

# LOTUS New Construction V3

Summary of changes from NR V2.0 and MFR Pilot  
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## 1. Introduction

LOTUS New Construction (LOTUS NC) is a new LOTUS Rating System built by merging LOTUS Non-Residential (LOTUS NR) and LOTUS Multi-family Residential (LOTUS MFR) in one single system.

LOTUS NC applies to all types of new building constructions and major building refurbishments at the exception of single-family houses and buildings with a Gross Floor Area (GFA) lower than 2,500 m<sup>2</sup>.

LOTUS NC V3 is superseding both LOTUS NR V2.0 (released in June 2015) and LOTUS MFR Pilot (released in October 2015).

Not only LOTUS NC V3 is the result of merging LOTUS NR and LOTUS MFR, but also many changes have been brought to improve the system:

- the number of prerequisites has been reduced to keep only the most relevant prerequisites
- credits have been reorganized in new categories (e.g. Materials & Resources and Site & Environment)
- special project situations (core & shell, mixed-use, etc.) are now considered
- updates following new standards, codes and regulations have been made (e.g. compliance with QCVN 09:2017/BXD)
- new credits have been added (e.g. credit H-3 Biophilic Design), while some credits have been removed (e.g. Man-5 Green Management)
- new strategies have been added to credits (e.g. Strategy C: Cooling Tower Water Efficiency in credit W-4 Sustainable Water Solutions)
- requirements of some credits have been refined (e.g. thresholds in credit MR-3 Non-baked materials have been increased to 80% and 100% for 1 and 2 points)
- some mistakes have been fixed (e.g. Figure H.2 and Table H.4 of credit H-5 External Views have been revised)
- explanations have been clarified where needed (e.g. clearer definition of quality views in credit H-5 External Views)

Though most changes impact both LOTUS NR V2.0 and LOTUS MFR Pilot at the same time (as they were relatively similar systems), the list of changes presented in the following sections separates changes from NR V2.0 and changes from MFR Pilot for more clarity.

## 2. List of changes from LOTUS NR V2.0

Changes brought from the LOTUS Non-Residential V2.0 Technical Manual are listed in the following tables.

### 2.1 General changes

Item	Modifications
Eligibility	Core & Shell projects are eligible for assessment under LOTUS NC.
Residential and Non-Residential projects	This new section describes which types of project are considered Residential and which types are considered as Non-Residential (NR). Though LOTUS NC can apply for both Residential and NR projects, not the same requirements are set in all the credits.
Categories	<ul style="list-style-type: none"> <li>▪ The credits have been reorganized in 7 categories instead of 10 in LOTUS NR V2.0, with the following new categories:               <ul style="list-style-type: none"> <li>- Materials &amp; Resources: Materials + credits: Demolition and Construction Waste and Operation Waste Management</li> <li>- Site &amp; Environment: Ecology + Adaptation &amp; Mitigation + Community + credits: Refrigerants and Light Pollution Minimization</li> </ul> </li> <li>▪ The Innovation category has been renamed Exceptional Performance.</li> </ul>
Prerequisites	<ul style="list-style-type: none"> <li>▪ A large number of prerequisites have been removed               <ul style="list-style-type: none"> <li>- WP-PR-1, Man-PR-2: regulations are well enforced, and new construction projects will comply with the requirements that were included in these prerequisites.</li> <li>- Eco-PR-1, A-PR-1: these prerequisites required time and effort from project team for no real green benefit beyond making reports/documentation</li> <li>- A-PR-2, WP-PR-3, Man-PR-1: requirements that were included in these prerequisites are now considered in credits for points.</li> </ul> </li> <li>▪ A new prerequisite has been added: H-PR-2 Low-Emission Products requiring projects to install only low-VOC paints and coatings.</li> </ul>
Removed Credits	<p>The following credits have been removed from LOTUS NR V2.0:</p> <ul style="list-style-type: none"> <li>▪ M-1 Materials Reuse</li> <li>▪ M-2 Materials with Recycled Content</li> <li>▪ M-4 Sustainable Timber and Rapidly Renewable Materials</li> <li>▪ Eco-1 Construction Environmental Management Plan</li> <li>▪ Eco-2 Habitat Restoration</li> <li>▪ Eco-4 Green Roof</li> <li>▪ A-5 Local Materials</li> <li>▪ CY-3 Access for People with Disabilities</li> <li>▪ Man-5 Green Management</li> </ul>

New Credits	<p>The following credits have been added in LOTUS V3 NC:</p> <ul style="list-style-type: none"> <li>▪ E-1 Passive Design</li> <li>▪ MR-1 Reduced Concrete Use</li> <li>▪ MR-2 Sustainable Materials</li> <li>▪ H-3 Biophilic Design</li> <li>▪ H-7 Acoustic Comfort</li> <li>▪ SE-3 Vegetation</li> <li>▪ SE-7 Construction Activity Pollution Control</li> <li>▪ Man-1 Effective Design Process</li> <li>▪ Man-5 Green Awareness</li> </ul>
Weighting	<p>The total number of point available in LOTUS V3 NC is of 100 points + 8 bonus points for Innovation whereas this total was of 110 points + 8 bonus points for Innovation in LOTUS NR V2.0.</p>
Codes and Standards Referenced in LOTUS	<p>The list of codes and standards has been updated.</p>
Special project situations	<p>This new section has been added to describe specific requirements for special project situations:</p> <ul style="list-style-type: none"> <li>▪ Core &amp; Shell projects</li> <li>▪ Mixed-Use Residential/NR buildings</li> <li>▪ Design-Build projects</li> <li>▪ Projects with incomplete spaces</li> <li>▪ Project sites with multiple buildings</li> </ul>

## 2.2 Changes in the certification process

Section	Modifications
LOTUS NC Certification Process	LOTUS Full Certification is now valid for 5 years provided that energy and water consumption data is submitted on a yearly basis.
LOTUS Provisional Certification Stage	<p>At Provisional Certification stage, the following credits are not available as it is not possible for projects to provide satisfying evidence of compliance in the design stage:</p> <ul style="list-style-type: none"> <li>• MR-2 Sustainable Materials</li> <li>• MR-4 Demolition and Construction Waste</li> <li>• Man-3 Commissioning (for strategies to ensure a proper handover to the building users and to conduct commissioning activities during the operations of the building)</li> <li>• Man-4 Maintenance</li> <li>• Man-5 Green Awareness</li> </ul> <p>As such, projects only need to achieve a total of 35 points to obtain Provisional Certification.</p>
Provisional Certificate	<p>This section has been clarified to explain that:</p> <ul style="list-style-type: none"> <li>▪ No certification level is awarded to projects at Provisional Certification stage, only an indication that the project is on-track to achieve an anticipated level of certification at Full Certification stage is given.</li> <li>▪ A Provisional Certificate can be issued by the VGBC on demand by the Applicant.</li> </ul>
Appeal Procedure	A description of the appeal procedure available for projects to submit further evidence after the 2 rounds of submissions have been included.
Site inspections	Site inspections may now be conducted on projects in complement of the Full Certification submissions.
LOTUS NC Submissions	The whole section has been re-written to improve clarity.

## 2.3 Changes in categories

	Prerequisite or Credit removed from LOTUS NC
	New credit created for LOTUS NC
	Prerequisite or Credit moved to a new category

## Energy

NR V2.0 Credit/PR	V3 NC Credit/PR	Description of the changes
E-PR-1 Passive Design	E-PR-2 Passive Design	<ul style="list-style-type: none"> <li>No changes.</li> </ul>
E-PR-2 Total Building Energy Use	E-PR-1 Minimum Energy Efficiency Performance	<ul style="list-style-type: none"> <li>This is now a stand-alone prerequisite renamed “Minimum Energy Efficiency Performance”</li> <li>Requirements: Two changes have been made in line with QCVN 09:2017/BXD:               <ul style="list-style-type: none"> <li>Sub-metering is not required anymore</li> <li>Requirements on SHGC values are set for both vertical glazing and skylights</li> </ul> </li> <li>Project types not included in the scope of QCVN 09:2017/BXD (such as: factories, cultural buildings, sports centers, etc.), do not need to comply with requirements on LPD values.</li> </ul>
/	E-1 Passive Design (1 point)	<ul style="list-style-type: none"> <li>New credit awarding one point for conducting a Passive Design Analysis that includes thermal and daylight simulations at early design stage</li> </ul>
E-PR-3 & E-1 Total Building Energy Use (PR + 14 points)	E-PR-3 & E-2 Total Building Energy Use (PR + 14 points)	<ul style="list-style-type: none"> <li>LOTUS Guidelines – Energy Performance Calculation Method have been updated in line with QCVN 09:2017/BXD</li> </ul>
E-2 Building Envelope (4 points)	E-3 Building Envelope (3 points)	<ul style="list-style-type: none"> <li>The number of points available has been reduced from 4 points down to 3 points.</li> <li>In Option A, points are now awarded for every 15% reduction of building’s average OTTV compared to QCVN 09:2017/BXD requirements</li> <li>Requirements in Option B have been split in 4 strategies for more clarity:               <ul style="list-style-type: none"> <li>Strategy B1: Solar radiation</li> <li>Strategy B2: West facing façade</li> <li>Strategy B3: WWR on West and East facing facades</li> <li>Strategy B4: Effective external shadings</li> </ul> </li> <li>Projects with no west-facing façade and no east-facing façade are directly awarded 2 points in Strategy B2 and Strategy B3 is not applicable.</li> </ul>

<p>E-3 Natural Ventilation and Air-conditioning (6 points)</p>	<p>E-4 Building Cooling (6 points)</p>	<ul style="list-style-type: none"> <li>▪ The credit has been renamed “Building Cooling”</li> <li>▪ Strategy A: Natural Ventilation For locations where the average maximum temperature during the hottest month is below 30°, a space shall be considered naturally ventilated where the total operable opening area is no less than 5% of the floor area (instead of 4% in NR V2.0). This change has been made according to section 2.2.1 of QCVN 09:2017/BXD.</li> <li>▪ Strategy B: Air-conditioning <ul style="list-style-type: none"> <li>- Strategy B1: Efficiency improvement <ul style="list-style-type: none"> <li>• In line with QCVN 09:2017/BXD where efficiency of non-ducted air-conditioners is assessed against CSPF instead of COP, a new requirement has been added: 1 point for every 20% improvement of CSPF for non-ducted air-conditioners</li> <li>• Tables including minimum COP requirements have been updated according to QCVN 09:2017/BXD and ASHRAE 90.1-2013.</li> <li>• The threshold for points on COP improvement has been reduced from 5% to 3% for chillers with cooling capacity above 1055 kW</li> </ul> </li> <li>- Strategy B2: Variable Controls VAV systems need to be high-performance VAV systems to be considered as compliant.</li> <li>- Strategy B3: Alternative HVAC system types New strategy where a point can be awarded for projects that install a Dedicated Outdoor Air System (DOAS) and/or installing a Radiant Cooling system.</li> </ul> </li> </ul>
<p>E-4 Artificial Lighting (3 points)</p>	<p>E-5 Artificial Lighting (3 points)</p>	<ul style="list-style-type: none"> <li>▪ Strategy A: Lighting Power Density <ul style="list-style-type: none"> <li>- Table E.8 including maximum LPD values for different types of buildings/spaces has been updated according to QCVN 09:2017/BXD</li> <li>- For building types not listed in Table E.8 (such as: manufacturing facilities, museum, gymnasium, etc.), values listed in Table 9.5.1 of ASHRAE 90.1-2007 should be considered or a space-by-space method should be followed.</li> </ul> </li> <li>▪ Strategy B: Lighting Control System The installation of occupancy and daylight sensors (that were required in QCVN 09:2013/BXD) is now contributing towards the achievement of Strategy B requirements.</li> </ul>

E-5 Energy Monitoring and Management (2 points)	E-6 Energy Monitoring and Management (2 points)	<ul style="list-style-type: none"> <li>▪ The following changes have been brought in the strategy Power Monitoring System: <ul style="list-style-type: none"> <li>- Separate floors, separate tenancies, lifts and escalators do not need to be monitored individually</li> <li>- Energy uses should be monitored with permanent meters recording both consumption and demand at intervals of one hour or less</li> <li>- Where applicable, virtual meters can be used instead of actual energy meters</li> </ul> </li> </ul>
E-6 Renewable Energy (2 points)	E-8 Renewable Energy (3 points)	<ul style="list-style-type: none"> <li>▪ The number of points available has been increased from 2 points up to 3 points.</li> <li>▪ Thresholds for 1 and 2 points have been raised from 0.5% and 1.5% to 1% and 2%.</li> </ul>

## Water

NR V2.0 Credit/PR	V3 NC Credit/PR	Description of the changes
W-PR-1 Water Efficient Fixtures	W-PR-1 Water Efficient Fixtures	<ul style="list-style-type: none"> <li>Requirements for the prerequisite have been raised to a minimum of 20% reduction of total building domestic water consumption through fixtures in comparison to baseline.</li> </ul>
W-1 Water Efficient Fixtures (5 points)	W-1 Water Efficient Fixtures (5 points)	<ul style="list-style-type: none"> <li>Requirements for points have all been raised by 5% of reduction of total building domestic water consumption through fixtures in comparison to baseline.</li> <li>Kitchen faucets used exclusively for filling operations should not be considered</li> <li>Flow rates for faucets and showerheads should either be based on pressure of 3 bars or on actual flow rates measured on-site</li> <li>In case faucets with auto control are installed in the building, the baseline water use should be calculated with a 15 seconds duration of use and the design water use should be calculated with a 12 seconds duration of use.</li> </ul>
W-2 Water Efficient Landscaping (2 points)	W-2 Water Efficient Landscaping (2 points)	<ul style="list-style-type: none"> <li>The quality of the water used for irrigation should meet the requirements of QCVN 39:2011/BTNMT National technical regulation on Water Quality for irrigated agriculture.</li> </ul>
W-3 Water Monitoring (2 points)	W-3 Water Metering (1 point)	<ul style="list-style-type: none"> <li>The credit has been renamed “Water Metering”</li> <li>The number of points available has been reduced from 2 points down to 1 point.</li> <li>Requirements on central water monitoring system have been removed</li> <li>The list of major water flows to monitor with permanent water meters (as applicable to the projects) is now provided</li> </ul>
W-4 Sustainable Water Use Solutions (4 points)	W-4 Sustainable Water Solutions (5 points)	<ul style="list-style-type: none"> <li>The number of points available has been increased from 4 points up to 5 points.</li> <li>4 strategies are now included:               <ul style="list-style-type: none"> <li>Strategy A: Water recycling/reuse/harvest (as former credit)</li> <li>Strategy B: Swimming Pool Water Efficiency (requiring projects to implement strategies to reduce water use for swimming pools)</li> <li>Strategy C: Cooling Tower Water Efficiency (requiring projects to design cooling tower systems operating at 6 or more cycles of concentration)</li> <li>Strategy D: Drinking Water (requiring projects to provide a drinking water filtration system)</li> </ul> </li> <li>In Strategy A, a list of standards with minimum quality requirements at the point of delivery for recycled, reused or harvested water has been included.</li> </ul>

## Materials → Materials & Resources

NR V2.0 Credit/PR	V3 NC Credit/PR	Description of the changes
M-1 Materials Reuse (2 points)	/	<ul style="list-style-type: none"> <li>▪ Credit removed from LOTUS NC.</li> </ul>
M-2 Materials with Recycled Content (3 points)	/	<ul style="list-style-type: none"> <li>▪ Credit removed from LOTUS NC.</li> </ul>
/	MR-1 Reduced Concrete Use (2 points)	<ul style="list-style-type: none"> <li>▪ New credit to encourage projects to minimize the use of concrete in buildings.</li> <li>▪ 3 strategies are included: <ul style="list-style-type: none"> <li>- Strategy A: Reduce concrete usage for slabs</li> <li>- Strategy B: Reduce concrete usage for beams and columns</li> <li>- Strategy C: Reduce concrete usage for non-structural systems</li> </ul> </li> <li>▪ For compliance, projects should use solutions such as: pre-stressed elements, structural steel, steel-concrete composite materials, drywall partitions, etc.</li> </ul>
/	MR-2 Sustainable Materials (5 points)	<ul style="list-style-type: none"> <li>▪ New credit to encourage the use of sustainable materials which include reused materials, materials with recycled content, rapidly renewable materials, sustainable timber and materials third party certified based on whole lifecycle analysis.</li> <li>▪ Points are based on the percentage of the total value of the materials in the project that is from sustainable materials</li> <li>▪ The different types of sustainable materials are given different “weights” (referred to as “sustainability value”) to consider in calculations</li> <li>▪ Also, additional features to the sustainable materials (such as: materials manufactured in an ISO 14001 certified facility, environmental product declarations, local materials, etc.) are also considered in calculations through sustainability factors</li> </ul>
M-3 Non-baked Materials (2 points)	MR-3 Non-baked Materials (2 points)	<ul style="list-style-type: none"> <li>▪ In line with circular 13/2017/TT-BXD, thresholds have been raised from 50% and 70% to 80% and 100% for 1 and 2 points.</li> <li>▪ Calculations can now be based either on area (m<sup>2</sup>) or on volume (m<sup>3</sup>)</li> <li>▪ Column cladding should be included in the calculations but glass and laminate partitions should be excluded.</li> </ul>

M-4 Sustainable Timber and Rapidly Renewable Materials (2 points)	/	<ul style="list-style-type: none"> <li>The credit has been removed from LOTUS NC.</li> </ul>
WP-PR-2 Demolition and Construction Waste	MR-PR-1 Demolition and Construction Waste	<ul style="list-style-type: none"> <li>The Prerequisite has been moved from the Waste &amp; Pollution Category</li> </ul>
WP-2 Demolition and Construction Waste (2 points)	MR-4 Demolition and Construction Waste (2 points)	<ul style="list-style-type: none"> <li>The Credit has been moved from the Waste &amp; Pollution Category</li> <li>A new strategy on Reduction of Waste Generation is now included.</li> </ul>
WP-3 Dedicated Recycling Storage Area (2 points)	MR-5 Operation Waste Management (1 point)	<ul style="list-style-type: none"> <li>The Credit has been moved from the Waste &amp; Pollution Category and has been renamed "Operation Waste Management"</li> <li>The number of points available has been reduced from 2 points down to 1 point.</li> <li>The size of the storage area should not be calculated based on the total gross floor area but should be based on the waste generation and frequency of recycling pick-up of the project.</li> <li>Also, short-term storage areas located all over the project with smaller bins allocated for the different types of recyclable waste generated should be provided.</li> </ul>

## Ecology (removed from LOTUS NC)

NR V2.0 Credit/PR	V3 NC Credit/PR	Description of the changes
Eco-PR-1 Environment	/	<ul style="list-style-type: none"> <li>Prerequisite removed from LOTUS NC.</li> </ul>
Eco-1 Construction Environmental Management Plan (2 points)	/	<ul style="list-style-type: none"> <li>Credit removed from LOTUS NC.</li> <li>Part of the scope of the credit is now considered in new credit SE-7 Construction Activity Pollution Control</li> </ul>
Eco-2 Habitat Restoration (3 points)	/	<ul style="list-style-type: none"> <li>Credit removed from LOTUS NC.</li> <li>The scope of the credit is now considered in new credit SE-3 Vegetation</li> </ul>
Eco-3 Development footprint (2 points)	SE-2 Development footprint (2 points)	<ul style="list-style-type: none"> <li>The credit has been moved to Category Site &amp; Environment</li> <li>Another strategy can be followed to increase the open space of the project, which is to make the roof accessible to occupants. Will qualify as open space, the area of the roof that is accessible to all occupants and that is vegetated or provides social / recreational value (seating, swimming pool, playground, etc.)</li> <li>A calculation section is now included.</li> </ul>
Eco-4 Green Roof (2 points)	/	<ul style="list-style-type: none"> <li>Credit removed from LOTUS NC.</li> <li>The scope of the credit is now considered in new credit SE-3 Vegetation</li> </ul>

## Waste & Pollution (removed from LOTUS NC)

NR V2.0 Credit/PR	V3 NC Credit/PR	Description of the changes
WP-PR-1 Wastewater Treatment	/	<ul style="list-style-type: none"> <li>Prerequisite removed from LOTUS NC.</li> </ul>
WP-1 Refrigerants (3 points)	SE-6 Refrigerants (2 points)	<ul style="list-style-type: none"> <li>The Credit has been moved to the Site &amp; Environment Category</li> <li>The number of points available has been reduced from 3 points down to 2 points.</li> </ul>
WP-PR-2 Demolition and Construction Waste	MR-PR-1 Demolition and Construction Waste	<ul style="list-style-type: none"> <li>The Prerequisite has been moved to Category Materials &amp; Resources</li> </ul>
WP-2 Demolition and Construction Waste (2 points)	MR-4 Demolition and Construction Waste (2 points)	<ul style="list-style-type: none"> <li>The Credit has been moved to the Materials &amp; Resources Category</li> <li>A new strategy on Reduction of Waste Generation is now included.</li> </ul>
WP-3 Dedicated Recycling Storage Area (2 points)	MR-5 Operation Waste Management (1 point)	<ul style="list-style-type: none"> <li>The Credit has been moved to the Materials &amp; Resources Category and has been renamed "Operation Waste Management"</li> <li>The number of points available has been reduced from 2 points down to 1 point.</li> <li>The size of the storage area should not be calculated based on the total gross floor area but should be based on the waste generation and frequency of recycling pick-up of the project.</li> <li>Also, short-term storage areas located all over the project with smaller bins allocated for the different types of recyclable waste generated should be provided.</li> </ul>
WP-PR-4 Light Pollution Minimization	/	<ul style="list-style-type: none"> <li>Prerequisite removed from LOTUS NC.</li> </ul>
WP-4 Light Pollution Minimization (1 point)	SE-8 Light Pollution Minimization (1 point)	<ul style="list-style-type: none"> <li>The Credit has been moved to the Site &amp; Environment Category</li> <li>Requirements on automatic lighting shutoff strategies from WP-PR-4 in LOTUS NR V2.0 are now required to achieve 1 point.</li> </ul>

## Health & Comfort

NR V2.0 Credit/PR	V3 NC Credit/PR	Description of the changes
H-PR-1 Indoor Smoking	H-PR-1 Indoor Smoking	<ul style="list-style-type: none"> <li>New requirements added on outdoor designated smoking areas which should be indicated with signs and should be equipped with ashtrays, trash bins and with extinguishers if located near flammable materials.</li> </ul>
H-1 Fresh Air Supply (2 points)	H-1 Ventilation for indoor air quality (3 points)	<ul style="list-style-type: none"> <li>New credit merging former credits H-1 Fresh Air Supply and H-2 CO<sub>2</sub> Monitoring and adding one strategy on Air Filtration:               <ul style="list-style-type: none"> <li>Strategy A: Fresh Air Supply</li> <li>Strategy B: Air Filtration</li> <li>Strategy C: CO<sub>2</sub> based demand-controlled ventilation</li> </ul> </li> <li>Strategy A is similar to former credit H-1 Fresh Air Supply</li> <li>Strategy B is a new strategy requiring projects to install air filters on fresh air intake</li> <li>Strategy C is different from former credit H-2 CO<sub>2</sub> Monitoring as demand-controlled ventilation is now required and the CO<sub>2</sub> concentration at maximum intended occupancy should be kept lower than 900 ppm in all the high density occupied spaces</li> <li>In Strategy A, for naturally-ventilated spaces, the total area of wall or roof openings shall be at least 5% of the naturally ventilated spaces' floor area, instead of 4% in MFR Pilot.</li> </ul>
H-2 CO <sub>2</sub> Monitoring (2 points)		
/	H-PR-2 Low-Emission Products	<ul style="list-style-type: none"> <li>New prerequisite requiring all projects to install only low-VOC interior paints and coatings.</li> </ul>
H-3 Hazardous Materials (3 points)	H-2 Low Emission Products (2 points)	<ul style="list-style-type: none"> <li>The number of points available has been reduced from 3 points down to 2 points.</li> <li>The credit has been renamed Low-Emission Products and is now split in 4 strategies:               <ul style="list-style-type: none"> <li>Strategy A: Adhesives and sealants</li> <li>Strategy B: Floorings</li> <li>Strategy C: Composite wood</li> <li>Strategy D: Ceilings, partitions and insulation</li> </ul> </li> <li>Criteria to define which products are considered as low-VOC and as low-formaldehyde have been broadened.</li> </ul>
/	H-3 Biophilic Design (1 point)	<ul style="list-style-type: none"> <li>New credit requiring projects to provide building occupants access to natural environment</li> </ul>

H-4 Daylighting (3 points)	H-5 Daylighting (3 points)	<ul style="list-style-type: none"> <li>▪ The credit has been split in 2 options: <ul style="list-style-type: none"> <li>- Option A: Daylight factor (with only 2 points available)</li> <li>- Option B: Daylight autonomy (3 points available)</li> </ul> </li> <li>▪ Option A is similar to previous credit, while Option B considers spatial daylight autonomy and annual sun exposure.</li> <li>▪ Spaces that are not compatible with the provision of daylighting (such as: auditoriums and conference rooms dedicated to video conferencing) can now be exempted from this credit.</li> </ul>
H-5 External Views (2 points)	H-6 External Views (2 points)	<ul style="list-style-type: none"> <li>▪ Spaces that are not compatible with the provision of external views (such as: auditoriums, conference rooms dedicated to video conferencing and gymnasiums) can now be exempted from this credit.</li> <li>▪ Strategy A: <ul style="list-style-type: none"> <li>- Thresholds for 1 and 2 points have been raised from 65% and 80% to 70% and 90%.</li> <li>- Some mistakes in Figure H.2 and Table H.4 have been fixed.</li> </ul> </li> <li>▪ Strategy B: Explanations on how an area can qualify as an area with quality views have been updated to provide more details and clarity.</li> </ul>
H-6 Thermal Comfort (2 points)	H-7 Thermal Comfort (2 points)	<ul style="list-style-type: none"> <li>▪ Air-conditioned spaces and mixed-mode ventilated spaces: Consistent indoor conditions to maintain should be a dry-bulb temperature set between 24° to 26°C (instead of an operative temperature set between 24° to 26°C and a relative humidity set below 70% as required in LOTUS NR V2.0)</li> <li>▪ Non-air-conditioned spaces: Installation of high-volume low-speed (HVLS) fans is included as a strategy to increase indoor air velocity in method 2 of compliance for non-air-conditioned spaces</li> </ul>
/	H-8 Acoustic Comfort (1 point)	<ul style="list-style-type: none"> <li>▪ New credit on acoustic comfort with 2 options available: <ul style="list-style-type: none"> <li>- Option A: Internal Noise Levels</li> <li>- Option B: Noise absorption and insulation</li> </ul> </li> <li>▪ Option A requires projects to limit internal noise to recommended levels in all occupied spaces</li> <li>▪ Option B requires projects to achieve recommended reverberation times and comply with the requirements of TCXDVN 277:2002 on airborne and impact sound insulation</li> </ul>

## Adaptation & Mitigation → Site & Environment

NR V2.0 Credit/PR	V3 NC Credit/PR	Description of the changes
A-PR-1 Flooding Resistance	/	<ul style="list-style-type: none"> <li>Prerequisite removed from LOTUS NC.</li> </ul>
A-1 Flooding Resistance (1 point)	SE-1 Flooding Resistance (1 point)	<ul style="list-style-type: none"> <li>Requirements on flood risk report from A-PR-1 in LOTUS NR V2.0 are now required to achieve 1 point in the credit.</li> </ul>
Eco-3 Development footprint (2 points)	SE-2 Development footprint (2 points)	<ul style="list-style-type: none"> <li>The credit has been moved from the Ecology Category</li> <li>Another strategy can be followed to increase the open space of the project, which is to make the roof accessible to occupants. Will qualify as open space, the area of the roof that is accessible to all occupants and that is vegetated or provides social / recreational value (seating, swimming pool, playground, etc.)</li> <li>A calculation section is now included.</li> </ul>
/	SE-3 Vegetation (4 points)	<ul style="list-style-type: none"> <li>New credit including 2 strategies aiming to encourage the introduction of more sustainable greenery into the built environment. <ul style="list-style-type: none"> <li>Strategy A: Greenery Index</li> <li>Strategy B: Landscape management plan</li> </ul> </li> <li>Strategy A. requires projects to achieve high values of Greenery Index which is calculated considering the amount and the sustainability of greenery installed on-site.</li> <li>Strategy B is similar to former strategy B in credit Eco-2 Habitat Restoration</li> </ul>
A-2 Storm Water Runoff (2 points)	SE-4 Stormwater Management (2 points)	<ul style="list-style-type: none"> <li>The credit has been renamed “Stormwater Management”</li> <li>The credit has been split in 2 options: <ul style="list-style-type: none"> <li>Option A: Site Perviousness</li> <li>Option B: Stormwater Control</li> </ul> </li> <li>Option A is the same as in NR V2.0 but is only applicable to projects that have a non-building area + green roof area that makes up more than 20% of the total site area or makes up more than 200 m<sup>2</sup></li> <li>Option B requires projects to use stormwater control practices to help capture and/or infiltrate stormwater in order to decrease volume of on-site stormwater runoff from the 2-year storm event.</li> </ul>
A-3 Heat Island Effect (2 points)	SE-5 Heat Island Effect (2 points)	<ul style="list-style-type: none"> <li>In calculations, areas covered with skylights should be deducted from the roof area.</li> </ul>

WP-1 Refrigerants (3 points)	SE-6 Refrigerants (2 points)	<ul style="list-style-type: none"> <li>The credit has been moved from the Waste &amp; Pollution Category</li> <li>The number of points available has been reduced from 3 points down to 2 points.</li> </ul>
/	SE-7 Construction Activity Pollution Control (1 point)	<ul style="list-style-type: none"> <li>New credit requiring projects to implement strategies to limit pollution arising from construction activities.</li> </ul>
WP-4 Light Pollution Minimization (1 point)	SE-8 Light Pollution Minimization (1 point)	<ul style="list-style-type: none"> <li>The credit has been moved from the Waste &amp; Pollution Category</li> <li>Requirements on automatic lighting shutoff strategies from WP-PR-4 in LOTUS NR V2.0 are now required to achieve 1 point.</li> </ul>
A-PR-2 Green Transportation	/	<ul style="list-style-type: none"> <li>Prerequisite removed from LOTUS NC.</li> </ul>
A-4 Green Transportation (3 points)	SE-9 Green Transportation (3 points)	<ul style="list-style-type: none"> <li>Requirements in Strategy B have been modified. For 1 point, the building should be located within a 500 m walking distance from 2 different public transportation routes</li> <li>Strategy C: Private Buses in LOTUS NR V2.0 has been removed</li> <li>Requirements on collective transportation information for occupants from A-PR-2 in LOTUS NR V2.0 are now required to achieve 1 point in Strategy B: Public Transportation.</li> </ul>
CY-1 Community Connectivity (2 points)	SE-10 Community Connectivity (1 point)	<ul style="list-style-type: none"> <li>The credit has been moved from the Community Category</li> <li>The number of points available has been reduced from 2 points down to 1 point</li> <li>The following exception is included in the requirements: Exception: Due to their location in industrial parks, if bicycles are made available for at least 5% of the staff to use (5 bicycles for each 100 staff), factories are allowed to consider a 1km walking distance from the building to the basic services.</li> </ul>
CY-2 Public Space (2 points)	SE-11 Outdoor Communal Space and Facilities (2 points)	<ul style="list-style-type: none"> <li>The credit has been moved from the Community Category and has been renamed “Outdoor Communal Space and Facilities”</li> <li>Public spaces should bring some social and recreational value to be compliant.</li> </ul>
A-5 Local Materials (2 points)	/	<ul style="list-style-type: none"> <li>Credit removed from LOTUS NC.</li> <li>The use of local materials is now encouraged in Credit MR-2 Sustainable Materials.</li> </ul>

## Community (removed from LOTUS NC)

NR V2.0 Credit/PR	V3 NC Credit/PR	Description of the changes
CY-1 Community Connectivity (2 points)	SE-10 Community Connectivity (1 point)	<ul style="list-style-type: none"> <li>The credit has been moved to the Site &amp; Environment Category</li> <li>The number of points available has been reduced from 2 points down to 1 point</li> <li>The following exception is included in the requirements: Exception: Due to their location in industrial parks, if bicycles are made available for at least 5% of the staff to use (5 bicycles for each 100 staff), factories are allowed to consider a 1km walking distance from the building to the basic services.</li> </ul>
CY-2 Public Space (2 points)	SE-11 Outdoor Communal Space and Facilities (2 points)	<ul style="list-style-type: none"> <li>The credit has been moved to the Site &amp; Environment Category</li> <li>Public spaces should bring some social and recreational value to be compliant.</li> </ul>
CY-3 Access for People with Disabilities (2 points)	/	<ul style="list-style-type: none"> <li>Credit removed from LOTUS NC.</li> </ul>

## Management

NR V2.0 Credit/PR	V3 NC Credit/PR	Description of the changes
Man-PR-1 Design Stage	/	<ul style="list-style-type: none"> <li>Prerequisite removed from LOTUS NC.</li> </ul>
Man-1 Design Stage (1 point)	/	<ul style="list-style-type: none"> <li>Credit removed from LOTUS NC.</li> </ul>
/	Man-1 Effective Design Process (1 point)	<ul style="list-style-type: none"> <li>New credit including 3 strategies to improve the design process:               <ul style="list-style-type: none"> <li>Strategy A: Integrated Design Process</li> <li>Strategy B: Building Information Modeling</li> <li>Strategy C: Cost-effective Design</li> </ul> </li> </ul>
Man-PR-2 Construction Stage	/	<ul style="list-style-type: none"> <li>Prerequisite removed from LOTUS NC.</li> </ul>
Man-2 Construction Stage (2 points)	Man-2 Construction Stage (1 point)	<ul style="list-style-type: none"> <li>The number of points available has been reduced from 2 points down to 1 point.</li> </ul>
Man-3 Commissioning (4 points)	Man-3 Commissioning (4 points)	<ul style="list-style-type: none"> <li>The credit now includes 3 different steps:               <ul style="list-style-type: none"> <li>For 2 points, the project should conduct commissioning activities to ensure that building systems are well-installed and are performing as intended</li> <li>For 3 points, the project should also ensure a proper handover to the owner O&amp;M staff and end users</li> <li>For 4 points, the project should also conduct commissioning activities during the operations of the building</li> </ul> </li> <li>The list of systems to be commissioned, “Hydraulic systems” has been replaced with: “Plumbing systems (including the domestic hot water systems and pumping systems)”</li> </ul>
Man-PR-3 Maintenance	Man-PR-3 Maintenance	<ul style="list-style-type: none"> <li>No changes</li> </ul>
Man-4 Maintenance (2 points)	Man-4 Maintenance (1 point)	<ul style="list-style-type: none"> <li>The number of points available has been reduced from 2 points down to 1 point.</li> </ul>

Man-PR-4 Green Management Practice	Man-PR-4 Green Awareness	<ul style="list-style-type: none"> <li>Prerequisite renamed into “Green Awareness”</li> </ul>
Man-5 Green Management Practice (1 point)	/	<ul style="list-style-type: none"> <li>Credit removed from LOTUS NC.</li> </ul>
/	Man-5 Green Awareness (1 point)	<ul style="list-style-type: none"> <li>New credit requiring projects to implement at least 2 strategies to raise awareness on sustainability</li> </ul>

## Innovation → Exceptional Performance

NR V2.0 Credit/PR	V3 NC Credit/PR	Description of the changes
Inn-1 Exceptional Performance Enhancement	EP-1 Enhanced Performance	<ul style="list-style-type: none"> <li>Points for enhanced performance can be awarded in a new situation: when, in a credit with different strategies available, the building performance reaches a higher number of points than what is available in the credit.</li> <li>2 tables now include the list of credits for which points for enhanced performance are available</li> </ul>
Inn-2 Innovative techniques / initiatives	EP-2 Innovative Solutions	<ul style="list-style-type: none"> <li>Previous criterion has been replaced with: "Implement innovative solutions that are outside the scope of LOTUS"</li> </ul>

## 2.4 Changes in the glossary

The following modifications have been brought to the Glossary:

The Glossary has been reorganized under different sections:

- LOTUS specific terms
- Submissions terms
- Master Plan terms
- Technical Terms

The following definitions have been updated:

- Gross Floor Area (GFA)
- Net occupied area
- Occupied spaces

The following definitions have been added:

- Conditioned space
- CPSF (Cooling Performance Seasonal Factor)
- Full-time occupants
- Green roof
- LPD (Lighting Power Density)
- Mixed-use building
- R-value
- SCOP<sub>c</sub> (Seasonal Coefficient Of Performance for cooling)
- SRI (Solar Reflectance Index)
- SHGC (Solar Heat Gain Coefficient)
- Thermal Zone
- Unmet load hour
- VAV (variable air volume)
- VRV/VRF (variable refrigerant volume/flow)
- VSD (variable-speed drive)

### 3. List of changes from LOTUS MFR Pilot

Changes brought from the LOTUS Multi-family Residential Pilot Technical Manual are listed in the following tables.

#### 3.1 General changes

Item	Modifications
Eligibility	Core & Shell projects are eligible for assessment under LOTUS NC.
Residential and Non-Residential projects	This new section describes which types of project are considered Residential and which types are considered as Non-Residential (NR). Also, though LOTUS NC can apply for both Residential and NR projects, not the same requirements are set in all the credits.
Categories	<ul style="list-style-type: none"> <li>▪ The credits have been reorganized in 7 categories instead of 10 in LOTUS MFR Pilot, with the following new categories:               <ul style="list-style-type: none"> <li>- Materials &amp; Resources: Materials + credits: Demolition and Construction Waste and Operation Waste Management</li> <li>- Site &amp; Environment: Ecology + Adaptation &amp; Mitigation + Community + credits: Refrigerants and Light Pollution Minimization</li> </ul> </li> <li>▪ The Innovation category has been renamed Exceptional Performance.</li> </ul>
Prerequisites	<ul style="list-style-type: none"> <li>▪ A large number of prerequisites have been removed:               <ul style="list-style-type: none"> <li>- WP-PR-1, CY-PR-1, Man-PR-2: regulations are well-enforced and new construction projects will comply with the requirements that were included in these prerequisites.</li> <li>- Eco-PR-1, A-PR-1: these prerequisites required time and efforts from project teams for no real green benefit beyond making reports/documentation</li> <li>- A-PR-2, WP-PR-3, Man-PR-1: requirements that were included in these prerequisites are now considered in credits for points.</li> </ul> </li> <li>▪ A new prerequisite has been added: H-PR-2 Low-Emission Products requiring projects to install only low-VOC paints and coatings.</li> </ul>
Removed Credits	<p>The following credits have been removed from LOTUS MFR Pilot:</p> <ul style="list-style-type: none"> <li>▪ M-1 Materials Reuse</li> <li>▪ M-2 Materials with Recycled Content</li> <li>▪ M-4 Sustainable Timber and Rapidly Renewable Materials</li> <li>▪ Eco-1 Construction Environmental Management Plan</li> <li>▪ Eco-2 Habitat Restoration</li> <li>▪ Eco-4 Green Roof</li> <li>▪ A-5 Local Materials</li> <li>▪ CY-3 Access for People with Disabilities</li> <li>▪ Man-5 Green Management</li> </ul>

New Credits	<p>The following credits have been added in LOTUS V3 NC:</p> <ul style="list-style-type: none"> <li>▪ E-1 Passive Design</li> <li>▪ MR-1 Reduced Concrete Use</li> <li>▪ MR-2 Sustainable Materials</li> <li>▪ H-3 Biophilic Design</li> <li>▪ SE-3 Vegetation</li> <li>▪ SE-7 Construction Activity Pollution Control</li> <li>▪ SE-11 Outdoor Communal Space and Facilities</li> <li>▪ Man-1 Effective Design Process</li> </ul>
Weighting	<p>The total number of point available in LOTUS V3 NC is of 100 points + 8 bonus points for Innovation whereas this total was of 110 points + 8 bonus points for Innovation in LOTUS MFR Pilot.</p>
Codes and Standards Referenced in LOTUS	<p>The list of codes and standards has been updated.</p>
Special project situations	<p>This new section has been added to describe specific requirements for special project situations:</p> <ul style="list-style-type: none"> <li>▪ Core &amp; Shell projects</li> <li>▪ Mixed-Use Residential/NR buildings</li> <li>▪ Design-Build projects</li> <li>▪ Projects with incomplete spaces</li> <li>▪ Project sites with multiple buildings</li> </ul>

## 3.2 Changes in the certification process

Section	Modifications
LOTUS NC Certification Process	LOTUS Full Certification is now valid for 5 years provided that energy and water consumption data is submitted on a yearly basis.
LOTUS Provisional Certification Stage	<p>At Provisional Certification stage, the following credits are not available as it is not possible for projects to provide satisfying evidence of compliance in the design stage:</p> <ul style="list-style-type: none"> <li>• MR-2 Sustainable Materials</li> <li>• MR-4 Demolition and Construction Waste</li> <li>• Man-3 Commissioning (for strategies to ensure a proper handover to the building users and to conduct commissioning activities during the operations of the building)</li> <li>• Man-4 Maintenance</li> <li>• Man-5 Green Awareness</li> </ul> <p>As such, projects only need to achieve a total of 35 points to obtain Provisional Certification.</p>
Provisional Certificate	<p>This section has been clarified to explain that:</p> <ul style="list-style-type: none"> <li>▪ No certification level is awarded to projects at Provisional Certification stage, only an indication that the project is on-track to achieve an anticipated level of certification at Full Certification stage is given.</li> <li>▪ A Provisional Certificate can be issued by the VGBC on demand by the Applicant.</li> </ul>
Appeal Procedure	A description of the appeal procedure available for projects to submit further evidence after the 2 rounds of submissions have been included.
Site inspections	Site inspections may now be conducted on projects in complement of the Full Certification submissions.
LOTUS NC Submissions	The whole section has been re-written to improve clarity.

### 3.3 Changes in categories

	Prerequisite or Credit removed from LOTUS NC
	New prerequisite or credit created for LOTUS NC
	Prerequisite or Credit moved to a new category

## Energy

MFR Pilot Credit/PR	V3 NC Credit/PR	Description of the changes
E-PR-1 Passive Design	E-PR-2 Passive Design	<ul style="list-style-type: none"> <li>No changes.</li> </ul>
E-PR-2 Total Building Energy Use	E-PR-1 Minimum Energy Efficiency Performance	<ul style="list-style-type: none"> <li>This is now a stand-alone prerequisite renamed as “Minimum Energy Efficiency Performance”.</li> <li>Requirements: Two changes have been made in line with QCVN 09:2017/BXD:               <ul style="list-style-type: none"> <li>Sub-metering is not required anymore</li> <li>Requirements on SHGC values are set for both vertical glazing and skylights</li> </ul> </li> </ul>
/	E-1 Passive Design (1 point)	<ul style="list-style-type: none"> <li>New credit awarding one point for conducting a Passive Design Analysis that includes thermal and daylight simulations at early design stage</li> </ul>
E-PR-3 & E-1 Total Building Energy Use (PR + 14 points)	E-PR-3 & E-2 Total Building Energy Use (PR + 14 points)	<ul style="list-style-type: none"> <li>LOTUS Guidelines – Energy Performance Calculation Method have been updated in line with QCVN 09:2017/BXD</li> </ul>
E-2 Building Envelope (4 points)	E-3 Building Envelope (3 points)	<ul style="list-style-type: none"> <li>The number of points available has been reduced from 4 points down to 3 points.</li> <li>In Option A, points are now awarded for every 15% reduction of building’s average OTTV compared to QCVN 09:2017/BXD requirements</li> <li>Requirements in Option B have been split in 4 strategies for more clarity:               <ul style="list-style-type: none"> <li>Strategy B1: Solar radiation</li> <li>Strategy B2: West facing façade</li> <li>Strategy B3: WWR on West and East facing facades</li> <li>Strategy B4: Effective external shadings</li> </ul> </li> <li>Projects with no west-facing façade and no east-facing façade are directly awarded 2 points in Strategy B2 and Strategy B3 is not applicable.</li> </ul>

E-3 Natural Ventilation and Air-conditioning (6 points)	E-4 Building Cooling (6 points)	<ul style="list-style-type: none"> <li>▪ The credit has been renamed “Building Cooling”</li> <li>▪ Strategy B: Air-conditioning <ul style="list-style-type: none"> <li>- Strategy B1: Efficiency improvement <ul style="list-style-type: none"> <li>• In line with QCVN 09:2017/BXD where efficiency of non-ducted air-conditioners is assessed against CSPF instead of COP, a new requirement has been added: 1 point for every 20% improvement of CSPF for non-ducted air-conditioners</li> <li>• Tables including minimum COP requirements have been updated according to QCVN 09:2017/BXD and ASHRAE 90.1-2013.</li> <li>• The threshold for points on COP improvement has been reduced from 5% to 3% for chillers with cooling capacity above 1055 kW</li> </ul> </li> <li>- Strategy B2: Variable Controls <ul style="list-style-type: none"> <li>VAV systems need to be high-performance VAV systems to be considered as compliant.</li> </ul> </li> <li>- Strategy B3: Alternative HVAC system types <ul style="list-style-type: none"> <li>New strategy where a point can be awarded for projects that install a Dedicated Outdoor Air System (DOAS) and/or installing a Radiant Cooling system.</li> </ul> </li> </ul> </li> </ul>
E-4 Artificial Lighting (3 points)	E-5 Artificial Lighting (3 points)	<ul style="list-style-type: none"> <li>▪ No changes as the LPD value required for residential buildings in QCVN 09:2017/BXD is the same as the value required in QCVN 09:2013/BXD.</li> </ul>
E-5 Energy Monitors (1 point)	E-6 Energy Monitoring and Management (1 point)	<ul style="list-style-type: none"> <li>▪ If a centralized air-conditioning system is used to provide cooling to the dwelling units, energy meters should be installed to monitor the energy consumption for cooling.</li> </ul>
E-6 Lifts (1 point)	E-7 Lifts (1 point)	<ul style="list-style-type: none"> <li>▪ No changes</li> </ul>
E-7 Renewable Energy (2 points)	E-8 Renewable Energy (3 points)	<ul style="list-style-type: none"> <li>▪ The number of points available has been increased from 2 points up to 3 points.</li> <li>▪ Requirements are now only based on the percentage of the total energy used in the building that is produced from renewable sources (requirements based on the power output of the renewable electricity generation system have been removed).</li> <li>▪ Thresholds for 1 and 2 points have been raised from 0.5% and 1.5% to 1% and 2% of the total energy used in the building.</li> </ul>

## Water

MFR Pilot Credit/PR	V3 NC Credit/PR	Description of the changes
W-PR-1 Water Efficient Fixtures	W-PR-1 Water Efficient Fixtures	<ul style="list-style-type: none"> <li>Requirements for the prerequisite have been raised to a minimum of 20% reduction of total building domestic water consumption through fixtures in comparison to baseline.</li> </ul>
W-1 Water Efficient Fixtures (5 points)	W-1 Water Efficient Fixtures (5 points)	<ul style="list-style-type: none"> <li>Requirements for points have all been raised by 5% of reduction of total building domestic water consumption through fixtures in comparison to baseline.</li> <li>Kitchen faucets used exclusively for filling operations should not be considered</li> <li>Flow rates for faucets and showerheads should either be based on pressure of 3 bars or on actual flow rates measured on-site</li> <li>In case faucets with auto control are installed in the building, the baseline water use should be calculated with a 15 seconds duration of use and the design water use should be calculated with a 12 seconds duration of use.</li> </ul>
W-2 Water Efficient Landscaping (2 points)	W-2 Water Efficient Landscaping (2 points)	<ul style="list-style-type: none"> <li>The quality of the water used for irrigation should meet the requirements of QCVN 39:2011/BTNMT National technical regulation on Water Quality for irrigated agriculture.</li> </ul>
W-3 Water Monitoring (1 point)	W-3 Water Metering (1 point)	<ul style="list-style-type: none"> <li>The credit has been renamed “Water Metering”</li> <li>The list of major water flows to monitor with permanent water meters (as applicable to the projects) is now provided</li> <li>Residential projects need to meter water flows in common areas only. Water consumption in the dwelling-units doesn’t have to be monitored</li> </ul>
W-4 Sustainable Water Use Solutions (5 points)	W-4 Sustainable Water Solutions (5 points)	<ul style="list-style-type: none"> <li>4 strategies are now included:               <ul style="list-style-type: none"> <li>Strategy A: Water recycling/reuse/harvest (same as former Strategy A)</li> <li>Strategy B: Swimming Pool Water Efficiency (same as former Strategy B)</li> <li>Strategy C: Cooling Tower Water Efficiency (requiring projects to design cooling tower systems operating at 6 or more cycles of concentration)</li> <li>Strategy D: Drinking Water (requiring projects to provide a drinking water filtration system)</li> </ul> </li> <li>In Strategy A, a list of standards with minimum quality requirements at the point of delivery for recycled, reused or harvested water has been included.</li> </ul>

## Materials → Materials & Resources

MFR Pilot Credit/PR	V3 NC Credit/PR	Description of the changes
M-1 Materials Reuse (2 points)	/	<ul style="list-style-type: none"> <li>▪ Credit removed from LOTUS NC.</li> </ul>
M-2 Materials with Recycled Content (3 points)	/	<ul style="list-style-type: none"> <li>▪ Credit removed from LOTUS NC.</li> </ul>
/	M-1 Reduced Concrete Use (2 points)	<ul style="list-style-type: none"> <li>▪ New credit to encourage projects to minimize the use of concrete in buildings.</li> <li>▪ 3 strategies are included: <ul style="list-style-type: none"> <li>- Strategy A: Reduce concrete usage for slabs</li> <li>- Strategy B: Reduce concrete usage for beams and columns</li> <li>- Strategy C: Reduce concrete usage for non-structural systems</li> </ul> </li> <li>▪ For compliance, projects should use solutions such as: pre-stressed elements, structural steel, steel-concrete composite materials, drywall partitions, etc.</li> </ul>
/	M-2 Sustainable Materials (5 points)	<ul style="list-style-type: none"> <li>▪ New credit to encourage the use of sustainable materials which include reused materials, materials with recycled content, rapidly renewable materials, sustainable timber and materials third party certified based on whole lifecycle analysis.</li> <li>▪ Points are based on the percentage of the total value of the materials in the project that is from sustainable materials</li> <li>▪ The different types of sustainable materials are given different “weights” (referred to as “sustainability value”) to consider in calculations</li> <li>▪ Also, additional features to the sustainable materials (such as: materials manufactured in an ISO 14001 certified facility, environmental product declarations, local materials, etc.) are also considered in calculations through sustainability factors</li> </ul>
M-3 Non-baked Materials (2 points)	M-3 Non-baked Materials (2 points)	<ul style="list-style-type: none"> <li>▪ In line with circular 13/2017/TT-BXD, thresholds have been raised from 50% and 70% to 80% and 100% for 1 and 2 points.</li> <li>▪ Calculations can now be based either on area (m<sup>2</sup>) or on volume (m<sup>3</sup>)</li> <li>▪ Column cladding should be included in the calculations but glass and laminate partitions should be excluded</li> </ul>

M-4 Sustainable Timber and Rapidly Renewable Materials (2 points)	/	<ul style="list-style-type: none"> <li>The credit has been removed from LOTUS NC.</li> </ul>
WP-PR-2 Demolition and Construction Waste	MR-PR-1 Demolition and Construction Waste	<ul style="list-style-type: none"> <li>The Prerequisite has been moved from the Waste &amp; Pollution Category</li> </ul>
WP-2 Demolition and Construction Waste (2 points)	MR-4 Demolition and Construction Waste (2 points)	<ul style="list-style-type: none"> <li>The Credit has been moved from the Waste &amp; Pollution Category</li> <li>A new strategy on Reduction of Waste Generation is now included.</li> </ul>
WP-3 Waste Management (3 points)	MR-5 Operation Waste Management (2 points)	<ul style="list-style-type: none"> <li>The Credit has been moved from the Waste &amp; Pollution Category and has been renamed “Operation Waste Management”</li> <li>The number of points available has been reduced from 3 points down to 2 points.</li> <li>Strategy B1: Management and sorting of recyclables <ul style="list-style-type: none"> <li>Storage place in dwelling-units is not required anymore</li> <li>The size of the storage area should not be calculated based on the total gross floor area but should be based on the number of residents and frequency of recycling pick-up.</li> </ul> </li> <li>Strategy B2: Management and sorting of organic wastes <ul style="list-style-type: none"> <li>Storage place in dwelling-units is not required anymore</li> <li>Projects can hire a company to compost the organic wastes</li> </ul> </li> <li>Strategy B3: Management and sorting of bulky wastes has been removed but it is still required to provide a space sufficiently sized for bulky wastes (considering the intended frequency of collection) in the common waste storage area.</li> </ul>

## Ecology (removed from LOTUS NC)

MFR Pilot Credit/PR	V3 NC Credit/PR	Description of the changes
Eco-PR-1 Environment	/	<ul style="list-style-type: none"> <li>Prerequisite removed from LOTUS NC.</li> </ul>
Eco-1 Construction Environmental Management Plan (2 points)	/	<ul style="list-style-type: none"> <li>Credit removed from LOTUS NC.</li> <li>Part of the scope of the credit is now considered in new credit SE-7 Construction Activity Pollution Control</li> </ul>
Eco-2 Habitat Restoration (3 points)	/	<ul style="list-style-type: none"> <li>Credit removed from LOTUS NC.</li> <li>The scope of the credit is now considered in new credit SE-3 Vegetation</li> </ul>
Eco-3 Development footprint (2 points)	SE-2 Development footprint (2 points)	<ul style="list-style-type: none"> <li>The credit has been moved to Category Site &amp; Environment</li> <li>Another strategy can be followed to increase the open space of the project, which is to make the roof accessible to occupants. Will qualify as open space, the area of the roof that is accessible to all occupants and that is vegetated or provides social / recreational value (seating, swimming pool, playground, etc.)</li> <li>A calculation section is now included.</li> </ul>
Eco-4 Green Roof (2 points)	/	<ul style="list-style-type: none"> <li>Credit removed from LOTUS NC.</li> <li>The scope of the credit is now considered in new credit SE-3 Vegetation</li> </ul>

## Waste & Pollution (removed from LOTUS NC)

MFR Pilot Credit/PR	V3 NC Credit/PR	Description of the changes
WP-PR-1 Wastewater Treatment	/	<ul style="list-style-type: none"> <li>Prerequisite removed from LOTUS NC.</li> </ul>
WP-1 Refrigerants (1 point)	SE-6 Refrigerants (1 point)	<ul style="list-style-type: none"> <li>The Credit has been moved to Category Site &amp; Environment</li> </ul>
WP-PR-2 Demolition and Construction Waste	MR-PR-1 Demolition and Construction Waste	<ul style="list-style-type: none"> <li>The Prerequisite has been moved to Category Materials &amp; Resources</li> </ul>
WP-2 Demolition and Construction Waste (2 points)	MR-4 Demolition and Construction Waste (2 points)	<ul style="list-style-type: none"> <li>The Credit has been moved to Category Materials &amp; Resources</li> <li>A new strategy on Reduction of Waste Generation is now included.</li> </ul>
WP-3 Waste Management (3 points)	MR-5 Operation Waste Management (2 points)	<ul style="list-style-type: none"> <li>The Credit has been moved to Category Materials &amp; Resources and has been renamed “Operation Waste Management”</li> <li>The number of points available has been reduced from 3 points down to 2 points.</li> <li>Strategy B1: Management and sorting of recyclables                             <ul style="list-style-type: none"> <li>Storage place in dwelling-units is not required anymore</li> <li>The size of the storage area should not be calculated based on the total gross floor area but should be based on the number of residents and frequency of recycling pick-up.</li> </ul> </li> <li>Strategy B2: Management and sorting of organic wastes                             <ul style="list-style-type: none"> <li>Storage place in dwelling-units is not required anymore</li> <li>Projects can hire a company to compost the organic wastes</li> </ul> </li> <li>Strategy B3: Management and sorting of bulky wastes has been removed but it is still required to provide a space sufficiently sized for bulky wastes (considering the intended frequency of collection) in the common waste storage area.</li> </ul>
WP-PR-4 Light Pollution Minimization	/	<ul style="list-style-type: none"> <li>Prerequisite removed from LOTUS NC.</li> </ul>
WP-4 Light Pollution Minimization (1 point)	SE-8 Light Pollution Minimization (1 point)	<ul style="list-style-type: none"> <li>The Credit has been moved to Category Site &amp; Environment</li> <li>Requirements on automatic lighting shutoff strategies from WP-PR-4 in LOTUS MFR Pilot are now required to achieve 1 point.</li> </ul>

## Health & Comfort

MFR Pilot Credit/PR	V3 NC Credit/PR	Description of the changes
H-PR-1 Indoor Smoking	H-PR-1 Indoor Smoking	<ul style="list-style-type: none"> <li>New requirements added on outdoor designated smoking areas which should be indicated with signs and should be equipped with ashtrays, trash bins and with extinguishers if located near flammable materials.</li> </ul>
H-1 Fresh Air Supply (2 points)	H-1 Ventilation for indoor air quality (3 points)	<ul style="list-style-type: none"> <li>New credit merging former credits H-1 Fresh Air Supply and H-2 Ventilation in Wet Areas and adding one strategy on Air Filtration:               <ul style="list-style-type: none"> <li>Strategy A: Fresh Air Supply</li> <li>Strategy B: Air Filtration</li> <li>Strategy D: Ventilation in Wet Areas</li> </ul> </li> <li>Strategy A is similar to former credit H-1 Fresh Air Supply</li> <li>Strategy B is a new strategy requiring projects to install air filters on fresh air intake</li> <li>Strategy D is similar to former credit H-2 Ventilation in Wet Areas</li> <li>In Strategy A, for naturally-ventilated spaces, the total area of wall or roof openings shall be at least 5% of the naturally ventilated spaces' floor area, instead of 4% in MFR Pilot.</li> </ul>
H-2 Ventilation in Wet Areas (2 points)		
/	H-PR-2 Low-Emission Products	<ul style="list-style-type: none"> <li>New prerequisite requiring all projects to install only low-VOC interior paints and coatings.</li> </ul>
H-3 Low-VOC Emission Products (4 points)	H-2 Low-Emission Products (3 points)	<ul style="list-style-type: none"> <li>The number of points available has been reduced from 4 points down to 3 points.</li> <li>The credit has been renamed Low-Emission Products and is now split in 4 strategies:               <ul style="list-style-type: none"> <li>Strategy A: Adhesives and sealants</li> <li>Strategy B: Floorings</li> <li>Strategy C: Composite wood</li> <li>Strategy D: Ceilings, partitions and insulation</li> </ul> </li> <li>Criteria to define which products are considered as low-VOC and as low-formaldehyde have been broadened.</li> </ul>
/	H-3 Biophilic Design (1 point)	<ul style="list-style-type: none"> <li>New credit requiring projects to provide building occupants access to natural environment</li> </ul>

H-4 Daylighting (3 points)	H-4 Daylighting (3 points)	<ul style="list-style-type: none"> <li>▪ The credit has been split in 2 options: <ul style="list-style-type: none"> <li>- Option A: Daylight factor (with only 2 points available)</li> <li>- Option B: Daylight autonomy (3 points available)</li> </ul> </li> <li>▪ Option A is similar to previous credit, while Option B considers spatial daylight autonomy and annual sun exposure.</li> <li>▪ Spaces that are not compatible with the provision of daylighting (such as: auditoriums and conference rooms dedicated to video conferencing) can be exempted from this credit.</li> </ul>
H-5 Thermal Comfort (2 points)	H-6 Thermal Comfort (2 points)	<ul style="list-style-type: none"> <li>▪ Air-conditioned spaces and mixed-mode ventilated spaces: Consistent indoor conditions to maintain should be a dry-bulb temperature set between 24° to 26°C (instead of an operative temperature set between 24° to 26°C and a relative humidity set below 70% as required in LOTUS MFR Pilot)</li> <li>▪ Non-air-conditioned spaces: Installation of high-volume low-speed (HVLS) fans is included as a strategy to increase indoor air velocity in method 2 of compliance for non-air-conditioned spaces</li> </ul>
H-6 Noise Insulation (1 point)	H-7 Acoustic Comfort (2 points)	<ul style="list-style-type: none"> <li>▪ The number of points available has been increased from 1 point up to 2 points.</li> <li>▪ The same requirements have been kept for 1 point</li> <li>▪ For 2 points, projects should exceed requirements of TCXDVN 277:2002 to achieve: <ul style="list-style-type: none"> <li>- Airborne Sound Insulation = CKtc + 5 dB</li> <li>- Impact Sound Insulation = CVtc – 5 dB</li> </ul> </li> </ul>

## Adaptation & Mitigation → Site & Environment

MFR Pilot Credit/PR	V3 NC Credit/PR	Description of the changes
A-PR-1 Flooding Resistance	/	<ul style="list-style-type: none"> <li>Prerequisite removed from LOTUS NC.</li> </ul>
A-1 Flooding Resistance (1 point)	SE-1 Flooding Resistance (1 point)	<ul style="list-style-type: none"> <li>Requirements on flood risk report from A-PR-1 in LOTUS MFR Pilot are now required to achieve 1 point in the credit.</li> </ul>
Eco-3 Development footprint (2 points)	SE-2 Development footprint (2 points)	<ul style="list-style-type: none"> <li>The credit has been moved from the Ecology Category</li> <li>Another strategy can be followed to increase the open space of the project, which is to make the roof accessible to occupants. Will qualify as open space, the area of the roof that is accessible to all occupants and that is vegetated or provides social / recreational value (seating, swimming pool, playground, etc.)</li> <li>A calculation section is now included.</li> </ul>
/	SE-3 Vegetation (4 points)	<ul style="list-style-type: none"> <li>New credit including 2 strategies aiming to encourage the introduction of more greenery into the built environment. <ul style="list-style-type: none"> <li>Strategy A: Greenery Index</li> <li>Strategy B: Landscape management plan</li> </ul> </li> <li>Strategy A. requires projects to achieve high values of Greenery Index which is calculated considering the amount and the sustainability of greenery installed on-site.</li> <li>Strategy B is similar to former strategy B in credit Eco-2 Habitat Restoration</li> </ul>
A-2 Storm Water Runoff (2 points)	SE-4 Stormwater Management (2 points)	<ul style="list-style-type: none"> <li>The credit has been renamed “Stormwater Management”</li> <li>The credit has been split in 2 options: <ul style="list-style-type: none"> <li>Option A: Site Perviousness</li> <li>Option B: Stormwater Control</li> </ul> </li> <li>Option A is the same as in MFR Pilot but is only applicable to projects that have a non-building area + green roof area that makes up more than 20% of the total site area or makes up more than 200 m<sup>2</sup></li> <li>Option B requires projects to use stormwater control practices to help capture and/or infiltrate stormwater in order to decrease volume of on-site stormwater runoff from the 2-year storm event.</li> </ul>
A-3 Heat Island Effect (2 points)	SE-5 Heat Island Effect (2 points)	<ul style="list-style-type: none"> <li>In calculations, areas covered with skylights should be deducted from the roof area.</li> </ul>

WP-1 Refrigerants (1 point)	SE-6 Refrigerants (1 point)	<ul style="list-style-type: none"> <li>The credit has been moved from the Waste &amp; Pollution Category</li> </ul>
/	SE-7 Construction Activity Pollution Control (1 point)	<ul style="list-style-type: none"> <li>New credit requiring projects to implement strategies to limit pollution arising from construction activities.</li> </ul>
WP-4 Light Pollution Minimization (1 point)	SE-8 Light Pollution Minimization (1 point)	<ul style="list-style-type: none"> <li>The credit has been moved from the Waste &amp; Pollution Category</li> <li>Requirements on automatic lighting shutoff strategies from WP-PR-4 in LOTUS MFR Pilot are now required to achieve 1 point.</li> </ul>
A-PR-2 Green Transportation	/	<ul style="list-style-type: none"> <li>Prerequisite removed from LOTUS NC.</li> </ul>
A-4 Green Transportation (3 points)	SE-9 Green Transportation (3 points)	<ul style="list-style-type: none"> <li>Requirements in Strategy B have been modified. For 1 point, the building should be located within a 500 m walking distance from 2 different public transportation routes</li> <li>Strategy C: Private Buses in LOTUS MFR Pilot has been removed</li> <li>Requirements on collective transportation information for occupants from A-PR-2 in LOTUS MFR Pilot are now required to achieve 1 point in Strategy B: Public Transportation.</li> </ul>
CY-1 Community Connectivity (2 points)	SE-10 Community Connectivity (1 point)	<ul style="list-style-type: none"> <li>The credit has been moved from the Community Category</li> <li>The number of points available has been reduced from 2 points down to 1 point</li> </ul>
CY-2 Public Space (2 points)	SE-11 Outdoor Communal Space and Facilities (2 points)	<ul style="list-style-type: none"> <li>New Credit merging former credits CY-2 Public Space and CY-3 Outdoor Communal Facilities from the Community Category and including them as 2 different strategies: <ul style="list-style-type: none"> <li>Strategy A: Public space</li> <li>Strategy B: Outdoor Communal Facilities</li> </ul> </li> <li>In Strategy A, public spaces should have social and recreational value to be compliant.</li> </ul>
CY-3 Outdoor Communal Facilities (2 points)		
A-5 Local Materials (2 points)	/	<ul style="list-style-type: none"> <li>Credit removed from LOTUS NC.</li> <li>The use of local materials is now encouraged in Credit MR-2 Sustainable Materials.</li> </ul>

## Community (removed from LOTUS NC)

MFR Pilot Credit/PR	V3 NC Credit/PR	Description of the changes
CY-PR-1 Access for People with Disabilities	/	<ul style="list-style-type: none"> <li>Prerequisite removed from LOTUS NC.</li> </ul>
CY-1 Community Connectivity (2 points)	SE-10 Community Connectivity (1 point)	<ul style="list-style-type: none"> <li>The credit has been moved to the Site &amp; Environment Category</li> <li>The number of points available has been reduced from 2 points down to 1 point.</li> </ul>
CY-2 Public Space (2 points)	SE-11 Outdoor Communal Space and Facilities (2 points)	<ul style="list-style-type: none"> <li>New Credit moved to the Site &amp; Environment Category</li> <li>This credit is merging former credits CY-2 Public Space and CY-3 Outdoor Communal Facilities and include them as 2 different strategies:                             <ul style="list-style-type: none"> <li>Strategy A: Public space</li> <li>Strategy B: Outdoor Communal Facilities</li> </ul> </li> <li>In Strategy A, public spaces should have social and recreational value to be compliant.</li> </ul>
CY-3 Outdoor Communal Facilities (2 points)		

## Management

MFR Pilot Credit/PR	V3 NC Credit/PR	Description of the changes
Man-PR-1 Design Stage	/	<ul style="list-style-type: none"> <li>Prerequisite removed from LOTUS NC.</li> </ul>
Man-1 Design Stage (1 point)	/	<ul style="list-style-type: none"> <li>Credit removed from LOTUS NC.</li> </ul>
/	Man-1 Effective Design Process (1 point)	<ul style="list-style-type: none"> <li>New credit including 3 strategies to improve the design process:               <ul style="list-style-type: none"> <li>Strategy A: Integrated Design Process</li> <li>Strategy B: Building Information Modeling</li> <li>Strategy C: Cost-effective Design</li> </ul> </li> </ul>
Man-PR-2 Construction Stage	/	<ul style="list-style-type: none"> <li>Prerequisite removed from LOTUS NC.</li> </ul>
Man-2 Construction Stage (2 points)	Man-2 Construction Stage (1 point)	<ul style="list-style-type: none"> <li>The number of points available has been reduced from 2 points down to 1 point.</li> </ul>
Man-3 Commissioning (4 points)	Man-3 Commissioning (4 points)	<ul style="list-style-type: none"> <li>The credit now includes 3 different steps:               <ul style="list-style-type: none"> <li>For 2 points, the project should conduct commissioning activities to ensure that building systems are well-installed and are performing as intended</li> <li>For 3 points, the project should also ensure a proper handover to the owner O&amp;M staff and end users</li> <li>For 4 points, the project should also conduct commissioning activities during the operations of the building</li> </ul> </li> <li>The list of systems to be commissioned, “Hydraulic systems” has been replaced with: “Plumbing systems (including the domestic hot water systems and pumping systems)”</li> </ul>
Man-PR-3 Maintenance	Man-PR-3 Maintenance	<ul style="list-style-type: none"> <li>No changes</li> </ul>
Man-4 Maintenance (2 points)	Man-4 Maintenance (1 point)	<ul style="list-style-type: none"> <li>The number of points available has been reduced from 2 points down to 1 point.</li> </ul>

Man-PR-4 Green Management	Man-PR-4 Green Awareness	<ul style="list-style-type: none"> <li>Prerequisite renamed into “Green Awareness”</li> </ul>
Man-5 Green Management Practice (1 point)	/	<ul style="list-style-type: none"> <li>Credit removed from LOTUS NC.</li> </ul>
Man-6 Green Awareness (2 points)	Man-5 Green Awareness (1 point)	<ul style="list-style-type: none"> <li>The number of points available has been reduced from 2 points down to 1 point.</li> <li>Now, at least 2 strategies to raise awareness on sustainability should be implemented for projects to be awarded 1 point.</li> </ul>

## Innovation → Exceptional Performance

MFR Pilot Credit/PR	V3 NC Credit/PR	Description of the changes
Inn-1 Exceptional Performance Enhancement	EP-1 Enhanced Performance	<ul style="list-style-type: none"> <li>Points for enhanced performance can be awarded in a new situation: when, in a credit with different strategies available, the building performance reaches a higher number of points than what is available in the credit.</li> <li>2 tables now include the list of credits for which points for enhanced performance are available</li> </ul>
Inn-2 Innovative techniques / initiatives	EP-2 Innovative Solutions	<ul style="list-style-type: none"> <li>Previous criterion has been replaced with: "Implement innovative solutions that are outside the scope of LOTUS"</li> </ul>

### 3.4 Changes in the glossary

The following modifications have been brought to the Glossary:

The Glossary has been reorganized under different sections:

- LOTUS specific terms
- Submissions terms
- Master Plan terms
- Technical Terms

The following definitions have been updated:

- Gross Floor Area (GFA)
- Net occupied area
- Occupied spaces

The following definitions have been added:

- Conditioned space
- CPSF (Cooling Performance Seasonal Factor)
- Full-time occupants
- Green roof
- LPD (Lighting Power Density)
- Mixed-use building
- R-value
- SCOP<sub>c</sub> (Seasonal Coefficient Of Performance for cooling)
- SRI (Solar Reflectance Index)
- SHGC (Solar Heat Gain Coefficient)
- Thermal Zone
- Unmet load hour
- VAV (variable air volume)
- VRV/VRF (variable refrigerant volume/flow)
- VSD (variable-speed drive)