credit for demonstrating plant growing media selection fulfilling at least 2 of the following listed requirements:</p> <ul style="list-style-type: none">i. Super light-weight;ii. Inert;iii. Well-drained;iv. Well-aerated;v. Fire resistant; andvi. Nutrient retentive.	
Assessment	<p><u>Criteria</u></p> <p>5 credits can be achieved if green roof and/or organic farm and/or roof material that meets the solar reflectance index of ≥ 82 is used for 50% of the available roof area. Areas occupied by mechanical equipment shall be excluded from total main roof area.</p> <p><i>Alternatively</i></p> <p>2 credits can be achieved for provision of green roof and/or organic farm on roof area. 1 additional credit can be achieved if the green roof and/or organic farm is more than 10% of the available roof area.</p>	

All green roof and and/or organic farm areas shall be measured horizontally based on the soil areas as shown on the plan. Greenery in movable pots shall not be counted.

1 credit can be achieved for demonstrating plant selection fulfilling at least 2 of the above listed requirements.

1 credit can be achieved for demonstrating plant growing media selection fulfilling at least 2 of the above listed requirements.

Documentation

The Applicant shall provide the following documents:

To demonstrate the use of green roof and/or organic farm and/or roof material that meets the solar reflectance index of ≥ 82 for 50% of the available roof area:

- i. Layouts and calculations;
- ii. Equipment catalogue and laboratory test report on solar reflectance index of roof materials; and
- iii. Record photographs of the green roof/ organic farm/ roof material.

Alternatively

- i. Narrative of the strategies and the combination (if any);
- ii. Calculation, equipment catalogue, demonstrating requirements on plant selection have been fulfilled;
- iii. Calculation, equipment catalogue, demonstrating requirements on plant growing media selection have been fulfilled;
- iv. Layout and calculation; and
- v. Record photographs of green roof/ organic farm.

Background

Apart from enhancing the landscape and the environment of our city, attenuating the heat island effect and improving air quality, roof greening can also improve the performance and increase the life span of waterproof and insulation facilities on the roof. Consequently, roof greening is also conducive to energy conservation.

The extent of greening is determined by the use and design of the roof, which usually include the provision of planters, soft and hard landscaping, paving, decking and related waterproofing, irrigation and drainage system works. More details can be found in Greening, Landscape and Tree Management Section of Development Bureau [1].

Organic farm in a building can advocate sustainability by providing benefits such as producing healthy and nutritious food free from harmful chemical residues, conserving natural resources, encouraging

1 Development Bureau. Greening, Landscape and Tree Management Section. Retrieved 1 March 2016, from <http://www.greening.gov.hk/en/home/index.html>

an abundance of species living in balanced, harmonious ecosystems, etc. More details can be found in Agriculture, Fisheries and Conservation Department (AFCD) website for Organic Farming [2].

A study on green roof application in existing buildings in Hong Kong was conducted by Architectural Services Department in 2007 [3]. Several design issues, relating to loading, existing roof status, maintenance access and safety, soil depth, and successful low-maintenance species, have been outlined.

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- 2 Agriculture, Fisheries and Conservation Department. Organic Farming. Retrieved from 1 March 2016, from https://www.afcd.gov.hk/english/agriculture/agr_organicfarm/agr_organicfarm.html
 - 3 Architectural Services Department. Study on Green Roof Application in Hong Kong. Retrieved from 1 March 2016, from http://www.archsd.gov.hk/media/11630/green_roof_study_final_report.pdf

	SA 6	Security
Exclusion		None.
Objective		To engender a feeling of well-being amongst building users.
Credit Attainable	6	
Credit Requirement		Maximum 6 credits for providing the following listed security measures: <ul style="list-style-type: none">i. Site is fenced;ii. Site is illuminated by building exterior lighting;iii. Provide a security control counter;iv. CCTV to monitor the building entrance(s);v. CCTV to monitor the elevators;vi. Frequent patrol of building and fence perimeter;vii. Access from adjacent building is inhibited by barriers;viii. Illuminance of footpaths is at least 50 lux at night time;ix. Alarm locally for opening and breakage;x. Meters are located in common areas;xi. Indoor parking;xii. Car park is fenced; andxiii. Others to be proposed by the Applicant.
Assessment		<u>Criteria</u> 1 credit can be achieved for providing each of listed items as shown above. Same type of provision in multiple locations can only be counted once. <u>Documentation</u> The Applicant shall provide the following documents: <ul style="list-style-type: none">i. Summary table showing the location of the security provisions with narrative and architectural layout plan;ii. CCTV catalogue and layout;iii. Guard patrol route and patrol frequency; andiv. Record photographs.
Background		Local surveys undertaken in recent years show that security is a serious concern for estates' residents. This may be in the context of personal safety and in the context of loss of belongings. For commercial and institutional buildings security is also an issue, in public buildings where strangers congregate, in common areas such as staircases and toilets, etc. The design of building, landscape and the implementation of security facilities can effectively reduce most burglaries and other crimes. The security facilities and measures required depend on the type of premises and level of security needed. In general, effective security incorporates three elements: natural and architectural barriers that

discourage access, human security and electronic security.

Security can be enhanced through the integrated use of reliable hardware (surveillance cameras, security barriers, etc.) coupled with a sound management system (watchman tour, etc.). Security systems need to be integrated with fire safety management and communications systems.

Assessment shall take into account the guidelines provided in ASTM [1] [2], British Standards [3], and similar authoritative guidance.

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- 1 ASTM International. Designation E 1665-95a. Standard Classification for Serviceability of an Office Facility for Facility Protection.
 - 2 ASTM International. Designation E 1693-95a. Standard Classification for Serviceability of an Office Facility for Occupant Assets.
 - 3 British Standards Institution. BS8220. Standard Guide for Security of Buildings Against Crime.

SA 7 Corporate Social Responsibility Facilities/ Services

Exclusion	None.
Objective	To encourage development as an asset to the society and promotes Corporate Social Responsibility (CSR).
Credit Attainable	5
Credit Requirement	Maximum 5 credits for providing the following listed CSR facilities/ services:

- i. Allowing person with visual impairment to bring along with their guide dogs;
- ii. Automated External Defibrillator.
- iii. Baby-care room;
- iv. Bicycle parking;
- v. Breast feeding room;
- vi. Free baby stroller lending service;
- vii. Free drinking fountain;
- viii. Free wheelchair lending service;
- ix. Free Wi-Fi in common area;
- x. Organic farm;
- xi. Permanent art work;
- xii. Permanent green building education show board; and
- xiii. Others to be proposed by the Applicant.

Assessment

Criteria

1 credit can be achieved for providing of each of the above listed items. Same type of provision in multiple locations can only be counted once. The organic farm can be double-counted in section SA 5 Green Roof if the requirements in both sections are complied. The size of the organic farm is not regulated under this section.

Documentation

The Applicant shall provide the following documents:

- i. Location plan to indicate the facilities/ services; and
- ii. Record photographs.

Background

The provision of CSR facilities/ services does not only provide convenience to the building users, but also to the community and society. It is one of the many opportunities to demonstrate the commitment of an organisation on CSR.

CSR facilities/ services are essential to the mental and physical well-being of individuals and the community as a whole. It contributes to the quality of life of building users and hence sustainability.

Applicants are encouraged to propose other CSR facilities/ activities which are subject to the approval of Technical Review Committee (TRC) on case-by-case basis.

	SA 8 Amenities for Operation and Maintenance
Exclusion	None.
Objective	To facilitate the maintenance staff in carrying out operation and maintenance of the building and its engineering services.
Credit Attainable	6
Credit Requirement	<p>Maximum 6 credits for providing the following listed amenities that improve the operation and maintenance of the building and its engineering services:</p> <ol style="list-style-type: none">i. Aerial working platform;ii. Building Management System (BMS);iii. Cat ladder;iv. Davit arm system;v. External pipe duct;vi. Fall arrest system;vii. Gondola system;viii. Lavatories for building management staff;ix. Maintenance platform;x. Maintenance workshop;xi. Movable platform;xii. Twin - tank systems andxiii. Others to be proposed by the Applicant.
Assessment	<p><u>Criteria</u></p> <p>1 credit can be achieved for providing each of the listed items as shown above. Same type of amenity in multiple locations can only be counted once.</p> <p><u>Documentation</u></p> <p>The Applicant shall provide the following documents:</p> <ol style="list-style-type: none">i. Summary table listing each type of amenities and their locations; andii. Record photographs.
Background	<p>Availability of maintenance tools for maintenance staff are one of the key factors to maintain the effectiveness of the building and its engineering services for maintaining building performance and value.</p> <p>BEAM Plus encourages the Applicant to provide adequate maintenance tools and amenities to facilitate the maintenance staff in improving operation and maintenance of the building and its engineering services.</p>

	SA 9	Barrier Free Access
Exclusion		None.
Objective		To ensure full access to pertinent building facilities for persons with disability.
Credit Attainable		4
Credit Requirement		<p>Maximum 4 credits for providing barrier-free access provisions as per the obligatory design requirements of Design Manual – Barrier Free Access 2008.</p> <p><i>Alternatively</i></p> <p>For buildings that need to comply with Design Manual – Barrier Free Access 2008 version:</p> <p>Maximum 4 credits for providing enhanced barrier-free access provisions as per the recommended design requirements of Design Manual – Barrier Free Access 2008.</p>
Assessment		<p><u>Criteria</u></p> <p>1 credit can be achieved for providing each of the listed obligatory provisions as stipulated in the “Obligatory Design Requirements” of The Code of Practice for Barrier Free Access 2008 [1]. Same type of provision in multiple locations can only be counted once.</p> <p>Alternatively, 1 credit can be achieved for providing each of the listed enhanced provisions as stipulated in the “Recommended Design Requirements” of The Code of Practice for Barrier Free Access 2008 [1]. Same type of provision in multiple locations can only be counted once.</p> <p><u>Documentation</u></p> <p>The Applicant shall provide the following documents:</p> <ol style="list-style-type: none">Summary table listing the obligatory provisions and their locations;Location plan to indicate the facilities/ services; andRecord photographs. <p><i>Alternatively</i></p> <ol style="list-style-type: none">Summary table listing the enhanced provisions and their locations;Location plan to indicate the facilities/ services; and

1 Buildings Department. Design Manual - Barrier Free Access 2008. Retrieved 1 March 2016, from http://www.bd.gov.hk/english/documents/code/e_bfa2008.htm

- iii. Record photographs.

Background

In order to enhance social integration disabled persons shall have the same rights as any other individuals. Under the Disability Discrimination Ordinance, discrimination against persons with a disability by failing to provide means of access to any premises that the public is entitled to enter or use, or by refusing to provide appropriate facilities is prohibited, unless the premises are designed to be inaccessible to persons with a disability.

Full access for disabled persons means more than just being able to enter and leave a building, or use the toilets. It enables persons with a disability to make full use of the basic facilities in a building without assistance and undue difficulties. The Code of Practice for Barrier Free Access sets out design requirements to cater for the special needs of persons with locomotor disabilities, visual impairment and hearing impairment.

Facilities that cater for the special needs of the physically impaired shall be provided, which include but not limited to shaded areas for walking and sitting; accessibility to public toilets; adequate lighting; emergency phones; visual-free walking areas; ramps with handrails; and car or bus dropping-off points near to venues.

	SA 10	Educational and Promotional Programme
Exclusion		None.
Objective		To encourage behavioural change through educational and promotional programme.
Credit Attainable		2
Credit Requirement		2 credits for Building Owner/ Building Management Company to educate and advocate the behavioural change of building users in respect of Site Aspects by: <ul style="list-style-type: none">i. Organising educational seminar/ promotion campaign; orii. Promoting or participating in Hong Kong Green Building Week organised by Construction Industry Council (CIC) and the Hong Kong Green Building Council Limited (HKGBC).
Assessment		<u>Criteria</u> Credits can be achieved when the Applicant organises at least one of the activities within the 1 year period at the time of submission. <u>Documentation</u> The Applicant shall provide the following documents: <ul style="list-style-type: none">i. Promotional materials such as posters, notice of the programme; andii. Record photographs.
Background		BEAM Plus encourages the Applicant to transfer knowledge through seminar or exhibition for building users, so that they can acquire necessary knowledge, shape the standings and behaviour.

	SA 11	Innovative Techniques/ Performance Enhancements
Exclusion		None.
Objective		To encourage adoption of practices, new technologies and techniques in respect of Site Aspects that have yet to find application in Hong Kong or provide for performance enhancements over and above stated performance criteria in BEAM Plus for Existing Buildings.
Credit Attainable		2 Bonus
Credit Requirement		a) Innovative Techniques 1 Bonus credit for applying innovation technique in respect of Site Aspects that will improve the performance of the building. b) Performance Enhancements 1 Bonus credit for building with exemplary performance over and above the criteria identified in Site Aspects of the BEAM Plus for Existing Buildings.
Assessment		<u>Criteria</u> a) Innovative Techniques The onus will be on the Applicant to present the evidence of the application of new practices, technologies and techniques and the associated environmental benefits. The Applicant shall provide a submission which identifies the intent of the proposed innovative technique and quantifies environmental benefits through its application. The Assessor shall refer the submission to BSL TRC who will consider each application on its merit. The Bonus credit shall be granted at the sole discretion of BSL TRC. b) Performance Enhancements The onus will be on the Applicant to present evidence of the performance compared to the existing criteria. The Applicant shall provide a submission which identifies the proposed application and quantifies its exemplary performance over and above the criteria identified in Site Aspects of the BEAM Plus for Existing Buildings. The Assessor shall refer the submission to BSL TRC who will consider each application on its merit. The Bonus credit shall be granted at the sole discretion of BSL TRC.
		<u>Documentation</u> The Applicant shall provide the following documents:

a) Innovative Techniques

- i. Narrative to indicate the innovative techniques;
- ii. Calculation quantifying environmental benefits through application of proposed innovation technique; and
- iii. Record photographs.

b) Performance Enhancements

- i. Calculation quantifying exemplary performance over and above the criteria identified in Site Aspects of the BEAM Plus for Existing Buildings through proposed application; and
- ii. Record photographs.

Background

BEAM Plus encourages the Applicant to incorporate innovative techniques and green practices into their building so as to realise the associated environmental benefits, which related to sustainable living, improved comfort, lower water consumption, reduced pollution.

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|----------|------------------------------------|------------|---------------------------------------|
| 4 | Materials and Waste Aspects | 4.1 | Selection of materials |
| | | 4.2 | Waste management and reduction |
| | | 4.3 | Innovations and additions |

Background The amount and the types of materials used and the waste generated in the operation and maintenance and fitting-out of buildings represents a significant use of natural resources. There are opportunities to reduce environmental impacts through interior design methods and choice of materials and products, in terms of extracted raw materials, emissions, and the embodied energy. Discussion on waste management in Hong Kong is more critical than before. It is important to encourage the stakeholders to recognise the importance of the waste management for existing buildings in Hong Kong.

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| 4.1 | Selection of materials | MWA 1 Materials Purchasing Plan |
| | | MWA 2 Materials Purchasing Practices |
| | | MWA 3 Ozone Depleting Substances |

Background The selection of materials that can be planted and harvested within a relatively short time, that are otherwise sustainable, have significant recycled content, or otherwise have relatively low environmental impacts in their life cycle, should be considered for maintenance, redecoration, fit-out and renovations.

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| 4.2 | Waste management and reduction | MWA 4 Waste Management Plan |
| | | MWA 5 Basic Waste Recycling Facilities |
| | | MWA 6 Recycling Facilities for Different Waste Streams |
| | | MWA 7 Food Waste Management |
| | | MWA 8 Action to Waste Reduction |

Background Hong Kong is running out of land for waste disposal, and if no action is taken sooner, the existing landfill sites will be filled up in the next 3-5 years. To tackle the problem, much effort has been put in reducing waste generation and identifying outlets for reusing recycled materials. With adequate provisions for waste collection and sorting, and a proactive approach in seeking opportunities for recycling, the management of waste from buildings can be improved significantly.

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| 4.3 | Innovations and additions | MWA 9 Achievement of Wastewi\$e Certificate |
| | | MWA 10 Educational and Promotional Programme |
| | | MWA 11 Innovative Techniques/ Performance Enhancements |

Background It is encouraged to drive behavioural change through educational and promotional programme. This section also allows the applicant to submit for consideration for the award of bonus credits on any innovative techniques or performance enhancements which the applicant deems to provide environmental benefits additional to those already covered in this Manual.

	MWA 1	Materials Purchasing Plan
Exclusion		None.
Objective		To encourage purchasing practices which aim at reducing the environmental impacts of products used through formulating the purchasing procedure or plan into a more environmentally friendly way.
Credit Attainable		3
Credit Requirement		1 credit for providing an endorsed policy. 1 credit for providing a materials purchasing plan with objectives, 5R principles and targets. 1 credit for the plan is endorsed by top management of Building Owner/ Building Management Company.
Assessment		<u>Criteria</u> The Applicant shall provide a materials purchasing policy endorsed by top management to demonstrate the commitment. In addition, the Applicant shall provide a materials purchasing plan including but not limited to the following items: <ul style="list-style-type: none">i. Objectives;ii. Short term (3 years) and long term (5 years) targets;iii. Responsibility;iv. 5R principles (rethink, reduce, reuse, replace and recycle);v. Environmental attributes;vi. Specified on-going consumables;vii. Specified durable goods; andviii. Monitoring and checking. The plan shall be endorsed by top management of Building Owner/ Building Management Company and reviewed regularly. This credit only assesses the procurement plan for materials/ products, where procurement for services is assessed under section MAN 1 Green Purchasing Plan. The implementation of materials procurement practice is not necessary for fulfilling this credit. The performance of implementation is assessed under section MWA 2 Materials Purchasing Practices. <u>Documentation</u> The Applicant shall provide the following documents: <ul style="list-style-type: none">i. Endorsed materials purchasing policy; andii. Endorsed materials purchasing plan.

Background

Although life-cycle analysis can be used to assess materials and products, there are no well-defined criteria for categorizing materials as green or environmentally friendly. This involves the identification and quantification of all of the raw materials and energy consumed in the production, use, and disposal of the product, as well as the pollutants and by-products generated. Two of the most significant environmental impact caused by materials used in buildings are waste streams and the possible impacts on the health and comfort of building users. There are many environmentally friendly alternatives that are available in market to substitute the products currently used in buildings. More details and green procurement specification can be found in Environmental Protection Department (EPD) website [1].

Typical Environmental Attributes

- i. Minimise the use of virgin materials;
- ii. Reduce energy/ water consumption;
- iii. Reduce or cease the use of toxic substances;
- iv. Use products that are generated from environmentally certified processes;
- v. Reusable and recyclable at the end of product life;
- vi. Minimised packaging; and
- vii. With proper way of disposal etc.

Examples for On-going Consumables

Goods/ Products	Environmental Attributes
Batteries	- Rechargeable
Envelops, business cards etc.	- Certified (e.g. FSC) - Chlorine free - Coating free - Recycled content
Paper towel and toilet tissue	- Non-chlorine bleached paper - Recycled paper
Plastic bags	- Biodegradable
Printing paper	- Certified (e.g. FSC) - Chlorine free - Coating free - Recycled content
Toner cartridges	- Refillable

1 Environmental Protection Department. Green Procurement. Retrieved from 1 March 2016, from http://www.epd.gov.hk/epd/english/how_help/green_procure/green_procure.html

Examples for Durable Goods

Goods/ Products	Environmental Attributes
Computers	- With Energy Label
Lamps	- With Energy Label
Office furniture	- Volatile Organic Compounds (VOCs) free - 2 nd hand product
Paint	- VOCs free - Water-based

MWA 2 Materials Purchasing Practices

Exclusion	None.
Objective	To encourage purchasing practices which reduce the environmental impact of products used by implementing Materials Purchasing Plan.
Credit Attainable	20
Credit Requirement	a) Environmentally Purchasing Practices

Maximum 10 credits for purchasing environmentally friendly ongoing consumables:

- i. Printing paper – 50% recycle content;
- ii. Printing paper – Certified (e.g. FSC);
- iii. Printing paper – Chlorine free;
- iv. Printing paper – Coating free;
- v. Envelop – 50% recovered fiber by weight;
- vi. Paper towel and toilet tissue – Chlorine;
- vii. Printing ink – 20% vegetable or soybean oil;
- viii. Toner cartridge – Refillable;
- ix. Pen – Refillable ink and provide refill;
- x. Plastic garbage bags – 50% recycle content;
- xi. Plastic bag – Biodegradable;
- xii. Battery – Rechargeable;
- xiii. Detergent – Low VOC and without halogenated substances;
- xiv. Computer – With energy label;
- xv. LCD Monitor – With energy label;
- xvi. Printer – With energy label and energy saving mode;
- xvii. Fluorescent Lamp – Grade 1 energy label;
- xviii. Furniture – 2nd hand product;
- xix. Water dispenser – Bottleless; and
- xx. Other ongoing consumables with environmental attributes proposed by the Applicant.

No. of Credits	2	4	6	8	10
Percentage of environmentally friendly items purchased	30%	35%	40%	45%	50%

Maximum 5 credits for purchasing environmentally friendly product during refurbishment:

- i. Sustainable/ recycled timber (e.g. FSC);
- ii. Recycled/ reused materials;
- iii. Regionally manufactured materials (within 800km);
- iv. Second-hand products;
- v. Glue/ Adhesive – <5% VOC;
- vi. Paint – VOC free;

- vii. Carpet – Removable & reusable tiles;
- viii. Carpet – PVC free;
- ix. Product certified under CIC Carbon Labelling Scheme, HKGBC Green Building Product Accreditation and Standards (HK G-PASS); and
- x. Other products for refurbishment with environmental attribute proposed by the Applicant.

No. of Credit(s)	1	2	3	4	5
Percentage of environmentally friendly items purchased	30%	35%	40%	45%	50%

Maximum 3 credits for increment of purchasing amount of environmentally friendly items when compared with last year.

No. of Credit(s)	1	2	3
Percentage increment of purchased environmentally friendly items	3%	5%	10%

b) Targets on Environmentally Procurement

2 credits for providing new target on procurement rate of environmentally purchasing based on the past 12 months performance.

Assessment

Criteria

a) Environmental Purchasing Practices

The Applicant shall demonstrate that at least 30% of all purchased items are environmentally friendly (i.e. the above listed items) in the past 12 months. The amount of procurement shall be quantified by dollar values. The purchased environmentally friendly items shall be listed in the endorsed Materials Purchasing Plan under section MWA 1.

The Applicant shall also demonstrate the improvement of purchasing practice by demonstrating at least 3% more environmentally friendly items are purchased when compared with past year.

b) Targets on Environmentally Procurement

The Applicant shall provide new target on procurement rate of environmentally purchasing based on the past 12 months performance.

Documentation

The Applicant shall provide the following documents:

a) Environmental Purchasing Practices

- i. Summary table listing the purchased items' product type, manufacturer, quantities, and environmental attribute and reference source in the past 12 months;
- ii. Calculation demonstrating the proportion of environmentally friendly items purchased in the past 12 months;
- iii. Calculation demonstrating the improvement of purchasing practice compared with the past year performance;
- iv. Documents showing the environmental attributes;
- v. Purchase records; and
- vi. Record photographs.

b) Targets on Environmentally Procurement

- i. Undertaking letter stating new target on procurement rate of environmentally purchasing.

Background

See MWA 1.

MWA 3 Ozone Depleting Substances

Exclusion	For part b only, buildings without newly installed equipment using refrigerants.
Objective	To reduce the release of ozone depletion substances into the atmosphere.
Credit Attainable	4
Credit Requirement	<p>a) Phase Out Plan for Existing Equipment with Ozone Depleting Substances</p> <p>Maximum 2 credits for providing phase out plan for existing equipment with ozone depleting substances:</p> <ul style="list-style-type: none">i. Refrigerants; andii. Fire suppression. <p>(Note: 2 credits are achieved if there is no equipment with ozone depleting substances in the building.)</p> <p>b) Newly Installed Equipment using Refrigerants</p> <p>1 credit for newly installed equipment using the refrigerants with Global Warming Potential (GWP) less than 1,900.</p> <p>(Note: Credit can be excluded for no equipment using the refrigerants is installed in the past 12 months.)</p> <p>c) Fire Suppression Materials</p> <p>1 credit for using the fire suppression and other materials that avoids the use of ozone depleting substances in their manufacture, composition or use.</p>
Assessment	<p><u>Criteria</u></p> <p>a) Phase Out Plan for Existing Equipment with Ozone Depleting Substances</p> <p>1 credit can be achieved for the provision of phase out plan for each of the above listed items.</p> <p>The Applicant shall provide a phase out plan detailing the following as a minimum:</p> <ul style="list-style-type: none">i. Objectives;ii. List of equipment with ozone depleting substances; andiii. Phase out schedule.

b) Newly Installed Equipment using Refrigerants

The newly installed equipment using refrigerants shall have a GWP less than 1,900.

c) Fire Suppression Materials

All portable fire extinguishers shall avoid the use of ozone depleting substances (ODS) in their manufacturing process, composition or use. For permanent system/ equipment (e.g. replacement of fire suppressants, thermal insulations, and other applications), only newly installed materials would be assessed.

For sections b) and c)

The newly installed equipment is defined as the equipment that is installed within the past 12 months.

Documentation

The Applicant shall provide the following documents:

a) Phase Out Plans for Existing Equipment with Ozone Depleting Substances

i. Phase out plan.

b) Newly Installed Equipment using Refrigerants

- i. Summary table listing the newly and existing installed equipment, type, model number and refrigerant type;
- ii. Equipment catalogue/ technical sheets; and
- iii. Record photographs.

c) Fire Suppression Materials

- i. Summary table listing the quantity and types of portable fire extinguishers and fixed fire protection system; and
- ii. Equipment catalogue/ technical sheets.

Background

In Hong Kong, Ozone Layer Protection Ordinance (Cap 403) 1989 demonstrates the international obligations Hong Kong has taken to control the manufacture, import and export of ODS [1]. Ozone Layer Protection (Controlled Refrigerants) Regulation 1994 requires the conservation of controlled refrigerants used in large scale installations and motor vehicles [2]. Ozone Layer Protection (Products Containing Scheduled Substances) (Import Banning) Regulation 1993 prohibits the import of portable fire extinguishers containing halons and other controlled products from a country or place not a party to the Montreal Protocol unless the Authority considers that it complies with the requirements of the Protocol. CFCs generally have high ODP and GWP. HCFCs generally have much lower ODP and GWP. HFCs offer near-zero ODP, but some have comparatively high GWPs. EPD started to ban the import of products containing HCFCs in phases since 2010 [3]. For ozone depletion potential, global warming potentials and calculation method, details can be found in EPD website [4] and USGBC LEED v4 manual [5].

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- 1 Environmental Protection Department. A Concise Guide to the Ozone Layer Protection Ordinance. Retrieved 1 March 2016, from http://www.epd.gov.hk/epd/english/laws_regulations/comp_guides/files/cgto_olpo_eng.pdf
 - 2 Environmental Protection Department. A Concise Guide to the Ozone Layer Protection (Controlled Refrigerants) Regulation. Retrieved 1 March 2016, from http://www.epd.gov.hk/epd/english/laws_regulations/comp_guides/files/cgt_olp_cr_eng.pdf
 - 3 Environmental Protection Department. Ozone Layer Protection. Retrieved 1 March 2016, from http://www.epd.gov.hk/epd/english/environmentinhk/air/ozone_layer_protection/wn6_info.html
 - 4 Environmental Protection Department. Guidelines to Account for and Report on Greenhouse Gas Emissions and Removals for Buildings (Commercial, Residential or Institutional Purposes) in Hong Kong. Retrieved 1 March 2016, from http://www.epd.gov.hk/epd/sites/default/files/epd/english/climate_change/files/Guidelines_English_2010.pdf
 - 5 USGBC. LEED v4 for Building Operations and Maintenance.

	MWA 4	Waste Management Plan
Exclusion		None.
Objective		To encourage best practice for the management of waste, including sorting, recycling and disposal of waste.
Credit Attainable		3
Credit Requirement		1 credit for providing a waste management policy endorsed by top management. 1 credit for providing a waste management plan with objectives and 5R principles. 1 credit for the waste management plan is endorsed by top management.
Assessment	<u>Criteria</u>	<p>The Applicant shall provide a waste management policy endorsed by top management to demonstrate the commitment. In addition, the Applicant shall provide a waste management plan detailing the following as a minimum:</p> <ol style="list-style-type: none">i. Objectives;ii. Responsibility;iii. 5R principles (rethink, reduce, reuse, replace and recycle);iv. Waste minimisation programme;v. Waste recycle/ reuse programme;vi. Waste data collection system;vii. Influence on building users (e.g. training/ workshop/ campaign);viii. Resource allocation;ix. Training for staff; andx. Reporting to top management. <p>The plan shall be endorsed by top management of Building Owner/ Building Management Company and reviewed in regular basis.</p> <p>The implementation of waste management plan is not necessary for attaining this credit. This is assessed under section MWA 8 Waste Management Implementation and Continual Improvement.</p>
	<u>Documentation</u>	<p>The Applicant shall provide the following documents:</p> <ol style="list-style-type: none">i. Endorsed waste management policy; andii. Endorsed waste management plan.
Background		The building management can achieve a great deal in improving waste management and recycling, especially through positive engagement

with building users. Where waste management is in an emergent stage the starting point is a waste stream audit to establish current waste benchmarks, then to evaluate how each type of waste can be reduced through source reduction, reuse and recycling. Development of a waste management system, suitably resourced with facilities, staff and time, should follow. Targets should include the reduction of incoming waste streams, compliance with regulations in respect of hazardous waste, reducing waste disposal at land fill, identifying recycling opportunities, etc. Pro-active management should consider reducing use of toxic materials, or at least ensure environmentally sound disposal.

Hong Kong generates various types of waste, and each has its own requirements for handling. EPD keeps regular statistics on each waste type, such as composition, quantity sent for disposal and quantity recycled, for example, municipal solid waste, waste paper, plastic waste and glass bottles [1]. More details can be found in Hong Kong Waste Reduction Website [2].

1 Environmental Protection Department. Waste Reduction Factsheet. Retrieved 1 March 2016, from https://www.wastereduction.gov.hk/en/assistancewizard/recyc_fact_sheet.htm

2 Environmental Protection Department. Hong Kong Waste Reduction Website. Retrieved 1 March 2016, from <https://www.wastereduction.gov.hk/en/index.htm>

	MWA 5	Basic Waste Recycling Facilities
Exclusion		None.
Objective		To reduce pressure on landfill sites and help to preserve non-renewable resources by promoting recycling of waste materials.
Credit Attainable		3
Credit Requirement		Maximum 3 credits for providing on-site recycling facilities for paper, plastic and metal waste at easily accessible locations.
Assessment		<p><u>Criteria</u></p> <p>1 credit can be achieved for providing recycling facilities for each of the above listed items. Same type of provision in multiple locations can only be counted once.</p> <p>For each waste stream, provide at least one storage bin/ storage area for recycling. The recycling facilities shall be located at easily access location(s). The size of the recycling facilities and collection frequency are not regulated.</p> <p>The collection organisation/ recycler shall be employed by either Building Owner or Building Management Company.</p> <p><u>Documentation</u></p> <p>The Applicant shall provide the following documents:</p> <ol style="list-style-type: none">Summary table to illustrate the quantities and locations of the facilities;Record photographs; andRecycling arrangement.
Background		<p>Well managed facilities for the recycling of solid waste encourage recycling and results in reductions in the disposal at landfill sites. Buildings should be provided with facilities for waste separation and sorting, and short term storage at appropriate locations.</p> <p>The assessment seeks to establish the extent to which facilities are provided to allow for the recycling of waste. The means to facilitate waste recycling is not prescribed as much depends on the design and type of building, and the activities carried out within.</p>

MWA 6 Recycling Facilities for Different Waste Streams

Exclusion	None.
Objective	To reduce pressure on landfill sites and help to preserve non-renewable resources by promoting recycling of waste materials.
Credit Attainable	6
Credit Requirement	<p>a) On-site Recycling Facilities</p> <p>Maximum 5 credits for providing the following listed on-site recycling facilities:</p> <ul style="list-style-type: none">i. Clothes;ii. Fluorescent lamp (CFLs and fluorescent tubes);iii. Glass bottle;iv. Rechargeable battery;v. Waste Electrical and Electronic Equipment (WEEE); andvi. Others to be proposed by the Applicant. <p>b) Notification to Building Users</p> <p>1 credit for notifying the building users the locations of the above mentioned recycling facilities.</p>
Assessment	<p><u>Criteria</u></p> <p>a) On-site Recycling Facilities</p> <p>1 credit can be achieved for the provision of recycling facilities for each of the above listed items. Same type of provision in multiple locations can only be counted once.</p> <p>For each waste stream, provide at least one storage bin/ storage area for recycling. The size of the recycling facilities and collection frequency are not regulated.</p> <p>The collection organisation/ recycler shall be employed by either Building Owner or Building Management Company.</p> <p>b) Notification to Building Users</p> <p>The Applicant shall demonstrate that the building users are notified about the detail of the above mentioned recycling facilities.</p> <p><u>Documentation</u></p> <p>The Applicant shall provide the following documents:</p> <p>a) On-site Recycling Facilities</p>

- i. Summary table to illustrate the quantities and locations of the facilities;
- ii. Record photographs; and
- iii. Recycling arrangement.

b) Notification to Building Users

- i. Notice/ memo to demonstrate the notification to building users is provided about detail of the locations of the above mentioned recycling facilities.

Background

See MWA 5.

MWA 7 Food Waste Management

Exclusion	Office buildings.
Objective	To reduce pressure on landfill sites by promoting the reduction and recycling of food waste.
Credit Attainable	4
Credit Requirement	1 credit for signing the Food Wise Charter.

Maximum 3 credits for adopting the following good practices as per Hong Kong Food Wise Campaign:

- i. Promote best practices and behavioural changes to reduce food waste;
- ii. Provide a food waste management plan;
- iii. Implement the plan with measurable targets;
- iv. Encourage the building management to conduct in-house waste audit and improve the performance in accordance with the results;
- v. Promote and adopt recipes that make use of food trimmings;
- vi. Engage in Government's/ non-governmental organisations' food waste reduction activities;
- vii. Support the Food Wise Hong Kong Campaign and similar initiatives;
- viii. Donate surplus food; and
- ix. Others to be proposed by the Applicant.

Assessment

Criteria

1 credit can be achieved for adopting each of the above listed practices.

The Applicant shall sign the Food Wise Charter and contribute to reduce food waste following the good practice guide as per Hong Kong Food Wise Campaign. The implementation record for the past 12 months at the time of submission shall also be provided.

Currently the Food Wise Hong Kong Campaign has issued good practice guides covering market, F&B, hotel, residential, shopping mall and school. The good practices for other building types shall be made reference with these existing practice guides. Only office type buildings are excluded from the assessment.

Documentation

The Applicant shall provide the following documents:

- i. Certified true copy of the signed Food Wise Charter;
- ii. Summary table listing the implementation of good practices with justification and reference;
- iii. Location plan to indicate the facilities/ posters; and

- iv. Record photographs.

Background

Hong Kong faces an imminent waste problem. In 2013, over 3,600 tonnes of food waste, accounting for about 38 percent of municipal solid waste, were disposed of at landfills every day. While the Government has been adopting a multi-pronged approach to tackle the problem, more action is required and active participation from the community is also needed to alleviate the waste problem.

To take forward the Chief Executive's pledge to promote food waste reduction, the Environment Bureau announced on 3 December 2012 the setting up of the Food Wise Hong Kong Steering Committee. The Steering Committee is tasked to formulate and oversee the implementation strategies of the Food Wise Hong Kong Campaign, so as to reduce food waste to be disposed of at landfills. More information on the Food Wise Hong Kong Campaign, Food Wise Charter and good practice guides can be found in EPD [1] and Food Wise Hong Kong Campaign website [2].

1 Environmental Protection Department. Food Waste Challenge. Retrieved 1 March 2016, from http://www.epd.gov.hk/epd/english/environmentinhk/waste/prob_solutions/food_waste_challenge.html

2 Food Wise Hong Kong Campaign. Retrieved 1 March 2016, from <http://www.foodwisehk.gov.hk/en/index.php>

	MWA 8	Action to Waste Reduction
Exclusion		None.
Objective		To advocate the continual improvement for waste management.
Credit Attainable		7
Credit Requirement		<p>a) Implementation of the Waste Management Plan</p> <p>1 credit for demonstrating the implementation of the waste management plan.</p> <p>b) Waste and Recycling Records</p> <p>Maximum 2 credits for the collection of the waste and recycling records:</p> <ul style="list-style-type: none">i. 1 credit for past 6 months; andii. 2 credits for past 12 months. <p>c) Continual Improvement</p> <p>Maximum 3 credits for providing new targets on the following, based on the performance of the past 12 months:</p> <ul style="list-style-type: none">i. Waste recycle items;ii. Recycle rate; andiii. Reduction rate. <p>d) Dissemination and Feedback</p> <p>1 credit for disseminating the waste reduction and recycle target to building users and providing feedback channels.</p>
Assessment	<u>Criteria</u>	<p>a) Implementation of the Waste Management Plan</p> <p>The Applicant shall evaluate the implementation of the waste management plan stipulated in section MWA 4. It is not necessary to complete all targeted actions. Regular review and recommendation for continual improvement are required.</p> <p>b) Collection of the Waste and Recycling Records</p> <p>The Applicant shall document the waste and recycling records.</p> <p>c) Continual Improvement</p> <p>1 credit can be achieved for the provision of each listed target.</p>

The Applicant shall provide new targets to demonstrate a continual improvement on performance of waste recycling/ reduction.

d) Dissemination and Feedback

The Applicant shall disseminate the targets on waste reduction and recycling to building users and provide feedback channels.

Documentation

The Applicant shall provide the following documents:

a) Implementation of the Waste Management Plan

- i. Documents substantiating the compliance (e.g. records, record photographs etc.); and
- ii. Regular review and recommendation for continual improvement.

b) Collection of the Waste and Recycling Records

- i. All waste and recycle records for past 6 or 12 months.

c) Continual Improvement

- i. Undertaking letter from Building Owner/ Building Management Company for the commitment of improving performance on waste recycles, recycle rates and reduction rates.

d) Dissemination and Feedback

- i. Poster/ notice demonstrating that the targets on waste reduction and recycling are disseminated to building users;
- ii. Feedback method; and
- iii. Feedback records (if any).

Background

See MWA 4.

	MWA 9	Achievement of Wastewi\$e Certificate
Exclusion		None.
Objective		<p>To encourage business/ organisations adopting measures to achieve waste reduction.</p> <p>To recognise the business/ organisations attaining specified environmental requirements and achieving a self-improvement goals.</p> <p>To benchmark the participating business/ organisations within the same sectors.</p>
Credit Attainable	1	
Credit Requirement		1 credit for obtaining the Wastewi\$e Certificate of Hong Kong Green Organisation Certification (HKGOC).
Assessment		<p><u>Criteria</u></p> <p>The Applicant shall provide documentation to demonstrate that the Wastewi\$e Certificate in “Good Level” or “Excellence Level” is obtained in the past 12 months or valid at the time of submission.</p> <p><u>Documentation</u></p> <p>The Applicant shall provide the following document:</p> <ul style="list-style-type: none">i. True copy of HKGOC Wastewi\$e Certificate.
Background		HKGOC is led by the Environmental Campaign Committee alongside the EPD in conjunction with the other nine organisations. HKGOC aims to encourage businesses and organisations to adopt environmental practices, benchmark green organisations with achievement in green management, and recognise and acknowledge the efforts of and commitments to the environment [1].

1 Environmental Campaign Committee (ECC). The Hong Kong Awards for Environmental Excellence. Retrieved 1 March 2016, from <http://www.hkaee.gov.hk/eindex.html>

	MWA 10 Educational and Promotional Programme
Exclusion	None.
Objective	To encourage behavioural change through educational and promotional programme.
Credit Attainable	2
Credit Requirement	2 credits for Building Owner/ Building Management Company to educated and advocate the behavioural change of building users in respect of Materials and Waste Aspects by: <ul style="list-style-type: none">i. Organising educational seminar/ promotion campaign; orii. Promoting or participating in Hong Kong Green Building Week organised by Construction Industry Council (CIC) and the Hong Kong Green Building Council Limited (HKGBC).
Assessment	<p><u>Criteria</u></p> <p>Credits can be achieved when the Applicant organises at least one of the activities within the 1 year period at the time of submission.</p> <p><u>Documentation</u></p> <p>The Applicant shall provide the following documents:</p> <ul style="list-style-type: none">i. Promotional materials such as posters, notice of the programme; andii. Record photographs.
Background	BEAM Plus encourages the Applicant to transfer knowledge through seminar or exhibition for building users, so that they can acquire necessary knowledge, shape the standings and behaviour.

	MWA 11 Innovative Techniques/ Performance Enhancements
Exclusion	None.
Objective	To encourage adoption of practices, new technologies and techniques in respect of Materials and Waste Aspects that have yet to find application in Hong Kong or provide for performance enhancements over and above stated performance criteria in BEAM Plus for Existing Buildings.
Credit Attainable	2 Bonus
Credit Requirement	<p>a) Innovative Techniques</p> <p>1 Bonus credit for applying innovative technique in respect of Materials and Waste Aspects that will improve the performance of the building.</p> <p>b) Performance Enhancements</p> <p>1 Bonus credit for building with exemplary performance over and above the criteria identified in Materials and Waste Aspects of the BEAM Plus for Existing Buildings.</p>
Assessment	<p><u>Criteria</u></p> <p>a) Innovative Techniques</p> <p>The onus will be on the Applicant to present the evidence of the application of new practices, technologies and techniques and the associated environmental benefits.</p> <p>The Applicant shall provide a submission which identifies the intent of the proposed innovative technique and quantifies environmental benefits through its application. The Assessor shall refer the submission to BSL TRC who will consider each application on its merit. The Bonus credit shall be granted at the sole discretion of BSL TRC.</p> <p>b) Performance Enhancements</p> <p>The onus will be on the Applicant to present evidence of the performance compared to the existing criteria.</p> <p>The Applicant shall provide a submission which identifies the proposed application and quantifies its exemplary performance over and above the criteria identified in Materials and Waste Aspects of this Manual. The Assessor shall refer the submission to BSL TRC who will consider each application on its merit. The Bonus credit shall be granted at the sole discretion of BSL TRC.</p> <p><u>Documentation</u></p> <p>The Applicant shall provide the following documents:</p>

a) Innovative Techniques

- i. Narrative to indicate the innovative techniques;
- ii. Calculation quantifying environmental benefits through application of proposed innovation technique; and
- iii. Record photographs.

b) Performance Enhancements

- i. Calculation quantifying exemplary performance over and above the criteria identified in Materials and Waste Aspects of the BEAM Plus for Existing Buildings through proposed application; and
- ii. Record photographs.

Background

BEAM Plus encourages the Applicant to incorporate innovative techniques and green practices into their building so as to realise the associated environmental benefits, which related to sustainable living, improved comfort, lower water consumption, reduced pollution.

- 5 Energy Use**
 - 5.1 Energy management and analysis**
 - 5.2 Energy efficient practices and measures**
 - 5.3 Energy efficient improvement**
 - 5.4 Innovations and additions**

Background

An objective of BEAM Plus is to encourage thorough evaluation of the performance of building and services system designs, and greater investments into measures that will help to improve the energy performance of existing buildings, so as to reduce energy consumption and the associated environmental impacts, and to reduce summer peak electricity demand.

The assessment of the building and engineering systems is performance based as far as possible, but credits are also given for features which have proven to contribute to energy efficiency and conservation. Credits are given where management, operation and maintenance practices are such as to seek continual improvements in energy performance.

- 5.1 Energy management and analysis**
 - EU 1 Energy Management**
 - EU 2 Energy Analysis**

Background

The management and operation of a building and the way that the tenants use the building can have a major impact on its energy consumption. Energy management should be fully integrated into the organisation's management systems; have monitoring and targeting systems in place based on sub-metering of the energy used; include regular reports and reviews of the monitored data; set targets for energy efficiency improvements supported by an action plan.

- 5.2 Energy efficient practices and measures**
 - EU 3 Energy Efficient Practices and Measures**

Background

One of the major reasons why buildings fail to meet performance expectations is the lack of adequate commissioning of systems and equipment, and the inadequacy of operations and maintenance, commissioning data, and as-installed equipment data and drawings. Successful commissioning shall help systems to properly operate and maintain throughout their life cycle.

- 5.3 Energy efficient improvement**
 - EU 4 Energy Benchmarking**

Background

To further encourage energy efficiency and improvement, this section requires not only benchmarking the project building's energy performance against comparable buildings with similar space use, occupancy and operations, but also to establish saving targets and apply measures for building's continual improvement in energy performance.

5.4 Innovations and additions

EU 5 Achievement of Energywise and Carbon Reduction Certificate

EU 6 Educational and Promotional Programme

EU 7 Innovative Techniques/ Performance Enhancements

Background

It is encouraged to drive behavioural change through educational and promotional programme. This section also allows the applicant to submit for consideration for the award of bonus credits on any innovative techniques or performance enhancements which the applicant deems to provide environmental benefits additional to those already covered in this Manual.

	EU 1	Energy Management
Exclusion		None.
Objective		To encourage high level management to involve in the improvement of energy efficiency and conservation.
Credit Attainable	4	
Credit Requirement		a) Energy Management Plan 1 credit for providing an endorsed energy management policy. 1 credit for providing energy management plan with objective and targets. 1 credit for demonstrating that the plan is endorsed by top management of Building Owner/ Building Management Company. b) Appointment of Energy Warden 1 credit for appointing an Energy Warden in the Building Management Company.
Assessment		<u>Criteria</u> a) Energy Management Plan The Applicant shall provide an energy management policy endorsed by the top management of Building Owner/ Building Management Company to demonstrate the commitment. In addition, an energy management plan with objective and targets and/or the plan being endorsed by top management of Building Owner/ Building Management Company are critical for the success of effective implementation of energy management. b) Appointment of Energy Warden The Applicant shall provide evidence of appointment of at least one Energy Warden as key member in the building management team for the building. The scope of work for the energy warden shall also be indicated. The energy warden shall meet all of the following requirements: i. An employee of the Building Management Company; and ii. Participated in more than 80% of the property management meetings. <u>Documentation</u> The Applicant shall provide the following documents:

a) Energy Management Plan

- i. An energy management policy endorsed by the top management of Building Owner/ Building Management Company;
- ii. An energy management plan; and
- iii. Energy management records (e.g. photographs/ poster showing promotion of energy management practice for the premises, receipt showing equipment upgrade) for the past 2 years demonstrating that the top management endorsed the implementation of energy management plan.

b) Appointment of Energy Warden

- i. Scope of the work for the energy warden(s);
- ii. Resume of energy warden(s); and
- iii. Meeting minutes showing the attendance and/or action items by the appointed energy warden.

Background

Commitment from top management is crucial for building's energy conservation. The implementation of the Energy Management Plan can be achieved with the support from the top management. BEAM Plus encourages high level management to involve in the improvement of energy efficiency and conservation.

An energy management team should be established to execute energy management activities, and a senior staff member as energy warden should also be appointed as the team leader responsible for the overall coordination of the program.

After setting up the energy management policy and an energy management team, a management plan should then be formulated. The management plan will be a guide on how the team to improve energy efficiency. It should include the specific reduction targets of energy and cost, as well as the organisation of management resources.

	EU 2	Energy Analysis
Exclusion		For part a only, Buildings to compulsorily comply with Building Energy Code (BEC) 2012 or later version.
Objective		To enable and encourage building operators to measure, record, monitor and analyse energy performance of the building's engineering systems, particularly concerning energy use.
Credit Attainable	7	
Credit Requirement		<p>a) Data Collection Facilities</p> <p>Maximum 3 credits for providing sub-metering systems for each of the following electrical loads where applicable:</p> <ul style="list-style-type: none">i. Chiller plant/ chiller plant with cooling tower (if any);ii. Air-conditioning units;iii. Lighting and small power; andiv. Lift & escalator (if any). <p>b) Data Collection Record</p> <p>1 credit for providing total building energy consumption data record of at least 2 years for building services under the control of Building Owner/ Building Management Company.</p> <p>c) Energy Audit Report</p> <p>1 credit for conducting energy audit in accordance with the Buildings Energy Efficiency Ordinance (Cap 610) requirement for existing buildings.</p> <p>1 credit for filling up Table (II) to Table (VIII) under the Template 1 on Additional Information to Executive Summary of Energy Audit Report.</p> <p>d) Carbon Audit Report</p> <p>1 credit for conducting carbon audit in accordance with the requirements as stipulated in the guideline issued by the Authority.</p>
Assessment		<p><u>Criteria</u></p> <p>a) Data Collection Facilities</p> <p>1 credit can be achieved for the provision of sub-metering system for each of the listed electrical loads.</p> <p>The Applicant shall provide the description of the sub-metering system and data record sample, in order to demonstrate that electricity use pattern and/or operation data for the major systems can be adequately monitored for audit purposes.</p>

Metering shall provide record at intervals of one hour or less and capable to record both consumption and demand (i.e. kW, kVA, kWh). The whole facilities (i.e. meters, BMS, computer) are capable to store all meter data for at least 24 months.

b) Data Collection Record

The Applicant shall provide record of total building energy consumption data for building services under the control of the building management in order to demonstrate that proper record keeping practice has been implemented. It is good practice to have energy consumption data record separately for different system types of major electrical load. However this is not an assessment criterion for this credit. One electrical meter that records several different system types of major electrical load can be accepted in this credit.

c) Energy Audit Report

The Applicant shall provide an energy audit report in accordance with the Buildings Energy Efficiency Ordinance (Cap 610) requirement for existing buildings and/or filled Table (II) to Table (VIII) in Template 1 [1] on Additional Information to Executive Summary of Energy Audit Report. Relevant calculation and/or measured data as supporting to the filled data in Template 1 shall also be provided. The report shall be endorsed by a Registered Energy Assessor (REA).

d) Carbon Audit Report

The Applicant shall provide a carbon audit or Greenhouse Gas (GHG) Emissions audit report in accordance with the latest version Guidelines to Account for and Report on Greenhouse Gas Emissions and Removals for Buildings (Commercial, Residential or Intentional Purposes) in Hong Kong, issued by Electrical & Mechanical Services Department (EMSD) and Environmental Protection Department (EPD). The report shall be endorsed by a Qualified Service Provider (QSP).

Documentation

The Applicant shall provide the following documents:

a) Data Collection Facilities

- i. Drawings, as-built electrical schematic;
- ii. Manufacturer technical specification, technical data sheets for meter, transducers, and sensors;
- iii. Operation manual;
- iv. Testing and commissioning records;
- v. Data record samples; and

1 Template for Additional Information (adoption on voluntary basis, refer to TG-EAC clause 8.5), Energy Audit Code (EAC) 2012 Edition

- vi. Record photographs.
- b) Data Collection Record
- i. Energy consumption data record for total building energy loads (e.g. electricity bills, BMS log data, metering log data, manually recorded data); and
 - ii. Spreadsheet summarising the energy consumption data according to major systems with monthly bar chart plotted.
- c) Energy Audit Report
- i. An energy audit report endorsed by REA;
 - ii. Filled Table (II) to Table (VIII) in Template 1 on Additional Information to Executive Summary of Energy Audit Report; and
 - iii. Calculation and/or measured data as supporting to the data filled in the template.
- d) Carbon Audit Report
- i. A carbon audit or GHG emission audit report endorsed by a QSP.

Background

Surveys of a large number of buildings in Hong Kong [2] revealed that buildings are in general insufficiently equipped with measuring and monitoring devices for measurement of energy performance. This makes it particularly difficult to improve the energy efficiency of buildings and major plant, such as the central chiller plant.

Opportunities for reducing energy consumption can be identified only if it is possible to monitor performance of the systems. Good monitoring systems can allow better control of part load performance, not only improving efficiency, but also improving the control of the building's thermal comfort conditions. Plant control can be altered and the results monitored to show how energy consumption changes. Unseen plant faults, which are not evident during routine maintenance, can be identified from analysis of performance trend data. Control problems can be detected and control strategies improved to match the building demand.

The cost of instrumentation is not significant when compared with installation costs and the accuracy should be such as to provide meaningful readings. The payback on improved performance can be very high taking into account the reduction in electricity consumption and demand charges resulting from more efficient plant operation.

Similar to the function of financial audit to a company, energy audit needs to be conducted at regular intervals to provide the building management with a clear picture about the types and quantities of energy being used in a building and for what purposes, whether energy

2 Yik F W H, Chiu T W. Measuring instruments in chiller plants and uncertainties in performance evaluation. Transactions, The Hong Kong Institution of Engineers, 5(3) 95-99.

has been used efficiently and effectively, and the room for improvements.

	EU 3 Energy Efficient Practices and Measures
Exclusion	None.
Objective	To encourage energy management practices and the implementation of energy efficient measures to improve building energy performance.
Credit Attainable	25
Credit Requirement	<p>a) Energy Efficient Practices</p> <p>Maximum 5 credits for implementing the following energy saving practices:</p> <ol style="list-style-type: none">i. Turn on equipment/ systems based on operational hours of buildings. (Operation schedule);ii. Avoid pre-cooling. Switch on centralised A/C system not more than 30 minutes in advance in the morning. (Operation schedules of AC and building);iii. For premises where the A/C systems are provided with heaters, avoid operating the heaters when the outdoor air temperature is above 20°C. (Operation schedule and/or print screen of BMS showing temperature setting);iv. Turn off lighting if it is not needed. (Operation schedule and/or photograph showing timer setting);v. Cut down number of lamps/ luminaires in area over-lit (over CIBSE recommendation) by artificial lighting and in perimeter area sufficiently lit by natural daylight. (Photographs showing lux measurement and de-lamping);vi. Encourage using the stairs (for one or two floors up or down) rather than taking the lift. (Site photograph showing notice/poster to encourage tenant/ building user);vii. Shut down some of the lifts and escalators during non-peak hours. (Operation schedule); andviii. Arrange routine cleaning schedule for light diffusers, globes and reflectors to ensure light output efficiency (Cleaning schedule). <p>b) Energy Efficient Measures</p> <p>Maximum 20 credits for demonstrating the following upgrades in the past 3 years:</p> <ol style="list-style-type: none">i. 8 credits for replacing at least 30% by total cooling capacity serving the building from air-cooled chiller to either water-cooled chiller or oil free variable speed air/ water cooled chiller;ii. 6 credits for at least 50% by total cooling capacity serving the building are high efficiency chiller (>15% higher than BEC 2012's COP at full load in the same category);iii. 6 credits for at least 80% by total cooling capacity of all VRF are high efficiency VRF (>15% higher than BEC 2012's COP at full load in the same category);

- iv. 4 credits for at least 50% of total fresh air flow rate to the building are controlled by CO₂ sensors;
- v. 3 credits for at least 50% of air-conditioned areas not frequently used (e.g. meeting room, conference room, etc.) are served by air-conditioning with motion sensors controlling its operation;
- vi. 4 credits for at least 30% of total fresh air flow rate to the building are pre-treated by heat recovery system;
- vii. 4 credits for at least 30% of air-conditioned areas are served by enthalpy controlled free cooling;
- viii. 4 credits for at least 50% of total supply air flow rate of all PAU/AHU are supplied by VSD fans;
- ix. 4 credits for at least 50% of total supply air flow rate of all FCU are supplied by VSD fans;
- x. 4 credits for at least 50% of total chilled water flow rate of all chilled water pumps are VSD driven;
- xi. 4 credits for at least 50% of total condensing water flow rate of all condensing water pumps are VSD driven;
- xii. 3 credits for having "automatic tube cleaning systems" on all water-cooled chillers;
- xiii. 4 credits for electronic ballasts for all fluorescent lamps;
- xiv. 4 credits for replacing >80% of T8 to T5;
- xv. 4 credits for at least 30% of all areas are served by LED lighting;
- xvi. 3 credits for at least 30% of all public areas such as corridors, toilets, etc. are served by lighting with motion/ occupancy sensor controls;
- xvii. 3 credits for at least 30% of all areas accessible to daylight are served by lighting with dimming controls to adjust lighting level to suit the space's need;
- xviii. 2 credits for having separate lighting controls for the window perimeter and that for the interior. Lighting at the window perimeter can be turned down or off on a sunny day;
- xix. 5 credits for at least 50% of all window areas with direct access to daylight are applied with solar window film (i.e. windows that are heavily shaded or not having a direct view to the sky are excluded);
- xx. 3 credits for at least 30% of all lift motor power are re-generative lift;
- xxi. 1 credit for at least 30% of all lift motor power are Variable Voltage Variable Frequency (VVVF) drives and/or direct current motor controlled by solid-state elements for lifts;
- xxii. 1 credit for at least 30% of all escalator motor power are VVVF drive systems and high gear systems for escalators;
- xxiii. 1 credit for at least 30% of all escalator motor power are controlled by optical sensors to allow escalators to be stopped or slowed down when there are no users;
- xxiv. 1 credit for at least 50% of all lift (by quantity) have automatic switch off lighting and ventilation fan inside the lift car when the lift is in standby/ idle mode;
- xxv. 2 credits for adding harmonics filter to reduce total harmonics distortion (THD) in electricity distribution system;
- xxvi. 1 credit for having heat pump pre-heating at least 50% of domestic hot water (by quantity of sanitary fitting);

- xxvii. 1 credit for having thermostat on/off and/or speed control for exhaust fans serving at least 50% of plant rooms area but exclude those rooms that require continuous exhaust due to health and safety issues (e.g. chemical storage room, refuse storage room); and
- xxviii. 1 credit for openable windows for mixed mode/ natural ventilation.

Assessment

Criteria

a) Energy Efficient Practices

1 credit can be achieved for implementing each of the above listed energy saving practices.

The Applicant shall provide a short report endorsed by top management of Building Owner/ Building Management Company with the following elements as a minimum:

- i. Brief description of how the energy saving practices are implemented; and
- ii. Supporting photographs and/or documentation, such as equipment operation schedule. Suggested supporting is included in the bracket stated in the credit requirement.

b) Energy Efficient Measures

The Applicant shall provide a short report endorsed by top management of Building Owner/ Building Management Company with the following elements as a minimum:

- i. A table showing the energy saving measures installed and the date of installation; and
- ii. Supporting photographs and documentation, such as contract, agreement, receipt to demonstrate the provision of measures and the date of installation.

Documentation

The Applicant shall provide the following documents:

a) Energy Efficient Practices and b) Energy Efficient Measures

- i. A short report on the narrative of the practices and measures.

Other Energy Efficient Features

For energy efficient practices and measures not listed above, the Applicant can submit the proposed practices and measures for BSL TRC consideration.

The Applicant shall submit the documentation stated in the requirement. Number of credit(s) to be achieved is subject to BSL TRC's final approval based on the scale of practices and measures

and the energy impact to the building and/or the innovation of the proposed features.

EU 4 Energy Benchmarking

- Exclusion** For part a) only, building types not covered by EMSD Benchmarking Tool.
- Objective** To reduce the consumption of non-renewable energy resources and the consequent harmful emissions of carbon dioxide (CO₂) to the atmosphere and encourage energy conservation and methods to reduce peak electricity demand.
- Credit Attainable** 11
- Credit Requirement** a) Benchmarking

For applicable types of buildings:

Credit(s) can be achieved based on the benchmarking results obtained from EMSD Benchmarking Tool.

No. of Credit(s)	1	2	3
Percentile	50 th	40 th	30 th

Alternative for Commercial Buildings:

Credit(s) can be achieved based on the label obtained from HKGBC Benchmarking & Energy Saving Tool – Office Buildings (HK BESTOF).

No. of Credit(s)	1	2	3
HK BESTOF	Green	Bronze	Silver or above

b) Self-Improvement

Credits can be achieved based on the reduction percentage by comparing electricity bill/ metering data in the category determined in part a) Benchmarking. (Baseline year can be any year in the past 5 years).

- i. For buildings ranked at the 40th percentile or below under EMSD Benchmarking Tool/ "Bronze" or below label obtained from HK BESTOF:

No. of Credits	2	3	4	5	6	7	8
Annual energy use reduction	2%	3%	4%	5%	6%	7%	8%

- ii. For buildings ranked at the 30th percentile or above under EMSD Benchmarking Tool or "Silver"/ "Gold"/ "Platinum" label obtained from HK BESTOF:

No. of Credits	2	3	4	5	6	7	8
Annual energy use reduction	1%	1.5%	2%	2.5%	3%	3.5%	4%

Assessment

Criteria

a) Benchmarking

The number of credit(s) to be achieved shall be determined by referencing to the percentage cumulative percentage obtained from EMSD Benchmarking Tool [1] or label obtained from HK BESTOF or equivalent. The data used for the benchmarking shall be within the past 2nd to 5th year at the time of submission.

b) Self-Improvement

The number of credits to be achieved shall be determined by referencing to the reduction percentage using the electricity bill/ metering data in the category determined in part a) Benchmarking. Data in the past 12 months at the time of submission shall be used to compare with the Baseline year. Baseline year can be any year in the past 5 years.

Documentation

The Applicant shall provide the following documents:

a) Benchmarking

- i. Screenshots of the input for the benchmarking and relevant supporting documents; and
- ii. Result obtained from EMSD/ HK BESTOF.

b) Self-Improvement

- i. Spreadsheet showing the energy consumption extracted from the bills/ metering data and the calculation showing the percentage of reduction.

Background

BEAM Plus encourages energy-efficient buildings and reduction in maximum electricity demand. To further encourage energy efficiency and improvement, this section requires not only benchmarking the project building's energy performance against comparable buildings with similar space use, occupancy and operations, but also to establish

1 Electrical and Mechanical Services Department. Energy Consumption Indicators & Benchmarking Tools. Retrieved 1 March 2016, from <http://www.emsd.gov.hk/emsd/eng/pee/ecib.shtml>

saving targets for building's continual improvement in energy performance.

	EU 5	Achievement of Energywise and Carbon Reduction Certificate
Exclusion	None.	
Objective	To encourage participants to adopt measures to save energy within their establishments and recognise the energy saving efforts of those companies and organisations.	
Credit Attainable	2	
Credit Requirement	Maximum 2 credits for obtaining the following valid Environmental Certificate of Hong Kong Green Organisation Certification (HKGOC): i. Energywise Certificate; and ii. Carbon Reduction Certificate.	
Assessment	<u>Criteria</u> 1 credit can be achieved for obtaining each listed certificate. The Applicant shall provide documentation to demonstrate that the Energywise Certificate in “Good Level” or “Excellence Level” or Carbon Reduction Certificate are obtained in the past 12 months or valid at the time of submission. <u>Documentation</u> The Applicant shall provide the following document: i. True copy of HKGOC Certificate(s).	
Background	HKGOC is led by the Environmental Campaign Committee alongside the EPD in conjunction with the other nine organisations. HKGOC aims to encourage businesses and organisations to adopt environmental practices, benchmark green organisations with achievement in green management, and recognise and acknowledge the efforts of and commitments to the environment [1].	

1 Environmental Campaign Committee (ECC). The Hong Kong Awards for Environmental Excellence. Retrieved 1 March 2016, from <http://www.hkaee.gov.hk/eindex.html>

	EU 6	Educational and Promotional Programme
Exclusion		None.
Objective		To encourage behavioural change through educational and promotional programme.
Credit Attainable		2
Credit Requirement		2 credits for Building Owner/ Building Management Company to educate and advocate the behavioural change of building users in respect of Energy Use by: <ul style="list-style-type: none">i. Organising educational seminar/ promotion campaign; orii. Promoting or participating in Hong Kong Green Building Week organised by Construction Industry Council (CIC) and the Hong Kong Green Building Council Limited (HKGBC).
Assessment		<u>Criteria</u> Credits can be achieved when the Applicant organises at least one of the activities within the 1 year period at the time of submission. <u>Documentation</u> The Applicant shall provide the following documents: <ul style="list-style-type: none">i. Promotional materials such as posters, notice of the programme; andii. Record photographs.
Background		BEAM Plus encourages the Applicant to transfer knowledge through seminar or exhibition for building users, so that they can acquire necessary knowledge, shape the standings and behaviour.

	EU 7	Innovative Techniques/ Performance Enhancements
Exclusion	None.	
Objective		To encourage adoption of practices, new technologies and techniques in respect of Energy Use that have yet to find application in Hong Kong or provide for performance enhancements over and above stated performance criteria in BEAM Plus for Existing Buildings.
Credit Attainable	2 Bonus	
Credit Requirement	a) Innovative Techniques	<p>1 Bonus credit for applying innovation technique in respect of Energy Use that will improve the performance of the building.</p> <p>b) Performance Enhancements</p> <p>1 Bonus credit for building with exemplary performance over and above the criteria identified in Energy Use of the BEAM Plus for Existing Buildings.</p>
Assessment	<u>Criteria</u>	<p>a) Innovative Techniques</p> <p>The onus will be on the Applicant to present the evidence of the application of new practices, technologies and techniques and the associated environmental benefits.</p> <p>The Applicant shall provide a submission which identifies the intent of the proposed innovative technique and quantifies environmental benefits through its application. The Assessor shall refer the submission to BSL TRC who will consider each application on its merit. The Bonus credit shall be granted at the sole discretion of BSL TRC.</p> <p>b) Performance Enhancements</p> <p>The onus will be on the Applicant to present evidence of the performance compared to the existing criteria.</p> <p>The Applicant shall provide a submission which identifies the proposed application and quantifies its exemplary performance over and above the criteria identified in Energy Use of the BEAM Plus for Existing Buildings. The Assessor shall refer the submission to BSL TRC who will consider each application on its merit. The Bonus credit shall be granted at the sole discretion of BSL TRC.</p>
	<u>Documentation</u>	<p>The Applicant shall provide the following documents:</p>

a) Innovative Techniques

- i. Narrative to indicate the innovative techniques;
- ii. Calculation quantifying environmental benefits through application of proposed innovation technique; and
- iii. Record photographs.

b) Performance Enhancements

- i. Calculation quantifying exemplary performance over and above the criteria identified in Energy Use of the BEAM Plus for Existing Buildings through proposed application; and
- ii. Record photographs.

Background

BEAM Plus encourages the Applicant to incorporate innovative techniques and green practices into their building so as to realise the associated environmental benefits, which related to sustainable living, improved comfort, lower water consumption, reduced pollution.

- 6 Water Use**
 - 6.1 Water conservation**
 - 6.2 Water management**
 - 6.3 Effluent**
 - 6.4 Innovations and additions**

Background

Water is known to be in scarce supply in many parts of the world. Globally, water conservation is already a major issue. Hong Kong has long enjoyed a reliable and economic supply of most of its fresh water needs from the Mainland.

However, with increased industrialisation of Guangdong Province there is likely to be greater competition for water supply, meaning that water conservation may become a significant issue for Hong Kong in the future. Hong Kong should look into ways to improve the utilisation and conservation of water resources.

- 6.1 Water conservation**
 - WU 1 Water Conservation Plan**
 - WU 2 Water Efficient Devices**
 - WU 3 Cooling Tower Water**
 - WU 4 Water Recycling**
 - WU 5 Water Saving Performance**

Background

Despite the continued decline in industrial consumption there is an annual trend of rising consumption due to increasing domestic consumption. Based on projected population growth for the period, the domestic and service uses, being the key components of our fresh water consumption, are expected to increase. Industrial use, for the same period, is expected to drop because of further decline in water intensive industries. Wider use of fresh water in water-cooled air-conditioning systems (WACS) will contribute to consumption by the non-domestic sector.

Raw water from the Dongjiang River in Guangdong continues to be Hong Kong's main source of supply and makes up about 70-80 percent of Hong Kong's needs. Hong Kong has few options to reduce dependency on the Mainland, where water resources are becoming increasingly limited. There is opportunity to reduce potable water use through better design, management and user awareness. There are also opportunities to recycle used water and rain water in order to reduce the use of potable water. Additional benefits of potable water conservation are reduced energy use for transport and the cost of treatment of raw water.

- 6.2 Water management**
- WU 6 Water Quality Survey**
 - WU 7 Fresh Water Plumbing System Maintenance**
 - WU 8 Water Metering**
 - WU 9 Water Leakage Monitoring**
 - WU 10 Water Audit**
 - WU 11 Twin-tank System**
- Background** A comprehensive water management program can help to reduce water consumption and ensure the quality of water supplied. It is encouraged to regularly inspect the plumbing system, keep tracking the water consumption, promote and implement water conservation measures and practices.
- 6.3 Effluent**
- WU 12 Water Efficient Flushing System**
 - WU 13 Flushing Water Quality**
- Background** Whilst 80% of users in Hong Kong are supplied with seawater for flushing purposes there are environmental impacts associated with the treatment and delivery of seawater, and the load imposed on municipal sewage treatment plants. Measures taken to reduce the effluent discharge can have significant environmental benefits.
- 6.4 Innovations and additions**
- WU 14 Educational and Promotional Programme**
 - WU 15 Innovative Techniques/ Performance Enhancements**
- Background** It is encouraged to drive behavioural change through educational and promotional programme. This section also allows the applicant to submit for consideration for the award of bonus credits on any innovative techniques or performance enhancements which the applicant deems to provide environmental benefits additional to those already covered in this Manual.

	WU 1	Water Conservation Plan
Exclusion	None.	
Objective	To formulate short-term and long-term strategies in conserving fresh water.	
Credit Attainable	3	
Credit Requirement	1 credit for providing an endorsed water conservation policy. 1 credit for providing a water conservation plan with objectives, targets and strategies in reduction of fresh water consumption. 1 credit for demonstrating that the water conservation plan is endorsed by top management.	
Assessment	<u>Criteria</u> The Applicant shall provide the water conservation policy and plan endorsed by top management of Building Owner/ Building Management Company to demonstrate the commitment. The water conservation plan shall include the following as minimum: i. Objectives; ii. The short-term (3 years) and long-term (5 years) water saving targets; iii. Strategies in reducing the fresh water consumption, including those already completed, those in progress and those for future implementation; iv. Monitoring of fresh water consumption; v. Frequency of water audit; and vi. Feedback channels. The plan shall be endorsed by top management of Building Owner/ Building Management Company and reviewed in regular basis. The assessment will seek to establish if mechanisms are in place to effectively limit wastage of water, and to set targets for water saving with an appropriate budget for upgrading the installations. <u>Documentation</u> The Applicant shall provide the following documents: i. Endorsed water conservation policy; and ii. Endorsed water conservation plan.	
Background	Fresh water is a precious natural resource. Supply of clean and safe drinking water is a problem in many parts of the world. Every society shares the global responsibility to promote sustainable use of fresh	

water resources on the Earth. A water conservation plan can provide opportunities for Building Owners/ Building Management Company in setting water saving targets and implement water conservation measures to reduce the fresh water use.

	WU 2	Water Efficient Devices
Exclusion		Water devices installed at tenants' areas may be excluded from the assessment.
Objective		To reduce the consumption of fresh water through the application of water saving devices that have proven performance and reliability.
Credit Attainable	9	
Credit Requirement		Maximum 9 credits for installing the listed water efficient devices. <ul style="list-style-type: none">i. 1 credit for automatic infrared sensor water taps;ii. 2 credits for 80% of all water taps are certified under Voluntary Water Efficiency Labelling Scheme (WELS) Grade 2 or above, or fitted with flow controllers of WELS Grade 2 or above; or 4 credits for 80% of all water taps are certified under WELS Grade 1 or fitted with flow controllers of WELS Grade 1;iii. 2 credits for 80% of all showers for bathing are certified under WELS Grade 2 or above, or fitted with flow controllers of WELS Grade 2 or above; or 4 credits for 80% of all showers for bathing are certified under WELS Grade 1 or fitted with flow controllers of WELS Grade 1.
Assessment		<u>Criteria</u> The Applicant shall provide evidence to demonstrate that automatic infrared sensor water taps are installed, and at least 80% of water taps and shower heads for bathing (if any) installed at the locations under the control of the Applicant are with WELS Grade 2 or above. <u>Documentation</u> The Applicant shall provide the following documents: <ul style="list-style-type: none">i. Schedule of water taps and shower heads for bathing installed at the locations under the control of the Applicant;ii. Manufacturer specification or catalogues of water taps and shower heads for bathing;iii. Registry of the WELS products extracted from Water Supplies Department (WSD)'s website or registration certificate of WELS issued by WSD showing the WELS Grade of the water taps and shower for bathing; andiv. On-site photographs of the water fixtures.

Background

Hong Kong differs from most other places in the world in that the majority of buildings have saltwater for flushing rather than using fresh water. Therefore the scope for fresh water reductions may be more limited here than elsewhere. Neither the quantification of water use nor the potential for savings has been addressed in local research literature. Nevertheless, evidence from other countries suggests that reductions in water use may be achieved through the use of water efficient devices and automatic controls.

The WELS is a water conservation initiative of the HKSAR Government [1]. WELS intends to cover the common types of plumbing fixtures and water-consuming appliances. Products participating in WELS will incorporate a water efficiency label that will tell consumers the level of water consumption and water efficiency to help consumers choose water efficient products for water conservation. Currently 5 products are included in the WELS, i.e. showers for bathing, water taps, washing machines, urinal equipment and flow controllers.

1 Water Supplies Department. Voluntary Water Efficiency Labelling Scheme. Retrieved 1 March 2016, from http://www.wsd.gov.hk/en/plumbing_and_engineering/wels/index.html

	WU 3 Cooling Tower Water
Exclusion	Buildings without cooling tower or cooling tower with salt water.
Objective	To maintain good conditions of cooling tower system and reduce the fresh water consumption for cooling tower makeup.
Credit Attainable	4 Bonus
Credit Requirement	<p>a) Cooling Tower Water Management Plan</p> <p>1 Bonus credit for providing a cooling tower water management plan.</p> <p>b) Monitoring of Water Quality of Cooling Tower System</p> <p>1 Bonus credit for conducting and monitoring the water quality parameters of cooling tower system on a routine and regular basis.</p> <p>c) Routine Inspection and Maintenance of Cooling Tower System</p> <p>1 Bonus credit for conducting routine inspection of cooling tower system.</p> <p>1 Bonus credit for conducting routine and prevention maintenance of cooling tower system.</p>
Assessment	<p><u>Criteria</u></p> <p>a) Cooling Tower Water Management Plan</p> <p>The Applicant shall provide a cooling tower water management plan which include the following as minimum:</p> <ol style="list-style-type: none">i. Objective;ii. Responsibility;iii. Narrative of water treatment system;iv. Measures to minimise the risk of water related issues; andv. Frequency of inspection and maintenance. <p>b) Monitoring of Water Quality of Cooling Tower System</p> <p>The Applicant shall conduct monitor water quality on a routine and regular basis.</p> <p>c) Routine Inspection and Maintenance of Cooling Tower System</p> <p>The Applicant shall also conduct routine inspection and maintenance of cooling tower system.</p> <p><u>Documentation</u></p> <p>The Applicant shall provide the following documents:</p>

a) Cooling Tower Water Management Plan

- i. Cooling tower water management plan; and
- ii. Narrative and on-site photographs of the water treatment system.

b) Monitoring of Water Quality of Cooling Tower System

- i. Water sampling records within the past 12 months.

c) Routine Inspection and Maintenance of Cooling Tower System

- i. Inspection and maintenance records of cooling tower system in the past 12 months.

Background

When water evaporates from the tower, dissolved solids (such as calcium, magnesium, chloride, and silica) are left behind. As more water evaporates, the concentration of dissolved solids increases. If the concentration gets too high, the solids can cause scale to form within the system or the dissolved solids can lead to corrosion problems. The concentration of dissolved solids is controlled by blowdown. Makeup water is then added to replace evaporative losses and blowdown volume. Cooling towers can therefore account for large portions of a building's total water use.

Increasing the number of cycles can save thousands of gallons of fresh water during a building's peak cooling periods. Chemically analysing makeup water allows for calculation of optimal cycles. Cycles can also be increased by treating water to remove or sequester dissolved solids rather than relying only on blowdown and input of fresh makeup water.

	WU 4	Water Recycling
Exclusion	None.	
Objective	To encourage harvesting of rainwater and recycling of grey water to reduce the consumption of fresh water.	
Credit Attainable	4 Bonus	
Credit Requirement	a) Rainwater Recycling 1 Bonus credit for provisions of rainwater capture, recycle and reuse facilities. 1 Bonus credit for demonstrating the amount of rainwater for recycling $\geq 1\%$ of total amount of fresh water consumption. b) Grey Water Recycling 1 Bonus credit for provisions of grey water capture, recycle and reuse facilities. 1 Bonus credit for demonstrating the amount of grey water for recycling $\geq 1\%$ of total amount of fresh water consumption.	
Assessment	<u>Criteria</u> a) Rainwater Recycling The Applicant shall provide details on the rainwater harvesting system including the drawings showing the general arrangement and the schematic diagrams. The calculation of the expected fresh water saving shall also be provided. The Applicant shall demonstrate that the recycling of rainwater is at least 1% or more of the total amount of fresh water consumption to achieve the bonus credit. The percentage of fresh water saving can be determined by the amount of rainwater recycled and reused per year (m^3) divided by the amount of fresh water meter reading from the building per year (m^3). b) Grey Water Recycling The Applicant shall provide details on the grey water systems including the drawings showing the general arrangement and the schematic diagrams. The calculation of the expected fresh water saving shall also be provided. The Applicant shall demonstrate that the recycling of grey water is at least 1% or more of the total amount of fresh water consumption to achieve the bonus credit.	

The percentage of fresh water saving can be determined by the amount of grey water recycled and reused per year (m^3) divided by the amount of fresh water meter reading from the building per year (m^3).

Documentation

The Applicant shall provide the following documents:

- i. Drawing and schematic diagrams of the rainwater harvesting (for Part a) and/or grey water recycling (for Part b) systems;
- ii. Calculation on the fresh water saving; and
- iii. On-site photographs of the water recycling system(s).

Background

Rainwater harvesting is a process or technique of collecting, filtering, storing and using rainwater for irrigation or cleaning purpose.

Grey water is defined as water discharge from bathtub, shower, washing basin (except for kitchen and clinical areas), condensate from air-conditioning system and water discharged from cooling tower, swimming pool and fountain.

Using recycled water not only helps to reduce the demand for fresh water supply, but also provides a reliable source in case of supply interruptions.

The problem for Hong Kong's high-rise dense built environments is that the potential for collecting rainwater is limited. Yang et al [1] provide the main parameters and their relationship to estimate the amount of rainwater that may be collected on different roof areas and different sizes of tanks, based on the amount of rainfall as recorded by the Hong Kong Observatory.

Well-populated buildings not supplied with saltwater for flushing would be a good candidate from water recycling, otherwise reuse is likely to be limited, depending on the extent of cleaning, irrigation and the types of equipment used for cooling.

1 Yang H X, Chow W H, Burnett J. Water and Energy Conservation of Rainwater Collection Systems on Building Roofs. Advances in Building Technology, Vol. 2. Elsevier. 2002. pp 1281-1288.

WU 5 Water Saving Performance

Exclusion	None.
Objective	To encourage to continual improvement in reducing fresh water consumption.
Credit Attainable	6
Credit Requirement	Maximum 6 credits can be achieved based on the reduction percentage by comparing water bill/ metering data. (Reference year can be any year in the past 5 years).

No. of Credit(s)	1	2	3	4	5	6
Annual fresh water use reduction	1%	2%	5%	8%	10%	15%

Assessment Criteria

The Applicant shall compute the reduction of water consumption by the water bills or metering data. The numerator shall be the water consumption to be compared against the baseline year and it has to be the current year data. The denominator could be any years within 5 years at the time of submission.

A ratio indicator by a certain operational measuring unit (such as the number of building users) could be applied to allow for such comparison.

The Applicant shall also demonstrate what management initiatives (rather than changes in occupancy or use) or hardware upgrade have been implemented to reduce the water consumption.

Documentation

The Applicant shall provide the following documents:

- i. Plumbing schematic diagram or photographs showing the meters;
- ii. Water bills/ metering data for the baseline year and current year;
- iii. Water reduction calculation; and
- iv. Narratives on the management initiatives or evidence of hardware upgrade in reducing fresh water consumption.

Background BEAM Plus encourages the continual improvement approach in reducing the fresh water consumption. The assessment criterion takes into account the reliable data and it can help the Building Owners/ Building Management Company to formulate a strategy plan to achieve continual improvement.

	WU 6	Water Quality Survey
Exclusion	None.	
Objective	To ensure that the quality of fresh water is satisfactory.	
Credit Attainable	2	
Credit Requirement	1 credit for demonstrating that the quality of fresh water at all fresh water tanks and the farthest point of each water tank meets WSD's requirements. 1 credit for monitoring the quality of fresh water at least once a year for consecutive 3 years or providing undertaking letter, which indicate the above requirement.	
Assessment	<u>Criteria</u> Samples of drinking water for physical, chemical and bacteriological examinations under shall be collected, preserved, handled and tested in accordance with the requirements in relevant WSD Circular Letters [1] in force and the latest version of Quality Water Supply Schemes for Buildings – Fresh Water (Plus) [2]. If all the water samples can comply with the requirements in relevant WSD Circular Letters in force and the latest version of Quality Water Supply Scheme for Buildings – Fresh Water (Plus), this credit is fulfilled. For the second credit, the Applicant shall provide evidence demonstrating that the quality of fresh water is monitored at least once a year in consecutive 3 years. Should monitoring of the quality of fresh water not be implemented in the past 3 consecutive years, the Applicant shall provide undertaking letter which is endorsed by top management of Building Owner/ Building Management Company, indicating the above requirement.	
	<u>Documentation</u> The Applicant shall provide the following documents:	
		i. Plumbing schematic diagrams with indication of the sampling locations; ii. Laboratory test report showing the compliance of water samples with the requirements in relevant WSD Circular Letters in force and the latest version of Quality Water Supply Scheme for Buildings – Fresh Water (Plus); and iii. Undertaking letter (if any).

1 Water Supplies Department. WSD Circular Letters. Retrieved 1 March 2016, from http://www.wsd.gov.hk/en/plumbing_and_engineering/circular_letters/index.html

2 Water Supplies Department. Quality Water Supply Schemes for Buildings – Fresh Water and Flushing Water. Retrieved 1 March 2016, from http://www.wsd.gov.hk/en/customer_services_and_water_bills/application_for_licence_certificate/quality_water_recognition_scheme_for_buildings/index.html

Background

Hong Kong enjoys one of the safest water supplies in the world. The quality of the drinking water fully conforms to the Guidelines for Drinking-water Quality recommended by the World Health Organisation. WSD is committed to supplying the public with water that is clear, odourless, wholesome and free from pathogenic bacteria.

Although the quality of water supplied to the consumers is strictly controlled and monitored, the quality of water drawn from consumers' taps may sometimes be affected by the condition of the inside plumbing, such as the phenomenon of discoloured water due to the presence of iron from rusty pipes and the solder materials etc.

To encourage the Building Owner/ Building Management Company to maintain their plumbing systems properly and with the endorsement of the Advisory Committee on Quality of Water Supplies (the predecessor of the Advisory Committee on Water Resources and Quality of Water Supplies (ACRQWS)), WSD launched the Fresh Water Plumbing Quality Maintenance Recognition Scheme in 2002. On 1 January 2008, the Scheme was renamed as Quality Water Recognition Scheme for Buildings (QWRSB). It was further renamed as "Quality Water Supply Scheme For Building – Fresh Water (Plus)" in 2015. The successful applicants will be awarded a Certificate to recognise proper maintenance of the plumbing systems inside a building for keeping the wholesomeness of government potable supply throughout the inside service up to the consumers' taps

WU 7 Fresh Water Plumbing System Maintenance

- Exclusion** None.
- Objective** To encourage Building Owner/ Building Management Company to maintain the plumbing systems in good condition to ensure the building users can enjoy good quality of water.
- Credit Attainable** 6
- Credit Requirement** 1 credit for cleaning the fresh water tanks at least once every three months.
- 2 credits for inspecting the fresh water plumbing system at least once every three months and rectifying defects found during routine inspection.
- Maximum 3 credits can be achieved based on the participation of the Quality Water Supply Schemes for Buildings – Fresh Water (Plus).

No. of Credit(s)	1	2	3
Type of Certificate	Blue	Silver	Gold

Assessment

Criteria

The Applicant shall demonstrate:

- i. The water tanks are cleaned at least once every 3 months in the past 12 months;
- ii. The plumbing system is inspected at least once every 3 months in the past 12 months by licensed plumbers or qualified building services engineers or building surveyors and is found to be in good physical condition; and
- iii. All defects identified in the inspections are promptly rectified by licensed plumbers or qualified persons.

Documentation

The Applicant shall provide the following documents:

- i. Fresh water tanks cleaning records;
- ii. Fresh water plumbing system inspection records;
- iii. Defects rectification record (if any); and
- iv. Certificate of the Quality Water Supply Scheme for Buildings – Fresh Water (Plus) issued by WSD.

Background

The quality of treated water from WSD fully complies with the WHO guidelines for drinking water. To ensure good quality of water at the taps, the maintenance of the fresh water plumbing systems in buildings has to be consistently kept at a high standard.

According to Waterworks Ordinance, the responsibility for fresh water

plumbing maintenance lies with the Building Owners/ Building Management Companies. However, some of them are not aware of this. As a result, their fresh water plumbing systems are not properly maintained. The tap water may become discoloured or dirty. Choked or burst water pipes cause weak water flow or no water supply at taps. To avoid these problems, the fresh water plumbing systems have to be inspected regularly and any defects identified have to be rectified immediately. The water tanks have to be cleaned regularly.

In order to encourage Building Owner/ Building Management Company to maintain their plumbing systems properly and with the endorsement of the then Advisory Committee on Quality of Water Supplies (the predecessor of ACRQWS), WSD launched the Fresh Water Plumbing Quality Maintenance Recognition Scheme (which was renamed as QWRSB on 1 January 2008). QWRSB was re-titled "Quality Water Supply Scheme for Buildings - Fresh Water (Plus)" in 2015.

The successful applicants will be awarded one of three grades to recognise proper maintenance of the plumbing systems inside a building for keeping the good quality of government supplied water throughout the inside service up to the consumers' taps. There are three grades of Certificates: Blue, Silver and Gold. The Certificate is valid for one or two years subject to the satisfactory maintenance of the plumbing system and the number of years of participation in the scheme. The Certificate may be displayed in the building, and on stationeries and promotional materials. The Scheme aims to:

- i. Enable local residents and overseas visitors to have greater confidence of the water quality at the tap;
- ii. Strengthen the capability of Building Owners/ Building Management Company to achieve value-added performance in meeting the needs of consumers with respect to quality of tap water;
- iii. Give recognition to those Building Owners/ Building Management Company who can demonstrate consistent compliance of the prescribed criteria under the Scheme; and
- iv. Assist the Building Owners/ Building Management Company to conduct self-assessments on plumbing conditions and to identify areas for necessary maintenance.

	WU 8	Water Metering
Exclusion		None.
Objective		To provide opportunity to reduce the water use by tracking the water consumption records on different water systems.
Credit Attainable		2
Credit Requirement		Maximum 2 credits for permanent installation of water meters for the following water sub-systems: <ul style="list-style-type: none">i. Irrigation;ii. Indoor plumbing fixtures and fittings;iii. Cooling towers;iv. Water features/ pools; andv. Other process water.
Assessment		<p><u>Criteria</u></p> <p>1 credit can be achieved for providing the water meter for each of the above listed items. Same type of provision in multiple locations can only be counted once.</p> <p>The Applicant shall provide sufficient water meters so that the water usage for different systems can be tracked. The water meters may be manually read/ equipped with data logging capability/ connected to Building Management System (BMS).</p> <p><u>Documentation</u></p> <p>The Applicant shall provide the following documents:</p> <ul style="list-style-type: none">i. Narrative of the water sub-metering system;ii. Plumbing schematic diagrams or layout drawings showing the provisions of the water metering for any water sub-systems;iii. Data logging records; andiv. On-site photographs of the water meters.
Background		Generally in Hong Kong buildings, there is very limited provision for monitoring water use other than the meters required for utility billing purposes. The provision of water sub-meters for major water uses can assist the Building Owners/ Building Management Company to audit water use by tracking the water consumption records. This provides opportunities to implement water saving strategies.

	WU 9	Water Leakage Monitoring
Exclusion	None.	
Objective	To provide opportunity to reduce the water use by tracking the water leakage in water supply system.	
Credit Attainable	2 Bonus	
Credit Requirement	Maximum 2 Bonus credits for installation of devices for detecting water leakage at the communal water supply system within the building lot. i. Underground buried pipes; and ii. Water pipes at all fresh water pump rooms.	
Assessment	<u>Criteria</u> 1 Bonus credit can be achieved for providing water leakage system for each of the above listed items. The Applicant shall install water leakage detectors such as infra-red or moisture detectors for the communal water supply pipes at underground and/or fresh water pump rooms to demonstrate compliance. <u>Documentation</u> The Applicant shall provide the following documents: i. System description of the water leakage system; ii. Plumbing schematic diagrams or layout drawings showing the provisions of the water leakage detectors; iii. Equipment catalogues of the water leakage detectors; and iv. On-site photographs of the water leakage detectors (if any).	
Background	Water seepage has been a cause for concern to a number of Government departments including the Buildings Department. Detection of water leaks in service pipework also presents an opportunity to save water, and perhaps more importantly, reduce the Potential for structural damage as well as the creation of unhygienic conditions. Causes of water seepage vary but one of the common sources of seepage is water-borne piping embedded in the structural members of a building. Water seepage arising from embedded piping causes not only nuisance but also deterioration to the structural member of a building if unattended for a prolonged period. Designers are strongly advised to design the routing of all water-borne piping off structural elements to meet the indispensable need for repair and replacement of such piping during the design life of the building, which would normally outlast the design life of the piping. The huge benefit to the consumers and the public that this will bring about in terms of easy	

maintenance of the building for its entire design life will certainly outweigh the efforts at the design stage of a building project.

	WU 10	Water Audit
Exclusion		None.
Objective		To establish a water use inventory and provide opportunity to reduce water consumption.
Credit Attainable		4
Credit Requirement		2 credits for undertaking a water audit. 1 credit for maintaining a water use inventory. 1 credit for the implementation of water saving recommendations as stipulated in the water audit.
Assessment	<u>Criteria</u>	<p>The Applicant shall undertake a water audit and compose a water audit report. The frequency of the water audit is not regulated but it shall be conducted on a regular basis. The report shall include water consumption records, operation and maintenance records, etc. for all areas of water use, but may exclude water consumption by tenants. The report shall include:</p> <ol style="list-style-type: none">i. Breakdown of usage across the site and site activities, reconciled against total metered water consumption;ii. Inspection of equipment, devices and processes across the site as part of preparing a usage inventory investigation of consumption by major equipment, devices and processes;iii. Investigation of usage trends and patterns using monitoring as detailed below in this section;iv. Preparation of Key Performance Indicators (KPIs) of consumption (using baseline data) in relation to an appropriate indicator (such as L/m²); andv. Demonstrating the implementation of water conservation plan.
	<u>Documentation</u>	<p>The Applicant shall provide the following documents:</p> <ol style="list-style-type: none">i. Water audit report;ii. Water use inventory of the building; andiii. Documentation or photographs demonstrating the implementation of water saving recommendations.
Background		Water audit is an important water management tool. It is a process to analyse the water use inside the building and provide opportunities for water saving.

	WU 11	Twin-tank System
Exclusion	None.	
Objective	To reduce the water wastage during the maintenance or cleaning of the water tanks and provide an uninterrupted fresh and flush water supply to building users.	
Credit Attainable	2 Bonus	
Credit Requirement	Maximum 2 Bonus credits for providing twin-tank system for: i. Fresh water supply system; and ii. Flushing water supply system.	
Assessment	<u>Criteria</u> 1 Bonus credit can be achieved for providing twin-tank for each of the above listed water supply systems. The Applicant shall provide evidence that the twin-tank for fresh and/or flushing supply water systems are installed for each building of the assessment boundary. <u>Documentation</u> The Applicant shall provide the following documents: i. Plumbing schematic diagrams showing the provisions of the twin-tank system for fresh water and/or flush water; and ii. On-site photographs of the twin-tank system.	
Background	Water tanks installed on the roof of buildings for both the fresh and flushing water supply systems used to be single-compartment tanks. As the water is supplied from one single source (a tank with single compartment), the water supply will be affected if that single source is interrupted. The Hong Kong Waterworks Standard Requirements has recommended that all fresh and flushing water tanks to be thoroughly cleaned at least once every three months. Water supply interruption during tank cleansing often causes inconvenience to residents. Normally, water supply will be suspended for a few hours when the tank is cleaned. Building users may need to store fresh water for temporary use or use fresh water to flush toilets during the cleaning period. There is also considerable wastage when water remained in the tank has to be drained for tank cleansing. This situation can be improved with the introduction of the twin-tank water supply system.	

In the twin-tank [1] system, the water tank is divided into two compartments. The system adopts an "alternately operating" approach in its operations. When one of the compartments is being cleaned, the other one is still in operation, ensuring continual water supply and the least, if any, disruption to residents.

Each compartment of the twin-tank shall be equipped with:

- i. A duplicate sets of inlet, outlet and associated overflow and drainage pipeworks;
- ii. A stop valve at the inlet of each tank compartment to ensure that water will not get into the compartment when it is being cleaned; and
- iii. An automatic pump control switch at the downstream side of each sump pump to protect the up-feed system particularly when the stop valve for the tank compartment is closed.

To make the water tanks more long-lasting, it is recommended that more durable materials such as epoxy-coated reinforcement bars and Grade 45 waterproof concrete be used to build the tanks.

1 Water Supplies Department. Twin-tank system. Retrieved 1 March 2016, from http://www.wsd.gov.hk/en/plumbing_and_engineering/tts/index.html

	WU 12	Water Efficient Flushing System
Exclusion		None.
Objective		To reduce the volumes of sewage discharged from buildings thereby reducing burdens on municipal sewage supply and treatment facilities.
Credit Attainable		3
Credit Requirement		<p>Maximum 2 credits for installing water efficient flushing systems.</p> <ul style="list-style-type: none">i. Water closet with no more than 6L per flush; andii. Dual flush water closet. <p>Maximum 1 credit for installing water efficient flushing urinal equipment:</p> <ul style="list-style-type: none">i. Sensor type urinal;ii. Waterless urinal; andiii. Urinal equipment (WELS Grade 2 or above).
Assessment		<p><u>Criteria</u></p> <p>1 credit can be achieved for providing each of the above listed water efficient flushing systems. Same type of provision in multiple locations can only be counted once.</p> <p>The Applicant shall demonstrates that the flushing systems are water efficient with the following criteria:</p> <ul style="list-style-type: none">i. Water closet are furnished with single flush system with no more than 6L per flush and/or with dual flush system;ii. Sensor type and/or waterless urinals are installed; andiii. Urinals are certified with WELS Grade 2 or above. <p><u>Documentation</u></p> <p>The Applicant shall provide the following documents:</p> <ul style="list-style-type: none">i. Schedule of the water closets and urinals installed;ii. Catalogues of the low flow/ dual flush system and the urinals with flow rate data indicated;iii. The WELS certificate; andiv. On-site photographs of the water efficient flushing system.
Background		<p>With the application of modern technology in the design of water closet flushing systems, the effectiveness of flushing can be maintained with a reduced discharge. Similarly, the concentration of sewage in discharges can be reduced at the building level to reduce the burden on sewage treatment plants.</p>

WU 13 Flushing Water Quality

- Exclusion** None.
- Objective** To enhance the awareness of Building Owner/ Building Management Company on proper maintenance of the flushing system.
- Credit Attainable** 4
- Credit Requirement** 1 credit for cleaning the flushing water storage tanks at least once in every 6 months.

Maximum 3 credits can be achieved based on the participation of the Quality Water Supply Schemes For Buildings – Flushing Water.

No. of Credit(s)	1	2	3
Type of Certificate	Blue	Silver	Gold

Assessment

Criteria

The Applicant shall demonstrate:

- i. The flushing water tanks are cleaned at least once every 6 months in the past 12 months.
- ii. The plumbing system is inspected at least once every 3 months in the past 12 months by licensed plumbers or qualified building services engineers or building surveyors and is found to be in good physical condition; and
- iii. All defects identified in the inspections are promptly rectified by licensed plumbers or qualified persons.

Documentation

The Applicant shall provide the following documents:

- i. Flushing water tanks cleaning record for the past 12 months;
- ii. Plumbing system inspection record for the past 12 months;
- iii. Defects rectification record for the past 12 months (if any); and
- iv. Certificate of the Quality Water Supply Scheme for Buildings – Flushing Water issued by WSD.

Background

The Flushing Water Plumbing Quality Maintenance Scheme was launched in July 2013 and it was retitled as Quality Water Supply Scheme for Buildings - Flushing Water [1] in March 2015. The objectives of the Scheme are:

- i. Strengthen the capability of Building Owners/ Building Management Company to achieve value-added performance in

1 Water Supplies Department. Quality Water Supply Scheme for Buildings - Flushing Water. Retrieved 1 March 2016, from http://www.wsd.gov.hk/en/customer_services_and_water_bills/application_for_licence_certificate/fwpgmrs/index.html

- meeting the expectation of consumers with respect to the reliability of flushing system;
- ii. Give recognition to those Building Owners/ Building Management Company who can demonstrate consistent compliance of the prescribed criteria under the scheme;
 - iii. Assist the owners, operators and Building Owners/ Building Management Company in conducting self-assessments on plumbing conditions and to identify areas for necessary maintenance; and
 - iv. Minimise the failure frequency of inside services of flushing system.

Successful buildings will be awarded certificates, which are classified into three grades according to the length of the continuous period for which a building has joined the scheme, to recognise that their flushing water plumbing systems have been properly maintained. The three grades of certificates are:

- i. Blue certificates: New participation or continuous participation of less than 3 years;
- ii. Silver certificates: Continuous participation of 3 years or more but less than 5 years; and
- iii. Gold certificates: Continuous participation with 5 years or more.

	WU 14	Educational and Promotional Programme
Exclusion		None.
Objective		To encourage behavioural change through educational and promotional programme.
Credit Attainable		2
Credit Requirement		2 credits for Building Owner/ Building Management Company to educate and advocate the behavioural change of building users in respect of Water Use by: <ul style="list-style-type: none">i. Organising educational seminar/ promotion campaign; orii. Promoting or participating in Hong Kong Green Building Week organised by Construction Industry Council (CIC) and the Hong Kong Green Building Council Limited (HKGBC).
Assessment		<u>Criteria</u> Credits can be achieved when the Applicant organises at least one of the activities within the 1 year period at the time of submission. <u>Documentation</u> The Applicant shall provide the following documents: <ul style="list-style-type: none">i. Promotional materials such as posters, notice of the programme; andii. Record photographs.
Background		BEAM Plus encourages the Applicant to transfer knowledge through seminar or exhibition for building users, so that they can acquire necessary knowledge, shape the standings and behaviour.

	WU 15	Innovative Techniques/ Performance Enhancement
Exclusion		None.
Objective		To encourage adoption of practices, new technologies and techniques respect of Water Use that have yet to find application in Hong Kong or provide for performance enhancements over and above stated performance criteria in BEAM Plus for Existing Buildings.
Credit Attainable		2 Bonus
Credit Requirement		a) Innovative Techniques 1 Bonus credit for applying innovation technique in respect of Water Use that will improve the performance of the building. b) Performance Enhancements 1 Bonus credit for building with exemplary performance over and above the criteria identified in the Water Use of the BEAM Plus for Existing Buildings.
Assessment		<u>Criteria</u> a) Innovative Techniques The onus will be on the Applicant to present the evidence of the application of new practices, technologies and techniques and the associated environmental benefits. The Applicant shall provide a submission which identifies the intent of the proposed innovative technique and quantifies environmental benefits through its application. The Assessor shall refer the submission to BSL TRC who will consider each application on its merit. The Bonus credit shall be granted at the sole discretion of BSL TRC. b) Performance Enhancements The onus will be on the Applicant to present evidence of the performance compared to the existing criteria. The Applicant shall provide a submission which identifies the proposed application and quantifies its exemplary performance over and above the criteria identified in Water Use of this Manual. The Assessor shall refer the submission to BSL TRC who will consider each application on its merit. The Bonus credit shall be granted at the sole discretion of BSL TRC. <u>Documentation</u> The Applicant shall provide the following documents:

a) Innovative Techniques

- i. Narrative to indicate the innovative techniques;
- ii. Calculation quantifying environmental benefits through application of proposed innovation technique; and
- iii. Record photographs.

b) Performance Enhancements

- i. Calculation quantifying exemplary performance over and above the criteria identified in Water Use of the BEAM Plus for Existing Buildings through proposed application; and
- ii. Record photographs.

Background

BEAM Plus encourages the Applicant to incorporate innovative techniques and green practices into their building so as to realise the associated environmental benefits, which related to sustainable living, improved comfort, lower water consumption, reduced pollution.

- 7 Indoor Environmental Quality**
 - 7.1 Occupants satisfaction**
 - 7.2 Ventilation**
 - 7.3 Thermal comfort**
 - 7.4 Hygiene**
 - 7.5 Indoor air quality**
 - 7.6 Lighting quality**
 - 7.7 Acoustics and noise**
 - 7.8 Innovations and additions**

Background

This section considers some of the broader issues of sustainable buildings as well as the most significant indoor performance issues. Indoor environmental quality (IEQ) includes indoor air quality and ventilation provisions that safeguard health. Considerations of these issues, as well as thermal comfort, lighting, acoustics and noise, impact on well-being, comfort and productivity.

Given that on average people in Hong Kong spend around 85% of their time indoors, indoor environmental conditions have a significant impact on the quality of life. Buildings should provide safe, healthy and comfortable indoor spaces. Poor indoor environments in commercial and institutional buildings can impact on productivity and may pose health risks to users. The design, management, operation and maintenance of buildings should seek to provide a good quality indoor environment, but with optimum use of energy and other resources.

- 7.1 Occupants satisfaction**

IEQ 1 Building Users Satisfaction Survey on Indoor Comfort

Background

Collecting feedback from occupants in a systematic way on their satisfaction with the indoor environmental quality helps building managers to reveal problems that may not be observed in daily building operations. Taking corrective actions on area indicated with dissatisfaction will contribute toward continual improvement.

- 7.2 Ventilation**

IEQ 2 Minimum Ventilation Performance
IEQ 3 Localised Ventilation

	Background	This requirement ensures that ventilation systems of the air-conditioned premises have been designed according to recognised procedures to provide a minimum ventilation rate of sufficient quality and quantity. It is not possible to use CO ₂ as a measure of satisfactory performance in unoccupied premises but it is possible to determine if ventilation will be satisfactory through measurement of ventilation rate and ventilation effectiveness. There are three basic requirements for ventilation of occupied rooms and rooms used for habitation; background ventilation, local exhaust, and source control. Background ventilation is intended to dilute the unavoidable contaminant emissions from people and materials. Background ventilation should be provided for control of radon levels in occupied and habitable rooms, and reduces possibility of mould growth under conditions of high humidity. Local exhaust is intended to remove contaminants from those specific rooms, such as kitchens, in which concentrated sources are expected.
7.3	Thermal comfort	IEQ 4 Thermal Comfort
	Background	BEAM Plus seeks to ensure that buildings and systems are tested as far as practicable and the specified thermal comfort conditions can be achieved under conditions of normal occupancy.
7.4	Hygiene	IEQ 5 Biological Contamination IEQ 6 Waste Disposal Facilities IEQ 7 Control of Environmental Tobacco Smoke
	Background	Post-SARS, a lot more attention has been paid to building hygiene. Clearly, certain features of building and building services design, e.g. plumbing and drainage systems, are likely to contribute to health problems. Proper provisions for inspection, cleaning and maintenance allows for comprehensive management of hygiene in buildings.
7.5	Indoor air quality	IEQ 8 IAQ Monitoring IEQ 9 IAQ in Car Parks
	Background	Indoor air quality (IAQ) is defined by a list of the constituents, in both solid and gaseous states, in air. A key factor in determining appropriate standards for IAQ is the duration of exposure. Exposure to indoor pollutants for a matter of minutes (e.g. car parks), hours (e.g. entertainment establishments), or over a working day (e.g. offices, classrooms, etc) will be different for most parameters depending on dose and response.
7.6	Lighting quality	IEQ 10 Interior Lighting

Background

A consequence of poor lighting in work places is discomfort and loss of working efficiency. Although interior lighting in workplaces is one of the most challenging design tasks, unfortunately often relatively little attention is given to design for work spaces where productive and creative activities take place. To focus only on luminance level on the horizontal plane is insufficient.

The quality of an interior lighting scheme cannot be specified or demonstrated through measurement of light sources and outputs alone, but needs to consider the relationship of the light sources to the nature of the space being illuminated, and visual tasks of users in the space.

7.7 Acoustics and noise **IEQ 11 Background Noise**
IEQ 12 Room Acoustics
IEQ 13 Noise Isolation
IEQ 14 Vibration

Background

When indoor noise is above a certain level, it can cause discomfort, irritation and interference with workplace activities. In addition, poor acoustics in certain premises will interfere with speech intelligibility. Background noise inside buildings comes from a number of sources, including noise break-in from the surrounding environment and noise produced inside the building, such as from building services equipment and adjoining premises. Background noise should be limited to a level which are suitable for the use of the premises in a building development.

Many Hong Kong buildings are built close to roads and railway lines such that ground transportation noise can cause nuisance to occupants. Noise from fixed sources and aircraft may also pose a problem for some developments.

The selection and erection of building services systems and equipment can influence the background noise levels in certain locations, and may also induce unwanted vibration. The sound insulation properties of floors and internal walls are crucial in controlling noise propagation inside a building. It is also necessary to consider how the design of premises affects speech intelligibility.

7.8 Innovations and additions **IEQ 15 Achievement of IAQwi\$e Certificate**
IEQ 16 Educational and Promotional Programme
IEQ 17 Innovative Techniques/ Performance Enhancements

Background

It is encouraged to drive behavioural change through educational and promotional programme. This section also allows the applicant to submit for consideration for the award of bonus credits on any innovative techniques or performance enhancements which the applicant deems to provide environmental benefits additional to those already covered in this Manual.

	IEQ 1	Building User Satisfaction Survey on Indoor Comfort
Exclusion		None.
Objective		To obtain building users' satisfaction rate regarding indoor environmental quality.
Credit Attainable		3
Credit Requirement		<p>1 credit for conducting building user satisfaction survey to collect anonymous responses regarding the indoor environmental quality regularly, or, at a minimum conduct the survey within 1 year at the time of submission.</p> <p>1 credit for demonstrating the survey covered the aspects of hygiene, IAQ, ventilation, thermal comfort, lighting quality, and aural environment.</p> <p>1 credit for implementing a complaint response and action system for continual improvement of indoor comfort.</p>
Assessment		<p><u>Criteria</u></p> <p>a) Occupant Satisfaction Survey</p> <p>The Applicant shall conduct at least one building user satisfaction survey before certification to collect anonymous responses from the building users. To obtain the second credit, the survey shall cover at least the following topics:</p> <ol style="list-style-type: none">i. Thermal comfort;ii. Indoor air quality;iii. Aural comfort;iv. Lighting; andv. Building cleanliness. <p>The survey shall include representative samples of building users contributing at least 20% of the total building tenants. The credit(s) can be achieved by presenting the survey results.</p> <p>b) Complaint Response and Action System</p> <p>The Applicant shall implement a complaint response and action system to collect and record tenants' complaints on comfort issues, and to perform and document corrective actions.</p> <p><u>Documentation</u></p> <p>The Applicant shall provide the following document(s):</p> <p>a) Building User Satisfaction Survey</p>

- i. A report of the building user satisfaction survey.
- b) Complaint Response and Action System
 - i. Procedure of receiving complaints and the implementation of corrective actions for discomfort (in any).

Background

Traditional building management focuses on measuring and regulating the resource efficiency of buildings and systems. Less attention has been paid on how well buildings meet their design intent for the building users. Collecting direct feedback from the building users on their satisfaction with the building's comfort level can reveal problems that may not be observed in daily operations, which helps building management to improve the indoor environmental quality. The challenge is to collect and analyse this input in a systematic and meaningful manner; to identify the cause of the problem, and taking corrective action.

IEQ 2 Minimum Ventilation Performance

Exclusion	For part a) only, residential.
Objective	To ensure that a minimum quality and quantity of outdoor air is supplied to spaces in the project in order to support the well-being and comfort of building users.
Credit Attainable	4
Credit Requirement	<p>a) Fresh Air Intakes</p> <p>1 credit for demonstrating the fresh air intakes are free from potential pollutant sources.</p> <p>b) Ventilation for Normally Occupied Areas and Common Areas</p> <p>2 credits for providing adequate ventilation for the normally occupied areas.</p> <p>i. 1 credit for 80% area compliance; and</p> <p>ii. 2 credits for 100% area compliance.</p> <p>1 credit for providing adequate ventilation for 80% of common areas in a building.</p>
Assessment	<p><u>Criteria</u></p> <p>a) Fresh Air Intakes</p> <p>The Applicant shall demonstrate that all fresh air intakes are free from potential pollutant sources. The air intake minimum separation distance shall comply with recommendations from recognised authorities, e.g. ANSI/ASHRAE 62.1-2013 [1] or equivalent.</p> <p>b) Ventilation for Normally Occupied Areas and Common Areas</p> <p>Normally occupied areas are enclosed areas where people normally spend more than 1 hour there. Examples of normally occupied area can be found in Appendix 8.1 Glossary.</p> <p>Enclosed common areas include corridors, lift lobbies, entrance lobbies, etc.</p> <p>For mechanical ventilated areas, the design ventilation rates shall comply with recommendations from recognised authorities, e.g. ANSI/ASHRAE 62.1-2013 or equivalent. Compliance shall be demonstrated by calculations, or measurements on a representative sample of each type of space.</p>

1 ANSI/ASHRAE 62.1-2013, Ventilation for Acceptable Indoor Air Quality. American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.

In case of the minimum ventilation rate is not complied due to the physical constraints of the existing ventilation system, demonstrate that the system is operated at maximum capacity to deliver outdoor air into the space and provide not less than 5 l/s per person of combined outdoor air rate.

For naturally ventilated areas, the Applicant shall demonstrate that the ventilation rate (ACH of higher than 0.5) is achieved under average wind conditions in at least 80% of the areas, aggregated by floor area. Compliance may be demonstrated by suitable commissioning measurements such as a tracer gas test [2] on a representative sample of spaces, including worst cases, or by appropriate modelling techniques, such as wind tunnel test and Computational Fluid Dynamics (CFD) study.

When modelling approach is adopted, the model shall include building and surrounding large structures within radius of 2 building heights. A minimum percentage occurrence of prevailing winds of 75% annual is required. At least 8 of the prevailing wind directions shall be tested.

Documentation

The Applicant shall provide the following document(s):

a) Fresh Air Intakes

- i. Layouts showing the fresh air intake locations and the separation distances from potential pollutant sources

b) Ventilation for Normally Occupied Areas and Common Areas

- i. A report identifying each of the ventilation zones, the space types, occupant densities, and the design criteria adopted; and
- ii. The report of methodology and results of calculations, simulations and/or measurements in the specified sample of spaces to demonstrate compliance with the assessment criteria.

Background

The purpose of this credit is to provide the minimum outdoor air ventilation for the control of odours, that is, the supply, distribution and control of ventilation to maintain carbon dioxide (CO₂) levels within design targets in normally occupied spaces, and the control of indoor pollutants such as Total Volatile Organic Compound (TVOC), formaldehyde, etc.

Designers are recommended to consider also the provision of ventilation to common areas, such as corridors, lift lobbies, entrance lobbies, etc. Where design constraints render the provision of natural ventilation not feasible, mechanical ventilation should be provided to

2 ASTM International. E 741-11. Standard Test Method for Determining Air Change in a Single Zone by Means of a Tracer Gas Dilution

improve the indoor environment. Good practices when designing mechanical ventilation in public areas require:

- i. The ventilation system to be capable of providing sufficient fresh air taking into account the anticipated population;
- ii. Intake and exhaust points be properly designed to prevent contamination of fresh air supply and avoid short-circuiting; and
- iii. The ventilation system and its associated ductwork, where provided, should be conveniently accessible for maintenance.

Ventilation for bathrooms, kitchens, and refuse rooms may be sources of pollution affecting common areas.

Cross ventilation is important to control temperature and to dilute pollutants and odours. Recommended practice is to place ventilation openings so that cross ventilation can occur. However, wind driven cross ventilation can only happen when there is a reliable higher pressure on one side of openings than on the other. For an isolated building this may be easily achieved by simple consideration of prevailing winds and the building form. For buildings within dense groupings, however, local wind direction may be less apparent. A more sophisticated analysis of the behaviour of the wind is necessary to ensure beneficial cross flows.

	IEQ 3	Localised Ventilation
Exclusion	None.	
Objective	To prevent exposure of building users to concentrated indoor sources of pollutants.	
Credit Attainable	3	
Credit Requirement	Maximum 3 credits for providing adequate ventilation for the following rooms/ areas with significant indoor pollution sources: <ul style="list-style-type: none">i. Toilets;ii. Kitchens;iii. Printing/ Photocopier rooms;iv. Chemical storage areas; andv. Other relevant area.	
Assessment	<u>Criteria</u> 1 credit can be achieved for the provision of adequate ventilation system for each of the above listed rooms/ areas. The Applicant shall provide sufficient local exhaust for rooms/ areas under their control where concentrated pollutant sources are likely to be present. The design exhaust rates shall comply with recommendations from recognised international standards such as ANSI/ASHRAE 62.1-2013 or local regulation requirements. Note: Maximum 3 credits is allowed for demonstrating the provision of an adequate ventilation system under “Other relevant area” category. <u>Documentation</u> The Applicant shall provide the following documents: <ul style="list-style-type: none">i. A summary table detailing the design criteria and the ventilation system designs providing local exhaust;ii. Drawings showing the locations with significant indoor pollution sources and associated ventilation system layouts;iii. Calculation indicating that the exhaust rate is achieved; andiv. Photographs or drawings showing the location of the exhaust point.	
Background	Concentrated pollution sources are best managed at source. The provision of localised ventilation, segregated from the general ventilation, is an appropriate strategy. In commercial and similar premises, pollutant sources such as photocopying equipment, toilets, etc. should be provided with dedicated exhaust systems. In other buildings, local exhaust is intended to remove contaminants from specific rooms such as kitchens, in which concentrated sources are expected.	

	IEQ 4 Thermal Comfort
Exclusion	Premises without any air-conditioning provisions.
Objective	To ensure the thermal comfort of the building users.
Credit Attainable	3
Credit Requirement	<p>1 credit for demonstrating the air temperature within the air-conditioned space is in the range of 24 – 26°C during April to October.</p> <p>1 credit for demonstrating the relative humidity within the air-conditioned space is in the range of 40 – 70% during April to October.</p> <p>1 credit for demonstrating the air velocity within the air-conditioned space is <0.3 m/s.</p>
Assessment	<p><u>Criteria</u></p> <p>The measurement report shall be prepared and endorsed by Indoor Air Quality Certificate Issuing Bodies (CIB). The measurement protocols such as the equipment used, measurement methodologies, number of points required and the contents of the report shall in accordance with the Guidance Notes for the Management of Indoor Air Quality in Offices and Public Places issued by the Government of the Hong Kong Special Administrative Region [1].</p> <p><u>Documentation</u></p> <p>The Applicant shall provide the following documents:</p> <ol style="list-style-type: none">i. Measurement report endorsed by a CIB; andii. Drawings showing the measurement locations and ventilation system layouts.
Background	The Heating, Ventilating, and Air-Conditioning (HVAC) system should be able to maintain room conditions (within acceptable tolerances) under normal occupied periods. Measurements under such circumstances can demonstrate compliance with the operating requirements.

1 Indoor Air Quality Management Group, the Government of the Hong Kong Special Administrative Region. Guidance Notes for the Management of Indoor Air Quality in Offices and Public Places. Retrieved 1 March 2016, from <http://www.iaq.gov.hk/en/publications-and-references/guidance-notes.aspx>

	IEQ 5	Biological Contamination
Exclusion		None.
Objective		To reduce the risk of biological contamination from the operation of the HVAC and water systems.
Credit Attainable		4
Credit Requirement		<p>Maximum 3 credits for demonstrating compliance with the Operation and Maintenance Precautions recommended in the Code of Practice – Prevention of Legionnaires Disease, for the following systems:</p> <ul style="list-style-type: none">i. Components in Air-Conditioning System except Cooling Tower;ii. Plumbing and Drainage System;iii. Hot Water System;iv. Fountains; andv. Pools. <p>Note: Credit(s) can be excluded for buildings with less than 3 of the listed systems.</p> <p>1 credit for maintaining water trapping of the floor drain.</p>
Assessment	<u>Criteria</u>	<p>1 credit can be achieved for demonstrating compliance for each of the listed systems as shown above.</p> <p>The Applicant shall provide document detailing how the design, installation, operation and maintenance of the HVAC and water systems meet with the requirements and recommendation contained in the Code of Practice – Prevention of Legionnaires Disease [1].</p> <p>The Applicant shall demonstrate the water trapping of the floor drains is maintained automatically with refilling design; or manually by pouring water into the floor drains at least once a week.</p> <u>Documentation</u> <p>The Applicant shall provide the following document:</p> <ul style="list-style-type: none">i. The design and justification on fulfilling the credit requirement.

1 Prevention of Legionnaires' Disease Committee, EMSD. Code of Practice for the Prevention of Legionnaires' Disease in Hong Kong 2012 Edition. Retrieved 1 March 2016, from http://www.emsd.gov.hk/filemanager/en/content_296/COP-PLD_2012.pdf

Background

Most cases of Legionnaires' Disease (LD) are caused by the bacterium *Legionella pneumophila*. There are many other species of the organism which have been implicated in human disease, but other milder illnesses may be caused by these organisms. All illnesses due to legionella species are known collectively as 'legionellosis'; Pontiac Fever is one of the milder conditions. *Legionella pneumophila* is found in natural water supplies and in soil. It is also found in many recirculating and water supply systems.

Measurements in a newly completed building are unlikely to reveal problems with biological contamination caused by either air-conditioning and ventilation systems, or water systems. Consequently, BEAM Plus requires proper maintenance of the MVAC and water system to reduce the risk of biological contamination.

	IEQ 6	Waste Disposal Facilities
Exclusion		None.
Objective		To reduce the risk of odours from the waste disposal facilities entering occupied areas or public areas.
Credit Attainable		3
Credit Requirement		3 credits for providing de-odourising system in refuse storage or materials recovery area. i. 1 credit for provision at main refuse storage and material recovery chambers (RS&MRC); and ii. 2 credits for provisions at all other rooms designated for refuse storage or materials recovery.
Assessment		<u>Criteria</u> When a centralised ventilation system is adopted, a single air purifier or carbon filter may be installed before final discharge into the atmosphere. Air purifying devices such as 'Chemical Air Scrubber', 'Bio-oxygen Generator', 'Photo-oxidation Generator' or other appropriate devices are also accepted. <u>Documentation</u> The Applicant shall provide the following documents: i. Drawings showing the locations of refuse room or refuse collection chambers; and ii. Catalogues and photographs of the air purification system and de-odourising system.
Background		Where refuse contains large amounts of food and other organic waste there are potential odours and health problems if refuse is not well contained from the points of disposal by users to the place of final collection. Automatic systems are available to isolate refuse from users, which could also help to minimise the problem.

	IEQ 7	Control of Environmental Tobacco Smoke
Exclusion		None.
Objective		To protect the health of building users and reduce the risk of environmental tobacco smoke entering the occupied areas or public areas.
Credit Attainable		1
Credit Requirement		1 credit for implementing no smoking policy outside the building except in designated smoking areas.
Assessment		<p><u>Criteria</u></p> <p>The Applicant shall provide documentation to demonstrate the following measures are implemented in the external areas of the building:</p> <ol style="list-style-type: none">i. For those areas with business purposes: Smoking shall be prohibited.ii. For those areas without business purposes: Smoking shall be prohibited within the site boundary, except in designated smoking areas located at least 7.5 m from all entries, outdoor air intakes, and operable window.iii. Post the signage at all building entrances indicating the no smoking policy and the boundary of no smoking areas. <p><u>Documentation</u></p> <p>The Applicant shall provide the following documents:</p> <ol style="list-style-type: none">i. No smoking policy;ii. Layout plan showing the designated smoking areas are located at least 7.5 m from all entries, outdoor air intakes, and operable window; andiii. Photos of the signage indicating the no smoking policy and the boundary of no smoking area.
Background		<p>According to WHO, tobacco use is one of the main risk factors for a number of chronic diseases, including cancer, lung diseases, and cardiovascular diseases. There are six million people died due to tobacco use (smoking and smokeless) every year and a total of 600,000 people are also estimated to die from the effects of second-hand smoke.</p> <p>In accordance with the Smoking (Public Health) Ordinance (Cap 371), statutory no smoking areas cover the indoor areas of all restaurant premises, indoor workplaces, public indoor places, and some public outdoor places in Hong Kong. No person shall smoke or carry a lighted cigarette, cigar, or pipe in no smoking areas.</p>

In particular, certain public outdoor places are designated as statutory no smoking areas under section 3 and Schedule 2 of Cap 371, including escalators, public pleasure grounds, bathing beaches and the vicinities including adjacent barbeque areas as well as public swimming pools and the vicinities including sidewalks, diving boards, and spectator stands. Furthermore, Hong Kong Wetland Park, the running tracks, sidewalks, and spectator's stands at Hong Kong Stadium and Mong Kok Stadium are also designated statutory no smoking areas.

Extension of no smoking areas within the site boundary would help to reduce the risk of environmental tobacco smoke entering the occupied areas or public areas and thus protect the health of building users.

	IEQ 8	IAQ Monitoring
Exclusion	None.	
Objective	To ensure good IAQ level in normally occupied spaces.	
Credit Attainable	11	
Credit Requirement	<p>Maximum 9 credits for demonstrating compliance with appropriate criteria for indoor pollutant levels, for following parameters:</p> <ul style="list-style-type: none">i. Carbon Dioxide;ii. Carbon Monoxide;iii. Respirable Suspended Particulate;iv. Nitrogen Dioxide;v. Ozone;vi. Formaldehyde;vii. Total Volatile Organic Compounds;viii. Radon; andix. Bacteria. <p>1 credit for obtaining Excellent Class for the IAQ Certification Scheme for Offices and Public Places.</p> <p>1 credit for demonstrating the continuous participation in the 'Indoor Air Quality Certification Scheme for Office and Public Place' for past 3 consecutive years.</p>	
Assessment	<p><u>Criteria</u></p> <p>1 credit can be achieved for demonstrating compliance for each of the above listed parameters.</p> <p>Credit(s) compliance shall be demonstrated by measurements. The measurement protocol, i.e. the measuring equipment used, duration of measurements, number of the sampling points, shall be made with reference to the latest version of the Environmental Protection Department (EPD)'s IAQ Certification Scheme. The criteria shall be those defined under Good Class of the scheme.</p> <p><u>Documentation</u></p> <p>The Applicant shall provide the following documents:</p> <ul style="list-style-type: none">i. Measurement report issued by a Hong Kong Accreditation Service (HKAS) accredited IAQ Certificate Issuing Body (CIB) with measurement methodology, number of sampling points required under IAQ Certification Scheme, measuring date, time and conditions of the interiors space, the measurement results and the calibration certificates of the measuring equipment.	

Alternatively

A valid IAQ Certificate issued by EPD. (Note: it is not necessary to submit the first measurement results)

- ii. For the last two credit(s), related IAQ Certificate issued by EPD.

Background

EPD has launched the IAQ Certification Scheme in 2003 in order to improve the indoor air quality and promote public awareness of the importance of IAQ. There are two objectives of the Certification Scheme: a) to recognise good IAQ management practice; and b) to provide incentives for Building Owner/ Building Management Companies to pursue the best level of IAQ. More details of the IAQ Certification Scheme can be found in EPD website [1].

1 Indoor Air Quality Information Centre. Retrieved 1 March 2016, from <http://www.iaq.gov.hk/en/index.aspx>

	IEQ 9	IAQ in Car Parks
Exclusion		Buildings without carpark or with carpark area less than 10% of construction floor area.
Objective		To ensure the air quality in car parks is within acceptable level.
Credit Attainable	2	
Credit Requirement	2 credits for complying with the recommended CO and NO ₂ level as stipulated in ProPECC PN 2/96.	
Assessment	<u>Criteria</u>	<p>1 credit can be achieved for demonstrating compliance with CO or NO₂ level.</p> <p>Credit compliance shall be demonstrated by measurements. The measurement protocol, i.e. the measuring equipment used, duration of measurements, number of the sampling points, shall be made with reference to the guidelines given in ProPECC PN 2/96 [1].</p> <p>Semi-enclosed car park without any mechanical ventilation shall also be included in the assessment.</p>
	<u>Documentation</u>	<p>The Applicant shall provide the following document:</p> <ol style="list-style-type: none">Measurement report issued by a Hong Kong Accreditation Service (HKAS) accredited IAQ Certificate Issuing Body (CIB) with measurement methodology, number of sampling points required under IAQ Certification Scheme, measuring date, time and conditions of the interiors space, the measurement results and the calibration certificates of the measuring equipment.
Background		CO and NO ₂ are the most relevant air pollutants inside car parks in Hong Kong. As a generalisation, petrol engine vehicles (mainly cars) are the source of most but not all CO while diesel engine vehicles are the source of most but not all NO ₂ in car parks. CO blocks the absorption of oxygen by the blood and this can lead to dizziness, unconsciousness, or death depending on the concentration. NO ₂ affects the lungs and can cause breathing difficulties, prompts asthma attacks and causes long term damage to the lungs.

1 Environmental Protection Department. Practice Notes for Professional Persons. ProPECC PN 2/96. Control of Air Pollution in Car Parks. Retrieved 1 March 2016, from http://www.epd.gov.hk/epd/sites/default/files/epd/english/resources_pub/publications/files/pn96_2.pdf

	IEQ 10	Interior Lighting
Exclusion		None
Objective		To ensure the adequacy and maintenance of visual comfort conditions achieved by the electric lighting provisions in occupied areas.
Credit Attainable		8
Credit Requirement		<p>1 credit for conducting site illuminance measurement.</p> <p>Maximum 3 credits for achieving the prescribed lighting performance in each type of premises, regarding the illuminance and lighting quality as listed below:</p> <ul style="list-style-type: none">i. Maintained illuminance and illuminance uniformity;ii. Achieving the limiting unified glare rating; andiii. Light sources with an appropriate colour rendering index. <p>2 credits for fulfilling the above requirement in tenant's area.</p> <ul style="list-style-type: none">i. 1 credit for assessing not less than 25% of area; andii. 2 credits for assessing not less than 50% of area. <p>1 credit for providing automatic control of artificial lighting such as daylight sensors at perimeter zones and/or occupancy sensor.</p> <p>1 credit for providing individual control of a small group of artificial lighting.</p>
Assessment		<p><u>Criteria</u></p> <p>a) Site Illuminance Measurement</p> <p>The Applicant shall conduct at least one illuminance measurement before certification in each type of premises to obtain the illuminance levels at the reference plane of the task or activity, and the uniformity of the area. The measurement method shall make reference to the CIBSE Code for Lighting [1]</p> <p>b) Prescribed Lighting Performance</p> <p>1 credit can be achieved for demonstrating each of the prescribed lighting performance. 1 or 2 credits can be achieved for demonstrating 25% or 50% of tenant's area fulfils all three prescribed lighting performance.</p>

1 The Chartered Institution of Building Services Engineers. Code for Lighting. London. CIBSE.

Normally occupied areas are enclosed areas where people will stay more than 1 hour there. Examples of normally occupied area can be found in [Appendix 8.1 Glossary](#).

The lighting performance criteria adopted shall be based on authoritative guidance, such as CIE [2,3,4] or CIBSE [1] publications, or equivalent. Compliance with the assessment criteria shall be demonstrated either by measurements using a standardised measurement protocol appropriate to the parameter being assessed, and/or by modelling (calculation), providing the calculation method or software used is based on a standardised method, and uses data/assumptions appropriate to the circumstances.

c) Automatic Control

The Applicant shall provide automatic control of artificial lighting such as daylight sensors at perimeter zone and/or occupancy sensor, where applicable.

d) Individual Control

For single occupant spaces, the Applicant shall provide individual lighting controls that enable occupants to adjust the lighting to suit their individual tasks and preferences. For all shared multi-occupant spaces, the Applicant shall provide zoned control systems that enable occupants to adjust the lighting to meet group needs and preferences.

Documentation

The Applicant shall provide the following documents:

a) Site Illuminance Measurement

i. Measurement report.

b) Prescribed Lighting Performance

- i. The layout plan showing all the normally occupied areas;
- ii. A summary table indicating the maintained illuminance, uniformity, unified glare rating and colour rendering index (by measurements or simulations) at each zone of the normally occupied areas; and
- iii. Catalogues or other supporting documents showing that the colour rendering index of the lighting system.

2 Commission Internationale de l'Eclairage (CIE). Lighting of Indoor Work Places. CIE Standard S 008/E.

3 Commission Internationale de l'Eclairage (CIE). Discomfort Glare in Interior Lighting. CIE 117-1995.

4 Commission Internationale de l'Eclairage (CIE). Calculation and Presentation of Unified Glare Rating Tables for Indoor Lighting Luminaires. CIE 190-2010

c) Automatic Control

- i. Drawings of the automatic control system; and
- ii. Photographs of the sensors.

d) Individual Control

- i. Drawings of the zoned control system; and
- ii. Photographs of the occupied spaces and the control point.

**Measured
Performance**

For lighting installations that are already installed, illuminance on the task area can be measured using a lux meter.

The colour quality of lamps can be assessed from the lamp specifications. Colour appearance (correlated colour temperature) can be checked from the specification provided by the suppliers.

Computation

'Uniformity' which is concerned with illuminance conditions on the task and immediate surroundings.

The uniformity can be calculated according to that described in CIBSE Code for Lighting. The calculated uniformity (minimum to average illuminance) over any task area and immediate surroundings shall not be checked for compliance with the recommendations given in CIBSE Code for Lighting.

The unified glare rating (UGR) can be calculated according to CIBSE Code for Lighting, CIE 117 and CIE 190.

The calculated UGR shall be checked for compliance with the recommendations given in CIE [2] or CIBSE Code for Lighting.

A validated computer program such as Dialux, Radiance and Lightscape etc. can be used for the calculation. The calculated results will then be checked for compliance.

Background

Lighting quality is a complicated subject and is an integration of task performance, visual comfort, social communication, mood, health, safety and well-being and aesthetic judgement. It is also related to economics and the environment in respect of the installation, maintenance and operation of the lighting system.

The uniformity of illuminance distribution on the task area and its surrounding area have a great impact on how quickly, safely and comfortably a person perceives and carries out a visual task. A task area is not usually the entire area of a workstation. On an office desk, for example, the task area may only be about the size of a desk, but in interiors such as drawing offices the visual task may cover the whole area of a drawing board. Where task areas may be located anywhere over an area of a room, the recommendation applies to all potential task areas within that area.

Glare is another important factor which affects lighting quality. It describes the sensation produced by bright areas in the field of view, and may be experienced either as discomfort glare or as disability glare. In any proposed lighting installation, the likelihood of discomfort glare being experienced can be estimated by calculating the UGR.

It is also important for visual performance and the feeling of comfort when objects and human skin are rendered naturally and correctly. To provide an objective indication of the colour rendering properties of a light source, the general colour-rendering index, Ra, has been introduced. The maximum value of Ra is 100, which stands for the quality of natural light, and this figure decreases with decreasing colour-rendering quality.

	IEQ 11	Background Noise
Exclusion		Buildings/ premises which are inherently noisy.
Objective		To control as far as practicable the background noise at appropriate levels to the intended use of the premises.
Credit Attainable	1	
Credit Requirement		1 credit for demonstrating background noise levels from both external sources and building services equipment are within the prescribed criteria.
Assessment		<p>Based on the nature of the building, relaxation shall be allowed in considering the acceptance of this credit. The Applicant shall submit both the design and calculation to justify such relaxation.</p> <p><u>Criteria</u></p> <p>Internal noise level:</p> <ol style="list-style-type: none">i. Office type premises: NR 40;ii. Classrooms and similar premises: NR 35;iii. Residential premises, hotel and apartments: NR 35;iv. Shopping malls (common areas): NR 45; andv. Indoor games halls & indoor swimming pools: NR 50. <p>In case where criteria appropriate to the type and use of premises/ spaces are not stated herein, the Applicant shall provide evidence as to the suitability of the criteria adopted.</p> <p>Compliance shall be demonstrated by detailed calculations, or measurements, or both, depending on the Applicant's preference. The measurement report and/or acoustic calculations shall be endorsed by a Corporate Member of Hong Kong Institute of Acoustics (HKIOA) or equivalent.</p> <p>Internal noise calculations or site measurements shall include at least one sample of each type of occupied space, taking account the worst case condition of exposure to noise sources external to the space, and undertaken during periods appropriate to the usage pattern for the space. Measuring equipment shall conform to the accuracy requirements given in IEC 61672-1 [1] Class 1 requirements, or equivalent standard.</p> <p>For most types of buildings, the assessment shall take into account noise from building services equipment under normal operation mode while for residential units, the assessment shall only consider the external noise sources.</p>

1 International Electrotechnical Commission. IEC 61672-1:2013 Electroacoustics - Sound level meters.

Documentation

The Applicant shall provide the following document:

- i. Acoustic measurement report endorsed by a HKIOA corporate member with valid calibration certificate of sound level meters or calculations to demonstrate compliance of NR level.

Background

The internal noise levels in occupied spaces are important to the well-being of a person. It can have major impacts on the concentration and productivity of the occupants. Higher noise levels may lead to hearing impairment and health hazard.

IEQ 12 Room Acoustics

Exclusion	Buildings/ premises in which speech intelligibility is not important, and rooms of special acoustical nature.
Objective	To improve the acoustical properties of rooms in which speech intelligibility is important.
Credit Attainable	1
Credit Requirement	1 credit for demonstrating that the mid-frequency reverberation time in applicable rooms meets the prescribed criteria of different types of premises.
Assessment	<p>Based on the nature of the building, relaxation shall be allowed in considering the acceptance of this credit. The Applicant shall submit both the design and calculation to justify such relaxation.</p> <p><u>Criteria</u></p> <p>The average reverberation time for mid frequencies (500Hz, 1kHz and 2kHz), shall be:</p> <ol style="list-style-type: none">Office type premises: 0.4 to 0.6s;Classrooms and similar premises: 0.4 to 0.6s;Residential premises, hotels and apartments: 0.4 to 0.6s;Indoor games halls, indoor swimming pools: 1.5 to 2s; andShopping malls (common areas): 1.0 to 1.5s. <p>In case where criteria appropriate to the type and use of premises/ spaces are not stated herein, the Applicant shall provide evidence as to the suitability of the criteria adopted.</p> <p>Compliance shall be demonstrated by detailed calculations, or measurements depending on the Applicant's preference. The measurement report and/or acoustic calculations shall be endorsed by a Corporate Member of Hong Kong Institute of Acoustics or equivalent.</p> <p>The reverberation time shall be assessed using Sabine's formula [1] or similar alternative taking into account the room details and appropriate assumptions about the materials in the space. Measurements during commissioning shall use the method given in ISO 3382 [2] or equal equivalent. The assessment shall include at least one sample of each type of occupied space.</p>

1 I.Sharland. Woods practical guide to noise control. Colchester, England.

2 International Standard Organisation. ISO 3382. Acoustics - Measurement of the reverberation time of rooms with reference to other acoustical parameters.

Documentation

The Applicant shall provide the following document:

- i. Reverberation time measurement or calculation at representative locations with supporting documents of the absorption coefficients.

Background

An important first step in architectural acoustic design is to identify appropriate values of reverberation time for the intended use of a room and then to specify materials to be used in the construction which will achieve the desired value of the reverberation time for a given space and use.

The focus for BEAM Plus is on the acoustical qualities in workplaces such as offices and classrooms, libraries, and retails, etc. Whilst the matter of room acoustics is complex, and defining performance by a single indicator is problematic, an important acoustical measurement is the reverberation time. It is used to determine how quickly sound decays in a room, and offers a relatively simple assessment of acoustical design.

IEQ 13 Noise Isolation

Exclusion	Buildings/ premises which are inherently noisy and unaffected by noise.
Objective	To improve the noise isolation of normally occupied premises/ rooms to reduce impact of noise nuisance and enhance speech privacy.
Credit Attainable	1
Credit Requirement	1 credit for demonstrating airborne noise isolation between rooms, spaces and premises fulfils the prescribed criteria.
Assessment	<u>Criteria</u>

Compliance shall be demonstrated by computer simulation, detailed calculations, or measurements depending on the Applicant's preference. The performance of the weighted Sound Reduction Index (SRI)/ Level Difference shall fulfill the requirements as stated in below table. The measurement report and/or acoustic calculations shall be endorsed by a Corporate Member of Hong Kong Institute of Acoustics or equivalent.

Type of Premises	Weighted SRI	Level Difference
Between offices/ conference rooms/ retails shop/	R_w 44	$D_{nT,w}$ 38
Between hotel rooms/ serviced apartments/ function rooms/ activity rooms	R_w 52	$D_{nT,w}$ 46
Between classrooms	R_w 37	$D_{nT,w}$ 31
Between bedroom to living room (same unit)	R_w 46	$D_{nT,w}$ 40
Between bedroom to bedroom/ living room to living room (different units)	R_w 52	$D_{nT,w}$ 46
Between bedroom to bedroom (same unit)	R_w 44	$D_{nT,w}$ 38

In case where criteria appropriate to the type and use of premises/ spaces are not stated herein, the Applicant shall provide evidence as to the suitability of the criteria adopted

The Applicant shall submit a schedule of the premises and spaces in the building, the noise isolation criteria adopted, relevant partition or slab details as they impact on noise isolation, the rooms/ premises subject to field tests or for which detailed calculations/ simulations have been made, underlying assumptions, and the results of tests or calculations/ simulations demonstrating compliance with the criteria.

Documentation

The Applicant shall provide the following documents:

- i. Layout plan/ elevation drawings showing the location of the partition walls/ slab;
- ii. Construction details of the partition walls/ slab; and
- iii. Calculations/ Computer simulation results/ Field test measurement report endorsed by a Corporate Member of Hong Kong Institute of Acoustics or equivalent.

Note: It is not necessary to submit the construction details of the partitions/ slab if on-site measurement approach is adopted.

Background

The noise transmitted between spaces, through walls and through floors, which are not addressed under the local Building Regulations, but have been a matter for legislation elsewhere.

The extent to which walls and floor can attenuate unwanted noise from neighbours and neighbouring spaces is an important aspect of controlling noise levels in interiors. Ventilation openings, doors, etc., are likely to be the weakest part of the envelope enclosing a space as far as airborne noise transmission is concerned. Guidance on the design of walls and floors, and guidelines for assessing performance is available in the literature [1].

1 British Standards Institution BS8233 – Sound insulation and noise reduction for buildings – Code of Practice.

	IEQ 14	Vibration
Exclusion		None.
Objective		To avoid excessive vibration from building services equipment.
Credit Attainable		1
Credit Requirement		a) Vibration Isolation Devices 1 credit for providing vibration isolation devices for building services equipment. b) Vibration Level 1 credit for vibration levels not exceeding the prescribed criteria.
Assessment		<u>Criteria</u> a) Vibration Isolation Devices The applicant shall demonstrate the building services equipment including fans/ chillers/ pumps/ lift/ cooling tower etc. are provided with appropriate vibration isolation devices. b) Vibration Level Vibration generated from the building services equipment shall be in compliance with the criteria given in ISO 2631-2 [1]. The level of vibration in terms of root mean square acceleration shall be determined by on-site measurement. The vibration measurement report shall be endorsed by a Corporate Member of Hong Kong Institute of Acoustics or equivalent. <u>Documentation</u> The Applicant shall provide the following document(s): a) Vibration Isolation Devices i. Schedule of equipment with vibration isolator; and ii. Photographs showing the vibration isolation devices b) Vibration Level i. Vibration measurement report with valid calibration certificate of instrumentations to demonstrate compliance.

1 International Standard Organisation. ISO2631-2. Evaluation of human exposure to whole-body vibration – Part 2 : Continuous and shock-induced vibration in buildings (1 to 80Hz)

Background

Excessive vibration in buildings can also be a source of annoyance to users. It is possible to mitigate against vibration caused by internal sources, such as building services equipment, through good design by installing vibration isolators. CIBSE [2] provided useful guidance on the selection of vibration isolators.

2 The Chartered Institution of Building Services Engineers. CIBSE guide B5: noise and vibration control for HVAC (CIBSE, 2002)

	IEQ 15	Achievement of IAQwi\$e Certificate
Exclusion		None.
Objective		To encourage building to benchmark and recognise their green management.
Credit Attainable		1
Credit Requirement		1 credit for obtaining the valid IAQwi\$e Certificate of Hong Kong Green Organisation Certification (HKGOC).
Assessment		<p><u>Criteria</u></p> <p>The Applicant shall provide documentation to demonstrate that the IAQwi\$e Certificate in “Good Level” or “Excellence Level” is obtained in the past 12 months or valid at the time of submission.</p> <p><u>Documentation</u></p> <p>The Applicant shall provide the following document:</p> <ul style="list-style-type: none">i. True copy of HKGOC IAQwi\$e Certificate.
Background		<p>HKGOC is led by the Environmental Campaign Committee alongside the EPD in conjunction with the other nine organisations. HKGOC aims to encourage businesses and organisations to adopt environmental practices, benchmark green organisations with achievement in green management, and recognise and acknowledge the efforts of and commitments to the environment [1].</p>

1 Environmental Campaign Committee (ECC). The Hong Kong Awards for Environmental Excellence. Retrieved 1 March 2016, from <http://www.hkaee.gov.hk/eindex.html>

	IEQ 16	Educational and Promotional Programme
Exclusion		None.
Objective		To encourage behavioural change through educational and promotional programme.
Credit Attainable		2
Requirement		<p>2 credits for Building Owner/ Building Management Company to educate and advocate the behavioural change of building users in respect of Indoor Environmental Quality by:</p> <ul style="list-style-type: none">i. Organising educational seminar/ promotion campaign; orii. Promoting or participating in Hong Kong Green Building Week organised by Construction Industry Council (CIC) and the Hong Kong Green Building Council Limited (HKGBC).
Assessment		<p><u>Criteria</u></p> <p>Credits can be achieved when the Applicant organises at least one of the activities within the 1 year period at the time of submission.</p> <p><u>Documentation</u></p> <p>The Applicant shall provide the following documents:</p> <ul style="list-style-type: none">i. Promotional materials such as posters, notice of the programme; andii. Record photographs.
Background		BEAM Plus encourages the Applicant to transfer knowledge through seminar or exhibition for building users, so that they can acquire necessary knowledge, shape the standings and behaviour.

	IEQ 17	Innovative Techniques/ Performance Enhancements
Exclusion		None.
Objective		To encourage adoption of practices, new technologies and techniques in respect of Indoor Environmental Quality that have yet to find application in Hong Kong or provide for performance enhancements over and above stated performance criteria in BEAM Plus for Existing Buildings.
Credit Attainable		2 Bonus
Requirement		a) Innovative Techniques 1 Bonus credit for applying innovation technique in respect of Indoor Environmental Quality that will improve the performance of the building. b) Performance Enhancements 1 Bonus credit for building with exemplary performance over and above the criteria identified in Indoor Environmental Quality of the BEAM Plus for Existing Buildings.
Assessment		<u>Criteria</u> a) Innovative Techniques The onus will be on the Applicant to present the evidence of the application of new practices, technologies and techniques and the associated environmental benefits. The Applicant shall provide a submission which identifies the intent of the proposed innovative technique and quantifies environmental benefits through its application. The Assessor shall refer the submission to BSL TRC who will consider each application on its merit. The Bonus credit shall be granted at the sole discretion of BSL TRC. b) Performance Enhancements The onus will be on the Applicant to present evidence of the performance compared to the existing criteria. The Applicant shall provide a submission which identifies the proposed application and quantifies its exemplary performance over and above the criteria identified in Indoor Environmental Quality of the BEAM Plus for Existing Buildings. The Assessor shall refer the submission to BSL TRC who will consider each application on its merit. The Bonus credit shall be granted at the sole discretion of BSL TRC.

Documentation

The Applicant shall provide the following documents:

a) Innovative Techniques

- i. Narrative to indicate the innovative techniques;
- ii. Calculation quantifying environmental benefits through application of proposed innovation technique; and
- iii. Record photographs.

b) Performance Enhancements

- i. Calculation quantifying exemplary performance over and above the criteria identified in Indoor Environmental Quality of the BEAM Plus for Existing Buildings through proposed application; and
- ii. Record photographs.

Background

BEAM Plus encourages the Applicant to incorporate innovative techniques and green practices into their building so as to realise the associated environmental benefits, which related to sustainable living, improved comfort, lower water consumption, reduced pollution.

8 Appendix

8.1 Glossary

Alternative Assessment Method	Proposed criteria and assessment method submitted by Applicants when seeking alternative means of compliance with a particular credit.
Appeals	The process whereby Applicant's may appeal, a separate published charge, the allocation of individual credits, with First Appeal submissions reviewed by the BSL TRC and Final Appeals handled by HKGBC.
Applicant	The party authorised to seek BEAM Plus certification of the project (typically the client, occupier, tenant or representative therefore) whose will form a contractual relationship with HKGBC and BSL in the certification process.
Baseline	A line serving as the basis for comparison in Performance-based approach.
BEAM Assessors	A person engaged to conduct an independent assessment of the Project submissions on behalf of BSL and validated by BSL TRC.
BEAM Plus Category	In BEAM Plus for Existing Buildings, BEAM Plus Section refers to assessment sections such as MAN P1 - Green Purchasing Plan, MWA P1 - Waste Recycling Facilities, etc.
BEAM Plus Framework	The rating systems, assessment standards, credit criteria, training and examination processes applied to certification and accreditation under BEAM Plus for New Buildings, Existing Buildings and Interiors.
BEAM Plus Grading	The outcome of a certification assessment of a building expressed as a performance level of Bronze (above average), Silver (good), Gold (very good) or Platinum (excellent).
BEAM Pro	A trained professional engaged by the Applicant to help integrate sustainability measures into the project and facilitate information submissions for assessment.
BEAM Affiliate	A BEAM Affiliate is a person accredited by the HKGBC as being competent to support green building design, construction and operations. The credential provides an individual who cannot yet meet the BEAM Pro requirement with an alternative route to become a BEAM Pro.
BEAM Society Limited	The independent, not-for-profit, member-based organisation that owns and operates BEAM Plus and undertakes assessments, training and examinations as a basis for certification and accreditation by HKGBC.
BSL Coordinator	An officer of the BSL that maintains day-to-day liaisons between the Applicant, the BSL, and the assigned BAS for the project.
Building Management System	BMS uses computer-based monitoring to coordinate, organise, and optimise building control subsystems, including HVAC, lighting, equipment scheduling, and alarm reporting. Sometimes known as Building Automation System.

Central Building Services	Independent central plant equipment (i.e. air-conditioning, lighting, electrical installations and lifts and escalators) in the host building that are controlled by the landlord and not by the Applicant.
Certificate Validity	The duration for which a BEAM Plus certificate and grading remain effective and officially recognised by the BSL.
Certification Scope	The construction floor area of the project, defined by the footprint or boundary of the space being leased or occupied, and its associated interfaces with its surroundings.
Chloro-fluorocarbons	CFCs cause ozone depletion when released into the atmosphere.
Commissioning	The process of putting Building Services systems into active service. This includes testing and adjusting HVAC, electrical, plumbing and other systems to assure proper balancing and adherence to design criteria, and instructing building representatives in their use.
Compliance	Demonstration of fulfilment of a particular credit requirement under BEAM Plus, furnished through the provision of information as specified in the relevant grading system and submission template.
Credit	In BEAM Plus Existing Buildings, Credit refers to credit(s) allocated for each BEAM Plus Section and credits are used to determine the category grade and overall grade according to the number of credits achieved.
Credit Interpretation Request	The process whereby Applicants can seek technical and administrative guidance from BSL TRC on the application of BEAM Plus credits to their projects.
Embodied energy	Embodied energy is the energy used during the entire life cycle of a product, including its manufacture, transportation, and disposal, as well as the inherent energy captured within the product itself.
Environmentally Manufactured Materials	Materials that are produced by manufacturer with a recognised environmental management system, EMS in place (such as ISO 14001:2004). The EMS shall help the manufacturer minimise how their operations (processes etc.) negatively affect the environment (i.e. cause adverse changes to air, water, or land), comply with applicable laws, regulations, and other environmentally oriented requirements, and continually improve in the above.
Exfiltration	Air leakage through cracks and interstices and through the ceilings, floors, walls and the envelope.
Exhaust air	Air is removed from a space and discharged outside the building by mechanical or natural ventilation systems.
FSC Certification	A certification system for timber products which confirms that timber has been harvested in a sustainable manner.
Global Warming Potential	GWP provides a measure of the potential for damage that a chemical has relative to one unit of carbon dioxide, the primary greenhouse gas.
Green cleaning	Green cleaning is the use of cleaning products and practices that have lower environmental impacts than conventional products and practices.

Hong Kong Green Building Council Limited	The industry body established in 2009 to coordinate efforts towards green building in Hong Kong. HKGBC certifies BEAM Plus projects and accredits BEAM Pro and BAS.
Hydro-chlorofluorocarbons	HCFCs cause ozone depletion when released into the atmosphere.
Hydro-fluorocarbons	HFCs are commonly used to replace HCFC refrigerants to reduce the OPD, however HFCs refrigerants have a high GWP.
Infiltration	Infiltration is uncontrolled air leakage into conditioned spaces through unintentional openings in ceilings, floors, and walls from unconditioned spaces or the outdoors.
MVAC	Mechanical ventilation and air-conditioning installations.
Normally Occupied Areas	Normally occupied areas are enclosed areas where people normally spend more than 1 hour there. Examples include activity room, auditorium, conference room, classroom, exhibition hall, hotel guest room, hotel lobby, indoor swimming pool and sport hall, library, lecture theatre, office, restaurant, retail shop, etc.
Not Normally Occupied Areas	Not normally occupied areas are enclosed areas where people normally stay less than 1 hour there. Examples includes corridors, entrance and lift lobby (except hotel lobby), locker room, plantroom, stairway etc.
Ozone Depleting Potential	ODP of a chemical compound is the relative amount of degradation to the ozone layer it can cause.
Performance Categories	The areas into which BEAM Plus criteria are divided based on their influence on the sustainability performance of a project (site, design and construction management, materials, energy use, water use, indoor environmental quality, innovations and performance enhancements).
Potable Water	Water that is safe enough to be consumed by humans, or used with low risk of immediate or long-term harm. Although the quality of water supplied to buildings in Hong Kong is strictly controlled, the quality of water drawn from consumers' taps may sometimes be affected by the condition of the inside plumbing such as discolouration from rusty pipes. Consumers are responsible for proper maintenance of internal plumbing and are required to engage a licensed plumber if the water quality is found to be affected due to defects in the inside plumbing.
Pre-requisite	Assigned credits, either legal requirements or key performance aspects (relating to management, materials aspects and water use), that must be satisfied to start the BEAM Plus assessment and obtain the certification.
Project space	The BEAM Plus for Existing Buildings certified area.
Registration/ Registered Projects	The first step in seeking formal certification under BEAM Plus. Registered projects, subject to payment of a specified fee, are listed within the BSL projects database for public information.
Submissions Documents	Documentation (including drawings, specifications, photographs, reports, signed confirmations, etc., as specified under each BEAM Plus credit) required by the BSL to conduct the certification assessment of a project.

Technical Review Committee	The committee within the BSL that oversees the implementation and progress monitoring of BEAM Plus certification assessments, and resolves technical issues and Credit Interpretation Request.
Unitary air-conditioning unit	As defined in decentralised air-conditioning system.
Variable refrigerant flow	Variable refrigerant volume flow in a unitary air-conditioner where the cooling supply to the conditioned space is adjusted by modulating the flow of refrigerant.
Variable speed drive	A motor drive that controls the motor speed over a continuous range. This usually refers to the motor drive for HVAC's fans or pumps.