BPD_GM01
GM Submission at BP stage for Non-Residential Building

Sample Forms Attached For Viewing Only
Applicable for projects with 1st submission date for URA planning permission on or after 1st Dec 2010

All these forms and calculations are to be generated from the Green Mark (GM) e-filing system.

The forms spell out all the elective requirements which the QPs and the other practitioners can choose for their design to meet the environmental sustainability requirement.

QPs are only required to provide salient information pertaining to the items that are relevant to their design and the GM e-filing system will automatically compute the score to be allocated for the items selected.

Documentary evidences need not be submitted together with these forms. However, QPs are advised to maintain such records. BCA may require such evidences to be submitted for auditing purpose.

Building and Construction Authority

SUBMISSION OF GREEN MARK SCORE CALCULATIONS
Regulation 7 of the Building Control (Environmental Sustainability) Regulations 2008 (Cap. 29)

Commissioner of Building Control Building & Construction Authority 5 Maxwell Road #02-00 Tower Block, MND Complex Singapore 069110	*INSTRUCTIONS* (1) Please refer to the Explanatory Notes attached before completing these forms via Green Mark (GM) e-Filing system. (2) Submit one copy of this form together with Form BPD_GM01_Appendix 1 (for residential building) and/or Form BPD_GM01_Appendix 2 (for non-residential building) with the application for approval of building plans.

Section I (To be completed by Qualified Person)

1. I confirm that I have been appointed under section 8(1)(a) or 11(1)(d)(i) of the Building Control Act (Cap 29) as the qualified person in respect of the building works herein described.

   Project Reference No. : _____ GM e-Filing No.: _____

   Description of building works: _____

   _____

   _____

   _____

2. I hereby declare that the building works or parts thereof assessed and the numerical scores assigned to these building works or parts thereof using the scoring methodology specified in the Code for Environmental Sustainability of Buildings are correct. I further declare that the Green Mark score submitted herewith complies with the minimum environmental sustainability standard under the Building Control (Environmental Sustainability) Regulations and the Green Mark score calculations are as stated in Form BPD_GM01_Appendix 1 and/or Form BPD_GM01_Appendix 2. The Green Mark score for the proposed building works is _____ for residential buildings and/or _____ for non-residential buildings respectively.

Name & Address of Professional Firm	Name & Signature of Qualified Person
Date:	Tel No.:

Section II (To be completed by Appropriate Practitioners)

3. We hereby declare that the building works or parts thereof assessed and the numerical scores assigned to these building works or parts thereof using the scoring methodology specified in the Code for Environmental Sustainability of Buildings are correct.

Name & Address of Professional Firm	Name & Signature of Practitioner for Mechanical Works
Date:	Tel No.:
Name & Address of Professional Firm	Name & Signature of Practitioner for Electrical Works
Date:	Tel No.:

CALCULATIONS OF GREEN MARK SCORE FOR NON-RESIDENTIAL BUILDINGS
Regulation 7 of the Building Control (Environmental Sustainability) Regulations 2008 (Cap. 29)

SECTION I : SUMMARY

Project Reference No.: _____ GM e-Filing No.: _____

The Gross Floor Area (GFA) for the building works, where applicable :

Building Works	New GFA in m^2	Existing GFA in m^2 (Major Retrofitting)
Residential		Not Applicable
Non-Residential		
Total		

Pls indicate Non-Residential Floor Area & Percentage (%), where applicable :

Non-Residential Floor Area	Floor Area in m^2	% Floor Area	% Prorate by Scoring
Air-conditioned spaces			
Non Air-conditioned spaces excluding carparks and common areas			
Total			

Category Items	**Max Points Allocated**	**Points Scored**
(I) Energy Related Requirements		
Part 1 : Energy Efficiency		
NRB 1-1 Thermal Performance of Building Envelope – ETTV	12	
NRB 1-2 Air-Conditioning System	30	
Sub-Total (A) - For NRB 1-1 to 1-2 :	**42**	
Prorate Sub-Total (A) :		
NRB 1-3 Building Envelope – Design/Thermal Parameters	35	
NRB 1-4 Natural Ventilation / Mechanical Ventilation	20	
Sub-Total (B) - For NRB 1-3 to 1-4 :	**55**	
Prorate Sub-Total (B) :		
NRB 1-5 Daylighting	6	
NRB 1-6 Artificial Lighting	12	
NRB 1-7 Ventilation in Carparks	4	
NRB 1-8 Ventilation in Common Areas	5	
NRB 1-9 Lifts and Escalators	2	
NRB 1-10 Energy Efficient Practices & Features	12	
NRB 1-11 Renewable Energy	20	
Sub-Total (C) - For NRB 1-5 to 1-11 :	**61**	
Category Score for Part 1 – Energy Efficiency *(Min 30 points)* **Prorate Sub-Total (A) + Prorate Sub-Total (B) + Sub-Total (C) :**	**116**	

Project Reference No.: _____ GM e-Filing No.: _____

Category Items		Max Points Allocated	Points Scored
(II) Other Green Related Requirements			
Part 2 : Water Efficiency			
NRB 2-1	Water Efficient Fittings	10	
NRB 2-2	Water Usage and Leak Detection	2	
NRB 2-3	Irrigation System and Landscaping	3	
NRB 2-4	Water Consumption of Cooling Tower	2	
Category Score for Part 2 – Water Efficiency :		**17**	
Part 3 : Environmental Protection			
NRB 3-1	Sustainable Construction	10	
NRB 3-2	Sustainable Products	8	
NRB 3-3	Greenery Provision	8	
NRB 3-4	Environmental Management Practice	7	
NRB 3-5	Green Transport	4	
NRB 3-6	Refrigerants	2	
NRB 3-7	Stormwater Management	3	
Category Score for Part 3 – Environmental Protection :		**42**	
Part 4 : Indoor Environmental Quality			
NRB 4-1	Thermal Comfort	1	
NRB 4-2	Noise Level	1	
NRB 4-3	Indoor Air Pollutants	2	
NRB 4-4	Indoor Air Quality (IAQ) Management	2	
NRB 4-5	High Frequency Ballasts	2	
Category Score for Part 4 – Indoor Environmental Quality :		**8**	
Part 5 : Other Green Features			
NRB 5-1	Green Features & Innovations	7	
Category Score for Part 5 – Other Green Features :		**7**	
Category Score for Part 2 to Part 5 *(Min 20 points)* **:**		**74**	
Category Score for Part 1 – Energy Efficiency *(Min 30 points)* **Prorate Sub-Total (A) + Prorate Sub-Total (B) + Sub-Total (C) :**		**116**	
Green Mark Score *(Min 50 points)* **- {Category Score for Part 1** *(Min 30 points)* **+ Category Score for Part 2 to Part 5** *(Min 20 points)***} :**		**190**	

The Green Mark score for the proposed building works is _____ for non-residential buildings.

SECTION II : GREEN MARK SCORE CALCULATIONS DETAILS

Project Reference No.: _____ GM e-Filing No.: _____

(I) Energy Related Requirements

Part 1 : Energy Efficiency	**Max Points Allocated**	**Points Scored**
Section (A) Applicable to Air-Conditioned Building Areas (with an aggregate air-conditioned areas > 500 m^2)		
Air-conditioned spaces and percentage floor area if applicable :		

Floor Area in m^2	% Floor Area	% Prorate By Scoring

NRB 1-1 Thermal Performance of Building Envelope – ETTV	**12**	
For Buildings that are underground, NRB 1-1 may be excluded in the computation, the score obtained under NRB 1-2 will be prorated accordingly		
ETTV = _____ W/m^2		
Green Mark Points : Points scored = 1.2 x (50 - ETTV); Max 12 points *Max Permissible ETTV (Envelope Thermal Transfer Value)=50 W/m^2;*		
NRB 1-2 Air-Conditioning System	**30**	
Where there is a combination of centralised air-con system with unitary air-con system, the computation is based on the air-conditioning system with the larger aggregate capacity		

(a) Water Cooled Chilled-Water Plant

Peak Building Cooling Load = _____ RT

Air-Conditioning System Efficiency in kW/RT		
Full Load Condition	OR	Expected Operating Part Load Condition

Green Mark Points : Max 20 points		
Peak building cooling load (RT)	*≥500*	*<500*
Baseline : Prerequisite Requirement *Minimum central chilled-water plant efficiency (kW/RT)*	*0.70*	*0.80*
Points for meeting prescribed chiller plant efficiency	*15*	*12*
Points for every % improvement in the chiller plant operating efficiency over the baseline	*0.25*	*0.45*

(b) Air Cooled Chilled-Water Plant / Unitary Air-Conditioners

_____ *Air Cooled Chilled-Water Plant*

_____ *Unitary Air-Conditioners*

Peak Building Cooling Load = _____ RT

Air-Conditioning System Efficiency in kW/RT		
Full Load Condition	OR	Expected Operating Part Load Condition

Green Mark Points : Max 20 points		
Peak building cooling load (RT)	*≥500*	*<500*
Baseline : Prerequisite Requirement *Minimum system efficiency of air cooled chilled water plant or unitary conditioners (kW/RT)*	*0.80*	*0.90*
Points for meeting prescribed efficiency	*12*	*10*
Points for every % improvement in the operating efficiency over the baseline	*1.30*	*0.60*

Project Reference No.: _____ GM e-Filing No.: _____

(I) Energy Related Requirements

Part 1 : Energy Efficiency cont'd	**Max Points Allocated**	**Points Scored**
NRB 1-2 Air-Conditioning System cont'd		
(c) Air Distribution System % improvement in the air distribution system efficiency over baseline standard (SS553) = ____ % *Green Mark points - 0.2 point for every % improvement; Max 6 points.* Buildings using district cooling system, *Note : No need to compute plant efficiency in item (a), (b), points obtained will be prorated based on the air distribution system efficiency under item (c).*		
(d) Prerequisite Requirement : Provision of permanent measuring instruments for monitoring of water cooled chilled-water plant efficiency *(1 point).*		
(e) Verification of central chilled-water plant instrumentation for water cooled chilled-water plant using the heat balance substantiating test *(1 point).*		
(f) Provision of variable speed controls for chilled-water pumps and cooling tower fans to ensure better high part-load plant efficiency *(1 point).*		
(g) Sensors or similar automatic control devices are used to regulate outdoor air flow rate to maintain the concentration of carbon dioxide within an acceptable range of 700 ppm above outdoor *(1 point).*		
Sub-Total (A) – For NRB 1-1 to 1-2 :	**42**	
Prorate Sub-Total (A) - For buildings that are underground where NRB 1-1 is excluded		
Prorate Sub-Total (A) -by percentage of air-conditioned areas where applicable:		

Project Reference No.: _____ GM e-Filing No.: _____

(I) Energy Related Requirements

Part 1 : Energy Efficiency cont'd	**Max Points Allocated**	**Points Scored**
Section (B) -Applicable to Non Air-Conditioned Building Areas (with an aggregate non air-conditioned areas > 10% of total floor area excluding carparks and common areas)		

Non Air-conditioned spaces and percentage floor area if applicable :

Floor Area in m^2	% Floor Area	% Prorate By Scoring

NRB 1-3 Building Envelope - Design/Thermal Parameters — **35**

For Existing Buildings, NRB 1-3(a) may be excluded in the computation, the total score obtained under NRB 1-3(b), NRB 1-3(c) and NRB 1-3(d) will be prorated accordingly

(a) Minimum direct west facing through building design orientation

Percentage of west facing façade areas over total façade areas = _____ %

Green Mark Points : Points = 15 – [0.3 x (% of west facing external facade areas)]; Max 15 points.

Where there is no west facing, the total points for this item will be 30 points; the items NRB 1-3 (b) and NRB (c) as listed below will be not applicable

(b) (i) Minimum west facing window openings

Percentage of west facing window areas over total west facing façade areas = _____ %

Green Mark Points : Points = 10 – [0.1 x (% of west facing window areas)].

(ii) Effective sunshading provision for windows on the west façade with minimum shading of 30%.

Percentage of west facing window areas with sunshading devices over total west facing facade areas = _____ %

Green Mark Points : Points = 0.1 x (% of west facing window areas with sunshading devices); Max 10 points for NRB 1-3(b).

(c) Better Thermal Transmittance (U-value) of external west facing walls

Percentage of external west facing walls areas with U-value of 2 W/m^2K or less over total west facing façade areas = _____ %

Green Mark Points : Points = 0.05 x (% of external west facing walls areas that meet the criteria); Max 5 points.

(d) Better Thermal Transmittance (U-value) of roof

Roof Weight Group	Max U-value of Roof (W/m^2K) (A)	U-value of Roof (W/m^2K) (B)	Roof Area (m^2) (C)	Reduction from baseline Roof U-value (W/m^2K) D=A-B	Average Reduction prorated based on roof areas (W/m^2K) $E=\frac{D \times C}{\sum C}$
Light	0.8				
Medium	1.1				
Heavy	1.5				

Green Mark Points : 1 point for every 0.1 W/m^2K reduction from baseline, Max 5 points.

Project Reference No.: _____ GM e-Filing No.: _____

(I) Energy Related Requirements

Part 1 : Energy Efficiency cont'd	**Max Points Allocated**	**Points Scored**
NRB 1-4 Natural Ventilation / Mechanical Ventilation	**20**	
Where there is a combination of naturally ventilated and mechanical ventilated spaces, the points scored will be based on the predominant ventilation modes of normally occupied spaces.		

(a) Natural Ventilation

(i) Proper design of building layout that utilises prevailing wind conditions to achieve adequate cross ventilation *(Max 10 points)*

* Building Layout Design

Total No. of units/ rooms in the development	Units/ Rooms with windows facing north and south directions *(1.0 point for every 10 %)*		
	Total No.	Percentage	Points Scored

(ii) Use of ventilation simulation software

- identification of the most effective building design and layout *(5 points)*
- recommendations to implement design optimisation *(5 points)*

(b) Mechanical Ventilation

Use of energy efficient mechanical ventilation system design

Percentage improvement in the air-distribution system efficiency

= _____ %

Green Mark Points : 0.6 point for every % improvement over baseline SS553; Max 15 points.

Sub-Total (B) – For NRB 1-3 to 1-4 :	**55**	
Prorate Sub-Total (B) - For existing building where NRB 1-3(a) is excluded :		
Prorate Sub-Total (B) - by percentage of non air-conditioned areas where applicable:		

Project Reference No.: _____ GM e-Filing No.: _____

(I) Energy Related Requirements

Part 1 : Energy Efficiency cont'd	**Max Points Allocated**	**Points Scored**
Section (C) General		
NRB 1-5 Daylighting	**6**	

(a) Use of daylighting and glare simulation analysis to verify the adequacy of ambient lighting levels in all normally occupied areas
Extent of coverage : At least 75% of the units with effective daylighting provisions
Distance from façade perimeter meeting minimum required illuminance level = _____ m

Green Mark Points			
Distance from the façade perimeters (m)	*≥ 3.0*	*4.0 - 5.0*	*> 5.0*
Points Allocated	*1*	*2*	*3*

(b) Daylighting in Common Areas
Extent of coverage : At least 80% of the applicable areas

Common Areas	Daylighting (0.5 point)
(i) Toilets	
(ii) Staircases	
(iii) Corridors	
(iv) Lifts	
(v) Atriums	
(vi) Carparks	

NRB 1-6 Artificial Lighting	**12**	

Use of better efficient lighting to minimise energy consumption from lighting usage while maintaining proper lighting level.

Percentage improvement in lighting power budget (as compared with SS 530 requirement) (0.30 point for every percentage improvement)		
Include tenants' lighting provision *(Max 12 points)*	OR	*Exclude tenants*' lighting provision *(Max 5 points)*

NRB 1-7 Ventilation in Carparks	**4**	

Mode of Ventilation	Max Points (A)	Carpark Area (m^2) (B)
Natural ventilation	4.0	
Fume extract with CO sensors	2.5	
Mechanical ventilation with CO sensors	2	
Others (not listed above)	-	

Green Mark Points : Points scored = $\sum$(A x B) / $\sum$B; *Max 4 points*

Project Reference No.: _____ GM e-Filing No.: _____

(I) Energy Related Requirements

Part 1 : Energy Efficiency cont'd	**Max Points Allocated**	**Points Scored**
NRB 1-8 Ventilation in Common Areas	**5**	

Use of energy efficient design and control ventilation systems in common areas with at least 90% of each applicable area.

Common Areas	Natural Ventilation (1.5 points)	Mechanical Ventilation (0.5 point)
(a) Toilets		
(b) Staircases		
(c) Corridors		
(d) Lift lobbies		
(e) Atriums		

Green Mark Points : Max 5 points.

NRB 1-9 Lifts and Escalators — **2**

Use of lifts and escalators with AC variable voltage and variable frequency (VVVF) motor drive and sleep mode features.

(a) Lifts (*1 point*)	
(b) Escalators (*1 point*)	

NRB 1-10 Energy Efficient Practices & Features — **12**

(a) Computation of energy consumption based on design load in the form of Energy Efficiency Index (EEI) *(1 point)*

EEI = _____ kWh/m^2/year

(b) Use of vertical greenery system on west and east façade to reduce the heat gain through the building envelope *(1 point)*

- more than 50% of the applicable facade areas *(1.0 point)*

- at least 25% of the applicable façade areas *(0.5 point)*

Project Reference No.: _____ GM e-Filing No.: _____

(I) Energy Related Requirements

Part 1 – Energy Efficiency cont'd	**Max Points Allocated**	**Points Scored**
NRB 1-10 Energy Efficient Practices & Features cont'd		

(c) The following energy efficient features are deemed acceptable

(indicate where applicable)

(i)	Solar thermal heaters	
(ii)	Heat recovery devices	
(iii)	Light shelves	
(iv)	Motion sensors for staircases half landing	
(v)	Heat pumps	
(vi)	Sun pipes	
(vii)	Lifts with gearless drive	
(viii)	Re-generative lift	
(ix)	Photocell sensors to maximise the use of daylighting	
(x)	Gas water heaters	

Items that are not listed above but with clearance from BCA

(i) _____

(ii) _____

(iii) _____

(iv) _____

(v) _____

Based on the energy efficient features selected, the percentage of energy savings over the total building energy consumption

= _____ %

Green Mark Points : 3 points to 1% energy saving ; Max 10 points.

NRB 1-11 Renewable Energy	**20**	

Application of renewable energy sources in buildings

Percentage of replacement of electricity by renewable energy (based on total electricity consumption)		
Include tenants' usage	OR	*Exclude tenants'* usage)

Green Mark Points : Max 20 points		
Expected EEI as in NRB 1-10(a) in kWh/m²/year	*≥30*	*<30*
Include tenants' usage - *Points for every % replacement*	*5.0*	*3.0*
Exclude tenants' usage - *Points for every % replacement*	*3.0*	*1.5*

Sub-Total (C) – For NRB 1-5 to 1-11 :	**61**	
Prorate Sub-Total (A) - by % of air-conditioned areas where applicable :		
Prorate Sub-Total (B) - by % of non air-conditioned areas where applicable :		
Category Score for Part 1 – Energy Efficiency *(Min 30 points)* **Prorate Sub-Total (A) + Prorate Sub-Total (B) + Sub-Total (C) :**	**116**	

Project Reference No.: _____ GM e-Filing No.: _____

(II) Other Green Requirements

Part 2 : Water Efficiency	**Max Points Allocated**	**Points Scored**
NRB 2-1 Water Efficient Fittings	**10**	

Use of water fittings that are certified under the Water Efficiency Labelling Scheme (WELS).

Water Fittings	Rating based on WELS		Others
	Excellent	Very Good	
No. of Fittings (A)			
Weightage (B)	10	8	0

Green Mark Points : Points scored = $\sum$(A x B) / $\sum$A; *Max 10 points*

NRB 2-2 Water Usage and Leak Detection	**2**	
(a) Provision of private meters to monitor major water usage system such as irrigation, cooling tower and tenant's usage *(1 point).*		
(b) Linking all private meters to the Building Management System (BMS) for leak detection *(1 point).*		
NRB 2-3 Irrigation System and Landscaping	**3**	
(a) Use of non-potable water including rainwater for landscape irrigation *(1 point)*		
(b) Use of automatic water efficient irrigation system with rain sensor for at least 50% of the landscape areas served by the system *(1 point)*		
(c) Use of drought tolerant plants require minimal irrigation for at least 80% of the landscape areas *(1 point)*		
NRB 2-4 Water Consumption of Cooling Tower	**2**	
(a) Use of cooling tower water treatment system which can achieve 7 or better cycles of concentration at acceptable water quality *(1.0 point)*		
(b) Use of NEWater or on-site and recycled water from approved sources *(1 point)*		
Category Score for Part 2 - Water Efficiency :	**17**	

Project Reference No.: _____ GM e-Filing No.: _____

(II) Other Green Requirements

Part 3 : Environmental Protection	**Max Points Allocated**	**Points Scored**
NRB 3-1 Sustainable Construction	**10**	

(a) Use of Sustainable and Recycled Materials *(Max 5 points)*

(i) Green Cements with approved industrial by-products

(that is Ground Granulated Blastfurnace Slag (GGBS), silica fume, fly ash) to replace Ordinary Portland Cement (OPC) by at least 10% by mass for superstructure works. *(1 point)*

(ii) Recycled Concrete Aggregates (RCA) and Washed Copper Slag (WCS) from approved sources to replace coarse and fine aggregates for concrete production of main building elements

Use of RCA and WCS to replace coarse and fine aggregates	Total Quantity Used in tonnage	Minimum Usage Requirement in tonnage [0.03 x (GFA in m^2)]
* RCA (replace coarse)		
* WCS (replace fine)		

Green Mark Points : 2 points when total quantity used is at least equal to minimum requirement; 4 points when total quantity used ≥ 2 x minimum requirement

(b) Concrete Usage Index (CUI)

Concrete Volume in m^3 (A)	
Total Constructed Floor Area in m^2 (B)	
CUI (C = A / B)	

Green Mark Points					
Project CUI (m^3/m^2)	*≤ 0.70*	*≤ 0.60*	*≤ 0.50*	*≤ 0.40*	*≤ 0.35*
Points Allocated	*1*	*2*	*3*	*4*	*5*

NRB 3-2 Sustainable Products	**8**	

Use of environmental friendly products that are certified by approved local certification body and are applicable for non-structural building components and construction

Environmental friendly products	Weightage based on extent of environmental friendliness		
	Good	Very Good	Excellent
Points (A)			
Weightage (B)	1.0	1.5	2.0

Green Mark Points : 1 point for high impact, 0.5 point for low impact; Points scored = ∑(A x B); Max 8 points

NRB 3-3 Greenery Provision	**8**	

(a) Green Plot Ratio (GnPR)

Total Leaf Area in m^2 (A)	
Site Area in m^2 (B)	
GnPR (C = A / B)	

Green Mark Points						
GnPR	*0.5 to <1.0*	*1.0 to <1.5*	*1.5 to <3.0*	*3.0 to <3.5*	*3.5 to < 4.0*	*≥4.0*
Points Allocated	*1*	*2*	*3*	*4*	*5*	*6*

(b) Restoration of trees on site, conserving or relocating of existing trees on site *(1 point)*

(c) Use of compost recycled from horticulture waste *(1 point).*

Project Reference No.: _____ GM e-Filing No.: _____

(II) Other Green Requirements

Part 3 : Environmental Protection cont'd	**Max Points Allocated**	**Points Scored**
NRB 3-4 Environmental Management Practice	**7**	
(a) Implement effective environmental management programmes *(1 point).*		
(b) Main builder that has good track records in the adoption of sustainable, environmentally friendly and considerate practices during construction such as Green and Gracious Builder Award *(1 point).*		
(c) Building quality assessed under Construction Quality Assessment System (CONQUAS) *(1 point)*		
(d) Firms ISO 14000 certified *(0.25 point for each firm)*		
(i) Developer		
(ii) Main builder		
(iii) M&E consultant		
(iv) Architect		
(e) Project team comprises Green Mark Manager (GMM), Green Mark Facilities Manager (GMFM) and Green Mark Professional (GMP) *(Max 1 point)*		
(i) Certified GMM *(0.5 point)*		
(ii) Certified GMFM *(0.5 point)*		
(iii) Certified GMP *(1 point)*		
(f) Provision of building users' guide *(1 point).*		
(g) Provision of facilities or recycling bins for collection and storage of different recyclable waste such as paper, glass, plastic, etc, *(1 point).*		
NRB 3-5 Green Transport	**4**	
(a) Good access to nearest MRT/LRT stations or bus stops *(1 point).*		
(b) Provision of covered walkway to facilitate connectivity and use of public transport *(1 point).*		
(c) Provision of hybrid/electric vehicle refueling/ recharge stations and priority parking lots within the development *(1 point).*		
(d) Provision of sheltered bicycles parking lots with shower and changing facilities *(1 point).* - bicycles parking lots for at least [3% x Gross Floor Area (GFA) / 10], cap at 50 where applicable *(1.0 point)* - bicycles parking lots for at least [1.5% x Gross Floor Area (GFA) / 10], at minimum of 10, where applicable *(0.5 point)*		
NRB 3-6 Refrigerants	**2**	
(a) Refrigerants with ozone depletion potential (ODP) of zero or with global warming potential (GWP) of less than 100 *(1 point).*		
(b) Use of refrigerant leak detection system at critical areas of plant rooms containing chillers and other equipments with refrigerants *(1 point)*		
NRB 3-7 Stormwater Management	**3**	
Treatment of stormwater runoff before discharge The extent of stormwater treatment - more than 35% of total site area or paved area *(3 points)* - more than 10% to 35% of total site area *(2 points)* - up to 10% of total site area *(1 point)*		
Category Score for Part 3 - Environmental Protection :	**42**	

Project Reference No.: _____ GM e-Filing No.: _____

(II) Other Green Requirements

Part 4 : Indoor Environmental Quality	**Max Points Allocated**	**Points Scored**
NRB 4-1 Thermal Comfort	**1**	
Air-conditioning system is designed to allow cooling load variation due to fluctuations in ambient air temperature to ensure consistent indoor conditions for thermal comfort. Indoor operative temperature between 24 to 26^{o} C Relative Humidity < 65%.		
NRB 4-2 Noise Level	**1**	
Occupied spaces in buildings are designed with good ambient sound levels as recommended in SS 553		
NRB 4-3 Indoor Air Pollutants	**2**	
(a) Use of low volatile organic compounds (VOC) paints certified by approved local certification body for at least 90% of the total internal areas *(1 point).* ☐ (b) Use of environmentally friendly adhesives certified by approved local certification body for at least 90% of the applicable areas *(1 point).* ☐		
NRB 4-4 Indoor Air Quality (IAQ) Management	**2**	
(a) Provision of filtration media and differential pressure monitoring equipment in Air Handling Units (AHUs) in accordance with SS554 *(1 point)* ☐ (b) Implementation of effective IAQ management plan to ensure that building ventilation systems are clean and free from residuals left over from construction activities (including internal surfaces condition testing). *(1 point)* ☐		
NRB 4-5 High Frequency Ballasts	**2**	
Use of high frequency ballasts in the fluorescent luminaries in at least 90% of all applicable areas		
Category Score for Part 4 - Indoor Environmental Quality :	**8**	

Project Reference No.: _____ GM e-Filing No.: _____

(II) Other Green Requirements

Part 5 : Other Green Features	**Max Points Allocated**	**Points Scored**
NRB 5-1 Green Features and Innovations	**7**	

(a) The following green features are deemed acceptable :

(1) Water Efficiency

(i) Use of self cleaning façade system
- more than 75% of the applicable facade areas *(2 points)*
- more than 50% of the applicable facade areas *(1 point)*
- at least 25% of the applicable facade areas *(0.5 point)*

(ii) Use of grey water recycling system
- all blocks of the development*(2 points)*
- at least 1 block of the development *(1 point)*

(iii) Recycling AHU condensate
- more than 75% of AHU condensate *(1 point)*
- at least 50% of AHU condensate *(0.5 point)*

(iv) Provision of system to recycle runoff from vertical green wall
- at least 25% of the green areas *(1 point)*
- less than 25% of the green areas *(0.5 point)*

(v) Use of air-cooled variable refrigerant flow (VRF) systems as the main air-conditioning system *(0.5 point)*

(2) Environmental Protection

(i) Provision of green roof and roof top garden
- more than 50% of the roof areas *(1 point)*
- at least 25% of the roof areas *(0.5 point)*

(ii) Provision of vertical greening in common areas
- more than 75% of the applicable wall areas *(2 points)*
- more than 50% of the applicable wall areas *(1 point)*
- at least 25% of the applicable wall areas *(0.5 point)*

(iii) Provision of double refuse chutes to separate recyclable from non-recyclable waste *(1 point).*

(iv) Use of non-chemical termite treatment system such as termite baiting system, anti-termite mesh, etc *(0.5 point).*

(v) Use of at least 5 nos. of compost bins to recycle organic waste *(0.5 point).*

(vi) Use of non-chemical water treatment for swimming pools *(0.5 point).*

(vii) Conservation of existing buildings structure
- more than 50 % of existing structure or building envelope *(2 points)*
- at least 25% of existing structure or building envelope *(1 point)*

(viii) Project Buildability Score (Bscore) above prevailing minimum requirement stated in relevant COP on Buildable Design.
- Bscore > 5 points above minimum requirement *(1 point)*
- Bscore > 3 points above minimum requirement *(0.5 point)*

(ix) Calculation of carbon footprint of the development *(1.0 point)*

(x) Adoption of demolition protocol to maximise resource recovery of demolition materials for reuse or recycling
- recovery rate of more than 35% crushed concrete waste to be sent to the approved recyclers with proper facilities *(2 points)*
- recovery rate of at least 20% crushed concrete waste to be sent to the approved recyclers with proper facilities *(1 point)*

Project Reference No.: _____ GM e-Filing No.: _____

(II) Other Green Requirements

Part 5 : Other Green Features cont'd	**Max Points Allocated**	**Points Scored**
NRB 5-1 Green Features and Innovations cont'd		
(3) Indoor Air Quality (i) Use of pneumatic waste collection system. *(1 point)* ☐ (ii) Use of Ultraviolet light-C band (VC) emitters in all air handling units (AHUs) to improve indoor air quality *(0.5 point).* ☐ **(4) Others** (i) Use of siphonic rainwater discharge system at roof *(0.5 point)* ☐ (ii) Provision of carpark guidance system *(0.5 point).* ☐ (b) Items that are not listed above but with clearance from BCA : (i) _____ ☐ (ii) _____ ☐ (iii) _____ ☐ (iv) _____ ☐ (v) _____ ☐		
Category Score for Part 5 – Other Green Features :	**7**	
Category Score for Part 2 to Part 5 *(Min 20 points)***:**	**74**	
Green Mark Score *(Min 50 points)***- {Category Score for Part 1** *(Min 30 points)* **+ Category Score for Part 2 to Part 5** *(Min 20 points)***} :**	**190**	

Project Reference No.: _____ GM e-Filing No.: _____

ADDITIONAL INFORMATION

Summary of Sustainable Products used in NRB 3-2

Environmental friendly products	Weightage based on extent of environmental friendliness		
	Good	Very Good	Excellent
Points (A)			
Weightage (B)	1.0	1.5	2.0

List of sustainable products

S/No.	Description of environmental friendly products	Extent of coverage	Impact (1.0 point or 0.5 point)	Weightage (Good or Very Good or Excellent)

Explanatory Notes :

Forms BPD_GM01, BPD_GM01_Appendix 1 and BPD_GM01_Appendix 2

1) For building works that are subject to the Building Control (Environmental Sustainability) Regulation 2008, the Form BPD_GM01 must be completed, accompanied with 1 set of Form BPD_GM01_Appendix 1 and/or 1 set of Form BPD_GM01_Appendix 2 where applicable. These forms are to be generated using the **Green Mark (GM) e-Filing System** accessible from BCA website and submitted together with the application for building plan approval.

2) For building works that involve mixed-use building which comprises both residential and non-residential buildings, the Green Mark score calculation as in Form BPD_GM01_Appendix 1 and Appendix 2 will have to be submitted together with the Form BPD_GM01 unless the following condition apply :

   - Where any part of the building works that related to a non-residential building or residential building involve a gross floor area (GFA) of less than 2000m^2 and that of the other part of these building works, only the Green Mark score calculation of the larger part of these building works (Form BPD_GM01_Appendix 1 OR Appendix 2) are required to be submitted together with the Form BPD_GM01.
   - For example, if the gross floor area (GFA) of the non-residential buildings is less than 2000m^2 and that of the residential buildings, only the Green Mark score calculation for the residential buildings that is Form BPD_GM01_ Appendix 1 will need to be submitted together with Form BPD_GM01 for building plan approval as illustrated in Table 2-1 below.

Table 2-1 – Applicable Criteria for Mixed-Use Buildings with New GFA ≥ 2000m^2

Project Type	Total New GFA Residential (m^2)	Total New GFA Non-Residential (m^2)	Form BPD_GM01_ Appendix 1	Form BPD_GM01_ Appendix 2
Mixed-use building	≥ 2000	≥ 2000	1 set	1 set
	≥ 2000	< 2000	1 set	Not applicable
	< 2000	≥ 2000	Not applicable	1 set
	< 2000	< GFA for Residential	1 set	Not applicable
	< GFA for Non-Residential	< 2000	Not applicable	1 set