

BPD_GM02

ES Submission at As-Built Stage for Non-Residential Buildings

These ES submission forms are to be generated from the ES Online Portal (*previously known as Green Mark (GM) E-filing Portal*). These generated submission forms are to be e-signed by the QP and appropriate practitioners before submitting via CORENET.

Sample Forms Attached for Viewing Only

Applicable for Projects with 1st Submission date for URA planning Permission on or after 1 Dec 2021

The forms spell out all the base and carbon reduction measures requirements which QPs and the other practitioners can choose for their design to meet the minimum environmental sustainability standards in complying with the Building Control (Environmental Sustainability) Regulations 2008.

QPs are only required to provide salient information pertaining to the items that are relevant to their design and the ES Online Portal (*previously known as Green Mark (GM) E-filing Portal*) will which compute and perform validation on those items that are required to be complied/selected.

In addition:

If there is any deviation to the last submitted template/form, Update and re-submit the template/form on building envelope (e.g. ETTV, RTTV), the air-conditioning information, energy modelling and daylight (where applicable)

Submittal of the other documents may be required and shall be made in such manner and in such form as the Commissioner of Building Control requires upon request

For more information: <https://www1.bca.gov.sg/buildsg/sustainability/minimum-environmental-sustainability-standard-for-new-buildings-and-existing-buildings-undergoing-major-additions-and-alterations>

SUBMISSION OF ENVIRONMENTAL SUSTAINABILITY REQUIREMENTS
Regulation 7 of the Building Control (Environmental Sustainability) Regulations 2008 (Cap. 29)

Commissioner of Building Control Building & Construction Authority 52 Jurong Gateway Road, #11-01 Singapore 608550	INSTRUCTIONS (1) Please refer to the Explanatory Notes attached before completing these forms via ES Online Portal. (2) Submit one copy of this form together with Form BPD_GM02_Appendix 1 (for residential building) and/or Form BPD_GM02_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 are in compliance with the minimum environmental sustainability standard that have met the score of minimum 50 points using the methodology specified in the Code for Environmental Sustainability of Buildings and are as stated in Form BPD_GM02_Appendix 1 and/or Form BPD_GM02_Appendix 2 where relevant.

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 are in compliance with the minimum environmental sustainability standard using the methodology specified in the Code for Environmental Sustainability of Buildings.

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.:

ENVIRONMENTAL SUSTAINABILITY REQUIREMENTS 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
Air-conditioned spaces		
Non Air-conditioned spaces		
Total		

(I) Base Requirements	Applicable (Yes/No)	Compliance (Yes/No)
NRB01 Envelope and Roof Thermal Transfer		
NRB01-1 Building Envelope		
NRB01-2 Roof		
(a) Roof with skylights		
(b) Roof without skylights		
NRB02 Air-Tightness and Leakage		
NRB02-1 Windows and Curtain Walls		
(a) Test on air leakage rates based on SS 212 for windows		
(b) Test on air leakage rates based on SS 654 for curtain walls		
NRB02-2 Openings between conditioned and non-conditioned spaces		
(a) Doors equipped with automated technology or self-closing devices with the independent control valve and energy meters		
(b) Equipped with enclosed vestibules or air lock rooms for doorway with high pedestrian traffic flow		
NRB03 Building Energy Performance (Select NRB03-1 or NRB03-2, where applicable)		
NRB03-1 Performance Based Approach via Energy Modelling		
NRB03-2 Energy Performance Standards for Key Building Systems		
(a) Air-Conditioning System		
(i) Water-Cooled Building System		
(ii) Air-Cooled Building System		
• Air-Cooled Chilled Water Plant		
• Unitary Air-Conditioners		
(b) Lighting System		
(c) Mechanical Ventilation System		
(i) Mechanical ventilation system for normally occupied spaces		
(ii) Provision of CO sensors in Carpark Areas		
(d) Vertical Transportation System		

Project Reference No.:		GM e-Filing No.:	
(I) Base Requirements		Applicable (Yes/No)	Compliance (Yes/No)
NRB04 Measurement and Verification (M & V) Instrumentation			
NRB04-1 Instrumentation for Chilled Water Air-Conditioning System			
NRB04-2 Instrumentation for Variable Refrigerant Flow (VRF) System			
NRB05 Electrical Sub-Metering			
- Lifts and escalators - Mechanical ventilation system - Centralised hot water supply system - General power supply and lighting systems for tenancy areas and owners' premises			
NRB06 Maintenance of Building Cooling System Performance			
NRB06-1 Chillers			
Access space provisions are as follows:			
(a) Clear space of 2 m or more at the front of chiller unit piping section			
(b) Clearance of 1.2 m or more between the chillers measured from plinth to plinth			
(c) Overhead service clearance of 1.5 m or more above the chiller			
NRB06-2 Pump Systems			
Access space provisions are as follows:			
(a) Except for the areas where the pipes are connected, a clearance of 0.6 m or more is to be provided round the pump			
(b) Clear head room space of 1 m or more above the pump and motor			
NRB06-3 Cooling Towers			
Maintenance provisions are as follows:			
(a) Provision of maintenance platform, stairs and catwalks of 600 mm width or more with handrails around the cooling towers and access to the level			
(b) Clear space of 2 m or more from the top of cooling towers to location of the trellis, where applicable.			
NRB06-4 Air-Distribution Systems			
(a) Air handling units (AHU) of cooling capacity greater than 35 kW shall be floor mounted as stipulated in SS 553.			
(b) For AHUs that are floor mounted, the access space provisions shall be as follows:			
(i) AHU access – Provide minimum 1m clear space from the AHU room door entrance to the AHU			
(ii) Cooling coil pipe and filter access – Provide minimum 800 mm clear space after pipe connection to facilitate cooling coil cleaning and filter access;			
(iii) Fan access – Provide minimum 800 mm clear space for fan/motor access and maintenance (if the access is not from cooling coil connection side).			
(iv) AHU side and back clearance – Provide minimum 600 mm clear space			

Total no. of compliances: No. of sustainable attributes that are not applicable:
 (Total No of compliances + No. of sustainable attributes that are not applicable = 23)

[illegible]

Project Reference No.:		GM e-Filing No.:	
(II) Carbon Reduction Measures: [Select four (4) carbon reduction measures from 3 Parts including a minimum of 2 measures from Part 2- Sustainable Construction]			Selected Options (√ complied)
Part 1 : Sustainable Design Strategies			
NRBE01-1 Enhanced Building Envelope Performance			
(a) Façade design with ETTV of not more than 40 W/m ² or or enhanced with provision of good thermal break/Insulating profile framing			
(b) Cool materials that are certified – Minimum coverage of 80% of external walls or roof areas			
(c) Innovative façade technology and solutions for 20% of fenestration areas			
NRBE01-2 Naturally Ventilated Building Design			
(a) Building layout design – Minimum 20% of all units with window openings facing prevailing wind directions			
(b) Natural ventilated design for common areas - Minimum coverage of 80% in at least two (2) common areas			
NRBE01-3 Effective Daylighting			
(a) For normally occupied spaces - Minimum 15% of total occupied areas			
(b) For common areas – Minimum coverage of 80% (by number) in at least two (2) common areas			
(c) Provision of daylight redirecting technologies			
Part 2 : Sustainable Construction			
NRBE02-1 Resource Efficiency Measures			
(a) Existing building structures areas are conserved for adaptive reuse – More than 50% of the floors and/or wall areas			
(b) Concrete Usage Index of no more than 0.50			
(c) Embodied carbon reporting for upfront carbon emission of concrete, steel and glass			
NRBE02-2 Low carbon concrete			
(a) Eco-friendly cement for 80% of superstructural works			
(b) Aggregate replacement that meet minimum usage requirement			
(c) Processed waste for non-structural application			
NRBE02-3 Sustainable Products			
Provision of at least three (3) environmentally friendly products that are certified for 80% of applicable areas or building components.			
Part 3 : Sustainable Technologies			
NRBE03-1 Renewable Energy System			
Minimum 1% reduction in electricity consumption for the building developments			
NRBE03-2 Smart Building Solutions (<i>Minimum two (2) solutions to comply to this measure</i>)			
(a) Use of BACnet, Modbus or any other open protocol	☐		
(b) Energy management system, applications and dashboard	☐		
(c) Demand controlled ventilation system	☐		
(d) Timer sensors/controls	☐		
(e) Differential pressure monitoring equipment in Air Handling Units (AHUs)	☐		
(f) Others pls state (subject to BCA's clearance)	☐		
NRBE03-3 Green Building Technologies			
• Energy recovery system	☐		
• Lifts with regenerative function	☐		
• Passive displacement ventilation system	☐		
• Hybrid cooling system	☐		
• Smart sensor and control technologies	☐		
• Dedicated outdoor air system	☐		
• Others, pls state (subject to BCA's clearance)	☐		

Total No. of Carbon Reduction Measures: No. of Proposed Alternative Solutions:

SECTION II: SUPPLEMENTARY DETAILS																																	
Project Reference No.: 		GM e-Filing No.: 																															
(I) Base Requirements			Applicability																														
NRB01 Envelope and Roof Thermal Transfer																																	
NRB01-1 Building Envelope																																	
(a) The building envelope designed meet the Envelope Thermal Transfer Value (ETTV) of no more than 45 W/m² based on the methodology stated in the Code on Envelope Thermal Performance for Buildings and the details are as follows: <table border="1" style="width: 100%; border-collapse: collapse; margin: 10px 0;"> <thead> <tr> <th style="padding: 5px;">Block No/Ref</th> <th style="padding: 5px;">Gross areas of external wall and windows (m²)</th> <th style="padding: 5px;">Gross Heat Gain (W)</th> <th style="padding: 5px;">ETTV, W/m² of the respective block</th> </tr> </thead> <tbody> <tr><td style="height: 20px;"></td><td></td><td></td><td></td></tr> <tr><td style="height: 20px;"></td><td></td><td></td><td></td></tr> <tr><td style="height: 20px;"></td><td></td><td></td><td></td></tr> </tbody> </table> ETTV (Weightage Average) for the whole development is W/m² OR (b) The building envelope is to be designed with the following design parameters with the respective glazing properties. <table border="1" style="width: 100%; border-collapse: collapse; margin: 10px 0;"> <thead> <tr> <th style="padding: 5px;">Window to Wall Ratio (WWR)</th> <th style="padding: 5px;">Shading Coefficients of Glass (SC_{glass})</th> </tr> </thead> <tbody> <tr><td style="text-align: center; padding: 5px;"><0.20</td><td style="text-align: center; padding: 5px;">≤0.51</td></tr> <tr><td style="text-align: center; padding: 5px;">0.20 to <0.25</td><td style="text-align: center; padding: 5px;">≤0.41</td></tr> <tr><td style="text-align: center; padding: 5px;">0.25 to <0.30</td><td style="text-align: center; padding: 5px;">≤0.35</td></tr> <tr><td style="text-align: center; padding: 5px;">0.30 to <0.35</td><td style="text-align: center; padding: 5px;">≤0.30</td></tr> <tr><td style="text-align: center; padding: 5px;">0.35 to ≤0.40</td><td style="text-align: center; padding: 5px;">≤0.27</td></tr> <tr><td style="text-align: center; padding: 5px;">0.40 to ≤0.50</td><td style="text-align: center; padding: 5px;">≤0.22</td></tr> </tbody> </table> WWR_{bldg devt} = Proposed SC_{glass} range from to 			Block No/Ref	Gross areas of external wall and windows (m ²)	Gross Heat Gain (W)	ETTV, W/m ² of the respective block													Window to Wall Ratio (WWR)	Shading Coefficients of Glass (SC _{glass})	<0.20	≤0.51	0.20 to <0.25	≤0.41	0.25 to <0.30	≤0.35	0.30 to <0.35	≤0.30	0.35 to ≤0.40	≤0.27	0.40 to ≤0.50	≤0.22	☐ Yes ☐ Complied ☐ Not Applicable Please select one of the following reasons if this section is not applicable in this development: ○ All spaces are designed to be non-air-conditioned ○ Less than 500sqm of the spaces are designed to be air-conditioned ○ This is an underground structure with no façade work
Block No/Ref	Gross areas of external wall and windows (m ²)	Gross Heat Gain (W)	ETTV, W/m ² of the respective block																														
Window to Wall Ratio (WWR)	Shading Coefficients of Glass (SC _{glass})																																
<0.20	≤0.51																																
0.20 to <0.25	≤0.41																																
0.25 to <0.30	≤0.35																																
0.30 to <0.35	≤0.30																																
0.35 to ≤0.40	≤0.27																																
0.40 to ≤0.50	≤0.22																																

SECTION II: SUPPLEMENTARY DETAILS

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

(I) Base Requirements

Applicability

NRB01 Envelope and Roof Thermal (cont'd)

NRB01-2 Roof

(a) Roof with Skylights

The roof with skylight is designed with Roof Thermal Transmittance Value (RTTV) of no more than 50 W/m² based on the methodology stated in the Code on Envelope Thermal Performance for Buildings

RTTV = W/m²

- ☐ Yes ☐ Complied
☐ Not Applicable

Please select one of the following reasons if this section is not applicable in this development:

- There is no building works on roof

(b) Roof without Skylights

Roof Weight Group	Weight Range (kg/m ²)	Maximum U-value (W/m ² k)	U-Value of Roof (W/ m ² /K)
Light	<50	0.5	
Medium	50 to 230	0.8	
Heavy	>230	1.2	

- ☐ Yes ☐ Complied
☐ Not Applicable

Please select one of the following reasons if this section is not applicable in this development:

- There is no building works on roof

NRB02 Air-Tightness and Leakage

NRB02-1 Windows and Curtain Walls

Windows and curtain walls shall be designed to ensure that the air leakage rates do not exceed the limits specified in the following standards.

(a) SS 212 – Specification for Aluminium Alloy Windows

- ☐ Yes ☐ Complied
☐ Not Applicable

Please select one of the following reasons if this section is not applicable in this development:

- all spaces are designed to be non-air-conditioned
- There is no Window in this development

SECTION II: SUPPLEMENTARY DETAILS

Project Reference No.: GM e-Filing No.: **(I) Base Requirements****Applicability**

(b) SS 654- Code of Practice for Curtain Walls

- ☐ *Yes* ☐ *Complied*
☐ *Not Applicable*

Please select one of the following reasons if this section is not applicable in this development:

- *all spaces are designed to be non-air-conditioned*
- *there are no curtain walls in this development*

NRB02-2 Openings between conditioned and non-conditioned spaces

Building entrances and door openings to building exterior or non-air-conditioned spaces and the like, shall

- ☐ be provided with doors that are equipped with automated technology or self-closing devices with the use of pressure independent control valve and energy meters

- ☐ *Yes* ☐ *Complied*
☐ *Not Applicable*

Please select one of the following reasons if this section is not applicable in this development:

- *all spaces are designed to be non-air-conditioned*

- ☐ be equipped with vestibules or other appropriate measures for doorway with high pedestrian traffic flow. In the case of vestibules, the interior and exterior door must have a minimum distance of not less than 2.5 m apart and should be interlocked to avoid being opened at the same time.

- ☐ *Yes* ☐ *Complied*
☐ *Not Applicable*

Please state your proposed measures:

Please select one of the following reasons if this section is not applicable in this development:

- *all spaces are designed to be non-air-conditioned*

SECTION II: SUPPLEMENTARY DETAILS																
Project Reference No.: 	GM e-Filing No.: 															
(I) Base Requirements	Applicability															
NRB03 Building Energy Performance (Select NRB03-1 or NRB03-2, where applicable)																
NRB03-1 Performance Based Approach via Energy Modelling																
Demonstration of minimum energy improvements of 50% over 2005 baseline* via energy modelling and in accordance to the prescribed methodology set out in this Code. Based on the results of the energy modelling, the Proposed Model is expected to achieve a saving of % in annual energy consumption compared to the Reference Model. The details are provided under Section III – Additional Information. <i>Note:</i> <i>*This can be translated to 30% energy savings over current Singapore Standard and baseline</i> <i>The limits set for Total System Efficiency (TSE) of respective building cooling system stipulated under NRB03-2(a) shall apply.</i>	☐ <i>Yes</i> ☐ <i>Complied</i> ☐ <i>Not Applicable</i>															
NRB03-2 Energy Performance Standards for Key Building Systems																
NRB03-2(a) Air-Conditioning System																
(i) Water-Cooled Building Cooling System Water-Cooled Chilled Water Plant (Building System) <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 60%; padding: 5px;">Chiller Plant System Efficiency for water cooled chilled water plant</td> <td style="width: 40%; padding: 5px;"></td> <td style="width: 10%; text-align: right; padding: 5px;">kW/RT</td> </tr> <tr> <td style="padding: 5px;">Total System Efficiency (TSE)</td> <td style="padding: 5px;"></td> <td style="text-align: right; padding: 5px;">kW/RT</td> </tr> </table> or District Cooling System (subject to MEES under EC Act) <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 60%; padding: 5px;">Air Distribution System Efficiency</td> <td style="width: 40%; padding: 5px;"></td> <td style="width: 10%; text-align: right; padding: 5px;">kW/RT</td> </tr> </table> (ii) Air-Cooling Building Cooling System Air-Cooled Chilled Water Plant <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 60%; padding: 5px;">Chiller Plant System Efficiency for air-cooled chilled water plant</td> <td style="width: 40%; padding: 5px;"></td> <td style="width: 10%; text-align: right; padding: 5px;">kW/RT</td> </tr> <tr> <td style="padding: 5px;">Total System Efficiency (TSE)</td> <td style="padding: 5px;"></td> <td style="text-align: right; padding: 5px;">kW/RT</td> </tr> </table>	Chiller Plant System Efficiency for water cooled chilled water plant		kW/RT	Total System Efficiency (TSE)		kW/RT	Air Distribution System Efficiency		kW/RT	Chiller Plant System Efficiency for air-cooled chilled water plant		kW/RT	Total System Efficiency (TSE)		kW/RT	☐ <i>Yes</i> ☐ <i>Complied</i> ☐ <i>Not Applicable</i> Please select one of the following reasons if this section is not applicable in this development: ○ <i>There is no provision of Water-Cooled Chilled Water Plant or District Cooling System</i> ○ <i>Overall Air-Conditioning spaces is less than 500sqm</i> ☐ <i>Yes</i> ☐ <i>Complied</i> ☐ <i>Not Applicable</i> Please select one of the following reasons if this section is not applicable in this development: ○ <i>There is no provision of Air-Cooled Chilled Water Plant</i> ○ <i>Overall Air-Conditioning spaces is less than 500sqm</i>
Chiller Plant System Efficiency for water cooled chilled water plant		kW/RT														
Total System Efficiency (TSE)		kW/RT														
Air Distribution System Efficiency		kW/RT														
Chiller Plant System Efficiency for air-cooled chilled water plant		kW/RT														
Total System Efficiency (TSE)		kW/RT														

SECTION II: SUPPLEMENTARY DETAILS							
Project Reference No.:	GM e-Filing No.:						
(I) Base Requirements	Applicability						
Unitary Air-Conditioners <table border="1"> <tr> <td>Condensing Unit System Efficiency</td> <td> </td> <td>kW/RT</td> </tr> <tr> <td>Total System Efficiency (TSE)</td> <td> </td> <td>kW/RT</td> </tr> </table>	Condensing Unit System Efficiency		kW/RT	Total System Efficiency (TSE)		kW/RT	☐ Yes ☐ Complied ☐ Not Applicable Please select one of the following reasons if this section is not applicable in this development: ☐ There is no provision of Unitary Air-Conditioners ☐ Overall Air-Conditioning spaces is less than 500sqm
Condensing Unit System Efficiency		kW/RT					
Total System Efficiency (TSE)		kW/RT					
NRB03-2 (b) Lighting System							
Lighting system provision of at least 40% more energy efficient than the prescribed lighting power budget stated in SS530. Percentage improvement in lighting power budget = % Note: Lighting provision for building façade and landscape should comply with the prescribed lighting power budget stated in SS 530, where relevant.	☐ Yes ☐ Complied ☐ Not Applicable Please select one of the following reasons if this section is not applicable in this development: ☐ There is no provision of lightings in this development						
NRB01 Building Energy Performance (cont'd)							
NRB03-2 (c) Mechanical Ventilation System							
(i) Provision of mechanical ventilation system of at least 10% more energy efficient than the prescribed standard stated in SS 553 for normally occupied spaces that utilise mechanical ventilation as the preferred ventilation mode. Percentage improvement in mechanical ventilation system efficiency = %	☐ Yes ☐ Complied ☐ Not Applicable Please select one of the following reasons if this section is not applicable in this development: ☐ Spaces is naturally ventilated ☐ There is no mechanical ventilation system for applicable area						
(ii) Provision of Carbon Monoxide (CO) detection sensor control with Variable Speed Drive (VSD) to regulate demand for mechanical ventilation in carpark areas.	☐ Yes ☐ Complied ☐ Not Applicable Please select one of the following reasons if this section is not applicable in this development: ☐ Carpark is naturally ventilated ☐ Carpark not built for this project						

SECTION II: SUPPLEMENTARY DETAILS	
Project Reference No.:	GM e-Filing No.:
(I) Base Requirements	Applicability
NRB03-2 (d) Vertical Transportation System	
Reduce energy consumption by providing energy efficient vertical transportation systems that are equipped with variable voltage variable frequency (VVVF) drives and sleep mode features and/or standby speed/stop features, where relevant.	☐ <i>Yes</i> ☐ <i>Complied</i> ☐ <i>Not Applicable</i> Please select one of the following reasons if this section is not applicable in this development: ○ <i>Lift system not provided</i> ○ <i>The use of traction lifts is not suitable for this project'</i>

SECTION II: SUPPLEMENTARY DETAILS	
Project Reference No.:	GM e-Filing No.:
(I) Base Requirements	Applicability
NRB04 Measurement and Verification (M&V) Instrumentation	
NRB04-1 Instrumentation for Chilled Water System	
Provision of permanent measuring instruments for monitoring of the energy performance of the water-cooled and air-cooled central chilled water plants and air distribution systems.	☐ <i>Yes</i> ☐ <i>Complied</i> ☐ <i>Not Applicable</i> Please select one of the following reasons if this section is not applicable in this development: ☐ <i>There is no provision Chilled-Water System in this development.</i>
NRB04-2 Instrumentation for Variable Refrigerant Flow (VRF) System	
Provision of permanent measuring instruments for monitoring of the energy performance of the Variable Refrigerant Flow (VRF) condensing units and air-distribution systems.	☐ <i>Yes</i> ☐ <i>Complied</i> ☐ <i>Not Applicable</i> Please select one of the following reasons if this section is not applicable in this development: ☐ <i>There is no provision of Variable Refrigerant Flow (VRF) System</i> ☐ <i>The aggregate conditioned floor area for VRF Systems is less than 2000 m2 or more</i>

SECTION II: SUPPLEMENTARY DETAILS	
Project Reference No.: 	GM e-Filing No.:
(I) Base Requirements	Applicability
NRB05 Electrical Sub-Metering	
Facilitate measurement and monitoring of major energy end uses for energy management and audit. Separate sub-meters shall be provided and linked to a monitoring system that can measure and trend energy consumption data of the following systems:	
Lifts and escalators	☐ Yes ☐ Complied ☐ Not Applicable Please select one of the following reasons if this section is not applicable in this development: ○ There is no provision or replacement of Lift or Escalator ○ There are less than 6 numbers or sets or with sum of all feeders less than or equal to 50 kVA. ○ under public upgrading programmes
Mechanical Ventilation Systems	☐ Yes ☐ Complied ☐ Not Applicable Please select one of the following reasons if this section is not applicable in this development: ○ There is no provision of Mechanical Ventilation Systems ○ The total subsystem's load <= 15 kW
Centralised hot water supply system	☐ Yes ☐ Complied ☐ Not Applicable Please select one of the following reasons if this section is not applicable in this development: ○ There is no provision of Centralised hot water supply system ○ <= 50kW Thermal heating capacity

SECTION II: SUPPLEMENTARY DETAILS	
Project Reference No.:	GM e-Filing No.:
(I) Base Requirements	Applicability
General power supply and lighting systems for tenancy areas and owners' premises	☐ <i>Yes</i> ☐ <i>Complied</i> ☐ <i>Not Applicable</i> Please select one of the following reasons if this section is not applicable in this development: ☐ <i>A & A works with no addition/change in general power supply or lighting systems</i> ☐ <i>under public upgrading programmes</i>

SECTION II: SUPPLEMENTARY DETAILS

Project Reference No.: _____

GM e-Filing No.: _____

(I) Base Requirements**Applicability****NRB06 Maintenance of Building Cooling System Performance**

To ensure adequate service clearances so that the building cooling system performance can be maintained during operation as designed. Service clearances are to be provided as per manufacturers' specification or prescribed standards stated in the following clauses, whichever governs.

"For existing building project, this indicator can be considered as an alternative solution under carbon reduction measures (sustainable design strategies) if it meets the requirement"

NRB06-1 Chillers

Access space provisions are as follows:

- ☐ (a) Clear space of 2 m or more at the front of chiller unit piping section for tube maintenance and cleaning, repair and replacement of bigger components
- ☐ (b) Clearance of 1.2 m or more between the chillers measured from plinth to plinth for regular maintenance.
- ☐ (c) Clearance of 1.5 m or more above the chiller for maintenance, overhaul or replacement.

- ☐ Yes ☐ Complied
☐ Not Applicable

Please select one of the following reasons if this section is not applicable in this development:

- There is no provision or replacement of Chillers

NRB06-2 Pump Systems

Access space provisions are as follows:

- ☐ (a) Except for the areas where the pipes are connected, a clearance of 0.6 m or more is to be provided round the pump for regular maintenance.
- ☐ (b) Clear head room space of 1 m or more above the pump and motor to facilitate overhaul maintenance or replacement

- ☐ Yes ☐ Complied
☐ Not Applicable

Please select one of the following reasons if this section is not applicable in this development:

- There is no provision or replacement Pump Systems

NRB06-3 Cooling Towers

Maintenance provisions are as follows:

- ☐ (a) Provision of maintenance platform, stairs and catwalks of 600 mm width or more with handrails around the cooling towers and access to the level for periodic maintenance, inspection of water basin and fill media.
- ☐ (b) Clear space of 2 m or more from the top of cooling towers to location of the trellis, where applicable.

- ☐ Yes ☐ Complied
☐ Not Applicable

Please select one of the following reasons if this section is not applicable in this development:

- There is no provision or replacement of Cooling Towers

SECTION II: SUPPLEMENTARY DETAILS

Project Reference No.: _____

GM e-Filing No.: _____

(I) Base Requirements**Applicability****NRB06 Maintenance of Building Cooling System Performance****NRB06-4 Air-Distribution Systems**

- (a) Air handling units (AHU) of cooling capacity greater than 35 kW shall be floor mounted as stipulated in SS 553.

- ☐ Yes ☐ Complied
☐ Not Applicable

Please select one of the following reasons if this section is not applicable in this development:

- There is no provision or of Air-Distribution Systems replacement of AHUs with cooling capacity greater than 35kW

- (b) For AHUs that are floor mounted, the access space provisions shall be as follows:

- ☐ Yes ☐ Complied
☐ Not Applicable

Please select one of the following reasons if this section is not applicable in this development:

- There is no provision or of Air-Distribution Systems replacement of AHUs
- The cooling capacity of the AHU is not greater than 35kW
- AHUs are not floor mounted. Please state the reasons: _____
- This project is an existing building development with major A&A and /or retrofit.

- | | |
|--------------------------|--|
| ☐ | (i) AHU access – Provide minimum 1.0 m clearance from the AHU room door entrance to the AHU for general maintenance; |
| ☐ | (ii) Cooling coil pipe and filter access – Provide minimum 800 mm clearance after pipe connection to facilitate cooling coil cleaning and filter access; |
| ☐ | (iii) Fan access – Provide minimum 800 mm clearance for fan/motor access and maintenance (if the access is not from the cooling coil connection side); and |
| ☐ | (iv) AHU side and back clearance – Provide minimum 600 mm clear width for general access and maintenance. |

SECTION II: DESIGN SUBMISSION – SUPPLEMENTARY DETAILSProject Reference No.: GM e-Filing No.: **(II) Carbon Reduction Measures:** [Select four (4) carbon reduction measures from 3 Parts including a minimum of 2 measures from Part 2- Sustainable Construction]**Part 1: Sustainable Design Strategies****NRBE01-1 Enhanced Building Envelope Performance**

- (a) The building envelope is designed with Envelope Thermal Transmittance Value (ETTV) of no more than 40 W/m² based on the methodology stated in the Code on Envelope Thermal Performance for Buildings or enhanced with provision of good thermal break/Insulating profile framing

☐ ETTV = W/m²
☐ Enhanced with provision of good thermal break/insulating profile framing

☐ *Selected Option*
☐ *Complied*

- (b) Application of cool materials that are certified by an approved local certification body for 80% of all external wall or roof areas

☐ *Selected Option*
☐ *Complied*

Locations	Total Area, in m ²	Total Non-Applicable Area in m ²	Total Applicable Area in m ²	Total Areas with cool materials in m ²	Extent of Coverage in %
External Wall Areas					
Main building blocks					
OR					
Roof Areas					
Main building blocks					
Carparks					
Note: Non-applicable areas can include green roofs and areas beneath large equipment such as water tanks or photovoltaic (PV) panels where the application of cool materials may not be relevant.					

Extent of Coverage: Total Areas with cool materials/ Total Applicable Areas

SECTION II: DESIGN SUBMISSION – SUPPLEMENTARY DETAILS

Project Reference No.:

GM e-Filing No.:

(II) Carbon Reduction Measures: [Select four (4) carbon reduction measures from 3 Parts including a minimum of 2 measures from Part 2- Sustainable Construction]**Part 1: Sustainable Design Strategies**

- (c) Provision of innovative façade technology or solutions such as the use of electrochromic glass, integration of photovoltaic modules, parametric façade and so on for at least 20% of the fenestration areas

Total fenestration areas (in m²) =☐ *Selected Option*☐ *Complied*

Technology or solution used fenestration Area, in m ²	
Electrochromic glass	
Integration of photovoltaic modules	
Parametric facade	
Others (pls state) _____ (Subject to BCA's clearance)	
Total fenestration areas with innovative solutions	
Percentage % of fenestration that meet the requirements	

NRBE01-2 Naturally Ventilated Building Design

Enhance indoor thermal comfort through the provision of building layout design which facilitate good natural ventilation

- (a) Building layout design comprises 20% of all normally occupied spaces with openings facing prevailing wind directions

☐ *Selected Option*☐ *Complied*

Total nos. of units/rooms in the development	Units/Rooms with openings facing prevailing north and south directions	
	Total No.	Percentage

SECTION II: DESIGN SUBMISSION – SUPPLEMENTARY DETAILSProject Reference No.: GM e-Filing No.: **(II) Carbon Reduction Measures:** [Select four (4) carbon reduction measures from 3 Parts including a minimum of 2 measures from Part 2- Sustainable Construction]**Part 1: Sustainable Design Strategies**

(b) Design for natural ventilation with minimum coverage of 80% in at least two (2) of the following areas

- ☐ Lift Lobbies
- ☐ Corridors
- ☐ Staircases
- ☐ Carpark
- ☐ Atrium
- ☐ Toilets

- ☐ *Selected Option*
- ☐ *Complied*

NRBE01-3 Effective Daylighting

Encourage the provision of effective natural lighting for better visual comfort.

- (a) Normally occupied spaces: Daylighting provision with desired lighting level and specific Daylight Autonomy (DA) requirements as outlined in the following table for a minimum 15% of total occupied areas using the daylighting availability tables provided. The provision must come with integration of daylighting controls.

Total occupied areas (m ²)	
Total Area meeting daylight requirement (m ²)	
% of total occupied areas with effective daylighting (%)	

- ☐ *Selected Option*
- ☐ *Complied*

- (b) Common Areas: Daylighting provision with integrated daylight controls for a minimum coverage of 80% (by number) in at least two (2) of the following areas

- ☐ Lift Lobbies
- ☐ Corridors
- ☐ Staircases
- ☐ Carpark
- ☐ Atrium
- ☐ Toilets

- ☐ *Selected Option*
- ☐ *Complied*

SECTION II: DESIGN SUBMISSION – SUPPLEMENTARY DETAILSProject Reference No.: GM e-Filing No.: **(II) Carbon Reduction Measures:** [Select four (4) carbon reduction measures from 3 Parts including a minimum of 2 measures from Part 2- Sustainable Construction]**Part 1: Sustainable Design Strategies**

(c) Provision of daylight redirecting technologies such as light shelves or tubular daylight to enhance lighting level.

☐ Light Shelves☐ Tubular daylight☐ Others (please specify):

(to be evaluated on a case to case basis)

☐ *Selected Option*☐ *Complied*

SECTION II: DESIGN SUBMISSION – SUPPLEMENTARY DETAILSProject Reference No.: GM e-Filing No.: **(II) Carbon Reduction Measures** [Select four (4) carbon reduction measures from 3 Parts including a minimum of 2 measures from Part 2- Sustainable Construction]**Part 2: Sustainable Construction****NRBE02-1 Resource Efficiency Measures**

Design and practices that optimises resource efficiency in building construction

- (a) Existing structures with more than 50% of floor and / or wall areas are conserved for adaptive reuse

% conserved and/or adapted for reuse	
--------------------------------------	--

- ☐ *Selected Option*
☐ *Complied*

- (b) Design with Concrete Usage Index (CUI) of not more than 0.50

Concrete Volume in m ³ (A)	
Total Constructed Floor Area in m ² (B)	
Project Concrete Usage Index (CUI), C = A/B)	

- ☐ *Selected Option*
☐ *Complied*

- (c) Embodied carbon reporting to account for the upfront carbon emissions of three (3) key construction materials namely, concrete, steel and glass used in building developments.

- ☐ *Selected Option*
☐ *Complied*

NRBE02-2 Low Carbon Concrete

Use of sustainable materials for construction

- (a) Eco-friendly cement used:

- ☐ Use of concrete up to grade C50/60) with eco-friendly cementitious materials that are classified under CEM II to V types for at least 80% of the super-structural works by volume

or

- ☐ Used of certified concrete for 80% of the super-structural works

- ☐ *Selected Option*
☐ *Complied*

SECTION II: DESIGN SUBMISSION – SUPPLEMENTARY DETAILSProject Reference No.: GM e-Filing No.: **(II) Carbon Reduction Measures** [Select four (4) carbon reduction measures from 3 Parts including a minimum of 2 measures from Part 2- Sustainable Construction]**Part 2: Sustainable Construction**

- (a) Aggregate replacement: Use of recycled concrete aggregate (RCA), washed copper slag (WCS) and/or granite fines from approved sources that meet the minimum usage requirement (that is 1.5% x GFA for RCA or granite fines and/or 0.75 x GFA for WCS)

GFA = m²

	Minimum requirement (tons) based on GFA	Tonnage used	Meet Minimum Usage (Yes/No)
RCA used	<system compute; 1.5/100*GFA>		
WCS used	<system compute; 0.75/100*GFA>		
Granite fines used	<system compute; 1.5/100*GFA>		

- ☐ *Selected Option*
☐ *Complied*

- (b) Alternative construction materials that can be used as a replacement for standard building materials for non-structural application

- ☐ *Selected Option*
☐ *Complied*

Please state the alternative construction materials used:

Area of Application:

- ☐ Footpath
☐ Road Construction
☐ Concrete bench for parks
☐ Pavement
☐ Others (please specify):

NRBE02-3 Sustainable Products

Minimum provision of three (3) environmentally friendly products that are certified with Environmental Product Declaration (EPD) requirements or two-ticks rating by an approved local certification body for 80% of the applicable areas or building components

- ☐ *Selected Option*
☐ *Complied*

SECTION II: DESIGN SUBMISSION – SUPPLEMENTARY DETAILS

Project Reference No.: _____

GM e-Filing No.: _____

(II) Carbon Reduction Measures [Select four (4) carbon reduction measures from 3 Parts including a minimum of 2 measures from Part 2- Sustainable Construction]**Part 3: Sustainable Technologies****NRBE03-1 Renewable Energy System**

Encourage the use of on-site renewable energy sources to reduce the use of electricity by at least 1% of the expected total building electricity consumption.

Renewable energy sources include the following:

Photovoltaic (PV) System (a)	kWp
Expected electricity generated by PV system (b)	kWh/year
Expected total building electricity consumption (c)	kWh/year
Percentage of replacement of electricity by renewable energy (based on total electricity consumption) (d) = (b) / (c) * 100	%

- ☐ *Selected Option*
☐ *Complied*

NRBE03-2 Smart Building Solutions

Encourage the provision of minimum two (2) building solutions which facilitates some form of automation and controls over building systems for better energy management and thermal comfort as listed

- ☐ (a) Use of BACnet, Modbus or any other open protocol as the network backbone of the building management system where data points can be used to facilitate communication and integration with other building systems.
- ☐ (b) Energy management system, applications and dashboard that help building owners and/or tenants to better manage their energy consumption in an intuitive manner
- ☐ (c) Demand controlled ventilation system such as carbon dioxide sensors or devices to regulate the fresh air intake and ventilation based on occupants' need.
- ☐ (d) Timer sensors/controls for lighting and ventilation systems in common areas and facilities
- ☐ (e) Smart Building sensors that are equipped with sensing capability, microprocessors and communication technology
- ☐ (f) Differential pressure monitoring switches in Air Handling Units (AHUs)
- ☐ (g) Others (1): (please specify): _____
(to be evaluated on a case to case basis)
- ☐ (h) Others (2): (please specify): _____
(to be evaluated on a case to case basis)

- ☐ *Selected Option*
☐ *Complied*

SECTION II: DESIGN SUBMISSION – SUPPLEMENTARY DETAILS																
Project Reference No.: 		GM e-Filing No.: 														
(II) Carbon Reduction Measures [Select four (4) carbon reduction measures from 3 Parts including a minimum of 2 measures from Part 2- Sustainable Construction]																
Part 3: Sustainable Technologies																
NRBE03-3	Green Building Technologies															
Adoption of low-carbon solutions and technologies which help reduce energy consumption. Examples of the systems that can be considered: <table border="1" style="margin-top: 10px;"> <tr> <td>☐</td> <td>(i) Energy recovery system</td> </tr> <tr> <td>☐</td> <td>(ii) Lifts with regenerative function</td> </tr> <tr> <td>☐</td> <td>(iii) Passive displacement ventilation system</td> </tr> <tr> <td>☐</td> <td>(iv) Hybrid cooling system</td> </tr> <tr> <td>☐</td> <td>(v) Smart sensor and control technologies</td> </tr> <tr> <td>☐</td> <td>(vi) Dedicated outdoor air system</td> </tr> <tr> <td>☐</td> <td>(vii) Others: (please specify): (to be evaluated on a case to case basis)</td> </tr> </table>		☐	(i) Energy recovery system	☐	(ii) Lifts with regenerative function	☐	(iii) Passive displacement ventilation system	☐	(iv) Hybrid cooling system	☐	(v) Smart sensor and control technologies	☐	(vi) Dedicated outdoor air system	☐	(vii) Others: (please specify): (to be evaluated on a case to case basis)	☐ <i>Selected Option</i> ☐ <i>Complied</i>
☐	(i) Energy recovery system															
☐	(ii) Lifts with regenerative function															
☐	(iii) Passive displacement ventilation system															
☐	(iv) Hybrid cooling system															
☐	(v) Smart sensor and control technologies															
☐	(vi) Dedicated outdoor air system															
☐	(vii) Others: (please specify): (to be evaluated on a case to case basis)															

Project Reference No.:

GM e-Filing No.:

SECTION III: ADDITIONAL INFORMATION**(I) Summary of Energy Modelling Results and Design Information under NRB03-1 and NRB03-2****(i) Water-Cooled Building Cooling System**

Design Information			
Type of Air-Conditioners	Water-Cooled Chilled Water Plant (Building System)	District Cooling System (DCS) - subject to MEES under EC Act	
Air-Conditioned Spaces served by this system			m ²
Peak Building Cooling Load			RT
Chilled Water Supply Temperature (CHWS)			°C
Total Installed Capacity (Including Standby)			RT
Year Installed (Existing Chiller)			
Design System Efficiency			
Chiller Efficiency			kW/RT
Chiller Plant System Efficiency			kW/RT
Air Distribution System Efficiency			kW/RT
			W/CMH
Total System Efficiency (TSE)			kW/RT

(i) Air-Cooling Building Cooling System

Applicable to air-cooled chilled-water plant for Existing Buildings with peak building cooling load of not more than 500 RT and unitary air conditioners

Design Information			
Type of Air-Conditioners	Air-Cooled Chilled Water Plant	Unitary Air-Conditioners	
Air-Conditioned Spaces served by this system			m ²
Peak Building Cooling Load			RT
Total Installed Capacity (Including Standby)			RT
For air-cooled chilled water plant (≤ 500RT) Chilled Water Supply Temperature (CHWS)			°C
Design System Efficiency			
Condensing Unit System Efficiency			kW/RT
Chiller Efficiency of air-cooled chilled water plant			kW/RT
Chiller Plant System Efficiency for air-cooled chilled water plant			kW/RT
Air Distribution System Efficiency			kW/RT
			W/CMH
Total System Efficiency (TSE)			kW/RT

Project Reference No.: _____

GM e-Filing No.: _____

SECTION III: ADDITIONAL INFORMATION**(II) Summary of Energy Modelling Results and Design Information under NRB03-1**

Other Energy System (Saving from baseline model)		
Energy in Water-Cooled Chilled Water Plant over baseline model		%
Energy in Air-Cooled Chilled Water Plant over baseline model		%
Energy in Unitary Air-Conditioners over baseline model		%
Energy saving in Lighting System over baseline model		%
Energy saving in mechanical ventilation system (General) over baseline model		%
Percentage improvement in mechanical ventilation system (Carpark) over baseline model		%

Renewable Energy (Capacity)		kWp
Renewable Energy (Energy Replacement)		%
Energy Saving on Demand Control (motion sensor, photo sensor, CO sensor)		%
Total Energy Building Consumption (TEBC)		kWh/year
Data centre Energy Consumption (DCEC)		kWh/year
Carpark Area		m ²
Data Centre area (DCA)		m ²
Gross Lettable Area (GLA)		m ²
Weighted Floor Vacancy Rate of gross lettable areas (VCR)		%
Typical weekly Operating hours of office buildings in Singapore (55)		hrs/week
Weighted Weekly Operating Hours of Gross Lettable Area exclusive of data Centre Area (OH)		hrs/week
EUI [Total Energy Building Consumption (TEBC) /GFA]		kWh/m ² /yr

Regenerative lift	Yes	No
-------------------	------------	-----------

(III) Summary of Sustainable Products used in NRBE02-3

List of Sustainable Products

S/No.	Description of environmentally friendly products	Certification Type (EPD/SGBC 2 Ticks)	Applicable areas or building Components	Extent of Coverage (%)
1				
2				
3				
4				
5				

(minimum 3 product categories for 80% of applicable areas or building components)