BPD_GM01

GM Submission at BP stage for Non-Residential Buildings – Transit Stations

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

Sample Forms Attached For Viewing Only

Applicable for projects with 1st submission date for URA planning permission on or after 15th Jan 2013

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

For projects with the provision of air-conditioning system, the appropriate practitioners for Mechanical Works are required to e-sign and submit the air-conditioning information in prescribed form in support of his declaration in BPD_GM01 forms together with the QP's BP submission. (Refer to the following link at   http://www.bca.gov.sg/EnvSusLegislation/others/Air-Con Info Template.pdf.)

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

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 2-NRB/ST. The Green Mark score for the proposed building works is _____ .

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

Building Works	New GFA in m^2
Non-Residential (Station)	

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

Floor Area	Floor Area in m^2	% Floor Area
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		
ST 1-1 Environmental Control Systems	27.0	
ST 1-2 Lighting Systems	12.0	
ST 1-3 Electrical Services	7.0	
ST 1-4 Lifts and Escalators	3.5	
ST 1-5 Energy Efficient Features	7.5	
Category Score for Part 1 – Energy Efficiency *(Min 30 points)* **:**	**57.0**	

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

Category Items	Max Points Allocated	Points Scored
(II) Other Green Requirements		
Part 2 : Water Efficiency		
ST 2-1 Water Efficient Fittings	6.0	
ST 2-2 Water Usage Monitoring	1.5	
ST 2-3 Water Consumption of Cooling Towers	3.5	
Category Score for Part 2 – Water Efficiency :	**11.0**	
Part 3 : Environmental Protection		
ST 3-1 Sustainable Construction	9.0	
ST 3-2 Sustainable Products	4.0	
ST 3-3 Greenery Provision	3.0	
ST 3-4 Site Selection	4.0	
ST 3-5 Environmental Management Practice	4.0	
ST 3-6 Public Transport Accessibility	15.0	
ST 3-7 Refrigerants	2.0	
Category Score for Part 3 – Environmental Protection :	**41.0**	
Part 4 : Indoor Environmental Quality		
ST 4-1 Thermal Comfort	1.0	
ST 4-2 Indoor Air Pollutants	2.0	
ST 4-3 Indoor Air Quality (IAQ) Management	2.0	
Category Score for Part 4 – Indoor Environmental Quality :	**5.0**	
Part 5 : Other Green Features		
ST 5-1 Green Features & Innovations	6.0	
Category Score for Part 5 – Other Green Features :	**6.0**	
Category Score for Part 2 to Part 5 *(Min 20 points)* **:**	**63.0**	
Category Score for Part 1 – Energy Efficiency *(Min 30 points)* **:**	**57.0**	
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)*}** :**	**120.0**	

The Green Mark score for the proposed building works is _____ .

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**
ST 1-1 Environmental Control Systems	**27.0**	

Where there is a combination of central chilled-water plant with unitary air-conditioners, 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 = [   ] kW/RT

Green Mark Points : Max 20 points			
Peak building cooling load (RT)	*≥ 500*	*≥ 300 to < 500*	*< 300*
Baseline : Prerequisite Requirement Minimum Design System Efficiency (DSE) for central chilled-water plant	*0.70*	*0.80*	*0.85*
Points for meeting prescribed chiller plant efficiency	*15.0*	*12.0*	*7.0*
Points for every % improvement in the chiller plant operating efficiency over the baseline	*0.25*	*0.45*	*0.60*

(b)   Air Distribution System

Air Distribution System	**% improvement in the air distribution system efficiency over baseline**	**Points Scored**
Option 1 Fan System Motor Nameplate Power		
Option 2 Fan System Input Power		
Green Mark Points - 0.15 point for every % improvement; Max 3 points.		

Buildings using <u>district cooling system,</u>

Note : No need to compute plant efficiency in item (a), points obtained will be prorated based on the air distribution system efficiency under item (b).
OR

(c)   Unitary Air-Conditioners

Peak Building Cooling Load = [   ] RT

Air-conditioning System efficiency = [   ] kW/RT

Green Mark Points : Max 20 points		
Peak building cooling load (RT)	*≥ 500*	*< 500*
Baseline : Prerequisite Requirement Minimum Design System Efficiency (DSE) for unitary conditioners (kW/ RT)	*0.80*	*0.90*
Points for meeting prescribed efficiency	*12.0*	*10.0*
Points for every % improvement in the operating efficiency over the baseline	*1.30*	*0.60*

(d)   Mechanical Ventilation System for non-air-conditioning spaces

Mechanical Ventilation System	**% improvement in the motor power requirement over baseline**	**Points Scored**
Option 1 Fan System Motor Nameplate Power		
Option 2 Fan System Input Power		
Green Mark Points - 0.2 point for every % improvement; Max 4 points.		

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

(I) Energy Related Requirements		**Max Points Allocated**	**Points Scored**
Part 1 : Energy Efficiency cont'd			
ST 1-2 Lighting Systems		**12.0**	

(a)   Artificial Lighting

Green Mark Points - Max 6 points. Baseline : Maximum lighting power budget stated in SS 530 or as approved			
Percentage of lighting power budget over the baseline	*≤90 %*	*≤85 %*	*≤80 %*
Points allocated	*4 points*	*4.5 points*	*6 points*

(b)   Daylighting in public areas (i.e. concourse and platform areas) of underground station *(Max 6 points)*

Total Public areas in m² (concourse and platform areas)	Public areas with daylighting *(0.5 point for every %)*	
	Area in m²	% Area

ST 1-3 Electrical Services	**7.0**	

(a)   Provision of low-loss service transformers *(Max 4 points)*

Transformer Capacity	No load loss at rated voltage	Full load loss at rated voltage	Points Allocated	Points Scored
> 1 MVA	< 0.25% of rated load	< 2.50% of rated load	3.0	
> 1 MVA	< 0.20% of rated load	< 1.50% of rated load	4.0	
≤ 1 MVA	< 0.35% of rated load	< 2.50% of rated load	3.0	
≤ 1 MVA	< 0.25% of rated load	< 1.50% of rated load	4.0	

(b)   Provision of sub-metering systems

(i)	Lighting system for public areas	
(ii)	Air-conditioning system	
(iii)	Mechanical ventilation system for back of house plant rooms	
(iv)	Plumbing and sanitary systems	
(v)	Lifts and escalators system	
(vi)	Electrical reticulation system for tenants	

Green Mark Points – 1.5 points for at least 50% of the systems listed and 3 points for all systems. Max 3 points.

ST 1-4 Lifts and Escalators	**3.5**	

(a)   Lifts with energy efficient features *(Max 1.5 points)*
0.5 point for each item and prorate based on extent of coverage

(i)	Geared or other better energy efficient traction	
(ii)	AC variable voltage and variable frequency (VVVF) motor drive or equivalent	
(iii)	Sleep mode features or equivalent	

(b)   Escalators with energy efficient features *(Max 2 points)*
0.5 point for each item and prorate based on extent of coverage

(i)	Direct drive with gear box directly coupled to the main drive shaft	
(ii)	AC variable voltage and variable frequency (VVVF) motor drive	
(iii)	Standby speed mode	
(iv)	Standby stop mode	

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

(I) Energy Related Requirements		
Part 1 : Energy Efficiency cont'd	**Max Points Allocated**	**Points Scored**
ST 1-5 Energy Efficient Features	**7.5**	

(a)   The following energy efficient features are deemed acceptable

(i)	Auto-condenser tube cleaning system *(1 point)*	
(ii)	Variable speed chilled water pumps *(1 point)*	
(iii)	Automatic control devices to regulate the demand for mechanical ventilation for staircases and corridors *(1 point)*	
(iv)	Automatic control devices to regulate outdoor air supply to maintain the carbon dioxide (CO_2) concentration to below 700 ppm *(1 point)*	
(v)	Instrumentation for monitoring central cooled chilled-water plant efficiency in accordance with prescribed standard *(1 point)*	

(b)   Use of energy efficient equipment or products that are certified by approved local certification body *(0.5 point for each; Max 2 points)*

(i) _____

(ii) _____

(iii) _____

(iv) _____

(c)   Items that are not listed above but with clearance from BCA
   (2 points for every % energy saving)

Total building energy consumption in kWh/year	Energy Saving of each energy efficient feature proposed	
	Total Energy Saving in kWh/year	Total Energy Saving in %

(i) _____

(ii) _____

(iii) _____

(iv) _____

(v) _____

(vi) _____

(vii) _____

(viii) _____

(ix) _____

(x) _____

Green Mark Points : Max 7.5 points for ST 1-5

Category Score for Part 1 – Energy Efficiency *(Min 30 points)* **:**	**57.0**	

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

(II) Other Green Requirements		

Part 2 : Water Efficiency	**Max Points Allocated**	**Points Scored**
ST 2-1 Water Efficient Fittings	**6.0**	
Use of water fittings that are certified under the Water Efficiency Labelling Scheme (WELS) with very good or excellent WELS rating (a) Basin taps and mixers (b) Flushing cisterns (c) Shower taps, mixers or showerheads (d) Sink/Bib taps and mixers (e) Urinals and urinal flush valve *Green Mark Points : 2 points for at least 2 fitting types; 4 points for at least 3 fitting types; 6 points for all fitting types; Max 6 points*		
ST 2-2 Water Usage Monitoring	**1.5**	
(a) Provision of sub-meters to monitor water usage from tenants (retail shops) *(0.5 point).* (b) Provision of sub-meters to monitor water usage of public toilets *(0.5 point).* (c) Provision of sub-meters to monitor water usage for cooling towers *(0.5 point).*		
ST 2-3 Water Consumption of Cooling Towers	**3.5**	
(a) Use of cooling tower water treatment system which can achieve 7 or better cycles of concentration at acceptable water quality *(1 point)* (b) Provision of effective drift eliminator with minimum efficiency of 0.002% *(2 points)* (c) Provision of alternative water sources like NEWater or recycled AHU condensate, etc, *(0.5 point)*		
Category Score for Part 2 - Water Efficiency :	**11.0**	

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

(II) Other Green Requirements		
Part 3 : Environmental Protection	**Max Points Allocated**	**Points Scored**
ST 3-1 Sustainable Construction	**9.0**	

(a)   Use of Sustainable and Recycled Materials *(Max 7 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 the concrete production of structural 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 non-load bearing partition walls

Extent of coverage (based on number of applicable rooms)	RCA replace coarse aggregates *(Max 2 points)*	WCS replace fine aggregates *(Max 2 points)*
At least 80% of rooms *(2 points)*		
At least 50% of rooms *(1 point)*		

    (iii)   Recycled Concrete Aggregates (RCA), incinerated bottom ash or reclaimed asphalt pavement for road construction *(1 point)*

    (iv)   Use of eco-concrete

Road kerbs	
At-grade foot paths	
Road side drains	

Green Mark Points : 0.5 point each; Max 1 point
Extent of coverage : at least 90% of applicable areas.

(b)   Use of sustainable alternatives which can be fabricated off-site with minimal concrete usages and wet trade for the construction of entrance structure *(1 point)*

(c)   Reuse of suitable excavated soil in other sites *(1 point)*

ST 3-2 Sustainable Products	**4.0**	

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)	0.5	1.5	2.0

Green Mark Points : 1 point for high impact, 0.5 point for low impact;
Points scored = $\sum$(A x B); Max 4 points

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

(II) Other Green Requirements		
Part 3 : Environmental Protection cont'd	**Max Points Allocated**	**Points Scored**
ST 3-3　　Greenery Provision	**3.0**	

(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 (Max 2 points)				
GnPR	*0.5 to <1.0*	*1.0 to <1.5*	*1.5 to <2.0*	*≥ 2.0*
Points Allocated	*0.5*	*1.0*	*1.5*	*2.0*

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

ST 3-4　　Site Selection	**4.0**	

Proper site planning and selection which minimize land uptake

Green Mark Points (Max 4 points)	
Land Uptake	*Points Allocated*
At least 90% under road reserve	*4 points*
At least 70% under road reserve or green field sites (with allowance for development above)	*3 points*
At least 50% under road reserve or green field sites (with allowance for development above)	*2 points*
At least 70% above central median or along road reserve	*1 point*

ST 3-5　　Environmental Management Practice	**4.0**	

(a)　Implement effective environmental management programmes including monitoring and setting targets to minimise energy use, water use and construction waste *(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)　Firms ISO 14000 certified *(0.25 point for each firm)*

(i)	Developer	
(ii)	Main builder	
(iii)	M&E consultant	
(iv)	Architect	

(d)　Project team comprises Green Mark Manager (GMM) and Green Mark Facilities Manager (GMFM) and Mark Professional (GMP) *(Max 1 point)*

(i)	Certified GMM *(0.5 point)*	
(ii)	Certified GMFM *(0.5 point)*	
(iii)	Certified GMP *(1 point)*	

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

(II) Other Green Requirements		
Part 3 : Environmental Protection cont'd	**Max Points Allocated**	**Points Scored**
ST 3-6 Public Transport Accessibility	**15.0**	
(a) Covered links to bus stops *(2 points)* - at least 3 or more covered links *(2 points)* - at least 2 covered links *(1 point)* - at least 1 covered link *(0.5 point)*		
(b) Covered links to taxi-stand/ passenger drop-off point *(1 point)* - at least 2 or more covered links *(1 point)* - at least 1 covered link *(0.5 point)*		
(c) Covered links to bus interchanges/other transit stations *(3 points)*		
(d) Connectivity to neighbouring developments *(Max 6 points)*		
(i) Connections to be made available via underground or covered links - at least 2 or more connections to each development *(1.5 points)* - at least 1 connection to each development *(1 point)*		
(ii) Knock-out panels for future connection No. of knock-out panels = *(1 point for each knock-out panel)*		
(iii) Additional entrance No. of additional entrance = *(1 point for each additional entrance)*		
(e) Provision of bicycle parking lots *(2 points)*		

Green Mark Points				
Bicycle parking lots	*20 to 39 lots*	*40 to 69 lots*	*70 to 99 lots*	*≥100 lots*
Points Allocated	*0.5*	*1.0*	*1.5*	*2.0*

	Max Points Allocated	**Points Scored**
(f) Provision of sheltered bicycle parking lots *(1 point)*		

Green Mark Points		
Percentage of sheltered bicycle parking lots over total no. of bicycle parking lots provided	*≥50%*	*100 %*
Points Allocated	*0.5*	*1.0*

	Max Points Allocated	**Points Scored**
ST 3-7 Refrigerants	**2.0**	
(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)*		
Category Score for Part 3 - Environmental Protection :	**41.0**	

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

(II) Other Green Requirements		
Part 4 : Indoor Environmental Quality	**Max Points Allocated**	**Points Scored**
ST 4-1 Thermal Comfort	**1.0**	
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° C Relative Humidity < 65%.		
ST 4-2 Indoor Air Pollutants	**2.0**	
(a) Use of low volatile organic compounds (VOC) paints certified by approved local certification body for at least 90% of the total applicable internal wall 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)*		
ST 4-3 Indoor Air Quality (IAQ) Management	**2.0**	
(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)*		
Category Score for Part 4 - Indoor Environmental Quality :	**5.0**	

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

(II) Other Green Requirements		
Part 5 : Other Green Features	**Max Points Allocated**	**Points Scored**
ST 5-1 Green Features and Innovations	**6.0**	

(a)   The following green features are deemed acceptable :

(1) Water Efficiency

(i)   Use of grey water recycling system *(2 points)*

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

(2) Environmental Protection

(i)   Protection of existing greenery by using construction methods that have minimal site disturbance such as bored/mined construction or equivalent *(2 points)*

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

(iii)   Provision of vertical greening *(1 point)*
 - more than 50% of the applicable wall areas *(1 point)*
 - at least 25% of the applicable wall areas *(0.5 point)*

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

(3) Indoor Air Quality

(i)   Use of ultraviolet light-C band (UV) emitter at all AHUs (air handling units) to improve indoor air quality *(0.5 point)*

(4) Others

(i)   Use of siphonic rainwater discharge system at roof *(0.5 point)*

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

(II) Other Green Requirements		
Part 5 : Other Green Features	**Max Points Allocated**	**Points Scored**
ST 5-1 Green Features and Innovations cont'd		

(b)   Items that are not listed above but with clearance from BCA

(i)   _____

(ii)   _____

(iii) _____

(iv)   _____

(v)   _____

(iv)   _____

(vii) _____

(viii) _____

(ix)   _____

(x)   _____

Green Mark Points : 2 points for high impact, 1 point for medium impact and 0.5 point for low impact; Max 6 points for ST 5-1

	Max Points Allocated	**Points Scored**
Category Score for Part 5 – Other Green Features :	**6.0**	
Category Score for Part 2 to Part 5 *(Min 20 points)* **:**	**63.0**	
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)*} **:**	**120.0**	

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

ADDITIONAL INFORMATION

Summary of Sustainable Products used in ST 3-2

Environmental friendly products	Weightage based on extent of environmental friendliness		
	Good	Very Good	Excellent
Points (A)			
Weightage (B)	0.5	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_GM01and BPD_GM01_Appendix2-NRB/ST

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 2-NRB/ST. 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.