NON-RESIDENTIAL EXISTING BUILDING (NREB): HOTEL

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CONTENTS

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INTRODUCTION

WHAT IS THE GREEN BUILDING INDEX (GBI)?

The Green Building Index is an environmental rating system for buildings developed by PAM (Pertubuhan Arkitek Malaysia / Malaysian Institute of Architects) and ACEM (the Association of Consulting Engineers Malaysia). The Green Building Index is Malaysia's first comprehensive rating system for evaluating the environmental design and performance of Malaysian buildings based on the six (6) main criterias of Energy Efficiency, Indoor Environment Quality, Sustainable Site Planning & Management, Materials & Resources, Water Efficiency, and Innovation.

The Green Building Index is fundamentally derived from existing international rating tools, including the Singapore Green Mark and the Australian Green Star system, but extensively modified for relevance to the Malaysian tropical weather, environmental context, cultural and social needs.

This PAM/ACEM GBI initiative aims to assist the building industry in its march towards sustainable development. The GBI environmental rating system is created to:

- **Define green building by establishing a common language and standard of measurement;**
- **Promote integrated, whole-building design;**
- **Recognise and reward environmental leadership;**
- **Transform the built environment to reduce the environmental impact of development; and**
- **Ensure new buildings remain relevant in the future and existing buildings are refurbished and thereafter sustained properly to remain relevant.**

WHO CAN USE THE GREEN BUILDING INDEX (NON-RESIDENTIAL)?

PAM/ACEM encourage all members of Project Teams, Building owners, Developers and other interested parties (including Contractors, Government and Design and Build Contractors) to use the Green Building Index to validate environmental initiatives of the design phase of new non-residential construction or base non-residential building refurbishment; or construction and procurement phase of non-residential buildings. Use of the Green Building Index is encouraged on all such projects to assess and improve their environmental attributes.

Use of the Green Building Index (Non-Residential) tool without formal certification by an independent accredited GBI Certifier does not entitle the user or any other party to promote the Green Building Index rating achieved. No fee is payable to PAM/ACEM for such use, however formal recognition of the Green Building Index rating - and the right to promote same - requires undertaking the formal certification process offered by PAM/ACEM.

Whilst GBI NREB is a generic rating tool for Office Buildings, GBI NREB:HOTEL is a bespoke rating tool developed for Hotels.

All Green Building Index rating tools are reviewed annually; please forward any feedback to info@pam.org.my.

PROJECT INFORMATION

PROJECT NAME		
PROJECT REGISTRATION NO.		
PROJECT ADDRESS		
	POSTCODE	STATE
CONSTRUCTION TYPE		
TOTAL GROSS FLOOR AREA (GFA)		
LAND AREA (FOR LANDED PROPERTY)		
REGISTRATION FEE (EXCLUDING GST)		
TARGETTED RATING		
TOTAL POINTS CLAIM		
EXPECTED CONSTRUCTION DATE	COMMENCED	COMPLETION
DATE BUILDING COMPLETED (NREB/IEB ONLY)		
PROJECT DESCRIPTION & MAJOR DESIGN FEATURES		

CONSULTANTS INFORMATION

OWNER'S NAME		
COMPANY		
OWNER'S REPRESENTATIVE	NAME	DESIGNATION

ARCHITECT	NAME	PROFESSIONAL REG. NO.	COMPANY
CIVIL ENGINEER	NAME	PROFESSIONAL REG. NO.	COMPANY
STRUCTURAL ENGINEER	NAME	PROFESSIONAL REG. NO.	COMPANY
MECHANICAL ENGINEER	NAME	PROFESSIONAL REG. NO.	COMPANY
ELECTRICAL ENGINEER	NAME	PROFESSIONAL REG. NO.	COMPANY
QUANTITY SURVEYOR	NAME	PROFESSIONAL REG. NO.	COMPANY
LAND SURVEYOR	NAME	PROFESSIONAL REG. NO.	COMPANY
LANDSCAPE ARCHITECT	NAME	PROFESSIONAL REG. NO.	COMPANY
COMMISSIONING SPECIALIST (CxS)	NAME	PROFESSIONAL REG. NO.	COMPANY
GBI FACILITATOR	NAME	PROFESSIONAL REG. NO.	COMPANY
OTHER SPECIALIST CONSULTANT(S)			
MAIN CONTRACTOR			
LOCAL AUTHORITY			

DETAIL ASSESSMENT CRITERIA
SUMMARY OF FINAL SCORE

PART	ITEM	MAXIMUM POINTS	SCORE
1	Energy Efficiency (EE)	38	
2	Indoor Environmental Quality (EQ)	21	
3	Sustainable Site Planning & Management (SM)	10	
4	Material & Resources (MR)	9	
5	Water Efficiency (WE)	12	
6	Innovation (IN)	10	
	TOTAL SCORE	**100**	

GREEN BUILDING INDEX CLASSIFICATION:

POINTS	GBI RATING
86 to 100 points	Platinum
76 to 85 points	Gold
66 to 75 points	Silver
50 to 65 points	Certified

DETAIL ASSESSMENT CRITERIA
SUMMARY OF CONTENTS

PART	CRITERIA	ASSESSMENT CRITERIA	POINTS	TOTAL
	EE	**ENERGY EFFICIENCY**		
1	**Design & Performance**			38
	EE1	Minimum EE Performance	2	
	EE2	Lighting Zoning	3	
	EE3	Electrical Sub-metering	2	
	EE4	Renewable Energy	5	
	EE5	Advanced or Improved EE Performance - BEI	15	
	Commissioning			
	EE6	Enhanced or Re-commissioning	4	
	EE7	On-going Post Occupancy Commissioning	2	
	Monitoring, Improvement & Maintenance			
	EE8	EE Monitoring & Improvement	2	
	EE9	Sustainable Maintenance	3	
2	**EQ**	**INDOOR ENVIRONMENTAL QUALITY**		
	Air Quality			21
	EQ1	Minimum IAQ Performance	1	
	EQ2	Environmental Tobacco Smoke (ETS) Control	1	
	EQ3	Carbon Dioxide Monitoring and Control	1	
	EQ4	Indoor Air Pollutants	2	
	EQ5	Mould Prevention	1	
	Thermal Comfort			
	EQ6	Thermal Comfort: Controllability of Systems	2	
	EQ7	Air Change Effectiveness	1	
	Lighting, Visual & Acoustic Comfort			
	EQ8	Daylighting	2	
	EQ9	Daylight Glare Control	1	
	EQ10	Electric Lighting Levels	1	
	EQ11	High Frequency Ballasts	1	
	EQ12	External Views	2	
	EQ13	Internal Noise Levels	1	
	Verification			
	EQ14	IAQ Before/During Occupancy	2	
	EQ15	Occupancy Comfort Survey: Verification	2	
3	**SM**	**SUSTAINABLE SITE PLANNING & MANAGEMENT**		
	Facility Management			10
	SM1	GBI Rated Design & Construction	1	
	SM2	Building Exterior Management	1	
	SM3	Integrated Pest Management, Erosion Control & Landscape Mgt	1	
	Transportation			
	SM4	Green Vehicle Priority	1	
	SM5	Parking Capacity	1	
	Reduce Heat Island Effect			
	SM6	Greenery & Roof	4	
	SM7	Building User Manual	1	

DETAIL ASSESSMENT CRITERIA
SUMMARY OF CONTENTS (CONTINUED)

PART	CRITERIA	ASSESSMENT CRITERIA	POINTS	TOTAL
4	**MR**	**MATERIALS & RESOURCES**		
	Reused & Recycled Materials			9
	MR1	Material Reuse and Selection	1	
	MR2	Recycle Content Materials	1	
	Sustainable Materials & Resources and Policy			
	MR3	Sustainable Timber	1	
	MR4	Sustainable Purchasing Policy	1	
	Waste Management			
	MR5	Storage, Collection & Disposal of recyclables	3	
	Green Products			
	MR6	Refrigerants & Clean Agents	2	
5	**WE**	**WATER EFFICIENCY**		
	Water Harvesting & Recycling			12
	WE1	Rainwater Harvesting	3	
	WE2	Water Recycling	2	
	Increased Efficiency			
	WE3	Water Efficient - Irrigation/Landscaping	2	
	WE4	Water Efficient Fittings	3	
	WE5	Metering & Leak Detection System	2	
6	**IN**	**INNOVATION**		
	IN1	Innovation & Environmental Initiatives	9	10
	IN2	Green Building Index Facilitator	1	
			TOTAL POINTS	**100**

1 ENERGY EFFICIENCY (EE)

DESIGN & PERFORMANCE | COMMISSIONING | MONITORING, IMPROVEMENT & MAINTENANCE

38 POINTS

ITEM	AREA OF ASSESSMENT	DETAIL POINTS ALLOCATED	MAX POINTS	SCORE
DESIGN & PERFORMANCE				
EE1	**MINIMUM EE PERFORMANCE (MANDATORY COMPLIANCE)**			
	Establish minimum energy efficiency (EE) performance to reduce energy consumption in buildings, thus reducing CO_2 emission to the atmosphere. Meet the following minimum EE requirements as stipulated in MS 1525:		**2**	
	a. OTTV ≤ 50, RTTV ≤ 25, Roof U-Value ≤ 0.4 (Light weight) or ≤ 0.6 (Heavy weight). Submit calculations (use of the BEIT software or other GBI approved software is acceptable), ***AND***	1		
	b. Provision of Energy Management Control system where Air-conditioned space ≥ 4000 m^2.	1		
EE2	**LIGHTING ZONING**			
	Provide flexible lighting controls to optimise energy savings:-		**3**	
	All individual or enclosed spaces to be individually switched; and the size of individually switched lighting zones shall not exceed 30m^2 for 90% of the NLA; with switching clearly labelled and easily accessible by building occupants.	1		
	Provide auto-sensor controlled lighting in conjunction with daylighting strategy for all perimeter zones and daylit areas, if any	1		
	Provide motion or occupancy sensors or equivalent to complement lighting zoning equivalent to at least 25% NLA. For guestroom, master switch or access card switch or equiv to switch off all lights, fan, tv and airconditioning when room is not occupied will qualify as occupancy sensor.	1		
EE3	**ELECTRICAL SUB-METERING & TENANT SUB-METERING**			
	Monitor energy consumption of key building services as well as all tenancy areas:-		**2**	
	Provide sub-metering for all energy use ≥ 100kVa.	1		
	Provide separate sub-metering for lighting and/or power at each floor or tenancy.	1		
EE4	**RENEWABLE ENERGY**			
	Encourage use of renewable energy:-		**5**	
	Where 0.25 % of the Maximum electricity Demand (M.D.) or total electricity consumption, or 2 kWp (PV or equiv) whichever is the greater is generated by renewable energy, ***OR***	1		
	Where 0.5 % of the M.D. or total electricity consumption, or 5 kWp (PV or equiv) whichever is the greater is generated by renewable energy, ***OR***	2		
	Where 1.0 % of the M.D. or total electricity consumption, or 10 kWp (PV or equiv) whichever is the greater is generated by renewable energy, ***OR***	3		
	Where 1.5 % of the M.D. or total electricity consumption, or 20 kWp (PV or equiv) whichever is the greater is generated by renewable energy, ***OR***	4		
	Where 2.0 % of the M.D. or total electricity consumption, or 40 kWp (PV or equiv) whichever is the greater is generated by renewable energy.	5		
EE5	**ADVANCED OR IMPROVED EE PERFORMANCE**			
	Exceed Energy Efficiency (EE) performance better than the baseline minimum to reduce energy consumption in the building. Achieve Building Energy Intensity (BEI) as defined by GBI for the following corresponding credit points. The default operating hours for Hotel is 24/7. Non-electricity fuel energy is excluded in the BEI calculation. BEI_1 values listed below apply to Hotel consisting of minimal supporting facilities such as budget type hotel, hotel rated 3-Star & below, and service apartments. BEI_2 values apply to Hotel rated 4-Star & above and where not less than 25% of its GFA (excluding carpark area) comprises Back-of-the-House (BOTH) facility and other high energy intensity facilities such as F&B outlets, convention halls, ballroom/s, function rooms, etc.		**15**	
	BEI_1 ≤ 200, BEI_2 ≤ 290, ***OR***	2		
	BEI_1 ≤ 190, BEI_2 ≤ 270, ***OR***	3		
	BEI_1 ≤ 175, BEI_2 ≤ 250, ***OR***	5		
	BEI_1 ≤ 160, BEI_2 ≤ 233, ***OR***	8		
	BEI_1 ≤ 150, BEI_2 ≤ 212, ***OR***	10		
	BEI_1 ≤ 135, BEI_2 ≤ 195, ***OR***	12		
	BEI_1 ≤ 120, BEI_2 ≤ 175	15		

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ITEM	AREA OF ASSESSMENT	DETAIL POINTS ALLOCATED	MAX POINTS	SCORE
DESIGN & PERFORMANCE				
EE5	**ADVANCED OR IMPROVED EE PERFORMANCE**			
	OR II) Demonstrate Energy savings over the last 3 years from Existing Building historical BEI baseline, to improve by:		**15**	
	≥ 20% AND with resultant $BEI_1 \leq 267$ or $BEI_2 \leq 387$	2		
	≥ 25% AND with resultant $BEI_1 \leq 228$ or $BEI_2 \leq 324$	3		
	≥ 30% AND with resultant $BEI_1 \leq 200$ or $BEI_2 \leq 290$	5		
	≥ 40% AND with resultant $BEI_1 \leq 190$ or $BEI_2 \leq 270$	8		
	≥ 50% AND with resultant $BEI_1 \leq 175$ or $BEI_2 \leq 250$	10		
	≥ 60% AND with resultant $BEI_1 \leq 160$ or $BEI_2 \leq 233$	12		
	≥ 70% AND with resultant $BEI_1 \leq 150$ or $BEI_2 \leq 212$	15		
COMMISSIONING				
EE6	**ENHANCED COMMISSIONING/RE-COMMISSIONING/RETRO COMMISSIONING OF BUILDING ENERGY SYSTEMS**			
	Ensure building's energy related systems are properly commissioned so as to realise their full potential. Appoint a GBI recognised Commissioning Specialist (CxS) to perform the commissioning for all the building's energy related systems in accordance with ASHRAE Commissioning Guideline or other GBI approved equivalent standard by:- a) Implement improvements to ensure building's major energy using systems are repaired, operated and maintained effectively to optimize energy performance. b) Develop a commissioning or ongoing commissioning plan for the building's major energy-using systems. c) Provide training for management staff to build awareness and skills in a broad range of sustainable building operations topics, including energy efficiency and building, equipment and systems operations and maintenance. d) Update the building operating plan as necessary to reflect any changes in the occupancy schedule, equipment runtime schedule, design set points and lighting levels.	4	**4**	
EE7	**ON-GOING POST OCCUPANCY COMMISSIONING**			
	Carry out up-to-date on-going post occupancy commissioning for all tenancy areas after fit-out changes are completed, if any.		**2**	
	a) Professional Engineer shall review all tenancy fit-out plans to ensure original design intent is not compromised and sign off the completed works.	1		
	b) CxS shall carry out re-commissioning of the building's energy related systems for the affected tenancy areas.	1		
MONITORING, IMPROVEMENT & MAINTENANCE				
EE8	**EE MONITORING & IMPROVEMENT**			
	1. Use Energy Management System (or have a dedicated Energy Management Team) to monitor and analyse energy consumption including reading of sub-meters.	1	**2**	
	2. Fully commission and activate Maximum Demand Limiting programme (where EMS is not provided and air-conditioned area is < 4,000m^2, the dedicated Energy Management Team to demonstrate EE operational strategy), ***AND***	1		
	Compile, summarise and submit BEI, Fuel and Water Consumption of the building to GBI on an annual basis during the 3-years validity period or earlier whenever requested by GBI. Submissions shall include monthly energy and water bills.			
EE9	**SUSTAINABLE MAINTENANCE**			
	Ensure the building's energy related systems will continue to perform as intended with proper and sustainable maintenance:-		**3**	
	a) At least 75% of permanent building maintenance team to participate in the commissioning of all building energy services.	1		
	b) Provide for a designated building maintenance office that is fully equipped with facilities (including tools and instrumentation) and inventory storage,	1		
	c) Provide evidence of documented plan for at least 3-year facility maintenance and preventive maintenance budget (inclusive of staffing and outsourced contracts).	1		
	EE SUB-TOTAL	**38**	**38**	**0**

2 INDOOR ENVIRONMENTAL QUALITY (EQ)

AIR QUALITY | THERMAL COMFORT | LIGHTING, VISUAL & ACOUSTIC COMFORT | VERIFICATION

21 POINTS

ITEM	AREA OF ASSESSMENT	DETAIL POINTS ALLOCATED	MAX POINTS	SCORE
AIR QUALITY				
EQ1	**MINIMUM IAQ PERFORMANCE**			
	Establish minimum indoor air quality (IAQ) performance to enhance indoor air quality in building, thus contributing to the comfort and well-being of the occupants:-		**1**	
	Meet the minimum requirements of ventilation rate in ASHRAE 62.1 or the local building code whichever is the more stringent.	1		
EQ2	**ENVIRONMENTAL TOBACCO SMOKE (ETS) CONTROL**			
	Minimize exposure of building occupants, indoor surfaces, and ventilation air distribution systems to Environmental Tobacco Smoke (ETS):-		**1**	
	a) Prohibit smoking in the building and locate any exterior designated smoking areas away from entries, outdoor air intakes and operable windows ***OR***	1		
	b) Prohibit smoking in the building except in designated smoking rooms and establish negative pressure in the smoking rooms together with provision of effective air filtration system.	1		
EQ3	**CARBON DIOXIDE MONITORING AND CONTROL**			
	Provide response monitoring of carbon dioxide levels to ensure delivery of minimum outside air requirements:-		**1**	
	Install carbon dioxide (CO_2) monitoring and control system with at least one (1) CO_2 sensor at all main return points on each floor to facilitate continuous monitoring and adjustment of outside air ventilation rates to each floor, and ensure independent control of ventilation rates to maintain CO_2 level ≤ 1,000 ppm.	1		
EQ4	**INDOOR AIR POLLUTANTS**			
	Reduce detrimental impact on occupant health from finishes that emit internal air pollutants:		**2**	
	Use low VOC paint and coating throughout the building. Paints and Coatings to comply with requirements specified in international labelling schemes recognized by GBI, ***AND*** Use low VOC carpet or flooring throughout the building. Carpets to comply with requirements specified in international labelling schemes recognized by GBI. Other types of flooring to comply with requirements under FloorScore developed by Science Certification System or equivalent, ***AND*** Use low VOC adhesive and sealant or no adhesive or sealant used.	1		
	Use products with no added urea formaldehyde. These include: 1) Composite wood and agrifiber products defined as: particleboard, medium density fiberboard (MDF) plywood, wheatboard, strawboard, panel substrates and door cores, ***AND*** 2) Laminating adhesives used to fabricate on-site and shop-applied composite wood and agrifiber assemblies, ***AND*** 3) Insulation foam, ***AND*** 4) Draperies	1		
EQ5	**MOULD PREVENTION**			
	Design system(s) which reduce the risk of mould growth and its associated detrimental impact on occupant health: Where it is demonstrated that the mechanical air-conditioned ventilation system will maintain a positive indoor air pressure relative to the exterior and can actively control indoor air humidity to be no more than 70% RH without the use of active control that will consume additional energy. Ensure that excessive moisture in building is controlled during the retrofit Design, Construction and Operation stages by the consideration and the control of the following: 1) Rainwater leakage through roof and walls 2) Infiltration of moist air 3) Diffusion of moisture through walls, roof and floors 4) Groundwater intrusion into basements and crawl spaces through walls and floors 5) Leaking or burst pipes 6) Indoor moisture sources 7) Construction moisture, ***OR*** The building is fully naturally ventilated	1	**1**	

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ITEM	AREA OF ASSESSMENT	DETAIL POINTS ALLOCATED	MAX POINTS	SCORE
THERMAL COMFORT				
EQ6	**THERMAL COMFORT: CONTROLLABILITY OF SYSTEMS**			
	Provide a high level of thermal comfort system control by individual occupants or by specific groups in multi-occupant spaces to promote the productivity, comfort and well-being of building occupants:-		**2**	
	Provide individual comfort controls for ≥ 50% of the building occupants to enable adjustments to suit individual task needs and preferences. ***AND*** Provide comfort system controls for all shared multi-occupant spaces to enable adjustments to suit group needs and preferences.	2		
	Conditions for thermal comfort include the primary factors of air temperature, radiant temperature, air speed and humidity. Comfort system control for this purpose is defined as the provision of control over at least one of these primary factors in the occupants' local environment.			
EQ7	**AIR CHANGE EFFECTIVENESS**			
	Provide effective delivery of clean air through reduced mixing with indoor pollutants in order to promote a healthy indoor environment. Demonstrate that the Air Change Effectiveness (ACE) meets the following criteria for at least 50% of the NLA (excluding Guestroom Floors and Back-of-the-House Areas): The ventilation systems are designed to achieve an ACE of ≥0.95 when measured in accordance with ASHRAE 129: Measuring air change effectiveness where ACE is to be measured in the breathing zone (nominally 1.0 m from finished floor level). Displacement ventilation or task-air ventilation are deemed to meet ACE requirement without need for design simulation and measurement upon completion.	1	**1**	
LIGHTING, VISUAL & ACOUSTIC COMFORT				
EQ8	**DAYLIGHTING**			
	Provide good levels of daylighting for building occupants:-		**2**	
	Demonstrate that ≥ 30% of the NLA has a daylight factor in the range of 1.0 – 3.5%, ***OR***	1		
	Demonstrate that ≥ 50% of the NLA has a daylight factor in the range of 1.0 – 3.5%.	2		
	Ballrooms and function rooms which require 'black out' conditions are exempted from Daylighting NLA computation.			
EQ9	**DAYLIGHT GLARE CONTROL**			
	Reduce discomfort of glare from natural light. Where blinds or screens are fitted on all glazing and atrium as a base building, incorporate provisions to meet the following criteria; a) Eliminate glare from all direct sun penetration and keep horizontal workspace lux level below 2000; ***AND*** b) Eliminate glare from diffuse sky radiation for occupant workspace at viewing angles of 15° to 60° from the horizontal at eye level (typically 1.2m from floor level); ***AND*** c) Control with an automatic monitoring system (for atrium and windows with incident direct sun light only - not applicable for fixed blinds/screens); ***AND*** d) Equip with a manual override function accessible by occupants (not applicable for fixed blinds/screens)	1	**1**	
EQ10	**ELECTRIC LIGHTING LEVELS**			
	Baseline building lighting not to be over designed:-		**1**	
	Demonstrate that lighting designs for different spaces of the building maintain luminance levels of no more than specified in MS1525 for 90% of NLA.	1		
EQ11	**HIGH FREQUENCY BALLASTS**			
	Increase workplace amenity by avoiding low frequency flicker that may be associated with fluorescent lighting:-		**1**	
	Install high frequency ballasts for at least 90% of all fluorescent luminaires used.	1		

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ITEM	AREA OF ASSESSMENT	DETAIL POINTS ALLOCATED	MAX POINTS	SCORE
LIGHTING, VISUAL & ACOUSTIC COMFORT				
EQ12	**EXTERNAL VIEWS**			
	Reduce eyestrain for building occupants by allowing long distance views and provision of visual connection to the outdoor.		**2**	
	Reduce eyestrain for building occupants by allowing long distance views and provision of visual connection to the outdoor. Ballrooms and function rooms which require 'black out' conditions are exempted from this NLA computation.			
	Demonstrate that ≥ 60% of the NLA has a direct line of sight through vision glazing at a height of 1.2m from floor level.	1		
	Demonstrate that ≥ 75% of the NLA has a direct line of sight through vision glazing at a height of 1.2m from floor level.	2		
EQ13	**INTERNAL NOISE LEVELS**			
	Maintain internal noise levels at an appropriate level. Demonstrate that 90% of the NLA do not exceed the following ambient internal noise levels:- Within the entire baseline building general office, space noise from the building services does not exceed 40dBAeq. ***OR*** Within the baseline building office space, the sound level does not exceed 45dBAeq for open plan and not exceed 40dBAeq for closed offices. *Note that internal noise level thresholds for areas other than office shall not exceed values stipulated in ASHRAE Standard or other GBI approved Standards, Code of Practice or Design Guides; e.g. CIBSE Guide.*	1	**1**	
VERIFICATION				
EQ14	**IAQ BEFORE/DURING OCCUPANCY**			
	Reduce indoor air quality problems resulting from the construction process (or inherent conditions) in order to improve and sustain the comfort and well-being of building occupants. Develop and implement an Indoor Air Quality (IAQ) Management Plan to effect this requirement as follows:- a) Perform a building flush out by supplying outdoor air to provide not less than 10 airchanges/hour for at least 30 minutes operation and continuous minimum 1 ACH for the next 14 days. ***OR*** b) If low VOC materials and low formaldehyde composite wood are used, then building flush out can be performed by supplying outdoor air to provide not less than 10 airchanges/hour for at least 15 minutes operation or not less than 6 airchanges/hour for at least 30 minutes operation and continuous 1ACH for the next 7 days. ***OR*** c) Conduct IAQ testing to demonstrate maximum concentrations for pollutants are not exceeded according to the Indoor Air Quality Code of Malaysia.	1	**2**	
	Permanent Air Purging System: Where a permanent air flushing system of at least 10 airchanges/hour operation is installed and operated at least once a year during occupancy stage.	1		
EQ15	**OCCUPANCY COMFORT SURVEY: VERIFICATION**			
	Provide for the assessment of comfort of the building occupants:-		**2**	
	Conduct an occupancy comfort survey of building occupants. This survey should collect anonymous responses about thermal comfort, visual comfort and acoustic comfort in a building. It should include an assessment of overall satisfaction with thermal, visual and acoustic performance and identification of thermal-related, visual-related and acoustic-related problems. ***AND*** Develop a plan for corrective action if the survey results indicate that more than 20% of occupants are dissatisfied with the overall comfort in the building. This plan should include measurement of relevant environmental variables in problem areas. *The relevant environmental variables include 1) Temperature, relative humidity, air speed and mean radiant temperature, 2) Lighting level and glare problem, 3) Background noise level, 4) Odour problem, CO_2 level, VOCs, and particulate concentration.*	2		
	EQ SUB-TOTAL	**21**	**21**	**0**

3 SUSTAINABLE SITE PLANNING & MANAGEMENT (SM)

FACILITY MANAGEMENT | TRANSPORTATION | REDUCE HEAT ISLAND EFFECT

10 POINTS

ITEM	AREA OF ASSESSMENT	DETAIL POINTS ALLOCATED	MAX POINTS	SCORE
FACILITY MANAGEMENT				
SM1	**GBI RATED DESIGN & CONSTRUCTION**			
	If the building has been previously GBI (or other GBI approved Green Rating system) rated under any category, ***OR*** within the last 12 months a comprehensive Energy Efficiency Audit has been conducted.	1	**1**	
SM2	**BUILDING EXTERIOR MANAGEMENT**			
	Employ environmentally sensitive building exterior management plan to reduce pollution.		**1**	
	Use environmentally non-polluting methods and chemicals for cleaning of building exterior including maintenance equipment, chemicals, paint and sealants.	1		
SM3	**INTEGRATED PEST MANAGEMENT, EROSION CONTROL & LANDSCAPE MGT**			
	Employ environmentally sensitive management to preserve the site's natural components. Minimise harmful chemical use, energy waste, water waste, air pollution, solid waste and/or chemical runoff such as gasoline and oil. The following operational elements must be addressed:		**1**	
	a) Use of least toxic chemical pesticides, minimum use of chemicals and use only in targeted locations and only for targeted species. Conduct routine inspection and monitoring ***AND*** b) Erosion and sedimentation control for ongoing landscape operations including measures that prevent erosion and sedimentation, prevent air pollution from dust or particulate matter and restore eroded areas.	1		
TRANSPORTATION				
SM4	**GREEN VEHICLE PRIORITY - LOW EMITTING & FUEL EFFICIENT VEHICLES**			
	Encourage use of green vehicles:-		**1**	
	Provide preferred parking for low-emitting and fuel-efficient vehicles for 5% of the total car parking lots. *"Preferred parking" refers to the parking spots that are closest to the main entrance of the project (exclusive of spaces designated for handicapped or parking passes provided at a discounted price).*	1		
SM5	**PARKING CAPACITY**			
	Discourage over-provision of car parking capacity:-		**1**	
	Size parking capacity not to exceed the minimum local zoning requirements, ***AND*** provide preferred parking for carpools or vanpools for 5% of the total provided parking spaces.	1		
REDUCE HEAT ISLAND EFFECT				
SM6	**GREENERY & ROOF**			
	Reduce heat island (thermal gradient difference between developed and undeveloped areas) to minimize impact on microclimate and human and wildlife habitat:-		**4**	
	A) Hardscape & Greenery Application: 1) Provide any combination of the following strategies for 50% of the site hardscape (including sidewalks, courtyards, plazas and parking lots): a) Shade (within 5 years of occupancy); b) Paving materials with a Solar Reflectance Index (SRI) of at least 29; c) Open grid pavement system;	2		
	B) Roof Application: 1) Use roofing material with a Solar Reflectance Index (SRI) equal to or greater than the value in the table below for a minimum of 75% of the roof surface; ***OR*** 2) Install a vegetated roof for at least 50% of the roof area; ***OR*** 3) Install high albedo and vegetated roof surfaces that, in combination, meet the following criteria: *(Area of SRI Roof / 0.75) + (Area of vegetated roof / 0.5) ≥ Total Roof Area* *Roof Type Slope SRI* *Low-Sloped Roof < 2:12 78* *Steep-Sloped Roof > 2:12 29*	2		
SM7	**BUILDING USER MANUAL**			
	Document Green building design features and strategies for user information and guide to sustain performance during occupancy:-		**1**	
	Provide a Building User Manual which documents passive and active features that should not be downgraded (including housekeeping SOP).	1		
	SM SUB-TOTAL	**10**	**10**	**0**

4 MATERIALS & RESOURCES (MR)

REUSED & RECYCLED MATERIALS | SUSTAINABLE MATERIALS & RESOURCES AND POLICY | WASTE MANAGEMENT | GREEN PRODUCTS

9 POINTS

ITEM	AREA OF ASSESSMENT	DETAIL POINTS ALLOCATED	MAX POINTS	SCORE
REUSED AND RECYCLED MATERIALS				
MR1	**MATERIALS REUSE AND SELECTION**			
	Reuse building materials and products to reduce demand for virgin materials and reduce creation of waste. This serves to reduce environmental impact associated with extraction and processing of virgin resources. Integrate building design and its buildability with selection of reused building materials, taking into account their embodied energy, durability, carbon content and life cycle costs:-		1	
	Where reused products/materials constitutes ≥ 20% of the project's total retrofit material cost value.	1		
MR2	**RECYCLED CONTENT MATERIALS**			
	Increase demand for building products that incorporate recycled content materials in their production:- *(Recycled content shall be defined in accordance with the International Organization of Standards Document)*		1	
	Where use of materials with recycled content is such that the sum of post-consumer recycled plus one-half of the pre-consumer content constitutes ≥ 20% (based on cost) of project's total retrofit material cost value.	1		
SUSTAINABLE MATERIALS & RESOURCES AND POLICY				
MR3	**SUSTAINABLE TIMBER**			
	Encourage environmentally responsible forest management:-		1	
	Where ≥ 75% of wood-based materials and products used in the retrofit works are certified. *These components include, but are not limited to, structural framing and general dimensional framing, flooring, sub-flooring, wood doors and finishes. To include wood materials permanently installed and also temporarily purchased for the project. Compliance with Malaysian Timber Certification Scheme or Forest Stewardship Council requirements.*	1		
MR4	**SUSTAINABLE PURCHASING POLICY**			
	Develop a Sustainable Purchasing policy that must cover product purchases within the building and management's control.	1	1	
WASTE MANAGEMENT				
MR5	**STORAGE, COLLECTION & DISPOSAL OF RECYCLABLES**			
	Facilitate reduction of waste generated during retrofit construction and during building occupancy that is hauled and disposed of in landfills:-		3	
	Provide recycling facilities/infrastructure for sorting and separate collection of recyclable waste for recycling (consumables - glass, paper, metal, equipment, addition & alteration construction wastes).	1		
	Promote and encourage waste minimization and recycling among occupants, tenants and visitors through various avenues.	1		
	Promote waste sorting, collecting, quantifying, monitoring and recycling of a large range of waste generated in-house.	1		
GREEN PRODUCTS				
MR6	**REFRIGERANTS & CLEAN AGENTS**			
	Use environmentally-friendly Refrigerants and Clean Agents exceeding Malaysia's commitment to the Montreal & Kyoto protocols:-		2	
	Use zero Ozone Depleting Potential (ODP) products: non-CFC and non-HCFC refrigerants ***AND*** fire suppression clean agents;	1		
	Use non-synthetic (natural) refrigerants ***AND*** fire suppression clean agents with zero ODP and negligible Global Warming Potential of ≤10.	1		
	MR SUB-TOTAL	**9**	**9**	**0**

5 WATER EFFICIENCY (WE)

WATER HARVESTING & RECYCLING | INCREASED EFFICIENCY

12 POINTS

ITEM	AREA OF ASSESSMENT	DETAIL POINTS ALLOCATED	MAX POINTS	SCORE
WATER HARVESTING & RECYCLING				
WE1	**RAINWATER HARVESTING**			
	Encourage rainwater harvesting that will lead to reduction in potable water consumption:-		**3**	
	Rainwater harvesting that leads to ≥5% reduction in potable water consumption, ***OR***	1		
	Rainwater harvesting that leads to ≥15% reduction in potable water consumption, ***OR***	2		
	Rainwater harvesting that leads to ≥30% reduction in potable water consumption.	3		
WE2	**WATER RECYCLING**			
	Encourage water recycling that will lead to reduction in potable water consumption:-		**2**	
	Treat and recycle ≥10% wastewater leading to reduction in potable water consumption, ***OR***	1		
	Treat and recycle ≥30% wastewater leading to reduction in potable water consumption.	2		
INCREASED EFFICIENCY				
WE3	**WATER EFFICIENT - IRRIGATION/LANDSCAPING**			
	Reduce potable water consumption for landscape irrigation by:		**2**	
	a) 50%	1		
	b) 100%	2		
WE4	**WATER EFFICIENT FITTINGS**			
	Encourage reduction in potable water consumption through use of efficient devices:-		**3**	
	I) With reference to Utility calculations;			
	a) Reduce annual potable water consumption by ≥20%, ***OR***	1		
	b) Reduce annual potable water consumption by ≥30%, ***OR***	2		
	c) Reduce annual potable water consumption by ≥50%.	3		
	OR II) From existing 3-year average water consumption record, reduce annual potable water use by:			
	a) ≥ 20%	1		
	b) ≥ 30%	2		
	c) ≥ 50%	3		
WE5	**METERING & LEAK DETECTION SYSTEM**			
	Encourage the design of systems that monitors and manages water consumption:-		**2**	
	Use of sub-meters to monitor and manage major water usage for cooling towers, irrigation, kitchens and tenancy use.	1		
	Link all water sub-meters to EMS to facilitate early detection of water leakage.	1		
	WE SUB-TOTAL	**12**	**12**	**0**

6 INNOVATION (IN)

INNOVATION & ENVIRONMENTAL INITIATIVES | GREEN BUILDING INDEX FACILITATOR

10 POINTS

ITEM	AREA OF ASSESSMENT	DETAIL POINTS ALLOCATED	MAX POINTS	SCORE
IN1	**INNOVATION & ENVIRONMENTAL INITIATIVES**			
	Provide design team and project the opportunity to be awarded points for exceptional performance above the requirements set by GBI rating system:- 1 point for each approved innovation and environmental design initiative up to a maximum of 9 points, such as (refer to GBI website for updates and details); • Condensate water recovery (accounting for at least 50% of total AHUs/FCUs); • Thermal / PCM / Thermal Mass storage system (accounting for at least 25% of total required capacity); • Solar thermal technology / Solar Airconditioners (generating at least 10% of total required capacity); • Heat pipe technology (for at least 75% of PAHUs for purpose of RH control/improvement); • Auto-condenser tube cleaning system (for 100% of chilled water system); • Advanced air filtration technology (serving at least 50% of the NLA); • Refrigerant leak detection and recovery facility; • Fire System Water Recycling during regular testing; • Car park mechanical ventilation fans provided with VSD and controlled by CO_2/CO sensors.	9	**9**	
IN2	**GREEN BUILDING INDEX FACILITATOR**			
	To support and encourage the integration required for Green Building Index rated buildings and to streamline the application and certification process:-		**1**	
	Engage the services of a Green Building Index Facilitator to assist in obtaining Green Building Index certification.	1		
	IN SUB-TOTAL	**10**	**10**	**0**