



**INDUSTRIAL EXISTING
BUILDING (IEB)**

**DESIGN REFERENCE GUIDE
& SUBMISSION FORMAT**

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INTRODUCTION

The purpose of the Green Building Index Design Reference Guide is to establish a guidance document to assist project teams in understanding the criteria for each of the main components of the Green Building Index Rating Tool. The project team can use the document as a guide when submitting for the Green Building Index as it clearly identifies examples of how and what is required for completing the submission. Each of the main six criteria's are further divided into the corresponding sub-sections in obtaining the necessary credit points. This guide is indicative and not an exhaustive/definitive reference to the Green Building Index rating tool.

The basic framework of this document sets out for each subsection the intent, description, requirements, approach & implementation and in some occasions, calculations to achieve the credit point for each sub-section. The Green Building Index Design Reference Guide further becomes the base curriculum for the training of facilitators on the Green Building Index Rating Tools.

To attain the Green Building Index classification, the procedures are as follows:

- STAGE 1 APPLICATION & REGISTRATION**
- STAGE 2 DESIGN ASSESSMENT (DA)**
- STAGE 3 COMPLETION & VERIFICATION ASSESSMENT (CVA)**

A summary of the stages is described below:

STAGE 1 | APPLICATION & REGISTRATION

Complete and Submit application form with Owner's information, project contact details, project information and any supporting documents to Greenbuildingindex Sdn Bhd (GSB). Upon acceptance & approval of the application documentation, the registration fee will be confirmed dependent on the size of the project. On payment of fees, a GBI registration number will be given, and the terms and conditions duly signed between owner and GSB. A GBI Certifier will be assigned for the duration of the project.

GBI Registration Fees can be obtained from www.greenbuildingindex.org

GBI Terms & Conditions

An agreement setting out the terms and conditions between Project owner and Greenbuildingindex Sdn Bhd is to be duly signed at this stage.

STAGE 2 | DESIGN ASSESSMENT (DA)

Appraisal conducted upon the submission by the Project Design team / Client (Architect/Engineer/ Building Owner or Developer directly or through a GBI Facilitator) of comprehensive design and other necessary documents for Green Building Index Assessment. After acceptance of registration from GBI, the Project Design team & client should proceed to collect information for each of the six criteria completing the submittal requirements described under each detailed sub-section. It is recommended that the information submitted is based on preconstruction information (ie tender documentation stage) when all parameters of the design have been finalised. A Provisional Design Assessment certificate is given at this stage. A summary Design Assessment (DA) checklist is provided to determine target scoring.

STAGE 3 | COMPLETION & VERIFICATION ASSESSMENT (CVA)

Appraisal conducted upon CPC of the project when all necessary documents are re-submitted according to as-built information and calculations by the Project Design Team / Client (Architect/Engineer/Building Owner or Developer directly or through a GBI Facilitator). The Completion & Verification Assessment confirms that the targeted criteria have been properly implemented and achieved, or otherwise, for the intended classification.

GBI verifies within 12 months of CPC (or CCC/OC/OP whichever is the later); or earlier, if occupancy is not less than 50%, on the project classification. The verification process involves verifying the actual measured energy and water use, sustainable measures, indoor comfort survey results and action plan, Building Manual and Sustainable Maintenance program. A full Certification is given at this stage. A summary Completion & Verification Assessment (CVA) checklist is provided to determine target scoring.

APPEAL PROCEDURES

Appeal can be submitted (with fee paid) after receiving the Design Assessment result or after receiving the Completion & Verification Assessment results.

VALIDITY OF CERTIFICATION

The validity of the certification is limited for three years. This is to encourage sustainable building maintenance management throughout the life of the building.

CERTIFIERS & FACILITATORS

GBI Certifiers perform the detailed assessment and accrediting tasks of building projects submitted to the GBI Accreditation Panel (GBIAP) for final certification.

GBI Facilitators provide services to enable building projects to achieve GBI Accreditation. A GBI Facilitator is a registered person with GSB having completed the training and examinations conducted by GSB.

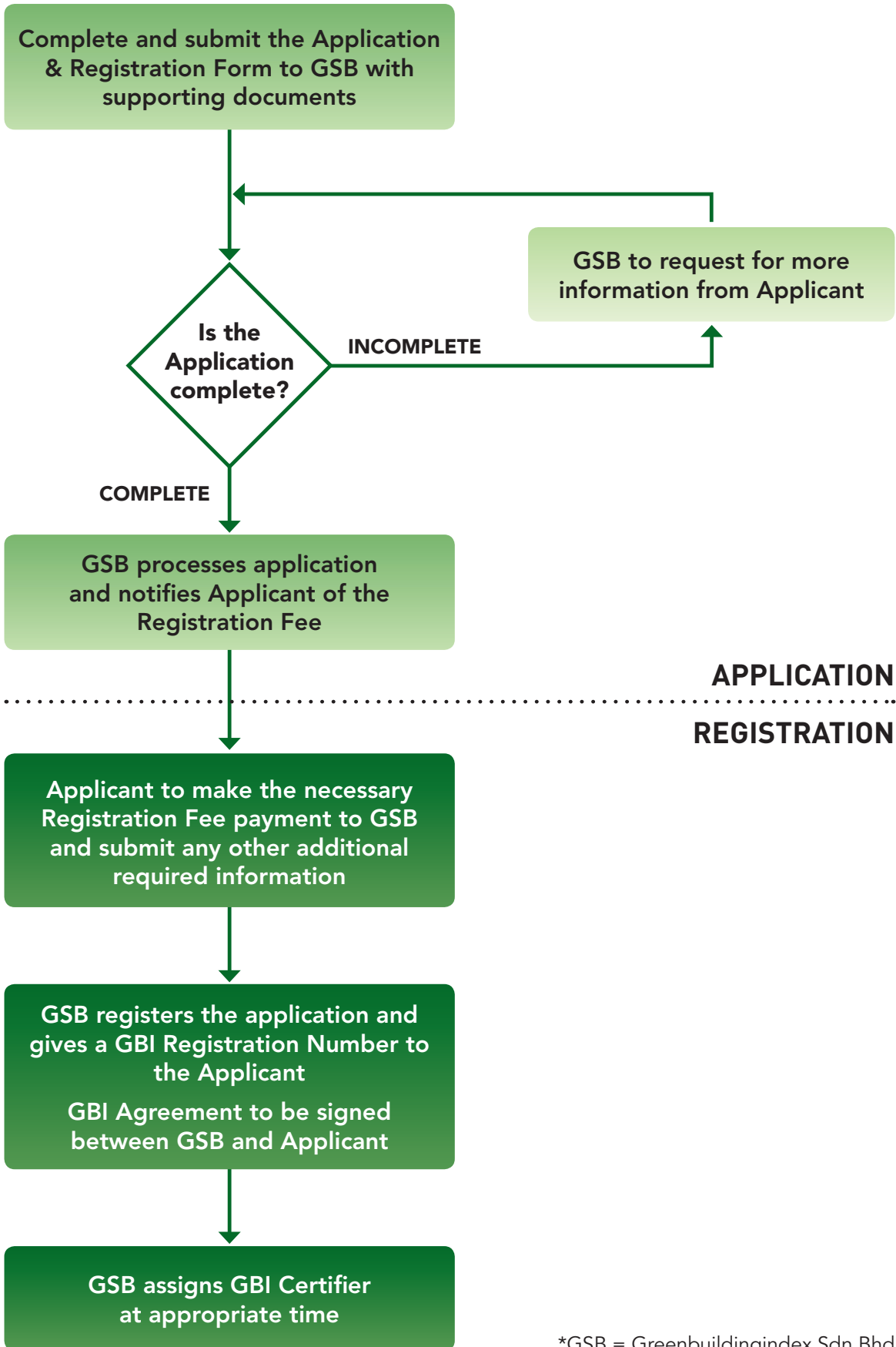
GBI TERMS & CONDITIONS

An agreement setting out the terms and conditions between the Project owner and Greenbuildingindex Sdn Bhd.



**INDUSTRIAL EXISTING
BUILDING (IEB)
PROCEDURES**

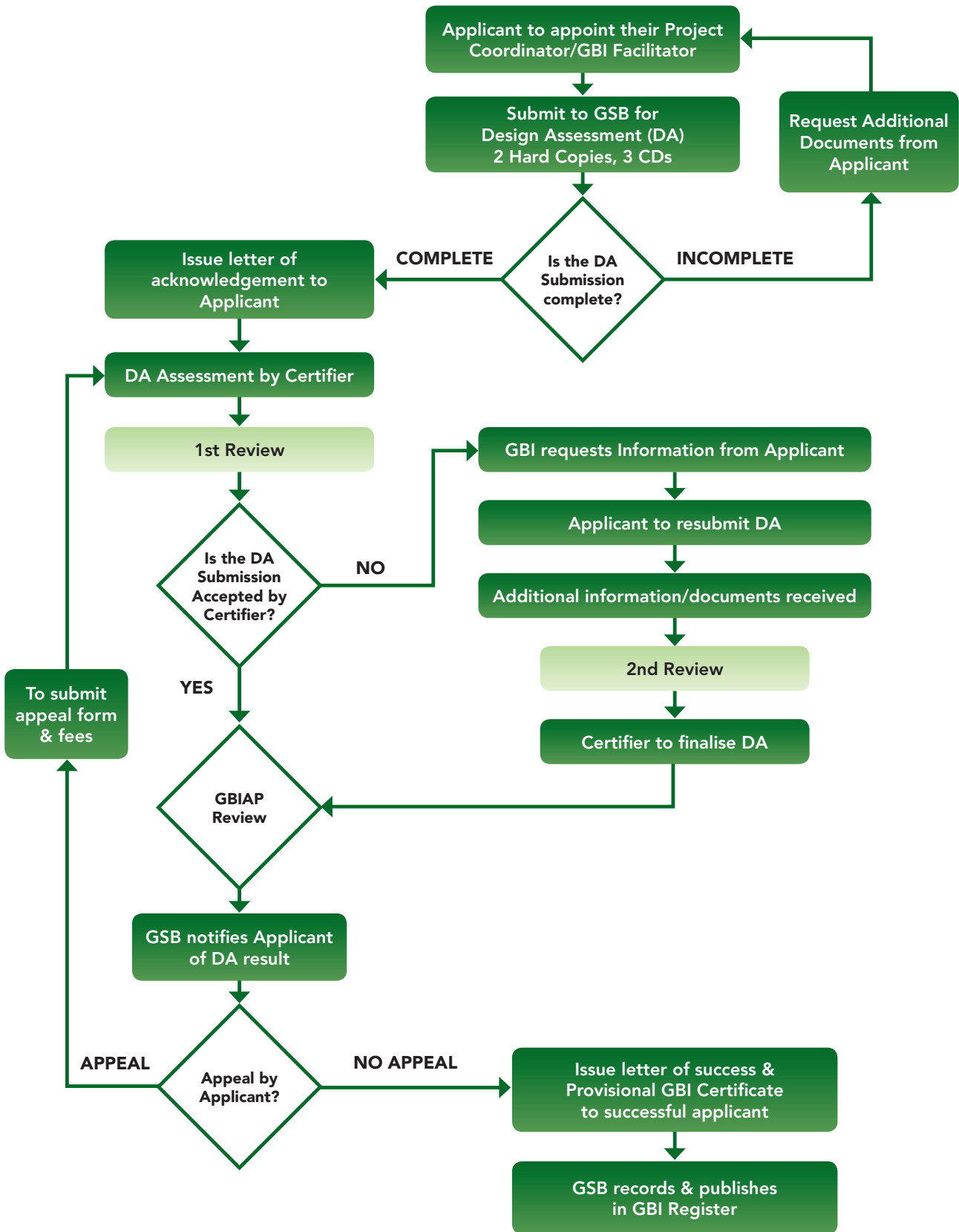
STAGE 1 APPLICATION & REGISTRATION



**APPLICATION
REGISTRATION**

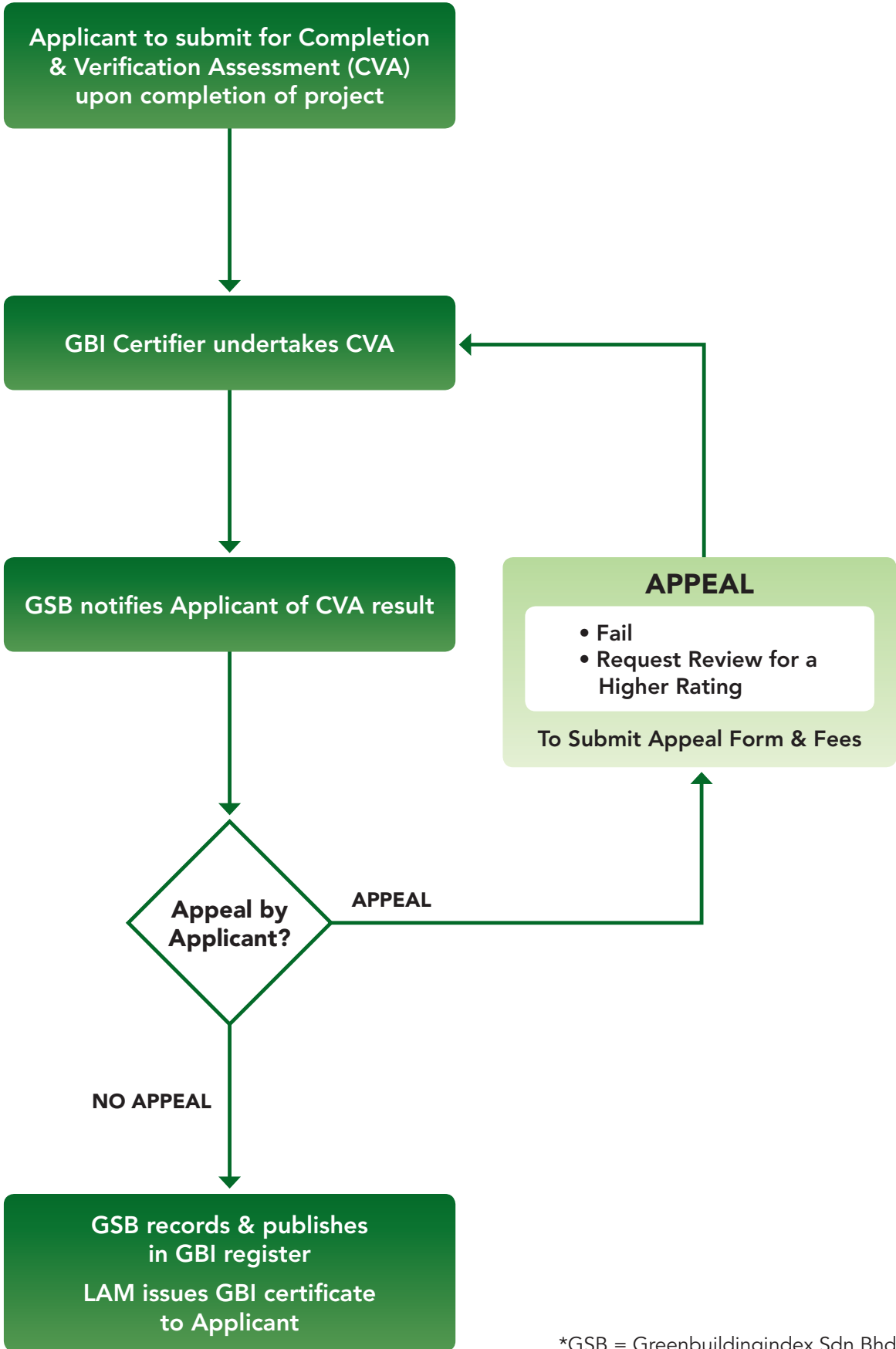
*GSB = Greenbuildingindex Sdn Bhd

STAGE 2 DESIGN ASSESSMENT (DA)



*GSB = Greenbuildingindex Sdn Bhd

STAGE 3 COMPLETION & VERIFICATION ASSESSMENT (CVA)



*GSB = Greenbuildingindex Sdn Bhd



**INDUSTRIAL EXISTING
BUILDING (IEB)
CRITERIA CHECKLIST
& SUBMISSION FORMAT**

INDUSTRIAL EXISTING BUILDING (IEB) PROJECT INFORMATION

NAME OF BUILDING	
ADDRESS OF BUILDING	
POSTCODE	
STATE	

APPLICANT	
CONTACT PERSON	

ARCHITECT	
CIVIL ENGINEER	
STRUCTURAL ENGINEER	
MECHANICAL ENGINEER	
ELECTRICAL ENGINEER	
QUANTITY SURVEYOR	
LAND SURVEYOR	
LANDSCAPE CONSULTANT	
OTHER SPECIALIST CONSULTANT(S)	
MAIN CONTRACTOR	
LOCAL AUTHORITY	
TOTAL GROSS FLOOR AREA	
LAND AREA FOR LANDED PROPERTY	

BUILDING AND INDUSTRIAL PROCESS DESCRIPTION	

INDUSTRIAL EXISTING BUILDING (IEB)

ASSESSMENT CRITERIA OVERALL POINTS SCORE

PART	ITEM	MAXIMUM POINTS
1	Energy Efficiency (EE)	38
2	Indoor Environmental Quality (EQ)	22
3	Sustainable Site Planning & Management (SM)	10
4	Material & Resources (MR)	8
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

INDUSTRIAL EXISTING BUILDING (IEB) ASSESSMENT CRITERIA SCORE SUMMARY

PART	CRITERIA	ITEM	POINTS	SUBMITTER	GBI
1	EE	ENERGY EFFICIENCY			
		Design & Performance			
	EE1	Minimum EE Performance	2		
	EE2	Lighting Zoning	3		
	EE3	Electrical Sub-metering	2		
	EE4	Renewable Energy & Onsite Energy Capture/Recovery	8		
	EE5	Advanced or Improved EE Performance - BEI and/or EUI	10		
		Commissioning			
	EE6	Enhanced or Re-Commissioning or Retro Commissioning	5		
	EE7	On-going Post Occupancy Commissioning	2		
		Monitoring, Improvement & Maintenance			
EE8	EE Monitoring & Improvement	2			
EE9	Sustainable Maintenance	4			
2	EQ	INDOOR ENVIRONMENTAL QUALITY			
		Air Quality			
	EQ1	Minimum IAQ Performance	1		
	EQ2	Environmental Tobacco Smoke (ETS) Control	1		
	EQ3	Carbon Dioxide Monitoring and Control	1		
	EQ4	Indoor Air Pollutants & Industrial Chemical Exposure	3		
	EQ5	Mould Prevention	1		
		Occupant Comfort			
	EQ6	Thermal Comfort: Controllability of Systems	2		
	EQ7	Air-Change Effectiveness	1		
	EQ8	Breakout Spaces	1		
		Lighting, Visual & Acoustic Comfort			
	EQ9	Daylighting	2		
	EQ10	Daylight Glare Control	1		
	EQ11	Electric Lighting Levels	1		
	EQ12	High Frequency Ballasts	1		
EQ13	External Views	2			
EQ14	Internal Noise Levels	1			
	Verification				
EQ15	IAQ Before & During Occupancy	2			
EQ16	Post Occupancy Comfort Survey: Verification	1			

GREEN BUILDING INDEX DESIGN REFERENCE GUIDE & SUBMISSION FORMAT

PART	CRITERIA	ITEM	POINTS	SUBMITTER	GBI
3	SM	SUSTAINABLE SITE PLANNING & MANAGEMENT			
	Facility Management				
	SM1	GBI Rated Design & Construction	1		
	SM2	Building Exterior Management	1		
	SM3	Integrated Pest Management, Erosion Control & Landscape Management	1		
	Transportation				
	SM4	Green Vehicle Priority	1		
	SM5	Parking Capacity	1		
	Reduce Heat Island Effect				
	SM6	Greenery & Roof	4		
SM7	Building User Manual	1			
4	MR	MATERIALS & RESOURCES			
	Reused & Recycled Materials				
	MR1	Materials Reuse and Selection	1		
	MR2	Recycled 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	1			
5	WE	WATER EFFICIENCY			
	Water Harvesting & Recycling				
	WE1	Rainwater Harvesting	3		
	WE2	Water Recycling	3		
	Increased Efficiency				
	WE3	Water Efficient Irrigation/Landscaping	2		
WE4	Water Reduction	2			
WE5	Metering & Leak Detection System	2			
6	IN	INNOVATION			
	IN1	Innovation & Environmental Design Initiatives	9		
	IN2	Green Building Index Facilitator	1		
TOTAL POINTS			100		

INDUSTRIAL EXISTING BUILDING (IEB)

The Industrial Existing Building (IEB) Reference Guide is formatted in reference to the Industrial Existing Building Tool. It is envisaged that this reference guide is a live document that from time to time will be updated for the benefit of the end users.

The Reference Guide has been formatted to form part of the basic criteria checklist for all documentation submissions for both the Design Assessment (DA) and Completion & Verification Assessment (CVA). The front cover sheet of the individual criteria is to be attached with documentation drawings, project narratives and technical submissions. The criteria checklist is to be signed by the Principal Submitting Person (in short "PSP"), Submitting Person (in short "SP") or Specialist (in short "S") together with the client's (in short "C"). Where the retrofitting works do not require appointment of the full complement of consultants, the sole or lead consultant will sign lieu.

Enclosed the summary checklist together with the corresponding signatories required for each criteria.

PART	CRITERIA	ITEM	REQUIRED SIGNATORIES
1	EE	ENERGY EFFICIENCY	
	EE1	Minimum EE Performance	PSP and C
	EE2	Lighting Zoning	SP and C
	EE3	Electrical Sub-metering	SP and C
	EE4	Renewable Energy & Onsite Energy Capture/Recovery	SP/S and C
	EE5	Advanced or Improved EE Performance – BEI and/or EUI	SP/S and C
	EE6	Enhanced or Re-Commissioning or Retro Commissioning	SP/S and C
	EE7	On-going Post Occupancy Commissioning	SP/S and C
	EE8	EE Monitoring & Improvement	SP/S and C
	EE9	Sustainable Maintenance	SP/S and C
2	EQ	INDOOR ENVIRONMENTAL QUALITY	
	EQ1	Minimum IAQ Performance	SP and C
	EQ2	Environmental Tobacco Smoke (ETS) Control	PSP and C
	EQ3	Carbon Dioxide Monitoring and Control	SP and C
	EQ4	Indoor Air Pollutants & Industrial Chemical Exposure	PSP and C
	EQ5	Mould Prevention	PSP/SP and C
	EQ6	Thermal Comfort: Design & Controllability of Systems	SP and C
	EQ7	Air-Change Effectiveness	SP and C
	EQ8	Breakout Spaces	PSP and C
	EQ9	Daylighting	PSP and C
	EQ10	Daylight Glare Control	PSP and C
	EQ11	Electric Lighting Levels	SP and C
	EQ12	High Frequency Ballasts	SP and C
	EQ13	External Views	PSP and C
	EQ14	Internal Noise Levels	PSP/SP/S and C
	EQ15	IAQ Before & During Occupancy	SP/S and C
EQ16	Post Occupancy Comfort Survey: Verification	S and C	
3	SM	SUSTAINABLE SITE PLANNING & MANAGEMENT	
	SM1	GBI Rated Design & Construction	PSP/SP/S and C
	SM2	Building Exterior Management	PSP/SP/S and C
	SM3	Integrated Pest Management, Erosion Control & Landscape Management	PSP/SP/S and C
	SM4	Green Vehicle Priority	PSP and C
	SM5	Parking Capacity	PSP and C
	SM6	Greenery & Roof	PSP/SP/S and C
SM7	Building User Manual	S and C	

GREEN BUILDING INDEX DESIGN REFERENCE GUIDE & SUBMISSION FORMAT

PART	CRITERIA	ITEM	REQUIRED SIGNATORIES
4	MR	MATERIALS & RESOURCES	
	MR1	Materials Reuse and Selection	PSP/QS and C
	MR2	Recycled Content Materials	PSP/QS and C
	MR3	Sustainable Timber	PSP/QS and C
	MR4	Sustainable Purchasing Policy	PSP/QS and C
	MR5	Storage, Collection & Disposal of Recyclables	PSP/S/QS AND C
	MR6	Refrigerants & Clean Agents	SP and C
5	WE	WATER EFFICIENCY	
	WE1	Rainwater Harvesting	PSP/SP/S and C
	WE2	Water Recycling	SP/S and C
	WE3	Water Efficient Irrigation/Landscaping	SP and C
	WE4	Water Reduction	PSP/SP/S and C
	WE5	Metering & Leak Detection System	SP and C
6	IN	INNOVATION	
	IN1	Innovation & Environmental Design Initiatives	PSP/SP/S and C
	IN2	Green Building Index Facilitator	S and C

PSP is defined as Architect or Engineer (similar to the definition in Certificate of Completion & Compliance, CCC)

SP is defined as Engineer, Landscape Architect, Planner and Quantity Surveyor (QS).

S is defined as Specialist which includes Facilitator, Project Manager, Facilities Manager, Energy or Sustainable Consultant and Commissioning Specialist.

C is defined as Client or client's assigned representative.

For IEB project without the full complement of the identified professionals, then the sole or lead professional may sign in lieu.

SUBMISSION FORMAT & SIGNATURES

All submission information shall be attached to their respective cover criteria sheet along with relevant signatures for each of the criteria. The criteria checklist is to be marked by the submitter on all project documentation as described under "Required Submission for Design Assessment (DA)" or "Required Submission for Completion & Verification Assessment (CVA)". Please leave the GBI's column for the administration of GSB. All documents must be duly verified and signed as part of the procedural requirements. GSB will return documents that are not submitted in full compliance for corrective action.

The following is the recommended format of all documents that will form the Design Assessment (DA) & Completion & Verification Assessment (CVA) submission;

1. All Drawings, Plans, Sections and Elevations to be formatted on A3 size paper, with respective scale or scales clearly indicated. Should drawings be too small for legibility, provide a key plan with part plans for full clarity of building information.
2. All Perspectives to fit A3 size paper.
3. All Reports to be A4 format. Signature of Qualified submitting professional should form part of the submission.
4. Clearly mark the Design Assessment Checklist or Completion & Verification Checklist on submission of documentations together with a Design Submission form.

All submission to be saved into CDROM pdf format. Two (2) hard copies and three (3) copies of CDROM are to be submitted to GSB.



**INDUSTRIAL EXISTING
BUILDING (IEB)
ASSESSMENT CRITERIA**

INDUSTRIAL EXISTING BUILDING (IEB)
ENERGY EFFICIENCY
(EE)

**INDUSTRIAL EXISTING BUILDING (IEB)
ENERGY EFFICIENCY (EE)**

EE1	MINIMUM EE PERFORMANCE	2 POINTS
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INTENT

To create energy efficiency (EE) awareness and promote the use of MS 1525.

DESCRIPTION

Establish minimum energy efficiency (EE) performance to reduce energy consumption in industrial buildings, thus reducing CO₂ emission to the atmosphere. Meet the following minimum EE requirements as stipulated in MS 1525.

REQUIREMENTS

Submit calculations for Overall Thermal Transfer Value (OTTV) ≤ 50 and Roof Thermal Transfer Value (RTTV) ≤ 25. Use of the BEIT software or other GBI approved software is acceptable,

AND

Provision of Energy Management System where Air Conditioned space ≥ 4,000m²

APPROACH & IMPLEMENTATION

Wall insulation can be achieved in many ways, such as, but not limited to, using autoclaved lightweight concretes, composite insulated walls, double brickwalls and many other construction systems. Glazing should be optimally sized. The use of Insulated Glazing Units and/or performance glazing such as low-e and/or spectrally selective glazing is encouraged. Roof should be insulated with suitable insulation materials to prevent heat gain into occupied spaces.

POTENTIAL TECHNOLOGIES & STRATEGIES

Design the building envelope, HVAC, lighting and other systems to maximise energy performance.

REQUIRED SUBMISSION FOR DESIGN ASSESSMENT (DA)

	SUBMITTER	GBI
1. Plans and elevations marking out walls & apertures used for the calculation coloured blue; and walls & apertures not used for calculation coloured red. Recommended scale 1: 200	<input type="radio"/>	<input type="radio"/>
2. OTTV calculations for each facing wall and RTTV calculation for roof.	<input type="radio"/>	<input type="radio"/>
3. Description of wall, roof & aperture materials specified.	<input type="radio"/>	<input type="radio"/>
4. Calculations of U-values for roof and walls.	<input type="radio"/>	<input type="radio"/>
5. Proposed Glazing specifications on Shading Coefficient, U-values and Visible Light Transmission.	<input type="radio"/>	<input type="radio"/>
6. Confirm provision of Energy Management System where air conditioned space ≥ 4,000m ² .	<input type="radio"/>	<input type="radio"/>

REQUIRED SUBMISSION FOR COMPLETION & VERIFICATION ASSESSMENT (CVA)

	SUBMITTER	GBI
1. As-Built plans and elevations marking out walls & apertures used for the calculation coloured blue; and walls & apertures not used for calculation coloured red.	<input type="radio"/>	<input type="radio"/>
2. OTTV calculations for each facing wall and roof.	<input type="radio"/>	<input type="radio"/>
3. Description of built wall & aperture materials with U-value calculation	<input type="radio"/>	<input type="radio"/>
4. Manufacturer issued glazing specification on shading coefficient, U-values and Visible Light Transmission.	<input type="radio"/>	<input type="radio"/>
5. Description of As-Installed Energy Management System and I/O schedule.	<input type="radio"/>	<input type="radio"/>
6. Describe any deviation or addition to the DA submission.	<input type="radio"/>	<input type="radio"/>

PROJECT NAME				DATE
SUBMITTING PROFESSIONAL	NAME	DESIGNATION	COMPANY	SIGNATURE
CLIENT	NAME	DESIGNATION	COMPANY	SIGNATURE

NOTE ATTACH ALL SUBMITTALS WITH THIS COVER PAGE

INDUSTRIAL EXISTING BUILDING (IEB) ENERGY EFFICIENCY (EE)

EE2	LIGHTING ZONING	3 POINTS
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INTENT

To provide flexible lighting controls so as to optimise energy savings.

DESCRIPTION

Encourage and recognise lighting design practices that offer greater flexibility for light switching, making it easier to light only occupied areas.

REQUIREMENTS

1 point: Awarded for all individual or enclosed spaces to be individually switched; and the size of individually switched lighting zones shall not exceed 100m² for 90% of the NLA; with switching clearly labelled and easily accessible by building occupants.

1 point: Awarded for provision of auto-sensor controlled lighting in conjunction with daylighting strategy for all perimeter zones and daylight areas and/or provide task lighting for at least 25% (separate from motion sensor provision) of industrial plant area.

1 point: Awarded for provision of motion sensors or equivalent to complement lighting zoning for at least 25% NLA of building **OR** provide task lighting for at least 25% (separate from auto-sensor provision) of industrial plant area.

APPROACH & IMPLEMENTATION

Decreasing the size of lighting zones allows for more flexible control over lighting giving owners/tenants the ability to reduce energy consumption and costs by only lighting those areas or zones that are occupied or required.

POTENTIAL TECHNOLOGIES & STRATEGIES

Design lighting zones by increasing switching flexibility with controls by individual switches and/or automated sensing devices.

REQUIRED SUBMISSION FOR DESIGN ASSESSMENT (DA)

	SUBMITTER	GBI
1. Drawings of floor plans clearly showing every proposed individually switched lighting zone and its coverage area.	<input type="radio"/>	<input type="radio"/>
2. Electrical schematic drawings showing the locations and extent of switching, the area controlled by the switch and automated control sensing system detailed.	<input type="radio"/>	<input type="radio"/>
3. Report to include the areas of all switched zones and confirmation that the total areas meet the percentage NLA requirements.	<input type="radio"/>	<input type="radio"/>

REQUIRED SUBMISSION FOR COMPLETION & VERIFICATION ASSESSMENT (CVA)

	SUBMITTER	GBI
1. As-Built Drawings of floor plans clearly showing each individually switched lighting zone and its coverage area.	<input type="radio"/>	<input type="radio"/>
2. As-Built Electrical schematic drawings showing the locations and extent of switching, the area controlled by the switch and automated control sensing system detailed.	<input type="radio"/>	<input type="radio"/>
3. Report to include the exact areas of all switched zones and confirmation that the total area meets the percentage NLA requirements.	<input type="radio"/>	<input type="radio"/>
4. Describe any deviation or addition to the DA submission.	<input type="radio"/>	<input type="radio"/>

PROJECT NAME				DATE
SUBMITTING PROFESSIONAL	NAME	DESIGNATION	COMPANY	SIGNATURE
CLIENT	NAME	DESIGNATION	COMPANY	SIGNATURE

NOTE ATTACH ALL SUBMITTALS WITH THIS COVER PAGE

**INDUSTRIAL EXISTING BUILDING (IEB)
ENERGY EFFICIENCY (EE)**

EE3	ELECTRICAL SUB-METERING	2 POINTS
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INTENT

To monitor energy consumption of key building services as well as all tenancy and industrial plant areas.

DESCRIPTION

Encourage and recognise the provision of energy sub-metering to facilitate energy monitoring of base building services and industrial plant process by tenant or end users.

REQUIREMENTS

- 1 point:** Provide separate sub-metering for all energy use $\geq 100\text{kVA}$; with separate sub-metering for
- 1) Lighting, **AND**
 - 2) Power, **AND**
 - 3) Industrial processes

APPROACH & IMPLEMENTATION

For building with existing tenancies, separate metering shall be provided for car parks; chillers; AHUs; lifts; common area lighting and power and any additional item including plant equipment or process which carries an energy use $\geq 100\text{kVA}$.

For existing industrial buildings, with tentative space planning layouts, compliance is by demonstrating commitment and provision to install meters for separate tenancy and plant areas. As a minimum this is to be provided on each floor and to each wing or other clearly separable tenancy area or zone.

Where Energy Management System (EMS) is provided, all meters should be linked to the EMS for monitoring and recording, and control where appropriate.

POTENTIAL TECHNOLOGIES & STRATEGIES

Utilise Energy Management System (EMS) for measurement and management of energy usage including Maximum Demand Limiting.

REQUIRED SUBMISSION FOR DESIGN ASSESSMENT (DA)

	SUBMITTER	GBI
1. An extract from the specification detailing the installation requirements for electrical sub-meters that meets the credit criteria.	<input type="radio"/>	<input type="radio"/>
2. Clearly marked electrical schematic drawings showing the proposed locations of meters and the usage served by those meters.	<input type="radio"/>	<input type="radio"/>

REQUIRED SUBMISSION FOR COMPLETION & VERIFICATION ASSESSMENT (CVA)

	SUBMITTER	GBI
1. As-Built Electrical schematic drawings showing the exact locations of meters and the building usage served by those meters.	<input type="radio"/>	<input type="radio"/>
2. Describe any deviation or addition to the DA submission.	<input type="radio"/>	<input type="radio"/>

PROJECT NAME				DATE
SUBMITTING PROFESSIONAL	NAME	DESIGNATION	COMPANY	SIGNATURE
CLIENT	NAME	DESIGNATION	COMPANY	SIGNATURE

NOTE ATTACH ALL SUBMITTALS WITH THIS COVER PAGE

**INDUSTRIAL EXISTING BUILDING (IEB)
ENERGY EFFICIENCY (EE)**

EE4	RENEWABLE ENERGY & ONSITE ENERGY CAPTURE/RECOVERY	8 POINTS
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INTENT

To promote use of all forms of renewable energy and/or onsite energy capture/recovery to reduce environmental impact and emission of CO₂.

DESCRIPTION

The use of renewable energy systems and/or onsite energy capture/recovery will help to defer the need for power plant-up and promote green energy use. Calculate the project performance by expressing the energy produced by the renewable energy systems and/or onsite energy capture/recovery as a percentage of the building annual energy use. In the context of the built environment in Malaysia, the most likely form of renewable energy would be derived from BIPV, STC and biomass. Other forms of renewable energy are also applicable with their appropriate conversion into equivalent electrical energy for calculation purposes.

REQUIREMENTS

- 1 point :** Awarded where 0.25% or 2 kWp whichever is the greater, of the equivalent total electricity consumption is generated by Renewable Energy (RE) and/or onsite energy capture/recovery, **OR**
- 2 points :** Awarded where 0.50% or 5kWp whichever is the greater, **OR**
- 3 points :** Awarded where 0.75% or 7.5kWp whichever is the greater, **OR**
- 4 points :** Awarded where 1.00% or 10 kWp whichever is the greater, **OR**
- 5 points :** Awarded where 1.25% or 15 kWp whichever is the greater, **OR**
- 6 points :** Awarded where 1.50% or 20 kWp whichever is the greater, **OR**
- 7 points :** Awarded where 2.00% or 40 kWp whichever is the greater, **OR**
- 8 points :** Awarded where 2.50% or 60 kWp whichever is the greater.

- Notes:**
- i) Electricity includes other forms of energy.
 - ii) Building annual energy use for this criterion excludes energy consumed by the industrial plant process.

APPROACH & IMPLEMENTATION

Assess the project for renewable energy potential such as solar, wind, geothermal, low-impact hydro, biomass and other non-polluting technologies. Building Integrated Photo Voltaic (BIPV) is recommended to be used to generate renewable electricity in non-residential buildings in the Malaysian climate. The BIPV system can be grid connected or stand-alone system with or without battery pack to store excess energy production. Solar Thermal Cooling (STC) is also highly recommended for application in industrial buildings.

POTENTIAL TECHNOLOGIES & STRATEGIES

Assess the project for non-polluting and renewable energy potential such as solar, wind, geothermal, low-impact hydro, biomass and bio-gas strategies. When applying these strategies, take advantage of FiT where applicable.

REQUIRED SUBMISSION FOR DESIGN ASSESSMENT (DA)	SUBMITTER	GBI
1. Plans and elevations marking out areas allocated to house renewable energy equipment.	<input type="radio"/>	<input type="radio"/>
2. Describe proposed technology to be used, including documenting total kWp or equivalent to be installed.	<input type="radio"/>	<input type="radio"/>
3. Predict reduced total electricity consumption by the building and percentage of renewable energy to be generated.	<input type="radio"/>	<input type="radio"/>

REQUIRED SUBMISSION FOR COMPLETION & VERIFICATION ASSESSMENT (CVA)	SUBMITTER	GBI
1. As-Built plans and elevations marking out installation and location of renewable energy equipment.	<input type="radio"/>	<input type="radio"/>
2. Manufacturer’s technical specification of the renewable energy equipment.	<input type="radio"/>	<input type="radio"/>
3. As-Measured kWp or equivalent renewable energy generated.	<input type="radio"/>	<input type="radio"/>
4. Describe any deviation or addition to the DA submission.	<input type="radio"/>	<input type="radio"/>

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INDUSTRIAL EXISTING BUILDING (IEB) ENERGY EFFICIENCY (EE)

EE5**ADVANCED EE PERFORMANCE – BEI
AND/OR EUI****10 POINTS****INTENT**

To encourage enhancement of building and industrial plant process EE performance thereby reduce CO₂ emission.

REQUIREMENTS

1) Demonstrate that Energy Efficiency (EE) performance exceeds the baseline minimum to reduce energy consumption in the building and/or the industrial plant process. For the building, improve Building Energy Intensity (BEI) as defined by GBI (use of GBI approved software is permitted). For industrial plant process, use Energy Use Intensity (EUI) to compare against baseline data for similar plant process (baseline EUI shall be furnished by applicant for GBI acceptance). Use BEI or EUI if either building or industrial plant process energy use constitutes more than 75% of the total energy use. Otherwise, calculate both BEI and EUI with the lower point score applicable, for award of points as follows:

1 point	where BEI ≤ 180 kWh/m ² /year or EUI improvement ≥ 10%
3 points	where BEI ≤ 150 kWh/m ² /year or EUI improvement ≥ 25%
4 points	where BEI ≤ 140 kWh/m ² /year or EUI improvement ≥ 30%
5 points	where BEI ≤ 130 kWh/m ² /year or EUI improvement ≥ 35%
6 points	where BEI ≤ 120 kWh/m ² /year or EUI improvement ≥ 40%
7 points	where BEI ≤ 110 kWh/m ² /year or EUI improvement ≥ 45%
8 points	where BEI ≤ 100 kWh/m ² /year or EUI improvement ≥ 50%
10 points	where BEI ≤ 90 kWh/m ² /year or EUI improvement ≥ 55%

2) Demonstrate Energy savings over the last 3 years from Existing Building/Plant historical BEI/EUI baseline, to be improved, for award of points as follows:

1 point	where BEI > 15% with resultant BEI ≤ 200 kWh/m ² /year or EUI improvement > 10%
2 points	where BEI > 20% with resultant BEI ≤ 190 kWh/m ² /year or EUI improvement > 25%
3 points	where BEI > 25% with resultant BEI ≤ 180 kWh/m ² /year or EUI improvement > 30%
5 points	where BEI > 30% with resultant BEI ≤ 150 kWh/m ² /year or EUI improvement > 35%
6 points	where BEI > 40% with resultant BEI ≤ 140 kWh/m ² /year or EUI improvement > 40%
7 points	where BEI > 50% with resultant BEI ≤ 130 kWh/m ² /year or EUI improvement > 45%
8 points	where BEI > 60% with resultant BEI ≤ 120 kWh/m ² /year or EUI improvement > 50%
10 points	where BEI > 70% with resultant BEI ≤ 110 kWh/m ² /year or EUI improvement > 55%

APPROACH & IMPLEMENTATION

Cutting edge technologies and materials should be fully explored for application. For passive design applications, consider use of better insulation materials, such as wall insulation of autoclaved lightweight concrete, composite insulated wall, double brickwalls or other options. Glazing should be optimally sized and the use of performance glazing such as low-e and/or spectrally selective glazing is encouraged. Roof insulation should also be properly addressed. For active design applications, consider EE products for all components and educate users on need to reduce plug loads both in procurement policy and usage.

POTENTIAL TECHNOLOGIES & STRATEGIES

Design the building envelope and systems to maximise energy performance. Adopt the most energy efficient design concepts and strategies for both the building and plant process. For plant process, explore opportunities for energy recovery and/or reuse. Quantify BEI and/or EUI performance as compared to a baseline building/plant or the existing building/plant with the aid of appropriate simulation software tools as appropriate.

CONTINUED ON NEXT PAGE

**INDUSTRIAL EXISTING BUILDING (IEB)
ENERGY EFFICIENCY (EE)**

EE5	ADVANCED EE PERFORMANCE – BEI AND/OR EUI	10 POINTS
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REQUIRED SUBMISSION FOR DESIGN ASSESSMENT (DA)	SUBMITTER	GBI
1. All documentation provided for EE1 (cross referenced)	<input type="radio"/>	<input type="radio"/>
2. Submit predicted BEI and/or EUI calculations. (For GBI Certified or Silver rating, may use static energy calculation using manual method or software programs such as BEIT or other GBI approved software programs; for GBI Gold or Platinum, must use dynamic energy calculation using GBI approved software programs)	<input type="radio"/>	<input type="radio"/>

REQUIRED SUBMISSION FOR COMPLETION & VERIFICATION ASSESSMENT (CVA)	SUBMITTER	GBI
1. Actual verified BEI and/or EUI achieved for completed building/plant.	<input type="radio"/>	<input type="radio"/>
2. Actual EMS printouts.	<input type="radio"/>	<input type="radio"/>
3. Describe any deviation or addition to the DA submission.	<input type="radio"/>	<input type="radio"/>

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**INDUSTRIAL EXISTING BUILDING (IEB)
ENERGY EFFICIENCY (EE)**

EE6	ENHANCED RE-COMMISSIONING OR RETRO COMMISSIONING	5 POINTS
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INTENT

To ensure building and industrial plant process energy related systems are installed to achieve proper commissioning so as to realise their full potential and intent. This will serve to eliminate the bad practice of not fully commissioning the installed systems.

REQUIREMENTS

Appoint a GBI recognised Commissioning Specialist (CxS) to perform the commissioning for all the facility's energy related systems in accordance with ASHRAE Commissioning Guideline or other GBI approved equivalent standard by:

- Implementing improvements to ensure building/plant's major energy using systems are repaired, operated and maintained effectively to optimise energy performance.
- Developing a commissioning or ongoing commissioning plan for the building/plant's major energy-using systems.
- Providing training for staff to build awareness and skills in a broad range of sustainable building/plant operations, including energy efficiency, equipment and systems operations and maintenance.
- Updating the building/plant operating plan as necessary to reflect any changes in the occupancy/production schedule, equipment runtime schedule, design set points and lighting levels.

APPROACH & IMPLEMENTATION

Appointment of a CxS to provide commissioning advice (including accessibility and maintainability provisions) to the Client and to monitor and verify commissioning of the building and industrial plant process energy related systems.

POTENTIAL TECHNOLOGIES & STRATEGIES

Installation of state-of-the-art measuring devices and sensors compatible with the installed EMS will aid in commissioning and also enhance EE.

REQUIRED SUBMISSION FOR DESIGN ASSESSMENT (DA)

	SUBMITTER	GBI
1. Confirmation letter from the CxS of his appointment and scope of works in accordance with the GBI CxS requirements.	<input type="radio"/>	<input type="radio"/>

REQUIRED SUBMISSION FOR COMPLETION & VERIFICATION ASSESSMENT (CVA)

	SUBMITTER	GBI
1. Documentary evidence that the full scope of CxS works have been carried out during the contract administration phase.	<input type="radio"/>	<input type="radio"/>
2. The final commissioning report including recommendations to the client regarding the performance of the commissioned building/plant energy related systems.	<input type="radio"/>	<input type="radio"/>
3. A copy of the systems manual as described in the CxS scope of works.	<input type="radio"/>	<input type="radio"/>
4. Documented evidence of training of building/plant management staff.	<input type="radio"/>	<input type="radio"/>
5. Describe any deviation or addition to the DA submission.	<input type="radio"/>	<input type="radio"/>

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INDUSTRIAL EXISTING BUILDING (IEB)
ENERGY EFFICIENCY (EE)

EE7	ON-GOING POST OCCUPANCY COMMISSIONING	2 POINTS
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INTENT

To ensure up-to-date on-going post occupancy/post plant operation commissioning are carried out for all tenancy fit-out and plant modification changes are completed.

REQUIREMENTS

1 point: Awarded where professional engineer/specialist reviews all tenancy fit-out plans/plant modification to ensure original design intent is not compromised and upon completion of the fit-out/plant modification works, verify and fine-tune the installations to suit.

1 point: Awarded where the CxS carries out a full post/re-commissioning of the energy related systems to verify that their performance is sustained in conjunction with the completed tenancy fit-outs/plant modifications.

APPROACH & IMPLEMENTATION

Professional engineer/specialist must check all fit-out designs and plant modifications. The CxS shall carry out the post occupancy commissioning for all tenancy areas after fit-out changes/plant modification changes are completed.

REQUIRED SUBMISSION FOR DESIGN ASSESSMENT (DA)

	SUBMITTER	GBI
1. Declaration that post occupancy/modification commissioning will be undertaken.	<input type="radio"/>	<input type="radio"/>

REQUIRED SUBMISSION FOR COMPLETION & VERIFICATION ASSESSMENT (CVA)

	SUBMITTER	GBI
1. Document what has been approved and constructed for post-occupancy fit-out/plant modifications.	<input type="radio"/>	<input type="radio"/>
2. CxS to verify re-commissioning works, if applicable.	<input type="radio"/>	<input type="radio"/>
3. Describe any deviation or addition to the DA submission.	<input type="radio"/>	<input type="radio"/>

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INDUSTRIAL EXISTING BUILDING (IEB) ENERGY EFFICIENCY (EE)

EE8	EE MONITORING & IMPROVEMENT	2 POINTS
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INTENT

To provide for ongoing accountability of the building/plant energy consumption over time.

REQUIREMENTS

1 point: Awarded for the use of Energy Management System to monitor and trend log energy consumption for building and plant process, **AND**

Monitor sub-metering of building system and plant process to track energy consumption of major uses and other end use applications e.g. by categorising into building/plant systems or floors etc.

1 point: Fully commission EMS and activate Maximum Demand Limiting programme. **AND**

Compile, summarise and submit BEI/EUI, Fuel and Water Consumption of building/plant to GSB on an annual basis during the 3-years validity period or earlier whenever requested by GSB. Submission shall include monthly energy and water bills.

APPROACH & IMPLEMENTATION

Fully commission the maximum demand limiting programme and utilise EMS to monitor energy consumption.

REQUIRED SUBMISSION FOR DESIGN ASSESSMENT (DA)

	SUBMITTER	GBI
1. Declaration of commitment to carry out EE verification upon completion.	<input type="radio"/>	<input type="radio"/>

REQUIRED SUBMISSION FOR COMPLETION & VERIFICATION ASSESSMENT (CVA)

	SUBMITTER	GBI
1. Actual verified BEI/EUI achieved, Renewable Energy generated and Water consumption for completed building/plant.	<input type="radio"/>	<input type="radio"/>
2. Where EMS is installed, comprehensive printouts of EMS results including Maximum Demand Limiting program setting.	<input type="radio"/>	<input type="radio"/>
3. Describe any deviation or addition to the DA submission.	<input type="radio"/>	<input type="radio"/>

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**INDUSTRIAL EXISTING BUILDING (IEB)
ENERGY EFFICIENCY (EE)**

EE9	SUSTAINABLE MAINTENANCE	4 POINTS
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INTENT

To ensure the energy related systems will continue to perform as intended with proper and sustainable maintenance.

REQUIREMENTS

1 point : Awarded where at least 75% of permanent maintenance team to participate in the commissioning of all energy services.

1 point : Set up a permanent Energy Monitoring Committee (EMC) to ensure that building/plant energy performance is continuously monitored and improved.

1 point : Awarded for providing a designated facility maintenance office that is fully equipped with facilities (including tools and instrumentation) and inventory storage, **AND**

1 point : Provide evidence of documented plan for at least 3-year facility maintenance and preventive maintenance budget (inclusive of staffing and outsourced contracts) for building and plant process.

APPROACH & IMPLEMENTATION

Ensure the maintenance team fully participates in the testing and commissioning stage, understand the design intent and provide a 3-year sustainable maintenance program.

REQUIRED SUBMISSION FOR DESIGN ASSESSMENT (DA)

	SUBMITTER	GBI
1. Identify building maintenance room and facilities in the design floor plan.	<input type="radio"/>	<input type="radio"/>
2. Commitment to deploy at least 75% of permanent building maintenance team to participate in commissioning of all building energy services with organisation chart and staff positions identified.	<input type="radio"/>	<input type="radio"/>
3. Commitment to provide evidence of documented plan for at least 3-year facility maintenance and preventive maintenance budget (inclusive of staffing and outsourced contracts).	<input type="radio"/>	<input type="radio"/>

REQUIRED SUBMISSION FOR COMPLETION & VERIFICATION ASSESSMENT (CVA)

	SUBMITTER	GBI
1. Documentary evidence that 75% of the maintenance team were involved in the full testing & commissioning of the building/plant process energy related systems.	<input type="radio"/>	<input type="radio"/>
2. Comprehensive list of maintenance tools and instrumentation, and inventory storage items.	<input type="radio"/>	<input type="radio"/>
3. Provide evidence of documented plan for at least 3-year facility maintenance and preventive maintenance budget for facility maintenance (inclusive of staffing and outsourced contracts).	<input type="radio"/>	<input type="radio"/>
4. Describe any deviation or addition to the DA submission.	<input type="radio"/>	<input type="radio"/>

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INDUSTRIAL EXISTING BUILDING (IEB)
**INDOOR ENVIRONMENTAL
QUALITY (EQ)**

INDUSTRIAL EXISTING BUILDING (IEB) INDOOR ENVIRONMENTAL QUALITY (EQ)

EQ1	MINIMUM IAQ PERFORMANCE	1 POINT
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INTENT

To provide for minimum IAQ performance to enhance indoor air quality in building (and industrial plant area where applicable), thus contributing to comfort and well-being of occupants.

DESCRIPTION

Design provision to meet the minimum requirements of ventilation rate in ASHRAE 62.1 or the local building code whichever is the more stringent.

REQUIREMENTS

Meet the minimum requirements of ventilation rate in ASHRAE 62.1 or the local building code whichever is the more stringent.

APPROACH & IMPLEMENTATION

Designing ventilation system to meet the minimum requirement specified in ASHRAE 62.1 ensures adequate fresh air is available to occupants in the space. The Ventilation Rate Procedure or the Indoor Air Quality Procedures can be used to determine the minimum required ventilation rates for various applications. Ventilation Rate Procedure is more straightforward to apply. The IAQ Procedure of ASHRAE 62.1 is a performance-based procedure that addresses designing the ventilation system to maintain acceptable levels of known contaminants.

REQUIRED SUBMISSION FOR DESIGN ASSESSMENT (DA)

	SUBMITTER	GBI
1. Description of the ventilation design.	<input type="radio"/>	<input type="radio"/>
2. Schematic to illustrate the ventilation system design.	<input type="radio"/>	<input type="radio"/>
3. Summary table with calculations to illustrate how the delivered minimum outdoor airflow to each zone and the outdoor air intake for the system meet the requirements of ASHRAE and/or local code.	<input type="radio"/>	<input type="radio"/>

REQUIRED SUBMISSION FOR COMPLETION & VERIFICATION ASSESSMENT (CVA)

	SUBMITTER	GBI
1. As-Built drawings to illustrate the ventilation system design.	<input type="radio"/>	<input type="radio"/>
2. Summary report to describe the ventilation design and how it complies with ASHRAE 62.1 and/or the local code including information regarding the fresh air intake volumes and any special conditions that affect the ventilation design.	<input type="radio"/>	<input type="radio"/>
3. Detailed calculations or simulations to show how the delivered minimum outdoor airflow to each zone and outdoor airflow air intake for the system meet the requirements in ASHRAE and/or local code.	<input type="radio"/>	<input type="radio"/>
4. Describe any deviation or addition to the DA submission.	<input type="radio"/>	<input type="radio"/>

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**INDUSTRIAL EXISTING BUILDING (IEB)
INDOOR ENVIRONMENTAL QUALITY (EQ)**

EQ2	ENVIRONMENTAL TOBACCO SMOKE (ETS) CONTROL	1 POINT
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INTENT

To minimise exposure of building and plant occupants to Environmental Tobacco Smoke.

DESCRIPTION

Avoid health problems associated with tobacco smoke by preventing possible contamination in the building and plant, thereby reducing health risks to occupants linked to "second-hand smoke".

REQUIREMENTS

Prohibit smoking in the building and plant area; and locate any exterior designated smoking areas at least 10m away from entries, outdoor air intakes and operable windows, **OR**

Prohibit smoking in the building and plant area except in designated smoking room, and establish negative pressure in the smoking rooms together with provision of effective air filtration system.

APPROACH & IMPLEMENTATION

Prohibition of smoking in air-conditioned public building is already mandatory under Malaysian Law. This credit can be achieved by strictly enforcing prohibition of smoking in the premises, through supervision or signage. If designated smoking areas are provided outside the premises, ensure that the tobacco smoke does not enter the rest of the premises or the ventilation system.

REQUIRED SUBMISSION FOR DESIGN ASSESSMENT (DA)

	SUBMITTER	GBI
1. Description of strategies to be employed in the premises to achieve this credit (by means of management policy or signage proposal).	<input type="radio"/>	<input type="radio"/>
2. Plans showing the location of exterior and/or interior designated smoking areas, if any.	<input type="radio"/>	<input type="radio"/>
3. Ventilation design schematics and description illustrating provision of effective air filtration system and maintenance of negative pressure for smoking room (where designated smoking room in the premises is provided).	<input type="radio"/>	<input type="radio"/>

REQUIRED SUBMISSION FOR COMPLETION & VERIFICATION ASSESSMENT (CVA)

	SUBMITTER	GBI
1. As-Built drawings identifying location of exterior and/or interior designated smoking areas.	<input type="radio"/>	<input type="radio"/>
2. Summary report describing strategies undertaken to ensure prohibition of smoking indoors can be enforced and strategies implemented to ensure that tobacco smoke will not enter the premises or ventilation system where exterior and/or interior smoking area is provided.	<input type="radio"/>	<input type="radio"/>
3. Photographic evidence of strategies adopted.	<input type="radio"/>	<input type="radio"/>
4. Describe any deviation or addition to the DA submission.	<input type="radio"/>	<input type="radio"/>

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INDUSTRIAL EXISTING BUILDING (IEB)
INDOOR ENVIRONMENTAL QUALITY (EQ)

EQ3	CARBON DIOXIDE MONITORING AND CONTROL	1 POINT
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INTENT

To provide response monitoring of carbon dioxide levels to ensure delivery of optimal outside air requirements.

DESCRIPTION

Use carbon dioxide monitoring and control system to deliver the required outdoor air to the occupants to suit variation in occupancy.

REQUIREMENTS

Install carbon dioxide (CO₂) monitoring and control system with at least one (1) CO₂ sensor at main return air points on each air-conditioned floor/zone to facilitate continuous monitoring and adjustment of outside air ventilation rates to each floor/zone, and ensure independent control of ventilation rates to maintain CO₂ level ≤ 1,000 ppm.

APPROACH & IMPLEMENTATION

Use of carbon dioxide monitoring system is a typical energy conservation measure to ensure different spaces receive adequate outdoor air for their current occupancy and the ventilation system can adjust the ventilation rate to meet changing requirements. This helps to ensure occupants will receive adequate outdoor air at all times.

REQUIRED SUBMISSION FOR DESIGN ASSESSMENT (DA)

	SUBMITTER	GBI
1. Submission of ventilation and control schematics together with description of how CO ₂ monitoring and controls are integrated into the ventilation design.	<input type="radio"/>	<input type="radio"/>

REQUIRED SUBMISSION FOR COMPLETION & VERIFICATION ASSESSMENT (CVA)

	SUBMITTER	GBI
1. As-Built drawings showing the installed sensors and controls.	<input type="radio"/>	<input type="radio"/>
2. Summary report on the ventilation design and CO ₂ monitoring and control system including information regarding the location, quantity of installed sensors, the operational parameters and set points.	<input type="radio"/>	<input type="radio"/>
3. Manufacturer's information confirming the specifications of the CO ₂ sensors.	<input type="radio"/>	<input type="radio"/>
4. Photographic evidence of typical installations.	<input type="radio"/>	<input type="radio"/>
5. Describe any deviation or addition to the DA submission.	<input type="radio"/>	<input type="radio"/>

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INDUSTRIAL EXISTING BUILDING (IEB)
INDOOR ENVIRONMENTAL QUALITY (EQ)

EQ4	INDOOR AIR POLLUTANTS & INDUSTRIAL CHEMICAL EXPOSURE	3 POINTS
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INTENT

To minimise detrimental impact on occupants’ health from finishes that emit internal air pollutants and exposure to industrial chemicals.

DESCRIPTION

Encourage the use and specification of healthy materials and finishes which contain low volatile organic compounds (VOC) and formaldehyde.

REQUIREMENTS

1 point: Use low VOC paint and coating throughout the building and plant area. Paints and Coatings to comply with requirements specified in international labelling schemes recognised by GBI, **AND**

Use low VOC carpet or flooring throughout the building. Carpets to comply with requirements specified in international labelling schemes recognised 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 point: Use products with no added urea formaldehyde. These include:

1. Composite wood and agrifiber products defined as: particleboard, medium density fibreboard (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 point : Minimise air pollutants from building and plant by using environmental friendly house keeping chemicals and minimise microbial contamination and NOX emission.

APPROACH & IMPLEMENTATION

The credit requirements should be clearly stated in project specifications. Provide cut-sheets, material safety data sheets, certificates and test reports. Submittal of the compliance documentation is a pre-requisite for product approval.

REQUIRED SUBMISSION FOR DESIGN ASSESSMENT (DA)

	SUBMITTER	GBI
1. Summary report identifying areas where the low VOC materials will be installed and how the credit compliance is to be met.	<input type="radio"/>	<input type="radio"/>

REQUIRED SUBMISSION FOR COMPLETION & VERIFICATION ASSESSMENT (CVA)

	SUBMITTER	GBI
1. As-Built drawings showing where low VOC materials or products are used.	<input type="radio"/>	<input type="radio"/>
2. List of products installed that meet the credit requirements, and their specifications.	<input type="radio"/>	<input type="radio"/>
3. Manufacturer’s information including data sheets, certificates, test reports etc to demonstrate credit compliance.	<input type="radio"/>	<input type="radio"/>
4. Photographic evidence of each typical low VOC installation.	<input type="radio"/>	<input type="radio"/>
5. Describe any deviation or addition to the DA submission.	<input type="radio"/>	<input type="radio"/>

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INDUSTRIAL EXISTING BUILDING (IEB) INDOOR ENVIRONMENTAL QUALITY (EQ)

EQ5	MOULD PREVENTION	1 POINT
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INTENT

To prevent microbial contamination in the building and plant area to ensure the health and well-being of occupants.

DESCRIPTION

Design system(s) which reduce the risk of mould growth and its associated detrimental impact on occupant health.

REQUIREMENTS

Demonstrate that the air-conditioning and mechanical 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 and plant area is controlled during the Design, Construction and Operation stages by the consideration and the control of the following:

- Rainwater leakage through roof and walls
- Infiltration of moist air
- Diffusion of moisture through walls, roof and floors
- Groundwater intrusion into basements and crawl spaces through walls and floors
- Leaking or burst pipes
- Indoor moisture sources
- Construction moisture

OR

The above mentioned measures are not necessary or applicable for any part of the building or plant area that is not air-conditioned.

APPROACH & IMPLEMENTATION

The most effective way to control indoor mould growth is through elimination of moisture. It is important to dry water damaged areas and items within 24 to 48 hours to prevent mould growth. Humidity in spaces and ductwork has to be controlled throughout construction and occupation of the building.

REQUIRED SUBMISSION FOR DESIGN ASSESSMENT (DA)

	SUBMITTER	GBI
1. Summary report outlining the strategies adopted to meet the credit requirements.	<input type="radio"/>	<input type="radio"/>
2. A copy of specifications for the strategies to be carried out.	<input type="radio"/>	<input type="radio"/>

REQUIRED SUBMISSION FOR COMPLETION & VERIFICATION ASSESSMENT (CVA)

	SUBMITTER	GBI
1. As-Built drawings or As-Built specifications confirming that the industrial building has been constructed in accordance with the strategies adopted.	<input type="radio"/>	<input type="radio"/>
2. Manufacturer's information on all relevant materials specified for mould prevention and/or resistance, to verify credit compliance.	<input type="radio"/>	<input type="radio"/>
3. Documentation evidence during construction of the precautions taken for mould prevention, e.g. photographs of material storage and protection for items that are susceptible to mould growth as identified in the DA submission stage.	<input type="radio"/>	<input type="radio"/>
4. Provide 24-hour record (during full occupancy) of Temperature-Relative Humidity measurements for at least two (2) areas acceptable to the GBI Certifier.	<input type="radio"/>	<input type="radio"/>
5. Describe any deviation or addition to the DA submission.	<input type="radio"/>	<input type="radio"/>

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INDUSTRIAL EXISTING BUILDING (IEB)
INDOOR ENVIRONMENTAL QUALITY (EQ)

EQ6	THERMAL COMFORT: DESIGN & CONTROLLABILITY OF SYSTEMS	2 POINTS
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INTENT

To provide a thermal environment that is comfortable and supports the productivity and well-being of building and plant occupants.

DESCRIPTION

Provide a high level of thermal comfort system control by individual occupant or by specific groups in multi-occupant spaces to promote the productivity, comfort and well-being of occupants.

REQUIREMENTS

1 point: Provide a high level of thermal comfort system control by individual occupant or by specific groups in multi-occupant spaces to promote the productivity, comfort and well-being of occupants. Design to ASHRAE 55 in conjunction with the relevant localised parameters as listed in MS1525.

1 point: Provide individual comfort control for ≥ 50% of the occupants to enable adjustments to suit individual task needs and preferences, **AND**

Provide comfort system control for all shared multi-occupant spaces to enable adjustments to suit group needs and preferences, **AND**

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.

APPROACH & IMPLEMENTATION

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.

REQUIRED SUBMISSION FOR DESIGN ASSESSMENT (DA)

	SUBMITTER	GBI
1. Describe how the project will fulfil the requirements on provision of individual control for at least 50% of occupants and also provision of controls for shared multi-occupant spaces.	<input type="radio"/>	<input type="radio"/>

REQUIRED SUBMISSION FOR COMPLETION & VERIFICATION ASSESSMENT (CVA)

	SUBMITTER	GBI
1. Summary report that includes information on the methods used to establish thermal conditions for the project and how the system design addresses the design criteria.	<input type="radio"/>	<input type="radio"/>
2. Provide 72-hour record (during full occupancy) of temperature measurement for at least two (2) areas acceptable to the GBI Certifier, to verify the specified close thermal comfort condition.	<input type="radio"/>	<input type="radio"/>
3. Summary report on the individual types of control and the controls for multi-occupant spaces that are provided to achieve the credit compliance.	<input type="radio"/>	<input type="radio"/>
4. Photographic evidence of each typical type of sensor and control installed.	<input type="radio"/>	<input type="radio"/>
5. Describe any deviation or addition to the DA submission.	<input type="radio"/>	<input type="radio"/>

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INDUSTRIAL EXISTING BUILDING (IEB)
INDOOR ENVIRONMENTAL QUALITY (EQ)

EQ7	AIR-CHANGE EFFECTIVENESS	1 POINT
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INTENT

To provide effective delivery of clean air through reduced mixing with indoor pollutants in order to promote a healthy indoor environment.

DESCRIPTION

Prevent or minimise short-circuiting of outdoor ventilation air through recirculation of supply and return air.

REQUIREMENTS

Demonstrate that the Air Change Effectiveness (ACE) meets the following criteria for at least 90% of the NLA (air-conditioned areas only):

The ventilation system is designed to achieve an ACE ≥ 0.95 when measured in accordance with ASHRAE 129. Measure air change effectiveness, where ACE is to be measured within the breathing zone (nominally 1.0m from finished floor level).

APPROACH & IMPLEMENTATION

Compliance may be met either through measurement of the completed building in accordance to ASHRAE 129 or equivalent or using CFD simulations or implementation of accepted airside design strategy such as UFAD (Under Floor Air Distribution), LLD (Low Level Displacement), personalised ventilation system, etc.

REQUIRED SUBMISSION FOR DESIGN ASSESSMENT (DA)

	SUBMITTER	GBI
1. Summary report detailing the design criteria that has been adopted for each type of space in the development.	<input type="radio"/>	<input type="radio"/>
2. Describe how the ventilation system meets the credit compliance.	<input type="radio"/>	<input type="radio"/>

REQUIRED SUBMISSION FOR COMPLETION & VERIFICATION ASSESSMENT (CVA)

	SUBMITTER	GBI
1. As-Built drawings to show the ventilation system.	<input type="radio"/>	<input type="radio"/>
2. Summary report detailing the ventilation design criteria adopted for each type of space in the building.	<input type="radio"/>	<input type="radio"/>
3. Record of measurement to demonstrate compliance of this credit requirement.	<input type="radio"/>	<input type="radio"/>
4. Describe any deviation or addition to the DA submission.	<input type="radio"/>	<input type="radio"/>

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INDUSTRIAL EXISTING BUILDING (IEB)
INDOOR ENVIRONMENTAL QUALITY (EQ)

EQ8	BREAKOUT SPACES	1 POINT
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INTENT

To reduce worker's fatigue.

DESCRIPTION

Provide breakout space to reduce worker's fatigue for at least 5% of employees per shift.

REQUIREMENTS

Provide breakout space to reduce worker's fatigue for at least 5% of employees per shift.

REQUIRED SUBMISSION FOR DESIGN ASSESSMENT (DA)

	SUBMITTER	GBI
1. Plans and elevations marking out areas for breakout spaces.	<input type="radio"/>	<input type="radio"/>
2. Description of strategies to be employed in the building to achieve this credit (by means of management policy or signage proposal).	<input type="radio"/>	<input type="radio"/>

REQUIRED SUBMISSION FOR COMPLETION & VERIFICATION ASSESSMENT (CVA)

	SUBMITTER	GBI
1. As-Built drawings identifying location of breakout spaces.	<input type="radio"/>	<input type="radio"/>
2. Summary report describing strategies undertaken.	<input type="radio"/>	<input type="radio"/>
3. Photographic evidence of strategies adopted.	<input type="radio"/>	<input type="radio"/>
4. Describe any deviation or addition to the DA submission.	<input type="radio"/>	<input type="radio"/>

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INDUSTRIAL EXISTING BUILDING (IEB)
INDOOR ENVIRONMENTAL QUALITY (EQ)

EQ9	DAYLIGHTING	2 POINTS
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INTENT

To ensure provision of good levels of daylighting for building and plant occupants.

DESCRIPTION

Provide good level of diffused daylight into interior of building and plant.

REQUIREMENTS

1 point: Demonstrate that $\geq 30\%$ of the NLA has a Daylight Factor in the range of 1.0 – 3.5% as measured at the working plane, 800mm from floor level, **OR**

2 points: Demonstrate that $\geq 50\%$ of the NLA has a Daylight Factor in the range of 1.0 – 3.5% as measured at the working plane, 800mm from floor level.

Note: Refer to MS1525 for the description and calculation of Daylight Factor.

APPROACH & IMPLEMENTATION

Daylight system for building includes window, façade shading/light deflecting devices (e.g. lightshelves), roof lights and atrium spaces. The Daylight Factor is the ratio of indoor light level measured on the working plane to the outdoor light level during overcast conditions with no direct sun. For a daylighted space, to ensure visual comfort, the lighting level should be fairly uniform with no great contrast.

REQUIRED SUBMISSION FOR DESIGN ASSESSMENT (DA)	SUBMITTER	GBI
1. Summary report with diagrams, of the design daylight strategies including for glare control that will be undertaken to meet the credit requirements.	<input type="radio"/>	<input type="radio"/>

REQUIRED SUBMISSION FOR COMPLETION & VERIFICATION ASSESSMENT (CVA)	SUBMITTER	GBI
1. As-Built drawings and specifications demonstrating that the daylighting system has been constructed according to design drawings/specifications. Typical As-Built floor plans and sections showing position of glare control system.	<input type="radio"/>	<input type="radio"/>
2. Typical floor plans with Daylight Factor measurement results.	<input type="radio"/>	<input type="radio"/>
3. Site plan incorporating height of existing buildings or planned buildings surrounding the building together with solar diagrams & sun path.	<input type="radio"/>	<input type="radio"/>
4. Summary of Daylight Factor results.	<input type="radio"/>	<input type="radio"/>
5. Manufacturer’s Information on the daylighting system used, if custom-made.	<input type="radio"/>	<input type="radio"/>
6. Furnish photographs of each type of typical device installed.	<input type="radio"/>	<input type="radio"/>
7. Describe any deviation or addition to the DA submission.	<input type="radio"/>	<input type="radio"/>

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INDUSTRIAL EXISTING BUILDING (IEB)
INDOOR ENVIRONMENTAL QUALITY (EQ)

EQ10	DAYLIGHT GLARE CONTROL	1 POINT
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INTENT

To reduce discomfort of glare from natural light.

DESCRIPTION

Ensure daylighting system is designed with adequate and proper glare control in order not to negate the benefits of daylighting.

REQUIREMENTS

Where blinds or screens are fitted on glazing and atrium as a base building, incorporate provisions to meet the following criteria:

1. Eliminate glare from all direct sun penetration and keep horizontal workspace luminance level below 2000 lux;
2. Eliminate glare from diffused sky radiation for occupant workspace at viewing angles of 15° to 60° from the horizontal at eye level (typically 1.2m from floor level);
3. Control with an automatic monitoring system (for atrium and windows with incident direct sun light only - not applicable for fixed blinds/screens); **AND**
4. Equip with a manual override function accessible by occupants (not applicable for fixed blinds/screens).

APPROACH & IMPLEMENTATION

Glare issues typically arise during periods of low angle sun (early mornings and late afternoons) and during periods with bright sky. Glare control should therefore be designed to ensure both a view out and some level of daylight when the systems are engaged.

REQUIRED SUBMISSION FOR DESIGN ASSESSMENT (DA)

	SUBMITTER	GBI
1. Typical floor plans and sections showing variable position of glare control system.	<input type="radio"/>	<input type="radio"/>
2. Brief description of proposed control mechanism to be provided.	<input type="radio"/>	<input type="radio"/>
3. Summary report to describe how view and daylight is assured when glare control system is engaged.	<input type="radio"/>	<input type="radio"/>

REQUIRED SUBMISSION FOR COMPLETION & VERIFICATION ASSESSMENT (CVA)

	SUBMITTER	GBI
1. As-Built drawings and specifications to confirm that building is constructed according to design drawing and specifications.	<input type="radio"/>	<input type="radio"/>
2. Typical As-Built floor plans and sections showing position of glare control system.	<input type="radio"/>	<input type="radio"/>
3. Description of control mechanism installed.	<input type="radio"/>	<input type="radio"/>
4. Manufacturer's Information on the blind and control systems provided.	<input type="radio"/>	<input type="radio"/>
5. Summary report to describe how view and daylight is assured when glare control system is engaged.	<input type="radio"/>	<input type="radio"/>
6. Furnish photographs of each type of typical glazed control system installed.	<input type="radio"/>	<input type="radio"/>
7. Describe any deviation or addition to the DA submission.	<input type="radio"/>	<input type="radio"/>

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INDUSTRIAL EXISTING BUILDING (IEB)
INDOOR ENVIRONMENTAL QUALITY (EQ)

EQ11	ELECTRIC LIGHTING LEVELS	1 POINT
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INTENT

To ensure lighting level is not over-designed.

DESCRIPTION

Ensure lighting level is designed in accordance to MS1525 for different types of spaces.

REQUIREMENTS

Demonstrate that lighting design maintains a luminance level of no more than specified in MS1525 for 90% of NLA (building and industrial plant area) as measured at the working plane (800mm above the floor level).

APPROACH & IMPLEMENTATION

The ambient lighting level should be designed in accordance with the luminance level recommended in MS1525. Task lighting may be provided for occupants who require a higher lighting level either for their own preference or for various task needs.

REQUIRED SUBMISSION FOR DESIGN ASSESSMENT (DA)

	SUBMITTER	GBI
1. Summary report of lighting design brief to illustrate how the credit will be met.	<input type="radio"/>	<input type="radio"/>

REQUIRED SUBMISSION FOR COMPLETION & VERIFICATION ASSESSMENT (CVA)

	SUBMITTER	GBI
1. As-Built drawings showing the lighting layout plans.	<input type="radio"/>	<input type="radio"/>
2. Photometric measurements to illustrate that the lighting level fulfils the credit requirement.	<input type="radio"/>	<input type="radio"/>
3. Furnish photographs of typical floor lighting installation.	<input type="radio"/>	<input type="radio"/>
4. Describe any deviation or addition to the DA submission.	<input type="radio"/>	<input type="radio"/>

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INDUSTRIAL EXISTING BUILDING (IEB)
INDOOR ENVIRONMENTAL QUALITY (EQ)

EQ12	HIGH FREQUENCY BALLASTS	1 POINT
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INTENT

To provide for comfortable visual working environment for occupants.

DESCRIPTION

Increase workplace comfort by avoiding low frequency flickers that may be associated with fluorescent light fittings.

REQUIREMENTS

Install high frequency ballasts in fluorescent luminaires over a minimum of 90% of NLA (building and industrial plant area).

APPROACH & IMPLEMENTATION

Specify high frequency ballasts in fluorescent luminaires. The use of high frequency ballasts in the range of 20kHz and higher will provide smoother, non-flickering lamp operation. At this frequency, the flicker is totally undetectable to the human eye and sensory faculty.

REQUIRED SUBMISSION FOR DESIGN ASSESSMENT (DA)

	SUBMITTER	GBI
1. Description of design strategy to achieve installation of high frequency ballasts for minimum 90% of NLA.	<input type="radio"/>	<input type="radio"/>

REQUIRED SUBMISSION FOR COMPLETION & VERIFICATION ASSESSMENT (CVA)

	SUBMITTER	GBI
1. As-Built lighting plans to identify location of the 90% NLA of fluorescent luminaries installed with high frequency ballasts.	<input type="radio"/>	<input type="radio"/>
2. Manufacturer’s information confirming the specifications of high frequency ballasts installed.	<input type="radio"/>	<input type="radio"/>
3. Describe any deviation or addition to the DA submission.	<input type="radio"/>	<input type="radio"/>

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INDUSTRIAL EXISTING BUILDING (IEB)
INDOOR ENVIRONMENTAL QUALITY (EQ)

EQ13	EXTERNAL VIEWS	2 POINTS
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INTENT

To reduce eyestrain for building occupants by providing long distance views and provision of visual connection to the outdoor.

DESCRIPTION

Provision of view to the outside for building occupants to achieve benefits of connectivity with the outdoor environment.

REQUIREMENTS

1 point: Demonstrating that ≥ 60% of the NLA has a direct line of sight through vision glazing at a height of 1.2m from floor level, **OR**

2 points: Demonstrating that ≥ 75% of the NLA has a direct line of sight through vision glazing at a height of 1.2m from floor level.

Note: This requirement is applicable to the office building component of the industrial plant only.

APPROACH & IMPLEMENTATION

Column free spaces and low interior partitions should be designed if possible. Offices should locate open plan areas along the perimeter of the façade, while private offices and areas not regularly occupied should be placed at the core of the building. Maintaining the views for spaces near the core is the primary design objective.

REQUIRED SUBMISSION FOR DESIGN ASSESSMENT (DA)

	SUBMITTER	GBI
1. Typical floor plans to identify how external view for the spaces is maintained.	<input type="radio"/>	<input type="radio"/>
2. Design strategy of the interior layout that will be designed or recommended to maintain view to the outside.	<input type="radio"/>	<input type="radio"/>

REQUIRED SUBMISSION FOR COMPLETION & VERIFICATION ASSESSMENT (CVA)

	SUBMITTER	GBI
1. As-Built plans including interior layout confirming that there is direct line of sight to outside through vision glazing between 0.8 and 2.2m above the finish floor level for the required spaces.	<input type="radio"/>	<input type="radio"/>
2. For buildings where fit-out is not done, recommended interior layout shall be provided to tenants.	<input type="radio"/>	<input type="radio"/>
3. Describe any deviation or addition to the DA submission.	<input type="radio"/>	<input type="radio"/>

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INDUSTRIAL EXISTING BUILDING (IEB)
INDOOR ENVIRONMENTAL QUALITY (EQ)

EQ14	INTERNAL NOISE LEVELS	1 POINT
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INTENT

To ensure building is designed to maintain a comfortable acoustic environment for occupants.

DESCRIPTION

Maintain internal noise level at an appropriate level.

REQUIREMENTS

Demonstrate that 90% of the NLA (office component only) do not exceed the following ambient internal noise level:

- Within the entire baseline building general office, space noise from the building services does not exceed 40 dBAeq, **OR**
- Within the baseline building office space, the sound level does not exceed 45 dBAeq for open plan and does not exceed 40 dBAeq for closed offices.

APPROACH & IMPLEMENTATION

Excessive noise can cause discomfort to occupants. Some of the solutions to ensure acceptable noise level is maintained include:

- Specify internal acoustics lining up to 5-10m of the AHU discharge duct
- Specify use of duct silencers or sound attenuators
- Specify acoustical ceiling
- Specify furniture with sound absorbing surfaces on both sides
- Locate photocopiers, fax machines away from the main office areas in a separate area
- Insulate partition cavities
- Mechanical equipment room to be located away from office and conference rooms

REQUIRED SUBMISSION FOR DESIGN ASSESSMENT (DA)

	SUBMITTER	GBI
1. Design report on strategies to ensure internal noise level is maintained at the prescribed levels.	<input type="radio"/>	<input type="radio"/>
2. Floor plans showing location of Core, M&E, and equipment rooms.	<input type="radio"/>	<input type="radio"/>

REQUIRED SUBMISSION FOR COMPLETION & VERIFICATION ASSESSMENT (CVA)

	SUBMITTER	GBI
1. Report describing the measured internal and external noise sources and features installed to achieve required noise level.	<input type="radio"/>	<input type="radio"/>
2. As-Built drawings showing noise control features.	<input type="radio"/>	<input type="radio"/>
3. Manufacturer's data sheets of the acoustic materials used in building.	<input type="radio"/>	<input type="radio"/>
4. Describe any deviation or addition to the DA submission.	<input type="radio"/>	<input type="radio"/>

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INDUSTRIAL EXISTING BUILDING (IEB)
INDOOR ENVIRONMENTAL QUALITY (EQ)

EQ15	IAQ BEFORE & DURING OCCUPANCY	2 POINTS
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INTENT

To maintain good Indoor Air Quality condition both before building/plant occupancy and during occupancy.

DESCRIPTION

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 occupants.

REQUIREMENTS

1 Point: Develop and implement an Indoor Air Quality (IAQ) Management Plan for the Pre-Occupancy phase as follows:

Option 1: Perform a building/plant flush-out by supplying outdoor air to provide not less than 10 air changes/hour (ACH) for at least 30 minutes operation before occupancy and continuous minimum 1 ACH during the initial 14 days occupancy of the completed building/plant, **OR**

Option 2: If low VOC materials and low formaldehyde composite wood are used, then building/plant flush-out can be performed by supplying outdoor air to provide not less than 10 ACH for at least 15 minutes operation or not less than 6 ACH for at least 30 minutes operation and continuous minimum 1 ACH for the next 7 days. **OR**

Option 3: Conduct IAQ testing to demonstrate maximum concentrations of pollutants do not exceed that listed in the Indoor Air Quality Code of Malaysia within 12 months of occupancy.

1 Point: Permanent Air Purging System – Where a permanent air flushing system of at least 10 air changes/hour operation is installed for use during occupancy stage.

APPROACH & IMPLEMENTATION

Options 1 and 2, flush-out procedure may begin once all fit-out work is completed. As the purpose of flushing out is to evacuate air-borne contaminants in the building, the most effective way is to use non-polluting interior materials as a source control.

Option 3, IAQ testing procedure to confirm major contaminants are below recognised acceptable levels. This will help to ensure good indoor air quality for occupants.

REQUIRED SUBMISSION FOR DESIGN ASSESSMENT (DA)	SUBMITTER	GBI
1. Summary report outlining the strategies and procedures to be taken to meet the credit requirements.	<input type="radio"/>	<input type="radio"/>

REQUIRED SUBMISSION FOR COMPLETION & VERIFICATION ASSESSMENT (CVA)	SUBMITTER	GBI
1. Report on flush-out procedure including the actual dates of the flush-out.	<input type="radio"/>	<input type="radio"/>
2. If IAQ testing is carried out, a report to outline the procedures undertaken and the results of the testing to verify if the credit requirements are met or not. If not, corrective measures must be taken.	<input type="radio"/>	<input type="radio"/>
3. Describe any deviation or addition to the DA submission.	<input type="radio"/>	<input type="radio"/>

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INDUSTRIAL EXISTING BUILDING (IEB)
INDOOR ENVIRONMENTAL QUALITY (EQ)

EQ16	POST OCCUPANCY COMFORT SURVEY: VERIFICATION	1 POINT
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INTENT

To provide for assessment of comfort of the building occupants/plant workers.

DESCRIPTION

Conduct post occupancy comfort survey of building occupants/plant workers and to undertake measures to rectify the problems identified during the survey.

REQUIREMENTS

- 1) Conduct an occupancy comfort survey of building occupants/workers annually. This survey should collect anonymous responses about thermal comfort, visual comfort and acoustic comfort in a building/plant. 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**
- 2) Develop a plan for corrective action if the survey results indicate that more than 20% of occupants/workers are dissatisfied with the overall comfort in the building/plant. 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, CO₂ level, VOCs, and particulate concentration.

APPROACH & IMPLEMENTATION

Provide a systematic process and system for occupants to provide feedback on their indoor environmental comfort. The survey should collect responses from a significant and representative sample of occupants. The subjective survey should be accompanied with objective measurements of the relevant environmental variables. Short term monitoring or spot measurements should be done once problem areas have been identified through the survey. Corrective actions should then be undertaken to rectify the problem areas identified to improve the indoor environmental conditions of the occupants.

REQUIRED SUBMISSION FOR DESIGN ASSESSMENT (DA)

	SUBMITTER	GBI
1. Summary report of the strategies that will be undertaken to meet the credit compliance.	<input type="radio"/>	<input type="radio"/>

REQUIRED SUBMISSION FOR COMPLETION & VERIFICATION ASSESSMENT (CVA)

	SUBMITTER	GBI
1. Survey questionnaire used to collect responses from the occupants.	<input type="radio"/>	<input type="radio"/>
2. Objective measurement plan illustrating the areas and measurements undertaken.	<input type="radio"/>	<input type="radio"/>
3. Analysis report of the results of the survey and measurements.	<input type="radio"/>	<input type="radio"/>
4. Corrective action plan and measures undertaken to rectify the problem.	<input type="radio"/>	<input type="radio"/>
5. Describe any deviation or addition to the DA submission.	<input type="radio"/>	<input type="radio"/>

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INDUSTRIAL EXISTING BUILDING (IEB)
**SUSTAINABLE SITE PLANNING
& MANAGEMENT (SM)**

**INDUSTRIAL EXISTING BUILDING (IEB)
SUSTAINABLE SITE PLANNING & MANAGEMENT (SM)**

SM1	GBI RATED DESIGN & CONSTRUCTION	1 POINT
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INTENT

To give due recognition to a building/plant with previous green rating or with energy efficiency audit report which is still valid.

DESCRIPTION

Encourage building/plant to subscribe to continuous improvements and maintaining its green rating and energy efficiency effort.

REQUIREMENTS

Awarded if the building/plant 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.

APPROACH & IMPLEMENTATION

Maintain green rating of the building/plant throughout its life span through sustainable practices and conforming to the GBI requirement. Continuously pay attention to the energy efficiency needs of the building/plant by conducting annual energy audits where necessary.

REQUIRED SUBMISSION FOR DESIGN ASSESSMENT (DA)	SUBMITTER	GBI
1. Furnish past GBI certificate or other GBI approved Green Building Certificate OR valid Energy Efficiency Audit report (not more than 12 months old).	<input type="radio"/>	<input type="radio"/>

REQUIRED SUBMISSION FOR COMPLETION & VERIFICATION ASSESSMENT (CVA)	SUBMITTER	GBI
1. Furnish past GBI certificate or other GBI approved Green Building Certificate OR valid Energy Efficiency Audit report (not more than 12 months old).	<input type="radio"/>	<input type="radio"/>

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**INDUSTRIAL EXISTING BUILDING (IEB)
SUSTAINABLE SITE PLANNING & MANAGEMENT (SM)**

SM2	BUILDING EXTERIOR MANAGEMENT	1 POINT
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INTENT

To mitigate pollution to the environment when carrying out maintenance of building/plant exterior.

DESCRIPTION

Promote conscious use of environmentally friendly products to carry out building/plant management works.

REQUIREMENTS

Employ environmentally sensitive building/plant exterior management plan to reduce pollution. Use environmentally non-polluting methods and chemicals for cleaning of building/plant exterior including maintenance equipment, chemicals, paint and sealants.

APPROACH & IMPLEMENTATION

Develop a building/plant management plan that identifies environmentally non-polluting and non-wasteful methodology for exterior management plan and source for environmentally friendly cleaning agents to be used.

REQUIRED SUBMISSION FOR DESIGN ASSESSMENT (DA)

	SUBMITTER	GBI
1. Submit building/plant exterior management plan and intended list of non-polluting cleaning agents / products.	<input type="radio"/>	<input type="radio"/>

REQUIRED SUBMISSION FOR COMPLETION & VERIFICATION ASSESSMENT (CVA)

	SUBMITTER	GBI
1. Furnish as implemented building/plant exterior management plan.	<input type="radio"/>	<input type="radio"/>
2. Comprehensive list of non-polluting cleaning agents/products procured including names of suppliers and eco-certificates.	<input type="radio"/>	<input type="radio"/>
3. Photographic and documentation evidence of actual applications at site.	<input type="radio"/>	<input type="radio"/>
4. Describe any deviation or addition to the DA submission.	<input type="radio"/>	<input type="radio"/>

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**INDUSTRIAL EXISTING BUILDING (IEB)
SUSTAINABLE SITE PLANNING & MANAGEMENT (SM)**

SM3	INTEGRATED PEST MANAGEMENT, EROSION CONTROL & LANDSCAPE MANAGEMENT	1 POINT
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INTENT

To preserve the natural environment of the building/plant exterior through adopting environmentally sensitive management measures.

DESCRIPTION

Promote the awareness and need to use least toxic chemicals for exterior maintenance as well as effect erosion and sedimentation controls.

REQUIREMENTS

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. 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**
2. 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.

APPROACH & IMPLEMENTATION

Practise environmentally sensitive management measures for integrated pest management, erosion & sedimentation control and landscape management. When and where possible, use only organic pesticides and fertilizers; and products that solely consist of biodegradable substances that are not passed through the food chain of pests.

REQUIRED SUBMISSION FOR DESIGN ASSESSMENT (DA)

	SUBMITTER	GBI
1. Submit Pest Management Plan.	<input type="radio"/>	<input type="radio"/>
2. Submit Erosion & Sedimentation Control Plan.	<input type="radio"/>	<input type="radio"/>
3. Submit Landscape Management Plan.	<input type="radio"/>	<input type="radio"/>

REQUIRED SUBMISSION FOR COMPLETION & VERIFICATION ASSESSMENT (CVA)

	SUBMITTER	GBI
1. Submit as implemented Pest Management Plan and photographic evidence of activity in compliance.	<input type="radio"/>	<input type="radio"/>
2. Submit as implemented Erosion & Sedimentation Control Plan and photographic evidence of activity in compliance.	<input type="radio"/>	<input type="radio"/>
3. Submit as implemented Landscape Management Plan and photographic evidence of activity in compliance.	<input type="radio"/>	<input type="radio"/>
4. Describe any deviation or addition to the DA submission.	<input type="radio"/>	<input type="radio"/>

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**INDUSTRIAL EXISTING BUILDING (IEB)
SUSTAINABLE SITE PLANNING & MANAGEMENT (SM)**

SM4	GREEN VEHICLE PRIORITY- LOW EMITTING & FUEL EFFICIENT VEHICLES	1 POINT
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INTENT

To reduce pollution and land development impacts from automobile use.

DESCRIPTION

Provide preferred parking areas for green vehicles, thereby encouraging the use of such vehicles (e.g. hybrid or electric vehicles).

REQUIREMENTS

Encourage use of green vehicles:

- Provide preferred parking for low-emitting and fuel-efficient vehicles comprising 5% of total parking bays. "Preferred Parking" refers to the parking spots that are closest to the main entrance of the building/plant (exclusive of spaces designated for handicapped or parking passes provided at a discounted price).

APPROACH & IMPLEMENTATION

Set aside the required number of car park bays to be provided for green vehicles. To further encourage the usage of green vehicles, locate the required car park bays near lift lobbies.

REQUIRED SUBMISSION FOR DESIGN ASSESSMENT (DA)

	SUBMITTER	GBI
1. Submit calculations for provision of 5% required car park bays for green vehicles.	<input type="radio"/>	<input type="radio"/>
2. Plans showing the locations and numbers of car park bays reserved for green vehicles.	<input type="radio"/>	<input type="radio"/>

REQUIRED SUBMISSION FOR COMPLETION & VERIFICATION ASSESSMENT (CVA)

	SUBMITTER	GBI
1. Submit As-Built plans showing locations and the allocated 5% car park bays for green vehicles.	<input type="radio"/>	<input type="radio"/>
2. Describe any deviation or addition to the DA submission.	<input type="radio"/>	<input type="radio"/>

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**INDUSTRIAL EXISTING BUILDING (IEB)
SUSTAINABLE SITE PLANNING & MANAGEMENT (SM)**

SM5	PARKING CAPACITY	1 POINT
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INTENT

To reduce pollution and land development impacts from single occupancy vehicle use.

DESCRIPTION

Reward for not over-providing parking capacity. This is to encourage the use of public transport and carpools and reduce single occupancy private vehicle use. The environmental benefits of travelling by public transport include the reduction in the emission of greenhouse gases by private cars, thereby reducing urban pollution and traffic congestion.

REQUIREMENTS

Discourage over-provision of car parking capacity:

- Size parking capacity not exceeding the minimum local zoning requirements, **AND**
- Provide preferred parking for carpools or vanpools for 5% of the total provided parking spaces.

APPROACH & IMPLEMENTATION

During retro-fitting planning stage, work out the minimum required number of car park bays. Consult with and inform the local authorities at all times.

REQUIRED SUBMISSION FOR DESIGN ASSESSMENT (DA)

	SUBMITTER	GBI
1. Submit detailed calculation showing the minimum number of car park bays required by the local authorities, and the number of bays provided.	<input type="radio"/>	<input type="radio"/>
2. Submit plans showing location for preferred parking for carpools or vanpools.	<input type="radio"/>	<input type="radio"/>

REQUIRED SUBMISSION FOR COMPLETION & VERIFICATION ASSESSMENT (CVA)

	SUBMITTER	GBI
1. Submit final car park calculations verified by qualified persons.	<input type="radio"/>	<input type="radio"/>
2. Submit As-Built drawings indicating the preferred parking for carpools or vanpools.	<input type="radio"/>	<input type="radio"/>
3. Describe any deviation or addition to the DA submission.	<input type="radio"/>	<input type="radio"/>

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**INDUSTRIAL EXISTING BUILDING (IEB)
SUSTAINABLE SITE PLANNING & MANAGEMENT (SM)**

SM6	GREENERY & ROOF	4 POINTS
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INTENT

To reduce heat island effect (thermal gradient difference between developed and undeveloped areas) so as to minimise impact on microclimate and human and wildlife habitat.

DESCRIPTION

- Minimise impact on microclimate and human wildlife habitat.
- Reward for achieving any option. Roof application includes roofs over individual parking lots and roofs over parking structures.
- The use of greenery on rooftops can help alleviate urban heat island effects through shading and evaporative cooling. It also enhances aesthetics to the surrounding and provides a more pleasant working environment, which is also discussed in Indoor Environmental Quality.

REQUIREMENTS

2 Points: Hardscape & Greenery Application

- 1) Provide any combination of the following strategies for 50% of the site hardscape (including sidewalks, courtyards, plazas and parking lots):
 - Shade (within 5 years of occupancy);
 - Paving materials with a Solar Reflectance Index (SRI) of at least 29;
 - Open grid pavement system;

2 Points: 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:

$$(\text{Area of SRI Roof} / 0.75) + (\text{Area of vegetated roof} / 0.5) > \text{Total Roof Area}$$

Roof Type	Slope	SRI Value
Low-Sloped	< 2:12	78
Steep-Sloped	> 2:12	29

APPROACH & IMPLEMENTATION

During retro-fit planning stage, ensure landscaping design is incorporated, and choice of materials with preferred SRI is considered. Where possible, introduce landscaping to exposed roof surfaces. Plants used should be of either native or adaptive types.

REQUIRED SUBMISSION FOR DESIGN ASSESSMENT (DA)

	SUBMITTER	GBI
1. Submit Site plan and Roof Plan showing the extent of proposed hardscape and greenery (softscape) (To scale).	<input type="radio"/>	<input type="radio"/>
2. Section drawing of the rooftop showing details of built-up roof greenery (To scale).	<input type="radio"/>	<input type="radio"/>
3. List of names of native or adaptive vegetation and their characteristics.	<input type="radio"/>	<input type="radio"/>

REQUIRED SUBMISSION FOR COMPLETION & VERIFICATION ASSESSMENT (CVA)

	SUBMITTER	GBI
1. As-Built plans and sections of roof (To scale). Submit list of materials used and their SRI values.	<input type="radio"/>	<input type="radio"/>
2. Submit photographs of roof and materials.	<input type="radio"/>	<input type="radio"/>
3. Describe any deviation or addition to the DA submission.	<input type="radio"/>	<input type="radio"/>

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**INDUSTRIAL EXISTING BUILDING (IEB)
SUSTAINABLE SITE PLANNING & MANAGEMENT (SM)**

SM7	BUILDING USER MANUAL	1 POINT
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INTENT

To document Green building design features and strategies for user information and guide to sustain performance during occupancy.

DESCRIPTION

A Building User Manual is intended to inform occupants about the active and passive design features that should be maintained throughout the lifespan of the building.

REQUIREMENTS

Provide (include updating) a Building User Manual which documents passive and active features that should not be downgraded.

APPROACH & IMPLEMENTATION

The preparation of the Building User Manual should commence during design concept stage and continue to be developed during all subsequent stages up to and including retro-fitting works. Participation by all consultants and building owner is recommended.

REQUIRED SUBMISSION FOR DESIGN ASSESSMENT (DA)	SUBMITTER	GBI
1. Commitment to develop Building User Manual and furnish framework of contents.	<input type="radio"/>	<input type="radio"/>

REQUIRED SUBMISSION FOR COMPLETION & VERIFICATION ASSESSMENT (CVA)	SUBMITTER	GBI
1. Building User Manual.	<input type="radio"/>	<input type="radio"/>
2. Describe any deviation or addition to the DA submission.	<input type="radio"/>	<input type="radio"/>

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INDUSTRIAL EXISTING BUILDING (IEB)
MATERIALS & RESOURCES
(MR)

INDUSTRIAL EXISTING BUILDING (IEB) MATERIALS & RESOURCES (MR)

MR1

MATERIALS REUSE AND SELECTION

1 POINT

INTENT

To encourage designers to specify the usage of reused building materials when retrofitting buildings.

DESCRIPTION

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.

REQUIREMENTS

1 point: Where reused products/materials constitute $\geq 20\%$ of the project's total retrofit material cost value.

APPROACH & IMPLEMENTATION

Salvage and use old/disused materials such as columns, beams, wall & floor panelling, bricks, door frames, decorative items, furniture, tiles, etc in the green refurbishment of existing buildings.

The following approach can achieve this credit by using:

Reused Materials found on site: Fixed components such as doors, cabinetries, posts etc. that no longer serve their original function are refurbished, reconditioned and installed for a different use or in a different location.

Reused Materials found off site: Use of salvaged materials found off site. They must be previously used or they may be relocated from another facility.

Temporary structures: Temporary formwork, framing and structures etc that can be reused many times before disposal (5-10 cycles of usage) can also be included. If the temporary structures are not new procurement for this project but have been used previously in other project/s, state the number of re-use that are remaining (e.g. use of system formwork is encouraged).

REQUIRED SUBMISSION FOR DESIGN ASSESSMENT (DA)

	SUBMITTER	GBI
1. Provide a narrative describing the materials reuse strategy for the project.	<input type="radio"/>	<input type="radio"/>
2. List of anticipated reused or salvaged materials for the project.	<input type="radio"/>	<input type="radio"/>
3. Cost of each proposed reused or salvaged materials.	<input type="radio"/>	<input type="radio"/>
4. Establish the estimated Total Cost of the materials for the project excluding MEP items (or use the 45% default value for materials costs; i.e. Total Materials Cost may be derived by multiplying the total construction cost by 0.45) for the project.	<input type="radio"/>	<input type="radio"/>

REQUIRED SUBMISSION FOR COMPLETION & VERIFICATION ASSESSMENT (CVA)

	SUBMITTER	GBI
1. Documentation during the construction stage including photographs of the reused materials.	<input type="radio"/>	<input type="radio"/>
2. List of reused or salvaged materials used in the project after completion and their locations in the building.	<input type="radio"/>	<input type="radio"/>
3. Cost of each reused or salvaged materials either based on actual cost paid or replacement value of the material.	<input type="radio"/>	<input type="radio"/>
4. Provide the Actual Total Cost of the materials in the project.	<input type="radio"/>	<input type="radio"/>
5. Describe any deviation or addition to the DA submission.	<input type="radio"/>	<input type="radio"/>

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**INDUSTRIAL EXISTING BUILDING (IEB)
MATERIALS & RESOURCES (MR)**

MR2	RECYCLED CONTENT MATERIALS	1 POINT
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INTENT

To encourage designers to specify the usage of recycled content materials when retrofitting buildings.

DESCRIPTION

Increase demand for building products that incorporate recycled content materials in their production. (Recycled content shall be defined in accordance with the ISO14021 document).

REQUIREMENTS

1 point: 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 $\geq 20\%$ (based on cost) of project's total retrofit material cost value.

APPROACH & IMPLEMENTATION

The goal in using materials with recycled content should be established during the design phase. The project team must identify materials with recycled content and such availability should be coordinated (as early as possible) by the project team with the contractor, subcontractors and suppliers.

The quantum and value of the recycled content of the materials to the total material cost must be documented by the project team.

A recycled content claim may be made only for materials that have been recovered or otherwise diverted from the solid waste stream, either during the manufacturing process (pre-consumer), or after consumer use (post-consumer).

Post-consumer content is given twice the weightage as it is lot more labour intensive to collect scrap or end of lifecycle products, transport it to the manufacturing plants, treat it, before finally including it into the manufacturing loop.

Formwork submitted as reused material cannot be double accounted under recycled material since wood which is a natural product, will not be considered to have recycled content. However, where recycled wood (pre- or post-consumer) fibre is included into another material to form a composite (e.g. recycled wood fibre mixed with recycled plastic to form a composite), these will be considered.

REQUIRED SUBMISSION FOR DESIGN ASSESSMENT (DA)

	SUBMITTER	GBI
1. Calculation of the recycled content value of each material must be provided.	<input type="radio"/>	<input type="radio"/>
2. The percentage of post-consumer and/or pre-consumer recycled content can be established by cost: or by weight (converted to cost).	<input type="radio"/>	<input type="radio"/>
3. Information on the sources/suppliers on the materials with recycled content must be provided.	<input type="radio"/>	<input type="radio"/>
4. Submit estimated value of the materials with recycled content against the estimated total value of the materials for the project.	<input type="radio"/>	<input type="radio"/>

REQUIRED SUBMISSION FOR COMPLETION & VERIFICATION ASSESSMENT (CVA)

	SUBMITTER	GBI
1. Documentation during the construction stage including photographs of the installed reused materials.	<input type="radio"/>	<input type="radio"/>
2. Calculation of the recycled content value of each material must be provided.	<input type="radio"/>	<input type="radio"/>
3. Information on the sources/suppliers on the materials with recycled content must be provided.	<input type="radio"/>	<input type="radio"/>
4. Calculate the total percentage (based on cost) value of the materials with recycled content against the actual total value of the materials for the project. The percentage of post-consumer and/or pre-consumer recycled content must be established by cost.	<input type="radio"/>	<input type="radio"/>
5. Establish the estimated Total Cost of the materials excluding MEP items (or use the 45% default value for materials costs; i.e. Total Materials Cost may be derived by multiplying the total construction cost by 0.45) for the project.	<input type="radio"/>	<input type="radio"/>
6. Describe any deviation or addition to the DA submission.	<input type="radio"/>	<input type="radio"/>

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**INDUSTRIAL EXISTING BUILDING (IEB)
MATERIALS & RESOURCES (MR)**

MR3	SUSTAINABLE TIMBER	1 POINT
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INTENT

To promote responsible forest management.

DESCRIPTION

To encourage environmentally responsible forest management.

REQUIREMENTS

Where ≥ 75% of wood-based materials and products used in the retrofit 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 Forest Stewardship Council and Malaysian Timber Certification Council requirements.

APPROACH & IMPLEMENTATION

Establish the volume and types of wood products used in the project. Check the availability of the wood species and products that complies with FSC and MTCC requirements by making contact with the local vendors, suppliers and manufacturers that provide the required certifications.

Provide a list of certified vendors, suppliers and manufacturers to the contract bidders.

REQUIRED SUBMISSION FOR DESIGN ASSESSMENT (DA)

	SUBMITTER	GBI
1. List all new wood products specified in the project and identify which components are FSC and MTCC certified.	<input type="radio"/>	<input type="radio"/>
2. Indicate the estimated volume of each wood product.	<input type="radio"/>	<input type="radio"/>

REQUIRED SUBMISSION FOR COMPLETION & VERIFICATION ASSESSMENT (CVA)

	SUBMITTER	GBI
1. List all new wood products used in the project and identify which components are FSC and MTCC certified.	<input type="radio"/>	<input type="radio"/>
2. The volume of each wood product must be shown.	<input type="radio"/>	<input type="radio"/>
3. The vendor's chain-of-custody (COC) number must be shown in the invoice to verify FSC and MTCC certifications.	<input type="radio"/>	<input type="radio"/>
4. Describe any deviation or addition to the DA submission.	<input type="radio"/>	<input type="radio"/>

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INDUSTRIAL EXISTING BUILDING (IEB)
MATERIALS & RESOURCES (MR)

MR4	SUSTAINABLE PURCHASING POLICY	1 POINT
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INTENT

To promote the use of sustainable consumer products apart from building/plant maintenance and operational needs, through the adoption of a sustainable purchasing policy.

DESCRIPTION

It is essential to extend environmental protection to cover the day to day operation of a building/plant through the implementation of a sustainable purchasing policy by the owners and tenancies.

REQUIREMENTS

Develop a Sustainable Purchasing Policy that must cover product purchases within the building/plant and management's control.

APPROACH & IMPLEMENTATION

Sustainable purchasing policy involves commitment to the environment, economic and social aspects of the society. Procurement of products should consider the sustainability of their raw materials used, production energy consumed, environmental impact, reusable or recyclable contents, biodegradability and so forth.

REQUIRED SUBMISSION FOR DESIGN ASSESSMENT (DA)

	SUBMITTER	GBI
1. Submit an outline of the Sustainable Purchasing Policy with its objective, scope and responsibilities, best practices and procurement strategies, etc.	<input type="radio"/>	<input type="radio"/>

REQUIRED SUBMISSION FOR COMPLETION & VERIFICATION ASSESSMENT (CVA)

	SUBMITTER	GBI
1. Submit a comprehensive Sustainable Procurement Policy outlining in details its objectives, scope and responsibilities, best practices and procurement strategies, procedures and staffing.	<input type="radio"/>	<input type="radio"/>

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INDUSTRIAL EXISTING BUILDING (IEB)
MATERIALS & RESOURCES (MR)

MR5	STORAGE, COLLECTION & DISPOSAL OF RECYCLABLES	3 POINTS
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INTENT

To provide dedicated areas and storage bins for non-hazardous materials for recycling during BOTH retrofit construction and building/plant occupancy.

DESCRIPTION

Facilitate reduction of waste generated during retrofit construction and during building/plant occupancy that is hauled and disposed of in landfills.

REQUIREMENTS

- 1 point:** Provide recycling facilities/infrastructure for sorting and separate collection of recyclable waste for recycling (consumables - glass, paper, metal, equipment, addition & alteration construction wastes).
- 1 point:** Promote and encourage waste minimization and recycling among occupants, tenants and visitors through various avenues.
- 1 point:** Promote waste sorting, collecting, quantifying, monitoring and recycling of a large range of waste generated in-house.

APPROACH & IMPLEMENTATION

During retrofit construction, designate a dedicated area where on-site sorting of waste materials can be stored in separate skips for collection to recycling facilities.

During Building Occupancy, designate storage areas for recyclable materials that are clearly labelled for recycling, placed within accessible reach of the building occupants and in a location with easy vehicular access to facilitate collection.

The size of the storage space allocated should be adequate to store the recyclable waste volume generated by the building/plant occupants/operation.

Identify and include a list of recycling facilities that are able to handle and treat the recyclable waste diverted from landfills by the building/plant occupants/operation.

REQUIRED SUBMISSION FOR DESIGN ASSESSMENT (DA)

	SUBMITTER	GBI
1. Floor plans showing the proposed locations of the storage areas for recyclables and their proximity to the building entrance and vehicular access point/s.	<input type="radio"/>	<input type="radio"/>
2. Ensure that the space provided for recyclables is in addition to the storage space allocated for general waste.	<input type="radio"/>	<input type="radio"/>
3. Describe proposed promotional activities to encourage recycling within the building/plant.	<input type="radio"/>	<input type="radio"/>

REQUIRED SUBMISSION FOR COMPLETION & VERIFICATION ASSESSMENT (CVA)

	SUBMITTER	GBI
1. As-Built plans showing the locations of the storage area for recyclables. The plans should indicate the proximity of the storage from the building entrance.	<input type="radio"/>	<input type="radio"/>
2. Photographs showing the location, size, storage provision and labelling of dedicated facilities during retrofit construction.	<input type="radio"/>	<input type="radio"/>
3. Write up of promotional activities to encourage recycling within the building/plant including evidence of such promotional activities carried out.	<input type="radio"/>	<input type="radio"/>
4. A waste recycling strategy and plan that identifies types of recyclable materials diverted from landfills as well as recycling facilities that have been signed up to handle the recyclable waste	<input type="radio"/>	<input type="radio"/>
5. Describe any deviation or addition to the DA submission.	<input type="radio"/>	<input type="radio"/>

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**INDUSTRIAL EXISTING BUILDING (IEB)
MATERIALS & RESOURCES (MR)**

MR6	REFRIGERANTS & CLEAN AGENTS	1 POINT
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INTENT

To demonstrate leadership in accelerating phase-out of all Ozone Depleting Substances. Recognise and promote use of low Global Warming Substances.

DESCRIPTION

Use environmentally-friendly Refrigerants and Clean Agents exceeding Malaysia’s commitment to the Montreal & Kyoto protocols.

REQUIREMENTS

1 point: Use zero Ozone Depleting Potential (ODP) products: non-CFC and non-HCFC Refrigerants **AND** Clean Agents.

APPROACH & IMPLEMENTATION

Use synthetic refrigerants (for HVAC) and clean agents (for fire fighting) with zero ODP such as HFCs that exceeds Malaysia’s commitment to the Montreal & Kyoto protocols.

Use of non-synthetic (natural) refrigerants (for HVAC) and clean agents (for fire fighting) with zero ODP and negligible Global Warming Potential (GWP) such as water, hydrocarbon, carbon dioxide, ammonia and etc (for HVAC); and nitrogen, argon, water mist and etc. (for fire fighting) is encouraged and is rewarded under Innovation.

REQUIRED SUBMISSION FOR DESIGN ASSESSMENT (DA)

	SUBMITTER	GBI
1. Submit proposed types of refrigerants and clean agents to be used and/or if no refrigerants or clean agents will be used.	<input type="radio"/>	<input type="radio"/>

REQUIRED SUBMISSION FOR COMPLETION & VERIFICATION ASSESSMENT (CVA)

	SUBMITTER	GBI
1. Submit list of as-installed refrigerants and clean agents.	<input type="radio"/>	<input type="radio"/>
2. Describe any deviation or addition to the DA submission.	<input type="radio"/>	<input type="radio"/>

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INDUSTRIAL EXISTING BUILDING (IEB)
WATER EFFICIENCY
(WE)

INDUSTRIAL EXISTING BUILDING (IEB) WATER EFFICIENCY (WE)

WE1	RAINWATER HARVESTING	3 POINTS
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INTENT

To encourage rainwater harvesting that will lead to reduction in potable water consumption.

DESCRIPTION

Maximise rainwater collection from rooftop or runoff rainwater systems for building consumption and/or irrigation.

REQUIREMENTS

- 1 point:** Rainwater harvesting that leads to $\geq 5\%$ reduction in potable water consumption, **OR**
- 2 points:** Rainwater harvesting that leads to $\geq 15\%$ reduction in potable water consumption, **OR**
- 3 points:** Rainwater harvesting that leads to $\geq 30\%$ reduction in potable water consumption.

APPROACH & IMPLEMENTATION

The two (2) main approaches to rainwater harvesting are collection of runoff rainwater from surrounding site and roof top rainwater harvesting. Both systems require separate water storage tanks and additional pressure boosting equipment may be required. Gravity fed system is encouraged to avoid additional energy use for pumping. Use rainwater for non-potable applications such as toilets and urinal flushing, landscape irrigation, washing floors etc.

Water purifying system may be necessary depending on the application and methodology of harvesting the rainwater. Where rainwater filtration/purification is required, use of ozone or activated oxygen in lieu of chlorine or other GHG chemicals, is preferred to obviate negative environmental impact.

Rainwater harvesting calculation method and parameters adopted using GBI recognised Standards, Codes or Guides are acceptable.

REQUIRED SUBMISSION FOR DESIGN ASSESSMENT (DA)

	SUBMITTER	GBI
1. A technical report describing the concept and details of rainwater collection, conveyance system (gutters/downpipes or equivalent), filtration system (if any), storage facility and distribution system.	<input type="radio"/>	<input type="radio"/>
2. The technical report shall include schematics showing how the rainwater is to be harvested and utilised.	<input type="radio"/>	<input type="radio"/>

REQUIRED SUBMISSION FOR COMPLETION & VERIFICATION ASSESSMENT (CVA)

	SUBMITTER	GBI
1. Final as-installed calculation of rainwater harvested, storage tank capacity and building usage distribution system.	<input type="radio"/>	<input type="radio"/>
2. As-Built drawings for rainwater harvesting system and storage tank location (Recommended scale 1:200).	<input type="radio"/>	<input type="radio"/>
3. Furnish photographs of as installed main equipment and components.	<input type="radio"/>	<input type="radio"/>
4. Describe any deviation or addition to the DA submission.	<input type="radio"/>	<input type="radio"/>

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INDUSTRIAL EXISTING BUILDING (IEB)
WATER EFFICIENCY (WE)

WE2	WATER RECYCLING	3 POINTS
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INTENT

To encourage water recycling that will lead to reduction in potable water consumption.

DESCRIPTION

Encourage recycling of greywater and/or blackwater for building and irrigation use to reduce discharge to external sewer, thereby reducing the overall building potable water consumption.

Encourage and recognise building design that reduces water flow to sewerage treatment plants.

REQUIREMENTS

Treat and recycle the following percentage of wastewater leading to reduction in potable water consumption:

- 1 point:** For ≥ 10% or more wastewater being treated and recycled, **OR**
- 2 points:** For ≥ 30% or more wastewater being treated and recycled, **OR**
- 3 points:** For ≥ 50% or more wastewater being treated and recycled

APPROACH & IMPLEMENTATION

Water treatment systems and re-use technology options are acceptable for treating greywater and blackwater. The treated water is then recycled for use in irrigation, toilet flushing etc. Sand filters can be a cost effective treatment technique.

POTENTIAL TECHNOLOGIES & STRATEGIES

Consider channelling greywater from sinks, showers and other sources to wastewater treatment plant. Options for on-site wastewater treatment include packaged biological nutrient removal systems and high efficiency filtration systems can be considered.

REQUIRED SUBMISSION FOR DESIGN ASSESSMENT (DA)

	SUBMITTER	GBI
1. Preliminary calculation to demonstrate the percentage of wastewater to be treated and recycled.	<input type="radio"/>	<input type="radio"/>
2. A technical report describing the concept and details of the recycling and treatment plant, conveyance system, storage facility and distribution system.	<input type="radio"/>	<input type="radio"/>
3. The technical report shall include schematics showing how the wastewater is recycled, stored and utilised.	<input type="radio"/>	<input type="radio"/>

REQUIRED SUBMISSION FOR COMPLETION & VERIFICATION ASSESSMENT (CVA)

	SUBMITTER	GBI
1. Final as-installed calculation of the recycled and treated wastewater, storage tank capacity and distribution system.	<input type="radio"/>	<input type="radio"/>
2. As-Built drawings for wastewater recycling and treatment system, and storage tank location (to scale).	<input type="radio"/>	<input type="radio"/>
3. Describe any deviation or addition to the DA submission.	<input type="radio"/>	<input type="radio"/>

PROJECT NAME				DATE
SUBMITTING PROFESSIONAL	NAME	DESIGNATION	COMPANY	SIGNATURE
CLIENT	NAME	DESIGNATION	COMPANY	SIGNATURE

NOTE ATTACH ALL SUBMITTALS WITH THIS COVER PAGE

INDUSTRIAL EXISTING BUILDING (IEB)
WATER EFFICIENCY (WE)

WE3	WATER EFFICIENT IRRIGATION/ LANDSCAPING	2 POINTS
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INTENT

To encourage and recognise the design of landscaping system that minimises or does not require the use of potable water supply from the local water authority.

DESCRIPTION

The main aim is to reduce the consumption of potable water for landscape irrigation. This may be achieved through the use of native or adaptive plants to reduce potable water consumption.

REQUIREMENTS

- 1 point:** For reducing potable water consumption for landscape irrigation by 50% or more, **OR**
- 2 points:** For not using potable water at all for landscape irrigation.

APPROACH & IMPLEMENTATION

Design a water-efficient landscape by selecting native or adaptive plants that require minimal water. Reduce or eliminate use of potable water for landscape irrigation system.

POTENTIAL TECHNOLOGIES & STRATEGIES

Perform soil/climate analysis to determine appropriate plant material and design the landscape with native or adaptive plants to reduce or eliminate irrigation requirements. Where irrigation is required, use high efficiency equipment and/or climate based controllers.

REQUIRED SUBMISSION FOR DESIGN ASSESSMENT (DA)

	SUBMITTER	GBI
1. A brief description of the system with references to Guidelines used, calculations, and an explanation of how the system meets the requirement for the credit.	<input type="radio"/>	<input type="radio"/>
2. A brief report by a landscape architect detailing the selection of native adaptive vegetation and the water efficient irrigation system and demonstrating that it will meet all the requirements for the credit.	<input type="radio"/>	<input type="radio"/>

REQUIRED SUBMISSION FOR COMPLETION & VERIFICATION ASSESSMENT (CVA)

	SUBMITTER	GBI
1. As-Built plans showing the detail location of the planted native adaptive vegetation and installed water efficient irrigation system (to scale).	<input type="radio"/>	<input type="radio"/>
2. Calculation of the reduction of potable water for landscape irrigation.	<input type="radio"/>	<input type="radio"/>
3. Furnish photographs of the vegetation installed.	<input type="radio"/>	<input type="radio"/>
4. Describe any deviation or addition to the DA submission.	<input type="radio"/>	<input type="radio"/>

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INDUSTRIAL EXISTING BUILDING (IEB)
WATER EFFICIENCY (WE)

WE4	WATER REDUCTION	2 POINTS
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INTENT

To encourage reduction in potable water consumption through use of efficient devices/industrial process.

REQUIREMENTS

1 point: Reduce annual potable water consumption by $\geq 30\%$, **OR**

2 points: Reduce annual potable water consumption by $\geq 50\%$.

APPROACH & IMPLEMENTATION

The use of water efficient water closets, wash hand basins or shower heads or systems which has the potential to reduce potable water consumption in the building.

Specify the use of automatic self-closing faucets, electronic or otherwise, to eliminate wastage through faucets left running unnecessarily.

Specify the use of modified waterless urinals.

REQUIRED SUBMISSION FOR DESIGN ASSESSMENT (DA)

	SUBMITTER	GBI
1. A brief description of the system and an explanation of how the system meets the requirement for the credit.	<input type="radio"/>	<input type="radio"/>
2. Submit proposed makes of the intended fittings and industrial process.	<input type="radio"/>	<input type="radio"/>

REQUIRED SUBMISSION FOR COMPLETION & VERIFICATION ASSESSMENT (CVA)

	SUBMITTER	GBI
1. Actual verified water consumption for the building.	<input type="radio"/>	<input type="radio"/>
2. Tabulation of all as-installed water efficient fittings and calculations to verify percentage of water saved to meet the requirement for the credit.	<input type="radio"/>	<input type="radio"/>
3. Submit manufacturer's details of the installed fittings.	<input type="radio"/>	<input type="radio"/>
4. Furnish photographs of each type of water efficient fittings as-installed.	<input type="radio"/>	<input type="radio"/>
5. Describe any deviation or addition to the DA submission.	<input type="radio"/>	<input type="radio"/>

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INDUSTRIAL EXISTING BUILDING (IEB)
WATER EFFICIENCY (WE)

WE5	METERING & LEAK DETECTION SYSTEM	2 POINTS
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INTENT

To encourage the design of systems that allows monitoring and management of water consumption.

REQUIREMENTS

1 point: Use of sub-meters to monitor and manage major water usage for cooling towers, irrigation, kitchens, tenancy use, and industrial process use.

1 point: Link all water sub-meters to EMS to facilitate early detection of water leakage.

APPROACH & IMPLEMENTATION

Specify the provisions of sub-meters for major water consuming system/equipment.

Incorporate EMS monitoring system of sub-meters.

POTENTIAL TECHNOLOGIES & STRATEGIES

To incorporate provisions of analogue or digital flow water sub-meters.

Incorporation of EMS monitoring will enable early detection of water leakage and contain water wastage.

REQUIRED SUBMISSION FOR DESIGN ASSESSMENT (DA)

	SUBMITTER	GBI
1. Describe proposed provision of sub-meters of all major water consuming system/equipment and interface with EMS.	<input type="radio"/>	<input type="radio"/>

REQUIRED SUBMISSION FOR COMPLETION & VERIFICATION ASSESSMENT (CVA)

	SUBMITTER	GBI
1. Submit tabulated inventory of as-installed sub-meters.	<input type="radio"/>	<input type="radio"/>
2. As-Built plans of the building showing the location of sub-meters.	<input type="radio"/>	<input type="radio"/>
3. Furnish photographs of typical sub-meter installed.	<input type="radio"/>	<input type="radio"/>
4. Sample of actual EMS report recording consumption and simulated leakage.	<input type="radio"/>	<input type="radio"/>
5. Describe any deviation or addition to the DA submission.	<input type="radio"/>	<input type="radio"/>

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INDUSTRIAL EXISTING BUILDING (IEB)
INNOVATION
(IN)

INDUSTRIAL EXISTING BUILDING (IEB) INNOVATION (IN)

IN1

INNOVATION & ENVIRONMENTAL DESIGN INITIATIVES

9 POINTS

INTENT

To provide opportunity for the project to be awarded points for exceptional performance above the requirements set by GBI rating system.

DESCRIPTION

Reward innovation and initiatives.

REQUIREMENTS

Encourage project team to score 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, for innovative ideas such as, but not limited to:

- Use of Industrialised Building System (IBS) for the retrofit component (minimum CIDB IBS score of 30);
- Condensate water recovery (accounting for at least 50% of total AHUs/FCUs) for use as cooling water make-up water etc;
- Co-generation / Tri-generation system;
- Thermal / PCM / Thermal Mass storage system (accounting for at least 25% of total required capacity);
- Solar thermal technology / Solar Air conditioners (generating at least 10% of total required capacity);
- Heat recovery system (contributing to at least 10% of total required capacity);
- Heat pipe technology (contributing to at least 50% of the relevant applications);
- Light pipes (generating at least 1% of total lighting capacity);
- Auto-condenser tube cleaning system (fitted to plant equipment serving at least 50% of total capacity);
- Non-chemical water treatment system for condenser or chilled water circuit (serving at least 50% of total capacity);
- Air and dirt separator system for chilled water piping system;
- Vacuum degasser cleaning system for chilled water piping system;
- Dynamic balancing control valve system (for entire chilled water system)
- Mixed mode / low energy ventilation system;
- Advanced air filtration technology (serving at least 50% of GFA);
- Waterless urinals (fitted to at least 75% male toilets);
- Central vacuum system (serving at least 50% of NLA);
- Central Pneumatic Waste Collection system (serving at least 50% of NLA);
- Self-cleaning façade (for at least 10% of façade);
- Electrochromic glazed façade (for at least 10% of façade);
- Refrigerant leakage detection and recycling facilities (for at least 90% of HVAC plant);
- Car park mechanical ventilation fans provided with VSD and controlled by CO₂/CO sensors;
- Use non-synthetic (natural) Refrigerants AND Clean Agents with zero ODP and negligible Global Warming Potential;
- ISO 14000 series certification;
- Recycling of all fire systems water during regular testing;

Project team may submit any innovation not listed above to GSB for consideration and approval of credit point.

APPROACH & IMPLEMENTATION

During Concept Design Stage, commence discussions on all possible innovation ideas to be incorporated into the building early. Late incorporation of innovation ideas may be difficult and costly.

CONTINUED ON NEXT PAGE

**INDUSTRIAL EXISTING BUILDING (IEB)
INNOVATION (IN)**

IN1	INNOVATION & ENVIRONMENTAL DESIGN INITIATIVES	9 POINTS
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REQUIRED SUBMISSION FOR DESIGN ASSESSMENT (DA)	SUBMITTER	GBI
1. Report on each innovation, how it is derived, and how it would assist in reducing energy and/or improving sustainable design.	<input type="radio"/>	<input type="radio"/>

REQUIRED SUBMISSION FOR COMPLETION & VERIFICATION ASSESSMENT (CVA)	SUBMITTER	GBI
1. Full documentation and photographic evidence of each innovation, and the process from commencement to commissioning, complete with drawings, manuals and maintenance write-up.	<input type="radio"/>	<input type="radio"/>
2. Describe any deviation or addition to the DA submission.	<input type="radio"/>	<input type="radio"/>

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**INDUSTRIAL EXISTING BUILDING (IEB)
INNOVATION (IN)**

IN2	GREEN BUILDING INDEX FACILITATOR	1 POINT
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INTENT

To support and encourage the design integration required for Green Building Index rated buildings and to streamline the application and certification process.

DESCRIPTION

Encourage and promote green technology service providers.

REQUIREMENTS

Support and encourage the design integration required for Green Building Index rated buildings and to streamline the application and certification process, where:

At least one principal participant of the project team shall be a Green Building Index Facilitator who is engaged at the onset of the design process until completion of construction and Green Building Index certification is obtained. Name of the GBI Facilitator shall be inserted in GBI Application & Registration Form.

APPROACH & IMPLEMENTATION

Appoint a Green Building Index Facilitator early to assist in the concept design stage, and ensure that the Facilitator follows through the entire project.

REQUIRED SUBMISSION FOR DESIGN ASSESSMENT (DA)

	SUBMITTER	GBI
1. Proof of appointment of the named GBI Facilitator.	<input type="radio"/>	<input type="radio"/>
2. GBI Facilitator to present DA submission to GBI Certifier.	<input type="radio"/>	<input type="radio"/>

REQUIRED SUBMISSION FOR COMPLETION & VERIFICATION ASSESSMENT (CVA)

	SUBMITTER	GBI
1. GBI Facilitator to present CVA submission to GBI Certifier.	<input type="radio"/>	<input type="radio"/>

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ACKNOWLEDGEMENTS

GSB would like to thank all contributors for efforts in preparing the INDUSTRIAL EXISTING BUILDING Design Reference Guide Version 1.0. The following are the main contributors to the formation of this document:

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