

APPENDIX 2

LANDSCAPE REPLACEMENT REQUIREMENTS FOR NON-LANDED PRIVATE RESIDENTIAL AND COMMERCIAL/MIXED-USE/HOTEL DEVELOPMENTS OUTSIDE STRATEGIC AREAS

No.	Parameter	Details																																																																																																																						
1	Definition	Landscape Replacement Areas (LRAs) for developments outside Strategic Areas comprise horizontal landscaped areas (softscape only) provided on the first storey or upper levels of the development, and vertical greenery.																																																																																																																						
2	Green Plot Ratio (GnPR)	<p>GnPR is computed using the following formula:</p> $\text{GnPR} = \frac{\text{Total leaf area of greenery counted as Landscape Replacement (softscape)}}{\text{Total site area of development}}$ <p>All Leaf Area from softscape areas within the development can be counted towards the GnPR computation.</p> <p>Total Leaf Area is computed based on the Leaf Area Index for each species, canopy area (for trees and palms) and the quantity planted. The plant species sub-categories and LAI values can be obtained online from NParks' Flora Fauna Web (http://florafauweb.nparks.gov.sg) by searching the common or scientific names of plants.</p> <p>Table 1 provides a template for computing the overall development GnPR. This table should be filled in and submitted together with the landscape plans.</p> <p align="center">Table 1: Green Plot Ratio computation template</p> <table border="1"> <thead> <tr> <th colspan="7">DECLARATION OF GREEN PLOT RATIO</th> </tr> <tr> <th rowspan="2">Category</th> <th rowspan="2">Unit</th> <th rowspan="2">Sub category</th> <th>LAI Value</th> <th>Canopy Area/m²</th> <th>Qty/Planted area</th> <th>LEAF Area</th> </tr> <tr> <th>(A)</th> <th>(B)</th> <th>(C)</th> <th>(A)x(B)x(C)</th> </tr> </thead> <tbody> <tr> <td rowspan="4">Trees</td> <td>no</td> <td>Open Canopy</td> <td>2.5</td> <td>60</td> <td>No.</td> <td></td> </tr> <tr> <td>no</td> <td>Intermediate Canopy</td> <td>3.0</td> <td>60</td> <td>No.</td> <td></td> </tr> <tr> <td>no</td> <td>Dense Canopy</td> <td>4.0</td> <td>60</td> <td>No.</td> <td></td> </tr> <tr> <td>no</td> <td>Intermediate columnar canopy</td> <td>3.0</td> <td>12</td> <td>No.</td> <td></td> </tr> <tr> <td>Trees</td> <td>m²</td> <td>Planted at ≤ 2.0m trunk to trunk</td> <td>(as above)</td> <td>NA</td> <td>m²</td> <td></td> </tr> <tr> <td rowspan="2">Palms</td> <td>no</td> <td>Solitary</td> <td>2.5</td> <td>20</td> <td>No.</td> <td></td> </tr> <tr> <td>no</td> <td>Cluster</td> <td>4.0</td> <td>17</td> <td>No.</td> <td></td> </tr> <tr> <td>Palms</td> <td>m²</td> <td>Solitary(trunk to trunk ≤2m)</td> <td>2.5</td> <td>NA</td> <td>m²</td> <td></td> </tr> <tr> <td rowspan="2">Shrubs</td> <td>m²</td> <td>Monocot</td> <td>3.5</td> <td>NA</td> <td>m²</td> <td></td> </tr> <tr> <td>m²</td> <td>Dicot</td> <td>4.5</td> <td>NA</td> <td>m²</td> <td></td> </tr> <tr> <td>Turf</td> <td>m²</td> <td>Turf</td> <td>2.0</td> <td>NA</td> <td>m²</td> <td></td> </tr> <tr> <td>Vertical greenery</td> <td>m²</td> <td></td> <td>2.0</td> <td>NA</td> <td>m²</td> <td></td> </tr> <tr> <td colspan="6" style="text-align: right;">(X) Total Leaf Area(m²)</td> <td></td> </tr> <tr> <td colspan="6" style="text-align: right;">(Y) Site Area</td> <td></td> </tr> <tr> <td colspan="6" style="text-align: right;">(X / Y) Green Plot Ratio</td> <td></td> </tr> </tbody> </table>	DECLARATION OF GREEN PLOT RATIO							Category	Unit	Sub category	LAI Value	Canopy Area/m ²	Qty/Planted area	LEAF Area	(A)	(B)	(C)	(A)x(B)x(C)	Trees	no	Open Canopy	2.5	60	No.		no	Intermediate Canopy	3.0	60	No.		no	Dense Canopy	4.0	60	No.		no	Intermediate columnar canopy	3.0	12	No.		Trees	m ²	Planted at ≤ 2.0m trunk to trunk	(as above)	NA	m ²		Palms	no	Solitary	2.5	20	No.		no	Cluster	4.0	17	No.		Palms	m ²	Solitary(trunk to trunk ≤2m)	2.5	NA	m ²		Shrubs	m ²	Monocot	3.5	NA	m ²		m ²	Dicot	4.5	NA	m ²		Turf	m ²	Turf	2.0	NA	m ²		Vertical greenery	m ²		2.0	NA	m ²		(X) Total Leaf Area(m ²)							(Y) Site Area							(X / Y) Green Plot Ratio						
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3	Computation requirements	<p>Developments are required to provide LRAs in accordance to the GPR and development type. LRAs provided must also meet the minimum Green Plot Ratio standards. Details are shown in the tables below:</p> <p>Table 2: Non-Landed Private Residential Developments</p> <table border="1"> <thead> <tr> <th></th> <th>GPR ≤ 1.4</th> <th>1.4 < GPR < 2.8</th> <th>GPR ≥ 2.8</th> </tr> </thead> <tbody> <tr> <td>Minimum overall greenery provision (as % of site area)</td> <td>30</td> <td>35</td> <td>40</td> </tr> <tr> <td>Sub-control on minimum on-ground greenery provision (as % of site area)</td> <td>20</td> <td>30</td> <td>35</td> </tr> <tr> <td>Minimum Green Plot Ratio (total leaf area divided by Site Area)</td> <td>3</td> <td>3.5</td> <td>4</td> </tr> </tbody> </table> <p>Table 3: Commercial/Mixed-Use/Hotel Developments</p> <table border="1"> <thead> <tr> <th></th> <th>GPR ≤ 1.4</th> <th>1.4 < GPR < 2.8</th> <th>GPR ≥ 2.8</th> </tr> </thead> <tbody> <tr> <td>Minimum overall greenery provision (as % of site area)</td> <td>30</td> <td>35</td> <td>40</td> </tr> <tr> <td>Minimum Green Plot Ratio (total leaf area divided by Site Area)</td> <td>3</td> <td>3.5</td> <td>4</td> </tr> </tbody> </table> <p>The computation of the LRAs is determined by:</p> <ul style="list-style-type: none"> • Horizontal surface area of the softscape (i.e. permanent planting areas, including extensive green roofs) • Vertical surface area of green walls (if any). <p>Horizontal landscaped areas computed as part of the LRAs within developments should be:</p> <p>a) Unenclosed and exposed to the sky; or</p>		GPR ≤ 1.4	1.4 < GPR < 2.8	GPR ≥ 2.8	Minimum overall greenery provision (as % of site area)	30	35	40	Sub-control on minimum on-ground greenery provision (as % of site area)	20	30	35	Minimum Green Plot Ratio (total leaf area divided by Site Area)	3	3.5	4		GPR ≤ 1.4	1.4 < GPR < 2.8	GPR ≥ 2.8	Minimum overall greenery provision (as % of site area)	30	35	40	Minimum Green Plot Ratio (total leaf area divided by Site Area)	3	3.5	4
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		<p>b) If covered, to be open sided, naturally ventilated and qualify for GFA exemption under the LUSH guidelines for Communal Planter Boxes, Sky Terraces and Covered Communal Ground Gardens.</p> <p>As a guide, vertical greenery and/or extensive green roofs can make up to 10% of the overall Landscape Replacement requirements (as a percentage of site area). Requests to use vertical greenery and/or extensive green roofs for more than 10% of the Landscape Replacement requirements can be considered based on the merits of the proposal.</p> <p>For <u>non-landed private residential developments</u>, developers must meet the minimum ground greening requirement before providing vertical greenery/extensive green roofs as landscape replacement.</p>
4	Performance requirements	<p>All LRAs should meet the following performance requirements:</p> <ul style="list-style-type: none"> • Designed with safety in mind (e.g. consider wind/structural loading issues associated with upper storey landscape areas) and easily maintained (e.g. with irrigation and maintenance systems); and • Well-designed, lushly-landscaped and integrated with the overall form and architectural treatment of the building. <p>Vertical greenery should be publicly visible, e.g. placed at external building façade fronting key pedestrian thoroughfares and/or main roads, and at major public spaces, plazas and main entrance areas. URA may impose additional urban design requirements for vertical greenery for sites in Urban Design areas e.g. Central Area and Key Growth areas.</p> <p>Extensive green roofs should be of a substantial size and have sufficient density of planting, to contribute to green cover and support biodiversity. Such roofs need not be made accessible to the public and/or building users but maintenance access is to be provided for such roofs. Please note that horizontal trellis-based greenery will not qualify as green roofs.</p> <p>Other than the extensive green roofs, the public and/or building users should be able to access all communal landscape areas easily during the normal opening hours of the development¹.</p>

¹ For example, the communal landscaped areas in a shopping mall should be open and accessible to the public during the mall's normal operating hours. Similarly, the communal landscaped areas in an office development should be accessible to the larger office community and not limited to users of one specific office premises.

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5	Softscape requirements	<p>Planting should be incorporated on permanent and sunken planting beds to enhance the spatial and visual quality of the green spaces. The sunken planting beds should have sufficient soil depth to accommodate plants and landscaping.* Plantings should be appropriately spaced to accommodate growth.</p> <p>Requirements for the horizontal softscape areas:</p> <ul style="list-style-type: none"> • As a guide, a minimum soil depth of 1000mm should be provided for trees and palms, 500mm for shrubs and climbers, and 300mm for ground covers; • A combination of trees, palms, shrubs, ground covers and creepers is required. • Potted plants will not be counted as part of the softscape area as they can be easily removed. <p><i>*As an alternative to providing sunken planting beds, building owners can provide well-landscaped, lowraised planting beds at 300mm high, planted with trees or shrubs (i.e. no turfing allowed). This facilitates compliance with FSSD's fire safety requirements on habitable space.</i></p>
6	Areas to be excluded from Landscape Replacement Areas	<p>The following areas will not be considered as part of the required LRAs:</p> <ul style="list-style-type: none"> • All service facilities, e.g. vehicular drop-offs and drive ways, vehicular ramps, surface car parks, top of M&E or lift core, and BMU tracks, etc; • Vehicular driveway greenery; • Outdoor Refreshment Areas (ORAs); • Key circulation for the building, e.g. access stairs, ramps, and covered walkway, etc.
7	Planting references and landscaping design	<p>To ensure appropriate plant selection and placement, designers are strongly encouraged to decide on planting and landscape design in consultation with an Accredited Landscape Architect or Certified Practising Horticulturalist.</p> <p>The suitability of the vertical greenery and extensive green roof system used (e.g. in terms of weight, growing media, availability of light, resilience to weather elements) should also be taken into consideration.**</p>

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		<p>Please refer to the following publications for more detailed planting references:</p> <ul style="list-style-type: none"> a) 1001 Garden plants in Singapore (2nd edition)(2006), NParks b) CS E09:2012 - Guidelines on planting of trees, palms and tall shrubs on rooftop (2012), NParks c) A Selection of Plants for Green Roofs in Singapore 2nd Edition (2008), NParks d) Trees of our Garden City, 2nd edition (2009), NParks e) Concise Guides to Safe Practices on Rooftop Greenery and Vertical greenery (2013), NParks f) CS E12:2016 - Design Guides To Promote Biodiversity On Roof Gardens (2017), NParks(<i>for biodiversity-friendly inaccessible green roofs</i>) <p><i>**For vertical green proposing support systems, planter boxes of minimum 500mm depth are encouraged to be provided at every storey for dense plant growth.</i></p>
8	Exemption	<p>The URA will exercise flexibility on the above requirements when evaluating individual developments affected by specific constraints (e.g. developments with conserved buildings, party wall developments, developments subject to specific urban design requirements, and developments with storey height constraint of 4-storeys and below). In addition, conserved buildings in historic districts will be exempted from the above requirements.</p>
9	Maintenance and safety	<p>Building owners should retain the required LRAs.</p> <p>Consideration should be given to the choice of plant species, relative to the level of sunlight and maintenance required. Irrigation and maintenance systems should be well designed upfront to ensure the safety of the maintenance personnel, and to allow for easy maintenance.</p> <p>Please refer to the following for more information :</p> <ul style="list-style-type: none"> • Concise Guides to Safe Practices on Rooftop Greenery and Vertical greenery (2013), NParks • CS E11:2014 - Guidelines on Design for Safety of Skyrise Greenery (2014), NParks • CS E07 : 2012 - Guidelines on General Maintenance for Rooftop Greenery (2012) <p>Building owners should consider adopting water efficient strategies in their design. Please refer to PUB's Best Practice Guide in Water Efficiency for Buildings for more information.</p>

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10	Ownership	The LRAs will form part of the common property for strata subdivided developments. LRAs for hotels within mixed-use developments, however, may be attributed to the hotel strata should they be contiguous to other hotel uses and be adequately segregated from other uses.
11	Alterations to the required Landscape Replacement Areas	<p>URA's approval is required if there is a reduction in the softscape areas (e.g. planting and structure of the planting beds).</p> <p>URA's approval is not required for changes to the planting species as long as the softscape area and GnPR requirements are complied with.</p>
12	Submission requirements	<ul style="list-style-type: none"> • Declaration of the overall Landscape Replacement Areas and Green Plot Ratio for the entire development • Overall Green Plot Ratio computation • Landscape Plans showing proposed planting palette, as well as the layout of planting species at landscape areas, green walls and extensive green roofs. For vertical greenery/ extensive green roofs, the plans should show the proposed system • Annotations in the landscape plans to show the proposed planting species • Sections showing the depth of all the proposed planting beds/vertical greenery for Landscape Replacement Areas • Annotation of the 45-degree line, where relevant • Relevant perspectives showing the proposed plant species, as-built outcome and spatial quality • Short statement on the proposed maintenance and irrigation methods for the planting. <p>See Appendix 2-1 for example of landscape plan and information required.</p>

