



DESIGN REFERENCE GUIDE

Township

Version 1.0

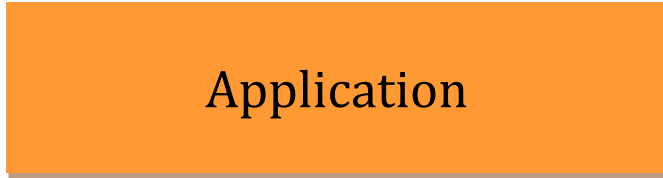
1ST June 2015

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1. Certification Process

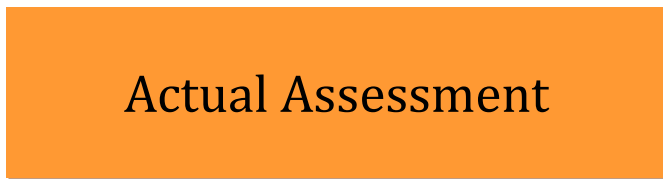
The GreenRE Township Certification process is as follows:



Submittal of application with relevant supporting documents for certification upon finalization of township design



A pre-assessment audit will be conducted to give the project team a better understanding of the criteria and evaluation of the certification level sought.



Actual assessment to be conducted once the design and documentary evidences (e.g. approved plan) are ready. After the actual assessment, our assessors will review the documents submitted and formalize report to management within four weeks.

Assessment process includes design and documentary reviews to verify if the township meets

- (i) The intents of the criteria
- (ii) The pre-requisite requirement for GreenRE Bronze, Silver, Gold and Platinum rating where applicable.
- (iii) Letter of award showing the GreenRE rating will be issued at this stage.



Site verification to be conducted upon project completion. Refer to page 6 for pre-requisite requirements. A certificate will be issued at this stage.

The GreenRE Township criteria consist of six (6) environmental impact categories namely:

- (a) **Part 1 - Energy Efficiency:** This category focuses on the approach that can be used in the infrastructure and public amenities to optimise the energy efficiency of the township.
- (b) **Part 2 - Water Management:** This category focuses on the selection of fittings for public amenities and strategies towards efficient water usage and management.
- (c) **Part 3 - Material & Waste Management:** This category focuses on the design, practices and selection of materials and resources that would reduce the environmental impacts and the waste management strategies.
- (d) **Part 4 - Environmental Planning:** This category focuses on the design strategies that would enhance the indoor environmental quality which include air quality, thermal comfort, acoustic control and daylighting.
- (e) **Part 5 - Green Buildings and Green Transport:** This category focuses on the public transportation network and availability of green rated buildings within the township.
- (f) **Part 6 - Community and Innovation:** This category focuses on the community involvement and innovative features available for the benefit of the community.

These environment impact categories are broadly classified under two main grouping namely (I) Energy Related Requirements and (II) Other Green Requirements.

Energy Related Requirements consist of Part 1- Energy Efficiency where credits are allocated for the various energy efficient designs, practices and features used. A minimum of 10 credits must be obtained from this group to be eligible for certification.

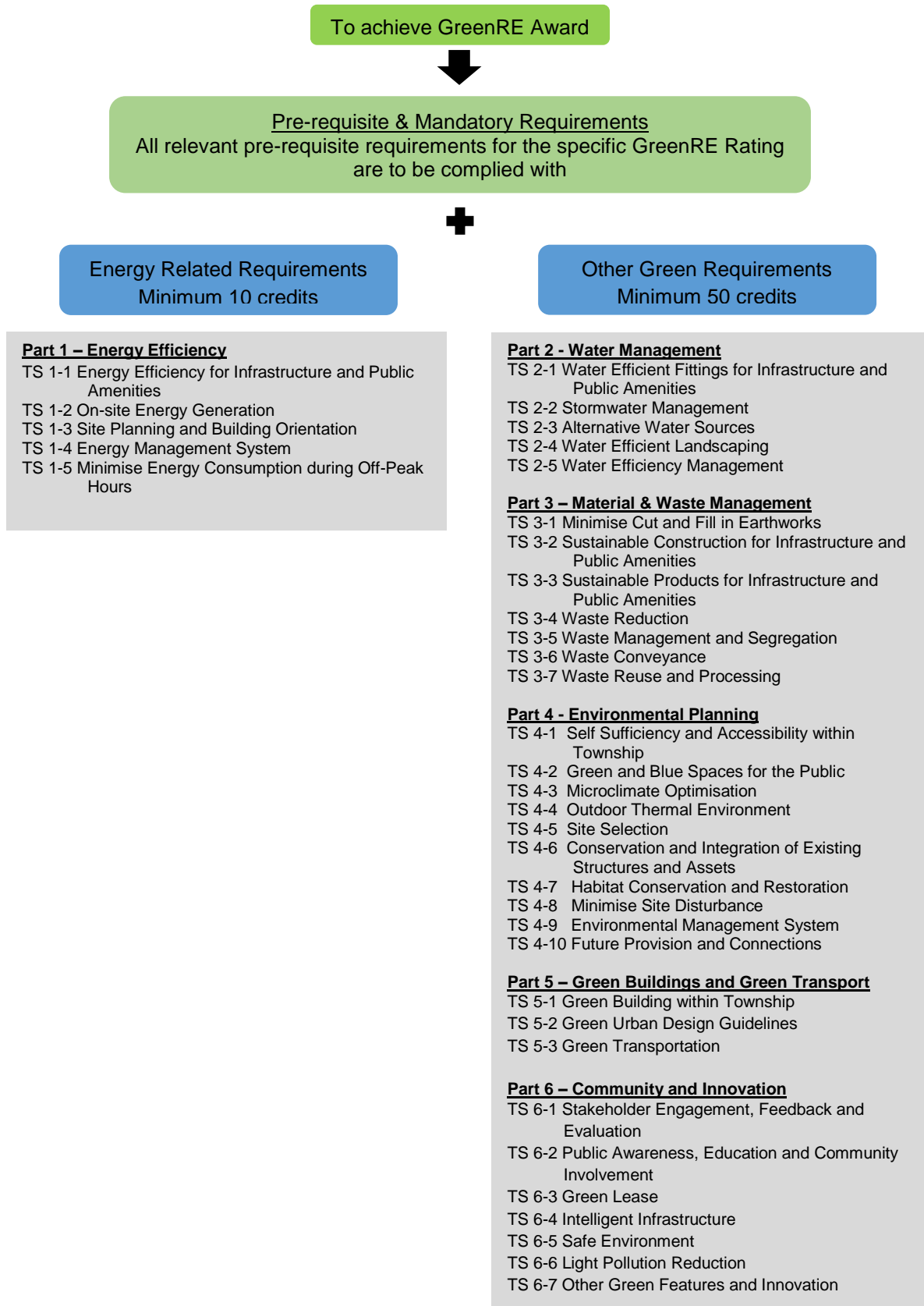
Other Green Requirements consist of Part 2 - Water Management; Part 3 – Material & Waste Management; Part 4 - Environmental Planning; Part 5 - Green Buildings and Green Transport, and Part 6 – Community and Innovation. A minimum of 50 credits must be obtained from this grouping to be eligible for certification.

2. GreenRE Award Rating

Score	Rating
100 and above	GreenRE Platinum
90 to < 100	GreenRE Gold
75 to < 90	GreenRE Silver
60 to < 75	GreenRE Bronze

3. GreenRE Assessment Criteria

3.1 Framework – GreenRE for Township



3.2 Credit Allocation for Township Criteria

Category		Credit Allocation	
(I) Energy Related Requirements			
Minimum 10 Credits	Part 1 – Energy Efficiency		
	TS 1-1 Energy Efficiency for Infrastructure and Public Amenities	10	
	TS 1-2 On-site Energy Generation	6	
	TS 1-3 Site Planning and Building Orientation	10	
	TS 1-4 Energy Management System	5	
	TS 1-5 Minimise Energy Consumption During Off-Peak Hours	1	
Category Score for Part 1 – Energy Efficiency		32	
(II) Other Green Requirements			
Minimum 50 Credits (Part 2 to 6)	Part 2 – Water Management		
	TS 2-1 Water Efficient Fittings for Infrastructure and Public Amenities	4	
	TS 2-2 Stormwater Management	8	
	TS 2-3 Alternative Water Sources	4	
	TS 2-4 Water Efficient Landscaping	2	
	TS 2-5 Water Efficiency Management	3	
	Category Score for Part 2 – Water Management		21
	Part 3 – Material and Waste Management		
	TS 3-1 Minimise Cut and Fill in Earthworks	3	
	TS 3-2 Sustainable Construction for Infrastructure and Public Amenities	7	
	TS 3-3 Sustainable Products for Infrastructure and Public Amenities	5	
	TS 3-4 Waste Reduction	2	
	TS 3-5 Waste Management and Segregation	4	
	TS 3-6 Waste Conveyance	2	
	TS 3-7 Waste Reuse and Processing	4	
	Category Score for Part 3 – Material and Waste Management		27
	Part 4 – Environmental Planning		
	TS 4-1 Self Sufficiency and Accessibility Within Township	5	
	TS 4-2 Green and Blue Spaces for the Public	3	
	TS 4-3 Microclimate Optimisation	4	
	TS 4-4 Outdoor Thermal Environment	8	
	TS 4-5 Site Selection	5	
	TS 4-6 Conservation and Integration of Existing Structures and Assets	1	
	TS 4-7 Habitat Conservation and Restoration	7	
	TS 4-8 Minimise Site Disturbance	2	
	TS 4-9 Environmental Management System	5	
	TS 4-10 Future Provision and Connections	2	
	Category Score for Part 4 – Environmental Planning		42
	Part 5 – Green Buildings and Green Transport		
	TS 5-1 Green Buildings Within Township	20	
	TS 5-2 Green Urban Design Guidelines	4	
	TS 5-3 Green Transport Within Township	11	
	Category Score for Part 5 – Green Buildings and Green Transport		35
Part 6 – Community and Innovation			
TS 6-1 Stakeholder Engagement, Feedback and Evaluation	6		
TS 6-2 Public Awareness, Education and Community Involvement	7		
TS 6-3 Green Lease	2		
TS 6-4 Intelligent Infrastructure	3		
TS 6-5 Safe Environment	1		
TS 6-6 Light Pollution Reduction	2		
TS 6-7 Other Green Features and Innovation	5		
Category Score for Part 6 – Community and Innovation		26	
GreenRE Township Score		183 (Max)	

3.3 Pre-requisite Requirements for GreenRE Township

1. Green Building within Township

At least one building (GFA > 5,000 m²) at Phase 1 to achieve the corresponding GreenRE rating.

GreenRE Township Rating	Minimum one GreenRE rated building (GFA > 5,000m ²) at Phase 1
GreenRE Bronze	Nil
GreenRE Silver	GreenRE Silver
GreenRE Gold	GreenRE Gold
GreenRE Platinum	GreenRE Platinum

2. Minimum System Efficiency and Energy Monitoring (if using Township Cooling System)

- i. Where District Cooling System is being utilised in the township, the total system (chilled water plant) efficiency must achieve a minimum of **0.8 kW/RT for GreenRE Silver, Gold and Platinum awards.**
- ii. Permanent instrumentation for monitoring of the district cooling system efficiency to be provided in accordance with the following requirement:
 - a. The installed instrumentation shall have the capability to calculate resultant plant efficiency (i.e. kW/RT) within 5% of its true value and in accordance with ASHRAE Guide 22 and AHRI 550/590.
 - b. The location and installation of the measuring devices to meet the manufacturer's recommendation.
 - c. Data acquisition system to have a minimum resolution of 16 bit.
 - d. All data logging with capability to trend at 1 minute sampling time interval.
 - e. Flow meters to be provided for chilled-water and condenser water loop and shall be of ultrasonic / full bore magnetic type or equivalent.
 - f. Temperature sensors with minimum accuracy of ± 0.05 °C at 0 °C. All thermo-wells shall be installed in a manner which ensures that the sensors can be in direct contact with fluid flow. Provisions shall be made for each temperature measurement location to have two spare thermo-wells located at both sides of the temperature sensor for verification of measurement accuracy.
- iii. Annual submission of building energy consumption data and operating system efficiency of the district cooling system to GreenRE.

3. Minimum score for GreenRE Gold and Platinum Township rating

Achieve minimum score for the following criteria:

Criteria	GreenRE Township Rating	
	Gold	Platinum
TS 3-2 Sustainable Construction for Infrastructure and Public Amenities	≥ 3 Credits	≥ 4 Credits
TS 3-3 Sustainable Products for Infrastructure and Public Amenities	≥ 2 Credits	≥ 3 Credits
Part 4 – Environmental Planning	≥ 15 Credits	≥ 21 Credits

3.4 GreenRE Township Criteria

Part 1 – Energy Efficiency	GreenRE Credits
<p><u>TS 1-1 Energy Efficiency for Infrastructure and Public Amenities</u></p> <p>Site wide energy modelling or calculation to include energy demand and operating carbon emissions of project baseline (as defined below) and proposed.</p> <p><u>Baseline:</u> Minimum efficiency requirement of mechanical and electrical systems as stated in MS1525:2014 or equivalent local standards, or based on conventional systems, etc.</p> <p>Baseline building energy efficiency index (EEI) based on national standard.</p> <p>The mechanical and electrical systems to be included in the calculation shall include (but not limited to) the following:</p> <ul style="list-style-type: none"> (a) Street lighting / landscape lighting / carpark lighting / electric signage (b) Water pumps (c) Mechanical fans (d) Lifts / escalators <p><u>Pre-requisite Requirements:</u></p> <p><i>Minimum System Efficiency and Energy Monitoring (if using District Cooling System)</i></p> <ul style="list-style-type: none"> (i) <i>Where District Cooling System is being utilised in the township, the total system (chilled water plant) efficiency must achieve a minimum of 0.8 kW/RT for GreenRE Silver, Gold and Platinum awards.</i> (ii) <i>Permanent instrumentation for monitoring of the township cooling system efficiency to be provided in accordance with the following requirement:</i> <ul style="list-style-type: none"> a) <i>The installed instrumentation shall have the capability to calculate resultant plant efficiency (i.e. kW/RT) within 5% of its true value and in accordance with ASHRAE Guide 22 and AHRI 550/590.</i> b) <i>The location and installation of the measuring devices to meet the manufacturer's recommendation.</i> 	<p>2 credits for carbon calculation</p> <p>0.15 credits for every percentage of saving over the total energy consumption for infrastructure and public amenities (Excludes energy consumption for those under GreenRE for Buildings)</p> <p>Credits awarded = 0.15 x (% improvement)</p> <p>(Up to 8 credits)</p> <p>[Total 10 credits]</p>

<p>c) <i>Data acquisition system to have a minimum resolution of 16 bit.</i></p> <p>d) <i>All data logging with capability to trend at 1 minute sampling time interval.</i></p> <p>e) <i>Flow meters to be provided for chilled-water and condenser water loop and shall be of ultrasonic / full bore magnetic type or equivalent.</i></p> <p>f) <i>Temperature sensors with minimum accuracy of ± 0.05 °C at 0 °C. All thermo-wells shall be installed in a manner which ensures that the sensors can be in direct contact with fluid flow. Provisions shall be made for each temperature measurement location to have two spare thermo-wells located at both sides of the temperature sensor for verification of measurement accuracy.</i></p> <p>(iii) <i>Annual submission of building energy consumption data and operating system efficiency of the district cooling system to GreenRE.</i></p>	
<p><u>TS 1-2 On-site Energy Generation</u></p> <p>Encourage the on-site generation of energy for self-supply in the common areas of the township (e.g. street lighting, landscape lighting, etc).</p> <p>(a) Energy generation by efficient combined system such as co-generation, tri-generation, etc.</p> <p>(b) Generation of renewable energy.</p> <p>(c) Energy recovery or regeneration.</p>	<p>Credits scored for every percentage replacement of electricity (based on total annual township energy consumption) by systems:</p> <p>10% – 2 credits 15% – 4 credits >20% – 6 credits</p> <p>[Total 6 credits]</p>
<p><u>TS 1-3 Site Planning and Building Orientation</u></p> <p>Minimise the heat gain / loss by use of passive solar strategies to reduce the energy demand.</p> <p>(a) 50% or more of the plot have one axis within plus minus 22.5 degree of geographical north / south, and north / south length is at least as long or longer than the east / west length</p> <p style="text-align: center;">OR</p>	<p style="text-align: center;"><u>(a) Plot coverage</u></p> <p>0.1 credit for every percentage improvement in the plot coverage Credits awarded = 0.1 x (% improvement)</p> <p style="text-align: center;">OR</p>

<p>(b) 50% or more of the project building GFA have one axis of each building is at least 1.5 times longer than the other, and the longer axis is within 22.5 degrees of geographical north / south axis</p> <p>(c) Reduction of the area of the west facing elevation of buildings, or application of inter-block shading strategies to west / east facing facades</p> <p>(d) Planning of buildings layout and massing to avoid blocking prevailing wind</p> <p>(e) Natural ventilation and day-lighting for public spaces</p>	<p><u>(b) GFA coverage</u> 0.15 credit for every percentage improvement in the GFA coverage Credits awarded = 0.15 x (% improvement) (Up to 4 credits)</p> <p>2 credits</p> <p>2 credits</p> <p>2 credits</p> <p>[Total 10 credits]</p>
<p><u>TS 1-4 Energy Management System</u></p> <p>Design and incorporate energy monitoring and/or control system to facilitate energy consumption monitoring and management for public facilities</p> <p>(a) Provide with sub-metering with remote metering capability for subsystems > 15 kW or with electric loads > 100 kVA</p> <p>(b) Provide with township level energy monitoring and automatic control systems for applicable energy consuming systems</p> <p>(c) Provide with energy management plan at design stage such as setting targets, developing measures and strategies</p>	<p>2 credits</p> <p>0.5 credit for each control system (minimum of 90% coverage of the system capacity) to public facilities, such as motion or photo sensors for lighting control, etc. (Up to 2 credits)</p> <p>1 credit</p> <p>[Total 5 credits]</p>
<p><u>TS 1-5 Minimise Energy Consumption During Off-Peak Hours</u></p> <p>Design and incorporate energy optimisation plan (e.g. for night operation and weekends where there is little occupancy) to ensure only the essential energy consuming devices are running e.g. the system configuration optimised for night loads</p>	<p>1 credit</p>
<p style="text-align: center;">PART 1 – ENERGY EFFICIENCY</p> <p style="text-align: center;">CATEGORY SCORE :</p>	<p>Sum of GreenRE credits obtained from TS 1-1 to 1-4:</p> <p style="text-align: center;">32 Credits Maximum</p> <p style="text-align: center;">[Minimum 10 credits]</p>

Part 2 – Water Management	GreenRE Credits									
<p><u>TS 2-1 Water Efficient Fittings for Infrastructure and Public Amenities</u></p> <p>Encourage the use of water efficient fittings covered under PUB’s Water Efficiency Labelling Scheme (WELS) or SPAN’s Water Efficiency Products Labelling Scheme (WEPLS) or equivalent water labelling schemes</p> <ul style="list-style-type: none"> (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 valves 	<table border="1" data-bbox="943 300 1490 394"> <thead> <tr> <th colspan="3">Rating based on WELS / WEPLS</th> </tr> <tr> <th>Good</th> <th>Very Good</th> <th>Excellent</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>2</td> <td>4</td> </tr> </tbody> </table> <p>Credits awarded based on the number and water efficiency rating of the fitting type used</p> <p style="text-align: center;">OR</p> <p>Based on the water saving compared to baseline model (Not rated fitting)</p> <p style="text-align: center;">[Total 4 credits]</p>	Rating based on WELS / WEPLS			Good	Very Good	Excellent	1	2	4
Rating based on WELS / WEPLS										
Good	Very Good	Excellent								
1	2	4								
<p><u>TS 2-2 Stormwater Management</u></p> <p>Encourage the treatment of stormwater run-off before discharge to public drains</p> <p>Provisions of the stormwater management features or design features as recommended in Urban Stormwater Management Manual for Malaysia (MASMA) design guidelines</p>	<p>Credits scored based on the % of runoff from impervious areas within the site</p> <p>OPTION A – Applicable only for the whole township including public realm, infrastructure and individual land parcels.</p> <p style="text-align: center;">10-35% = 2 credits 35-50% = 5 credits >50% = 8 credits</p> <p style="text-align: center;">OR</p> <p>OPTION B – Applicable for the whole township excluding individual land parcels.</p> <p style="text-align: center;">25-50% = 2 credits 50-70% = 5 credits >70% = 8 credits</p> <p style="text-align: center;">[Total 8 credits]</p>									
<p><u>TS 2-3 Alternative Water Sources</u></p> <p>Collection and use of alternative water sources for non-potable use such as irrigation, washing, water features, and cooling tower make-up water to reduce use of potable water. Water sources can include rainwater, greywater and recycled water from approved sources.</p> <p>Credits will be pro-rated based on the effectiveness of use</p>	<p>100% of replacement using non-potable water = 4 credits</p> <p>75% of replacement using non-potable water = 3 credits</p> <p>50% of replacement using non-potable water = 2 credits</p> <p>30% of replacement using non-potable water = 1 credits</p> <p style="text-align: center;">[Total 4 credits]</p>									

<p><u>TS 2-4 Water Efficient Landscaping</u></p> <p>Reduce the water demand by selecting drought resistant plants in landscaping design</p>	<p>2 credits</p> <p>[Total 2 credits]</p>
<p><u>TS 2-5 Water Efficiency Management</u></p> <p>Design and incorporate water efficiency management plans to reduce the demand of water by public facilities and in common areas</p> <p>(a) Provide the use of private water meters and leak detection system to monitor the major water usage e.g. irrigation, water features and swimming pools, etc</p> <p>(b) Targets to improve public area water performance should be set. To show intent, measures and implementation strategies of water efficiency improvement plans over the next three years</p>	<p>1 credit for provision of individual sub meters; 2 credits for sub-meters linked to township management system</p> <p>1 credit</p> <p>[Total 3 credits]</p>
<p style="text-align: center;">PART 2 – WATER EFFICIENCY</p> <p style="text-align: center;">CATEGORY SCORE :</p>	<p>Sum of GreenRE credits obtained from TS 2-1 to 2-5 :</p> <p style="text-align: center;">21 credits Maximum</p>

Part 3 – Material and Waste Management	GreenRE Credits										
<p><u>TS 3-1 Minimise Cut and Fill in Earthworks</u></p> <p>Encourage reduction in the quantity of excavated materials removed or transported into the township by optimising the use of cut and fill material removed during earthworks/ land preparation works for the township</p> <p>(a) Reusing of at least 50% of the topsoil</p> <p>(b) Reusing of at least 50% cut and fill material</p>	<p>1 credit</p> <p>2 credits</p> <p>[Total 3 credits]</p>										
<p><u>TS 3-2 Sustainable Construction for Infrastructure and Public Amenities</u></p> <p>Encourage recycling and the adoption of designs, practices and materials that are environmentally friendly and sustainable in the construction of infrastructure and public amenities</p> <p>(a) Use of sustainable and recycled materials</p> <p>(i) Green Cements with approved industrial by-product (such as Ground Granulated Blastfurnace Slag (GGBS), silica fume, fly ash) to replace ordinary Portland Cement (OPC) by at least 10% by mass for superstructural works.</p> <p>(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</p> <p><u>Note:</u> For structural building elements, the use of RCA and WCS shall be limited to maximum 10% replacement by mass of coarse/ fine aggregates respectively or as approved by the relevant authorities.</p> <p>(b) Recycle or salvage at least 50% of nonhazardous construction waste by weight, or conserve at least 50% of existing structural elements or building envelope by area</p> <p><u>Pre-requisite Requirement:</u> <i>Minimum score under this criterion:</i> GreenRE Gold ≥3 credits GreenRE Platinum ≥4 credits</p>	<p>2 credits</p> <p>Extent of Coverage: The total quantity used (in tonnage) for replacement of coarse or fine aggregates must not be less than the minimum usage requirement that is [0.03 x Gross Floor Area (GFA in m²)]</p> <table border="1" data-bbox="943 1276 1490 1497"> <thead> <tr> <th>Quantity of RCA / WCS</th> <th>Credits Allocation</th> </tr> </thead> <tbody> <tr> <td>≥ 0.5 times (0.5X) minimum usage requirement</td> <td>1</td> </tr> <tr> <td>≥ 1X minimum usage req.</td> <td>2</td> </tr> <tr> <td>≥ 1.5X minimum usage req.</td> <td>3</td> </tr> <tr> <td>≥ 2X minimum usage req.</td> <td>4</td> </tr> </tbody> </table> <p>(Up to 4 credits for TS 3-2(a)(i) and (a)(ii))</p> <p>0.1 credit for every percentage improvement</p> <p>(Up to 3 credits)</p> <p>[Total 7 Credits]</p>	Quantity of RCA / WCS	Credits Allocation	≥ 0.5 times (0.5X) minimum usage requirement	1	≥ 1X minimum usage req.	2	≥ 1.5X minimum usage req.	3	≥ 2X minimum usage req.	4
Quantity of RCA / WCS	Credits Allocation										
≥ 0.5 times (0.5X) minimum usage requirement	1										
≥ 1X minimum usage req.	2										
≥ 1.5X minimum usage req.	3										
≥ 2X minimum usage req.	4										

<p><u>TS 3-3 Sustainable Products for Infrastructure and Public Amenities</u></p> <p>Promote use of environmentally friendly products that are certified under by approved local certification body and are applicable to infrastructure works and public amenities (including street furniture)</p> <p><i>Pre-requisite Requirement:</i></p> <p><i>Minimum score under this criterion:</i> <i>GreenRE Gold ≥2 credits</i> <i>GreenRE Platinum ≥3 credits</i></p>	<table border="1" data-bbox="943 283 1489 411"> <tr> <th colspan="3">Weightage based on the extent of environmental friendliness of products</th> </tr> <tr> <td>Good</td> <td>Very Good</td> <td>Excellent</td> </tr> <tr> <td>1</td> <td>1.5</td> <td>2</td> </tr> </table> <p>Credits scored based on the weightage and the extent of coverage and impact</p> <p>1 credit for high impact item 0.5 credit for low impact item</p> <p>[Total 5 credits]</p>	Weightage based on the extent of environmental friendliness of products			Good	Very Good	Excellent	1	1.5	2
Weightage based on the extent of environmental friendliness of products										
Good	Very Good	Excellent								
1	1.5	2								
<p><u>TS 3-4 Waste Reduction</u></p> <p>Minimise waste generation in a sustainable manner, covering all kinds of waste including domestic household waste (e.g. food waste), commercial waste (e.g. paper waste), construction waste, etc</p>	<p>1 credit for each item monitored and reduced (Up to 2 credits)</p> <p>[Total 2 credits]</p>									
<p><u>TS 3-5 Waste Management and Segregation</u></p> <p>Encourage waste recycling within township to reduce waste going to landfill. Promote proper disposal of waste and provide waste management infrastructures</p> <ul style="list-style-type: none"> (a) Provision of at least one recycling station at the township level dedicated to the separation, collection and storage of recyclable materials such as paper, glass, plastics and metals (b) Provision of at least one drop-off credit for potentially hazardous waste such as paints, solvents, batteries (c) Provision of litter receptacles with integrated recycle containers at public areas (including at public amenities) (d) Develop a community waste strategy and education programme e.g. promotional materials such as posters, circulars and provision of recycling bags to promote waste sorting, collecting and recycling of waste 	<p>1 credit for every item of requirement that is met</p> <p>[Total 4 Credits]</p>									
<p><u>TS 3-6 Waste Conveyance</u></p> <p>Reduce the negative impact on environment during waste conveyance, such as use of odourless pneumatic conveyance system, specific waste transport design to minimise the disturbance</p>	<p>1 credit for low impact applications 2 credits for high impact applications</p> <p>[Total 2 Credits]</p>									

<p><u>TS 3-7 Waste Reuse and Processing</u></p> <p>Encourage use of environmentally friendly waste processing system</p> <p>(a) Provision of local composting (kitchen and garden wastes) /chipping facilities within the boundary of the development and / or at strategic locations. Compost should be made available to local users (building occupiers, owners, residents, maintenance firms)</p> <p>(b) Use of organic waste for energy generation e.g. through bio-methanisation</p>	<p>Up to 2 credits*</p> <p>Up to 2 credits*</p> <p>*2 credits for high impact applications, 1 credit for low impact applications</p> <p>[Total 4 Credits]</p>
<p style="text-align: center;">PART 3 – WASTE EFFICIENCY</p> <p style="text-align: center;">CATEGORY SCORE :</p>	<p style="text-align: center;">Sum of Greenre Credits obtained from TS 3-1 to 3-5:</p> <p style="text-align: center;">27 Credits Maximum</p>

Part 4 – Environmental Planning	GreenRE Credits
<p><u>TS 4-1 Self-Sufficiency and Accessibility Within Township</u></p> <p>Ensure that a diverse range of facilities needed to meet daily needs are suitably incorporated in the masterplan and can be accessed suitably to minimise vehicle trips or distance travelled. Increase the accessibility to key facilities by ensuring that they are sited in accordance to the local planning guidelines</p> <p><i>[In the absence of local planning guidelines, the following standards/ catchment radius shall apply:</i></p> <ul style="list-style-type: none"> I. <i>Basic Retail (e.g. Hawker centres, local shops, markets) 400m</i> II. <i>Community & Leisure Facilities (e.g. 3G exercise facilities, hardcourts, swimming pools, children’s playground) 400m</i> III. <i>Health Facilities (Pharmacy / GP / Polyclinic, Dentist) 400m</i> IV. <i>Educational facilities (e.g. Primary Schools, Secondary Schools excluding tertiary institutions) 800m</i> V. <i>Communal facilities (e.g. Child care centres/ pre-schools/ kindergartens, elder care centres, community centre, Resident’s committee centre, public squares) 800m</i> VI. <i>Employment Centres (e.g. mixed rental Offices / Light industry) 800m</i> VII. <i>Residential areas (e.g. mixed income housing)</i> VIII. <i>Other supporting amenities (Post office, ATM, Postal box) 800m</i> IX. <i>Place of worship 1000m]</i> X. <i>Hotels (only for commercial townships)</i> 	<p>1 credit for each facility applicable to the masterplan and easy accessible by public transport</p> <p>(Up to 5 credits)</p> <p>[Total 5 credits]</p>
<p><u>TS 4-2 Green and Blue Spaces for the Public</u></p> <p>Provide sufficient green and blue spaces for residents and occupants</p> <ul style="list-style-type: none"> (a) Parks, green spaces or water body at least 800 m² within 400m walking distance (b) Interconnectivity of green / blue spaces for public and biodiversity (c) Adopt native plant strategies in landscape design - must demonstrate that >60 % of the trees and shrubs are native 	<p>1 credit for every item of requirement that is met</p> <p>[Total 3 Credits]</p>

<p><u>TS 4-3 Microclimate Optimisation</u></p> <p>Promote design optimisation, including site planning and building massing, for better micro-climate, such as use of natural planting and water body to optimise microclimate, through modelling and simulation, verifying by field measurements of major climate data before and after the development:</p> <ul style="list-style-type: none"> (a) Solar analysis (sun path OR solar insolation simulation) (b) Ambient temperature simulation 	<p>1 credit each for design optimisation</p> <p>1 credit each for field measurement</p> <p>[Total 4 Credits]</p>
<p><u>TS 4-4 Outdoor Thermal Environment</u></p> <p>Encourage to use any combination of following strategies to improve the outdoor thermal comfort and reduce heat island effect</p> <ul style="list-style-type: none"> (a) Design and simulate to enable air flow through the development (CFD analysis or wind tunnel testing) (b) Use of building vegetation, vegetated walls and green roofs (minimum 20% of the plot area) (c) Street sidewalks/ pedestrian walkways shaded over 40% (d) Provide shade for open structures such as covered walkways, vine pergolas > 50% (e) Use of permeable paving materials with Solar Reflectance Index (SRI) > 29 (Gravel and wood chippings also encouraged to hardscape areas) (f) Open grid pavement system (at least 50% pervious) for pedestrian paths at green spaces > 40% (g) Provide shading for open air carparks > 50% (h) Avoid building heat exhaust to pedestrian walkways - Exhausts if fronting the public realm must be >5m above pedestrian walkways (i) Any other suitable strategy 	<p>2 credits for (a)</p> <p>1 credit each for (b) to (i)</p> <p>(up to 6 credits)</p>

<p><u>TS 4-5 Site selection</u></p> <p>(a) Avoid use of land with high agricultural or ecological value</p> <p>(b) Use of brownfield sites or reclaimed land, reducing the use of greenfield sites</p> <p>(c) Proper remediation measures carried out on contaminated land to restore the land for use</p> <p>(d) Flood risk assessment – demonstrate that the buildings are located in an area of low probability of flooding OR the development is appropriately flood resilient and resistant including safe access and escape routes</p> <p><i>Notes:</i> 1) <i>There must be no vulnerable building uses in the flood plain area such as emergency dispersal depots (police, fire, ambulance), or installations holding, using or containing hazardous substances.</i></p> <p>2) <i>Infrastructure and services planning for overall platform levels, roads, drainage and sewerage must be demonstrated.</i></p>	<p>1 credit for (a)</p> <p>For (b) Area of site which is previously built-on: 100% - 1 credit 50% - 0.5 credit</p> <p>1 credit for (c)</p> <p>2 credits if 100% of buildings are in an area of low probability of flooding / non-flood plain, OR demonstrates flood mitigation and escape routes 1 credits for 75% of buildings 0.5 credit for 50% of buildings</p> <p>[Total 5 Credits]</p>
<p><u>TS 4-6 Conservation an Integration of Existing Structures and Assets</u></p> <p>Conservation, preservation or restoration of historic remains, or buildings, or natural spaces or views that characterise and have local or community importance</p> <p><i>Note: Gazetted buildings will not be included.</i></p>	<p>1 credit</p> <p>[Total 1 Credit]</p>
<p><u>TS 4-7 Habitat Conservation & Restoration</u></p> <p>Determine the ecological value of the habitats in and around the site in order to conserve and enhance the biodiversity and prevent deforestation</p> <p>(a) Conduct an Environmental Impact Assessment or Biodiversity Impact Assessment to identify habitats, migration routes and potential damage from the development, including justification of developmental benefits versus the potential ecological losses and mitigation measures</p> <p>(b) Species protection plan or plans to increase the local species diversity</p> <p>(c) Prevent the loss of greenery in the township: Greenery area to be calculated on plan before and after project construction.</p>	<p>2 credits for (a)</p> <p>1 credit for (b)</p> <p>Part (c) No change – 1 credit 5% GnP improvement 2 credits 10% GnP improvement 4 credits</p> <p>[Total 7 Credits]</p>

<p><u>TS 4-8 Minimise Site Disturbance</u></p> <p>Minimise negative impact on the site environment by constraining construction activities.</p> <p>Reduce site clearance and deforestation by conserving at least 20% of the mature trees (Transplanting may be considered)</p>	<p>2 credits</p> <p>[Total 2 Credits]</p>
<p><u>TS 4-9 Environmental Management System</u></p> <p>Encourage the planning, design and management integration to adopt an environmental friendly management system and practices during development</p> <p>(a) Conduct site analysis and assessment before township development</p> <p>(b) Developer, masterplanner, and major contractor that are ISO 14000 certified</p> <p>(c) Project team comprises one Certified GreenRE Manager (GRM) or one Certified GreenRE Professional (GRP)</p> <p>(d) Environmental policy with measurable targets & programmes with management review and corrective action records</p>	<p>1 credit</p> <p>0.5 credit for each party (up to 1.5 credits)</p> <p>0.5 credit for GRM 1 credit for GRP (up to 1.5 credits)</p> <p>1 credit</p> <p>[Total 5 Credits]</p>
<p><u>TS 4-10 Future Provision and Connections</u></p> <p>To actively encourage the future adaptability and flexibility of the site, including expansion suitable design features have been specified to allow for future installation including:</p> <p>(a) Utilities expansion and distribution upgrades (Gas, electricity, water, cooling)</p> <p>(b) Transport and infrastructure expansion plans</p> <p>(c) Others</p>	<p>1 credit for showing potential of expansion for utilities expansion and distribution.</p> <p>1 credit for demonstration that other elements have been considered.</p> <p>[Total 2 Credits]</p>
<p>PART 4 – ENVIRONMENTAL PROTECTION</p> <p>CATEGORY SCORE :</p>	<p>Sum of Greenre Credits obtained from TS 4-1 to 4-10:</p> <p>42 Credits Maximum</p>

Part 5 – Green Buildings and Green Transport	GreenRE Credits																									
<p>TS 5-1 Green Buildings Within Township</p> <p>Encourage the adoption of green building practices in building design, construction and retrofitting within the township (includes buildings assessed under GreenRE for New Developments and GreenRE for Existing Buildings)</p> <p><u>Pre-requisite Requirement:</u> <i>At least one building (GFA > 5,000 m2) at Phase 1 to achieve the corresponding GreenRE rating.</i></p> <table border="1" data-bbox="207 541 914 751"> <thead> <tr> <th>GreenRE Township Rating</th> <th>Minimum one GreenRE rated building (GFA > 5,000m²) at Phase 1</th> </tr> </thead> <tbody> <tr> <td>GreenRE Bronze</td> <td>Nil</td> </tr> <tr> <td>GreenRE Silver</td> <td>GreenRE Silver</td> </tr> <tr> <td>GreenRE Gold</td> <td>GreenRE Gold</td> </tr> <tr> <td>GreenRE Platinum</td> <td>GreenRE Platinum</td> </tr> </tbody> </table>	GreenRE Township Rating	Minimum one GreenRE rated building (GFA > 5,000m ²) at Phase 1	GreenRE Bronze	Nil	GreenRE Silver	GreenRE Silver	GreenRE Gold	GreenRE Gold	GreenRE Platinum	GreenRE Platinum	<p style="text-align: center;">GreenRE Building Credits (GRBc)</p> <table border="1" data-bbox="946 300 1487 699"> <thead> <tr> <th>GRB Award Level</th> <th>Weightage</th> <th>GRBC = Weightage*GFA percentage %</th> </tr> </thead> <tbody> <tr> <td>Platinum</td> <td>0.20</td> <td>C1 = 0.20* % GFA of GreenRE Platinum buildings</td> </tr> <tr> <td>Gold</td> <td>0.15</td> <td>C2 = 0.15* % GFA of GreenRE Gold buildings</td> </tr> <tr> <td>Silver</td> <td>0.10</td> <td>C3 = 0.10* % GFA of GreenRE Silver buildings</td> </tr> <tr> <td>Total</td> <td colspan="2">GRBP = C1 + C2 + C3</td> </tr> </tbody> </table> <p style="text-align: center;">[Total 20 credits]</p>	GRB Award Level	Weightage	GRBC = Weightage*GFA percentage %	Platinum	0.20	C1 = 0.20* % GFA of GreenRE Platinum buildings	Gold	0.15	C2 = 0.15* % GFA of GreenRE Gold buildings	Silver	0.10	C3 = 0.10* % GFA of GreenRE Silver buildings	Total	GRBP = C1 + C2 + C3	
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<p><u>TS 5-2 Green Urban Design Guidelines</u></p> <p>Formulation of green urban design guidelines to ensure that key green features at the township level are carried through to development at the individual parcel level</p> <ul style="list-style-type: none"> (a) For all land parcels in the township (b) For all land parcels to be sold to other sub-developers (c) For strategic land parcels to be sold to other sub-developers 	<p style="text-align: right;">4 credits</p> <p style="text-align: right;">2 credits</p> <p style="text-align: right;">1 credit</p> <p style="text-align: right;">[Total 4 Credits]</p>																									
<p><u>TS 5-3 Green Transport Within Township</u></p> <p><u>General:</u></p> <ul style="list-style-type: none"> (a) Conduct Traffic Modelling for the township to assess and make improvements to the township master plan (b) Compact and walkable township pattern for master plan; major building entrances with good access to nearest LRT or bus stops in accordance to local planning guidelines or within a 500m walking distance, with sheltered and connected linkage. <p><u>Public Transport:</u></p> <ul style="list-style-type: none"> (c) Transit options connecting outwards from the main LRT nodes (d) Provide dedicated shuttle services and facilities to mass transit 	<p style="text-align: right;">2 credits for (a)</p> <p style="text-align: right;">Part (b) will be assessed at Masterplan level to determine the overall efficiency of the township, up to 2 credits.</p> <p style="text-align: right;">1 Credit for each Item (c) to (k) (Up to 7 Credits)</p> <p style="text-align: right;">[Total 11 Credits]</p>																									

<p><u>Bicycle:</u> Promote cycling as a real alternative to cars for shorter journeys</p> <ul style="list-style-type: none"> (e) Network of bicycle lanes and routes that are safe, well lit and segregated with direct links to key areas and routes (f) Provision for secure and sheltered bicycle facilities to public amenities <p><u>Car Parking:</u></p> <ul style="list-style-type: none"> (g) Reduce carpark footprint by employing underground or multi-storey carpark etc. (h) > 10% of open air parking spaces can be designated for flexible use when not being used for parking, e.g. market stalls, play areas (i) Provide hybrid / electric vehicle refuelling / recharge stations <p><u>Pedestrian:</u></p> <ul style="list-style-type: none"> (j) Universal design features (barrier-free accessibility) to improve the accessibility for the physically challenged (k) Way finding strategies 	
<p>PART 5 – GREEN BUILDINGS AND GREEN TRANSPORT</p> <p style="text-align: right;">CATEGORY SCORE :</p>	<p>Sum of Greenre Credits obtained from TS 5-1 to 5-3:</p> <p style="text-align: center;">36 Credits Maximum</p>

Part 6 – Community and Innovation	GreenRE Credits
<p><u>TS 6-1 Stakeholder Engagement, Feedback and Evaluation</u></p> <p>(a) Conduct residents/ building occupants’ satisfaction survey or engage in public consultation exercise to solicit feedback to enhance the quality of the living environment in common facilities / public amenities. Alternatively, provide effective feedback channels (e.g. hotlines, emails, etc) for residents to take ownership of the township</p> <p>(i) At Design Phase (ii) During construction / Post completion</p> <p>(b) Public consultation / feedback sessions to include the following key stakeholders:</p> <ul style="list-style-type: none"> • Public sector / government agencies • Community / residents committee • NGOs • Professional bodies • Trade unions <p>(c) Provide a proper evaluation of the feedback / survey</p> <p>(d) Release of findings and feedback received from the public consultation exercise or residents/ building occupants survey, including the list of follow-up actions taken</p>	<p>(a) 1 credit for consultation with stakeholders during construction / post completion (based on extent of consultation and community involvement)</p> <p>(b) 1 credit for consultation of at least two key stakeholder group</p> <p>(c) 1 credit for providing proper evaluation of feedback/ survey findings</p> <p>(d) 1 credit for release of findings and feedback received. Additional 2 credits for addressing follow-up actions</p> <p style="text-align: center;">[Total 6 Credits]</p>
<p><u>TS 6-2 Public Awareness, Education and Community Involvement</u></p> <p>To encourage and promote sustainable lifestyle and integration within the township through the production of a dedicated outreach or education programme to increase public awareness on environmental sustainability and green features of the township</p> <p>(a) User guide brochures, information portals and facilities (such as visitor centres and exhibits) should be provided where appropriate to facilitate public awareness and education. These areas may include:</p> <ul style="list-style-type: none"> • Online energy efficiency and energy tracker • Refuse collection • Recycling facilities • Water conservation and usage • Environmental technologies and info • Local transport information • Local amenities and local information • Community groups and activities • Religious building locations • Biodiversity of the area 	<p>Up to 2 credits can be scored based on extent of outreach or education programmes and contents.</p>

<p>(b) Encourage residents/ building occupants to participate in green activities</p>	<p>2 credits for at least 1 activity per year</p> <p>Additional 1 credit for each additional green activity organised per year (Up to 3 credits)</p> <p>[Total 7 Credits]</p>
<p><u>TS 6-3 Green Lease</u></p> <p>Master developer to encourage green lease as an alternative to regular economic rental models within the township.</p>	<p>2 credits</p> <p>[Total 2 Credits]</p>
<p><u>TS 6-4 Intelligent Infrastructure</u></p> <p>(a) Provide easy access to high speed communications infrastructure (digital, fibre optic, etc) and provisions to allow for future growth and maintenance</p> <p>(b) Provision of public access to intelligent transport information, including transit routes and schedules, carparking lot availability, amenities nearby, etc. so as to reduce the transport demand</p>	<p>2 credits</p> <p>1 credit</p> <p>[Total 3 Credits]</p>
<p><u>TS 6-5 Safe Environment</u></p> <p>Design for good natural surveillance of public spaces</p>	<p>1 credit</p> <p>[Total 1 Credit]</p>
<p><u>TS 6-6 Light Pollution Reduction</u></p> <p>Minimise light trespass from site, only light areas as required for safety and comfort</p>	<p>2 credits</p> <p>[Total 2 Credits]</p>
<p><u>TS 6-7 Other Green Features and Innovation</u></p> <p>Encourage the use of other green features which are innovative and have positive environmental Impact</p> <p>Examples:</p> <ul style="list-style-type: none"> • Dedicated bus and tram lanes on public roads • Car-free township • Use of pre-cast / pre-fabricated construction materials for infrastructure and public amenities • Common services tunnel • Adoption of local labour to ensure economic sustainability 	<p>2 credits for each high impact item 1 credit for each low impact item</p> <p>(Up to 5 credits)</p> <p>[Total 5 Credits]</p>
<p style="text-align: center;">PART 6 – COMMUNITY AND INNOVATION</p> <p style="text-align: right;">CATEGORY SCORE :</p>	<p>Sum of Greenre Credits obtained from TS 6-1 to 6-7:</p> <p style="text-align: center;">26 Credits Maximum</p>

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